

HOUSE SELECT COMMITTEE ON DISASTER RELIEF

APRIL 16, 2018 – 2:00 PM



U.S. 70 CORRIDOR COMMISSION NEUSE RIVER FLOOD MITIGATION

Currently there are two (2) parallel studies on-going as a follow-up to Matthew.

North Carolina Emergency Management – Risk Management Division is charged with Flood Analysis and Mitigation Strategies for three (3) river basins: Tar, Neuse & Lumber. All of these are equally important, but I am personally involved through the U.S. 70 Corridor Commission with the Neuse River Study. Engineering Consultant, AECOM has been employed to aid in their studies. NCDOT has initiated a study of the U.S. 70 Corridor along the Neuse River Basin and have engaged the services of N.C. State University.

SLIDE 1

The first meeting of the NCEM – Risk Management was held on February 27, 2018. AECOM graciously provided this slide which defines the process and purpose of the study – and while I am giving credit, I will also give them credit for the error. The date is February 27, 2018 not 2017. I did not think you wanted to hear that another year passed before action was taken.

SLIDE 1

Neuse River Basin Flood Analysis and Mitigation Strategies Study

Meeting 1
February 27, 2017



Flood Study Analysis and Mitigation – Purpose / Partners

The primary purpose / objectives of this project is to:

- Research primary causes and magnitude of flooding
- Calculate the impacts of flood frequencies on: Built Environment; Living Environment; and Economy.
- Identify and Assess Mitigation Strategies
- Assess short and long term benefits to costs of Mitigation Strategies
- Provide Potential Solutions

The Study / project utilizes the following partners to widely communicate results and gain valuable input and feedback:

- NC DPS – Emergency Management
- NC Department of Transportation
- Impacted County Governments and Municipalities
- ACOE
- NC Department of Commerce
- NC Department of Agriculture and Consumer Services
- Engaged Stakeholders and Non-Profits
- Informed: Congressional and Legislative Representatives

SLIDE 2

The second slide states the Purpose and Study Methodology

Meeting 1 Purpose

Introduce Study Purpose and Methodology

Provide Basin History and Profile

Present Modeling Approach

Provide Flooding Impacts Summary

Introduce Potential Mitigation Solutions



Study Methodology

Research Basin Profile

Perform Trend Analyses

- Population, Land Cover, Climate

Create Baseline Modeling

- Calibrate / Validate to Matthew
- Model Additional Flood Severities



Calculate Impacts

- Building Level Damages
- Roadway Overtopping Susceptibility

Develop Mitigation Project Options

Evaluate Mitigation Project Performance

- Benefits
- Costs

SLIDE 3

- The primary purpose of the Three Studies is to:
 1. Research primary causes and magnitude of flooding.
 2. Calculate the impacts of flood frequencies on the built and living environments, and on the economy.
 3. Identify and assess possible mitigation strategies.
 4. Assess short and long-term benefits to costs of each possible mitigation strategy.
 5. Provide potential solutions based on such analysis.

SLIDE 4

- Eleven (11) mitigation options are initially considered for each of the basins. Several have been further analyzed. These include:
- New wet and dry detention structures
- Channel diversion, dredging;
- Roadway Elevation/Clearing Spanning
- Community – Buyouts/Elevation/Relocation

SLIDE 5

The second meeting of the NCEM was last week on April 11.

Neuse River Basin Flood Analysis and Mitigation Strategies Study



Meeting 2
April 11, 2018

Flood Study Analysis and Mitigation – Purpose / Partners

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- Research primary causes and magnitude of flooding
- Calculate the impacts of flood frequencies on: Built Environment; Living Environment; and Economy
- Identify and Assess Mitigation Strategies
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- Provide Potential Solutions

The Study / project utilizes the following partners to widely communicate results and gain valuable input and feedback:

- NC DPS – Emergency Management
- NC Department of Transportation
- Impacted County Governments and Municipalities
- Army Corps of Engineers
- NC Department of Commerce
- NC Department of Agriculture and Consumer Services
- Engaged Stakeholders and Non-Profits
- Informed: Congressional and Legislative Representatives

SLIDE 6

Meeting 2 Purpose

- Overview Mitigation Strategies Considered
- Present Specifics of Mitigation Strategies Analyzed
- Present Benefit/Cost Results of Mitigation Strategies Analyzed
- Provide Justification for Mitigation Strategies not Pursued



