Implementation of Hazard Mitigation under the Sector-Based Approach in Puerto

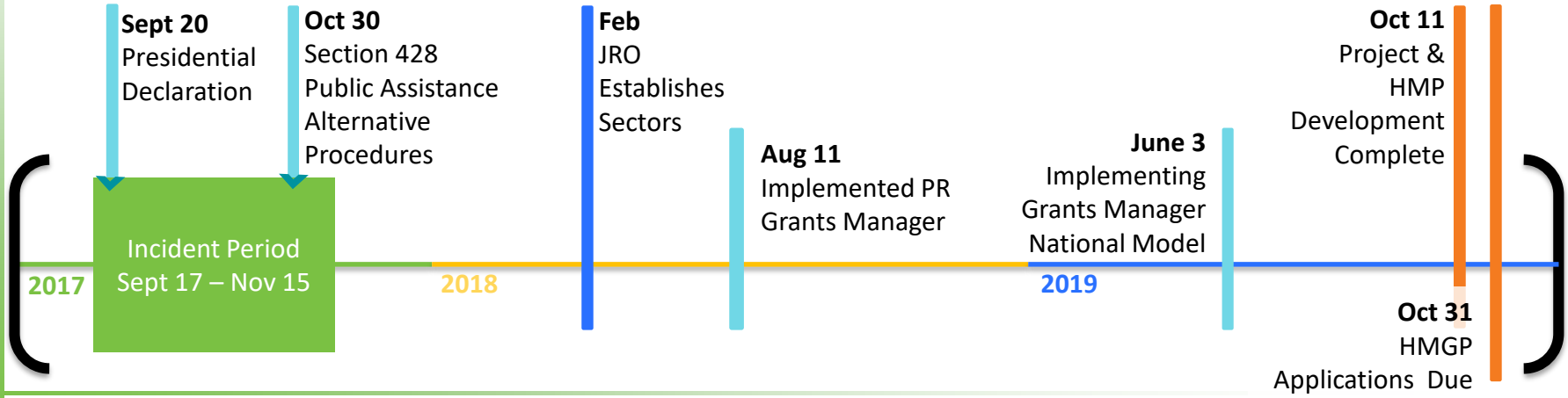
Cleveland, Ohio

Devin Schultze,
Jordan Williams,
Sherry Crouch
(CDM Smith)
Glenny Rodriguez-Alers (FEMA R2)

