3 FLOOD RISK ASSESSMENT

Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

This section describes the Risk Assessment process for the development of the City of Wilson Floodplain Management Plan. It describes how the City met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

This flood risk assessment covers the entire geographical area of the City of Wilson, NC. The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

1) Identify Hazards;

2) Profile Hazard Events;

3) Inventory Assets; and

4) Estimate Losses.

Data collected through this process has been incorporated into the following sections of this chapter:

Section 3.1: **Hazard Identification** identifies the natural flood hazards that threaten the planning area.

Section 3.2: **Hazard Profiles** discusses the threat to the planning area and describes previous occurrences of flood hazard events and the likelihood of future occurrences.

Section 3.3: Vulnerability Assessment assesses the planning area's exposure to natural flood hazards; considering assets at risk, critical facilities, and future development trends.

Section 3.4: Capability Assessment inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability.

3.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

The City of Wilson's FMPC conducted a hazard identification study to determine the natural flood hazards that threaten the planning area.

3.1.1 Results and Methodology

Using existing flood hazard data and input gained through planning meetings, the FMPC agreed upon a list of natural flood hazards that could affect the City. Flood hazard data from the Wilson County Multi-Jurisdictional Hazard Mitigation Plan, the North Carolina Division of Emergency Management (NCEM), FEMA, the National Climatic Data Center (NCDC), the Spatial Hazards Events and Losses Database for the United States (SHELDUS™) and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

The flood hazards identified in Table 3.1 were evaluated as part of this plan. Only the more significant hazards with the potential to cause significant human and/or monetary losses in the future have a more detailed hazard profile and are analyzed further in Section 3.3 Vulnerability Assessment.

Table 3.1 Flood Hazard Summary

Hazard	Frequency of Occurrence	Spatial Extent	Potential Magnitude	Significance
Flood: 100-/500-year	Occasional	Significant	Limited	Medium
Flood: Stormwater/Localized Flooding	Highly Likely	Limited	Limited	Medium
Stream Bank Erosion	Unlikely	Limited	Negligible	Low
Dam/Levee Failure	Unlikely	Limited	Negligible	Low

Guidelines:
Frequency of Occurrence:
Highly Likely: Nearly 100% probability within the next year.
Likely: Between 10 and 100% probability within the next year.
Occasional: Between 1 and 10% probability within the next year.
Unlikely: Less than 1% probability within the next year.

Potential Magnitude:
Catastrophic: More than 50% of the area affected.
Critical: 25 to 50% of the area affected.
Limited: 10 to 25% of the area affected.
Negligible: Less than 10% of the area affected.

Spatial Extent:
Limited: Less than 10% of planning area.
Significant: 10-50% of planning area.
Extensive: 50-100% of planning area.

Significance:
Low
Medium
High

Source: Amec Foster Wheeler Data Collection Guide

3.1.2 Disaster Declaration History

The FMPC researched past events that resulted in a federal and/or state emergency or disaster declaration in the planning area for Wilson in order to identify known flood hazards. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county and state resources are insufficient and that the situation is beyond their recovery capabilities. When the local

government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Table 3.2 displays flood related major disaster declarations that included Wilson County as a designated area. This table reflects the vulnerability and historic patterns of flood hazards for the County.

Table 3.2 FEMA Major Disaster Declarations including Wilson County, 1960 - 2014

Hazard Type	Disaster #	Date
Severe Storms, Tornadoes and Flooding	DR-1969	April 19, 2011
Hurricane Irene	DR-4019	August 31, 2011
Hurricane Isabel	DR-1490	September 18, 2003
Hurricane Floyd & Irene	DR-1292	September 16, 1999
Hurricane Fran	DR-1134	September 6, 1996

Source: FEMA (https://www.fema.gov/disasters)

3.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The hazards identified in Section 3.1 Hazard Identification, are profiled individually in this section. Information provided by members of the FMPC has been integrated into this section with information from other data sources.

Each hazard is profiled in the following format:

Hazard/Problem Description

This section provides a description of the hazard followed by details specific to the Wilson planning area. Where available, this section also includes information on the hazard extent, seasonal patterns, speed of onset/duration, magnitude and any secondary effects.

Past Occurrences

This section contains information on historical events, including the extent or location of the hazard within or near the Wilson planning area.

Frequency/Likelihood of Future Occurrence

This section gauges the likelihood of future occurrences based on past events and existing data. The frequency is determined by dividing the number of events observed by the number of years on record and multiplying by 100. This provides the percent chance of the event happening in any given year (e.g. 10 hurricanes or tropical storms over a 30-year period equates to a 33 percent chance of experiencing a hurricane or tropical storm in any given year). The likelihood of future occurrences is categorized into one of the classifications as follows:

- ***Highly Likely*** – Near 100 percent chance of occurrence within the next year
- ***Likely*** – Between 10 and 100 percent chance of occurrence within the next year (recurrence interval of 10 years or less)
- ***Occasional*** – Between 1 and 10 percent chance of occurrence within the next year (recurrence interval of 11 to 100 years)
- ***Unlikely*** – Less than 1 percent chance or occurrence within the next 100 years (recurrence interval of greater than every 100 years)

Those hazards determined to be of high or medium significance were characterized as priority hazards that required further evaluation in Section 3.3 Vulnerability Assessment. Significance was determined by frequency of the hazard and resulting damage, including deaths/injuries and property, crop and economic damage. Hazards occurring infrequently or having little to no impact on the Wilson planning area were determined to be of low significance and not considered a priority hazard. These criteria allowed the FMPC to prioritize hazards of greatest significance and focus resources where they are most needed.

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains an archive of destructive storm or weather data and information which includes local, intense and damaging events. NCDC

receives storm data from the National Weather Service (NWS). The NWS receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others. This database contains 34 flood related severe weather events that occurred in Wilson County between January 1950 and November 2014. Table 3.3 summarizes these events.

Table 3.3 NCDC Severe Weather Reports for Wilson County, January 1950 – November 2014

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Flash Flood	24	$0	$0	0	0
Flood	1	$0	$0	0	0
Heavy Rain	2	$0	$0	0	0
Hurricane/Typhoon	6	$1.2M	$50M	0	0
Tropical Storm	1	$0	$0	0	0
Total:	**34**	**$1.2M**	**$50M**	**0**	**0**

Source: National Climatic Data Center Storm Events Database, September 2014
Note: Losses reflect totals for all impacted areas within Chatham County.

The FMPC supplemented NCDC data with data from SHELDUS™ (Spatial Hazard Events and Losses Database for the United States). SHELDUS™ is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities for the period 1960-present. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC). Weather-related loss information originates from the National Climatic Data Center's Storm Data. Losses information for geological hazards comes from the National Geophysical Data Center. As needed, SHELDUS™ supplements with additional sources such as U.S. Geological Survey and others.

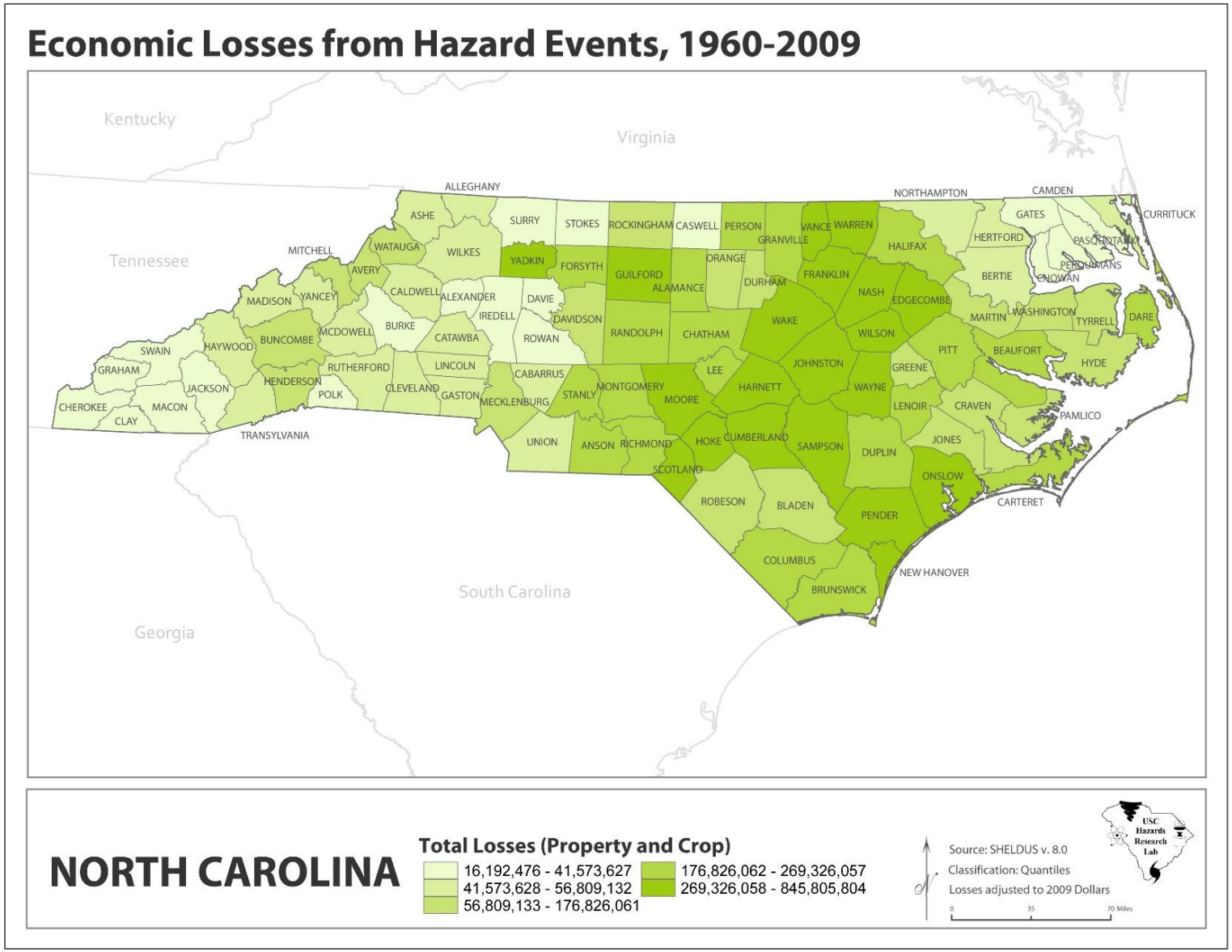
With the release of SHELDUS 13.1, the database includes every loss causing and/or deadly event between 1960 through present. SHELDUS™ reports losses in current and real dollars. Losses for multi-county events are distributed equally across counties with the exception of fatalities and injuries. If details on the location of fatalities and injuries are provided in the original data, SHELDUS™ will reflect it. SHELDUS™ contains information on 76 flood related severe weather events that occurred in Wilson County, NC between January 1960 and March 2015. Table 3.4 provides a summary of these events.

Table 3.4 SHELDUS Severe Weather Reports for Wilson County, January 1960 – March 2015

Type	# of Events	Property Loss	Crop Loss	Deaths	Injuries
Coastal	2	$9,036	$803,622	0	0
Flooding	6	$450,682	$65,495	1	0
Hurricane/Tropical Storm	10	$276,902,878	$71,979,524	1	1
Severe Storm/Thunder Storm	58	$943,535	$2,353,772	3	3
Total:	**76**	**$278,306,131**	**$75,202,413**	**5**	**4**

Source: Hazards & Vulnerability Research Institute (2014). The Spatial Hazard Events and Losses Database for the United States, Version 13.1 [Online Database]. Columbia, SC: University of South Carolina. Available from http://www.sheldus.org
Note: Losses have been adjusted for inflation to 2013 dollars.

The figure below reflects economic losses from hazard events contained within the SHELDUS data set for the entire State of North Carolina from 1960 - 2009. Wilson County ranks among one of the highest tiers in the State for total property and crop losses.



Source: SHELDUS v8.0

Figure 3.1 – North Carolina Economic Losses from Hazard Events, 1960-2009

The following sections provide profiles of the natural flood hazards that the FMPC identified in Table 3.1 Flood Hazard Summary.

3.2.1 Flood: 100-/500-year

Hazard/Problem Description

Flooding is defined by the rising and overflowing of a body of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties. Flooding can result from an overflow of inland waters or an unusual accumulation or runoff of surface waters from any source.

Certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.

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

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

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

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

Sources and Types of Flooding

Flooding within the City of Wilson can be attributed to two sources: 1) flash flooding resulting from heavy rainfall that overburdens the drainage system within the community; and 2) riverine flooding resulting from heavy and prolonged rainfall over a given watershed which causes the capacity of the main channel to be exceeded. According to FEMA’s Flood Insurance Study (FIS) for Wilson County, NC revised April 16, 2013, low lying areas of the County flood periodically. Flooding on the larger streams results primarily from hurricanes, tropical storms and other major weather fronts, while flooding on the smaller streams is due mainly to localized thunderstorms.

Riverine Flooding: The City of Wilson has numerous streams and tributaries running throughout its jurisdiction that are susceptible to overflowing their banks during and following excessive precipitation events. While flash flooding caused by surface water runoff is not uncommon in Wilson, riverine flood events (such as the "100-year flood") will cause significantly more damage and economic disruption for the area. Wilson's floodplains have been studied and mapped by FEMA.

Flash or Rapid Flooding: Flash flooding is the result of heavy, localized rainfall, possibly from slow-moving intense thunderstorms that cause small streams and drainage systems to overflow. Flash flood hazards caused by surface water runoff are most common in urbanized cities, where greater population density generally increases the amount of impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated. Flooding can occur when the capacity of the stormwater system is exceeded or if conveyance is obstructed by debris, sediment and other materials that limit the volume of drainage.

