



# Regional Resilience for Transportation and Economic Development

National Regional Transportation Conference | July 29, 2020






# Stronger CEDS, Stronger Regions

CEDS Resource & Training Archive

[www.CEDSCentral.com](http://www.CEDSCentral.com)



A sunset over a body of water with a city skyline in the distance. The sky is filled with dramatic, dark clouds illuminated from below by the setting sun, creating a gradient of colors from deep purple and blue to bright orange and yellow. The water in the foreground is dark with gentle ripples, reflecting the light from the sky. In the background, a silhouette of a city skyline is visible against the horizon.

**Resilience:** The ability of a region or community to anticipate, withstand, and bounce back from shocks, disruptions, and stresses including:

- ❑ Weather-related disasters or hazards / Impacts of climate change
- ❑ The closure of a large employer or military base
- ❑ The decline of an important industry
- ❑ Changes in workforce / effects of automation
- ❑ COVID-19 response & recovery
- ❑ Much more...



# Not Just Bouncing Back...*Bouncing Forward*

“ Another way of looking at resilience is the ability not only to bounce back but also to “bounce forward” - to recover and at the same time to enhance the capacities of the community or organization to better withstand future stresses.”

- Urban Land Institute – *After Sandy*



# Why **Regional** Resilience?

- Nearby communities often share similar risks/hazards
- Disaster impacts cross jurisdictional boundaries
- Communities are interdependent
  - Vulnerabilities in one community could impact another.
  - Mitigation investments in one community could impact another (positively or negatively).
- Economies are regional in nature
- Communities can accomplish more when they work together



# Thanks for Joining the Webinar!

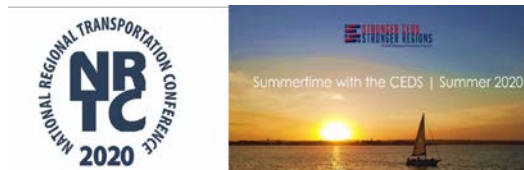
- Questions or comments can be submitted via the chat box on the right side of your screen in drop down menu
- A recording of the webinar will be made available soon at [www.nado.org](http://www.nado.org) & [www.CEDSCentral.com](http://www.CEDSCentral.com)
- Upcoming webinars for *Summertime with the CEDS*:
  - **August 6** – Economic Development: Considerations for Change
  - **August 11** – So You Want to Hire a Disaster Recovery Coordinator? Lessons Learned and Best Practices for EDDs
- Please contact Brett Schwartz at [bschwartz@nado.org](mailto:bschwartz@nado.org) if you have any general questions about NADO RF or the *Stronger CEDS, Stronger Regions* program

# Today's Presenters

**Gena McCullough**, Assistant Executive Director/Planning Director  
Bi-State Regional Commission (IL/IA)



**Joshua Owens**, Senior Regional Planner  
Houston-Galveston Area Council (TX)





# Extreme Weather and Infrastructure Resilience

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BI-STATE REGIONAL COMMISSION

FHWA PILOT PROJECT

GENA MCCULLOUGH, ASST. EXECUTIVE/  
PLANNING DIRECTOR



U.S. Department of Transportation  
Federal Highway Administration



# FHWA Resilience and Durability to Extreme Weather Pilot Program

## 2018 Resilience Pilots

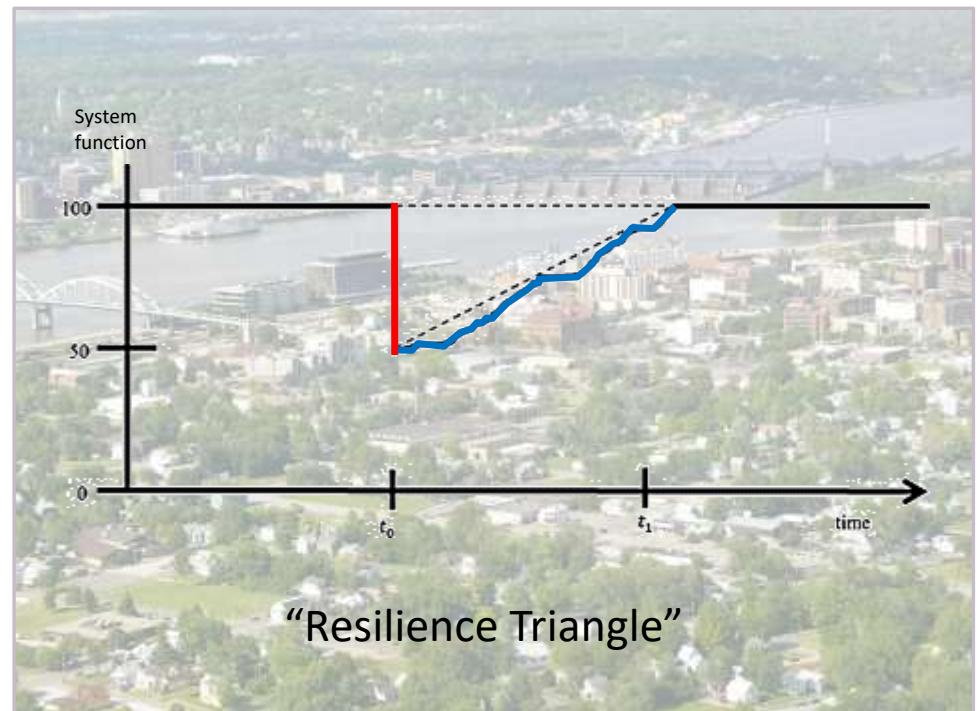




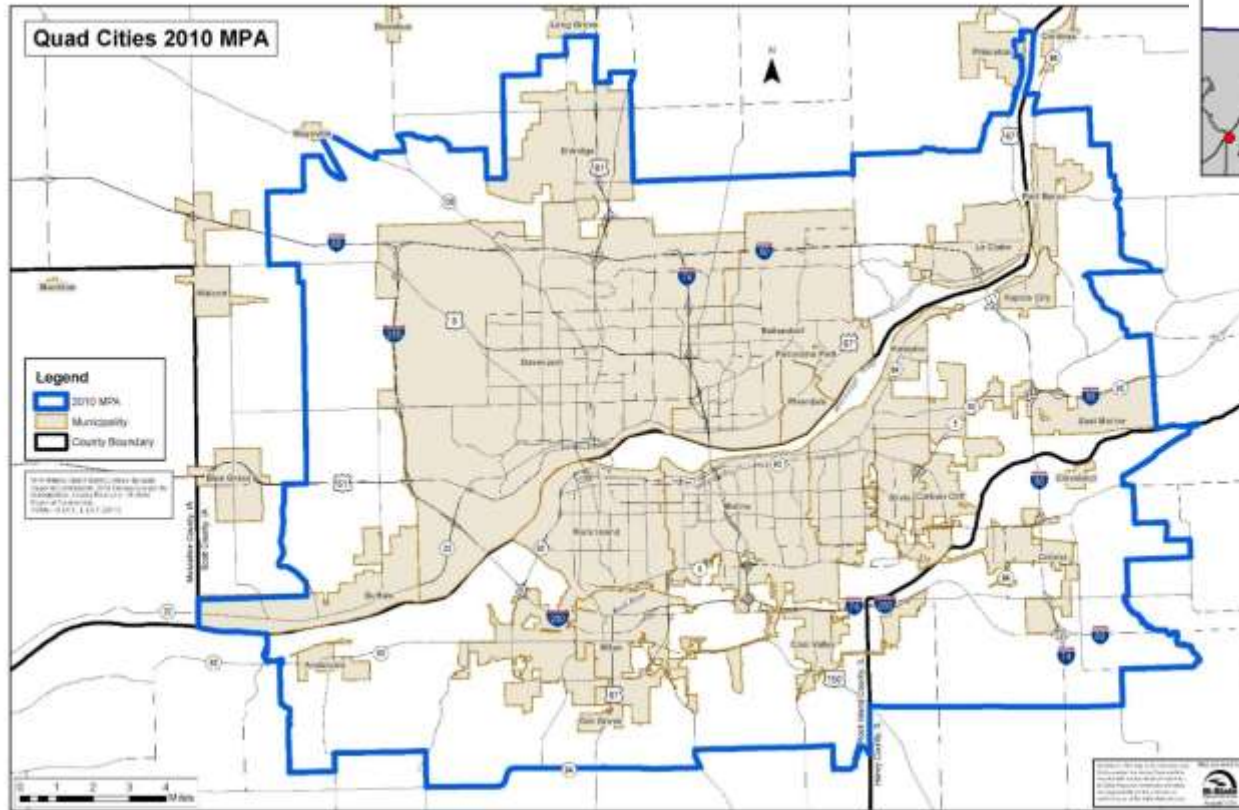
# Purpose of the Grant

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- Conduct vulnerability assessment
- Determine strategies to mitigate impacts



