

# Adapting to Sea Level Rise



**11<sup>th</sup> Annual CZM Southern and  
Caribbean Regional Meeting**

**Jeff Taebel, FAICP**

**10.30.08**

# H-GAC Foresight Panel on Environmental Effects

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Dr. Philip Bedient  
Herman and George R. Brown  
Professor of Civil Engineering  
Rice University

Dr. Peter Bishop  
Professor of Future Studies  
University of Houston

Alan Clark  
Director, Transportation Planning  
Houston-Galveston Area Council

Dr. Robert Harriss  
President and CEO  
Houston Advanced Research Center

Dr. Neal Lane  
Malcolm Gillis University Professor &  
Professor of Physics  
Senior Fellow, Baker Institute  
Rice University

Dr. Barry Lefer  
Assistant Professor, Department of Geosciences  
University of Houston

Dr. Eugene Leong  
Consultant

Mike Talbott, P.E.  
Director, Harris County Flood Control District  
Harris County Public Infrastructure Department

Dr. Arnold Vedlitz  
Professor, Bob Bullock Chair in Government  
and Public Policy  
Director of the Institute for Science, Technology,  
and Public Policy  
Texas A&M University

# Panel Charge

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- Identify potential future climate effects, impacts on:
  - People and public services
  - Public infrastructure and the built environment
  - Ecosystems and water quality
  - Regional economy
- Recommend best practices for local governments to address these impacts

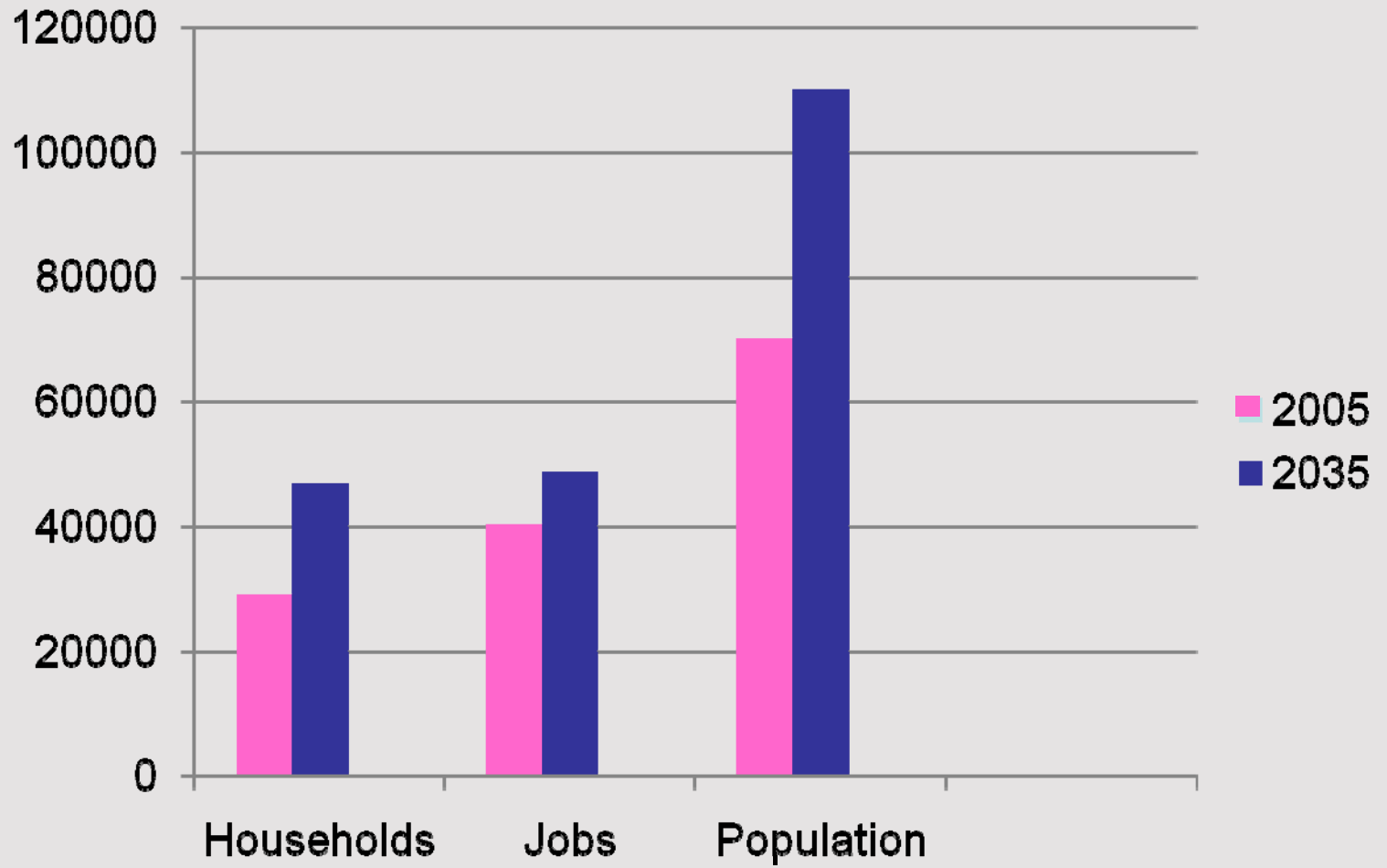


# Issues and Challenges

- Data
  - Model variations
    - Scope and time frames
  - What are the regional “on the ground” effects?
- Scenarios
  - Increased temperature
  - Flooding the 100-year floodplain
  - Sea level rise
  - Infrastructure and population impacts



