



Loss Avoidance Studies: Quantifying the Benefits of Mitigation

Matt McCullough, Community Planner, FEMA Region III

Robbie Coates, Disaster Grants Manager, Virginia Department of Emergency Management (VDEM)



FEMA

September 26, 2018



Webinar Housekeeping

- **Attendees may be muted to reduce background noise.**
 - Please do NOT put your phone on “hold”, it plays the hold music for everyone else on this call.
 - If you have to step away, mute your phone or hang up and rejoin the call later.
- **Use “Chat” panel to ask questions so that we can end on time**
 - The chat will be open for 10 minutes following the training.
- **The PowerPoint slides will be emailed to participants afterwards**
- **You may be eligible for Professional Credits**
 - American Institute of Certified Planners (AICP) Self - Reported Certification Maintenance Credit
 - Association of State Floodplain Managers (ASFPM) Certified Floodplain Manager (CFM) Continuing Education Credit
 - Participation certificates and agendas will be sent by request to all participants who attend the whole session and participate in the polls.



Welcome and Overview

- Background
- Loss Avoidance Studies
- Benefit Cost Analyses
- Virginia Experience
- Questions
- Close Out



Region 3 2018 Coffee Breaks

November Leveraging your HMP to Do More

Today Quantifying the Benefits of Mitigation

July Connecting to Local Plans

May Risk Assessment

March Grant Applications and Scopes

January Developing Natural Hazard Mitigation Strategies



Building on Expectations

Previous Coffee Break



Integrating Your Long Range Vision with your Hazard Mitigation Plan

Matt McCullough, Community Planner, FEMA Region III
Deepa Srinivasan, AICP, CFM, Founder and President, Vision Planning and Consulting (VPC), LLC
Andrew Estrain, Hazard Mitigation Planner, Vision Planning and Consulting (VPC), LLC
Jason Farrell, Deputy Mitigation Planning Lead, CERC Region III



July 25, 2018



Polling Question #1

How recently have you conducted a loss avoidance study?

- More than five years ago
- In between one and five years ago
- Within the past year
- Currently conducting one
- Have one funded for the future
- Never done one



What is a Loss Avoidance Study?

- Looks at completed mitigation projects after a disaster to see how well the projects worked
- Quantifies the benefits of mitigation in dollars
- “Loss avoidance” = costs that would have been incurred in a disaster but weren’t because of mitigation. Damage and expense prevented.



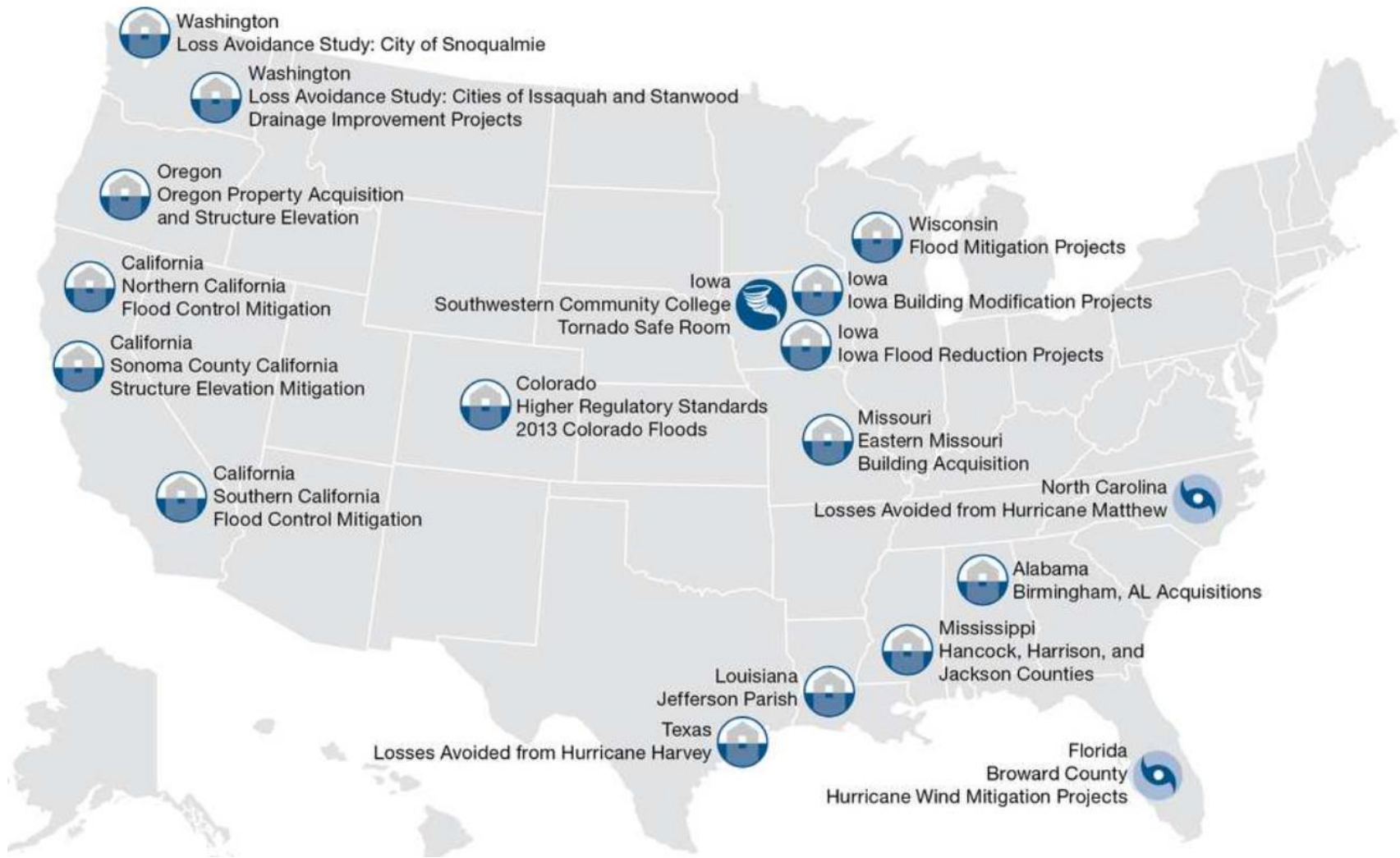
Kinston, North Carolina, on October 14, 2016.
FEMA News Photos

