

ECONOMIC EVALUATION OF FLOODPLAIN MANAGEMENT AND FLOOD MITIGATION

CITY OF BIRMINGHAM, ALABAMA



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PRESENTATION OUTLINE

1. BACKGROUND/LOCATION
2. FLOODPLAIN PROGRAM PROFILE
3. PROGRAM PERFORMANCE MEASURES
4. LOSS AVOIDANCE ANALYSIS APPLICATION
5. CONCLUSIONS
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FLOODPLAIN MANAGEMENT/MITIGATION PROGRAM PROFILE

- JOINED NFIP MARCH 1981
- JOINED CRS PROGRAM OCT 1994 (CRS CLASS 6)
- CONSTRUCTED VILLAGE CREEK LINEAR PARK PHASE I 1995
- AMENDED FLOODPLAIN ORDINANCE MARCH '95
- ADOPTED COUNTY-WIDE ALL NATURAL HAZARD MITIGATION PLAN APRIL 2004
- ADOPTED CITY-WIDE FLOOD
- MITIGATION/STORWATER MANAGEMENT PLAN OCTOBER 2004
- PLAN IMPLEMENTATION (PUBLIC OUTREACH PROGRAM & FEMA FLOOD MITIGATION PROJECTS (\$8.5 MILLION))

FLOODPLAIN MANAGEMENT PROGRAM OBJECTIVES

- MINIMIZE NEGATIVE IMPACTS OF FLOODING TO EXISTING/PROPOSED FLOODPLAIN DEVELOPMENT
- PROVIDE PUBLIC AWARENESS INFORMATION AND ASSISTANCE TO ALL AFFECTED AND INVOLVED PARTIES
- GET PROPERTIES WITH MOST SEVERE FLOODING OUT OF HARMS WAY THROUGH PROPERTY BUYOUTS
- REUSE ACQUIRED LAND AS COMMUNITY ASSETS/AMENITIES
- REDUCE FLOOD INSURANCE COSTS TO FLOOD POLICY HOLDERS
- REDUCE COSTS & ENHANCE QUALITY

FLOOD MITIGATION BUYOUT PROJECTS

- USACE BUYOUTS 1988-1992 (~800 PROPERTIES)
- FEMA VILLAGE CREEK BUYOUTS 1996-2000 (255 PROPERTIES)
- FMA REPETITIVE LOSS PROPERTIES PROJECTS 2001-2004
- 2003 PDM VALLEY & VILLAGE CREEK BUYOUTS (135 PROPERTIES)
- 2003 HMGP FLOODWAY BUYOUTS (46 PROPERTIES)
- 2005 PDM VALLEY & VILLAGE CREEK BUYOUTS (108 PROPERTIES)
- 2005 HMGP VILLAGE, VALLEY, FIVE MILE CREEK BUYOUTS (37 PROPERTIES)

FLOOD MITIGATION BUYOUT PROJECTS (CONT'D)

- ACQUIRED OVER 1100 FLOODPLAIN PROPERTIES TO DATE
- 1400 PROPERTIES IF 2005 BUYOUT PROJECTS ARE FUNDED
- SPENT OVER \$48 MILLION IN PROPERTY BUYOUTS TO DATE
- \$56 MILLION IF 2005 BUYOUT PROJECTS ARE FUNDED

KEY PROGRAM PERFORMANCE MEASURES

- CRS PROGRAM--REDUCTION IN FLOOD INSURANCE COSTS TO POLICY HOLDERS (COST SAVINGS OF \$170,000/YEAR)
- FLOOD MITIGATION PROJECTS--REMOVAL & RELOCATION OF OVER 1100 FLOODPLAIN PROPERTIES
- FLOOD MITIGATION PROJECTS---REDUCTION IN FLOOD MITIGATION LOSSES DUE TO LESS RESPONSE & RECOVERY AND PROPERTY MITIGATION ACTIONS
- BUT HOW DO WE MEASURE COST SAVINGS FROM PAST FLOOD MITIGATION PROJECTS?

