Conducting a Risk Assessment

Identifying Hazards & Potential Impacts to Community Assets

FEMA

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GOVERNOR'S OFFICE
OF EMERGENCY SERVICES

Housekeeping and Virtual Tour

- Technology Tour:
  - Polls.
  - Menti Board.
  - Annotation.
  - Chat and comment function.
  - Breakout rooms.
- Remember to mute!
- Recording.

- Follow-up:
  - Slides will be shared!
  - We will be providing an electronic certificate.

For any tech issues, message Toby Davine directly using the chat.

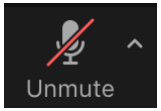
We will be Recording this Presentation

- Please be advised that FEMA and CalOES (through their contractor) will be recording this course.

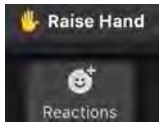
- The purpose of the recording will be to use for future reference, share with individuals who were unable to attend the presentation, and potentially otherwise at the agencies' discretion.

- By attending this course you are consenting to these conditions. Please be advised you can choose to self-identify or not during the Q&A.

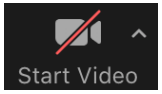
Housekeeping and Virtual Tour



- Please mute yourself when not speaking. To mute and unmute, select the microphone icon, or press *6 on a phone. Please only use one method to mute/unmute yourself to avoid 'double muting'.

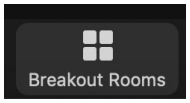


- If you have a question or comment, please use the chat box or the Raise Hand function on the top of your screen. This alerts the facilitator that you would like to speak. Click again to lower your hand after speaking.



Use video, if possible, to promote face to face communication. Click the video icon to turn on your webinar camera.

Live Transcript available.



Join a breakout room.

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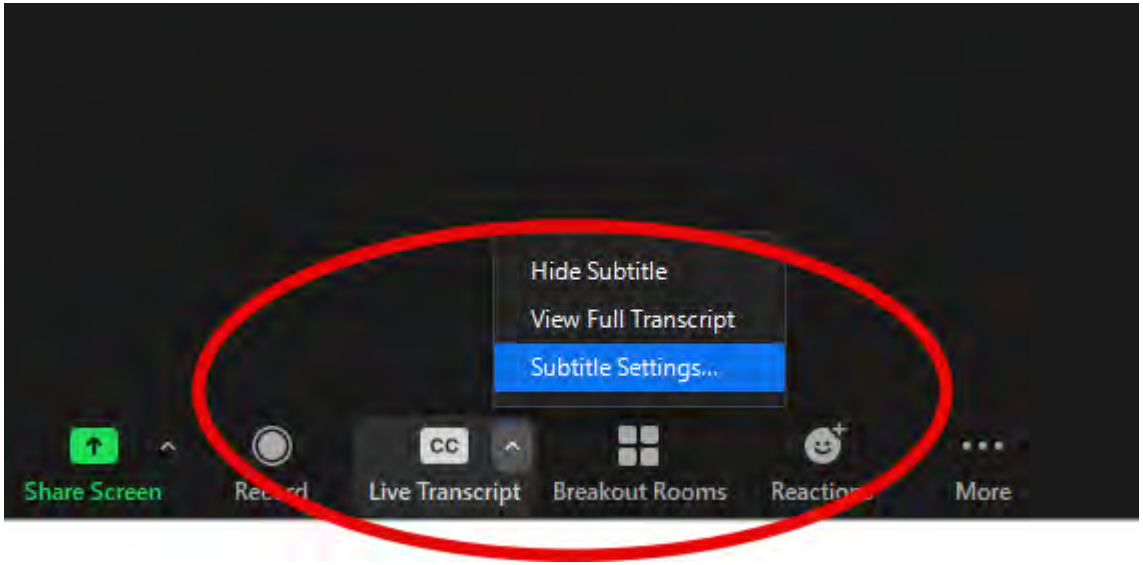
Live Transcript



- Zoom application settings allow customization of subtitles.

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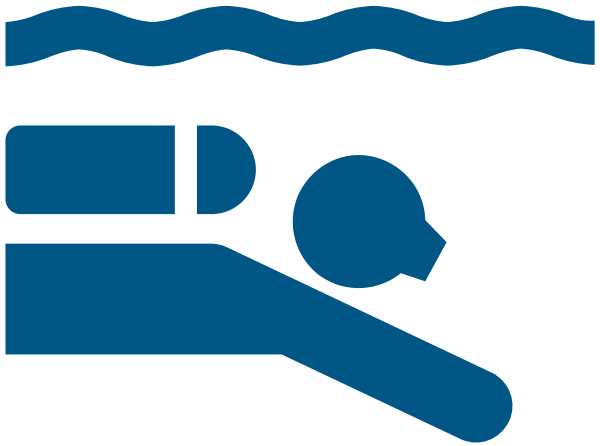
Let us know: Would you rather?

Would you rather be:

1. A deep-sea diver.
2. Astronaut.



Would you rather be:

1. Invisible.
2. Able to read minds.

Welcome!

Virtual G-318 Workshop: Local Mitigation Planning

- Module 1: The Planning Process
- **Module 2: Conducting a Risk Assessment**
- Module 3: Developing a Mitigation Strategy
- Module 4: Plan Maintenance and Implementation

Welcome!

Thank you for joining **Module 2: Conducting a Risk Assessment**

Today, we'll discuss:

- Risk Assessment Overview.
- Identifying and Profiling Hazards.
- Identifying and Profiling Exposed Community Assets.
- Assessing and Summarizing Impacts and Vulnerability.
- From Vulnerability to Mitigation.

This will be followed by the Office Hour and an introduction to the Resource Library.

Today's Agenda

9:00 AM – 9:15 AM	Welcome and Technology Tour
9:15 AM – 11:30 AM	Conducting a Risk Assessment • Learning Sessions • Activities and Breakout Rooms • Breaks
11:30 AM	Module Evaluation
11:30 AM – 12:00 PM	Office Hour/Resource Library Walk-through

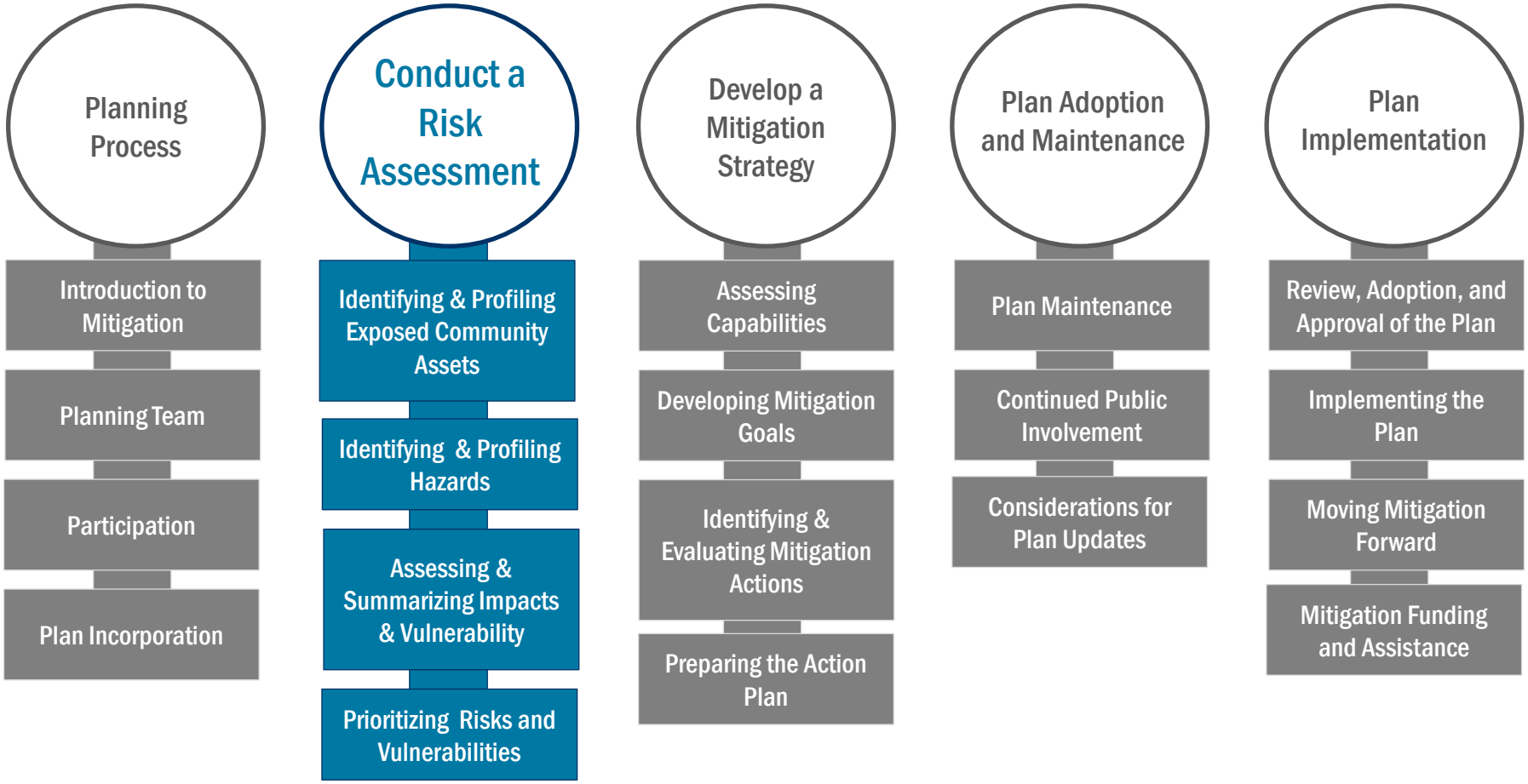
Today's Speakers

We'll hear from:

