



FINAL REPORT OF THE 2017 OKLAHOMA FLOOD RISK SYMPOSIUM

2017 OKLAHOMA FLOOD RISK SYMPOSIUM
SPONSORED BY THE ASFPM FOUNDATION AND
THE OKLAHOMA FLOODPLAIN MANAGERS ASSOCIATION
MARCH 28, 2017
ROSE STATE COLLEGE
MIDWEST CITY, OKLAHOMA



Dear Partners in Flood Risk Reduction,

On behalf of the Oklahoma Floodplain Managers Association, we are pleased to present the *Final Report of the 2017 Oklahoma Flood Risk Symposium*. This document presents a summary of the discussion and dialogue held by and between participants of the March 28, 2017 event.

This forum was the 11th state flood risk symposium sponsored by the ASFPM Foundation and the first held in Oklahoma. The forum's title, "Flood Risk Reduction in Oklahoma: One Discussion, Common Goals" proved to be fitting, as fifty-four participants from across a variety of industry sectors participated in this event.

Following a day of insightful speakers and meaningful discussion, participants developed and refined a number of action items. These action items will be presented to the OFMA Board of Directors for inclusion in the Association's Strategic Plan and Policy Agenda and will form the basis for OFMA's continuing flood risk reduction efforts.

We would like to thank all symposium participants for their insights, as the event results will serve invaluable for years to come. Similarly, the importance of the contributions of the many event volunteers from OFMA and the ASFPM Foundation, as well as the strong support from the ASFPM Executive Office, cannot be overstated.

For additional information about the 2017 Oklahoma Flood Risk Symposium, or to find out how to assist with flood risk reduction efforts, please contact OFMA at <http://www.okflood.org>.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Tom Leatherbee".

Tom Leatherbee, MCP, AINS, CFM
Symposium Co-Host

A handwritten signature in blue ink, appearing to read "Joe Remondini".

Joe Remondini, P.E., CFM
Symposium Co-Host

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INTRODUCTION

Discussions, training sessions, and other events related to floodplain management occur regularly in Oklahoma, particularly in the spring of each year. Most of these events are tailored toward an audience of industry professionals, whether floodplain administrators or private-sector consultants, and most focus on sharing best practices and providing updates about program changes. What is generally missing from these events is real conversation, held among individuals from a variety of industry sectors, about the true nature of flood risk, how this risk can be better identified and mitigated, and how these actions can be part of an overall strategy to build resilient communities.

The 2017 Oklahoma Flood Risk Symposium was held on March 28, 2017 at the Professional Training Center at Rose State College in Midwest City. Fifty-four invitees from across the state, drawn from a variety of industries and with diverse backgrounds in government and business alike, came together to engage in a day long conversation about flood risk reduction. The format of the day called for morning speakers who would provide an introduction to the concepts of risk identification, hazard mitigation, disaster response and community resilience, providing the participants with common knowledge and shared vocabulary for the day's discussions. The bulk of the day's work consisted of in-depth discussion of these topics by facilitated breakout groups, each of which was charged with reporting out potential action items for consideration by the entire group. The final session was an exercise in resource prioritization, with the breakout group action items being ranked by all participants.

This event was made possible by a partnership between the ASFPM Foundation and the Oklahoma Floodplain Managers Association. Building on its successful Gilbert F. White National Policy Forums, the ASFPM Foundation has been sponsoring these state flood risk reduction symposia for several years. Recognizing the need to unite the many flood risk reduction stakeholders and bring cohesiveness to flood risk reduction efforts, OFMA sought to bring one of these events to Oklahoma.

BACKGROUND

FLOOD RISK IN OKLAHOMA

Overall flood risk in Oklahoma is derived from a number of sources, including traditional riverine flooding, flash flooding, overland flow and localized drainage insufficiency. Historically, riverine flooding has been the focus of most regulatory and

mitigation efforts, with the National Flood Insurance Program minimum standards for community participation.

In a state known nationally for tornados (and more recently, for earthquakes), flooding presents a serious risk to life and property. Of the 18 major disaster declarations for Oklahoma since 2010, 8 have involved a flooding peril (FEMA). In 2015, Oklahoma was 4th in nation with 16 flood-related deaths (NOAA). Since the inception of the National Flood Insurance Program, over \$197m in flood insurance claims have been paid in Oklahoma (NFIP B&S Agent).

In 2011, the State of Oklahoma completed a new Comprehensive Water Plan. As part of this plan, a Supplemental Report on Floodplain Management was issued. This report highlighted the need to move beyond a regulatory approach to regulating flood risk, stating:

Moving forward, floodplain management cannot be based solely in a desire to comply with federal regulations. If floodplain management is undertaken only as a means to the end of making flood insurance available in a community, the opportunity to capitalize on relationships between floodplains and other aspects of water resources will never be realized, and the opportunity to mitigate the impacts of flooding on the lives of Oklahomans will be lost.

ABOUT THE ASFPM FOUNDATION

The mission of the ASFPM Foundation is “(t)o promote public policy through select strategic initiatives and serve as an incubator for long-term policy development that promotes sustainable floodplain and watershed management.”

ABOUT THE OKLAHOMA FLOODPLAIN MANAGERS ASSOCIATION

The Oklahoma Floodplain Managers Association brings together people with a common interest in floodplain management. Members include concerned citizens, public employees and elected officials, engineers, planners, contractors, lenders, insurance agents, real estate professionals, students, corporate partners and local, state and federal agencies. Our objectives include promoting interest in flood damage abatement, improving cooperation among government agencies, and encouraging innovative approaches to managing Oklahoma’s floodplains. In addition, we believe a unified membership can present one strong voice to communicate with the state legislature on flood-related issues. OFMA was organized in November 1990 and is a chapter of the Association of State Floodplain Managers, Inc.

OFMA’s mission is:

We encourage and support, with our partners, flood safe development and flood mitigation. We promote sound floodplain management practices and the natural and cultural benefits of the floodplain. We support the floodplain management profession through education and certification.

SPOTLIGHT TOPIC 1: IDENTIFYING AND PLANNING FOR RISK

Knowing the true level of flood risk is essential for informed planning and drives hazard mitigation, disaster response and recovery and community resiliency efforts. The first spotlight topic therefore focused on risk identification.

The plenary presentation contained an in-depth discussion of flood risk measurement and flood hazard severity, along with the associated discussion about the appropriateness of the 100 year standard. The presentation went on to address flood risks that may be exacerbated by the NFIP regulatory program and by improperly planned risk reduction efforts, such as poorly designed stormwater detention. Finally, the presentation highlighted the need for informed planning, both in the form of master drainage planning and proper hazard mitigation planning.

The discussion group first focused on the current state of flood risk identification, looking at what efforts are succeeding and what improvements are most needed, and determining that while urban areas are being best served, resources should be allocated to areas of greatest population at risk. Next, the group looked at how flood risk information is being used in the planning process, and identified a number of disconnects that are hampering informed planning; deficiencies with the data and with the utilization were noted. The group achieved a significant consensus that delays in producing new formal flood maps are significantly hampering efforts. There was also consensus that strengthening existing real estate disclosure laws could be of significant value.

SPOTLIGHT TOPIC 2: DISASTER RESPONSE AND COMMUNITY RECOVERY

Responding to a flood disaster may have unique characteristics, in that the risk is not reduced once the disaster event occurs – the hazard is based on geography and without active mitigation efforts, it will only remain or increase. Accordingly, it is fair to question the typical disaster response and recovery framework, which focuses on restoring those impacted back to pre-disaster life as quickly as possible.

The plenary presentation introduced the concept that pre-disaster planning and community engagement can help communities toward a new and better paradigm for disaster response. Commitment to this sort of planning by community leaders can allow communities to “build back better” instead of succumbing to emotional responses that may only serve to reinforce pre-disaster risk.

The discussion group built off of these concepts, first seeking to answer the question of whether helping someone return to a structure that has been damaged and remains in a high risk area is actually an act of compassion. The discussion then turned to the idea of establishing differing response goals for disasters caused by hazards that are location-based, as opposed to those hazards that can occur anywhere. Turning specifically to a discussion about the NFIP and flood hazards, the group then discussed whether the substantial damage and substantial improvement regulations provide an adequate “circuit breaker” to prevent continuing investment in high risk areas. This discussion about substantial damage quickly led to a consensus that the social justice concerns must be considered when addressing post-flood recovery, particularly in riverine areas. Lastly, the group addressed coordination between agencies and post-disaster politics, a conversation that led to growing support for independent third party coordination, such as that which is offered by the OFMA Disaster Response Team. The conversation also served as a preliminary step toward the formation of new partnerships between the USACE-Tulsa District, the Oklahoma Office of Emergency Management, and the OFMA DRT, particularly regarding response to flooding in communities around projects during periods of high volume releases.

SPOTLIGHT TOPIC 3: HAZARD MITIGATION AND BUILDING RESILIENT COMMUNITIES

Because flood hazards are location-based, and because flood risk is increasing as urbanization increases and as climate change influences severe weather patterns, intervention is required in order for disasters not to become recurrent and losses repetitive.

The plenary presentation for this topic told the story of building resilience in the City of Tulsa, a community known nationwide for its mitigation efforts. Being mindful of the community’s history, using tools such as the CRS Program’s Program for Public Information, capitalizing on existing political infrastructure, and embracing new trends such as low impact development has allowed Tulsa to transform its strong mitigation program into a program that truly is building a resilient community. Going forward,

these efforts will continue to grow, finding new and different ways to reach affected populations, including efforts to cross language and cultural barriers.

The discussion group first focused on the factors that can create community support for mitigation activities, as well as those that work to allow risky development. Next, the group talked about shifting the paradigm from mitigating only with “outside” money to developing local support, which may go along with diversifying the types of mitigation activities (e.g., structural projects vs. low impact development). The group attempted to examine a number of projects to determine who some have succeeded and some have not, and determined that scope of hazard impact and momentum play important roles. Finally, the discussion turned to other risks and how developing resilience needs to be multi-hazard in nature.

FLOOD RISK REDUCTION PRIORITY ACTION ITEMS

At the conclusion of the breakout discussions, each group was asked to create a list of five potential action items that could help inform a framework for future flood risk reduction efforts in Oklahoma. When the Symposium reconvened in plenary session, a reporter from each breakout group took the floor and presented a summary of the group discussion. Following the reports, each group’s identified potential action items were posted for consideration by all participants, who were each asked to rank their top five items. Based on this ranking, five priority action items emerged as the consensus of the group.

⇒ **Incorporate Economic Development and Community Revitalization into Hazard Mitigation and Disaster Recovery**

Currently, there is little or no integration between Hazard Mitigation Plans, Comprehensive Land Use Plans and economic development strategies. Compounding this disconnect, nearly all federal grants that could be used for mitigating flood hazards contain restrictions that make appropriate and responsible reuse of the land impossible. Encouraging, rather than forbidding, connections between hazard mitigation, economic development and community revitalization would open the door to future of blighted floodprone land being mitigated and reused through public-private partnerships, rather than remaining underused and subject to repetitive losses and increasing blight. Similarly, a unified approach could provide answers for disadvantaged communities in floodprone areas, allowing redevelopment that could remove hazard and blight,

rather than leaving a neighborhood full of repetitive loss homes clinging to the hope of someday obtaining funding for a levee project.

⇒ **Expedite the Risk Identification Process and Remove Barriers to Product Release**

Risk identification takes many forms, the most formal being a model-backed FIRM and FIS. In many cases, even maps identified as needed by and being produced through the RiskMAP project take so long to become effective that they may be significantly outdated before ever being used. While little can be done about some of the delays with the formal products, the process needs to be examined for any possible efficiencies. Removing barriers to communities taking leadership in map and model maintenance must be explored. In the absence of expediting these formal products, exploring an expanded role for less formal products, such as the very promising Base Level Engineering, may provide a critical stopgap, particularly in more rural areas.

⇒ **Restructure Training Curriculum to Address Intermediate Needs and Add Offerings for County and Rural Floodplain Management**

Currently, OFMA and the Oklahoma Water Resources Board partner to offer a wide variety of training classes, largely in the form of the Floodplain Management 101 and the Advanced Floodplain Management series. OWRB has piloted a few targeted classes designed to fill rural and intermediate needs, and OFMA has worked hard to spread classes around the state, but these efforts should be formalized. The OFMA Institute should be used as a platform for these efforts, as it serves as an excellent training repository, and it should be expanded to include the OWRB training materials. OFMA should partner with other nearby states and should seek to expand to a regional training coalition.

⇒ **Create a Mechanism for Federal Funding of Master Drainage Plans**

Without a Master Drainage Plan, funding a mitigation project in a basin borders on irresponsible use of funds. Simply put, however, it is easier to fund a project than a plan, regardless of the value of the plan. OFMA must work with OEM and FEMA to find a way to access hazard mitigation grant funding for Master Drainage Plans and must explore other options, including Community Development Block Grant funding used for Capital Improvement Programs, Urban Renewal Plan funding using local millage, and pushing for the establishment of mitigation districts with taxing ability.

⇒ **Develop a Certification Program for Flood-Resilient Neighborhoods**

Subdivision design is a major driver for flood hazard, whether in terms of localized drainage concerns or increasing peak flow in receiving waters. OFMA could lead the way in developing a certification program for neighborhoods that are committed to using low impact methods and No Adverse Impact principles. Certification could exist for new neighborhoods and for existing neighborhoods that have taken steps to mitigate.

THE WAY FORWARD TOWARD RESILIENCE

In the coming months, OFMA will begin to examine each of the priority action items in order to develop a comprehensive engagement strategy that leverages the resources of the association and its partners. The strategy will consist of long-term goals, discrete tasks, and measurable benchmarks in support of the priority action items. The strategy will be interdisciplinary in nature, with emphasis on coordinated effort rather than considering action items individually. This strategy will inform the association's work at its 2017 Strategic Planning Retreat and will form the basis of future Strategic Plans and Policy Agendas.

While the Priority Action Items comprise the primary deliverable of the 2017 Oklahoma Flood Risk Symposium, the event's true success will be measured by how the discussions begun are continued and how the connections are fostered in order to advance risk identification, hazard mitigation, disaster response and resilience building. OFMA leadership will closely review the breakout discussion notes and other materials and will find ways to build on the progress that emerged from the event.

APPENDIX A
SYMPOSIUM AGENDA



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



*A FLOOD RISK SYMPOSIUM SPONSORED BY THE ASFPM FOUNDATION
AND THE OKLAHOMA FLOODPLAIN MANAGERS ASSOCIATION*

PROFESSIONAL TRAINING CENTER • ROSE STATE COLLEGE • MIDWEST CITY, OKLAHOMA
MARCH 28, 2017

- 8:00 REGISTRATION
- 8:15 WELCOME AND INTRODUCTIONS
- 8:45 ORIENTATION AND PROCESS OVERVIEW
- 9:15 THE NATURE OF FLOOD RISK
- 9:30 SPOTLIGHT TOPIC 1: IDENTIFYING AND PLANNING FOR FLOOD RISK
*JANET MESHEK, P.E., CFM, SR/WA
MANAGER/PRINCIPAL ENGINEER, MESHEK & ASSOCIATES, PLC*
- 10:30 SPOTLIGHT TOPIC 2: DISASTER RESPONSE AND COMMUNITY RECOVERY
*RONALD D. FLANAGAN, CFM
PRINCIPAL PLANNER, FLANAGAN & ASSOCIATES, LLC*
- 11:15 SPOTLIGHT TOPIC 3: HAZARD MITIGATION AND BUILDING RESILIENT COMMUNITIES
*TIM LOVELL
EXECUTIVE DIRECTOR, DISASTER RESILIENCE NETWORK*
- 12:00 BREAKOUT GROUP PREPARATIONS – OVERVIEW OF TOPICS AND GROUPS
- 12:15 CONVENE INTO BREAKOUTS AND WORKING LUNCH
- 3:00 GROUP BREAKOUT REPORTS
- 4:30 CONCLUSIONS AND ACTION PLAN

THE ASFPM FOUNDATION IS A NATIONAL ORGANIZATION WHOSE MISSION IS TO PROMOTE PUBLIC POLICY THROUGH SELECT STRATEGIC INITIATIVES AND SERVE AS AN INCUBATOR FOR LONG-TERM POLICY DEVELOPMENT THAT PROMOTES SUSTAINABLE FLOODPLAIN AND WATERSHED MANAGEMENT.

OFMA IS A STATEWIDE ORGANIZATION WHOSE MISSION IS TO ADVOCATE FOR THE REDUCTION OF FLOOD RISK AND THE PROTECTION OF THE NATURAL FUNCTIONS OF THE FLOODPLAIN THROUGH EDUCATION, TRAINING AND SERVICE TO OKLAHOMANS.

FOR ADDITIONAL INFORMATION, INCLUDING INFORMATION ON GROUP RATES AT NEARBY HOTELS, PLEASE CONTACT TOM LEATHERBEE BY EMAIL AT LEGISLATIVE@OKFLOOD.ORG OR BY PHONE AT (405) 671-2803.

APPENDIX B
SYMPOSIUM ATTENDEES



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



*A Flood Risk Symposium Sponsored by the ASFPF Foundation
and the Oklahoma Floodplain Managers Association*

Professional Training Center * Rose State College * Midwest City, Oklahoma
March 28, 2017

PARTICIPANTS: A-L

<u>Checked-In</u>	<u>Last Name</u>	<u>First Name</u>	<u>Affiliation</u>
X	Ashabi	Geeta	City of Oklahoma City
X	Barker	Danielle	City of Bethany
X	Barnett	John	City of Del City
X	Barron	Johnny	City of Altus
X	Bennett	Wade	Bennett Surveying
X	Bigby	Jeff	City of Broken Arrow
X	Brady	Gavin	OFMA
X	Cabrera	Anthony	Tetra Tech
X	Cantrell	Mike	City of Del City
X	Cardin	Monica	City of Del City
X	Clapp	Steve	City of Del City
	Fite	Ed	GRDA
X	Flanagan	Ron	RD Flanagan and Associates
X	Galloway	Mike	Custer County
	Groover	Allen	Dewberry
X	Harjo	Bekki	NWS
X	Harrington	John	ACOG
X	Hendrix	Laura	City of Tulsa
X	Hillier	Tim	ASFPF Foundation
X	Jackson	Brad	City of Tulsa
X	January	Michelle	City of Oklahoma City
	Khan	Muhammed	SMC Consulting Engineers
X	Koch	Matt	ASFPF Foundation
X	Lacy	David	AirTopo
X	Laufenberg	Kait	ASFPF
X	Leatherbee	Tom	OFMA
X	Lewis	Leslie	ODOT
	Loudenback	Michelle	ODEQ
X	Lovell	Tim	Tulsa Partners

*A Flood Risk Symposium Sponsored by the ASFPF Foundation
and the Oklahoma Floodplain Managers Association*



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



Professional Training Center + Rose State College + Midwest City, Oklahoma
March 28, 2017

PARTICIPANTS: M-Z

Checked-In	Last Name	First Name	Affiliation
X	McGavock	Nicole	NWS
X	Meshek	Janet	Meshek and Associates
X	Milligan	Aaron	OWRB
X	Norris	Jarrold	City of Oklahoma City
X	Phillips	Jon	OWRB
X	Remondini	Joe	OFMA
X	Robinson	Bill	City of Tulsa
X	Rollins	Matt	EOM
X	Schultz	Carolyn	OFMA
X	Shan	Johnny	City of Oklahoma City
X	Shaver	Richard	Ace Aerial LLC
X	Sheffield	Blaine	City of Oklahoma City
X	Sisco	Conner, Intern	Disaster Resilience Network
X	Smiley	William	USACE
X	Smith	Bill	HISINC
X	Sparks	Jerry	ASFP Foundation
X	Stagg	Ana	Meshek and Associates
X	Stambaugh	Kasie	ODEQ
X	Stevens	Ellen	Ellen Stevens PE PHD
X	Sugeng	Yohanes	OWRB
X	Tichansky	Eric	USACE
X	Utlely	Marc	Utlely and Associates
X	Vogel	Jason	OSU
X	Watts	Carl	NFIP I-Service
	Wilkins	Kent	OWRB
X	Williams	Clark	HUD
X	Wind	Daniel	Kickapoo Tribe
X	Zachary	Paul	City of Tulsa

APPENDIX C

SPOTLIGHT PRESENTATIONS



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals

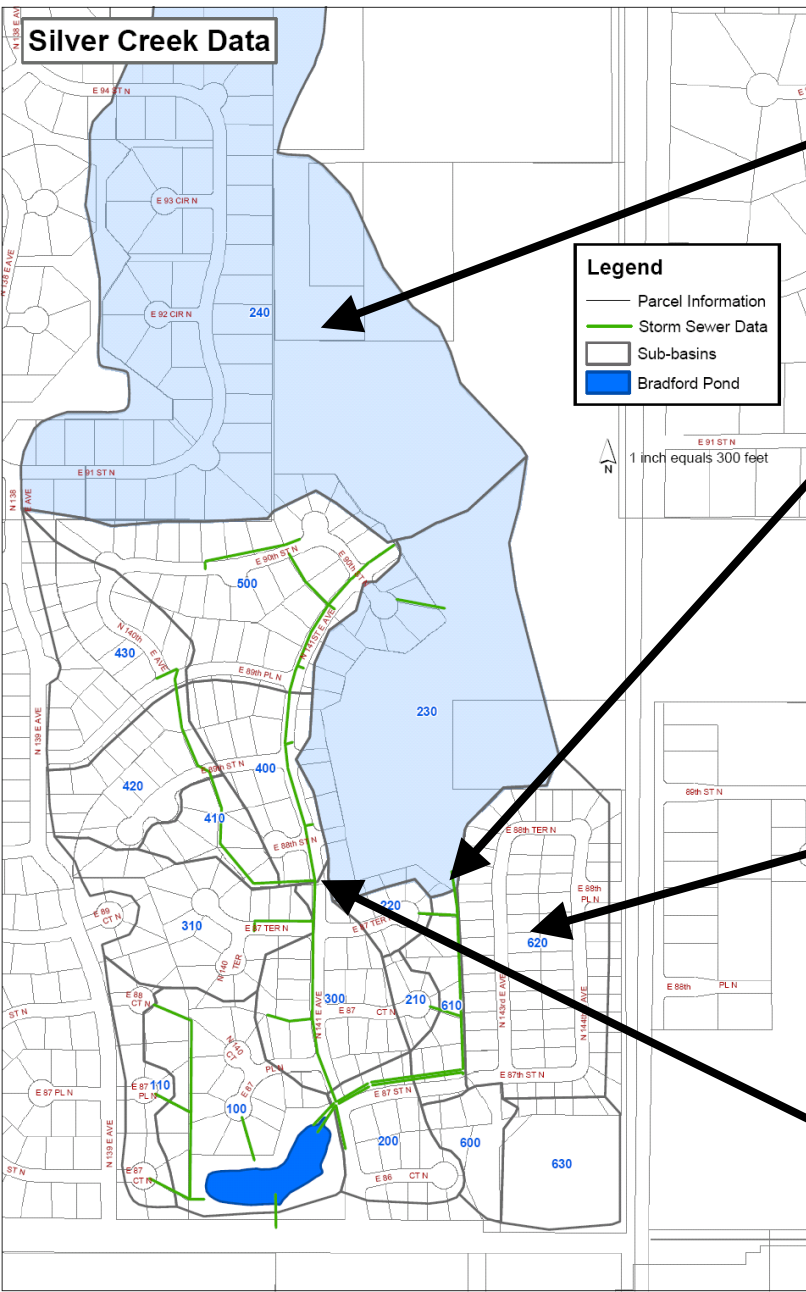


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ASSOCIATION*

**SPOTLIGHT TOPIC 1: IDENTIFYING AND PLANNING FOR
FLOOD RISK**

**JANET K. MESHEK, P.E., CFM, SR/WA
Meshek & Associates, PLC**

IDENTIFYING FLOOD RISK



- ❑ Missed 56 acres of Uncontrolled Drainage Area
- ❑ Total of 78 acres draining to a 36" pipe



