



City of Ridgecrest, California

**Military Installation
Resiliency Study/Risk
Assessment of China
Lake, Ridgecrest, and
Surrounding Areas**

**Policy and Technical Committee Meeting:
Review Draft Risk Scores
July 2022**



CITY OF RIDGECREST, CALIFORNIA

Military Installation Resiliency Study/Risk Assessment of China Lake, Ridgecrest, and Surrounding Areas

Purpose

- Review Risk Scores
- Prioritize Projects

The risk assessment methodology is a guideline to help prioritize projects, but your input and concerns ultimately determine the projects carried forward.



CITY OF RIDGECREST, CALIFORNIA

Military Installation Resiliency Study/Risk Assessment of China Lake, Ridgecrest, and Surrounding Areas

Agenda

- Risk Assessment Methodology
- Risk Assessment Results
- Project Prioritization
- Next Steps
 - Schedule
 - Questions

Policy and Technical Committee Members



Policy Committee

- Jed McLaughlin, Deputy City Manager, City of Ridgecrest
- Councilman Scott Hayman, Ridgecrest City Council
- Supervisor Phillip Peters, District 1, Kern County Board of Supervisors
- Captain Jeremy Vaughan, Commanding Office, NAWS China Lake (Ex-Officio Member)
- Dave Janiec, China Lake Alliance Executive Director

Technical Committee

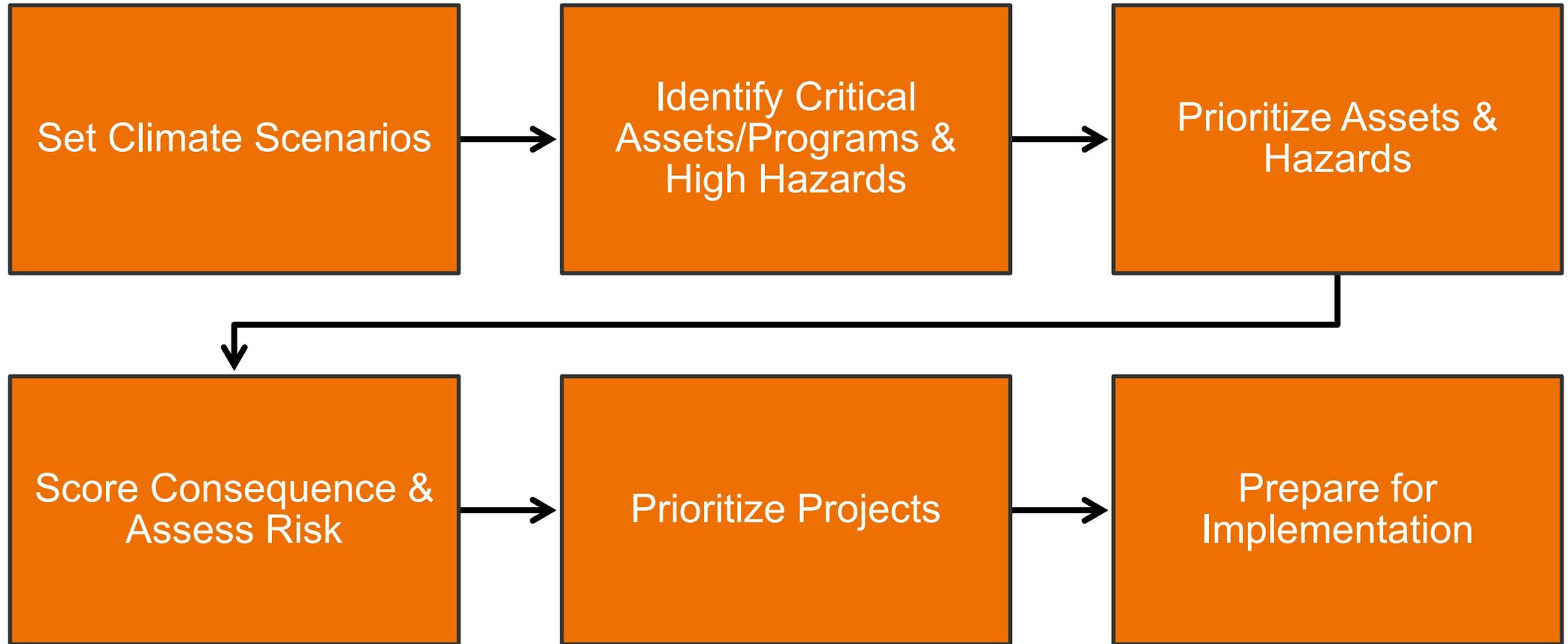
- Travis Reed, Public Works Director, City of Ridgecrest
- Lorelei Oviatt, AICP, Director, Kern County Planning
- John Kersey, Community Planning Liaison Officer, NAWS China Lake (Ex-Officio Member)
- Renee Morquecho, Chief Engineer, Indian Wells Valley Water District
- Calvin Rossi, Region Manager, Southern California Edison
- Scott O'Neil, Executive Director, Indian Wells Valley Economic Development Corporation



Risk Assessment Methodology



Process for Military Installation Resilience Assessment





Resilience

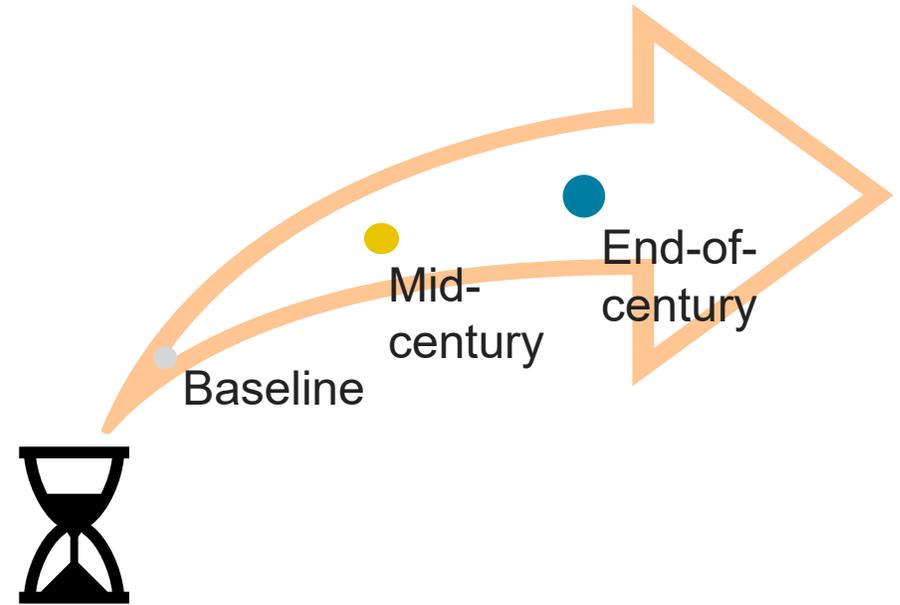
Past \neq Future

Building and planning codes, regulations, and standards are based on historical data



Time Horizons

- **Climate:** ~30-year average
- Current climate baseline:
 - **1961-1990**
- Future climate projections:
 - Based on asset lifecycle or design horizons:
 - Mid-century: 2035-2064
 - End of century: 2070-2100



Community Lifelines



Water:
Groundwater, Water/Wastewater Treatment Plants, Distribution



Safety and Security:
Public Safety Building



Health and Medical:
Hospital, Stormwater Park, Nature-Based Solution, Health System