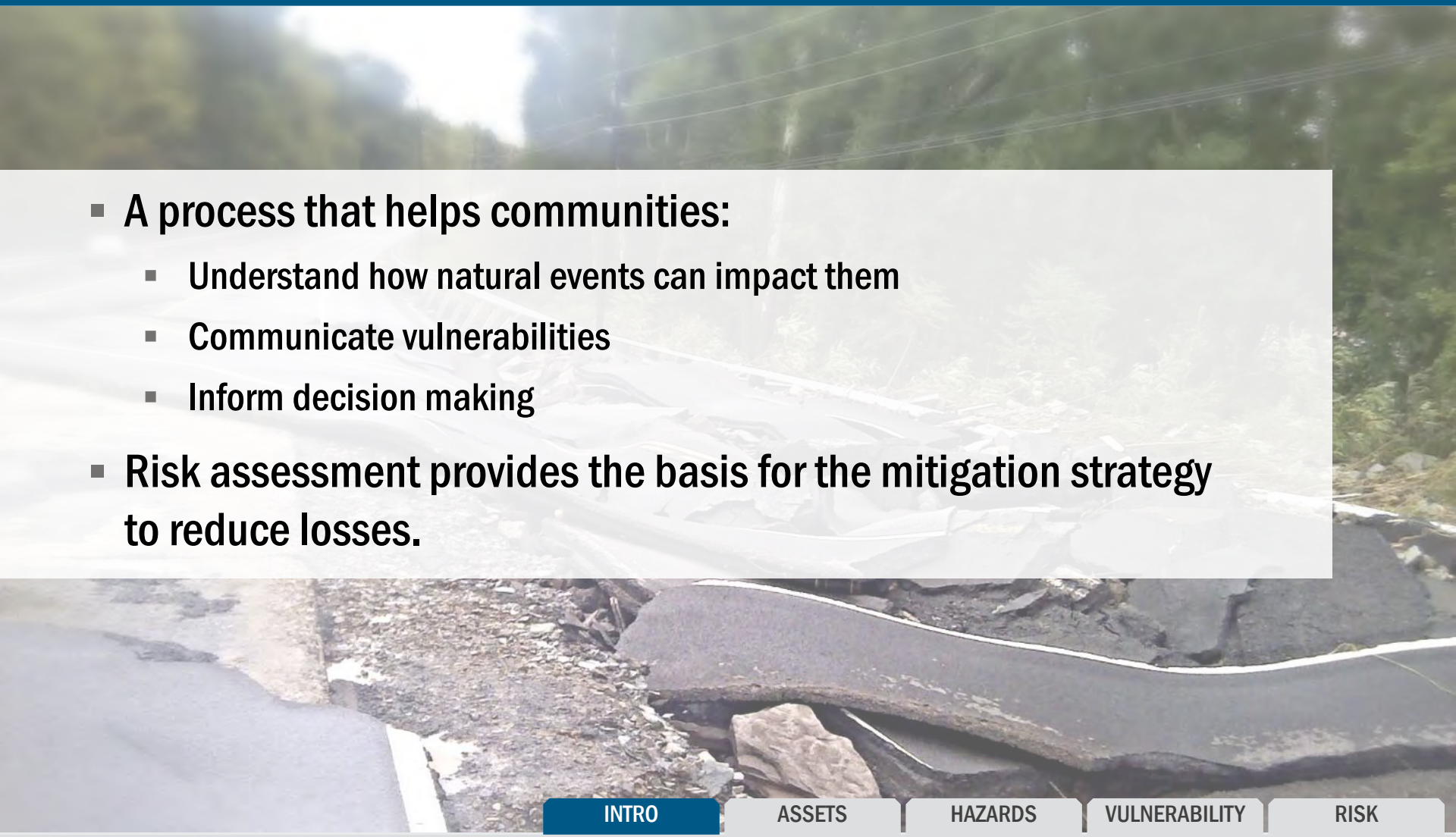
- Karen McCready-Hoover, Emergency Services Coordinator, CalOES Local Mitigation Planning
- Phillip Labra, Senior Emergency Services Coordinator, CalOES Local Mitigation Planning
- Xing Liu, Community Planner, FEMA Region 9

Risk Assessment Overview

Mitigation Training and Technical Assistance Modules



What Is a Risk Assessment?



- A process that helps communities:
  - Understand how natural events can impact them
  - Communicate vulnerabilities
  - Inform decision making
- Risk assessment provides the basis for the mitigation strategy to reduce losses.

Natural Hazard, Community Assets, and Risk

Note: Modified from U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models.

First, Look at the Current Approved Hazard Mitigation Plan

- Did FEMA or the State make recommended changes in the Plan Review Tool?
- Are the community assets from the old plan the same?
  - Think about substantial development that has taken place in recent years.
- What hazards did you profile?
  - Are there any new ones that should be included this time?
- How did you assess risk? Did it work?
- What will you do differently this time?

Identifying and Profiling Hazards

Natural Hazard, Community Assets, and Risk

Note: Modified from U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models.

Hazard Identification

- Identify all hazards that may impact a community.
- Provide the best available information to show hazard impacts.
- Reflect any changes in hazards since the previous plan.

Check your State's HMP for common hazards that you should consider profiling.

Types of Hazards

Natural Hazard

Technological Hazard

Human-Caused Hazard

- The focus on the mitigation plan should be on natural hazards, though others can be included, as well.
- Risks and hazards may have changed since your last update, or the quality of data may have improved. These changes should be incorporated.

Secondary/Cascading Hazards

- Some hazards can produce another, separate hazard, or “cascading event”.
- Consider discussing climate change as an exacerbating factor to a given hazard

Drought + Wildfire

Intense Rainstorms

Landslides + Flood After Fire

Hazard Profiling Includes:

- Location
- Extent
- Previous Occurrences
- Probability of Future Events

- Has anything changed since the current HMP was adopted?
- What new data are available?

Location

- Clearly identify areas vulnerable to damage by each natural event.
- If possible, show locations using maps.
- Specify hazards that affect entire planning area.
- Multi-jurisdictional plan needs to ID location of each hazard for each jurisdiction.

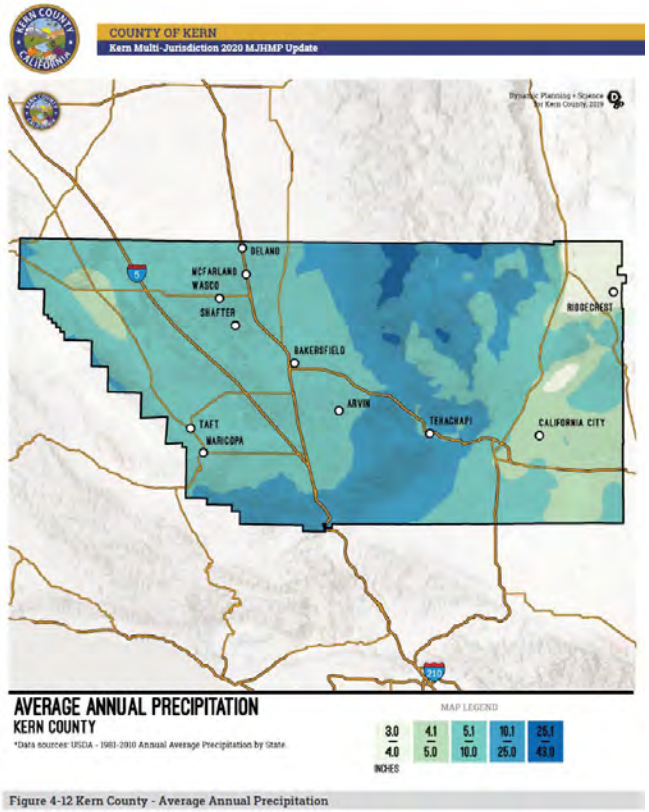


Figure 4-12 Kern County - Average Annual Precipitation

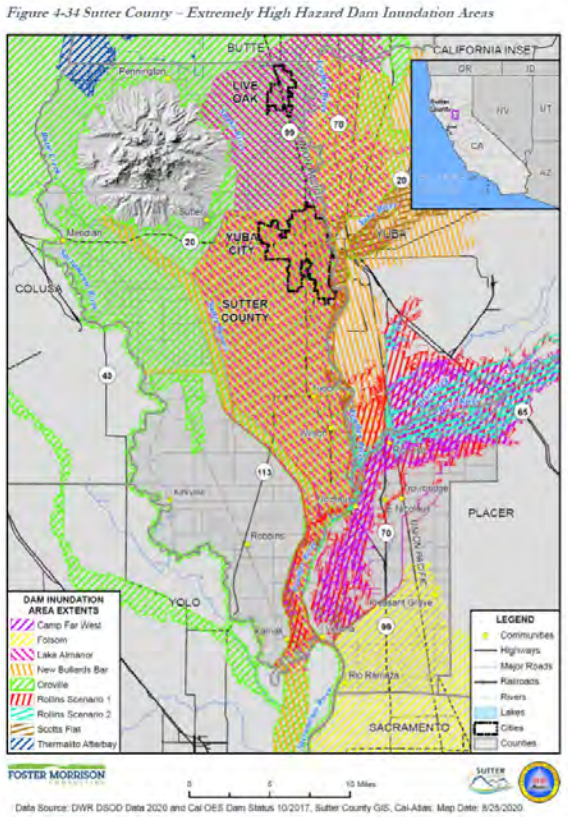


Figure 4-34 Sutter County – Extremely High Hazard Dam Inundation Areas

Extent

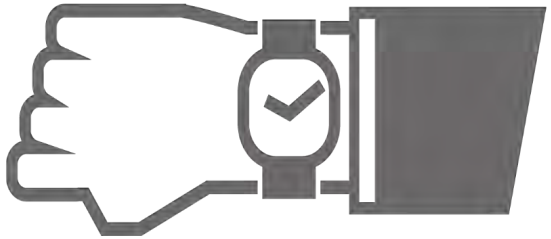
- **Do not confuse extent with geographic boundaries!**
- Measure of a hazard event's strength
  - Value on an established scientific scale or measurement system
  - Other measures of magnitude, such as water depth or wind speed
- Speed of onset of a hazard event
- Event duration
- Check your State HMP for examples

- Check out FEMA's Extent documentation at the Resource Library

Enhanced Fujita Scale (EF-Scale)

Previous Occurrences

- Describe how each hazard has affected your community in the past
- Consider including:
  - Dates of events
  - Description of the damage that occurred
  - Duration of each event
  - Include Presidential Emergency and Disaster Declarations
  - Local knowledge from elders and libraries
- Be sure to include events since previous HMP and as recent as possible



Probability of Future Occurrences

- Consider how often hazards occur.
- Looking at probability, consider one of the following approaches:
  - Qualitative Approach
  - Regional Data Approach
  - Down-scaled Data Projections Approach
  - Historical Analysis Approach

Qualitative Approach

- Descriptions can be based on community knowledge.
- You can use general descriptors.