- ❑ A 36" and a 24" storm sewer combine at a 36" storm sewer

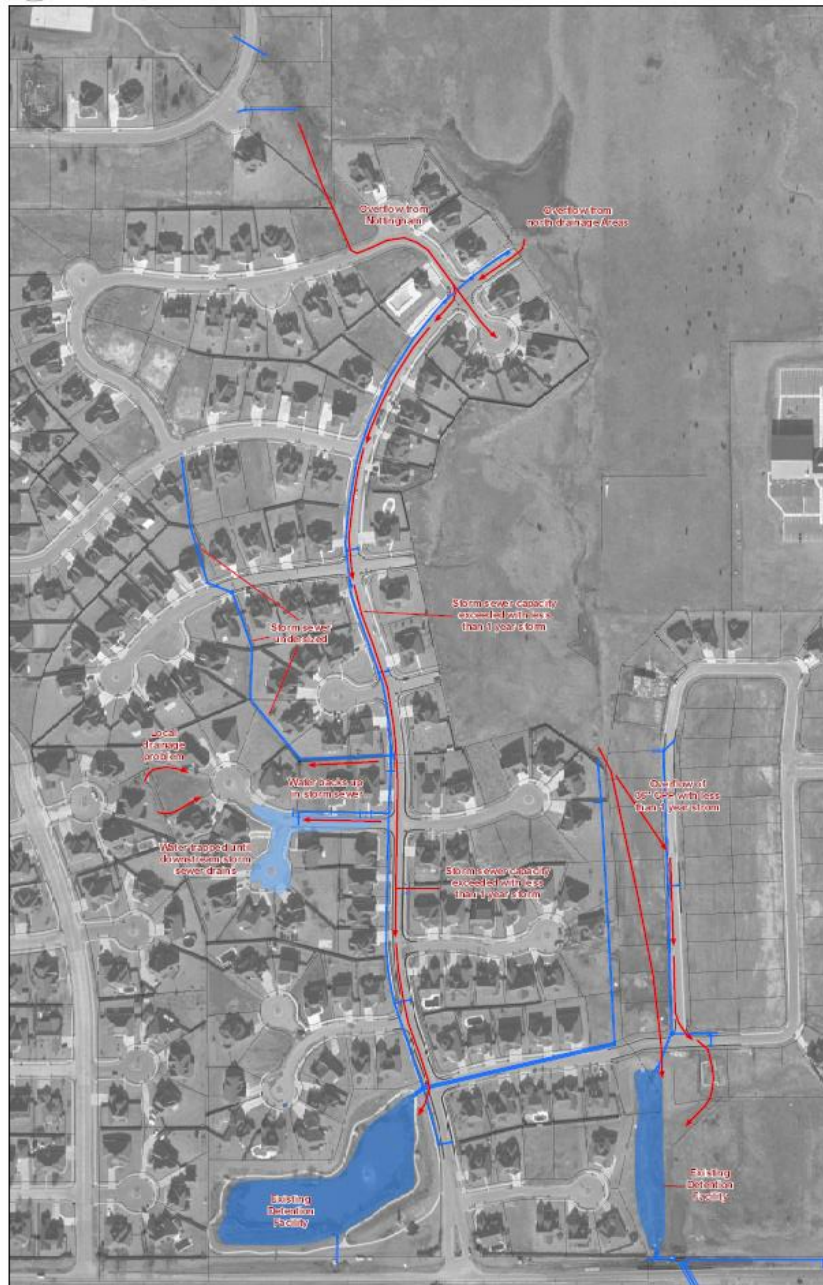
IDENTIFYING FLOOD RISK

❑ Hidden Problems

- ❑ Upstream developed flows not detained
- ❑ Buildings placed over the old watercourse
- ❑ Undersized storm sewers
- ❑ Missed upstream drainage basin (56 acres)

❑ Visible Problems

- ❑ Overflows following the old watercourse
- ❑ Water filling the streets in small storms
- ❑ “Sump” areas become impassible



What did it take to fix it?

- Divert water through an adequate stormwater conveyance system
- Divert water from undersized systems to a regional detention facility
- Make up for “missed” drainage area in the regional stormwater detention facility

What did it cost?

- \$1.2 M (2005)



☐ Flood Risk Identification

- Problems & Causes
- Inadvertent problems with the NFIP
- Natural and Man-made causes
 - Eliminating pervious areas
 - Loss of floodplain storage
 - Inadequate infrastructure
 - Improper use of stormwater detention
 - Ignoring the floodplain upstream from the SFHA
 - Buildings built too low
 - Inevitable increases in floodplain

☐ Flood Risk Planning

- Community Rating System (CRS)
- Master Drainage Planning
- Fixes & Prevention

□ Flood Risk = Probability x Consequences; where

- **Probability** = the likelihood of occurrence
- **Consequences** = the estimated impacts associated with the occurrence

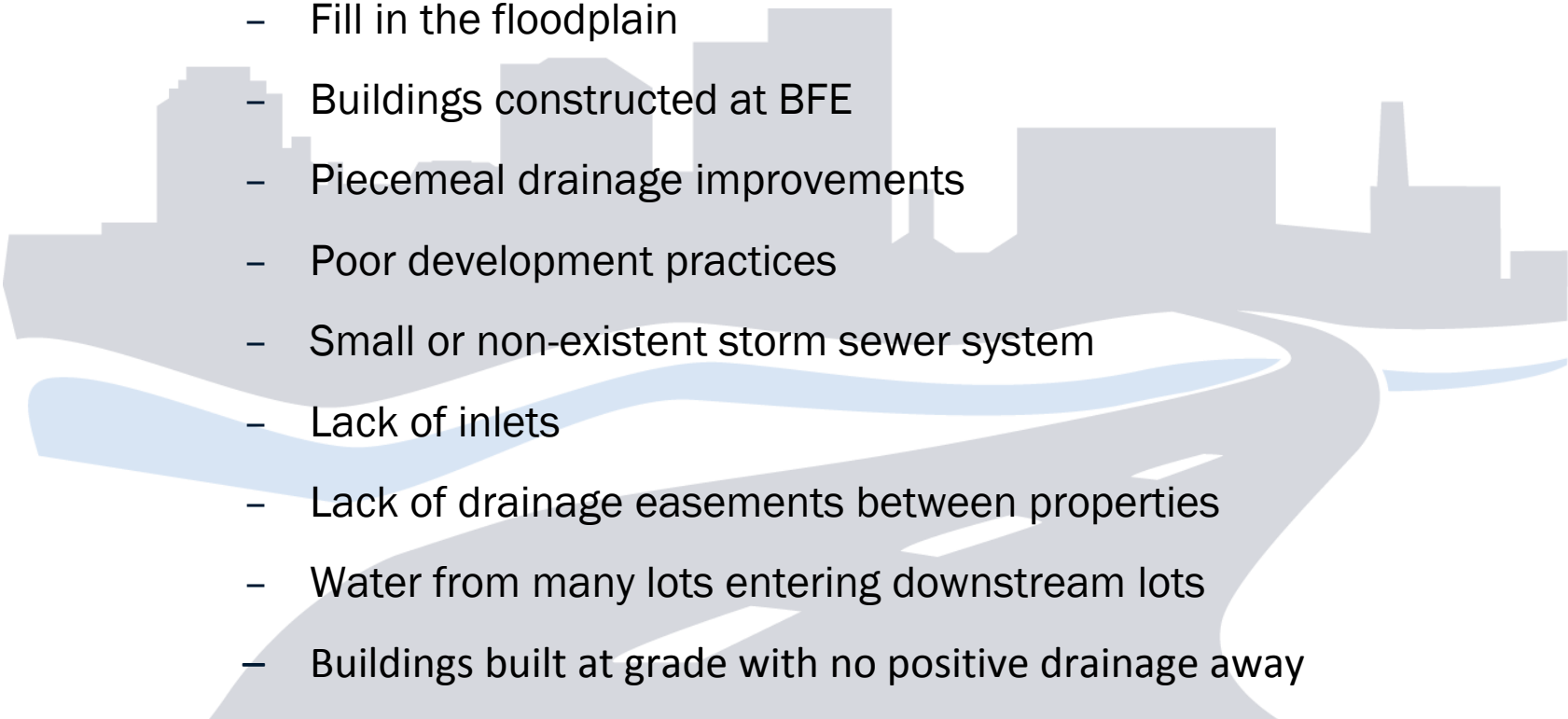
Which picture below shows more flood risk?



❑ Problems

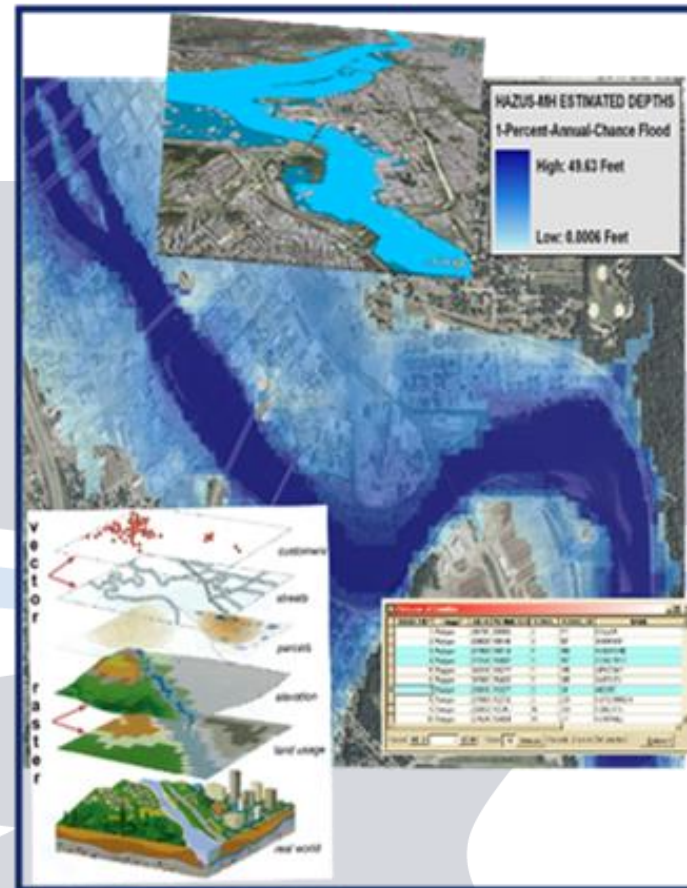
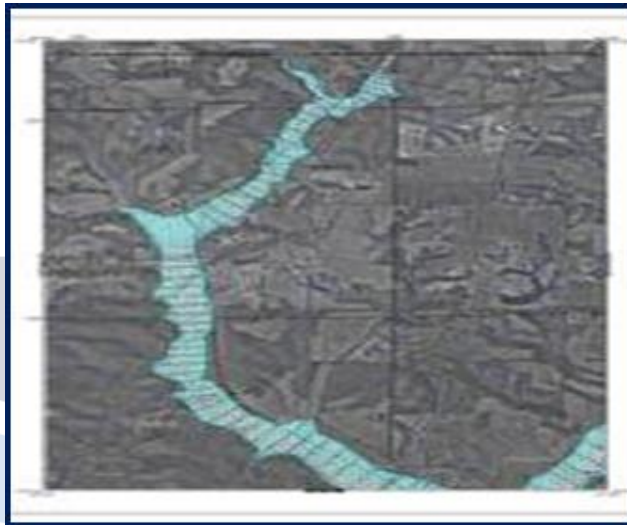
- River/Creek flooding
- Localized flooding

❑ Causes

- Increased impervious areas
 - Fill in the floodplain
 - Buildings constructed at BFE
 - Piecemeal drainage improvements
 - Poor development practices
 - Small or non-existent storm sewer system
 - Lack of inlets
 - Lack of drainage easements between properties
 - Water from many lots entering downstream lots
 - Buildings built at grade with no positive drainage away
- 
- A stylized, light blue and grey illustration of a city skyline with various buildings of different heights and shapes. In the foreground, a winding river or stream flows from the left towards the right, curving slightly. The background is a solid light blue color.

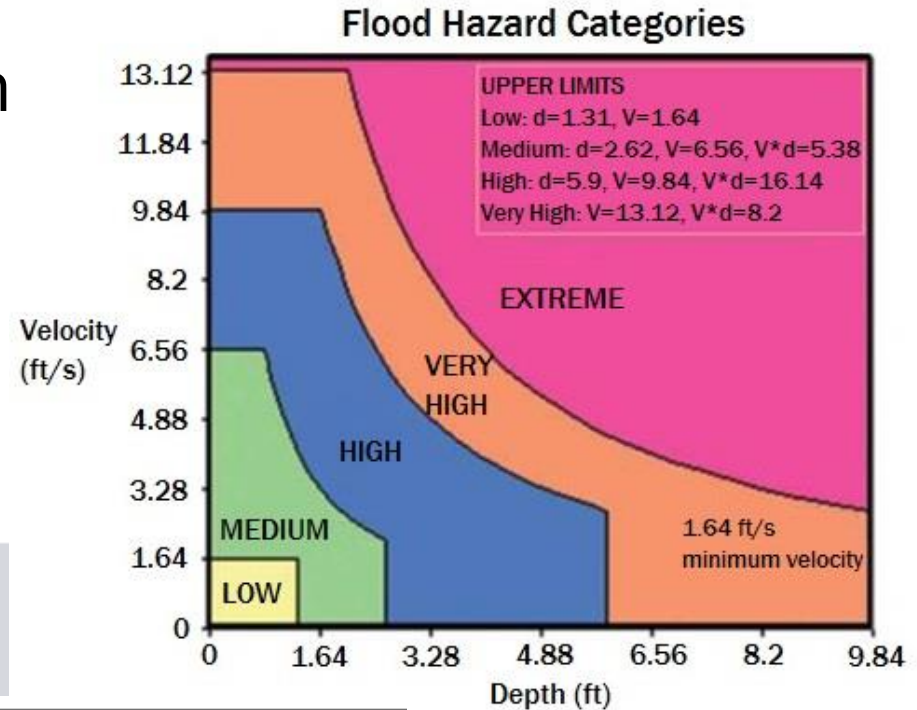
MEASURING FLOOD RISK

- How do we identify flood risk?
 - Use computer models to identify floodplains
 - Use GIS software to map and analyze the floodplains
 - Good data is key!



FLOOD HAZARD SEVERITY

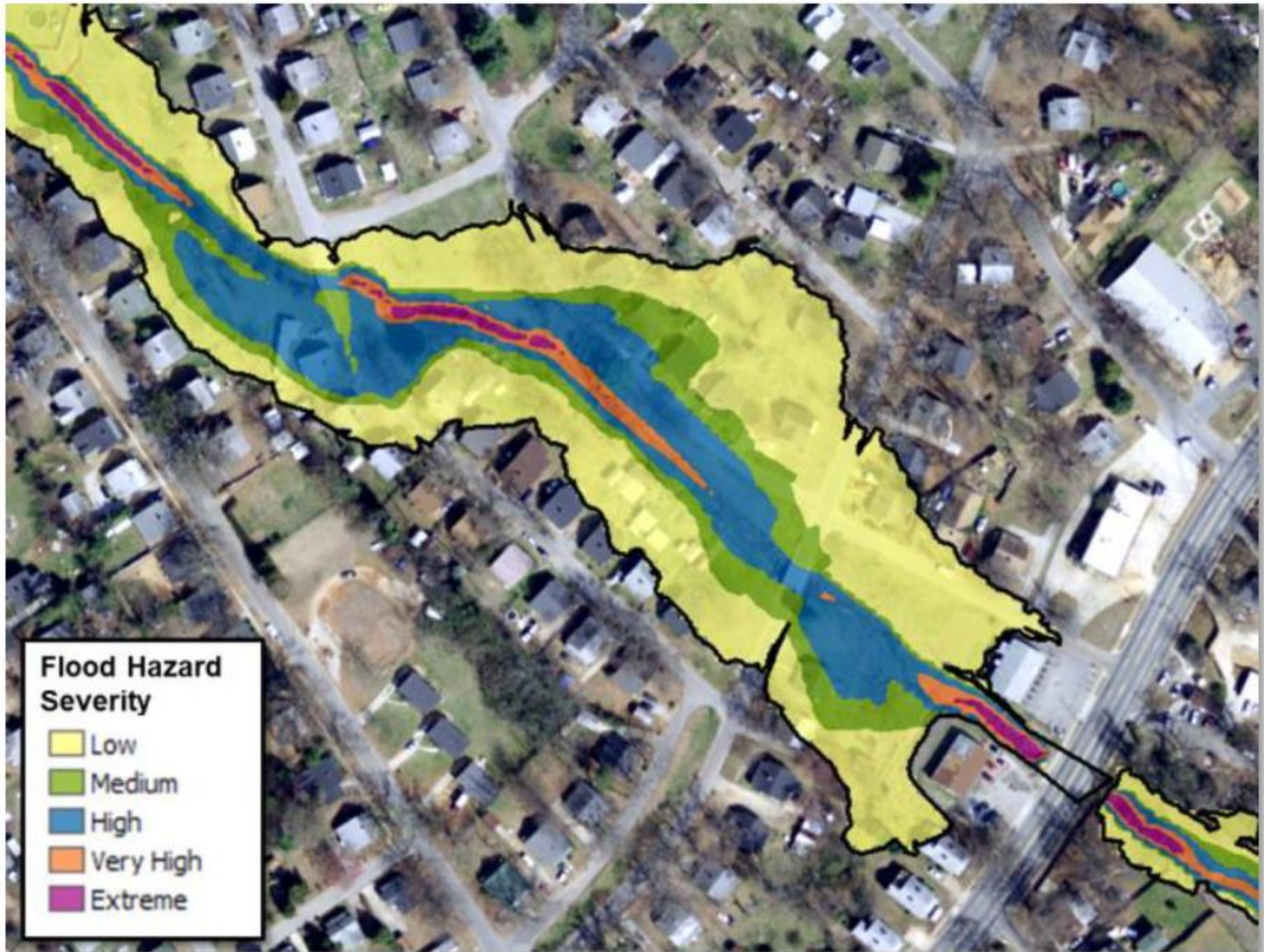
Product of Flood Depth
x Velocity



Flood Severity Category	Depth * Velocity Range (ft ² /sec)
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Low	< 2.2
Medium	2.2 – 5.4
High	5.4 – 16.1
Very High	16.1 – 26.9
Extreme	> 26.9

FLOOD HAZARD SEVERITY GRID



VELOCITY GRID



THE 1% (100-YEAR) STANDARD

❑ What is the 1% (100-year) storm?

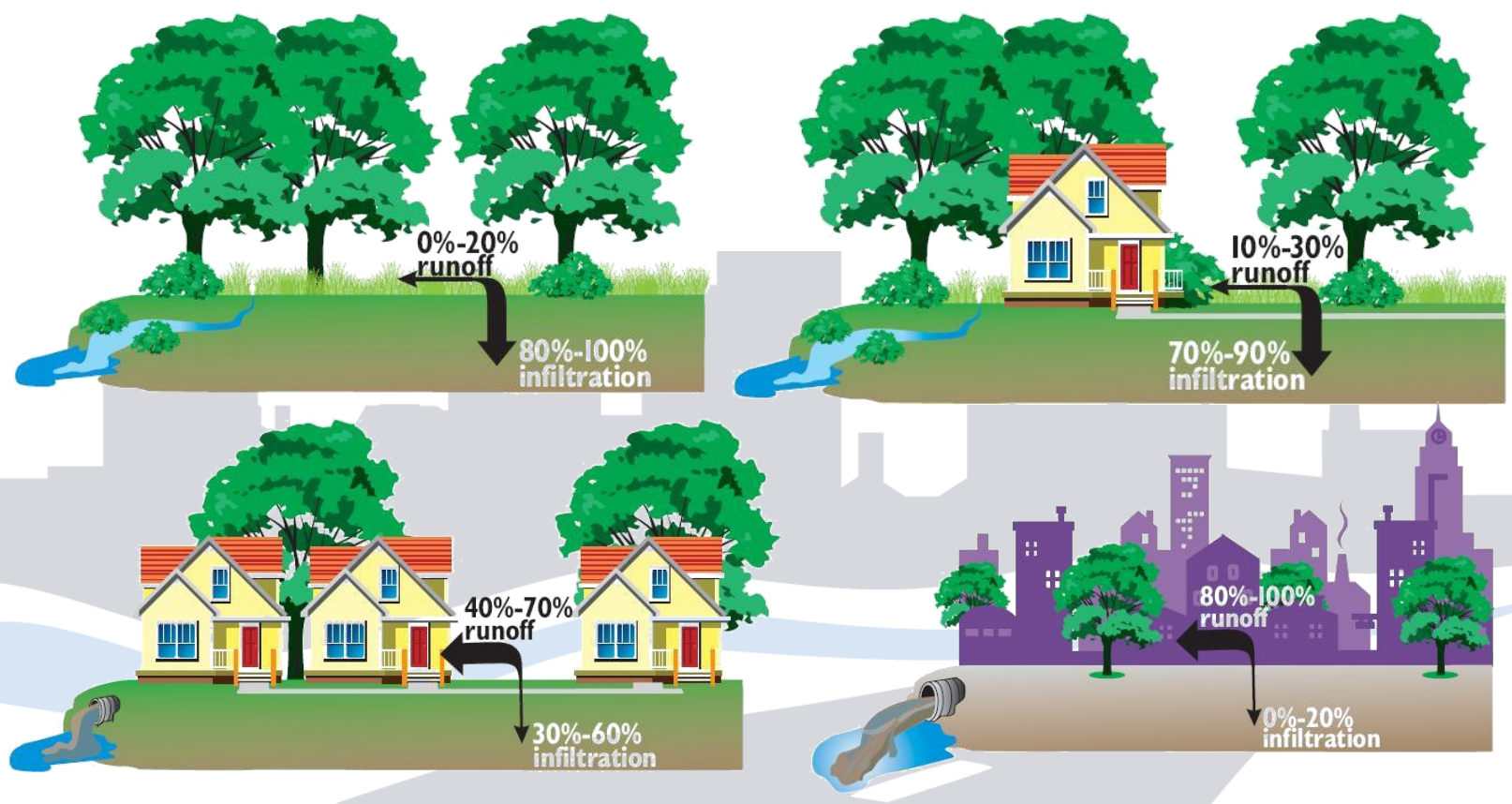
- 1 out of every 100 square miles should get a 100-year storm every year, statistically speaking?
- 100 out of 100 square miles has a 1% chance of receiving 100-year rainfall every year?
- Both!

❑ Why the 1% Standard for Floodplain Mapping?