Energy:
Power Grid, Microgrids, Renewables



Communications:
Communication Updates



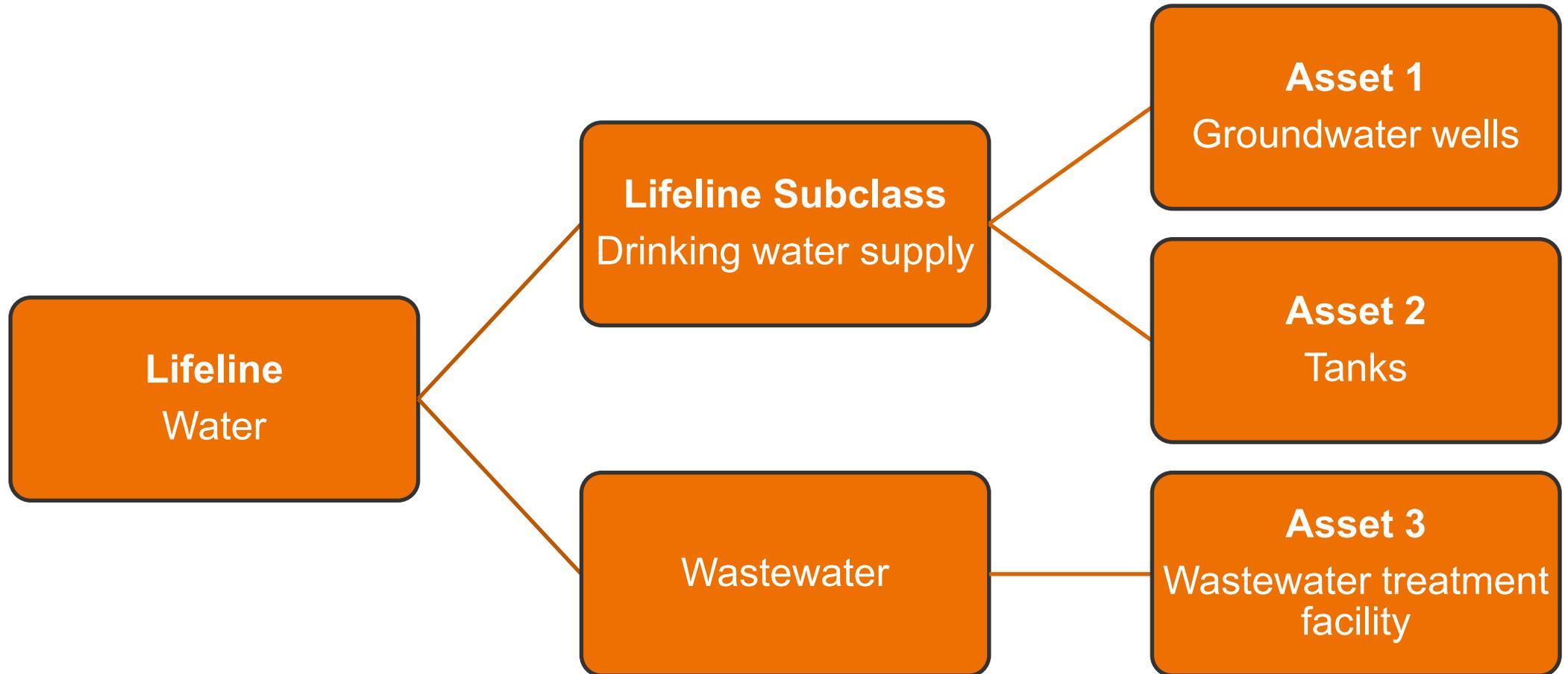
Transportation:
Road Elevation, Evacuation



Food, Shelter:
Community Housing



Assets





Community Lifelines – Subclasses

Lifeline	Lifeline Subclass
Communications	Communication admin Internet Radio Telephone
Education	Private schools Public schools
Energy	Backup power Energy distribution Power generation
Food and Shelter	Emergency Services Food Shelter
Health and Medical	First responders - H+M Major health center Private health provider
Safety and Security	Emergency management First responders First responders - S+S Installation security
Transportation	Air Fuel Road
Water	Drinking water supply Wastewater



Master Asset List

Lifeline	Lifeline Subclass	Proposed Asset (Survey Response)	Location Info Needed?	Initial Contact Person	Critical	Specific Asset Name	Past Events and Impacts	Lifeline Interview Notes	Potential and Existing Adaptation Projects	General Notes	Impacts - Wildfire	Consequence - Wildfire	Impacts - Drought	Consequence - Drought	Impacts - Earthquake
Communications	Communication admin	California Office of Emergency Services Communications (Reserve Unit)			Yes	Communications Reserve Unit Van	Communications van was used heavily during the earthquake.	Organization that activates during emergencies to provide communications services. Meet monthly to ensure that everyone is still connected. They have a mobile van (owned by the city) that can be relocated during an emergency (hospital or police). MIGU units provide additional communications services to emergency services.	Critical are the relationships through this group that allow for speedy response. Self-activating. Consider programs that support this further. Communications van upgrades would be useful. MIGU/Migu - critical, additional communications for first responders, provide extra communications and frequencies with different modes		N/A		N/A		As this is a mobile vehicle would be relatively unaffected by earthquake unless still falling debris. This would affect civil more than amateur. The comm van is the backup comm center to the EDC/dispatch. Amateur comms are relatively unaffected, as amateurs are not as critical as the EDC.
Communications	Communication admin	Emergency Services Committee (ESC)	No		Yes	Emergency Service Committee	Highly active group.	ARES is self-activating. But otherwise can be activated by the ICS. ESC is sponsored by city of Ridgecrest, operated by Sgt. Ryan Martone, with Ridgecrest PD. Gets all the players together to talk about emergency protocols etc.		Specific assets?	N/A		N/A		N/A
Communications	Communication admin	Local media	Pass	Michael Cash	Yes	Local media public communications system	No good system for getting information out to the public - TV/radio/community broadcast system Kern County - K-Gov has a local channel-infrastructure for Alert Kern County - subscription for community alerts	This system does not yet exist, but has been discussed. Possibly covered by Alert Kern (see asset listed below).	No robust system, need a coordinated approach for disseminating information to the community. Could have a local FM radio station to broadcast that information.	No details provided in workshop.	N/A		N/A		N/A
Communications	Communication admin	Alert Kern		Dennis Kidder	Yes	Ready Kern Emergency Alert System		The Ready Kern Emergency Alert System operates off the telephone system both landline and cellular to communicate to the communities. The main operational staff are collocated at the Kern County Emergency Command Center. The system alerting can be initiated from any location, but is reliant on the cellular, telephone system and data lines to deliver messages to the community.			N/A		N/A		If telephone lines and/or towers are knocked out system would fail.
Communications	Internet	Frontier Communications	Yes	Lewis Edrozo	Yes	Frontier Communications Central Office	If power goes out, there's a battery and diesel engine backup (diesel recharges batteries). Days of supply. If this system goes down then base loses communication. Backhoes taking out the infrastructure - 4 events. Human error. Prioritized for access and restoration.	Major network in the valley. Bought out Verizon. Minor damage during earthquake, but did not lose communications. Provide internet and telephone. Major network. Have a central office on China Lake, which is critical. Has copper and fibre coming in and out. Provides fibre for base and community, but there are backups. They have a battery and diesel engine backups (days worth). Wildfire is a concern, but not at China Lake. If that main office goes down, communications for the base would go down. In the last year the greatest threat to fibre is backhoes - has been knocked out multiple times in the last few years. Fibre along China Lake Blvd to 395 is particularly vulnerable. Prioritized over medicom in emergencies. Method of location has been provided in the past to someone at	There are plans to harden certain parts of the system, but no plans to create a ring or additional redundancy. Proposed: Having alternate paths for fiber optics through the valley, and switches to allow for backup.	What assets are essential?	N/A		N/A		Damage to physical infrastructure or connection
Communications	Radio	Communications Towers for Fire	No	Eric Coughran	Yes	Government Peak Communication Tower		No representatives in lifeline interview.		Police also use this network. (Chris Wong), XKE channel	Poor visibility could increase collision probability		2	N/A	Potential structural damage and communications out
Communications	Radio	Communications		Eric Coughran	Yes	Radio Springs					Poor visibility could increase collision probability		2	N/A	Potential structural damage



