



HAZARD REDUCTION & RECOVERY CENTER

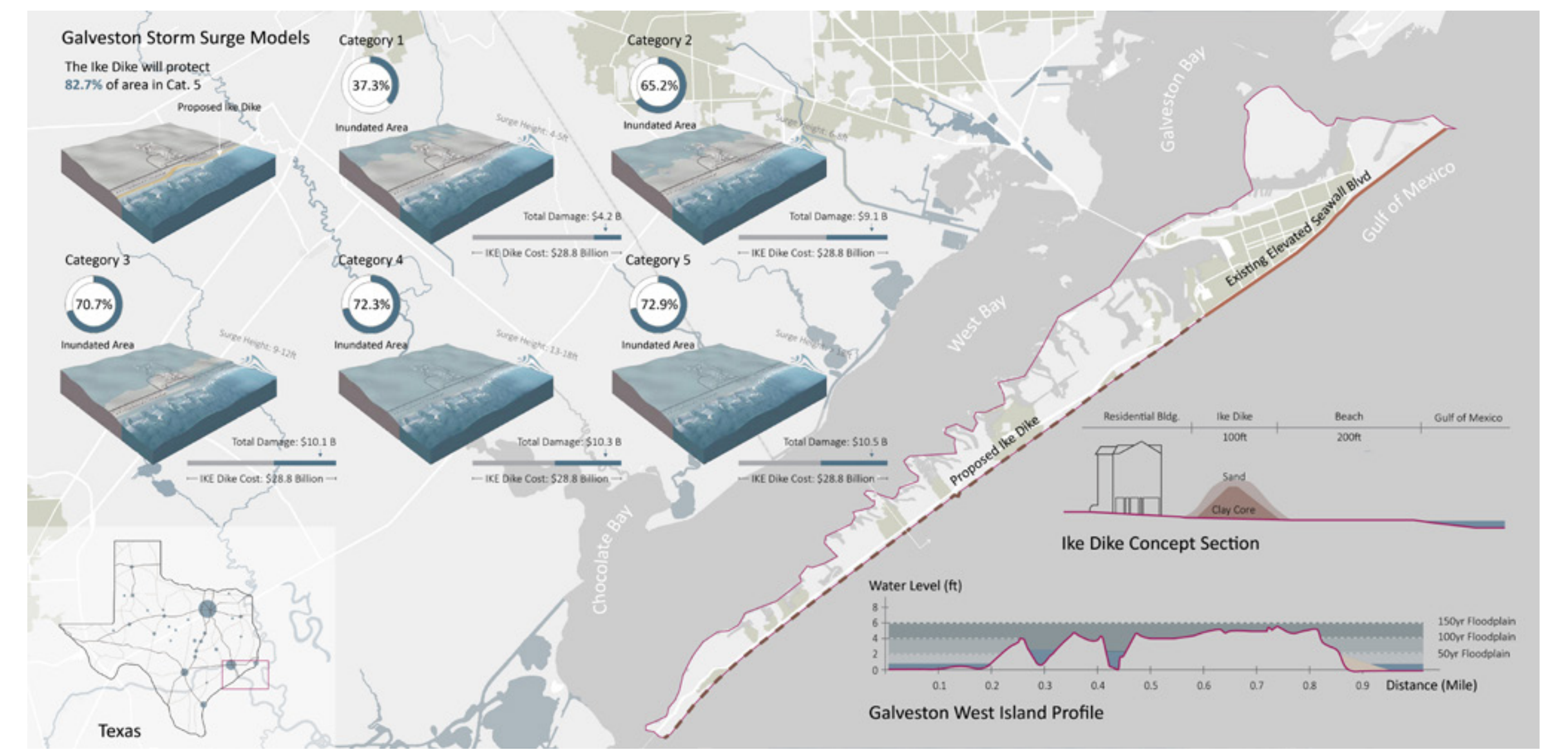
Assessing Galveston Future Flood Risk Combining Landscape Performance and Land Prediction Models