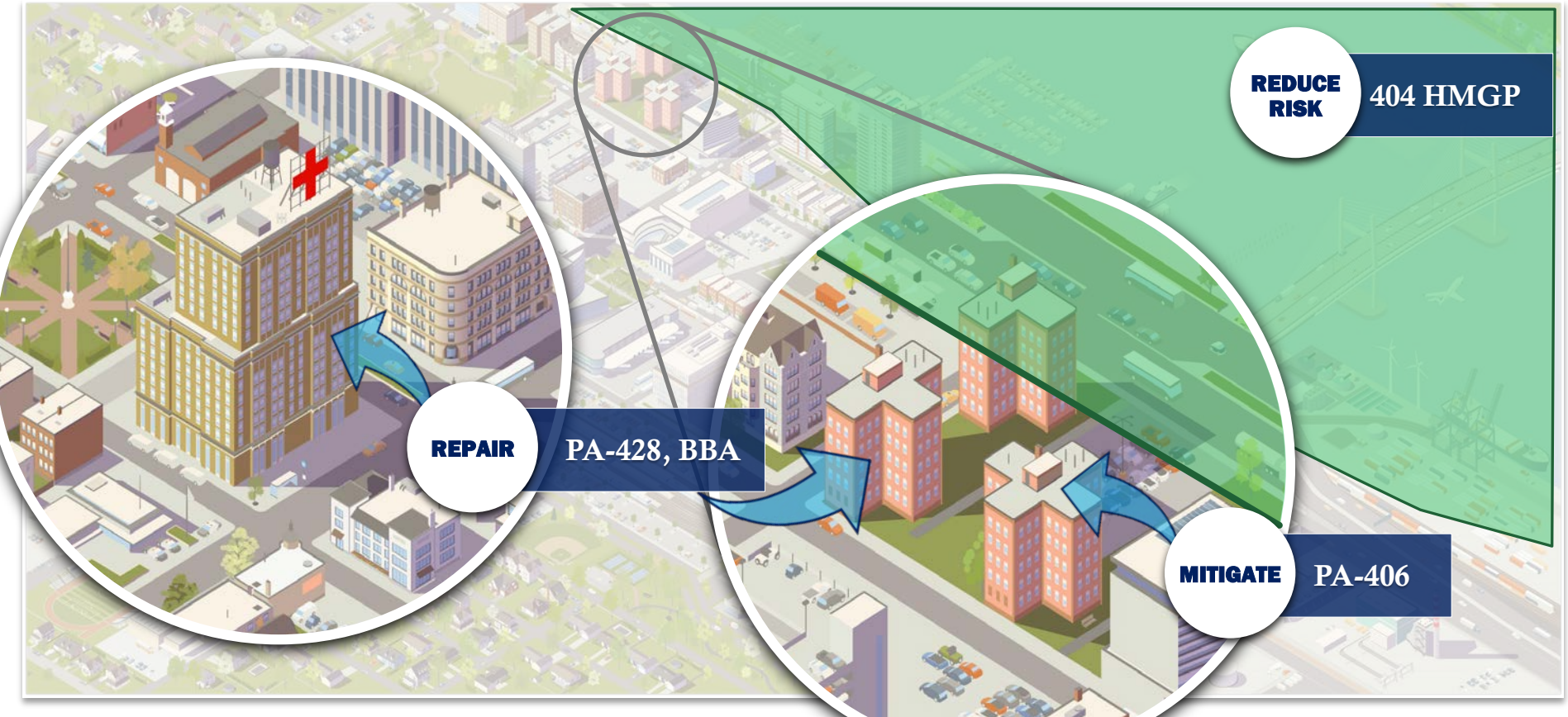
WATER + ENVIRONMENT + TRANSPORTATION + ENERGY + FACILITIES

DR-4339-PR, Hurricane Maria

- Category 4 Hurricane
- Island-wide impact
- Estimated $132 Billion in damages



FEMA Hazard Mitigation



The Sector-based Approach

National Disaster Recovery Framework (NDRF)

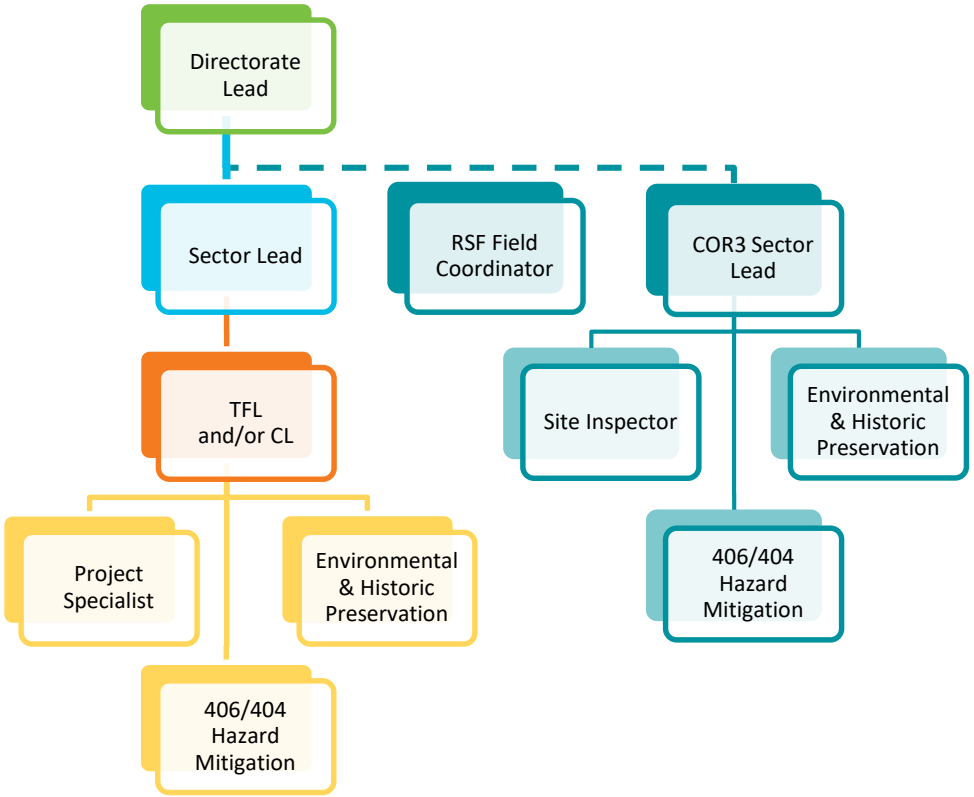
- FEMA oversees recovery and coordinates with Recovery Support Functions (RSFs)
- Emphasizes coordination with local municipalities and Commonwealth (COR3)
- Focus on **solutions-based recovery**

Intent of the Sector-based approach

- Focus on **solutions-based recovery** and **unified, wholistic approach**
- Improve community resilience beyond physical disaster-damages

