



**US Army Corps  
of Engineers** ®  
Kansas City District

# Valley Creek Flood Risk Management Study

## Bessemer, Alabama

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**Problem & Need:** Valley Creek has a history of flooding with notable historic events occurring in April 1979, December 1983, September 2011, and April 2014. Other recent out-of-bank events include: December 2015, December 2016, April 2017, September 2018, and December 2018. Frequent out-of-bank flooding occurs almost annually posing a potential threat to life safety and causing recurring economic damages.

**Study Process:** The feasibility study is fully federally funded. It will analyze alternatives for reducing flood risk within the upper Valley Creek watershed including structural and non-structural measures in Bessemer, Birmingham, and other communities in Jefferson County. The study will identify and evaluate reasonable alternatives including non-structural measures, channel and bridge modifications, levees and floodwalls, in-stream and off-channel detention alternatives.

Throughout the study process the US Army Corps of Engineers (USACE) will work closely with the project sponsor to gather local knowledge and input. USACE will also strive to gather input from the general public in the project area. Information gathered from the sponsor and general public informs the study process and aids USACE in developing a plan that is in line with the needs and desires of the affected community members. In order to participate in cost sharing of a construction project, the Corps of Engineers must determine in the study phase that a project is technically and economically feasibility, locally acceptable and environmentally sound.

### Study Timeline:

- **October 2018:** USACE and the City of Bessemer initiate the study process
- **October 2019:** USACE project team identifies the plan that reasonable maximizes the net economic benefits. The project team makes the plan available for review by the project sponsor, public, and USACE decision makers.
- **October 2021:** USACE releases the final decision, determining if the project will go forward to the design phase

**Questions or Comments:** Please submit comments or questions to [ValleyCreek@usace.army.mil](mailto:ValleyCreek@usace.army.mil). More information on the project can be found at:

<https://www.sam.usace.army.mil/Missions/Planning-Environmental/Environment-Resources/Inland-Environment/Valley-Creek-Flood-Risk-Management-Study/>

# VALLEY CREEK FRM STUDY AREA OVERVIEW

Valley Creek Basin in Jefferson County, AL



- Valley Creek Basin
- Major Rivers
- Mobile-TBB

1:9,500,000

## Legend

- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Municipalities
- Jefferson County
- Railroads

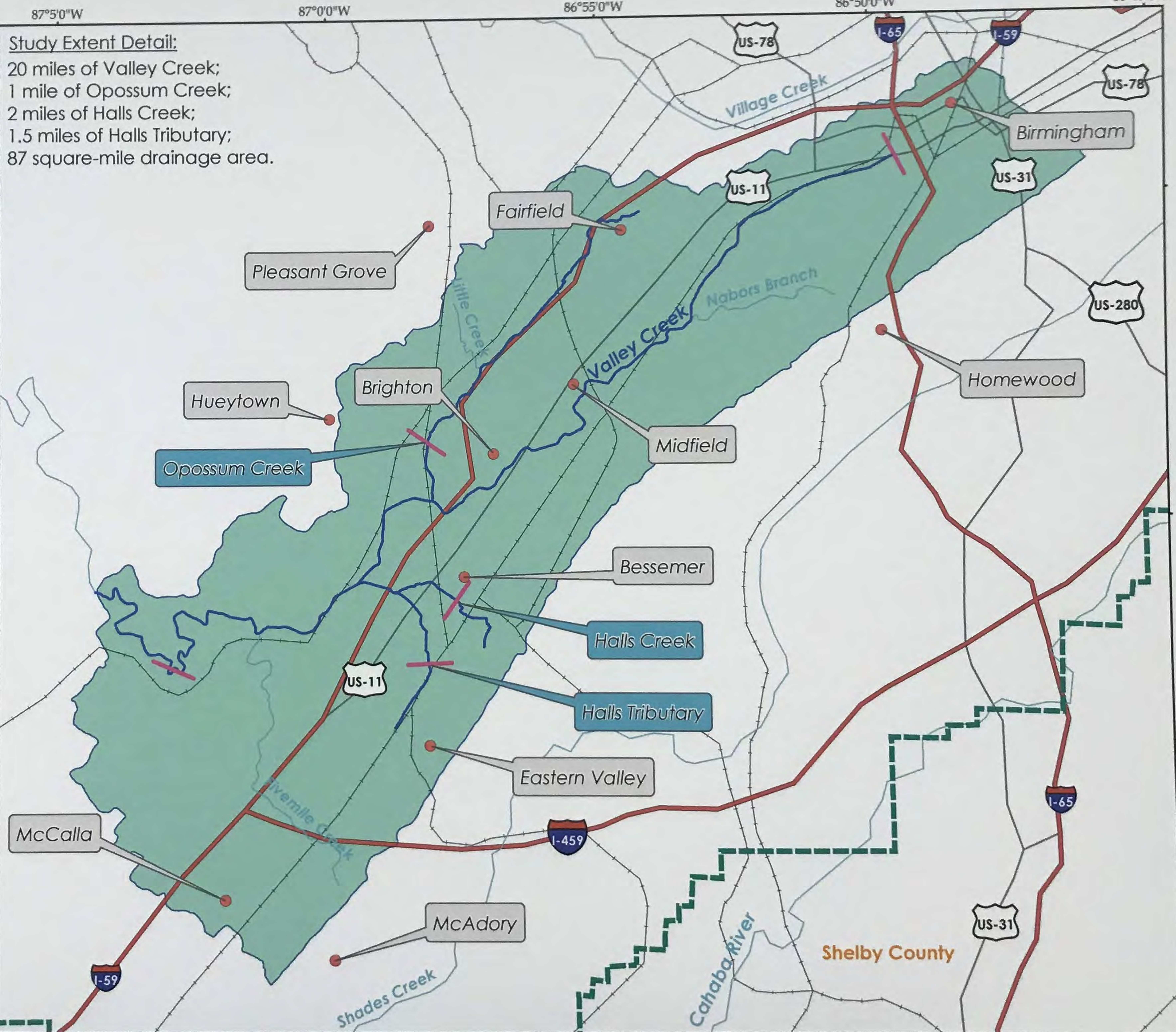
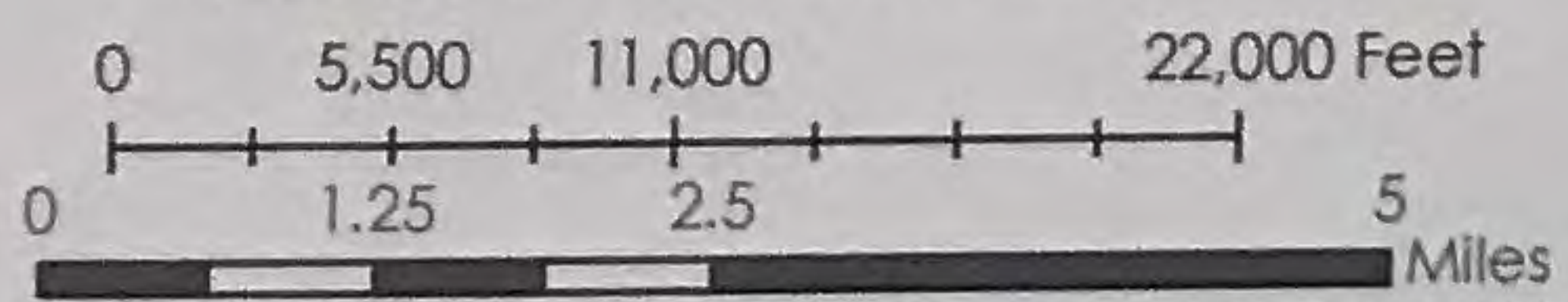
Sources: National Hydrography Dataset (USGS);  
National Transportation Dataset (USGS);  
Citites of Bessemer and Birmingham



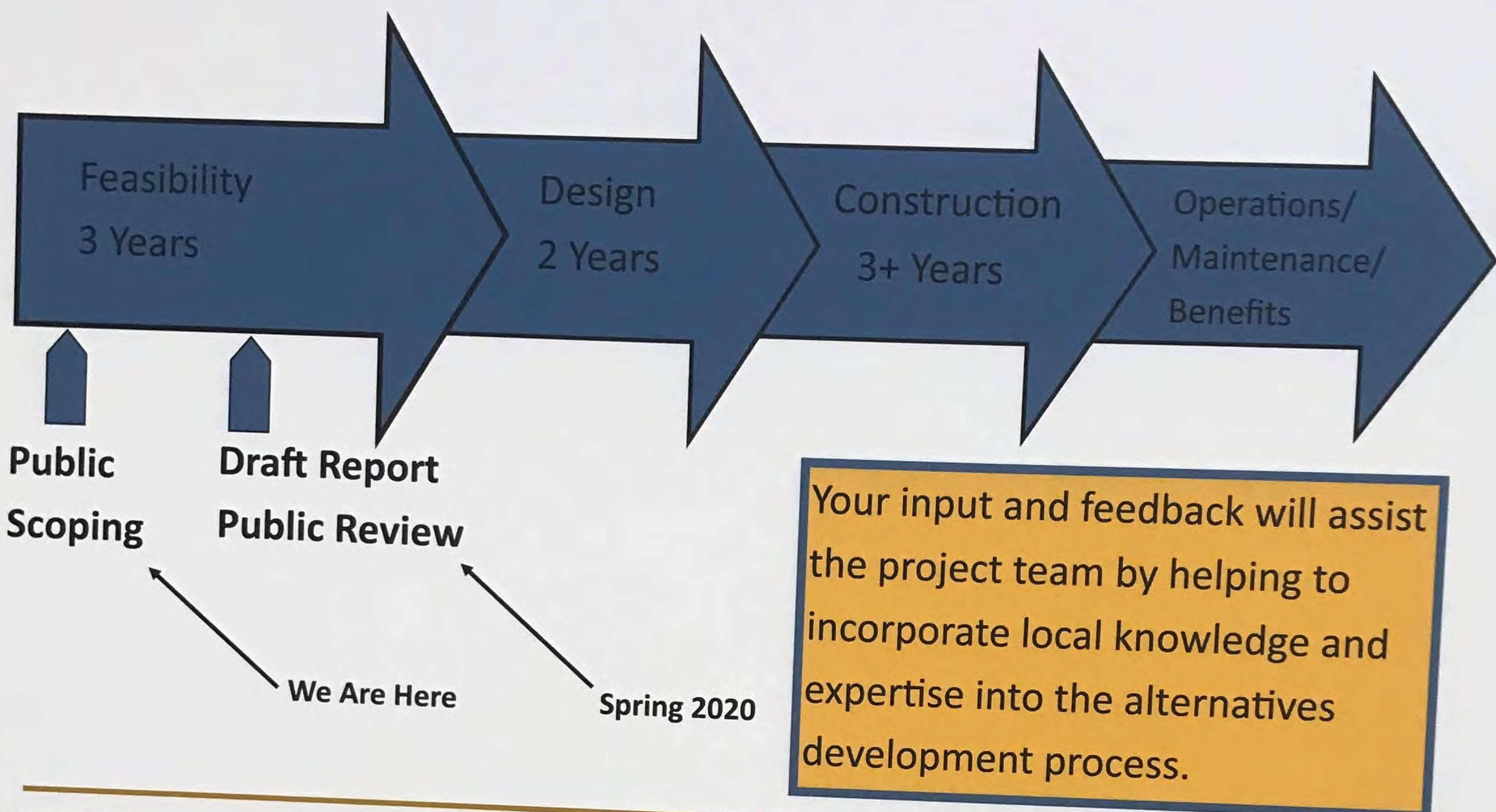
US Army Corps of Engineers



Coordinate System: GCS NAD 1983



# How to Stay Involved



## Provide Comments

- Fill out a comment form and submit now.
- Take a comment form, complete at home and mail in.
- Contact a project team member and provide your comment or feedback.

Check the website for new information and project updates:

<https://www.sam.usace.army.mil/Missions/Planning-Environmental/Environment-Resources/Inland-Environment/Valley-Creek-Flood-Risk-Management-Study/>

Send questions and comments to:

ValleyCreek@usace.army.mil



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# Project Phases & Durations

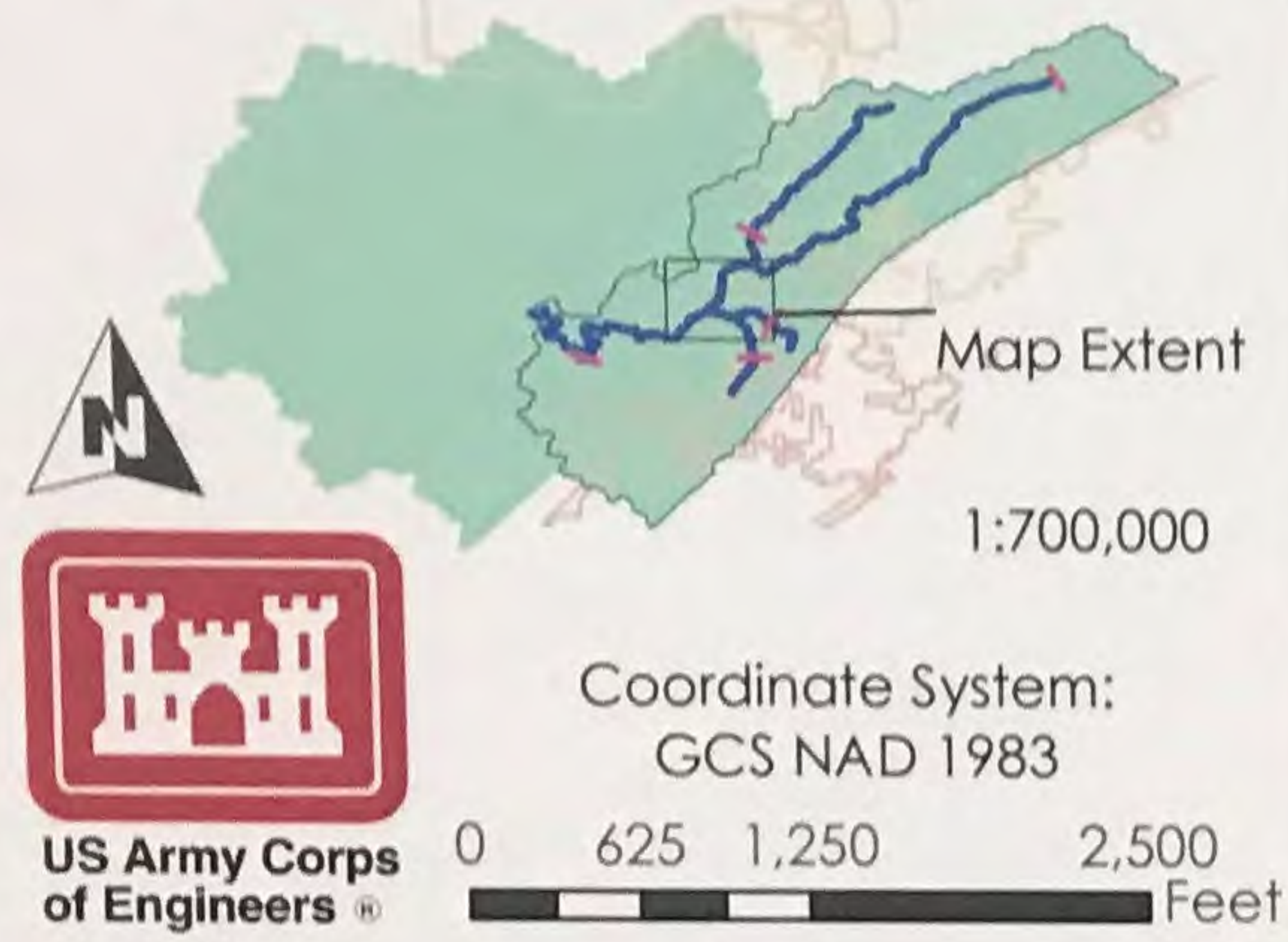
	Feasibility (Planning)	Design	Construction	O&M
Typical Duration	3 Years	2 Years	3 years	Project Life
Federal Share of Costs	(50%) Valley Creek Study is 100% federal	65%	65%	0

- This is a typical timeline, actual times are affected by funding availability, complexity of projects, sponsor preferences, and the agreed upon scope.