Prioritize Assets & Hazards

Impact = Critical Asset * Hazard Event



Asset

X



Hazard

=



Impact



Risk Assessment

$$\text{Risk} = \text{Likelihood Score} * \text{Consequence Score}$$

Likelihood Scoring

Chronic Climate Hazard Likelihood Scores		
Score	Qualitative Descriptor	Change in Event Frequency/Intensity
0	Not likely to occur in the future	More than 95% reduction compared to BL
1	Likely to occur much less frequently than current climate	50-95% reduction compared to BL
2	Likely to occur slightly less frequently than current climate	10-50% reduction compared to BL
3	Likely to occur about as frequently as in the current climate	Within +/-10% compared to BL
4	Likely to occur slightly more frequently than current climate	10-50% increase compared to BL
5	Likely to occur much more frequently than current climate	50-100% increase compared to BL

Acute Climate Hazard Likelihood Scores			
Score	Qualitative Descriptor	Annual Recurrence Interval	Annual Exceedance Probability
0	Negligible	1:1000 years	0.10%
1	Highly Unlikely	1:100 years	1%
2	Remotely Possible	1:20 years	5%
3	Occasional	1:10 years	10%
4	Normal	1:5 years	20%
5	Frequent	Less than 1:2.5 years	40%

Consequence Scoring

Score	Class	Consequence Description
0	Very Low	<ul style="list-style-type: none"> • No effects
1	Low	<ul style="list-style-type: none"> • Measurable but cosmetic effects • Costs handled within normal budgeting for entity • Correctible using operations and maintenance practices
2	Minor	<ul style="list-style-type: none"> • Some extra costs to repair but can be covered within current operations and capital budgets • Routine operations for minor incidents; community and assets have capacity to meet demand • Asset or service is still operable and accessible, although minor service disruption may be possible • Slightly reduced ability to perform scheduled maintenance
3	Moderate	<ul style="list-style-type: none"> • Manageable asset or service damage but repair costs may be beyond current operations and maintenance and capital budgets • Asset or service still operable but some access limited • Brief service disruption may be possible; asset design capacity being reached
4	Major	<ul style="list-style-type: none"> • Heavy burden on internal resources of the entity to repair or service assets • Significant threat to installation mission critical readiness • Asset or service still operable but accessibility limited • Lengthy service disruption; assets or services operating below capacity for lengthy periods of time
5	Catastrophic	<ul style="list-style-type: none"> • Loss of life, property, mobility, access to emergency services, or power • Loss of installation mission critical readiness • Complete asset or service replacement due to hazard severity • Need for outside emergency funding (FEMA disaster declaration) • Significant service disruptions may be possible, requiring alternate service delivery • No access to assets



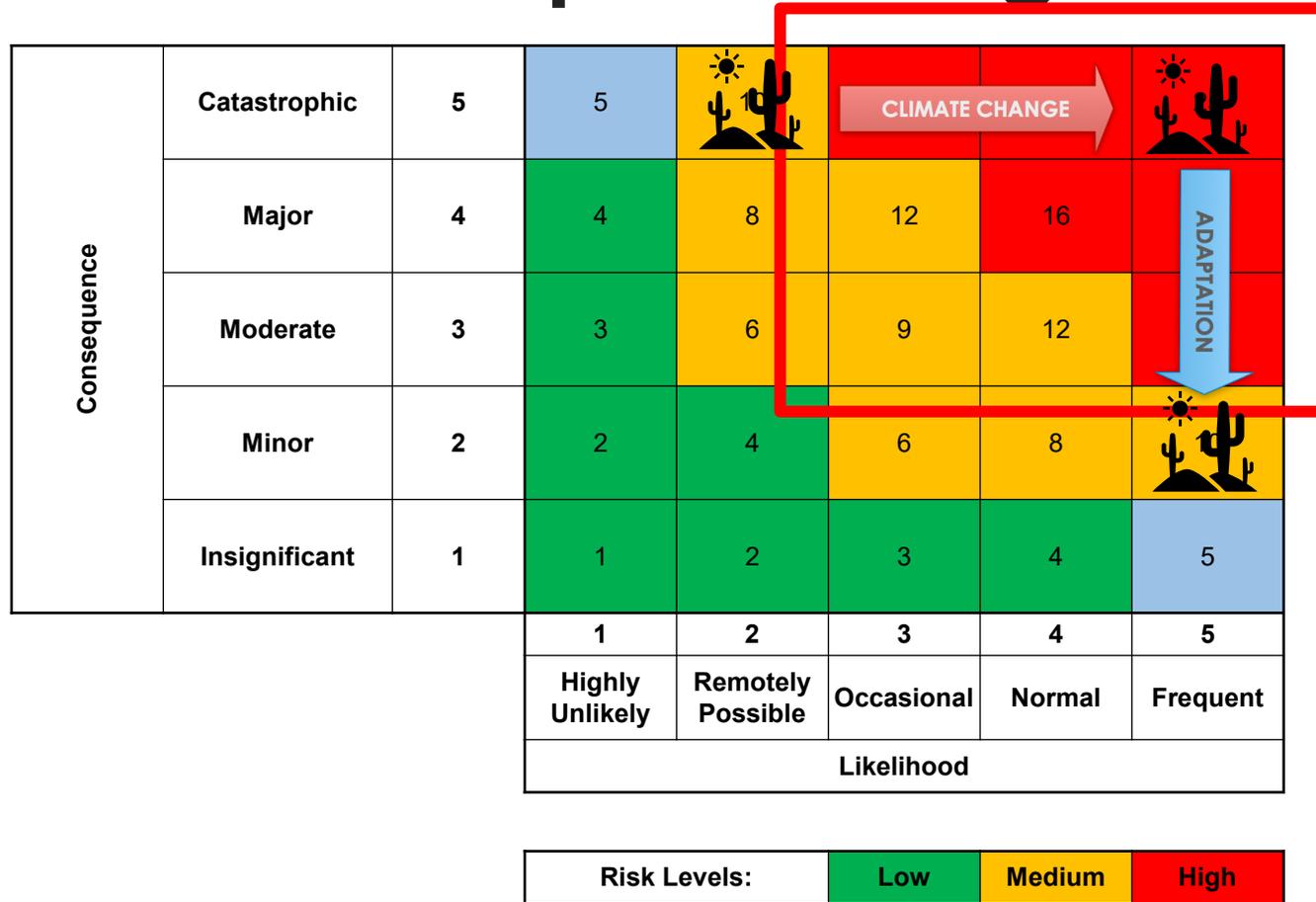
Risk Assessment Matrix

Consequence	Catastrophic	5	5 <i>Stress</i>	10	15	20	25
	Major	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Minor	2	2	4	6	8	10
	Insignificant	1	1	2	3	4	5 <i>Stress</i>
			1	2	3	4	5
			Highly Unlikely	Remotely Possible	Occasional	Normal	Frequent
			Likelihood				

Risk Levels:	Low	Medium	High
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Risk Assessment Example - Drought

