



Military Installation Resiliency Study

**CITY OF RIDGECREST
NAVAL AIR WEAPONS STATION CHINA LAKE
CALIFORNIA**



FEBRUARY 2023

CITY OF RIDGECREST | NAVAL AIR WEAPONS STATION CHINA LAKE CALIFORNIA

MILITARY INSTALLATION RESILIENCY STUDY

The City of Ridgecrest would like to thank the development team that played an active role in the publication of this Military Installation Resiliency Study. Special thanks to our contacts from Naval Air Weapons Station China Lake and the array of community representatives for their support and technical expertise.



CITY OF
RIDGECREST
CALIFORNIA



NAVAL AIR
WEAPONS STATION
CHINA LAKE

PREPARED BY
STANTEC CONSULTING SERVICES INC.

Please feel free to reproduce all or part of this document.
You need not secure permission. We ask that you print it
accurately and give credit to the CITY OF RIDGECREST,
CALIFORNIA.

Disclaimer:

This document was prepared under contract with City of Ridgecrest, California, with financial support from the Office of Local Defense Community Cooperation, Department of Defense. The content reflects the views of the City of Ridgecrest and does not necessarily reflect the views of the Office of Local Defense Community Cooperation.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	iv
ACRONYMS / ABBREVIATIONS AND GLOSSARY.....	xii
1 SECTION 1: INTRODUCTION.....	2
2 SECTION 2: BACKGROUND.....	10
3 SECTION 3: RESILIENCE PLANNING TEAM.....	22
4 SECTION 4: STAKEHOLDER ENGAGEMENT.....	26
5 SECTION 5: RISK ASSESSMENT.....	32
6 SECTION 6: ADAPTATION PLANNING.....	56
APPENDIX A: RESILIENCE ACTION PLAN.....	59
APPENDIX B: SAMPLE MOU.....	165
APPENDIX C: RISK ASSESSMENT MAPS.....	171
APPENDIX D: CLIMATE RISK DISCLOSURE STATEMENT.....	185

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK



Figure E1: NAWS China Lake. Source: <https://ridgecrest-ca.gov/477/Military-Installation-Resiliency-Study>

Natural disasters and changes in climate and extreme weather events in recent years have amplified vulnerabilities and risks for communities across the United States. Defense communities are deserving of specific attention because they are essential to supporting military installations that maintain our national security. Defense communities provide essential operations, services, and infrastructure necessary for military installations to maintain mission assurance and mission-critical functions. This infrastructure must not only protect and preserve military readiness and defense capabilities, but also provide safe places for service members and their families to live, work, and play.

As defense communities improve their own resilience, they effectively support the broader picture of military operations and

national security. The success of defense communities and military installations are interdependent—together they must plan, design, and finance to successfully shape a resilient future. These significant endeavors are best done through strong partnerships formed through shared, cohesive visions and understandings of vulnerabilities and risks, prioritization of resilience projects, and innovative financing tools.

Naval Air Weapons Station (NAWS) China Lake is the major economic engine for the City of Ridgecrest (City) and the surrounding region. Therefore, the City, surrounding local governments, and the State of California have a vested interest in supporting development and maintenance of infrastructure beyond installation boundaries to support military mission assurance and continued operations. These

linkages require an understanding of where vulnerabilities are shared and how working together can help address considerable challenges.

Stantec's Defense Community Resilience Planning Framework, developed in partnership with the Association of Defense Communities, has enabled the City and the surrounding communities to assess vulnerabilities and risks, with special attention given to the unique resilience requirements for a key stakeholder—NAWS China Lake. The planning framework provided methods to assess vulnerabilities and risks not only independently but also in coordination with threats to installation resiliency.

Our multidiscipline, practitioner-based team brought an integrated approach for multiple strategies to address key resilience issues that included, but were not limited to, land use, water resources, energy, transportation, communications, and community services. Our planning framework, based upon our experience with communities across the country, provided a risk-informed, phased approach to identify and prioritize investments for resilience actions with a

focused, action-oriented Resilience Action Plan, including potential funding sources.

City of Ridgecrest

The City, in partnership with NAWS China Lake and the surrounding communities, received a grant from the U.S. Department of Defense (DoD) Office of Local Defense Community Cooperation to undertake a Military Installation Resiliency Study to chart a path for the long-term sustainability and operability of NAWS China Lake, the City, and the surrounding communities. The City sponsored the Military Installation Resiliency Study as a community-led, cooperative strategic planning process among the City, NAWS China Lake, the surrounding local communities, and the State of California to analyze and implement actions necessary to foster, protect, and enhance both community and military installation sustainability.

This Military Installation Resiliency Study has enabled the City and surrounding local communities, together with NAWS China Lake, to assess shared vulnerabilities and risks, with special attention given to unique resilience requirements beyond



Figure E2: Aircraft flying over NAWS China Lake

Source: <https://ridgecrest-ca.gov/477/Military-Installation-Resiliency-Study>

the military installation boundaries. The focus was to understand and support the interconnectedness and interdependencies of the critical infrastructure assets and systems that link the City, NAWS China Lake, and the region. This includes assessing the potential effects of extreme weather events and other changes in environmental conditions that may adversely affect mission-essential functions and the mission sustainability of NAWS China Lake. The completed project includes a Technical Study Report and Resilience Action Plan (see Appendix A), with prioritized resilience actions and recommended funding sources, that focus on shared critical infrastructure, programs, and services. These recommended resilience actions address water, energy, transportation, communications, safety/security, and food/shelter.

The goal for the City, NAWS China Lake, and the surrounding communities is to plan, design, and finance a resilient future, together. Resilience is about making our communities and military installations stronger, now and in the future, for everyone.

About NAWS China Lake

Throughout its history, NAWS China Lake enabled DoD weapon, sensor, communication, and payload capabilities in terms of Research, Development, Acquisition, Test, and Evaluation (RDAT&E). Military activities at this site began in 1943, coinciding with the Navy's rapidly expanding air combat role during World War II.

Today, NAWS China Lake is the Navy's largest landholder, totaling more than 1.1 million acres, with approximately 95 percent of that land undisturbed. The combination of its location, complex terrain, restricted airspace, widespread instrumentation sites, laboratory infrastructure, and highly skilled

technical workforce provides an advanced and efficient methodology for conducting essential developmental and operational tests, and sustainment training necessary to maintain high technical standards throughout the DoD.

The Mission Today

The mission of NAWS China Lake is to provide and maintain lands, facilities, and capabilities by way of a cadre of shore enterprise professionals that enable RDAT&E of innovative technological systems and training of Navy Expeditionary Combat Command (NECC) personnel. The land and airspace, also referred to as ranges, in and around China Lake are critical to testing and evaluating a wide range of systems and maintaining the operational readiness of forces. The RDAT&E mission includes systems engineering, electronic warfare, software and mission systems integration, weapons and energetics, and human systems that generate cutting-edge capabilities for the warfighter. The training of NECC personnel produces combat-ready forces for Combatant Commanders around the globe.

Challenges to the Mission

The Navy's ability to enable testing and training missions in the upper Mojave Desert depends on the continued support and cooperation of its friends and neighbors in the surrounding communities. For more information view the NAWS China Lake brochure [Partners for a Compatible Future](#). Various types of incompatible development can threaten NAWS China Lake's ability to effectively make use of such an ideal testing and training location. Many concerns at NAWS China Lake relate to local land development and restrictions on the use of airspace within the Military Influence Area. These include:

- Encroachment on the single source of groundwater, which is a top concern
- Renewable energy projects that are not compatible with the RDAT&E mission
- Frequency interference from expanding cellular and commercial communications
- Vertical flight obstructions from communication towers, new transmission lines, wind turbines, and construction cranes
- Residential and commercial development within known aircraft noise areas

As incompatible development increases, pressure builds for the Navy to alter flight operations, reduce flights over certain areas, or otherwise reduce mission effectiveness, ultimately jeopardizing the viability of the RDAT&E mission.

What is Military Installation Resilience?

The 2019 National Defense Authorization Act includes the following definition for military installation resilience:

"The capability of a military installation to avoid, prepare for, minimize the effort of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions."

What is the Resilience Planning Framework?

The Resilience Planning Framework used to support the Military Installation Resiliency Study is presented in [Advancing Resilience for Defense Communities: A Planning Framework](#), an Association of Defense Communities publication that Stantec authored. The planning framework has guided the City's efforts to assess, plan, prioritize, and implement resilience strategies and infrastructure projects, with special attention given to the unique resilience requirements for NAWS China Lake. The planning framework provides methods to assess vulnerabilities and risks, not only independently, but also in coordination with threats to installation resilience, providing a risk-informed, phased approach to identify and prioritize investments for resilience projects. This planning framework is focused on the following results.

- Identify and develop strategies to enhance community resilience beyond installation boundaries.
- Identify shared critical infrastructure, services, and programs.
- Develop a Resilience Implementation Strategy to carry out recommended actions and projects.
- Protect and preserve military readiness.
- Support continued community growth and economic development.

Recognizing that NAWS China Lake is an essential part of the regional and state economy, the City, together with the broader region and the State of California, have a vested interest in understanding the resiliency of the region's infrastructure that supports the installation and military operations. Defense spending within

EXECUTIVE SUMMARY

California accounts for 1.6% of the state Gross Domestic Product¹.

The **Military Installation Resiliency Study** is comprised of the following documents.

- **Technical Report**

Identification of shared hazards, vulnerabilities, and risks affecting the City, NAWS China Lake, and the surrounding communities, with special attention given to the unique resilience requirements necessary to support the long-term sustainability and operability of the installation.

- **Resilience Action Plan**

Recommended actions and investments directly beyond the installation boundaries and across the region that may address the identified vulnerabilities and risks. The Resilience Action Plan Summary provides an overview of the Priority Critical Assets identified during the resilience assessment process, recommended resilience actions, and potential funding sources. Additional more detailed information is presented in the Resilience Action Plan (see Appendix A).

Implementing Resilience

The Resilience Action Plan provides the City, NAWS China Lake, and the surrounding communities a roadmap of recommended resilience actions, including recommended funding sources.

Our multidiscipline, practitioner-based team provided a risk-informed, phased approach to identify and prioritize critical assets for investment to further resilience for both NAWS China and the adjacent communities. The following priority critical assets were identified to include in the Resilience Action Plan.

- Groundwater
- Energy
- Kerr McGee Center
- Communications
- Installation Back Gate

Each priority-critical asset is identified in this results oriented Resilience Action Plan with specific recommended resilience actions focused on shared critical infrastructure, programs, or services.

Stantec's North America Funding Program staff mapped project information to fund priorities and timelines to recommend federal and state funding opportunities for each resilience action identified in the Resilience Action Plan. In total, 33 funding opportunities are identified and ranked for their relevance to the Military Installation Resiliency Study. Bundled projects are recommended for submission in a single application for particularly competitive or large grant opportunities, including the Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities Program (BRIC) and the DoD Office of Local Defense Community Installation Resilience program.

To support the implementation of the Resilience Action Plan recommendations, the City may consider establishment of a Memorandum of Understanding (MOU) to create a Partnership Committee as a more formal permanent organizational structure to facilitate long-term communication, collaboration, and coordination among the City, NAWS China Lake, and surrounding communities.

¹ "FY 2021 Defense Spending - California. U.S. DoD Office of Local Defense Community Cooperation. Accessed January 3, 2023. <https://oldcc.gov/dsbs-fy2021>

EXECUTIVE SUMMARY

Lifeline/Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Groundwater Supply				
PRIORITY	Develop Import Water Supplies: For either direct use or groundwater augmentation		10+ years	Varies
Groundwater Supply - Action Plan Tasks				
TBD	Water Rights Acquisition	IWVGA must secure permanent or temporary water rights from SWP Table A Entitlement or a combination of other small and long-term water supplies from a water district or water rights holder in coordination with KCWA. Option 1: Will require IWVGA to meet with AVEK to discuss the use and capacity of the California City pipeline and the transfer agreements with DWR, KCWA, and AVEK. Option 2: Several water banking programs are currently being developed within the Antelope Valley and surrounding areas of which IWVGA may opt to be a participant. Active participation will require the development of a firm and secure water right to be obtained from current California State Water Project stakeholders and coordinated through the Kern County Water Agency.	2023	\$ 48,390,000
TBD	Selection of the Most Feasible Imported Water Project Option	Selection of the most feasible imported water option after preparation of an engineering report and negotiation with the relevant transfer agencies.	2023	\$ 185,000
TBD	Feasibility Studies	IWVGA will participate in a groundwater recharge feasibility study and a pilot recharge project for Option 2 to finalize the size and location of the new spreading grounds. IWVGA will also evaluate the availability and reliability of external water supplies, including SWP water supplies, and the potential groundwater banking opportunities to enhance the reliability of its purchased water supplies.	2023	\$ 500,000
TBD	Option 1 – Environmental Impact Report and Supporting Studies ¹	Prepare Environmental Impact Report (EIR) ▪ Prepare documents for compliance with CEQA/NEPA and all necessary Technical Studies and surveys, conduct environmental review and investigations, identify permitting requirements, and fieldwork, as needed, for the pipelines and pump stations, reservoirs, and associated facilities for the Imported Water Interconnection Project.	2023 – 2024	\$ 1,500,000
TBD	Option 1 – Permitting and Regulatory Process ¹	All required permitting including, but not limited to, the following: ▪ Encroachment permits for right-of-way for the new California City pipeline extension along Highway 14 from the California Department of Transportation, ▪ Application submission to secure a Land Use Permit for construction of new imported water pipelines. ▪ Amendment to the IWVWD's current Domestic Water Supply Permit from the State Water Resources Control Board - Division of Drinking Water. ▪ Environmental Impact Report (EIR) preparation	2023 – 2026	\$ 1,000,000–1,500,000
TBD	Option 1 – Design, Permitting, and Construction	All design, permitting, and construction of the infrastructure required for the final Imported Water Project option.	2026 – 2035	\$ 177,975,000
TBD	Option 2 – Environmental Impact Report and Supporting Studies ²	Prepare Environmental Impact Report (EIR) ▪ Environmental documentation will need to be prepared to satisfy both CEQA and NEPA due to the potential use of Federal Lands.	2026 – 2035	\$1,500,000–3,000,000
TBD	Option 2– Permitting and Regulatory Process	All required permitting including the following: ▪ Required permitting is unknown at this time, however, permitting may be required for use of federal lands or other lands within the Kern County area or within an adjacent water agency.	2026 – 2035	\$ 13,000,000
TBD	Option 2 – Design, Permitting, and Construction	All design, permitting, acquisition of land rights and construction of the infrastructure required for the final Imported Water Project option.	2026 – 2035	\$ 83,000,000

EXECUTIVE SUMMARY

Lifeline/ Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Energy Grid				
PRIORITY	Energy Provisions	This project includes a set of actions intended to develop infrastructure and policy to provide consistent and reliable power to the City of Ridgecrest and NAWS China Lake.	5-10 years	Varies
Energy - Action Plan Tasks				
TBD	Energy Needs Assessment	Conduct power needs assessment: Connect with SCE customer representatives to understand site-specific outage issues & mitigation; Assess type and duration of historical outages to determine if there has been common causes for power outages; Determine potential for onsite production and storage to meet all of the City's electricity demands - hybrid optimization of multiple energy resources study (HOMER); Determine critical energy needs and amount of backup storage to avoid disruption during long-term outages; Assess feasibility of the geothermal power plant providing electricity to the installation and the City during a system level outage.	2023 6 months	\$50,000-\$75,000
TBD	Method of Service Study	Complete and submit a Method of Service Study (MOSS) to SoCal Edison requesting the desired changes and upgrades.		\$150,000-\$500,000 Needs Assessment will help narrow the cost estimate
TBD	Battery Storage	Install large-scale battery energy storage systems (BESSs) downstream of the Inyokern substation to be available during an outage. Location, capacity, and load requirements will be determined through the energy needs assessment. This project will require coordination with the California Energy Commission and SCE.	2025 12-24 months	4-hour BESS capacity capex cost Commercial scale ~\$450/kWh Utility scale ~\$ 350/kWh
TBD	Harden Inyokern Substation and Area Energy Assets	Install additional barriers and other improvements to protect the substation and other grid assets from motor vehicle collisions. Assets that require hardening to be identified and prioritized in energy needs assessment.	2023 4-6 months	\$25,000-\$50,000
TBD	Geothermal Plant Back-up Power	Install a switch at the Inyokern substation to allow the geothermal plant to supply emergency power to China Lake and Ridgecrest during long-term outages. This solution to require coordination with SCE and the Coso Operating Company.	2026 6-12 months	Unable to estimate cost without conducting the Needs Assessment.
TBD	City-Owned Energy Resources	Based in the results of the power needs assessment, install energy resources for City Hall, Kerr McGee Center, and the wastewater treatment plant that can support some or all energy needs during grid power outages. Potential energy resources include: Solar PV, Micro wind turbine, Battery energy storage system, Combined heat and power, and Fossil fuel generation. Future improvements will take into consideration NAWS China Lake's Interconnection Agreement with SCE and will not negatively impact the 12MW PV System – Rule 21 minimum threshold requirements.	2024-2025 12-24 months	2/kW for a PV array, \$300/kWh for 2-hour BESS storage or \$270/kWh for 4-hour storage, \$160/kW of output for a 2-hour BESS, 1MW/4MWH BESS for \$1.2M or small diesel generator for \$300,000 plus fuel costs.

EXECUTIVE SUMMARY

Lifeline/ Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Kerr McGee Community Center Building Upgrades				
PRIORITY	Kerr McGee Center Upgrades	The Kerr McGee Center serves as a shelter or resilience hub during emergency events and the design and upgrade to the facility's commercial kitchen to support serving 400 people for events is proposed. The project will include modernizing the facility's commercial kitchen and making the building compliant with the Americans with Disabilities Act (ADA).	5-10 years	\$5,670,000-\$6,920,000
Kerr McGee - Action Plan Tasks				
TBD	Building Assessment Including Structural ASCE 41 Tier 1 Assessment	Structural, Electrical, Mechanical, and Architectural building assessment to determine current condition. Includes review of existing construction documents, deterioration, existing damage, age and condition of equipment (HVAC, lighting, power, fire, telecom), peak demand, and ADA accessibility. Deliverables will be a Property Condition Assessment (PCA) Report, Deficiency Report, and a detailed scope of work for retrofits, including structural enhancements, to bring facility up to essential facility status. Scope includes client review and feedback on draft PCA report at 90%.	2023 4-6 weeks	\$60,000
TBD	Project Sequencing	Series of meetings to determine ideal sequencing for projects identified in the building assessment. This activity will consider shut-down periods, design schedule, supply chain issues, and other factors that will impact project sequencing. Meetings should include one person from each technical discipline (structural, MEP, architectural, accessibility, etc.) and City representatives (Parks and Recreation, Public Works, etc.).	2023 1 month	\$10,000
TBD	Structural Upgrades	Make structural upgrades determined by PCA and Tier 1 structural assessment. Planned upgrades will assume Kerr McGee must meet risk Category 4 requirements.	2027 6-12 months	\$500,000
TBD	HVAC filtration	Design and install additional HVAC filtration to remove smoke and particulates from wildfires.	2023 4-6 months	\$1,200,000
TBD	HVAC Compartmentalization	Design and install additional HVAC equipment to allow focused cooling, particularly on weekends and when used as a shelter or resilience hub.	2023 4-6 months	\$800,000
TBD	Doors and Windows	Replace, repair, or make upgrades to address cooling loss at perforations. Solutions to be determined in building assessment.	2026 4-6 months	\$250,000 - \$500,000
TBD	ADA Accessibility	Identify and complete projects to meet ADA standards for accessibility and essential facility standards.	2027 6-12 months	\$500,000
TBD	Commercial Kitchen	Design and complete upgrade to the facility's commercial kitchen to support serving 400 people for events, and function after an emergency event when the building is serving as a shelter or resilience hub.	2025 4-6 weeks	\$600,000
TBD	Back-up Power	Coordinate with other energy-related projects to support additional solar generation and other behind-the-meter solutions including battery backup and fossil fuel generators. The adjacent 496KW solar field can be expanded to increase capacity.	2024 12-24 months	\$1M-\$2M
TBD	Fire Alarm and Fire Monitoring System	Design and install fire alarm and monitoring system (nearly 40 years old) to current state and federal standards.	2024 4-6 months	\$750,000

EXECUTIVE SUMMARY

Lifeline/ Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Communications				
PRIORITY	Frontier Communications	Develop redundant and resilient Internet access for the installation and the City.	Immediate to 5 years	\$1,000,000
Frontier Communications - Action Plan Tasks				
TBD	Communications Needs Assessment	Review the radio communications operations on the installation and at the City. Determine where the coverage requirements are and the operational requirements for each agency.	3 months	\$15,000
TBD	Add redundant fiber connections to the installation	Potentially add redundant fiber connection into the installation from the Central Office (CO) for diverse pathway. Additionally, it might be possible to add fiber from a separate facility for more complete diversity.	3 months	\$500,000
TBD	Backup Power	Current CO has hours of battery backup and diesel generator. Increasing the battery backup and providing additional on-site fuel storage may help to decrease outages due to power.	1.5 years	\$100,000
TBD	Satellite Link to Installation	Additional redundancy can be achieved by adding satellite links to the installation for commercial Internet.	2 years	TBD
TBD	Add redundant links into the CO	Additional connections into the CO from satellite, uWave backhaul, or additional fiber could improve the resiliency of the commercial Internet services for the installation and the City.	5 years	\$345,000
PRIORITY	B Mountain Radio Tower	Develop redundant and resilient radio tower facility and infrastructure	Immediate to 3 years	\$1,000,000
B Mountain - Action Plan Tasks				
TBD	Communications Needs Assessment	Review the radio communications operations on the installation and at the City. Determine where the coverage requirements are and the operational requirements for each agency.	3 months	\$20,000
TBD	Redundancy and Resiliency	Review existing communications systems to determine where single points of failure exist. In particular, emphasize areas where multiple agencies rely on the same facilities, such as B Mountain.	3 months	\$20,000
TBD	Backup Power	Add generator and battery backup to existing facilities that do not already have it.	1.5 years	\$150,000
TBD	Add Redundancy and Interoperability	Assess radio systems to determine how and where facilities can be upgraded to add redundancy and improve efficiency. This could include simulcasting frequencies with multiple transmitters throughout the area. Adding mutual aid channels to installation radios as well as the City's radios for interoperable communications.	2 years	\$510,000
TBD	Backhaul	Assess radio system backhaul and potentially redundant links between dispatch and B Mountain in the event the link is broken.	2 years	\$300,000

EXECUTIVE SUMMARY

Lifeline/ Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Installation Gate Access Flood Management				
PRIORITY	Installation Back Gate-Roadway Flooding		6-9 years	\$ TBD
Installation Gate Access Flood Management - Action Plan Tasks (see notes 3 and 4)				
TBD	Implement Proposed Improvements identified in the Ridgecrest 1989 Master Drainage Plan at Bowman Wash and E. Ridgecrest Blvd (Hwy 178). Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. Construct upstream detention basins.	Construct bridge spanning Bowman Wash at Hwy 178. Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. This may be accomplished in an above-ground series of linear swales, bio-basins, rain gardens, detention/retention basins, and culverts. Deep seepage pits penetrating impervious materials may also serve to dissipate runoff and re-charge subsurface groundwater if feasible. The following project descriptions outline the project development stages.	Timing dependent on City decision makers. Estimate 3-6 months	\$ TBD
TBD	Project Initiation	Project Lead prepares project initiation document and forms the project development team (PDT)	3-6 months	\$25,000
TBD	Project Initiation Document	Prepare project study report and site-specific drainage studies to identify design concepts and preliminary cost estimate, environmental considerations, and right-of-way needs and costs.	6-9 months	\$200,000
TBD	Programming and Funding	Project Owner determines funding needs and source, and prepares a program for delivering the project.	9-12 months	\$25,000
TBD	Project Report (PR)	Prepare alternatives analysis of reasonable and feasible alternatives considered. Perform value analysis and determine preferred alternative. Develop preferred alternative to 35% design as part of the Project Report.	12-18 months	\$300,000
TBD	Environmental Studies (CEQA/ NEPA Clearances)	Perform applicable studies and prepare the Environmental Document.	12-18 months Concurrent with PR	\$200,000
TBD	Final PS&E's	Prepare final engineering design and construction documents (8% of construction estimate)	12-18 months	\$1,080,000
TBD	Bid and Construction Phase	Construct proposed improvements. Rough order construction costs are estimated based upon bridge span of 110 ft and length of 80 ft by \$450/sf, and graded basins/swales cost of \$50/sf for the full length from Richmond Rd to Bowman Wash, a distance of 2,700 lf and an assumed width of 50 ft. A 25% contingency is also added to this total and rounded up to the nearest 1/2 million. It should be noted that right-of-way needs and costs are unknown. Any right-of-way, if required, could add 6-12 mo. to the schedule and unknown costs.	24 months	\$13,500,000

Notes for Executive Summary Table:

- 1 - Cost included in "Option 1 - Design, Permitting, and Construction"
- 2 - Cost included in "Option 2 - Design, Permitting, and Construction"
- 3 - Note: If extensive public outreach and right-of-way is required, this could add another two years to the planning and preliminary design phase.
- 4 - Note: The above timelines are based upon the project development guidelines provided in the Caltrans Project Development Procedures Manual (PDPM).

ACRONYMS / ABBREVIATIONS

AEP	Annual Exceedance Probability
ARPA-E	Advanced Research Projects Agency-Energy
BACM	Best Available Control Measures
CEQA	California Environmental Quality Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CMAQ	Congestion Mitigation and Air Quality Improvement Program
COG	Council of Governments
CRP	Carbon Reduction Program
DBE/SS	Disadvantaged Business Enterprise Supportive Services Program
DI	Drilling Island
DoD	Department of Defense
FEMA	Federal Emergency Management Agency
GIS	Geographical Information Systems
ISO	Insurance Services Office
KCAPCD	Kern County Air Pollution Control District
NAWS China Lake	Naval Air Weapons Station China Lake
NECC	Navy Expeditionary Combat Command
NEPA	National Environmental Policy Act
NEVI	National Electric Vehicle Infrastructure
NFIP	National Flood Insurance Program
NPL sites	National Priorities List sites
NSFLTP	Nationally Significant Federal Lands and Tribal Projects
OLDCC	Office of Local Defense Community Cooperation
PE	Petroleum Extraction
PGA	Peak Ground Accelerations
PROTECT	Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation
RACM	Reasonably Available Control Measures
RDAT&E	Research, Development, Acquisition, Test, and Evaluation
SME	Subject Matter Expert
SPEI – 3	Standardized Precipitation and Evaporation Index calculated over 3-month periods
TA	Transportation Alternative
US EPA	United States Environmental Protection Agency

GLOSSARY

Acute Hazard	Hazards that impact assets over a relatively short period (e.g., hours to days).
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.
Chronic Hazard	Hazards that gradually impact assets over a longer period (e.g., years to decades) or occur regularly on an annual basis.
Climate	Climate is the long-term weather pattern in an area, typically over a 30-year period.
Climate Change	A change of climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.
Consequences	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather/climate events), exposure, and vulnerability. Impacts generally refer to effects on lives; livelihoods; health and well-being; ecosystems and species; economic, social, and cultural assets; services (including ecosystem services); and infrastructure. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.
Critical Asset	Are those where loss of functionality could lead to loss of life, serious injury, threatened safety, public health impacts, or quality of life reduction (e.g., long-term economic impacts or impacts to installation mission readiness).
Hazard	An event that may cause an impact to an asset.
Likelihood	The chance of a specific outcome occurring where it might be estimated probabilistically.
Military Installation Resilience	The capability of an installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission-assurance and mission-essential functions.
Resilience	The capacity of interconnected social, economic, and ecological systems to cope with a hazardous event, trend, or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure. Resilience is a positive attribute when it maintains capacity for adaptation, learning, and/or transformation.
Risk	The potential for adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. In the context of climate change impacts, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards. Hazards, exposure, and vulnerability may each be subject to uncertainty in terms of magnitude and likelihood of occurrence.
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

INTRODUCTION

INTRODUCTION

TOC

ES

1

2

3

4

5

6

RAP

Introduction

Increases in extreme weather events related to climate change, human-induced hazards, and a global pandemic have shed light on risks and vulnerabilities within our communities. Across the United States, we are facing devastating effects from natural and nonnatural disasters, and the realities of resiliency shortfalls that communities must respond to in real-time as we are seeing a rise in billion-dollar disasters. Annually, natural- and human-caused hazards take the lives of hundreds and cost taxpayers billions of dollars to help communities, organizations, businesses, and individuals recover. In 2021, \$145 billion was the price tag for weather and climate disasters, with 20 separate billion-dollar weather and climate disasters across the United States¹.

We are also experiencing significant human-induced incidents such as civil unrest, cybersecurity threats, and aging infrastructure. It is apparent that communities need to better understand their collective vulnerabilities and risks to these types of events and their effect on the people, services, facilities, and systems on which they rely for daily life.

Climate-related extreme weather events affect military readiness, alter the operational environment, and drain resources. Wildfires have forced evacuations at installations in the western United States while hurricanes on the East Coast and flooding in the Midwest have inflicted billions of dollars of damage on facilities that are home to key warfighting capabilities².

Two consecutive earthquakes impacted NAWS China Lake, including an M6.4 earthquake on July 4, 2019, and an M7.1 earthquake on July 5, 2019, with aftershocks that continued a year or longer after

the earthquakes. The epicenter of the earthquake on July 5, 2019, was within the installation boundary and damaged the airfield known as Armitage Field as well as related facilities. Following the earthquakes and aftershocks, Navy Damage Assessment Teams conducted 13 days of assessments on 1,341 installation buildings, plus utilities and structures. The total plant replacement value for the 3,598 facilities, many of which are highly specialized, totals \$5.2 billion across 1.1 million acres³. The earthquake impacts temporarily rendered the installation “not mission capable” due to the severity of the damage. Approximately \$2.369 billion in military construction funds and \$627.459 million in defense appropriations funds were allotted in the Fiscal Year 2020 Domestic and Defense Appropriation bills to help rebuild NAWS China Lake as part of the earthquake recovery efforts⁴. According to Naval Facilities Engineering Systems Command (NAVFAC) earthquake recovery program, 22 projects valued at \$2.3 billion included hangar improvements to the south airfield, reconstruction of the range control complex, construction of the propulsion lab and salt well as well as mainside lab, training, and community support facilities.

Community resilience is widely accepted in the planning industry as the sustained ability of a community to respond to,

¹2021 U.S. Billion-Dollar Weather and Climate Disasters in Historical Context. National Oceanic and Atmospheric Administrations. Accessed November 18, 2022. <https://www.climate.gov/news-features/blogs/beyond-data/2021-us-billion-dollar-weather-and-climate-disasters-historical>

²Department of Defense, Office of the Undersecretary of Defense (Acquisition and Sustainment). 2021. Department of Defense Draft Climate Adaptation Plan. Report Submitted to National Climate Task Force and Federal Chief Sustainability Officer. 1 September 2021.

³“Naval Air Weapons Station China Lake Earthquake Repair & Reconstruct Industry Forum.” Naval Facilities Engineering Command, NAVFAC Southwest. August 1, 2019.

⁴“Vital NAWS China Lake Funding Secured by McCarthy in Appropriations Bill.” Kevin McCarthy Media Center Press Releases. Accessed January 12, 2023. <https://kevinmccarthy.house.gov/media-center/press-releases/vital-naws-china-lake-funding-secured-by-mccarthy-in-appropriations-bill>

TOC

ES

1

2

3

4

5

6

RAP

1.1 Department of Defense Installation Resilience Program

The City is serving as the Military Installation Resiliency Study sponsor with technical and financial support from the DoD Office of Local Defense Community Cooperation (OLDCC) through the Installation Resilience program.

DoD Installation Resilience Program:

The program is designed to support local and state government initiatives to identify, analyze, and implement actions necessary to foster, protect, and enhance military installation sustainability that promotes both community and installation resilience and compatible community development.

Military installation resilience is defined as the capability of a military installation to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events, or from anticipated or unanticipated changes in environmental conditions, that do, or have the potential to, adversely affect the military installation or essential transportation, logistical, or other necessary resources outside of the military installation that are necessary in order to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions⁵.

⁵ FY2019 National Defense Authorization Act. S.1790 - 116th Congress (2019-2020): National Defense Authorization Act for Fiscal Year 2020 | Congress.gov | Library of Congress

INTRODUCTION

TOC

ES

1

2

3

4

5

6

The Installation Resilience program is designed to help communities make informed decisions and support continued partnering with the installation they support to respond to, address, and mitigate activities that are either impairing or likely to impair the use of the installation. The overarching goal is to increase the military value of the installation by preserving the military mission and provide opportunities for continued community growth in concert with the installation missions.