- O&M = ownership, operations & maintenance is a 100% local responsibility post construction.



# VALLEY CREEK FRM MEASURE SITES: MAP 4

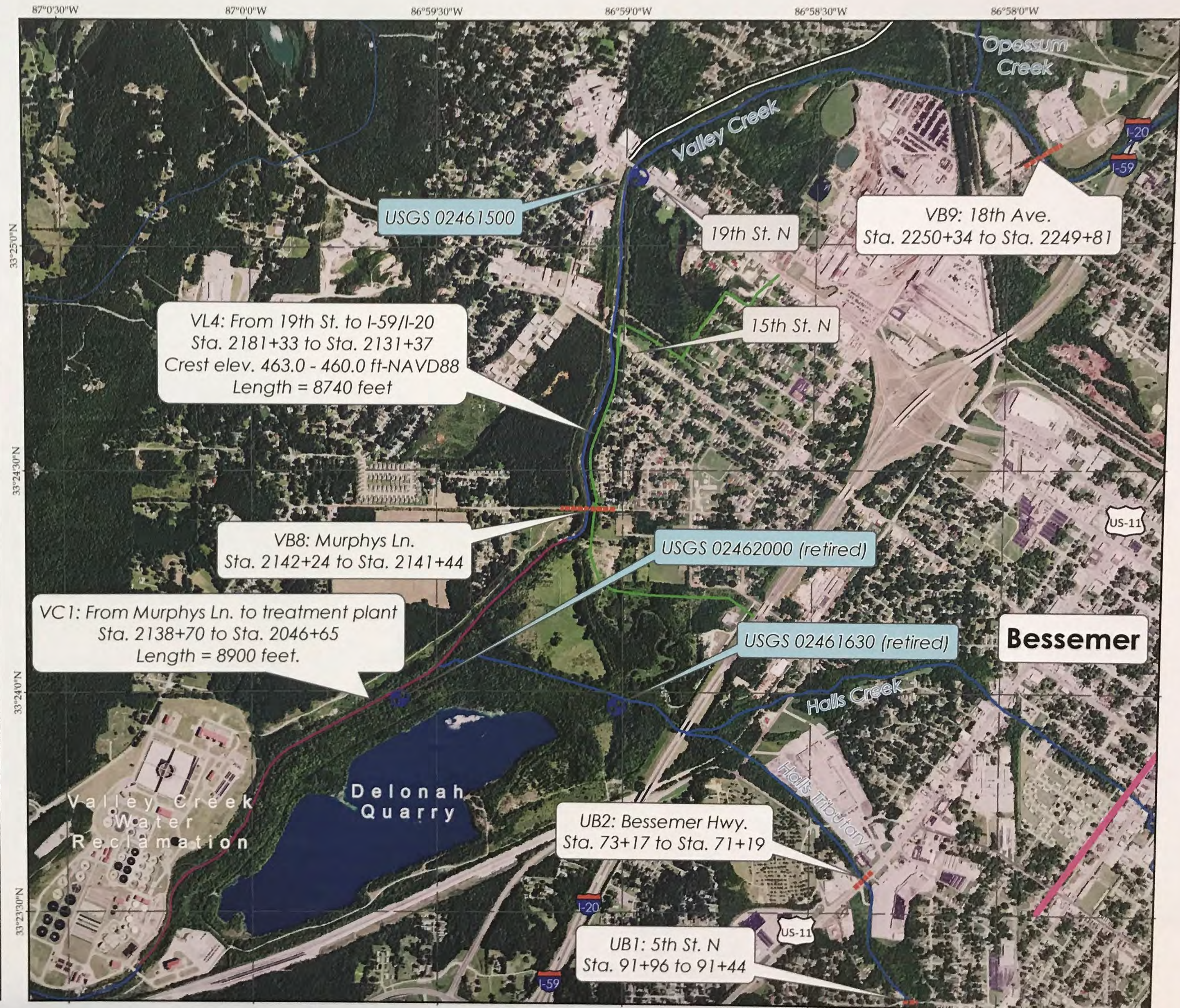


## Legend

- Proposed Detention
- Proposed Channel Modification
- Proposed Bridge Modification
- Proposed Levee
- Stream Gages
- Existing Levee
- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Valley Creek Basin
- Bessemer Limits
- Birmingham Limits

Notes: Map extent in Bessemer limits;  
Stationing is distance above Black Warrior River;  
Stationing on tributary is distance above Valley Creek.

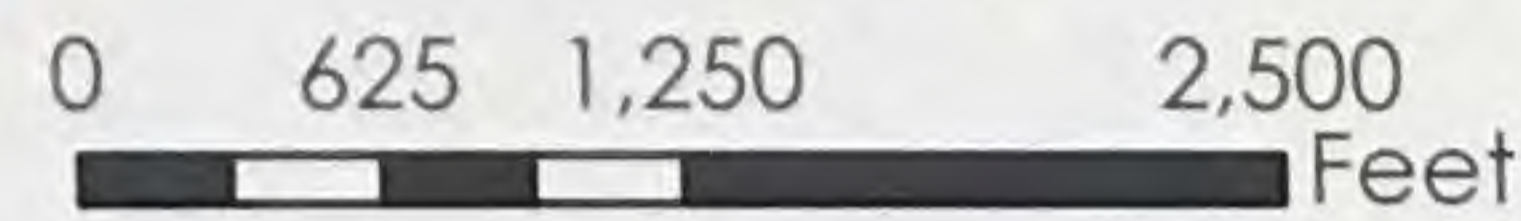
Data: National Hydrography Dataset (USGS);  
Limits (Cities of Birmingham and Bessemer);  
Imagery (USDA-APFO).



# VALLEY CREEK FRM MEASURE SITES: MAP 3



Coordinate System:  
GCS NAD 1983

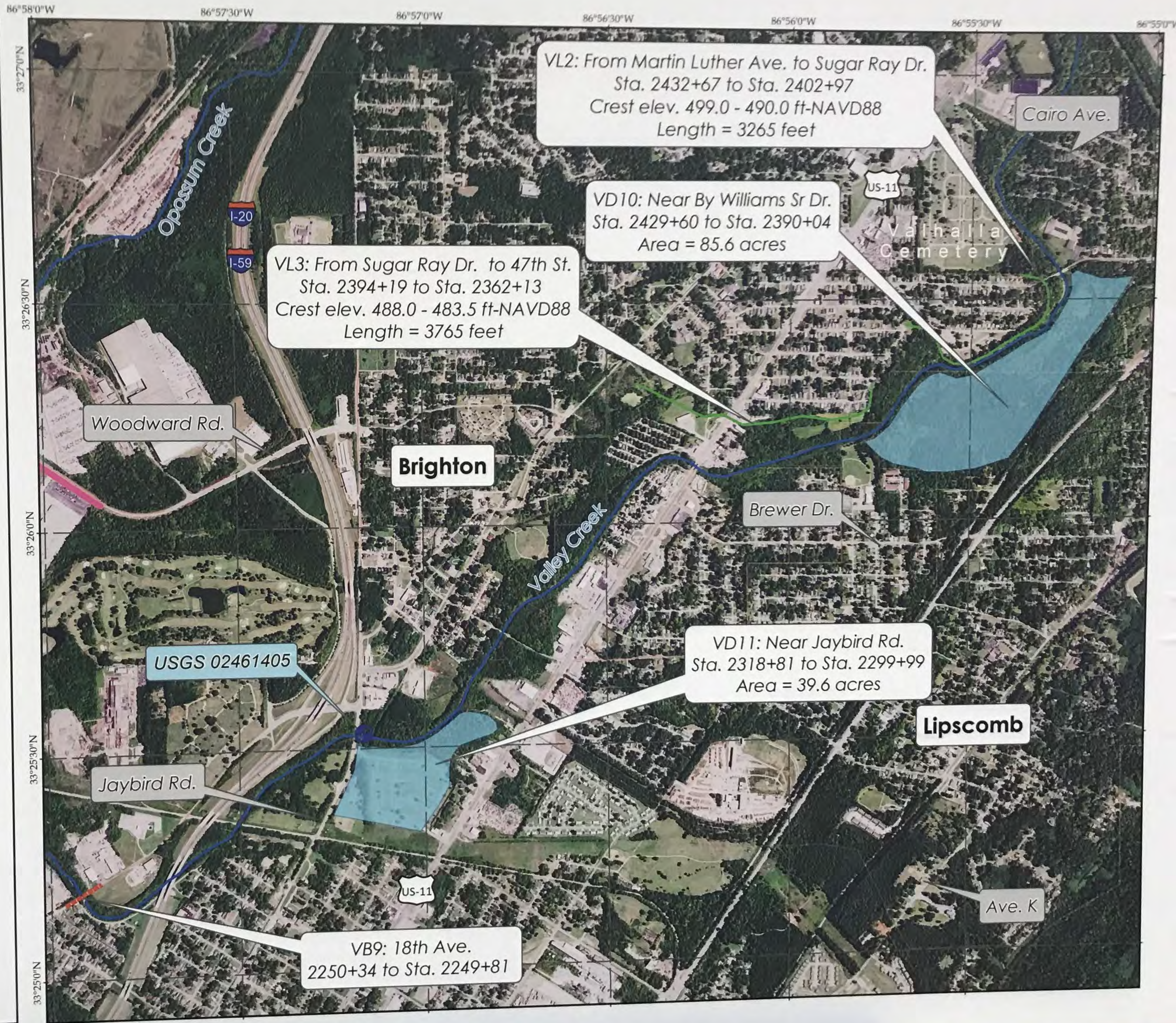


## Legend

- Proposed Bridge Modification
- Proposed Levee
- Proposed Detention
- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Valley Creek Basin
- Bessemer Limits
- Birmingham Limits

Notes: Map extent in Bessemer & Birmingham limits;  
Stationing is distance above Black Warrior River.

Data: National Hydrography Dataset (USGS);  
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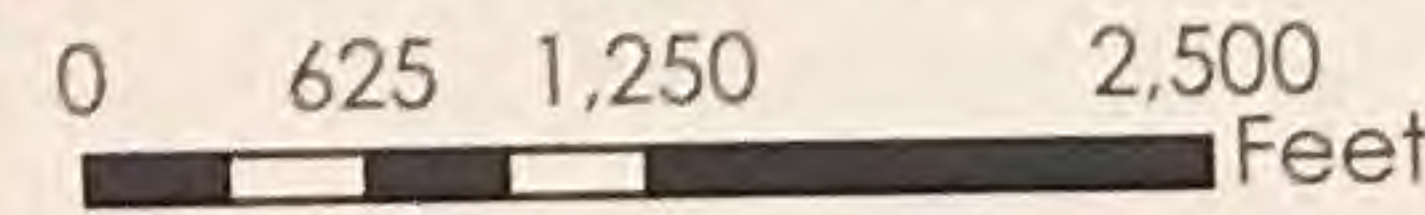


# VALLEY CREEK FRM MEASURE SITES: MAP 2



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Coordinate System:  
GCS NAD 1983