The Sector-based Approach

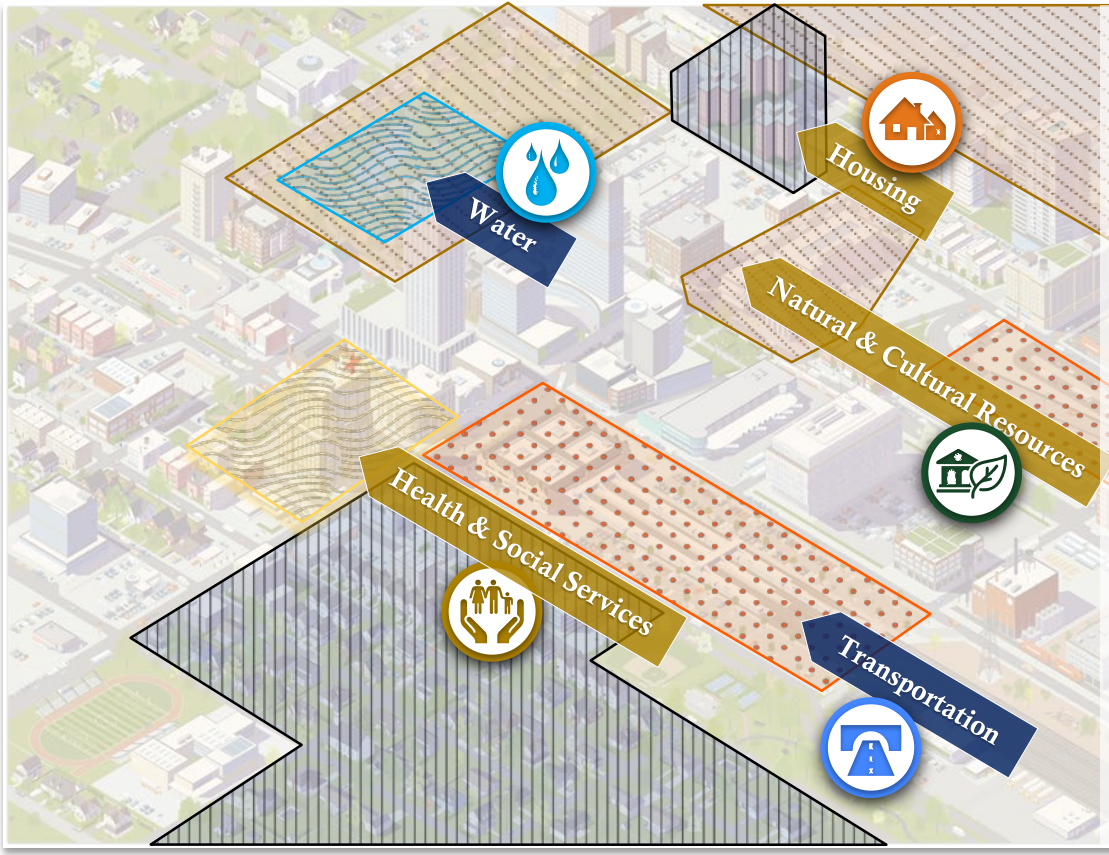
Hazard Mitigation Operations Cell



Advantages of the Sector-Based Approach

- Facilitates cross-agency collaboration
- Hazard mitigation is proposed based on municipality needs not funding source
- Focus on wholistic recovery rather than element-based mitigation

Challenges of the Sector-Based Approach



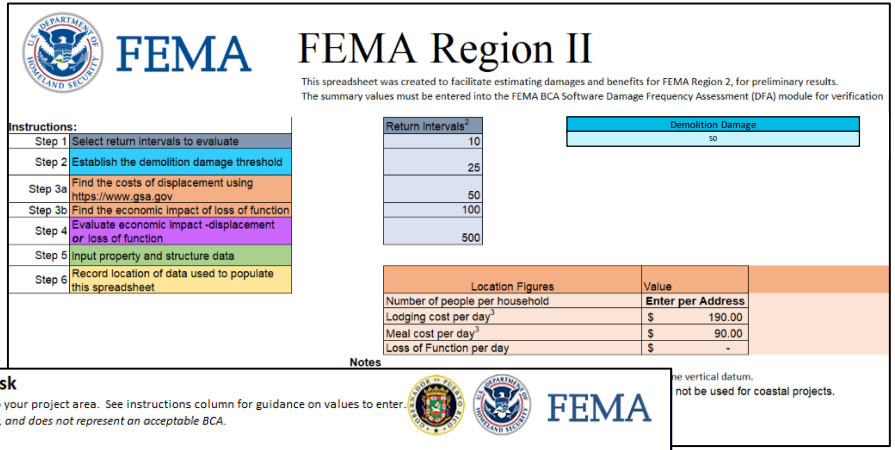
- Reaching Mitigation Specialists across sectors
- Facilitating cross-sector coordination and avoiding silo effect
- Information-sharing between sectors
- Standardizing resources for staff across sectors

Tools to Support Sector-Based Mitigation

Benefit Cost-Analysis Support

- Developing tools to perform Preliminary BCAs

- Identifying BCA efficiencies



FEMA

FEMA Region II

This spreadsheet was created to facilitate estimating damages and benefits for FEMA Region 2, for preliminary results.
The summary values must be entered into the FEMA BCA Software Damage Frequency Assessment (DFA) module for verification

Instructions:	
Step 1	Select return intervals to evaluate
Step 2	Establish the demolition damage threshold
Step 3a	Find the costs of displacement using https://www.gsa.gov
Step 3b	Find the economic impact of loss of function
Step 4	Evaluate economic impact -displacement *or* loss of function
Step 5	Input property and structure data
Step 6	Record location of data used to populate this spreadsheet

Return Intervals[2]
10
25
50
100
500

Demolition Damage
50

Location Figures	Value
Number of people per household	Enter per Address
Lodging cost per day[3]	$ 190.00
Meal cost per day[3]	$ 90.00
Loss of Function per day	$ -

Notes

...he vertical datum.
...not be used for coastal projects.

Benefit Estimator for Wind Risk

Please fill out **Only Highlighted Cells** specific to your project area. See instructions column for guidance on values to enter.
This worksheet is intended to be used as a guide, and does not represent an acceptable BCA.