This Military Installation Resiliency Study plays a critical role to protect both the military and the greater region to ensure continued military mission and effectiveness; continued community growth; and adequate and resilient shared critical infrastructure, such as water availability, stormwater, wastewater, installation energy, transportation, installation access, and communications.

1.2 Defense Community Resilience Planning Framework

A resilient defense community is a community, in partnership with its respective military installation, that understands its vulnerabilities, is prepared to respond to a shock, and proactively mitigates risks associated with a broad array of current and future hazards; a community that when it does experience a shock or disruption, is able to absorb the hit, rebound forward, and recover rapidly. The community needs to understand and support the interconnectedness and interdependencies of the critical infrastructure assets and systems that link the community, military installation, and greater region.

Stantec's Defense Community Resilience Planning Framework has allowed for the identification of opportunities to strengthen

resiliency in and around NAWS China Lake including identification of shared vulnerabilities and risks, identification of critical infrastructure, and strategies to address, including possible funding sources, to chart a path for the long-term sustainability and operability of NAWS China Lake and the surrounding region through analysis and implementation of necessary actions to foster, protect, and enhance both community and military installation resilience.

The Military Installation Resiliency Study provides the opportunity to continue and expand the established community and military partnerships essential to address the growing challenges to human health and safety, quality of life, infrastructure, economic growth, and military operations and readiness. Critical military infrastructure is essential to operational readiness and national security. Understanding infrastructure vulnerabilities, both inside and outside installation boundaries, is key to mitigating risks and enhancing military resilience. The Military Installation Resiliency Study explores how community partnerships can sustain an installation's ability to prepare for an extreme event and rapidly reestablish mission-related functionality.

1.3 Purpose

The City, NAWS China Lake, and the surrounding communities are exposed to a range of natural hazard threats, such as drought, earthquakes, extreme heat, extreme wind, wildfire, and floods. The frequency, magnitude, and impact of these hazards are worsening with climate change, amplifying the need to increase and invest in the resilience of the City, NAWS China Lake, and the surrounding region. As defense communities improve their own resilience, they effectively support the broader

INTRODUCTION

TOC

ES

1

2

3

4

5

6

picture of military operations and national security. These significant endeavors are more effective through strong partnerships with shared visions and understandings of vulnerabilities and risks, prioritization of resilience projects, and innovative financing tools.

NAWS China Lake serves as a significant economic engine for the City, surrounding communities, and the State of California. All parties have a vested interest in supporting the development and maintenance of infrastructure beyond installation boundaries to support military mission assurance and continued military operations. These linkages require an understanding of where vulnerabilities are shared and how working together can help address

considerable challenges. Together, all parties benefit from jointly defining success and the metrics to evaluate success.

1.4 Project Objectives

Stantec has conducted the Military Installation Resiliency Study based upon our Defense Community Resilience Planning Framework, with a focus on the interdependencies of the City, NAWS China Lake, and the surrounding region. This resilience planning framework is intended to support the City's efforts to assess, plan, prioritize, and implement resilience strategies and infrastructure projects to provide critical services and infrastructure in support of maintaining military mission assurance and mission-essential functions

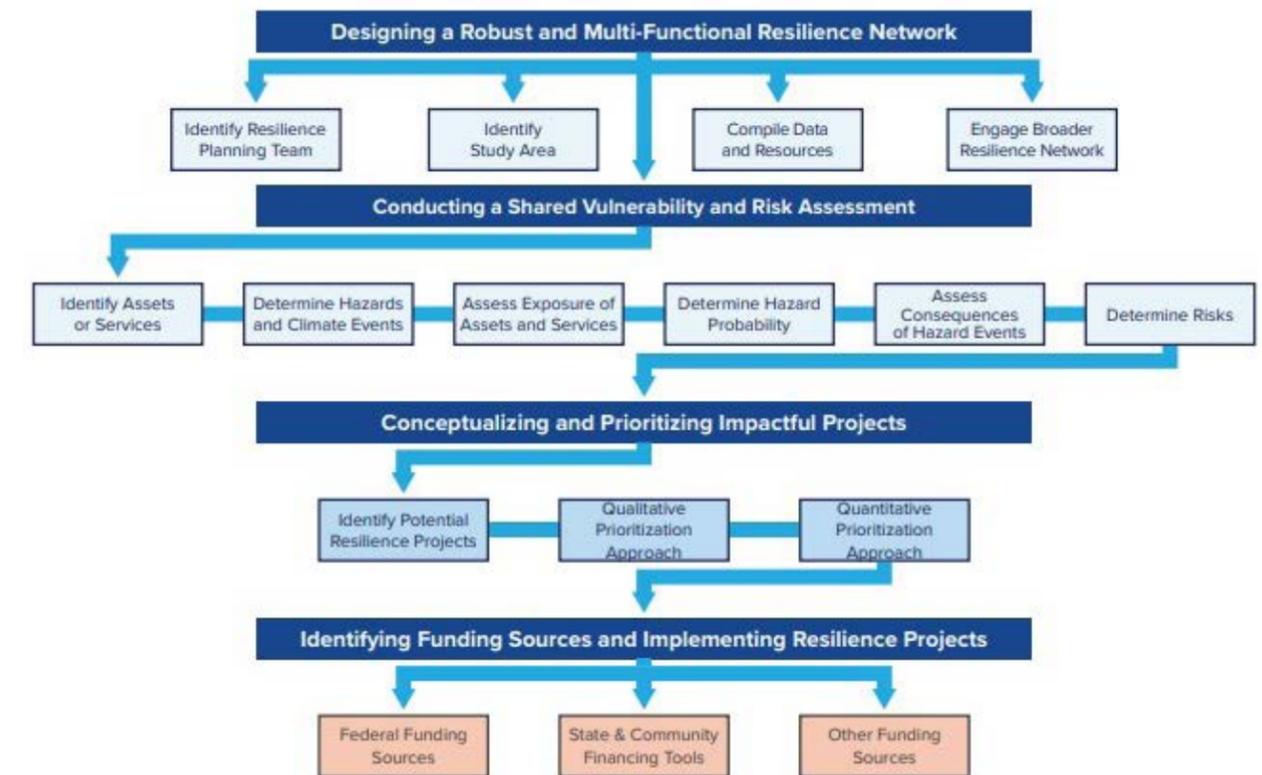


Figure 1.1: Defense Community Resilience Planning Framework Overview

INTRODUCTION

TOC

ES

1

2

3

4

5

6

RAP

as well as continued community growth and economic development.

1.5 Approach

The Defense Community Resilience Planning Framework provides a method to assess vulnerabilities and risks within the City, the surrounding area, and also in coordination with threats to installation resiliency. It provides a risk-informed, phased approach to identify and prioritize investments for resiliency projects and includes opportunities to foster partnerships. The process is broken into the four following phases (also shown in Figure 1.1, previous page).

1. Design a robust and multifunctional resilience network
2. Conduct a shared vulnerability and risk assessment
3. Conceptualize and prioritize impactful projects
4. Identify funding sources and implement the projects

The concept of resilience is linked to a wide variety of planning approaches, methodologies, and design concepts aimed at reducing risk to or lessening the impacts of shocks and stressors. Communities can enhance resiliency through hazard mitigation planning, climate change adaptation, smart technology, redundancy, and sustainability efforts, or a combination of these approaches. But all seek to protect communities from the loss of life and damages to infrastructure and property while simultaneously seeking to expedite the recovery process that improves the quality of life for community members. To ensure a comprehensive approach to resilience planning, it is important to understand key planning concepts when executing a resilience strategy.

- Hazard Mitigation – Hazard mitigation is any action taken to reduce risk before, during, or after a hazard event. As a planning concept, it looks to reduce harmful impacts from natural hazards, such as flooding, wildfires, earthquakes, severe weather, and hurricanes, or from human-induced threats, such as chemical releases, cyberattacks, and terrorism. Hazard mitigation planning can incorporate climate adaptation by assessing and seeking to reduce future risks.
- Climate Adaptation – Climate adaptation is the international practice of assessing and implementing strategies to respond to local variability in climate-related elements such as temperature, precipitation, wind, storm events, and sea-level rise. It is important for communities to assess how increased variability in climate trends might affect the daily lives of the people, processes, and systems within them. Adaptation can take many forms and can be tailored to the specific needs of a community or region.
- Smart Community – The smart community movement encompasses the broad concept of creating interconnected communities that leverage technologies and data to improve day-to-day problems people experience, and to benefit community activities. Smart technology and informed approaches to problems can

⁶ Nam, Taewoo and Theresa Pardo (2011). *Conceptualizing Smart City with Dimensions of Technology, People, and Institutions*. Center for Technology in Government, University at Albany, SUNY. Retrieved from https://inta-aivn.org/images/cc/Urbanism/background%20documents/dgo_2011_smartcity.pdf.

⁷ Goodland, Robert. *The Concept of Environmental Sustainability*. *Annual Review of Ecology and Systematics* (1995), 26: 1-24. Retrieved from <https://www.jstor.org/stable/2097196>

INTRODUCTION

TOC

ES

1

2

3

4

5

6

RAP

be integrated into resilience projects; often amplifying the effects of larger capital improvements.

- Redundancy – The concept of redundancy within resilience focuses on achieving safeguards against the failure of a system. Redundancy aims to increase reliability and predictability by providing alternatives when a primary system or process fails.
- Sustainability – While resilience captures the ability to respond to shocks to a system, sustainability speaks to the long-term ability to maintain or improve functions. Sustainability emphasizes the importance of economic efficacy, environmental stewardship, and equity or social vitality through what is often referred to as the “triple bottom line”

concept. Sustainability recognizes that these three pillars are essential in maintaining and improving long-term functionality and quality of life within communities. Defense communities face the added complexity of considering their relationship with the local military installation when striving to balance these goals during the decision-making process.

Resilience planning is not meant to be a linear process but rather a cyclical one to support the City of Ridgecrest in the development of an overall resilience program, with the goal of continuous improvement in resilience, quality of life, and public safety, and the overarching tenet of national security. In the long term, defense

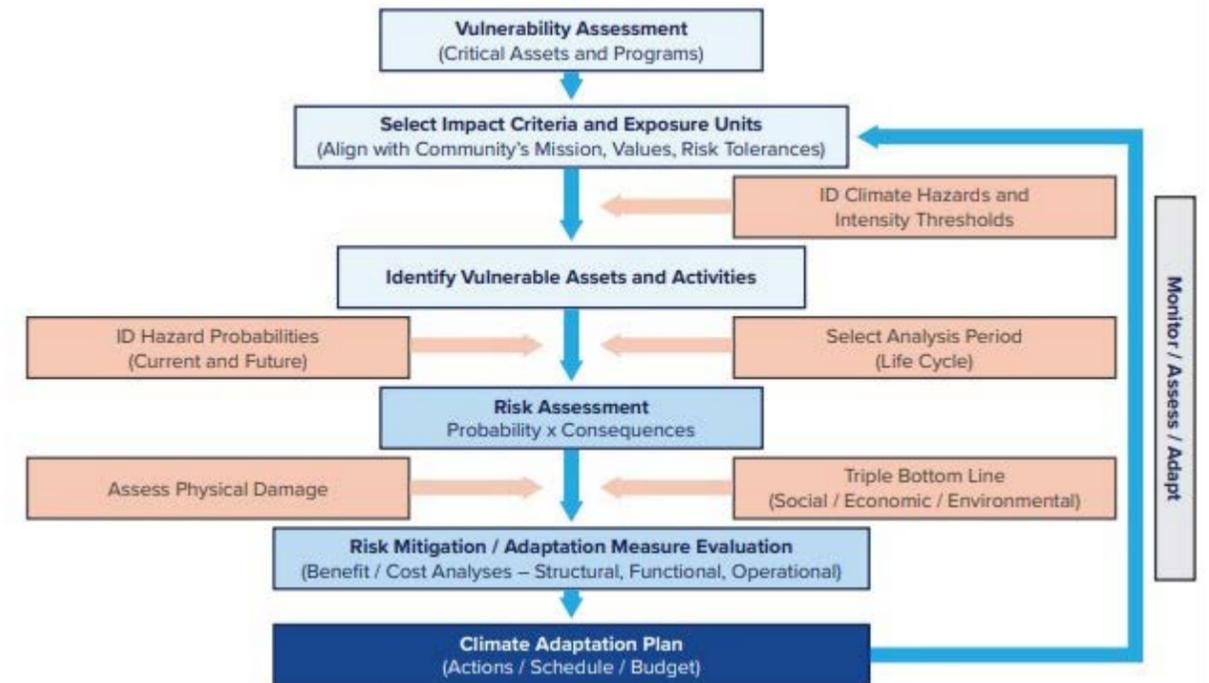


Figure 1.2: Vulnerability and Risk Assessment Process

INTRODUCTION

TOC

ES

1

2

3

4

5

6

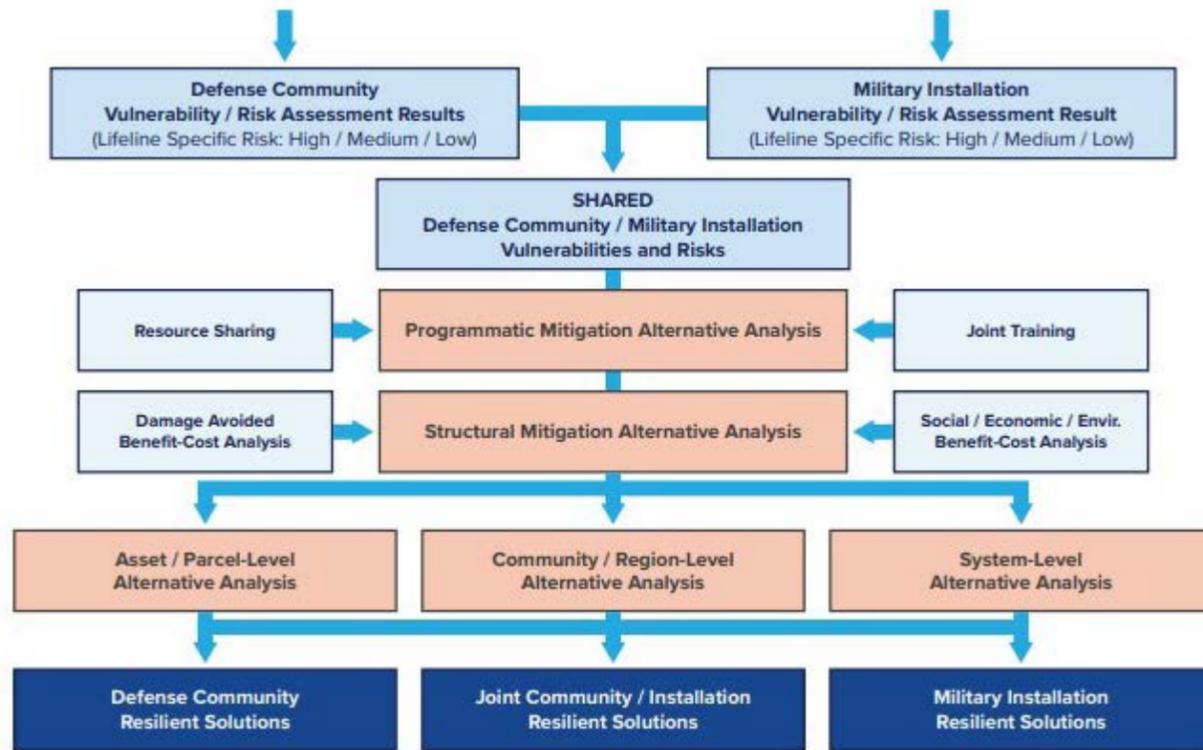


Figure 1.3: Resilience Planning with a shared community and Installation perspective

communities can continue to evaluate and build upon their resilience strategy and implementation. As the City becomes more resilient, it can further its resilience on a broader scale, strengthening regional and national defense resilience strategies as well.

In recent years, DoD has placed a growing emphasis on resilience to natural hazards as it relates to impacts on military installations and mission-essential functions, recognizing that climate hazards pose threats to national security.

DoD and installation resources can support and inform a defense community's resilience planning efforts and advance military installation resilience by funding and implementing identified solutions. In

addition, the adjacent defense community perspective is needed to ensure facilities, infrastructure, and services beyond the installation boundaries that are also critical to continue military operations and readiness are identified, understood, and preserved.

An opportunity is presented for broader, more coordinated, and impactful resilience initiatives by the City, NAWS China Lake, and the region working together. A more holistic and robust assessment of essential community infrastructure and services beyond the installation fence line are identified to maintain mission-essential functions. An overview of resilience planning with a shared community and installation perspective is outlined in Figure 1.3.

INTRODUCTION

The process applied to this project followed the process outlined below. This process is explained in sections 4 and 5.

PROCESS FOR MILITARY INSTALLATION RESILIENCE ASSESSMENT



TOC

ES

1

2

3

4

5

6

RAP

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

2.1 STUDY AREA

The Military Installation Resiliency Study area included the City of Ridgecrest, NAWS China Lake, and Kern County (see Figure 2.1: Location Map). This comprehensive study included the identification of critical and aging infrastructure, points of failure, including energy and water, transportation limitations, and vulnerabilities and risks to secure communication systems.

NAWS China Lake and the surrounding areas are vulnerable to a wide range of natural and man-made risks. The most notable natural hazards are associated with flood, wind, heat, extreme weather, and drought. A key focus of the study was assessing vulnerabilities and risks associated with the chronic overdraft of the groundwater amplified by drought

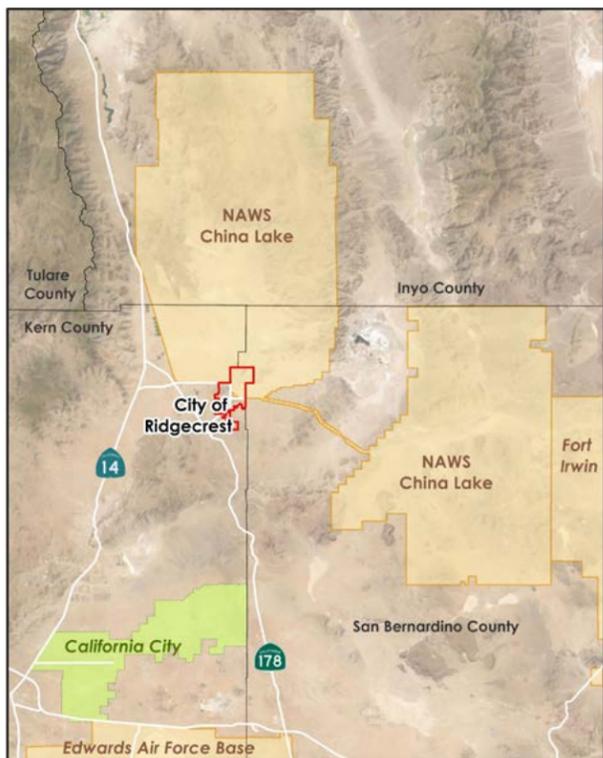


Figure 2.1: Location Map

and heat. The risk assessment considered the impacts of climate change including more frequent and/or extreme weather events.

2.2 COMMUNITY PROFILE

The region is intrinsically tied by the employment and economic effects of the jobs and personnel at NAWS China Lake who live in the City of Ridgecrest and surrounding Kern County.

The Kern Council of Governments coordinates and facilitates regional transportation planning efforts for each of the 11 incorporated cities in Kern County, among other planning efforts.

2.2.1 JUSTICE 40 DEMOGRAPHICS

The following section describes the [Justice40 Initiative](#), provides general demographic details on the City of Ridgecrest and Kern County, and then identifies which part of each jurisdiction could be potentially eligible to apply for Justice40 Initiative grant funding.

What is The Justice40 Initiative?

The Justice40 Initiative, as part of Executive Order 14008, is the federal government's goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.

⁸ "Memorandum for the Heads of Departments and Agencies – Interim Implementation Guidance for the Justice40 Initiative." Executive Office of the President Office of Management and Budget. July 20, 2021. <https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf>

⁹ Climate and Economic Justice Screening Tool." Council of the President of the United States Executive Office Council on Environmental Quality. Accessed November 1, 2022. <https://screeningtool.geoplatform.gov/en/methodology#low-income>

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

The Interim Implementation Guidance for the Justice40 Initiative included the following definitions:

Community – Agencies should define community as “either a group of individuals living in geographic proximity to one another or a geographically dispersed set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions⁸.”

Disadvantaged – Agencies should consider appropriate data, indices, and screening tools to determine whether a specific community is disadvantaged based on a combination of variables that may include, but are not limited to, the following:

- Low income, high and/or persistent poverty
- High unemployment and underemployment
- Racial and ethnic residential segregation, particularly where

the segregation stems from discrimination by government entities

- Linguistic isolation
- High housing cost burden and substandard housing
- Distressed neighborhoods
- High transportation cost burden and/or low transportation access
- Disproportionate environmental stressor burden and high cumulative impacts
- Limited water and sanitation access and affordability
- Disproportionate impacts from climate change
- High energy cost burden and low energy access
- Jobs lost through the energy transition
- Access to healthcare

The Justice40 Initiative investment categories of disadvantaged communities were later refined as described below⁹.

Categories	Disadvantaged Communities Criteria
	Communities are identified as disadvantaged IF they are at or above the 65th percentile for low income AND 80% or more of individuals 15 or older are not enrolled in higher education AND meet the additional criteria for each category as listed below.
Climate Change	Are at or above the 90th percentile for expected agriculture loss rate OR expected building loss rate OR expected population loss rate
Clean Energy and Energy Efficiency	Are at or above the 90th percentile for energy burden OR PM2.5 in the air
Clean Transit	Are at or above the 90th percentile for diesel particulate matter exposure or traffic proximity and volume
Affordable and Sustainable Housing	Are at or above the 90th percentile for lead paint AND median home value is at or less than the 90th percentile OR at or above the 90th percentile for the housing cost burden
Reduction and Remediation of Legacy Pollution	Are at or above the 90th percentile for proximity to hazardous waste facilities OR proximity to National Priorities List (NPL) sites OR proximity to Risk Management Plan (RMP) facilities
Critical Clean Water and Wastewater Infrastructure	Are at or above the 90th percentile for wastewater discharge
Health Burdens	Are at or above the 90th percentile for asthma OR diabetes OR heart disease OR low life expectancy
Training and Workforce Development	Are at or above the 90th percentile for low median income as a percentage of area median income OR linguistic isolation OR unemployment OR percentage of individuals in households at or below 100% Federal poverty level

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

Low Income is defined as the percent of a census tract's population in households where household income is at or below 200% of the Federal poverty level.

The White House Council on Environmental Quality, in partnership with the U.S. Digital Service, developed a [Climate and Economic Justice Screening Tool](#). The tool includes interactive maps with indicators to assist agencies in defining and identifying disadvantaged communities. The data to identify disadvantaged communities is based on census tract data with information coming from the census data, the American Community Survey, National Risk Index, EPA's National Air data, EPA's EJScreen traffic data, EPA's hazardous waste data, EPA's CERCLIS database, and HUD's Comprehensive Housing Affordability Strategy Dataset. By census tract, each of the investment categories described above can be searched.

The results of the Climate and Economic Screening tool for the area surrounding NAWS China Lake are shown in **Figure 2.2**. Census Tract 8 meets the disadvantaged communities criteria, as detailed above, for climate change, affordable and sustainable housing, and reduction in remediation of legacy pollution, and Census Tract 53 meets the disadvantaged communities criteria for health burdens, affordable and sustainable housing, and training and workforce development.

The Justice40 Initiative programs require an overhaul of federal funding processes. The White House established 21 existing federal Programs to serve as the Justice40 pilot Programs.

While not all-inclusive, the list beginning on page 15 shows a sampling of the potential Justice40 grant opportunities that could relate to the Military Installation Resiliency Study area. Specific funding opportunities for each prioritized resilience action are identified in the Resilience Action Plan (Appendix A).

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

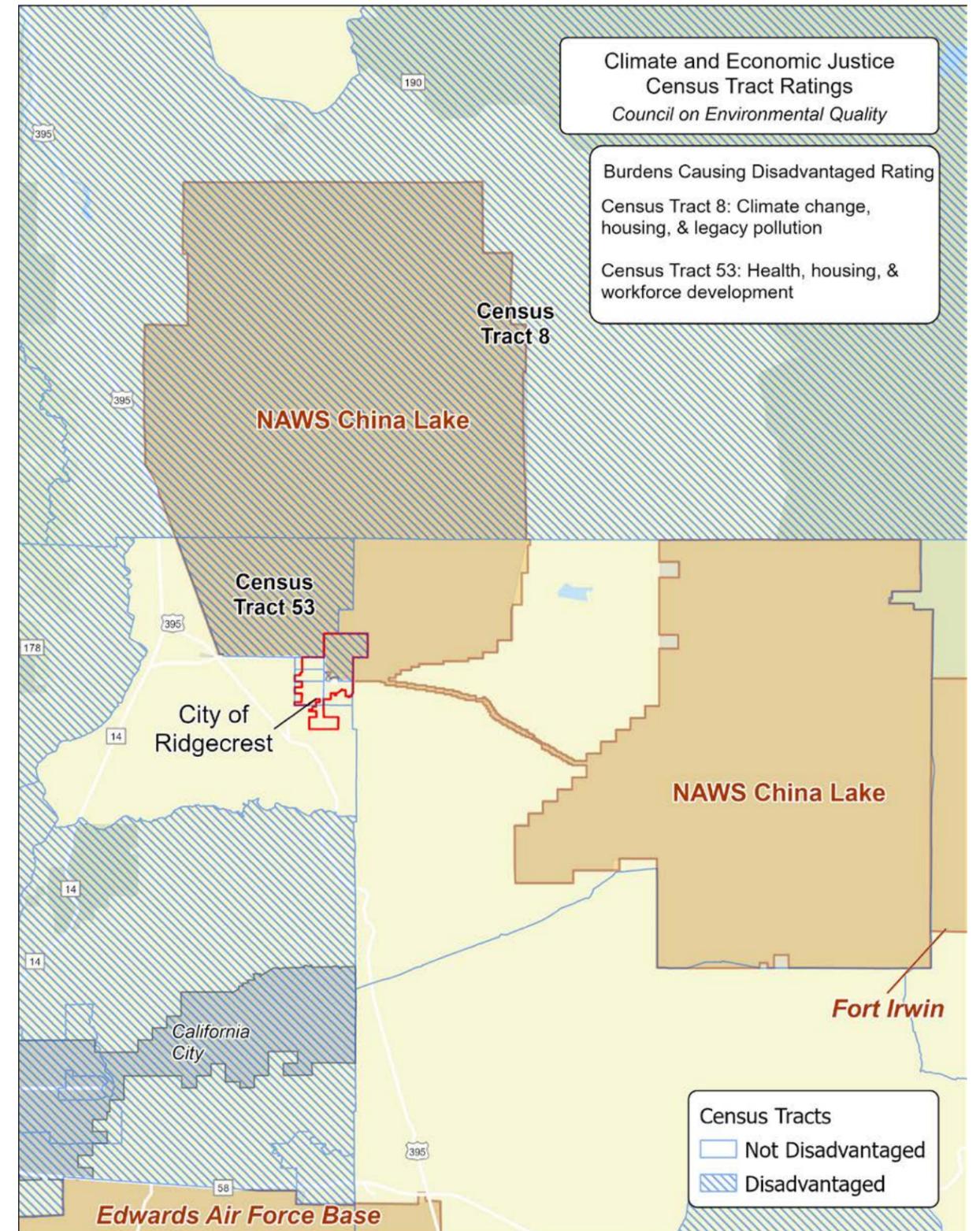


Figure 2.2: Climate and Economic Justice Screening Tool Results

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

FEMA Justice40 Initiative Programs

- [Building Resilient Infrastructure and Communities](#)
- [Flood Mitigation Assistance](#) competitive annual grant programs
- [Hazard Mitigation Assistance](#) to state, local, tribal, and territorial governments to make communities more resilient from natural hazards.
- [FEMA Risk Mapping, Assessment and Planning](#)
- [Regional Catastrophic Preparedness Grant Program](#), which help to ensure that communities are prepared for disasters.
- [Swift Current Initiative](#), which is the [first FEMA initiative](#) funded through the Bipartisan Infrastructure Law to strengthen national preparedness and resilience. The Swift Current Initiative aims to better align the delivery of flood mitigation funding to provide improved support to disaster survivors by expediting Flood Mitigation Assistance awards following a disaster rather than through an annual grant application cycle.

U.S. Department of Transportation Justice40 Initiative Programs

- [Carbon Reduction Program \(CRP\)](#)
- Charging & Fueling Infrastructure Grants
- [Congestion Mitigation and Air Quality Improvement Program \(CMAQ\)](#)
- Congestion Relief Program
- [Disadvantaged Business Enterprise Supportive Services \(DBE/SS\) Program](#)
- [National Electric Vehicle Infrastructure \(NEVI\) Competitive Program](#)
- [National Electric Vehicle Infrastructure \(NEVI\) Formula Program](#)
- [Nationally Significant Federal Lands and Tribal Projects \(NSFLTP\)](#)
- [On the Job Training Supportive Services](#)
- [Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation \(PROTECT\) Formula Program](#)
- Protect Grants
- Reduction of Truck Emissions at Port Facilities
- [Transportation Alternatives \(TA\) \(Surface Transportation Block Grant set-aside\)](#)
- Tribal High Priority Projects Program
- [Tribal Transportation Program Bridge Program \(Bridge Investment Program Set Aside\)](#)
- [Tribal Transportation Program Bridge Program \(Bridge, Replacement, Rehabilitation, Preservation, Protection, and Construction Set Aside\)](#)
- [Tribal Transportation Program](#)

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

U.S. Department of Energy Justice40 Initiative Programs

With more than [140 DOE Justice40 programs](#), below is a list of just a few opportunities.

- Advanced Research Projects Agency–Energy (ARPA-E)
- Federal Energy Management Program
- Grid Deployment Office
- Loan Programs Office
- Office of Clean Energy Demonstrations
- Officer of Cyber Security, Energy Security, and Emergency Response
- Office of Economic Impact and Diversity
- Office of Electricity
- Office of Energy Efficiency and Renewable Energy

City of Ridgecrest Demographics

Located in the northeast corner of Kern County, Ridgecrest is the County’s second-largest urban area and third-largest incorporated area. The City of Ridgecrest was incorporated in 1963.

According to U.S. Census data, the City of Ridgecrest has a population of 28,105, density of 340.3 people per square mile, and total land area in square miles of 20.86. Population growth in the City of Ridgecrest is closely tied to employment changes at NAWS China Lake.

NAWS China Lake lies within the City of Ridgecrest boundary limits; however, the Navy manages this land area and the City does not exercise land use authority. NAWS China Lake personnel and the U.S. Navy manage planning within the installation boundary limits.

A Military Influence Area (MIA) Overlay defines land use controls, such as types of land use designations and densities in the NAWS China Lake aviation approach and departure zones to protect public safety and the operational mission at NAWS China Lake.

BACKGROUND

TOC

ES

1

Kern County Demographics

According to the U.S. Census, the total population of Kern County is 917,673, density per square mile is 111.8, and total land area in square miles is 8,134.65.

2

Kern County includes 11 incorporated cities of which the City of Ridgecrest is one. The other incorporated cities include Arvin, Bakersfield, California City, Delano, Maricopa, McFarland, Shafter, Taft, Tehachapi, and Wasco.

3

There are three separate geographic regions in Kern County: 1) the valley region, which includes the southern San Joaquin Valley with elevations below 1,000 feet mean sea level; 2) the mountain region, which aligns with the Los Angeles Aqueduct in the eastern county, and includes the westernmost and central portion of the county above 1,000 feet sea level; and 3) the desert region, which also aligns with the Los Angeles Aqueduct. The focus of this study was within the desert region¹⁰.

4

5

6

RAP

According to the Justice40 mapper data, several Kern County census tracts meet one or more of the following Justice40 Initiative investment categories of disadvantaged communities as described below:

- Climate Change
- Clean Energy and Energy Efficiency
- Clean Transit
- Affordable and Sustainable Housing
- Reduction and Remediation of Legacy Pollution
- Critical Clean Water and Wastewater Infrastructure
- Health Burdens
- Training and Workforce Development

BACKGROUND

TOC

ES

1

2.2.2 ECONOMY

City of Ridgecrest Economy

According to the U.S. Census, the median household income (2016–2020) was \$71,774. The City of Ridgecrest, with its accessibility by two major highways, serves as a hub for shopping, commercial services, entertainment, and tourism for northeastern Kern County and the Eastern Sierra Region.