Flooding and Floodplains

The area adjacent to a channel is the floodplain, as shown in Figure 3.2. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

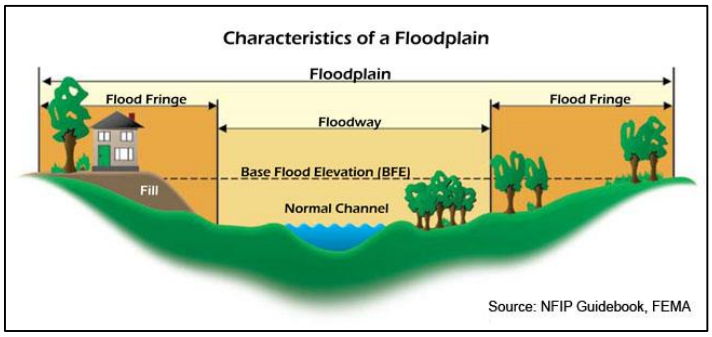


Figure 3.2 - Characteristics of a Floodplain

In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the NFIP. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 100-year flood, which is the minimum standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available

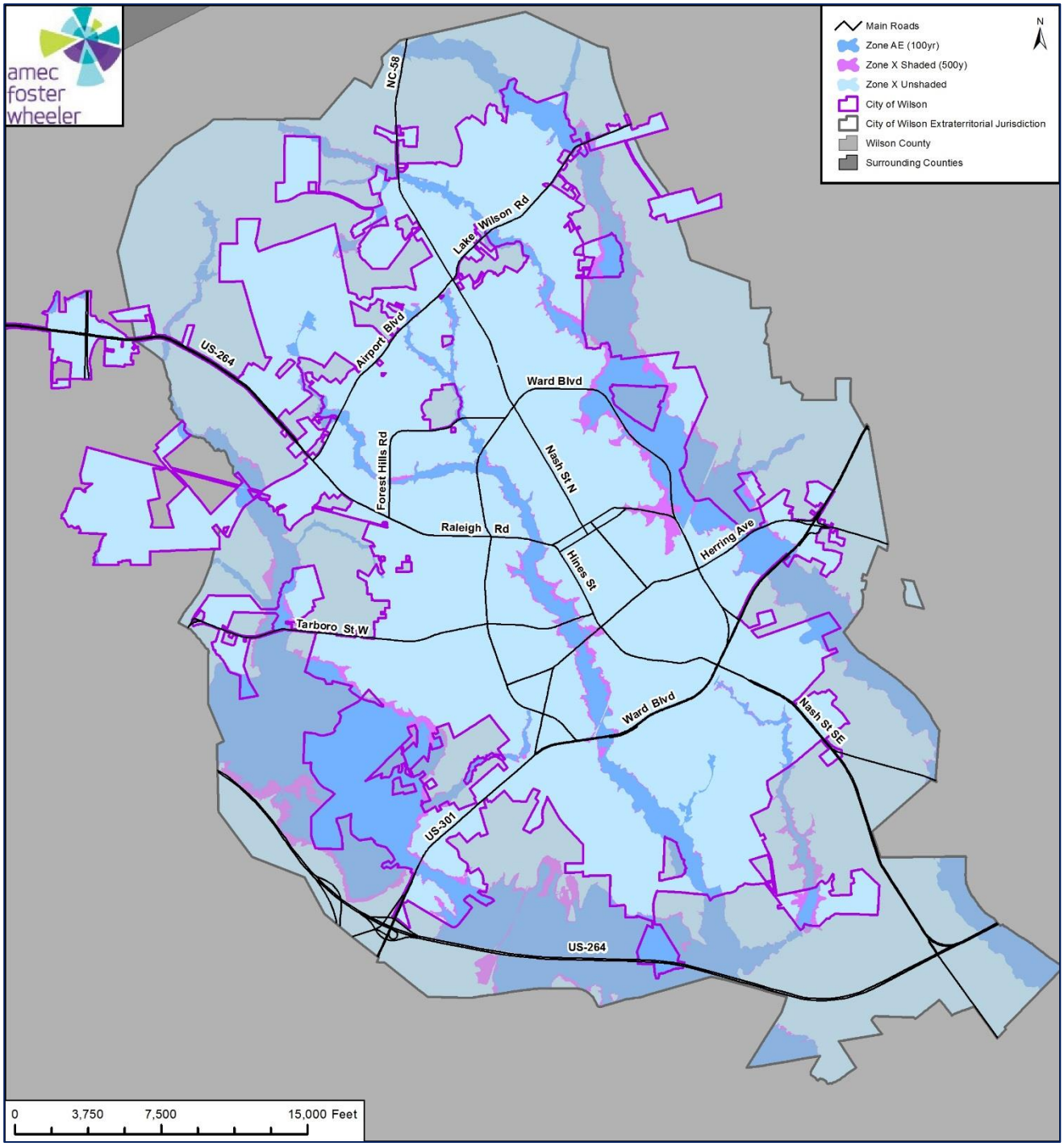
within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways often the most predictable and manageable hazard.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 100-year flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within Wilson using the most current FIS and associated FIRMs developed by FEMA for Wilson County effective on April 16, 2013. Table 3.5 summarizes the flood insurance zones identified by the DFIRMs.

Table 3.5 – Mapped Flood Insurance Zones within City of Wilson, NC

Zone	Description
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects.
0.2% Annual Chance (shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. Zone X (unshaded) is used on new and revised maps in place of Zone C.

Figure 3.3 reflects the mapped flood insurance zones for the City of Wilson. Approximately 15% of the City of Wilson political area falls within the 100-yr floodplain. A summary of acreage by flood zone is as follows: Zone AE (2,830 Acres); Zone X 500-yr (522 Acres); and Zone X Unshaded (15,284 Acres).



Source: FEMA DFIRM, 4/16/13

Figure 3.3 - Wilson DFIRM Flood Zones

The NFIP utilizes the 100-year flood as a basis for floodplain management. The FIS defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100 year period (recurrence intervals). Or considered another way, properties within a 100-year flood zone have a one percent probability of being equaled or exceeded during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are typically insured against flooding.

Past Occurrences

Table 3.6 shows detail for flood events reported by the NCDC since 1950 for Wilson County. Table 3.7 shows detail for flood events reported by SHELDUS from 1960 through present.

Table 3.6 - NCDC Flooding in Wilson County – January 1950 to November 2014

Location	Date	Event Type	Injuries /Deaths	Property Damage	Crop Damage	Source
Countywide	7/24/1997	Flash Flood	0/0	$0	$0	Not available
Lucama	1/27/1998	Flash Flood	0/0	$0	$0	Not available
Countywide	9/15/1999	Flash Flood	0/0	$0	$0	Emergency Manager
Countywide	9/21/1999	Flash Flood	0/0	$0	$0	Emergency Manager
Countywide	9/27/1999	Flash Flood	0/0	$0	$0	Gov't Official
Countywide	9/28/1999	Flash Flood	0/0	$0	$0	Gov't Official
Countywide	9/28/1999	Flash Flood	0/0	$0	$0	Gov't Official
Countywide	9/28/1999	Flash Flood	0/0	$0	$0	Gov't Official
Countywide	10/17/1999	Flash Flood	0/0	$0	$0	Gov't Official
Countywide	6/16/2001	Flash Flood	0/0	$0	$0	Trained Spotter
Wilson	7/5/2002	Flash Flood	0/0	$0	$0	Broadcast Media
Wilson	8/26/2002	Flash Flood	0/0	$0	$0	Law Enforcement
Wilson	8/31/2002	Flash Flood	0/0	$0	$0	Law Enforcement
Wilson	5/22/2004	Flash Flood	0/0	$0	$0	Law Enforcement
Northwest portion	6/14/2006	Flash Flood	0/0	$0	$0	Law Enforcement
Wilson	7/25/2006	Flash Flood	0/0	$0	$0	Newspaper
Evansdale	8/26/2007	Flash Flood	0/0	$0	$0	Dept of Highways
Wilson	6/16/2009	Flash Flood	0/0	$0	$0	Emergency Manager
Lucama	7/25/2009	Flash Flood	0/0	$0	$0	Emergency Manager
Wilson Airport	5/17/2010	Flash Flood	0/0	$0	$0	Law Enforcement
Lucama	9/30/2010	Flash Flood	0/0	$0	$0	Law Enforcement
Buckhorn Crossroads	9/30/2010	Flash Flood	0/0	$0	$0	Law Enforcement
Wilson	6/7/2013	Flash Flood	0/0	$0	$0	Trained Spotter
Lamm	4/29/2014	Flash Flood	0/0	$0	$0	Emergency Manager
Wilson (Zone)	1/27/1998	Flood	0/0	$0	$0	Not available
Wilson	2/3/1998	Heavy Rain	0/0	$0	$0	Not available
Wilson	2/16/1998	Heavy Rain	0/0	$0	$0	Not available
Wilson (Zone)	7/12/1996	Hurricane	0/0	$0	$0	Not available
Wilson (Zone)	9/5/1996	Hurricane	0/0	$0	$0	Not available
Wilson (Zone)	8/27/1998	Hurricane	0/0	$0	$50M	Official NWS Obs.
Wilson (Zone)	9/4/1999	Hurricane	0/0	$0	$0	Gov't Official
Wilson (Zone)	9/15/1999	Hurricane	0/0	$0	$0	Gov't Official
Wilson (Zone)	9/18/2003	Hurricane	0/0	$1.2M	$0	Emergency Manager
Wilson (Zone)	9/1/2006	Tropical Storm	0/0	$0	$0	Emergency Manager

Source: NCDC, March 2015

Table 3.7 - SHELDUS Flooding in Wilson County – January 1960 to March 2015

Date		Hazard Type	Injuries/Fatalities	Crop Damage	Property Damage
Month	Year				
June	1962	Coastal	0/0	$803,522	$8,035
October	1970	Coastal	0/0	$100	$1,001
February	1966	Flooding	0/0	$240	$13,182
March	1966	Flooding	0/0	$180	$17,975
September	1979	Flooding	0/1	$39,131	$391,314
March	1983	Flooding	0/0	$0	$812
August	1992	Flooding	0/0	$25,944	$25,944
March	1994	Flooding	0/0	$0	$1,455
October	1964	Hurricane/Tropical Storm	0/0	$3,757	$3,757
September	1971	Hurricane/Tropical Storm	0/0	$252,282	$2,523
September	1979	Hurricane/Tropical Storm	0/0	$16,044	$160,439
August	1981	Hurricane/Tropical Storm	0/0	$400,435	$0
July	1985	Hurricane/Tropical Storm	1/1	$0	$49,962
July	1996	Hurricane/Tropical Storm	1/1	$22,964,106	$13,887,345
September	1996	Hurricane/Tropical Storm	0/0	$19,158,042	$126,768,421
August	1998	Hurricane/Tropical Storm	0/0	$6,496,291	$0
September	1999	Hurricane/Tropical Storm	0/0	$22,688,567	$135,319,483
September	2003	Hurricane/Tropical Storm	0/0	$0	$710,947
April	1961	Severe Storm/Thunder Storm	0/0	$0	$130
January	1962	Severe Storm/Thunder Storm	0/0	$0	$201
June	1962	Severe Storm/Thunder Storm	0/0	$803,522	$8,035
November	1962	Severe Storm/Thunder Storm	0/0	$0	$2,504
May	1963	Severe Storm/Thunder Storm	0/0	$1,252	$1,252
July	1963	Severe Storm/Thunder Storm	0/0	$49,847	$35,573
November	1963	Severe Storm/Thunder Storm	0/0	$0	$1,269
August	1964	Severe Storm/Thunder Storm	0/0	$3,757	$3,757
September	1964	Severe Storm/Thunder Storm	0/0	$375,737	$375,737
June	1965	Severe Storm/Thunder Storm	0/0	$4,350	$4,350
July	1965	Severe Storm/Thunder Storm	0/0	$52,081	$7,092
August	1965	Severe Storm/Thunder Storm	0/0	$2,054	$2,054
February	1966	Severe Storm/Thunder Storm	0/0	$240	$13,182
March	1966	Severe Storm/Thunder Storm	0/0	$180	$17,975
June	1967	Severe Storm/Thunder Storm	0/0	$8,303	$8,303
August	1967	Severe Storm/Thunder Storm	0/0	$0	$4,359
March	1968	Severe Storm/Thunder Storm	0/0	$0	$1,674
June	1968	Severe Storm/Thunder Storm	0/0	$1,992	$1,992
August	1968	Severe Storm/Thunder Storm	0/0	$12,087	$37,190
November	1968	Severe Storm/Thunder Storm	0/0	$1,116	$11,157
July	1969	Severe Storm/Thunder Storm	0/0	$2,366	$2,366
August	1969	Severe Storm/Thunder Storm	0/0	$317	$317
July	1970	Severe Storm/Thunder Storm	0/0	$751	$751
October	1970	Severe Storm/Thunder Storm	0/0	$100	$1,001
January	1971	Severe Storm/Thunder Storm	0/0	$0	$5,752
March	1971	Severe Storm/Thunder Storm	0/0	$96	$959
April	1971	Severe Storm/Thunder Storm	0/0	$0	$96
May	1971	Severe Storm/Thunder Storm	0/0	$7,015	$7,015
June	1971	Severe Storm/Thunder Storm	0/0	$5,531	$5,531
July	1971	Severe Storm/Thunder Storm	1/0	$1,754	$1,987
September	1971	Severe Storm/Thunder Storm	0/0	$252,354	$3,242

Date		Hazard Type	Injuries/Fatalities	Crop Damage	Property Damage
Month	Year				
October	1971	Severe Storm/Thunder Storm	0/0	$764,035	$14,758
January	1972	Severe Storm/Thunder Storm	0/0	$0	$697
August	1972	Severe Storm/Thunder Storm	0/0	$0	$2,322
December	1972	Severe Storm/Thunder Storm	0/0	$0	$680
February	1973	Severe Storm/Thunder Storm	0/0	$2,623	$26,234
March	1975	Severe Storm/Thunder Storm	0/0	$0	$108
August	1981	Severe Storm/Thunder Storm	0/0	$313	$3,125
June	1986	Severe Storm/Thunder Storm	0/0	$0	$531
July	1986	Severe Storm/Thunder Storm	0/0	$0	$53,138
May	1987	Severe Storm/Thunder Storm	0/0	$0	$6,836
January	1988	Severe Storm/Thunder Storm	0/0	$0	$62,317
February	1989	Severe Storm/Thunder Storm	0/0	$0	$4,697
January	1992	Severe Storm/Thunder Storm	1/0	$0	$415
January	1993	Severe Storm/Thunder Storm	0/0	$0	$403
July	1993	Severe Storm/Thunder Storm	0/0	$0	$8,061
April	1996	Severe Storm/Thunder Storm	0/0	$0	$7,424
May	1996	Severe Storm/Thunder Storm	0/0	$0	$97,993
May	1997	Severe Storm/Thunder Storm	2/0	$0	$36,286
August	1999	Severe Storm/Thunder Storm	0/0	$0	$3,496
June	2010	Severe Storm/Thunder Storm	0/0	$0	$2,671
March	2011	Severe Storm/Thunder Storm	0/0	$0	$4,143
July	2011	Severe Storm/Thunder Storm	0/0	$0	$5,178
August	2011	Severe Storm/Thunder Storm	0/0	$0	$16,311
May	2012	Severe Storm/Thunder Storm	0/0	$0	$1,268
July	2012	Severe Storm/Thunder Storm	0/0	$0	$9,639
June	2013	Severe Storm/Thunder Storm	0/0	$0	$7,500
August	2013	Severe Storm/Thunder Storm	0/0	$0	$500

Source: SHELDUS v13.1, March 2015

The following provides details on select flood events recorded in the NCDC database and from FEMA's FIS for Wilson County, NC. These scenarios represent the types of flood events that can be expected in the future in the City of Wilson.