Study Methodology



SLIDE 7

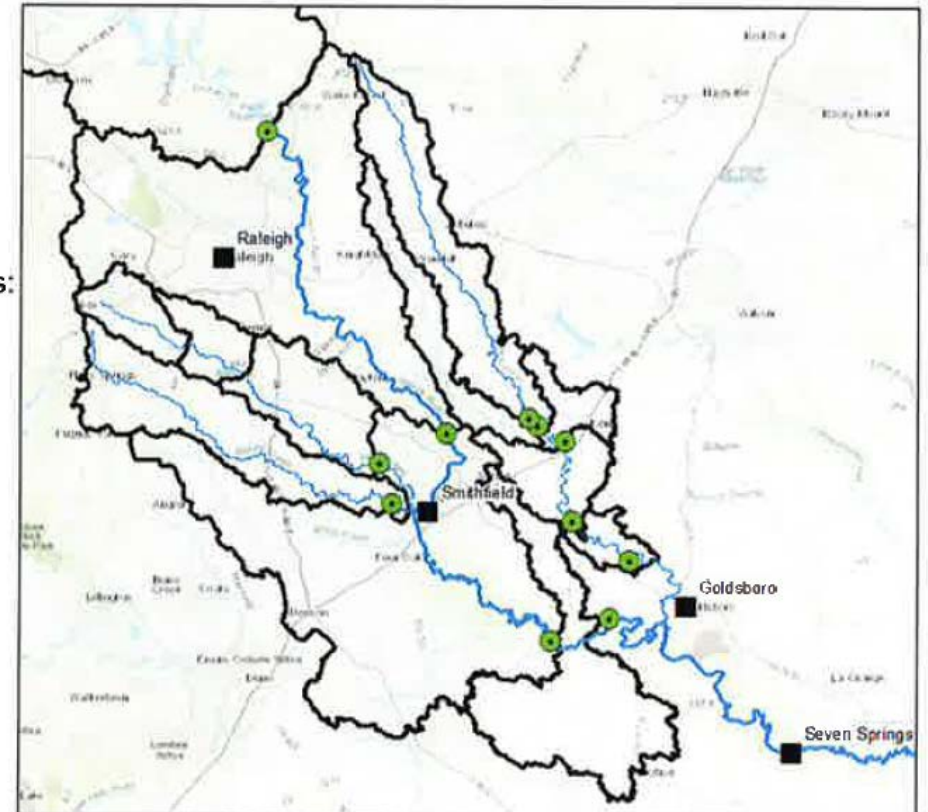
Mitigation Options Master List

- | | |
|--|--|
| 1. New Detention Structure(s) | 7. Roadway Elevation / Clear Spanning |
| 2. Existing Detention Retrofit/Enhancement | 8. Large Scale Wet Flood Proofing |
| 3. Offline Storage | 9. Community Buyouts/Elevation/Relocation |
| 4. Channel Modifications | 10. Land Use / Impervious Restrictions |
| 1. Diversion | 11. River Corridor Greenspace Implementation |
| 2. Dredging | |
| 3. Lining | |
| 5. New Embankment Structure | |
| 6. Existing Levee Repair/Enhancement | |

Option: New Detention Structures

Initial Investigation
Considered 10 sites:

- 3 on Mainstem
- 5 on Little River
- 1 Middle Creek
- 1 Swift Creek

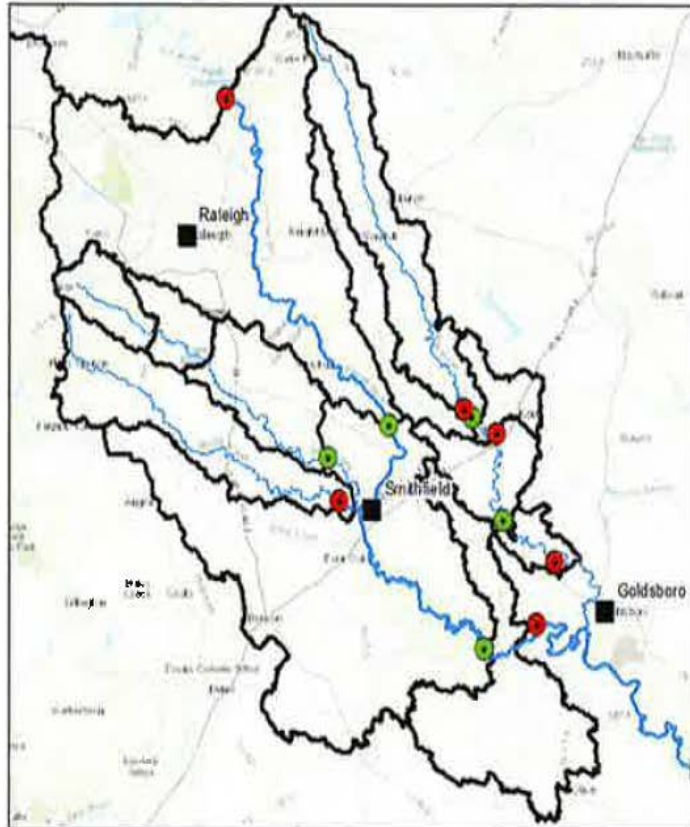


SLIDE 8

Option: New Detention Structures

Analyzed 4 scenarios with best feasibility including dams at:

- Wilsons Mills
- NU-2
- Swift Creek
- Beulahtown
- Bakers Mill



New Detention Structures – Wet Detention

Wet Pond: Dam creates a permanent pool with flood storage above the pool but below the spillway. Considerations include:

- Recreation including fishing, boating, picnic areas, camping
- Potential for water supply to benefit municipal or agricultural needs
- Increased quality of life for surrounding population
- Increased property values adjacent to and in vicinity of the lake
- Eliminates wetlands in favor of open water. Wetland offset would be required
- Sedimentation is a concern



U.S. Army Corps of Engineers

SLIDE 9

New Detention Structures – Dry Detention

Dry Pond: No permanent pool. Only detains water during storm events and is typically evacuated in a controlled manner within a set amount of time.

- Allows for more flood storage
- Property can be available for other uses, e.g. soccer fields, open space parks, or lease back for agricultural purposes
- Maintains river connectivity and not as disruptive to natural condition as wet detention. This often results in less issues with permitting
- Less impact on fish and aquatic species
- Significantly less issues with sediment maintenance



New Detention Structures – Possible Scenarios

Scenario 1: Dry dam at Wilsons Mills and Bakers Mill, Wet dam at Beulahtown

Scenario 2a: Dry dam on mainstem at NR-2

Scenario 2b: Wet dam on mainstem at NR-2

Scenario 3: Dry dam at Wilsons Mills, Wet dams at Beulahtown and SC-1

Scenario 4: Dry dams at Wilsons Mills, Beulahtown, and SC-1

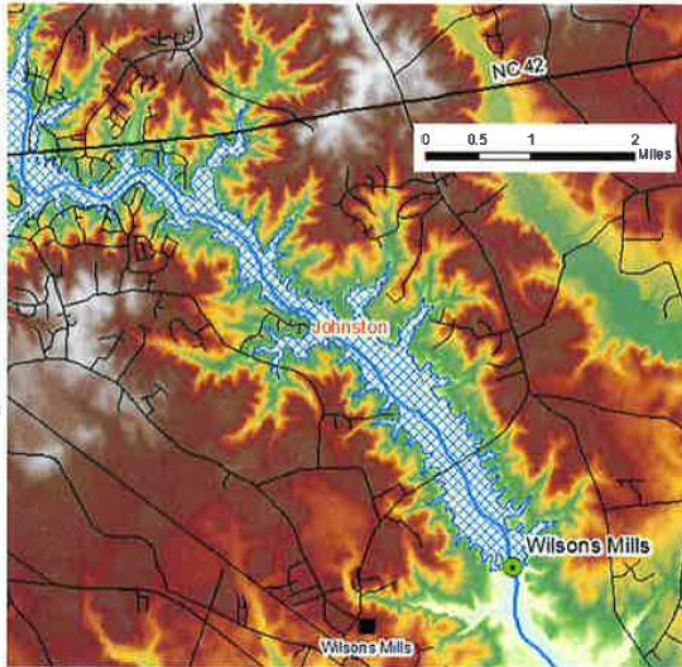


SLIDE 10

New Detention Structures – Wilson's Mills

Wilson's Mills

- In 1965 USACE Study
- Protection for Smithfield
- Heavily developed area
- 1.0 miles of road impacted
- 63 or 97 buildings acquired depending on dam configuration
- D.A. Approx. 400 sq. mi.*