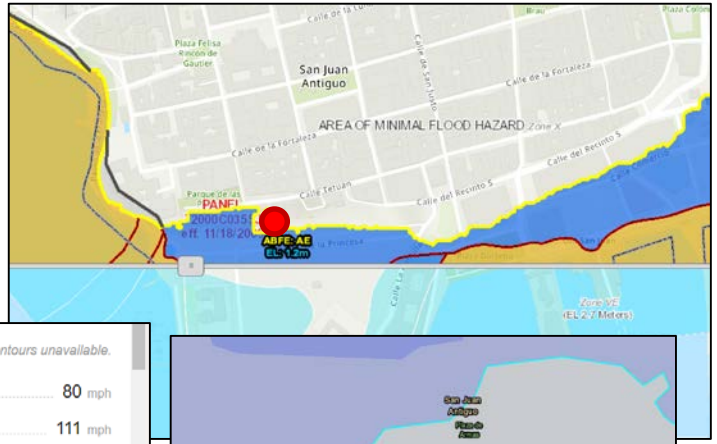
FEMA

Data	Inputs	Instructions	Links
Recurrence Interval (years)	30	Estimate recurrence interval of damage event. Use the Hurricane Maria Wind Recurrence Interval Estimator linked to the right.	Hurricane Maria Wind RI Map
Total Estimated Damages	$ 300,000	Enter the known damage from the Project Worksheet or an estimated damage.	
Annualized Damages	$ 10,000		
Building Risk Category	IV	Enter I, II, III, or IV depending on the building risk category as defined by ASCE 7-16 linked to the right.	DR-4339-PR HMP Guidance (DRAFT 3.05.2019)
After Mitigation RI (years)	3000	After mitigation recurrence interval is based on the building risk category selected.	
Level of Effectiveness	80%	Enter the estimated level of effectiveness the mitigation measure will achieve. Typically shutters are 80% effective up to the RI of the building category risk they are designed for. **DO NOT CHANGE THIS VALUE UNLESS INSTRUCTED OTHERWISE.**	
After Mitigation Damage	$ 60,000		
Annualized Damages	$ 20		
Difference in Annualized Damages	$ 9,980		
Project Useful Life (years)	30	Enter the project useful life of the proposed project. Typical Project Useful Life values can be found in the link to the right.	Typical Project Useful Life Guidance
Estimated Benefits	**$123,842**		

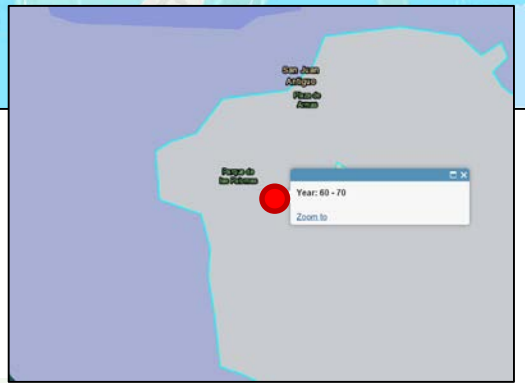
Tools to Support Sector-based Mitigation

Hazard Identification and Risk Analysis Support

- Leveraging R2 Risk Analysis tools to streamline BCAs
  - Advisory BFE Maps
  - Wind Microzone + Recurrence Interval Maps

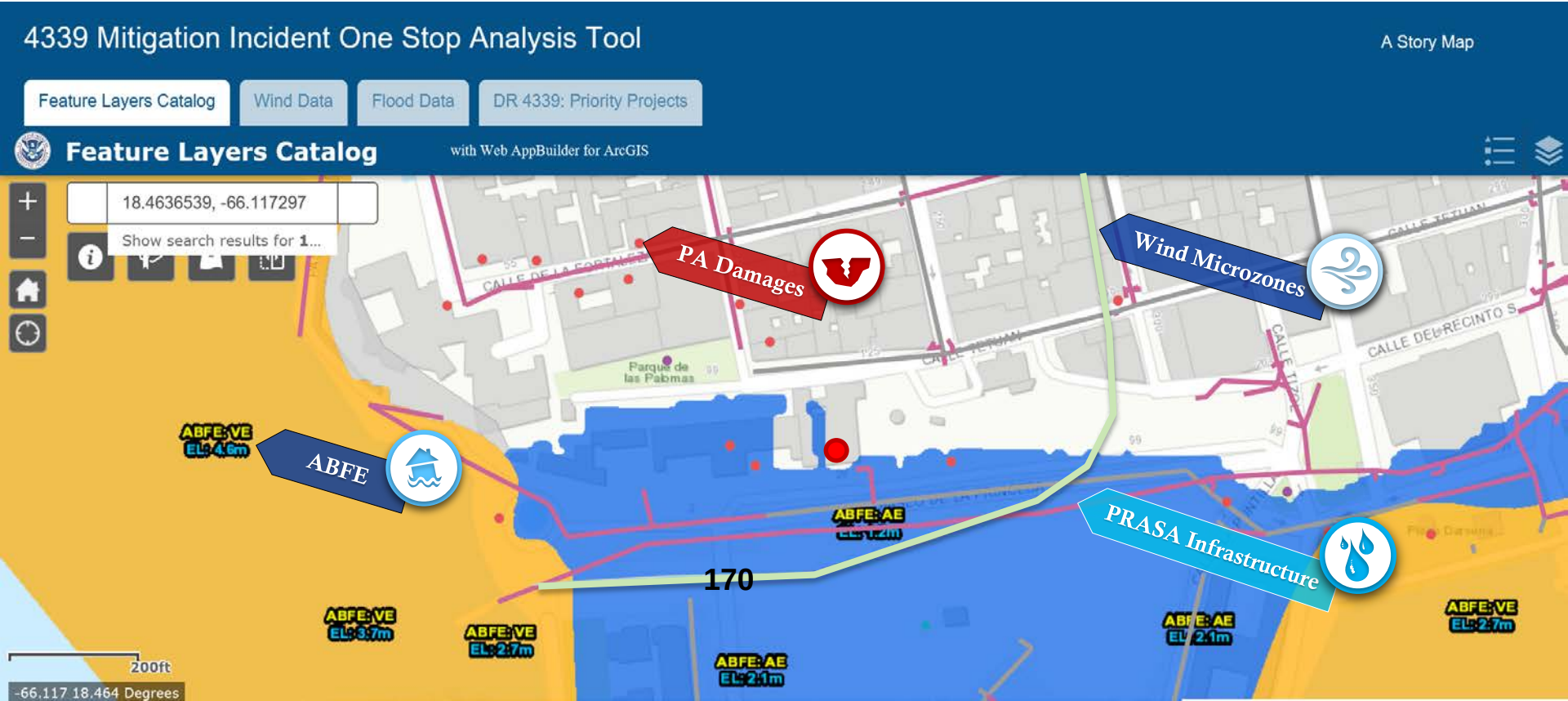


Puerto Rico Building Code 2018	Contours unavailable.
MRI 10-Year	80 mph
MRI 25-Year	111 mph
MRI 50-Year	131 mph
MRI 100-Year	147 mph
Risk Category I	167 mph
Risk Category II	180 mph
Risk Category III	192 mph
Risk Category IV	199 mph