LOSS AVOIDANCE ANALYSIS FOR BIRMINGHAM, AL

- **LOSSES AVOIDED ANALYSIS:** AN APPROACH FOR QUANTIFYING THE DIRECT COST SAVINGS FROM IMPLEMENTED FLOOD MITIGATION PROJECTS. (QUANTIFY PROGRAM PERFORMANCE)
- **PAST APPLICATION:** LOSSES AVOIDED IN BIRMINGHAM, AL ANALYSIS OF 735 ACQUISITIONS ON VILLAGE CREEK (518-USACE/217-FEMA BUYOUTS)
- **CURRENT APPLICATION:** EXTENDED LOSSES AVOIDED ANALYSIS FOR FEMA BUYOUTS

LOSS AVOIDANCE ANALYSIS FOR BIRMINGHAM, AL CONT.

PAST APPLICATION

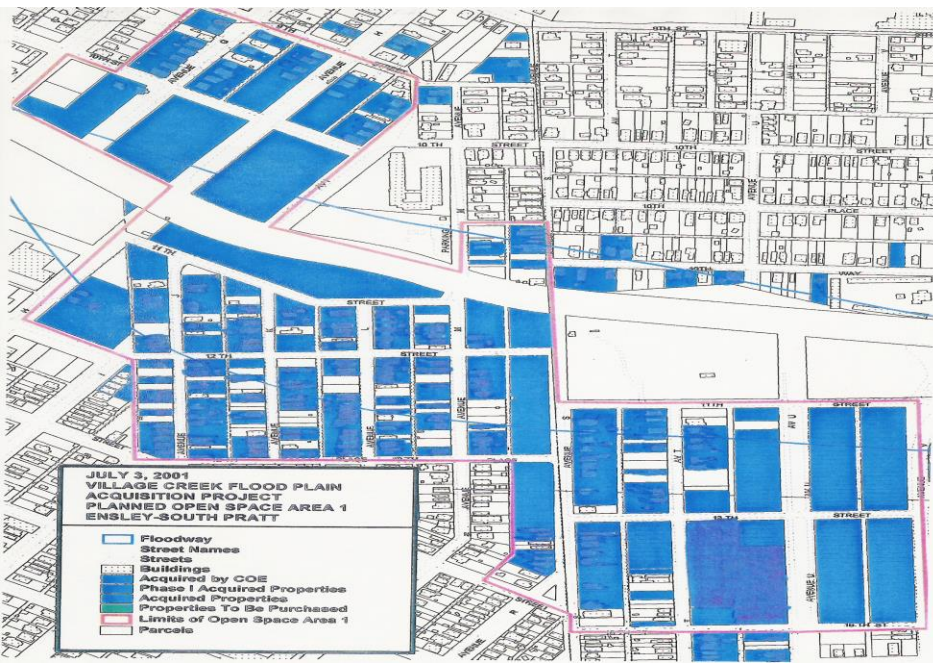
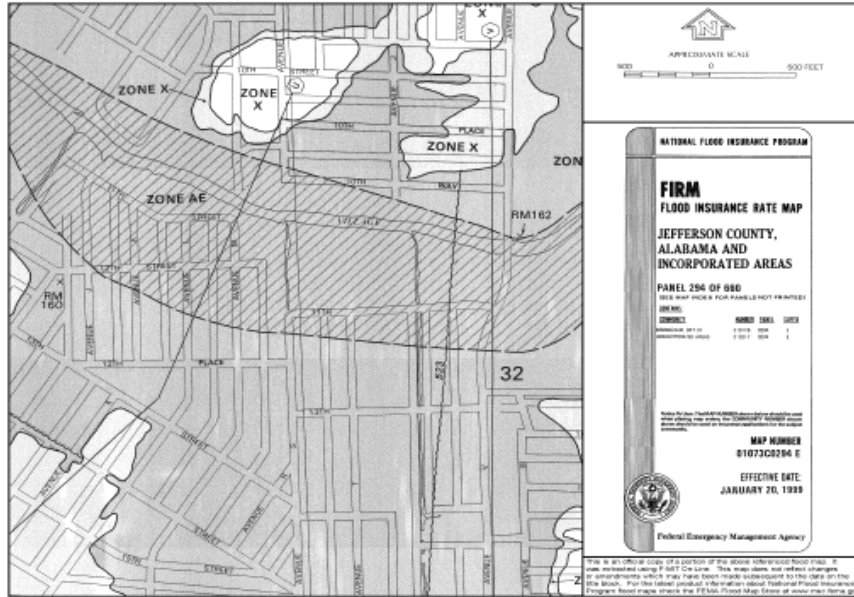
- 518 PROPERTIES EVALUATED USING 5 FLOOD EVENTS (1996-2000) USACE BUYOUT
- 217 PROPERTIES EVALUATED USING 2 FLOOD EVENTS (1999, 2000) FEMA BUYOUT
- USACE-\$36 MILLION.....\$23.4 MILLION (FED); \$12.6 MILLION (CITY)
- FEMA-\$7 MILLION.....\$5.3 MILLION (FED), \$1.7 MILLION (CITY)
- USACE TOTAL LOSSES AVOIDED = \$60 MILLION OR 166 % OF TOTAL ACQUISITION COSTS
- FEMA TOTAL LOSSES AVOIDED = \$3.4 MILLION OR 48% OF TOTAL ACQUISITION COSTS