The Navy is the largest employer in Indian Wells Valley, adding to the economic base within the City of Ridgecrest and surrounding communities. NAWS China Lake economic community benefits provide support for local businesses and the community from service members, contractors, visitors, and supply purchases. 2017 economic highlights from NAWS China Lake include:

- \$1.2 billion – regional contribution to the regional economy
- \$679 million – output from payroll, operations and maintenance, and visitor spending
- \$503 million – total direct annual payroll for personnel working at NAWS China Lake
- \$36 million – annual amount in state/local taxes including:
 - ▶ \$14 million from payroll
 - ▶ \$20 million from operations and maintenance
 - ▶ \$2 million from visitor spending¹¹

Kern County Economy

According to the U.S. Census, the median household income (2016–2020) was \$54,851.

Kern County has unemployment rates that are 50% higher than the rest of the State. In 2020, Kern County had the second-worst poverty rate in the State¹².

Kern County's diverse valley, desert, and mountain regions are unlike any other region in California. The economies are as diverse as the regions and include agriculture, oil production, renewable energy, aerospace, military, and recreation. Unique strategies are required to meet Kern's economic, transportation, and other needs¹³.

According to the DoD Office of Local Defense Community Cooperation, Kern County is a top defense contract spending location, bringing in \$1.4 billion in FY2021. In FY2021, it was among the top three defense spending locations¹⁴.

2

3

4

5

6

RAP

¹⁰ "Kern Council of Government 2022 Regional Transportation Plan – Sustainable Communities Strategy." Kern Council of Governments. Accessed November 8, 2022. <https://www.kerncog.org/wp-content/uploads/2022/04/CHAPTER-4-SUSTAINABLE-COMMUNITIES-STRATEGY-2022-RTP-PJC-041222.pdf>

¹¹ "Partners for a Compatible Future – Naval Air Weapons Station China Lake." CNIC Navy. Accessed November 10, 2022. <https://www.ridgecrest-ca.gov/DocumentCenter/View/6940/NAWS-China-Lake---Partners-for-a-Compatible-Future?bidId=>

¹² "Kern Council of Governments 2022 Regional Transportation Plan." Kern Council of Governments. Accessed November 8, 2022. <https://www.kerncog.org/wp-content/uploads/2022/04/Executive-Summary-2022-RTP.pdf>

¹³ "Kern Council of Government 2022 Regional Transportation Plan – Sustainable Communities Strategy." Kern Council of Governments. Accessed November 8, 2022. <https://www.kerncog.org/wp-content/uploads/2022/04/CHAPTER-4-SUSTAINABLE-COMMUNITIES-STRATEGY-2022-RTP-PJC-041222.pdf>

¹⁴ "FY2021 Defense Spending California." DoD Office of Local Defense Community Cooperation. Accessed November 10, 2022. https://oldcc.gov/sites/default/files/FY2021%20Defense%20Spending_CA.pdf

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

2.2.3 GENERAL PLAN - SAFETY ELEMENT

According to California Government Code Section 65300, each city and county is required to prepare and maintain a planning document, called a General Plan. It serves as the jurisdiction's "blueprint" for future decisions regarding land use, infrastructure, public services, and resource conservation. Among the California state-mandated General Plan chapters are Noise and Safety Elements. While not explicitly referenced as a hazard mitigation plan, the Safety Element of a General Plan identifies hazardous risks and establishes policies and programs for mitigation.

City of Ridgecrest General Plan

The City combined the state-mandated Noise and Safety Elements of its General Plan into a Health and Safety Element that establishes policies to protect the community from risks associated with natural and man-made hazards such as seismic, geologic, flooding, wildlife hazards, and air quality.

According to the Health and Safety Element, hazards are defined as natural conditions that can affect the health or life of any person or cause significant property damage. The Health and Safety Element provides policy and program input to City operational practices and the physical development process so that unnecessary exposure to these hazards can be avoided or minimized.

The hazard and risk summary identified earthquakes and floods as the most significant hazards, followed by severe weather. In July 2019, a series of two earthquakes caused significant area damage. Because NAWS China Lake was

the epicenter of the earthquakes, the damage was so severe that the installation was temporarily evaluated as "not mission capable" due to earthquake damage.

Naval Facilities Engineering Systems Command (NAVFAC) earthquake recovery program identified 22 projects valued at \$2.3 billion that included hangar improvements to the south airfield, reconstruction of the range control complex, construction of the propulsion lab and salt well, as well as mainside lab, training, and community support facilities.

Other hazards and risks include:

- High Wind/Tornados
- Geologic Hazards
- Drought
- Wildfires and Grassfires
- Noxious Weeds and Insects
- Floods

A snapshot of the most relevant goals and policies of the Health and Safety Element of the City of Ridgecrest General Plan adopted in 2009 are included in the following pages. Policies that are most pertinent to the Military Installation Resiliency Study are highlighted in yellow.

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

Goal and Policies	Description
Goal HS-1 – General	Protect the City and its residents from injury and damage resulting from natural catastrophes and hazardous conditions including aircraft operations, air quality, flooding, fire, and noise.
HS-1.1 Development Constraints	The City shall permit development only in areas where the potential danger to the health and safety of people can be mitigated to an acceptable level.
HS-1.2 Maintain Emergency Services	The City shall ensure that during natural catastrophes and emergencies the City can continue to provide essential emergency public services.

Goal and Policies	Description
Goal HS-2 - Air Quality	To reduce the generation of air pollutants and promote alternative methods of transportation to maximize the quality of life of residents.
HS-2.2 Coordination with Local and Regional Agencies	The City shall coordinate with other local, regional, and state agencies in developing an effective approach to implementing air quality plans that achieve State and Federal Ambient Air Quality Standards and control regional air transport pollution problems (such as NAWS China Lake's programs to control fugitive dust at Owens Lake).

Goal and Policies	Description
Goal HS-3 – Emergency Response	Ensure the maintenance of the Emergency Response Plan in order to maintain its effectiveness in preparing and responding to natural or human-made disasters.
HS-3.5 Water Main Upgrades	The City shall support Water District efforts to upgrade water mains in order to provide adequate fire flows in all parts of the City.
HS-3.12 Educate Public on Emergency Response	The City shall conduct training programs for staff in disaster preparedness.
HS-3.13 Coordinate with Kern County	The City will strive to work with other local agencies, including Kern County and cities within the County, to develop coordinated geographical information systems (GIS) planning for emergency response services.
HS-3.14 Siting of Critical Emergency Responses	The City shall ensure that the siting of critical emergency response facilities, such as hospitals, fire stations, police offices, substations, emergency operations centers, and other emergency service facilities and utilities, have minimal exposure to flooding, seismic and geological effects, fire, and explosions.

Goal and Policies	Description
Goal HS-4 – Flood Hazard	Minimize loss of life and property of City residents from flood hazards.
HS-4.2 City-Wide Flood Control System	The City shall consider the feasibility for the development of a comprehensive city-wide flood control system with adequate design capacity for, at a minimum, 50-year storm conditions and 100-year storm capacity, where feasible.
HS-4.6 Comprehensive Flood Plain Management Program	To regulate development and land uses within the 100-year flood plain, the City shall prepare and adopt a comprehensive flood plain management program.

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

Goal and Policies	Description
Goal HS-5 – Geologic and Seismic Hazards	Minimize loss of life and reduce to a minimum the loss or disruption of the flow of goods and services and destruction of property that could result from seismic and/or geologic activity.
HS-5.8 Earthquake Awareness	The City shall provide a continuous citywide educational program on potential seismic risks in the Indian Wells Valley and steps residents can take to minimize the effects of an earthquake.
HS-5.15 Soil Erosion and Soil Conservation Programs	The City shall support erosion control (wind and water) and soil conservation programs of other agencies in Indian Wells Valley.

The findings of this Military Installation Resiliency Study can be incorporated into the next Health and Safety Element of the City of Ridgecrest General Plan (2009) as it is updated in the future.

Kern County General Plan

The Kern County General Plan Safety Element, as mandated by California Government Code Section 65300, goals, policies, and implementation measures are captured below. The General Plan was last updated in September 2009.

Goals

1. Minimize injuries and loss of life and reduce property damage.
2. Reduce economic and social disruption resulting from earthquakes, fire, flooding, and other geologic hazards by assuring the continuity of vital emergency public services and functions.
3. Assist in the allocation of public resources in Kern County to develop information regarding geologic, fire, and flood safety hazards, and to develop a systematic approach toward the protection of public health, safety, and welfare from such hazards.
4. Create an awareness for the residents in Kern County through the dissemination of information about geologic, fire, and flood safety hazards.

5. Ensure the availability and effective response of emergency services following a catastrophic event.
6. Prepare the County for effective response to and rapid beneficial recovery from the occurrence of a catastrophic event.
7. Ensure that adequate emergency services and facilities are available to the residents of Kern County through the coordination of planning and development of emergency facilities and services.
8. Reduce the public's exposure to fire, explosion, blowout, and other hazards associated with the accidental release of crude oil, natural gas, and hydrogen sulfide gas.

Policies

1. That the County's program of identification, mapping, and evaluating the geologic, fire, and flood safety hazard areas, and significant concentrations of hydrogen sulfide in oilfield areas, presently underway by various County departments, be continued.
2. Those hazardous areas, identified as unsuitable for human occupancy, are guided toward open space uses such as agriculture, wildlife habitat, and limited recreation.

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

3. That the County government encourages public support of local, state, and federal research programs on geologic, fire, flood hazards, valley fever, plague, and other studies so that acceptable risk may be continually reevaluated and kept current with contemporary values.
4. The County shall encourage extra precautions be taken for the design of significant lifeline installations such as highways, utilities, and petrochemical pipelines.
5. The adopted Kern County, California, Multi-Hazard Mitigation Plan is incorporated by reference. This multijurisdictional plan, approved in compliance with the Disaster Mitigation Act of 2000, provides long-term planning to reduce the impacts of future disasters.

Implementation Measures

1. All hazards (geological, fire, and flood) should be considered whenever a Planning Commission or Board of Supervisor's action could involve the establishment of a land use activity susceptible to such hazards.
2. The Safety Element should be reviewed and comprehensively revised every five years, or whenever substantially new scientific evidence becomes available.
3. Require detailed site studies for ground shaking characteristics, liquefaction potential, dam failure inundation, flooding potential, and fault rupture potential as background to the design process for critical facilities under County discretionary approval.
4. Require seismic review prior to major addition, renovation, or increase in occupancy of buildings.
5. Maintain adequate setbacks between oil/gas wells and development using

- the zone districts DI (Drilling Island) or PE (Petroleum Extraction) and implementation of the uniform Fire Code 7904.32.3
6. The adopted multijurisdictional Kern County, California, Multi-Hazard Mitigation Plan, as approved by FEMA, shall be used as a source document for preparation of environmental documents pursuant to CEQA, evaluation of project proposals, formulation of potential mitigation, and identification of specific actions that could, if implemented, mitigate impacts from future disasters and other threats to public safety.

Kern County may incorporate the findings and recommendations included in this Military Installation Resiliency Study in the next Safety Element of the Kern County General Plan (2009) as it is updated in the future.

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

2.3 Installation Overview

NAWS China Lake is where the Navy and Marine Corps have developed or tested every significant airborne weapon system in the past five decades¹⁵. The installation benefitted from the 2005 Base Realignment and Closure Commission recommendation to consolidate naval weapons and armament research, development, and testing at the facility, which was followed by a \$55 million and 177,000-square-foot weapons and armaments technology center. Example programs and systems developed at NAWS China Lake include the Tomahawk cruise missile, Joint Stand-Off Weapons System, and the Joint Direct Attack Munitions¹⁶.

2.3.1 GEOGRAPHY

NAWS China Lake is located approximately 150 miles north of Los Angeles, directly north of the City of Ridgecrest, and surrounded by the counties of Inyo, Kern, and San Bernadino in the Western Mojave Desert Region of California.

Two major land areas make up NAWS China Lake. The North Range, encompassing 606,926 acres, lies in portions of Inyo, Kern, and San Bernadino counties. The South Range, encompassing 503,510 acres, lies in San Bernadino Valley. The North Range contains an airfield, main site, propulsion laboratories, and geothermal development, in addition to the unpopulated desert land.

2.3.2 MILITARY MISSION/OPERATIONS

Throughout its history, NAWS China Lake enabled DoD weapon, sensor, communication, and payload capabilities in terms of Research, Development, Acquisition, Test, and Evaluation (RDAT&E).

Military activities at this site began in 1943, coinciding with the Navy's rapidly expanding air combat role during World War II.

Today, NAWS China Lake is the Navy's largest landholder, totaling more than 1.1 million acres, with approximately 95% of that land undisturbed. NAWS China Lake represents 85% of the Navy's land for RDAT&E and 38% of the Navy's land holdings worldwide¹⁷. The combination of NAWS China Lake's location, complex and varied terrain, restricted airspace, widespread instrumentation sites, laboratory infrastructure, and highly skilled technical workforce provides an advanced and efficient methodology for conducting essential developmental and operational tests, as well as sustainment training necessary to maintain high technical standards throughout the DoD.

The Navy, as part of NAWS China Lake, remains the Indian Wells Valley's largest employer with 620 military employees, 4,166 full-time civilians, and 1,734 onboard and off-site contractors¹⁸. An average of 10,000 people pass through the gates of NAWS China Lake daily¹⁹. The real estate assets total nearly 5.5 million square feet spread across 1,527 buildings, and have a plant replacement value of \$3.9 million²⁰. NAWS China Lake provides economic stimulus totaling \$1.2 billion annually to the surrounding counties of Inyo, Kern, and San Bernadino with employment, demand for housing, demand for goods, and a rippling of economic benefits²¹.

The mission of NAWS China Lake is to provide and maintain lands, facilities, and capabilities by way of a cadre of shore enterprise professionals

BACKGROUND

TOC

ES

1

2

3

4

5

6

RAP

who enable RDAT&E of innovative technological systems and training of Navy Expeditionary Combat Command (NECC) personnel. The land and airspace, also referred to as ranges, in and around China Lake are critical to testing and evaluating a wide range of systems and maintaining the operational readiness of the forces. The RDAT&E mission includes systems engineering, electronic warfare, software and mission systems integration, weapons and energetics, and human systems that generate cutting-edge capabilities for the warfighter. The training of NECC personnel produces combat-ready forces for Combatant Commanders around the globe.

2.3.3 MILITARY OPERATIONS ISSUES

The Navy's ability to enable testing and training missions in the upper Mojave Desert depends on the continued support and cooperation of its friends and neighbors in the surrounding communities. Various types of incompatible development can threaten NAWS China Lake's ability to effectively make use of such an ideal testing and training location. Many concerns at NAWS China Lake relate to local land development and restrictions on the use of airspace within the Military Influence Area.

These include:

- Encroachment on a single source of groundwater, which is a top concern.
- Renewable energy projects that are not compatible with the RDAT&E mission.
- Frequency interference from expanding cellular and commercial communications.
- Vertical flight obstructions from

communication towers, new transmission lines, wind turbines, and construction cranes.

- Residential and commercial development within known aircraft noise areas.

As incompatible development increases, pressure builds for the Navy to alter flight operations, reduce flights over certain areas, or otherwise reduce mission effectiveness, ultimately jeopardizing the viability of the RDAT&E mission.

¹⁵"Military – China Lake." *GlobalSecurity.org*. Accessed November 8, 2022. <https://www.globalsecurity.org/military/facility/china-lake.htm>

¹⁶"BRAC Boon: China Lake Builds Facilities for Additional Weapons Testing." *Defense Industry Daily*. Accessed November 8, 2022. <https://www.defenseindustrydaily.com/brac-boon-china-lake-builds-facilities-for-additional-naval-weapons-testing-05978/>

¹⁷"Naval Air Weapons Station China Lake." *CNIC*. Accessed October 27, 2022. <https://cnsw.cnic.navy.mil/installations/NAWS-China-Lake/>

¹⁸"Military Installations – Naval Air Weapons Station China Lake In-Depth Overview." Accessed October 27, 2022. *Naval Air Weapons Station China Lake | Base Overview & Info | MilitaryINSTALLATIONS* (militaryonesource.mil)

¹⁹*Ibid.*

²⁰"Economic Development Strategic Plan, City of Ridgecrest, CA." *FJ McLaughlin & Associates*. June 2017.

²¹"NAWS China Lake Economic Impact Assessment, September 2018." Accessed 28, 2022. *NAWS-China-Lake---Partners-for-a-Compatible-Future* (ridgecrest-ca.gov)

RESILIENCE PLANNING TEAM

TOC

ES

1

2

3

4

5

6

RAP

Establishing a network to support resilience planning efforts is key to the development of impactful resilience actions. Convening the right people, organizations, and resources is essential to identify strategies and projects that are effective and enhance both community and military installation resilience, quality of life, and public safety. The military installation is always represented in an ex officio role to advise the community on perspectives of the installation and military operations.

The resilience planning team is typically comprised of individuals and organizations that work together to gather resources and data, contribute expertise, and help develop the path forward for the community through the representation of a broad range of interests. The resilience planning team for the Military Installation Resiliency Study includes a Policy Committee, which serves as the executive steering committee, and the Technical Committee, which represents a broader stakeholder group with technical expertise tasked with reviewing the vulnerabilities, risks, and development of resilience actions.

The Policy Committee is tasked with executing the planning process and coordinating efforts between the community and the installation while the Technical Committee contributes to the planning process through knowledge sharing and collaboration. A broader coalition of leaders, key stakeholders, entities, resources, data, regulators, and government officials, with a role or vested interest in advancing community and military installation resilience, also engaged with Stantec Subject Matter Experts (SMEs). The SME-led conversations identified and developed specific resilience project actions to address vulnerabilities and risks associated with identified priority critical assets to support infrastructure and services deemed important for resiliency of the City of Ridgecrest, NAWS China Lake, and the surrounding region.

RESILIENCE PLANNING TEAM

TOC

ES

1

2

3

4

5

6

RAP

3.1 Policy Committee

Name	Title	Jurisdiction
Scott Hayman	Mayor Pro Tem	City of Ridgecrest
Supervisor Phillip Peters	District 1 Board of Supervisors	Kern County
Captain Jeremy Vaughan	Commanding Officer	NAWS China Lake (Ex Officio Member)
Jed McLaughlin	Chief of Police	City of Ridgecrest
Dave Janiec	Executive Director	China Lake Alliance

3.2 Technical Committee

Name	Title	Jurisdiction
Travis Reed	Public Works Director	City of Ridgecrest
Lorelei Oviatt	Director of Planning and Natural Resources	Kern County
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

STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT

TOC

ES

1

2

3

4

5

6

RAP

The purpose of stakeholder engagement is to broaden the understanding of the complex issues facing the Ridgecrest community while also ensuring that various critical perspectives are incorporated during the project's execution. Due to the nature of military operations at NAWS China Lake, direct public engagement was not possible during this project to protect private and sensitive national security information.

Engagement was focused on specific staff at both the City and NAWS China Lake as well as members of the Policy Committee and Technical Committee, and identified critical asset owners/operators.

The objective of the stakeholder engagement was twofold.

- Ensure the accurate capture of relevant community infrastructure information, including asset data.
- Evaluate and assess interim deliverables, providing direction and focus to the project's execution.

Figure 4.1 provides a visual overview of the timelines and content of each round of stakeholder engagement that is detailed in the following subsections.



Figure 4.1: Timeline of Project and Stakeholder Engagement

4.1 Survey

In August 2021, a survey was released to a select list of participants including City staff, NAWS China Lake personnel, City Council members, regional service providers, and neighboring counties. Survey responses supported the development of a preliminary list of hazards (natural and man-made) and critical community assets or programs to include in the study's vulnerability and risk assessments. Stantec used the results throughout the resilience study process to prioritize assets and hazards.

There were 26 survey responses from 13 organizations:

- NAWS China Lake
- City of Ridgecrest
- Indian Wells Valley Water District
- China Lake Alliance
- Kern County Sheriff's Office
- Inyo County Sheriff's Office
- Kern County Fire
- Inyokern Airport
- Southern California Edison
- Indian Wells Valley Economic Development Corp.
- Cerro Coso Community College
- Ridgecrest Regional Hospital
- Bernie's Landscaping

The results helped identify hazards of concern to the community and base as well as initial understandings of critical assets to the community.

4.2 Workshop #1 - Preliminary Asset and Hazard Screening

A workshop was carried out in October 2021 to refine the list of critical assets and hazards identified in the survey. Survey results were reviewed and gaps were identified, allowing for a broader collaborative discussion on assets and programs, criticality considering the nexus of community, installation, and regional parties.

The intent of the workshop was to identify by specific name the appropriate critical assets and programs falling within each FEMA Community Lifeline, and to define criticality for the community.



Figure 4.2: FEMA Community Lifelines

Criticality was defined using the criteria in the graphic below.

This process helped remove duplicates, and gain clarity and a common understanding amongst participants of the goal of the asset identification process.



Figure 4.3: What makes an asset or program critical?

TOC

ES

1

2

3

4

5

6

RAP

STAKEHOLDER ENGAGEMENT

TOC

ES

1

2

3

4

5

6

RAP

4.3 Workshop #2 – Lifeline Interviews

The lifeline interviews workshop was used as a primer exercise to review the refined list of critical assets in preparation for the subsequent detailed lifeline interviews structured by the lifeline group.

The workshop focused on:

- Gaining further clarity on asset names, locations, and the relevant contact information;
- Organizing assets according to lifeline class;
- Impacts from prior human or natural hazard events (including earthquakes);
- Information on any active or planned adaptation projects; and
- This workshop set the stage for more detailed interviews to follow using the revised and more accurate asset and contact information.

4.4 Lifeline Interviews

Over the course of two weeks in February 2022, Stantec hosted six sets of interviews structured around the lifeline groups:

- Transportation
- Health and Medical, Safety and Security
- Water
- Energy
- Food and Shelter, Education
- Communications

These interviews helped tease larger or linear assets into their relevant sub-systems, thereby isolating the critical functionality necessary to maintain service

delivery or functionality. The interviews also allowed Stantec to dive deeper and gather more information on:

- Impacts from prior human or natural hazard events (including earthquakes)
- Active or planned adaptation projects

4.5 Draft Exposure Analysis

In May 2022, the final list of critical assets was developed and an exposure analysis was undertaken. Through GIS mapping and the evaluation of hazard data the potential interaction of each hazard and critical asset was assessed. This was used to determine if each asset would be exposed to each hazard.

Therefore, only the hazards geographically impacting assets were taken forward for further review.

The results of this assessment were presented to the Policy and Technical Committee members for review, and upon approval were then taken into the consequence scoring exercise.

STAKEHOLDER ENGAGEMENT

TOC

ES

1

2

3

4

5

6

RAP

4.6 Consequence Scoring

This task was coordinated via email. Stantec liaised with the asset owners/operators to evaluate the impacts previously reported during the lifeline interviews.

The exercise required participants to score consequences of impact statements for their applicable assets using a five-point scale.

Impact statements summarize the way in which an asset could be or has been impacted by a specific hazard.

Consequence measures the degree of severity of the outcome if an asset were impacted by a hazard. When selecting a consequence class, we can consider physical damage, operations and maintenance, and service delivery. Figure 4.4 shows a summary of the consequence classes and their descriptions.

These consequence scores were then utilized in the development of the risk scores based on the formula:

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

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, 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 long periods of time
5	Catastrophic	<ul style="list-style-type: none"> • Loss of life, property, mobility, access to emergency services, and/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

Figure 4.4: Consequence Score Descriptions

STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT

TOC

ES

1

2

3

4

5

6

RAP

4.7 Draft Risk Assessment Results

In July 2022, Stantec presented the risk assessment results to the technical and policy committee members for review. The purpose of this exercise was to review the risk scores, identify any at-risk assets that were outliers or surprises to the committees, and use those assets at highest risk as a starting point and shortlist for developing adaptation projects or programs. The outcome of this meeting was to determine which 5-7 assets would be taken forward for project development with the subject matter experts (SMEs).

4.8 Subject Matter Experts Interviewing Asset Owners

When developing resiliency project design concepts and identifying funding, there is a need for relevant data. Designing infrastructure improvements requires engineers with expertise in resiliency solutions, with specific understanding of how climate change factors may influence a design solution that is resilient to future climate conditions rather than current conditions.

To develop recommended resiliency actions and project design concepts for the identified priority critical assets, Stantec engaged our experienced Subject Matter Experts (SMEs) to interface directly with the asset owners/operators to delve deeper into understanding specific asset vulnerabilities, and prepare proposed resilience actions. The SMEs represented expertise focused on the following topics groundwater sustainability, energy reliability, building structure,

communications infrastructure and operations, and roadway flooding. Each Stantec SME team engaged directly with the identified asset owners/operators using a step-by-step process to guide the interview process, identify specific issues associated with the asset, and develop resilience actions, including potential funding sources, to address the vulnerabilities and risks. **This step-by-step process for each Priority Critical Asset is noted below.**

- **Step 1** – Collect Background Information
- **Step 2** – Identify Responsible Parties
- **Step 3** – Identify Timeline to Carry Out Action
- **Step 4** – Identify Potential Funding Sources
- **Step 5** – Develop Action Plan Tasks
- **Step 6** – Identify Public Support / Co-Benefits
- **Step 7** – Identify Alternatives Considered
- **Step 8** – Provide Supplemental Documents /Files

TOC

ES

1

2

3

4

5

6

RAP

4.9 Preliminary Adaptation/ Resiliency Projects Presentation

In early December 2022, the SMEs presented their preliminary projects virtually to the Policy and Technical Committees. This session was used to confirm the direction of the resiliency planning efforts and fill any remaining data gaps. It also allowed an opportunity for Ridgecrest and NAWS to see results before the completion of the final report.

The session proved critical for ensuring accurate content creation, redirecting the SMEs to additional relevant resources, and honing the proposed solutions to best fit community needs.

In January 2023, the draft version of the Military Installation Resiliency Study was submitted for City, Policy Committee, and Technical Committee review.

4.10 Final Report – Military Installation Resiliency Study

With all edits and revisions complete, the final report was issued in February 2023, including all relevant appendices and supporting documentation.

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

The previous section's results culminated in the final risk assessment, where assets and programs that are difficult to compare due to their different qualities can be ranked to identify the greatest risks to the defense community and installation. A Risk Score was developed for each hazard-asset interaction by multiplying the consequence and likelihood scores, following the equation:

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

Likelihood Score: An estimate of the probability of occurrence of a particular hazard.

Consequence Score: Semi-quantitative estimates that characterize the severity of impact if a particular asset were impacted by a hazard.

To account for a changing climate, risks were evaluated for three separate time periods: the baseline (1961-1990), mid-century (2035-2064), and end-of-century (2070-2100). The condition of assets into the future is assumed to be well maintained and thus will provide a similar level of resilience to hazards (i.e., consequences do not change with time). The risk matrix classification applied is shown in Figure 5.1, which includes Low, Medium, High, Shock (high consequence/low likelihood), and Stress (low consequence/high likelihood) classes.

5.1 Identify Critical Assets and Programs

The first step to estimating risk for the City of Ridgecrest was to identify critical assets that could be impacted by hazards using FEMA's Community

Consequence	Catastrophic	5	5	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
			1	2	3	4	5
		Rare	Unlikely	Possible	Likely	Almost Certain	
		Likelihood					

Risk Levels:	Shock/Stress	Low	Medium	High
--------------	--------------	-----	--------	------

Figure 5.1: Risk Matrix Classification

RISK ASSESSMENT

Lifelines – FEMA defines Community Lifeline as an asset, service, or capability that “enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.” Given the list of Community Lifelines, survey respondents were asked to identify assets that are critical to the community and the installation. For the purposes of this project, critical asset was defined as an asset that if it were to malfunction could lead to at least one of the following adverse outcomes: loss of life, serious injury, health impacts, deterioration in quality of life, and/or threatened safety (see Section 4.2).

Survey respondents provided a list of 171 assets that might be considered critical. These assets were then screened to identify duplicates and were categorized into lifeline subclasses (these subclasses defined by the project team), which characterized the types of assets included in each lifeline category.

Asset criticality was then reevaluated during Workshops #1 and #2. The workshops provided an opportunity for stakeholders to discuss details about asset condition, relevant hazards, past impacts, and potential adaptation projects, including any existing renovation or upgrade projects. Some new assets were added during the workshops and some assets were removed from the list due to privacy concerns from the asset owner, or because the assets were not exposed to the hazards. Upon completion of this process, a total of 69 separate critical assets were identified and taken forward for the risk assessment (map of Critical Assets contained in Appendix C).

Figure 5.2: Community Lifeline and Lifeline subclasses



TOC

ES

1

2

3

4

5

6

RAP

RISK ASSESSMENT

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

5.2 Hazard Likelihood Scoring

A hazard is an event that may cause an impact to an asset. This study considered natural and manmade hazards as well as acute and chronic hazards. Natural hazards considered in this study include drought, earthquake, extreme heat, extreme wind, flood, and wildfire. Manmade hazards considered in this study include cybersecurity, power-grid failure, supply chain disruption, terrorism, and infectious disease.

The initial list of hazards was developed through consultation with the County Hazard Mitigation Plan as well as broader best practice lists for consultation. This list was reviewed and included in the survey, along with input from the Technical Committee, and using the feedback from both, the draft hazard list was finalized for inclusion in the exposure analysis and later the risk assessment.

Chronic hazards are those that gradually impact assets over a longer period (e.g., years to decades) or occur regularly on an annual basis, compared to short-term, acute hazards (e.g., hours to days) that occur once every few years, or more rarely. To address chronic hazards, it is important to consider how these events will change in the future because they can have significant impacts on assets and people over time. Instead of looking at the probability of occurrence of a hazard event, relative changes in frequency compared to the baseline period are used to evaluate chronic hazard likelihoods (Figure 5.3).

Acute hazards are those that impact assets over a relatively short period (e.g., hours to days) compared to chronic hazards (e.g., years to decades). Since acute hazards occur less frequently (rarer) than chronic hazards, the hazard likelihood is evaluated based on the annual exceedance probability (Figure 5.4).

Figure 5.3: Climate hazard likelihood scores for Chronic Hazards

Score	Change in Event Frequency/Intensity	Qualitative Descriptor
1	>50% decrease compared to baseline	Likely to occur much less frequently than current climate
2	10-50% decrease compared to baseline	Likely to occur slightly less frequently than current climate
3	Within +/-10% compared to baseline	Likely to occur about as frequently as in the current climate
4	10-50% increase compared to baseline	Likely to occur slightly more frequently than current climate
5	>50% increase compared to baseline	Likely to occur much more frequently than current climate

Figure 5.4: Climate hazard likelihood scores for Acute Hazards

Likelihood Score	Descriptor	Annual Recurrence Interval	Annual Exceedance Probability (AEP)
1	Rare	Greater than 1:100 years	0-1%
2	Unlikely	1:20 to 1:100 years	1-5%
3	Possible	1:6.5 to 1:20 years	5-15%
4	Likely	1:2 to 1:6.5 years	15-50%
5	Almost Certain	Less than 1:2 years	50-100%

TOC

ES

1

2

3

4

5

6

RAP

Hazard likelihoods were estimated for the baseline period (1961-1990), as well as the mid-century (2035-2064) and the end of the century (2070-2100) using data from climate projections and other resources. This approach provides a more comprehensive estimate of the changing likelihood to various hazards in the future and covers a sufficient period of time to allow for capital planning timelines and large infrastructure renewal.

Hazard likelihoods are quantified based on an "Indicator" parameter. Indicator thresholds are defined for each hazard to identify when assets are likely to be impacted. The annual probability of an indicator exceeding the threshold is referred to as the Annual Exceedance Probability (AEP), which is used to estimate climate hazard likelihood used

in the risk assessment. As noted above, we consider the relative change in annual exceedance probability (or frequency) for chronic hazards, and the absolute annual exceedance probability for acute hazards.

The following subsections outline the hazards addressed in this study and provide a rationale for the assigned likelihood scores.

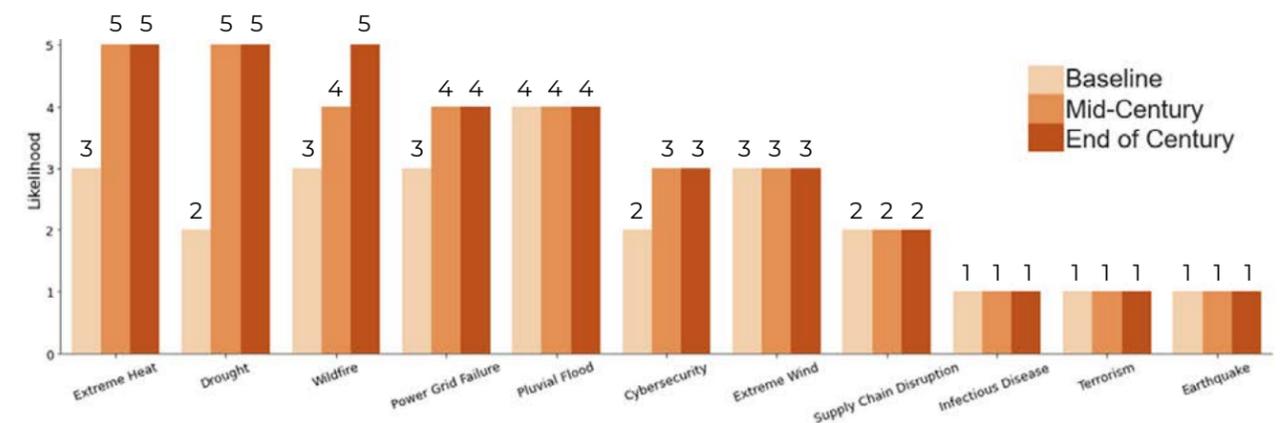


Figure 5.5: Summary of likelihood scores assigned for each of the hazards addressed in this study for the baseline, mid-century, and end of the century periods.