September 5, 1996 – The copious amount of rainfall associated with Hurricane Fran produced many severe flash and river floods.

January 27, 1998 - Flooding caused many rural county roads to become impassable and many had to be closed. In addition to the rapid rises in streams and creeks, river flooding was well underway due to the excessive rainfall for the month of January. Continuous storm systems brought heavy precipitation to central North Carolina during the month, with a major storm ending the month with flooding and river flooding.

Flash flood on July 25, 2006 closes U.S. Hwy 301. (AP Photo/The Wilson Times)

August 27, 1998 - Torrential rains and strong gusty winds accompanied Hurricane Bonnie through the night on the 27th and into the daylight hours on the 28th. There were numerous reports of trees being blown down across Sampson, Wayne, Johnston, Wilson, Harnett, and Cumberland counties. About ten thousand people lost power in these areas sometime during

the storm. Tobacco losses were extensive. The estimated total value of the tobacco crop lost due to Bonnie ranged from 25 to 50 million dollars. The City of Wilson recorded 4.94 inches of rain.

September 15, 1999 - Hurricane Floyd produced 15-20 inches of rain that fell across the eastern half of the state, causing every river and stream to flood. Many rivers set new flood records. Whole communities were underwater for days, even weeks in some areas. Thousands of homes were lost. Crop damage was extensive. The infrastructure of the eastern counties, mainly roads, bridges, water plants, etc., was heavily damaged. Even worse was the loss of life, mainly due to flooding. Many Carolinians did not heed the call to evacuate and many more drove into flooded streams and rivers. In the central part of the state, 21 people lost their lives. Also, the loss of livestock was significant, mainly swine and poultry.

Tropical Storm Andrea floods sections of Singletary Street and Elvie Street. (AP Photo/The Wilson Times)

September 18, 2003 - Hurricane Isabel made landfall along the Outer Banks just north of Cape Lookout around 1 pm on September 18, 2003. Up to 6 inches of rain fell across Edgecombe, Halifax and Wilson counties resulting in flooding of several roads.

July 25, 2006 – Flash flooding resulted in the closure of about 10 streets and several stalled cars including US Hwy 301 and Ward Boulevard.

June 7, 2013 - Tropical Storm Andrea tracked northeast up the East Coast and through North Carolina on June 7th, bringing a swath of heavy rain of 3 to 6 inches across central and eastern portions of the area. This heavy rain resulted in numerous road closures and brought several small creeks and streams out of their banks.

Frequency/Likelihood of Future Occurrence

Occasional - By definition of the 100-year flood event, SFHAs are defined as those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in these areas have a 26 percent chance of flooding over the life of a 30-year mortgage.

The 500-year flood area is defined as those areas that will be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year; it is not the flood that will occur once every 500 years.

Given the 10 hurricane and tropical storm occurrences recorded by NCDC and SHELDUS within a period of 39 years (1964 - 2003), the County has a 26 percent chance of experiencing a hurricane or tropical storm in any given year.

3.2.2 Flood: Stormwater/Localized Flooding

Hazard/Problem Description

Localized stormwater flooding can also occur throughout the City of Wilson. Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system. The cause of localized stormwater flooding in Wilson can be attributed to its generally flat topography, abundance of water features, and the large amount of developed and impervious land, which limits ground absorption and increases surface water runoff.

Past Occurrences

Figure 3.4 depicts the areas of localized stormwater flooding identified by the FMPC. The areas of localized flooding are listed below in Table 3.8.

Table 3.8 - Areas of Localized Flooding

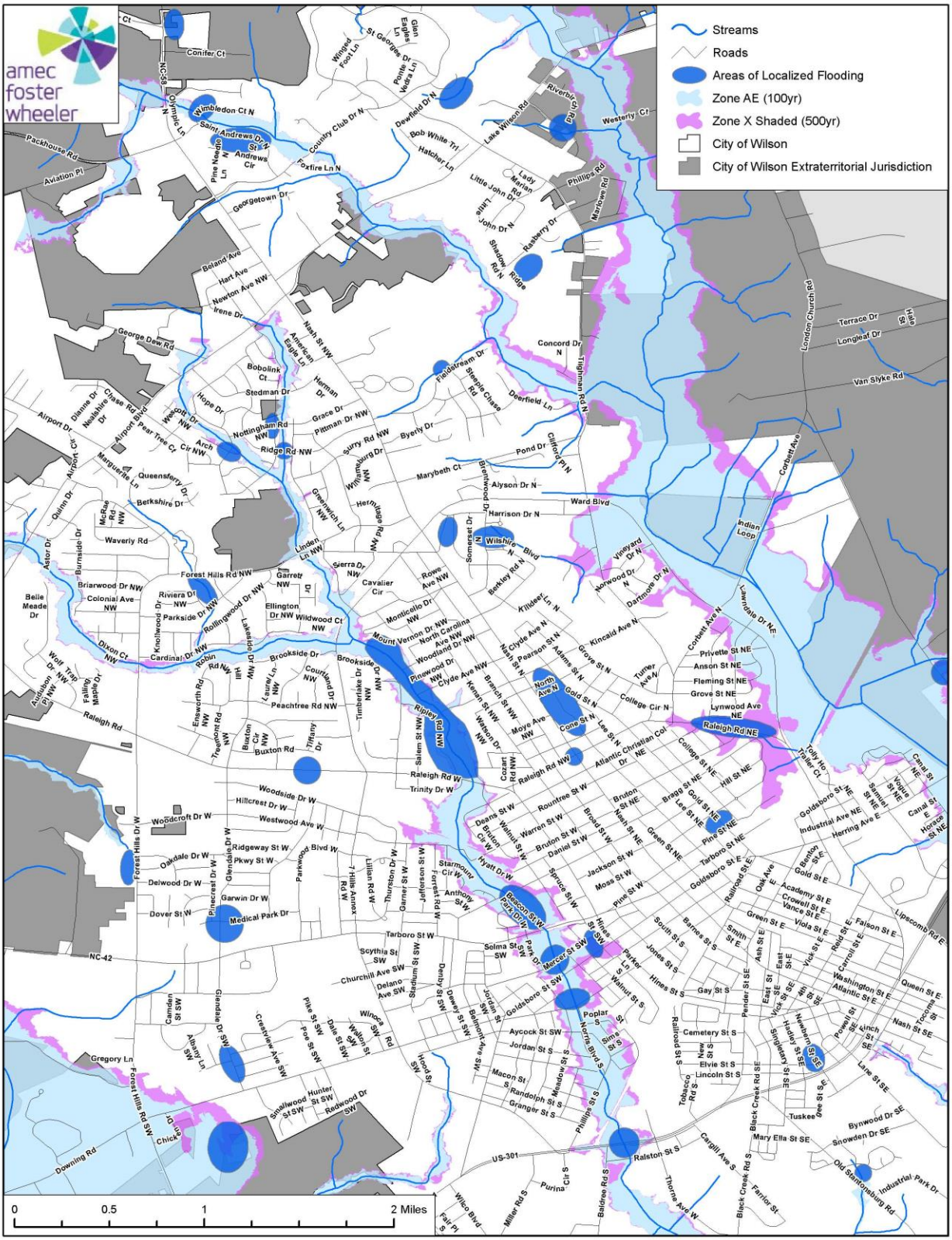
Area	Street Name or Intersection
1	Solaris Drive and Durban Drive
2	Wimbledon Court N
3	Saint Andrews Drive N and Pine Needles Lane N
4	Prestwick Lane N, Dewfield Drive N and Chandler Drive N
5	Saddle Run Road N and Riverbirch Road N
6	Burkam Court N
7	Brentwood Drive N, Fieldstream Drive N and Westshire Drive N
8	Buckingham Road NW, Whipporwill Lane NE and Nottingham Road NW
9	Brook Ln NW and Lancaster Road NW
10	Ridge Road NW, Canal Drive NW and Buckingham Road NW
11	Parkside Drive NW and Forest Hills Road NW
12	Arbor Rd N
13	Brentwood Circle N and Brentwood Drive
14	Raleigh Road Pkwy
15	Ripley Road NW, Canal Drive NW, Kincaid Avenue NW and Mt. Vernon Drive NW
16	Vance St N, Cone Street N and Lee Street
17	Raleigh Road Parkway North and Nash Street N
18	Raleigh Road Parkway North and Rountree Street NE
19	London Church Rd
20	Gold Street N
21	Cresent Drive
22	Glendale Drive , Katherine Court W, Medical Park Drive W and Pinecrest Drive W
23	Willbrook Lane SW, Glendale Drive SW, Trull Street SW and McNair Street SW
24	Winding Creek Drive SW and Crystal Drive SW
25	Beacon Street W and Park Avenue W
26	Mercer Street SW
27	Mercer Street SW and Spruce Street SW
28	Lodge Street S, Norris Blvd S, and Meadow Street
29	Ward Blvd
30	New Bern Street SE, Spaulding Street SW and Elvie Street SE
31	Stantonsburg Road SE, E Trail Drive SE

Localized flooding may be caused by the following maintenance related issues:

Clogged Inlets – debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system which may cause flooding near the structure. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.

Blocked Drainage Outfalls – debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.

Improper Grade – poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.



Source: City of Wilson, 2015

Figure 3.4 - Localized Flooding Locations

Frequency/Likelihood of Future Occurrence

Highly Likely **-** Given the 24 flash flood events recorded in NCDC over a 17 year period, there is a near 100 percent chance of occurrence within the next year. Precipitation resulting from heavy rainstorms, tropical storms, and hurricanes makes it highly likely that unmitigated properties will continue to experience localized flooding.

3.2.3 Stream Bank Erosion

Hazard/Problem Description

Stream banks erode by a combination of direct stream processes, like down cutting and lateral erosion, and indirect processes, like mass-wasting accompanied by transportation. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower as shown in Figure 3.5. This distribution of velocity results in erosion occurring on the outside of the bend and deposition occurring on the inside of the bend.

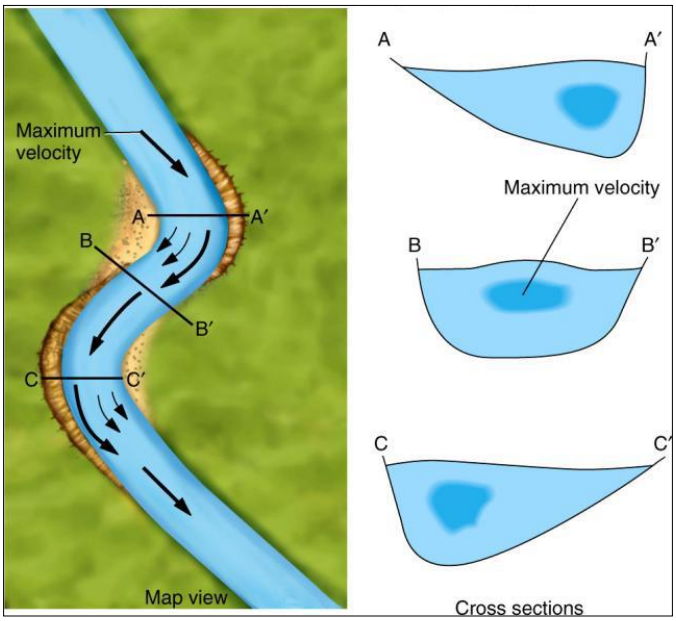


Figure 3.5 - Stream Meanders

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse, and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or forbs, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part

of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Past Occurrences

Several sources were vetted to identify areas of erosion in the City of Wilson. This includes searching local newspapers, interviewing local officials, and reviewing the State of North Carolina Hazard Mitigation Plan. Minimal information could be found regarding erosion in the City. The City does have an Erosion and Sedimentation Control Ordinance in effect.

Frequency/Likelihood of Future Occurrence

Unlikely - Erosion is a natural, dynamic, and continuous process that can be expected to occur on a small scale within the City of Wilson in the future. The annual probability level assigned for major erosion events is less than 1% probability within the next year. Given the lack of historical events, location, data, and threat to life or property, erosion is not considered a priority hazard for the City.

3.2.4 Dam/Levee Failure

Hazard/Problem Description

Dam Failure

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, or concrete. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues.

A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, human-caused events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as hurricanes, earthquakes, or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping cause a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;

- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; and
- High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Each state has definitions and methods to determine the Hazard Potential of a dam. In North Carolina, dams are regulated by the state if they are 25 feet or more in height and impound 50 acre-feet or more. Dams and impoundments smaller than that may fall under state regulation if it is determined that failure of the dam could result in loss of human life or significant damage to property below the dam. The height of a dam is from the highest point on the crest of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam.