LOSS AVOIDANCE ANALYSIS FOR BIRMINGHAM, AL CONT.

CURRENT APPLICATION

- **STUDY OBJECTIVE:** WHAT'S THE CURRENT COST SAVINGS FOR FEMA BUYOUT PROJECT?
- **STUDY ASSUMPTIONS:** ECONOMIC ASSUMPTION/DEPTH-DAMAGE DATA ASSUMPTIONS
- **STUDY APPROACH:** DATA COLLECTION & TOTAL ACQUISITION COST & LOSSES AVOIDED CALCULATIONS
- **STUDY RESULTS:** 2 STORM EVENTS LOSSES AVOIDED = \$3.4 MILLION
- WHAT'S LOSSES AVOIDED BASED ON 3, 4, 5, 6, 7 STORM EVENTS?????

STUDY AREA



KEY STUDY ASSUMPTIONS

- FLOOD EVENTS ARE INDEPENDENT
- CRAWL SPACE STRUCTURES WITH UTILITIES
- FIA DEPTH DAMAGE FUNCTION ARE APPLICABLE
- CONTENT VALUE IS APPROXIMATELY 30% OF PROPERTY VALUE

STUDY APPROACH

- DATA COLLECTION: PROJECT MITIGATION COSTS, VULNERABILITY, FLOOD HAZARD, & BUILDING DATA

<u>Flood Event Date</u>	<u>Flood Event Frequency</u>	<u>Flood Event Elevation</u>
June 1999	5 to 10 Year	519 Feet
March 2000	10 to 25 Year	520 Feet
April 2001	5 to 10 Year	519 Feet
September 2001	5 Year	518.5 Feet
May 2003	10 Year	519.5 Feet
February 2004	10 to 25 Year	520.5 Feet
September 2004	10 Year	519.5 Feet

<u>Number of Properties</u>	<u>Finished Floor Elevation</u>	<u>Total Property Value</u>
1	516 Feet	\$19,921
23	517 Feet	\$788,104
70	518 Feet	\$2,862,450
75	519 Feet	\$3,396,051
25	520 Feet	\$1,146,216
13	521 Feet	\$458,266
5	522 Feet	\$140,200
5	523 Feet	\$133,652
217		\$8,944,860

STUDY APPROACH CONT.

- DATA COMPUTATIONS: TOTAL PROJECT ACQUISITION COSTS

<u>Property Type</u>	<u>Formulae for Total Acquisition Cost Calculation</u>
Tenant Occupied Homes	Purchase price + Relocation cost + Appraisal fee + Title fee + Legal fee + Demolition cost + Project management fee

STUDY APPROACH CONT.

■ DATA COMPUTATIONS: TOTAL LOSSES AVOIDED

<u>Formulae for Losses Avoided Calculation</u>	<u>From Depth Damage Table</u>
Damage to structure + Damage to contents + Displacement cost	$= (\text{Bldg DDF}) \times (\text{Property Value})$ $= (\text{Content DDF}) \times (\text{Content Value})$ $= (\$500 \text{ per month}) \times (\text{Displacement Period})$ <p>Note: DDF = Depth Damage Function</p>

STUDY APPROACH CONT.

