APPENDIX 1: FLOOD EMERGENCY

DESCRIPTION

The floodplain landscape is constantly being altered by natural and human forces. Natural erosion and sediment deposition occur, but human development affects the floodplain not only in areas of development, but also downstream.

Historically, people have always been attracted to water masses to live, recreate, and conduct business. Communities relied on the water for basic needs and transportation. Additionally, the floodplain's fertile soils make prime agriculture land. More recently, development has been spurred along coastlines because of aesthetic reasons and recreational values of the sites. The result of this recent shift in population is an increase in the amount of people who live in flood vulnerable areas.

The results of flooding can be catastrophic. All types of flooding are responsible for destroying industry, business, and residential structures. Objects such as cars, boats, and propane tanks are often displaced by floodwaters. Flood education is important due to the fact that floods often occur at night when it is difficult to see potential danger and warning time is limited.

Floods are part of the earth's hydrologic cycle that circulates water throughout the environment. Water enters the atmosphere by means of evaporation and transpiration. It is released onto the earth's surface by means of precipitation where it becomes surface water or groundwater. Sometimes when there is too much precipitation than an area can handle, a flood results.

Flooding occurs when normally dry land is inundated by fresh or salt water. The three main types of flooding are: riverine, coastal, and shallow.

A. Riverine Flooding

Riverine flooding occurs when a channel that carries water in and out of a watershed receives too much water and the excess flows over its banks and into the adjacent floodplain. Events in the watershed always affect the events and conditions downstream. Over the bank and flash flooding are the two types of riverine flooding. Over the bank flooding, the most common, occurs when excess water overloads the channels and flows out onto the floodplain.

B. Coastal Flooding

Coastal flooding is caused by hurricanes, nor'easters, and other severe storms. High winds and changes in air pressure push water towards the shore causing storm surge. This is covered more completely in Appendix 2 Hurricanes.

C. Shallow Flooding

Shallow flooding occurs in flat terrain where a lack of channels means water is unable to easily drain away. The problems that occur fall into three categories: sheet flow, ponding, and urban drainage.

- **Sheet Flow:** This occurs after an intense or prolonged rainfall, and lack of channels or soil infiltration causes the floodwater to spread out over a large area.

- **Ponding:** Ponding occurs when runoff collects in depressions and cannot drain out. These floodwaters do not flow away and will remain in temporary pools until they infiltrate into the soil, evaporate or are pumped out.

- **Urban Drainage:** Urban drainage consists of storm sewers, ditches, retention ponds, and other facilities constructed to carry off or store runoff. Systems were mainly built to handle runoff expected from a ten-year storm and when larger storms occur, runoff will occur. The result is backed-up sewers, overloaded ditches, and shallow flooding. Another urban drainage problem exists in areas that are protected by levees. These areas do not drain naturally, especially when levees block the runoff from the river.

D. Special Flood Hazards

There are three special flood hazards that do not fit in the above categories, but may be of interest in the Hampton Roads area. They are: closed basin lakes, uncertain flow paths, and dam breaks.

- **Closed Basin Lakes:** Closed basin lakes water level change according to the amount of rainfall they receive. This can become problematic when they receive too much rainfall and the water cannot drain off. Floodwaters may then stay up for extended periods of time making properties unusable or isolated. Septic fields can become unusable too.

- **Uncertain Flow Paths:** Sometimes after very large or rare floods, channels will change. This can easily be seen in alluvial fans that have numerous channels. After a flood, these channels may unpredictably change and can pose three hazards:

  - ✓ Velocity of floodwaters and the debris they carry
  - ✓ Sediment and debris deposited by the floodwaters
  - ✓ Potential for the channel to move across the fan during the flood

- **Dam Breaks:** A break in a dam can cause serious problems downstream because of the high velocities and large volumes of water released. A breach can occur within hours of the first signs of trouble, often leaving little or no time for evacuation. Dam breaks occur for one of three reasons:

  - ✓ The foundation fails due to seepage, settling or earthquake
  - ✓ The design, construction, materials or operation were deficient
  - ✓ Flooding exceeds the capacity of the dam's spillway

NFIP FLOOD STUDIES AND TERMINOLOGY

The National Flood Insurance Program (NFIP) is a federal program enabling property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. The City of Newport News participates in the NFIP.