Photos from
loss
avoidance
study for
Hurricane
Matthew
in NC



FEMA Loss Avoidance Studies

<https://www.fema.gov/hmgrp-loss-avoidance-studies>



National Study: Value of Mitigation

- Federally funded mitigation can save \$6 in future costs for every \$1 spent.
- Exceeding international building codes can save \$4 for every \$1 spent.
- Public-sector mitigation for flooding – saves \$7 for every \$1 spent.
- www.nibs.org



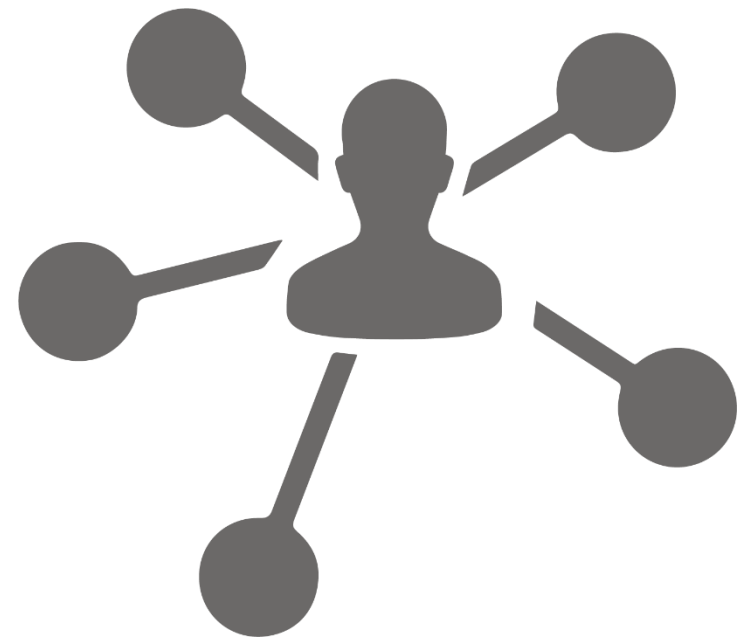
National Institute of
BUILDING SCIENCES

Natural Hazard Mitigation Saves:
2017 Interim Report



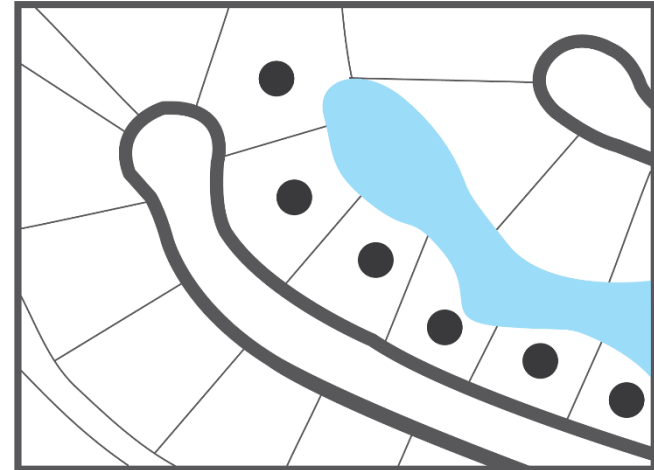
Connecting HMPs, BCAs, and LASs

- **The Hazard Mitigation Plan sections on capabilities, risk assessment, and mitigation actions are all areas to consider:**
 - What risk are we decreasing?
 - What bad are we preventing?
 - What value is provided to the community?
- **This impacts and can become talking points for Capital Improvements Budget discussions, Long Term Planning, and identifying potential funding sources and partnerships.**



Why do a Benefit Cost Analysis?

- FEMA grants have to show BCA cost effectiveness (aligned with Circular A-94).
- Opportunity in Capital Improvement Budget and Long Term Planning Discussions
- With more data available, more opportunities to highlight benefits of mitigation and strengthen the cases you're already making.
- Some grants allow collaboration and cross-grant coordination as long as all requirements are met for both/ all. Allows for holistic thinking around what is best for the community.



Robbie Coates



Robbie Coates

Grants Manager, Disaster Programs

State Hazard Mitigation Officer

Virginia Department of Emergency Management



Purpose for Loss Avoidance Studies

- To be able to measure performance of implemented projects, such as those funded through FEMA hazard mitigation assistance grants.
- To be able to demonstrate the **true value** of mitigation in terms of \$\$ saved, as to promote even more future investment in risk reduction activities.
- It is required for enhanced status for state hazard mitigation plans, which increases post-disaster HMGP funds from 15% to 20% (1/4 extra)



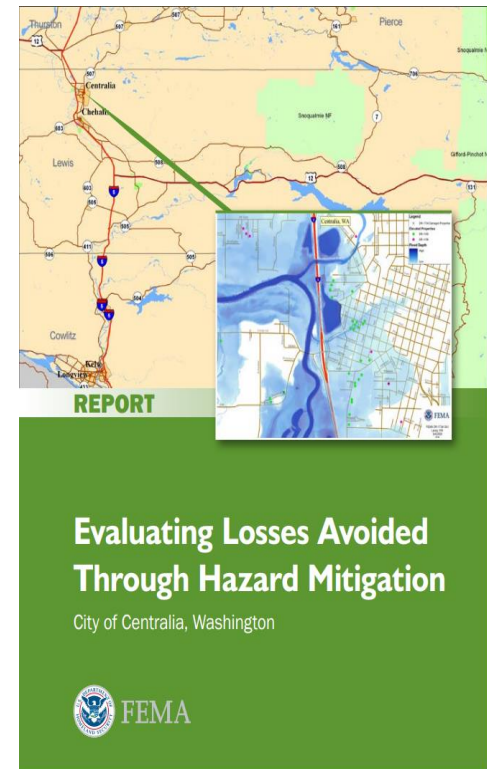
How to Pick a Good Location for a Loss Avoidance Study?