Dam Safety Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage. Dams are assigned one of three classes based on the nature of their hazard potential:

1. Class A (Low Hazard) includes dams located where failure may damage uninhabited low value non-residential buildings, agricultural land, or low volume roads.
2. Class B (Intermediate Hazard) includes dams located where failure may damage highways or secondary railroads, cause interruption of use or service of public utilities, cause minor damage to isolated homes, or cause minor damage to commercial and industrial buildings. Damage to these structures will be considered minor only when they are located in backwater areas not subjected to the direct path of the breach flood wave; and they will experience no more than 1.5 feet of flood rise due to breaching above the lowest ground elevation adjacent to the outside foundation walls or no more than 1.5 feet of flood rise due to breaching above the lowest floor elevation of the structure.
3. Class C (High Hazard) includes dams located where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.

Table 3.9 - Dam Hazards Classification

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads	Less than 25 vehicles per day
	Economic damage	Less than $30,000
Intermediate	Damage to highways, interruption of service	25 to less than 250 vehicles per day

Hazard Classification	Description	Quantitative Guidelines
	Economic damage	$30,000 to less than $200,000
	Loss of human life	Probable loss of 1 or more human lives
High	Economic damage	More than $20,000
	Probable loss of human life due to breached roadway or bridge on or below the dam	250 or more vehicles per day

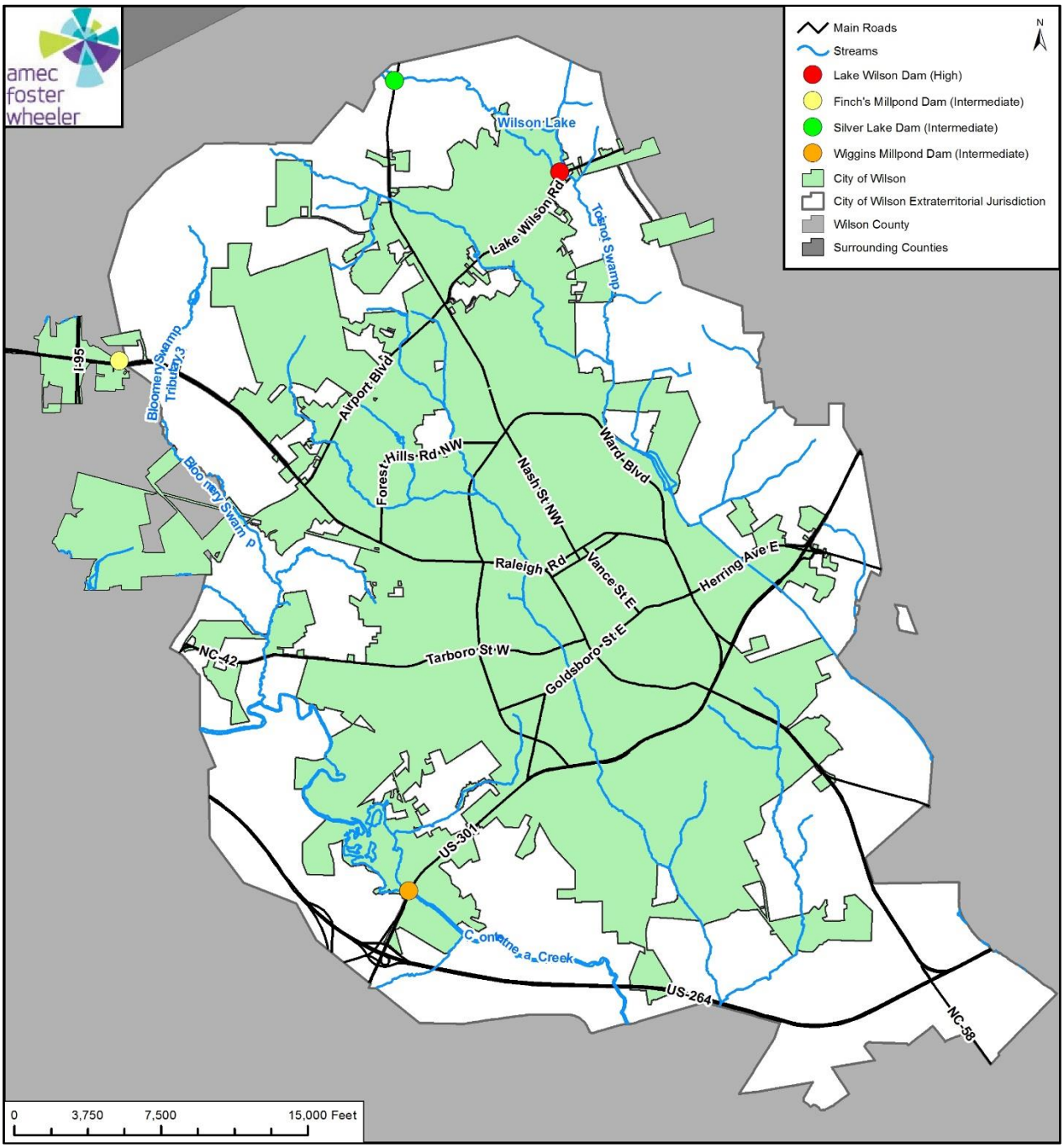
Source: NCDENR

Table 3.10 provides details for four dams included in the North Carolina Dam Inventory that are located within the City of Wilson and/or have the potential to affect the City if a breach were to occur. The City of Wilson owns two of the dams; one is classified as high hazard and one is classified as intermediate hazard. The two additional dams are classified as intermediate hazard and are privately owned. Figure 3.6 reflects the location of the dams within the City.

Table 3.10 - North Carolina Dam Inventory for City of Wilson, NC

Dam Name	NIDID	Owner	Height (Ft.)	NID Storage (acre-feet)	Hazard Description	Primary Purpose	River
Lake Wilson	NC00894	City of Wilson	20	998	High	Water Supply	Toisnot Swamp
Wiggins Mill Pond	NC00895	City of Wilson	17	1,020	Intermediate	Water Supply	Contentnea Creek
Finch's Mill Pond	NC00891	Private	15	469	Intermediate	Recreation	Bloomery Swamp
Silver Lake	NC00896	Private	13	538	Intermediate	Recreation	Toisnot Swamp

Source: North Carolina Dam Inventory, December 2014



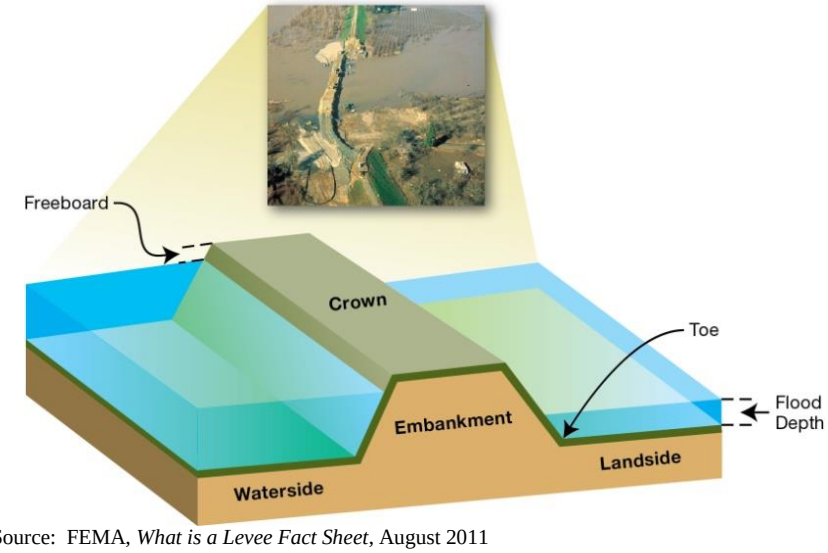
Source: North Carolina Dam Inventory, December 2014

Figure 3.6 – North Carolina Dam Inventory for City of Wilson, NC

Levee Failure

FEMA defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce the risk from temporary flooding." Levee systems consist of levees, floodwalls, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. Levees often have "interior drainage" systems that work in conjunction with the levees to take water from the landward side to the water side. An interior drainage system may include culverts, canals, ditches, storm sewers, and/or pumps.

Levees and floodwalls are constructed from the earth, compacted soil or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. Levees and floodwalls are typically built parallel to a waterway, most often a river, in order to reduce the risk of flooding to the area behind it. Figure 3.7 below shows the components of a typical levee.



Source: FEMA, *What is a Levee Fact Sheet*, August 2011

Figure 3.7 - Components of a Typical Levee

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events. Levees reduce, not eliminate, the risk to individuals and structures behind them. A levee system failure or overtopping can create severe flooding and high water velocities. It is important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Past Occurrences

The U.S. Army Corps of Engineers National Levee Database (NLD) does not identify any levees within Wilson County. There are no past reported dam breaches or levee failures within the City of Wilson.

Frequency/Likelihood of Future Occurrence

Unlikely – There is one high hazard dam and one intermediate hazard dam located within Wilson County that could impact the City. A flooding hazard from future dam failure is unlikely. There are no significant levees located within the County.

3.2.5 Assessment of Areas Likely to Flood

The following targeted areas are identified by the FMPC as areas likely to flood in the future. Some of these areas are already experiencing flooding but others are not. For example, changes in floodplain development, the watershed, and population growth will make these targeted areas more likely to flood in the future.

Identified Area #1: 100-year SFHAs

According to the April 16, 2013 Flood Insurance Study prepared by FEMA, approximately 18% of the parcel acreage within the City is located within a Zone AE or Zone X Shaded (500-year) Special Flood Hazard Area (SFHA). Changes in floodplain development and future development within the watershed in general is likely to increase the size of the SFHAs due to an increase in impervious area.

Identified Area #2: Areas of Localized Stormwater Flooding

Due to the level topography, a consistent level of annual precipitation and the heavy precipitation resulting from thunderstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding. An increase in imperious area due to future development will only exacerbate the localizing flooding issues unless measures are taken to reduce the volume of runoff.

Identified Area #3: Repetitive Loss Areas

Properties categorized as repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the 100-year floodplain as well as localized stormwater flooding. As mentioned above, both types of flooding are likely to increase in the future due to development in the floodplain/watershed. Therefore, is it very likely that unmitigated repetitive loss properties will continue to flood in the future.

3.2.6 Flood Hazards Profile Summary

Table 3.11 summarizes the results of the hazard profile for the City of Wilson based on hazard identification data and input from the FMPC. For each hazard profiled within Section 3.2, this table includes the likelihood of future occurrence and whether or not the hazard is considered a priority for the City.

Table 3.11 Summary of Flood Hazard Profile Results

Hazard	Likelihood of Future Occurrence	Priority Hazard
Flood: 100-/500-year	Occasional	Yes
Flood: Stormwater/Localized Flooding	Highly Likely	Yes
Stream Bank Erosion	Unlikely	No
Dam/Levee Failure	Unlikely	Yes

3.3 Vulnerability Assessment

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. Plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B): An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and

(C): Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

The FMPC conducted a vulnerability assessment of the hazards identified as a priority in order to assess the impact that each hazard would have on the City. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses.

Vulnerability assessments followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard.

Wilson's GIS-based flood risk assessment was completed using the best data made available at the time of the analysis. Digital data was collected from local, regional and national sources that included the City of Wilson, the North Carolina Emergency Management Agency, and the Federal Emergency Management Agency. This analysis took advantage of FEMA's recently revised Flood Insurance Study for Wilson County dated April 2013.

Properties at Risk

The 2010 building footprint layer for the City of Wilson was used as the basis for determining properties at risk to flood damage. Building counts by FEMA flood zone were determined using a spatial intersection of building footprints provided by North Carolina Emergency Management and the effective FEMA flood zones provided in the Wilson County DFIRM Database effective 4/16/2013. Table 3.12 shows the building count, improved value, content value and total value for all buildings located within a SFHA.

Table 3.12 – City of Wilson Properties at Risk by Occupancy Type

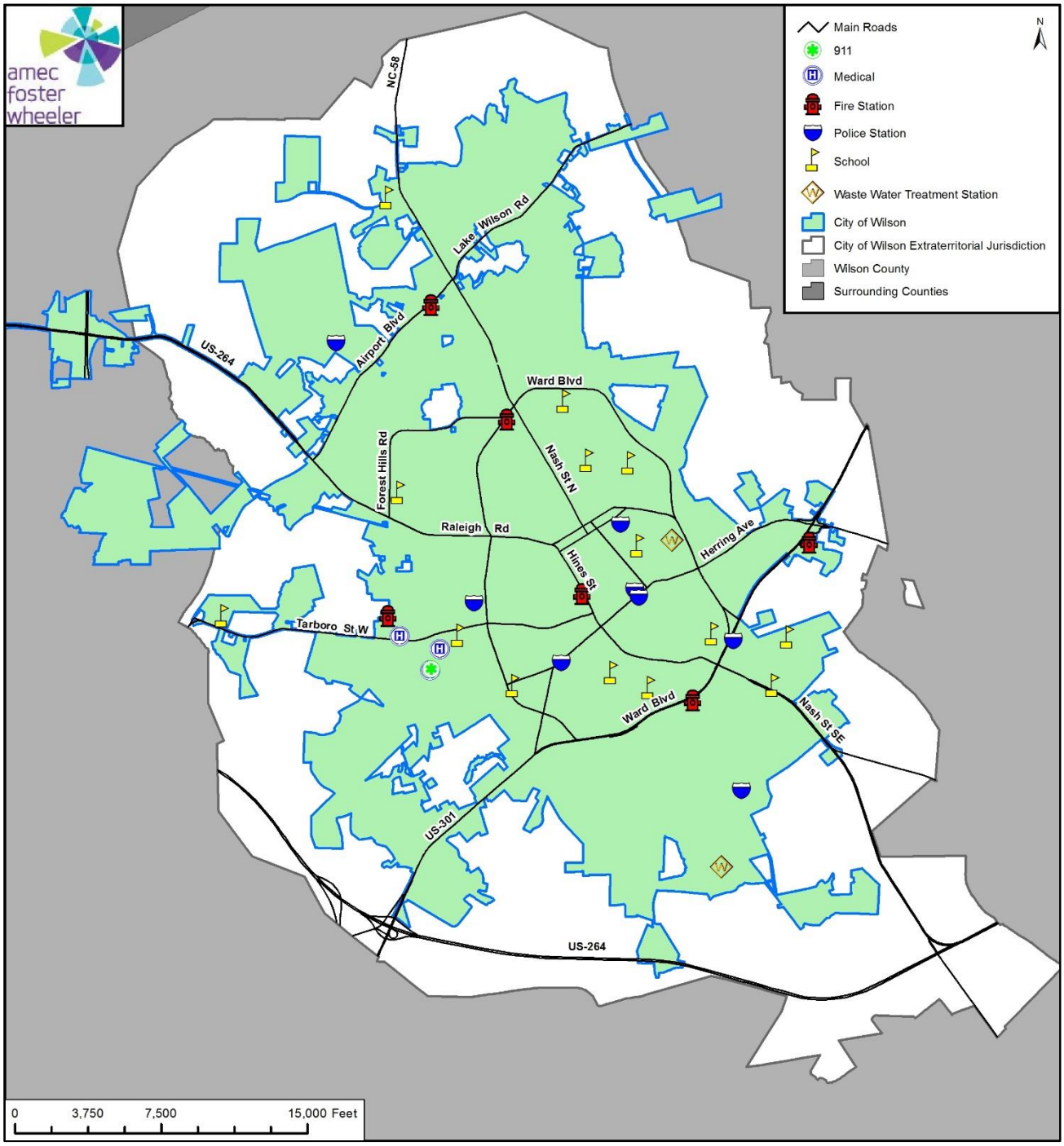
Occupancy Type	Total Number of Buildings in Floodplain	Total Building Value	Estimated Content Value	Total Value
Zone AE				
Agricultural	1	$7,320	$22,784	$30,104
Commercial	177	$81,173,318	$91,632,038	$172,805,356
Education	1	$153,832	$153,832	$307,664
Government	12	$2,726,995	$2,498,694	$5,225,689
Industrial	11	$6,550,839	$20,140,265	$26,691,105
Religious	7	$1,294,551	$950,413	$2,244,964
Residential	829	$95,806,117	$47,922,169	$143,728,286
Total	**1,038**	**$187,712,972**	**$163,320,195**	**$351,033,167**