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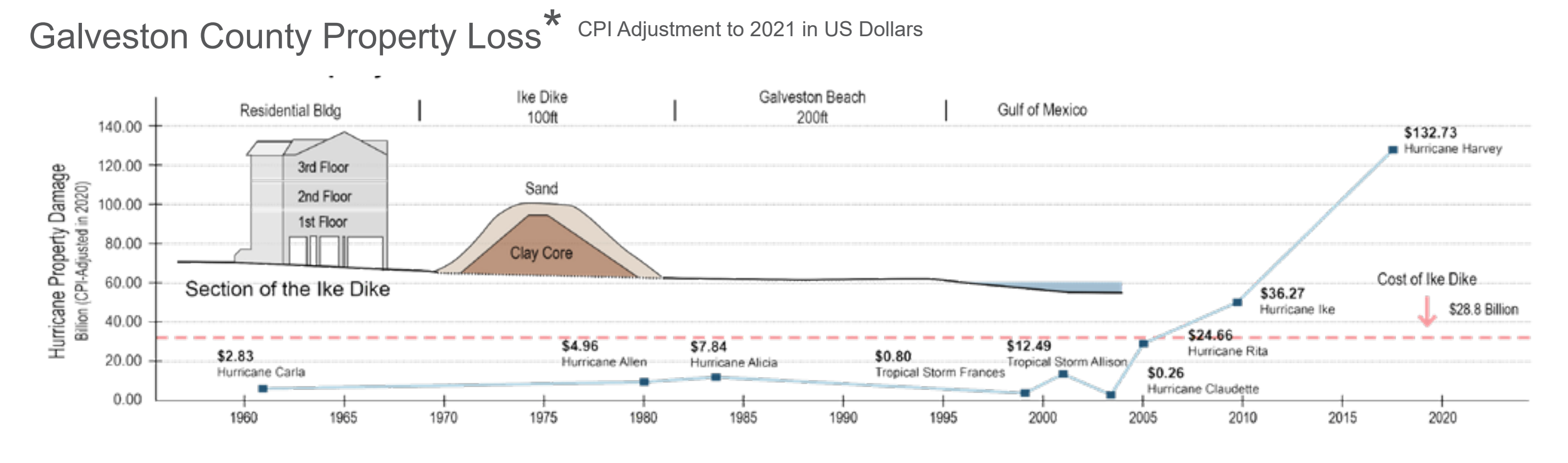
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Introduction

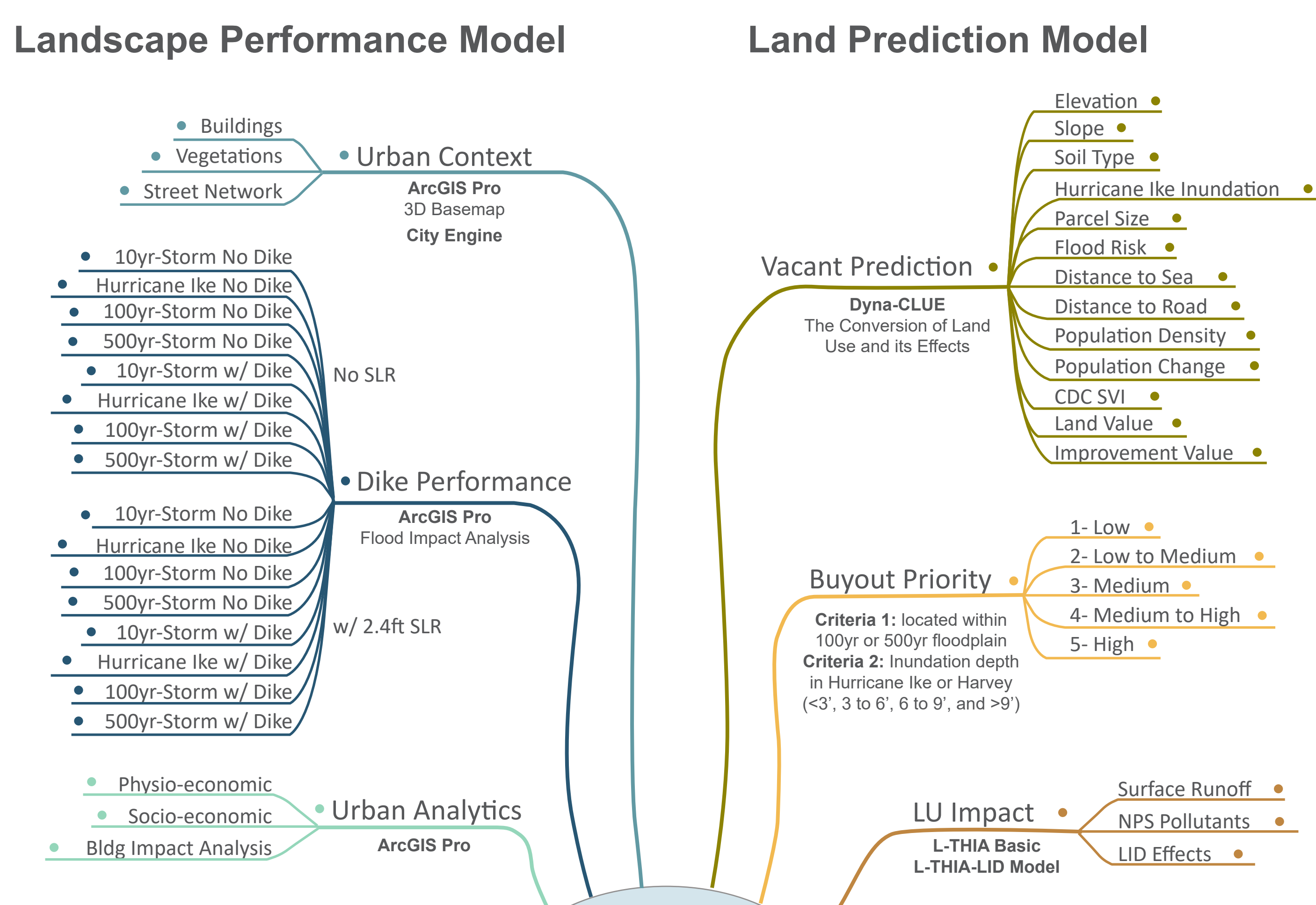
Study Area: Galveston Island, Texas, USA
Characteristics: **Barrier island** of Houston-Galveston area, has suffered from hurricanes and coastal flooding for a long time due to **flat topography and coastal adjacency** but supports large population and economy.