- Target areas where there is known mitigation activity, and an event has occurred after the project has been completed
- Target areas where there is a high water mark from the said event, or where the local government has documented the high water mark (this may be from a quote or verbal verification from a local official)
- Target areas where you have good pre-project and post-project data, such as elevation certificates and final project costs
- Will require coordination with the local governments



What Has Been Done in Virginia?

- Southampton County, Virginia – 20 properties
 - Gloucester County, Virginia – 6 properties
 - City of Franklin, Virginia – 10 properties
 - City of Poquoson, Virginia* – 17 properties
-
- The methodology used was based on a FEMA initiated study in Centralia, Washington



**City of Poquoson's plan was completed using a contractor*




What Type of Data is Needed?

- **Location of structure (former address or parcel number)**
- **Flood insurance study**
- **Structure square footage**
- **Type of foundation (crawl or slab)**
- **First floor elevation of structure (pre-mitigation) and for elevations post-mitigation**
- **Number of floors**
- **Benefit Cost Analysis (BCA) Software**
- **Flood depths of events occurring after mitigation (have to take into account the same vertical datum as available pre-mitigation)**



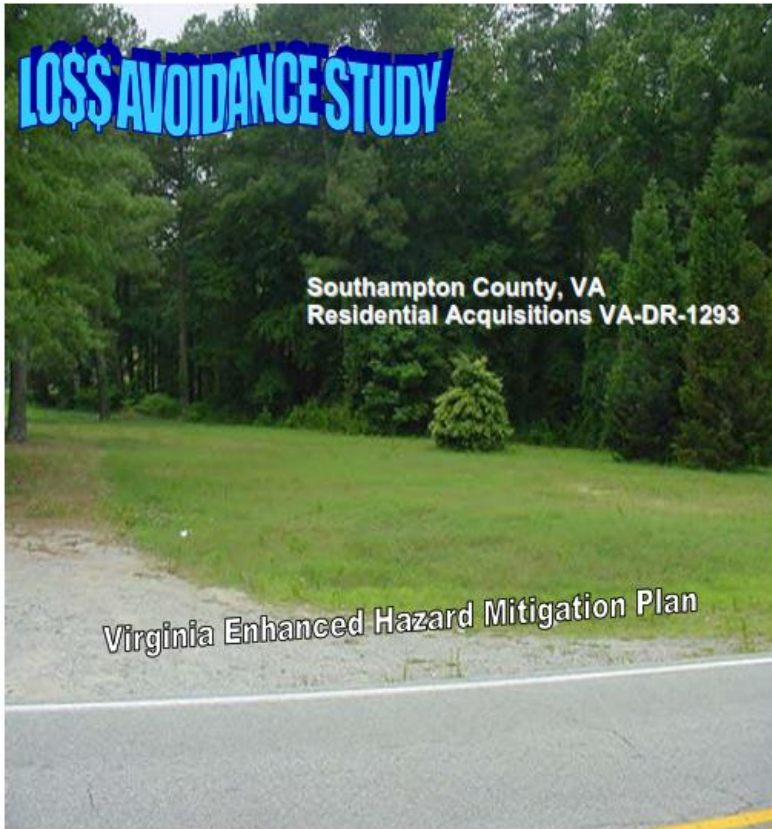
May Need Some Built in Assumptions

- Building replacement value was taken from RS means (construction cost estimating), and averaged across all of the structures
- Contents value of 30% of the building replacement value (per BCA)
- Depth Damage function from the BCA tool was used to determine avoided building, contents, and displacement costs during the events

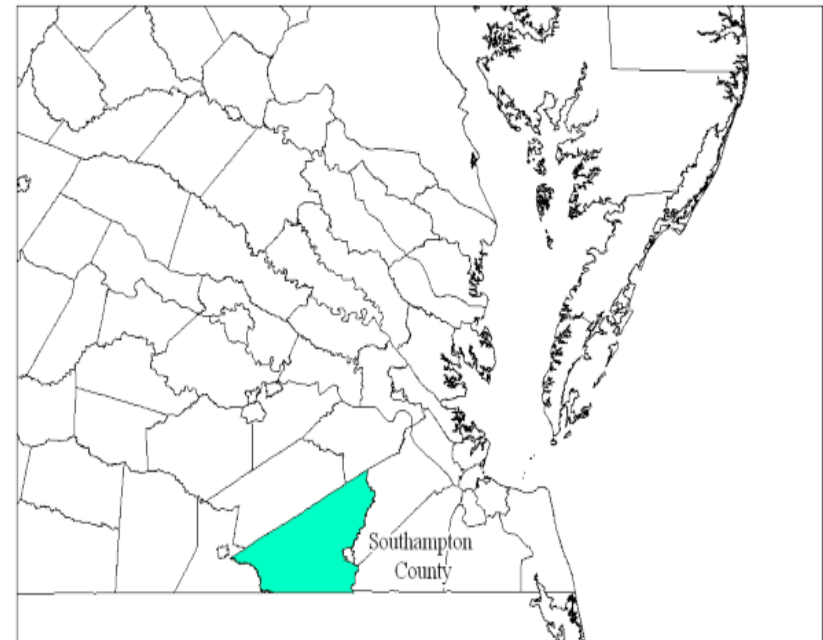
RESIDENTIAL	Average	1 Story	1417 sq. ft.								
<ul style="list-style-type: none"> • Simple design from standard plans • Single family – 1 full bath, 1 kitchen • No basement • Asphalt shingles on roof • Hot air heat • Gypsum wallboard interior finishes • Materials and workmanship are average • Detail specifications on p. 27 <p><small>Note: The illustration shown may contain some optional components (for example: garages and/or fireplaces) whose costs are shown in the modifications, adjustments, & alternatives below or at the end of the square foot section.</small></p>											
											