## Legend

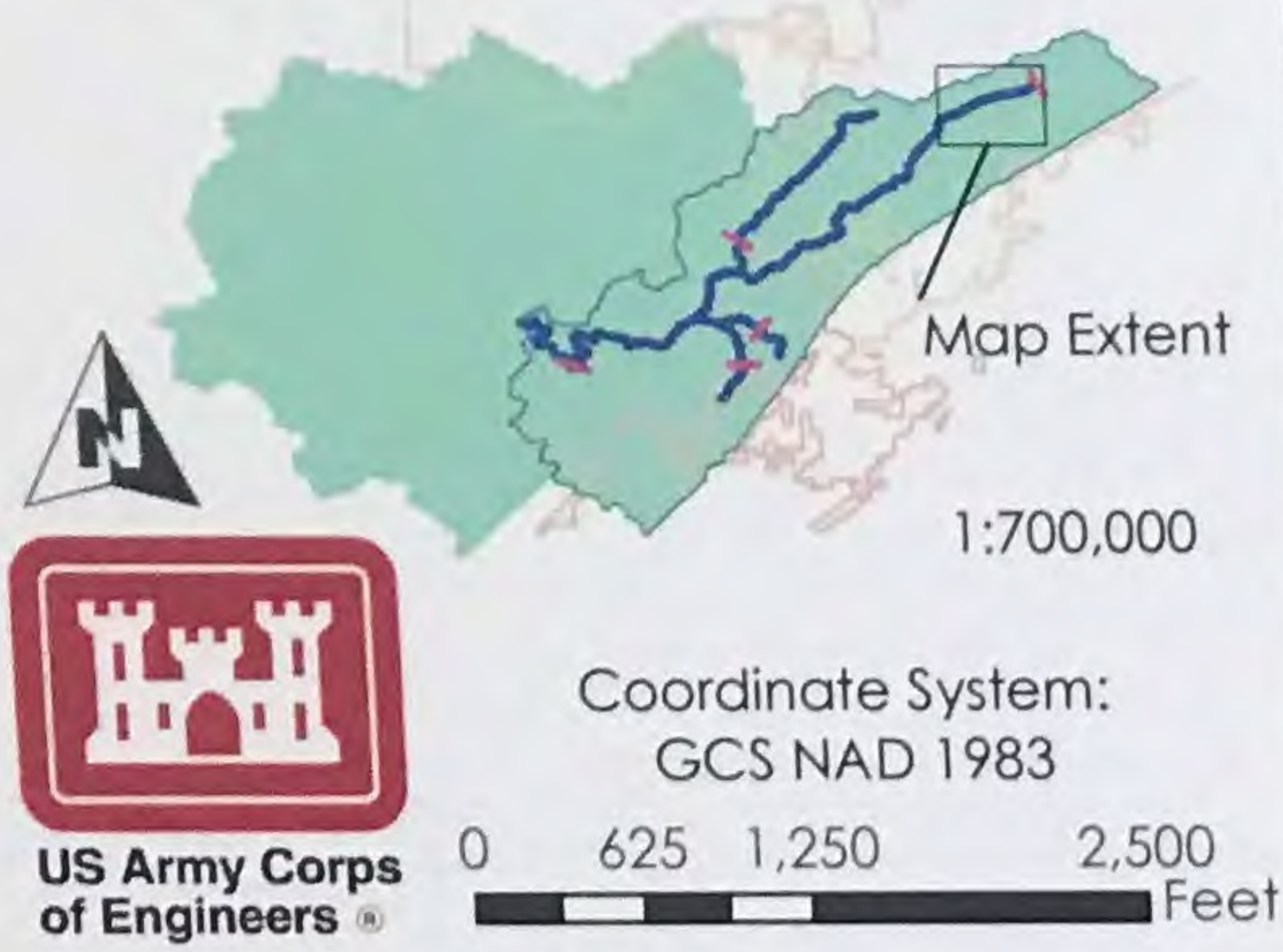
- Proposed Detention
- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Valley Creek Basin
- Bessemer Limits
- Birmingham Limits

Notes: Map extent in Birmingham limits;  
Stationing is distance above Black Warrior River.

Data: National Hydrography Dataset (USGS);  
Limits (Cities of Birmingham and Bessemer);  
Imagery (USDA-APFO).



# VALLEY CREEK FRM MEASURE SITES: MAP 1

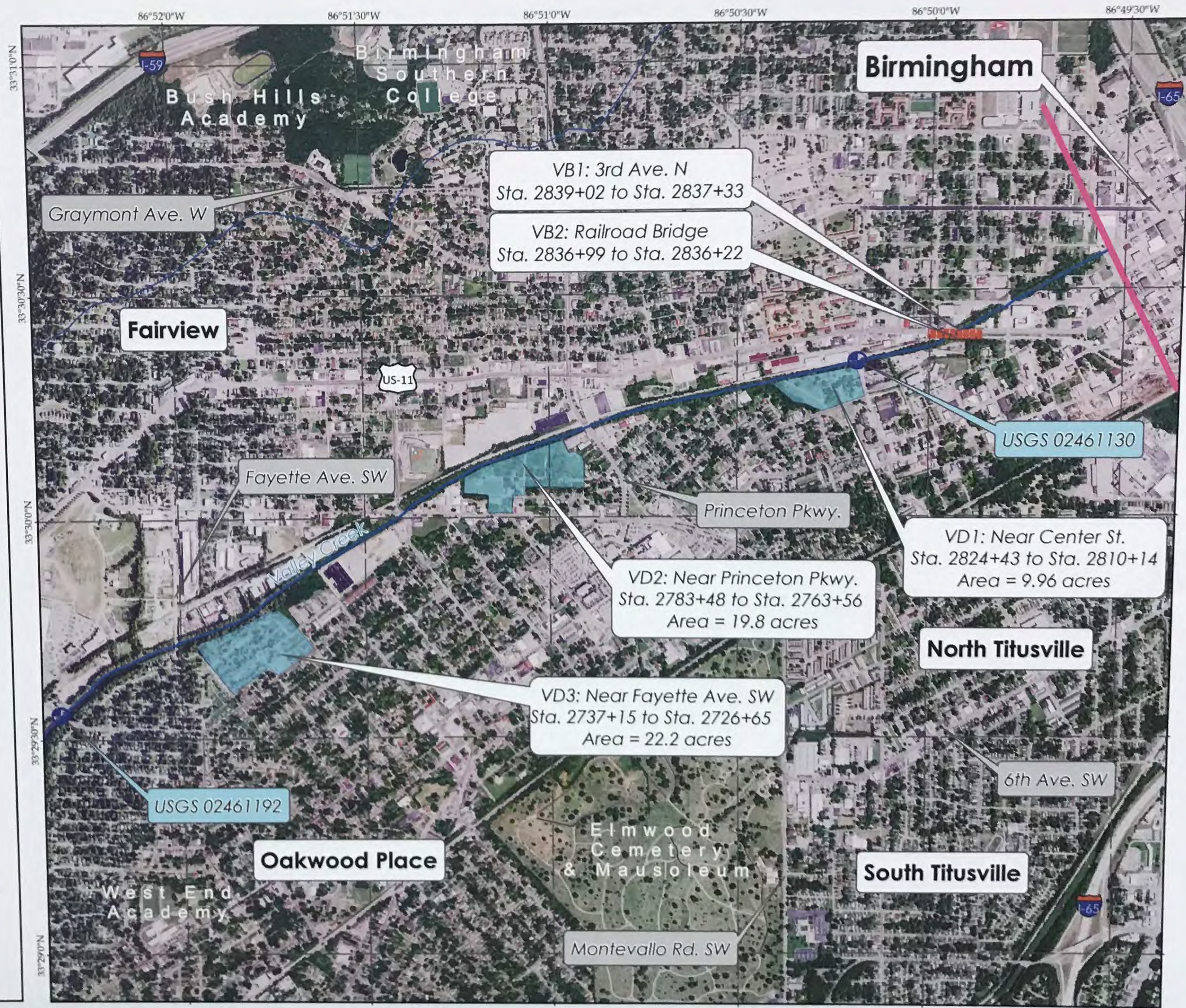


## Legend

- Proposed Detention
- Proposed Bridge Modification
- Stream Gages
- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Valley Creek Basin
- Birmingham Limits
- Bessemer Limits

Notes: Map extent in Birmingham limits;  
Stationing is distance above Black Warrior River.

Data: National Hydrography Dataset (USGS);  
Limits (Cities of Birmingham and Bessemer);  
Imagery (USDA-APFO).



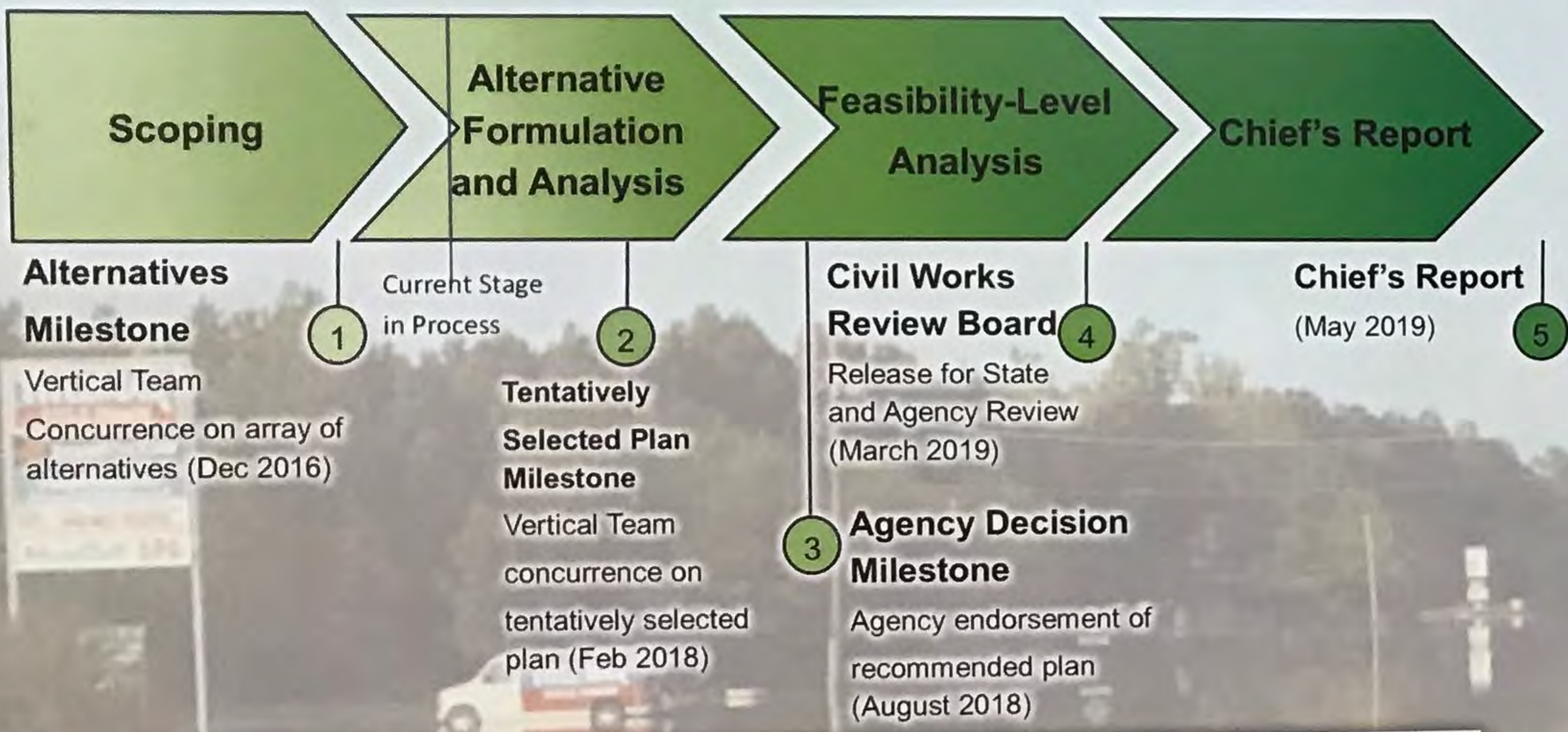




# Study Process



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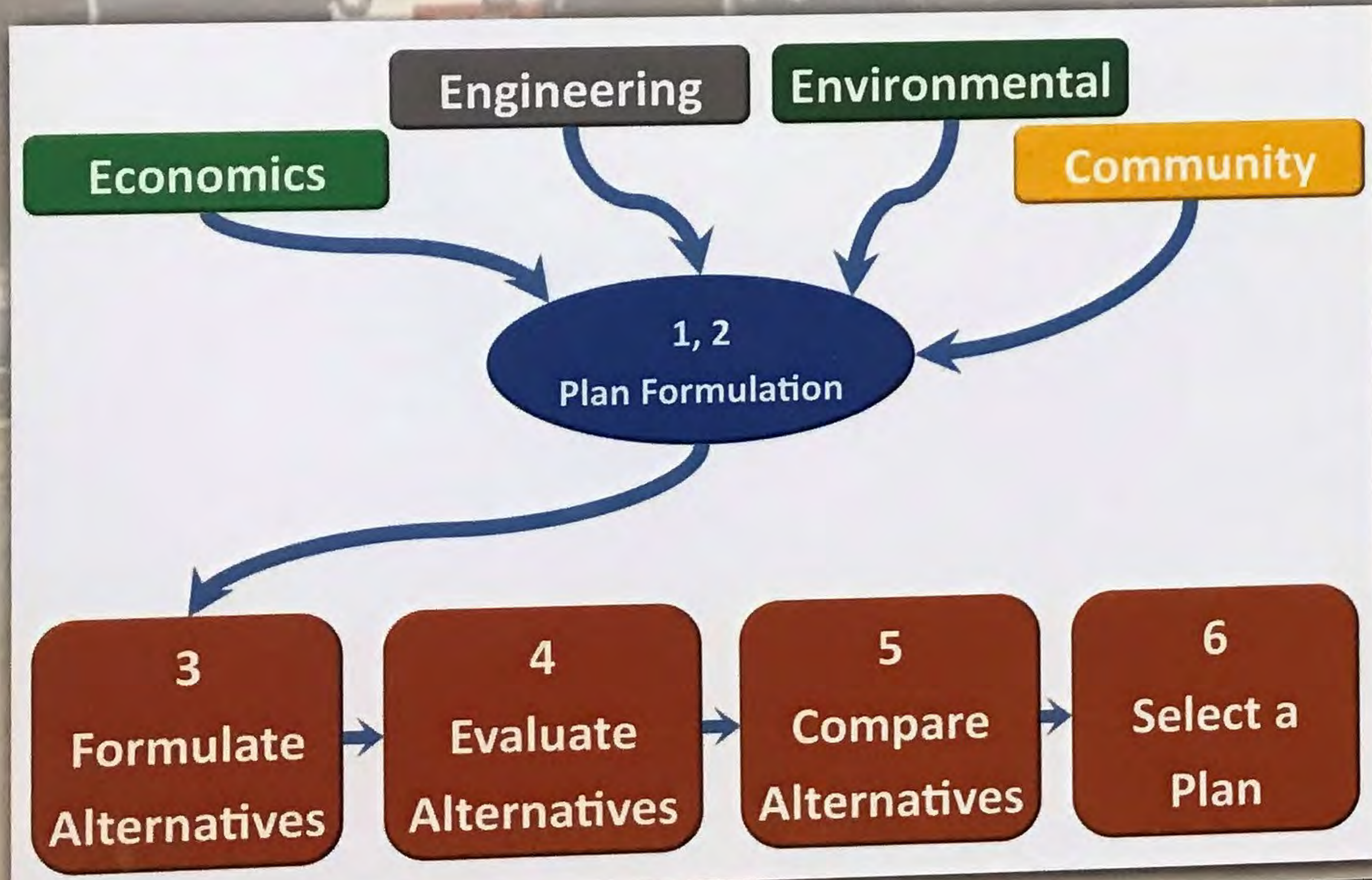


**The Six-step Planning Process**  
 This study will utilize the traditional iterative six-step planning process commonly used in water resource development studies:

1. Identify problems and opportunities
2. Inventory and forecast conditions
3. Formulate alternative plans
4. Evaluate effects of alternative plans
5. Compare alternative plans
6. Select a recommended plan