Tools to Support Sector-based Mitigation

Mitigation Analysis GIS Database



Tools to Support Sector-based Mitigation

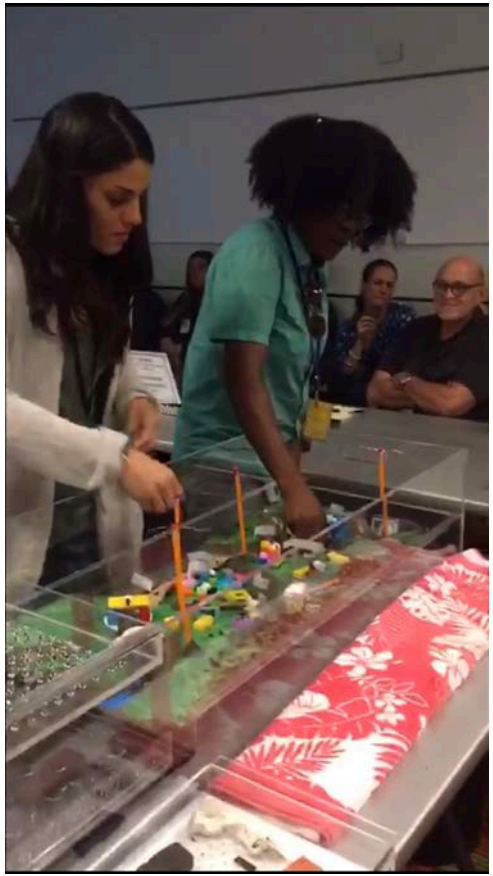
Communication Outreach

- SharePoint: Centralized data repository
- Weekly mitigation project meetings

BCA TECHNICAL ASSISTANCE PAGE

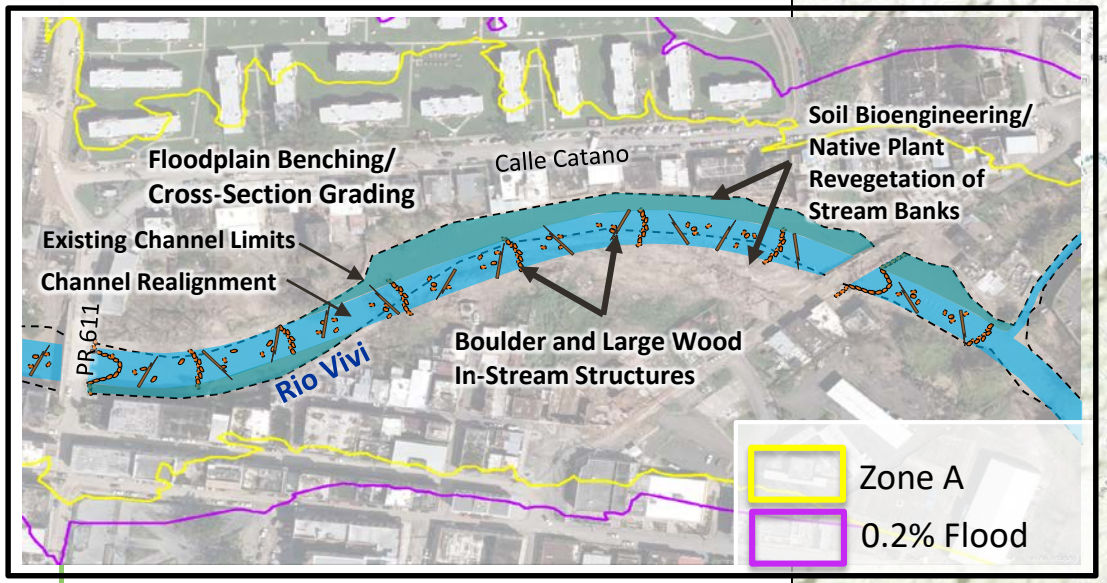
MITIGATION DATA RESOURCE LIBRARY

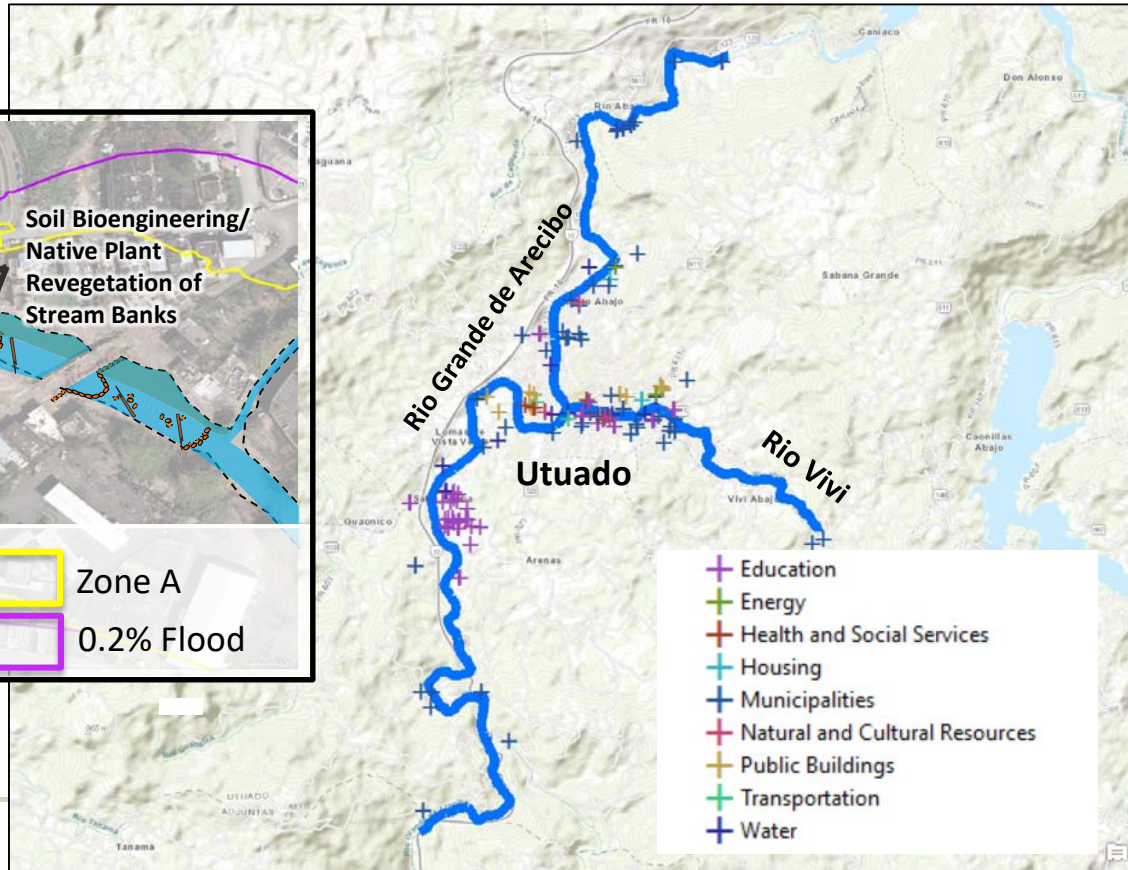