Increasing property loss especially in recent three decades, are even more than the estimated cost of Ike Dike (\$28.8 Billion in US Dollars). By storm surge simulation result, the Ike Dike will **protect 82.7%** area in Category 5, and **\$10.5 Billion property values** across 1 to 5 categories.



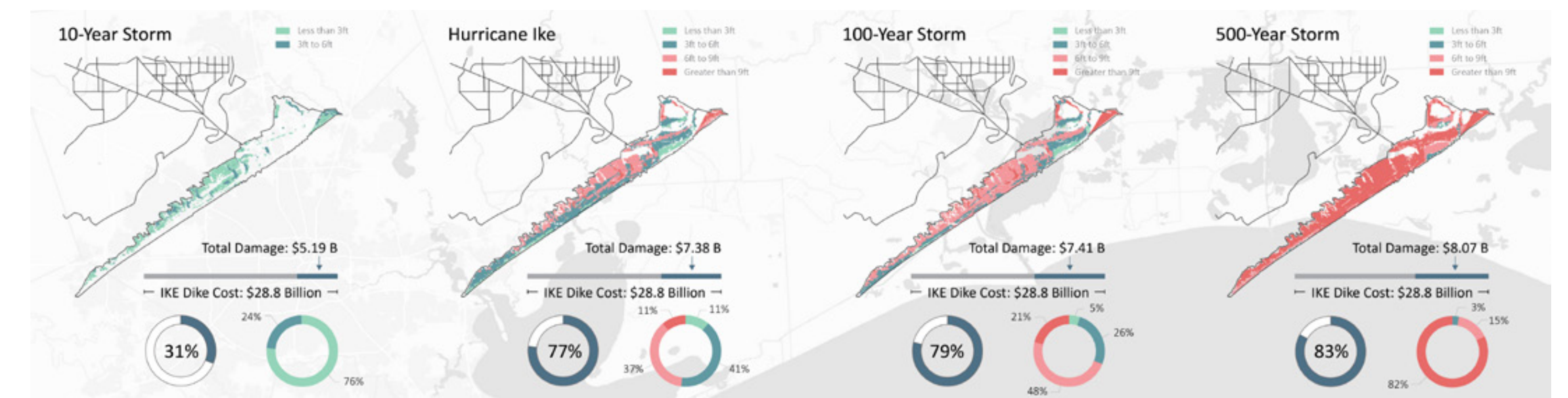
Workflow & Method



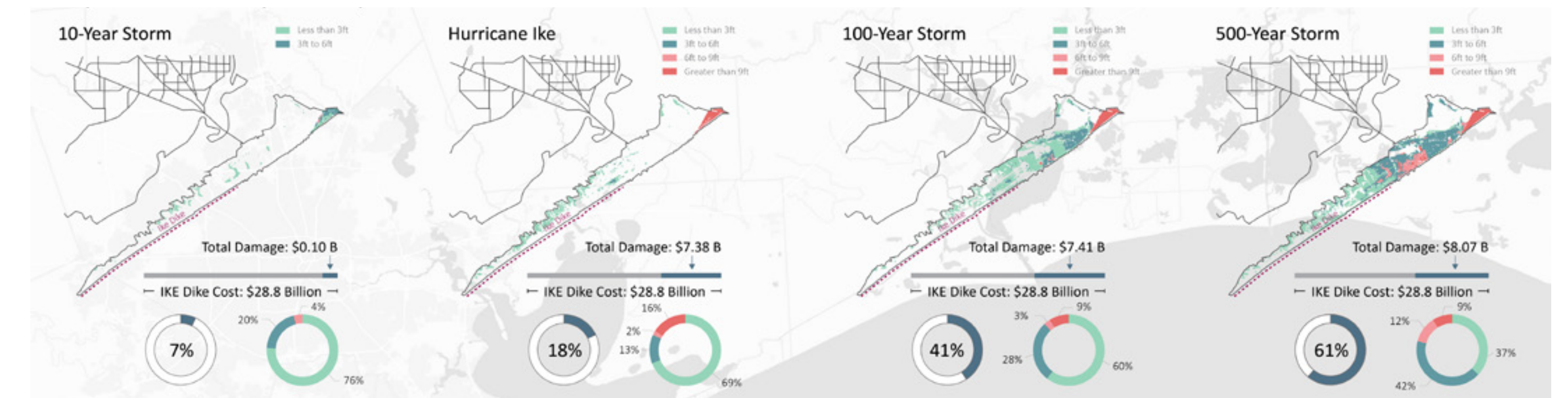
How well will the **Ike Dike** protect Galveston Island across multiple storm scenarios, with the current sea level and a predicted 2.4ft SLR?
How to increase flood resilience for Galveston County?
How can Galveston County increase its flood resilience through incorporating non-structural strategies such as **vacant land buyout policies**?