## Potential Measures

- Non-Structural
  - Buy-Out
  - Relocation
- Channel Modifications
  - Clearing
  - Snagging
  - Deepening
  - Widening
- Bridge and Culvert Modifications
- Diversion Channels
- Reservoirs and Retention Basins



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# VALLEY CREEK FRM FLOOD IMPACTS: MAP 3

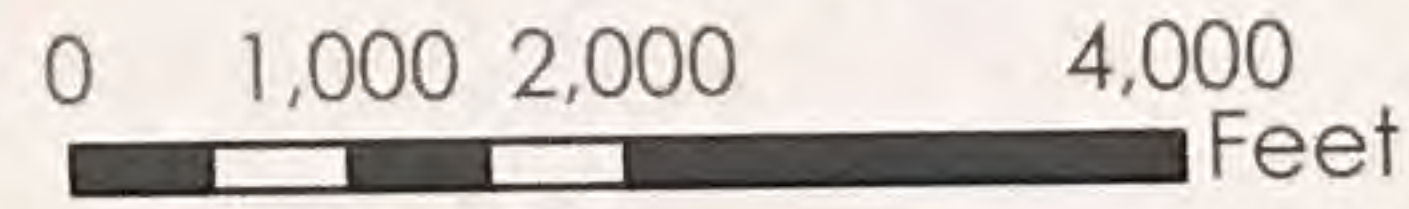


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Coordinate System:  
GCS NAD 1983

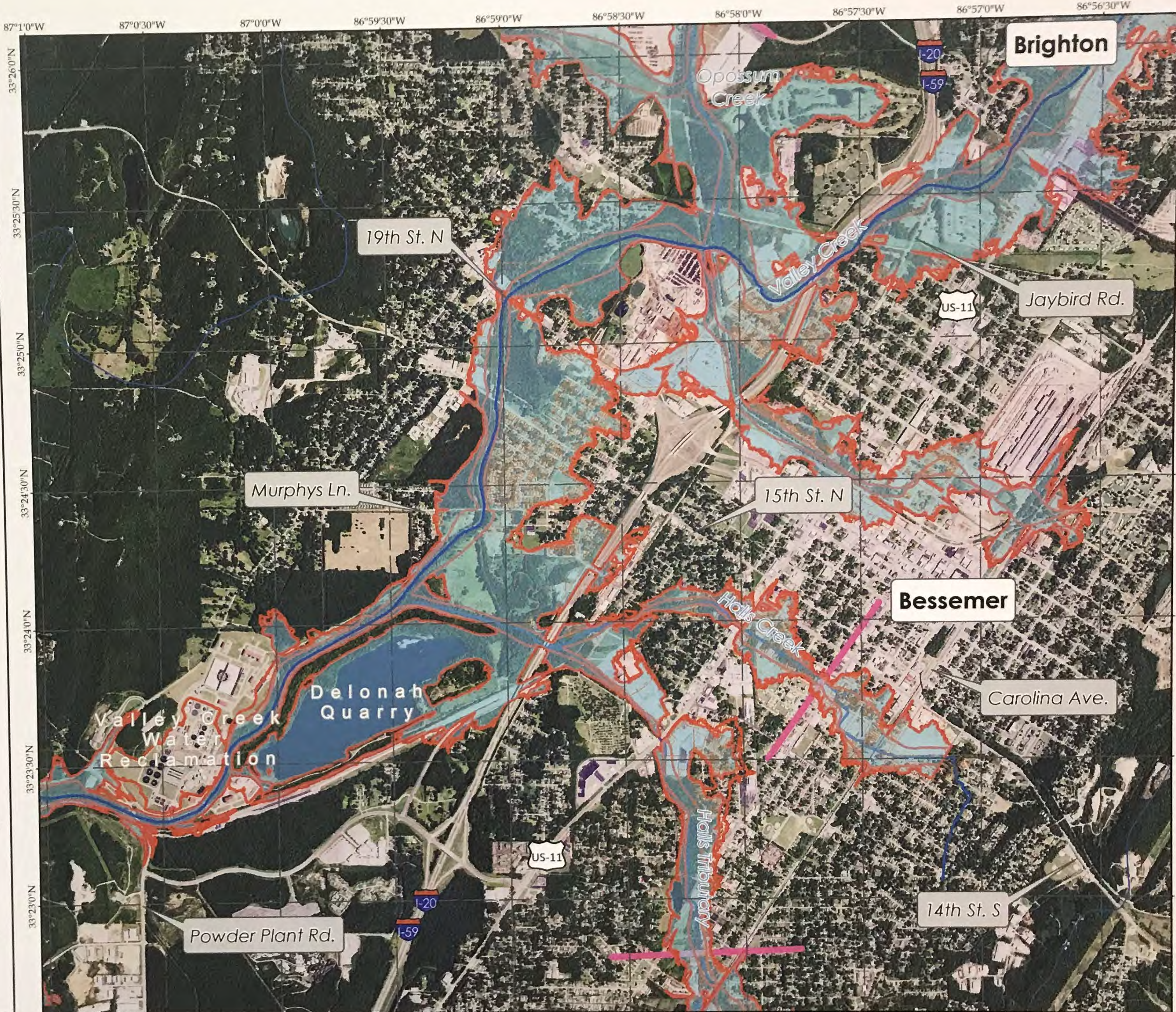


## Legend

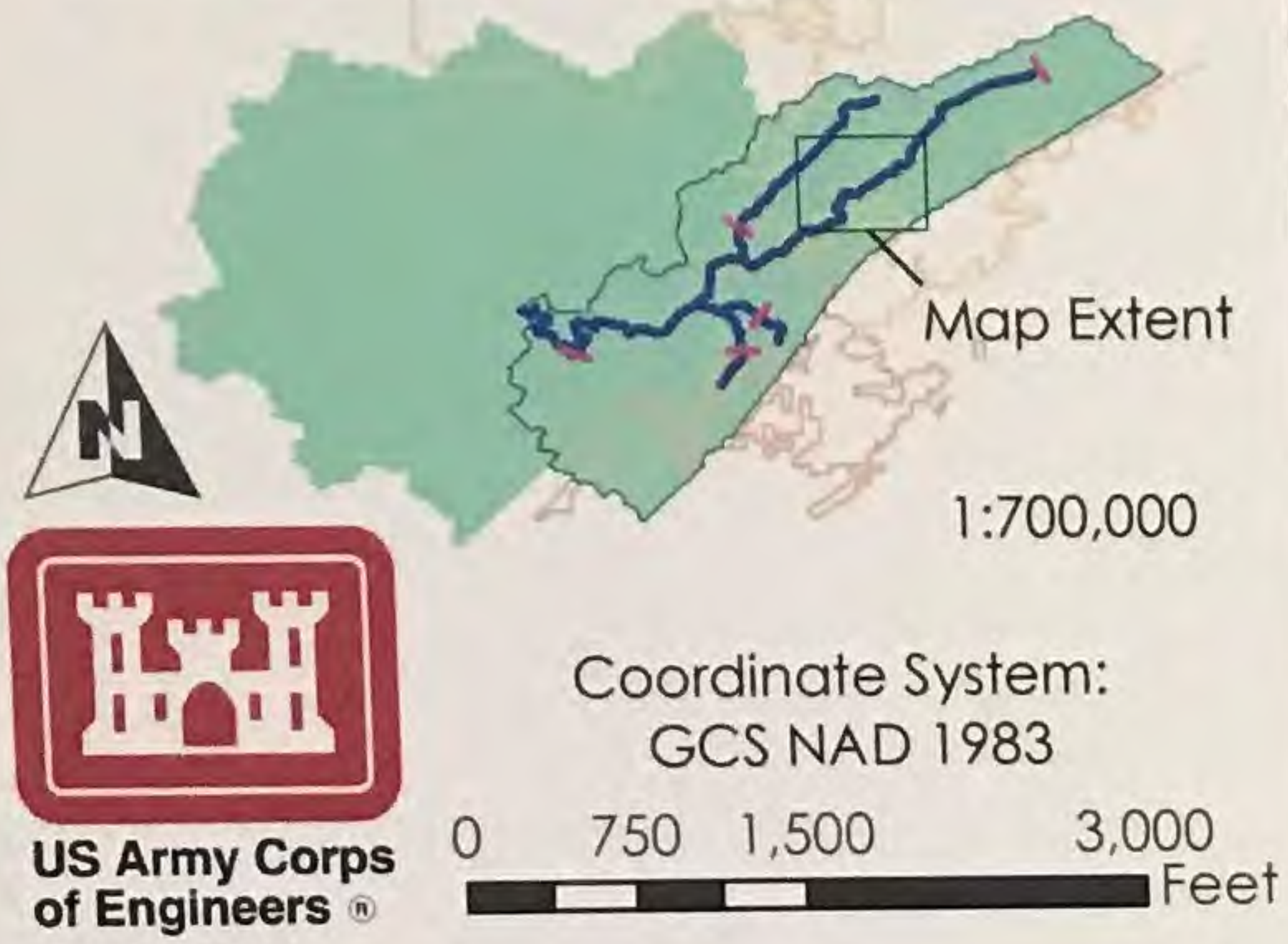
- Effective FEMA 100 Year
- Effective FEMA 500 Year
- Birmingham Parcels in SFHA
- Bessemer Parcels in SFHA
- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Valley Creek Basin
- Bessemer Limits
- Birmingham Limits

Notes: Map extent in Bessemer & Birmingham limits.

Data: National Flood Hazard Layer (FEMA);  
National Hydrography Dataset (USGS);  
Limits (Cities of Birmingham and Bessemer);  
Parcels (Cities of Birmingham and Bessemer);  
Imagery (USDA-APFO).