Occupancy Type	Total Number of Buildings in Floodplain	Total Building Value	Estimated Content Value	Total Value
Zone X (500-yr)				
Agricultural	0	$0	$0	$0
Commercial	41	$23,149,342	$23,373,183	$46,522,525
Education	0	$0	$0	$0
Government	10	$13,208,366	$14,637,171	$27,845,537
Industrial	23	$27,008,813	$50,500,777	$77,509,590
Religious	3	$709,764	$709,764	$1,419,528
Residential	369	$43,646,915	$22,386,146	$66,033,061
Total	**446**	**$107,723,200**	**$111,607,040**	**$219,330,241**
Zone X (Unshaded)				
Agricultural	0	$0	$0	$0
Commercial	35	$31,365,323	$31,365,277	$62,730,600
Education	4	$590,341	$590,340	$1,180,681
Government	14	$60,909,291	$2,838,053	$63,747,344
Industrial	6	$8,415,883	$17,410,225	$25,826,108
Religious	2	$1,480,332	$1,480,332	$2,960,664
Residential	365	$45,541,191	$23,520,365	$69,061,556
Total	**426**	**$148,302,361**	**$77,204,592**	**$225,506,953**

Source: North Carolina Emergency Management, Risk Management, 2013

Critical Facility Inventory

Of significant concern with respect to any disaster event is the location of critical facilities in the planning area. Critical facilities are often defined as those essential services and facilities in a major emergency which, if damaged, would result in severe consequences to public health and safety or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities within the City are shown in Figure 3.8.



Data Source: City of Wilson, 2015

Figure 3.8 - Critical Facilities in Wilson, NC

Land Use

Existing land use is based on data contained within the 2010 Wilson Comprehensive Plan. The land use classifications are grouped into general activity categories from the American Planning Association's Land Based Classification System (LBCS). Table 3.13 below shows the approximate acreages and percentages of each general land use activity category within the City of Wilson's planning and zoning jurisdiction. Figure 3.9 shows the locations of these existing land use activities.

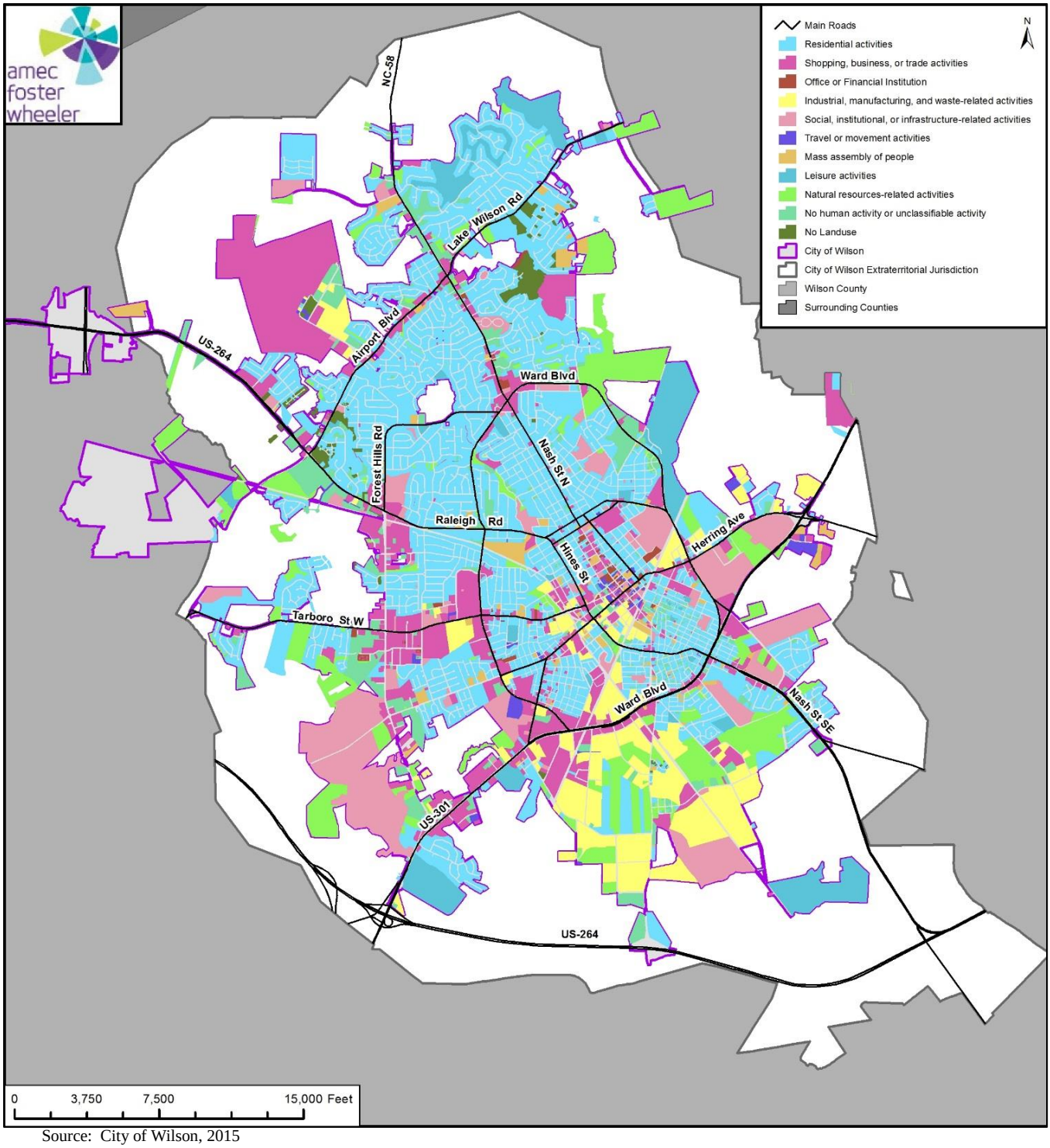
Table 3.13 - Existing Land Use Activities in the City's Planning Jurisdiction

Existing Land Use Activity	Acres*	% of Total Acres
No Human Activity or Unclassifiable Activity	2,809	7.2
Natural Resources Related Activities	13,883	35.7
Residential Activities	14,248	36.7
Leisure Activities	1,116	2.9
Mass Assembly of People	292	0.8
Shopping, Business or Trade Activities	2,502	6.4
Office or Financial Institution	60	0.2
Social, Institutional or Infrastructure-Related Activities	1,725	4.4
Industrial, Manufacturing, and Waste-Related Activities	2,140	5.5
Travel or Movement Activities	91	0.2
Total	**38,870**	**100**

*Based on site surveys by City Planning and Development Services staff.
Source: Wilson Comprehensive Plan, 2010

The most predominant land use in the City is residential, with more than one third of the City (approximately 37 percent) devoted to single and multi-family residential development. More than 40 percent of land in Wilson's planning and zoning jurisdiction is estimated to be in natural resource related activities or unclassified, leaving much opportunity for new development and growth within the existing City's planning jurisdiction. Income-producing land uses, including shopping, business, and trade; office or financial institution; industrial, manufacturing, and waste-related activities; and leisure activities comprise approximately 15 percent of Wilson's land use activities.

Within recent years, the growth pattern in Wilson has been focused to the north and west toward Interstate 95. Much of the City's new commercial development has been along the Raleigh Road Corridor west of Forest Hills Road. In the wake of this new growth, some older corridors and areas of the community have experienced disinvestment and are prime opportunities for redevelopment. Such areas include the Highway 301 Corridor, the Five Points area, the Historic Warehouse District, Downtown Wilson, and Center City neighborhoods.



Source: City of Wilson, 2015

Figure 3.9 - City of Wilson Existing Land Use Activities

3.3.1 Vulnerability of the City of Wilson to Specific Hazards

The Disaster Mitigation Act regulations require that the FMPC evaluate the risks associated with each of the hazards identified in the planning process. This section summarizes the possible impacts and quantifies the City's vulnerability to each of the hazards identified as a priority hazard in Table 3.11 in Section 3.2.6 Flood Hazards Profile Summary. The hazards evaluated as part of this vulnerability assessment include:

- Flood: 100-/500-year
- Flood: Stormwater/Localized Flooding
- Dam Failure

Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

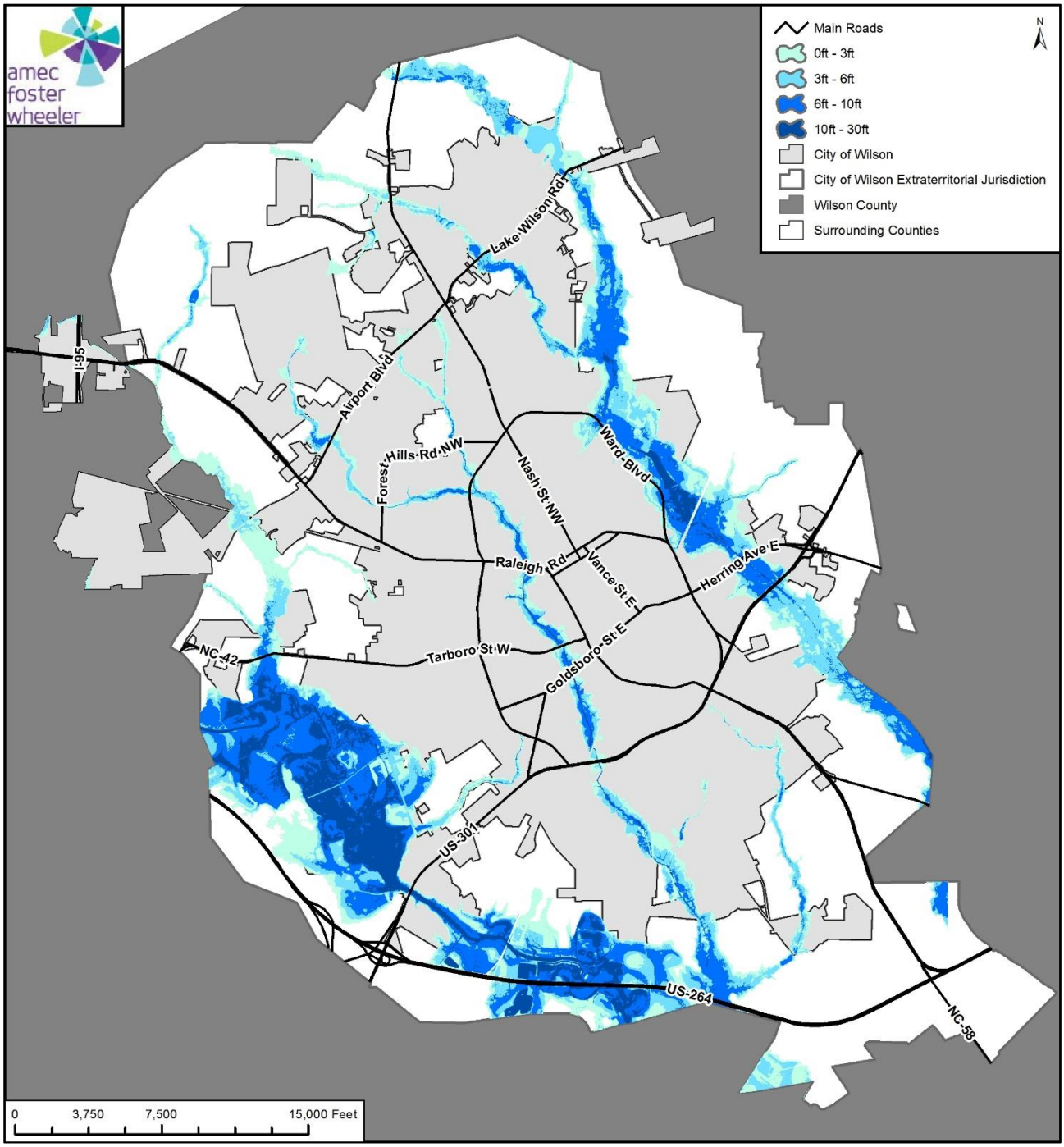
- **Extremely Low -** The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low -** Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium -** Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High -** Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High -** Very widespread with catastrophic impact.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of critical community facilities (e.g., a fire station), historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the impact, or vulnerability, of that area to that hazard.