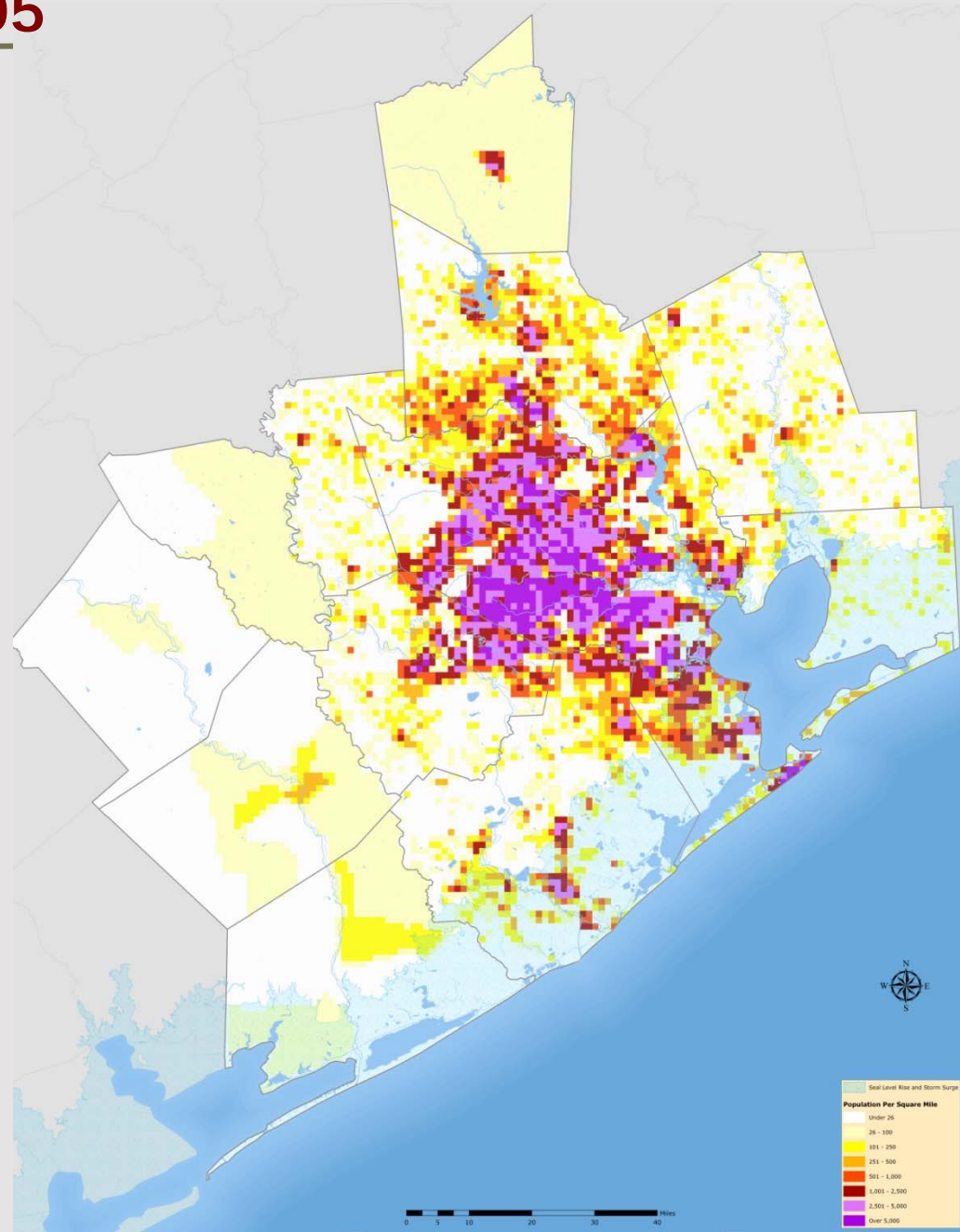
# Subject to 5' Sea Level Rise



# Population Impacted by 25' Sea Level Rise 2005



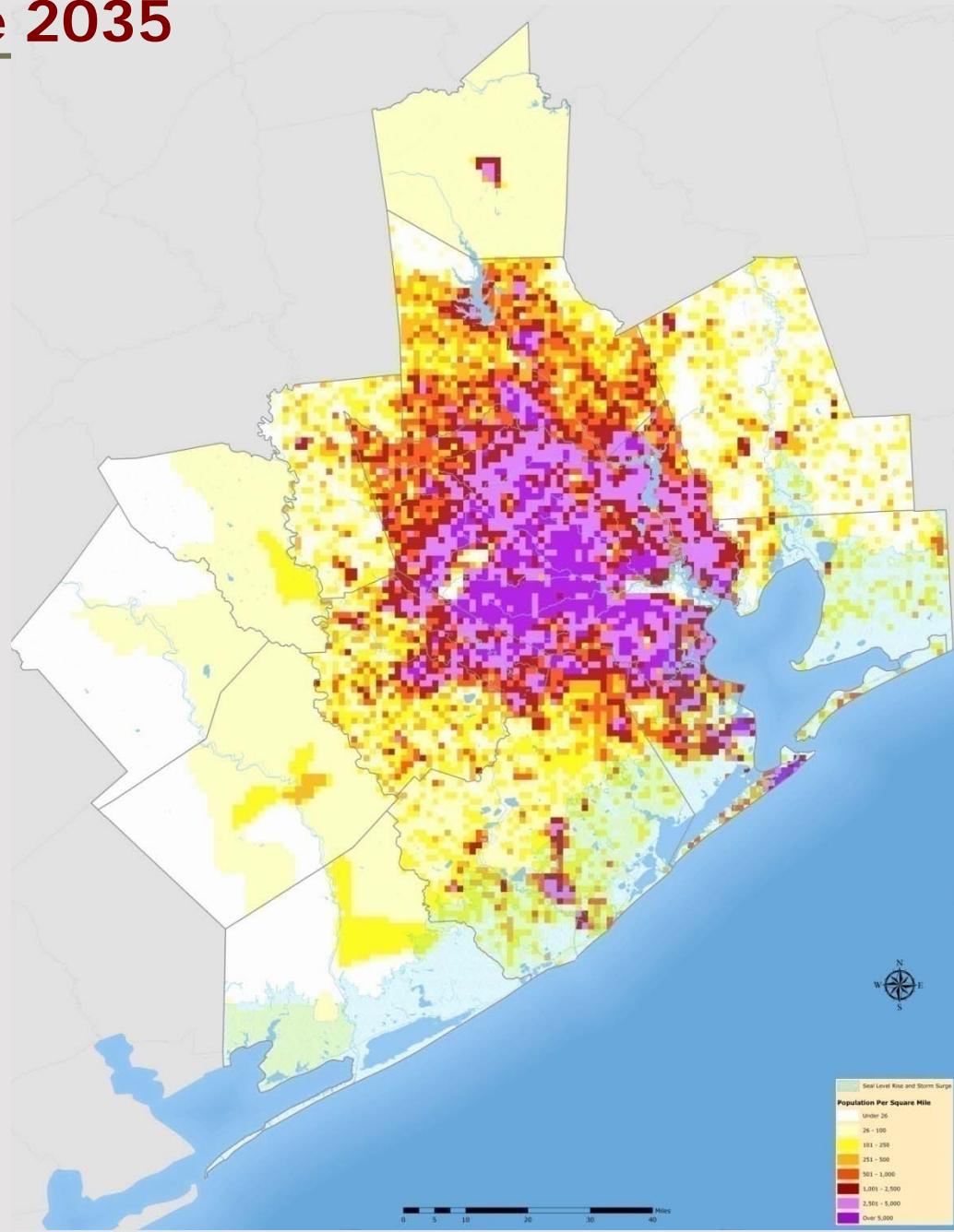
## Population Per Square Mile



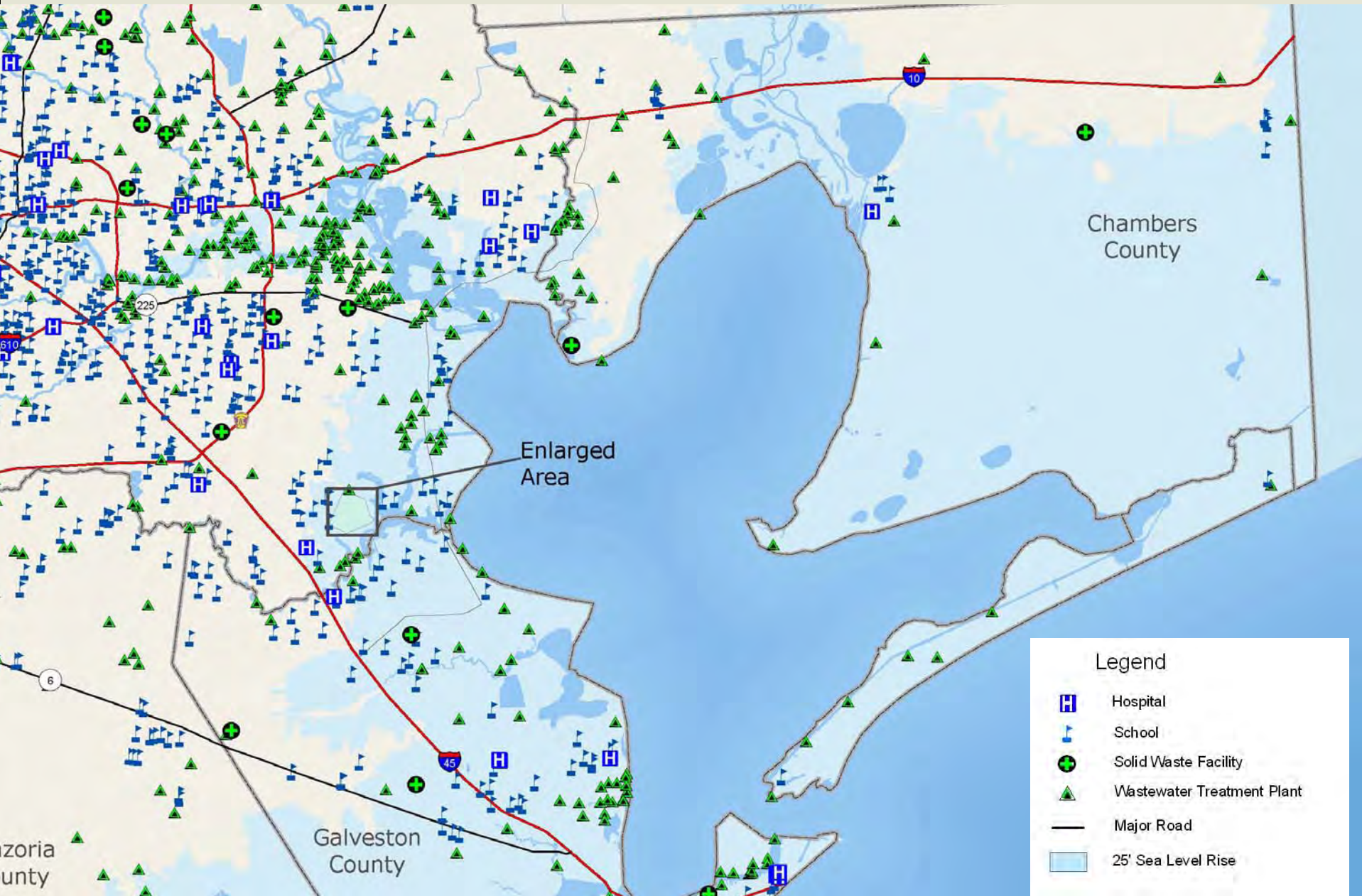
# Population Impacted by 25' Sea Level Rise 2035



## Population Per Square Mile



# Infrastructure