Participation in the NFIP is based on an agreement between local communities and the Federal Government. The Federal Government will make flood insurance available throughout a community as a financial protection against flood losses, if a community adopts and enforces a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas. This agreement allows the community to participate in the National Flood Insurance Program.

A. Flood Study Terminology

The NFIP has completed flood studies for the Hampton Roads area. To be able to interpret these studies, one needs to understand the terminology. The following terms are necessary to understand the flood studies and flood maps: the base flood, the 100-year flood, Special Flood Hazard Area, and Base Flood Elevation.

- **The Base Flood:** The base flood is the common or ordinary flood one might expect to happen for the area in one out of 100 years. This is referred to as a one-percent annual chance flood, a national standard used by the NFIP and all federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development.
- **The 100-Year Flood:** The 100-year flood is another name for the one-percent annual chance flood. This does not mean that the flood will only come once in a hundred years. A 100-year flood could come twice in one year or a few times over the course of 100 years. It could also not come for more than 100 years. To avoid confusion, the NFIP uses the term “base flood”. All terms can be used interchangeably.
- **Special Flood Hazard Area and Base Flood Elevation:** The Special Flood Hazard Area (SFHA) is the base floodplain or the land area covered by the floodwaters of the base flood. The SFHA is the area where mandatory flood insurance purchase requirement applies and where NFIP’s floodplain management regulations must be enforced in order for the community to participate in the NFIP. The Base Flood Elevation (BFE) is the computed elevation to which floodwater is anticipated to rise during the base flood.

B. Flood Insurance Study (FIS)

The FIS includes and presents a community’s flood risk data for its specific watercourses, lakes, and coastal flood hazard areas. It delineates the SFHA, designates the flood risk zones, and establishes base flood elevations. This report and associated maps serve as a basis for rating flood insurance and regulating floodplain development. It is also the basis for carrying out other floodplain management measures. Included in the FIS is a report and the Flood Insurance Rate Map (FIRM).

The FIS looks at a community’s flood risk through detailed studies of each kind of flooding: Riverine, Coastal, and Shallow.

- Riverine Flooding: A computerized flood profile of the stream is first produced when starting a Riverine study. Then, the flood elevation data is transferred onto a topographic map. A floodway analysis is then completed, that identifies where encroachment by development will increase flood elevations.

- Coastal Flooding: The two components of coastal flooding that are considered in determining flood risk are storm surge and wave action. Storm surge is the water that piles up on the shore because of air pressure changes and strong winds. Wave action is the actual waves that are wind-driven, produce velocities and impacts that may cause significant structural damage. Surge without wave action is called the Stillwater flood elevation. If the wave action or wave crest elevation is then added, the result is the Base Flood Elevation (BFE).

- Shallow Flooding Studies: These studies are based on historic flood experience and a study of the topography. The result will be a base flood depth (in feet above ground).

FLOOD HISTORY OF NEWPORT NEWS

The topography of Newport News varies from mean sea level in the southern sections of the City (southeast community) to 70 feet above sea level in the northern sections. Most of the City is flat with an average elevation of about 20 feet above sea level. There are no protective barriers between the developed portions of the City and the surrounding waters. Consequently, any increases in the level of the Chesapeake Bay and the lower James River could produce tidal flooding in Southern Newport News.

Storm water from the City of Newport News is discharged into receiving waters and their tributaries by storm sewer outfalls that consist of pipes, improved channels, and natural drainage ways. There are over 500 storm sewer outfalls in the City that discharge into receiving waters and their tributaries. These include Salter's Creek, Skiffes Creek, Warwick River, James River, Back River, and Big Bethel Reservoir. A drainage collection system of pipes, curb inlets, yard drain inlets, culverts, channels, natural ravines, and storm water ponds comprise the City's drainage system. Lee Hall and Skiffs Creek Reservoirs are part of the 100-year floodplain. Streets crossing these reservoirs can be subject to flooding during a 100-year storm. Interstate 64 is an evacuation route that crosses Lee Hall reservoir, and has experienced a closure during Hurricane Floyd due to floodwaters.

Records of floods have been kept in southeast Virginia since the first settlers arrived. One of the earliest recorded floods was the "the Great Flood of 1771". It was reported that the James River rose continuously for 60 hours, sometimes as much as 16 inches per hour.[1] Widespread destruction was reported along the James, the Rappahannock, and the Roanoke in particular, and 150 people lost their lives.