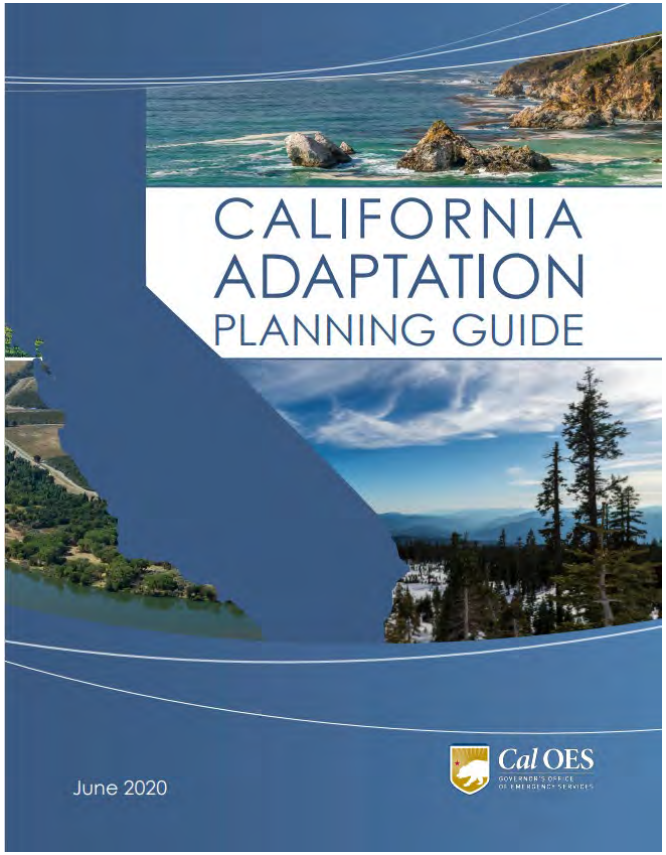
High = Every Year

Medium = Every Other Year

Low = Every Ten Years

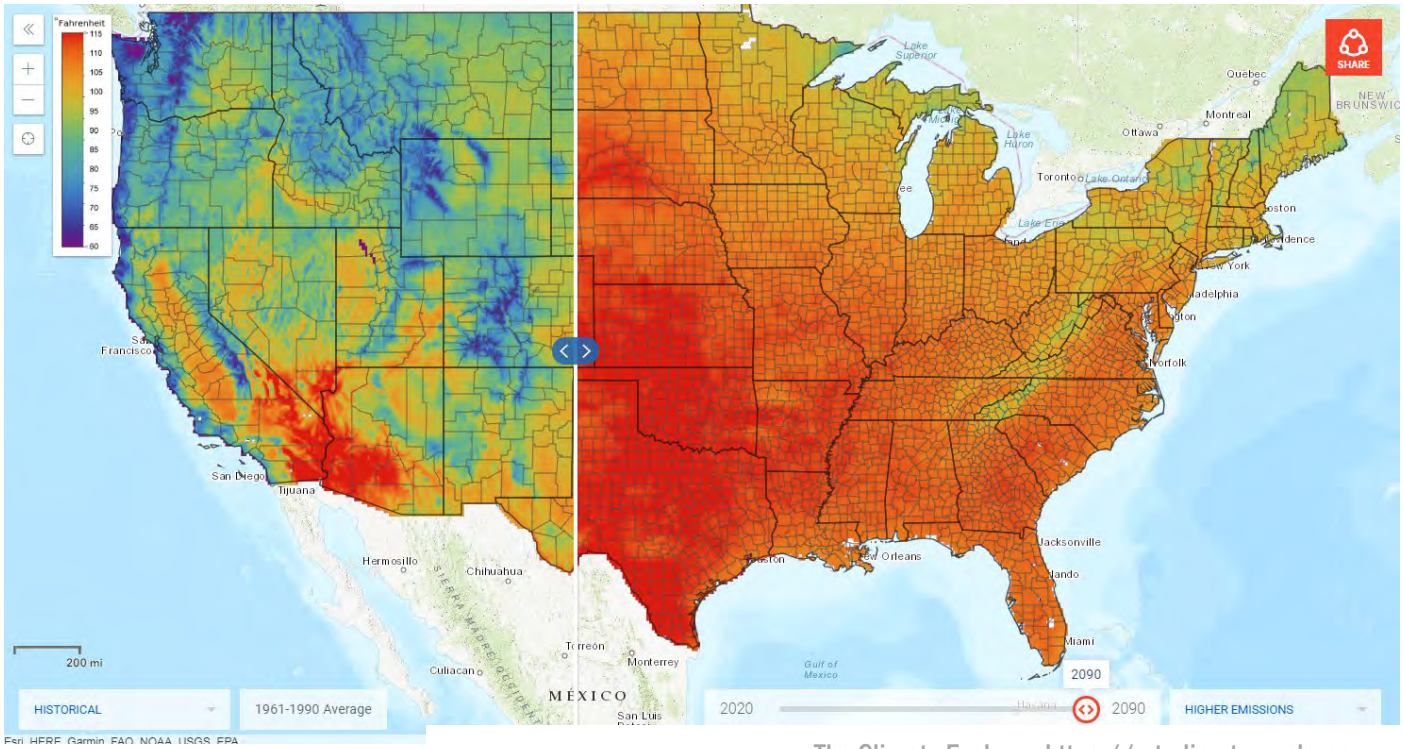
Regional Data Approach

- In California, local plans must use Adaptation Planning Guide (APG) for climate data
- Adaptation Clearinghouse- resilientca.org
- If local data is limited
  - Use National, Regional, or State data to identify probability
  - Look at climate trends affecting the Nation at large



Down-scaled Data Projections Approach

- Uses more localized data to identify trends
- Allows your community to see how future conditions will change



The Climate Explorer, https://crt-climate-explorer.nemac.org

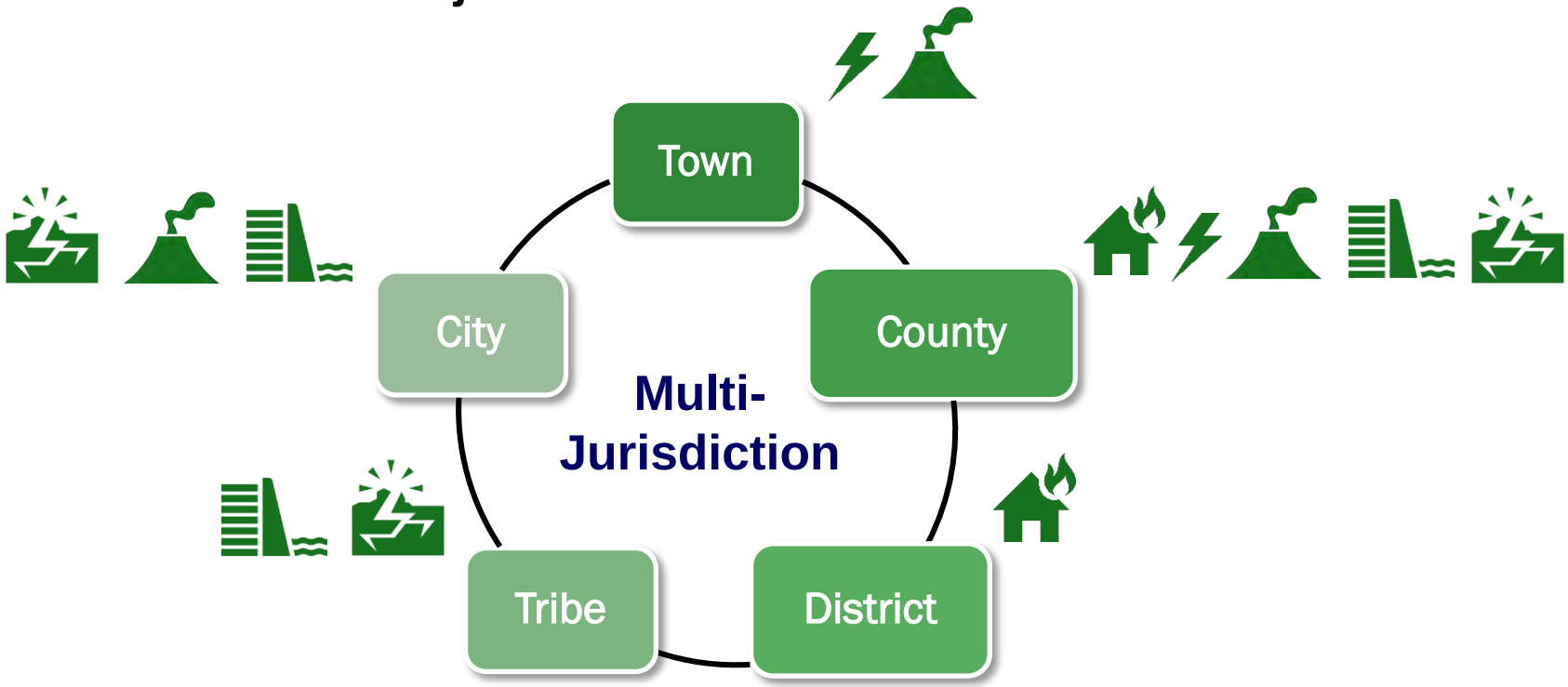
Historical Analysis Approach

- $\frac{Occurrence}{timeframe} = probability\ of\ future\ events$

$$\frac{\text{15 flooding event occurrences}}{\text{50 years with data recorded}} = \text{30\% chance of a future flood occurrence}$$

Multi-Jurisdictional Considerations

- Describe unique or varied hazards
- Assess risks for each jurisdiction



Questions?