- In 1973, the National Flood Insurance Program (NFIP) adopted the 100 year flood standard as a compromise
- The “Flood of Record” was different everywhere
- It fell between what the USACE uses for dams and levees (SPF or 200 to 500-year) and what most communities used for stormwater system designs (5 to 20-year)
- The NFIP considered this a tolerable or reasonable risk

INCREASING URBANIZATION

❑ Eliminating pervious area

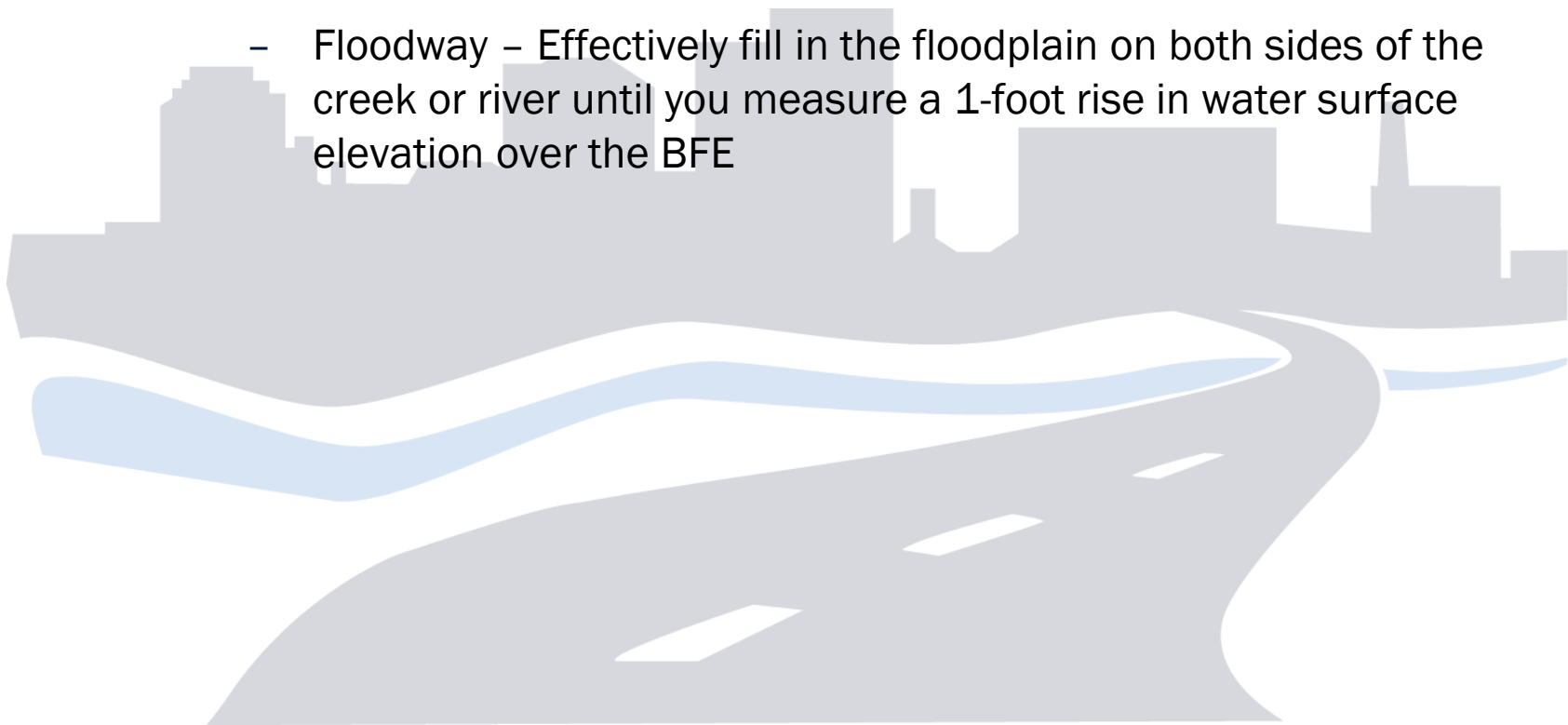


❑ Floodplain Storage

- Volume of the floodplain, normally measured in acre-feet

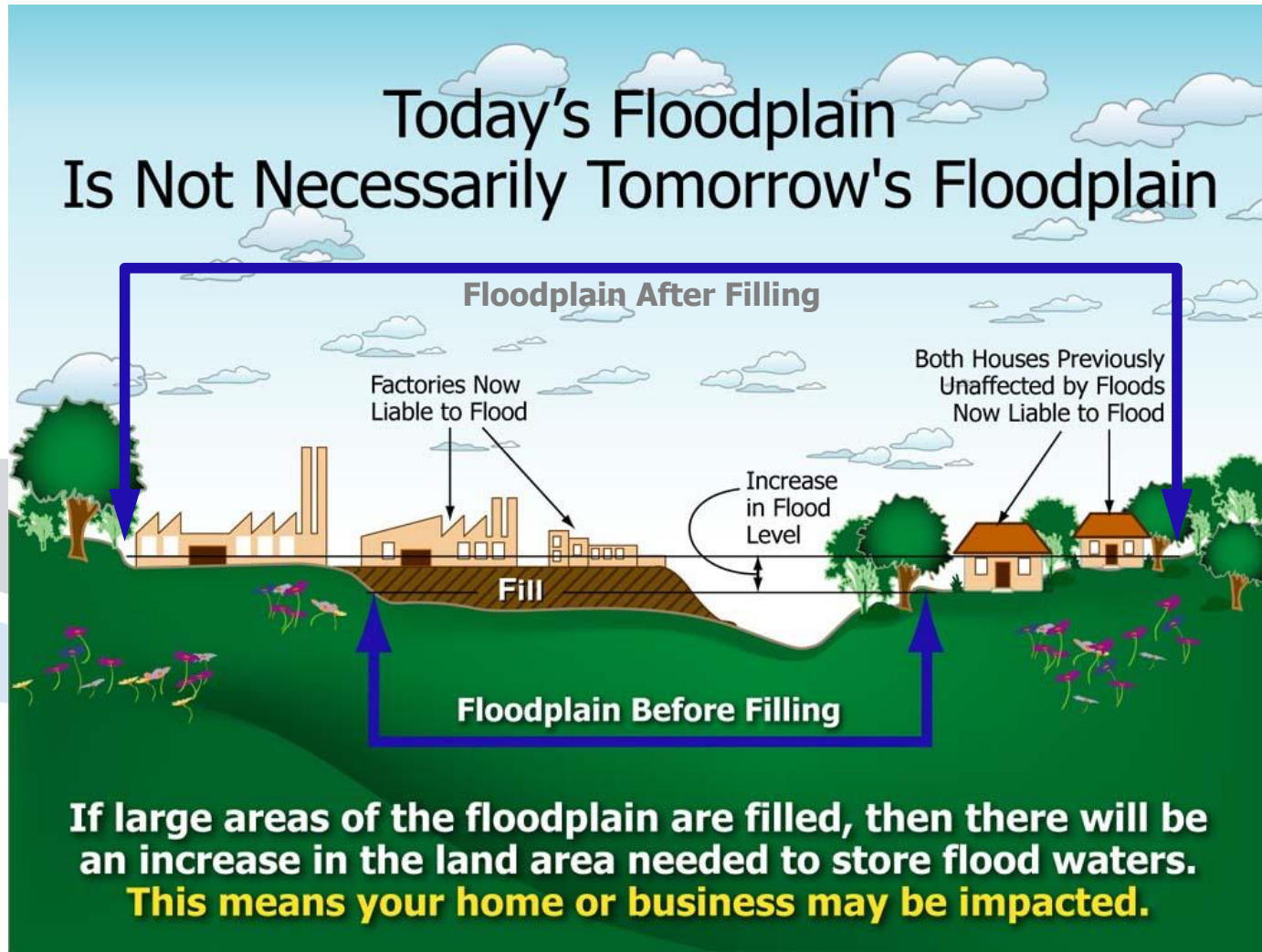
❑ FIRM map or Flood Insurance Rate Map

- Regulatory (1% or 100-year) Floodplain – also called the “Special Flood Hazard Area” or SFHA assuming current levels of urbanization
- Floodway – Effectively fill in the floodplain on both sides of the creek or river until you measure a 1-foot rise in water surface elevation over the BFE



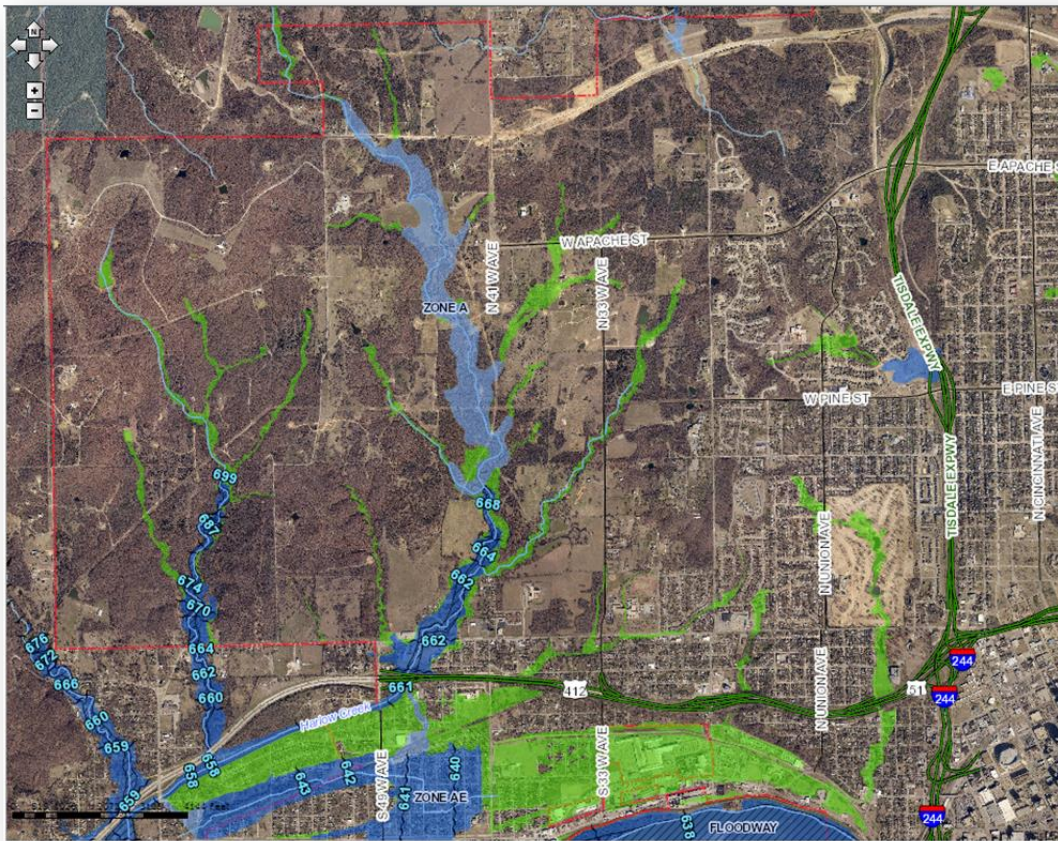
INADVERTENT PROBLEMS WITH THE NFIP

- ❑ Allowing Fill in the Floodplain
- ❑ Allowing buildings to be constructed without freeboard above the Base Flood Elevation (BFE)



IDENTIFYING FLOOD RISK

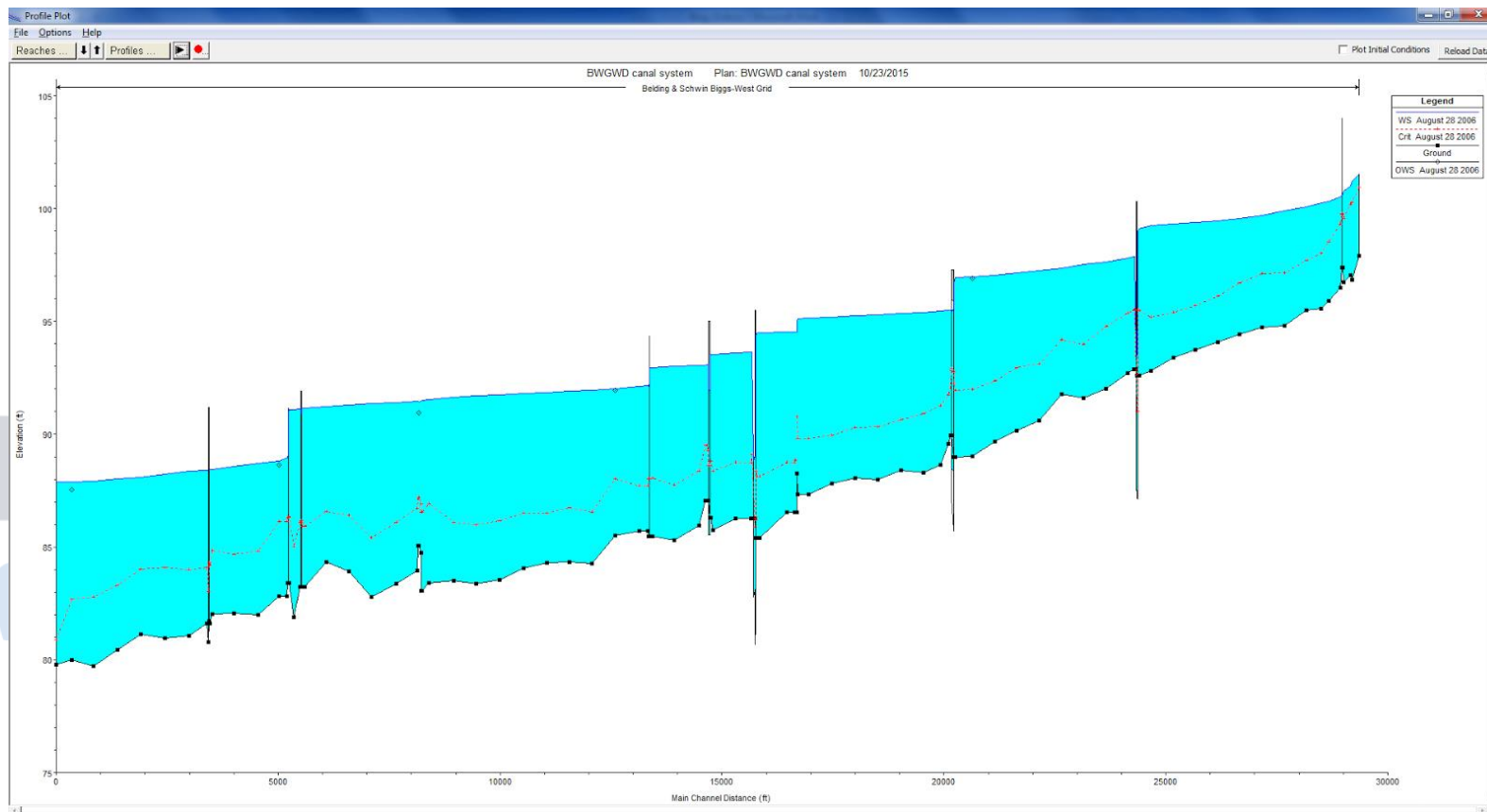
- ❑ NFIP minimum requirements allow you to fill in the floodplain up to the floodway with a 1-foot rise in BFE



- ❑ Harlow Creek Watershed (NW Tulsa)
 - Produced a Floodway Model
 - Computed floodplain storage before/after
 - Updated Flow Rates (12-15% higher)
 - Updated Hydraulics (1-3 feet higher)

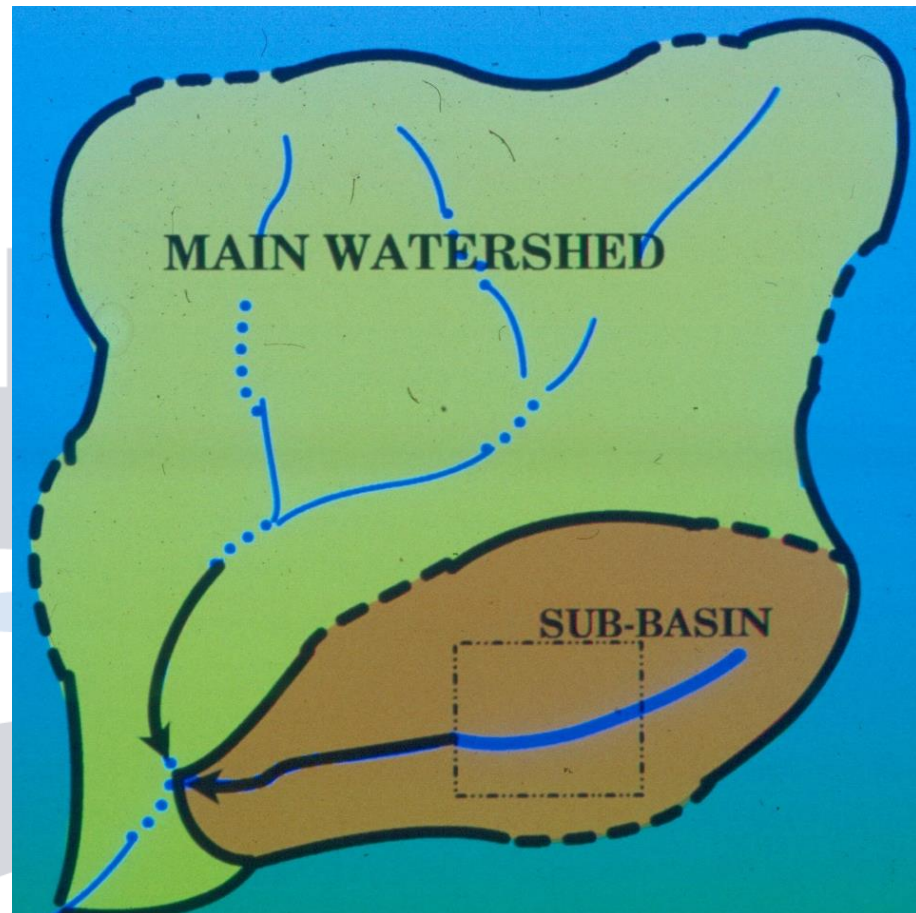
MAN-MADE FLOOD HAZARDS

- ❑ Inadequate infrastructure
- ❑ Replacing bridges or culverts on a piece-meal basis instead of considering downstream effects.

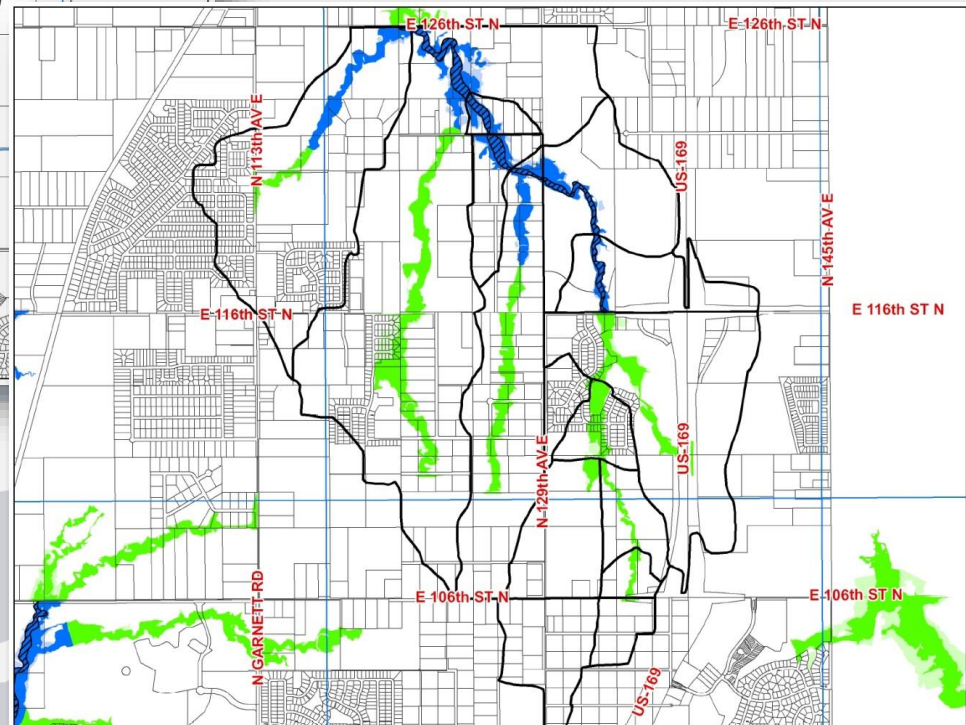
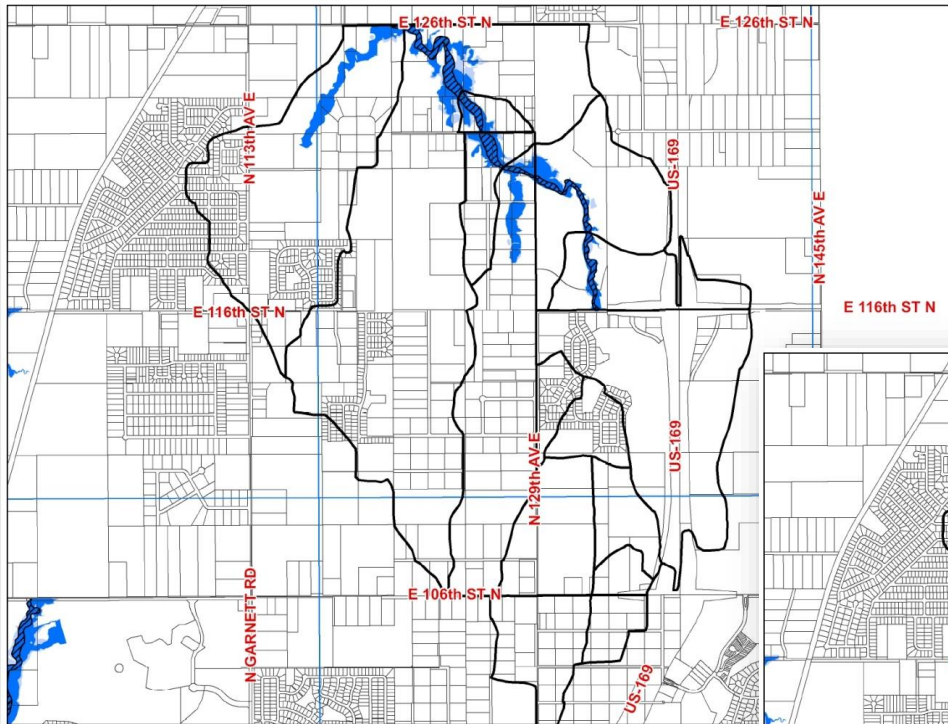


IMPROPER USE OF STORMWATER DETENTION

- Allowing development to occur without stormwater detention
- Allow development to occur with stormwater detention
- What?!?