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

HAZARDS

DROUGHT



5.2.1 DROUGHT

For this study, droughts are treated as acute natural hazards. While they occur over long time periods, a seasonal drought is treated as a single event. Drought was noted as the second most important hazard by community stakeholders in the survey (15 votes) and was noted as a high priority in the county hazard mitigation plan.

The indicator used to measure drought likelihood is the occurrence of severe drought seasons, as defined by the standardized precipitation and evapotranspiration index calculated over 3-month periods (SPEI-3) (Vicente-Serrano et al., 2010). Severe drought seasons are defined as those with an SPEI less than -1.5 (Bonsal et al., 2017). SPEI was calculated

for the baseline period as well as projected out to 2100 for the RCP8.5 scenario using statistically downscaled GCM precipitation and temperature data provided by Cal-Adapt ([Data Download | Cal-Adapt](#)).

In the baseline, the AEP of severe drought seasons is 3%, which increases to 60% by mid-century, and ~100% by the end of the century, when 1.6 seasons per year are expected to be in severe drought (Figure 5.6). Therefore, **the likelihood of drought is on an increasing trend from 2 in the baseline to 5 by the middle of the century and at the end of the century.**

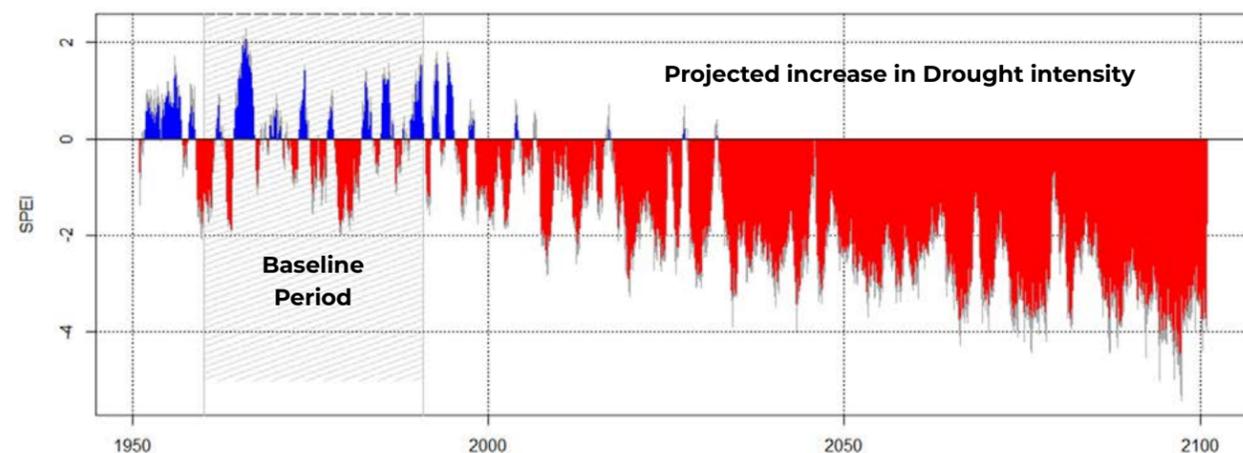


Figure 5.6: Past and projected SPEI-3 (Standardized precipitation and evapotranspiration index for 3-month periods) for the RCP8.5 scenario. Hatched region shows the baseline period. Temperature and precipitation data collected from Cal-Adapt.

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

HAZARDS

EARTHQUAKE



5.2.2 EARTHQUAKE

Earthquakes are acute natural hazards. Earthquakes were cited as the most important hazard by community stakeholders in the survey (17 votes) and were noted as a high priority in the county hazard mitigation plan.

The threshold used to characterize an earthquake that would impact assets is based on the Modified Mercalli Intensity Scale. An intensity of VII – “very strong shaking” was selected as the threshold beyond which damage could be expected of buildings. This intensity level is described as “damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures;” and

is typically associated with peak ground acceleration (PGA) values greater than 0.18g ([USGS, 2022 ShakeMap Scientific Background \(archive.org\)](#)). The AEP of 0.18g PGA at Ridgecrest is approximately 0.5% (Figure 5.7). This translates to a **likelihood score of 1** (see Table 5.4). Earthquakes are typically driven by geophysical tectonic processes and are therefore not likely to be impacted by a changing climate. As such, **the likelihood scores in the mid- and end-of-century are the same as those for the baseline.**

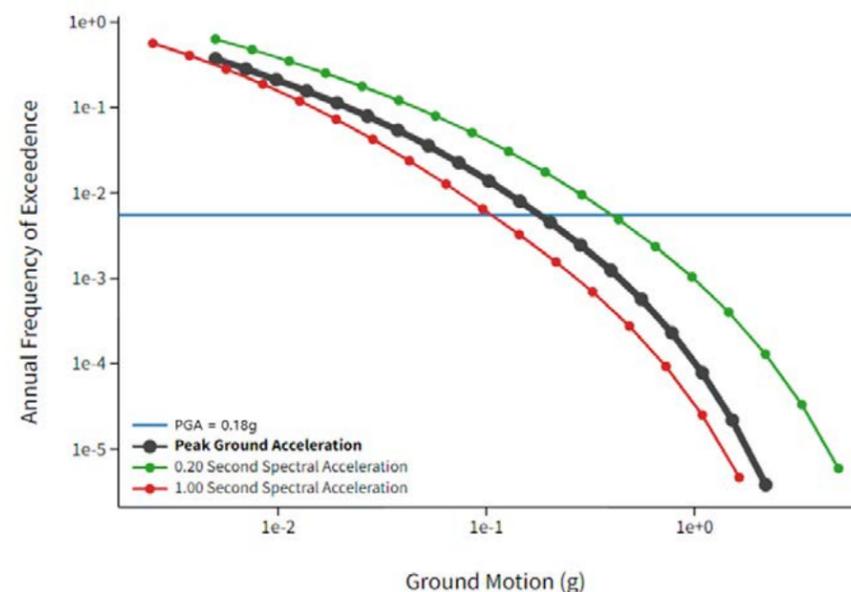


Figure 5.7: Estimated annual exceedance frequency of various peak ground accelerations (PGAs) at Ridgecrest, CA. Figure is modified from USGS Unified Hazard Tool. The blue line shows the “very strong shaking” (magnitude VII) threshold.

RISK ASSESSMENT

TOC

HAZARDS

EXTREME HEAT



ES

5.2.3 EXTREME HEAT

Extreme heat events in Ridgecrest are chronic natural hazards. Extreme heat was ranked as the third most important hazard by community stakeholders in the survey (5 votes) and was noted as a high priority in the county hazard mitigation plan. Extreme heat events are defined as days in which the maximum recorded temperature exceeds 109.1 °F. This threshold is the 98th percentile value of historical daily maximum/minimum temperatures (from 1961–1990, between April and October) observed at Ridgecrest. The number of extreme heat events was estimated for the baseline period and projected out to 2100 for the RCP8.5 scenario using statistically downscaled GCM temperature data provided by

Cal-Adapt ([Local Climate Change Snapshot \(cal-adapt.org\)](http://cal-adapt.org)), which is based on the work from Pierce et al (2018).

The frequency of extreme heat events is projected to increase in the future. Over the baseline period, Ridgecrest experienced an average of five extreme heat events per year. By the mid century, the frequency of extreme heat events is expected to increase more than fivefold, to about 28 days per year, and is projected to further increase to about 59 days per year by the end of the century. Using Figure 5.3, these estimates translate to a **likelihood of 3 in the baseline period to 5 by mid-century and at the end of the century. In short, Ridgecrest is expected to experience many more extreme heat events in the near future.**

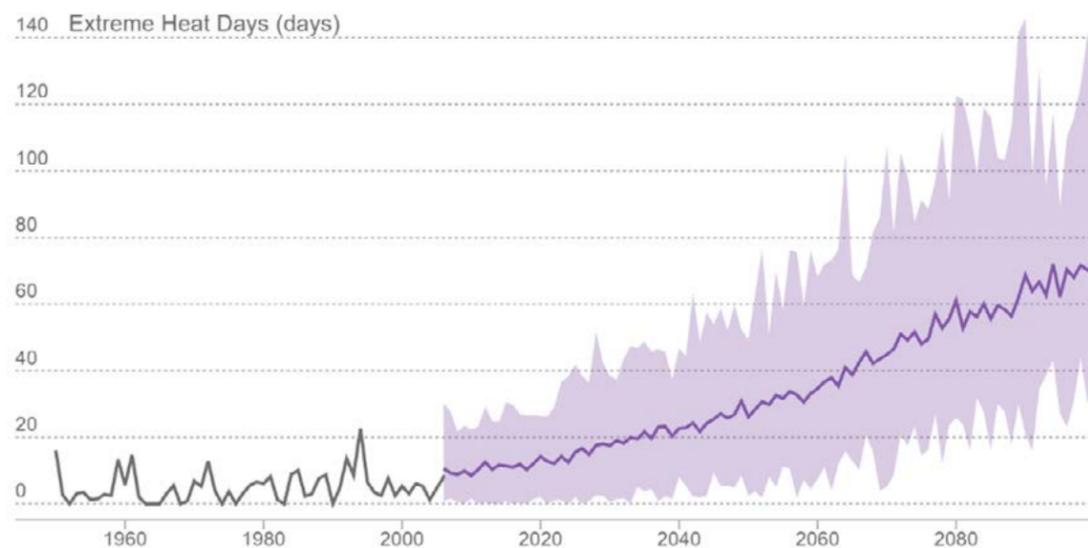


Figure 5.8: Number of past and projected future extreme heat events for the RCP8.5 scenario. Figure is modified from Cal-Adapt.

RISK ASSESSMENT

HAZARDS

EXTREME WINDS



TOC

ES

5.2.4 EXTREME WIND

Extreme wind is a chronic natural hazard. Three survey respondents noted extreme wind as an important hazard, and the county hazard mitigation plan listed extreme winds as a high-priority item; however, stakeholders in workshops did not note any significant impacts to the community due to extreme wind events in the past.

Of the impacts noted in the workshops, it was noted that winds of gale force or greater (>34 knots / 39 miles per hour) are too strong for the base helicopter to fly in. Extreme winds are therefore defined as days with winds exceeding gale-force for two hours or more. Past hourly wind gust data was collected from the weather station at China Lake NAWS (from the NCEI

Global Integrated Dataset) to identify any trends in the number of extreme wind events (Figure 5.9). While data for projected wind speeds from GCMs are available from Cal-Adapt (Pierce et al., 2018), the data represent the daily average windspeed, instead of maximum gusts. To approximate the impact of extreme wind in the future, a threshold of 17.9 mph was applied to the projected mean daily wind speed for the RCP8.5 scenario to define a “high wind day,” based on the analysis presented by Pierce et al. (2018) (Figure 5.10).

Over the baseline period, Ridgecrest experienced 3.5 extreme wind events per year (based on measured hourly gusts), and there is no significant trend in the historical record. Further, the number of high wind speed days (based on

projected mean daily windspeed) also does not exhibit a significant trend through the mid- or end-of-century periods. Assuming that high wind speed days can be used to approximate the number of extreme wind events in the future, then Ridgecrest should continue to expect about 3.5 extreme wind events per year. Since these events are a chronic hazard (Figure 5.3, the **likelihood score for extreme wind events is a 3 in the baseline and remains unchanged for the mid- and end-of-century periods.**

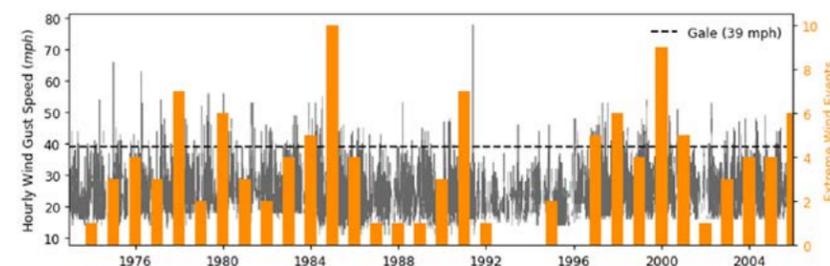


Figure 5.9: Past wind gust speed and extreme wind events (gusts >39 mph for 2+ hours) at the NAWS China Lake weather station. Data obtained from the NCEI Global Integrated Dataset.

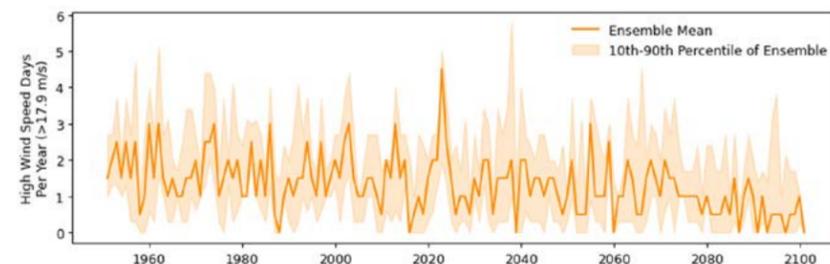


Figure 5.10: Projected future number of high wind speed days (mean daily windspeed >17.9 mph) for the RCP8.5 emissions scenario. Data obtained from Cal-Adapt (Pierce et al., 2018).

RISK ASSESSMENT

TOC

HAZARDS

PLUVIAL FLOOD

4
BASE

4
MID

4
END

ES

5.2.5 FLOOD

1 Flood is an acute natural hazard. While it was only noted by one survey respondent as an important hazard to the City of Ridgecrest, numerous stakeholders noted throughout the engagement process that floods have impacted Ridgecrest in the past. Further, floods were noted as a high priority in the county hazard mitigation plan.

2

3

4 While no detailed flood assessment was conducted for this study, we approximate the relative frequency of pluvial flood events using the number of “very wet days” as an indicator variable. Very wet days are defined as those in which more than 0.8 inches of rainfall fell in less than 24 hours. The number of very wet days was estimated for the baseline period using a gridded observed meteorological dataset (Livneh et al., 2015) and projected out to 2100 for the RCP8.5 scenario using statistically downscaled GCM temperature data (provided by Cal-Adapt; Pierce et al., 2018). For future projections, we use the average number of days across the complete ten-member climate model ensemble.

5

6

The frequency of very wet days is not expected to change significantly in the coming century. Over the baseline period, Ridgecrest experienced an average of 0.33 very wet days per year. Through the mid- and end-of-century periods, 0.27 and 0.38 days per year is projected, respectively, indicating no clear or significant trend. Using Figure 5.4, **these estimates translate to a likelihood of 4.**

RAP

RISK ASSESSMENT

HAZARDS

WILDFIRE

3
BASE

4
MID

5
END

TOC

ES

5.2.6 WILDFIRE

1 Wildfire is an acute natural hazard. While it was only noted by one survey respondent as an important hazard to the City of Ridgecrest, stakeholders noted throughout the engagement process that wildfire smoke has impacted the City in the past. Further, wildfire was noted as a high priority in the county hazard mitigation plan. Since there is very little vegetation (fuel) in the immediate vicinity of Ridgecrest, direct wildfire impacts are very unlikely. As such, wildfire hazard in Ridgecrest is typically associated with smoke impacts from wildfires burning in the Southern Sierra Nevada mountains, west of the City.

2

3

4

To estimate the relative change in frequency of wildfire smoke events in Ridgecrest, the probability of wildfire events in the Sierra Nevada Mountains was investigated. More specifically: the mean decadal probability of wildfire within any

5 given 1/16° (about 9000 acres) area across the Sierra, Western Regional Climate Center region. Historical and projected wildfire frequency data was obtained from Cal-Adapt for the RCP8.5 emissions pathway and a central population growth scenario (Westerling et al., 2018; Thomas et al., 2018; Dale et al., 2018). For future projections, the average probability across the complete four-member climate model ensemble was used.

6 The probability of wildfires in the Sierra region is expected to increase over the coming century. In the baseline, the mean decadal probability is 10%, which doubles to 20% by mid-century, then further increases to 30% in the end-of-century period. Using Figure 5.4, **these estimates translate to likelihoods of 3, 4, and 5 for the baseline, mid-century, and end-of-century periods, respectively.**

1

2

3

4

5

6

RAP

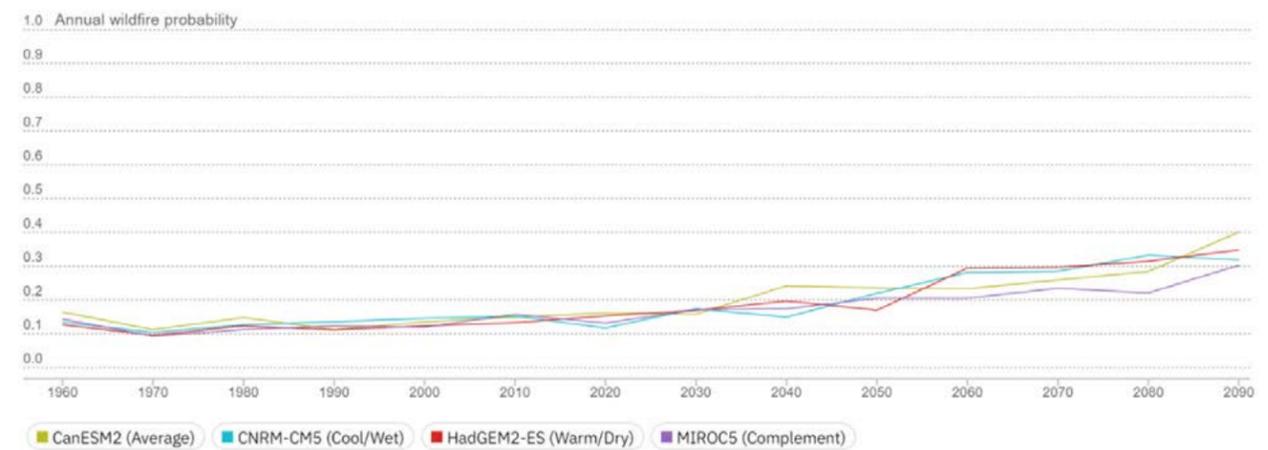


Figure 5.11: Past and projected decadal wildfire probability over the Sierra Nevada Mountains. Data produced by Thomas et al. (2018) and obtained from Cal-Adapt.

RISK ASSESSMENT

TOC

HAZARDS

CYBERSECURITY



ES

1

5.2.7 CYBERSECURITY

Cyberattacks are an acute manmade hazard. A successful cyberattack may impact a business enterprise system (e.g., communications, data management, information systems) or a process control system (e.g., monitoring, operations). Examples of cyberattacks include phishing or hacking, resulting in denial-of-service attacks and/or the installation of malware, spyware, or ransomware. Cyberattack attempts may be a chronic problem, but most attempts are blocked by basic cyber protections. Successful cyberattacks, in which the perpetrator bypasses cyber controls and is able to access a system, are less common. Likelihood of cyberattacks vary by asset type; healthcare system assets have a relatively high likelihood of being targeted, for example.

2

3

4

5

6

Trends show cyberattacks are increasing in frequency. In the U.S., local government agencies are the second-highest victimized group behind academia, with smaller jurisdictions more likely to be targeted as they often have less cyber protections and resources relative to major cities. A survey of local governments found an increase in cyberattacks between 2016 and 2020, as well as a surge in 2021.²²

While no specific cybersecurity studies were available for the Ridgecrest area, the frequency of cyberattacks was approximated using information available from the EPA, CISA, and ICMA. For example, the EPA's Baseline Information on Malevolent Acts for Community Water Systems estimates a 10% probability of

an asset being impacted by cyberattacks annually.²³

The frequency of cyberattacks is expected to increase through the end of the century. As cities continue to become "smarter" by incorporating automation, data, the Internet, and artificial intelligence into systems and operations, there will be more opportunities for such systems to be impacted by cyberattacks. Over the baseline period, critical assets within Ridgecrest were estimated to have a 5% chance of experiencing a cyberattack annually. As the baseline period is 1961–1990, it is acknowledged that the use of the Internet and cyber components have increased exponentially since the baseline period²⁴. Therefore, through the mid- and end-of-century periods, a 0.1 annual cyberattack likelihood was assigned. While trends show cyberattacks are increasing in frequency, insufficient data was available to establish different probabilities for mid- and end-of-century scenarios, as probability is largely dependent on cybersecurity and enacted controls. Using Figure 5.4, **these estimates translate to a likelihood of 2, 3, and 3 for baseline, mid-, and end-of-century, respectively.**

²² Ransomware Attacks Straining Local US Governments and Public Services (2022). FBI. Retrieved from 220330.pdf (ic3.gov).

²³ Baseline Information on Malevolent Acts for Community Water Systems 1.0 (2019). US EPA.

²⁴ The Internet was developed in the 1960s, but was not widely available to the public until the 1990s.

RISK ASSESSMENT

HAZARDS

POWER GRID FAILURE



TOC

ES

1

2

3

4

5

6

RAP

5.2.8 POWER GRID FAILURE

Power grid failure is a chronic hazard influenced by both manmade and natural (climate) factors. For this study, a power grid failure is considered any sustained power outage or an outage lasting more than five minutes. Power grid failures can have many different causes. Damage to system components from natural (e.g. extreme wind, wildfires) or manmade (e.g., sabotage, vandalism, vehicular accidents) events may cause outages. Outages may also be caused by failed equipment or insufficient supply to meet demand, such as demand prompted by extreme heat events (e.g., cooling loads).

Power in the Ridgecrest area is supplied by Southern California Edison (SCE).

SCE's 2021 Electric System Reliability Report presents service interruption information for the utility. This report indicates that the average customer in the district of Ridgecrest experienced power outages of more than five minutes (referred to as sustained outages) totaling 163.29 minutes in 2021. This is referred to as the system average interruption duration index (SAIDI). SCE's overall SAIDI for 2021 was 179.74 minutes, suggesting that customers in the district of Ridgecrest were impacted by power outages for slightly less time than the average SCE customer in 2021. However, the SCE's ten-year average SAIDI (2012-2021) is 140.77, which suggests that customers experience longer average power outages in 2021. Another key service reliability measure is system average interruption frequency index (SAIFI), which is the average number of sustained outages experienced by customers. The district of Ridgecrest had a SAIFI of 1.227 in 2021, which was higher than the SCE average SAIFA 1.11. SCE's ten-year average SAIFI is 1.01. Based on this reporting, the district of Ridgecrest experienced a higher frequency but a lower overall

²⁵ PG&E Annual Electric Reliability Report (2020). Retrieved from CPUC-2020-Annual-Electric-Reliability-Report.pdf (pge.com)

duration of power outages in 2021 than the average SCE customer.

SCE's 2022 Circuit Reliability Review for Ridgecrest identified that equipment (transformers, switches, or conductors) failure was the cause of 87.6% of SAIDI outages. The second-highest cause of SAIDI outages (6.4%) was attributed to other causes, which suggests that no clear cause was identified when the site was patrolled. SCE operations resulting in urgent maintenance without standard notice accounted for 4.6% of SAIDI outages. Third-party outages, those caused by human interaction with equipment, such as car accidents with a pole, accounted for 1.3% of outages. Ridgecrest's 2021 SAIDI was not impacted by vegetation or animals, public safety power shutoffs, and only 0.1% of SAIDI outages were attributed to weather, fire, or earthquake. Based on this information, equipment failure appears to be the main driver of sustained outages in Ridgecrest.

Future power outage trends are difficult to determine and could vary widely based on many factors, such as added grid capacity, electrification, population, and economic growth. It is assumed that growing demand for electricity in Ridgecrest will occur based on increased demand for cooling (due to increased extreme heat) and due to electrification (i.e., the shift from natural gas to electricity and electric vehicles), resulting in a higher frequency of blackouts or brownouts. Growing threats from extreme weather and wildfires are also expected to result in increased power grid failures, such as those resulting from public service power shutoffs enacted to reduce wildfire risk.

Future outages were estimated by extrapolating from past trends and have a low confidence due to the many variables that can impact power grid failure. Using Figure 5.3, **these estimates translate to a likelihood of 3, 4, and 4 for baseline, mid-, and end-of-century, respectively.**

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

HAZARDS

SUPPLY CHAIN DISRUPTION



5.2.9 SUPPLY CHAIN DISRUPTION

Supply chain disruption is an acute manmade hazard. For this study, a supply chain disruption was considered to be any event in which a shortage of essential goods or services (e.g., fuel, labor, food, or equipment) impacts essential government functions, public health, or public safety. Supply chain disruptions are difficult to predict. They often occur as a result of system shocks (e.g., natural or technological disasters) or resource constraints (e.g., raw materials, labor, fuel). Disruptions can be localized, regional, national, or global, adding complexities in anticipating potential events.

In the case of local supply chain disruption of critical supplies that include fuels, materials and equipment, additional supply storage and acquisition should be considered for redundancy in order to respond to a specific events and allow for continued operation. Specifically, supplies that pertain to public health such as water disinfectants used for water supply distribution and/or water treatment may consider alternative methods of delivery. Sodium Hypochlorite is used as a disinfectant for water treatment and is usually obtained through liquid chemical deliveries which could suffer a logistical disruption during a catastrophic event limiting access to the area. In order to avoid a logistic disruption, on-site generation technologies could be implemented as either a primary or redundant supply system, such as Electrolytic Technologies On-Site Generation Sodium Hypochlorite.

Due to uncertainties, trends in supply chain disruptions are difficult to project. As extreme weather events (e.g., extreme heat, drought) are projected to increase in the planning area (as well as globally), there is potential for the number of supply chain disruptions to increase in the future. Future occurrences will be impacted not only by causal events but also by logistics planning, socioeconomic trends, and policy.

No supply chain disruptions studies were available to inform current or future frequencies in Ridgecrest. Therefore, the same frequency of occurrence, 5% annually, was assigned to the baseline, mid- and end-of-century scenarios. Using Figure 5.4, **these estimates translate to a likelihood of 2 for all time horizons considered.**

RISK ASSESSMENT

HAZARDS

TERRORISM



5.2.10 TERRORISM

Terrorism is an acute manmade hazard. For this study, terrorism is a planned physical attack on a critical asset or system by insurgents. A terrorist event could be any use of physical violence directed at an asset or person operating/maintaining an asset. Terrorists may use weapons, such as guns, bombs, or incendiaries, or rely on chemical, biological, radioactive, or nuclear (CBRN) materials. Terrorists are typically motivated by political gain or to instill fear. Events similar to terrorism may be conducted for personal gain (e.g., financial gain or notoriety).

Due to uncertainties, trends in terrorism are difficult to predict. As extreme climate events (e.g., extreme heat, drought) are projected to increase in the planning area (as well as globally), there is potential for terrorism to increase if political stability decreases; however, such trends carry high levels of uncertainty. The J-100 standard from the American Water Works Association (AWWA), which assists community water systems in assessing risk to assets from malevolent acts, was used as an indicator in estimating annual likelihood of terrorist attacks on critical assets²⁶. The J-100 standard

²⁶ AWWA. [AWWA J100-10\(R13\) Risk and Resilience Management of Water and Wastewater Systems \(PDF\)](#).

TOC

ES

1

2

3

4

5

6

RAP

incorporates data collected at the national and local levels to provide base-level annual likelihoods for physical attacks on infrastructure, which can be adjusted to account variables that may heighten an asset's likelihood of being targeted.

No terrorism studies were available to inform potential terrorism trends in Ridgecrest over time. Therefore, the same frequency of occurrence, 0.0001 annual probability, was assigned to the baseline, mid- and end-of-century scenarios. Using Figure 5.4, **these estimates translate to a likelihood of 1 for all time horizons considered.**

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

HAZARDS

INFECTIOUS DISEASE



5.2.11 INFECTIONS DISEASE
 Infectious disease outbreak is an acute manmade hazard. For this study, an infectious disease outbreak was considered to be an event in which operations must be modified, staff shortages occur, or community resources needed to combat the outbreak are exceeded. Disease outbreaks could be caused by airborne viruses, such as Influenza or COVID-19, and may also be vector-borne, waterborne, or foodborne. Infectious disease outbreaks can be localized (e.g., an epidemic) or widely spread (e.g., a pandemic). Either have the potential to impact the planning area; however, a pandemic may have additional indirect impacts, such as widespread supply chain shortages and national or global economic impacts.

Trends in infectious disease outbreaks are challenging to project as many factors, such as population growth, climate, policy initiatives, urbanization, and global travel, may influence future events. A 2021 study from the National Academy of Sciences found the statistical probability of a pandemic similar to COVID-19 could be as high as 2% annually (or occurring approximately every 60 years) and a pandemic like the Spanish Flu, which resulted in 30 million deaths globally, may occur within the next 400 years²⁷.

No infectious disease outbreak studies were available to inform current or future frequencies in Ridgecrest. Given uncertainties regarding future rates of disease outbreak occurrences, the same likelihood of occurrence, 1% annually, was assigned to the baseline, mid- and end-of-century scenarios. Using Figure 5.4, **these estimates translate to a likelihood of 1 for all time horizons considered.**

²⁷ Duke Global Health Institute (2021). Retrieved from [Statistics Say Large Pandemics Are More Likely Than We Thought \(duke.edu\)](https://www.duke.edu/news-events/say-large-pandemics-are-more-likely-than-we-thought).

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

5.3 Consequence Scoring

Risk to an asset is a function of the consequences that would result if that asset were (negatively) impacted by a particular hazard. More specifically, consequences characterize the degree of severity of the outcome. Impacts statements are used to constrain the consequence scoring exercise by providing a description of the way in which an asset is likely to be affected by a particular hazard. Consequence scores were assigned for each combination of critical asset and hazard from “none” to “catastrophic” (Figure 5.12).

Consequence Score	Consequence Classification	Consequence Description
0	None	<ul style="list-style-type: none"> No effects
1	Insignificant	<ul style="list-style-type: none"> Measurable but cosmetic effects Very low consequence Costs handled within normal budgeting for entity Correctible using O&M practices
2	Minor	<ul style="list-style-type: none"> Some extra costs to repair but can be covered within current O&M 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 O&M 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 at 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

Figure 5.12: Consequence classification criteria

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

Impact statements and consequence scores for each asset/hazard combination were initially developed by Stantec risk assessors, followed by review and modifications by the relevant asset owners or other knowledgeable community members. The statements consist of concise one to two sentence descriptions of the likely outcome if a specific asset were exposed to a specific hazard.

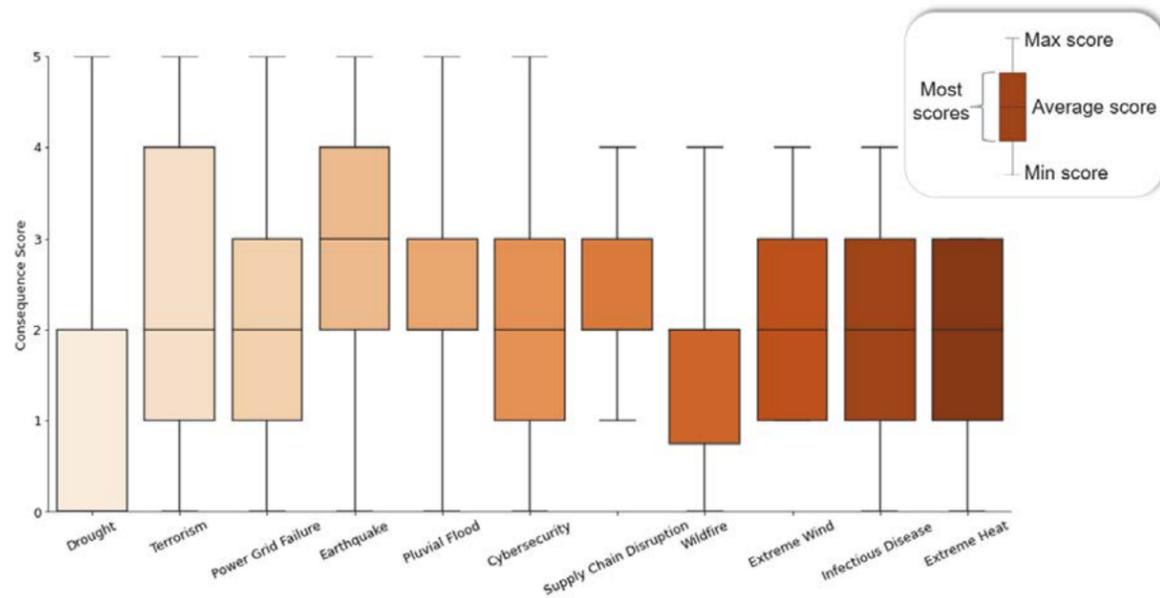


Figure 5.13: Distribution of consequence scores by hazard type

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

5.4 Risk Assessment Results

This risk assessment is looking at:
69 assets x 11 hazards x 3 time frames = 2,277 Potential impacts/risk scores.