Identifying and Profiling Exposed Community Assets

Natural Hazard, Community Assets, and Risk

Note: Modified from U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models.

Types of Community Assets

People *

Built Environment

- Structures (beyond what you own)
- Critical Facilities and Infrastructure

Natural Resources

Economy *

*Exposure of these assets is directly related to the other asset types

People

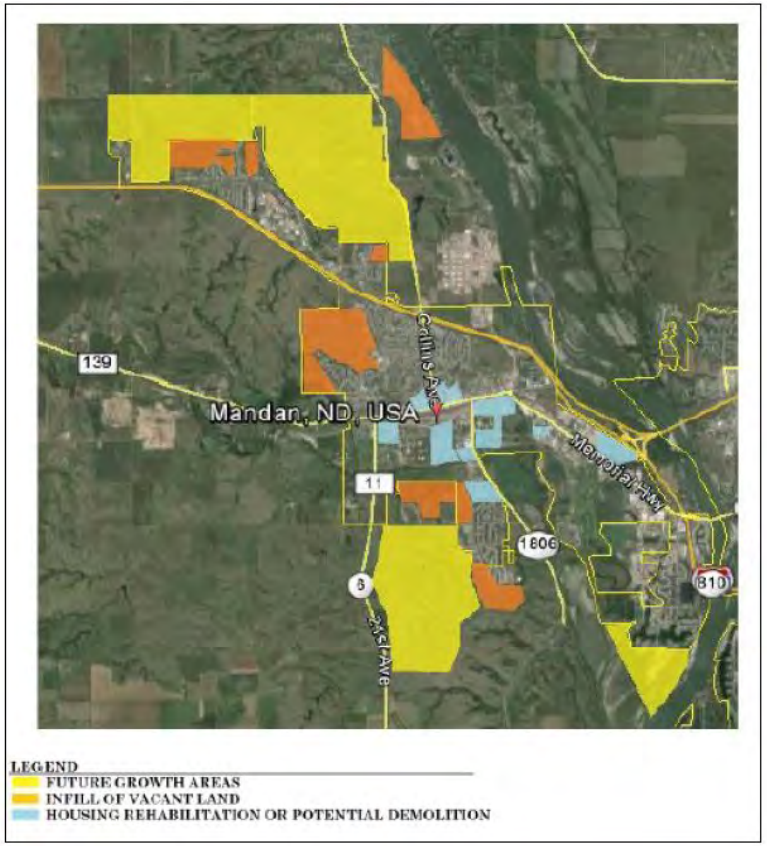
- Residents
- Workers
- Types and locations of visiting populations
- Higher Risk Populations
  - Seniors
  - Infants and children
  - Individuals with disabilities
  - People with limited English
  - People with insecure housing
  - Lower-income individuals

Who may experience higher risks?

- Listos California is a disaster preparedness campaign for higher risk demographics
- Provides culturally and linguistically appropriate support and training
- Higher risk groups should be meaningfully involved in the mitigation planning process

Built Environment: Structures

- Include locations, types, value, age and construction materials
- Consider infrastructure:
  - Existing
  - Future Development



Activity #1: Characteristics of the Built Environment

What characteristics about the built environment should you be inventorying? It depends on the hazard!

Use the chat box to share your answers with the group.

Flood

Fire

Earthquake

Where to find structure information for your community

- HAZUS- general building stock
- U.S. Census
- Open source maps (e.g. Google Earth/Maps)
- THIRA
- County tax assessor parcel data
- General plan
- Local housing element
- Local general or specific plans
- Local zoning code

Built Environment: Critical Facilities and Infrastructure

- Plan should include:
  - Location, types, age, and value
  - Relation to one another
- Identification and profiles should also include:
  - Planned improvements
  - Infrastructure for new development

Where to find critical facility and infrastructure information

- Homeland Infrastructure Foundation-Level Data (public)
- US Census
- Public works department
- Local, Regional or State transportation departments
- County OES
- Regional planning consortiums (MTC, ABAG, SACOG, SANDAG, etc.)

Built Environment: At-Risk Historic Assets

- Review the State Historic Preservation Office's (SHPO) inventory of historic assets.
- Compare with SHPO priorities, e.g., grant opportunities that help fund mitigation actions (for which those assets may be eligible).

Natural Resources

Areas where conservation of environmental functions:

- Reduce magnitude of hazards
- Help achieve other community objectives
- Protects critical habitat areas

Economy

- Major employers
- Primary economic sectors
- Key infrastructure that supports economic activity

Identifying At-Risk Assets

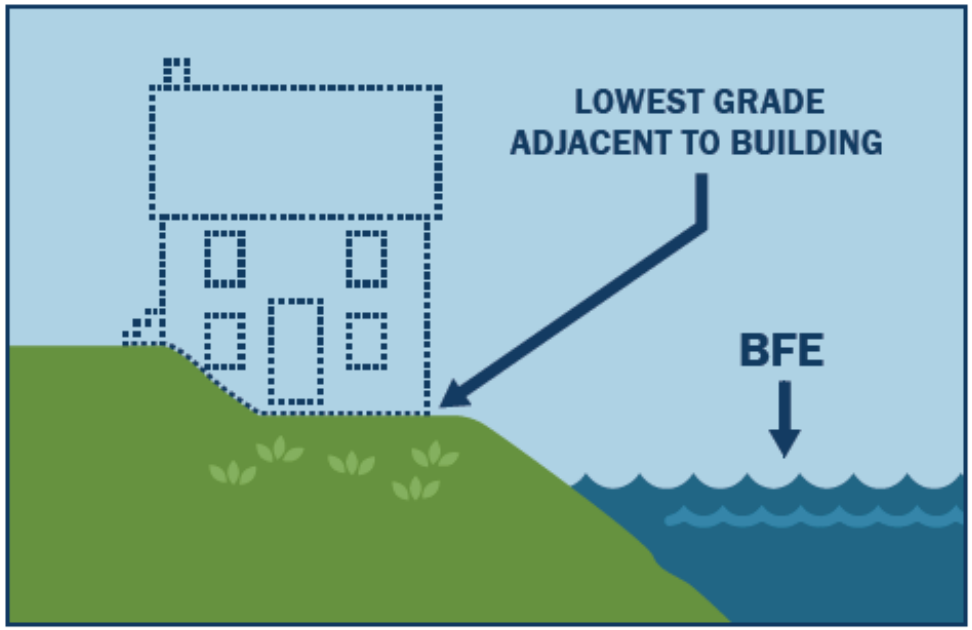
- Geographic Information Systems (GIS) is a way of analyzing and presenting geographic data such as land uses and risk areas.
- If GIS is available: Overlay mapping and hazard information that has been created with the locations of community assets.
- If GIS is not available: Use local knowledge of structure locations relative to known hazard locations, noting the hazard type and extent.

New Flood Maps Show Assets Near Floodplain

Identifying At-Risk Assets

- If you have a list of assets already, confirm that it's still valid.
- Consider assets that may have been added through new development or demographic change.

Park Visitor Center (Under Construction)



Community Lifelines

- Lifelines are another way to conceptualize critical assets.
- These are the most fundamental services in the community.
- When disrupted, decisive intervention is required to stabilize the incident.

Activity #2: Community Lifelines and Hazards

What lifelines support hospitals and are vulnerable to natural hazards?

Use the chat box to share your answers with the group.

How do HMPs Incorporate Community Lifelines?

City and County of San Francisco Hazards and Climate Resilience Plan, 2020

Transportation

On a daily basis, and in response to and recovery from a hazard event, San Franciscans depend on reliable, affordable, and accessible transportation. In addition, the functionality of many City and community assets depends on transportation access. Critical transportation assets are vulnerable to current and future hazards and impairment could have citywide or regional consequences. These considerations relate to city's climate goals of achieving 80% sustainable trips (walking, biking, public transit) in a world with more frequent climate hazard events.

Geographies

- Citywide
- Particularly: Waterfront

Sectors

Sector	Asset Class
Transportation	Roadways, Public Transit, SFO, Water-Based Transportation
Emergency Response	Critical Response Facilities, Other Emergency Sites

Vulnerabilities

- Residents depend on public transit for access to critical facilities during and after a hazard event, including cooling, heating, air quality centers.
- Current roadway flooding impacts safety and access for bicyclists, pedestrians, and motorists. This issue may become more severe in the future with SLR and intense precipitation events.
- Embarcadero Station and parts of Muni T-Third and Caltrain may be exposed to future flooding due to SLR. MUNI Metro East light rail and Ocean Blvd see current impacts from King Tides and winter storm flooding.
- Air quality and extreme heat events impact biking, walking, and transit use due to health concerns.