- Stopping floodplain management at the limits of the FIRM mapping

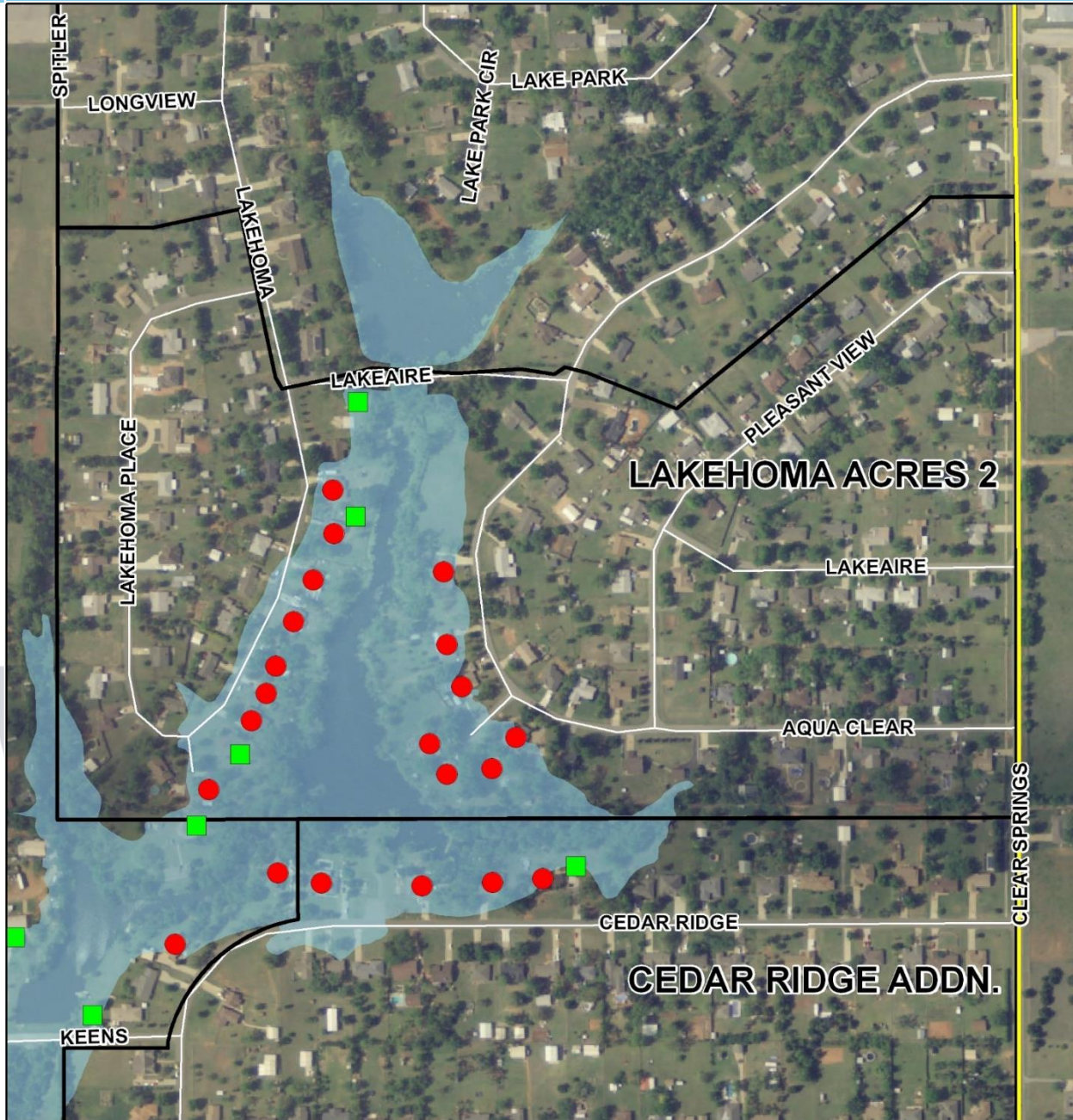


POORLY DESIGNED DEVELOPMENT

- ❑ Allowing the streets to act as the main conveyance for stormwater rather than requiring storm sewers
- ❑ Buildings constructed at grade without positive drainage to the street.



INEVITABLE INCREASES IN FLOODPLAIN AREA



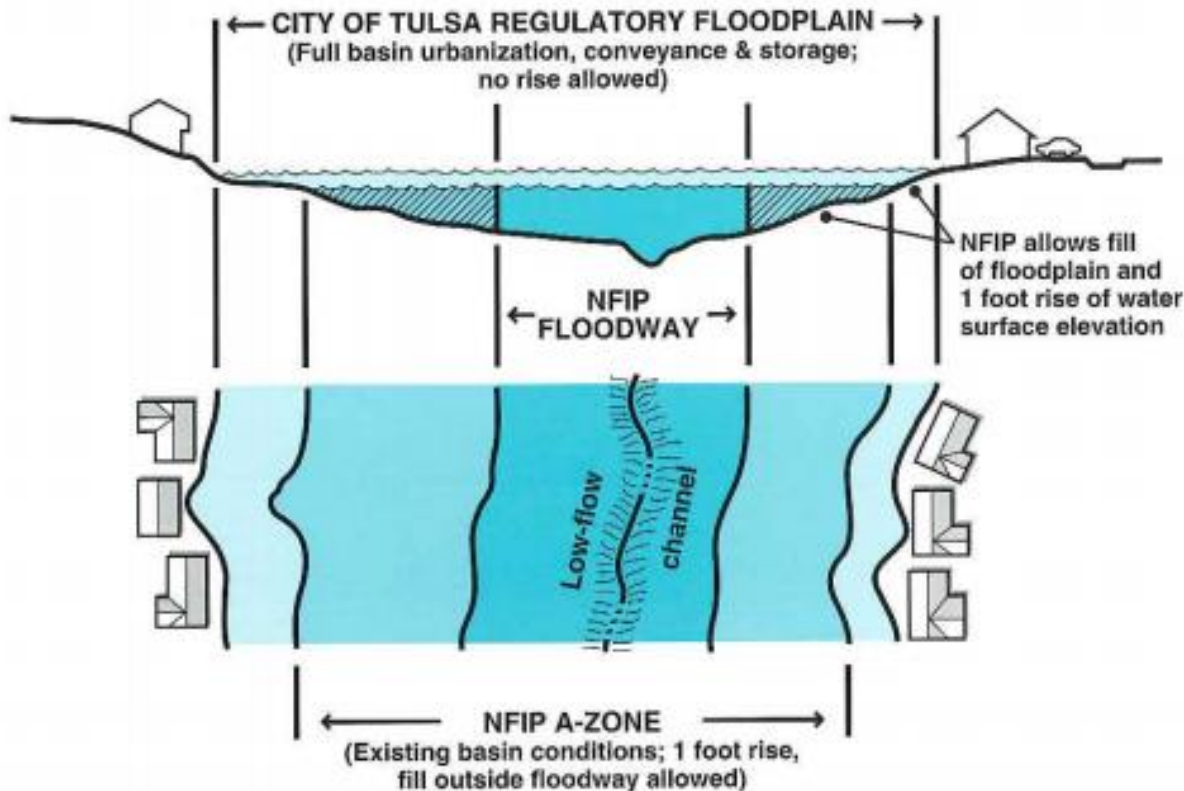
Properly permitted buildings that now flood because of urbanization

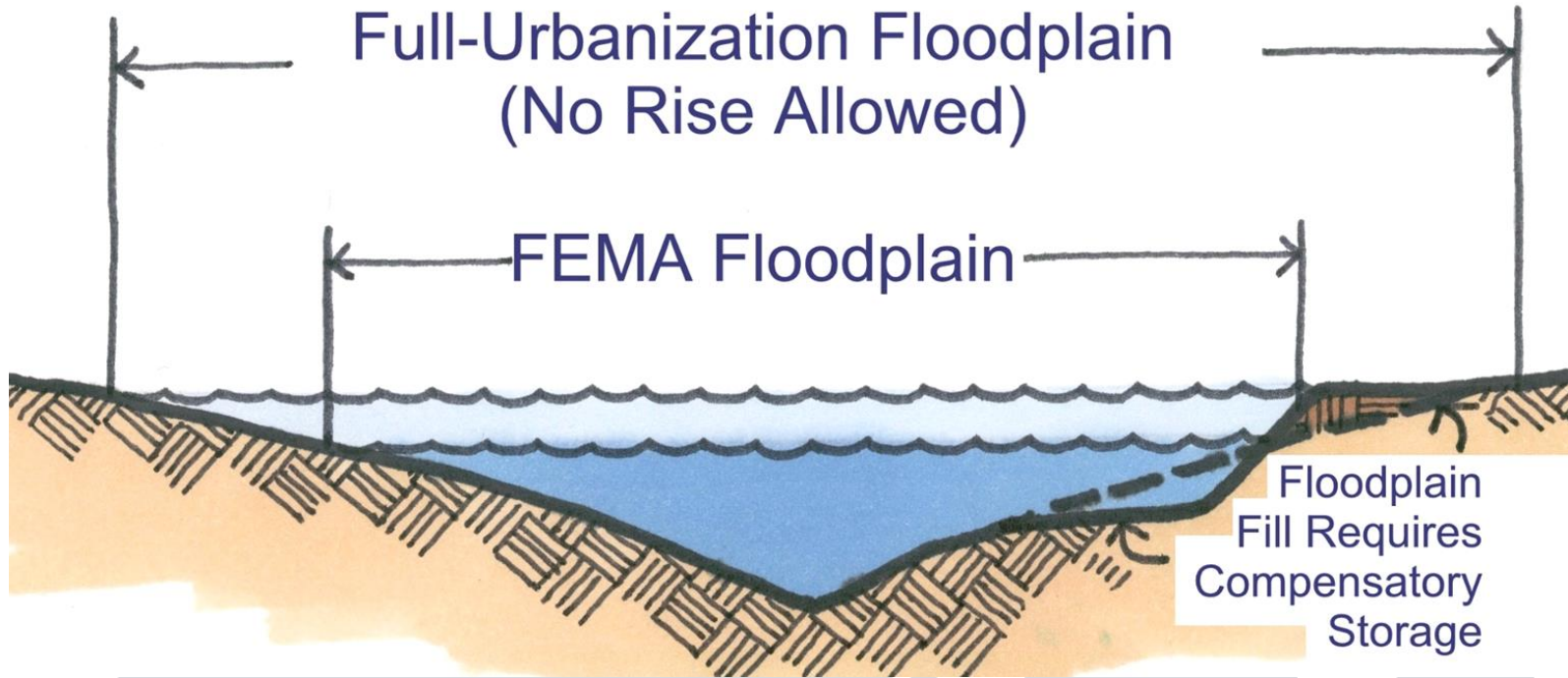


PLANNING FOR FLOOD RISK IN THE FLOODPLAIN

□ City of Tulsa Example

- Uses FIS Zone AE as its floodway
- Uses the fully urbanized floodplain as its Regulatory Floodplain





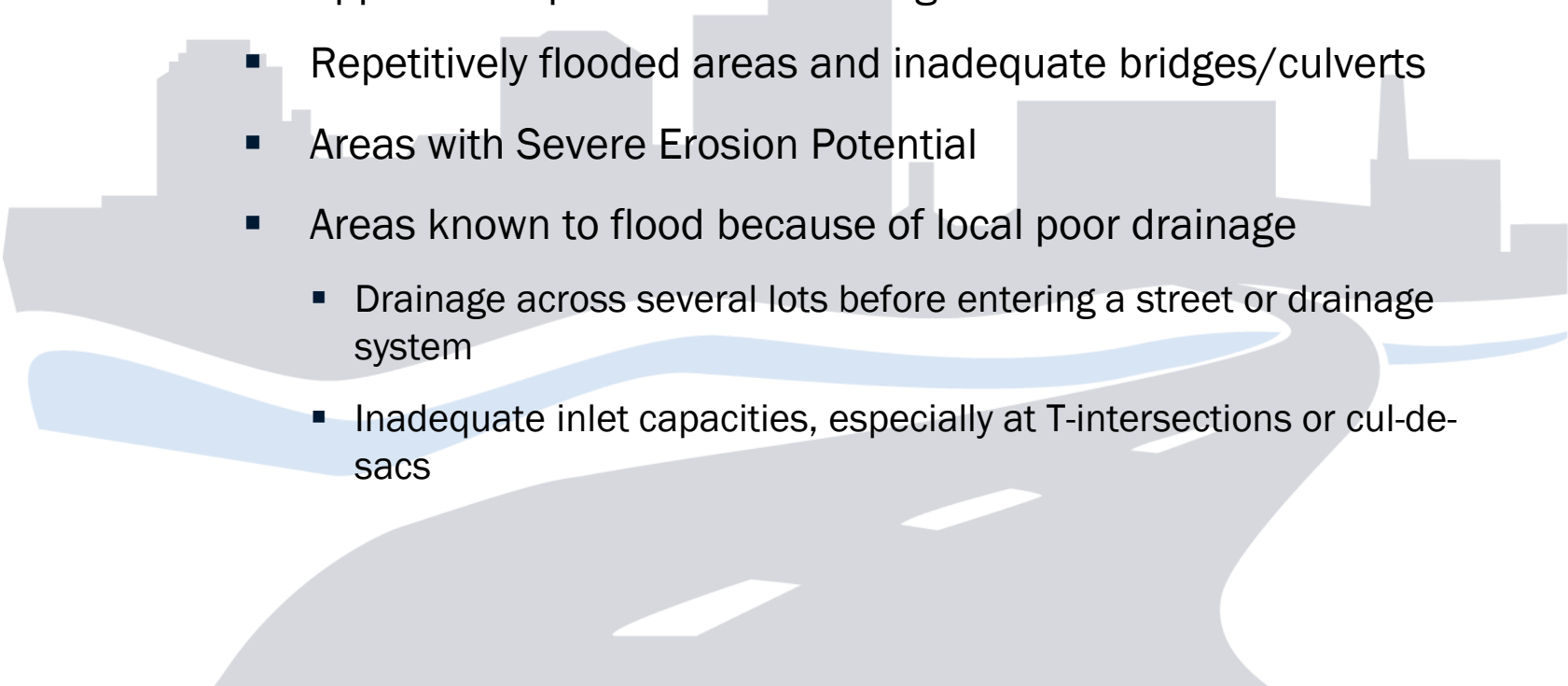
Recommended Urban Floodplain

Floodplain Fill and Upstream Urban Development will Significantly Increase Flood Discharges and Depths

❑ FEMA Discovery Reports identify Areas of Mitigation Interest or AoMIs

- Dams and Breach Inundation Areas
 - If development occurs within a Breach Inundation Area, hazard rating for the dam increases.
 - Dams may not have the spillway capacity required for a higher hazard rating.
- Levees –
 - Many were constructed using unknown techniques and materials.
 - The lack of adequate maintenance over time will also reduce the capability of a levee to contain the flood levels for which it was originally designed.
 - Given enough time, any levee will eventually be overtopped or damaged by a flood that exceeds the levee's capacity.

❑ Master Drainage Plans Identify Risk

- Key Emergency Routes Overtopped During Frequent Flooding Events
 - Areas that have developed without new floodplain mapping, underestimating the flood limits
 - Areas upstream from the FIRM mapping limits - within the upper one square mile of drainage area
 - Repetitively flooded areas and inadequate bridges/culverts
 - Areas with Severe Erosion Potential
 - Areas known to flood because of local poor drainage
 - Drainage across several lots before entering a street or drainage system
 - Inadequate inlet capacities, especially at T-intersections or cul-de-sacs
- 
- A stylized, light blue and grey illustration of a city skyline and a road. The skyline consists of various rectangular buildings of different heights. In the foreground, a road with white dashed lines curves to the right, with a drainage ditch or culvert running alongside it. The overall style is clean and modern, typical of a presentation slide.

MASTER DRAINAGE PLANNING KEY ELEMENTS

- 
- The background features a stylized illustration of a city skyline with various building shapes in shades of gray. A winding road or path, colored in light blue and white, curves through the foreground, leading towards the city.
- Identify existing and future flood risks and their causes
 - Estimate flood damages
 - Ensure that all possible activities are considered and the best ones for the community are selected as the Action Plan
 - Ensure that the MDP recommendations can coordinate with other community projects, lowering overall costs;
 - Ensure that the development criteria accounts for the hazards faced by existing and new development;
 - Educate residents and property owners about:
 - flood hazards,
 - loss reduction measures, and
 - the natural and beneficial functions of floodplains;
 - Build public and political support for activities and projects that:
 - prevent new problems,
 - reduce future losses, and
 - protect the natural and beneficial functions of floodplains

❑ Community Rating System CRS

- Rating plan that recognizes a community's voluntary efforts to manage their exposure to being flooded.
- Communities that are active in activities such as
 - mapping and regulations,
 - flood damage reduction,
 - flood preparedness or
 - public awareness
- Communities "receive" reductions in their flood insurance premiums.
- The CRS uses discounts that run in five percent increments, from five percent to 45 percent. Similar to a fire protection class plan, CRS class ratings range from Ten to One (all communities start out as a "Ten") and the higher a community's flood protection activity, the lower its class rating.
- Tulsa has a CRS rating of 2 – flood insurance premiums are reduced by 40% for those in the SFHA

CRS AND MASTER DRAINAGE PLANNING

❑ CRS Basics (related to MDP)

Table 110-1. CRS classes, credit points, and premium discounts.

CRS Class	Credit Points (cT)	Premium Reduction	
		In SFHA	Outside SFHA
1	4,500+	45%	10%
2	4,000–4,499	40%	10%
3	3,500–3,999	35%	10%
4	3,000–3,499	30%	10%
5	2,500–2,999	25%	10%
6	2,000–2,499	20%	10%
7	1,500–1,999	15%	5%
8	1,000–1,499	10%	5%
9	500–999	5%	5%
10	0–499	0	0

SFHA: Zones A, AE, A1–A30, V, V1–V30, AO, and AH

Outside the SFHA: Zones X, B, C, A99, AR, and D

Preferred Risk Policies are not eligible for CRS premium discounts because they already have premiums lower than other policies. Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage.

Some minus-rated policies may not be eligible for CRS premium discounts.

Premium discounts are subject to change.

Table 110-2. Credit points awarded for CRS activities.

Activity	Maximum Possible Points ¹	Maximum Points Earned ²	Average Points Earned ³	Percentage of Communities Credited ⁴
300 Public Information Activities				
310 Elevation Certificates	116	116	45	100%
320 Map Information Service	90	70	50	93%
330 Outreach Projects	350	175	72	89%
340 Hazard Disclosure	80	57	19	71%
350 Flood Protection Information	125	98	39	92%
360 Flood Protection Assistance	110	65	49	41%
370 Flood Insurance Promotion ⁵	110	0	0	0%
400 Mapping and Regulations				
410 Floodplain Mapping	802	585	64	50%
420 Open Space Preservation	2,020	1,548	463	70%
430 Higher Regulatory Standards	2,042	784	213	99%
440 Flood Data Maintenance	222	171	87	89%
450 Stormwater Management	755	540	107	84%
500 Flood Damage Reduction Activities				
510 Floodplain Mgmt. Planning	622	273	167	46%
520 Acquisition and Relocation	2,250	1,701	165	24%
530 Flood Protection	1,600	632	45	12%
540 Drainage System Maintenance	570	449	212	77%
600 Warning and Response				
610 Flood Warning and Response	395	353	129	37%
620 Levees ⁶	235	0	0	0%
630 Dams ⁶	160	0	0	0%

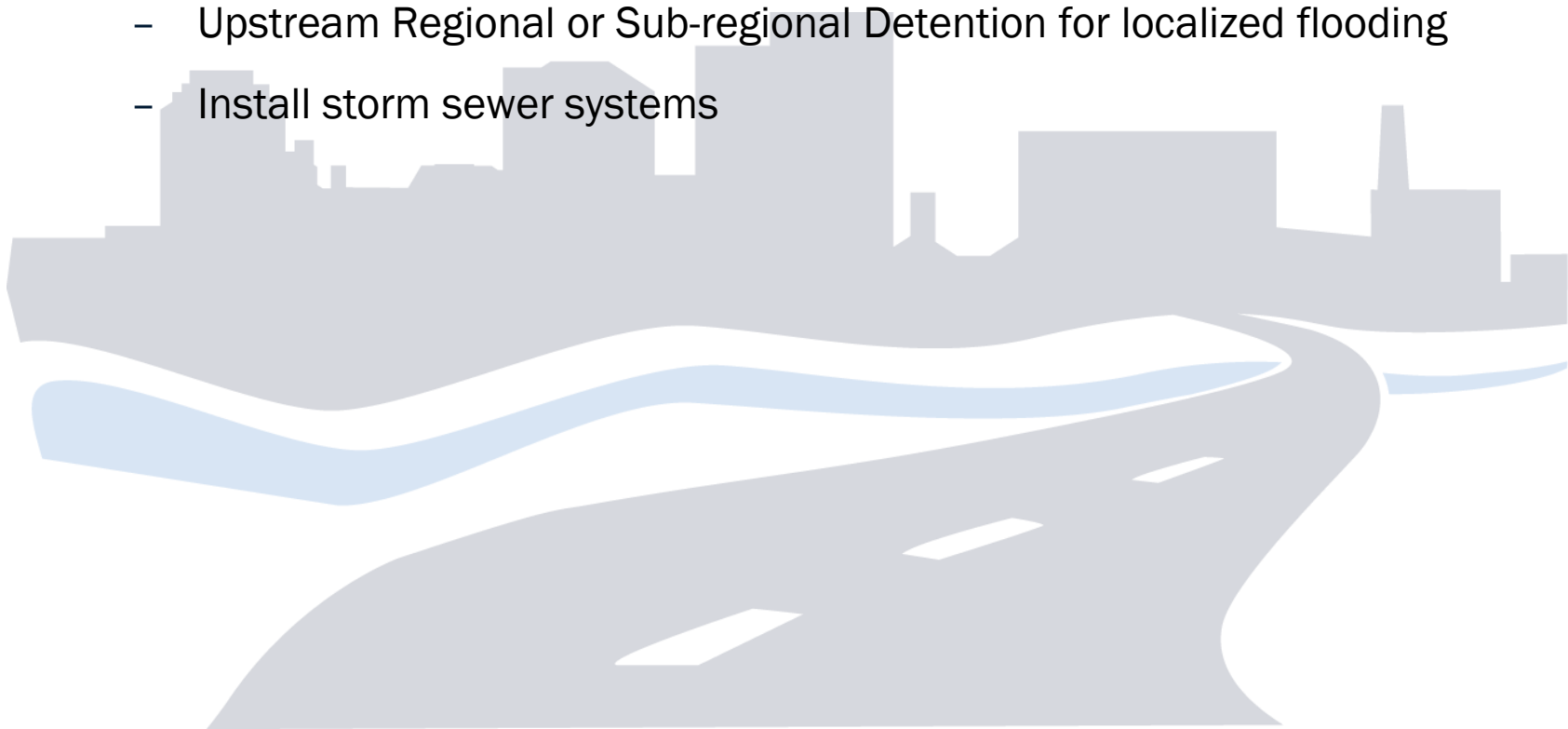
10-STEP PLANNING PROCESS FOR HMGP

Table 510-1. Planning steps for mitigation and for the CRS.