MITIGATION TECHNICAL ASSISTANCE



Examples of Solutions-Based Recovery

Watershed-based Solutions

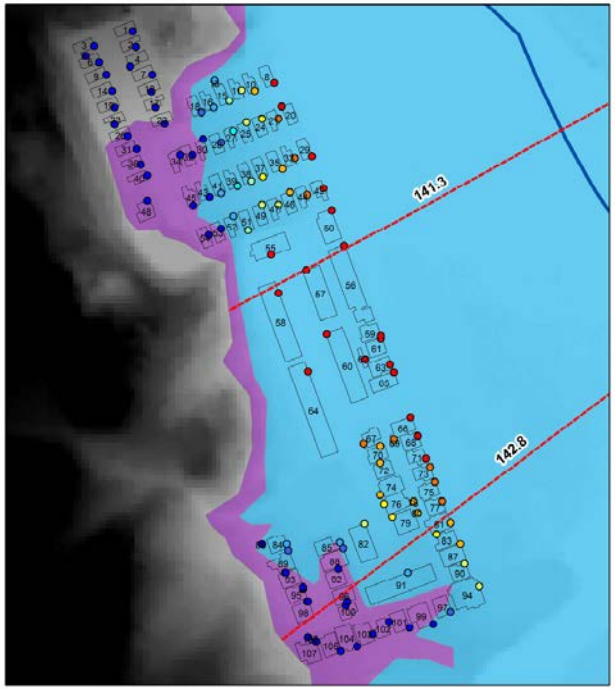




Guajataca Dam

Emergency Spillway (Pre-disaster)

Dos Rios and Alturas de Ciales



Legend

- ABFE Cross Sections (1% WSE in feet)
- Stream
- Building Footprints

ABFE Floodplain

- Zone A (Riverine 1%)
- Shaded X (Riverine 2%)

LAG Points

Flood Depth (Feet)