# VALLEY CREEK FRM FLOOD IMPACTS: MAP 2

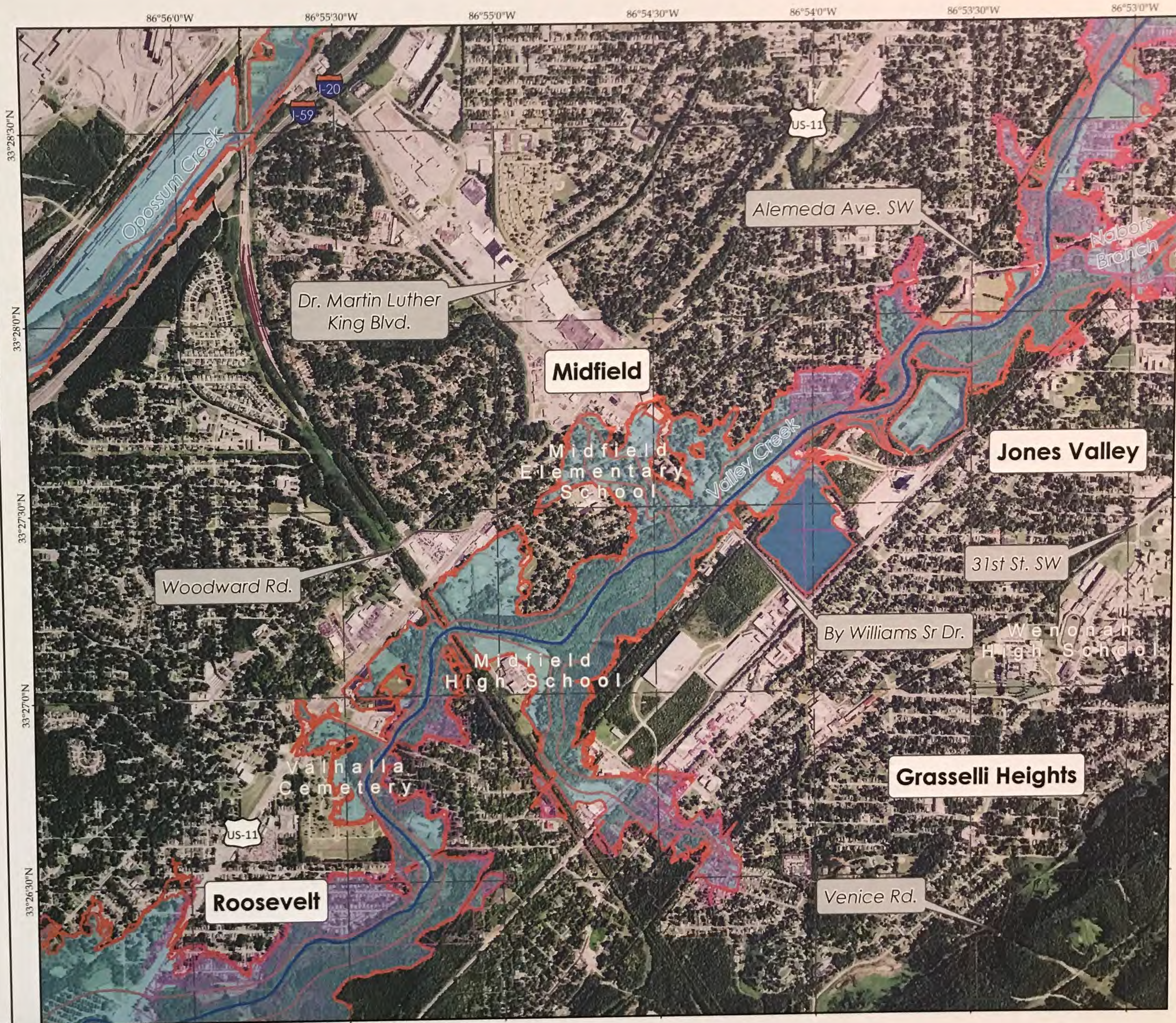


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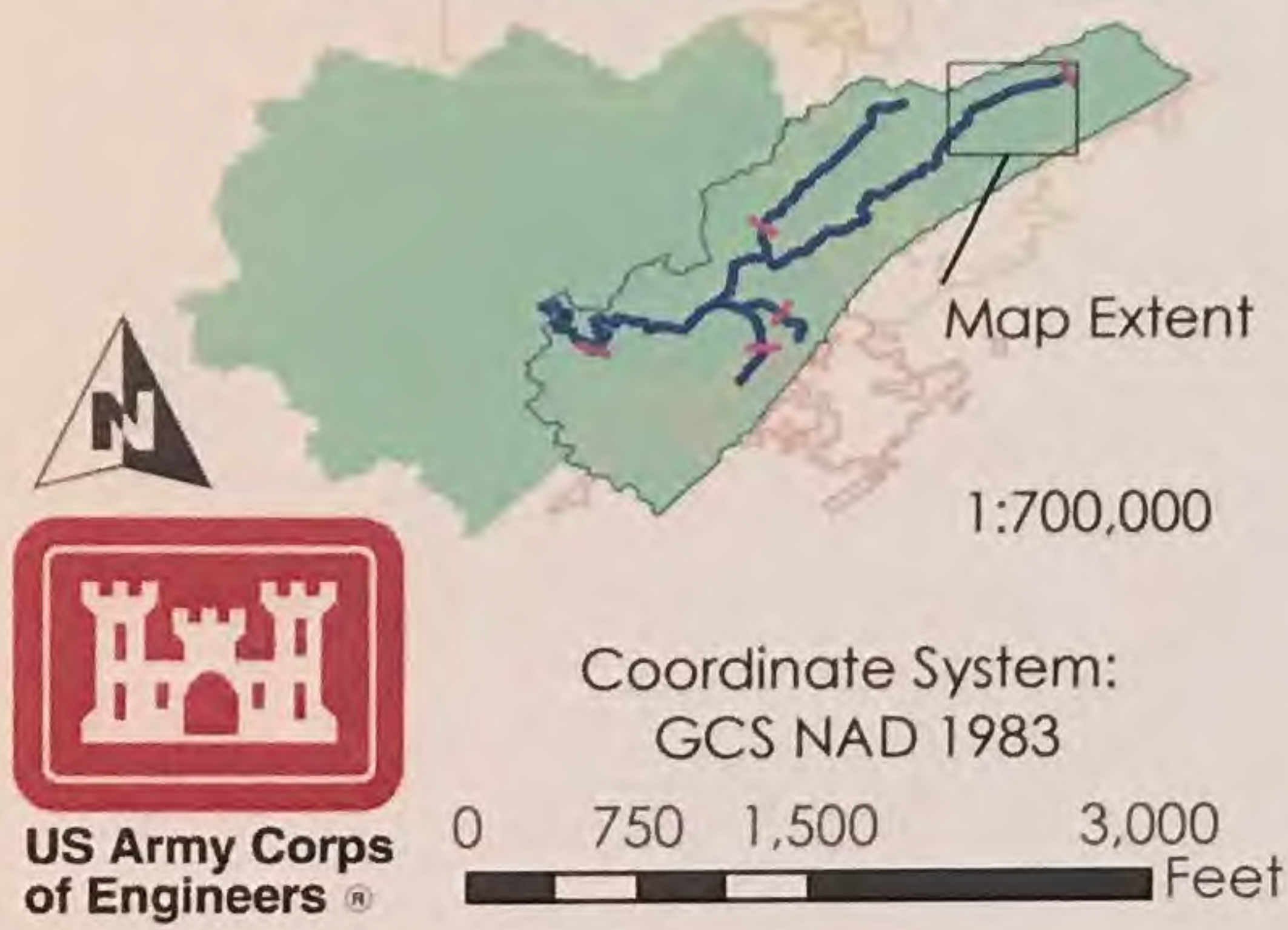
- Effective FEMA 100 Year
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- Birmingham Parcels in SFHA
- Study Extents
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Data: National Flood Hazard Layer (FEMA);  
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# VALLEY CREEK FRM FLOOD IMPACTS: MAP 1

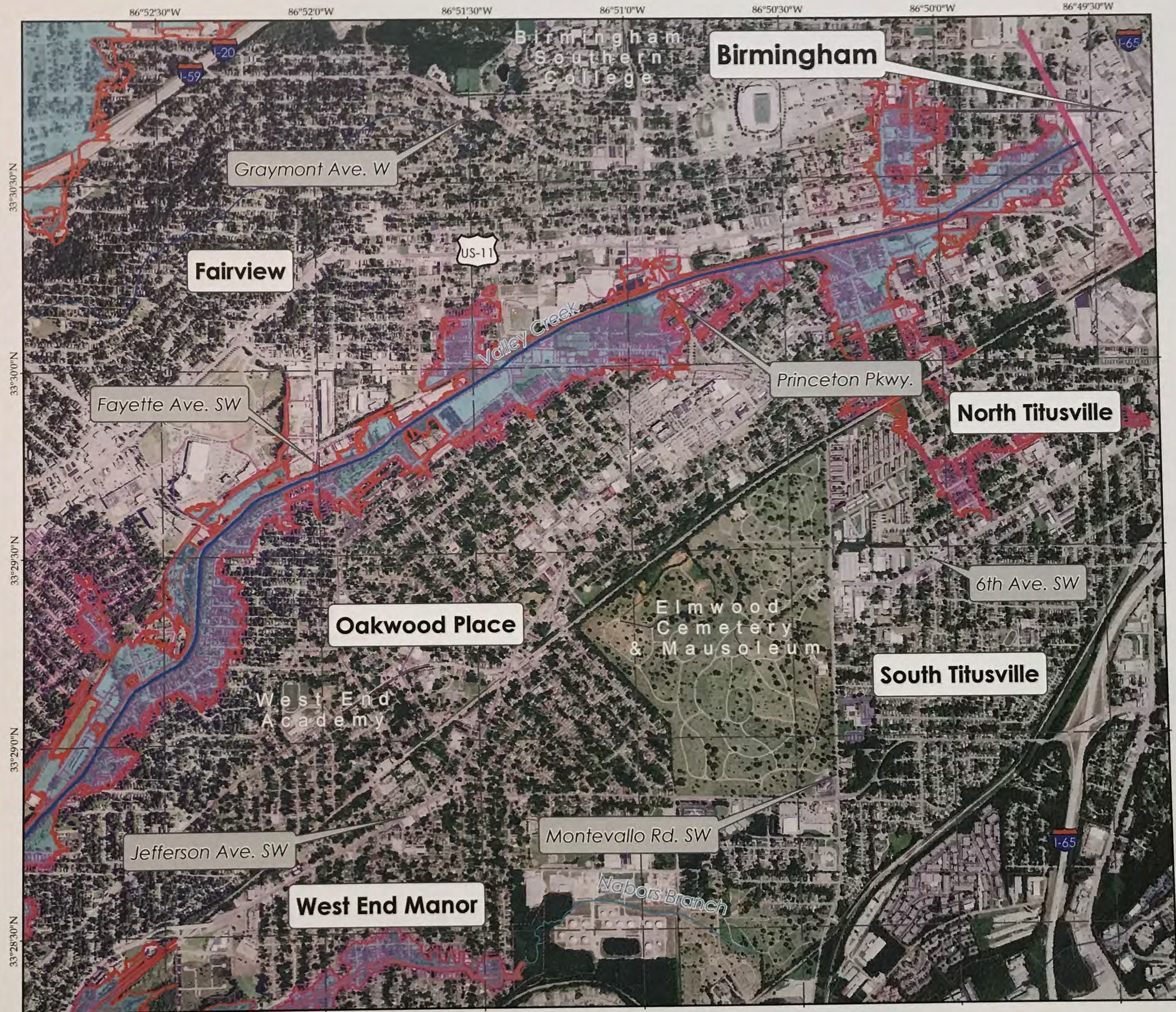


## Legend

- Effective FEMA 100 Year
- Effective FEMA 500 Year
- Birmingham Parcels in SFHA
- Study Extents
- Study Streams
- Upper Valley Creek Basin
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# Flood Risk Defined



## HAZARD

(What can cause harm?)

## PERFORMANCE

(How will the system react?)

## EXPOSURE

(Who & What are in harm's way?)

## VULNERABILITY

(How susceptible to harm?)

## CONSEQUENCE

(How much harm?)

## RISK

(Probability and severity  
of adverse  
consequences)

### Structural:

Measures that convey or keep water away from areas vulnerable to flooding.

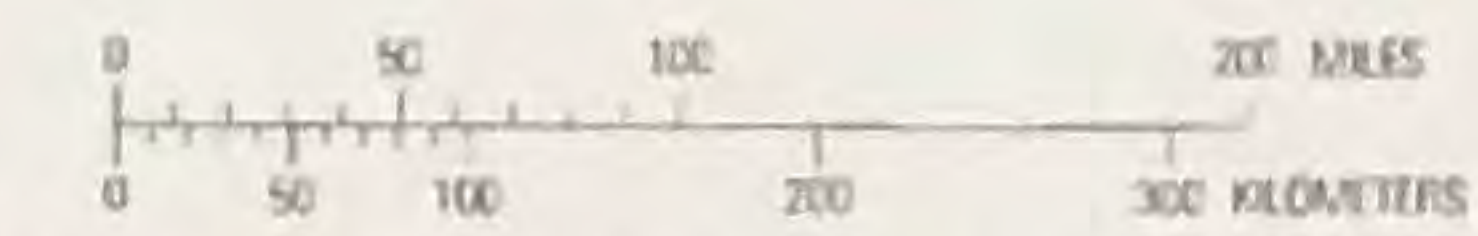
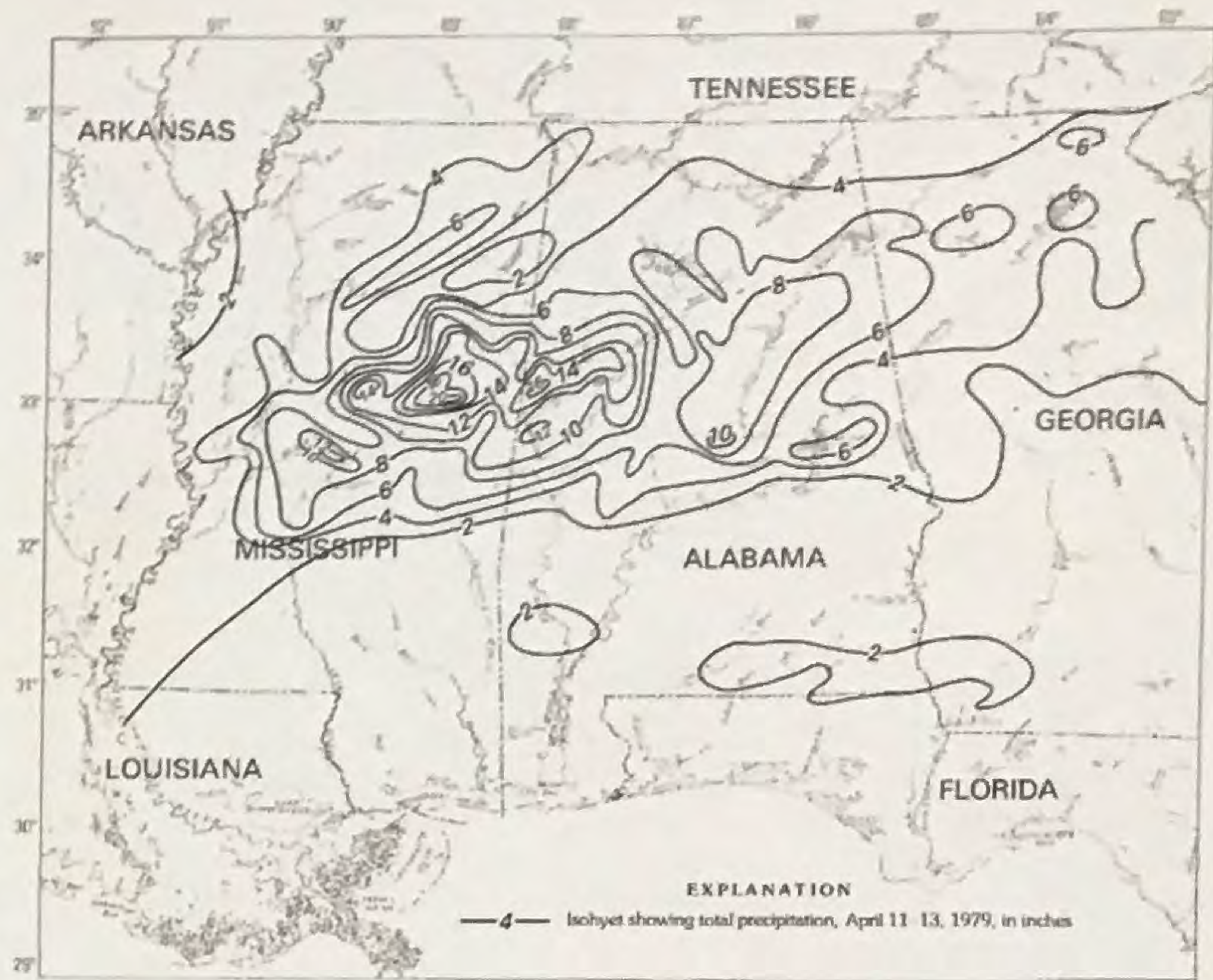
### Non-Structural:

Measures that focus on minimizing exposure to areas vulnerable to flooding.