Impacted by 25' Sea Level Rise





# Infrastructure Impacted by 25' Sea Level Rise - NASA



# Study Design Questions

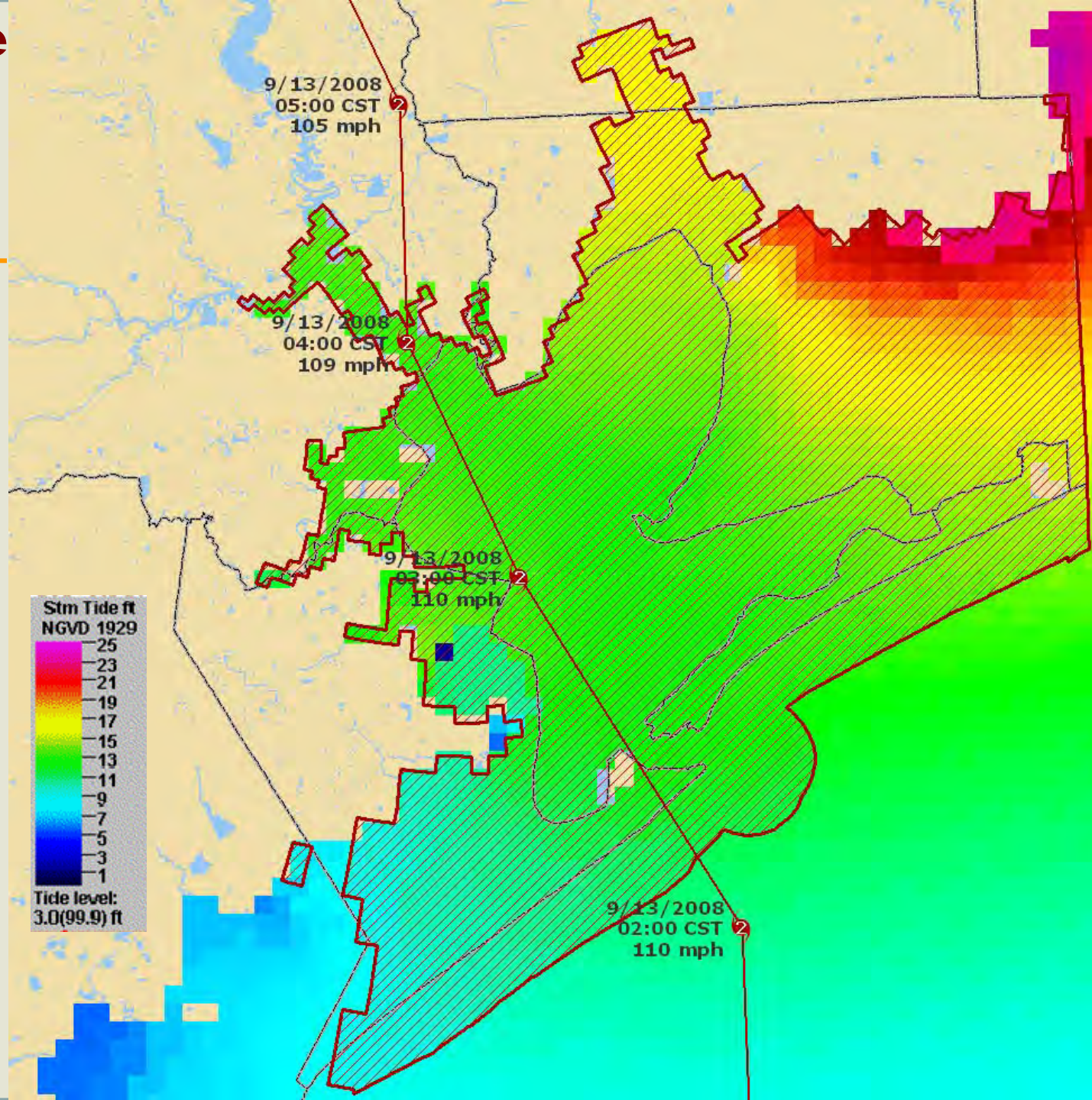
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- Destruction vs. temporary interruptions?
- Resiliency of potentially impacted areas?
- Secondary economic impacts?