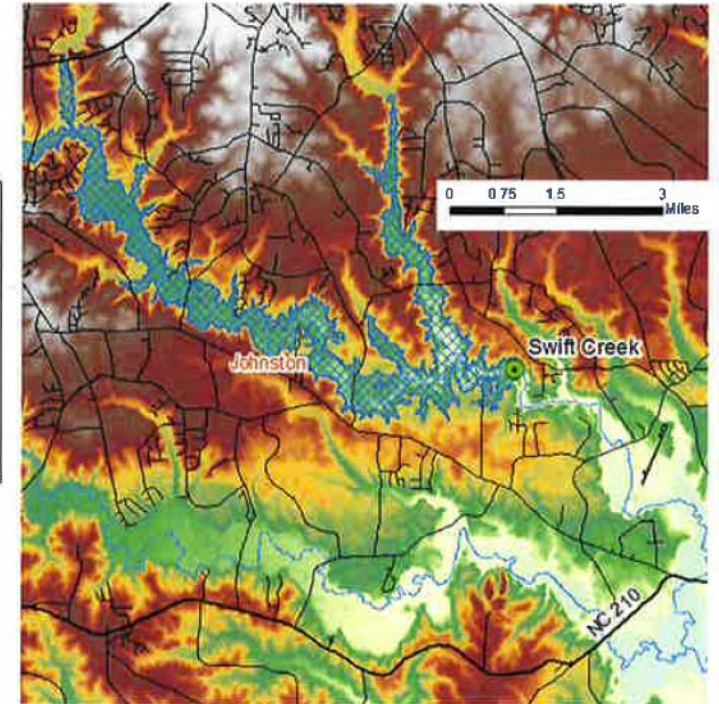


*Does not include area above Falls Lake Dam

New Detention Structures – Swift Creek

Swift Creek

- Provides some protection for Smithfield
- Heavily developed area
- Rapidly developing area
- 1.0 miles of road elevated
- 65 buildings acquired
- D.A. Approx. 140 sq. mi.



SLIDE 11

There will be three stakeholder meetings to gather relevant information from key community leaders and municipal staff about flooding and flood-related impacts in our communities.

The workshops will include presentations to review past flooding events, provide an update for on-going efforts of NC Emergency Management and to outline the proposed objectives and timeline for the study and implementation of flood mitigation measures.

SLIDE 11A

The workshops are scheduled as noted:

Kinston NC DOT Flood Study Stakeholder Meeting

When: Tuesday, April 17, 2018 – 9:00 am – 11:30 am Eastern Time

Where: Global Transpark
3800 Hwy 58 North
Kinston, NC 28504-7928
Room 148C

Smithfield NC DOT Flood Study Stakeholder Meeting

When: Monday, April 23, 2018 – 9:00 am – 11:30 am Eastern Time

Where: Town Hall Council Chambers
350 East Market Street
Smithfield, NC 27577

Goldsboro NC DOT Flood Study Stakeholder Meeting

When: Monday, April 23, 2018 – 2:00 pm – 4:30 pm Eastern Time

Where: Changed: Walnut Building, Room 101
Wayne Community College
3000 Wayne Memorial Drive
Goldsboro, NC 27534

- The final report from this study group is scheduled the week of April 25.

SLIDE 12

New Detention Structures – Scenario 1

Neuse Basin Study Area - Baseline			
Event	Buildings	Total Damages	
		Direct	Direct +Indirect
10-Yr	279	\$1,965,000	\$8,570,000
25-Yr	858	\$16,019,000	\$39,222,000
50-Yr	1,676	\$34,004,000	\$78,840,000
100-Yr	2,793	\$74,953,000	\$169,540,000
Matthew	3,662	\$186,413,000	\$439,901,000
500-Yr	5,572	\$328,463,000	\$739,393,000
1000-Yr	6,809	\$625,852,000	\$1,491,185,000

Neuse Basin Study Area – Scenario 1			
Event	Buildings	Total Damages	
		Direct	Direct +Indirect
10-Yr	159	\$377,000	\$630,000
25-Yr	453	\$4,504,000	\$13,118,000
50-Yr	960	\$15,576,000	\$36,656,000
100-Yr	1,772	\$33,551,000	\$80,378,000
Matthew	2,393	\$90,091,000	\$219,380,000
500-Yr	4,224	\$170,148,000	\$384,380,000
1000-Yr	5,096	\$273,751,000	\$624,644,000

New Detention Structures – Scenario 1

Neuse Basin Scenario 1 Losses Avoided			
Event	Buildings	Total Damages Avoided	
		Direct	Direct +Indirect
10-Yr	120	1,588,000	7,940,000
25-Yr	405	11,515,000	26,104,000
50-Yr	716	18,428,000	42,184,000
100-Yr	1,021	41,402,000	89,162,000
Matthew	1,269	96,322,000	220,521,000
500-Yr	1,348	158,315,000	355,013,000
1000-Yr	1,713	352,101,000	866,541,000