3.3.2 Flood: 100-/500-year Vulnerability Assessment

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Flood damage is directly related to the depth of flooding by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a specific percent damage to the structure, which translates to the same percentage of the structure's replacement value. Figure 3.10 depicts the depth of flooding that can be expected within the City during the 100-year flood event.



Source: Depths derived from FEMA 2013 DFIRM

Figure 3.10 – 100-yr Flood Depths for the City of Wilson

Methodology

A flood risk assessment for Wilson County was performed by NCEM Risk Management in 2013. The risk assessment data was requested and received by the City of Wilson in March 2015. All building attribute data and estimated flood damages are derived from the NCEM Risk Management iRisk database.

NCEM utilized land use codes provided in the Wilson parcel data to assign each building footprint a specific occupancy class (i.e. RES1, COM4, EDU2, etc.). An occupancy class is required in order to apply the correct depth damage factor which ensures the most accurate damage assessment.

Table 3.14 provides the depth damage factors that were used in calculating flood losses for the City. The depth damage factors were developed based on the Wilmington Corps depth damage curve. All depths assume the structure has no basement.

Table 3.14 - Wilson Flood Loss Damage Factors

	Percent Damaged (%)						
Depth (ft)	**Agricultural**	**Commercial**	**Education**	**Government**	**Industrial**	**Religious**	**Residential**
0	0	15	4	5	2	12	9
1	6	20	22	8	7	17	14
2	11	29	29	10	12	19	23
3	15	37	34	10	19	22	28
4	19	44	39	11	25	25	32
5	25	50	44	13	30	28	36
6	30	55	48	14	36	32	39
7	35	62	53	15	41	37	43
8	41	67	57	16	46	43	46
9	46	71	62	17	51	48	49
10	51	75	66	18	56	53	52
11	57	79	70	20	61	58	56
12	63	84	75	21	66	63	60
13	70	88	79	22	71	68	64
14	75	97	83	24	76	73	68
15	79	100	87	25	81	78	73
16	82	100	91	26	86	83	80
17	84	100	95	27	91	88	81
18	87	100	99	28	96	93	83
19	89	100	100	29	100	98	84
20	90	100	100	30	100	100	85
21	92	100	100	31	100	100	85
22	93	100	100	32	100	100	85
23	95	100	100	33	100	100	85
24	96	100	100	34	100	100	85

Source: Hazus 2.1

Content value estimations are based on FEMA Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 3.15 shows the breakdown of the different property types in Wilson and their estimated content replacement value percentages.

Table 3.15 - Content Replacement Factors

Property Type	Content Replacement Values
Residential	50%
Commercial	100%
Education	100%
Government	100%
Religious	100%
Industrial	150%

Source: Hazus 2.1

Values at Risk

The loss estimate for flood is based on the total of improved building value and contents value. Land value is not included in any of the loss estimates as generally the land is not subject to loss from floods. Once the potential value of affected parcels was calculated, damage factors were applied to obtain loss estimates by flood zone.

Table 3.16 shows the building count, total value, estimated damages and loss ratio for buildings that fall within the 100-year floodplain by flood zone and land use type. The loss ratio is the loss estimate divided by the total potential exposure (i.e., total of improved and contents value for all buildings located within the 100-year floodplain) and displayed as a percentage of loss. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from a flood.

Table 3.16 – Estimated Building Damage and Content Loss

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Zone AE						
Agricultural	1	$30,104	$9,354	$15,962	$25,316	84.1%
Commercial	103	$172,805,356	$3,603,056	$12,478,978	$16,082,034	9.3%
Education	1	$307,664	$4,472	$24,151	$28,623	9.3%
Government	8	$5,225,689	$214,328	$949,866	$1,164,193	22.3%
Industrial	3	$26,691,105	$788,474	$1,824,015	$2,612,488	9.8%
Religious	7	$2,244,964	$166,413	$722,420	$888,833	39.6%
Residential	680	$143,728,286	$13,443,010	$8,742,402	$22,185,412	15.4%
Total	**803**	**$351,033,167**	**$42,986,900**	**$42,986,900**	**$42,986,900**	**12.2%**
Zone X (500-yr)						
Agricultural	0	$0	$0	$0	$0	0.0%
Commercial	5	$46,522,525	$113,982	$420,327	$534,309	1.1%
Education	0	$0	$0	$0	$0	0.0%
Government	0	$27,845,537	$0	$0	$0	0.0%
Industrial	0	$77,509,590	$0	$0	$0	0.0%
Religious	0	$1,419,528	$0	$0	$0	0.0%
Residential	139	$66,033,061	$1,972,807	$594,458	$2,567,265	3.9%
Total	**144**	**$219,330,241**	**$2,086,790**	**$1,014,785**	**$3,101,574**	**1.4%**
Zone X (Unshaded)						
Agricultural	0	$0	$0	$0	$0	0.0%
Commercial	3	$62,730,600	$160,611	$547,856	$708,467	1.1%
Education	0	$1,180,681	$0	$0	$0	0.0%
Government	0	$63,747,344	$0	$0	$0	0.0%
Industrial	1	$25,826,108	$647,841	$1,943,522	$2,591,362	10.0%

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Loss	Estimated Total Damage	Loss Ratio
Religious	0	$2,960,664	$0	$0	$0	0.0%
Residential	162	$69,061,556	$1,370,075	$155,795	$1,525,870	2.2%
Total	**166**	**$225,506,953**	**$2,178,527**	**$2,647,173**	**$4,825,699**	**2.1%**

Source: North Carolina Emergency Management, Risk Management, 2013

Flooded acres

Also of interest is the land area affected by the various flood zones. The following is an analysis of flooded acres in the City in comparison to total area within the City limits.

Methodology

GIS was used to calculate acres flooded by FEMA flood zones. The City parcel layer and effective DFIRM were intersected and the flooded parcel area was calculated in acres. The flood zone was assigned to any given parcel based on the intersection of the parcel with a flood zone. Parcels can be located in multiple flood zones, and only the flooded acreage within the parcel was counted for each flood zone.

Limitations

One limitation to be made from this analysis is that the parcel layer does not include right-of-way areas. Due to this, there are voids of land that are not accounted for; therefore, this analysis only represents total parcel acres. Table 3.17 represents a detailed and summary analysis of total improved flooded acres by FEMA DFIRM flood zone for the City.

Table 3.17 - Total Parcel Acres to Improved Flooded Acres by Flood Zone

Flood Zone	Total Parcel Acres	Improved Flooded Acres
Zone AE	2,588	2,167
Zone X (500-yr)	620	471
Zone X (Unshaded)	15,105	13,871
Total	**18,314**	**16,509**

Source: Wilson 2015 Tax Assessor's Data, FEMA 2013 DFIRM

Population at Risk

A separate analysis was performed to determine the population at risk to the individual FEMA flood zones. Using GIS, the DFIRM flood zones were intersected with the building footprint layer. Those residential buildings that intersected the flood zones were counted and multiplied by the 2009-2013 Census Bureau household factor for the City of Wilson (2.49) as shown in Table 3.18.

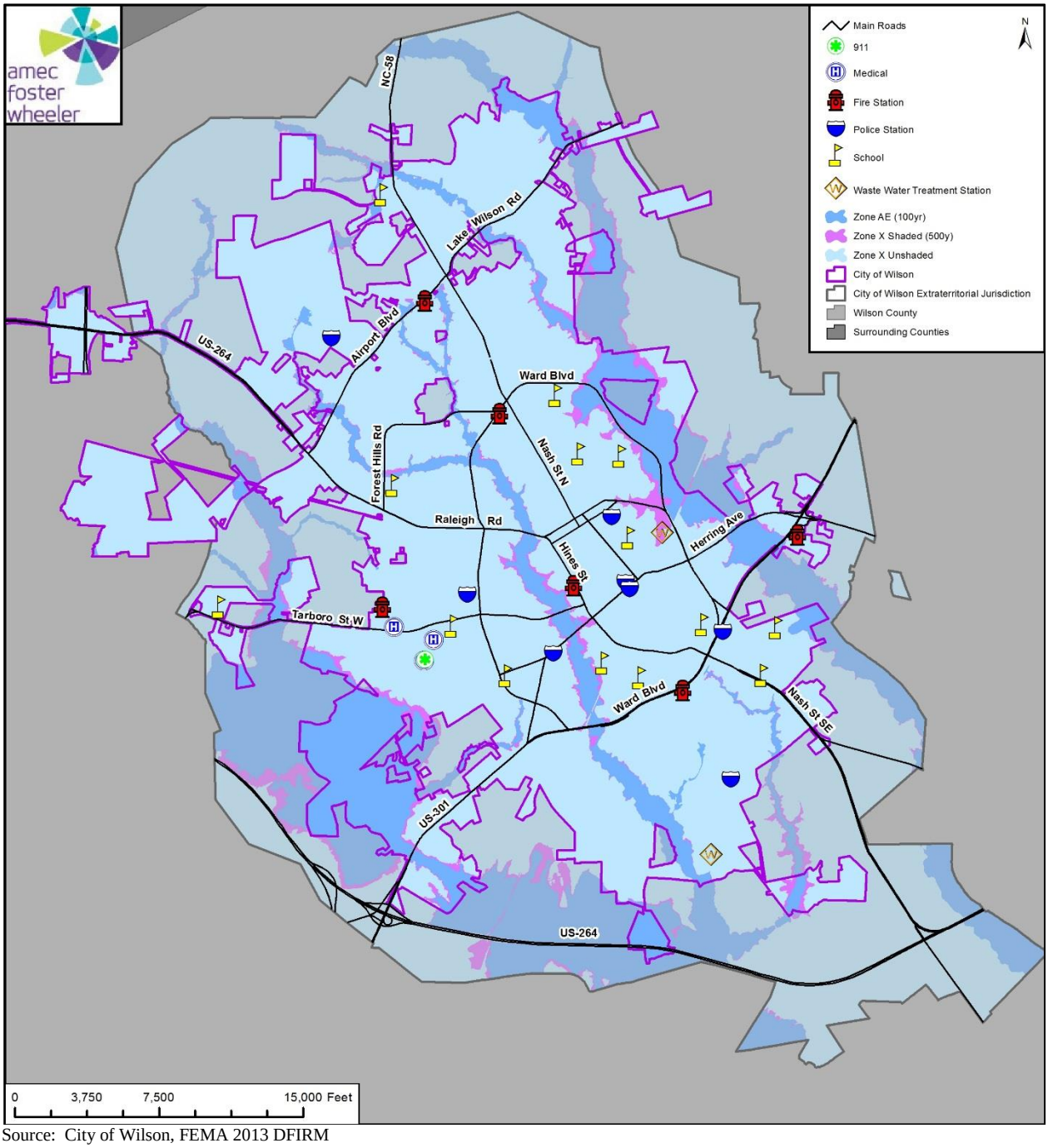
Table 3.18 - Wilson Population at Risk to Flood

Flood Zone	Residential Property Count	Population at Risk
Zone AE	829	2,064
Zone X (500-yr)	369	919
Zone X (unshaded)	365	909
Total	**1,563**	**3,892**

Source: Wilson 2015 Tax Assessor's Data, FEMA 2013 DFIRM, U.S. Census Bureau 5-year Community Survey (2009-2013)

Critical Facilities at Risk

A separate analysis was performed to determine critical facilities located in the 100- and 500-year floodplains. Using GIS, the DFIRM flood zones were overlaid on the critical facility location data. Figure 3.11 shows critical facilities and DFIRM flood zones. Table 3.19 details critical facilities by facility type and flood zone.



Source: City of Wilson, FEMA 2013 DFIRM

Figure 3.11 - Critical Facilities and FEMA Flood Zones

Table 3.19 - Critical Facilities by Flood Zone

Facility Name	Facility Type	Address/Coordinates	Flood Zone
Wilson County 9-1-1	911	1817 Glendale Dr SW STE A	Zone X Unshaded
Wilson County Rescue	EMS	1902 Tarboro Street W	Zone X Unshaded
Wilson EMS HQ	EMS	1817 Glendale Dr SW	Zone X Unshaded
Wilson FD Station 2	Fire	1807 Forest Hills Rd W	Zone X Unshaded
Wilson FD Station 4	Fire	109 Forest Hills Rd NW	Zone X Unshaded
Wilson FD Station 5	Fire	3530 Airport Blvd NW	Zone X Unshaded
Wilson FD Station 1	Fire	307 W Hines St	Zone X Unshaded
Wilson FD Station 3	Fire	6111 Ward Blvd	Zone X Unshaded
Wilson Medical Center	Hospital	1705 Tarboro St S	Zone X Unshaded
Wilson PD West District	Police	1501 Ward Blvd	Zone X Unshaded
Wilson PD North District Barton College	Police	200 A C College Drive NE	Zone X Unshaded
Wilson PD Central District	Police	1001 Goldsboro St S	Zone X Unshaded
Wilson PD Main	Police	120 Goldsboro Street E	Zone X Unshaded
Wilson PD South District	Police	700 US 301 N	Zone X Unshaded
Wilson PD Annex	Police	2313 Stantonsburg Rd SE	Zone X Unshaded
East Nash Substation	RVFD	2237 Whitley Road E A	Zone X Unshaded
New Hope Elementary	School	4826 Packhouse Rd	Zone X Unshaded
Fike High	School	500 Harrison Dr	Zone X Unshaded
Wells Elementary	School	1400 Grove St	Zone X Unshaded
Toisnot Middle	School	1301 Corbett Ave	Zone X Unshaded
Hearne Elementary	School	300 NE Gold St	Zone X Unshaded
Vick Elementary	School	504 N Carroll St	Zone X Unshaded
Adams Learning Center	School	639 Walnut St	Zone X Unshaded
Daniels Learning Center	School	723 Elvie St	Zone X Unshaded
Vinson-Bynum Elementary	School	1601 Tarboro St	Zone X Unshaded
Winstead Elementary	School	1713 Downing St	Zone X Unshaded
Forest Hills Middle	School	1210 Forest Hills Rd	Zone X Unshaded
Darden Middle	School	1665 Lipscomb Rd	Zone X Unshaded
Jones Elementary	School	4028 NC 42 W	Zone X Unshaded
Barnes Elementary	School	1913 Martin Luther King Jr. Pkwy	Zone X Unshaded
Sheriff's Dept	Sheriff	100 Green Street E	Zone X Unshaded
Animal Enforcement	Sheriff	4001 Airport Drive NW	Zone X Unshaded

Source: City of Wilson, FEMA 2013 DFIRM

Future Development

A GIS analysis was performed to quantify parcels within potential future development areas that are located within a special flood hazard area.