Base cost per square foot of living area											
Exterior Wall	Living Area										
	600	800	1000	1200	1400	1600	1800	2000	2400	2800	3200
Wood Siding - Wood Frame	151.30	136.60	125.70	117.05	109.70	104.95	102.30	99.25	92.80	88.25	85.15
Brick Veneer - Wood Frame	170.30	154.80	143.30	134.10	126.25	121.25	118.50	115.15	108.35	103.50	100.15
Stucco on Wood Frame	159.85	145.50	134.90	126.50	119.35	114.75	112.20	109.25	103.05	98.55	95.60
Solid Masonry	185.90	169.70	155.90	145.40	136.60	130.90	127.80	123.90	116.40	110.90	107.00
Finished Basement, Add	37.90	36.65	34.95	33.40	32.15	31.30	30.80	30.15	29.25	28.53	27.85
Unfinished Basement, Add	15.60	14.15	13.10	12.10	11.30	10.85	10.55	10.15	9.55	9.15	8.75



Southampton County

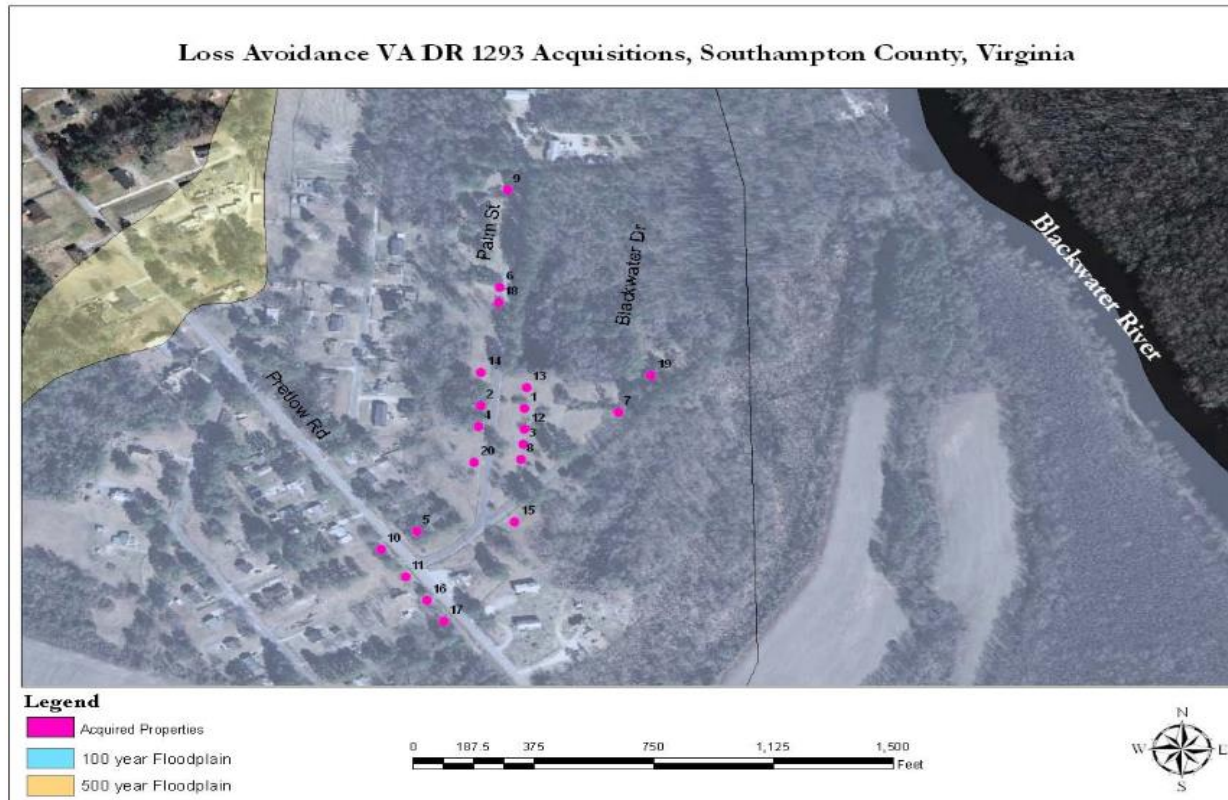


VA DR 1293 Southampton County



Project Area

Figure 2 - Study area and location of the 20 acquired properties with relationship to the Blackwater River.



5



Sample Data from Report

Table 2 – Building data for acquired structures in Southampton County.

Property ID	Base Flood Elevation	FFE (Before)	FFE (After)	Structure Type	Square Footage	Structure Replacement Value	Assumed Contents Value	2006 Flood Depths at Structure
FEMA DISASTER DR 1293 VA - Southampton County Acquisitions								
1	13.3	13.5	Acquired	1 Story	962	\$78,316.42	\$23,494.93	14.5
2	13.3	13	Acquired	1 Story	884	\$71,966.44	\$21,589.93	14.5
3	13.3	12.5	Acquired	1 Story	630	\$51,288.30	\$15,386.49	14.5
4	13.3	12.9	Acquired	1 Story	884	\$71,966.44	\$21,589.93	14.5
5	13.2	12.9	Acquired	1 Story	1173	\$95,493.93	\$28,648.18	14.5
6	13.3	13.8	Acquired	1 Story	883	\$71,885.03	\$21,565.51	14.5
7	13.2	11.5	Acquired	1 Story	1244	\$101,274.04	\$30,382.21	14.5
8	13.2	11.5	Acquired	1 Story	992	\$80,758.72	\$24,227.62	14.5
9	13.3	14.3	Acquired	1 Story	1260	\$102,576.60	\$30,772.98	14.5
10	13.2	14.3	Acquired	1 Story	1128	\$91,830.48	\$27,549.14	14.5
11	13.2	13.3	Acquired	1 Story	1080	\$87,922.80	\$26,376.84	14.5
12	13.3	12.3	Acquired	1 Story	630	\$51,288.30	\$15,386.49	14.5
13	13.3	13.5	Acquired	1 Story	960	\$78,153.60	\$23,446.08	14.5
14	13.3	13.4	Acquired	1 Story	944	\$76,851.04	\$23,055.31	14.5
15	13.4	12.7	Acquired	1 Story	1531	\$124,638.71	\$37,391.61	14.5
16	13	12.2	Acquired	1 Story	1484	\$120,812.44	\$36,243.73	14.5
17	13	12.1	Acquired	1 Story	1250	\$101,762.50	\$30,528.75	14.5
18	13.3	13.6	Acquired	1 Story	1018	\$82,875.38	\$24,862.61	14.5
19	13.2	11.4	Acquired	1 Story	1082	\$88,085.62	\$26,425.69	14.5
20	13.2	12.6	Acquired	1 Story	884	\$71,966.44	\$21,589.93	14.5
Assumption: Building Replacement Value is 81.41 per square foot, which is an average of the range of square footage from 600 to 1400 sq ft								