# Quad Cities, Iowa/Illinois



**5 Mississippi River Bridges +  
Rock River Crossings**

**4 Interstates, 5 U.S. Highways,  
10 State Highways**

**3 Railroads – Class I & II**

**24 Barge Terminals**

**2 Locks/Dams**

**3 Public Transit Systems  
+Multiple On-Demand Private  
Providers & Taxis Services**

**2 Airports**

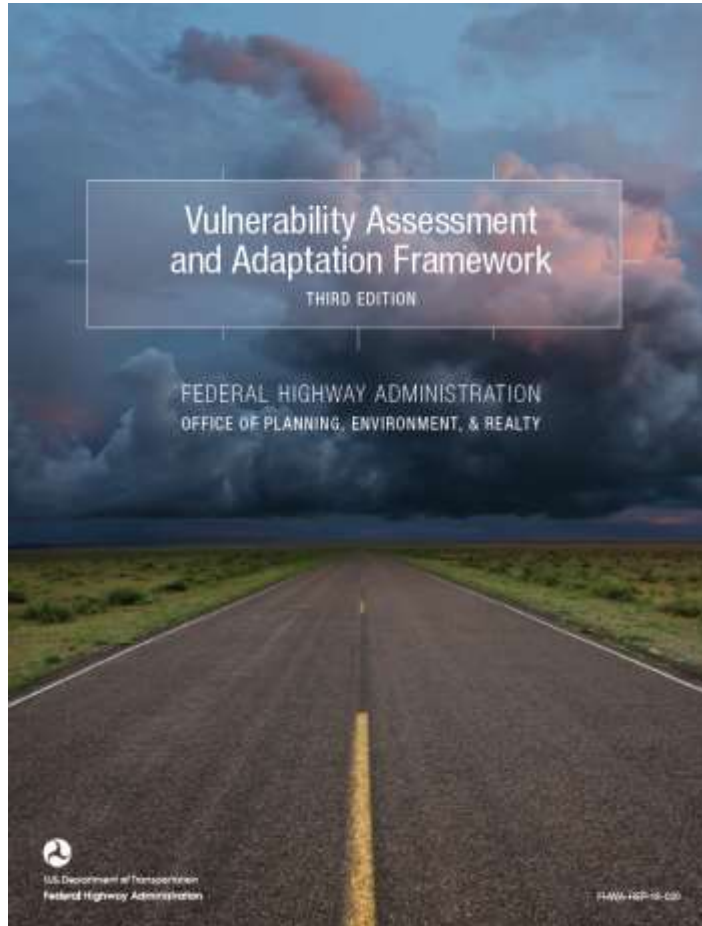
**2 National Trails**





# Vulnerability Assessment

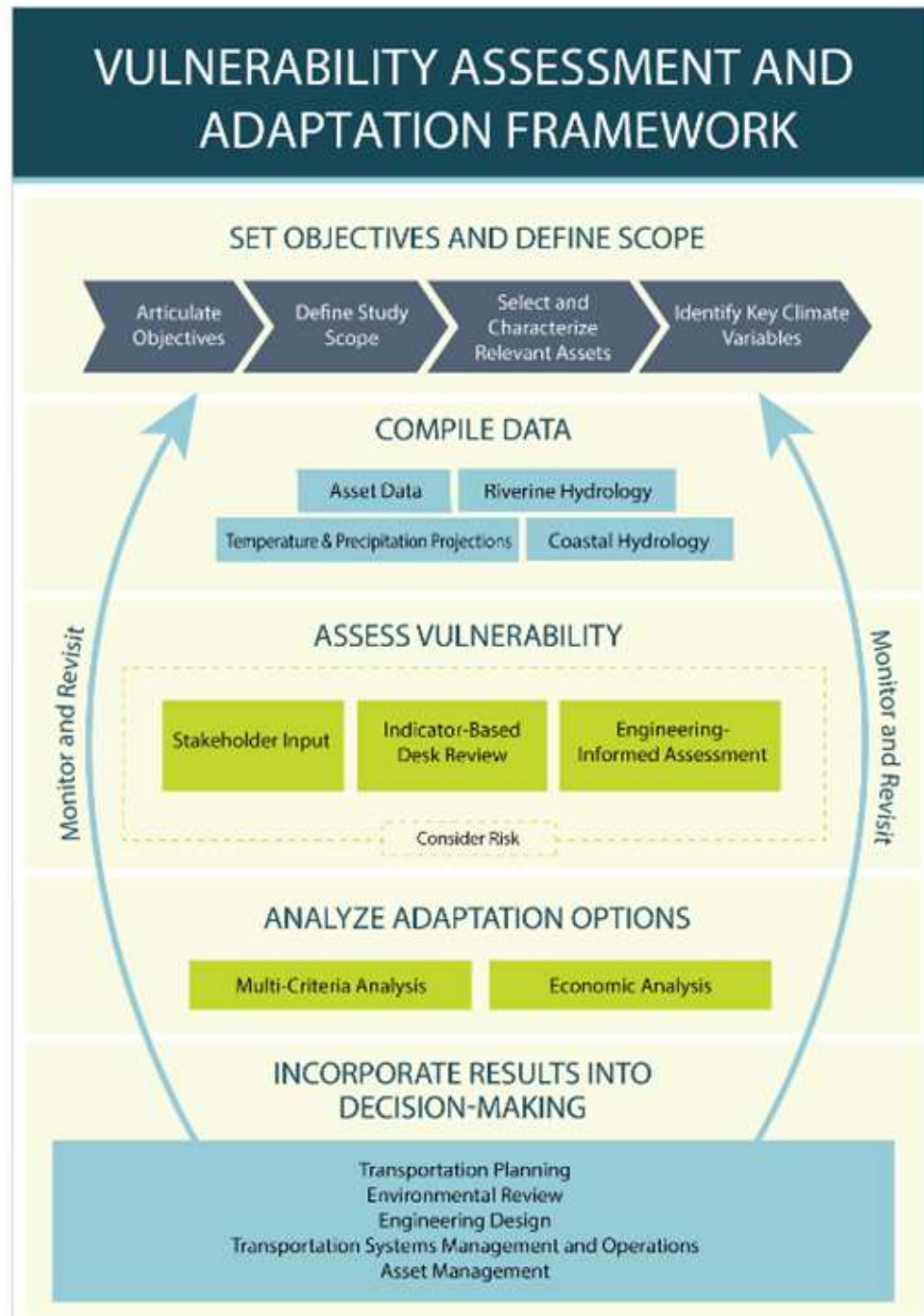
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- Structured process
- Ways to use results in practice
- Examples from other similar projects
- Links and references to related resources and tools

# Project framework

- Develop an Advisory Committee
- Secure data
- Access vulnerability and adaptation options
- Determine priorities and opportunities to incorporate adaptation
- Integrate assessment



# Stakeholders

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## Environmental/Other

- NOAA-NWS, State Climatologists
- Corps of Engineers, NRCS, DNR/IEPA
- Industry, Health Depts., Universities



## Transportation

- FHWA, State DOTs, County & City Engineers/Planners, EMAs
- Transit, Railroads, Airports, Trails Interests



## Policy and Adaptation

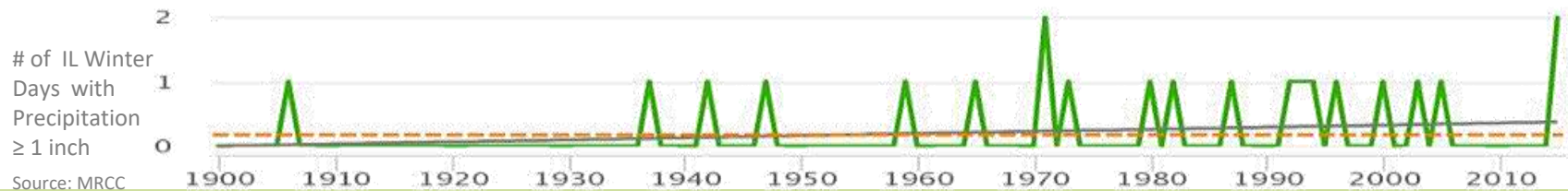
- Planning Advisory Group
- Transportation Technical and Policy Committees



# Summary of data trends

- FEMA Flood Risk Report
- CMIP Climate Data Processing Tool
- National Climatic Data Center
- FHWA, IL DOT, IA DOT
- Midwest Regional Climate Center
- US Geological Survey
- National Weather Service

- Increased variability
  - Floods, tornadoes, storms
- Increased precipitation
  - Frequency
  - Volume
- Increased disruptions for transportation networks
  - Impacts CAN be reduced through adaptive actions