Dike Performance

- 1. No Ike Dike**
 - No scenario's damage is more than the cost of the Ike Dike
 - Even a **10-year storm** can flood **nearly 1/3** of the island
 - Inundation level **increases significantly** in **500-year storm**
 - Considering multiple storms, the dike cost outweighs damage impacts

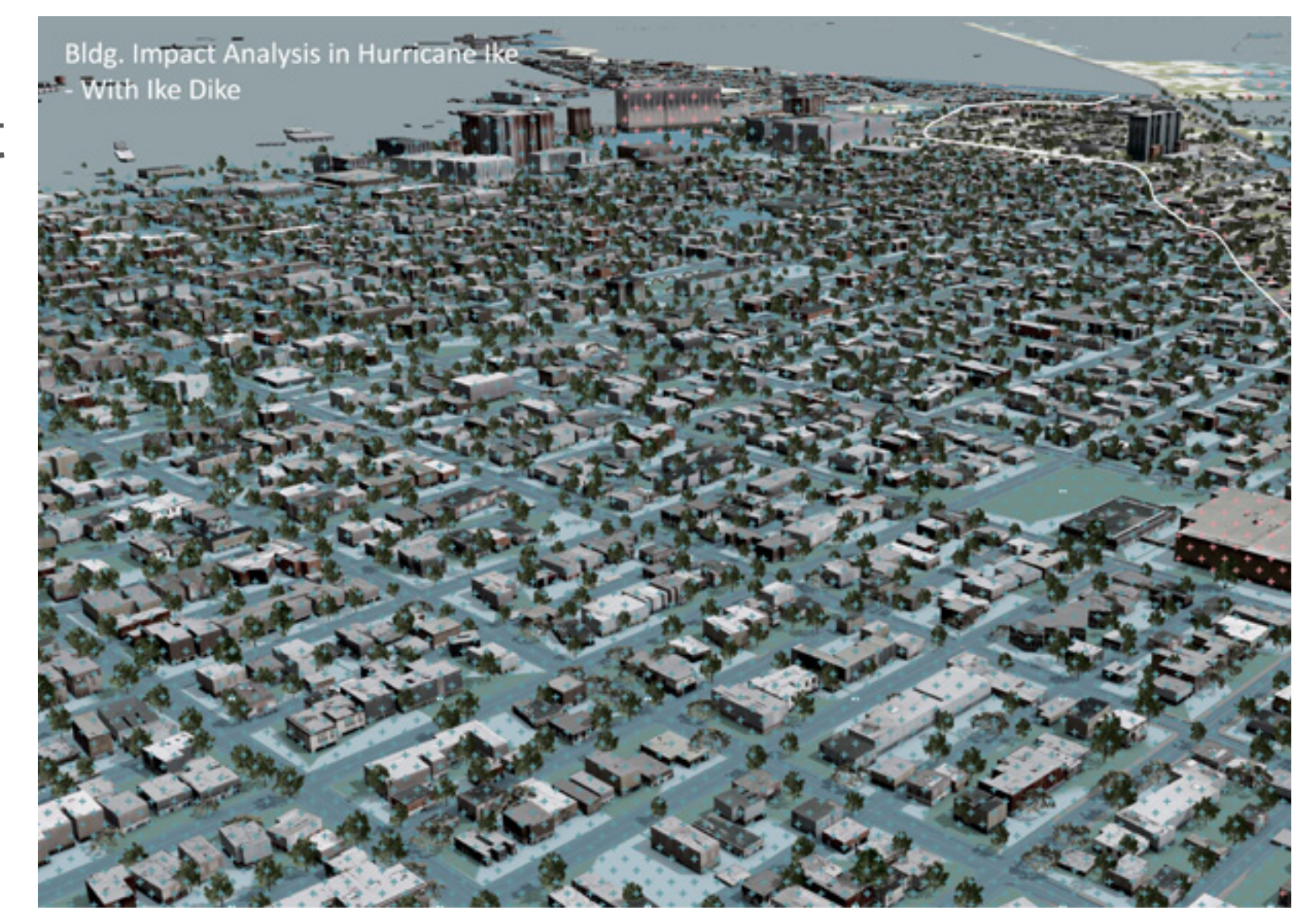