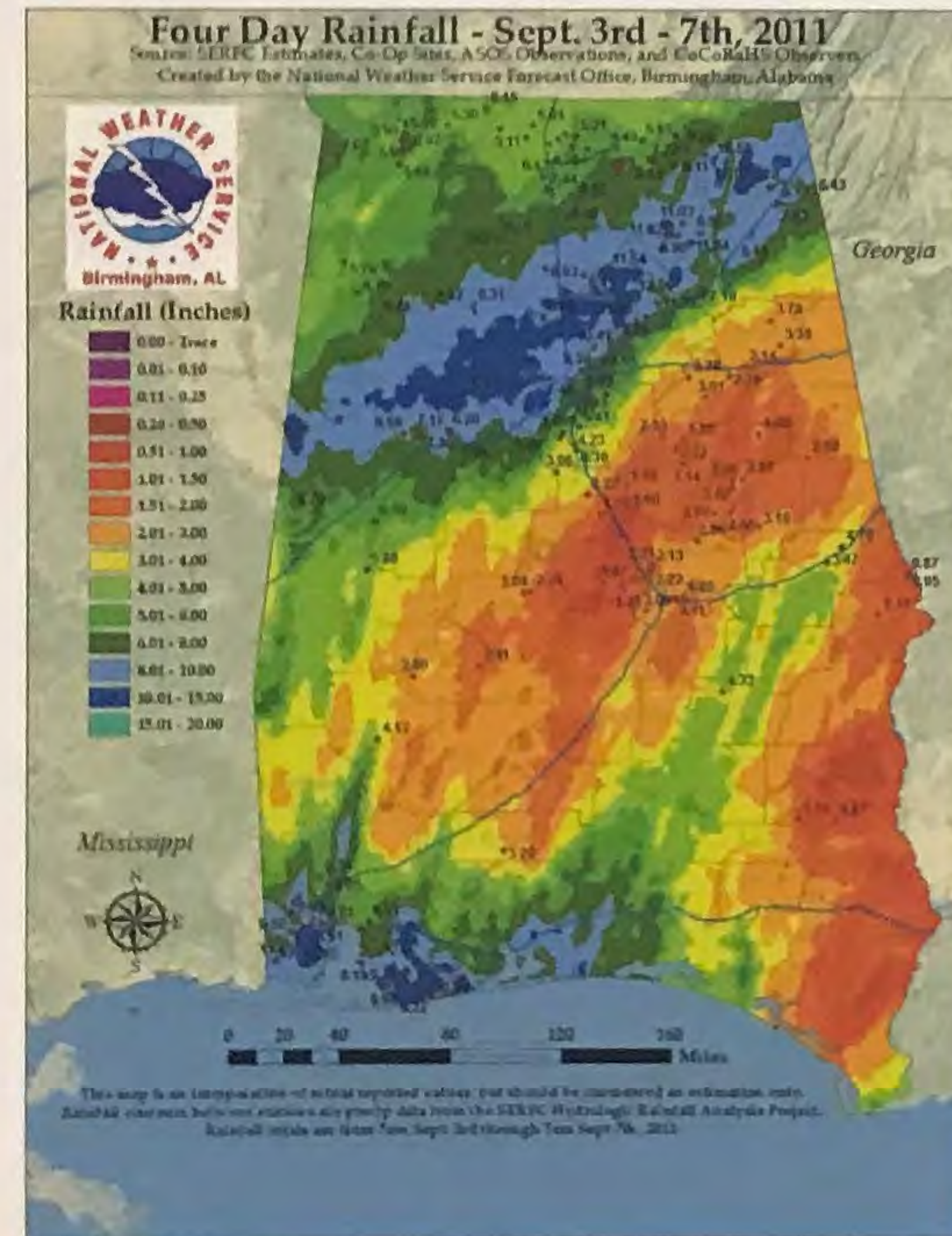
# Flooding History

**April 1979:** Frontal storm that produced nearly 9 inches of rainfall over a 48-hour period, and a peak discharge of 11,300 cfs at USGS 02461500 (19<sup>th</sup> St. gage), which is the 3<sup>rd</sup> largest discharge on record for the site. Peak stage for this event was 17.06 feet.

**December 1983:** Frontal storm that produced nearly 10 inches of rainfall in a 24-hour period in the Birmingham/Bessemer area. Associated discharge was 17,940 cfs, which is the largest on record for USGS 02461500. Peak stage associated with this event is unknown, but was likely the highest within the gaging period at 19<sup>th</sup> St.



*Isohyetal analysis of storm rainfall, April 11-14, 1979 (reprinted from Edelen et al., 1979).*



*Four day rainfall totals for Alabama (September 3-7, 2011; courtesy of NWS Birmingham Southeastern Forecast Office).*

**September 2011:** Rainfall was produced by remnants of Tropical Storm Lee. Approximately 10 inches of rain fell over Jefferson County from September 3<sup>rd</sup> - 7<sup>th</sup>. Discharge in Valley Creek peaked at 13,000 cfs at 19<sup>th</sup> St. (2<sup>nd</sup> largest on record), and stage peaked at 17.89 feet.

**April 2014:** The Valley Creek Basin received a 24-hour rainfall depth of about 4.5 inches from April 6<sup>th</sup>-7<sup>th</sup>, which resulted in severe flooding and a peak discharge of 10,200 cfs at 19<sup>th</sup> St. (4<sup>th</sup> largest on record). Peak stage associated with this event was 16.69 feet.



*Flooding in Bessemer Gardens (left) and over a Valley Creek bridge (right) during April 6-7, 2014 event (courtesy of John Talbot and ABC 3340 via NWS, respectively).*

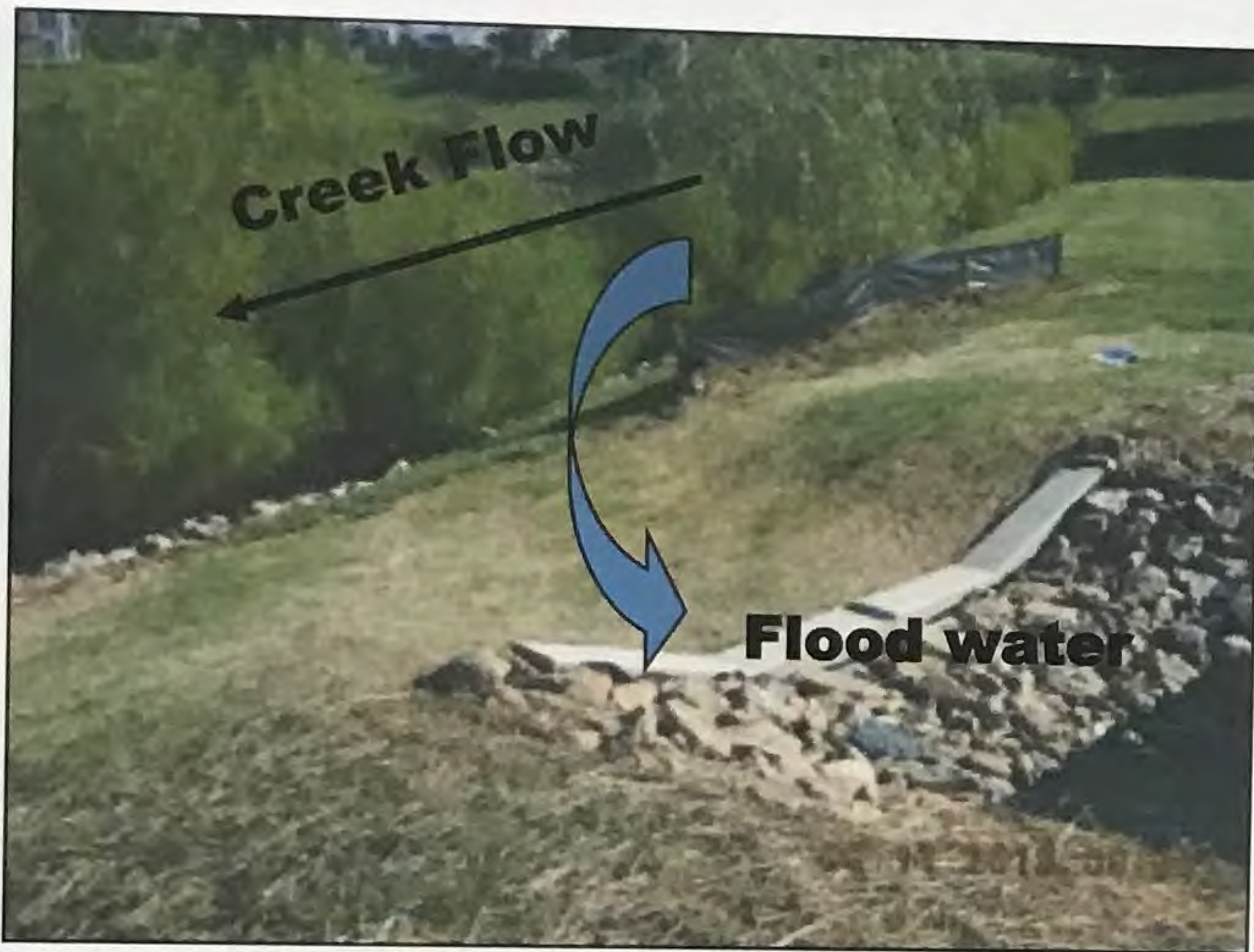


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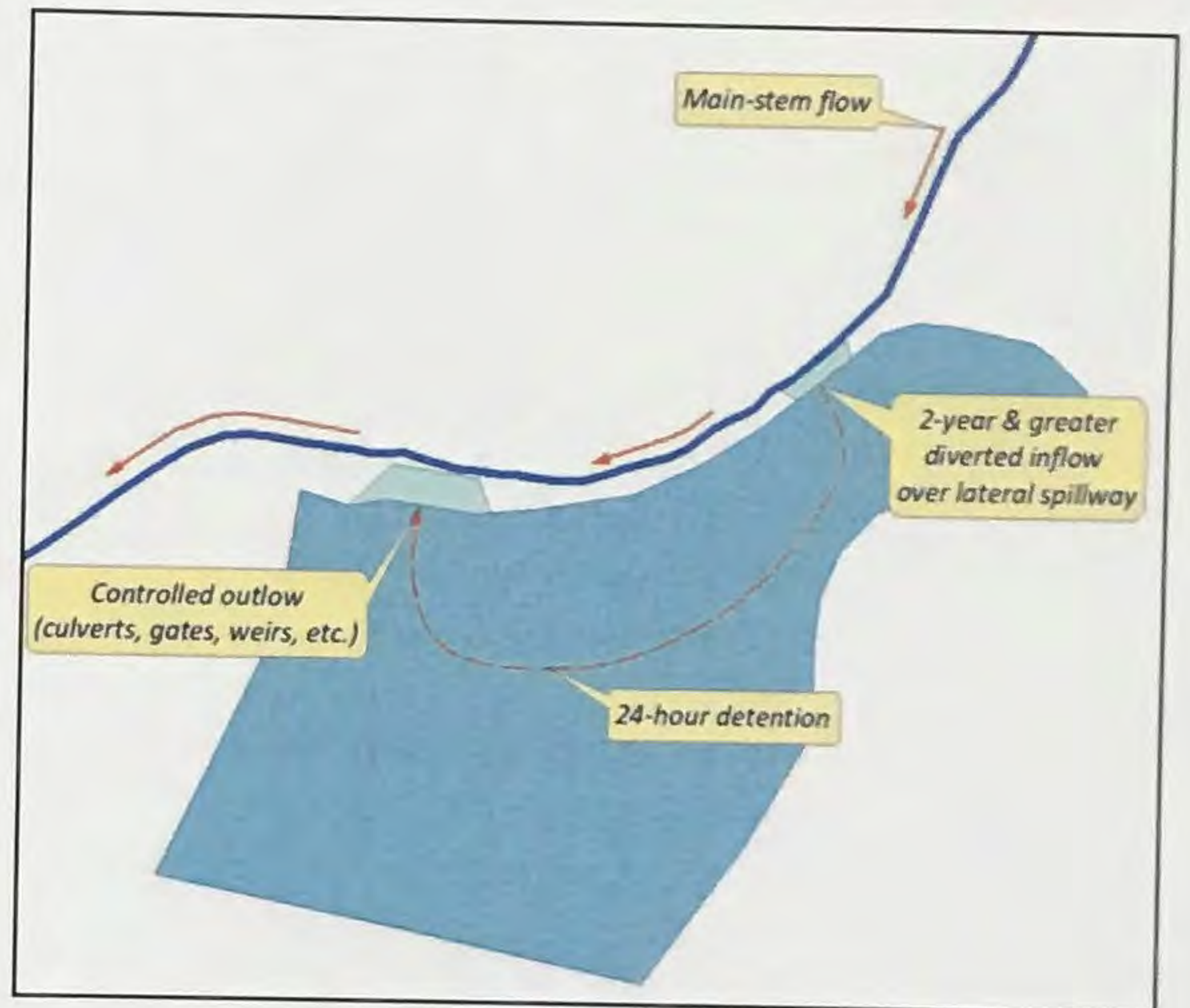
# Detention

Detention areas temporarily store excess water and release it slowly, reducing downstream flooding. Detention can be in line with the channel (i.e. conventional dam), or off channel (i.e. storage to the side of the stream channel).

In an urban setting, conventional dams are difficult to implement due to the dense population.



Example of a lateral spillway & weir used to divert excess water to an off channel detention (Photo, Bing images).

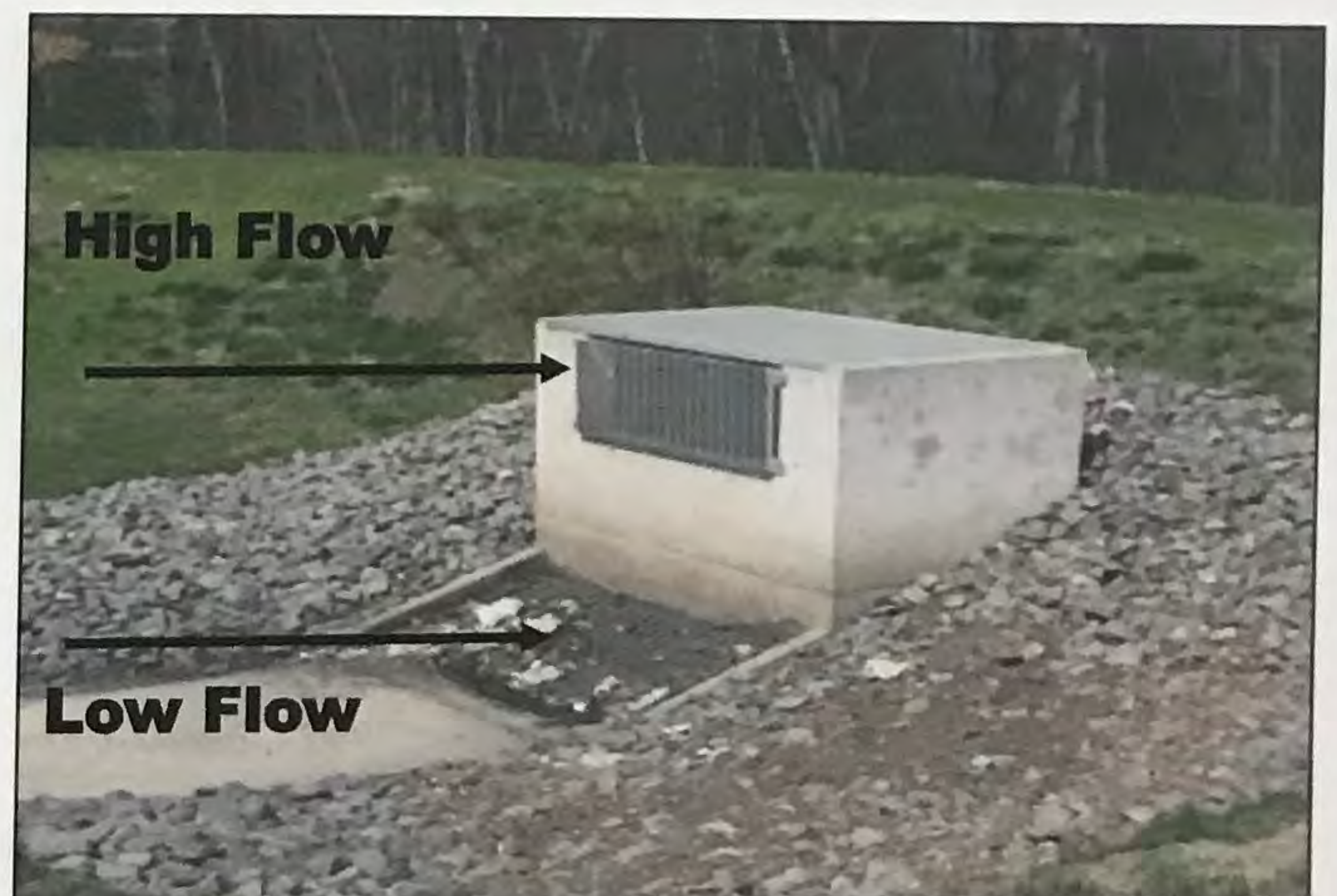


Example layout of off-channel detention.