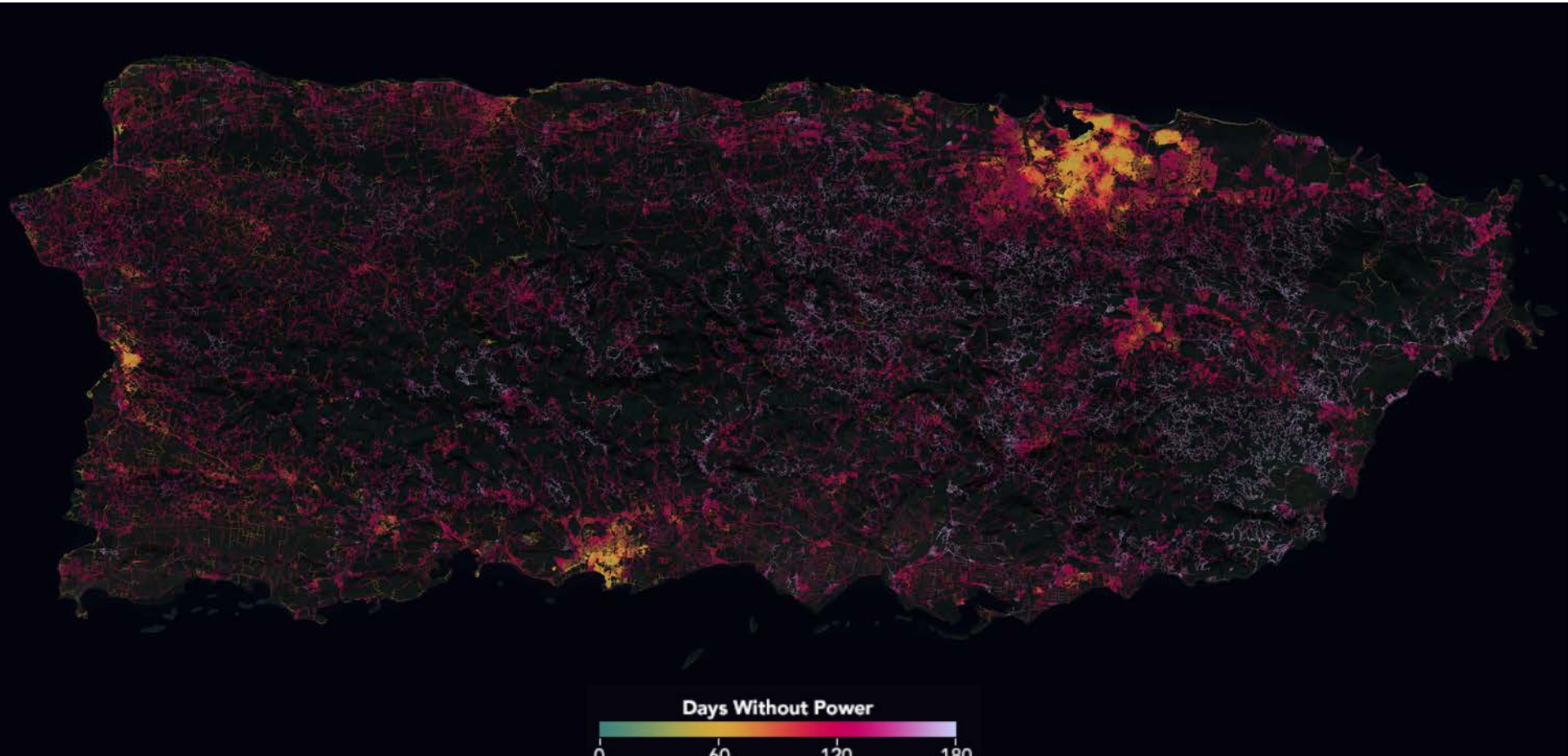
- < 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- > 18

Elevation (ft above NAVD88)

High : 348.424

Low : 88.2119

Island-wide Grid Rehabilitation



Complexities of Solutions-Based Projects

- Fitting solution within current Public Assistance Policy or HMA Guidance
- Showing efficacy of risk reduction
- Prioritizing Hazard Mitigation during recovery process

Federal Mitigation Grants save **$6** for every **$1** spent on recovery

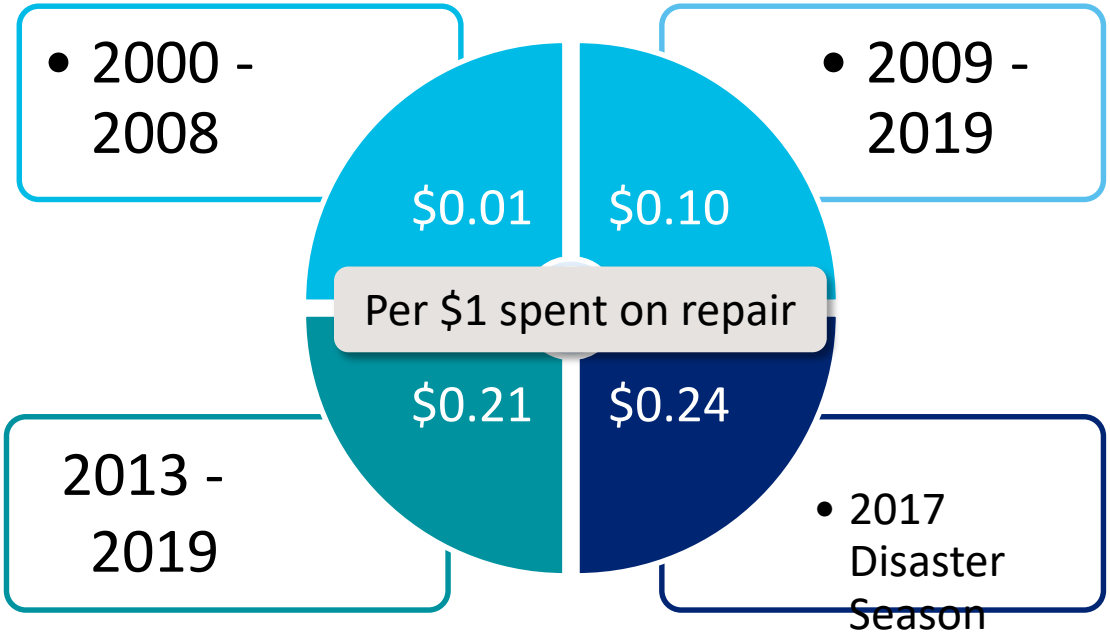
If only **15%** of Public Assistance repair costs are mitigated it will save **$120 Billion** in future damages

406 Hazard Mitigation across the Nation

Comparing
2000 – 2008 and
2009 – 2019 is a
1000% increase use
of 406 hazard
mitigation funding