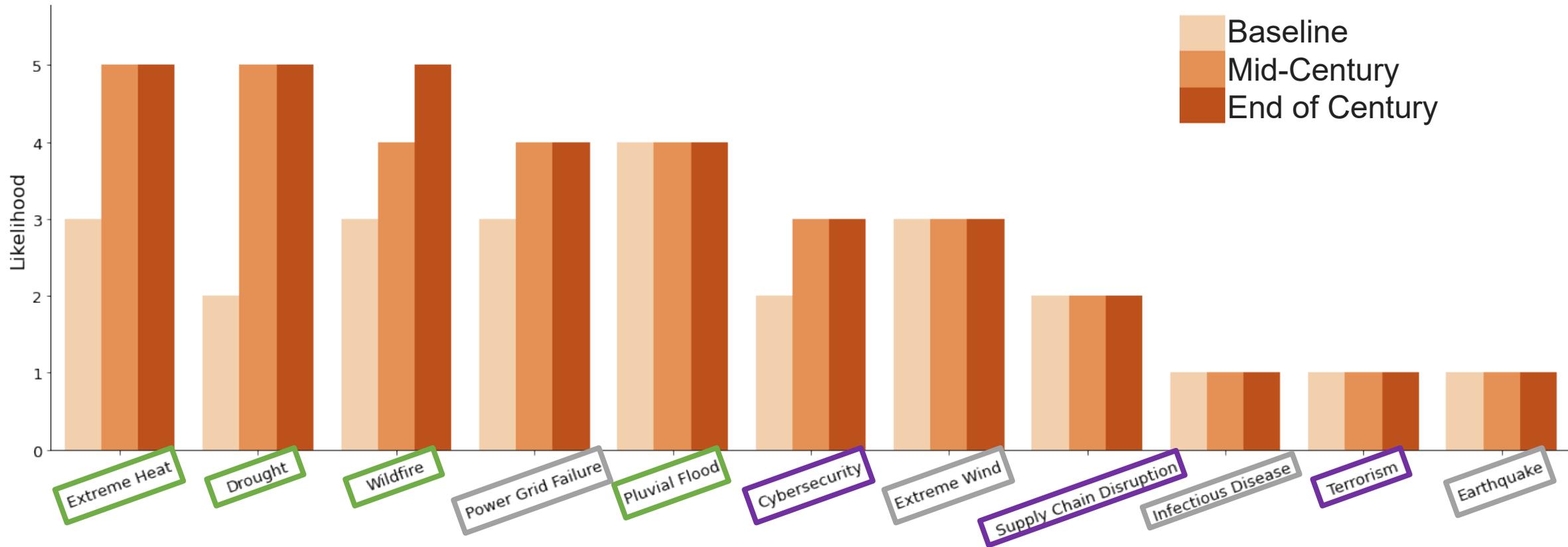




Risk Assessment Results



Hazard Likelihoods and Trends



SOURCES:

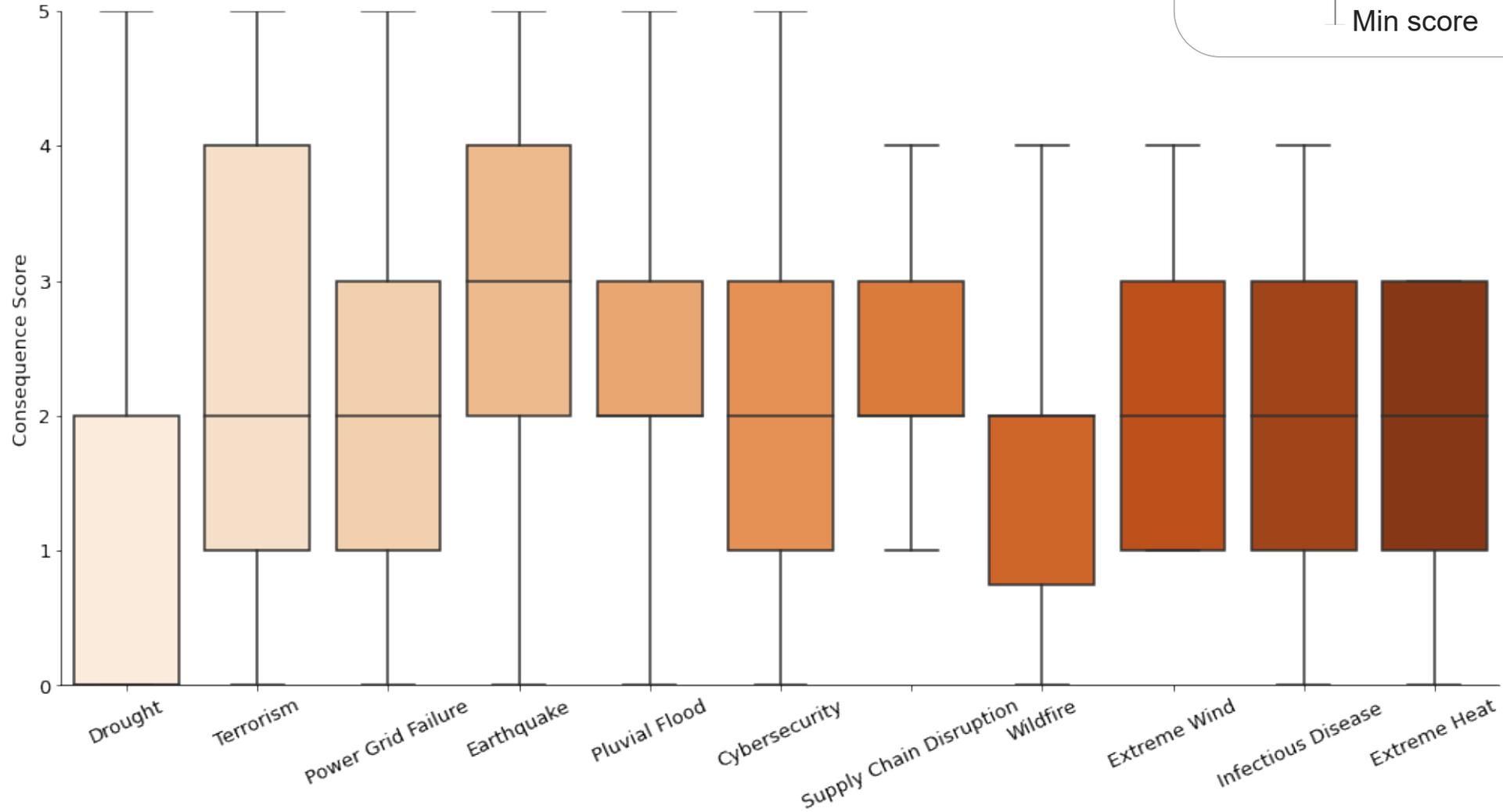
Climate Projections

Historical Data (SCE, NOAA, WHO, USGS)