Utilities

Utilities are critical for daily needs of households and businesses and disruption can have significant consequences for public health and the economy. In addition, utility restoration following a disaster is critical for recovery and there are many interdependencies. The SFPUC has made significant improvements and more are planned/underway through Sewer System Improvement Program (SSIP), Water System Improvement Program (WSIP), and Emergency Firefighting Water System (EFWS). Even with major improvements, elements of these utility systems may remain vulnerable to hazards. For some systems, there are limited alternatives and redundancies (e.g. potable water), so reducing damage and disruption is critical. The Lifelines Restoration Performance Project is taking a deeper dive of the issue of lifeline utilities and recommended actions to improve restoration timelines for earthquakes.

Geographies

- Citywide
- Particularly: Waterfront

Hazards

Sectors

Sector	Asset Class
Utilities and Infrastructure	Stormwater/Wastewater, Potable Water, Emergency Firefighting Water System (EFWS), Power, Natural Gas
Emergency Response	Critical Response Facilities, Other Emergency Sites

Vulnerabilities

- The stormwater/wastewater and potable water systems may be vulnerable to future coastal flooding due to sea level rise, particularly sensitive assets in low-lying areas.

Questions?

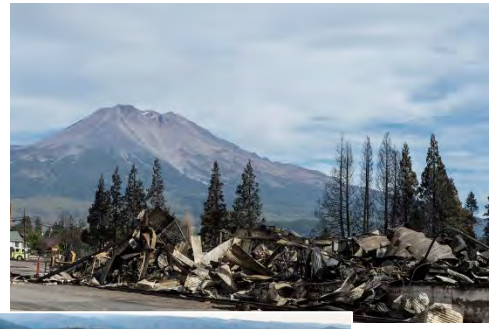
Break

FEMA

Assessing and Summarizing Impacts and Vulnerability

Assess Impacts and Vulnerability

- Look at the impacts for each hazard:
  - Identify population and assets exposed to hazard
  - Define unsafe community or structural conditions (vulnerability)
  - Estimate future potential losses (impacts)
  - Provide an overall summary of the community's assets, populations, and greatest vulnerabilities



Impact and Vulnerability

Impact

The different ways a hazard can affect the community

- Lives
- Structures
- Infrastructure and facilities
- Economy
- Historical value, etc.

Vulnerability

Weakness or gap in protection to an exposed asset

- Characteristics of population
- Age and condition of infrastructure
- Proximity to hazards

Impact vs. Extent

- **Impact**
  - Refers to the effect of a hazard on the people and property in the community, for example:
    - Injuries and deaths
    - Percentage of property damaged
- **Extent**
  - The potential magnitude of a hazard no matter where it hits or what is in harm's way
  - This does not refer to the geographic location!

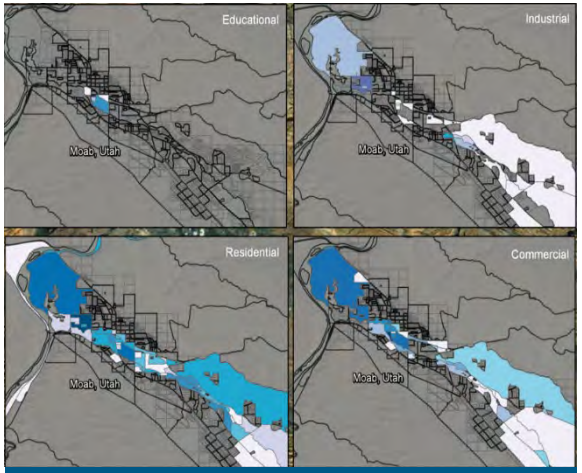
Methods for Assessing Vulnerability and Impacts

Historical Analysis

Start with your past

Exposure Analysis

Overlay your assets



Scenario Analysis

Ask yourself "what if?"

Historical Analysis: Start With Your Past

Based on past events, what are potential future impacts and losses?

- Use for higher frequency events with available data on past impacts and losses (e.g., winter storms, stormwater flooding).
- Consider vulnerability of new development.

Exposure Analysis: Overlay Your Assets

Consider:

- Number, type, value of assets
- Magnitude of hazard or event (e.g., high vs. moderate wildfire hazard areas)
- Possibility of future development in hazard-prone areas based on planning and zoning

Example: Exposure Analysis

Scenario Analysis: Ask Yourself "What if?"

Consider:

- Potential impacts if an event occurs, i.e., direct damage, casualties, down time, and others
- Quality and availability of data
  - Available tool(s)
  - Modeling tools like Hazus
  - Spreadsheet analysis

HAZUS
MULTI-HAZARD LOSS ESTIMATION

Example- Scenario Analysis Using HAZUS

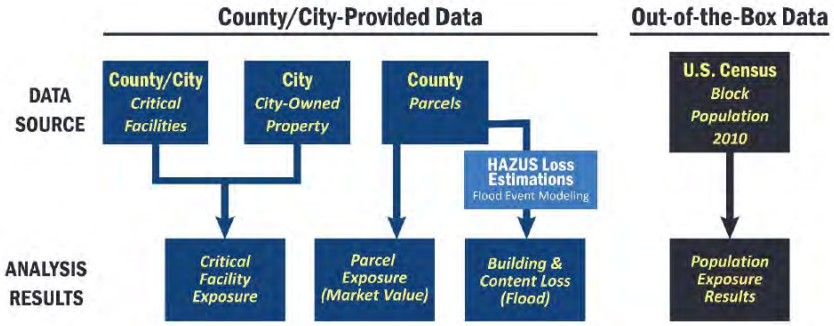
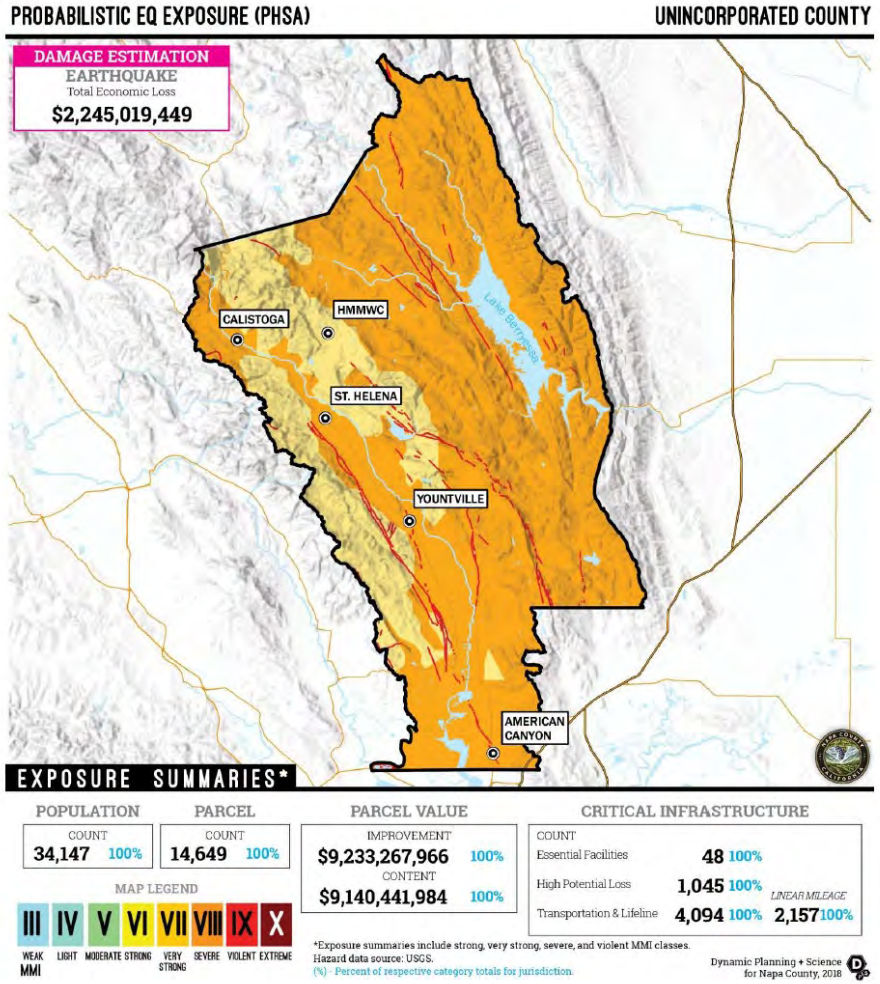
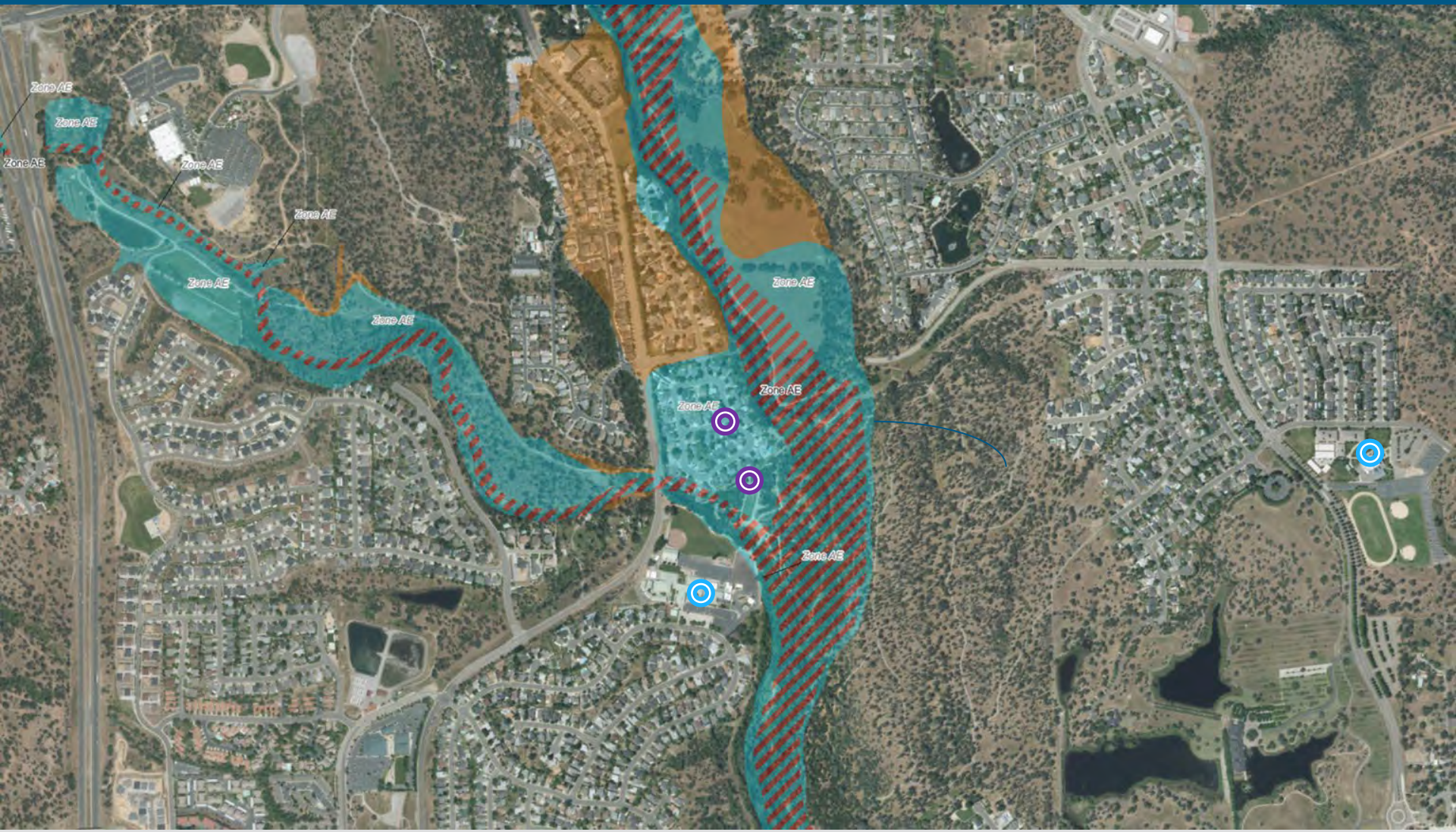