The City of Newport News has experienced many different types of flooding during hurricanes, tropical storms, nor'easters, and severe thunderstorms. Coastal flooding can occur in the City during the passage of a hurricane or during the passage of a nor'easter. Some hurricanes are more of a rain event than a wind event. During a rain event, the City will experience shallow flooding, but during a wind event, surge will be more of a problem. Nor'easters occur from September to March and can last several tide cycles. This can cause substantial flooding resulting in damage and loss of life. Severe thunderstorms can produce heavy rainfall that can result in shallow flooding and flash flooding.

The Flood Insurance Rate Map (FIRM) of Newport News (Tab A) shows flood risk zones and base flood elevations. The Special Flood Hazard Areas on FIRM are shaded zones identifying areas that have a 1% chance of being flooded in any given year from severe storms (this is the so called "100 Year Flood"). These areas are designated by Zones A, AO, AH, A1-30, AE, A99, M, V, V1-30, and VE. "A" Zones are those areas that might expect flooding without wave action, whereas "V" Zones might expect wave action with flooding. The numbers after Zones A and V 1-30 are codes representing the difference between anticipated "10" and "100" Year flood water levels.

[1] Retrieved on July 2007 from National Weather Web Site http://www.erh.noaa.gov/er/lwx/historic-events/va-floods.html

Three recent examples of flooding in Newport News

1. Hurricane Floyd – September 1999

Flash Flood Event

Hurricane Floyd was already downgraded to a tropical storm when it passed over Newport News. This did not mean that it did not cause considerable damage. The storm stalled and dropped almost 17 inches of rain on the City before and during the peak storm tide, causing flash flooding. The rainfall produced in a single two-day event was equivalent to over four months of rain. Flooding during Floyd was caused by drainage systems being overwhelmed, blockages of major culverts, 500-year storm event, and the proximity to 100-year flood plain.

Total public and private storm damage was estimated at 32 million dollars. A total of 281 homes were destroyed and 696 experienced major damage. Sixteen (16) residential areas reported flooding.

The flooding of Interstate I-64 is of major concern because it is an evacuation route. The areas of Newport News that flooded during Hurricane Floyd include:

- ***Warwick Boulevard:*** Warwick River crossing, Skiffs Creek Reservoir crossing, Lucas Creek (Eastwood Dr.) crossing
- ***Interstate I-64:*** Lee Hall Reservoir crossing, Jefferson Avenue interchange
- ***Jefferson Avenue*****:** Jones Run crossing, Lee Hall Reservoir crossing
- Major sections of the ***Southeast Community*** (100-year floodplain)
- Newmarket Area – ***City Line Apartments*** (100-year floodplain)
- North Hilton
- Residential areas near Jones Run
- Windsor Great Park area east of Stoney Run Creek
- Kiln Creek - Dunhill and Edgewater developments
- Great Oaks development located near Oyster Point

2. Hurricane Isabel - September 2003

Coastal Flooding Event

Hurricane Isabel was just below a category one hurricane when it roared through Newport News. Unlike Hurricane Floyd, Isabel did not produce an enormous amount of rainfall (3.7 inches). Isabel did; however, have storm surge that was measured at 7.9 feet above mean low water at Sewell's Point in Norfolk. The low pressure and winds actually pushed water into the Chesapeake Bay and rivers, causing record surge as you went further up river and the Chesapeake Bay.