Detention areas remain mostly dry except during periods of flooding. Retention areas are similar to detention areas, but maintain a small permanent pool.



Example of a wetland (Photo, Bing images).



Example of a riser structure used to control water from off channel detention back to the river (Photo, Bing images).



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# Levees/ Floodwalls

A levee is an engineered earthen berm that keeps water in the channel and out of nearby low-lying areas. A floodwall does the same thing, but is made of reinforced concrete.

A levee can provide protection to vulnerable areas from floods by reducing the risk of frequent inundation.

Levees and floodwalls are considered structural measures in flood risk management studies.



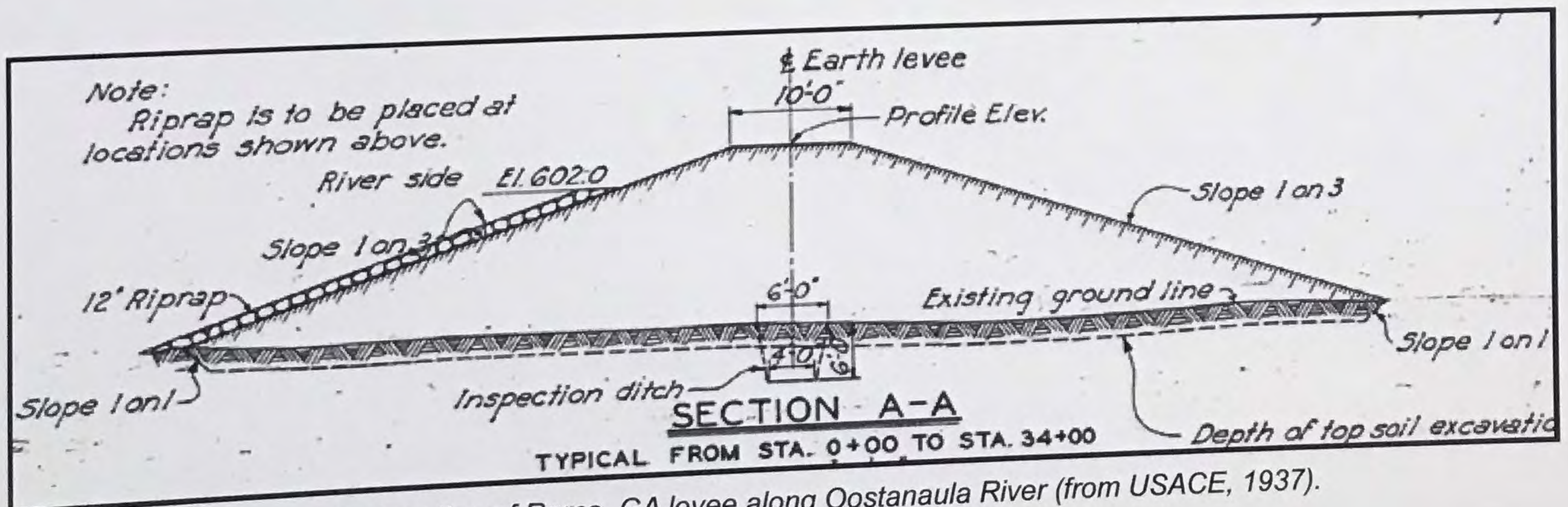
Floodwall tie-in at Rome, GA Levee.



Levee in Rome, GA along Oostanaula River.



Floodwall in Topeka, KS.



Typical section of Rome, GA levee along Oostanaula River (from USACE, 1937).





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# Channel Modification



*Example of a channel modification project.*

*Photo was taken during construction of the Turkey Creek Flood Risk Management Project in 2009.*

Channel modifications move more water by deepening, widening, or laying back the slopes of a stream or river channel.

Modifications decrease perimeter roughness by removing obstructions, debris, and woody vegetation.

Provides more channel capacity and reduces the water surface elevation upstream and along the modified area.

Increases velocity, meaning the water surface will be lower at the affected area.

Requires erosion control to make sure the channel remains stable. Hard armoring such as rip-rap or establishment of native grasses and wildflowers are just two methods of erosion control.

The type of erosion control used is dependent on the water velocity.



*Example of a channel modification project.*

*Photo was taken post construction of the Turkey Creek Flood Risk Management Project in 2019.*

# Valley Creek Flood Risk Management Study Town Hall Meeting

**Bessemer Civic Center**  
**June 19, 2019**  
**5:00 pm – 7:00 pm**



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# Meeting Format

- Opening Statements – 15 min
- Presentation of the Project – 10 min
- Invite to the poster boards – 5 min
- Open discussion and comment period – 90 min



# Opening Statements

City, County and/or Elected Officials

Corp of Engineers



# Agenda

- Authorization & Funding
- Study Purpose & Area
- Problems, Opportunities, and Objectives
- Potential Solutions
- Criteria for selecting a solutions
- Study Timeline



# Authorization & Funding

- In 1996, the Committee on Transportation and Infrastructure gave the Secretary of the Army, the US Army Corps of Engineers authority to study Valley Creek
- In Fiscal Year 2018 the Supplemental Appropriations for Disaster Relief and Recovery provided funds for the study.
- The study is scheduled for 3 years and \$3 million, which fully federally funded.





Source: Hueytown PD Officer Thompson)

Source: Hueytown PD Officer Thompson





Family Dollar on September 26th, 2018. (Victor Silva) (Source: Victor Silva)

Near Corner of Woodward Rd and Vandergrift Rd  
September 26, 2018, Source: Victor Silva







Corner of 18<sup>th</sup> and Valley Creek Dr.





Murphys Ln / 13<sup>th</sup> St N



# Study Purpose

- Gather data, define the problem more specifically
- Identify solutions to reduce the impact of flooding along Valley Creek
- Reduce economic damages
- Reduce the risk to life safety of the community



# Study Area

**VALLEY CREEK TRM STUDY AREA OVERVIEW**

Valley Creek Basin in Jefferson County, AL

1:9,500,000

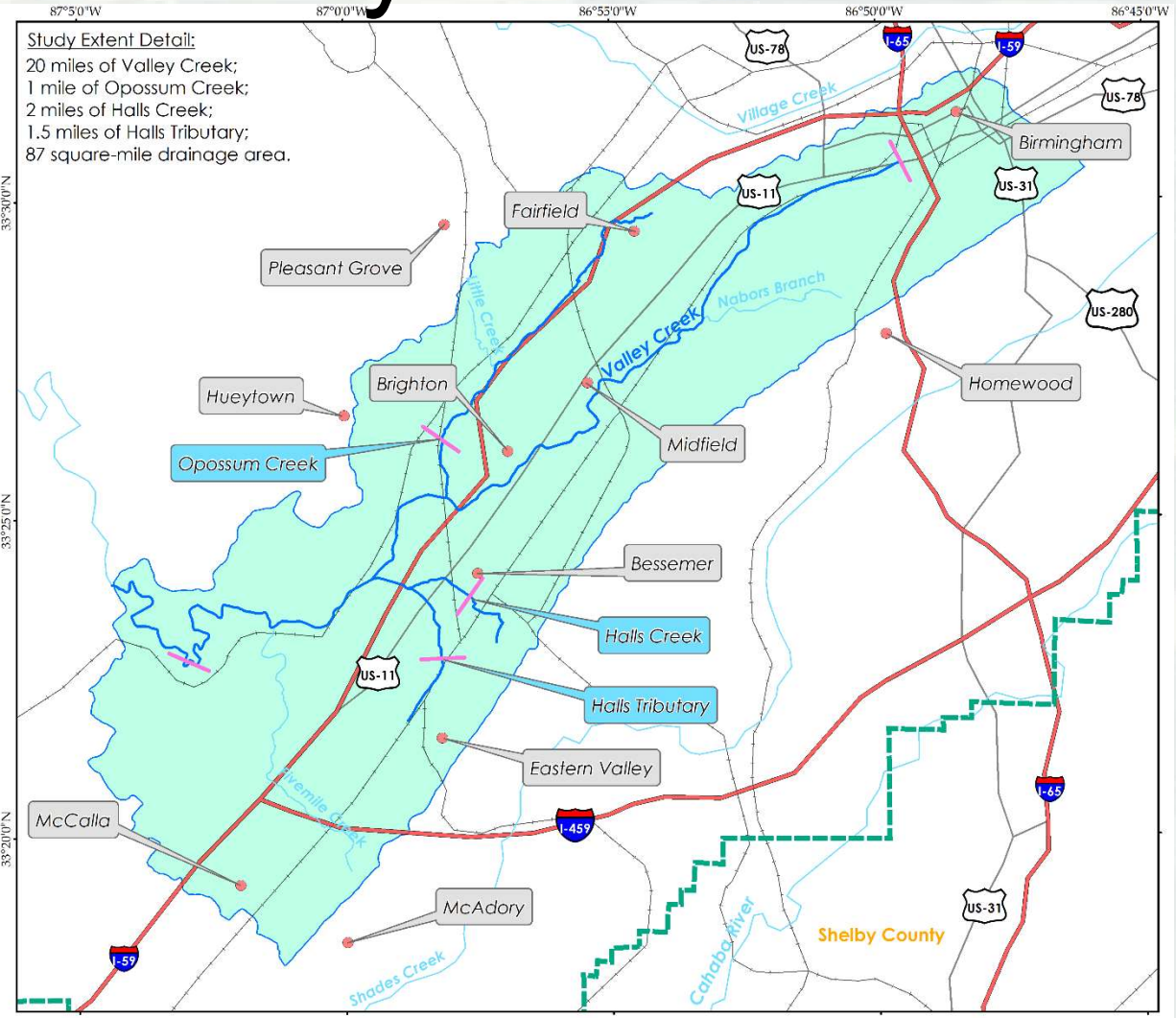
Valley Creek Basin  
Major Rivers  
Mobile-TBB

**Legend**

- Study Extents
- Study Streams
- Upper Valley Creek Basin
- Municipalities
- Jefferson County
- Railroads

Sources: National Hydrography Dataset (USGS); National Transportation Dataset (USGS); Citities of Bessemer and Birmingham

Coordinate System: GCS NAD 1983



# Problems & Opportunities

- Problems
  - ▶ Risk to loss of life due to frequent flash flooding
  - ▶ Frequently occurring economic damages
  - ▶ Poor environmental and water quality
- Opportunities
  - ▶ Reduce the risk for loss of life
  - ▶ Prevent recurring economic damages
  - ▶ Provide environmental, water quality, and/or recreational benefits
  - ▶ Improve communication of both immediate and long term risk

Public  
Input



# Study Objectives



- Primary
  - ▶ Reduce risk to life safety
  - ▶ Reduce economic damages
- Secondary
  - ▶ Improve environmental, water quality, and recreational opportunities in conjunction with the primary objective, if possible



# Potential Solution Categories (measures)

- Structural and non-structural options must be considered
  - ▶ **Non-structural** – focus on minimizing exposure to areas vulnerable to flooding.
  - ▶ **Structural** – convey or keep water away from areas vulnerable to flooding.



# Measures

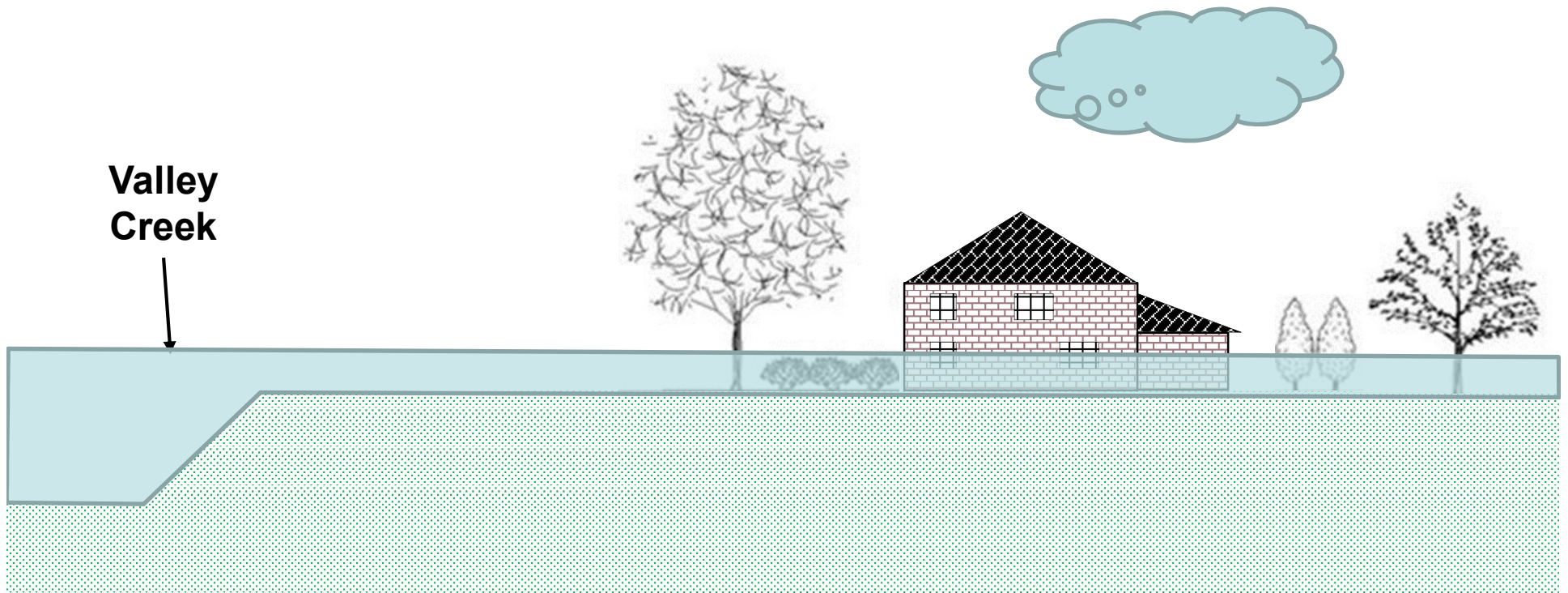


- Non-Structural
  - ▶ Flood-proofing
  - ▶ Buy-outs/relocation
  - ▶ Flood warning systems
- Structural
  - ▶ Channel modification
  - ▶ Levees/floodwalls
  - ▶ Bridge removal/modification
  - ▶ Diversion channels
  - ▶ Off-Channel detention basins
  - ▶ In stream storage reservoir(s)