Table 4-20: Age of Structures in Napa County

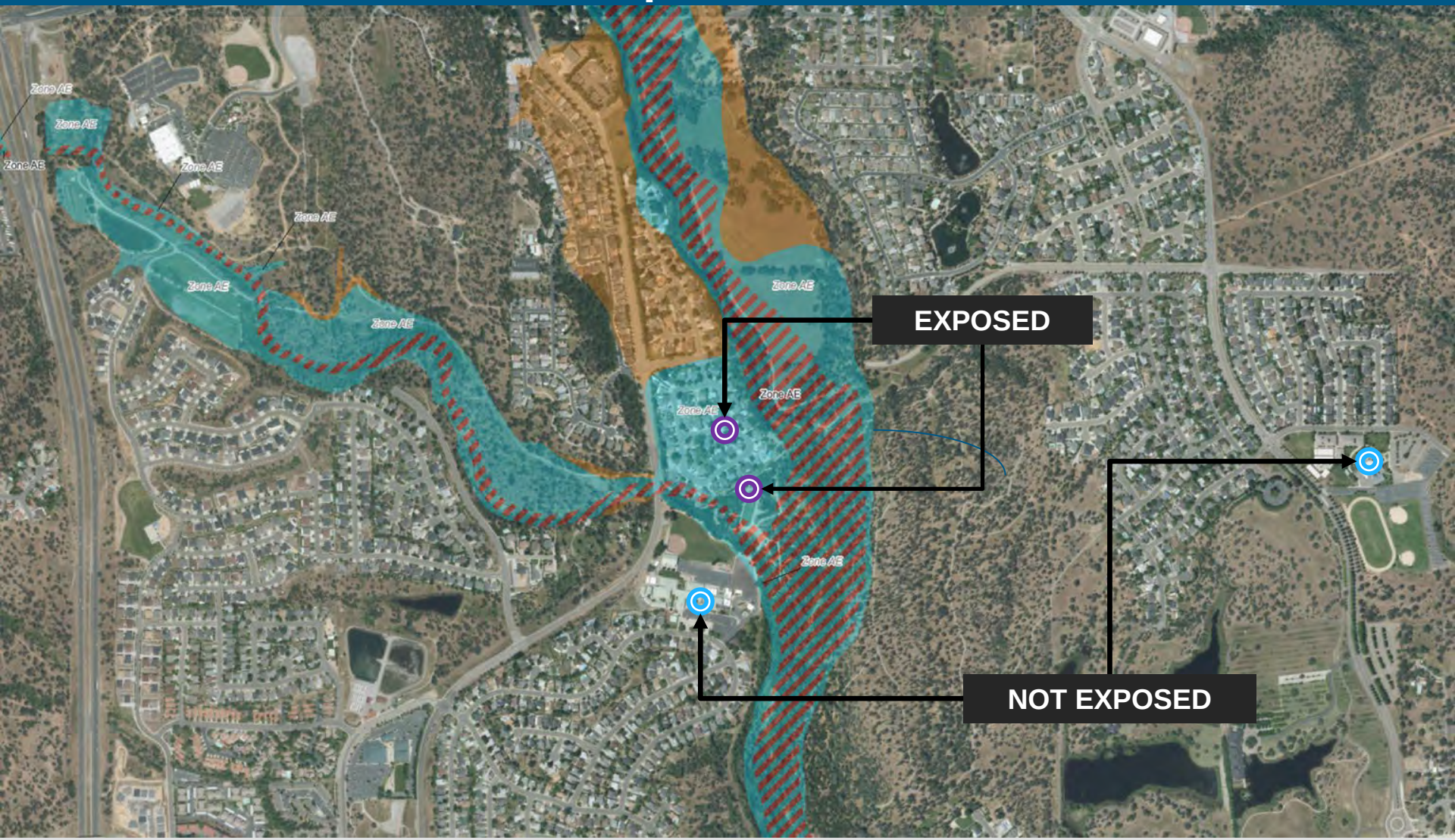
Time Period	No. of County Parcels with Improvements in Period	Significance of Time Frame
Pre-1933	4,167	Before 1933, there were no explicit earthquake requirements in building codes. State law did not require local governments to have building officials or issue building permits.
1933-1940	1,546	Before the first strong motion recording was made in 1940.
1941-1960	10,621	Prior to when the Structural Engineers Association of California published guidelines on earthquake construction in 1960.
1961-1975	10,574	Prior significant improvements to lateral force requirements in 1975.
1976-1994	11,178	Prior to the Uniform Building Code being amended to include provisions for seismic safety in 1994.
1994 - present	10,019	Seismic code is currently enforced.