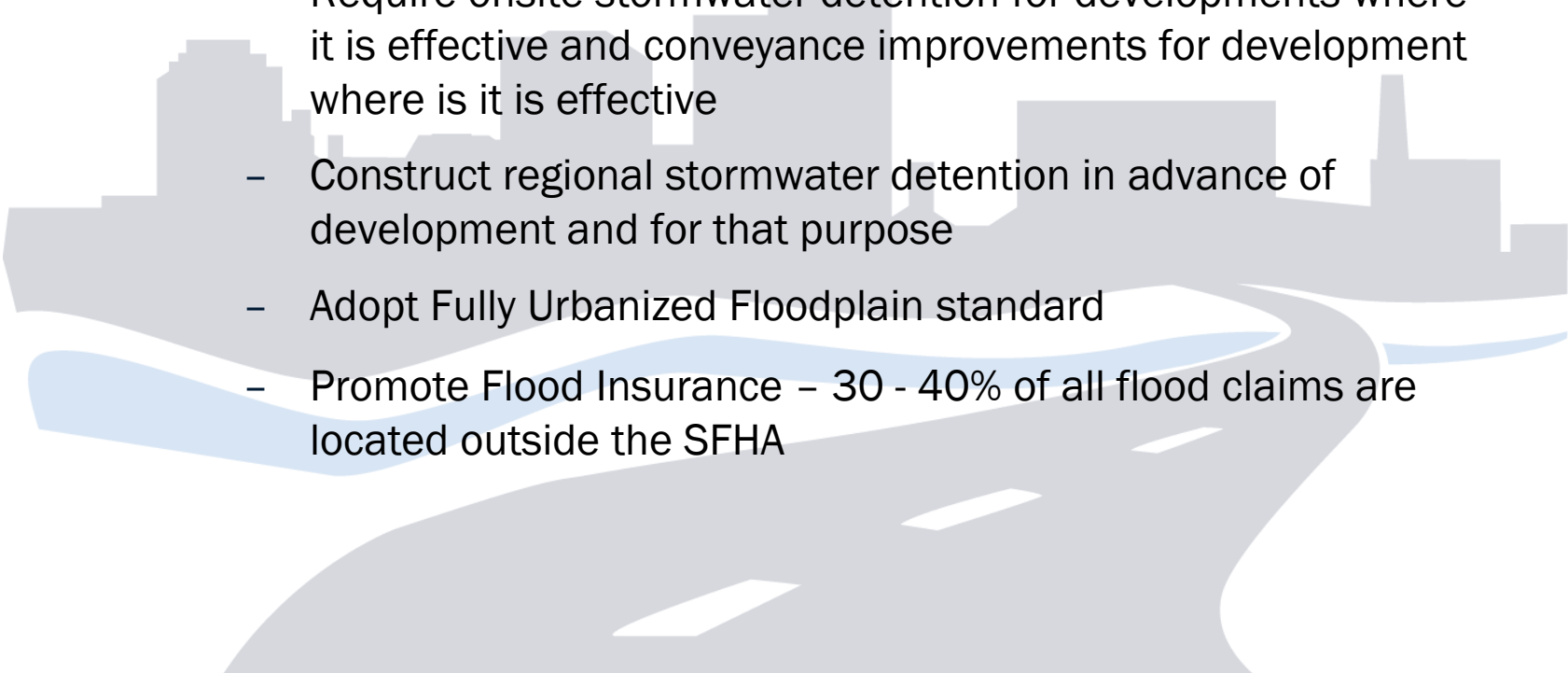
Multi-hazard Mitigation Planning	CRS	Maximum
Phase I – Planning process		
§201.6(c)(1)	1. Organize	15
§201.6(b)(1)	2. Involve the public	120
§201.6(b)(2) & (3)	3. Coordinate	35
Phase II – Risk assessment		
§201.6(c)(2)(i)	4. Assess the hazard	35
§201.6(c)(2)(ii) & (iii)	5. Assess the problem	52
Phase III – Mitigation strategy		
§201.6(c)(3)(i)	6. Set goals	2
§201.6(c)(3)(ii)	7. Review possible activities	35
§201.6(c)(3)(iii)	8. Draft an action plan	60
Phase IV – Plan maintenance		
§201.6(c)(5)	9. Adopt the plan	2
§201.6(c)(4)	10. Implement, evaluate, revise	26
Total		382

☐ Fixes

- Upstream Regional Detention
- Widen creek (may cause loss of floodplain storage)
- Replace inadequate bridges & culverts (may cause loss of floodplain storage)
- Buy out flooded buildings
- Upstream Regional or Sub-regional Detention for localized flooding
- Install storm sewer systems

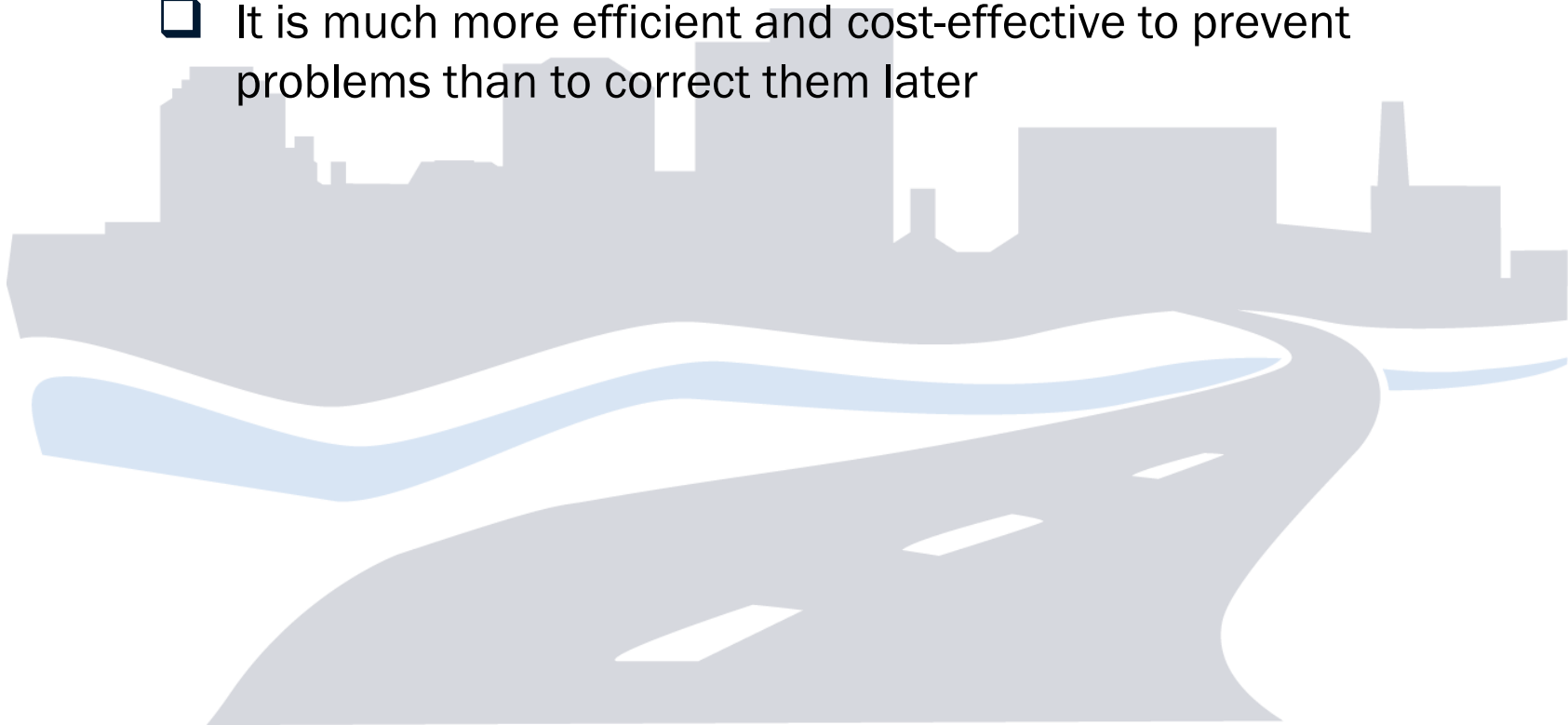


☐ Prevention

- Invest in a Master Drainage Plan, and maintain the hydrologic and hydraulic computer models as development or other watershed changes occur
 - Prepare and enforce drainage design criteria
 - Maintain floodplain storage or require compensatory storage
 - Require onsite stormwater detention for developments where it is effective and conveyance improvements for development where is it is effective
 - Construct regional stormwater detention in advance of development and for that purpose
 - Adopt Fully Urbanized Floodplain standard
 - Promote Flood Insurance – 30 - 40% of all flood claims are located outside the SFHA
- 
- A stylized, light blue and grey illustration of a city skyline with various buildings and a winding road that curves through the foreground. The road has white dashed lines indicating lanes. The background is a solid light blue color.

IDENTIFYING AND PLANNING FOR FLOOD RISK

- ❑ Master Drainage Planning and Sound Drainage Design Criteria are key to a comprehensive Stormwater and Floodplain Management program
- ❑ Changes in watershed conditions (more impervious area, etc.) or waterway conditions (channelization, etc.) always have downstream impacts
- ❑ It is much more efficient and cost-effective to prevent problems than to correct them later





City of Tulsa Skyline from Centennial Park



A Wedding at Centennial Park Stormwater Detention Facility

The New Emergency Management Paradigm

Rose State College

ASFPM Foundation

OFMA

March 28, 2017

Ronald D. Flanagan, CFM

Flanagan & Associates, LLC
Environmental Planning Consultants

Danielle Barker

Community Development Specialist
City of Bethany, OK

Contents

- **Traditional Emergency Management**
- **Public Information & Participation**
- **Disaster Preparedness**
- **Pre-Disaster Planning**
- **Mitigation Planning**
- **Emergency Response**
- **Short-Term Recovery**
- **Mitigation Plan Implementation**
- **Long-Term Recovery**

**Key Aspects of Emergency
Management are Generally
Covered in the Emergency
Operations Plan**

Traditional Emergency Management

- **Communications**
- **Emergency Response**
- **Short-Term Recovery**



Emergency Communications



Emergency Response



Response



Albert Ashwood

Director, Oklahoma Department of
Emergency Management

“ Emergency Management is an emerging profession that is changing day-by-day.

Traditional Recovery-
Public & Individual
Assistance- is only a Band-
Aid.

Mitigation is the only one that makes any sense. It is a Strategy that, when the next disaster happens, we don't have the same repeated damages.”



Public Information & Education

WARNING

**Flood Hazard
Area**

Evacuate vehicles:

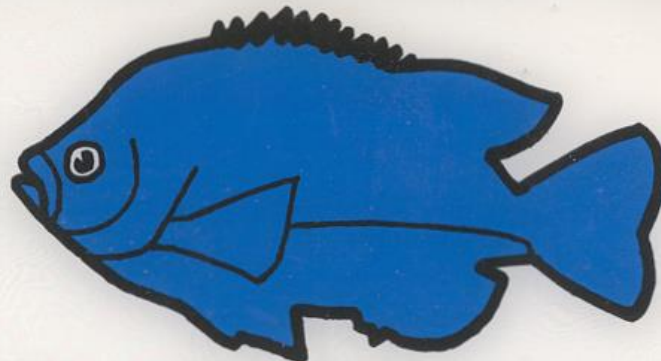
- **During heavy rainfall**
- **When warning lights are on**
- **If Mill Creek is rising**

No overnight parking





NO DUMPING



Keep Tulsa's Streams Clean

Blue Thumb Water Pollution Education Program

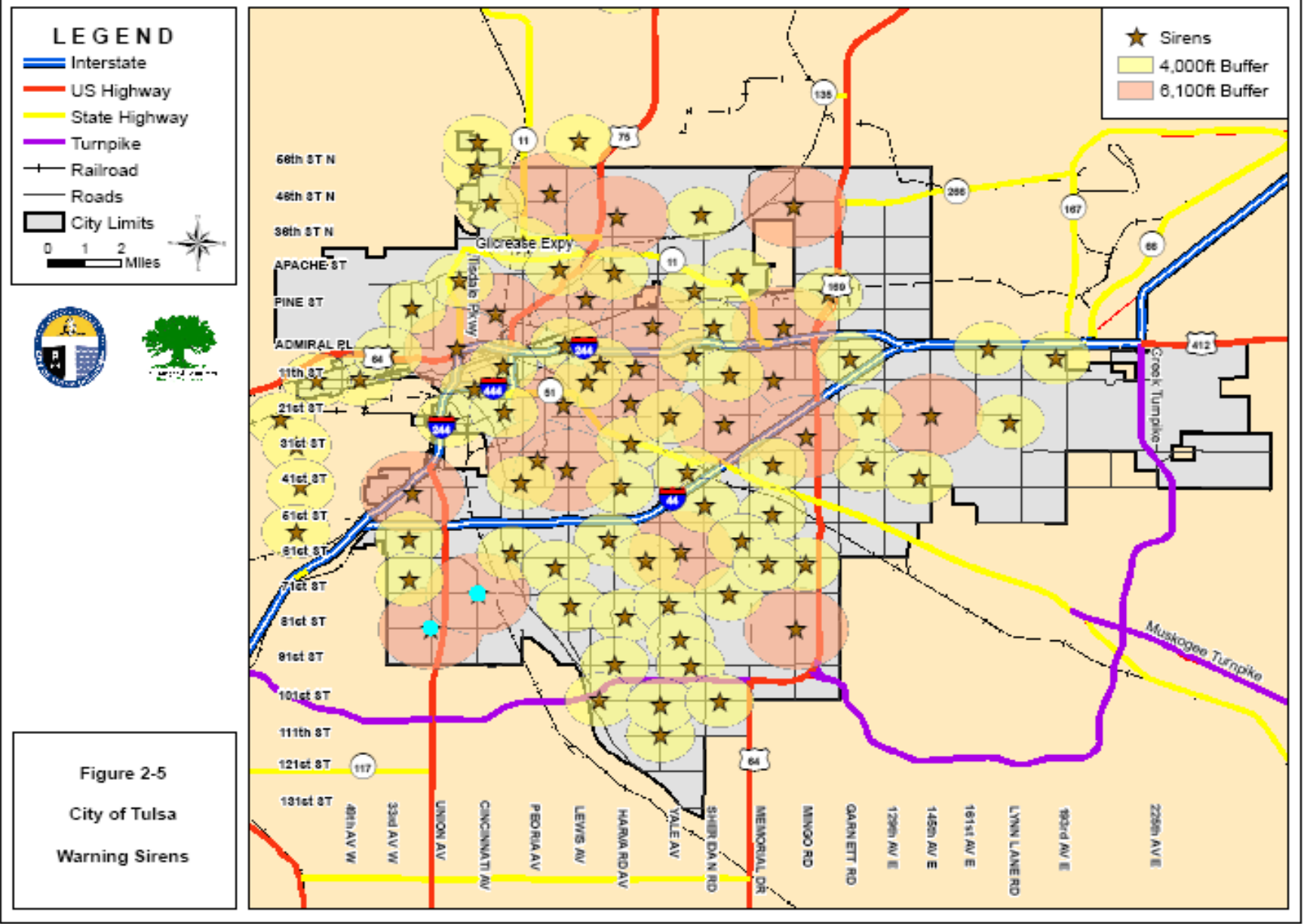


Figure 2-5
City of Tulsa
Warning Sirens



City of Tulsa 2014 Official Notice

Flood Hazard Information About Your Property



CITY OF
Tulsa
A New Kind of Energy.

Your property is located in or near an area subject to flooding. It may be within a FEMA Special Flood Hazard Area (SFHA), or the City of Tulsa Regulatory Floodplain within the City of Tulsa.

The FEMA SFHA is an area subject to inundation by the base (one percent annual chance) flood.

**What does this mean for you?
Please read on.**

Flood Insurance Available for All Properties in Tulsa

The Federal Emergency Management Agency says that if your home is located in a high-risk flood zone, there is a 26 percent chance it will flood during the life of a 30-year mortgage. Up to 25 percent of all National Flood Insurance Program claims come from structures outside of high-risk areas. Did you know the City of Tulsa has a 40 percent discount for homeowners in a SFHA on flood insurance, and a 10 percent discount for all other properties? Most homeowners' policies do not cover flood losses. You can protect your home and contents through the National Flood Insurance Program.

You should obtain coverage for structure and contents. There can be more damage to the contents than the structure. Renters can buy contents coverage even if the owner does not insure the structure. There is a 30-day waiting period before the policy becomes effective.

Flood insurance is required by law in order to obtain federally secured financing to buy, build, or renovate a structure located in a FEMA SFHA. This financing includes federal grants, FHA and VA loans, and most conventional mortgage loans.

To find out more about flood insurance, contact any licensed property/casualty agent or broker—the same person who sells your home and auto policies. All agencies charge the same premiums.

Official City of Tulsa Floodplain Notice

Sent to all Floodplain Properties Annually



OCTOBER 5, 1986

On this day, water from the Arkansas River rose to the level indicated by the red line shown at the bottom of this sign at this location.

FOR MORE INFORMATION, CONTACT:

National Weather Service – Tulsa, OK
www.weather.gov/tulsa

Arkansas-Red Basin River Forecast Center
www.weather.gov/abrfc

USGS Oklahoma Water Science Center
ok.water.usgs.gov

US Army Corps of Engineers – Tulsa, OK
www.srl-wc.usace.army.mil

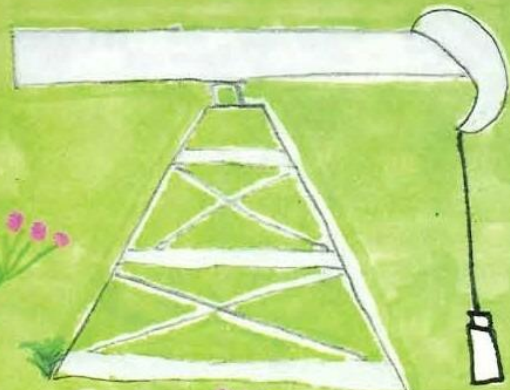
City of Tulsa
www.cityoftulsa.org



HIGH WATER MARK

25.21 feet (7.21 feet above flood stage)

Turn Around
Don't Drown!



2010
CALENDAR

Caden Unger
1st Place Winner
Maryetta Elementary School
Mrs. Smith - Stilwell

Public Participation & Involvement

Public Involvement in the Planning Process





Public Participation & Involvement

Disaster Preparedness

Agency Coordination
Evacuation Plans
Map Your Neighborhood



Agency Coordination



First Responders - Fire & Police Departments



Salvation Army Disaster Response Training

Vulnerable Population Preparedness



Hazard Mitigation Planning

General Hazards

Winter Storms

High Winds

Tornadoes

Lightning

Hail

Extreme Heat

Drought

Earthquakes

Urban Fires

Site-Specific Hazards

Floods

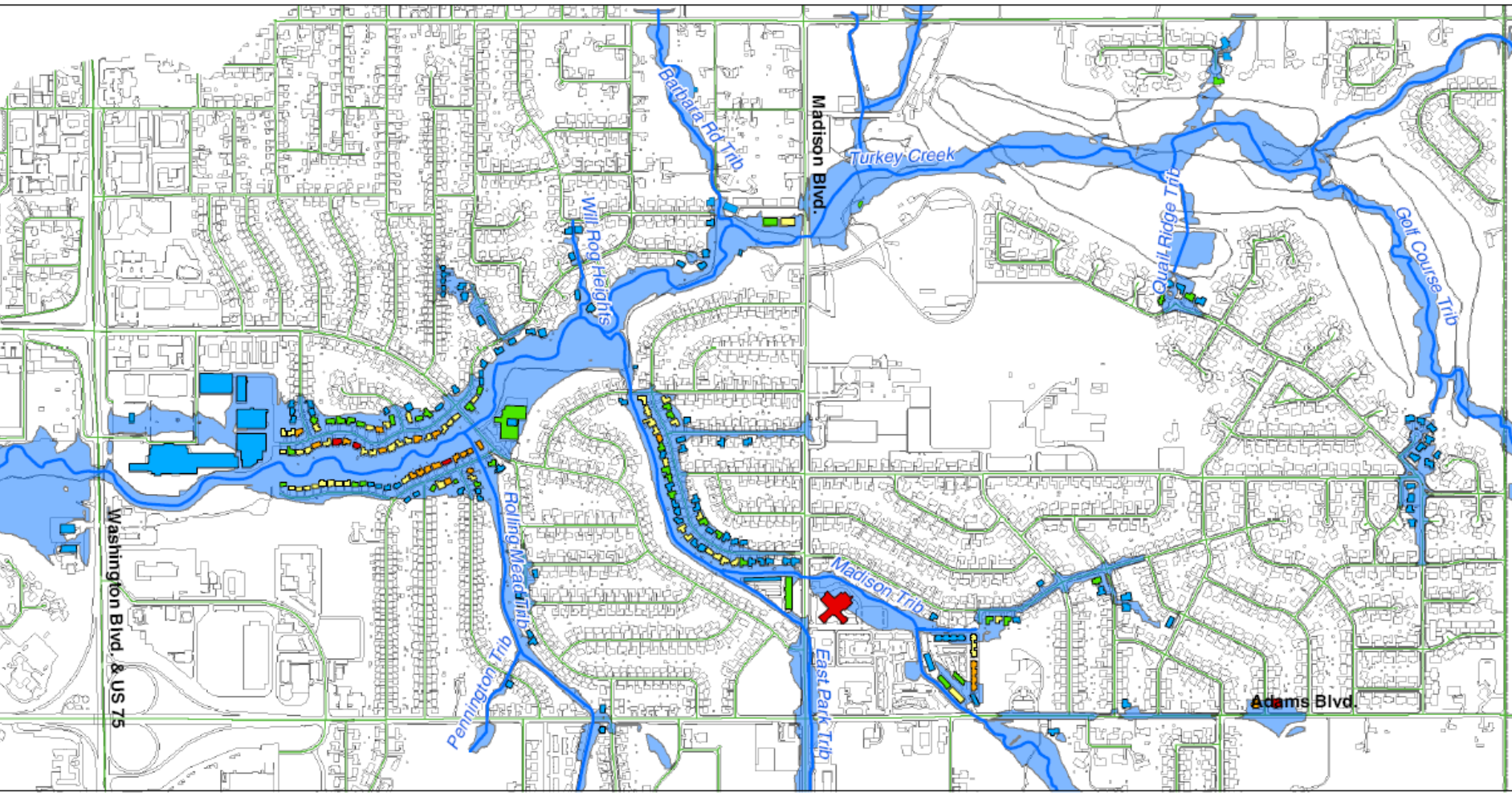
Dams & Levees

Expansive Soils

Wildfires

**Fixed-Site
Hazardous
Materials**

**Transportation
Hazards**



**Turkey Creek
Master Drainage Plan**
Property Flooding for 100yr Storm

Figure 11 Map # 1 of 1
Map Date: Feb 06, 2004



Legend	
Transportation Layer	100yr Depth of Flooding Above the Floodplain
Street Centerlines	0 - 0.9 feet
100yr Floodplain	1 - 1.9 feet
City Limits	2 - 2.9 feet
Buildings	3+ feet

1 in equals 800 ft NORTH



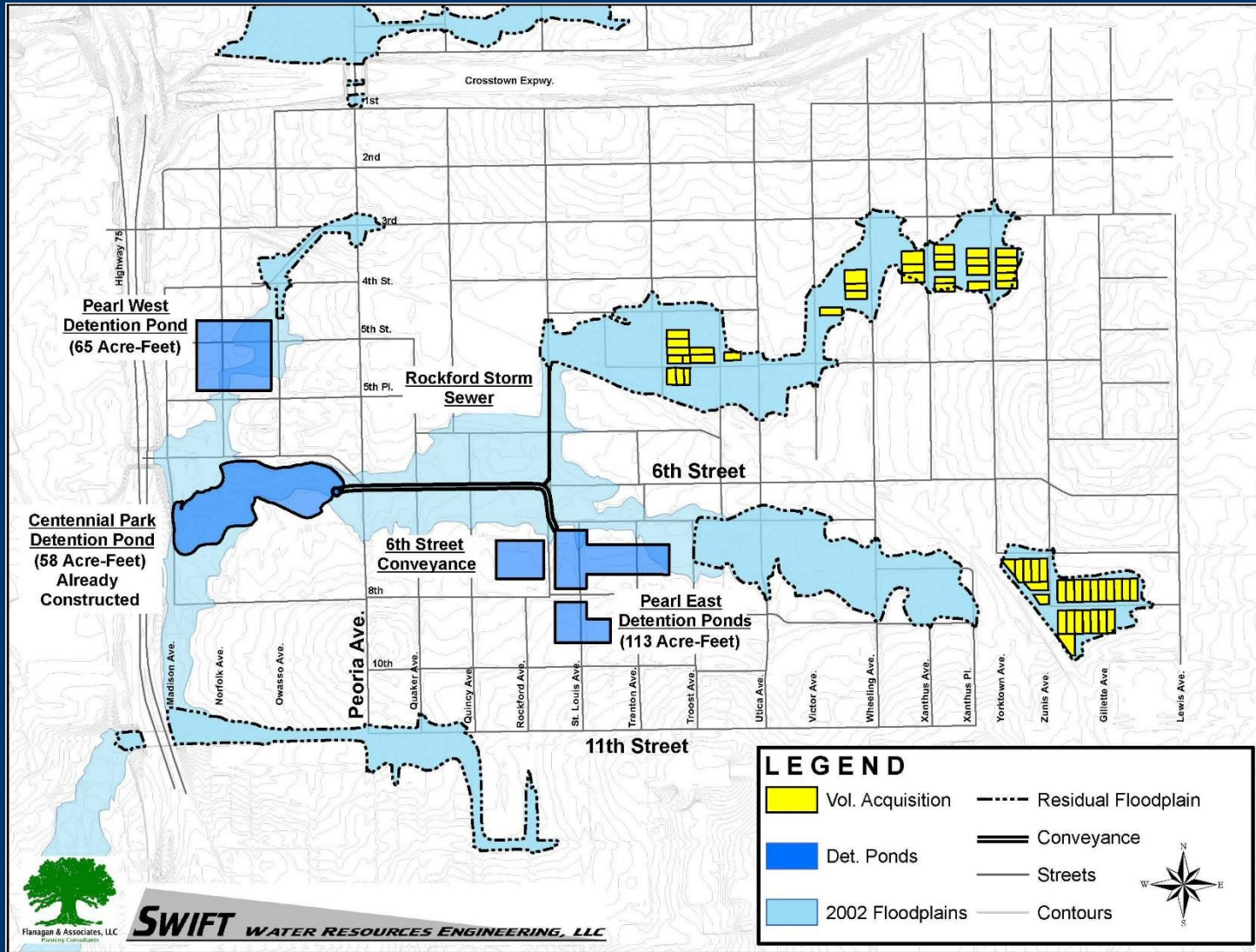
City of Bartlesville
Turkey Creek Master Drainage Plan