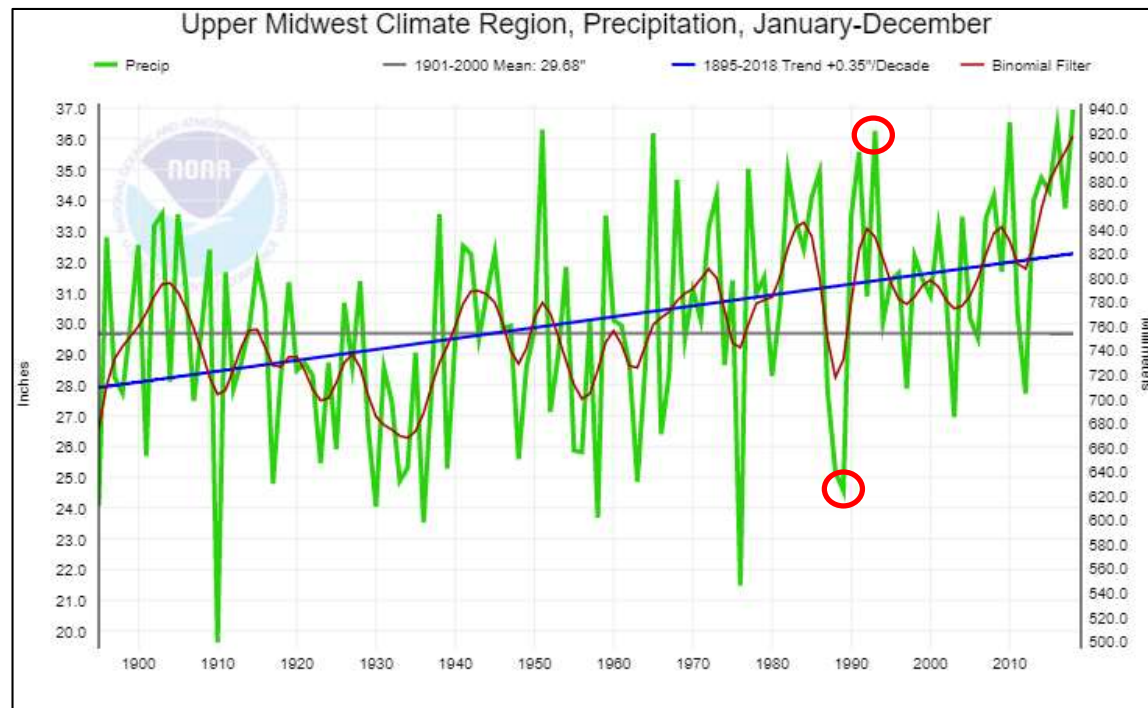


# Variability vs. Trend and Extremes

Trend

Variability

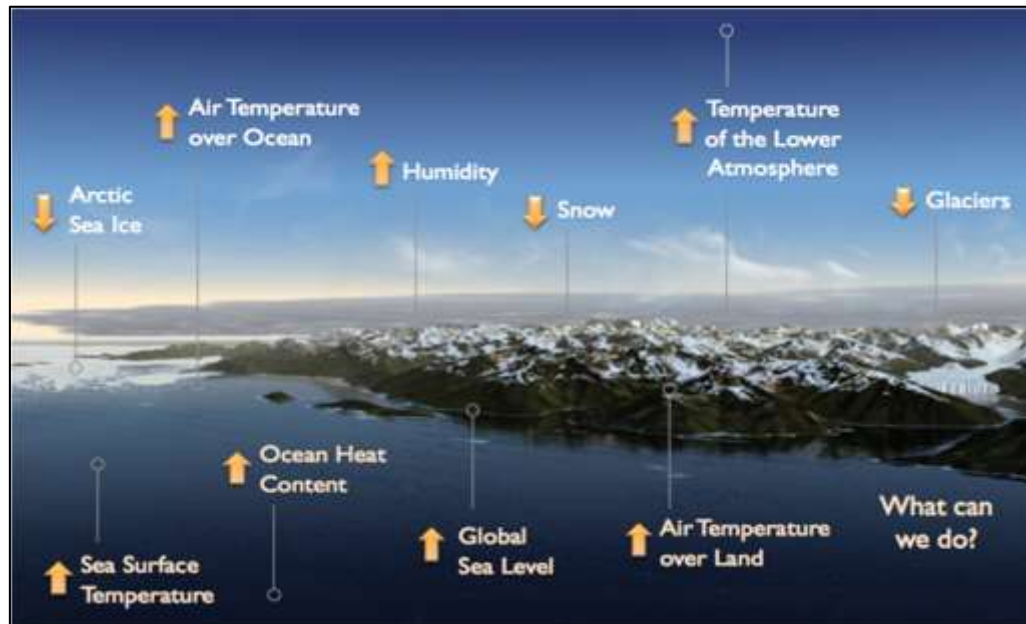
Extremes



# Climate Change (Trend)

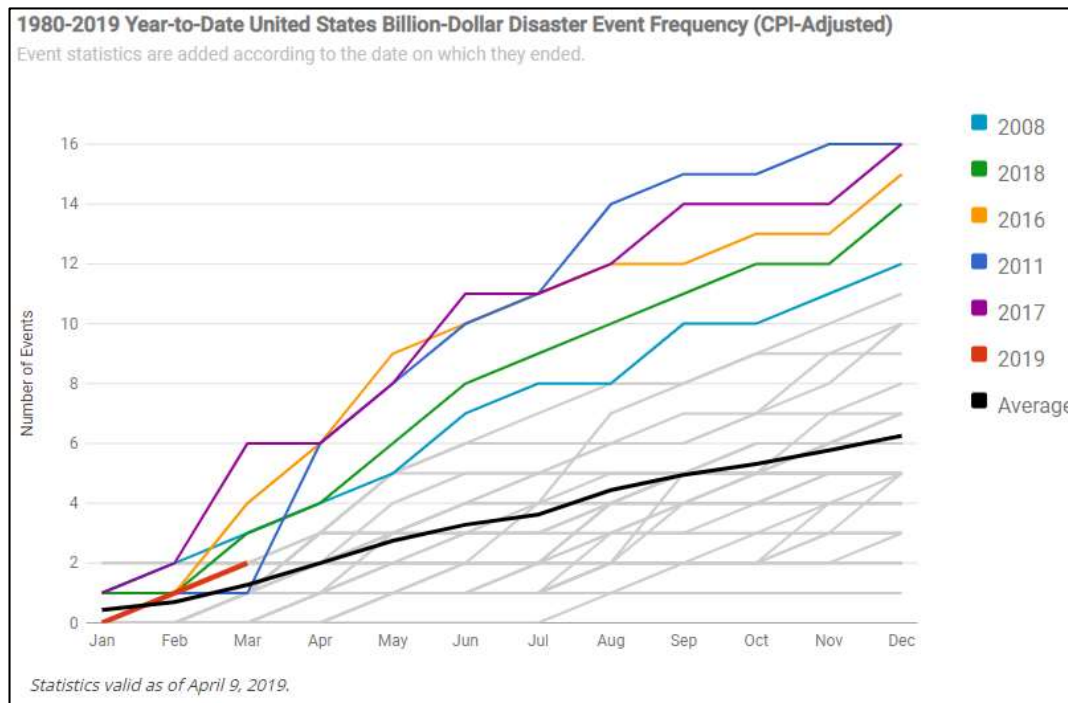
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Need to acknowledge and consider in planning. The rules of the game are changing now.



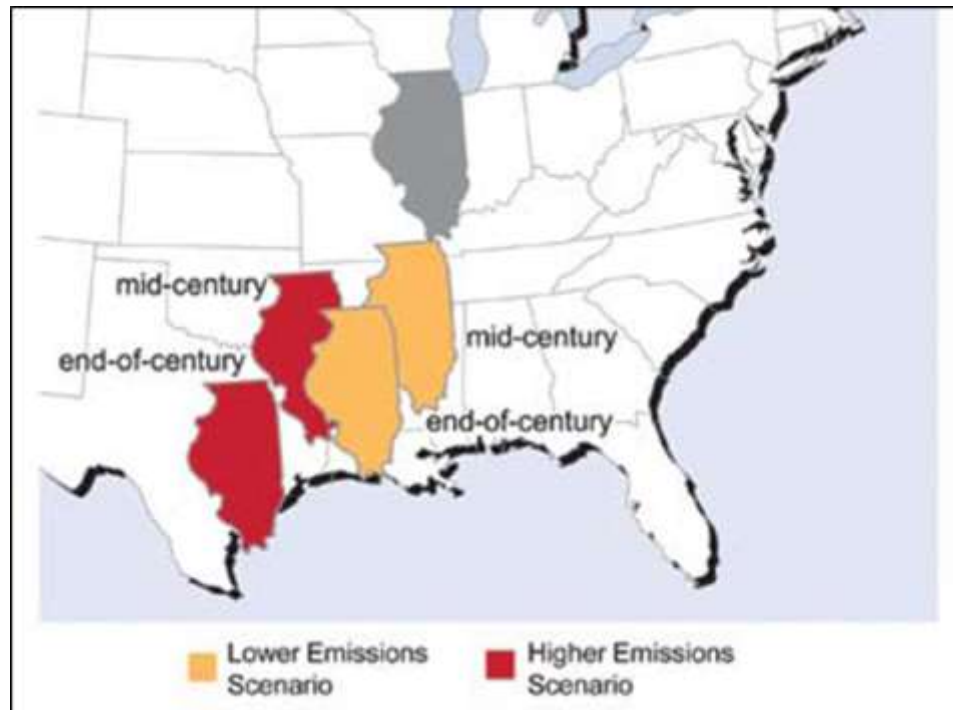


# Billion-Dollar Disasters



# Future Climate

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# Hazards today and in the future

Heat

Flood, river and flash

Drought

- Wildfires (rare)

Winter Storms

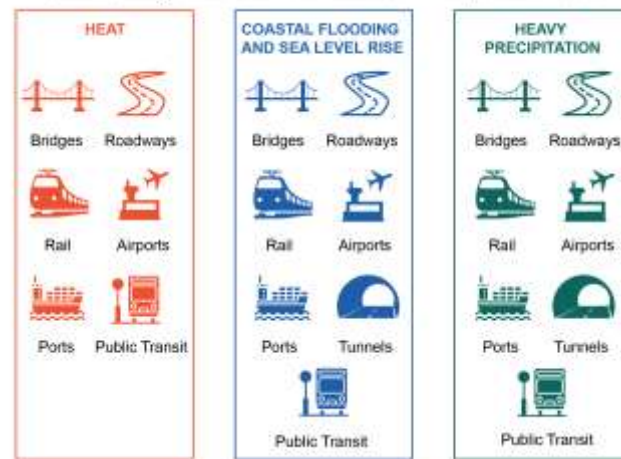
Severe weather

- Tornadoes, hail, damaging wind

Hurricanes? Coastal Flooding?