J100



Consequence Scoring



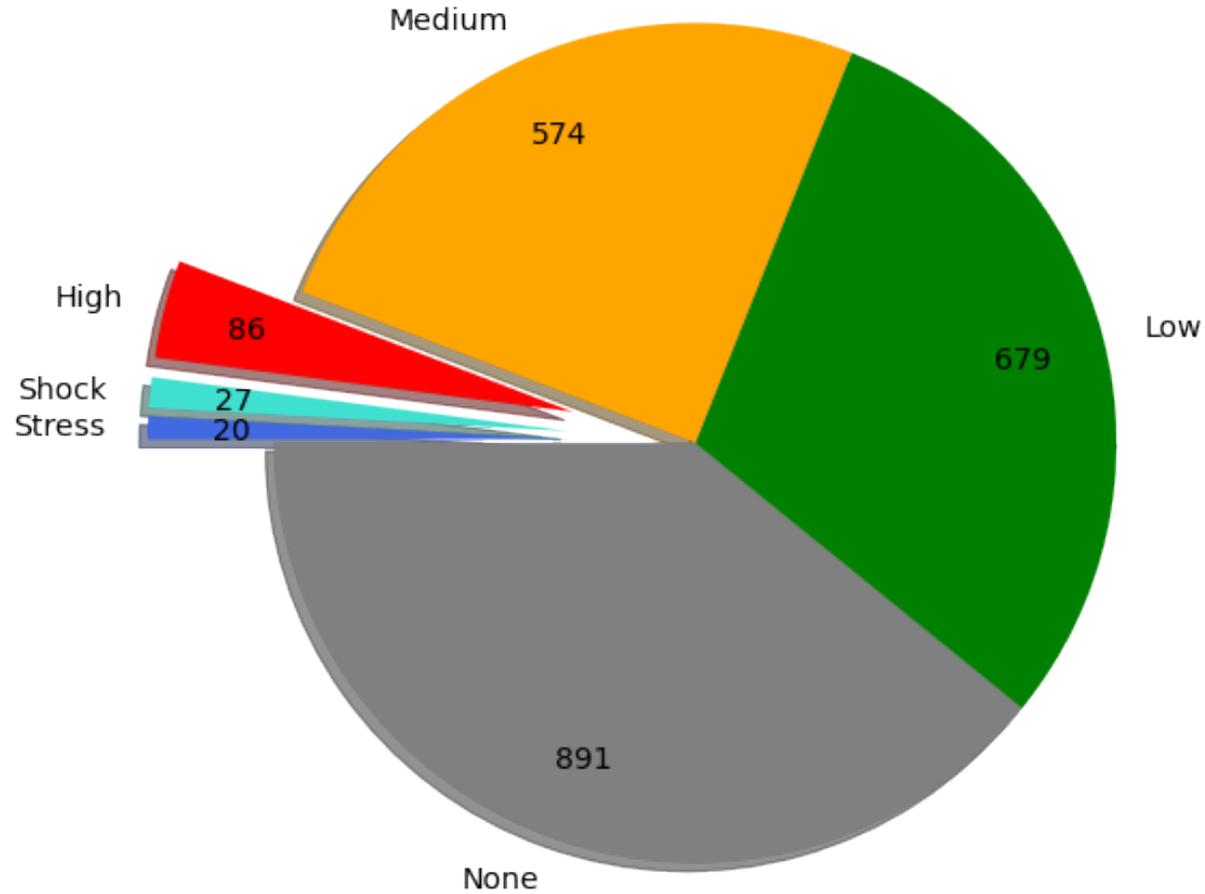


Risk Assessment Matrix

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	Minor	2	2	4	6	8	10
	Insignificant	1	1	2	3	4	5
			1	2	3	4	5
			Highly Unlikely	Remotely Possible	Occasional	Normal	Frequent
Likelihood							
Risk Levels:			Low	Medium	High		



How are the risks broken down by risk-class, over all assets and time frames?



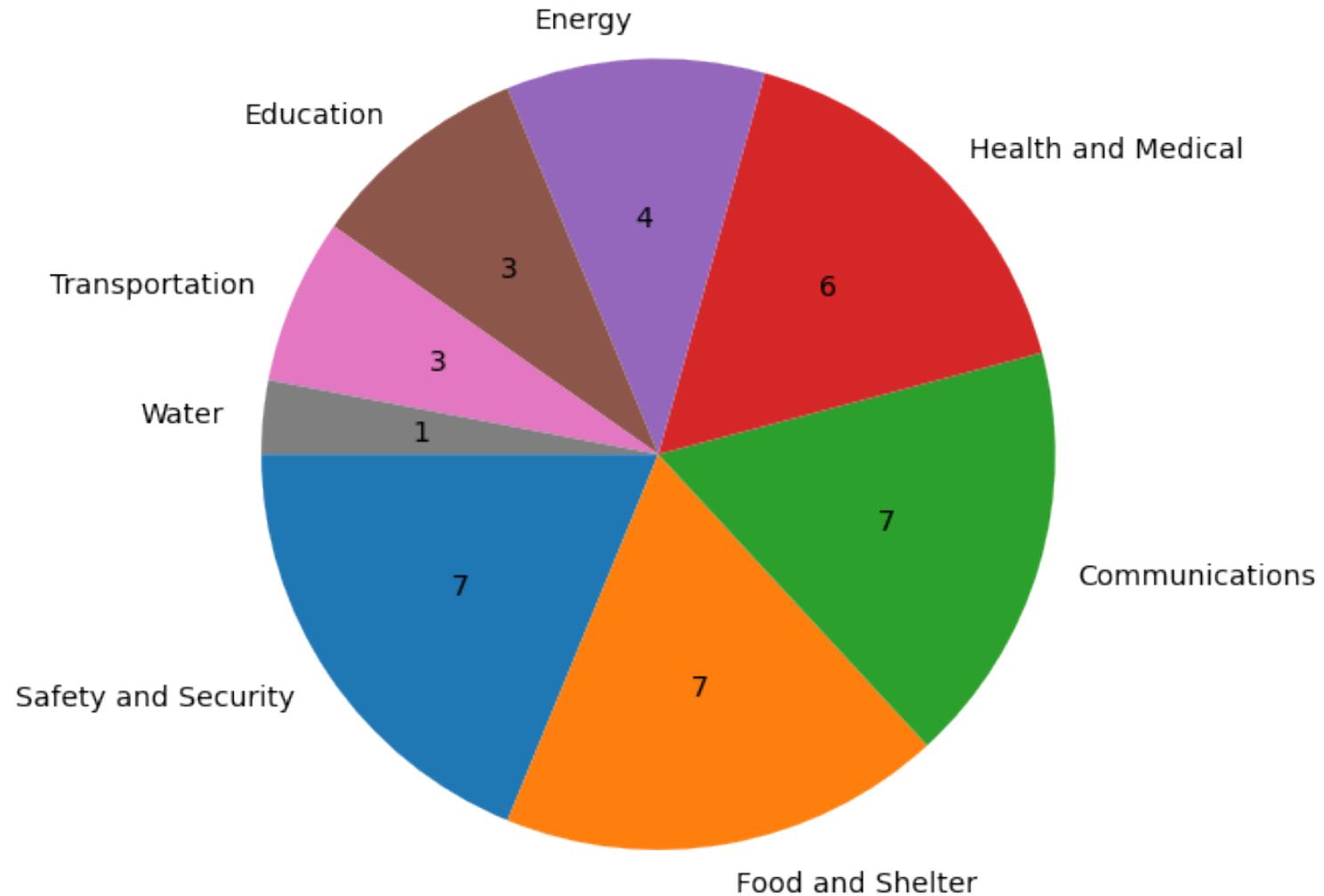
Consequence	Likelihood	Risk Level				
		1	2	3	4	5
Catastrophic	5	Shock	10	15	20	25
Major	4	4	8	12	16	20
Moderate	3	3	6	9	12	15
Minor	2	2	4	6	8	10
Insignificant	1	1	2	3	4	Shock

Likelihood

Risk Levels: Low Medium High



How are the high-risk and shocked/stressed (15+ and 5s) assets distributed by lifeline?