Master plan and mapping by
Meshek & Associates, Inc.
Civil & Water Resource Engineers and
Geographic Information Systems

20 West 2nd Street - Suite 200
Sand Springs, OK 74063
(018) 241-2803

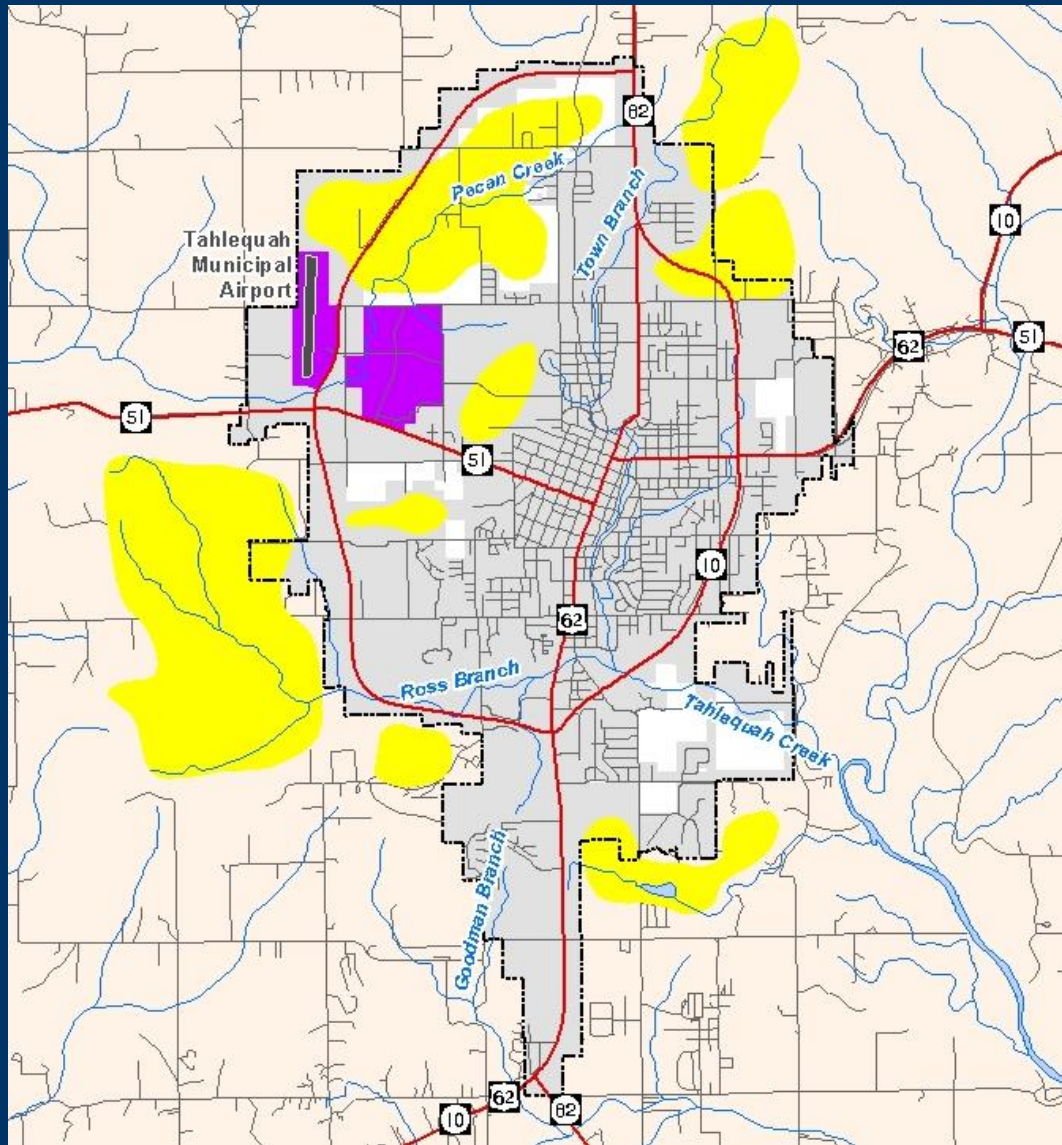
Bartlesville, Master Drainage Plans

Elm Creek – 2008 MDP Update



Recommended Plan

3 Detention Ponds, Conveyance Feature, Limited Acquisition



Future Growth Areas Map

Pre-Disaster Planning

Pre-Disaster Planning for Post-Disaster Recovery

The Time for Post-Disaster Recovery Planning is **BEFORE** the Disaster!

After the Disaster, **the emotional response is to Re-Establish the Pre-Disaster Status Quo** as quickly as possible.

Post Disaster Recovery Planning should be addressed by community leaders as part of the Hazard Mitigation Planning Process.

Unless we **“BUILD BACK BETTER”** we are merely re-investing in the repeat for the next disaster.

EMERGENCY RESPONSE PROCEDURES

Natural Hazards Annex

**City of Tulsa
Department of Public Works**

May 2004

Flanagan & Associates

**City of
Tulsa's Pre-
Disaster
Planning
&
Response
Procedures**

Emergency Response





THOUSANDS FLEE AREA HOMES



—World Staff Photo by D. LeRoy Randall

Many Evacuate Brookside, Garden City; More Rains Swell Oklahoma Streams

DAMAGE RUNS HIGH; RECORD CRESTS MOUNT

Many Roads Closed, Bridges Out; Worst Ramage on Cimarron

From World Wire Reports
Floodwaters drove hundreds more Oklahomans from their homes Friday as new deluges fed rivers and streams, already swollen by torrential rains of 10 to 20 inches since Wednesday night.

Residents were evacuated from a half-dozen towns in the state Friday and jittery Tulsa braced for possibly its worst flood in history Saturday.

Damage ran into the millions and there seemed to be no stopping of the spring rains which brought an abrupt end to one of the state's worst droughts.

Seven persons have died in the flood. Three others, believed to be missing, were found while another man was reported missing.

Missing Located
Located near Hennessey were Dr. and Mrs. Charles Hobbs of Kingfisher, Earl Hamil, Loyal, was reported safe at Hennessey.

The missing man is Roland Bullock, about 55, of near Lindsay. He fell into Turner creek, site of a flash flood near his home Saturday northwest of Lindsay. He

Arkansas Expected to Reach Peak Here Tonight; Some in Imperiled Region Resist Evacuation Pleas

By TRAVIS WALSH
Of The World Staff

More than 1,000 Tulsans moved to higher ground Friday and early Saturday as the debris-laden waters of the Arkansas river slowly rose toward a record crest expected to flood Garden City and much of Brookside.

Hundreds of others in the area classed as "critical" went optimistically to bed Friday night without making an attempt to move to safety.

The Arkansas was expected to reach the flood stage of 19 feet before dawn and crest at between 25 and 26 feet by 10 p. m. Saturday.

The reading at the 11th st. bridge at 12:20 a. m. Saturday was 16.14 feet. Forecast levels were for 22.5 feet by 6 a. m. and 24.5 by noon.

Sheriff Glenn Brown and Joe Morris, civil defense director, Friday afternoon began urging evacuation of Garden City and the section of Brookside generally between 36th and 81st sts. and Riverside dr. and Peoria ave.

Friday night police estimated 25 per cent of the residents in the affected Brookside area had left their homes. They estimated about half the residents of Garden City had moved.

Loom Ominously Close
At midnight, rising waters in the Cherry creek area north of the 51st st. bridge loomed ominously close to the Garden City area and sheriff's officers early Saturday sounded sirens and loudspeakers in an effort to get the people to move out.

"Once the water gets into that area, even if the river has not gone out of its banks, we can't get any trucks in there," Sheriff Morris said.

CD AND OTHER AGENCIES AID IN EMERGENCY

Red Cross, Firemen, Police, Guard Begin Flood Relief Work

By JOHN CLAYTON
Of The World Staff

Emergency evacuation efforts by the Civil Defense Administration in Tulsa—and coordinated agencies—were set in motion at 8 p. m. Friday for

School Authorities Pitch In

Large crews of volunteer workers moved rapidly at Bixby Friday afternoon as the city's high school to construct barricades hoping they would keep water out of the building's basement where boilers are located. Efforts were directed by Ray Tucker,

superintendent of schools, and Earnest Garrett, school board president. Teachers and nearby residents pitched in to handle the necessary chore. (Related evacuation map, photos on Page 9 and stories, photo on Page 1, Sec. 2).

Boy Rescued Alive After 23 1/2 Hours Buried in Well

Gary's Flood Area Flight DOCTORS SAY

Bixby Is Hoping for Best, Grimly Ready for Worst

By FRANK LESLIE
Of The World Staff

BIXBY, May 17—Oft-flooded residents of this lowland community were hoping for the best, but looking for the worst Friday as they prepared for the Arkansas' onslaught of flood



Emergency Response



Emergency Response

Short-Term Recovery

Housing
Food
Medical
Debris Management



Emergency/Short-Term Recovery



Double-wide
Garage- House
Destroyed

Moore Tornado A Tale of 2 Garages

Single-Bay
Garages- Minimal
Damage

Mitigation Plan Implementation



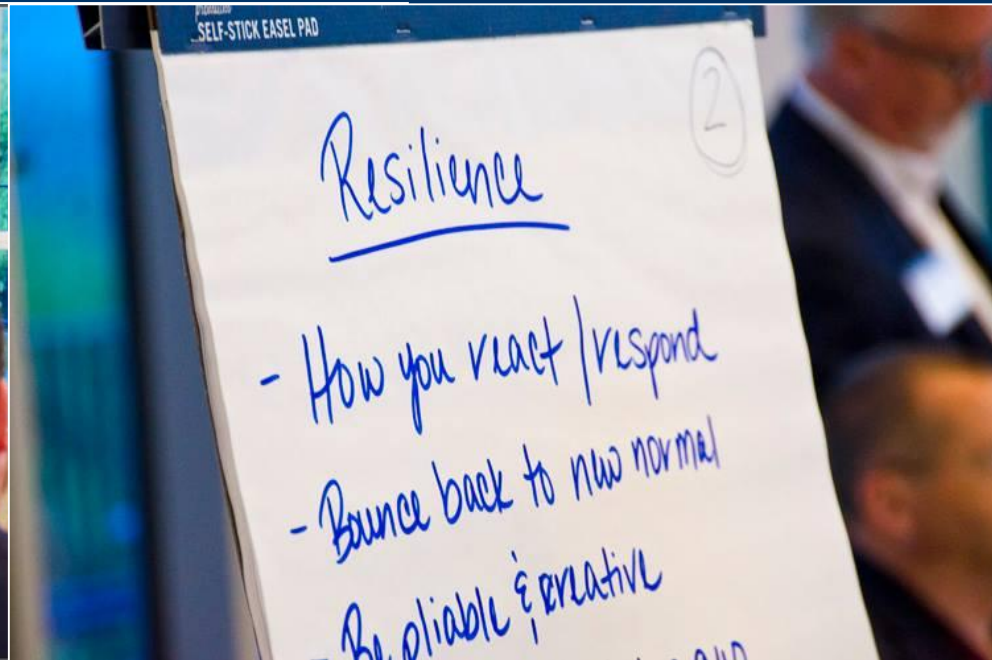
Flooded Homes to be Acquired



Fortified Home Construction

Long-Term Recovery

New Paradigm: Resilience





**MULTI-PURPOSE PLANNING
FOR GREENWAY CORRIDORS**



Acquired Homes created Neighborhood Open-Space



Arkansas River Parks Trail System



National Award Winning Multi-Purpose Centennial Park Stormwater Detention Facility



**Properly Planned Floodplains can be Enjoyed by
the Entire Community**



A Thing to be Enjoyed Forever



The
End

Hazard Mitigation and Building Resilient Communities

**Flood Risk Reduction in Oklahoma:
One Discussion,
Common Goals**

**Tim Lovell
Executive Director
Disaster Resilience Network**



The Perfect Storm

Increasing Severe Weather

Changing Demographics

Decreasing Federal Resources

With thanks to Jan Figart, Community Service Council of Greater Tulsa .

Tulsa Flood History

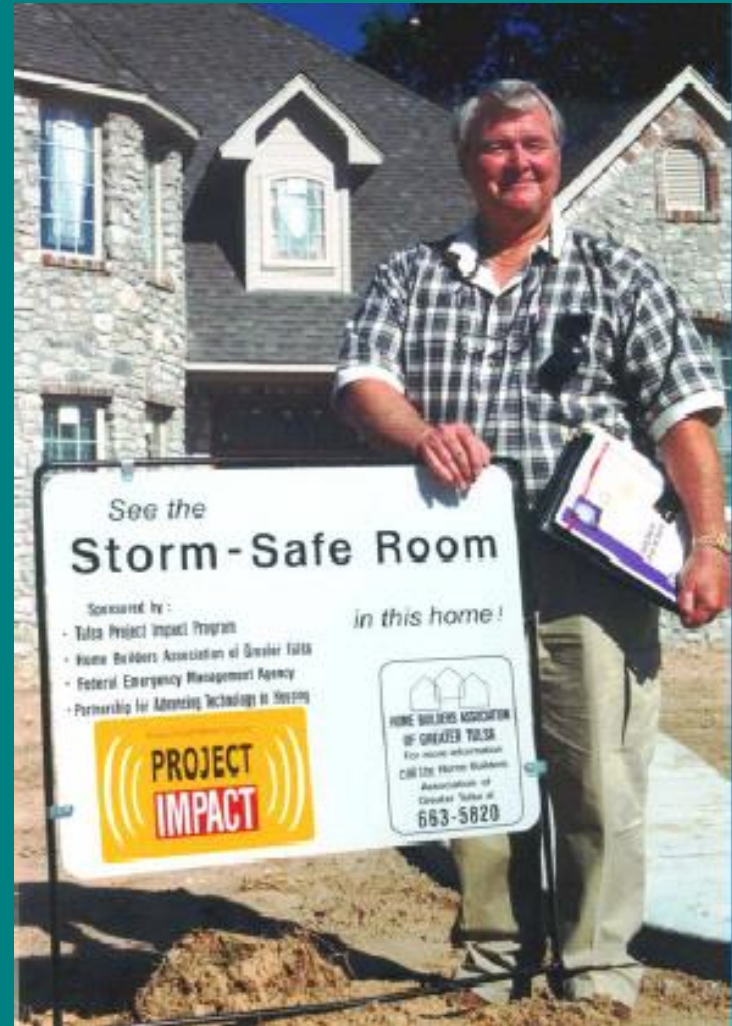


Courtesy Tulsa Tribune



Tulsa Project Impact

- FEMA Program using Public Private Partnerships
- Focused on multi-hazard approach
- Expanded to include Citizen Corps after September 11th, 2001



Disaster Resilience Network

DRN

Home • Business • Community



Stormwater Drainage & Hazard Mitigation Advisory Board



Program for Public Information

City of Tulsa Program for Public Information

December 2014

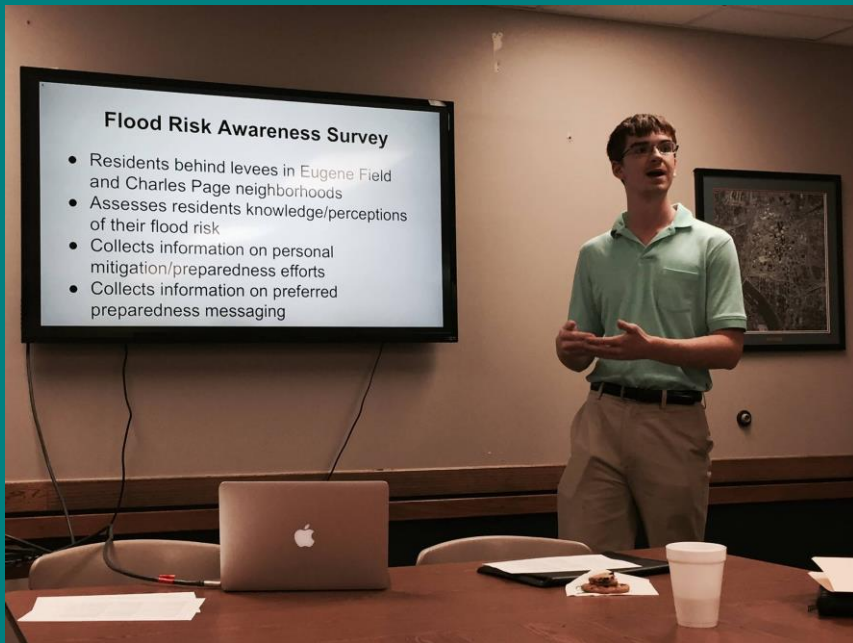


R.D. Flanagan & Associates
Planning Consultants

Tulsa Partners, Inc.



Oklahoma Silver Jackets Project / West Tulsa Levees



1986 Arkansas River Flood



Flood Risk in Tulsa: Are you Prepared?



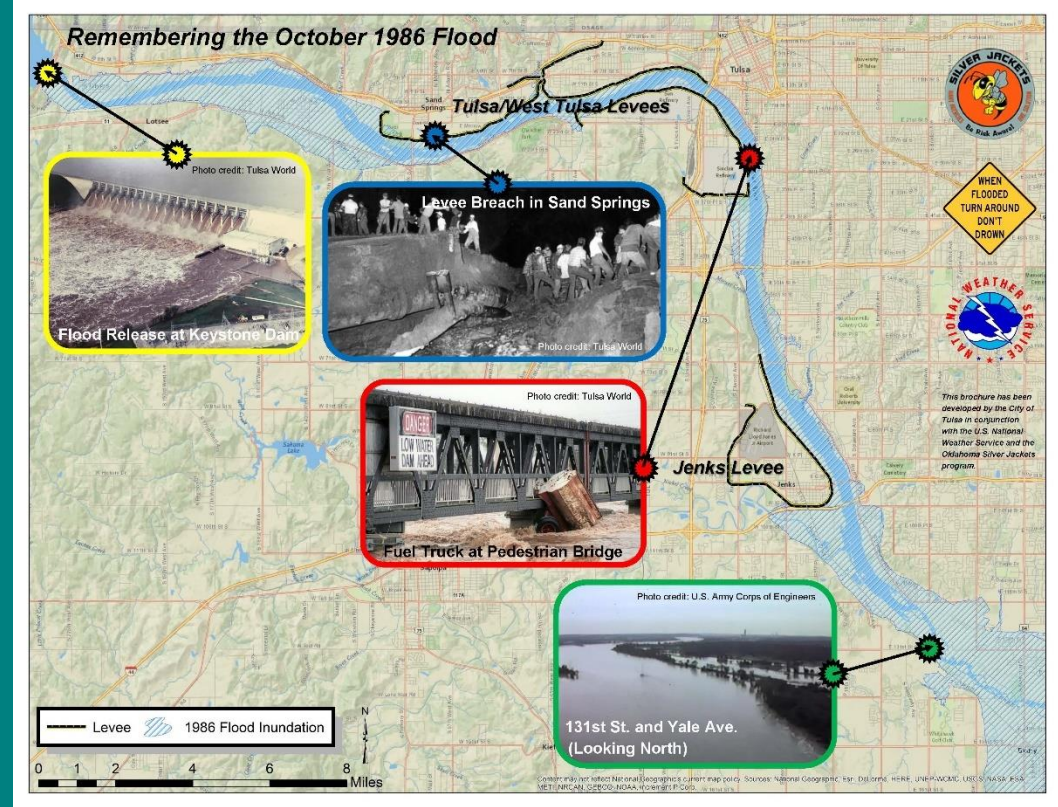
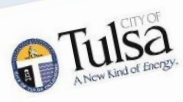
Remembering the October 1986 Arkansas River Flood

Thirty years ago, extreme rainfall filled Keystone Lake to capacity, forcing the U.S. Army Corps of Engineers to release water at a rate of 2.2 million gallons per second. Downstream flooding occurred in Sand Springs, Tulsa, Jenks and Bixby. Survivors of the October 1986 flood will remember how the Arkansas River rose and covered huge areas of normally dry land.