***These are confounded with an increase in social vulnerability.***

Climate Change and Notable Vulnerabilities of Transportation Assets



National Performance Goals at Risk



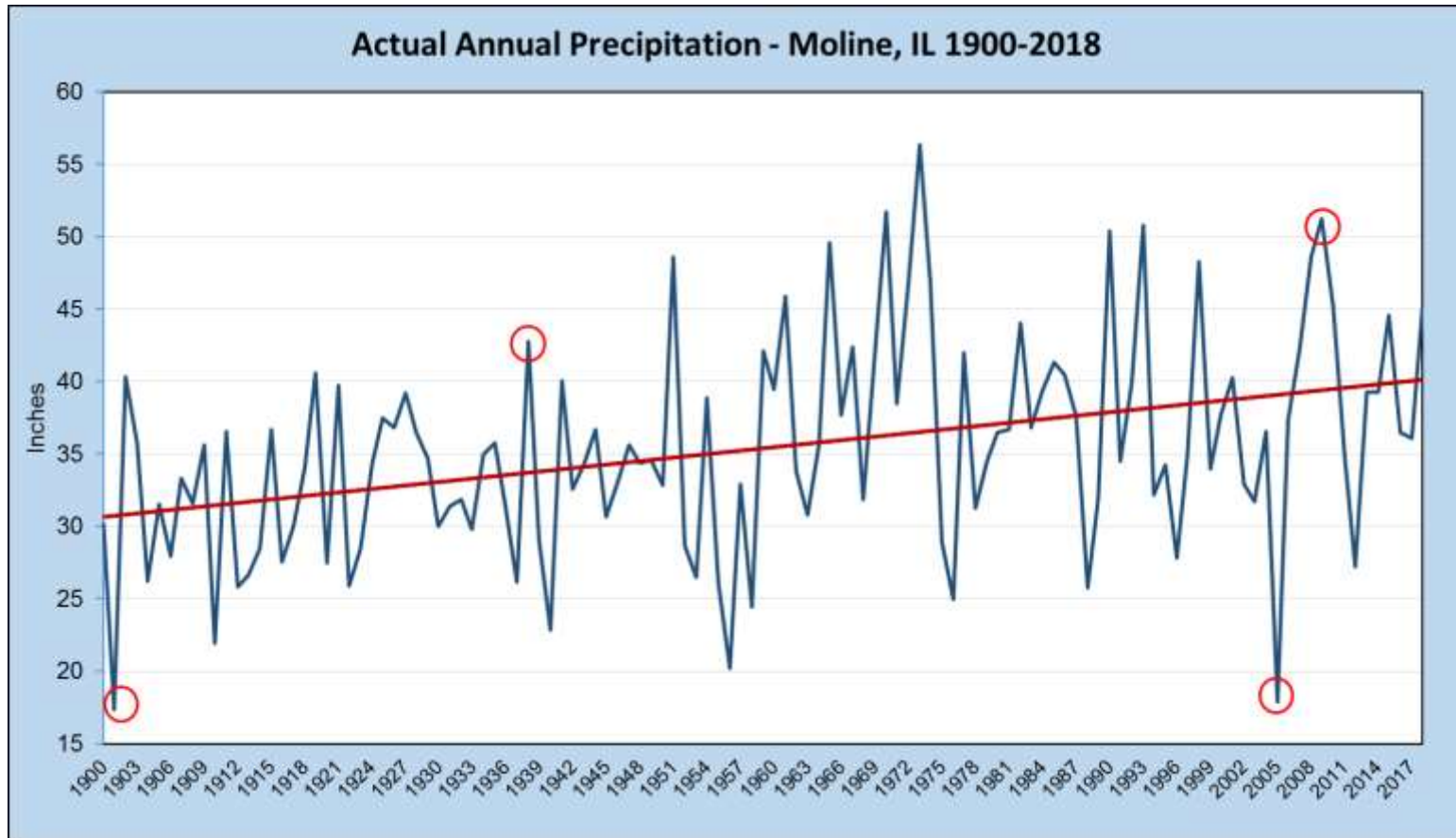


# Extreme weather in the Quad Cities

- River flooding
- Flash flooding
- Combined storms
  - Hail
  - Lightning/thunder
  - High winds
- Severe winter storm
- Extreme heat
- Tornadoes



# Local Trends 1900-2018







### Record Crests

22.70 ft on 5/2/2019 1<sup>st</sup>  
22.63 ft on 7/09/1993 2<sup>nd</sup>

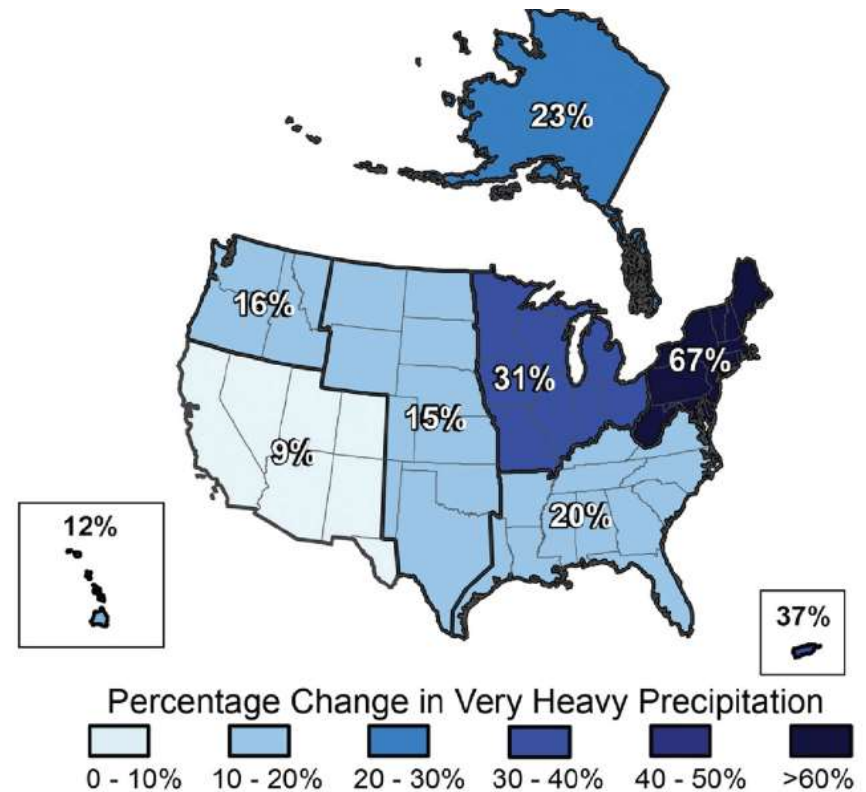
### Records for Consecutive Days above Flood Stage

96 days: 2019 – 3/15 to 6/18  
43 days: 2011 – 3/29 to 5/10

# Data sharing

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- City inundation data?
- Storm surge backup on the Mississippi?
- Late season floods?
- Straight line winds?
- Main routes that have underground power lines?
- Extreme heat?
- Other?



Source: Climate Change Impacts in Iowa: Report to the Governor and Assembly, 2010



# Prioritizing Assets

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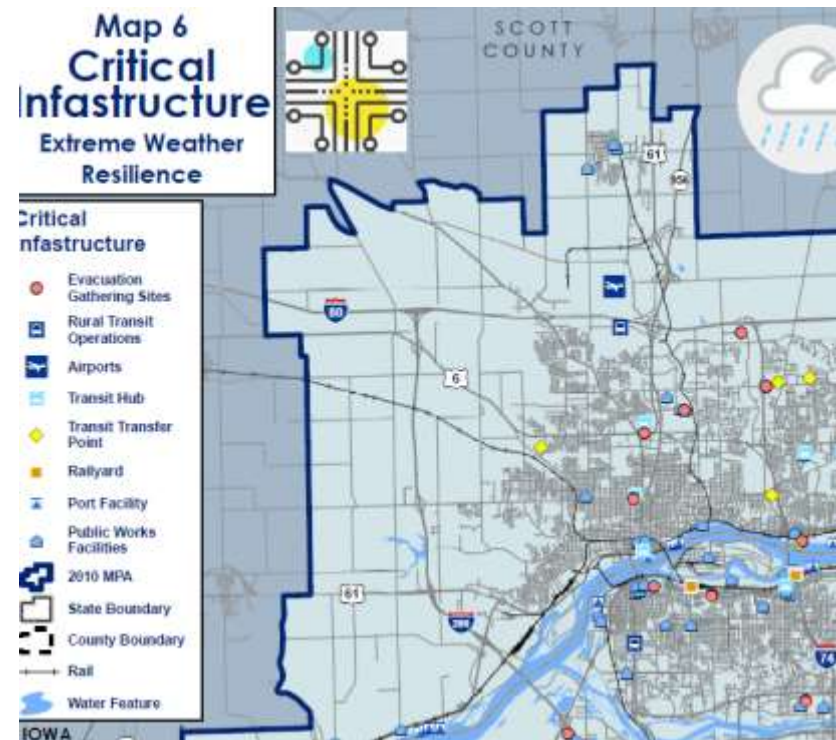
**Criticality assessment** = involves identifying the most critical elements of the transportation system for analysis, using quantitative and qualitative data.

**Vulnerability assessment** = what critical facilities/infrastructure are more vulnerable to disruptions or likely to be impacted by extreme weather, now and in the future?

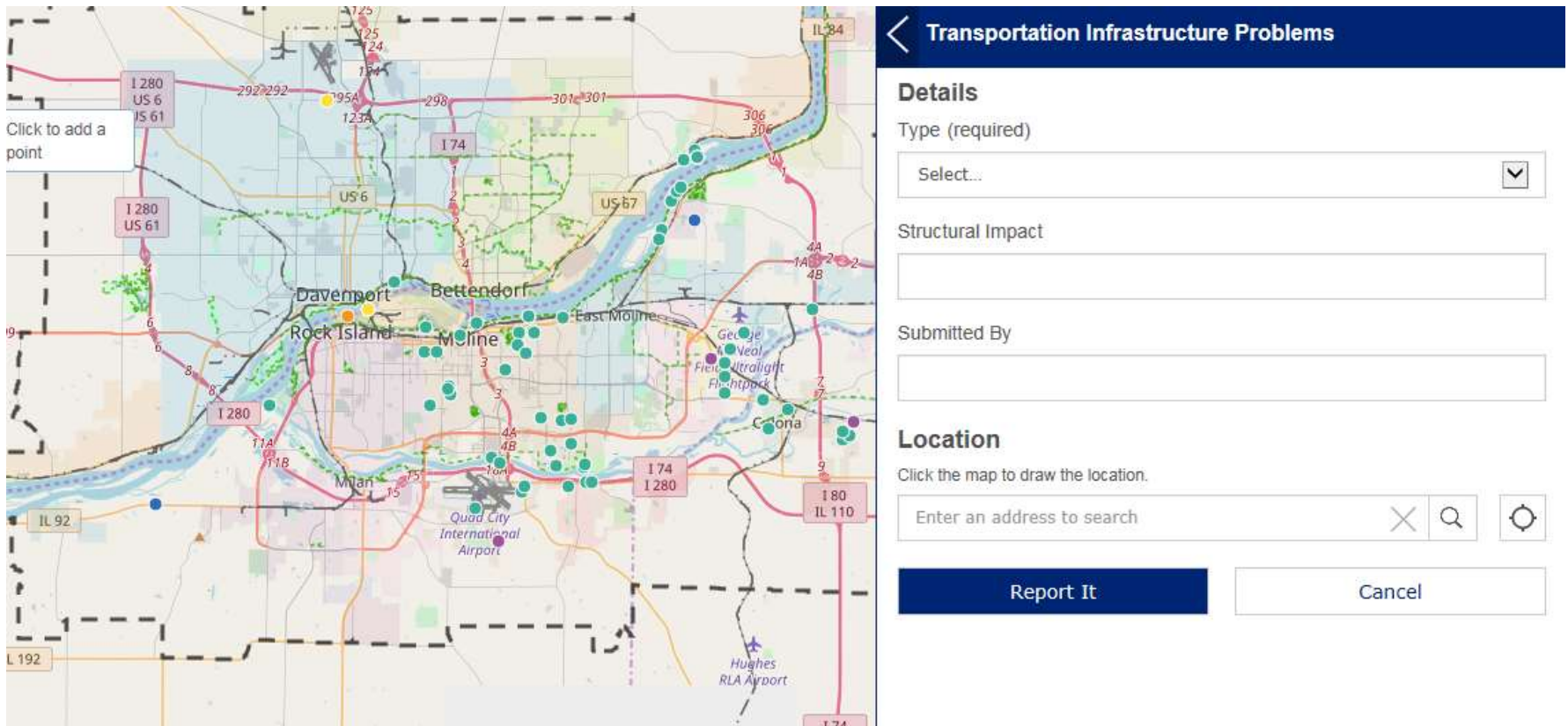
**Adaptation options** = strategies that can increase resilience of the regional transportation system.