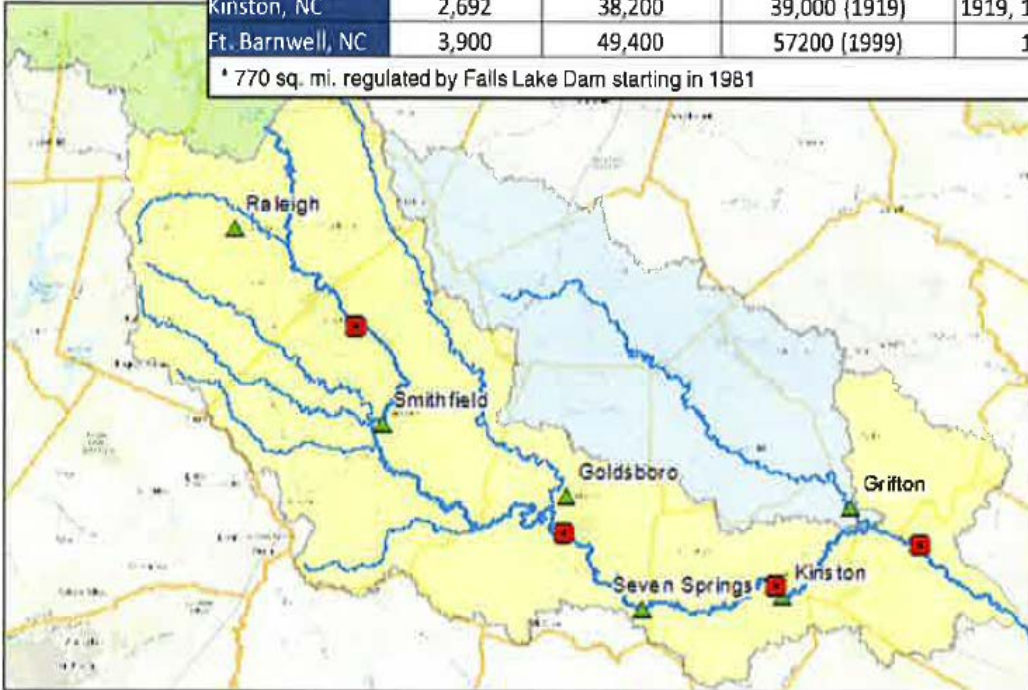
Neuse Basin Scenario 1 Losses Avoided			
Event	Buildings	Percent Damage Reduction	
		Direct	Direct +Indirect
10-Yr	43%	81%	93%
25-Yr	47%	72%	67%
50-Yr	43%	54%	54%
100-Yr	37%	55%	53%
Matthew	35%	52%	50%
500-Yr	24%	48%	48%
1000-Yr	25%	56%	58%

SLIDE 13

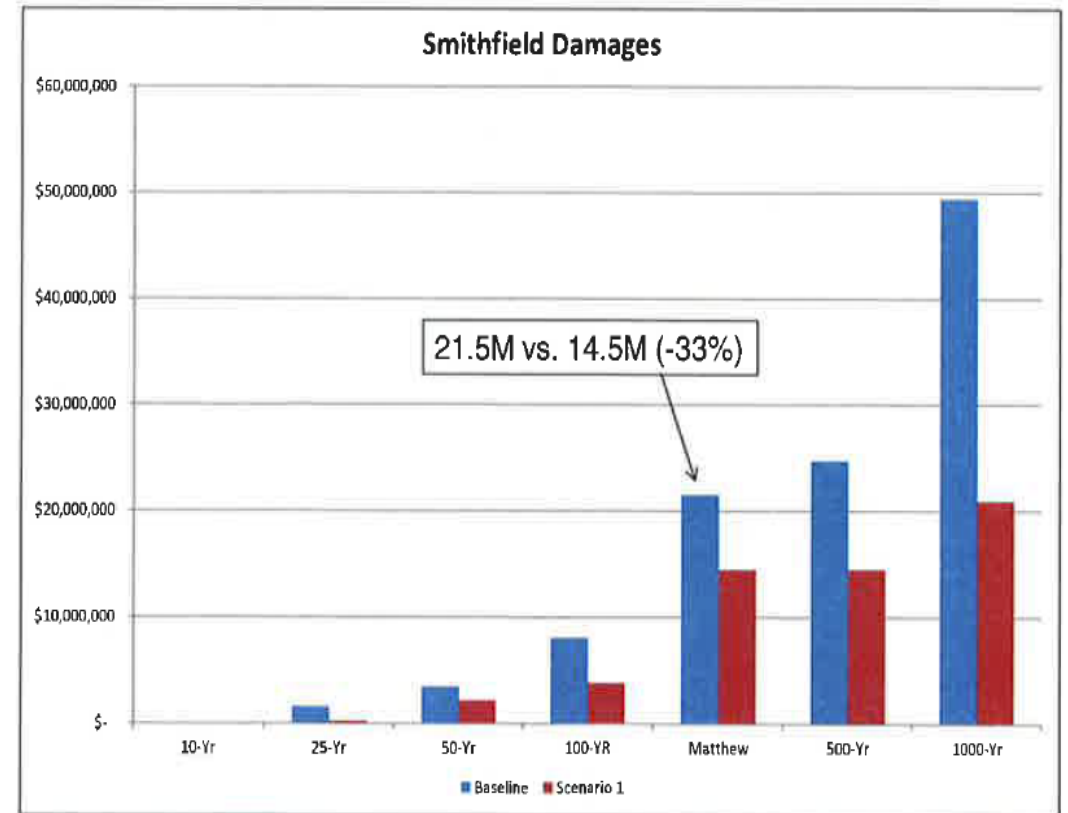
New Detention Structures

Location	Drainage Area (sq. mi.)*	Peak Matthew Discharge (cfs)	Previous Peak Discharge (cfs)	Years of Record*
Clayton, NC	1,150	20,200	21,200 (1919)	1919, 1928-2017
Goldsboro, NC	2,399	54,800	38,500 (1929, 1999)	1929-2017
Kinston, NC	2,692	38,200	39,000 (1919)	1919, 1925, 1928-2017
Ft. Barnwell, NC	3,900	49,400	57,200 (1999)	1997-2017