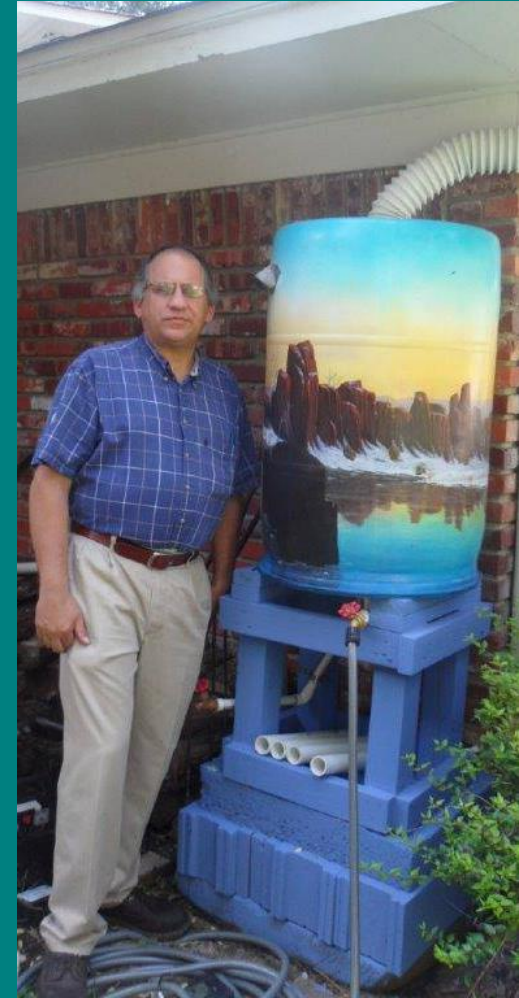
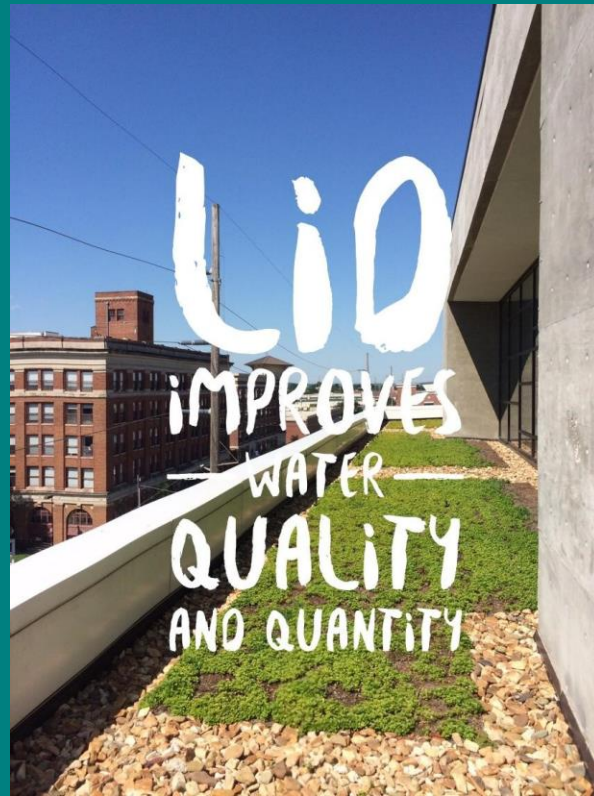
Our Community is Still at Risk

It has been many years since the last major flood on the Arkansas River in our area. However, the dangers to life and property from another major flood or severe weather event still exist. Please review this brochure, as your area is at risk of flooding from the Arkansas River.

Be Prepared. Be Safe.



Low Impact Development



100 Resilient Cities



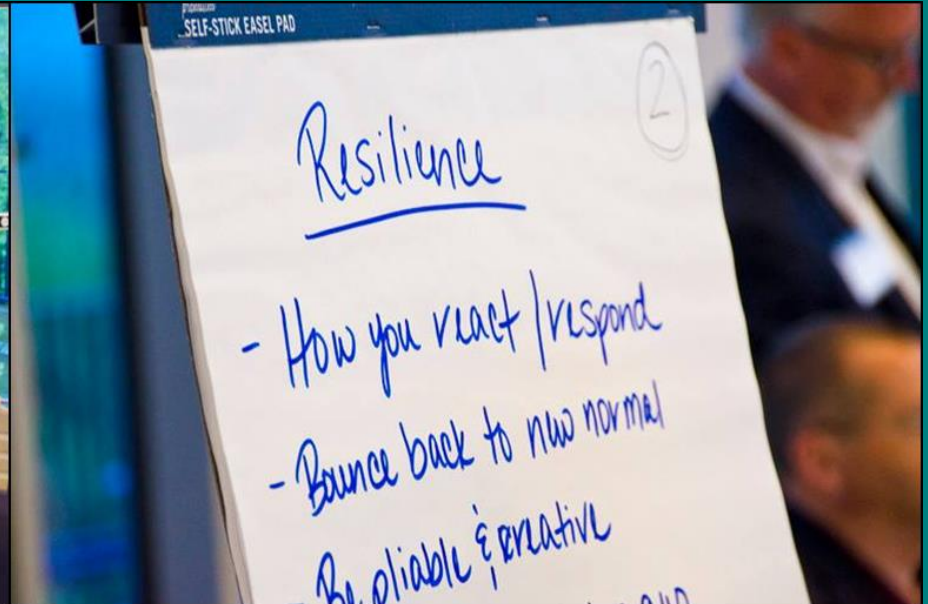
CITY OF
Tulsa
A New Kind of *Energy*™

PIONEERED BY THE
ROCKEFELLER FOUNDATION

100

RESILIENT

CITIES



Tulsa Area Long Term Recovery Committee(s)

March 25, 2015 EF 2



Photo Credit Seth Levy

March 30, 2016 EF 2

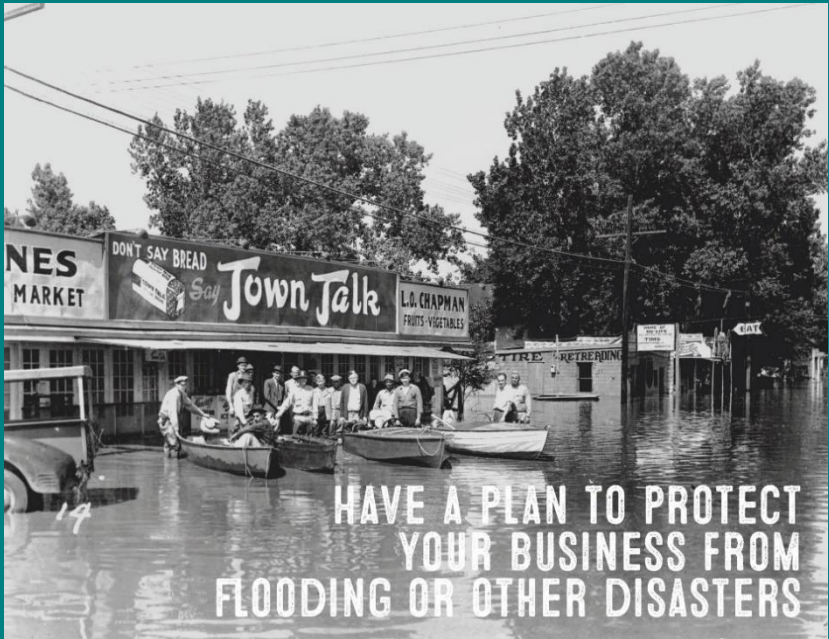


Photo Credit Terry McGee

Disaster Resilient Housing Council



Disaster Resilient Business Council



Disaster Resilient Cross-Cultural Council



Resilient Neighbors Network



Hazard Mitigation and Building Resilient Communities

Questions?



Tim Lovell
drndirector@gmail.com

APPENDIX D

BREAKOUT DISCUSSION NOTES



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



BREAKOUT GROUP TOPICS

Topic 1: Identify and Planning for Flood Risk

1. Flood risk identification efforts run the gamut from collected anecdotes such as “this land hasn’t flooded in the hundred years my family has owned it” to highly technical modeling efforts that use the latest available technology.
 - a. What is the current state of flood risk identification?
 - Is it succeeding? Great for Tulsa, OKC, etc. It is not good for Wewoka. Rural risk identification is poor.
 - Paper maps are still in use.
 - Significant portion of digitized maps have no model backing.
 - We are probably the same as other states.
 - We should be putting more effort in areas that have development ahead of them.
 - Fully urbanized-condition mapping is available for OKC, Edmond, Norman, and Tulsa.
 - b. What parts of our current efforts are serving us well?
 - Concentrate funding on highly populated areas.
 - State is highly involved with FEMA in the planning of new projects.
 - The State is the only CTP for Oklahoma.
 - c. Where improvements are most needed?
 - Availability of insurance data to FPA’s.
 - Outreach to the public. Real Estate agents don’t know how to read the maps. We have to train non-floodplain professionals.
 - It takes too long to put out a new map. In 3-5 yrs., things change and in some cases so much so that the map is no longer valid.
 - Rural and/or county floodplain management
2. Sound planning efforts begin with reliable data.
 - a. Is the best available flood risk information getting into the hands of those decision-makers responsible for planning?
 - It depends...
 - Some communities might not be looking at floodplain data or want to look at floodplain data
 - Development community is not very supportive of FPAs
 - The data is not getting in the hands that most need it
 - Community development professionals do not have the elementary training
 - Paper maps are needed in rural areas
 - Is there anything that OFMA can do? Provide more entry level classes, rural floodplain management classes
 - b. Are deficiencies in flood risk data adversely impacting planning activities?
 - yes

- c. Is consideration of flood risk limited to planning that is related to hazard mitigation, or is consideration of risk gaining broader acceptance in general planning, whether for land use, infrastructure, or even site design?
 - If there is compelling reason to do so (i.e. NW Oklahoma County)
 - It is being used by PW and planning (i.e. sewer, trails)
 - It depends...if you have a community where department talk, yes. If floodplain information is only seen by FPAs, then no.
 - Urban might be better at understanding the data.
 - d. Is there feedback from the planners about what sorts of risk information would be useful?
 - Historical information, elevation certificates, and similar data can be used by planning to guide development
 - e. How can the risk identification and planning processes be better integrated?
 - Internal education within a community
 - OFMA can assist
 - Rainfall data is critical for forecasting and modeling
3. In many organizations, a disconnect exists between planning processes and operational activities.
- a. How widespread is this disconnect with regard to flood risk?
 - Media does not report as enthusiastically to flooding as they do to tornados
 - There is a huge disconnect between recovery and response.
 - Huge disconnect between the people that have the data (planning) and the responders (operational people)
 - People are not taking risk seriously
 - b. Is the formal planning process an organization's primary conduit for incorporating flood risk information into decision-making?
 - Generally no.
 - If you include the HMP, the answer would be yes. However, most communities do not use the HMP on a daily basis.
 - c. What is the role of informal or alternate channels for flood risk information?
 - Neighborhood
 1. Something free, something fun and something food related
 2. Nextdoor.com
 - a. City of Tulsa has a login as a jurisdiction and can disseminate information thru it
 - Citywide Homeowners Association Talk - once a year by the City of Broken Arrow
 - Informal dissemination is important
 - d. Is the flood risk information being communicated in these ways different in terms of accuracy or detail?
 - Less detailed
 - Communities ought to track social media to make sure that the conversation is accurate
 - e. Is it possible to capitalize on these methods of communicating flood risk and incorporating flood risk information into decision-making and operational processes?
 - Yes...social media
 - "Do outreach at local level" rather than detailed information

- Call it “Youth Program” rather than
4. In Oklahoma, we have many different types of flood risks. Much discussion of flood risk seems to focus on “traditional” devastating riverine flooding, such as the flood risk that has faced (and to a great extent mitigated) by the City of Tulsa.
 - a. What other types of flood risk are faced by Oklahoma communities?
 - Poorly designed subdivisions
 - No low lots
 - Poor engineering by cheap developers
 - Poor standards by communities
 - Advertise directly to homeowners
 - Dams and levees
 - b. What can be done to help with recognition of regular but lower magnitude events as a serious flood risk?
 - Tie it to sell documents – state disclosure law
 - c. How might the types of flood risk to which Oklahoma communities are exposed change in the future as a result of factors such as development, infrastructure development or failure, or climate change?
 - Communities are developing their own regulatory maps to bypass the FEMA slow machine – but communities must be ready to enforce their maps on their own

TOP 5 ACTIONS – GROUP 1 (Identify and Planning for Flood Risk)

1. Can we speed up map production?
2. Restructure Training Classes
 - a. GAPS exist (high vs low level)
 - b. County FPAs, ACCO
3. Repetitive loss areas
 - a. Statewide?
4. OFMA give \$\$\$\$ to the teacher (via gift card) for use for classroom supply.
5. Enhance Informal communication – personal ambassadors



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



BREAKOUT GROUP TOPICS

Topic 2: Disaster Response and Community Recovery

1. The stated goal of disaster response is often quoted as “getting people back where they belong”.
 - a. In the case of flooding, where the hazard is location-based, is getting people back where they belong the same as in the case of a fire or tornado?
 - Do we have to have a flexible definition of a purpose or is it one size fits all?
 - Examples—respond to disasters; the flooding—depending on length 24 hours go in and mitigate it. Or if it is longer, like in Miami, took a lot longer, some people chose to not go back. Same thing in Piedmont- the structures on the island chose to not go back. Part of it is on the individual because of their emotional attachment. This has bad memories. Go back to something else. Physically whether it is fire or tornado or flood, no physical reason but more emotional.
 - Other side, want to expedite recovery. In case of flood, might be the last thing we want to do. Have to complete substantial damage estimate, floodplain permits; look for cumulative substantial damage, whereas we might open up on the weekends for an ice storm. Coast houses are the rich and the rivers are the poor.
 - Cache. They couldn’t build because they needed to rebuild. Still had to pay mortgage.
 - Hard to turn these tides. What is the role? Who says? Hurricane Sandy- Gov. NJ-not follow any of these permitting rules not follow for three years and then LA tried it and couldn’t do it.
 - Another factor: after 30 days- in a shelter, residency issues. After about 30 days, shelters run into funding issues and residency issues. What’s going to happen after 30 days? Big conversation-the longer you have a family out in recovery status, the more likely to leave. You lose property tax, community identity to leave. You can take a hide road. You end up having people leaving the community. You don’t want them to build back in the floodplain. What is our long-term recovery? It happens again. Long-term recovery effort gets lost.
 - b. Is helping someone return to a structure that has been damaged and remains in a high risk area an act of compassion?
 - Emotional and social component to these issues. So as community officials is it compassionate to get people back into homes quickly. How do we balance?
 - That exact reason-Purpose is to put people back where they are at. Conversation is ongoing. Going to do recovery planning, you should



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



have done planning. If you have flooded area, put them in a bad area, there should be options to go to new options. Not going back or have other options.

- Mitigating current association so there is some improvement.
- We allowed them to build, but we gave them criteria. People are going to go where they want to go. Give them options being able to do that.
- Different if you have businesses involved. City of Kingfisher-lost tenants, we lose employers. They can get back in and put them in the same place. Not even act for compassion for the employees.
- For profit cannot access public assistance funds.
- Businesses that are impacted need to be included in that planning process. Process of helping their employees.
- Businesses need to have a plan for their employees too. We didn't have a disaster plan for our company. Now we do. Planning is always the answer to this.
- Planning doesn't cut it. I have been to too many trailer parks in the state that are home to the most vulnerable families.
- Vulnerable neighborhoods. Not going to give you a homeowner a permit. Homeowner rebuilds somewhere else; community hasn't come up with a plan to rebuild the area, absentee landlord buy and move in more vulnerable.
- Community flip side, buy out then they have to maintain it without the funds.
- Pre-disaster and mitigation funds not for redevelopment funds. Growing communities' floodplain administrator has a target. Well placed mitigation project can turn in a blighted area into a more useful area. Some sort of redevelopment into our world for mitigation. It would allow private capital to flow in as well.
- FEMA started out with a wonderful program. HMP. Still stuck in 1968. Made no progress since then. Outlined a wonderful scenario. You can take a look any event. Not flexible enough to - Identify our vulnerabilities. No one should go back into a damaged house. There needs to be a moratorium that allows them to look at how to make a house better. Our emergency response is driven by emotion and politics.
- A couple of cities that have taken their levees to the 500-year. Like back where they belong-may not be where they were at.
- Three entities. Government- protection of life and property. Politics and emotion. The business side-profit. Trying to figure these things out and figuring these roles. How are we going to change that?
- Not the same for flood as it for the same as fire and tornado.
- Don't think they fully understand risk. They have different interpretations of risk. Miami-flooding. Moore-tornados. One of our two issues- we could do a better job of both in the education level is getting



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



people to understand their risk. They don't see how they can prevent the risk and there is a false sense of the risk. False sense of protection. Turn the risk off. Certain risks people don't want to imagine it and it is someone else's problem. False sense of security.

- Certain amount of defeatism. Accept and move on. The walls are still standing. How am I substantially damaged? Our terminology. Get caught in a trap. Battle of trying to tell them. We are on the regulations. We have to uphold these standards.
 - The Oklahoma Standard. Get you in the house and end this problem.
 - Unintended consequences. Federal Government will take care of us.
 - Politicians will override the regulations.
 - We are monetarily driven. Instead of saying can we put these monies together?
 - This is hard some Stafford act. Pilot program that allows positive redevelopment within an approved hazard mitigation plans
 - So project driven in our HMP. There are the tried and true methods. We don't do the dream projects. Let's loosen the act, maybe it is time to look at tying mitigation and economic development. We don't give the opp. To go and dream.- retention and economic development
 - Federal Government- boots on the ground. HMP-you have to have a HMP before you can get any projects to implement. However, the opposite is true for stormwater management. They will fund the drainage project but they won't fund the plan. FEMA should not fund a drainage plan without a proof that it is the best plan.
 - Isn't it better to go back and find what most of your issues are? What can we do?
 - FEMA doesn't allow us to include an economic benefit on a drainage project.
 - Why isn't flood in the homeowners insurance? Tom-because of the peril. Frequency and damage.
 - Flood insurance was one of the ways to get people to protect life. Then it was regulatory. 17% in floodplain have flood insurance.
 - Flooding is not location based. It becomes more proximity.
 - More proximity. FIRM map is to assign flood insurance rates. It is not a risk communication tool.
 - Missing elected officials. Need a champion. Not going to get anything done.
- c. Do current NFIP regulations about substantial damage and substantial improvement serve as an adequate "circuit breaker" to prevent continuing investment in high risk areas?



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- d. What opportunities exist to mitigation of future risks during ongoing recovery actions?
2. Particularly in riverine flood risk areas, socioeconomics cannot be ignored, with at risk areas often equating to those areas with the least ability to recover from disaster.
 - a. How can social justice concerns be balanced with the goal of minimizing continued risk?
 - Finding the right elected official is difficult. They don't want to deal with push back. Maybe we should be talking about social vulnerability.
 - NFIP is a horrible compromise. Every time someone tries to push on it the bad parts continue to show. The result instead of taking the banks to enforce the mandatory purchase requirement. It became tagging the insurance policy with the surcharge. Policy rates will increase. Price these out of their homes. Second side- are you booting out the people that are most vulnerable when you should be looking for solutions? Sometimes the only person that follows the law is the local FPA.
 - Wouldn't touch it with a pole. Only time would touch it with the NFIP is why my staff is treating you poorly or press release for CRS
 - Is it appropriate for them to leave their home and how do we address their concerns?
 - Need a new paradigm in Emergency Management. New paradigm in floodplain management. Is it a person that has 2 feet of flooding the most risky person or is it the person who is wheel chair bound or non-native speaker? More comprehensive approach. Need to invent a new paradigm for floodplain management. How do we do a better job of coordinating floodplain management as a whole
 - Everyone has a piece of the picture. It is a matter of organizing those who are involved in the risk. In response phase, who is going to pop. Have the social economic piece of the pie-one less of the piece to have to worry about.
 - It is another level of research.
 - Afraid to speak up. Minority population afraid to speak up.
 - More appropriate to attack with community leaders that know those social economic canvass on what they think and how they feel. It narrows down the number of people we have to deal with in response.
 - b. What tools/strategies exist to minimize exacerbation of socioeconomic impacts?
 3. Multiple government agencies and non-profit organizations (Baptist Disaster Relief, Red Cross, etc.) may be engaged during the disaster response and recovery process.



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- a. Which agency or NPO is expected to serve in the lead role?
- If there is Federal Disaster-the Federal Government is the heavy lifters. It is the Corps, FEMA, etc. When there is no federal disaster, depends on what type of event and how much pressure it is on the local, state. People in charge-there are nodes or cells. Lot of room to bring the NGOs and NPOs in the planning and response phase. Emergency Management folks, the Red Cross. We miss a lot of the floodplain management stuff. Lots of opportunities to be more involved to use our expertise.
 - One of the reasons for creating the DRT.
 - CRS-public information participation program. Identify floodplain management-all the various organizations that have anything to do with floodplain management, information on key message and contact main person, have now allowed us to expand that to all hazards. This is a daunting task-to what degree do you want to cooperate/participate.
 - Going to have a flood coordinating group. Forecast of river going to flood stage-floodplain managers going into call and have a seat going in the coordinated effort. Put the emergency response community, floodplain managers, USACE, regional emergency manager, local elected official, National Weather Service and will lay out "Unity of Effort" during flood events and/or prior to event.
 - Need to find a way to use Hazard Mitigation
 - Silver jackets-offer up with continued discussion. We could have one of these things the OFMA through OEM office for 2018 funds. Silver jackets-links up stakeholders and partners and structural and non-structural for flood-primarily for mitigation and preparedness. Brings together some of our authorities. Brings together links for resiliency. Annual project submission. Leveraging monies, high water mark assistance, disaster response and preparedness planning, etc. \$60,000 discretionary monies a year. Real engineers on the problem.
 - How do we bring this information to the local communities?
 - How do we prevent local overload? The disconnect between the two is to identify who does what? Who are the players?
 - Authority page- what do you want, how do you get it and here is who you contact?
 - exposure to these issues
 - silver jackets-used as guidance team. Reach out to other state agencies. Fell off for a while and trying to figure out how to get it reenergized. Trying to find our issues. Triangulate that FEMA can do through its RISKMAP programming, to that Matt and Bill Smiley can do. Silver Jackets is more local. We have thrown out a lot of ideas at each other. It is not beholden to one method typology. Big take away-- does it help you understand your risk?
 - silver jackets is a way to solve flood problems



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- b. What are the expected roles and responsibilities of government agencies and NPOs in the response and recovery process?
 - c. What is the best mix of government and NPO involvement? Across levels of government (Federal, state and local)? Across agencies (FEMA, USACE, etc.)? Integrating government and NPOs?
4. Disaster response and immediate post-disaster recovery are very much political processes.
- a. Would you consider requesting assistance from an independent third party with experience dealing with disaster response, regulatory needs and agency coordination to assist with disaster response?
 - b. Are you familiar with the OFMA Disaster Response Team?
 - USACE integrate the OFMA DRT with the Emergency Response Operations with the State EOC. Start down the road and that answers the question about integrating the DRT with flood.
 - Explained the DRT. Primary goal on a timeline-flood starting. Get a call. Get there about the time water recedes. We worked all night getting the substantial damage from county clerk. We were in the field in daybreak, collecting data when FEMA and OEM got there; handed over the data. We are that little slice of time that we are there before anyone else before the data vanishes.
 - USACE needs to contact the DRT for coordination and deployment.

TOP 5 ACTIONS - GROUP 2 (Disaster Response and Community Recovery)

1. Risk Communication Driven by the Hazard
2. Floodplain Management should consider social vulnerability.
3. Tying economic development and community action plans to our recovery plans
4. Develop a plan to engage multiple agencies at multiple levels to accomplish one goal
5. Seek better coordination and communication between the DRT and Pre-Disaster Flood Coordinating Group.