**Flood Depth-Damage Table Used
(For One-story Homes w/Raised First Floor)**

<u>Flood Depth (ft)</u>	<u>Bldg (DDF)</u>	<u>Contents (DDF)</u>	<u>Displacement (days)</u>
-2	6%	0%	0
-1	6%	0%	0
0	13%	14%	0
1	16%	21%	62
2	23%	33%	126
3	27%	41%	166
4	35%	44%	182
5	45%	45%	365

Sample Flood Elevation 520 ft

First Floor Elevation 518 ft

Flood Depth 2 ft

Building DDF 23%

Contents DDF 33%

Displacement Period 126 days

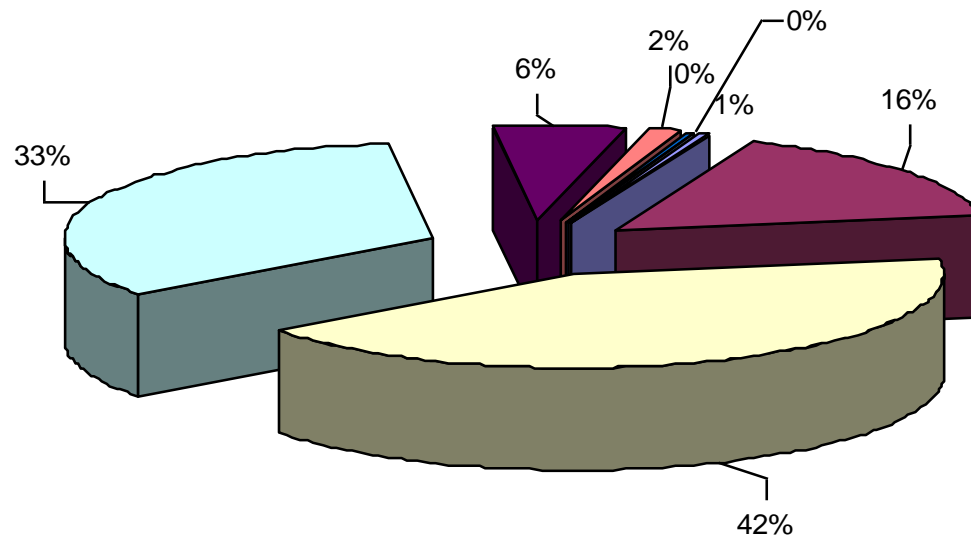
RESULTS

Losses Avoided By Finished Floor Elevation (FFE)

<u>Number of Properties</u>	<u>Finished Floor Elevation (FFE)</u>	<u>Property Value (Structure & Contents)</u>	<u>Total Acquisition Cost</u>	<u>Total Losses Avoided</u>
1	516 Feet	\$19,921	\$15,313	\$67,911
23	517 Feet	\$788,104	\$605,894	\$1,882,256
70	518 Feet	\$2,862,450	\$2,201,579	\$4,870,694
75	519 Feet	\$3,396,051	\$2,643,708	\$3,835,352
25	520 Feet	\$1,146,216	\$886,250	\$661,899
13	521 Feet	\$458,266	\$447,091	\$181,015
5	522 Feet	\$140,200	\$136,808	\$16,824
5	523 Feet	\$133,652	\$133,652	\$0
217		\$8,944,860	\$7,070,295	\$11,515,949

RESULTS CONT.