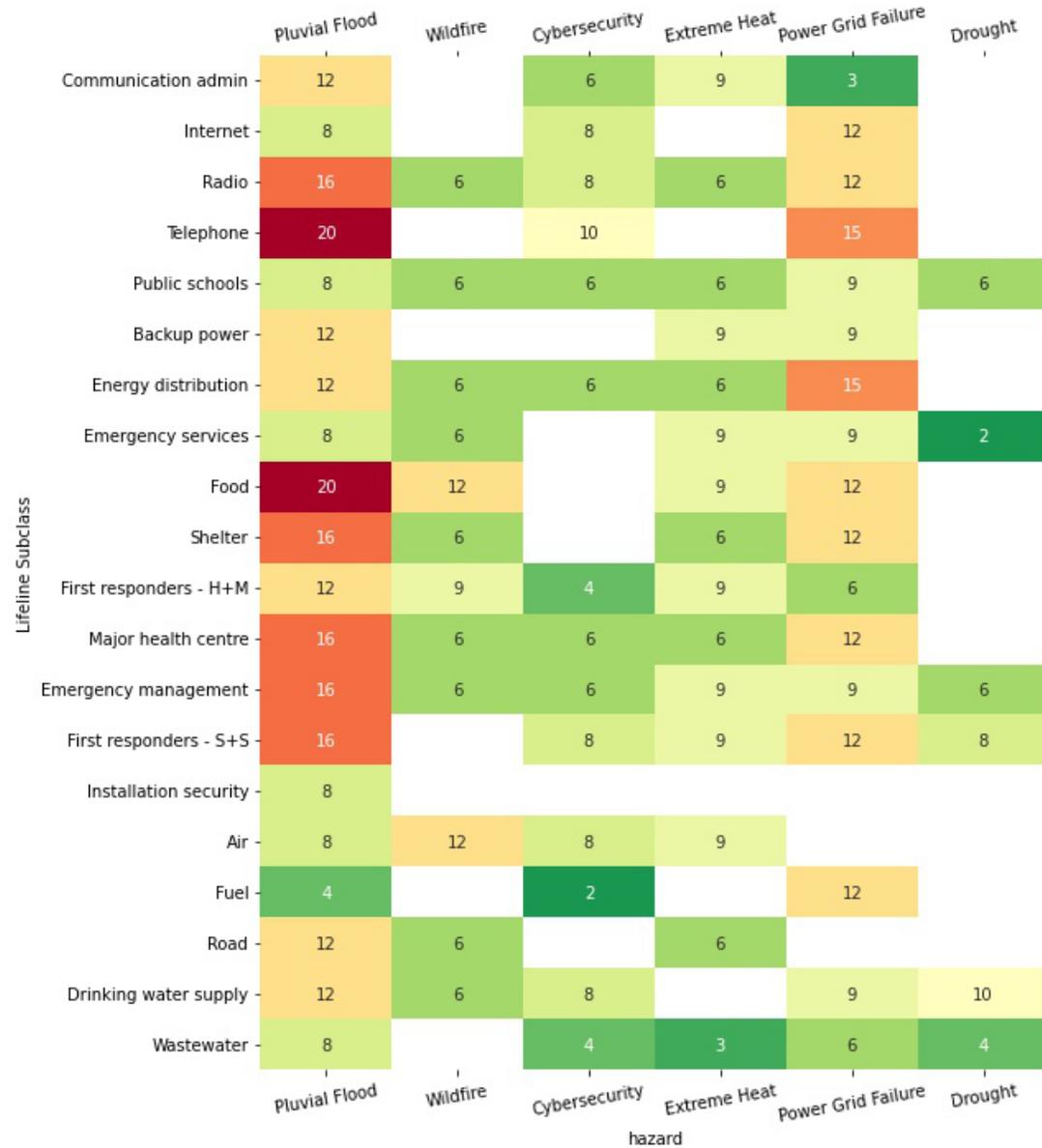


Community Lifelines – Subclasses

Lifeline	Lifeline Subclass
Communications	Communication admin Internet Radio Telephone
Education	Private schools Public schools
Energy	Backup power Energy distribution Power generation
Food and Shelter	Emergency Services Food Shelter
Health and Medical	First responders - H+M Major health center Private health provider
Safety and Security	Emergency management First responders First responders - S+S Installation security
Transportation	Air Fuel Road
Water	Drinking water supply Wastewater



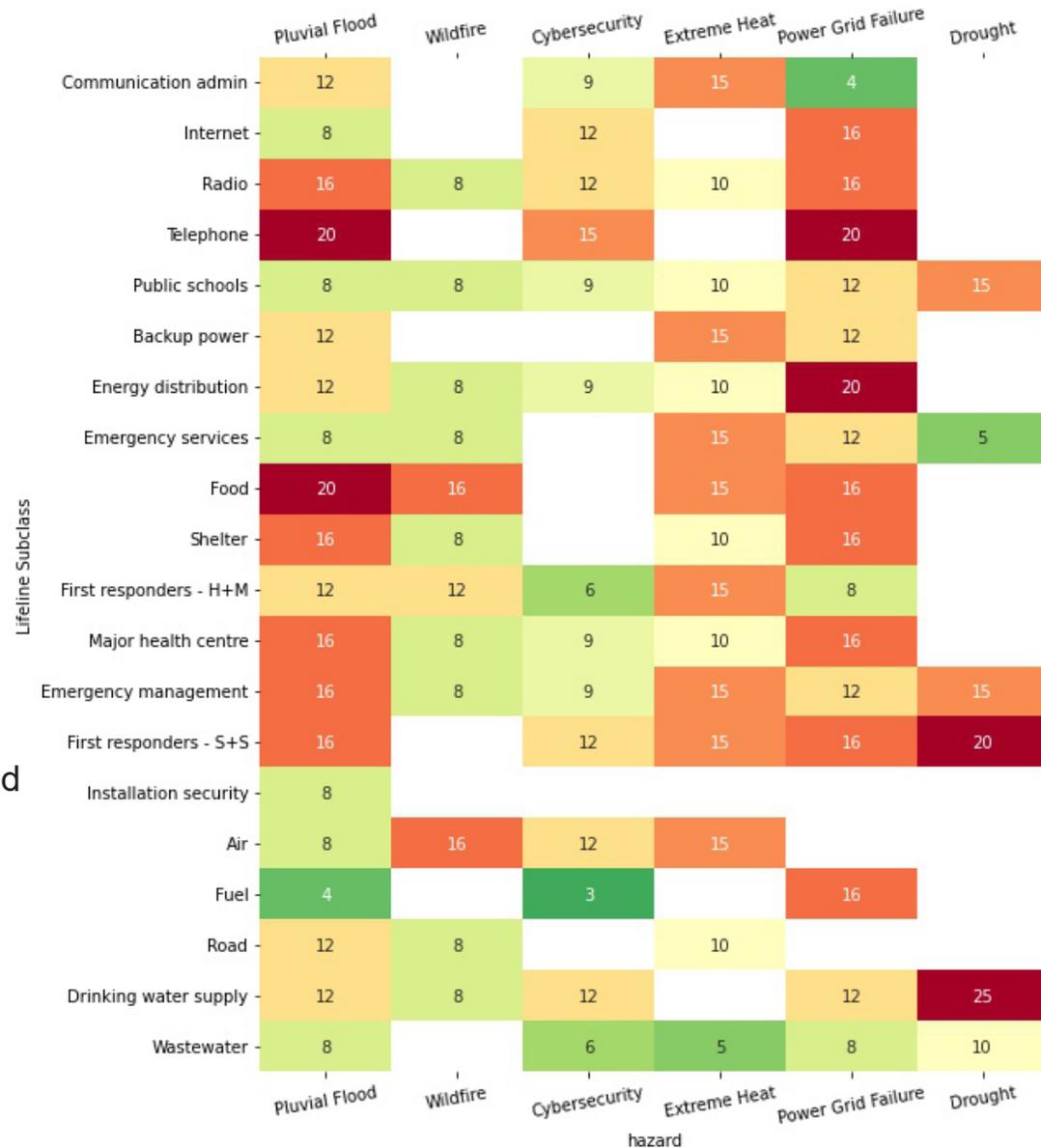
Which asset subclasses are at highest risk to which hazards?



Baseline



Which asset subclasses are at highest risk to which hazards?



Mid-Century

HAZARDS

Low-risk (not shown):

Supply Chain Disruption, Terrorism, Infectious Disease, Earthquake, Wind

Risky, but little change:

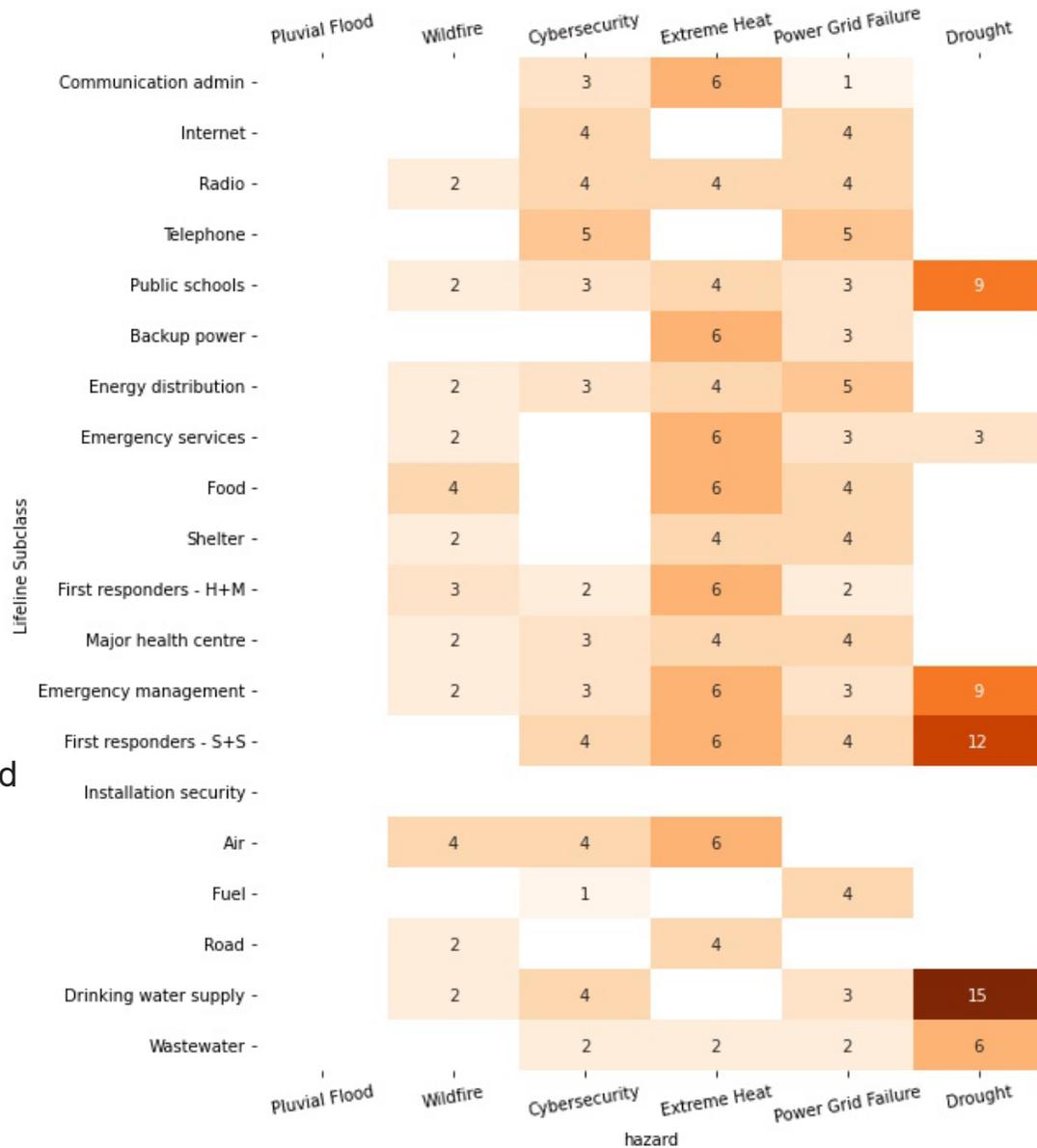
Flood

Risky, and getting worse:

Wildfire, Heat, Drought, Power Grid Failure, Cyber



Which risks are getting worse by mid-century?



Difference:
Mid-Century - Baseline

HAZARDS

Low-risk (not shown):
Supply Chain Disruption, Terrorism, Infectious Disease, Earthquake, Wind

Risky, but little change:
Flood

Risky, and getting worse:
Wildfire, Heat, Drought, Power Grid Failure, Cyber



Risk Assessment Matrix

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	Minor	2	2	4	6	8	10
	Insignificant	1	1	2	3	4	5
			1	2	3	4	5
			Highly Unlikely	Remotely Possible	Occasional	Normal	Frequent
			Likelihood				

Risk Levels:	Low	Medium	High
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Goal – Shortlist High Risk Assets to Develop Projects

Review those assets at highest risk and determine which 5-7 assets can be taken forward for development of adaptation projects or programs.

A **project** is typically specific to an asset.

E.g. retrofit and modernize Salvation Army Distribution Center

A **program** might address a common issue across multiple assets, involve policy updates, and/or involve multiple projects.

E.g. upgrade HVAC systems across all police and fire stations; revise existing policies to allow for on-site electricity generation



Groundwater and Energy Supply

- Not one specific piece of built infrastructure, there will be projects to address these risks.



What are the high-risk interactions? R>15

Lifeline	Lifeline Subclass	Hazard	Specific Asset Name	Likelihood	Consequence	Risk
Communications	Communication admin	Extreme Heat	Communications Reserve Unit Van	5	3	15
	Internet	Power Grid Failure	Frontier Communications Central Office	4	4	16
	Radio	Pluvial Flood	Dispatch Center Server room	4	4	16
		Power Grid Failure	Emergency Services Comms. Network	4	4	16
			Radio Tower - B Mountain	4	4	16
	Telephone	Cybersecurity	AT&T 911 Control System	3	5	15
		Pluvial Flood	AT&T 911 Control System	4	5	20
		Power Grid Failure	AT&T 911 Control System	4	5	20
Education	Public schools	Drought	Cerro Coso Community College	5	3	15
Energy	Backup power	Extreme Heat	RRH - Diesel substations	5	3	15
	Energy distribution	Power Grid Failure	SCE Inyokern Substation	4	5	20
Food and Shelter	Food	Extreme Heat	Salvation Army Dist. Center	5	3	15
		Pluvial Flood	Salvation Army Dist. Center	4	5	20
		Power Grid Failure	Salvation Army Dist. Center	4	4	16
		Wildfire	Salvation Army Dist. Center	5	4	20
	Shelter	Pluvial Flood	Kerr-McGee Community Center	4	4	16
			Welcome Center	4	4	16
		Power Grid Failure	Kerr-McGee Community Center	4	4	16



What are the high-risk interactions? $R > 15$

Lifeline	Lifeline Subclass	Hazard	Specific Asset Name	Likelihood	Consequence	Risk	
Health and Medical	First responders - H+M	Extreme Heat	Mercy Air	5	3	15	
		Wildfire	Kern County Dolphin Ave Fire Station	5	3	15	
			Kern County Las Flores Ave Fire Station	5	3	15	
			Kern County Monache Mtn. Ave Fire Stn.	5	3	15	
	Major health center	Pluvial Flood	NAWSCL Branch Health Clinic	4	4	16	
			Ridgecrest Regional Hospital	4	4	16	
		Power Grid Failure	NAWSCL Branch Health Clinic	4	4	16	
			Ridgecrest Regional Hospital	4	4	16	
	Safety and Security	Emergency management	Drought	Desert Empire Fairgrounds	5	3	15
			Pluvial Flood	City Hall operations and command center	4	4	16
Emergency services		Extreme Heat	Desert Empire Fairgrounds	5	3	15	
First responders - S+S		Drought	China Lake Police Department	5	4	20	
			Extreme Heat	China Lake Federal Fire Department	5	3	15
		Pluvial Flood	China Lake Police Department	5	3	15	
			Ridgecrest Police Department	4	4	16	
			Power Grid Failure	China Lake Federal Fire Department	4	4	16
Transportation		Air	Extreme Heat	NAWSCL Airfield	5	3	15
			Wildfire	NAWSCL Airfield	5	4	20
Water	Drinking water supply	Drought	IWVWD Groundwater wells	5	5	25	



What are the special event interactions? R=5

Lifeline	Lifeline Subclass	Hazard	Specific Asset Name	Class
Communications	Radio	Extreme Heat	Dispatch Center Server room	Stress
			Dispatch Center workstations	Stress
Education	Public schools	Drought	SSUSD Schools	Stress
		Extreme Heat	SSUSD Schools	Stress
		Terrorism	Cerro Coso Community College	Shock
Energy	Energy distribution	Earthquake	PGE installation connections	Shock
			PGE main trunk lines	Shock
			SCE Inyokern Substation	Shock
Food and Shelter	Emergency services	Drought	Desert Empire Fairgrounds	Stress
Health and Medical	Major health center	Earthquake	Ridgecrest Regional Hospital	Shock
		Wildfire	Ridgecrest Regional Hospital	Stress
Safety and Security	Emergency services	Terrorism	Desert Empire Fairgrounds	Shock
	First responders - S+S	Earthquake	China Lake Police Department	Shock
Transportation	Road	Extreme Heat	Liberty Ambulance	Stress
		Wildfire	Liberty Ambulance	Stress
Water	Wastewater	Extreme Heat	Recycled water	Stress



Project Notes from Interviews

Salvation Army Distribution Center

Evaporative coolers. Cooling system upgrade would be desirable.