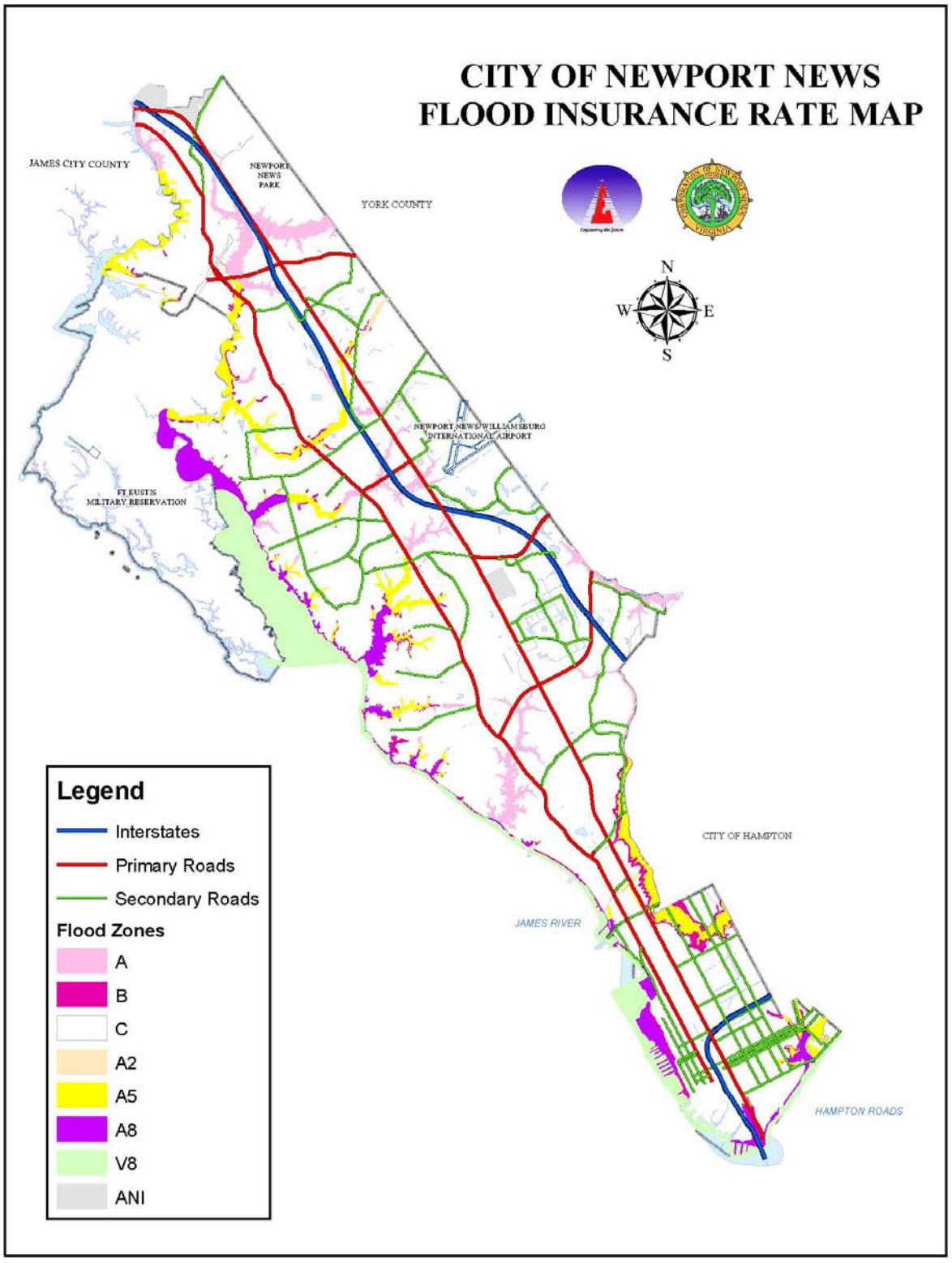
The tidal flooding that took place in the City of Newport News during Hurricane Isabel was mostly in the Salter's Creek floodplain. The 000, 100, 200 and 300 blocks of Sycamore, Buxton and Popular Avenues experienced flooding. Rapidly rising and swift moving floodwaters from Salter's Creek joined forces with the overflow from Hampton Harbor to create more flooding.

3. Thunderstorms, May 19 and May 22, 2004

Flash Flood Event

The event on the 19th occurred between 4:40 pm and 6:30 pm. There were two to three feet of water on portions of Warwick Boulevard between 36th and 50th Street, high water at Center Avenue and Jefferson Avenue, and underpasses along Main Street and Center Avenue.

On the 22nd a thunderstorm caused localized flooding at Flint Drive and Tillerson Drive. This event lasted from 12:45 am until 1:15 am.


CITY OF NEWPORT NEWS
FLOOD INSURANCE RATE MAP
JAMES CITY COUNTY
NEWPORT NEWS PARK
YORK COUNTY
N
W
E
S
NEWPORT NEWS/WILLIAMSBURG INTERNATIONAL AIRPORT
FT EUSTIS MILITARY RESERVATION
CITY OF HAMPTON
JAMES RIVER
HAMPTON ROADS
Legend
Interstates
Primary Roads
Secondary Roads
Flood Zones
A
B
C
A2
A5
A8
V8
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