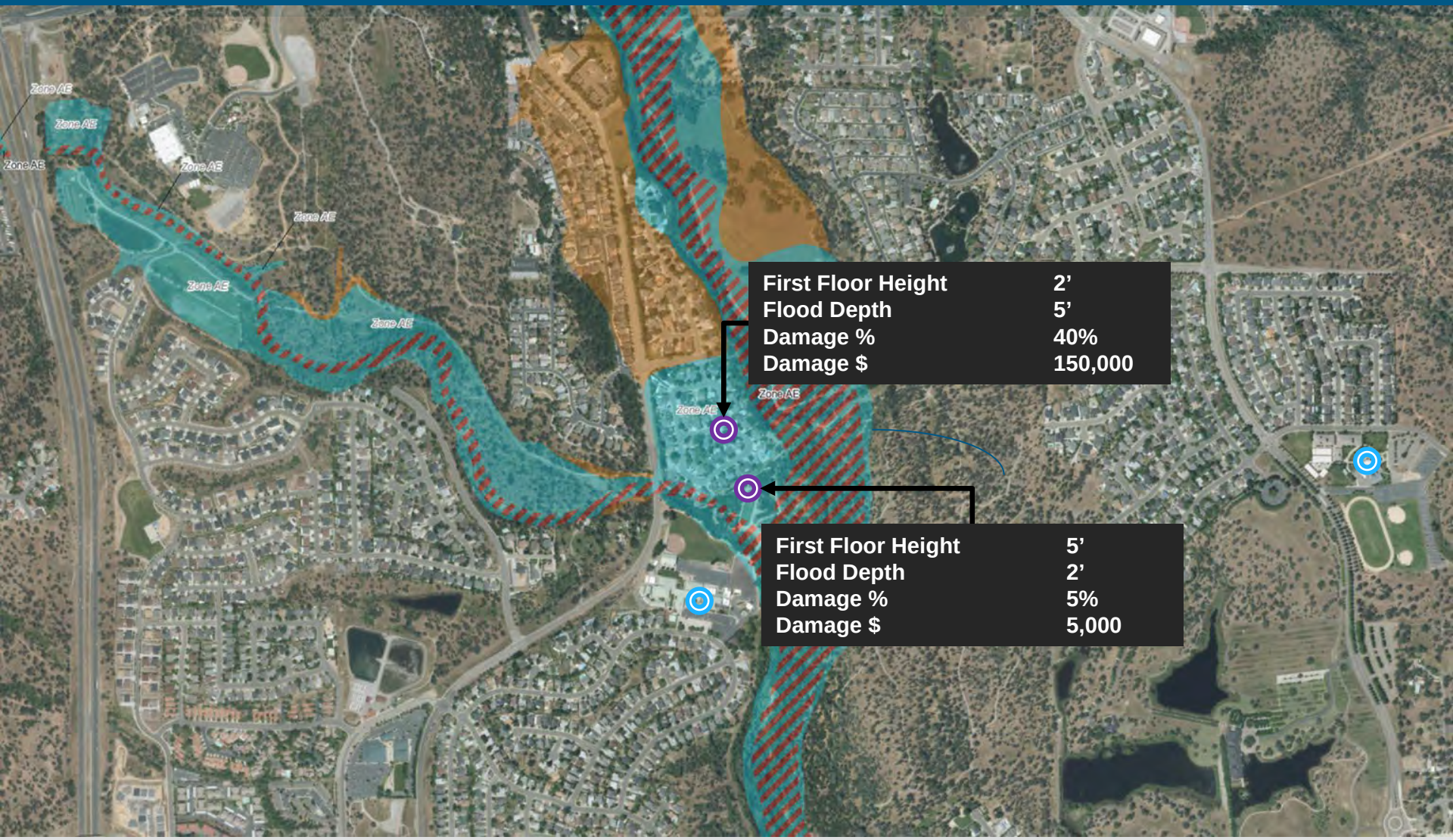
Demo: Risk and Vulnerability Analysis



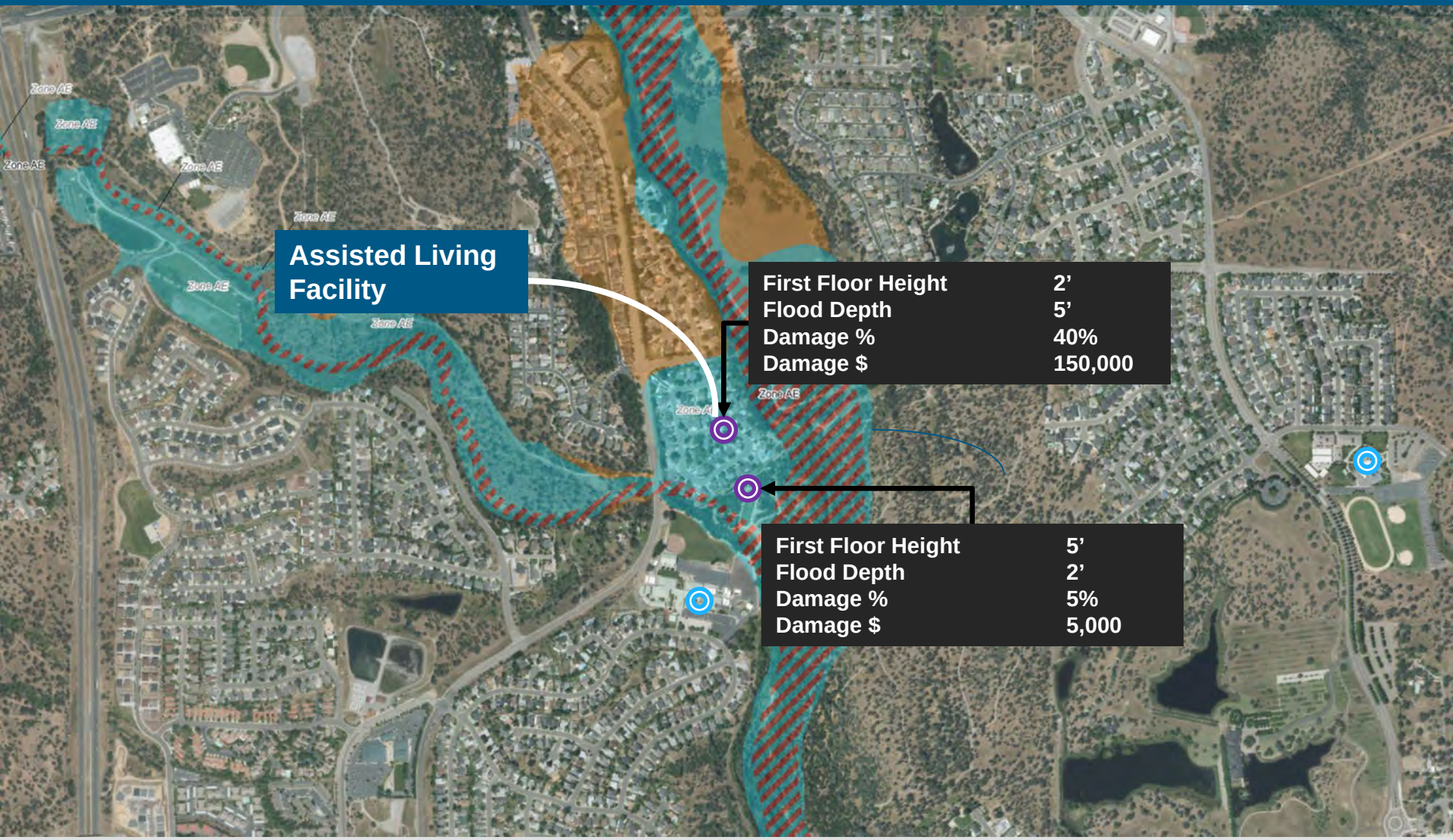
Which Structures are Exposed to Flood Risk?



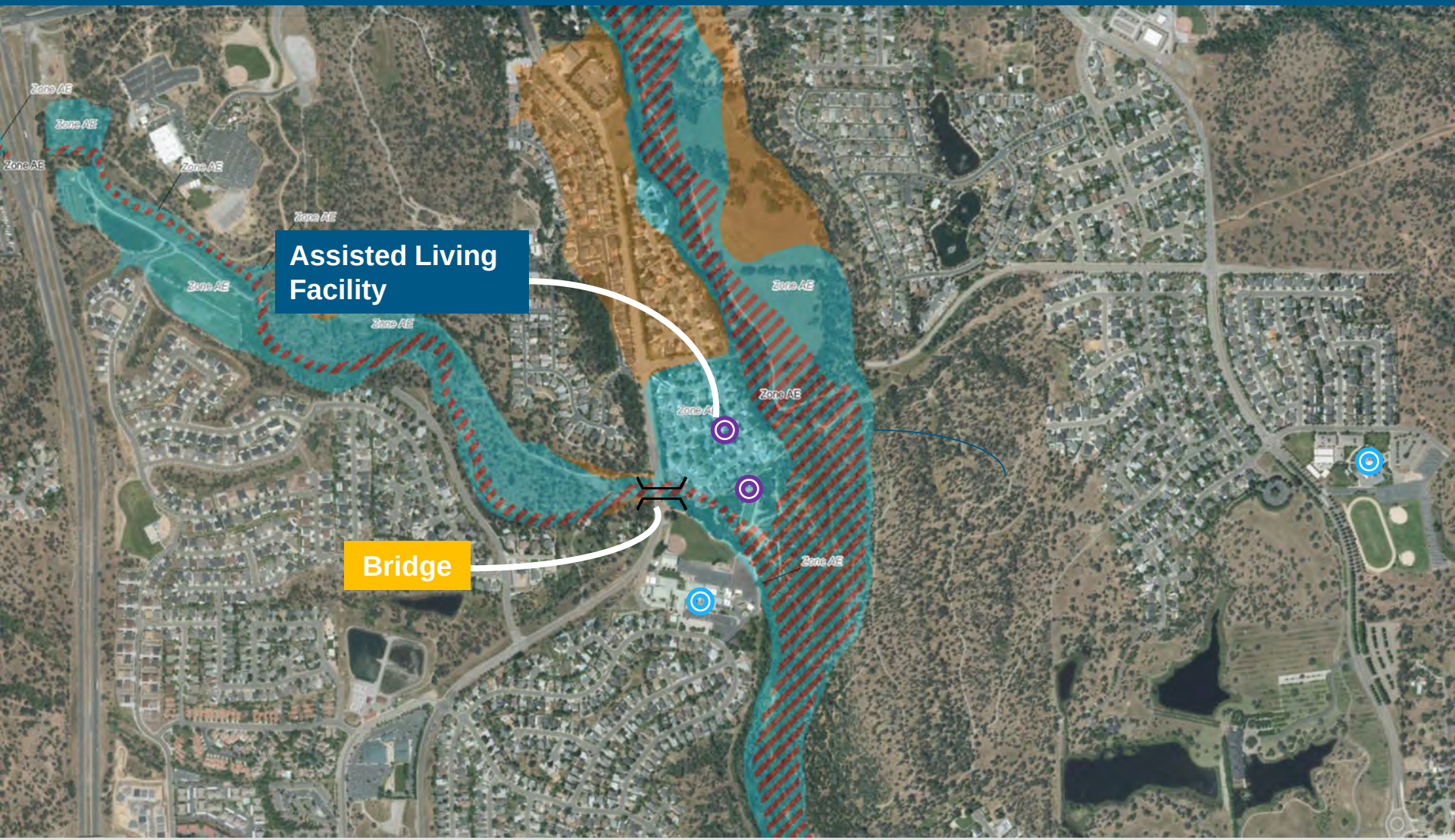
Exposure = Risk? No!