No backup generators currently. Mobile canteen on site.

No-site water storage would be required, currently only bottled water.

Frontier Communications Central Office

There are plans to harden certain parts of the system, but no plans to create a ring or additional redundancy.

Proposed: Having alternate paths for fiber optics through the valley, and switches to allow for backup.

Desert Empire Fairgrounds

Retrofit ceiling tiles. New projects to work in heat events (HVAC system). Lacking shower facilities (currently 10 stalls).

Back-up generators required (none currently).

Kerr-McGee Community Center

30yrs old, requires updating/renovations. No generators. Ceiling tile updates are required.



Project Notes from Interviews

Groundwater Wells / Water Supply

Provision of water interconnect to import



Prioritize Projects



Prioritize Projects

Project Types





Project Prioritization Metrics - Draft

Criteria		Weighting Factor	Scoring Criteria
1	Feasibility	20%	<p>5 – Funding identified, easily implemented within five years</p> <p>3 – Funding identified, implemented with only moderate complexity or delays</p> <p>1 – Funding identified, implementation is complex and faces certain delays for implementation</p> <p>0 – Not feasible, no funding identified and/or not able to be implemented</p>
2	Climate Resilience/Adaptation	20%	<p>5 – Very High (Action provides multiple benefits for climate resilience and adaptation)</p> <p>3 – High (Action provides at least one benefit for climate resilience)</p> <p>1 – Moderate (Action provides limited benefits for climate resilience)</p> <p>0 – Low (Action does not provide benefits for climate resilience)</p>
3	Equity (Social Vulnerability)	10%	<p>5 - High social vulnerability (susceptibility of social groups to adverse impacts from natural hazards relative to rest of US; by census tract from National Risk Index)</p> <p>3 - Moderate social vulnerability</p> <p>1 - Low social vulnerability</p>
4	Project Type	10%	<p>5 – Human Hazard Prevention</p> <p>5 – Public Emergency Services</p> <p>3 – Public Natural Resources Protection / Environmental Quality and Health</p> <p>3 – Public Education and Awareness / Community Cohesion and Resilience</p> <p>3 – Public Structural Projects</p> <p>1 – Private/Commercial Property Protection</p>
5	Degree of Public Concern	10%	<p>5 – Action addresses one or more hazards identified for the public as of greatest concern (energy security, groundwater supplies)</p> <p>3 – Action addresses one or more hazards identified for the public as of lesser concern (flood/storm, air quality, drought)</p> <p>1 – Action addresses one or more hazards identified for the public as of least concern</p>
6	Risk Reduction/Benefits	10%	<p>5 – Very High (Significant losses avoided and/or significant benefits with consideration to economic, social, and environmental factors)</p> <p>3 – High (Numerous losses avoided and/or numerous benefits with consideration to economic, social, and environmental factors)</p> <p>1 – Moderate (Some losses avoided, some benefits with consideration to economic, social, and environmental factors)</p> <p>0 – Low (No losses avoided, no public benefits with consideration to economic, social, and environmental factors)</p>
7	Costs	10%	<p>5 – Project Costs are predominantly staff time</p> <p>3 – Project Costs are estimated between \$0-\$100,000</p> <p>1 – Project Costs are estimated between \$100,001-\$500,000</p> <p>0 – Project Costs are estimated above \$500,001</p>
8	Equity (Community Resilience)	5%	<p>5 - Low community resilience (ability to respond and recover from natural hazards relative to rest of US; by census tract from National Risk Index)</p> <p>3 - Moderate community resilience</p> <p>1 - High community resilience</p>
9	Community Capacity	5%	<p>5 – Community has sufficient dedicated staff and/or experience to oversee project and funding requirements. Project can be maintained with local oversight/resources.</p> <p>3 – Community has nominally sufficient dedicated staff and/or limited experience to oversee project and/or funding requirements. Project can be maintained with local oversight/resources supported by external resources.</p> <p>1 – Community has no dedicated staff and/or no experience to oversee project and/or funding requirements. Project can only be maintained with external oversight and resources.</p>
Total		100%	Max score = 500



Prioritize Scoring Example

Example Project Scoring

Prioritization Metric		Weighting Factor	Score	Points	Notes
1	Environmental Considerations	20%	5	100	Significant impact due to p
2	Project Costs	20%	5	100	Cost < \$100K.
3	Project Benefits to Community (i.e., losses avoided)	25%	3	75	Large number of homes s outage.
4	Ease of Implementation	20%	5	100	Although situated in a resis the community, and consti
5	Urgency	15%	3	45	Fairly urgent with moderat events in the near term.
Total		100%		420	

Project Prioritization Scores

Project 1	500
Project 2	420
Project 3	400
Project 4	290
Project 5	240
Project 6	250
Project 7	250

Prioritization Legend:

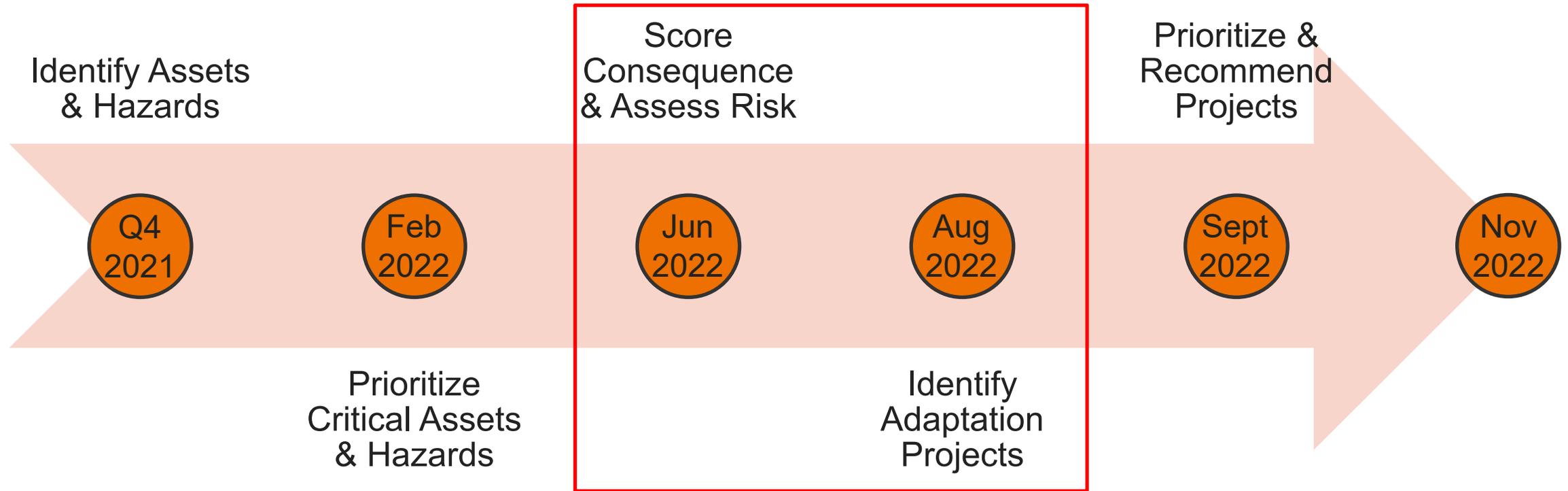
VERY HIGH
HIGH
MEDIUM
LOW



Next Steps



Project Schedule





Next Steps – July to September

Asset Deep Dives

- Engage with individual asset owners/operators to identify initial projects
- Develop draft project list

Review Prioritization Metrics

- Develop draft list of priority projects

Finalize Project Prioritization List

- Refine, review and update project list

Questions & Close