Note:

FFE designates First Floor Elevation

BRV designates Building Replacement Value

BFE designates Base Flood Elevation

Contents Value is 30% of the Building Replacement Value

Structure Replacement Value is the BRV multiplied by the Square Footage

Base Flood Elevation and FFE referenced to NGVD 1929



Results of Study – Southampton County

Property ID	Total Losses Avoided	Mitigation Funds Spent	% Savings in 7 Years
1	\$23,422	\$44,958	52%
2	\$21,523	\$36,914	58%
3	\$21,866	\$24,011	91%
4	\$30,733	\$51,127	60%
5	\$40,780	\$38,642	106%
6	\$21,498	\$39,885	54%
7	\$55,332	\$29,100	190%
8	\$44,064	\$42,263	104%
9	\$16,238	\$54,000	30%
10	\$14,537	\$49,792	29%
11	\$26,295	\$43,000	61%
12	\$21,902	\$40,000	55%
13	\$23,373	\$51,000	46%
14	\$22,984	\$47,000	49%
15	\$53,225	\$32,000	166%
16	\$51,591	\$78,000	66%
17	\$43,456	\$23,730	183%
18	\$24,786	\$49,695	50%
19	\$48,051	\$38,000	126%
20	\$30,733	\$43,000	71%
Total	\$636,388	\$856,117	74%

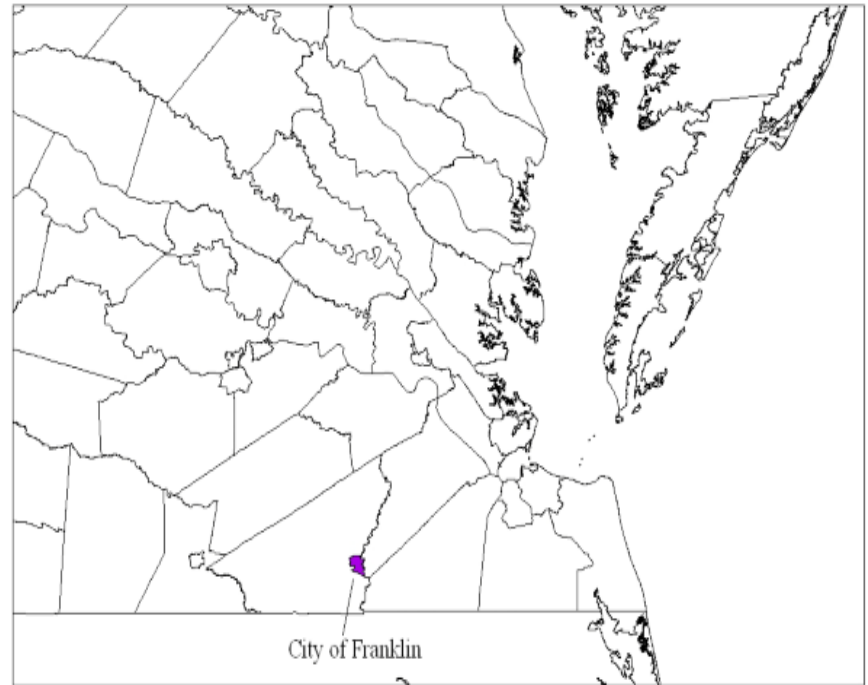


City of Franklin



1

VA DR 1293 City of Franklin



Project Area

Figure 2 - Study area and the location of the 10 acquired properties with relationship to the Blackwater River.



5



Flood Depth Data was Readily Available



Property ID	Water Depth above FFE Pre-Mitigation (feet)	Flood Depth Used	Building Repair Costs	Content Losses	Displacement Costs	Total
1	8.4	8	\$53,109	\$14,339	\$10,737	\$78,185
2	7.6	8	\$53,109	\$14,339	\$10,737	\$78,185
3	8.2	8	\$53,109	\$14,339	\$10,737	\$78,185
4	7.6	8	\$53,109	\$14,339	\$10,737	\$78,185
5	9.8	10	\$53,109	\$14,339	\$13,422	\$80,870
6	10.9	11	\$53,109	\$14,339	\$14,764	\$82,212
7	11.4	11	\$53,109	\$14,339	\$14,764	\$82,212
8	8.4	8	\$96,608	\$26,084	\$10,737	\$133,429
9	8.6	9	\$76,797	\$8,571	\$15,646	\$101,014
10	8.9	9	\$68,789	\$7,677	\$15,646	\$92,112
Total			\$613,957	\$142,708	\$127,927	\$884,591

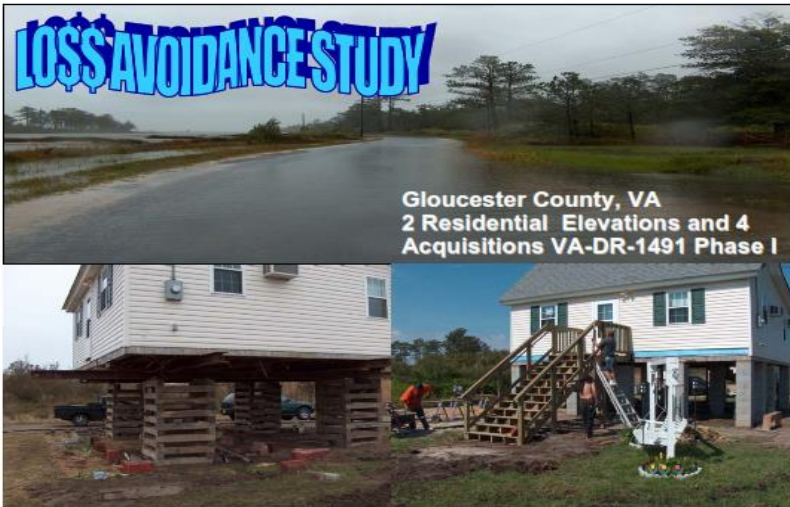


Results of the Study

Property ID	Total Losses Avoided	Mitigation Funds Spent	% Savings in 7 Years
1	\$78,185	\$ 19,714	397%
2	\$78,185	\$ 19,714	397%
3	\$78,185	\$ 19,714	397%
4	\$78,185	\$ 19,714	397%
5	\$80,870	\$ 19,714	410%
6	\$82,212	\$ 19,714	417%
7	\$82,212	\$ 19,714	417%
8	\$133,429	\$ 19,714	677%
9	\$101,014	\$ 19,714	512%
10	\$92,112	\$ 19,714	467%
Total	\$884,591	\$ 197,142	449%