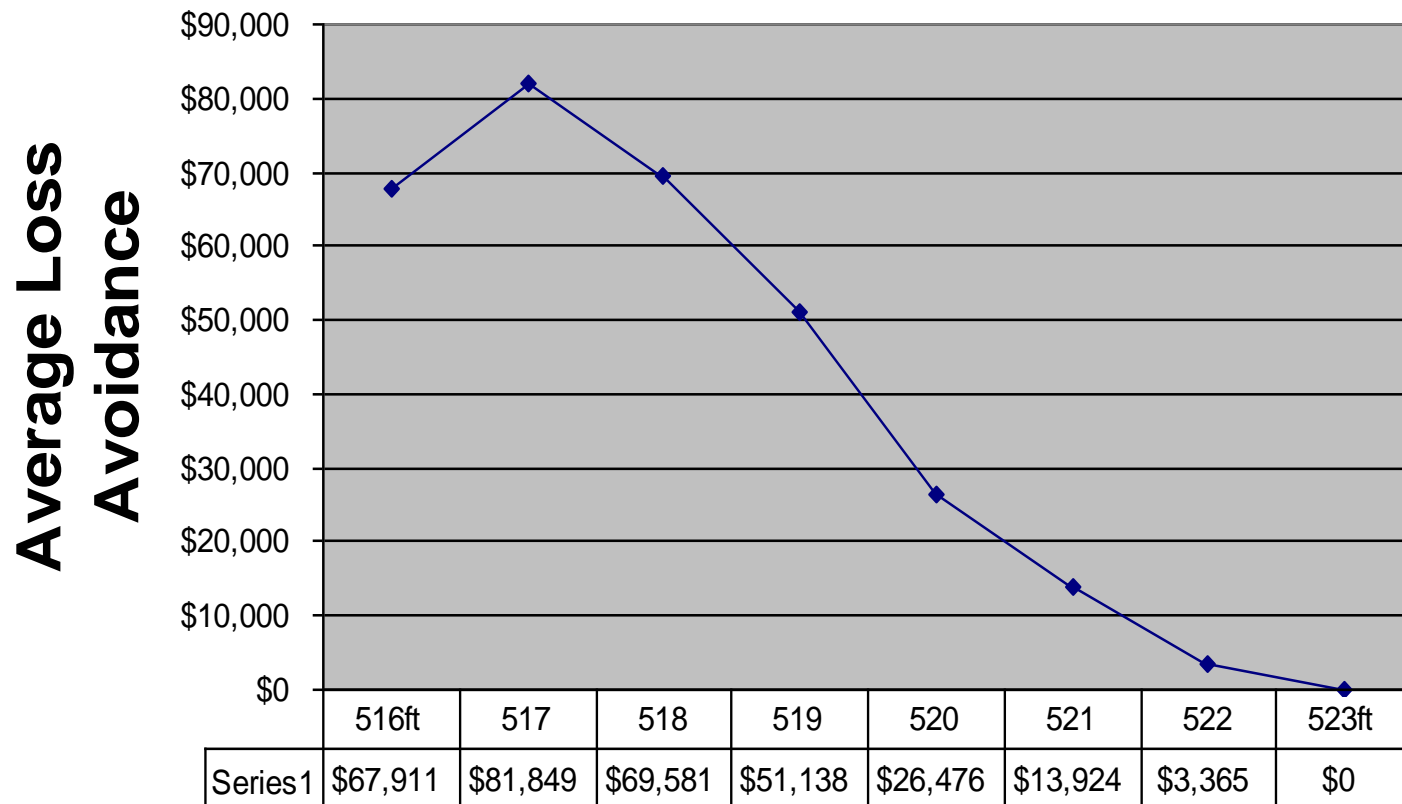
Losses Avoided by Finished Floor Elevation



516ft 517 518 519 520 521 522 523ft

RESULTS CONT.