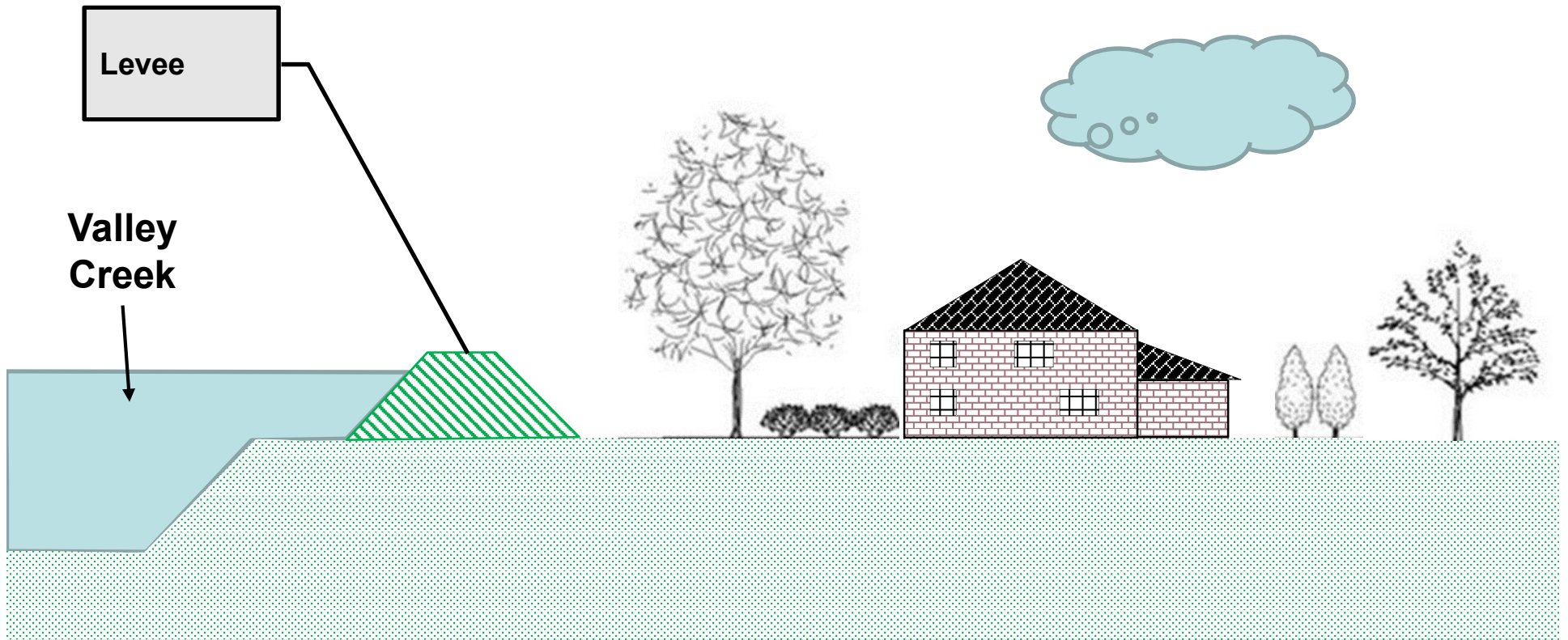




# The Existing Problem



# Structural - Levee



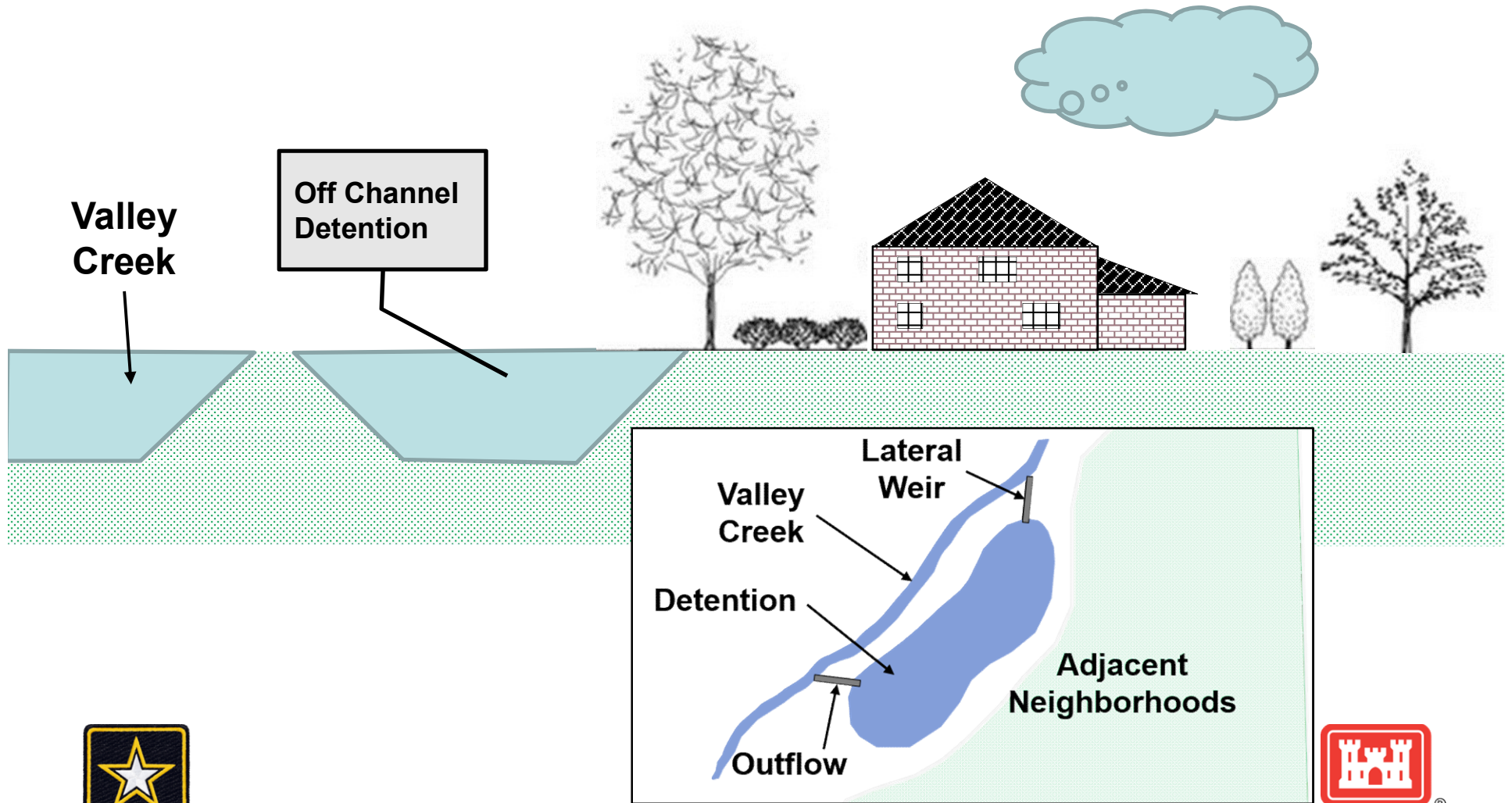
# Structural - Floodwall



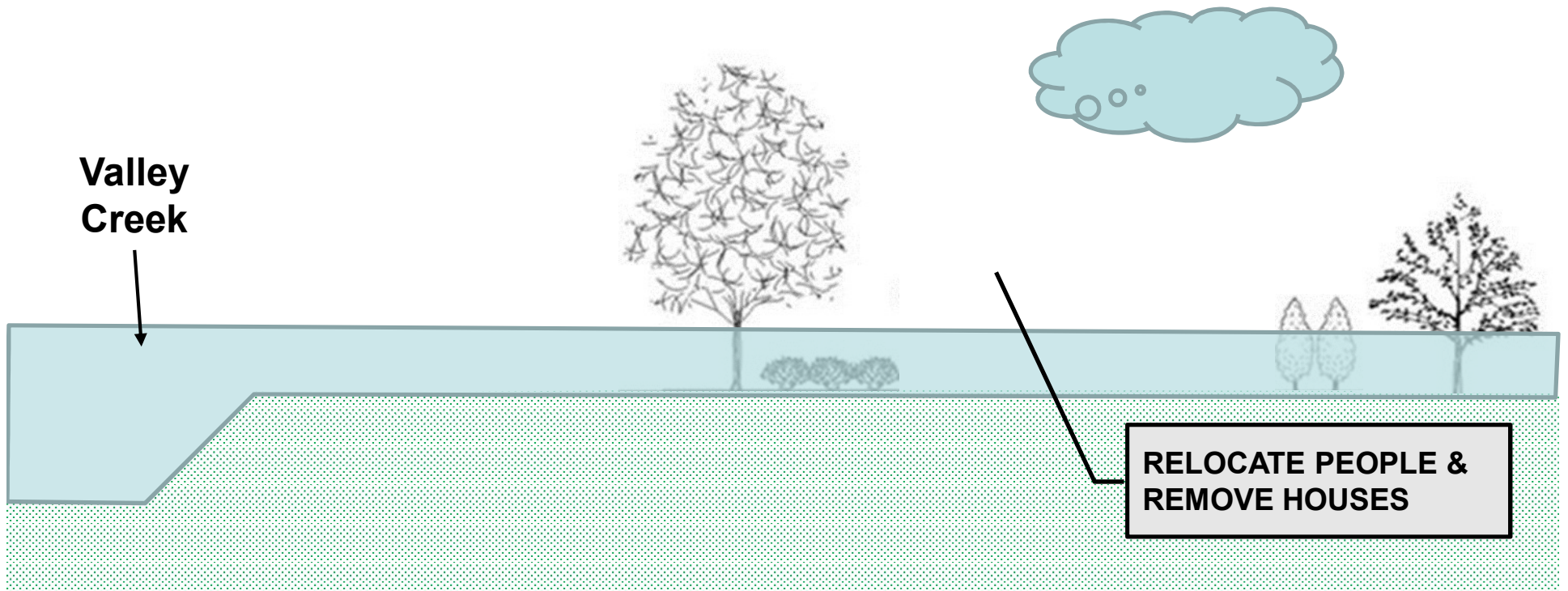
# Structural – Channel Modification



# Structural – Storage



# Non-structural – Buyout/Relocations



# Alternatives Under Evaluation

## Structural

Levees / floodwalls  
Channel Modification  
Upstream detention (i.e. dams)

## Non-Structural

Buyouts / relocations  
Flood-proofing



## Combination

- Evaluate at different levels of flooding.
  - ▶ 4% ACE (25-year)
  - ▶ 2% ACE (50-year)
  - ▶ 1% ACE (100-year)



# Federal Criteria for an Acceptable Solution

- Proposed action must solve the problem
- Action must be feasible
- Economic benefits must exceed the project cost
- Project cannot induce adverse affects elsewhere
- Locally and environmentally acceptable





# Environmental Compliance

- National Environmental Policy Act
  - ▶ Preparing Environmental Assessment
- National Historic Preservation Act
  - ▶ Developing Programmatic Agreement
- Clean Water Act- Sections 404/401
  - ▶ Will require 401 Water Quality Certification
- Endangered Species Act
- Mitigation
  - ▶ Special consideration for wetland and bottomland forest impacts
- ▶ Described in the Environmental Assessment

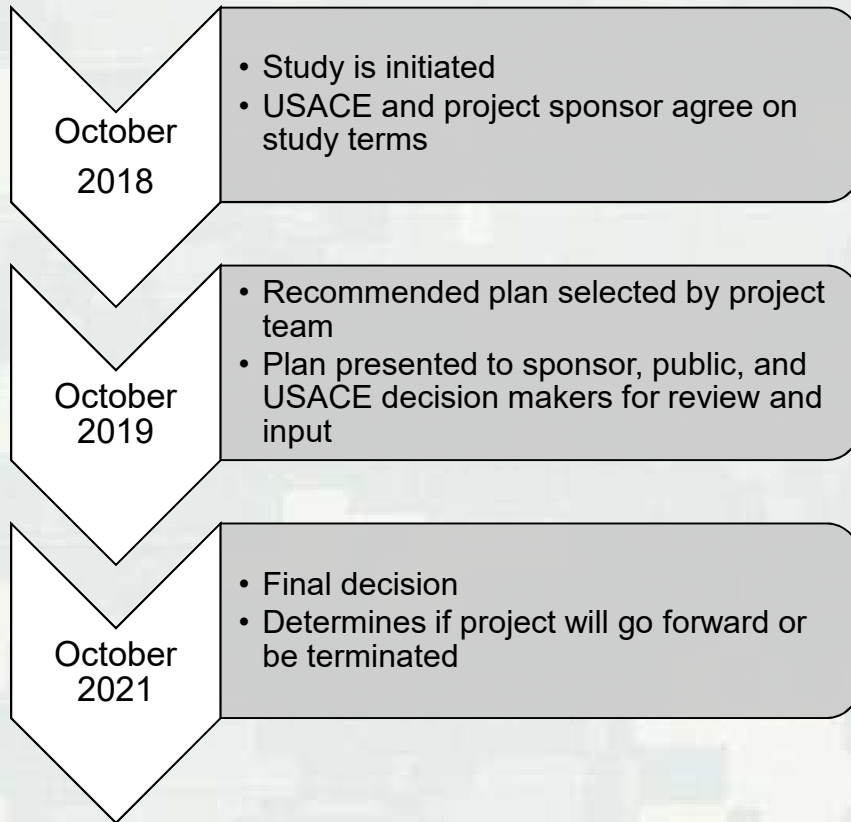


# Why is the Federal Criteria Important?

- Federal criteria ensures taxpayer dollars are utilized in a way that achieves maximum efficiency and avoids causing harm
- Corps projects are often cost shared between the Federal Government and the local sponsor



# Study Timeline



- Public input will be gathered and considered
  - ▶ Now (June 2019)
  - ▶ After the TSP milestone (Fall/Winter 2019)
  - ▶ Prior to Chief's Report (Spring/Summer 2021)