Gloucester County

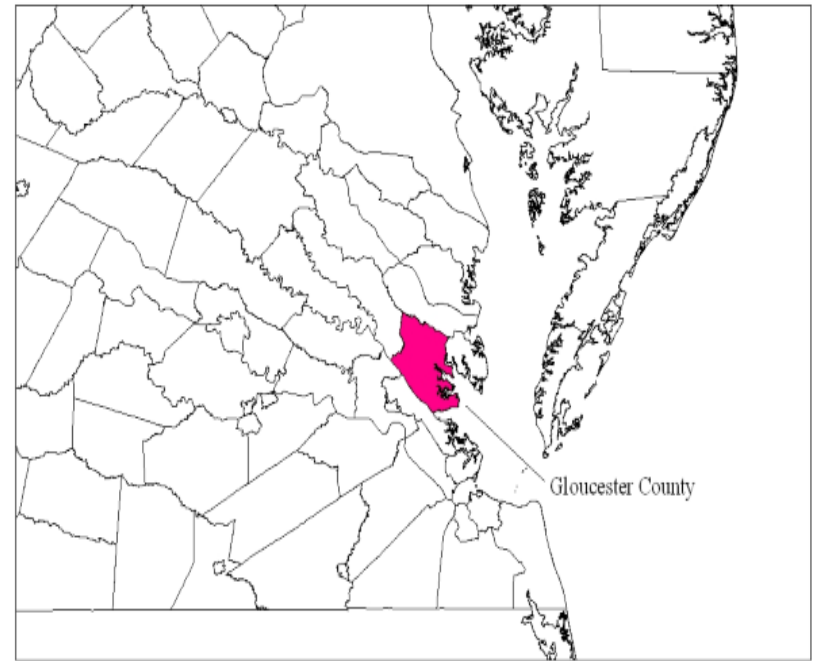


Virginia Enhanced Hazard Mitigation Plan



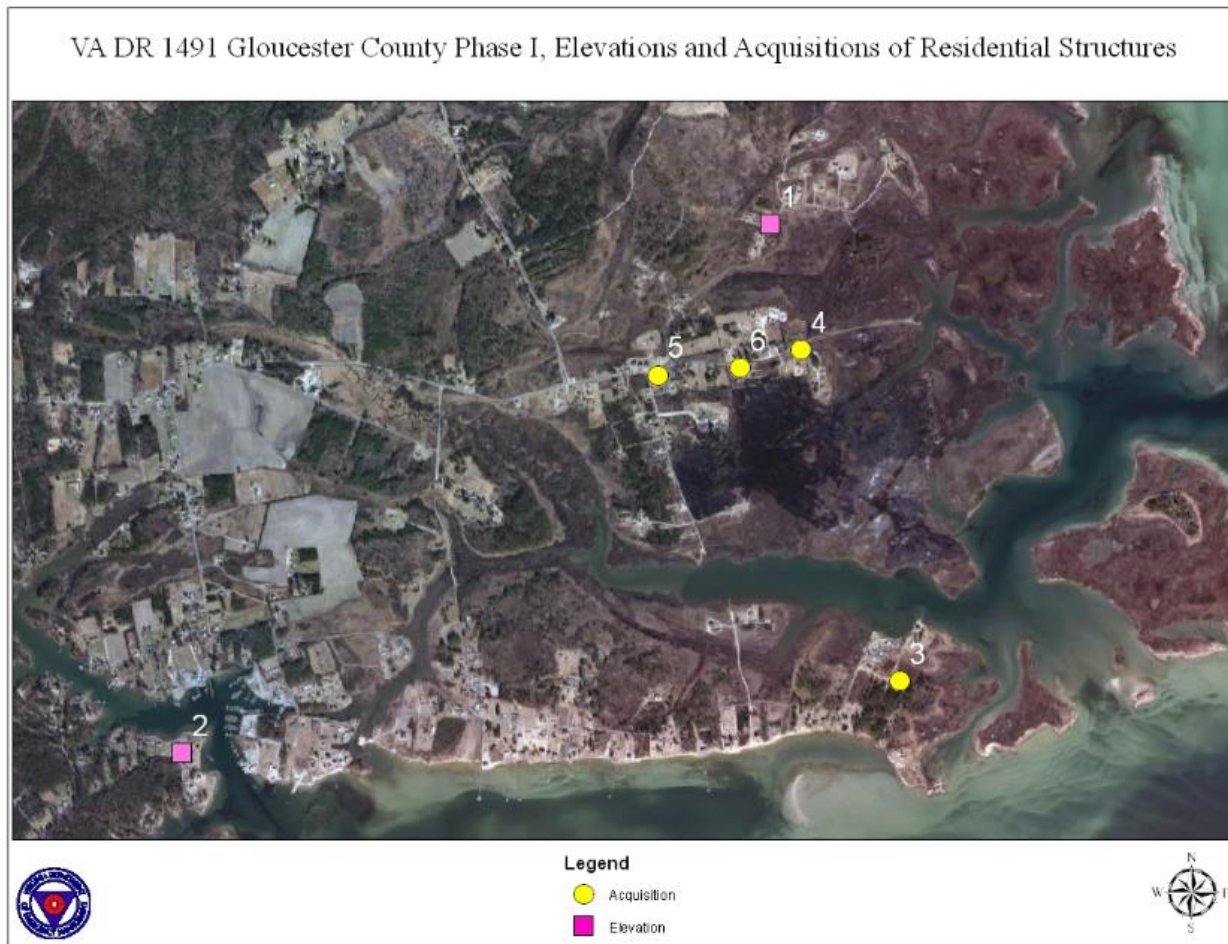
1

VA DR 1491 Gloucester County



Project Area

Figure 2 below shows the study area, the location of the 2 elevated and 4 acquired properties for this study.