Sandy: $0.44

Maria Goal: $0.77



Reaching the 0.77% Goal

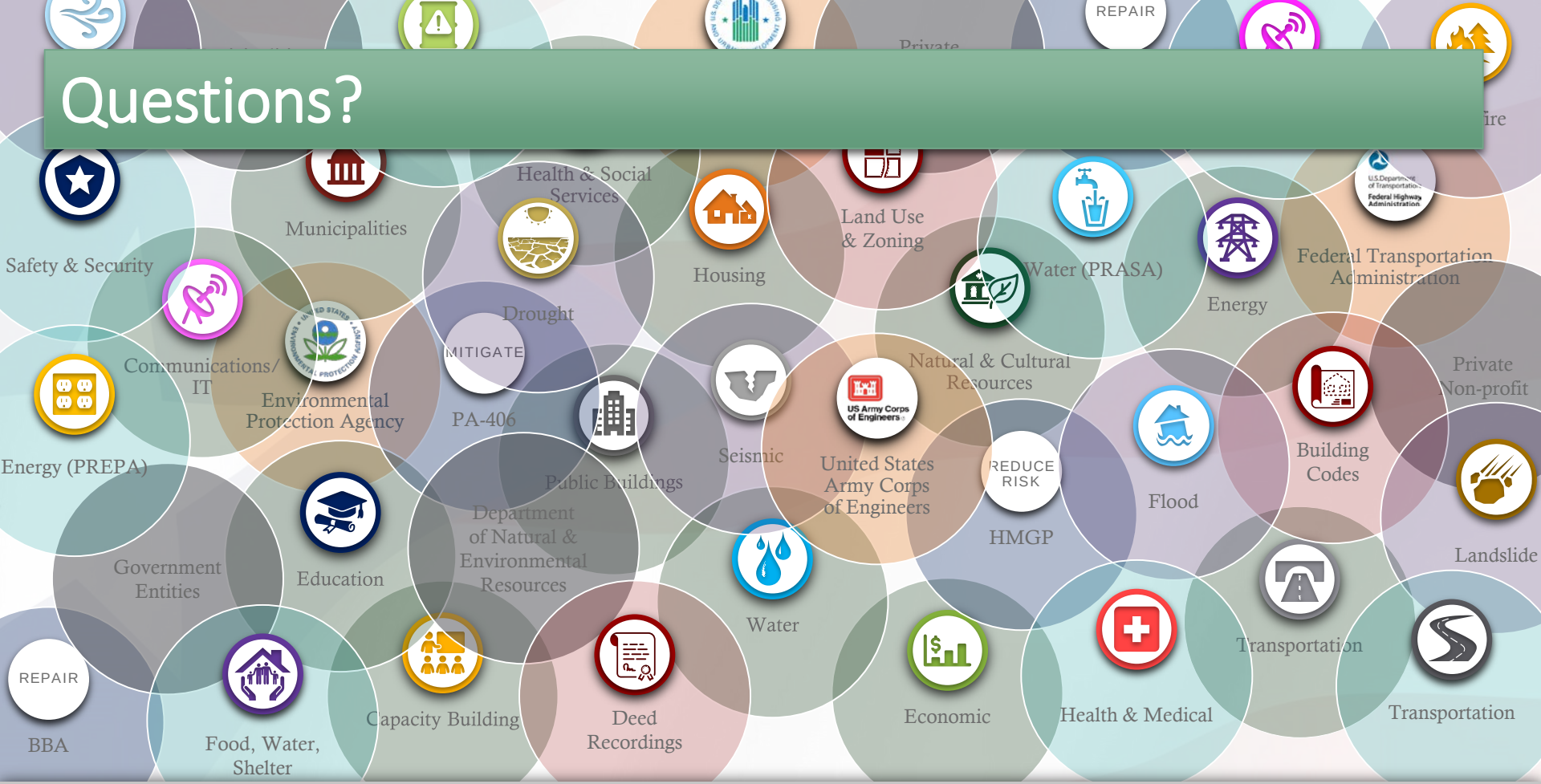
Section 406 Hazard Mitigation

- Front-loading hazard mitigation eligibility, technical feasibility, and cost-effective determinations
- Cooperative environment with Public Assistance Operations Team
- Coordination with State Hazard Mitigation Officer and COR3
- Applicant outreach and education on Hazard Mitigation
- Using BCAs as tool

Lessons Learned

- Encourage Regional Administrators to set Hazard Mitigation goals
- Hazard Mitigation Planning
  - Understand your Hazard Mitigation Priorities
  - Review local/State Hazard Mitigation Plan
  - Develop “shelf projects”
- Training staff on Hazard Mitigation
- Stand-up Hazard Mitigation Operations Cell
- Make recovery connections

Questions?


Safety & Security
Municipalities
Health & Social Services
Housing
Land Use & Zoning
Water (PRASA)
Energy
Federal Transportation Administration
Communications/ IT
Environmental Protection Agency
Drought
MITIGATE
PA-406
Natural & Cultural Resources
Private Non-profit
Energy (PREPA)
Public Buildings
Seismic
United States Army Corps of Engineers
REDUCE RISK
HMGP
Flood
Building Codes
Landslide
Government Entities
Education
Department of Natural & Environmental Resources
Water
Transportation
REPAIR
BBA
Food, Water, Shelter
Capacity Building
Deed Recordings
Economic
Health & Medical
Transportation
Sectors
Risks
Other Federal Funding Sources
FEMA Funding Sources
Applicants/ sub-applicants
Lifeline Infrastructure
Complexities