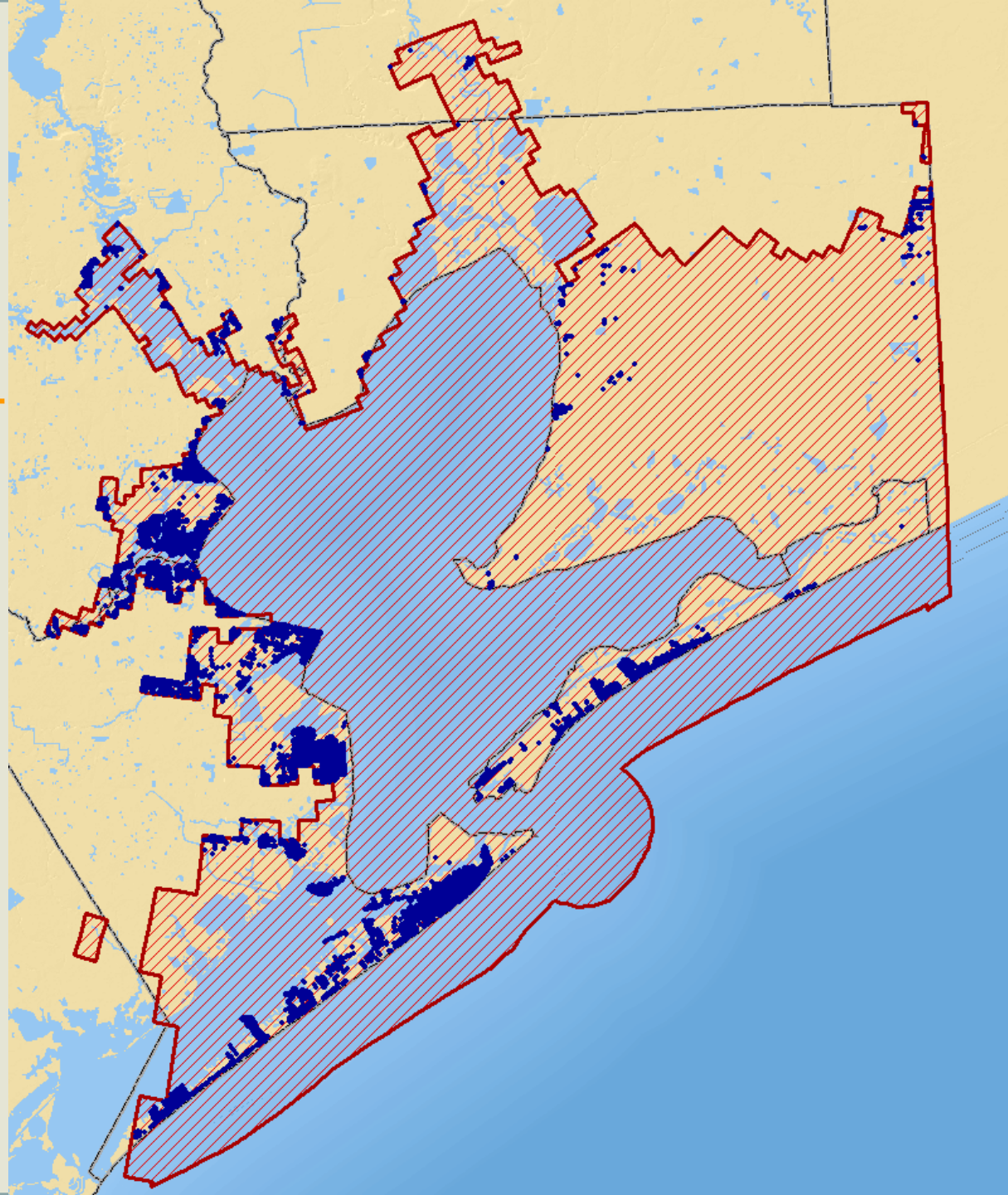


# Hurricane Ike Estimated Storm Surge

- Storm surge of 10 feet or more common in the Galveston Bay area
- Used extent of 10 foot surge as analysis zone