5.4.1 RISK CLASS DISTRIBUTION

Evaluation was carried out on all the risk scores from interactions across all assets, hazards, and time frames, and then focused on the 133 risks that were classified as either high, shock, or stress risk.

Figure 5.14 shows the distribution of all risk scores (2,777 total) into the risk categories of high, medium, low, shock, stress, or none.

Figure 5.15 takes only those risk scores of high, shock, or stress risks (133 total) and depicts their distribution across lifeline categories. This graphic is informational and high-level and does not determine the specific assets taken forward for adaptation planning.

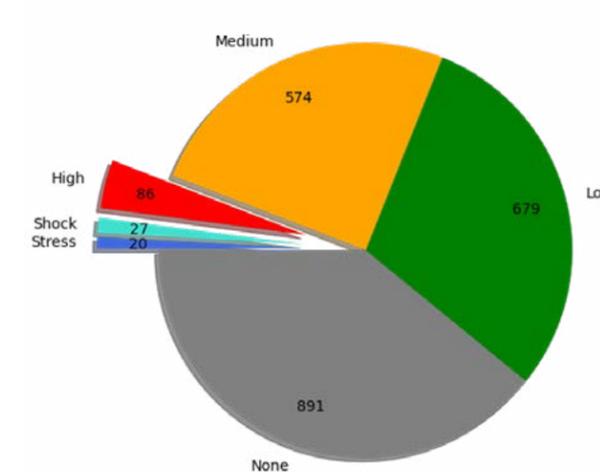


Figure 5.14: Distribution of risk scores across all assets, hazards, and time frames

5.4.2 RISKS BY LIFELINE

High, shock, and stress risks were further evaluated by lifeline.

Each lifeline can be ranked by its total risk exposure. Cumulative risk takes the sum of all risk, low and high, for all assets in a lifeline category (see Figure 5.16 next page). Similarly, each lifeline can be compared by the average risk score of its constituent assets (see Figure 5.17 next page). Since both of these graphs sum all risk scores (low and high) and are directly related to the total number of assets within each lifeline, these graphs emphasize those lifelines within which there are more critical assets. Therefore, these graphs should not be interpreted as determining the highest risk assets to be taken forward for adaptation planning, but rather serve to illustrate all risks across the City.

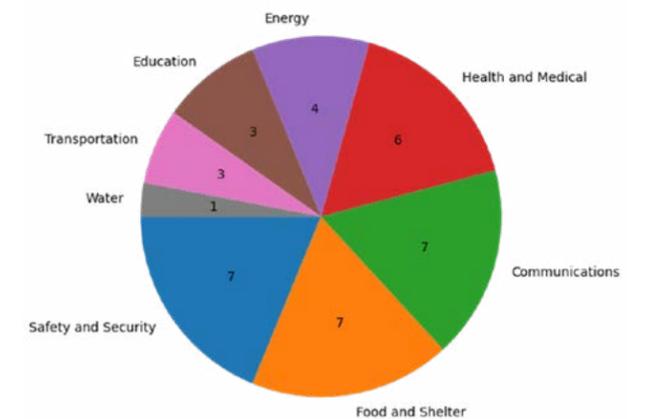


Figure 5.15: Number of high and shock/stress risks by lifeline

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

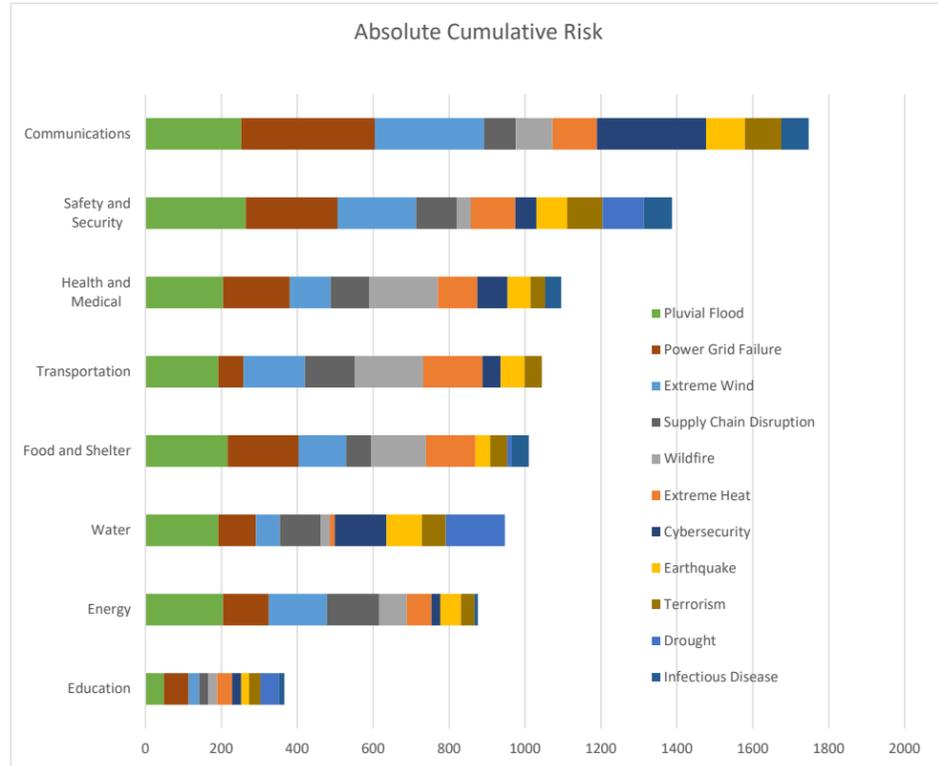


Figure 5.16: Cumulative risk by lifeline

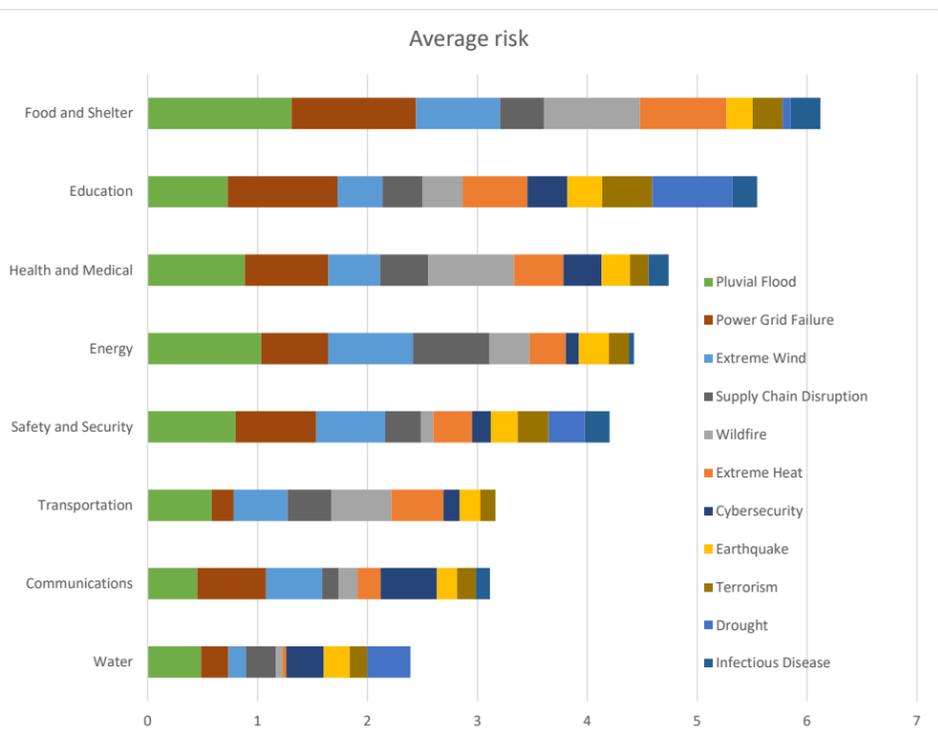


Figure 5.17: Average risk by lifeline

RISK ASSESSMENT

5.4.3 RISKS BY HAZARD

Some hazards were more impactful than others. The following graphs present information on the maximum and mean (average) risk scores per hazard.

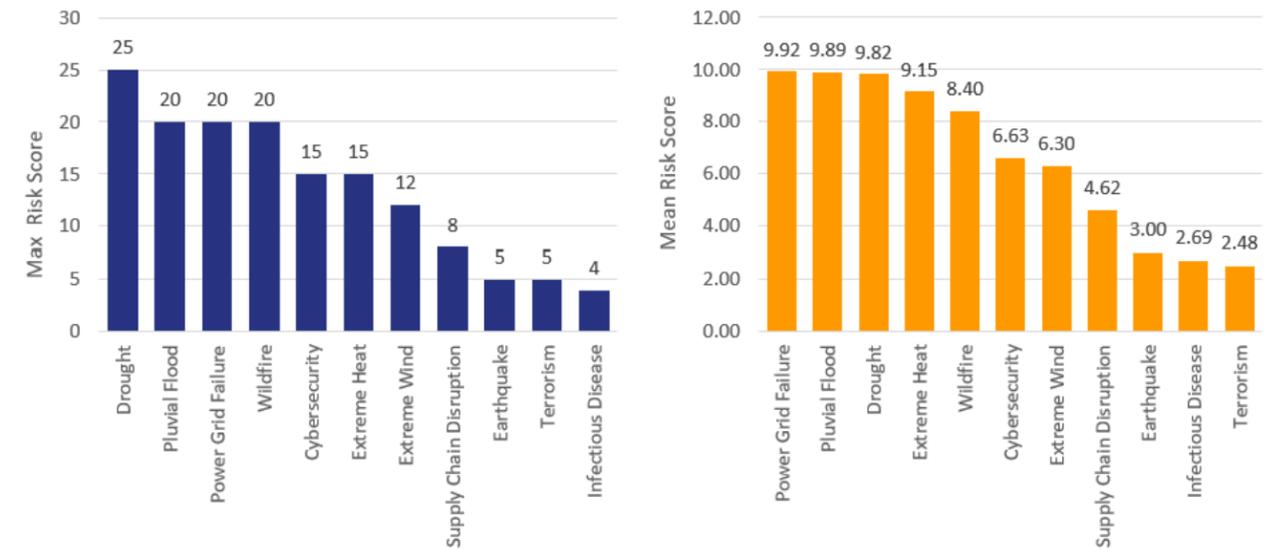


Figure 5.18: Maximum (left) and average (right) risk score across all assets and time frames, separated by hazard

TOC

ES

1

2

3

4

5

6

RAP

RISK ASSESSMENT

RISK ASSESSMENT

TOC

5.4.4 PRESENT AND FUTURE IMPACTS

ES

1

2

3

4

5

6

RAP

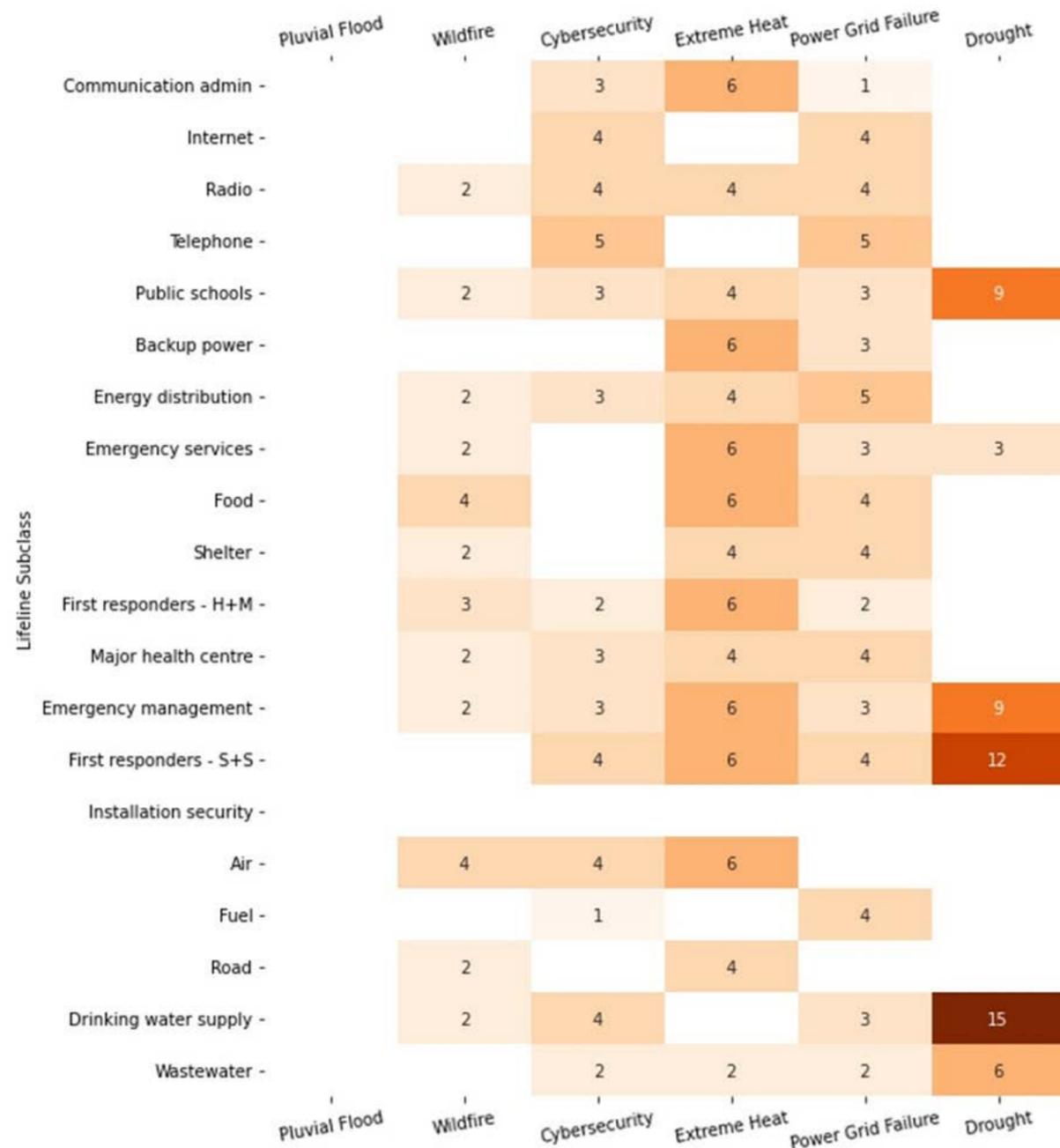


Figure 5.19: Average increase in risk score from the baseline to mid-century across lifeline subclasses. Hazards with only low risks are not shown (supply chain disruption, terrorism, infectious disease, earthquake, and wind).

TOC

5.4.5 HIGHEST RISKS

ES

1

2

3

4

5

6

RAP

Lifeline	Lifeline Subclass	Hazard	Specific Asset Name	Likelihood	Consequence	Risk Score
Communication	Communication admin	Extreme Heat	Communications Reserve Unit Van	5	3	15
		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
	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
	Shelter	Wildfire	Salvation Army Dist. Center	5	4	20
		Pluvial Flood	Kerr McGee Community Center	4	4	16
		Power Grid Failure	Welcome Center	4	4	16
Health and Medical	First Responders – Health and Medical	Extreme Heat	Mercy Air	5	3	15
		Wildfire	Kern County Dolphin Ave Fire Station	5	3	15
		Wildfire	Kern County Las Flores Ave Fire Station	5	3	15
		Wildfire	Kern County Monache Mtn. Ave Fire Station	5	3	15
	Major Health Center	Pluvial Flood	NAWSCL Branch Health Clinic	4	4	16
		Power Grid Failure	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 – Safety and Security	Drought	China Lake Police Department	5	4	20
		Extreme Heat	China Lake Federal Fire Department	5	3	15
		Extreme Heat	China Lake Police Department	5	3	15
Pluvial Flood		Ridgecrest Police Department	4	4	16	
Transportation	Air	Power Grid Failure	China Lake Federal Fire Department	4	4	16
		Extreme Heat	NAWSCL Airfield	5	3	15
Water	Drinking Water Supply	Wildfire	NAWSCL Airfield	5	4	20
		Drought	IWVWD Groundwater Wells	5	5	25

Figure 5.20: Highest-risk critical assets, categorized by lifeline, subclass, and hazard. Risk Score is calculated by Likelihood Score multiplied by the Consequence Score.

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

5.4.6 SHOCK AND STRESS RISKS

Shocks refer to those events that are of low likelihood to occur; however, they have severe impacts of high consequence to communities—examples of shocks include earthquakes or terrorism. These are also referred to as acute hazards, occurring over short periods of time and causing catastrophic negative impacts.

Stresses refer to those events that have a high likelihood of occurrence; however,

they have low or less severe impacts to communities—examples of stresses include drought. These are also referred to as chronic hazards, occurring over extended periods of time and causing gradual negative impacts.

Both shock and stress risk events were taken forward in the risk assessment due to their potentially disruptive nature and degradation of infrastructure.

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	SSUSD Schools	Shock
			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

Figure 5.21: Critical assets exposed to shock and stress risks

RISK ASSESSMENT

TOC

ES

1

2

3

4

5

6

RAP

5.4.7 FROM HIGH-RISK ASSETS TO ADAPTATION PROJECTS

The purpose of the risk assessment is to identify those assets most at risk to the outlined hazards, and to use this ranked list as a prioritization metric to position projects for adaptation planning to increase their resiliency to future events. The outcome of the risk assessment is therefore to determine which assets shall be taken forward for project development with the subject matter experts (SMEs), along with the identification of relevant funding sources to support further, more detailed, project planning and development.

The list of high risks (risk score >15), as well as shocks and stresses (risk score = 5) were reviewed with the Policy and Technical Committees during a joint working session with Stantec. Additional considerations during this review included urgency, complexity and interdependency, ongoing challenges (e.g., the existing chronic overdraft on the groundwater), and critical assets beyond the direct control of the City of Ridgecrest or NAWS China Lake (e.g., energy infrastructure). Noting the role of the community in supporting the mission readiness of the base, a lens of mission sustainment was also applied, which considered the hierarchy of critical assets and the needs of communities in times of crisis and emergency response.

The next section of this report details those projects taken forward, along with implementation plans and scoring metrics to support potential future funding applications.

ADAPTATION PLANNING

TOC 6.1 Prepare for Implementation

ES 6.1.1 ESTABLISH MEMORANDUM OF UNDERSTANDING

1 The Resilience Action Plan provides the City, NAWS China Lake, and the surrounding communities a roadmap of recommended resilience actions, including recommended funding sources. To support the implementation of the Resilience Action Plan recommendations, the City may consider establishment of a Memorandum of Understanding (MOU) to create a Partnership Committee as a more formal permanent organizational structure to facilitate long-term communication, collaboration, and coordination among the City, NAWS China Lake, surrounding communities, and the State of California to support continued military operations, community growth, and economic development.

2 Many defense communities across the country have entered into MOU's following compatible use and growth management planning projects to implement recommended actions and projects and address a variety of issues and concerns that may arise over time. The MOU serves to establish a more formal and permanent partnership that continues through leadership changes to installation command, community elected officials, and senior staff. The purpose of the MOU is to support the following.

- Create an ongoing structure for the implementation of the Resilience Action Plan recommended actions and projects, including development of a coordinated funding strategy.
- Enable the City, NAWS China Lake, surrounding communities, and the State of California to more efficiently and effectively communicate and coordinate.

- Create an organizational structure to support transition through changes in installation command and local community leadership.
- Identify and address additional issues and concerns that may arise over time that could have adverse impacts on continued military operations, community growth, and economic development.
- Help build new relationships.

6.2.2 PARTNERSHIP COMMITTEE

As part of the MOU, the City can initiate establishment of a Partnership Committee with specific goals, objectives, roles, and responsibilities to support continued communication and sharing of information to further implementation of both current and future resilience actions.

At a minimum, the MOU can support regularly scheduled quarterly meetings among Partnership Committee members, and establishment of a Working Group or Technical Committee that includes key staff from Partnership Committee member organizations to identify and address detailed resilience project planning, design, and construction.

A sample MOU for establishment of a Partnership Committee is provided in Appendix B.

6.2.3 UPDATE KERN COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

Development of the Kern County Multi-Jurisdictional Hazard Mitigation Plan included participation of the City of Ridgecrest and 62 other local jurisdictions. Hazard mitigation is the use of sustained, long-term actions to reduce the loss of life,

ADAPTATION PLANNING

personal injury, and property damage that can result from a disaster²⁸. The process for the Hazard Mitigation Plans is similar to the process for the Military Installation Resilience Review in that it assesses natural hazard vulnerabilities. Short- and long-term strategies that address hazards are identified in the Hazard Mitigation Plan. The Executive Summary lists the mitigation planning benefits as:

- Identifying actions for risk reduction through collaboration with stakeholders and the public;
- Focusing resources on the greatest risks and vulnerabilities;
- Building partnerships by involving citizens, organizations, and businesses;
- Increasing education and awareness of threats and hazards, as well as their risks;
- Communicating priorities to state and federal officials; and
- Aligning risk reduction with other community objectives²⁹.

FEMA requires hazard mitigation plans to be updated every five years. In Fiscal Year 2020, FEMA obligated more than \$884 million in Hazard Mitigation Assistance grants to state and local communities, tribes, and territories for 1,884 projects. A prerequisite for applying for this funding is for a community to have a Hazard Mitigation Plan.

It is recommended that the resilience actions identified in this Military Installation Resiliency Study, as specified in Appendix A - Resilience Action Plan, be incorporated into the Kern Multi-Jurisdictional Hazard Mitigation Plan.

The [Kern County Multi-Jurisdictional Hazard Mitigation Plan](#) has two volumes. Volume 1 provides a significant amount of detail and explanation of methods and profile

hazards specific to unincorporated parts of the County. Volume 2 explains the process and categorization of producing annexes and provides a navigation tool to explore materials for each of the 47 participating jurisdictions, including the City of Ridgecrest.

FEMA's Hazard Mitigation Grant Program provides funding to state, local, tribal, and territorial government so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities³⁰.

TOC

ES

- 1**
- 2**
- 3**
- 4**
- 5**
- 6**

RAP

²⁸ Kern County Multi-Jurisdictional Hazard Mitigation Plan 2019-2020 Executive Summary. Mitigate Hazards Website. Accessed January 25, 2023. <https://mitigatehazards.com/county-of-kern/>

²⁹ Ibid.

³⁰ Hazard Mitigation Grant Program. FEMA. Accessed February 23, 2023. <https://www.fema.gov/grants/mitigation/hazard-mitigation>



THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX A: RESILIENCE ACTION PLAN

RESILIENCE ACTION PLAN

RESILIENCE ACTION PLAN

INTRODUCTION

Defense communities are deserving of specific attention with regards to resiliency and a changing climate because they are essential to supporting military installations that maintain our national security. The City of Ridgecrest and the communities surrounding NAWS China Lake provide essential operations, services, and infrastructure necessary for the installation to maintain mission assurance and mission-critical functions. This infrastructure must not only protect and preserve military readiness and defense capabilities but also provide safe places for service members and their families to live, work, and play.

Stantec's Defense Community Resilience Planning Framework enabled the City of Ridgecrest, NAWS China Lake, and the surrounding communities to assess their vulnerabilities and risks to natural and man-made hazards, with special attention given to the unique resilience requirements for NAWS China Lake. The planning framework provided methods to assess vulnerabilities and risks not only independently but also in coordination with threats to installation resiliency that lie beyond the installation.

Our multidiscipline, practitioner-based team provided a risk-informed, phased approach to identify and prioritize critical assets for investment to increase the resilience of both NAWS China Lake and the adjacent communities. The following priority critical assets were identified to include in the Resilience Action Plan.

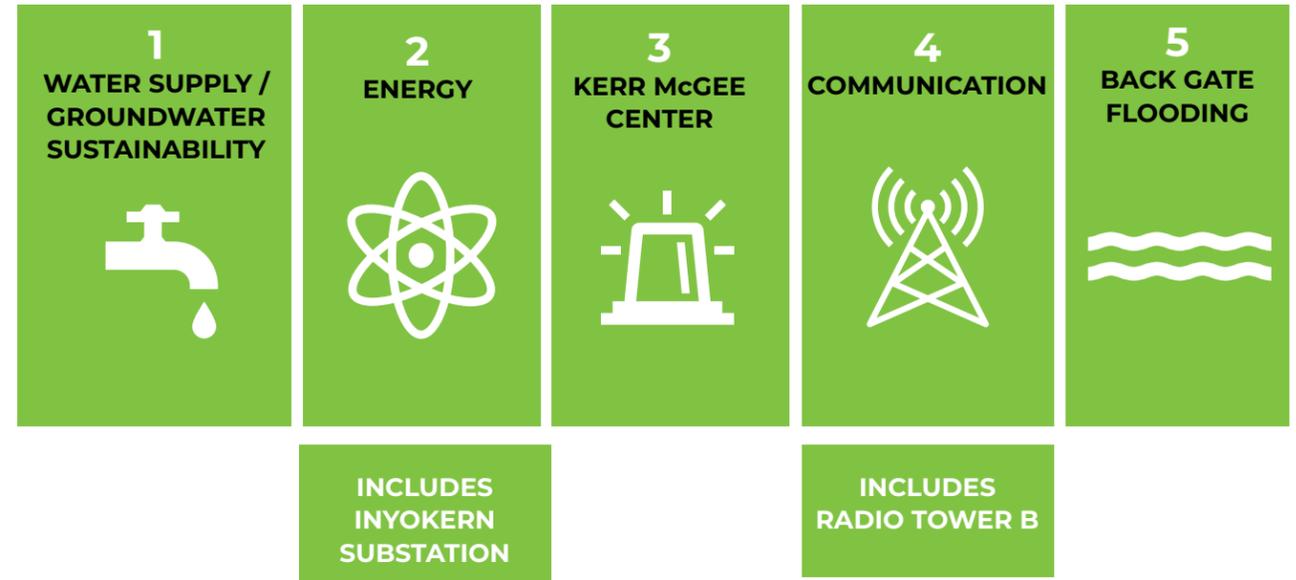
- Groundwater
- Energy
- Kerr McGee Center
- Communications
- Installation Back Gate

Each priority critical asset is identified in this results-oriented Resilience Action Plan, with specific recommended resilience actions focused on shared critical infrastructure, programs, or services.

Stantec's North America Funding Program staff mapped project information to fund priorities and timelines to recommend federal and state funding opportunities for each resilience action identified in the Resilience Action Plan. In total, 33 funding opportunities are identified and ranked for their relevance to the Military Installation Resilience Study. Bundled projects are recommended for submission in a single application for particularly competitive or large grant opportunities, including the FEMA Building Resilient Infrastructure and Communities Program (BRIC) and the DoD Office of Local Defense Community Installation Resilience program.

The goal for the City of Ridgecrest, NAWS China Lake, and the surrounding communities is to plan, design, and finance a resilient future, together. Resilience is about making communities and military installations stronger, now and in the future, for everyone.

5 PRIORITY CRITICAL ASSETS



TOC

RAP



B

C

D

TOC

RAP



B

C

D

ASSET TASK SUMMARY

TOC

RAP



B

C

D

Lifeline/Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Groundwater Supply				
PRIORITY	Develop Import Water Supplies: For either direct use or groundwater augmentation		10+ years	Varies
Groundwater Supply - Action Plan Tasks				
TBD	Water Rights Acquisition	IWVGA must secure permanent or temporary water rights from SWP Table A. Entitlement or a combination of other small and long-term water supplies from a water district or water rights holder in coordination with KCWA. Option 1: Will require IWVGA to meet with AVEK to discuss the use and capacity of the California City pipeline and the transfer agreements with DWR, KCWA, and AVEK. Option 2: Several water banking programs are currently being developed within the Antelope Valley and surrounding areas of which IWVGA may opt to be a participant. Active participation will require the development of a firm and secure water right to be obtained from current California State Water Project stakeholders and coordinated through the Kern County Water Agency.	2023	\$ 48,390,000
TBD	Selection of the Most Feasible Imported Water Project Option	Selection of the most feasible imported water option after preparation of an engineering report and negotiation with the relevant transfer agencies.	2023	\$ 185,000
TBD	Feasibility Studies	IWVGA will participate in a groundwater recharge feasibility study and a pilot recharge project for Option 2 to finalize the size and location of the new spreading grounds. IWVGA will also evaluate the availability and reliability of external water supplies, including SWP water supplies, and the potential groundwater banking opportunities to enhance the reliability of its purchased water supplies.	2023	\$ 500,000
TBD	Option 1 – Environmental Impact Report and Supporting Studies ¹	Prepare Environmental Impact Report (EIR) • Prepare documents for compliance with CEQA/NEPA and all necessary Technical Studies and surveys, conduct environmental review and investigations, identify permitting requirements, and fieldwork, as needed, for the pipelines and pump stations, reservoirs, and associated facilities for the Imported Water Interconnection Project.	2023 – 2024	\$ 1,500,000
TBD	Option 1 – Permitting and Regulatory Process ¹	All required permitting including, but not limited to, the following: • Encroachment permits for right-of-way for the new California City pipeline extension along Highway 14 from the California Department of Transportation, • Application submission to secure a Land Use Permit for construction of new imported water pipelines. • Amendment to the IWVWD's current Domestic Water Supply Permit from the State Water Resources Control Board - Division of Drinking Water. • Environmental Impact Report (EIR) preparation	2023 – 2026	\$ 1,000,000–1,500,000
TBD	Option 1 – Design, Permitting, and Construction	All design, permitting, and construction of the infrastructure required for the final Imported Water Project option.	2026 – 2035	\$ 177,975,000
TBD	Option 2 – Environmental Impact Report and Supporting Studies ²	Prepare Environmental Impact Report (EIR) • Environmental documentation will need to be prepared to satisfy both CEQA and NEPA due to the potential use of Federal Lands.	2026 – 2035	\$1,500,000–3,000,000
TBD	Option 2 – Permitting and Regulatory Process	All required permitting including the following: • Required permitting is unknown at this time, however, permitting may be required for use of federal lands or other lands within the Kern County area or within an adjacent water agency.	2026 – 2035	\$ 13,000,000
TBD	Option 2 – Design, Permitting, and Construction	All design, permitting, acquisition of land rights and construction of the infrastructure required for the final Imported Water Project option.	2026 – 2035	\$ 83,000,000

ASSET TASK SUMMARY

TOC

RAP



B

C

D

Lifeline/Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Energy Grid				
PRIORITY	Energy Provisions	This project includes a set of actions intended to develop infrastructure and policy to provide consistent and reliable power to the City of Ridgecrest and NAWS China Lake.	5–10 years	Varies
Energy - Action Plan Tasks				
TBD	Energy Needs Assessment	Conduct power needs assessment: Connect with SCE customer representatives to understand site-specific outage issues & mitigation; Assess type and duration of historical outages to determine if there has been common causes for power outages ; Determine potential for onsite production and storage to meet all of the City's electricity demands - hybrid optimization of multiple energy resources study (HOMER); Determine critical energy needs and amount of backup storage to avoid disruption during long-term outages; Assess feasibility of the geothermal power plant providing electricity to the installation and the City during a system level outage.	2023 6 months	\$50,000–\$75,000
TBD	Method of Service Study	Complete and submit a Method of Service Study (MOSS) to SoCal Edison requesting the desired changes and upgrades.		\$150,000–\$500,000 Needs Assessment will help narrow the cost estimate
TBD	Battery Storage	Install large-scale battery energy storage systems (BESSs) downstream of the Inyokern substation to be available during an outage. Location, capacity, and load requirements will be determined through the energy needs assessment. This project will require coordination with the California Energy Commission and SCE.	2025 12–24 months	4-hour BESS capacity capex cost Commercial scale ~\$450/kWh Utility scale ~\$ 350/kWh
TBD	Harden Inyokern Substation and Area Energy Assets	Install additional barriers and other improvements to protect the substation and other grid assets from motor vehicle collisions. Assets that require hardening to be identified and prioritized in energy needs assessment.	2023 4–6 months	\$25,000–\$50,000
TBD	Geothermal Plant Back-up Power	Install a switch at the Inyokern substation to allow the geothermal plant to supply emergency power to China Lake and Ridgecrest during long-term outages. This solution to require coordination with SCE and the Coso Operating Company.	2026 6–12 months	Unable to estimate cost without conducting the Needs Assessment.
TBD	City-Owned Energy Resources	Based in the results of the power needs assessment, install energy resources for City Hall, Kerr McGee Center, and the wastewater treatment plant that can support some or all energy needs during grid power outages. Potential energy resources include: Solar PV, Micro wind turbine, Battery energy storage system, Combined heat and power, and Fossil fuel generation. Future improvements will take into consideration NAWS China Lake's Interconnection Agreement with SCE and will not negatively impact the 12MW PV System – Rule 21 minimum threshold requirements.	2024–2025 12–24 months	2/kW for a PV array, \$300/kWh for 2-hour BESS storage or \$270/kWh for 4-hour storage, \$160/kW of output for a 2-hour BESS, 1MW/4MWH BESS for \$1.2M or small diesel generator for \$300,000 plus fuel costs.