# Critical Infrastructure & Facilities

- Evacuation gathering sites
- Public works facilities
- Transit hubs
- Transit transfer points
- Rural transit operations
- Airports
- Port facilities
- Railyard



# Stakeholder Survey & Interviews



The image shows a web application interface for reporting transportation infrastructure problems. On the left is a map of the Quad City area, including Davenport, Bettendorf, Rock Island, Moline, East Moline, and East Troy. The map displays major roads like I-280, US-6, and US-67, and airports like Quad City International and George J. Neal. Numerous colored markers (green, blue, purple) are placed on the map, indicating reported problems. A text box on the map says "Click to add a point".

On the right is a form titled "Transportation Infrastructure Problems". The form has a dark blue header with a back arrow and the title. Below the header is a "Details" section with a "Type (required)" dropdown menu (currently showing "Select..."). Below that is a "Structural Impact" text input field. Below that is a "Submitted By" text input field. Below that is a "Location" section with the instruction "Click the map to draw the location." and a search input field "Enter an address to search" with a clear button (X), a search button (magnifying glass), and a location selection button (location pin). At the bottom of the form are two buttons: a dark blue "Report It" button and a white "Cancel" button.

# Stakeholder Workshop

- Vulnerability assessment
- Adaptation options



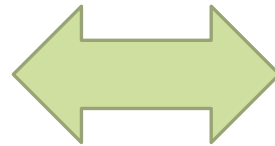


# Criticality Assessment

**Criticality assessment** = involves identifying the most critical elements of the transportation system for analysis, using quantitative and qualitative data.

Virginia DOT

Criteria	Data Source
Level of use	Traffic volume
Risk of flooding	Elevation relative to sea level
Special route locations	Maintenance priority routes & evacuation routes



North Jersey Transportation Planning Authority

Criteria	Data Source
Importance of destinations	Jobs and population density
Magnitude of connections	Traffic volume and ridership
Emergency routes	Evacuation routes

# Refining Criticality Criteria

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## **Stakeholder & Transportation Technical Committee Input**

**What is critical to our  
region's transportation  
system?**

- High use areas/routes
- Land use/destinations of importance
  - i.e. RI Arsenal, densely populated areas
- Mississippi River crossings
- Medical/emergency routes
  - i.e. hospital access
- Redundancy throughout network
- Economic vitality
  - i.e. access to large employers

# Data Input for Weighted Sum Overlay Analysis

## Bridges (AADT)

Manual Classification

< 1,000	1
1,001 – 10,000	2
10,001 – 25,000	3
25,001 – 40,000	4
> 40,000	5
Pedestrian access bridge	1

## IL Roadways (AADT)

Natural Breaks Classification

500 - 4,250	1
4,251 – 9,400	2
9,401 – 17,900	3
17,901 – 32,600	4
32,601 – 69,700	5

## IA Roadways (AADT)

Natural Breaks Classification

500 - 3,520	1
3,521 – 8,900	2
8,901 – 17,100	3
17,101 – 30,000	4
30,001 – 72,000	5

## Access to Critical Facilities

All access road segments 5

## Access to Major Employers

All access road segments 1

## Bettendorf Transit (Ridership)

Natural Breaks Classification of Avg. Weekday Ridership

0 – 76	1
77 - 95	2
96 - 111	3

## Davenport Transit (Ridership)

Natural Breaks Classification of Avg. Weekday Ridership

0 – 110	1
111 - 186	2
187 - 302	3

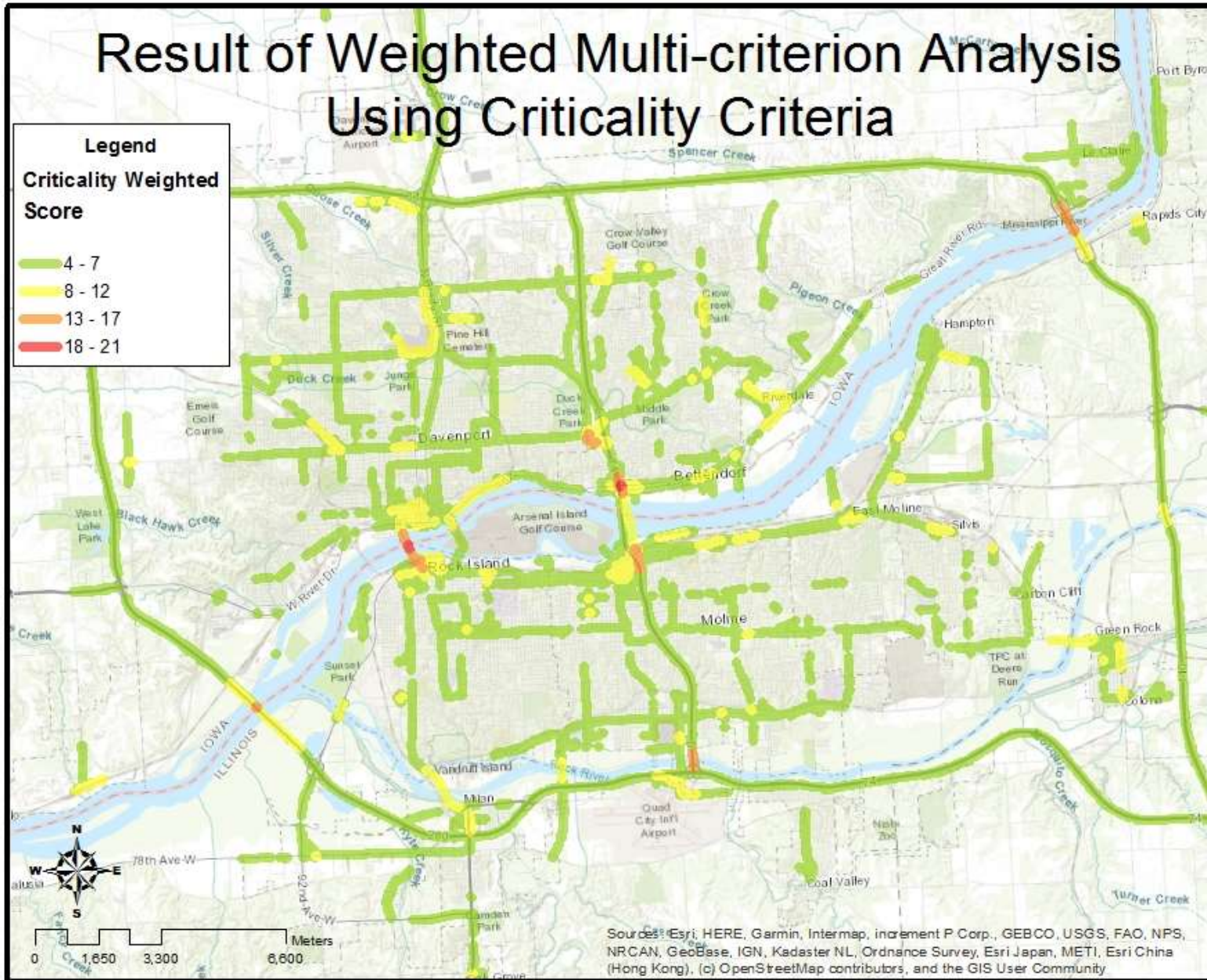
## MetroLink Transit (Ridership)