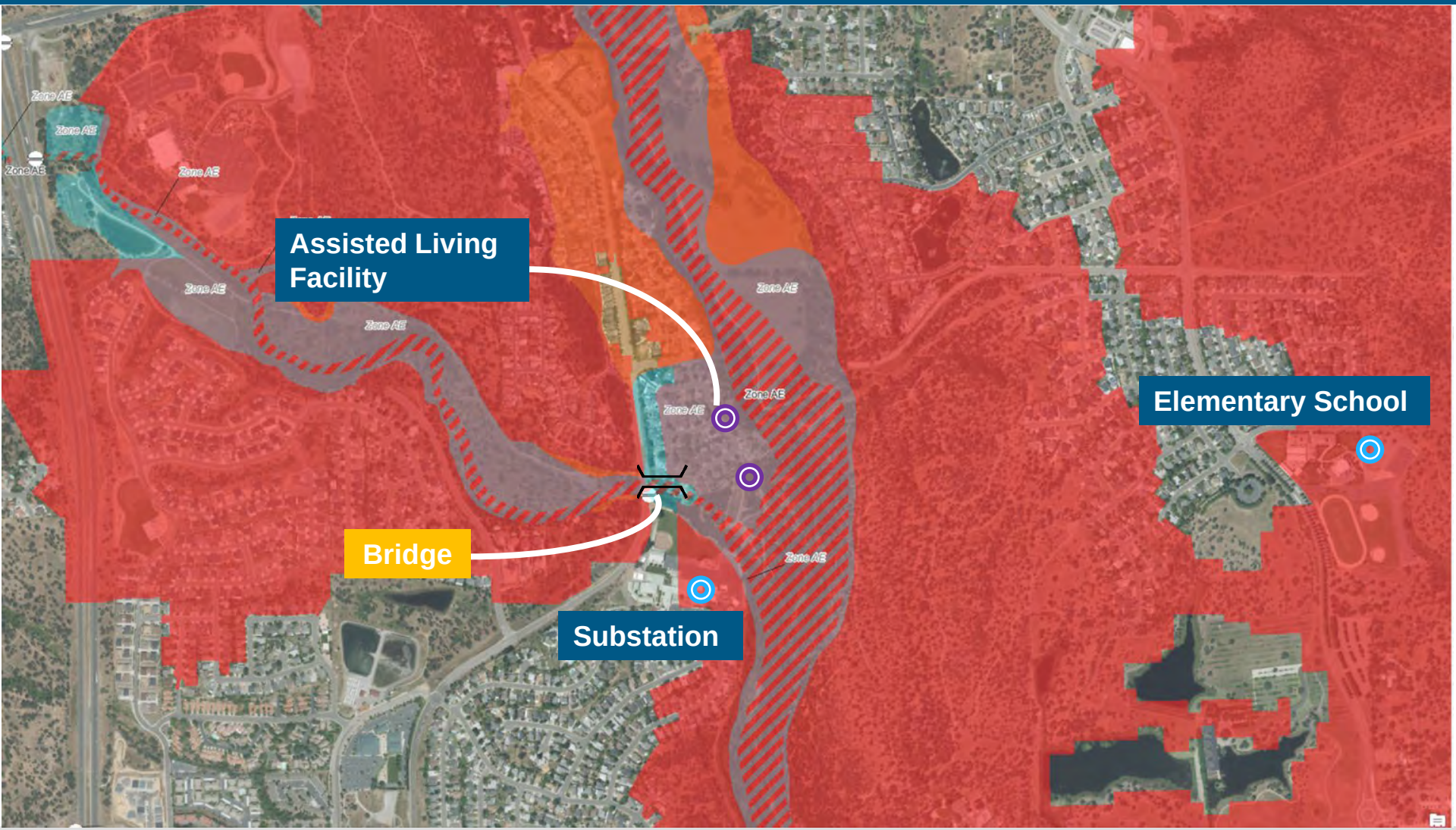
Not Only Consider the What, but the Who



Not Only Consider the Structures, but the Essential Infrastructures that Service these Structures



Does the Risk Change if We are Dealing with Multiple Hazards?



Considerations for Updating the Risk Assessment

- Increasing vulnerability from development in hazard-prone areas, climate change, etc.

- Decreasing vulnerability due to implementation of mitigation actions, adoption of improved codes and ordinances, etc.

How Can Plan Integration Improve the Process?

- More readily available, useful data
- Examples include:
  - Community land use changes already captured in the Comprehensive Plan
  - High risk areas already listed in the Emergency Operations Plan
  - Critical facility data inventories conducted by local fire official

Summarize Overall Vulnerability and Impacts

- Summarize each jurisdiction's overall vulnerability to each hazard.
- Focus on communicating analysis and findings to:
  - Emergency managers
  - Planners
  - Policy makers
  - Community members

Questions?

Break

FEMA

From Vulnerability to Mitigation

Develop Problem Statements

- Use the information from the Risk and Vulnerability Assessments to formulate problem statements
  - Clear, concise
  - Easily understood
  - Identify key issues or problems
  - Relate to specific community assets or hazards

Example Problem Statements

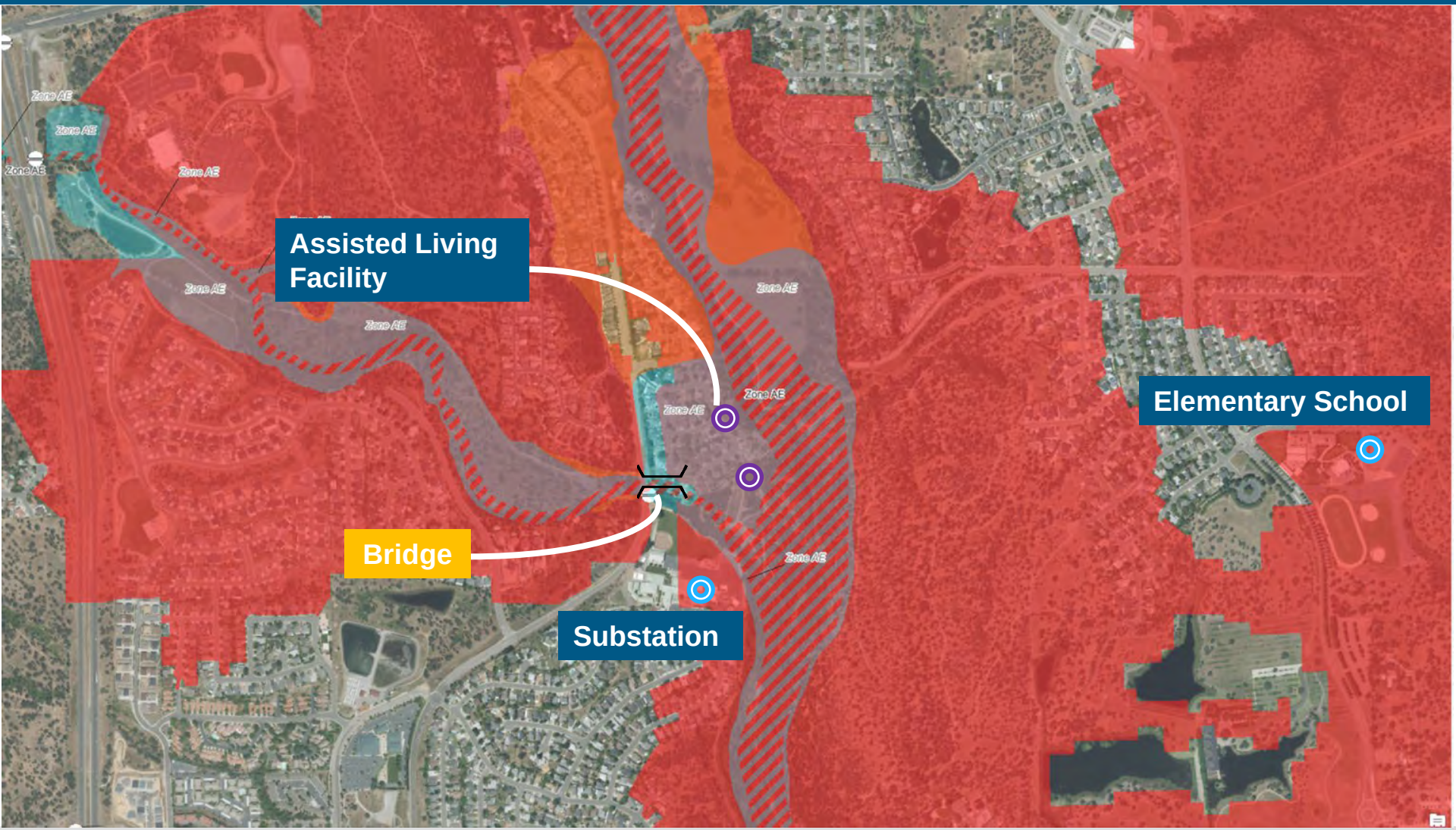
Napa County, CA

"79 critical infrastructure features (including 15 adult residential facilities and 12 family child care homes) are located in a severe earthquake probability zone in American Canyon."

Kern County, CA

"Properties in the area of Kelso Creek have a total value of approx. $7.5 million, and many properties are not floodproofed to the County's standards. Flooding could affect more than 200 residents in the area. Portions of Kelso Creek Road are at risk with an average cost of repairs of approximately $80,000 each time it floods."

Remember this Risk Assessment?



Activity #3: Identifying Problems

We will spend the next 15 minutes in small groups discussing and identifying possible problem statements pertaining to the previous risk assessment.

-

You'll be randomly sorted into a breakout rooms.

-

Afterward, we will reconvene, and each group will have the opportunity to provide a high-level summary of what was discussed. Please identify someone to report out to the larger group.

Activity #3: Identifying Problems

- Your facilitator will use the risk assessment results from the previous exercise.
- The goal is to come up with possible problem statements pertaining to that assessment.
- We'll come back to these problem statements in Module 3.

Activity #3: Identifying Problems

Report Out

Repetitive and Severe Repetitive Loss Properties

- **Repetitive Loss (RL) Property**
  - Any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling 10-year period, since 1978
  - May or may not be currently insured by the NFIP
- **Severe Repetitive Loss Property**
  - When there are at least four losses, each over $5000; **or**
  - two or more losses where the building payments are over the property value

Questions?

Module Evaluation

Visit the Resource Library at: Hazard Mitigation Local Hazard Mitigation Program