Methodology

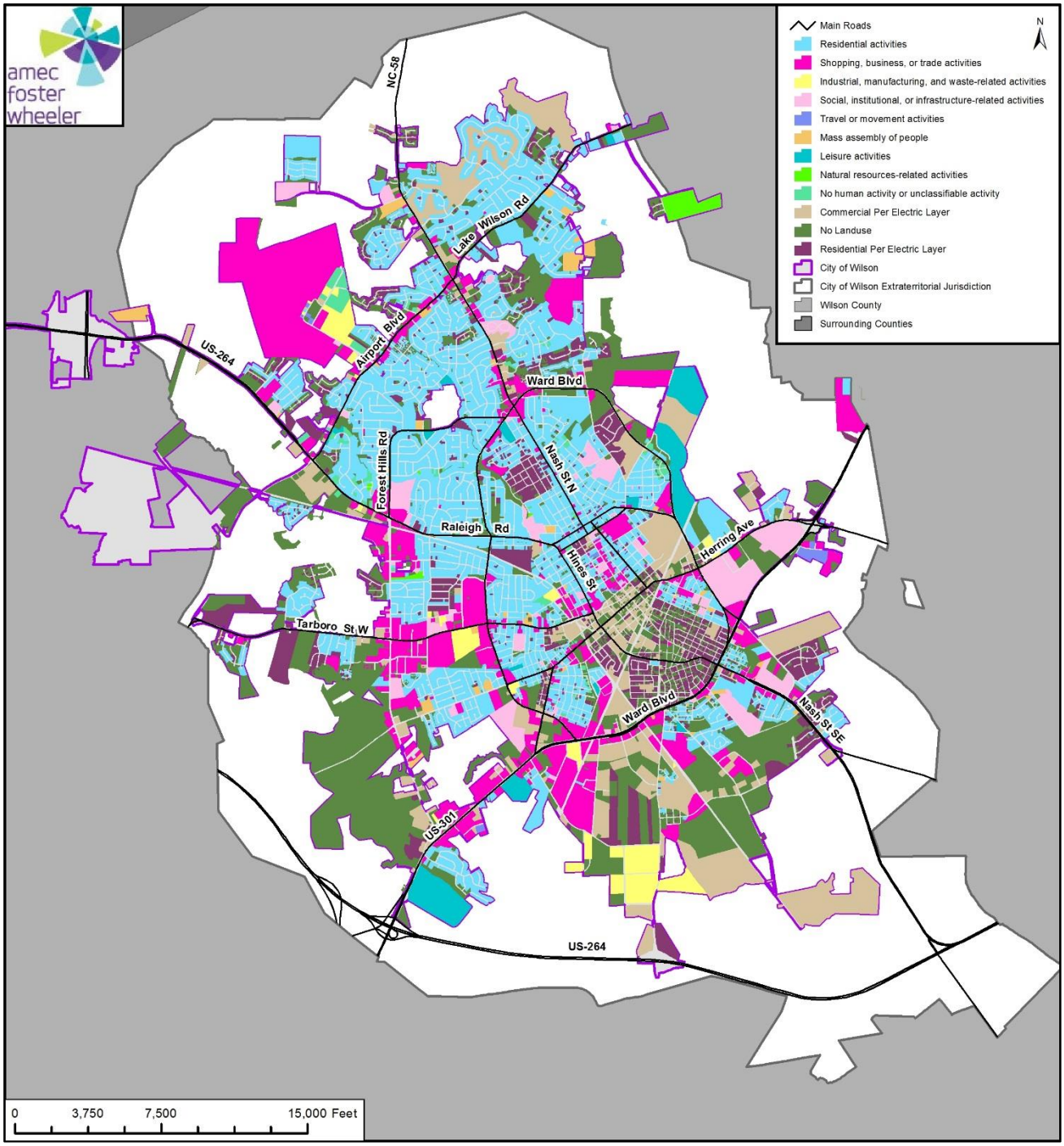
The 2015 Wilson parcel layer was used to identify potential areas of future development located within FEMA flood zones. Parcel counts by FEMA flood zone were determined using a spatial intersection of the tax parcels and the effective flood hazard area provided in the Wilson County DFIRM Database, effective 4/16/2013. In the event that a parcel was affected by multiple zones, the flood zone covering the majority of the parcel was assigned to the parcel. Table 3.20 delineates the future development areas by flood zone and land use. Figure 3.12 reflects the City's future land use designations.

Table 3.20 - Future Land Use and FEMA Flood Zones

Future Land Use	Unimproved Parcel Count	Unimproved Acreage
Zone AE		
Residential activities	1	0
Shopping, business, or trade activities	3	1
Industrial, manufacturing, and waste-related activities	0	0
Social, institutional, or infrastructure-related activities	0	0
Travel or movement activities	0	0
Mass assembly of people	0	0
Leisure activities	0	0
Natural resources-related activities	0	0
No human activity or unclassifiable activity	2	0
Commercial Per Electric Layer	4	0
NOLANDUSE	230	474
Residential Per Electric Layer	10	0
Total	**250**	**476**
Zone X (500-yr)		
Residential activities	1	0
Shopping, business, or trade activities	1	12
Social, institutional, or infrastructure-related activities	0	0
Mass assembly of people	0	0
Leisure activities	0	0
No human activity or unclassifiable activity	0	0
Commercial Per Electric Layer	0	0
NOLANDUSE	24	132
Residential Per Electric Layer	2	0
Total	**28**	**143**
Zone X (Unshaded)		
Residential activities	20	3
Shopping, business, or trade activities	14	13
Industrial, manufacturing, and waste-related activities	0	0
Social, institutional, or infrastructure-related activities	4	9
Travel or movement activities	0	0
Mass assembly of people	1	0
Leisure activities	1	0
Natural resources-related activities	0	0
No human activity or unclassifiable activity	0	0
Commercial Per Electric Layer	23	51

Future Land Use	Unimproved Parcel Count	Unimproved Acreage
NOLANDUSE	704	996
Residential Per Electric Layer	27	46
Total	**794**	**1,117**

Source: Wilson 2014 Tax Assessor's Data, FEMA 2013 DFIRM



Source: City of Wilson

Figure 3.12 - City of Wilson Future Land Use

Flood Insurance Analysis

One valuable source of information on flood hazards is current flood insurance data for active policies and past claims. Flood insurance is required as a condition of federal aid or a mortgage or loan that is federally insured for a building located in a FEMA flood zone.

The City of Wilson has been a Regular participant in the NFIP since July 1982. Wilson has achieved a Class 6 flood insurance rating through participation in the NFIP's Community Rating System which rewards all policyholders in the City with a 20 percent reduction in their flood insurance premiums. Tables 3.21 through 3.24 reflect NFIP policy and claims data for the City categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table 3.21 - NFIP Policy and Claims Data by Occupancy Type – City of Wilson

Occupancy	Number of Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	407	$248,583	$83,749,700	161	$3,075,601
2-4 Family	25	$15,304	$3,667,800	21	$654,913
All Other Residential	14	$11,516	$3,191,700	6	$258,586
Non-Residential	77	$189,417	$25,515,400	49	$1,324,554
Total	**523**	**$464,820**	**$116,124,600**	**237**	**$5,313,654**

Source: FEMA Community Information System as of 02/28/2015

Table 3.22 - NFIP Policy and Claims Data by Flood Zone – City of Wilson

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	311	$340,679	$60,909,100	142	$3,716,157
A Zones	1	$1,078	$151,300	4	$25,322
AO Zones	0	$0	$0	0	$0
AH Zones	0	$0	$0	0	$0
AR Zones	0	$0	$0	0	$0
A99 Zones	0	$0	$0	0	$0
V01-30 & VE Zones	0	$0	$0	0	$0
V Zones	0	$0	$0	0	$0
D Zones	0	$0	$0	0	$0
B, C & X Zone					
Standard	33	$30,853	$4,689,200	44	$1,234,611
Preferred	178	$92,210	$50,375,000	34	$298,196
Total	**523**	**$464,820**	**$116,124,600**	**224**	**$5,274,286**

Source: FEMA Community Information System as of 02/28/2015

Table 3.23 - NFIP Policy and Claims Data Pre-FIRM – City of Wilson

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	164	$230,504	$31,067,300	117	$3,194,396
A Zones	1	$1,078	$151,300	4	$25,322
AO Zones	0	$0	$0	0	$0
AH Zones	0	$0	$0	0	$0
AR Zones	0	$0	$0	0	$0
A99 Zones	0	$0	$0	0	$0
V01-30 & VE Zones	0	$0	$0	0	$0
V Zones	0	$0	$0	0	$0
D Zones	0	$0	$0	0	$0
B, C & X Zone					
Standard	19	$18,435	$2,860,900	41	$1,206,330
Preferred	81	$47,917	$24,248,000	26	$247,934
Total	**265**	**$297,934**	**$58,327,500**	**188**	**$4,673,982**

Source: FEMA Community Information System as of 02/28/2015

Table 3.24 - NFIP Policy and Claims Data Post-FIRM – City of Wilson

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	147	$110,175	$29,841,800	25	$521,762
A Zones	0	$0	$0	0	$0
AO Zones	0	$0	$0	0	$0
AH Zones	0	$0	$0	0	$0
AR Zones	0	$0	$0	0	$0
A99 Zones	0	$0	$0	0	$0
V01-30 & VE Zones	0	$0	$0	0	$0
V Zones	0	$0	$0	0	$0
D Zones	0	$0	$0	0	$0
B, C & X Zone					
Standard	14	$12,418	$1,828,300	3	$28,280
Preferred	97	$44,293	$26,127,000	8	$50,262
Total	**258**	**$166,886**	**$57,797,100**	**36**	**$600,304**

Source: FEMA Community Information System as of 02/28/2015

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed by the City to examine repetitive loss properties against FEMA flood zones.

Methodology

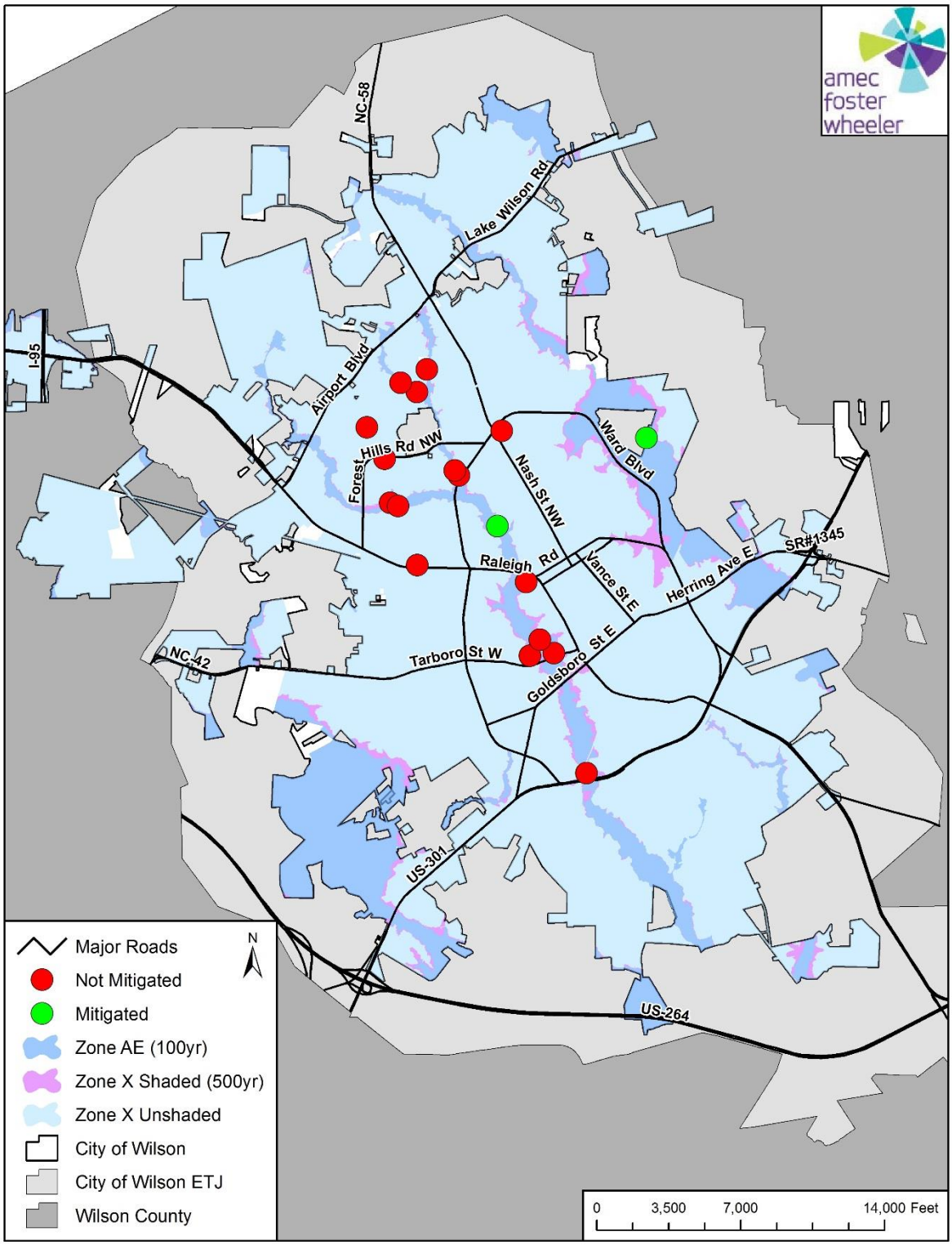
According to 2015 NFIP records, there are a total of two mitigated and 16 unmitigated repetitive loss properties within the City of Wilson. Three of the properties are classified as severe repetitive loss. Table 3.25 details repetitive loss building counts, FEMA flood zones and total payment for the unmitigated properties.