Loss Avoidance Results

ID #	Total Damages for Both Events	Mitigation Funds Spent	% Savings in 5 Years
1	\$27,990	\$78,370	35.7%
2	\$25,397	\$40,056	63.4%
3	\$65,479	\$87,440	74.9%
4	\$41,920	\$41,985	99.8%
5	\$18,513	\$45,730	40.5%
6	\$17,444	\$158,678	11.0%
Total	\$196,742	\$452,259	43.5%



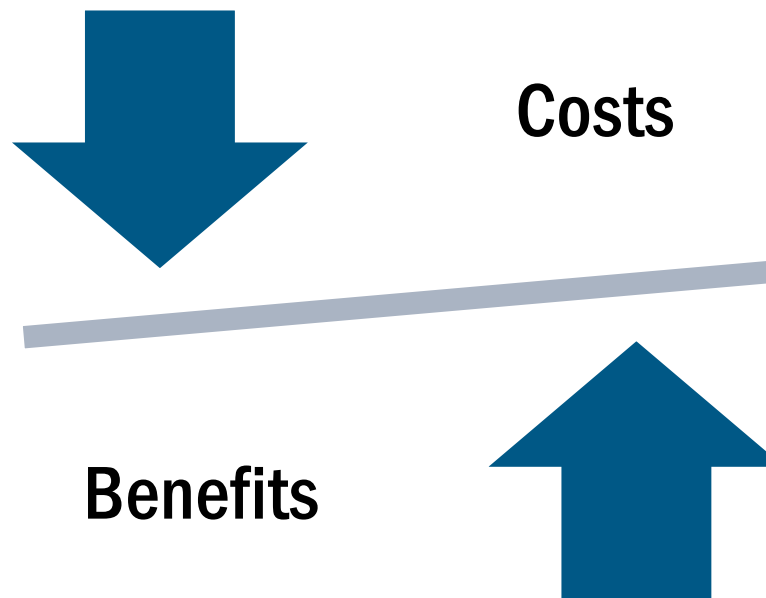
City of Poquoson

Property ID	Year Built	Number of Stories	Finished Floor Elevation (pre-mitigation)	Finished Floor Elevation (post-mitigation)	Cost of Mitigation	Structure Value	2009 Losses Avoided (Total)	2011 Losses Avoided (Total)	Aggregate Losses Avoided	Aggregate Benefit-Cost Ratio
7	1949	2	3.6 feet	10 feet	\$31,850	\$65,900	\$32,885	\$32,884	\$65,768	2.06
31	1939	1	4.0 feet	11 feet	\$28,150	\$63,000	\$45,864	\$45,864	\$91,728	3.23
12	1957	1	4.1 feet	11 feet	\$44,350	\$86,000	\$62,608	\$53,406	\$116,014	2.61
18	1949	1	4.4 feet	11 feet	\$28,150	\$51,300	\$31,857	\$31,857	\$63,715	2.26
10	1949	1	4.5 feet	11 feet	\$44,350	\$73,300	\$45,519	\$45,519	\$91,039	2.05
6	1948	1	4.8 feet	10 feet	\$43,150	\$94,300	\$58,560	\$58,560	\$117,121	2.71
4	1958	1	5.0 feet	10 feet	\$43,150	\$105,800	\$65,702	\$65,702	\$131,404	3.04
2	1949	1	5.3 feet	10 feet	\$43,250	\$95,900	\$47,950	\$47,950	\$95,900	2.21
9	1965	1	5.5 feet	10 feet	\$49,350	\$75,900	\$37,950	\$37,950	\$75,900	1.53
11	1965	1	5.9 feet	10 feet	\$43,150	\$97,000	\$48,500	\$48,500	\$97,000	2.23
5	1949	2	4.6 feet	11 feet	\$43,450	\$113,500	\$47,444	\$47,443	\$94,886	2.18
15	1949	2	5.0 feet	10 feet	\$39,250	\$99,100	\$41,424	\$41,424	\$82,848	2.11
16	1949	2	5.0 feet	11 feet	\$43,450	\$97,600	\$40,797	\$40,797	\$81,594	1.87
24	1955	1	5.0 feet	10 feet	\$38,170	\$101,800	\$63,218	\$63,218	\$126,436	3.31
14	1949	2	5.3 feet	10 feet	\$58,150	\$78,000	\$25,818	\$25,818	\$51,636	0.88
23	1949	1	5.5 feet	10 feet	\$56,050	\$106,500	\$53,251	\$53,250	\$106,500	1.90
25	1970	1	5.8 feet	10 feet	\$74,950	\$185,700	\$92,850	\$92,850	\$185,700	2.47
--	--	--	4.9 feet (Average)	10.35 feet (Average)	\$752,370 (Total)	\$1,590,600 (Total)	\$842,194 (Total)	\$832,992 (Total)	\$1,675,186 (Total)	2.22 (Aggregate)



Keep in Mind

- If benefits don't outweigh the costs, take the perspective of the timeframe that the study occurred



Keep in Mind

- Quality of data will not remain the same due to the discount rate
- Mitigation projects won't have the same benefits forever, due to interest increases and inflation



Contact Information

Robbie Coates

Grants Manager, Disaster Programs

State Hazard Mitigation Officer

Virginia Department of Emergency Management

804-897-9766

Robert.Coates@vdem.virginia.gov



Polling Question #2

What are the biggest hurdles to completing a loss avoidance study?