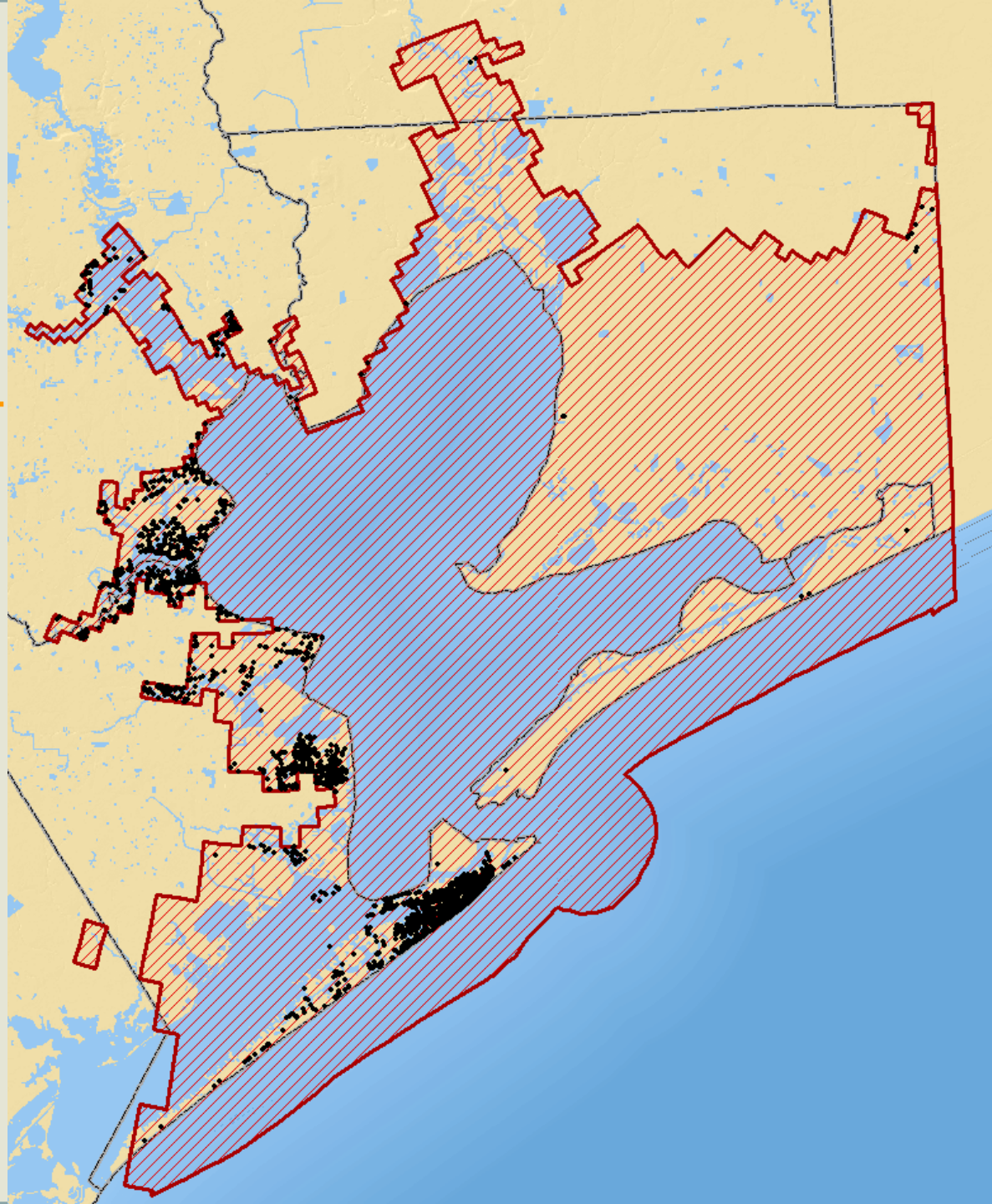


# Hurricane Ike Storm Surge Zone Potential Impacts



	<u>No.</u>	<u>Pop</u>
Households	81K	205K

# Hurricane Ike Storm Surge Zone Potential Impacts

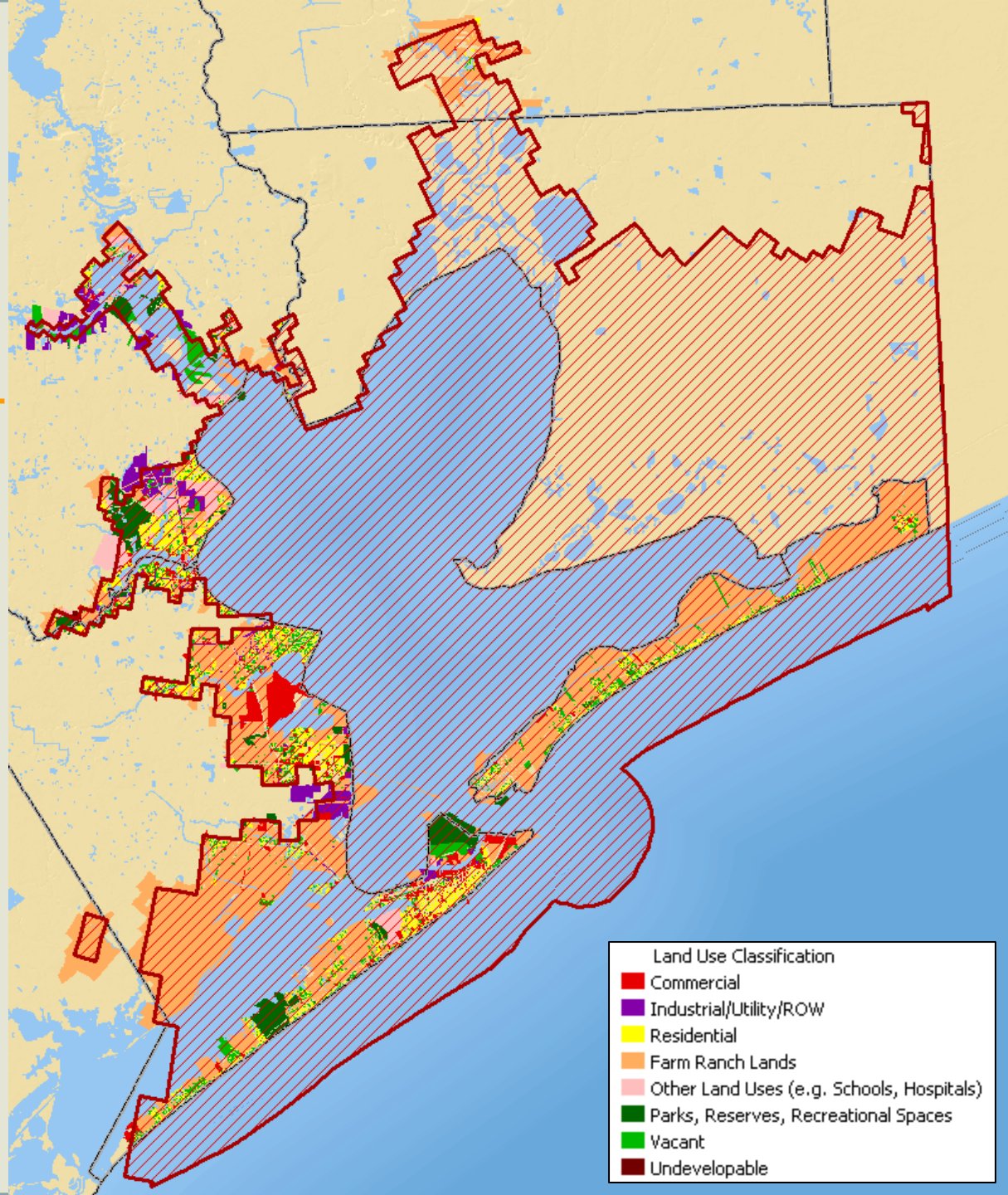


	<u>No</u>	<u>Pop</u>
Households	81K	205K
	<u>No</u>	<u>Jobs</u>
Businesses	>5-K	99K

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Businesses	>5K	99K
	<u>Parcels</u>	<u>Impr. Value</u>
Property*		
Residential	60K	\$6.9B
Commercial	5K	\$3.7B
Other	32K	\$191M

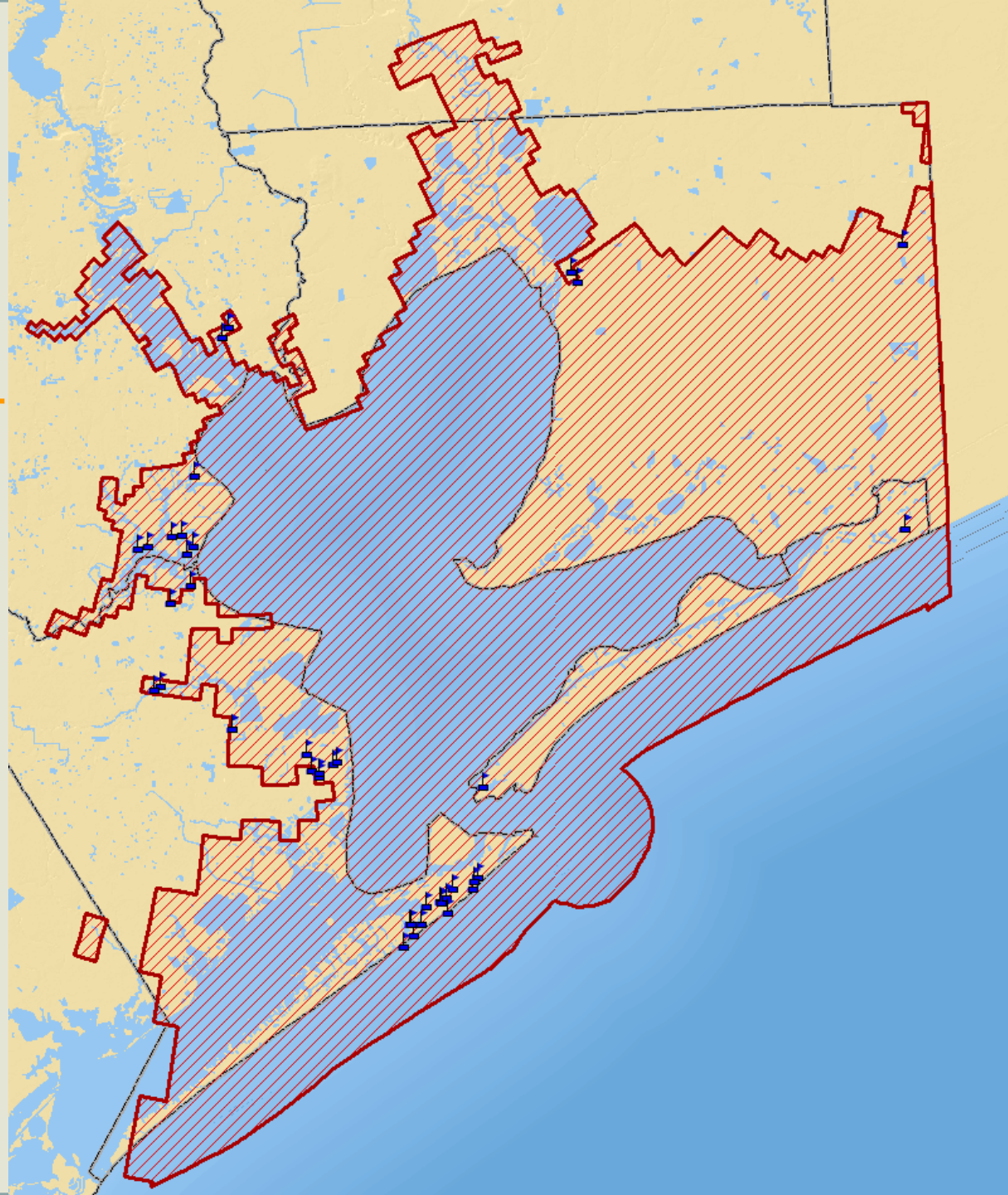
\*Galveston, Liberty, Harris, and Brazoria Counties