- 2. With the Ike Dike**
 - Average **36% decrease** in inundated area per storm (Ike scenario ~60%)
 - \$15.14 Billion decrease** in inundated property value across all storms (\$4 Billion decrease on average per scenario)
 - 22.5% Avg. decrease** in 9ft inundation



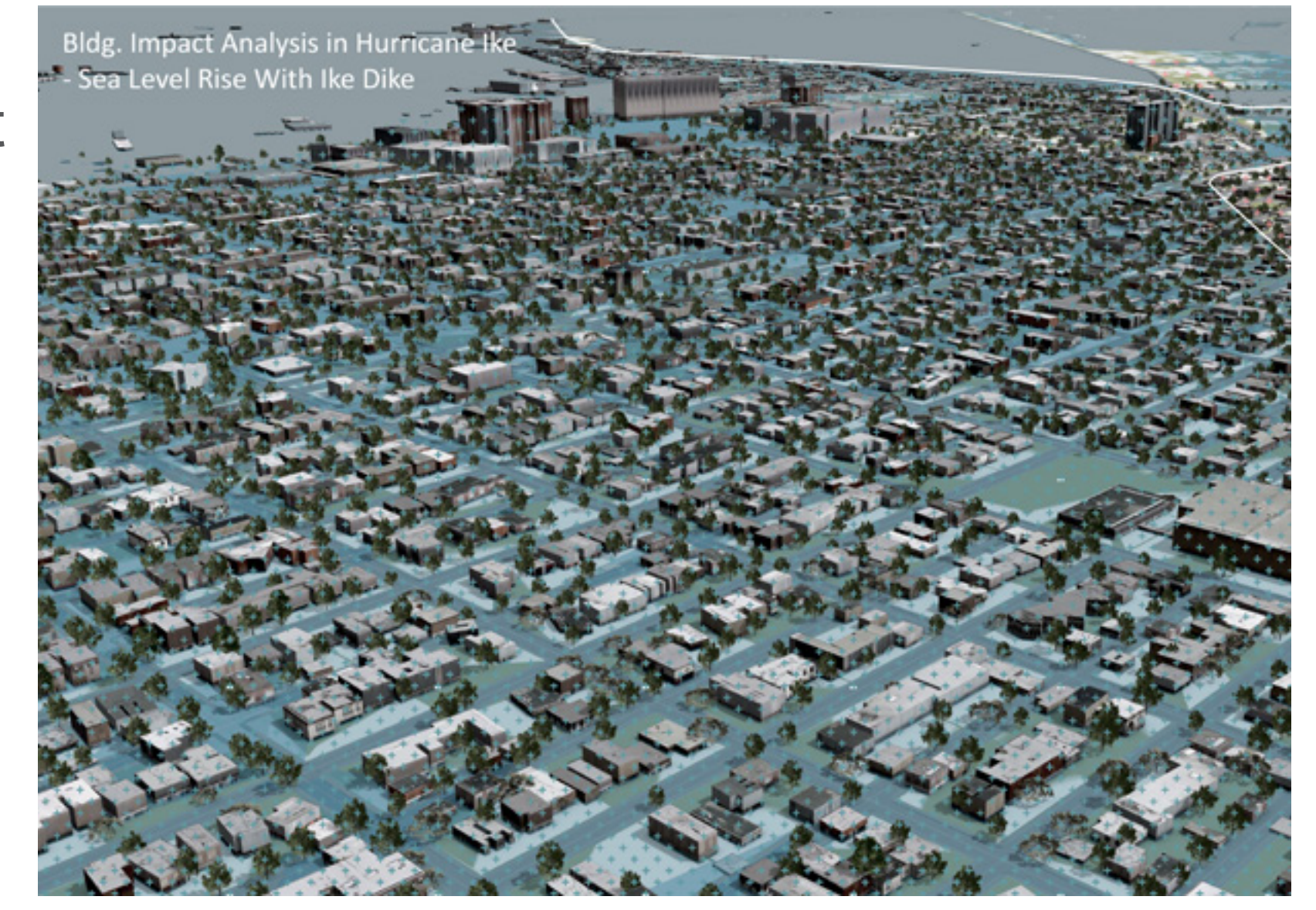
3. Bldg Impact Analysis - Hurricane Ike Scenario