Natural Breaks Classification of Avg. Weekday Ridership

0 – 634	1
635 – 1,545	2
1,546 – 2,518	3



# Result of Weighted Multi-criterion Analysis Using Criticality Criteria



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



# Criticality & Stakeholder Identified Vulnerability Areas

**Legend**

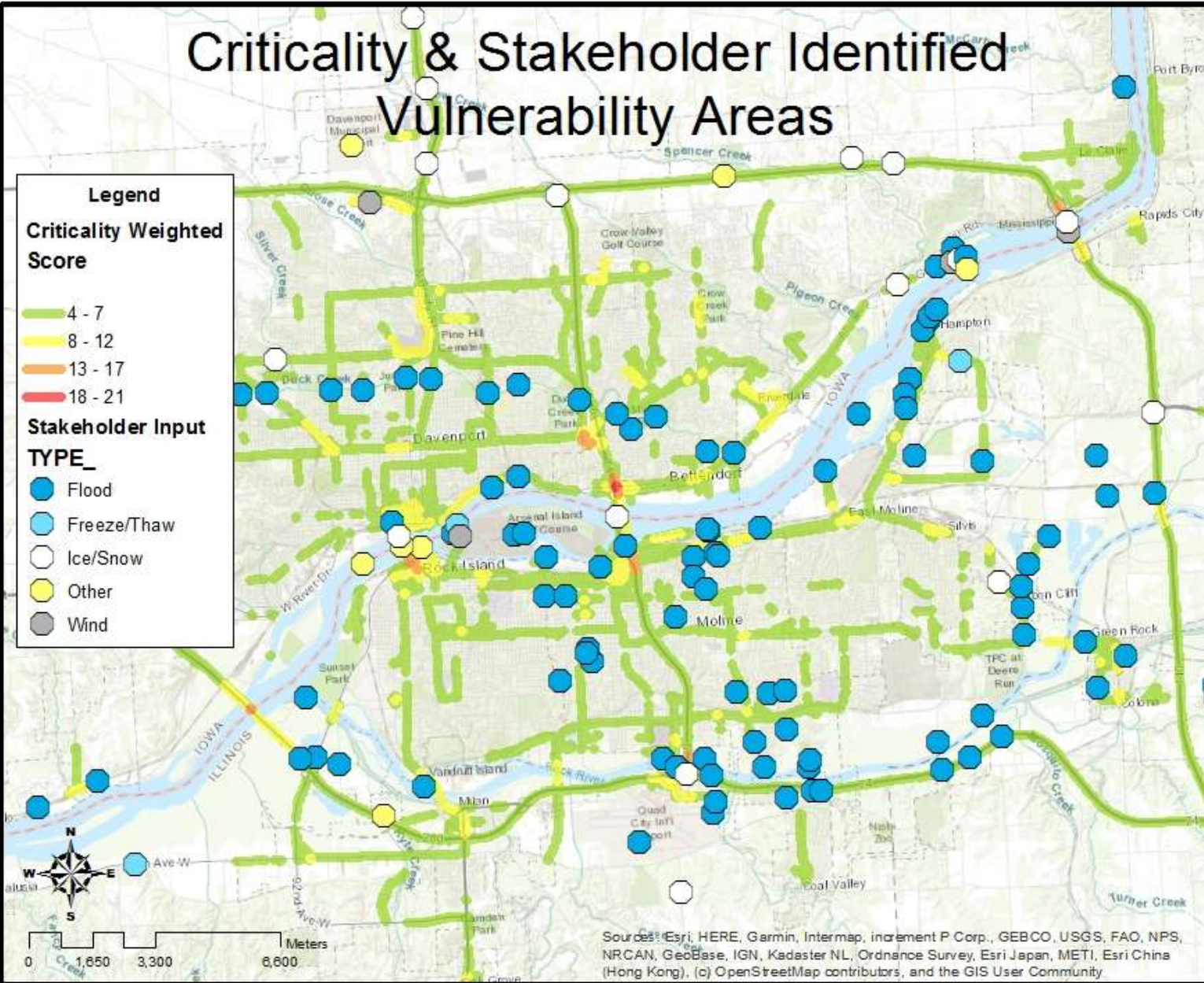
**Criticality Weighted Score**

- 4 - 7
- 8 - 12
- 13 - 17
- 18 - 21

**Stakeholder Input**

**TYPE\_**

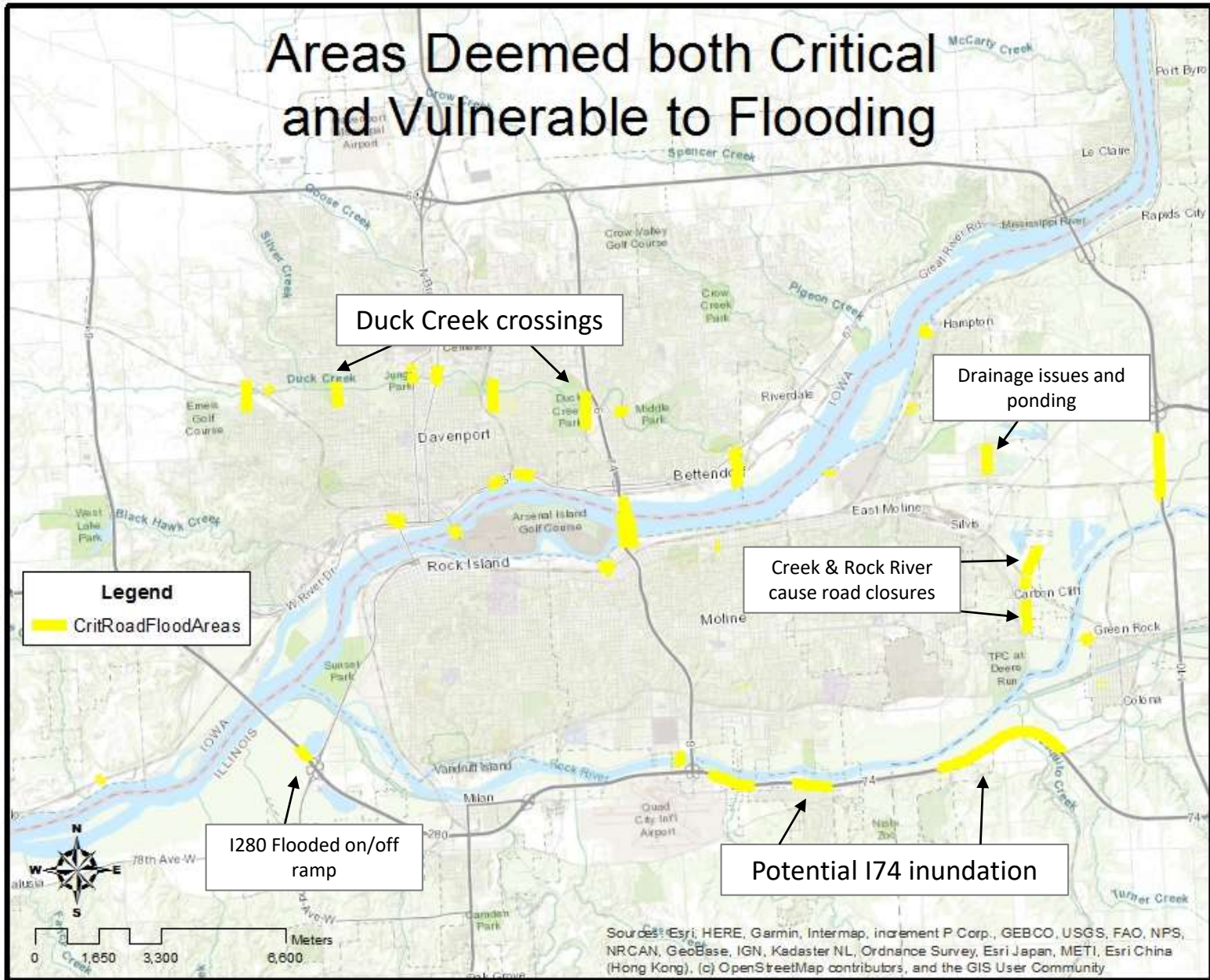
- Flood
- Freeze/Thaw
- Ice/Snow
- Other
- Wind



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



# Areas Deemed both Critical and Vulnerable to Flooding





# Focus for Adaptation Options Prioritization

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- Most at-risk
  - Corridors
  - Hot spots
- Already Planned Projects
- Asset by State or Jurisdiction
- Combination

Priority Segments for Adaptation Options Review



# Review Priorities by Potential Solutions

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## Advisory

Intelligent Transportation System (ITS)

Motorist alerts

Communication & Outreach Plan

Road side active warning systems

## Control

Variable speed limits

Vehicle restrictions

Route restrictions

Road-surface treatments

## Treatment

Green infrastructure

Levee construction (traditional and living)

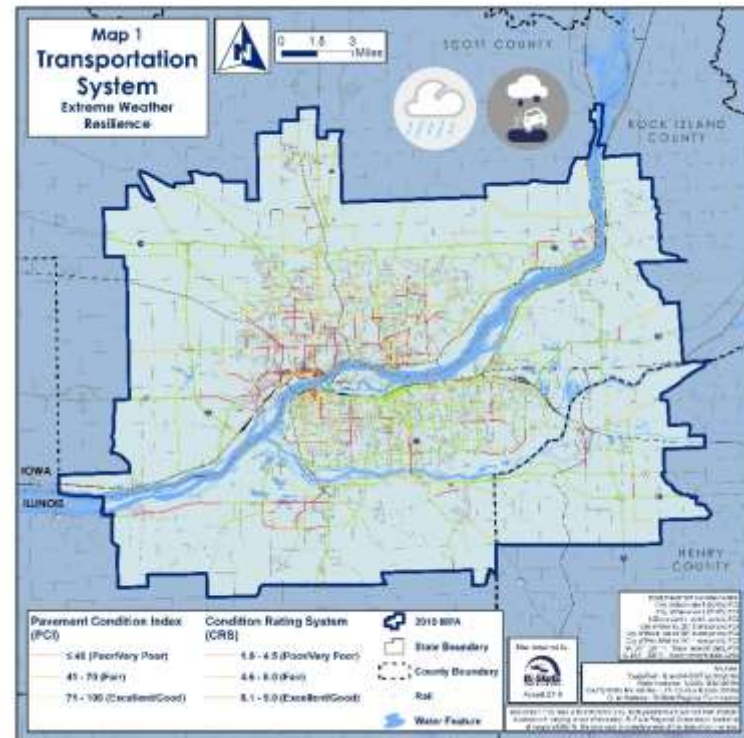
Culvert sizing

Road/bridge elevation

(Asam et. al., FHWA, 2015)

# Other *Policies and Procedures*

- Climate and emissions policies
- Emergency Management
- Mitigation Measures
- Disinvestment
- Solutions with co-benefits
- Environmental Justice and Equity



# Incorporating into Transportation Planning Process

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## L RTP

### Extreme Weather Resilience Objective

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- Develop objective for L RTP – policy statement
- Incorporate Adaptation Priorities in chapters
- Consider resilience review for planned projects

## TIP

### Resilience Discussion & Project Selection

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- Recognize resilience in TIP – use environmental maps to highlight vulnerabilities
- Review selection criteria to incorporate resilience

## Technical Asst.

### Resilience in Project Development Process

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- Write grants for priority resilience projects
- Work with local jurisdictions during project development process to incorporate adaptation options into project development



# Next Steps & Lesson Learned

Priorities and  
Opportunities for  
Adaptation

+

Integrate Results &  
Recommendations

## Jun.-Sep. 2020

- Criticality Mapping Analysis - Finalize
- Adaptation Strategies Draft to MPO Technical Committee and Advisory Committee
- Draft Resilience Study Report & Recommendations for the LRTP
- Final Report to FHWA

## Lessons Learned – Peer Exchange

- Growing Staff Capacity in Climate
- Data Integration
- Valuing Resilience
- Proactive Collaboration
- Mainstreaming Resilience
- Resilience Informed Planning

# Questions?

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# Lessons Learned in Economic Resilience Planning



**In the Houston-Galveston Region**













# Questions

- How well is the 13-county H-GAC Region positioned to withstand and prevent disruptions?
- What are the SWOT's at the regional and local level for the region's urban, suburban and rural areas?
- What are the current best practices in the region and elsewhere?
- What resources are available to assist communities?