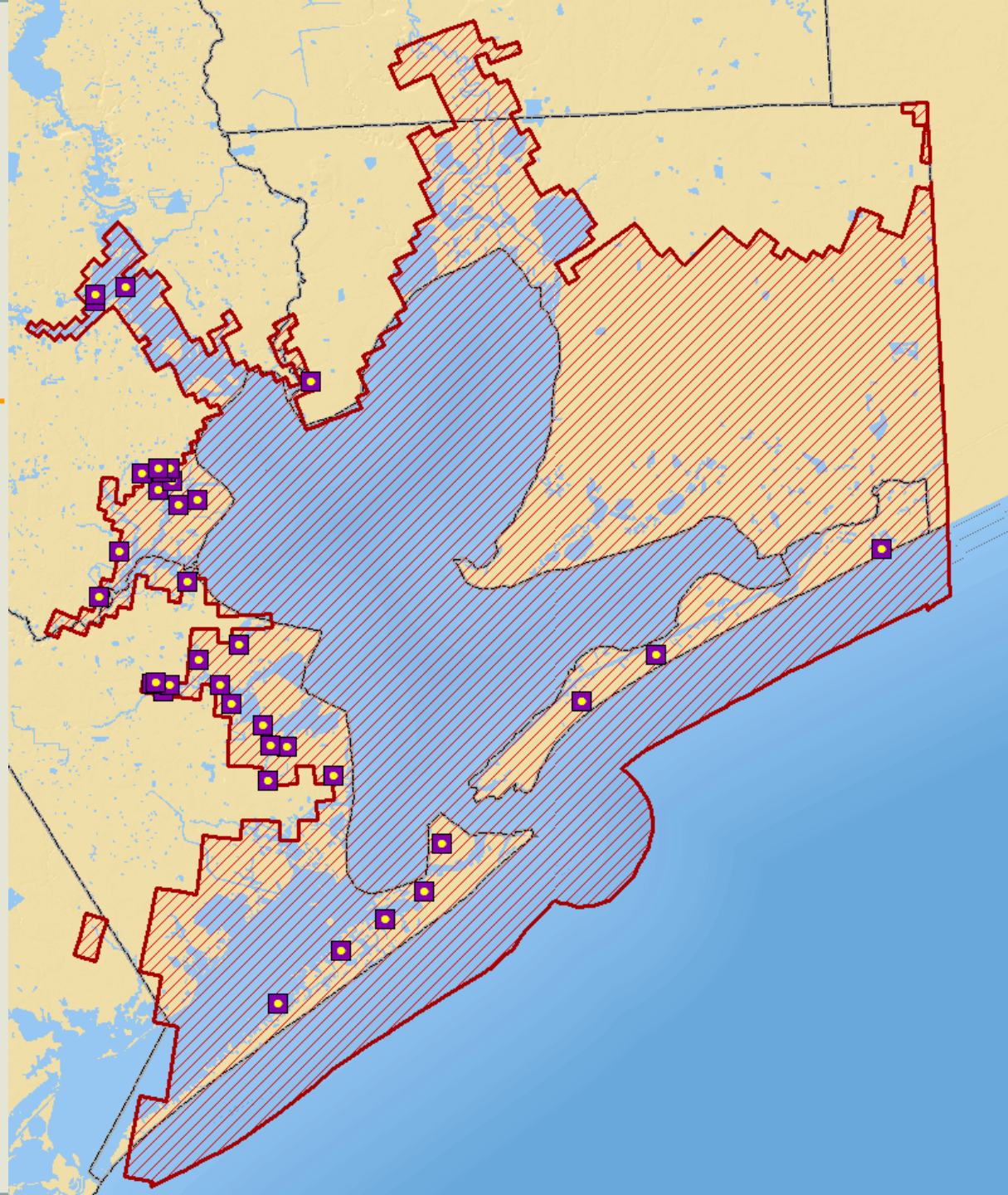
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Schools (K-12)	42	