- Inundation depth will **decrease 2.91ft** (from 6.39ft to 3.48ft)
- 12170 buildings (**90.0%**) and 820.03 acres **less inundated**
- 12870 buildings (95.4%) and 882.67 acres less inundated in **inundation category - greater than 9ft**



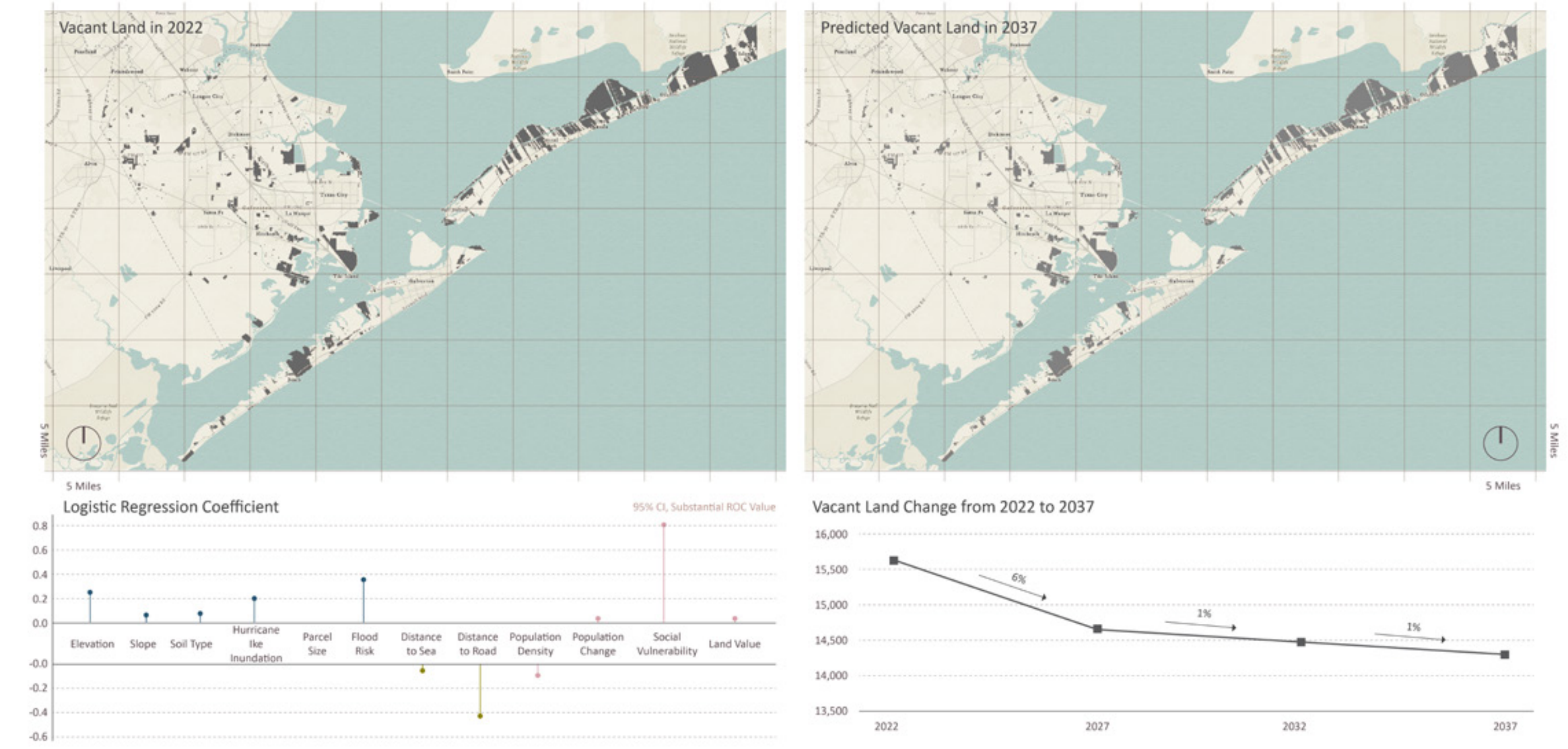
4. Bldg Impact Analysis - Hurricane Ike plus 2.4ft SLR Scenario

- Inundation depth will **decrease 2.58ft** (from 8.67ft to 3.81ft)
- 6228 buildings (**25.3%**) and 414.11 acres **less inundated**
- 24058 buildings (97.6%) and 1643.12 acres less inundated in **inundation category - greater than 9ft**