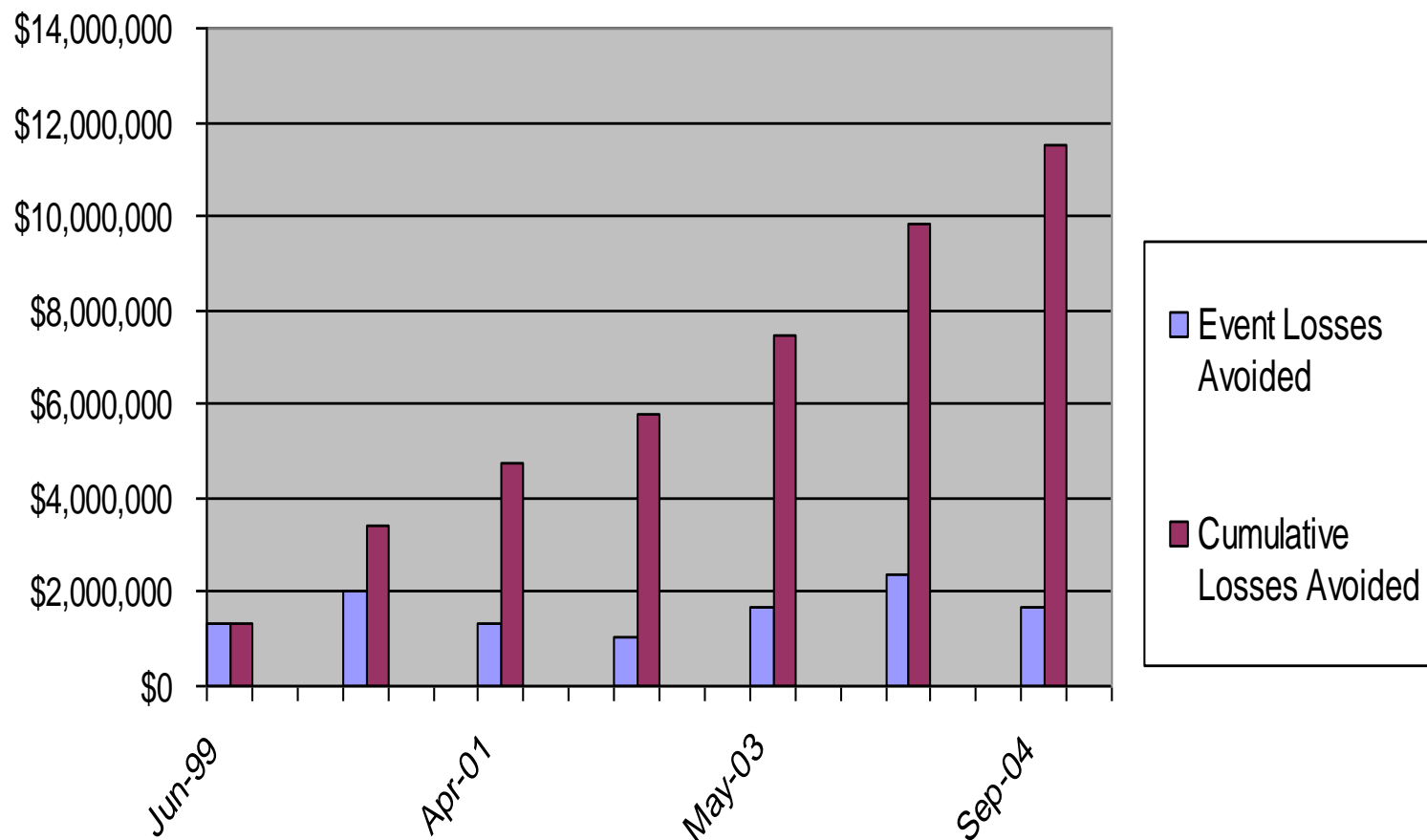
Average Loss Avoidance By FFE



Finished Floor Elevation (FFE) feet

RESULTS CONT.

Event & Cumulative Losses Avoided



CUMULATIVE LOSSES AVOIDED

Total Project Cost.....\$7,070,295

Federal Cost.....\$5,302,721

City Cost.....\$1,767,574

<u>Flood Event</u>	<u>Losses Avoided</u>	<u>Cumulative Losses Avoided</u>	<u>Observations</u>
June 1999	\$1,352,914	\$1,352,914	77 % of City Cost
March 2000	\$2,038,498	\$3,391,412	Twice City Cost Half of TP Cost
April 2001	\$1,352,914	\$4,744,326	89% of Fed Cost >2.5 City Cost
September 2001	\$1,036,529	\$5,780,855	Exceeds Fed Cost 82% of TP Cost
May 2003	\$1,691,502	\$7,472,357	Exceeds TP Cost
February 2004	\$2,352,090	\$9,824,447	5.5 City Cost
September 2004	\$1,691,502	\$11,515,949	1.5 TP Cost Twice Fed Cost 6.5 City Cost

CONCLUSIONS

- ANNUAL LOSS AVOIDANCE FOR PERIOD EXAMINED IS \$2.3 MILLION PER YEAR
- EVENT MEAN LOSS AVOIDANCE FOR PERIOD EXAMINED IS \$1.65 MILLION PER EVENT
- COST SAVINGS FROM PAST FEMA FLOOD BUYOUT PROJECT PROVIDED 10 TO 14 TIMES MORE ANNUAL SAVINGS THAN ANNUAL CRS FLOOD INSURANCE SAVINGS (\$170,000)

FUTURE INTERESTS/ OPPORTUNITIES

- PERFORM LOSS AVOIDANCE ANALYSIS FOR ALL FEMA BUYOUT PROJECTS
- EXPLORE USE OF LOSS AVOIDANCE ANALYSIS FOR NON-BUYOUT FLOOD MITIGATION PROJECTS AND FLOODPLAIN MANAGEMENT ACTIVITIES
- SEEK TO DEVELOP AS FEMA SUCCESS STORY
- SEEK TO WORK WITH AEMA & FEMA TO FURTHER DEVELOP LOSS AVOIDANCE ANALYSIS METHODS FOR USE BY ALL
- CONTINUE TO REPORT RESULTS AS A MEASURE OF PROGRAM PERFORMANCE TO LOCAL, STATE AND FEDERAL STAKEHOLDERS

QUESTIONS/DISCUSSIONS

Contact Information

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