\*Galveston, Liberty, Harris, and Brazoria Counties



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Sub-Stations	41

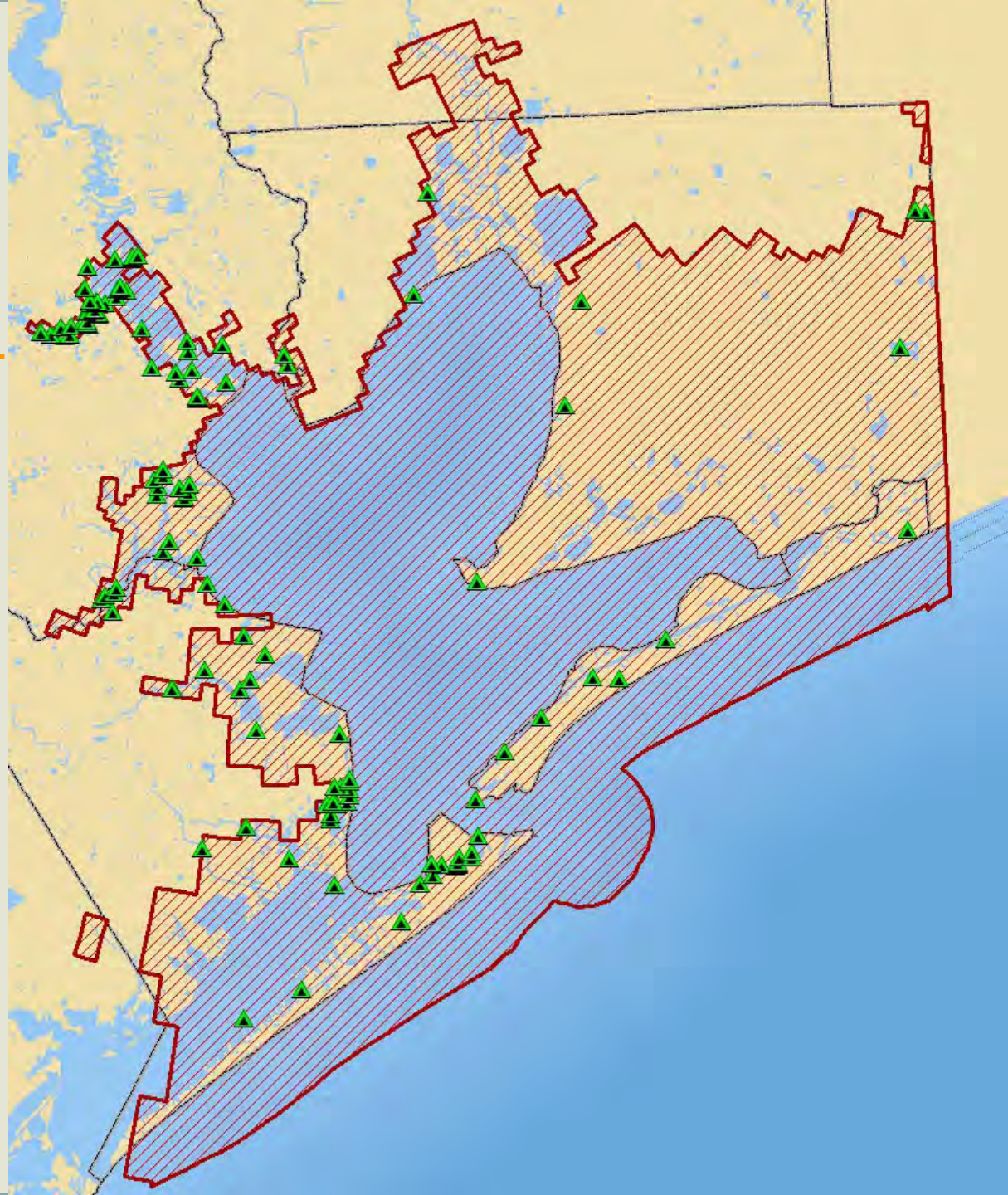


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Hospitals	13



# Bolivar Ferry - Pre Ike



# Bolivar Ferry - Post Ike



# Housing Damage Assessment

Tot. Area	935 SqMi
Assessed	29 SqMi 3%
Change	8 SqMi
No Change	21 SqMi

## Rooftop Analysis

Intact	16%
Partial Loss	26%
Total Loss	58%

## Debris Analysis

Heavy	5 SqMi
Moderate	2 SqMi
Light	6 SqMi
Not Deter.	17 SqMi



Assessed Areas

- Change
- No Change

# Major Data Groups

## Critical Infrastructure

- Refineries
- Pipelines
- Power Plants
- Power Sub-Stations
- Power Transmission Lines
- Fire & Police Stations
- Hospitals
- Schools & Universities
- Wastewater Treatment
- Landfills
- Closed Landfills
- Commercial Facilities
- Grocery Stores/Retailers
- Cultural Sites
- Buildings
- Cemeteries
- Correctional Facilities

## Imagery

- Pre Ike
- Post Ike
- NAIP (rural counties)
- Pre Ike Land Cover

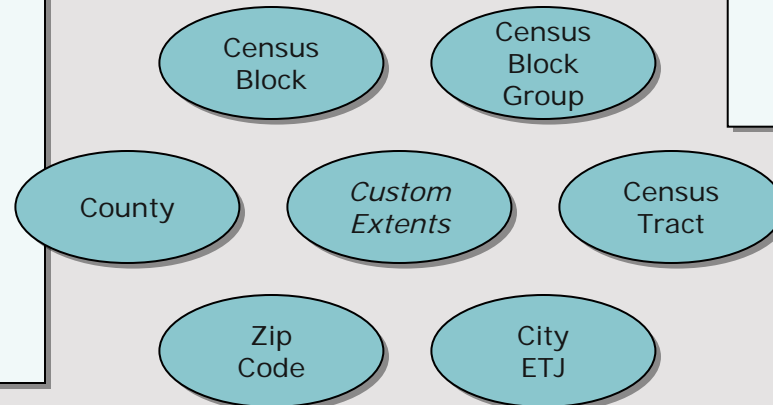
## Socio-Economic

- Parcel Boundaries
- Parcel Valuation
- Parcel Land Use
- Population
- Employment
- Households
- SBA Loans
- Businesses (InfoUSA)
- Regional Forecast

## Transportation

- Major Highways
- Arterial Roads (StarMap)
- Airports & Runways
- Bridges
- Railways & Crossings
- Metro Transit Centers
- Intermodal Terminals
- Ports
- Waterways

*Analysis can be provided  
in the following geographies*



# Recommendations

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- How we manage
- How we grow
- How we plan
- How we mitigate
- How we recover and reconstruct



# Selected Recommendations

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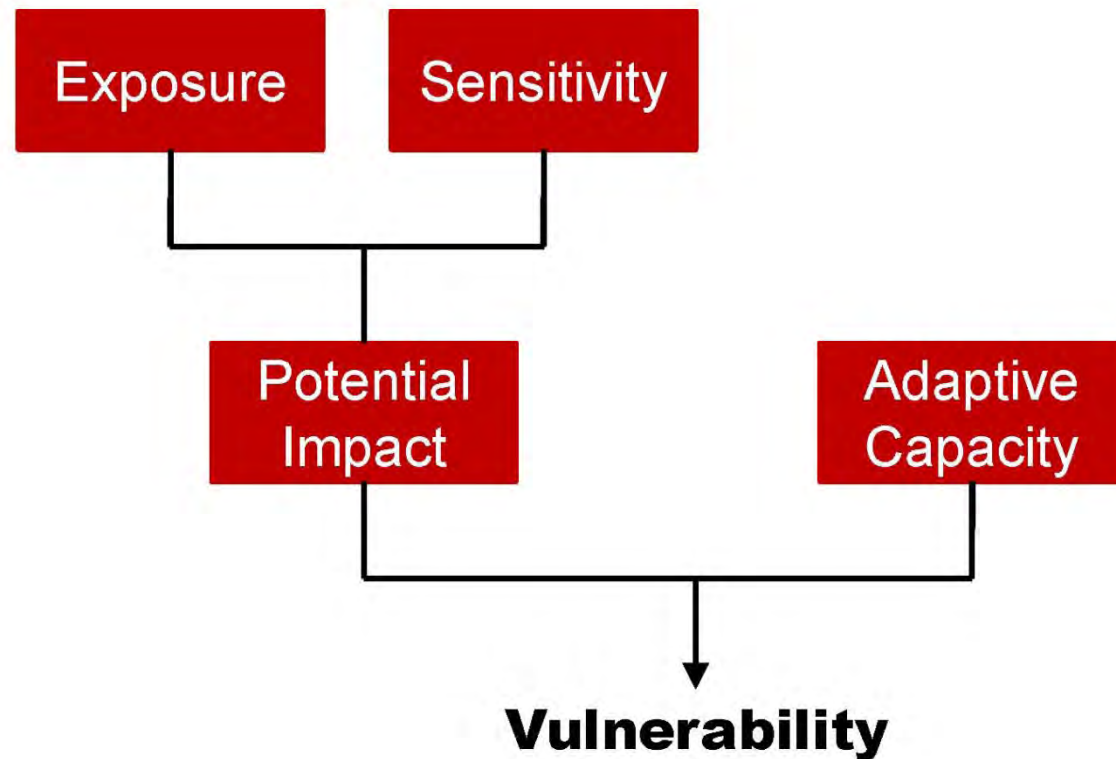
- Build “smarter”
  - Higher design values
  - Avoid vulnerable areas
  - Sound community planning
- Strategic investments in resiliency
- Improved coordination
- New financing mechanisms