ASSET TASK SUMMARY

Lifeline/Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Kerr McGee Community Center Building Upgrades				
PRIORITY	Kerr McGee Center Upgrades	The Kerr McGee Center serves as a shelter or resilience hub during emergency events and the design and upgrade to the facility's commercial kitchen to support serving 400 people for events is proposed. The project will include modernizing the facility's commercial kitchen and making the building compliant with the Americans with Disabilities Act (ADA).	5-10 years	\$5,670,000-\$6,920,000
Kerr McGee - Action Plan Tasks				
TBD	Building Assessment Including Structural ASCE 41 Tier 1 Assessment	Structural, Electrical, Mechanical, and Architectural building assessment to determine current condition. Includes review of existing construction documents, deterioration, existing damage, age and condition of equipment (HVAC, lighting, power, fire, telecom), peak demand, and ADA accessibility. Deliverables will be a Property Condition Assessment (PCA) Report, Deficiency Report, and a detailed scope of work for retrofits, including structural enhancements, to bring facility up to essential facility status. Scope includes client review and feedback on draft PCA report at 90%.	2023 4-6 weeks	\$60,000
TBD	Project Sequencing	Series of meetings to determine ideal sequencing for projects identified in the building assessment. This activity will consider shut-down periods, design schedule, supply chain issues, and other factors that will impact project sequencing. Meetings should include one person from each technical discipline (structural, MEP, architectural, accessibility, etc.) and City representatives (Parks and Recreation, Public Works, etc.).	2023 1 month	\$10,000
TBD	Structural Upgrades	Make structural upgrades determined by PCA and Tier 1 structural assessment. Planned upgrades will assume Kerr McGee must meet risk Category 4 requirements.	2027 6-12 months	\$500,000
TBD	HVAC filtration	Design and install additional HVAC filtration to remove smoke and particulates from wildfires.	2023 4-6 months	\$1,200,000
TBD	HVAC Compartmentalization	Design and install additional HVAC equipment to allow focused cooling, particularly on weekends and when used as a shelter or resilience hub.	2023 4-6 months	\$800,000
TBD	Doors and Windows	Replace, repair, or make upgrades to address cooling loss at perforations. Solutions to be determined in building assessment.	2026 4-6 months	\$250,000 - \$500,000
TBD	ADA Accessibility	Identify and complete projects to meet ADA standards for accessibility and essential facility standards.	2027 6-12 months	\$500,000
TBD	Commercial Kitchen	Design and complete upgrade to the facility's commercial kitchen to support serving 400 people for events, and function after an emergency event when the building is serving as a shelter or resilience hub.	2025 4-6 weeks	\$600,000
TBD	Back-up Power	Coordinate with other energy-related projects to support additional solar generation and other behind-the-meter solutions including battery backup and fossil fuel generators. The adjacent 496KW solar field can be expanded to increase capacity.	2024 12-24 months	\$1M-\$2M
TBD	Fire Alarm and Fire Monitoring System	Design and install fire alarm and monitoring system (nearly 40 years old) to current state and federal standards.	2024 4-6 months	\$750,000

ASSET TASK SUMMARY

Lifeline/Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Communications				
PRIORITY	Frontier Communications	Develop redundant and resilient Internet access for the installation and the City.	Immediate to 5 years	\$1,000,000
Frontier Communications - Action Plan Tasks				
TBD	Communications Needs Assessment	Review the radio communications operations on the installation and at the City. Determine where the coverage requirements are and the operational requirements for each agency.	3 months	\$15,000
TBD	Add redundant fiber connections to the installation	Potentially add redundant fiber connection into the installation from the Central Office (CO) for diverse pathway. Additionally, it might be possible to add fiber from a separate facility for more complete diversity.	3 months	\$500,000
TBD	Backup Power	Current CO has hours of battery backup and diesel generator. Increasing the battery backup and providing additional on-site fuel storage may help to decrease outages due to power.	1.5 years	\$100,000
TBD	Satellite Link to Installation	Additional redundancy can be achieved by adding satellite links to the installation for commercial Internet.	2 years	TBD
TBD	Add redundant links into the CO	Additional connections into the CO from satellite, uWave backhaul, or additional fiber could improve the resiliency of the commercial Internet services for the installation and the City.	5 years	\$345,000
PRIORITY	B Mountain Radio Tower	Develop redundant and resilient radio tower facility and infrastructure	Immediate to 3 years	\$1,000,000
B Mountain - Action Plan Tasks				
TBD	Communications Needs Assessment	Review the radio communications operations on the installation and at the City. Determine where the coverage requirements are and the operational requirements for each agency.	3 months	\$20,000
TBD	Redundancy and Resiliency	Review existing communications systems to determine where single points of failure exist. In particular, emphasize areas where multiple agencies rely on the same facilities, such as B Mountain.	3 months	\$20,000
TBD	Backup Power	Add generator and battery backup to existing facilities that do not already have it.	1.5 years	\$150,000
TBD	Add Redundancy and Interoperability	Assess radio systems to determine how and where facilities can be upgraded to add redundancy and improve efficiency. This could include simulcasting frequencies with multiple transmitters throughout the area. Adding mutual aid channels to installation radios as well as the City's radios for interoperable communications.	2 years	\$510,000
TBD	Backhaul	Assess radio system backhaul and potentially redundant links between dispatch and B Mountain in the event the link is broken.	2 years	\$300,000

ASSET TASK SUMMARY

ASSET TASK SUMMARY

TOC

RAP



B

C

D

Lifeline/ Topic	Projects	Project Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Installation Gate Access Flood Management				
PRIORITY	Installation Back Gate-Roadway Flooding		6-9 years	\$ TBD
Installation Gate Access Flood Management - Action Plan Tasks (see notes 3 and 4)				
TBD	Implement Proposed Improvements identified in the Ridgecrest 1989 Master Drainage Plan at Bowman Wash and E. Ridgecrest Blvd (Hwy 178). Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. Construct upstream detention basins.	Construct bridge spanning Bowman Wash at Hwy 178. Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. This may be accomplished in an above-ground series of linear swales, bio-basins, rain gardens, detention/retention basins, and culverts. Deep seepage pits penetrating impervious materials may also serve to dissipate runoff and re-charge subsurface groundwater if feasible. The following project descriptions outline the project development stages.	Timing dependent on City decision makers. Estimate 3-6 months	\$ TBD
TBD	Project Initiation	Project Lead prepares project initiation document and forms the project development team (PDT)	3-6 months	\$25,000
TBD	Project Initiation Document	Prepare project study report and site-specific drainage studies to identify design concepts and preliminary cost estimate, environmental considerations, and right-of-way needs and costs.	6-9 months	\$200,000
TBD	Programming and Funding	Project Owner determines funding needs and source, and prepares a program for delivering the project.	9-12 months	\$25,000
TBD	Project Report (PR)	Prepare alternatives analysis of reasonable and feasible alternatives considered. Perform value analysis and determine preferred alternative. Develop preferred alternative to 35% design as part of the Project Report.	12-18 months	\$300,000
TBD	Environmental Studies (CEQA/ NEPA Clearances)	Perform applicable studies and prepare the Environmental Document.	12-18 months Concurrent with PR	\$200,000
TBD	Final PS&E's	Prepare final engineering design and construction documents (8% of construction estimate)	12-18 months	\$1,080,000
TBD	Bid and Construction Phase	Construct proposed improvements. Rough order construction costs are estimated based upon bridge span of 110 ft and length of 80 ft by \$450/sf, and graded basins/ swales cost of \$50/sf for the full length from Richmond Rd to Bowman Wash, a distance of 2,700 lf and an assumed width of 50 ft. A 25% contingency is also added to this total and rounded up to the nearest 1/2 million. It should be noted that right-of-way needs and costs are unknown. Any right-of-way, if required, could add 6-12 mo. to the schedule and unknown costs.	24 months	\$13,500,000

Notes for Executive Summary Table:

- 1 - Cost included in "Option 1 – Design, Permitting, and Construction"
- 2 - Cost included in "Option 2 – Design, Permitting, and Construction"
- 3 - Note: If extensive public outreach and right-of-way is required, this could add another two years to the planning and preliminary design phase.
- 4 - Note: The above timelines are based upon the project development guidelines provided in the Caltrans Project Development Procedures Manual (PDPM).

TOC

RAP



B

C

D

THIS PAGE INTENTIONALLY LEFT BLANK

ASSET 1 GROUNDWATER

ASSET 1 GROUNDWATER

TOC

RAP



B

C

D

WATER SUPPLY / GROUNDWATER SUSTAINABILITY

DEVELOP IMPORT WATER SUPPLIES / FOR EITHER DIRECT USE OR GROUNDWATER AUGMENTATION

The Groundwater Sustainability Plan for the Indian Wells Valley Groundwater Basin (IWVGB), prepared by the Indian Wells Valley Groundwater Authority (IWVGA), found two viable imported water sources for groundwater recharge of the IWVGB in their effort to minimize the current overdraft of the IWVGB. Both options require the purchase of water supplies from SWP or other short-term/long-term water supplies in coordination with Kern County Water Agency [ref: IWVGB GSP 2020].

Option 1: Direct Use Project with AVEK

The IWVGA would purchase SWP Table A Entitlement or potentially a combination of other short- and long-term water supplies in coordination with Kern County Water Authority. The IWVGA would arrange for the purchased water supply to be wheeled through existing Antelope Valley–East Kern Water Agency (AVEK) facilities, specifically through existing AVEK surface water treatment facilities and the California City Pipeline. This new pipeline extension is now underway for planning, design and implementation and is referred to as the Imported Water Supply Conveyance Project.

Project Requirements

Option 1 requires that the purchased water supply is wheeled through existing (AVEK) facilities (existing AVEK surface water treatment facilities and the California City pipeline). Additionally, a new pipeline

extension from the California City pipeline would be required, spanning approximately 50 miles along Highway 14 into the City of Ridgecrest and the surrounding areas. The treated water would be used directly to meet water demands that exceed the long-term natural recharge rates to the IWVGB.

Option 2: Groundwater Recharge Project with the Los Angeles Department of Water & Power

The IWVGA will have an opportunity to participate in a regional groundwater augmentation and recovery project (water bank project) providing a reliable and sustainable water supply for the region. The water bank project would be through a partnership with existing water agencies within the Antelope Valley region. Currently there are several water banks being considered for development, many of which IWVGA could participate upon securing a reliable and sustainable water right from an existing California State Water Project Stakeholder.

Project Requirements

Option 2 requires the procurement of a water right to be delivered to a developed water bank within the region, and development of additional conveyance infrastructure to deliver water from the regional water bank to the City of Ridgecrest. The required infrastructure will utilize portions of the Imported Water Supply Conveyance Project currently being planned and designed for implementation.

TOC

RAP



B

C

D

RATIONALE FOR PROJECT/ACTION

IWVGA is overdrafting their aquifer at four times the rate of recharge and does not have access to any water supplies outside of the IWVGB.

In accordance with the California Department of Water Resources and in compliance with the Sustainable Groundwater Management Act (SGMA), Indian Wells Groundwater Agency prepared the “Groundwater Sustainability Plan for the Indian Wells Valley Groundwater Basin, Bulletin 118 Basin No. 6-054” (dated January 2020). As part of the SGMA requirements, Indian Wells Groundwater Agency is required to identify potential projects that will enhance their ability to sustainably manage and use the Indian Wells Groundwater Basin and not further degrade the groundwater levels and/or water quality.

Information presented in the reference groundwater sustainability plan shows that the location of the site, on average, receives only 2–5 inches of direct rainfall onto the basin floor and 4–20 inches of rainfall in the surrounding mountains. In addition, due to the location of the basin, evaporation is significant with annual evaporation for a free water surface ranges from 45– 65 inches/year. Therefore, groundwater recharge from direct precipitation is essentially nonexistent. It is believed that mountain front recharge provides the dominant recharge mechanism, producing approximately 7,650 acre-feet of water supply on an annual basis, as empirically calculated by

Desert Research Institute (DRI). Therefore it is stated that the sustainable yield from the Indian Wells Valley Groundwater Basin cannot exceed 7,650 acre-feet on a year-over-year average.

The estimated current sustainable yield of the IWVGB is 7,650 AFY while the current demand, or outflow, of the basin is 32,640 AFY. The current change of groundwater in storage is roughly 25,000 AFY.

The California Department of Water Resource (DWR) identifies the IWVGB as a critically overdrafted basin of high priority per “Sustainable Groundwater Management Act 2018 Basin Prioritization: Process and Results,” published in January 2019. Overdrafting of the IWVGB has resulted in the reduction of groundwater storage in the groundwater basin, the chronic lowering of groundwater levels, and the degradation of water quality.

Indian Wells Valley (encompassing the City of Ridgecrest and NAWS China Lake) does not have existing access to additional water supplies outside the area to be used for groundwater augmentation. Therefore development of groundwater augmentation projects, such as imported water supplies is paramount to the health and sustainable use of the groundwater basin.

ASSET 1 GROUNDWATER

ASSET 1 GROUNDWATER

TOC

RAP



B

C

D

Responsible Parties	Response/Description
Project Lead	Indian Wells Valley Groundwater Authority (IWVGA)
Project Support	Kern County Water Agency (KCWA)
Potential Partnerships or External Resources	<p>Option 1: AVEK – owns the nearest conveyance facility to IWVGB (California City pipeline, 15 miles south of IWVGB & 50 miles south of Ridgecrest). AVEK is a current SWP Contractor.</p> <p>Option 2: Several water banking programs are currently being developed within the Antelope Valley and surrounding areas of which IWVGA may opt to be a participant. Active participation will require the development of a firm and secure water right to be obtain from current California State Water Project stakeholders and coordinated through the Kern County Water Agency.</p>
Capacity	IWVGA will require an external source of funding to implement an imported water project. In order for the IWVGB to be sustainable, supplemental water supplies are required. However, due to the limited amount and extreme cost of water supplies and infrastructure, IWVGA is not financially capable of supporting or implementing an imported water supply without significant public funding. The IWVGA may also require additional administrative support and expenses in the pursuit of imported water supplies. All costs, including administrative, will be funded through federal, state, and local sources, when eligible.
Timeline	Response / Description
Estimated Time to Complete	10+ years

TOC

RAP



B

C

D

Action Plan Tasks	Task Description	Estimated Time to Complete	Estimated Cost (Planning Level)	Task Lead
Water Rights Acquisition	<p>IWVGA must secure permanent or temporary water rights from SWP Table A Entitlement or a combination of other small and long-term water supplies from a water district or water rights holder in coordination with KCWA.</p> <p>Option 1: Will require IWVGA to meet with AVEK to discuss the use and capacity of the California City pipeline and the transfer agreements with DWR, KCWA, and AVEK.</p> <p>Option 2: Several water banking programs are currently being developed within the Antelope Valley and surrounding areas of which IWVGA may opt to be a participant. Active participation will require the development of a firm and secure water right to be obtain from current California State Water Project stakeholders and coordinated through the Kern County Water Agency.</p>	2023	\$48,390,000	IWVGA
Selection of the Most Feasible Imported Water Project Option	Selection of the most feasible imported water option, after preparation of an engineering report and negotiation with the relevant transfer agencies.	2023	\$185,000	IWVGA
Feasibility Studies	IWVGA will participate in a groundwater recharge feasibility study and a pilot recharge project for Option 2 to finalize the size and location of the new spreading grounds. IWVGA will also evaluate the availability and reliability of external water supplies, including SWP water supplies, and the potential groundwater banking opportunities to enhance the reliability of its purchased water supplies.	2023	\$500,000	IWVGA
Option 1 – Environmental Impact Report and Supporting Studies ¹	Prepare documents for compliance with CEQA/NEPA and all necessary Technical Studies and surveys, conduct environmental review and investigations, identify permitting requirements, and fieldwork, as needed, for the pipelines and pump stations, reservoirs, and associated facilities for the Imported Water Interconnection Project.	2023 – 2026	1,500,000	IWVGA

ASSET 1 GROUNDWATER

ASSET 1 GROUNDWATER

TOC

RAP



B

C

D

Action Plan Tasks	Task Description	Estimated Time to Complete	Estimated Cost (Planning Level)	Task Lead
Option 1 – Permitting and Regulatory Process ¹	All required permitting, including but not limited to, the following: <ul style="list-style-type: none"> Encroachment permits for right-of-way for the new California City pipeline extension along Highway 14 from the California Department of Transportation. Application submission to secure a Land Use Permit for construction of new imported water pipelines. Amendment to the IWVWD's current Domestic Water Supply Permit from the State Water Resources Control Board – Division of Drinking Water. Environmental Impact Report (EIR) preparation. 	2023	1,000,000–1,500,000	IWVGA
Option 1 – Design, Permitting, and Construction	All design, permitting, and construction of the infrastructure required for the final Imported Water Project option.	2026 – 2035	\$177,975,000	IWVGA
Option 2 – Environmental Impact Report and Supporting Studies ²	Participate in the development of an Environmental Impact Report (EIR).	2035	1,500,000 - 3,000,000	IWVGA
Option 2 – Permitting and Regulatory Process	All required permitting, including the following: <ul style="list-style-type: none"> Participate in the development of an application to secure necessary permits for the construction of surface recharge facilities of groundwater. 	2035	\$13,000,000	IWVGA
Option 2 – Design, Permitting, and Construction	All design, permitting, and construction of the infrastructure required for the final Imported Water Project option.	2035	\$83,000,000	IWVGA

¹ Cost included in "Option 1 – Design, Permitting, and Construction"

² Cost included in "Option 2 – Design, Permitting, and Construction"

TOC

RAP



B

C

D

Co-Benefits	Description/Response
Public Support	No public outreach completed at this time.
Co-Benefits	Improvement of groundwater quality enables existing development to be sustainable.
Mission Readiness	Stabilizes workforce and off-base housing facilities.
Environmental	Reduces the need to continue groundwater overdrafts and sustainability of the sub-regional water supply.
Social	Supports water independence for the City of Ridgecrest and continued military operations at NAWWS China Lake.
Equity (Community Resilience)	Enhancement of the groundwater supply and potable water supply will provide for a sustainable community.
Equity (Social Vulnerability)	Continued clean water supply.
Economic	The project will enhance a basic need within the community – clean and sustainable water supplies; therefore, protecting the existing economic viability of the community.
Alternatives	Descriptions
	No alternatives have been further identified for water supply importation and groundwater augmentation. The key to imported water supplies is the development of agreements with either one of the state water project contractors to obtain Table A entitlements. Additional water supplies may also be considered through Cadiz with a current capacity for delivery of approximately 25,000 ac-ft annually.

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ **WaterSMART Program, Bureau of Reclamation**
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

WaterSMART Program, Bureau of Reclamation:

AGENCY: US Bureau of Reclamation

PURPOSE/GOALS: This program provides federal cost-share funds for entities to take a proactive approach to drought through building projects that increase water supply reliability and improve water management. Purchasing water rights is not an eligible expense for this program.

ELIGIBLE APPLICANTS: Eligible applicants include: states, tribes, irrigation districts, and water districts; state, regional, or local authorities; organizations with water or power delivery authority; or nonprofit conservation organizations that are acting in partnership with an entity listed.

ELIGIBLE USE OF FUNDS: Reclamation will fund projects that will build resiliency to drought by: Increasing the reliability of water supplies; Improving water management; Providing benefits for fish and wildlife and the environment. Proposals to use federal funding to purchase water are not eligible.

TERMS/REQUIREMENTS/NOTES: Maximum federal cost share of 75%.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: In FY23, three funding groups were provided for \$500K, \$3M, and \$5M projects. A total of \$86M in funding was awarded. The Bipartisan Infrastructure Law allocated \$8.3B for reclamation water infrastructure projects over the next five years.

LINK: <https://www.usbr.gov/drought/projects.html>

RANK AND REASONING: 4. Good fit for infrastructure only. Cannot fund water purchasing.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ **Water Infrastructure Financing and Integration Act (WIFIA)**
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Water Infrastructure Financing and Integration Act (WIFIA):

AGENCY: Environmental Protection Agency

PURPOSE/GOALS: The WIFIA program accelerates investment in our nation's water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects. The WIFIA program was established by the Water Infrastructure Finance and Innovation Act of 2014. Purchasing water rights is not an eligible expense for this program.

ELIGIBLE APPLICANTS: Local, state, tribal, and federal government entities; partnerships and joint ventures; and corporations and trusts

ELIGIBLE USE OF FUNDS: Purchasing water rights is ineligible. WIFIA can fund development and implementation activities for eligible projects including: Wastewater conveyance and treatment projects; Drinking water treatment and distribution projects; Enhanced energy efficiency projects at drinking water and wastewater facilities; Desalination, aquifer recharge, and water recycling projects; Acquisition of property if it is integral to the project or will mitigate the environmental impact of a project; and A combination of eligible projects secured by a common security pledge or submitted under one application by an SRF program.

TERMS/REQUIREMENTS/NOTES: Funds 49% of eligible project costs. Minimum project size of \$20M (or \$5M for communities <25,000 people).

TYPE: Loan

FUNDING AMOUNT AND CYCLE: \$6 billion available in FY22. Applications accepted annually on a rolling basis. For FY22, the cycle began Sept 6, 2022.

LINK: <https://www.epa.gov/wifia>

RANK AND REASONING: 4. Good fit for infrastructure only. Cannot fund water purchasing. Loan instead of grant.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D



GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ **Urban Community Drought Relief**
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Urban Community Drought Relief:

AGENCY: CA Department of Water Resources

PURPOSE/GOALS: Fund immediate potable water supply relief to address immediate drought impacts. These grants are intended to provide water to communities that face the loss or contamination of their water supplies; to address immediate impacts on human health and safety; to secure the future of California's water supply; and to protect fish and wildlife resources.

ELIGIBLE APPLICANTS: Urban communities covered by an approved Urban Water Management Plan.

ELIGIBLE USE OF FUNDS: Projects that support immediate drought response; enhance local supply and climate resilience through source watershed improvements; drought resilience planning; immediate drought response including bottled water and hauled water; new wells; emergency water interties; turf replacement; and water conservation activities.

TERMS/REQUIREMENTS/NOTES: 25% non-state match required.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: \$285M in total for 2022, made available through drought relief funds set aside in the CA Budget Act of 2021. Applications due January 31, 2022.

LINK: <https://water.ca.gov/Water-Basics/Drought/Urban-Drought-Grant>

RANK AND REASONING: 4. Good fit for infrastructure only. Cannot fund water purchasing. Future reauthorization unknown at this time, but anticipated to be refunded annually as the drought continues.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ **Sustainable Groundwater Management Act (SGMA) Implementation Grant Program**
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Sustainable Groundwater Management Act (SGMA) Implementation Grant Program:

AGENCY: CA Department of Water Resources

PURPOSE/GOALS: Promote healthy and sustainable groundwater basins to reduce and eliminate undesirable effects and promote projects that provide multiple benefits while also improving groundwater supply and quality.

ELIGIBLE APPLICANTS: Groundwater sustainability agencies located within eligible high- and medium-priority groundwater basins, including critically overdrafted basins.

ELIGIBLE USE OF FUNDS: Development of groundwater recharge projects with surface water, stormwater, recycled water, and other conjunctive use projects; projects that prevent or clean up contamination of groundwater that serve as a source of drinking water; projects that support water supply reliability, water conservation, and water use efficiency and water banking, exchange, and reclamation; and update of GSA sustainability plan.

TERMS/REQUIREMENTS/NOTES: No cost share required.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Most funds made available in FY22, which closed in November 2022. \$57 million in future appropriations in FY 23/24, dependent upon legislature approval.

LINK: <https://water.ca.gov/Work-With-Us/Grants-And-Loans/Sustainable-Groundwater>

RANK AND REASONING: 4. Good fit, but limited funding available in the future. Future reauthorization is unknown at this time

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ **Multibenefit Land Repurposing Program**
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Multibenefit Land Repurposing Program:

AGENCY: California Department of Conservation

PURPOSE/GOALS: Funds coordinated, regional groundwater sustainability projects that reduce groundwater use, repurpose irrigated agricultural land, and provide wildlife habitat. This grant program requires partnering and collaboration among stakeholders within regions or basins. Proposals should demonstrate multiple, committed partnerships and extensive collaboration with other agencies, organizations, entities, and individuals with interests in their proposal area.

ELIGIBLE APPLICANTS: (1) Groundwater Sustainability Agencies ("GSAs"), (2) federally recognized California Native American tribes, (3) non-federally recognized California Native American tribes on the contact list maintained by the Native American Heritage Commission; (4) public agencies; (5) nonprofit groups with 501(c) status; and (7) Watermasters implementing an approved groundwater sustainability plan or approved alternative to a groundwater sustainability plan

ELIGIBLE USE OF FUNDS: Regional block grant recipients must include each the following activities in their scope of work: 1. Develop a Multibenefit Agricultural Land Repurposing Plan; 2. Complete project development and permitting; 3. Implement land repurposing projects that achieve multiple benefits; 4. Support capacity needs; 5. Conduct outreach, education, and training; 6. Conduct monitoring

TERMS/REQUIREMENTS/NOTES: Project maximum of \$8.89 million

TYPE: GRANT.

FUNDING AMOUNT AND CYCLE: \$40 million available in Round 2, which is currently open. Application closes March 29, 2023.

LINK: <https://www.conservation.ca.gov/dlrp/grant-programs/Pages/Multibenefit-Land-Repurposing-Program.aspx>

RANK AND REASONING: 4. While not directly related to the proposed resilience actions, could be used to reduce agricultural demand on the groundwater basin. IWV Basin is identified as a critically overdrafted basin. Future reauthorization is unknown at this time.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ **Water Resources Development Act (WRDA) Internal Earmarks**
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Water Resources Development Act (WRDA) Internal Earmarks:

AGENCY: Army Corps of Engineers

PURPOSE/GOALS: WRDA is federal legislation that authorizes the US Army Corps of Engineers to participate in local and regional water resources projects around the country. Projects must be listed on the authorizing legislation to receive USACE support.

ELIGIBLE APPLICANTS: Public bodies (city, township, county, or special district) and tribes.

ELIGIBLE USE OF FUNDS: Eligible community infrastructure projects are any complete and useable transportation project; community support facilities; and utility infrastructure projects (e.g., water, wastewater, telecommunications, electric, gas, or other utility infrastructure [with necessary cyber safeguards]) that: are located off of a military installation; support a military installation; are owned by a state or local government or a not-for-profit, member-owned utility service; that will enhance military value, military installation resilience, and/or military family quality of life at the supported military installation; that are endorsed by the local installation commander representing the installation benefitting from the proposed project; are where ground-disturbing work has not yet commenced; and are construction-ready.

TERMS/REQUIREMENTS/NOTES: Determined by authorizing legislation.

TYPE: Internal funding available via earmarks as grants up to 50% match. Determined by authorizing legislation.

FUNDING AMOUNT AND CYCLE: Authorizing legislation passes typically every two years (latest in December 2022).

LINK: <https://www.congress.gov/bill/117th-congress/house-bill/7776>

RANK AND REASONING: 3. Good program but requires lobbying. WRDA only passed every two years so next opportunity will be 2024.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ **Drinking Water State Revolving Fund Program (DWSRF)**
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Drinking Water State Revolving Fund Program (DWSRF):

AGENCY: CA State Water Board – through the US EPA

PURPOSE/GOALS: The Drinking Water State Revolving Fund finances infrastructure improvements to mitigate drinking water risks and support the human right to water. The EPA provides annual capitalization grants to states to fund a revolving loan fund. The CA DW SRF gives priority to disadvantaged communities (DACs). Purchasing water rights is not an eligible expense for this program.

ELIGIBLE APPLICANTS: This opportunity provides funding for communities to implement mitigation activities to reduce risk to life and property from natural hazards. In CA, natural hazards include wildfire, earthquake, drought, extreme weather, flooding, and other impacts of climate change. HMGP funding can also support the development of Local Hazard Mitigation Plans (LHMP) and project-scoping activities.

ELIGIBLE USE OF FUNDS: CalOES receives funds from FEMA for distribution. Subapplicants to CalOES can be State agencies; federally recognized tribes; local governments / communities / special districts; and private nonprofit organizations

TERMS/REQUIREMENTS/NOTES: Planning grants: small DACs receive up to 100%, no cap
Category A-C and Consolidations: \$60K per connection, up to 100% project cost, Medium DACs cap of \$20M; Category D-F: \$45K per connection, up to 100% of project costs.

TYPE: Loans. Principal forgiveness for DACs.

FUNDING AMOUNT AND CYCLE: \$600M available in FY22. IJA added \$158.4M to CA DWSRF. Similar funding levels anticipated in FY23. Annual, accepted on rolling basis.

LINK: https://www.waterboards.ca.gov/water_issues/programs/grants_loans/docs/dwsrf_iup_sfy2021_22_final2.pdf

RANK AND REASONING: 3. Good fit for infrastructure only. Cannot fund water purchasing. Loan instead of grant. Long wait times for application review (33 months from application to award in 2021) reduces the score of this program.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D



GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ **Readiness and Environmental Protection Integration (REPI) Program**
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Readiness and Environmental Protection Integration (REPI) Program:

AGENCY: Department of Defense (DoD) Office of the Secretary of Defense (OSD)

PURPOSE/GOALS: DoD initiated the Readiness and Environmental Protection Integration (REPI) program to combat encroachment that can limit or restrict military training and testing through the use of encroachment management partnerships, referred to as REPI projects, that Congress authorized within 10 USC 2684a. These cost-sharing partnerships between the Military Services, state and local governments, and private conservation organizations acquire easements or other interests in land from willing sellers that preserve critical buffer areas and habitat near military installations. In the FY2019 Congress expanded the REPI authority to address military installation resilience casting climate change as an encroachment threat and allowing DoD to enter into agreements for the purposes of preserving off base habitat in a manner that maintains or improves military installation resilience. 10 USC 2684a(e) also provides authority to enter into an agreement for acquisition of real property (or interest therein) to support the purchase of water rights when necessary to support or protect the mission of the military installation.

ELIGIBLE APPLICANTS: Military Services

ELIGIBLE USE OF FUNDS: Defense Communities Only. States, counties, municipalities, and other political subdivisions of a state; special purpose units of a state or local government; other instrumentalities of a state or local government; and tribal nations.

TERMS/REQUIREMENTS/NOTES: No cost share minimum requirements. A REPI application must include an eligible partner(s) and willing landowner(s). All REPI inquiries are directed to the NAWWS China Lake Community Planning Liaison Officer.

TYPE: Cost-Sharing Partnership

FUNDING AMOUNT AND CYCLE: The REPI program does not provide funding to the Military Service partners through an open grants program; rather, each Military Service submits project proposals for funding through an online proposal tracker platform using authorized account access.

LINK: <https://www.repi.mil>

RANK AND REASONING: 2. Can be a tool to preserve critical buffer areas and habitats in a manner that maintains or improves military installation resilience and to purchase water rights, provided water rights allocated, required partnership(s) established and willing sellers.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D



GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ **Environmental Infrastructure Loans**
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ Climate-Smart Commodities

Environmental Infrastructure Loans:

AGENCY: Rural Community Assistance Corporation (RCAC)

PURPOSE/GOALS: This program aims to help recreate, improve, or expand the supply of safe drinking water, waste disposal systems, and other facilities that serve communities in the rural West. RCAC's loan programs are unique—they provide the early funds small rural communities need to determine feasibility and pay predevelopment costs prior to receiving state and federal program funding. RCAC also may provide interim construction financing as well as intermediate- and long-term loans for system improvements.

ELIGIBLE APPLICANTS: Public agencies, tribal governments, and nonprofit organizations with projects that primarily serve lower-income rural communities.

ELIGIBLE USE OF FUNDS: Eligible projects include water, wastewater, solid waste, and stormwater facilities that primarily serve lower-income rural communities. Project must be located in rural areas with a populations of 50,000 or less in California. Community size is limited to 10,000 for long-term USDA guaranteed loans and short-term loans for which USDA is the long-term lender.