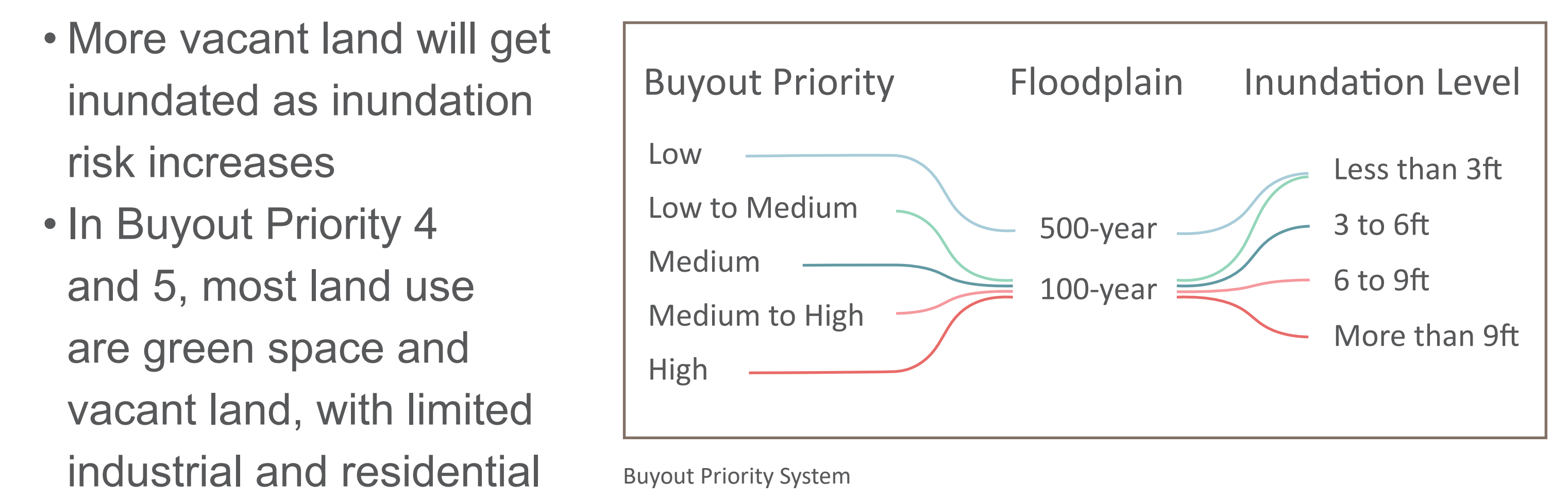


Land Use Change Impact

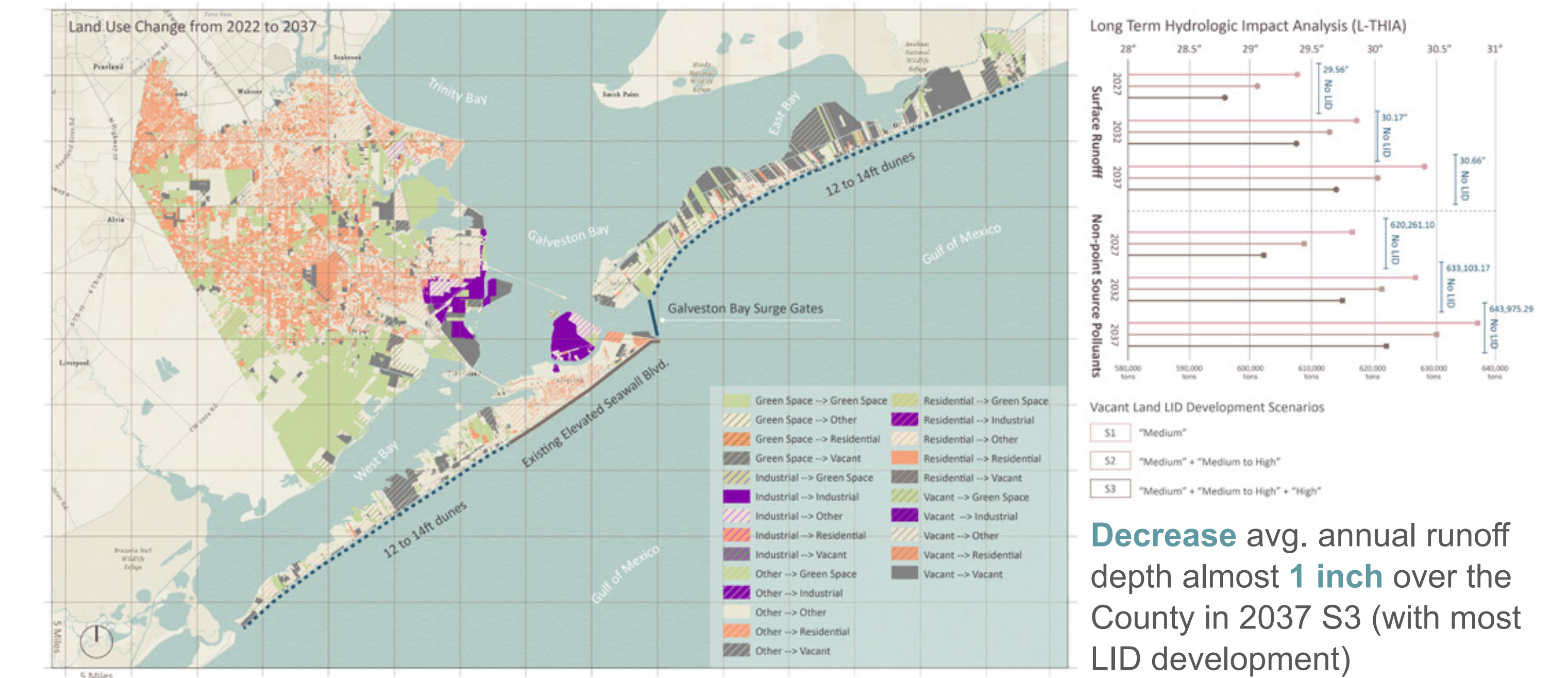
1. Vacant Land Prediction in CLUES



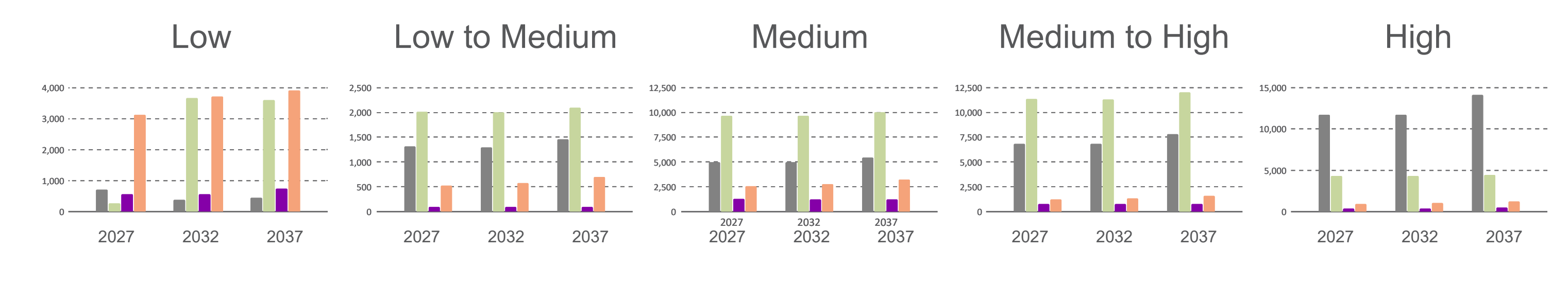
2. Buyout Priority defined by Inundation Risk System



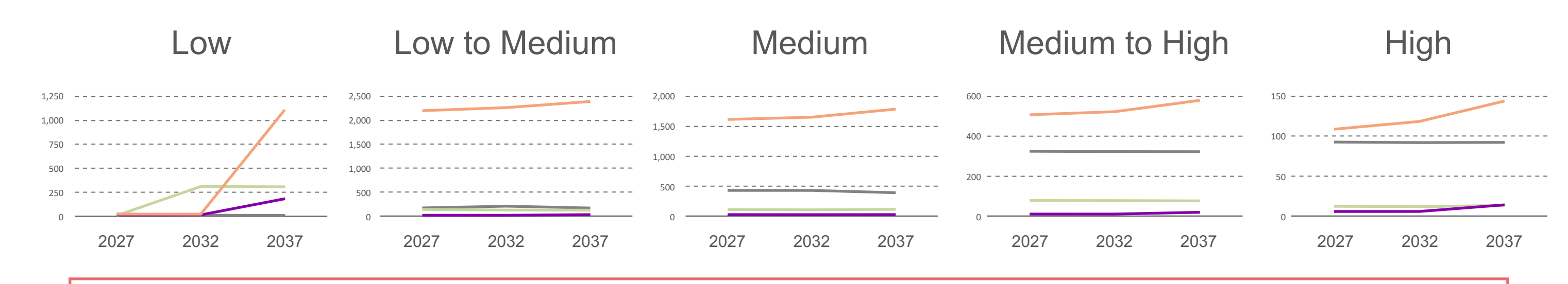
3. Land Use Change Impact



Inundated Area by Acres - Buyout Priority



Property Loss by Land Use (Millions of US Dollars) - Buyout Priority



The Ike Dike won't protect the area unless a full ring created and its effect diminishes in larger scale storms and SLR.

Land Use Change from 2022 to 2037 will increase 1) avg.runoff depth 0.12 inch/yr; and 2) total NPS loads about 2600 tons/yr