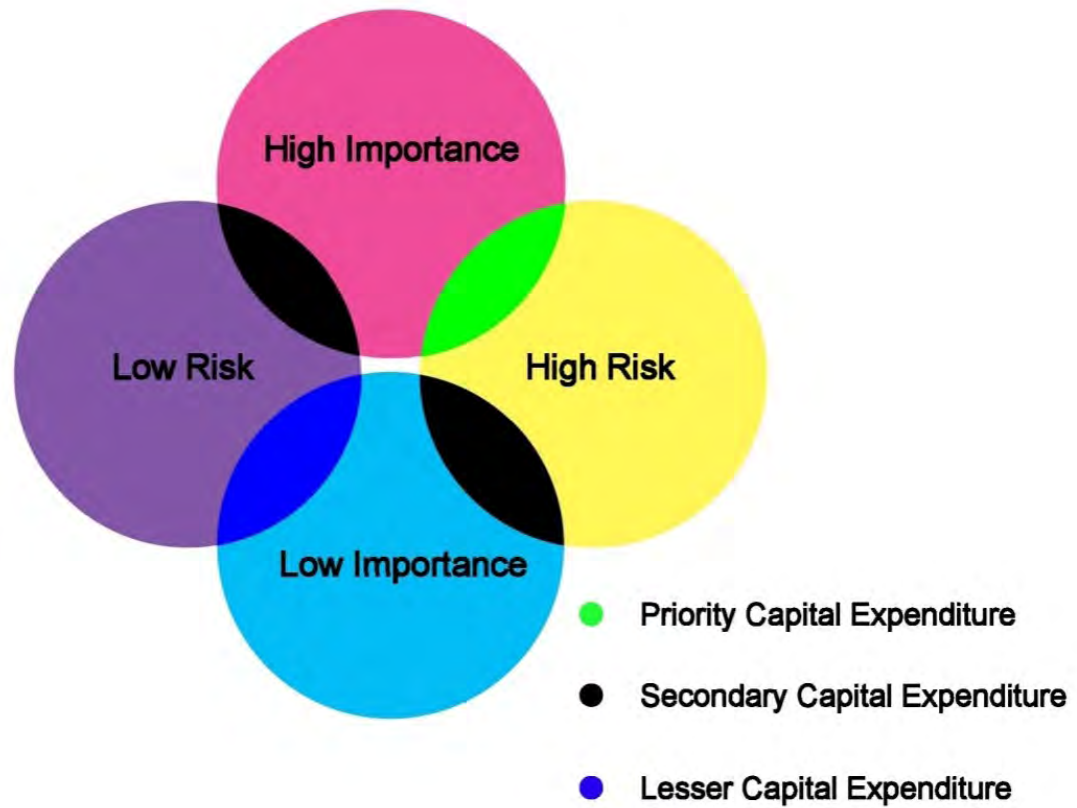


# Vulnerability Assessment

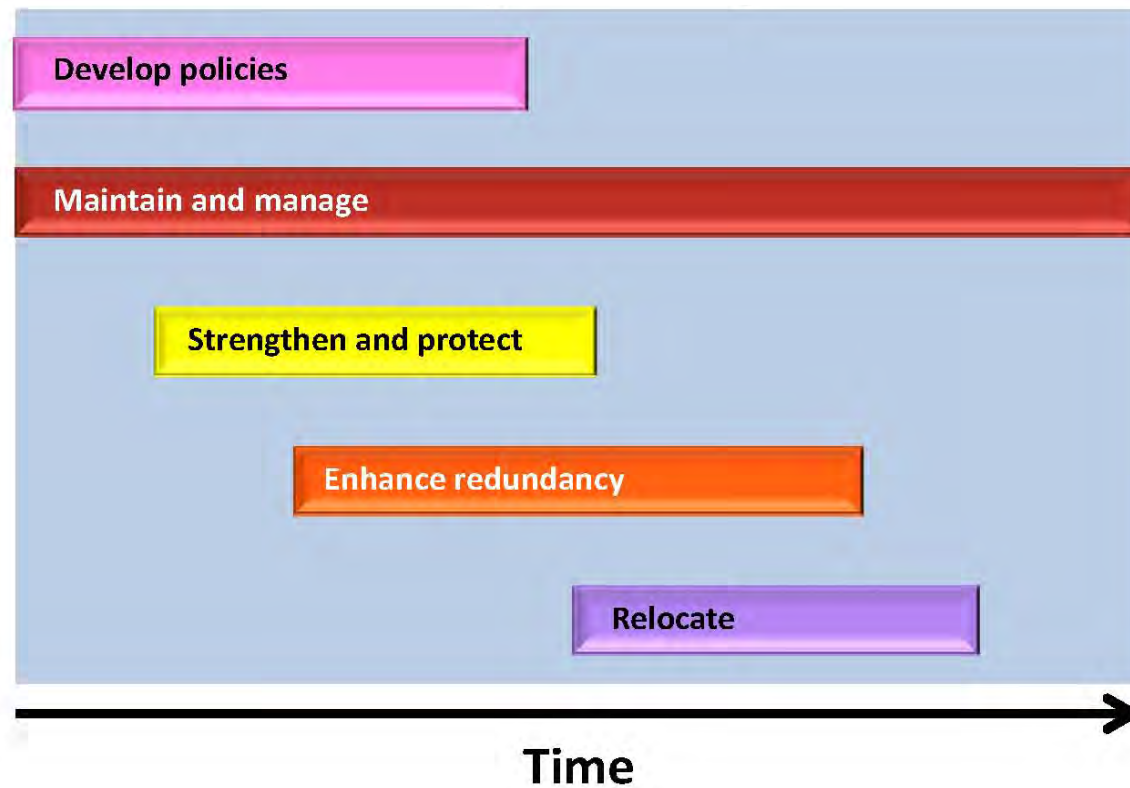
## Vulnerability and Its Components



# Prioritizing Strategies



# Phasing Strategies





# Questions?

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