# **Planning Process**

Economic Resilience Literature Review

Survey of Plans and Initiatives

Vulnerability Analysis

County-Level Workshops





# Economic Resilience Literature Review

## economic resilience

### *EDA definition*

Economic resilience is the ability to withstand and prevent disruptions to the economy.



# Survey of Plans and Initiatives

- Economic Development Strategic Plans
- Comprehensive Plans
- Hazard Mitigation Plans
- Capital Improvement Plans



# Vulnerability Analysis

- Past Disasters
- Hazard Mitigation Plan Priorities
- Vulnerable Populations
- Growth/Land Use Forecasts

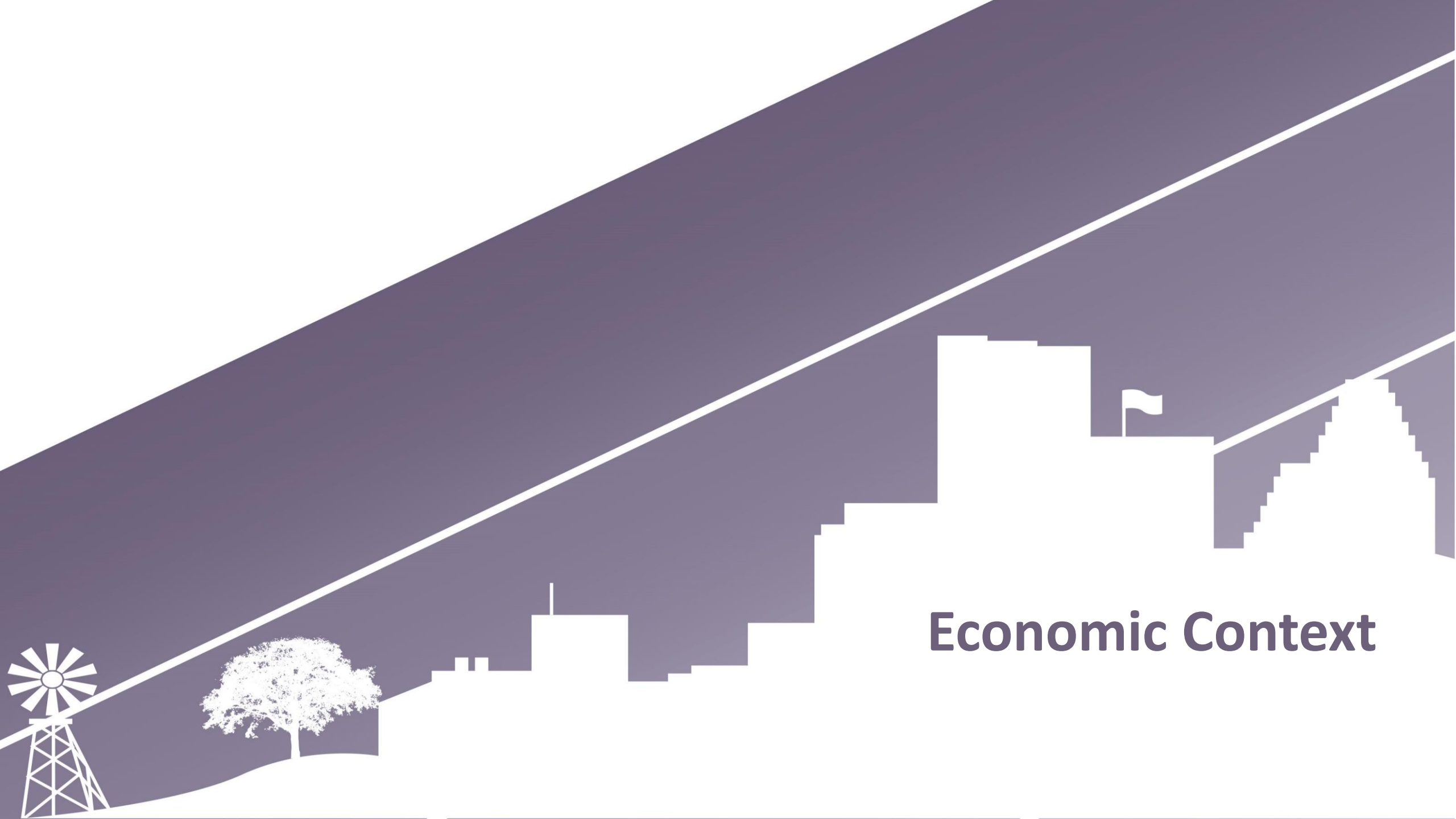


# County-Level Workshops

- Presented Socio-Economic Data
- Hazard Mitigation Plan Priorities
- Economic Development Goals/SWOT
- Areas for Collaboration







# Economic Context

  
**ConocoPhillips**

  
**Marathon Oil**

 Enterprise Products  
Partners L.P.

 **PLAINS**  
ALL AMERICAN  
PIPELINE, L.P.

**HALLIBURTON**

**BAKER  
HUGHES**  
a GE company 

  
**NATIONAL  
OILWELL  
VARCO**

*Apache*

**KBR**

 **CenterPoint**  
Energy

**KINDER  MORGAN**

 **ENBRIDGE**

  
**CALPINE**  
NYSE:CPH

 **CAMERON**













# Plan Contents

- Big Ideas
- County Level Economic Resilience Profiles
- Case Studies
- Resources