TERMS/REQUIREMENTS/NOTES: No cost share. See funding amount column for project award cap categories.

TYPE: Loan

FUNDING AMOUNT AND CYCLE: Short-term loans (1–3 years) normally not more than \$50,000; intermediate-term loans (up to 20 years repayment, 5% interest rate, for smaller capital needs normally not to exceed \$200,00); long-term loans (interest rate set at time of closing, 1% loan fee, 1% guarantee fee on guaranteed portion of loan).

LINK: https://www.rcac.org/wp-content/uploads/2022/09/Enviro_9-16-2022.pdf

RANK AND REASONING: 2. Relatively high interest rate terms. May still be favorable depending on other borrowing options for Ridgecrest.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ **Groundwater Grant Fund (Chapter 10, Prop 1)**
- ▶ Climate-Smart Commodities

Groundwater Grant Fund (Chapter 10, Prop 1):

AGENCY: CA State Water Board

PURPOSE/GOALS: Clean up and prevent contamination of groundwater that serves or has served as a source of drinking water.

ELIGIBLE APPLICANTS: Public agencies, nonprofits, public utilities, tribes, and mutual water companies.

ELIGIBLE USE OF FUNDS: Projects that clean up and prevent contamination of groundwater that serves or has served as a source of drinking water. Examples: treatment, well retrofits, source area cleanup, GW injection to prevent intrusion, and wastewater programs that prevent or reduce GW contamination (including septic-to-sewer). DW/WW projects must benefit DACs or Economically Distressed Areas (EDAs).

TERMS/REQUIREMENTS/NOTES: 50% minimum local cost share, reduced for DACs/SDACs. May be awarded in addition to principal forgiveness through the DWSRF or CWSRF.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Amount: originally set aside \$670M for grants, 10% for DACs and 10% for SDACs. There is an anticipated influx of funds from the CA SFY2022 Budget Addendum SB170, which will be announced in Spring 2022. SWB is considering routing a portion of the SB170 \$350M for water recycling / groundwater cleanup through this program.

Cycle: Multi-year rounds; round 3 closed in Fall 2021. This program may receive more funding in the future; however, at this time future funding is unknown.

LINK: https://www.waterboards.ca.gov/board_info/agendas/2021/feb/020221_amend_guidelines_clean.pdf

RANK AND REASONING: 1. Not as strong of a fit and Prop 1 funds fully expended. Future reauthorization unknown.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D



GROUNDWATER FUNDING SOURCES (Ranked):

- ▶ WaterSMART Program, Bureau of Reclamation
- ▶ Water Infrastructure Financing and Integration Act (WIFIA)
- ▶ Urban Community Drought Relief
- ▶ Sustainable Groundwater Management Act (SGMA) Implementation Grant Program
- ▶ Multibenefit Land Repurposing Program
- ▶ Water Resources Development Act (WRDA) Internal Earmarks
- ▶ Drinking Water State Revolving Fund Program (DWSRF)
- ▶ Readiness and Environmental Protection Integration Program (REPI)
- ▶ Environmental Infrastructure Loans
- ▶ Groundwater Grant Fund (Chapter 10, Prop 1)
- ▶ **Climate-Smart Commodities**

Climate-Smart Commodities:

AGENCY: US Department of Agriculture

PURPOSE/GOALS: Help current ag activities consider growing a different type of crop that doesn't use as much water or change ag practices to use less water. May be matched with other funding sources to take ag uses out of production

ELIGIBLE APPLICANTS: Public and private entities, including: County, city or township governments; Special district governments; State governments; Small businesses; For-profit organizations other than small businesses; Federally recognized Native American Tribal governments; Native American Tribal organizations other than Federally recognized Tribal governments; Nonprofits that have a 501(c)(3); Nonprofits that do not have a 501(c)(3); Private institutions of higher education; Public and State-controlled institutions of higher education.

ELIGIBLE USE OF FUNDS: Partnerships to support the production and marketing of climate-smart commodities via a set of pilot projects lasting one to five years. Project proposals included plans to: Pilot implementation of climate-smart agriculture and/or forestry practices on a large-scale, including meaningful involvement of small or historically underserved producers; Quantify, monitor, report, and verify climate results; and Develop markets and promote climate-smart commodities generated as a result of project activities.

TERMS/REQUIREMENTS/NOTES: Two groups of funding: First Funding Pool for projects \$5M to \$100M, Second Funding Pool for projects \$250,000 to \$4,999,999. 50% match required

TYPE: GRANT.

FUNDING AMOUNT AND CYCLE: \$3.1 billion one-time investment in 2022

LINK: <https://www.usda.gov/climate-solutions/climate-smart-commodities>

RANK AND REASONING: 1. Good fit, but appears to be a one-time investment. Future reauthorization of the program unknown at this time.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

ASSET 2 ENERGY

Step 1: Background Information

Aspect	Response
Project Name	Energy Provisions
Project or Action Description	<p>This project includes a set of actions intended to develop infrastructure and policy to provide consistent and reliable power to the City of Ridgecrest and NAWS China Lake. When responding to issues associated with unreliable grid supply of electricity, there are two broad approaches to improving energy resilience. The first is to improve the resilience and reliability of the grid providing service to the customers, and the second is to invest in behind-the-meter energy assets that can supplement the energy from another source or the grid. Grid-supplied electricity outages impacting a customer can have a wide range of potential causes resulting from transmission-level, substation-level, or distribution-level (most common) disruptions. While it is possible to reduce these disruptions, the potential solutions, and associated cost and feasibility of solutions will vary and are highly dependent on the causes of outages, potential mitigation measures, and the willingness of grid-side actors to support such solutions. Any electric grid resilience improvements will require SoCal Edison (SCE) engagement and support to achieve. A second approach to improving energy resilience and responding to electricity supply outages is to invest in behind-the-meter (BTM) energy resources that can compensate for the grid service. This approach involves having energy resources available on-site to provide some or all of the electricity that is typically provided from the electricity grid in the event of a grid outage. Determining the appropriate energy resources for this approach is highly dependent on the customer's energy resilience priorities, needs, and constraints. Because the customer is purchasing and installing the equipment on their site, a BTM energy resilience strategy can be pursued with greater independence from the grid service provider. However, SCE can still dictate interconnection requirements, and these will vary depending on how the energy resources are designed and operated. If the energy resources are only operated for backup generation when there is a power outage, the interconnection requirements will be different than if the energy resources are intended to be operated in parallel to the grid service, or even exporting to the grid at times. SCE offers program opportunities that compensate customers for energy that is exported to the grid, provided customers meet technical, operational, and administrative requirements.</p>

ASSET 2 ENERGY

Rationale for Project / Action	<p>Ridgecrest and NAWS China Lake purchase electricity from SoCal Edison (SCE). The Inyokern substation receives the electricity from the grid and distributes it to the City and the base. Both the installation and the City experience regular power outages, with the City experiencing considerably more. SCE's 2021 Electric System Reliability Report presents service interruption information for the utility. This report indicates that the average customer in the district of Ridgecrest experienced power outages more than five minutes (referred to as sustained outages), totaling 163.29 minutes in 2021. This is referred to as the system average interruption duration index (SAIDI). SCE's overall SAIDI for 2021 was 179.74 minutes, suggesting that customers in the district of Ridgecrest were impacted by power outages for slightly less time than the average SCE customer in 2021. However, the SCE's ten-year average SAIDI (2012-2021) is 140.77, which suggests that customers experienced longer average power outages in 2021. Another key service reliability measure is system average interruption frequency index (SAIFI), which is the average number of sustained outages experienced by customers. The district of Ridgecrest had a SAIFI of 1.227 in 2021, which was higher than the SCE average SAIFI of 1.11. SCE's ten-year average SAIFI is 1.01. Based on this reporting, the district of Ridgecrest experienced a higher frequency but a lower overall duration of power outages in 2021 than the average SCE customer. SCE's 2022 Circuit Reliability Review for Ridgecrest identified that equipment (transformers, switches, or conductors) failure was the cause of 87.6% of SAIDI outages. The second-highest cause of SAIDI outages (6.4%) was attributed to other causes, which suggests that no clear cause was identified when the site was patrolled. SCE operations resulting in urgent maintenance without standard notice accounted for 4.6% of SAIDI outages. Third-party outages, those caused by human interaction with equipment, such as car accidents with a pole, accounted for 1.3% of outages. Ridgecrest's 2021 SAIDI was not impacted by vegetation or animals, public safety power shutoffs, and only 0.1% of SAIDI outages were attributed to weather, fire, or earthquake.</p>
Priority Level	TBD

Step 2: Responsible Parties

Aspect	Response
Project Lead	City of Ridgecrest Mayor's Office
Project Support	Public Works, China Lake NAS
Potential Partnerships or External Resources	California Energy Commission, SoCal Edison, Coso Operating Company
Capacity	Ridgecrest will need support from the California Energy Commission and SoCal Edison to implement these projects. The City will also need external funding support.

ASSET 2 ENERGY

ASSET 2 ENERGY

TOC

RAP



B

C

D

Step 3: Timeline

Aspect	Response
Estimated Time to Complete	5-10 years

Step 4: Funding Sources

ENERGY FUNDING SOURCES

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

TOC

RAP



B

C

D

Step 5: Action Plan Tasks

Task(s)	Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Energy Needs Assessment	Conduct power needs assessment: Connect with SCE customer representatives to understand site-specific outage issues & mitigation; Assess type and duration of historical outages to determine if there has been common causes for power outages; Determine potential for onsite production and storage to meet all of the City's electricity demands – hybrid optimization of multiple energy resources study (HOMER); Determine critical energy needs and amount of backup storage to avoid disruption during long-term outages; Assess feasibility of the geothermal power plant providing electricity to the installation and the City during a system-level outage.	2023 6 months	\$50,000– \$75,000
Method of Service Study	Complete and submit a Method of Service Study (MOSS) to SoCal Edison requesting the desired changes and upgrades.	2023–2024 6 months	\$150,000– \$500,000, Needs Assessment will help narrow the cost estimate
Grid-Side System Resilience Solutions			
Battery Storage	Install large-scale battery energy storage systems (BESSs) downstream of the Inyokern substation to be available during an outage. Location, capacity, and load requirements will be determined through the energy needs assessment. This project will require coordination with the California Energy Commission and SCE.	2025 12–24 months	4-hour BESS capacity capex cost Commercial scale ~\$450/kWh Utility scale ~\$ 350/kWh

ASSET 2 ENERGY

TOC

RAP



B

C

D

Harden Inyokern substation and area energy assets	Install additional barriers and other improvements to protect the substation and other grid assets from motor vehicle collisions. Assets that require hardening to be identified and prioritized in energy needs assessment.	2023 4-6 months	\$25,000-\$50,000
Geothermal plant back-up power	Install a switch at the Inyokern substation to allow the geothermal plant to supply emergency power to China Lake and Ridgecrest during long-term outages. This solution to require coordination with SCE and the Coso Operating Company.	2026 6-12 months	Unable to estimate cost without conducting the Needs Assessment.
Behind-the-Meter Energy Resource Investments			
City-owned energy resources	Based in the results of the power needs assessment, install energy resources for City Hall, Kerr McGee Center, and the wastewater treatment plant that can support some or all energy needs during grid power outages. Potential energy resources include: Solar PV; Micro wind turbine; Battery energy storage system; Combined heat and power; and Fossil fuel generation. Future improvements will take into consideration NAWS China Lake's Interconnection Agreement with SCE and will not negatively impact the 12MW PV System – Rule 21 minimum threshold requirements.	2024-2025 12-24 months	TBD

ASSET 2 ENERGY

Step 6: Public Support / Co-Benefits

Aspect	Response
Public Support	To be determined as project tasks progress.
Co-Benefits:	Additional solar production capacity will reduce the City's carbon footprint and improve consistency and reliability of City services.
Mission Readiness	Upgrades will reduce frequency and duration of electrical outages for the base and the City.
Environmental	Additional solar production capacity will reduce the City's carbon footprint and GHG emissions
Social	Fewer power outages and more reliable and consistent City services.
Equity (Community Resilience)	Description of how project addresses equity concerns or fosters equitable outcomes within the community.
Equity (Social Vulnerability)	Fewer power outages and more reliable and consistent access to City services and facilities, especially during a long-term outage or post-disaster event.
Economic	More reliable electric service reduces impacts to businesses associated with outages, such as unplanned closings and staff absenteeism.

TOC

RAP



B

C

D

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Grid Resilience and Innovation Partnerships Program:

AGENCY: Department of Energy (DOE) Grid Development Office

PURPOSE/GOALS: Enhance grid flexibility and improve the resilience of the power system against growing threats of extreme weather and climate change. Offers three sub-programs: Grid Resilience Utility and Industry Grants (\$2.5 billion), Smart Grid Grants (\$3 billion), and Grid Innovation Program (\$5 billion).

ELIGIBLE APPLICANTS: Varies by sub-program, but broadly eligible entities that can apply for these grants include: electric grid operators; electricity storage operators; electricity generators; transmission owners or operators; distribution providers; and fuel suppliers. Southern California Edison would likely need to apply on Ridgecrest's behalf.

ELIGIBLE USE OF FUNDS: Varies by program, but in general, grants will fund transmission and distribution technology solutions that will mitigate hazards (Grid Resilience Utility and Industry Grants), increasing capacity of the transmission system, preventing faults that may lead to wildfires or other system disturbances, integrating renewable energy at the transmission and distribution levels, and facilitating the integration of increasing electrified vehicles, buildings, and other grid-edge devices (Smart Grid Grants); and use innovative approaches to transmission, storage, and distribution infrastructure to enhance grid resilience and reliability (Grid Innovation Program).

TERMS/REQUIREMENTS/NOTES: Varies by sub-program.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: The program will provide up to \$10.5 billion over five years (FY22–26). The first funding cycle opened in November 2022 and closed in December 2022. Expected to open again in 2023.

LINK: <https://www.energy.gov/gdo/grid-resilience-and-innovation-partnerships-grip-program>

RANK AND REASONING: 5. Resilience-oriented. Lots of funding, though will be competitive nationally.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ **Participating in Self-Generation Incentive Program (SGIP)**
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Participating in Self-Generation Incentive Program (SGIP):

AGENCY: CA Public Utilities Commission (CPUC)

PURPOSE/GOALS: The CPUC's Self-Generation Incentive Program (SGIP) offers rebates for installing energy storage technology at both residential and nonresidential facilities. These storage technologies include battery storage systems that can function during a power outage.

ELIGIBLE APPLICANTS: Nonresidential building applicants must: A) Be a government agency, educational institution, nonprofit organization, or small business and B) Be located in a DAC, or in a census tract with Median Household Income below 80 percent of Statewide Median Income. (for Equity Rebates). A variety of other public and private service providers experiencing Public Safety Power Shut-offs (PSPS) or located in a Tier 2 or 3 High Fire Threat District (HFTD) are also eligible.

ELIGIBLE USE OF FUNDS: Qualifying technologies include wind turbines, waste heat to power technologies, pressure reduction turbines, internal combustion engines, microturbines, gas turbines, fuel cells, and energy storage systems.

TERMS/REQUIREMENTS/NOTES: There are two categories of new, higher rebates for SGIP: Equity (\$850/kilowatt-hour) and Equity Resiliency (\$1,000/kilowatt-hour).

TYPE: Grant/Rebate

FUNDING AMOUNT AND CYCLE: Total SGIP Budget Availability by Category for 2020–2024: Equity = approx. \$84M; Equity Resiliency = approx. \$612M.

LINK: <https://www.cpuc.ca.gov/sgipinfo/>

RANK AND REASONING: 5. California only. Good fit.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ **Renewables Advancing Community Energy Resilience (RACER) Funding Program**
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Renewables Advancing Community Energy Resilience (RACER) Funding Program:

AGENCY: Department of Energy (DOE)

PURPOSE/GOALS: Supporting projects that enable communities to use solar and solar-plus-storage to prevent disruptions in power caused by extreme weather and other events, and to rapidly restore electricity if it goes down.

ELIGIBLE APPLICANTS: Individuals, domestic entities (including local governments, tribal governments, institutions, for-profit businesses, and nonprofits), and foreign entities are eligible to apply. See NOFO for details.

Teaming Partner List including stakeholders and historically underrepresented groups is highly encouraged.

ELIGIBLE USE OF FUNDS: Projects fall under three topic areas: 1) Innovative Community-Based Energy Resilience Planning; 2) Automation Strategies for Rapid Energy Restoration; and 3) Innovative Solutions to Increase the Resilience and Hardening of Photovoltaic (PV) Power Plants. Projects will foster engagement and ongoing communication among multiple stakeholders, such as utilities, municipal planners, emergency responders, community groups, and others, especially in underserved communities located in areas vulnerable to extreme events causing frequent energy and power service disruptions

TERMS/REQUIREMENTS/NOTES: Previous awards have ranged from \$500k-\$3M
Topic Area 1: Cost Share 20%; Topic Areas 2 and 3: Cost Share 20% and 50%.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Last cycle: FY22 opportunity opened April 12, 2022 – 20 awardees announced on November 2, 2022. \$33 million was available in FY22. Expected to reopen in 2023.

LINK: <https://www.energy.gov/eere/solar/renewables-advancing-community-energy-resilience-racer-funding-program>

RANK AND REASONING: 4. Good fit, but solar projects only. Nationally competitive.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ **Transmission Infrastructure Program**
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Transmission Infrastructure Program:

AGENCY: Department of Energy (DOE) Western Area Power Administration

PURPOSE/GOALS: Leverage federal funds and attract private and other nonfederal co-investment to support the development of critical transmission and related infrastructure

ELIGIBLE APPLICANTS: Any entity with an eligible project.

ELIGIBLE USE OF FUNDS: Prospective utility-scale transmission and/or related projects must: Have at least one terminus in WAPA's 15-state service territory; Demonstrate a reasonable expectation of repayment; Facilitate the delivery of clean energy; Not adversely impact system reliability or operations; and Serve the public interest.

TERMS/REQUIREMENTS/NOTES: Shorter-term loans, primarily through construction and up to 10 years. Interest rates set based on equivalent U.S. Treasury rate (plus a credit-based spread if applicable). Typical loan financings range from \$40 million to \$1 billion.

TYPE: Loan

FUNDING AMOUNT AND CYCLE: \$3.25 billion in borrowing authority.

LINK: <https://www.wapa.gov/transmission/TIP/Pages/AboutTIP.aspx>

RANK AND REASONING: 4. Good fit, but loan instead of grant. Western U.S. region only.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Community Energy Resilience Investment Program:

AGENCY: CA Energy Commission

PURPOSE/GOALS: The CERI program will enhance electric grid resilience for under-resourced and tribal communities across California. The program will invest in projects that: increase energy resilience and reliability, provide the greatest community benefit in reducing the likelihood and consequences of disruptions to the electricity grid, promote decarbonization of the energy system, improve energy justice and equity, and create good-paying jobs.

ELIGIBLE APPLICANTS: To be announced upon setup of CAEC program.

ELIGIBLE USE OF FUNDS: A grant awarded to an eligible entity under the program may be used for activities, technologies, equipment, and hardening measures to reduce the likelihood and consequences of disruptive events including weatherization, line management, the use of distributed energy resources, and other activities.

TERMS/REQUIREMENTS/NOTES: To be announced upon setup of CAEC program.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Infrastructure Investment and Jobs Act (IIJA) Section 40101(d) authorized \$459 million annually to states, the District of Columbia, U.S. territories, and Indian tribes over a five-year period. California-specific funding cycle and award amounts will be announced after the program is developed.

LINK: <https://www.energy.ca.gov/event/workshop/2022-08/staff-workshop-kickoff-development-community-energy-resilience-investment>

RANK AND REASONING: 3. Relevant but funding not yet made available to California applicants.

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ California Lending for Energy and Environmental Needs (CLEEN)

Transmission Facilitation Program:

AGENCY: Department of Energy (DOE) Grid Development Office

PURPOSE/GOALS: Develop new, large-scale transmission lines and upgrade existing transmission that would otherwise not be built.

ELIGIBLE APPLICANTS: Any entity with an eligible project.

ELIGIBLE USE OF FUNDS: Projects that construct, replace, or upgrade a transmission line that is either not less than 1,000 megawatts (MW) for new lines or 500 MW for existing lines as well as a project that connects microgrids in select states and U.S. territories.

TERMS/REQUIREMENTS/NOTES: Funding terms vary by financing tool offered.

TYPE: Loans, capacity contracts, Public-Private Partnerships

FUNDING AMOUNT AND CYCLE: Opened Nov. 2022; closes Feb. 1, 2023. Total funds available in FY23 is \$2.5 billion. Expected to open again in 2024.

LINK: <https://www.energy.gov/gdo/transmission-facilitation-program>

RANK AND REASONING: 2. Proposed projects may not be large enough scale to qualify for the program. Focused more on transmission than on an energy system as a whole.

TOC

RAP



B

C

D

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

ENERGY FUNDING SOURCES (Ranked):

- ▶ Grid Resilience and Innovation Partnerships Program
- ▶ Participating in Self-Generation Incentive Program (SGIP)
- ▶ Renewables Advancing Community Energy Resilience (RACER) Funding Program
- ▶ Transmission Infrastructure Program
- ▶ Community Energy Resilience Investment Program
- ▶ Transmission Facilitation Program
- ▶ **California Lending for Energy and Environmental Needs (CLEEN)**

California Lending for Energy and Environmental Needs (CLEEN):

AGENCY: CA Infrastructure and Economic Development Bank (IBank)

PURPOSE/GOALS: Provides low-cost direct public financing to local governments and nonprofits sponsored by public agencies to help meet the state's goals for greenhouse gas reduction, water conservation, and environmental preservation. The CLEEN Center offers two programs: the Statewide Energy Efficiency Program (SWEET) and the Light Emitting Diode Street Lighting (LED) program.

ELIGIBLE APPLICANTS: Local governments.

ELIGIBLE USE OF FUNDS: Include, but are not limited to: Advanced metering systems to support conversion of master-metered buildings to sub-metering; Data center, information technology, and communications; Energy management and/or control systems; Demand response programs; Water/wastewater, pipeline, mining/extraction, and similar end-use processes, facilities, buildings, and infrastructure; Lighting and control systems; Converting incandescent to CFL; LED repairs, replacements, and upgrades; Heating, ventilation, and air conditioning systems (HVAC); Building envelope; Occupant plug load management systems; Load reduction; Zero emission vehicles; Hydrogen fueling stations; Thermal and electric energy storage.

TERMS/REQUIREMENTS/NOTES: Can receive funds within 45 to 90 days of IBank board approval. Low-, competitive-, and fixed-interest rates up to 30 years. Ibank is AAA rated, and passes its low borrowing costs (through bonds) to applicants.

TYPE: Loan

FUNDING AMOUNT AND CYCLE: Continuous cycle

LINK: <https://www.grants.ca.gov/grants/california-lending-for-energy-and-environmental-needs-clean/>

RANK AND REASONING: 2. Applicable but is a loan instead of a grant. Appropriateness depends on the City's bond rating and ability to secure loans with similar interest rates.

ASSET 3 KERR MCGEE CENTER

TOC

RAP



B

C

D

Step 1: Background Information

Aspect	Response
Project Name	Kerr McGee Center Upgrades
Project / Action Description	This project involves structural, electrical, mechanical, and architectural upgrades to bring the facility to essential facility status and serve as a resilience hub following a disaster or emergency event. The project will include modernizing the facility's commercial kitchen and making the building compliant with the Americans with Disabilities Act (ADA).
Rationale for Project / Action	The Kerr McGee Center is Ridgecrest's primary community center and home to the Parks and Recreation Department. The Kerr McGee Center serves as a shelter or resilience hub during emergency events and the design and upgrade to the facility's commercial kitchen to support serving 400 people for events is proposed. Kerr McGee has structural, HVAC, and functional deficiencies that impact operations and create additional cost to the City. Upgrades will reduce operational costs, increase the facility's utility as a community center, and allow it to serve as a resilience hub.
Priority Level	TBD

Step 2: Responsible Parties

Aspect	Response
Project Lead	Parks and Recreation, Public Works
Project Support	Mayor's Office, Police
Potential Partnerships or External Resources	SoCal Edison, California Office of Emergency Services
Capacity	Ridgecrest has the capability to complete the necessary upgrades to the Kerr McGee Center; however, the City will need to identify external funding sources to pay for the projects.

ASSET 3 KERR MCGEE CENTER

TOC

RAP



B

C

D

Step 3: Timeline

Aspect	Response
Estimated Time to Complete	5-10 years

Step 4: Funding Sources

COMMUNITY CENTER SPECIFIC FUNDING SOURCES

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

ASSET 3 KERR MCGEE CENTER

TOC

RAP



B

C

D

Step 5: Action Plan Tasks

Task(s)	Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Building Assessment including structural ASCE 41 Tier 1 Assessment	Structural, Electrical, Mechanical, and Architectural building assessment to determine current condition. Includes review of existing construction documents, deterioration, existing damage, age and condition of equipment (HVAC, lighting, power, fire, telecom), peak demand, and ADA accessibility. Deliverable will be a Property Condition Assessment (PCA) Report, Deficiency Report, and a detailed scope of work for retrofits, including structural enhancements, to bring facility up to essential facility status. Scope includes client review and feedback on draft PCA report at 90%.	4–6 weeks, 2023	\$60,000
Project Sequencing	Series of meetings to determine ideal sequencing for projects identified in the building assessment. This activity will consider shut-down periods, design schedule, supply chain issues, and other factors that will impact project sequencing. Meetings should include one person from each technical discipline (structural, MEP, architectural, accessibility, etc.) and City representatives (Parks and Recreation, Public Works, etc.).	1 month, 2023	\$10,000
Structural Upgrades	Make structural upgrades determined by PCA and Tier 1 structural assessment. Planned upgrades will assume Kerr McGee must meet risk Category 4 requirements.	6–12 months, 2027	\$500,000
HVAC filtration	Design and install additional HVAC filtration to remove smoke and particulates caused by wildfires.	4–6 months, 2023	\$1,200,000
HVAC compartmentalization	Design and install additional HVAC equipment to allow focused cooling, particularly on weekends and when used as a shelter or resilience hub.	4–6 months, 2024	\$800,000

ASSET 3 KERR MCGEE CENTER

TOC

RAP



B

C

D

Doors and Windows	Replace, repair, or make upgrades to address cooling loss at perforations. Solutions to be determined in building assessment.	4–6 months, 2026	\$250,000–\$500,000
ADA Accessibility	Identify and complete projects to meet ADA standards for accessibility and essential facility standards.	6–12 months, 2027	\$500,000
Commercial Kitchen	Design and complete upgrades to the facility's commercial kitchen to support serving 400 people for events, and function after an emergency event when the building is serving as a shelter or resilience hub.	4–6 weeks, 2025	\$600,000
Back-up power	Coordinate with other energy-related projects to support additional solar generation and other behind-the-meter solutions including battery backup and fossil fuel generators. The adjacent 496KW solar field can be expanded to increase capacity.	12–24 months 2024	\$1M–\$2M
Fire alarm and fire monitoring system	Design and install fire alarm and monitoring system (nearly 40 years old) to current state and federal standards.	4–6 months, 2024	\$750,000

ASSET 3 KERR MCGEE CENTER

ASSET 3 KERR MCGEE CENTER

TOC

RAP



B

C

D

Step 6: Public Support / Co-Benefits

Aspect	Response
Public Support	TBD
Co-Benefits:	Upgrades to Kerr McGee will improve its ability to serve as Ridgecrest's primary community and event center as well as reduce the City's energy costs.
Mission Readiness	Kerr McGee will be better able to serve Ridgecrest residents, including military personnel and their families, both as a community center and as a resilience hub and shelter following an emergency event, disaster, or sustained power outage.
Environmental	Upgrades to the HVAC system, windows, and doors will reduce the City's energy consumption.
Social	Kerr McGee will perform better as a community and event center and serve as a resilience hub, when needed.
Equity (Community Resilience)	Recommended upgrades will allow Kerr McGee to better serve residents, particularly those needing a safe place to go following an emergency event.
Equity (Social Vulnerability)	Socially vulnerable populations will have a place to go during power outages to charge phones and cool off.
Economic	Kerr McGee will be a more productive event facility.

TOC

RAP



B

C

D

THIS PAGE INTENTIONALLY LEFT BLANK

KERR MCGEE CENTER FUNDING SOURCES (Ranked):

- ▶ Community Resilience Centers Program
- ▶ Extreme Heat and Community Resilience Grant Program

Community Resilience Centers Program:

AGENCY: CA Strategic Growth Council

PURPOSE/GOALS: Fund new construction and upgrades of neighborhood-level resilience centers to provide shelter and resources during climate and other emergencies. The program will also fund year-round services and ongoing programming that build overall community resilience.

ELIGIBLE APPLICANTS: Collaborative stakeholder structure is required. Public agencies and organizations, tribes, and community-based organizations, and some private businesses are eligible.

ELIGIBLE USE OF FUNDS: Defense Communities Only. States, counties, municipalities, other political subdivisions of a state; special purpose units of a state or local government; other instrumentalities of a state or local government; and tribal nations

TERMS/REQUIREMENTS/NOTES: Implementation Grants: \$95M total available for CRC Round 1 Implementation Grant Awards. Requests must fall between \$5M–\$10M. Planning grants: \$5M total available for CRC Round 1 Planning Grant Awards. Requests must fall between \$200k–\$500k.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: \$100 million available in FY23 and 24. Trailer bill to SB155 (2021) specified that \$25 million will be available in FY22–23 and \$75 million in FY23–24. Anticipated to open in late Spring 2023. Round 1 Draft Guidelines posted 12/7/22; accepting public comments until 01/27/23. Round 1 awards by late summer 2023.

LINK: <https://sgc.ca.gov/programs/community-resilience-centers/>

RANK AND REASONING: 5. GOOD FIT.

GROUNDWATER ENERGY **KERR MCGEE**
 COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

KERR MCGEE CENTER FUNDING SOURCES (Ranked):

- ▶ Community Resilience Centers Program
- ▶ Extreme Heat and Community Resilience Grant Program

Extreme Heat and Community Resilience Grant Program:

AGENCY: CA Office of Planning and Research

PURPOSE/GOALS: Has not yet been announced as of 12/20/22. Anticipated to be announced in Spring 2023.

ELIGIBLE APPLICANTS: Has not yet been announced as of December 29, 2022. Anticipated to be announced in Spring 2023.

ELIGIBLE USE OF FUNDS: Has not yet been announced as of December 29, 2022. Anticipated to be announced in Spring 2023.

TERMS/REQUIREMENTS/NOTES: Has not yet been announced as of December 29, 2022. Anticipated to be announced in Spring 2023.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Has not yet been announced as of December 29, 2022. Anticipated to be announced in Spring 2023.

LINK: <https://opr.ca.gov/climate/icarp/grants/>

RANK AND REASONING: 4. Guidance not yet released. Will likely be a good fit once released

GROUNDWATER ENERGY **KERR MCGEE**
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

ASSET 4 COMMUNICATIONS

ASSET 4 COMMUNICATIONS

TOC

RAP



B

C

D

Step 1: Background Information

Aspect	Response
Project Name	Frontier Communications
Project / Action Description	Develop redundant and resilient Internet access for the installation and the City.
Rationale for Project / Action	There is currently a single fiber feeding the installation from the Frontier Central Office.
Priority Level	Priority level to be completed by the Climate Resilience Team.

Step 2: Responsible Parties

Aspect	Response
Project Lead	NAWCL
Project Support	TBD
Potential Partnerships or External Resources Capacity	TBD

Step 3: Timeline

Aspect	Response
Estimated Time to Complete	Immediate to 3 years

TOC

RAP



B

C

D

Step 4: Funding Sources

COMMUNICATION SPECIFIC FUNDING SOURCES

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

ASSET 4 COMMUNICATIONS

ASSET 4 COMMUNICATIONS

TOC

RAP



B

C

D

Step 5: Action Plan Tasks

Task(s)	Description	Estimated Time to Complete	Estimated Cost (Planning Level)
Frontier Communications	Develop redundant and resilient Internet access for the installation and the City.	Immediate to 3 years	\$1,000,000
Communications needs assessment	Review the radio communications operations on the installation and at the City. Determine where the coverage requirements are and the operational requirements for each agency.	3 months	\$15,000
Add redundant fiber connections to the installation	Potentially add redundant fiber connection into the installation from the Central Office (CO) for diverse pathway. Additionally, it might be possible to add fiber from a separate facility for more complete diversity.	3 months	\$500,000
Backup Power	Current CO has hours of battery backup and diesel generator. Increasing the battery backup and providing additional on-site fuel storage may help to decrease outages due to power.	1.5 years	\$100,000
Satellite Link to Installation	Additional redundancy can be achieved by adding satellite links to the installation for commercial Internet.	2 years	TBD
Add redundant links into the CO	Additional connections into the CO from satellite, uWave backhaul, or additional fiber could improve the resiliency of the commercial Internet services for the installation and the City.	5 years	\$345,000
B Mountain Radio Tower	Develop redundant and resilient radio tower facility and infrastructure	Immediate to 3 years	\$1,000,000

TOC

RAP



B

C

D

Step 6: Public Support / Co-Benefits

Aspect	Response
Public Support	TBD
Co-Benefits:	
Mission Readiness	Internet communications is critical for day-to-day operations. This will allow the installation be in communication and maintain connectivity for critical infrastructure.
Environmental	N/A
Social	Ability to keep in touch with those outside of the area.
Equity (Community Resilience)	N/A
Equity (Social Vulnerability)	N/A
Economic	N/A

COMMUNICATIONS FUNDING SOURCES (Ranked):

- ▶ Broadband Technical Assistance Grants
- ▶ Last Mile Federal Funding Account
- ▶ Broadband Loan Loss Reserve Fund
- ▶ California Advanced Services Fund (CASF)
- ▶ Statewide Middle-Mile Network

Broadband Technical Assistance Grants:

AGENCY: California Public Utilities Commission (CPUC)

PURPOSE/GOALS: Provide technical assistance grants to local agencies and tribal governments in California to reimburse pre-construction expenses in advance of broadband deployment. Funded through federal Coronavirus State and Local Fiscal Recovery Funds.