* 770 sq. mi. regulated by Falls Lake Dam starting in 1981

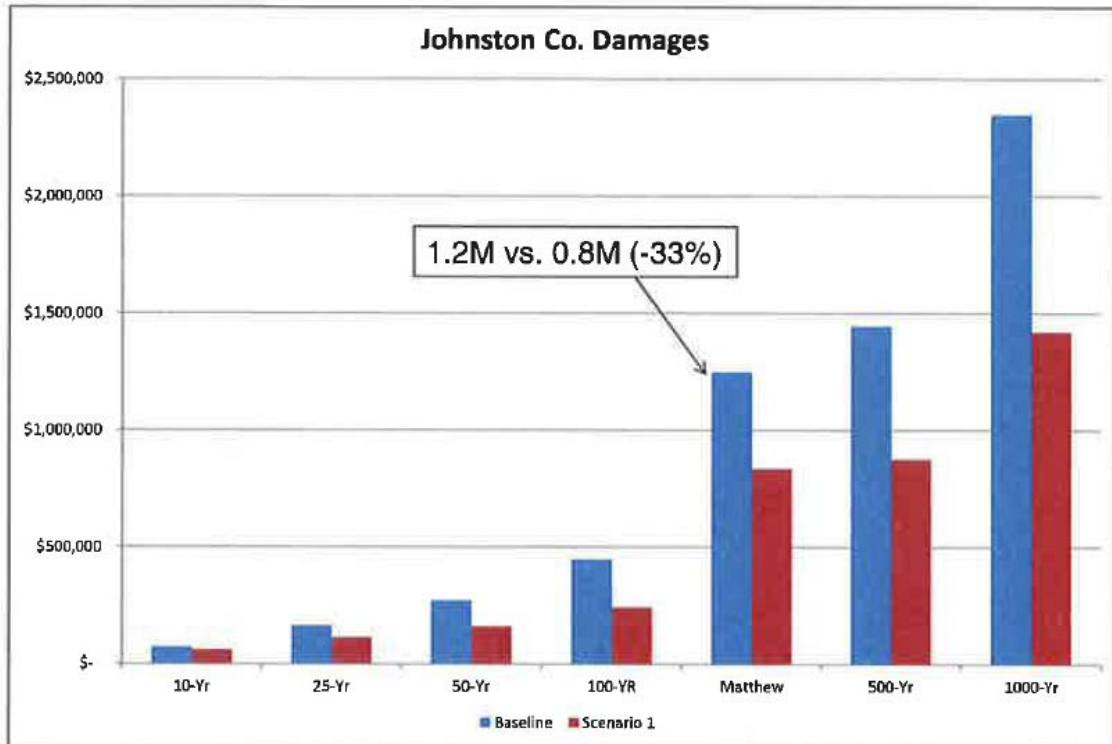


New Detention Structures – Scenario 1

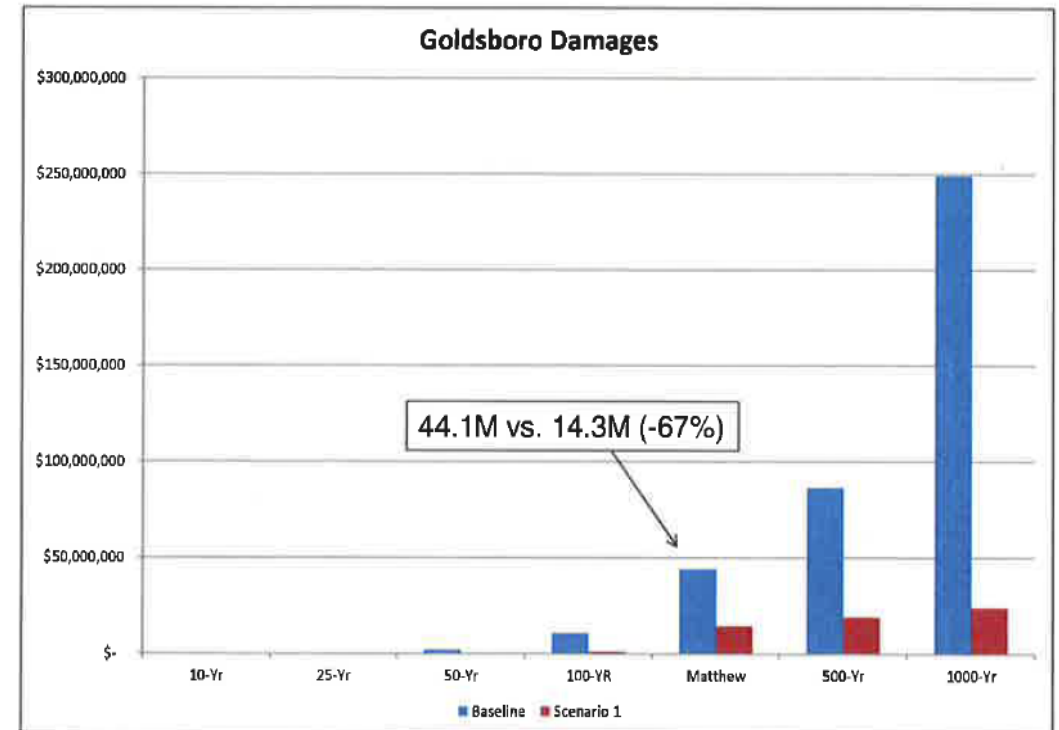


SLIDE 14

New Detention Structures – Scenario 1

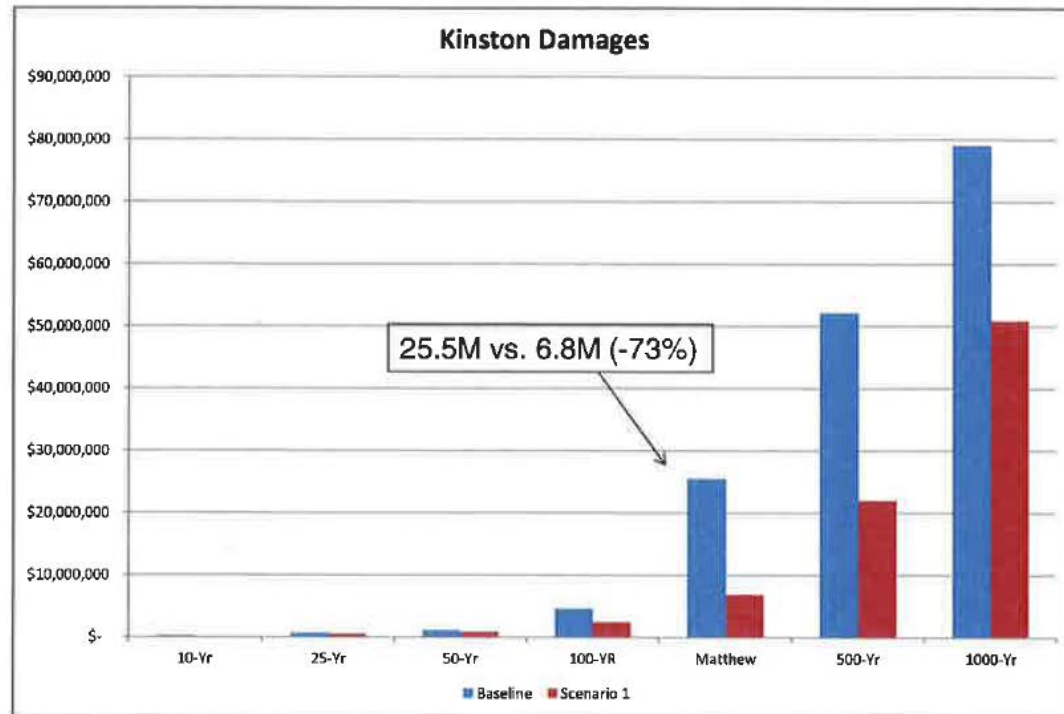


New Detention Structures – Scenario 1

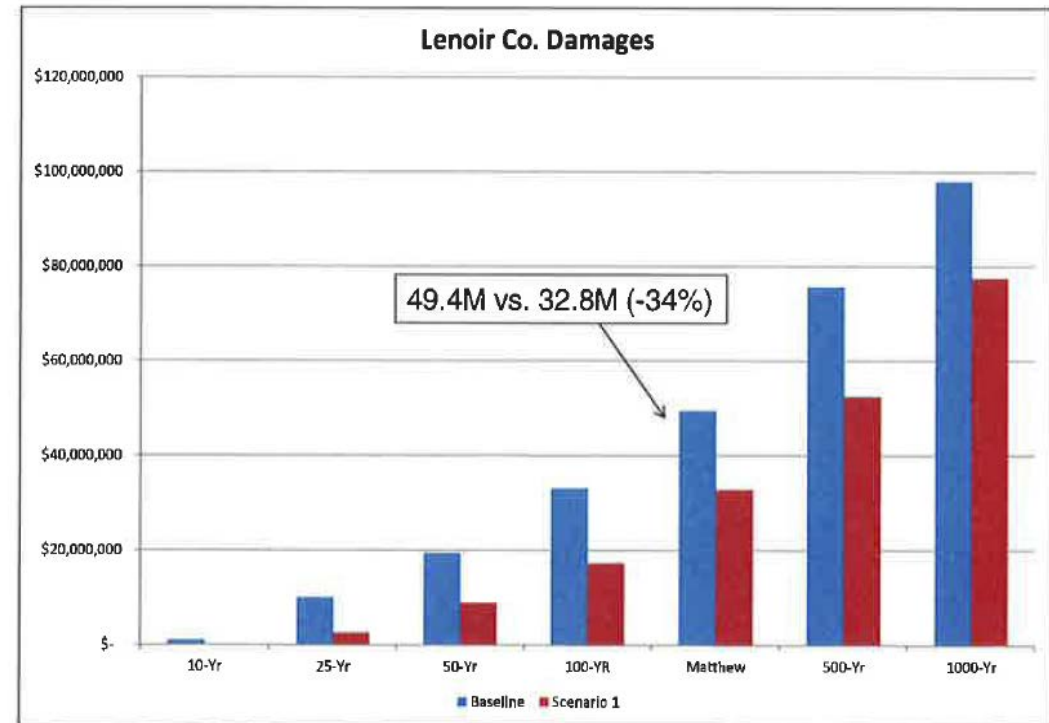


SLIDE 15