- **Lack of staff time/ technical expertise**
- **Insufficient data**
- **Expense**
- **Concern that the results will have a negative benefit cost ratio**
- **Other (please describe in the chat window)**



Grant Funding Following a Disaster

- Disaster Recovery Funding Sources - <https://www.fema.gov/media-library-data/1504031549687-ff95e2411477b7a3e758f087b764912b/DisasterRecoveryFundingLinks.docx>
- Fire Management Assistance Grant Program - <https://www.fema.gov/fire-management-assistance-grant-program>
- Hazard Mitigation Assistance – Hazard Mitigation Grant Program (HMGP) - <https://www.fema.gov/hazard-mitigation-grant-program>
- Hazard Mitigation Assistance – Pre-Disaster Mitigation Grant Program (HMGP) - <http://www.fema.gov/pre-disaster-mitigation-grant-program>
- Hazard Mitigation Assistance - Flood Mitigation Assistance Grant Program - <https://www.fema.gov/flood-mitigation-assistance-program>
- Repetitive Flood Claims Grant Program - <https://www.fema.gov/repetitive-flood-claims-grant-program-fact-sheet>
- Severe Repetitive Loss (SRL) Grant Program - <https://www.fema.gov/media-library/resources-documents/collections/14>
- National Flood Insurance Program (NFIP) - <https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4465/1/805> and <https://www.floodsmart.gov/floodsmart/>
- The National Emergency Family Registry and Locator System (NEFRLS) - <https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4628/1/805> and <https://www.fema.gov/media-library/assets/documents/94763>
- Emergency Management Performance Grant Program - <https://www.fema.gov/emergency-management-performance-grant-program>
- Fire Prevention & Safety Grants - <https://www.fema.gov/fire-prevention-safety-grants>
- Tribal Homeland Security Grant Program - <https://www.fema.gov/fy-2014-tribal-homeland-security-grant-program-thsgp>



Technical Assistance and Other Opportunities

- **Work with FEMA Region III
Point of Contact**
- **Work with State Hazard
Mitigation Officer**
- **Work with Cooperating
Technical Partners**



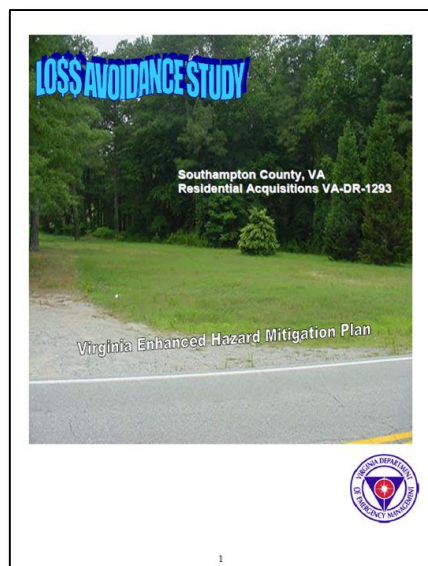
Resources

- FEMA Flood Map Service Center: <https://msc.fema.gov/portal/home>
- Data Visualization: Disaster Declarations for States and Counties: <https://www.fema.gov/data-visualization-disaster-declarations-states-and-counties>
- Hazard Mitigation Assistance Loss Avoidance Studies: <https://www.fema.gov/hmgp-loss-avoidance-studies>
- National Flood Hazard Layer (NFHL): <https://www.fema.gov/national-flood-hazard-layer-nfhl>
- Hazard Mitigation Assistance: <https://www.fema.gov/hazard-mitigation-assistance>
- Benefit Cost Analysis Tool Download: <https://www.fema.gov/benefit-cost-analysis>
- Hazard Mitigation Assistance Snapshot:
<https://fema.maps.arcgis.com/apps/webappviewer/index.html?id=b9d25d1b3d8347aeb084fac9d30c3f0e>
- Considerations for Local Mitigation Planning Grant Subapplications: https://www.fema.gov/media-library-data/1509544776285-a0adf6b43da2d25e5d74457008df5828/HMA_Job_Aid_Final_10312017.pdf
- Natural Hazard Mitigation Saves: 2017 Interim Report: <https://www.nibs.org/page/mitigationsaves>

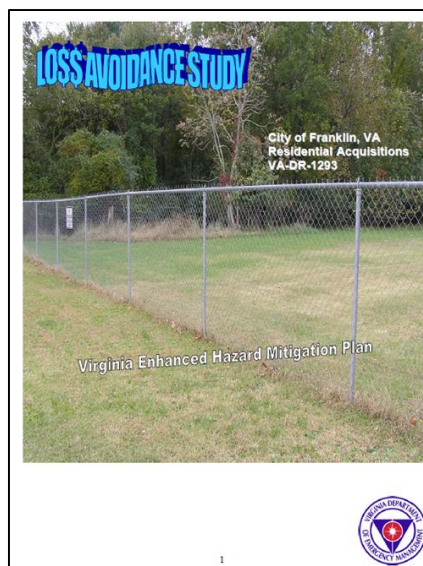


Resources

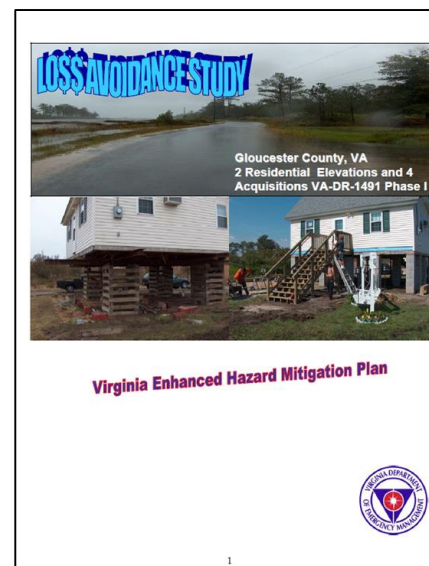
- Virginia's Loss Avoidance Studies



Southampton County



City of Franklin



Gloucester County



You May be Eligible for Professional Credits

Participation certificates and agendas will be sent to all participants who attend the whole session and participate in the polls.

American Institute of Certified Planners (AICP) Self-Reported Certification Maintenance Credit



Association of State Floodplain Managers (ASFPM) Certified Floodplain Manager (CFM) Continuing Education Credit



Thank you!

Thank you to:

- Robbie Coates

And all of you for participating today!



2018 FEMA Region III Coffee Break Calendar

- **November 14, 2018: Leveraging Your Hazard Mitigation Plan to Do More**

To register, please follow the link to:

<https://femaregion3coffeebreaks.eventbrite.com>



Questions?





FEMA