Table 3.25 – Unmitigated Repetitive Loss Summary – City of Wilson

Flood Zone	Building Count		Total Building Payment	Total Content Payment	Total Paid
	Insured	Uninsured			
AE	7	6	$591,371	$283,326	$874,697
X (Unshaded)	1	4	$36,955	$208,872	$245,827
Total	**8**	**10**	**$628,326**	**$492,198**	**$1,120,524**

Source: NFIP Repetitive Loss Data, February 2015

Figure 3.13 illustrates the location of unmitigated repetitive loss properties in relation to mapped FEMA flood zones within the City.



Source: NFIP Repetitive Loss Data, February 2015; FEMA DFIRM, 4/16/13

Figure 3.13 – City of Wilson Repetitive Loss Properties and FEMA Flood Zones

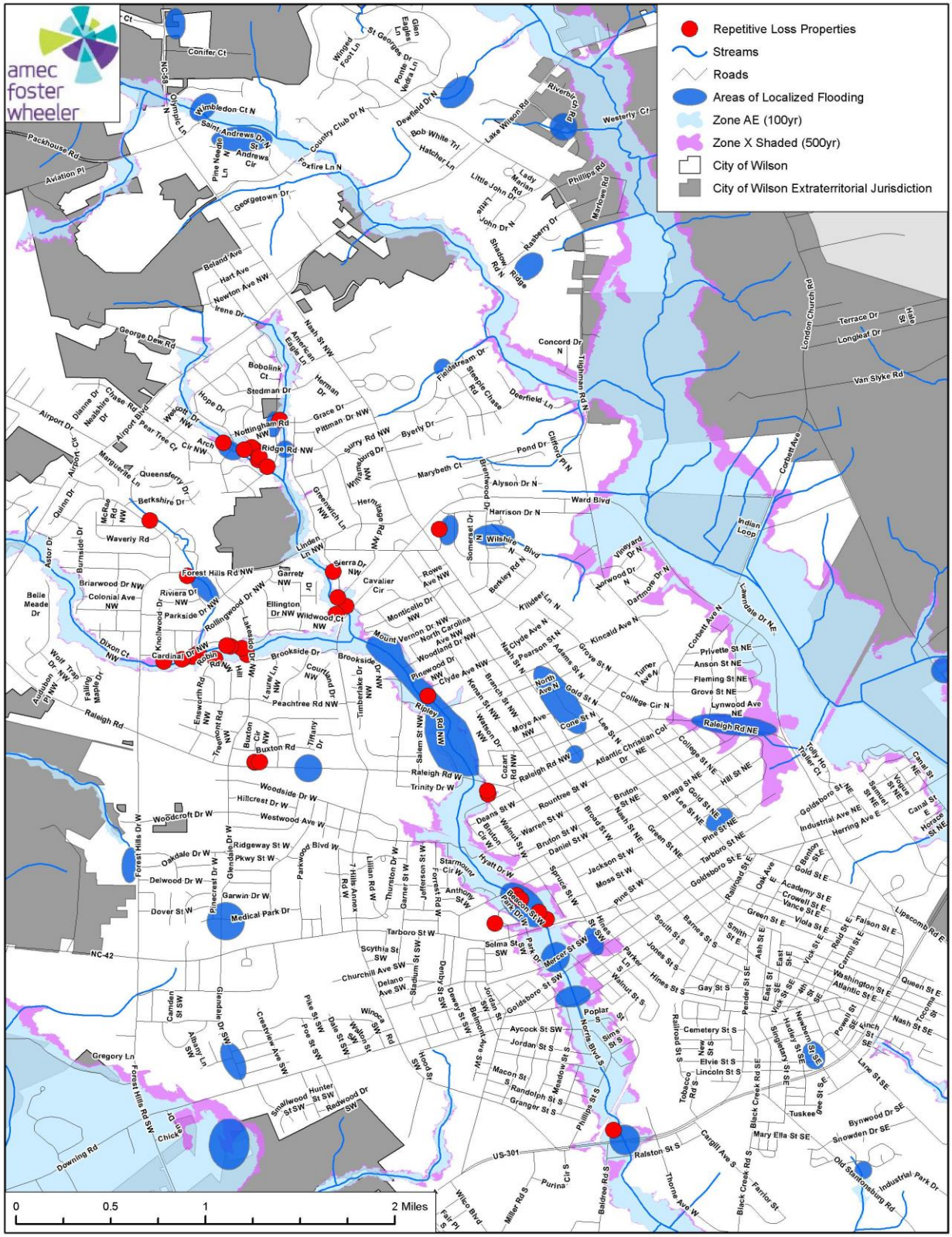
3.3.3 Flood: Stormwater/Localized Flooding Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Localized flooding occurs at various times throughout the year with several areas of primary concern to the City. Localized flooding and ponding affect streets and property. Figure 3.14 below shows localized flooding locations, repetitive loss areas and FEMA flood zones.

Future Development

The risk of localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity and an evaluation of regional drainage issues. Mitigating the root causes of the localized flooding or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to this hazard.



Source: City of Wilson, FEMA 2013 DFIRM

Figure 3.14- Localized Flooding Locations, Repetitive Loss Areas and FEMA Flood Zones

3.3.4 Dam/Levee Failure Vulnerability Assessment

Likelihood of Future Occurrence—Unlikely
Vulnerability—Low

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, regular monitoring is necessary to prevent these events and they can occur.

As noted in Section 3.2.4, there is one high hazard dam (Lake Wilson) with the potential to affect the City of Wilson in the event of a dam failure. Lake Wilson's dam height is 19.7 feet based on the NC Dam Safety database. In the unlikely event that the dam would fail, it is estimated that a flood wave with a maximum height of 9 feet would be generated. This flood height ranges from 25-50% less than the 10% annual chance flood (10-year recurrence interval) elevations developed by the NC Floodplain Mapping Program for this reach of Toisnot Swamp. Given the unpredictable nature of dam failure, the estimated number of impacted buildings and resultant damages utilized the more conservative 10% annual chance flood (10-year recurrence interval).

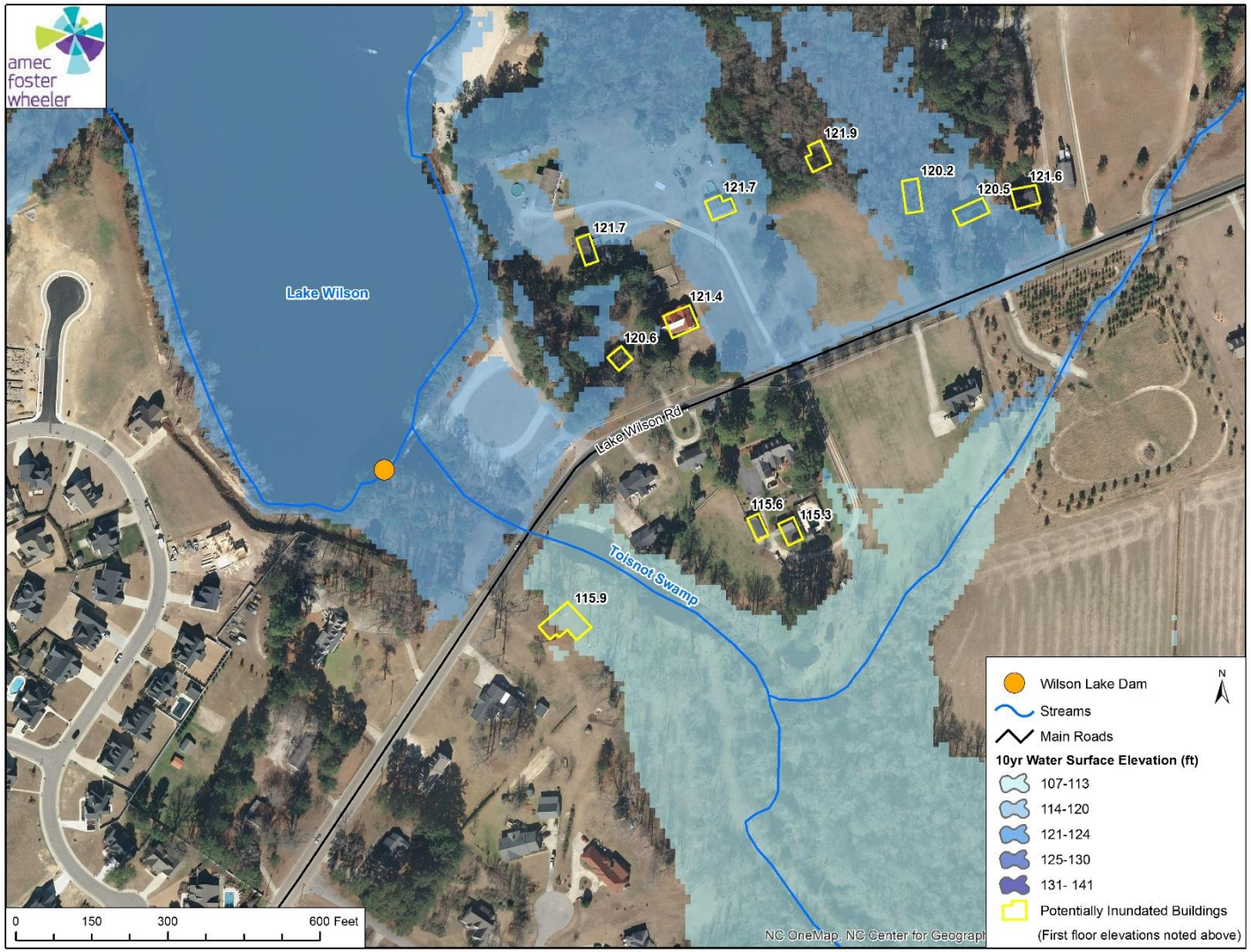
The estimated number and characteristics of buildings that could potentially be impacted by a failure of Lake Wilson Dam are shown in Table 3.26. Figure 3.15 shows the potential inundation area for a dam failure at Lake Wilson based on the 10-yr water surface elevation and first-floor elevations of the surrounding structures. **Note: the numbers presented in Table 3.26 and inundation area shown in Figure 3.15 are estimated based on the methodology described above. A dam inundation study including a hydrologic and hydraulic analysis was not performed.**

Table 3.26 - Properties Potentially at Risk to Lake Wilson Dam Failure

Occupancy Type	Total Number of Buildings in Estimated Inundation Area	Total Building Value	Estimated Content Value	Total Value	Estimated Total Damage (10-yr recurrence interval)	Loss Ratio
Residential	11	$999,388	$502,192	$1,501,580	$27,369	1.8%

Source: North Carolina Emergency Management, Risk Management, 2013

Citizens displaced from their homes due to a dam failure may require accommodations in temporary emergency shelters. An estimated 11 households may be displaced in the event of a Lake Wilson dam failure. Using the 2009-2013 U.S. Census household factor for the City of Wilson (2.49), an estimated 28 people could seek shelter.



Source: North Carolina Emergency Management, Risk Management, 2013

Figure 3.15- Potential Inundation Map for Lake Wilson Dam

3.4 Capability Assessment

Table 3.27 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City of Wilson.

Table 3.27 - Regulatory Mitigation Capabilities

Regulatory Tool (ordinances, codes, plans)	Y/N	Date	Comments
Comprehensive Plan	Y	2010	Comprehensive Plan 2030
Zoning Ordinance	Y	2013	City of Wilson Unified Development Ordinance (UDO)
Subdivision Ordinance	Y	2013	City of Wilson UDO
Floodplain Ordinance	Y	2013	City of Wilson UDO
Stormwater Ordinance	Y	2013	City of Wilson UDO
Erosion, Sedimentation and Pollution Control Ordinance	Y	2013	City of Wilson UDO, City Code
Building Code	Y	2015	State of NC Building Code
BCEGS Rating	Y	2009	4 – Residential, 4 - Commercial
Stormwater Management Program	Y	2013	City of Wilson Manual of Specifications, Standards & design (MSSD), UDO, City Code Chap. 46 Article I & II
Site Plan Review Requirements	Y		Per Section 10.E.1 of the Zoning Ordinance
Capital Improvements Plan	Y	2015-2019	
Local Emergency Operations Plan	Y	2012	Wilson County Emergency Operations Plan
Flood Insurance Study or Other Engineering Study for Streams	Y	April 2013	FEMA Flood Insurance Study
Repetitive Loss Plan	Y	2015	Repetitive Loss Area Analysis
Elevation Certificates	Y		

3.4.1 Administrative/Technical Mitigation Capabilities

Table 3.28 identifies personnel responsible for activities related to mitigation and loss prevention in the City of Wilson.

Table 3.28 - Administrative/Technical Capabilities

Resource	Y/N	Responsible Department
Planner/Engineer with knowledge of land development/land management practices	Y	City of Wilson Planning & Development
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	Y	City of Wilson Planning & Development
Planner/Engineer/Scientist with an understanding of natural hazards	Y	City of Wilson Planning & Development
Personnel skilled in GIS	Y	City of Wilson Planning & Development
Full time building official	Y	City of Wilson Planning & Development
Floodplain Manager	Y	City of Wilson Planning & Development
Emergency Manager	N	
Grant writer	N	
GIS data – Hazard areas	Y	City of Wilson Planning & Development
GIS data – Critical facilities	Y	City of Wilson Planning & Development

Resource	Y/N	Responsible Department
GIS data – Land use	Y	City of Wilson Planning & Development
GIS data – Building footprints	Y	City of Wilson Planning & Development
GIS data – Links to Assessor's data	Y	City of Wilson Planning & Development
Warning Systems/Services	N	

3.4.2 Fiscal Mitigation Capabilities

Table 3.29 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 3.29 - Fiscal Mitigation Capabilities

Resource	Accessible/Eligible to Use (Y/N)
Community Development Block Grants	Y
Capital improvements project funding	Y
Authority to levy taxes for specific purposes	Y
Fees for water, sewer, gas or electric services	Y
Impact fees for new development	N
Incur debt through general obligation bonds	Y
Incur debt through special tax bonds	?
Incur debt through private activity bonds	Y