New Detention Structures – Scenario 1

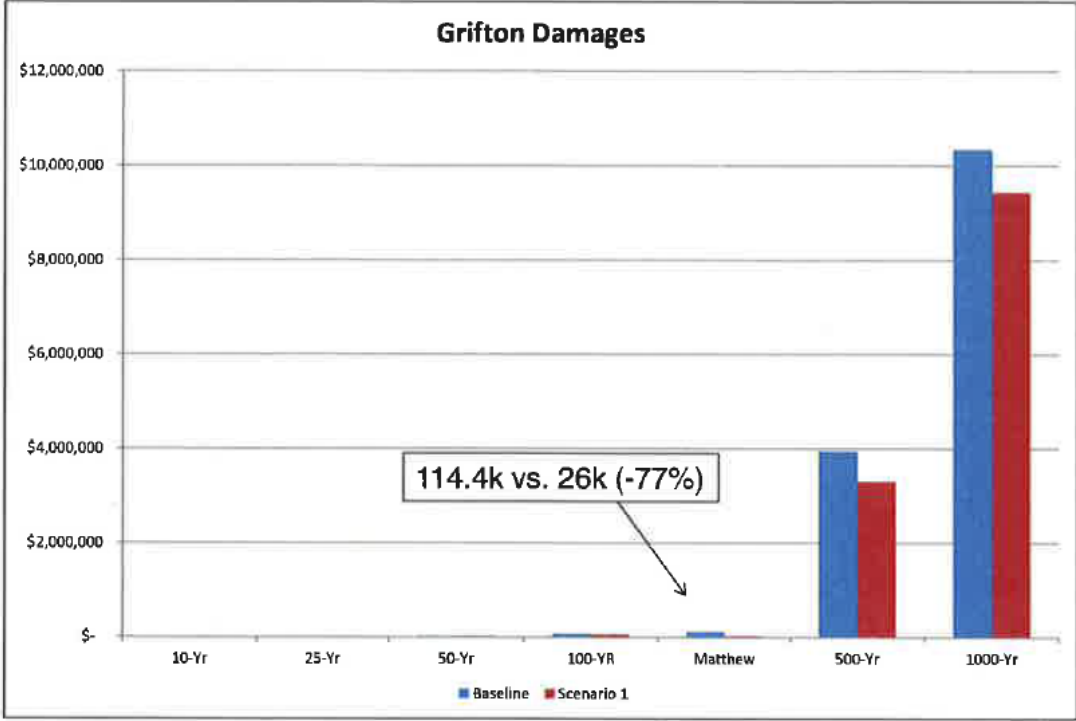


New Detention Structures – Scenario 1

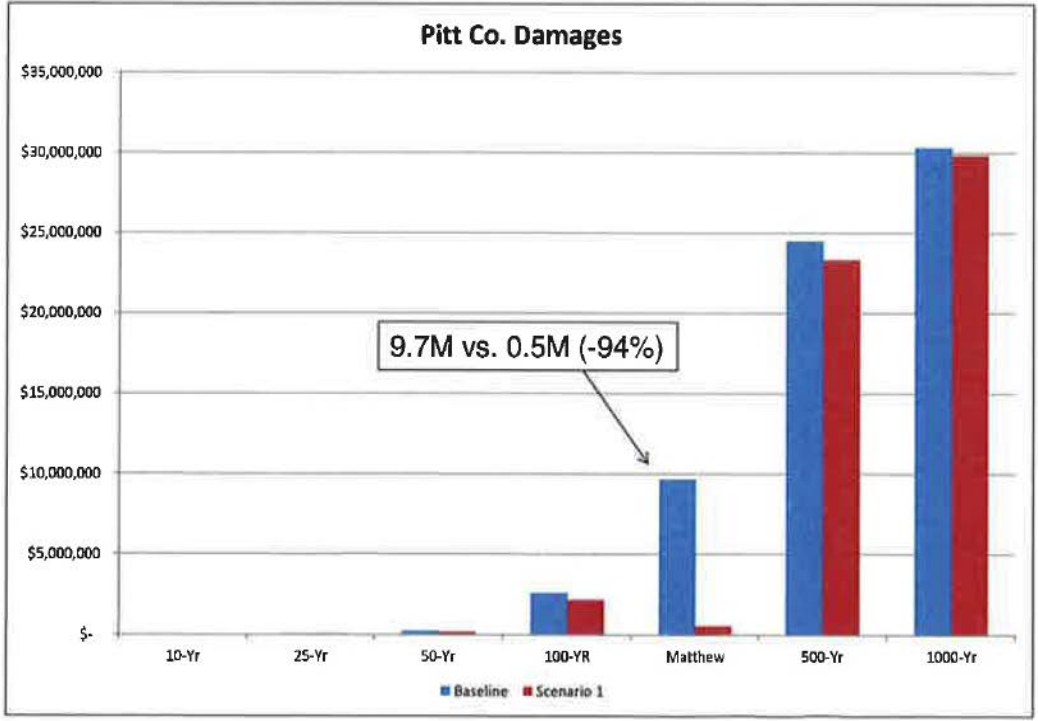


SLIDE 16

New Detention Structures – Scenario 1

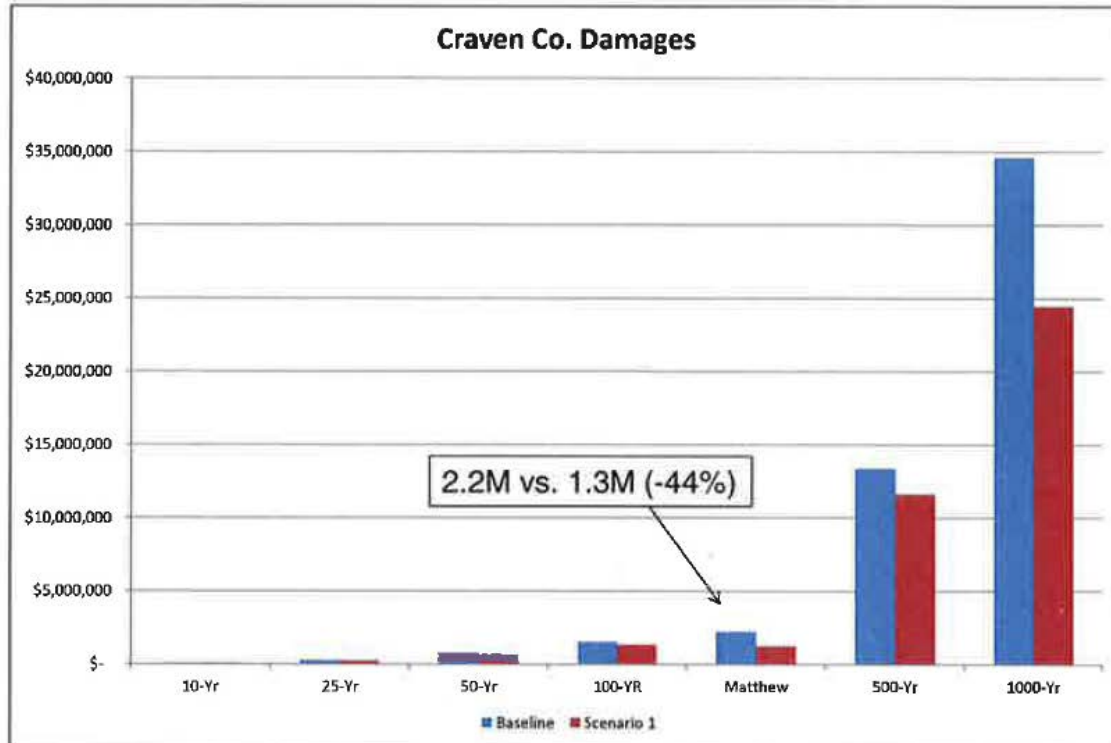


New Detention Structures – Scenario 1



SLIDE 17

New Detention Structures – Scenario 1



New Detention Structures – Scenario 1

- Costs Considered: Property Acquisition, Design/Construction, Road Impacts, Environmental Impacts, Operation and Maintenance
- Benefits considered: Direct and Indirect losses avoided, Recreational benefits, Land leasing potential
- Items for future consideration: Municipal and agricultural water supply, permitting, losses avoided for agriculture and properties on Little River.