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



BREAKOUT GROUP TOPICS

Topic 3: Hazard Mitigation and Building Resilient Communities

1. It is often more possible, both politically and financially, for a community to take actions to reduce flood risk and ensure that development is better positioned for the future after a disaster has occurred as opposed to before a disaster hits.
 - lots of acceptance in Tulsa after 80s flooding but now not so much interest because residents believe problem is fixed
 - problems continue in Weatherford because of unregulated development prior to permitting process
- a. In your community, how much support exists for hazard mitigation and resilient development or redevelopment?
 - Good support. Once plan was approved, every community got some sort of a grant - saw a benefit from planning and ability to do projects. He is encouraging them to include hazard mitigation in public projects, such as water plant upgrades.
 - lots of support until it interferes with development
 - Residents say they are in favor, but don't understand all of the implications. For example, public resistance to new flood maps with added flooding caused the new maps to fail to be adopted.
 - Got similar push-back in community. Their maps were digitized versions of old FHBMs. Many owners are successful in getting LOMAs, and indication that the maps may be inaccurate. Only a small number of flood insurance policies.
 - Not enough budget for map mod to produce accurate maps.
 - change emphasis to use of local data
- b. What are the common arguments used in favor of allowing risky development?
 - need for tax revenue
 - perception that area no longer floods
 - focus on short term costs and gains without seeing long term costs
 - difficulty in establishing value of human life
 - Elected officials pay more attention to money; he goes to builders to obtain cooperation
 - unable to prevent it if it's legal
 - cities need revenue and development so badly they won't stop it and citizens buy in also
 - Revenue important and there is no downside to community because feds will bail out if there is a disaster. Local communities are not held



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- accountable; once property is bought and sold, difficult to assign responsibility to builder, city, purchaser, etc.
 - homes not built according to plan, creating neighborhood problems
 - supports deductible on public and individual assistance
- c. Is hazard mitigation seen as a local responsibility or something that should only be paid for with “other money” such as using a grant?
- Previously only done using outside money. Once communities saw benefits, they are more receptive to the cost. Still issue in convincing communities that the cost is worth it.
 - citizens not receptive because they think that grants will help them later if a problem
 - communities don’t understand that mitigation is more than just projects; also includes public education, changes to building codes; developers not receptive to increase in cost of project
 - educates builders that safely features, such as safe rooms, increase sale value of property
 - Generic discussion of safe rooms
 - asked if citizens were encouraged to use non-traditional tools such as LID
 - believes that LID is useful for small events but not 100-year
- d. Why have some mitigation projects or pro-resilience efforts been successful?
- Right project, for example, buy-outs in Mingo Creek. Most projects are successful if they can get built, many don’t get done
 - knowing stakeholder is important
 - politically positive to fix a prior administration’s mistakes
 - Number of complaints will influence whether a project is done, regardless of its priority to the community
 - well-designed, proper analysis; reduced the frequency of flooding
 - combination of desire to fix a problem, cooperation between citizens and agency; achieving a solution that worked; motivation in terms of big floods
 - asked about map mod;
 - believes buyers and citizens will cooperate if they understand the risk
 - OKC requires a flood study if there are nearby creeks which could flood homes; use studies to set finished floor elevation
 - ordinances don’t provide authority to require these studies out of the floodplain; not much pushback from prospective home owners because they don’t want to flood
 - good flood maps may be the best mitigation tool
 - community can help by raising community awareness about maps



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- e. What non-traditional tools have communities used to achieve mitigation or resilience goals?
- encourage LID and competition for developers
 - provide a marketing tool for developer for providing resilience
 - stormwater and floodplain work together to reduce flooding with LID
 - city registry of sites with LID, could do similar with resilience
 - publicize success of projects;
 - Residents in Tulsa area noticed improvements in Tulsa areas
 - OKC got funding for improvements which are now mostly complete. They will be able to see how well it works next big event.
 - How would they capture and communicate that success?
 - businesses can publicize; cultivate media
 - non-structural projects, such as buy-outs
 - asked about creative ways of funding
 - stormwater utility fees
 - takes care of maintenance, but not much left over for projects
 - OK County buy out mitigation was appreciated by the property owners
 - OWRB SRF loans for green infrastructure
 - Blue Thumb stream restoration projects; community cleans out stream, plants trees, etc., contributes to community cohesion
 - leverages the positive feelings about the environment
- f. continuity – maintaining momentum in drought
- Southwest OK drought plan was implemented and is still being followed; use hazard mitigation plans and remind people.
 - need to maintain discipline and develop plans when there is not a problem; have plans in place with action plans to implement; don't wait until there is a problem and emotions are high
 - important to go through plans to make sure how they work and resolve to carry them out
 - need to leverage a crisis to bring attention; also need reliable funding to plan on a continuous basis
 - too many citizens believe that city will take care of them and they don't need to be responsible
2. Flood risk is only one of many risks faced by Oklahoma communities.
- a. What other risks do your communities face and how are they being mitigated?
- tornadoes; partnership between DRN, habitat, OK Insurance Commissioner, for wind-resistant buildings - raises awareness
 - grass fires; keep after state and local representatives for help
 - public awareness of fire safety
 - Earthquakes – scrutinizes solid waste facilities



Flood Risk Reduction in Oklahoma: One Discussion, Common Goals



- ice storms; more underground electricity and backup generators
 - spills and other manmade disasters; hazmat crews to clean up; private facilities have to have emergency plans
 - earthquakes – had to redefine what would trigger inspections
 - lightning – have warning systems at school athletic systems and would like to have for public parks, but need funding
- b. How can we learn from responding to other risks in order to building a comprehensively resilient community?
- communication is important, also coordination to avoid confusing communication
 - problems with multi-purpose sirens
 - be aware of situations that may make an action plan useless. Exposes potential weak spots in a multi-hazard communication
 - need to be aware that a home which is safe for one hazard may be unsafe for others
 - need education to avoid consequences of clean up
 - impact of lack of funding and administration budget cuts; will it do any good to approach legislators

TOP 5 ACTIONS – GROUP 3 (Hazard Mitigation and Building Resilient Communities)

1. OFMA award for most resilience developers/businesses
2. OFMA and members send letter to federal elected officials to encourage funding for PDM
3. Storm-ready neighborhoods – certification for developments that have safe rooms, freeboard for 100-year, etc.
4. Develop proposal to match local funds to encourage master drainage plans
5. Encourage pre-disaster mitigation planning to build back better

Didn't make cut

1. Start a PAC for officials who value mitigation and resilience
2. OFMA encourage communities to develop a PPI program if not a CRS 5 to 10
3. OFMA send letters supporting EO 13690
4. FEMA have community share in cost of flood mapping
5. Push for continued accelerated flood mapping

APPENDIX E
ACTION ITEM EXERCISE

Action Item Exercise
Final Rankings

Group 1

Speed up Risk Identification Process	19
Restructure training classes to address gaps between high and low levels and county level needs	15
Identify Repetitive Loss Areas Statewide	8
Create a student/teacher recognition program with emphasis on teachers	9
Enhance informal communications	3

Group 2

Risk communication driven by hazard	3
FPM consideration of social vulnerability	8
Tie economic development and community action plans to recovery plans	20
Develop a plan for agency integration - "unity of effort"	6
Improve coordination between DRT and USACE Flood Coordination Group	7

Group 3

Develop OFMA award for most resilient builders and developers and project	7
Develop a Storm Ready neighborhood program	13
Develop proposal for federal match for finding local Master Drainage Plans	17
Encourage predisaster mitigation planning to be ready to build back better	10
Send letters to elected officials supporting PDM	5

APPENDIX F

FLOODPLAIN MANAGEMENT ISSUES AND RECOMMENDATIONS:
OKLAHOMA COMPREHENSIVE WATER PLAN SUPPLEMENTAL REPORT



Oklahoma Comprehensive Water Plan Supplemental Report

Floodplain Management Issues & Recommendations

February 2011

This study was funded through an agreement with the Oklahoma Water Resources Board under its authority to update the Oklahoma Comprehensive Water Plan, the state's long-range water planning strategy. Results from this and other studies have been incorporated where appropriate in the OCWP's technical and policy considerations. The general goal of the 2012 OCWP Update is to ensure reliable water supplies for all Oklahomans through integrated and coordinated water resources planning and to provide information so that water providers, policy-makers, and water users can make informed decisions concerning the use and management of Oklahoma's water resources.

Oklahoma Comprehensive Water Plan



Floodplain Management Issues & Recommendations

The following report was submitted by the Oklahoma Floodplain Managers Association, in support of the Oklahoma Comprehensive Water Plan, to expressly present the state's most pertinent long-term floodplain management needs.

Floodplain Management Issues & Recommendations

Floodplain management efforts in Oklahoma have been comprised mainly of the efforts made by local communities to comply with the federal regulations that govern participation in the National Flood Insurance Program (NFIP). Local communities (cities, towns, counties) enact and enforce land use and development regulations relating to construction in areas of flood hazard so that federal flood insurance will be available to residents and business owners within the community. The Oklahoma Water Resources Board serves as the state coordinating agency and is responsible for assisting local communities in these efforts, as well as for regulating development on state owned property. Tribal governments are also eligible to participate in the NFIP.

Areas of flood hazard are determined by the Federal Emergency Management Agency (FEMA) through the issuance of Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRMs). New studies and maps are developed and issued by FEMA. When mapped areas need to be altered because of development, availability of more accurate data, or other factors, the effective maps can be officially altered by petitioning FEMA for a letter of map change. A large number of communities within the state have recently received or will soon receive new maps through federal programs known as Map Modernization or RiskMAP.

Communities that entered the National Flood Insurance Program before 1980 (pre-80 communities) adopt floodplain management regulations by ordinance of the governing body. Communities that entered the program after 1980 (post-80 communities) must follow specific requirements set forth in the Oklahoma Floodplain Management Act, including adopting floodplain management regulations by action of a five member floodplain board. All participating communities must have a floodplain administrator accredited by the Oklahoma Water Resources Board.

Floodplain management in Oklahoma is supported by a network of private-sector professionals, many of whom have gained national recognition for their work in the field. Public and private floodplain management professionals have joined together to form a non-profit organization known as the Oklahoma Floodplain Managers Association, Inc (OFMA). OFMA administers a nationally recognized certification program (Certified Floodplain Manager, or CFM), provides basic and advanced level training, and conducts educational and outreach programs aimed at saving lives and reducing property losses due to flooding.

Moving forward, floodplain management cannot be based solely in a desire to comply with federal regulations. If floodplain management is undertaken only as a means to the end of making flood insurance available in a community, the opportunity to capitalize on relationships between floodplains and other aspects of water resources will never be realized, and the opportunity to mitigate the impacts of flooding on the lives of Oklahomans will be lost.

The following actions should be taken to allow floodplain management to serve as an important and beneficial part of the state's future water resource strategies:

- *Encourage the preservation of the natural and beneficial functions of the floodplain.*

The floodplain is, first and foremost, a natural feature. Floodplains are, by their very nature, supposed to be inundated with floodwaters. Development within floodplains, whether building a new housing subdivision or lining a creek channel with concrete, serve to reduce the ability of floodplains to serve their intended purposes, including storage of floodwaters, provision of habitat space, improvement of water quality. Of particular importance is the role that floodplains, and particularly the vegetation that tends to be naturally present, play in improving the quality of stormwater before it reaches receiving waters. Local communities should be encouraged to adopt a regulatory philosophy that exploits the synergies between floodplain management and stormwater quality and properly recognizes the natural and beneficial functions of the floodplain.

- *Recognize that the minimum standards for participation in the National Flood Insurance Program are not sufficient to adequately reduce the frequency and severity of flood losses.*

The National Flood Insurance Program was designed to reduce reliance on disaster assistance and provide a mechanism to protect lenders who extended credit in areas at risk for flooding. The land use and development controls that comprise the minimum standards for community participation in the NFIP were designed to facilitate the provision of insurance, not necessarily to adequately reduce flood risk. Local communities must be encouraged to develop and implement "higher standard" regulations that are appropriate to mitigate the actual flood risk that exists within the community. Further, current methods of flood risk mapping do not adequately account for the inevitable increase in flood risk caused by development within the watershed. Regulations that require freeboard, or elevation of structures above the minimum standard "base flood elevation" or "BFE" could help account

for increased future risk. A minimum freeboard requirement of one foot is necessary just to account for the increase in flood elevation already built in to the maps. A higher freeboard requirement might be necessary and appropriate in many communities. Similarly, a prohibition of construction or improvement of any structure (at very least, any residential structure) within an established regulatory floodway would protect against risk of damage to the structures in question but would also preserve the integrity of the floodway, reducing flood risk throughout the surrounding area.

A requirement that the ability of the floodplain to store floodwaters not be reduced would significantly limit future increases in flood risk. This regulation could be implemented by requiring that compensatory storage, at a hydrologically equivalent location, be provided whenever an obstruction is placed anywhere in the floodplain. In areas with particularly serious flood risks, regulations prohibiting placement of any fill or structures in the floodplain could have far-reaching benefits.

As long as there is development within a watershed, floodplains are going to increase in size. A potential solution to this problem is to require that any new impervious surface added anywhere in a community be offset by installation of stormwater detention, whether on-site or on a regional basis.

All of these possible “higher standard” regulations have been successfully implemented in Oklahoma communities. It should be noted that many communities have been recognized for their higher regulatory standards by membership in the NFIP’s Community Rating System. Membership in the Community Rating System can lead to significant discounts on flood insurance rates for all structures in the community. In particular, the City of Tulsa has been recognized as having one of the three most effective programs in the entire nation because of their higher regulatory standards and other aspects of their floodplain management program. With the proper education, outreach, and technical assistance, these strategies for reducing risk could become more accessible to all communities in the state.

- *Provide a mechanism for comprehensive master drainage planning.*

Communities facing flooding problems often seek structural solutions – levees, culverts, storm sewers, detention ponds, etc. Tremendous resources are committed to the construction and maintenance of these projects, often without any real assurance that they will fix the underlying problem. The only way to determine the solution to all but the most

simplistic flooding problem is to conduct a comprehensive master drainage plan. Such a plan not only identifies the true nature of the problem, but allows for real cost-benefit analysis of the proposed solutions. Unfortunately, funding can be obtained for projects but generally cannot be obtained for comprehensive master drainage plans. To continue to allow projects to be planned and constructed without watershed and sub-watershed level analysis is an irresponsible use – if not a blatant waste of taxpayer monies. This problem must be addressed by identifying a funding mechanism for comprehensive master drainage plans that can be accessed by all communities in the state, regardless of size or resources.

- *Allow Oklahoma to continue to serve as a model for state floodplain management programs.*

Oklahoma's floodplain management program is, in many ways, a model for all other state programs. The floodplain administrator accreditation requirements are groundbreaking. Many other states are seeking to adapt systems for permitting development on state-owned property that mirror the OWRB program, with particular focus on the level of cooperation between OWRB and the Oklahoma Department of Transportation. The relationship between OWRB and the Oklahoma Floodplain Managers Association is envied by state coordinating agencies and state floodplain managers associations across the nation, particularly with regard to the partnership that exists whereby OFMA's Training Cadre has taken responsibility for teaching OWRB's advanced floodplain management training courses.

In order to maintain and build on the strengths of the state floodplain management program, a permanent funding source must be identified. Current funding for the floodplain management program comes from FEMA. This federal funding is intended to supplement, not replace, state appropriations or other revenues.

In addition to identifying revenues for the general operation of the floodplain management program, funding is needed to allow for the initiation or expansion of several important programs. Of primary importance is funding for the Cooperating Technical Partner Program, which would allow OWRB to leverage a tremendous amount of federal funding to improve flood hazard mapping throughout the state. A small amount of funding could lead to large returns, and thus should be made a priority. Another important initiative that should be funded is the creation of an inventory of all state owned structures located within the

floodplain, a project that is critical for disaster response and future planning and asset managing purposes.

State agencies other than OWRB also have contributed to Oklahoma having a model floodplain management program. OWRB and OFMA have worked very hard to build relationships with a number of state agencies impacted by floodplain management considerations. Cooperative efforts with the Oklahoma Insurance Department have caused flood insurance issues to be featured in agent and adjuster training, licensing and continuing education. Cooperation with the Department of Education resulted in the implementation of flood safety awareness training for school bus drivers. Oklahoma is the only state in the nation to have a flood safety awareness section in the state driver's manual, a tribute to cooperation with the Department of Public Safety. Emphasis should be placed on expanding these relationships and discovering new way to reduce risk by building partnerships with state agencies.

One potential partnership of critical importance relates to building and construction regulations. The nationally recognized building and construction codes now contain provisions related to floodplain management. OFMA and a number of floodplain management professionals in the state have been heavily involved in working to create and revise the flood safety provisions in these codes, working with FEMA and the International Code Council. Oklahoma, through the Uniform Building Code Council, is in the process of determining what portions of the nationally recognized codes will be the minimum requirements to be enforced for all construction throughout the state. It is critical that a floodplain management professional be added to the Uniform Building Code Council to assist with this process.

- ***Enhance disaster readiness.***

Despite the best mitigation efforts, communities with areas of flood risk will experience flooding disasters. Enhanced flood disaster readiness is critical for every community in the state. With the support of FEMA and OWRB, OFMA has created a Disaster Response Team to assist local communities in times of need. The Disaster Response Team consists of volunteer floodplain management professionals ready to deploy to a disaster to assist the local community in all aspects of disaster response, with a particular emphasis on helping the community comply with all of the requirements for inspections and damage assessments that are required by federal regulations. The OFMA Disaster Response Team is the first of its kind in the nation and has quickly become the model for

similar efforts in a number of other states. Formal support for the Disaster Response Team must continue to be strong, whether financial or administrative.

- *Preserve local control of floodplain management.*

Despite the high level of support provided by the state coordinating agency and statewide professional association, floodplain management is and will remain largely a local function. As such, local communities must be afforded flexibility to determine what sort of floodplain management program is best to address their own flood risk. One action that could greatly enhance the ability of local communities to administer their floodplain management program would be to remove the requirement that Post-80 communities appoint and utilize a five-member floodplain board. While the floodplain board may be appropriate for some communities, it is a burdensome obstacle to others. Some smaller communities have been unable to keep floodplain boards properly constituted, creating a barrier to entering or remaining in the NFIP. This barrier not only jeopardizes the ability of the community to make flood insurance available to its residents and businesses, but it can cause the community to be ineligible for federal disaster assistance.¹ In general, communities should be given options and provided with assistance, but should be granted the ability to craft their own programs and implement their own regulations, subject to the federal standards for participation in the NFIP.

- *Work toward achievement of a No Adverse Impact approach to floodplain management.*

The goal of floodplain management is to reduce the frequency and severity of flood losses, thus reducing the risk of loss of life and damage to property due to flooding. There are many ways to achieve this goal, but the most successful programs do so by adopting a “No Adverse Impact” approach to floodplain management. All communities within the state should strive to craft floodplain management programs that require all development to have “no adverse impact” on any other property in the area, in the community, and in the watershed.

¹ This requirement was removed by statute during the 2011 legislative session.

APPENDIX G

SYMPOSIUM ORGANIZERS AND VOLUNTEERS

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OFMA Organizing Committee

Gavin Brady	Reporter
Monica Cardin	Logistics Coordinator, Scribe
Tom Leatherbee	Co-Host, Facility Coordinator
Joe Remondini	Co-Host, Reporter

OFMA Volunteers

Jeff Bigby	Roamer
David Lacy	Drone Support - Group Photograph
Carolyn Schultz	Registration
Bill Smith	Reporter
Ana Stagg	Scribe
Ellen Stevens	Scribe
Marc Utley	Roamer
Clark Williams	Super Sub

ASFPM Foundation Representatives

Tim Hillier	Overall Moderator, Facilitator
Matt Koch	Facilitator
Jerry Sparks	Facilitator

ASFPM Headquarters Staff

Kait Laufenberg	Registration
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Special Thanks

Steve Clapp	Photographs
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APPENDIX H

SYMPOSIUM PRELIMINARY RESULTS PRESENTATION



2017 OKLAHOMA FLOOD RISK SYMPOSIUM PRELIMINARY RESULTS

OFMA Spring Technical Workshop

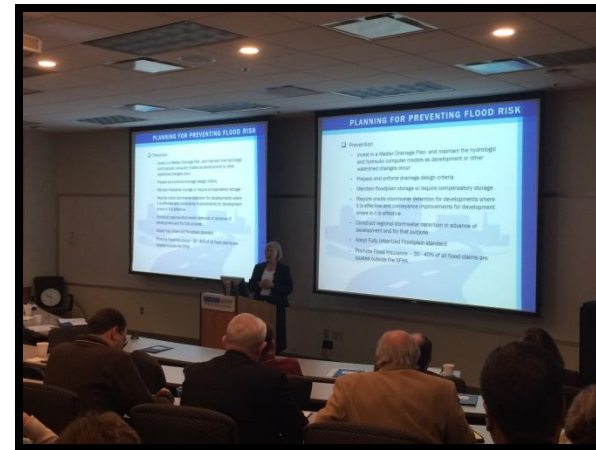
Catoosa, OK

April 6, 2017

A Special Event

First Oklahoma Flood Risk Symposium

- Sponsored by OFMA and the ASFPM Foundation
- 54 participants drawn from diverse organizations
- Different from normal events – a discussion, not a training session
- Sought to examine flood risk through multiple lenses and brainstorm solutions that apply across traditional boundaries
- Morning presentations gave way to afternoon discussion groups. Group discussions led to creation of priority action items.



Identifying and Planning for Flood Risk

- Spotlight presentation by Janet Meshek of Meshek & Associates
- Discussion focused on the state of flood risk identification efforts, how flood risk data can be better used in the planning process, and structural barriers preventing the use of flood risk data.



Disaster Response and Community Recovery

- Spotlight presentation by Ron Flanagan of RD Flanagan and Associates and Danielle Barker of the City of Bethany.
- Discussion focused on the nature of the flood hazard and its impacts on rebuilding, social justice impacts of floodplain management, interagency cooperation and disaster response politics.



Hazard Mitigation and Building Resilient Communities

- Spotlight Presentation by Tim Lovell of the Disaster Resilience Network
- Discussion focused on community motivation for mitigation activities, integrating flood preparedness with other hazard readiness



Flood Risk Reduction Priority Action Items

- Incorporate Economic Development and Community Revitalization into Hazard Mitigation and Disaster Recovery
- Expedite the Risk Identification Process and Remove Barriers to Product Release
- Restructure Training Curriculum to Address Intermediate Needs and Add Offerings for County and Rural Floodplain Management
- Create a Mechanism for Federal Funding of Master Drainage Plans
- Develop a Certification Program for Flood-Resilient Neighborhoods



The Way Forward Toward Resilience

- OFMA will develop a comprehensive engagement strategy to work toward achieving the Priority Action Items.
- The goals, tasks and benchmarks from that strategy will be incorporated into the Strategic Plan.
- OFMA leadership will work to maintain momentum and ensure that connections built during the Symposium are strengthened.

Acknowledgements

- Symposium Co-host Joe Remondini
- Symposium Planning Committee: Monica Cardin, Gavin Brady
- Volunteers: Carolyn Schultz, Ana Stagg, Ellen Stevens, Bill Smith, Jeff Bigby, Marc Utley, Clark Williams
- ASFPM Foundation and ASFPM Executive Office



GROUP 1 - IDENTIFY RISKS

1. CAN WE SPEED UP RISK ID. PROCESS?
2. RESTRUCTURE TRAINING CLASSES
 - GAPS EXIST (HIGH VS. LOW LEVEL)
 - MORE NEEDS AT COUNTY LEVEL (CURRENT)
 - COMMISSIONERS + FPA'S
3. REPETITIVE LOSS "AREAS" (TULSA)
 - STATEWIDE?
4. STUDENT/TEACHER RECOGNITION PROGRAM (EMPHASIS ON "TEACHERS" \$)
5. ENHANCE "INFORMAL" COMMUNICATIONS

GROUP 2: RESPONSE & RECOVERY

1. RISK COMMUNICATION DRIVEN BY HAZARD
2. FPM CONSIDERATE OF SOCIAL VULNERABILITY
3. TYING ECONOMIC DEVELOPMENT AND COMMUNITY ACTION PLANS TO OUR RECOVERY PLANS

GROUP 2: RESPONSE & RECOVERY

4. DEVELOP A PLAN FOR AGENCY INTEGRATION - "UNITY OF EFFORT"
5. IMPROVE COORDINATION B/W DRT AND PRE-DISASTER FLOOD COORDINATION GROUP

GROUP 3 - TOP 5 ACTIONS

1. Develop OFMA award for most resilient builders & developers and project
2. Develop a Storm Ready Neighborhoods program
3. Develop proposal for Federal match for funding local Master Drainage Plans
4. Encourage Pre-Disaster Mit Planning to be ready to build back better
5. DFMA and members send letters to National Elected officials supporting Pre-Disaster Mitigation