## **KEEPING WATER WHERE IT BELONGS**



## **DEFENDING GREAT PLACES**



## **FUTURE PROOFING**



**KEEPING WATER WHERE IT BELONGS**



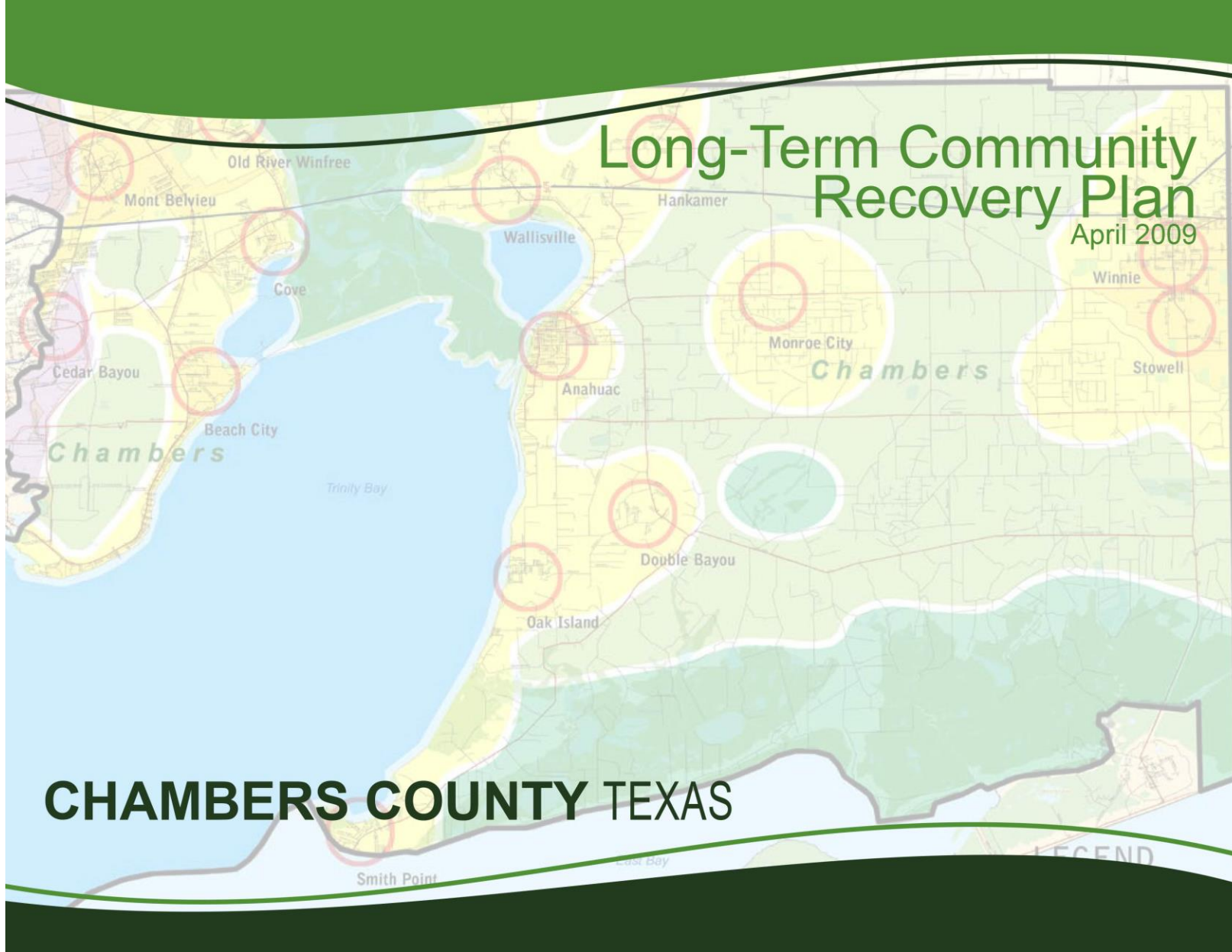




**KEEPING WATER WHERE IT BELONGS**







**KEEPING WATER WHERE IT BELONGS**





**KEEPING WATER WHERE IT BELONGS**







**DEFENDING GREAT PLACES**







# DEFENDING GREAT PLACES







**DEFENDING GREAT PLACES**





# Plan Linkages

Improved vehicular access and circulation

Provision of public places and civic spaces

Improved local and regional mobility

Reinforcing a Main Street Environment

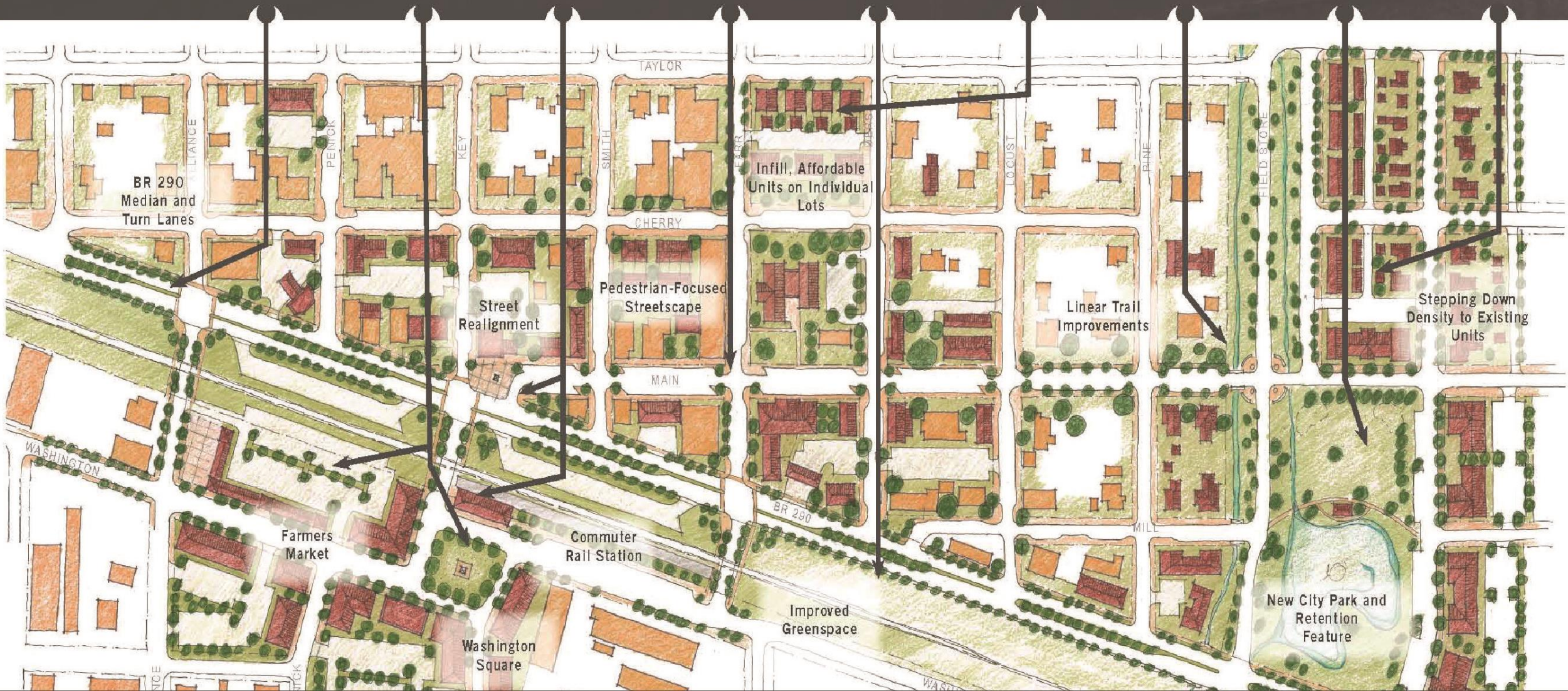
Enhanced community aesthetics

Housing choice offering affordable living options

Pedestrian-scaled and highly walkable development

Opportunities for community gathering

Effective transitioning to existing uses and neighborhoods



## DEFENDING GREAT PLACES







# FUTURE PROOFING







**FUTURE PROOFING**





**FUTURE PROOFING**







**FUTURE PROOFING**





# LIBERTY COUNTY ECONOMIC RESILIENCE PROFILE

## Contents

Liberty County Overview .....	90
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## Introduction

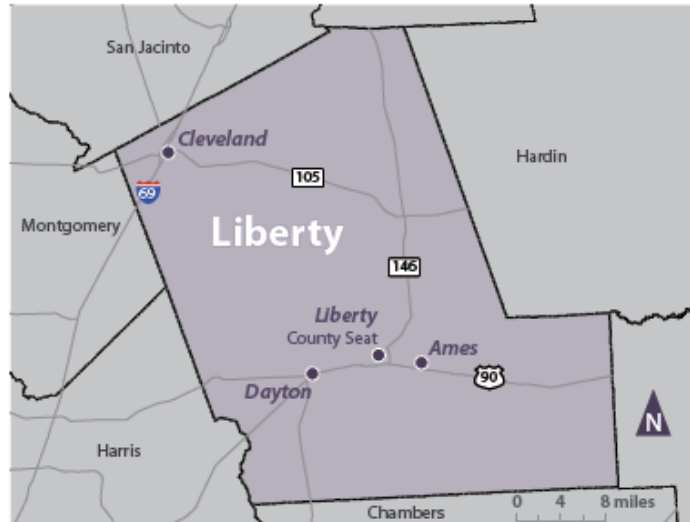
Economic resilience is the ability to withstand and prevent disruptions to the economy. The most common types of disruptions include downturns in the economy or in a key industry; the exit of a major employer; and natural or man made disasters.

Creating a resilient economy requires the ability to anticipate risk, evaluate how risk can impact economic assets, and build the capacity to respond to disruptions.

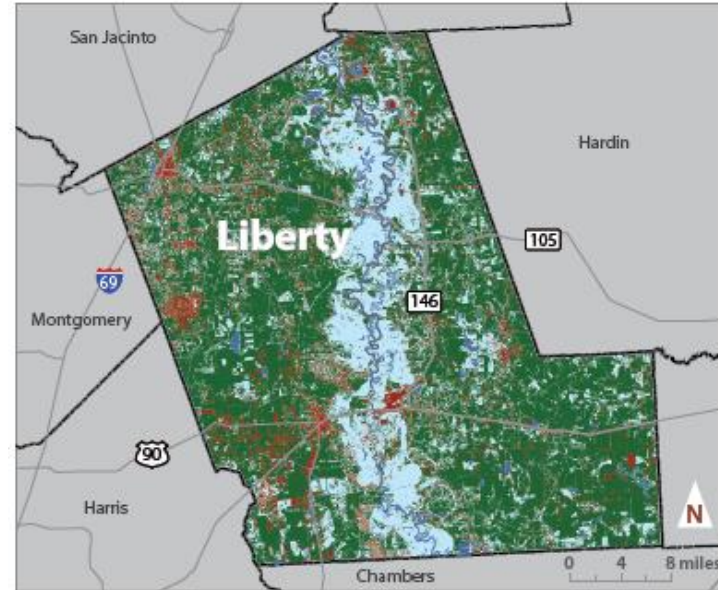
This profile is intended to provide an overview of the factors affecting the future growth, development and resilience of Liberty County and it's economy by providing key data points on the economy, demographics, and other useful information.

## Liberty County Boundaries

- Liberty County
  - Other counties
  - Top 4 cities
  - Major roads
- County Seat: Liberty  
Largest City: Liberty



## Land Use and Demographics



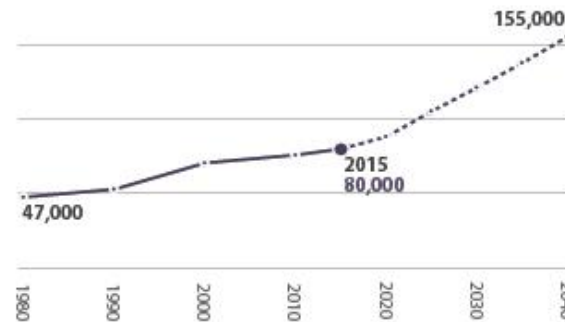
### Liberty County Land Use

- Other counties
- 1% Open water
- 8% Developed Land
- 32% Wetlands
- 60% Forest, shrubs, pasture, grasslands, barren lands and cultivated crops

Liberty County is bisected by the Trinity river, and the western half of the county is experiencing increased residential development.

## Population Growth Forecast

Liberty County grew by 69% from 1980 to 2015 and is expected to reach 155,000 residents by 2040.



## Municipal Populations

The City of Liberty is Liberty County's largest incorporated municipality.

- 9,175 Liberty
- 8,095 Cleveland\*
- 7,734 Dayton
- 1,093 Ames
- 1,054 Daisetta
- 885 Hardin
- 654 Plum Grove
- 615 Kenefick
- 486 Devers
- 267 North Cleveland
- 157 Old River-Winfree\*
- 100 Dayton Lakes
- 51,389 Unincorporated

\*The municipality spans multiple counties. Only the population residing in Liberty County is shown here.



# Leadership in Times of **CRISIS**

**A Toolkit for Economic Recovery and Resiliency**

**RESOURCES**





## USDA Rural Development: Summary of Major Programs

Download for more details  
on the resources available in  
Florida!

Download

### News & Resources

INVOLUCRANDO  
EMPRESAS  
PEQUEÑAS EN  
PREPARACIÓN  
PARA  
DESASTRES

#### New brochure in Spanish! ¡Nuevo folleto en español!

¿Por qué involucrar empresas pequeñas en continuidad comercial? Empresas pequeñas tiene una función crítica en la economía local porque proveen servicios y productos necesarios a ambos residentes y grandes empleadores. Después ...[\[more\]](#)

### Welcome

RestoreYourEconomy.org provides resources and best practice information for public and private stakeholders who are seeking to rebuild their local economies after an economic disruption, be it a natural disaster or man-made crisis, as well as assisting the business





# Questions

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