	Wilsons Mills	Beulahtown	Bakers Mill
Property Acquisition	\$ 27,822,000	\$ 32,031,000	\$ 15,075,000
Design/Construction	\$ 23,200,000	\$ 24,110,000	\$ 20,500,000
Environmental Impacts	\$ 0	\$ 11,114,000	\$ 0
Maintenance/yr.	\$ 20,000	\$ 150,000	\$ 20,000
Road Impacts	\$ 10,236,000	\$ 23,381,000	\$ 8,288,000
Property Value Increase	\$ 0	\$ 10,681,000	\$ 0
Tax Revenue Change/Yr.	\$ (-228,000)	\$ (-187,000)	\$ (-73,000)
Lease Benefit/Yr.	\$ 78,000	\$ 220,000	\$ 149,000

Recreation Benefits		
Site	30Y Benefit	50Y Benefit
Beulahtown	\$ 43,900,000	\$ 50,900,000

New Detention Structures - Scenario 1							
Time Horizon	Costs		Losses Avoided		Other Benefit	Benefit Cost Ratio	
	Initial Cost	Maintenance	Direct	D + I		Direct	D + I
30 Year	\$ 195,757,000	\$ 5,700,000	\$ 71,934,000	\$ 168,448,000	\$ 53,351,000	0.62	1.10
50 Year	\$ 195,757,000	\$ 9,500,000	\$ 119,890,000	\$ 280,746,000	\$ 59,531,000	0.87	1.66



The other Flood Mitigation Study initiated by N.C. Department of Transportation in partnership with N.C. State University as scheduled:

- Spring 2018 – Characterizing basin, inventory of infrastructure, stakeholder outreach
- Summer/Fall 2018 – Conduct local modeling, validation, progress report
- Winter 2019 – Access abatement measures, stakeholder outreach
- Spring 2019 – Final Report

U.S. ARMY CORPS OF ENGINEERS

1965 STUDY (MAY 17, 1965)

NEUSE RIVER BASIN

Purpose

FLOOD CONTROL
WATER SUPPLY
RECREATIONAL USES

Cost Benefit Analysis Ratio 3.3
Now Best Is 1 or Lower
53 years of Development
Expanded Impervious Areas

Recommends 13 Dams/Reservoirs
Included Falls of Neuse Dam (Water Supply)
Only 2 constructed: Falls of Neuse & Buckhorn Reservoir (Wilson County)
Study Area Map Attached

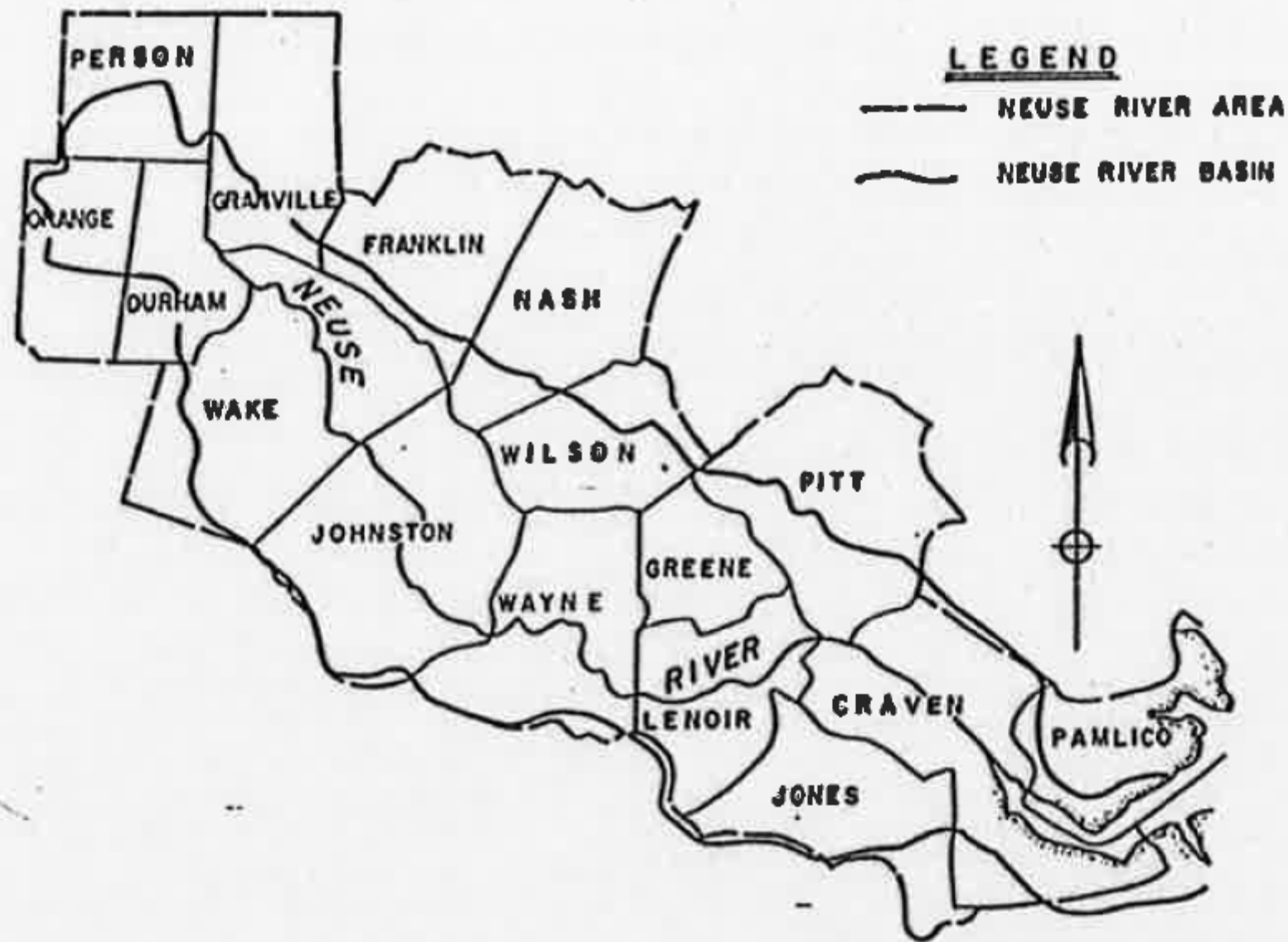


FIGURE 1. NEUSE RIVER AREA IN RELATION TO NEUSE RIVER BASIN

Slides, Graphs & Research Data

Courtesy of:

**North Carolina Emergency Management – Risk
Management**

&

AECOM, Consulting Engineers

THANK YOU!