ELIGIBLE APPLICANTS: Local agencies and tribal governments authorized by law to provide broadband Internet access service.

ELIGIBLE USE OF FUNDS: Funds will reimburse pre-construction expenses to provide broadband connections to unserved and underserved areas. Grants may be used to reimburse eligible costs such as environmental, feasibility, and engineering design studies or reports; needs assessments, market studies, broadband strategic plans, and business plans; forming a joint powers authority; and consultant and community-based organization services.

TERMS/REQUIREMENTS/NOTES: Grantees may receive up to 100 percent of technical assistance project costs of up to \$500,000 per local agency or tribe per fiscal year.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Applications accepted on a rolling basis and awarded monthly. \$50M allocated. Grants will be awarded on a first come, first served basis until funding is exhausted.

LINK: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/broadband-implementation-for-california/local-agency-technical-assistance>

RANK AND REASONING: 5. Good for planning efforts.

COMMUNICATIONS FUNDING SOURCES (Ranked):

- ▶ Broadband Technical Assistance Grants
- ▶ **Last Mile Federal Funding Account**
- ▶ Broadband Loan Loss Reserve Fund
- ▶ California Advanced Services Fund (CASF)
- ▶ Statewide Middle-Mile Network

Last Mile Federal Funding Account:

AGENCY: California Public Utilities Commission (CPUC)

PURPOSE/GOALS: The Federal Funding Account, established by the CPUC according to Senate Bill 156, will fund last mile broadband infrastructure projects to connect unserved and underserved Californians with high-speed broadband service. The Federal Funding Account has a \$2 billion budget made up of state and federal funds. Projects built using the federal American Rescue Plan Act funds must be built by 2027.

ELIGIBLE APPLICANTS: Must fall under a Priority Area as defined by CPUC. Priority areas are then eligible to apply. Areas of Ridgecrest are identified as priority areas according to the following map: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/broadband-implementation-for-california/last-mile-federal-funding-account/priority-areas>

ELIGIBLE USE OF FUNDS: Projects that will achieve last-mile connections—whether by focusing on funding last-mile projects or by ensuring that funded middle-mile projects have potential or partnered last-mile networks that could or would leverage the middle-mile network. A variety of project types are eligible.

TERMS/REQUIREMENTS/NOTES: Maximum Cost per location of \$9,300. Maximum Grant Amount of \$25,000,000. Applications with cost matches proposed are given additional points.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: \$2 billion—part of the \$6 billion investment from Senate Bill 156.

LINK: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/broadband-implementation-for-california/last-mile-federal-funding-account>

RANK AND REASONING: 5. Areas of Ridgecrest in priority areas.

COMMUNICATIONS FUNDING SOURCES (Ranked):

- ▶ Broadband Technical Assistance Grants
- ▶ Last Mile Federal Funding Account
- ▶ **Broadband Loan Loss Reserve Fund**
- ▶ California Advanced Services Fund (CASF)
- ▶ Statewide Middle-Mile Network

Broadband Loan Loss Reserve Fund:

AGENCY: California Public Utilities Commission (CPUC)

PURPOSE/GOALS: Established in 2021 by SB156, this fund provides a credit enhancement related to the financing of local broadband infrastructure development, with an emphasis on public broadband networks. The Fund will provide collateral to local governments to enable more favorable borrowing rates and terms for bonds issued to deploy broadband infrastructure.

ELIGIBLE APPLICANTS: Nonprofits and local government agencies per Public Utilities Code 281.2. Requires a separate financing agreement from a private lender.

ELIGIBLE USE OF FUNDS: Including, but not limited to, the payment of costs of debt issuance, obtaining credit enhancement, and establishing and funding of reserves for the payment of principal and interest on debt issued by fund participants.

TERMS/REQUIREMENTS/NOTES: Loan Loss Reserve Fund: Principal coverage between 5–20% of the total amount of the project loan, in the event of default.
Debt Service Reserve Fund: not to exceed 20% of the total debt amount and two years of debt service payments.

TYPE: Grant as credit assistance

FUNDING AMOUNT AND CYCLE: \$750 million established in the State Treasury through SB 156. The State will continuously appropriate monies in this fund to the Commission.

LINK: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/broadband-implementation-for-california/loan-loss-reserve-fund>

RANK AND REASONING: 4. Credit assistance instead of grant. However, much more funding available. Requires a separate financing agreement from a private lender.

COMMUNICATIONS FUNDING SOURCES (Ranked):

- ▶ Broadband Technical Assistance Grants
- ▶ Last Mile Federal Funding Account
- ▶ Broadband Loan Loss Reserve Fund
- ▶ **California Advanced Services Fund (CASF)**
- ▶ Statewide Middle-Mile Network

California Advanced Services Fund (CASF):

AGENCY: California Public Utilities Commission

PURPOSE/GOALS: The CASF Grant Account facilitates the deployment of broadband services through five CASF accounts: Broadband Adoption Account; Broadband Infrastructure Grant Account; Broadband Public Housing Account; Rural and Urban Regional Broadband Consortia Grant Account; and Line Extension Pilot Program. The CASF is funded by a surcharge rate on revenues collected by telecommunications carriers from end users for intrastate telecommunications services. Of all CASF programs offered, the Infrastructure Grant Account is most appropriate for this project

ELIGIBLE APPLICANTS: CASF Infrastructure Account: Any local agency providing broadband service.

ELIGIBLE USE OF FUNDS: CASF Infrastructure Account: Eligible projects include serviceable locations that are capable of being provided with broadband access at minimum speeds of 100 mbps downstream and 20 mbps upstream. Prioritizes projects that serve areas with no existing broadband access or where speeds are below 10 mbps downstream and 1 mbps upstream. The project location is currently listed as having between 10–25 mbps on the California Broadband Map <https://www.broadbandmap.ca.gov/>

TERMS/REQUIREMENTS/NOTES: CASF Infrastructure Account: Areas with no Internet connectivity are eligible for 100 percent funding. All other eligible project areas will be eligible for a baseline funding amount of 60 percent of construction costs. An additional 10% funding can be qualified for if the area is rural, unincorporated, disadvantaged, in rugged terrain, or other determining factors.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: CPUC is authorized to collect \$150 million for the CASG program every year until 2032. Made available in May 2022 until funds are expended. Prospective applicants and stakeholders must consult the local Broadband Consortium first before contacting CASF Infrastructure Staff for information.

LINK: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/california-advanced-services-fund>

RANK AND REASONING: 3. Lower funding level than other programs.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

COMMUNICATIONS FUNDING SOURCES (Ranked):

- ▶ Broadband Technical Assistance Grants
- ▶ Last Mile Federal Funding Account
- ▶ Broadband Loan Loss Reserve Fund
- ▶ California Advanced Services Fund (CASF)
- ▶ **Statewide Middle-Mile Network**

Statewide Middle-Mile Network:

AGENCY: California Public Utilities Commission (CPUC)

PURPOSE/GOALS: This funding program is designed to acquire, build, maintain, and operate a critical statewide open-access, middle-mile fiber network. The eligibility of the project depends on its location in Ridgecrest. It is recommended that the City get in contact with CPUC about the project.

ELIGIBLE APPLICANTS: Some portions of the desired broadband connection may be considered “middle-mile.” Middle-mile refers to the high-capacity fiberoptic cables that traverse long distances (i.e., 10s–100s of miles) to connect communities to the Internet backbone. Several middle-mile sections around Ridgecrest were recommended for funding in a public comment period in 2021.

ELIGIBLE USE OF FUNDS: Funding to be announced.

TERMS/REQUIREMENTS/NOTES: Funding to be announced.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: \$3.25 billion—part of the \$6 billion investment from Senate Bill 156.

LINK: <https://www.cpuc.ca.gov/industries-and-topics/Internet-and-phone/broadband-implementation-for-california/open-access-middle-mile>

RANK AND REASONING: 3. Dependent on the location of the project.

ASSET 5 BACK GATE FLOODING

Step 1: Background Information

Aspect	Response
Project Name	Installation Back Gate / Roadway Flooding
Project / Action Description	<ol style="list-style-type: none"> 1. Prepare Updated and Focused Drainage Study 2. Implement Bowman Wash Improvements Identified in the 1989 Master Drainage Plan 3. Construct Upstream Detention/Retentions Basins 4. Construct Culvert Crossing Richmond Rd. 5. Construct Bridge Across Hwy 178 at Bowman Wash 6. Construct Conveyance from Richmond Road to Bowman Wash
Rationale for Project / Action	The area of Richmond Rd at E. Ridgecrest Blvd (Hwy 178) floods during heavy storm events as run-off from the southwest and the southerly segment of the town of Ridgecrest travels northeasterly and along Ridgecrest Blvd. The China Lake back access and gate is north of this intersection, approximately one-half mile. There are no underground flood conveyance systems in the area and the regional low land area is about a half mile to the east at the Bowman Wash. With no underground storm drain systems, culverts, or outflows, flooding occurs along the south side of the roadway up to the roadway crown—a depth of approximately 0.4 feet. Flooding then extends laterally for long distances due to the volume, flat topography, and lack of conveyances. This flooding blocks vehicle access from both the south and the north for travelers wishing to cross Ridgecrest Blvd.
Priority Level	TBD

ASSET 5 BACK GATE FLOODING

Step 2: Responsible Parties

Aspect	Response
Project Lead	The flooding is both a local and regional challenge since the drainage boundary for the basin extends far beyond the town of Ridgecrest. It's also not clear or apparent if the City has mitigated any increases in run-off due to development of the town. It is unknown, but another factor that could increase flooding south of Hwy 178 is any widening or elevating of the highway through the years because this highway blocks the natural drainage patterns from the south that continue to the northeast. Therefore, the project lead could be either the City, Kern County Floodplain Management (if they have any jurisdiction), or the State.
Project Support	City of Ridgecrest Engineering (Public Works), Caltrans, Kern County Floodplain Management
Potential Partnerships or External Resources	City of Ridgecrest, Caltrans, China Lake

Step 3: Timeline

Aspect	Response
Estimated Time to Complete	5-10 years

Step 4: Funding Sources

FLOODING SPECIFIC FUNDING SOURCES (4)

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

ASSET 5 BACK GATE FLOODING

Step 5: Action Plan Tasks

Task(s)	Description	Estimated Time to Complete	
<i>Implement Proposed Improvements identified in the Ridgecrest 1989 Master Drainage Plan at Bowman Wash and E. Ridgecrest Blvd (Hwy 178). Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. Construct upstream detention basins.</i>	Construct bridge spanning Bowman Wash at Hwy 178. Direct flows at Richmond Rd./Hwy 178 easterly to Bowman Wash. This may be accomplished in aboveground series of linear swales, bio-basins, rain gardens, detention/retention basins, and culverts. Deep seepage pits penetrating impervious materials may also serve to dissipate runoff and recharge subsurface groundwater if feasible. The following project descriptions outline the project development stages.	Dependent on owner decision makers. Est. 3-6 months	TBD
<i>Project Initiation</i>	Project Lead prepares project initiation document and forms the project development team (PDT)	3-6 months	\$25,000
<i>Project Initiation Document</i>	Prepare project study report to identify design concepts and preliminary cost estimate, environmental considerations, and right-of-way needs and costs.	6-9 months	\$200,000
<i>Programming and funding</i>	Project Owner determines funding needs and source, and prepares a program for delivering the project.	9-12 months	\$25,000
<i>Project Report (PR)</i>	Prepare alternatives analysis of reasonable and feasible alternatives considered. Perform value analysis and determine preferred alternative. Develop preferred alternative to 35% design as part of the Project Report.	12-18 months	\$300,000
<i>Environmental Studies (CEQA/NEPA Clearances)</i>	Perform applicable studies and prepare the Environmental Document.	12-18 mo. (concurrent with PR)	\$200,000
<i>Final PS&E's</i>	Prepare final engineering design and construction documents.	12-18 months	\$1,080,000

ASSET 5 BACK GATE FLOODING

<i>Bid and Construction Phase</i>	Construct proposed improvements.	24 months	\$13,500,000
<i>Note: If extensive public outreach and right-of-way is required, this could add another two years to the planning and preliminary design phase.</i>			
<i>Note: The above timelines are based upon the project development guidelines provided in the Caltrans Project Development Procedures Manual (PDPM).</i>			

Step 6: Public Support / Co-Benefits

Aspect	Response
<i>Public Support</i>	TBD
<i>Co-Benefits:</i>	TBD
<i>Mission Readiness</i>	TBD
<i>Environmental</i>	<i>Both options have some benefit. The first option allows the drainage course to continue its historic path of travel by removing the obstruction caused by the road (Hwy 178). The second option allows for storm water runoff capture and infiltration.</i>
<i>Social</i>	<i>The area south of the highway currently floods and could have adverse impacts and losses of both property and life.</i>
<i>Equity (Community Resilience)</i>	TBD
<i>Equity (Social Vulnerability)</i>	TBD
<i>Economic</i>	<i>There's an "active transportation" facility or shared-use bike path that allows residents of Ridgecrest to comfortably ride their bikes or walk to the China Lake base for work. This facility is adversely impacting by flooding in its current condition.</i>

BACK GATE FLOODING FUNDING SOURCES (Ranked):

- ▶ Climate Adaptation Planning – Sustainable Transportation Planning Grant
- ▶ Defense Access Road (DAR) Program
- ▶ Flood Mitigation Assistance (FMA) Grant Program
- ▶ Readiness and Environmental Protection Integration (REPI) Program

Climate Adaptation Planning – Sustainable Transportation Planning Grant:

AGENCY: CA Department of Transportation (Caltrans)

PURPOSE/GOALS: Funds local and regional identification of transportation-related climate vulnerabilities through the development of climate adaptation plans as well as project-level climate adaptation planning to identify adaptation projects and strategies for transportation infrastructure.

ELIGIBLE APPLICANTS: Has not yet been announced as of 12/20/22.

ELIGIBLE USE OF FUNDS: Defense Communities Only. States, counties, municipalities, other political subdivisions of a state; special purpose units of a state or local government; other instrumentalities of a state or local government; and tribal nations.

TERMS/REQUIREMENTS/NOTES: Requires 11% match funding.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Anticipated to open in January 2023. \$50 million to award through this program.

LINK: <https://dot.ca.gov/programs/transportation-planning/regional-planning/sustainable-transportation-planning-grants>

RANK AND REASONING: 5. Lots of funding for planning work across the state; can tie this project to transportation.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

BACK GATE FLOODING FUNDING SOURCES (Ranked):

- ▶ Climate Adaptation Planning – Sustainable Transportation Planning Grant
- ▶ **Defense Access Road (DAR) Program**
- ▶ Flood Mitigation Assistance (FMA) Grant Program
- ▶ Readiness and Environmental Protection Integration (REPI) Program

Defense Access Road (DAR) Program:

AGENCY: Department of Defense (DoD)

PURPOSE/GOALS: The Defense Access Road (DAR) Program provides a means for the military to pay their share of the cost of public highway improvements necessary to mitigate an unusual impact of a defense activity. An unusual impact could be a significant increase in personnel at a military installation, relocation of an access gate, or the deployment of an oversized or overweight military vehicle or transporter unit.

ELIGIBLE APPLICANTS: Defense Communities Only. To initiate a DAR project, the local military installation identifies the access or mobility needs and brings these deficiencies to the attention of the Military Surface Deployment and Distribution Command (SDDC).

ELIGIBLE USE OF FUNDS: If the project is determined to be eligible for financing either in whole or in part with defense access road funds, SDDC will certify the roadway as important to the national defense and will authorize expenditure of DoD funds. The Commander, SDDC, is the only representative of the DoD officially authorized to make the certification required by section 210, title 23, U.S.C., on behalf of the Secretary of Defense.

TERMS/REQUIREMENTS/NOTES: No match requirement listed.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: The SDDC will determine if the proposed work/project/improvements are eligible for DAR funds and certify the road/roads/intersection as important to the national defense, if appropriate. Then the military service is responsible for requesting DoD funding for the project through their normal budgeting process. Once programmed by the military service, the funds must be authorized and appropriated by Congress. After Congressional approval, the funds are transferred to FHWA and allocated to the agency administering the project. Title 23 Federal-aid procedures are followed in the design and construction of the project.

LINK: <https://highways.dot.gov/federal-lands/programs/defense>

RANK AND REASONING: 5. Good fit, smaller pool of applicants.

GROUNDWATER ENERGY KERR MCGEE
 COMMUNICATIONS **FLOODING** GENERAL

TOC

RAP



B

C

D

BACK GATE FLOODING FUNDING SOURCES (Ranked):

- ▶ Climate Adaptation Planning – Sustainable Transportation Planning Grant
- ▶ Defense Access Road (DAR) Program
- ▶ **Flood Mitigation Assistance (FMA) Grant Program**
- ▶ Readiness and Environmental Protection Integration (REPI) Program

Flood Mitigation Assistance (FMA) Grant Program:

AGENCY: Federal Emergency Management Agency (FEMA)

PURPOSE/GOALS: To implement measures to reduce/eliminate risk of severe, repetitive flood damage/repetitive flood damage to buildings insured by the National Flood Insurance Program (NFIP)

ELIGIBLE APPLICANTS: This opportunity provides funding for communities to implement mitigation activities to reduce risk to life and property from natural hazards. In California, natural hazards include wildfire, earthquake, drought, extreme weather, flooding, and other impacts of climate change. HMGP funding can also support the development of Local Hazard Mitigation Plans (LHMP) and project scoping activities.

ELIGIBLE USE OF FUNDS: CalOES receives funds from FEMA for distribution. Subapplicants to CalOES can be State agencies; federally recognized tribes; local governments / communities / special districts; and private nonprofit organizations.

TERMS/REQUIREMENTS/NOTES: First step requires meeting with State FEMA office; 25% match required from nonfederal sources.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: \$160M total available. No ceiling or floor listed, but 120 expected awards. Annually, opening in September and closing in January.

LINK: <https://www.fema.gov/grants/mitigation/floods>

RANK AND REASONING: 3. Very competitive, project must protect against 20–100 year storms. Frequency of storm currently unquantified and thus eligibility cannot be considered.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS **FLOODING** GENERAL

TOC

RAP



B

C

D

BACK GATE FLOODING FUNDING SOURCES (Ranked):

- ▶ Climate Adaptation Planning – Sustainable Transportation Planning Grant
- ▶ Defense Access Road (DAR) Program
- ▶ Flood Mitigation Assistance (FMA) Grant Program
- ▶ **Readiness and Environmental Protection Integration (REPI) Program**

Readiness and Environmental Protection Integration (REPI) Program:

AGENCY: Department of Defense (DoD) Office of the Secretary of Defense (OSD)

PURPOSE/GOALS: DoD initiated the Readiness and Environmental Protection Integration (REPI) program to combat encroachment that can limit or restrict military training and testing through the use of encroachment management partnerships, referred to as REPI projects that Congress authorized within 10 USC 2684a. These cost-sharing partnerships between the Military Services, state and local governments, and private conservation organizations acquire easements or other interests in land from willing sellers that preserve critical buffer areas and habitat near military installations. In FY2019 Congress expanded the REPI authority to address military installation resilience casting climate change as an encroachment threat and allowing DoD to enter into agreements for the purposes of preserving off base habitat in a manner that maintains or improves military installation resilience.

ELIGIBLE APPLICANTS: Military Services

ELIGIBLE USE OF FUNDS: Defense Communities Only. States, counties, municipalities, and other political subdivisions of a state, special purpose units of a state or local government; other instrumentalities of a state or local government; and tribal nations. Natural infrastructure solutions to protect land around military installations from climate change, e.g., retention basins, groundwater recharge, prescribed burns, soil rehabilitation, stormwater catchment basins, constructing living shorelines, removing hazardous fuel loads, etc.

TERMS/REQUIREMENTS/NOTES: No cost share minimum requirements. A REPI application must include an eligible partner(s) and willing landowner(s). All REPI inquiries are directed to the NAWS China Lake Community Planning Liaison Officer.

TYPE: Cost-Sharing Partnership

FUNDING AMOUNT AND CYCLE: The REPI program does not provide funding through an open grants program; rather, each Military Service submits project proposals for funding through an online proposal tracker platform using authorized account access.

LINK: <https://www.repi.mil>

RANK AND REASONING: 3. Natural infrastructure solutions would be eligible and could be a good fit depending on what solution is selected to address back gate flooding.

GROUNDWATER ENERGY KERR MCGEE
 COMMUNICATIONS **FLOODING** GENERAL

TOC

RAP



B

C

D



GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

DoD Installation Resilience Program:

CATEGORY: Defense Communities, Hazard Mitigation/Resilience

AGENCY: Department of Defense (DoD) Office of Local Defense Community Cooperation

PURPOSE/GOALS: The Installation Resilience program of assistance is designed to provide technical and financial assistance to states and local governments to analyze and implement actions necessary to foster, protect, and enhance military installation sustainability. The program alleviates and prevents incompatible development and/or other man-made or natural installation resiliency activities likely to impair the continued operational utility of a Department of Defense installation, range, special use air space, military operations area, or military training route. The program enables states and local governments to assist installations to optimize their mission and sustain their installation, and enhances the long-term readiness and military value of the power projection platform.

ELIGIBLE APPLICANTS: Defense Communities Only. States, counties, municipalities, other political subdivisions of a state; special purpose units of a state or local government; other instrumentalities of a state or local government; and tribal nations are eligible if: (a) Office of Local Defense Community Cooperation determines there is existing or potential encroachment of a civilian origin on the local military mission and this encroachment of civilian origin is likely to impair the continued operational utility of a military installation, or (b) OLDCC determines there is a current, future, or potential threat to military installation resilience that involve, or may be significantly impacted by resources or activities outside of the military installation and that this threat to military installation resilience is likely to impair the military installation's ability to maintain, improve, or rapidly reestablish installation mission assurance and mission-essential functions.

ELIGIBLE USE OF FUNDS: Projects that address sustainability factors such as: urban growth, noise, stormwater and flood management, energy and water security threats, extreme weather events, etc.

TERMS/REQUIREMENTS/NOTES: 10% minimum cost share requirement. A minimum of ten percent (10%) of the project's total proposed funding is to be comprised of nonfederal sources.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Communities may participate in Installation Resilience program activities in two ways. The Military Services may nominate installation(s) for assistance through annual requests or may also nominate out of cycle. State and local governments may self-nominate at any time.

LINK: <https://oldcc.gov/our-programs/installation-resilience>

RANK AND REASONING: 5. DoD communities only means a limited applicant pool. Specifically targets resilience projects in defense communities.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING GENERAL

TOC

RAP



B

C

D

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ **Building Resilient Infrastructure and Communities (BRIC) Program**
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

Building Resilient Infrastructure and Communities (BRIC) Program:

AGENCY: Federal Emergency Management Agency (FEMA), coordinated through CalOES

PURPOSE/GOALS: To support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. For Ridgecrest, it is recommended that multiple projects are combined into one single BRIC application to be submitted to CalOES.

ELIGIBLE APPLICANTS: States, territories, or federally recognized tribes with major disaster declaration under the Stafford Act in the seven years prior to the annual grant application period start date. Cities and counties must go through their states to become a subrecipient.

ELIGIBLE USE OF FUNDS:

Capability and Capacity-Building (C&CB) Activities: activities that enhance the knowledge, skills, and expertise of the current workforce to expand or improve the administration of mitigation assistance.
Mitigation Projects: cost-effective projects designed to increase resilience and public safety; reduce injuries and loss of life; and reduce damage and destruction to property, critical services, facilities, and infrastructure.
Management Costs: to reimburse the recipient and subrecipient for eligible and reasonable indirect costs, direct administrative costs, and other administrative expenses associated with a specific mitigation project or C&CB activity.
 Project scoping and pre-award costs are now eligible.

TERMS/REQUIREMENTS/NOTES: \$2.295 billion was available for FY22 nationally. Grants fund up to 75% (generally) of the project cost, up to \$50 million.

TYPE: 25% match required from nonfederal sources. Announced 8/19/22, for California, CalOES will cover nonfederal match requirement under the Prepare California Initiative.

FUNDING AMOUNT AND CYCLE: Cycle: Annual. Opened Fall 2021; closes Winter 2022.

LINK: <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

RANK AND REASONING: 5. Very competitive. Recommend that multiple (or all) Ridgecrest MIRR projects are combined into a single application.

GROUNDWATER ENERGY KERR MCGEE
 COMMUNICATIONS FLOODING **GENERAL**

TOC

RAP



B

C

D

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ **Adaptation Planning Grant Program**
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

Adaptation Planning Grant Program:

CATEGORY: Hazard Mitigation/Resilience

AGENCY: CA Office of Planning and Research

PURPOSE/GOALS: Funding aims to fill local, regional, and tribal planning funding needs; provide communities with the resources to identify climate resilience priorities, and support the development of a pipeline of climate resilient infrastructure projects across the state

ELIGIBLE APPLICANTS: Robust, diverse partnerships. Co-applicants are strongly encouraged. At least one applicant must be a public entity. If partnership is not feasible at the time of application, applicants should provide a detailed explanation and/or outline a plan to build partnerships moving forward.

ELIGIBLE USE OF FUNDS: Funds can support the formation and operation of the partnership planning process including community engagement, staff costs, program meetings, travel costs, language access, evaluation activities, administrative costs, etc. Planning, design, and construction of engineering projects are not eligible.

TERMS/REQUIREMENTS/NOTES: No match required. Minimum award of \$25,000. Maximum award of \$600,000.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Amount: \$6.6 M in FY22-23; was allocated \$25 Million from state budget in FY21. Will have subsequent funding over the next few years.

Cycle: Three phases, FY21-22, FY22-23, FY23-24

Anticipate releasing the NOFA on January 6. Applications are anticipated to close March 31, 2023.

LINK: <https://www.opr.ca.gov/climate/icarp/grants/adaptation-planning-grant.html>

RANK AND REASONING: 4. Planning dollars only, which can be more appropriate for projects currently in conceptualization. Would require partnership with other entities. Would need to compete with agencies across California.

GROUNDWATER ENERGY KERR MCGEE

COMMUNICATIONS FLOODING **GENERAL**

TOC

RAP



B

C

D



GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ Adaptation Planning Grant Program
- ▶ **Hazard Mitigation Grant Program**
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

Hazard Mitigation Grant Program:

CATEGORY: Hazard Mitigation/Resilience

AGENCY: Federal Emergency Management Agency (FEMA)

PURPOSE/GOALS: This opportunity provides funding for communities to implement mitigation activities to reduce risk to life and property from natural hazards. In California, natural hazards include wildfire, earthquake, drought, extreme weather, flooding, and other impacts of climate change. HMGP funding can also support the development of Local Hazard Mitigation Plans (LHMP) and project scoping activities.

ELIGIBLE APPLICANTS: CalOES receives funds from FEMA for distribution. Subapplicants to CalOES can be State agencies; federally recognized tribes; local governments / communities / special districts; private nonprofit organizations.

ELIGIBLE USE OF FUNDS: Projects that minimize natural disasters; examples include: Aquifer Storage and Recovery, Floodplain and Stream Restoration, Flood Diversion and Storage, and Green Infrastructure Methods, Property Acquisition and Structure Demolition, Safe Room Construction, Minor Localized Flood Reduction Projects, Soil Stabilization

TERMS/REQUIREMENTS/NOTES: Funds up to 75% of eligible costs (25% match required); can apply for PrepareCalifornia grant for the 25% match.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Amount: The amount of HMGP funds availability is based on a percent of Public Assistance provided by Federal Emergency Management Agency (FEMA). In California, \$255M in federal funding and \$85M match by CA in FY22. Cycle: Annual.

LINK: https://content.govdelivery.com/attachments/CALOES/2021/11/08/file_attachments/1989755/HMGP%20NOFO%20-%202010.27.2021.pdf

RANK AND REASONING: 4. State-wide program, would have to submit each project individually. Only receives funding after a federally declared disaster.

GROUNDWATER

ENERGY

KERR MCGEE

COMMUNICATIONS

FLOODING

GENERAL

TOC

RAP



B

C

D



GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ **Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program**
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ Infrastructure State Revolving Fund (ISRF) Program

Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program:

CATEGORY: Hazard Mitigation/Resilience, Stormwater, Wastewater/Clean Water, Drinking water/Water Quality, Urban Heat, Community Development

AGENCY: Federal Emergency Management Agency (FEMA)

PURPOSE/GOALS: Establish state-level revolving loan funds for mitigation projects and activities to increase resilience and mitigate the impacts of events such as drought, extreme heat, severe storms, wildfires, floods, and earthquakes.

ELIGIBLE APPLICANTS: States, which will solicit local government agency projects for inclusion on the state Intended Use Plan. Local agencies cannot directly apply to FEMA for STORM loans.

ELIGIBLE USE OF FUNDS: Funding priorities:

- Benefits an underserved community – FEMA has historically used the CDC Social Vulnerability Index tool to define underserved communities (“high” vulnerability or an SVI >0.80). 40% of benefits will go to underserved communities;
- Supports partnerships between two or more eligible entities to implement a project or similar projects;
- Considers regional impacts of hazards on river basins, river corridors, micro-watersheds, macro-watersheds, estuaries, lakes, bays, and coastal regions, and areas at risk of earthquakes, tsunamis, droughts, severe storms, and wildfires, including the wildland-urban interface; or
- Proposes to finance projects for the resilience of major economic sectors or critical national infrastructure.

TERMS/REQUIREMENTS/NOTES: Max of \$5 Million. Loan terms are <1% interest rate, deferred payment until after construction, and 20-year terms (30 years for DACs).

TYPE: Loan

FUNDING AMOUNT AND CYCLE: \$500 million total authorized through IJJA. FY23 will be the first year of funding, offering \$50M to states, which can then be leveraged to offer larger sums in the form of loans. States must match FEMA capitalization grant with a 10% state match.

LINK: <https://www.fema.gov/grants/mitigation/storm-rlf>

RANK AND REASONING: 4. State program, but new. Guidance will be released in January 2023.

GROUNDWATER ENERGY KERR MCGEE
COMMUNICATIONS FLOODING **GENERAL**

TOC

RAP



B

C

D



GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ **DoD Defense Community Infrastructure Pilot (DCIP) Program**
- ▶ Infrastructure State Revolving Fund (ISRF) Program

DoD Defense Community Infrastructure Pilot (DCIP) Program:

CATEGORY: Defense Communities, Hazard Mitigation/Resilience

AGENCY: Department of Defense (DoD) & Federal Highway Administration (FHWA)

PURPOSE/GOALS: The Defense Community Infrastructure Pilot (DCIP) Program is designed to address deficiencies in community infrastructure, supportive of a military installation, in order to enhance military value, installation resilience, and military family quality of life.

ELIGIBLE APPLICANTS: Defense Communities Only. State and local governments.

ELIGIBLE USE OF FUNDS: Eligible community infrastructure projects are any complete and useable transportation project; community support facilities; and utility infrastructure projects (e.g., water, wastewater, telecommunications, electric, gas, or other utility infrastructure [with necessary cyber safeguards]) that: are located off of a military installation; support a military installation; are owned by a state or local government or a not-for-profit, member-owned utility service; that will enhance military value, military installation resilience, and/or military family quality of life at the supported military installation; that are endorsed by the local installation commander representing the installation benefitting from the proposed project; are where ground-disturbing work has not yet commenced; and are construction-ready.

TERMS/REQUIREMENTS/NOTES: For 2021 grant guidelines, award floor was \$250,000 and ceiling was \$20,000,000. 30% match requirement.

TYPE: Grant

FUNDING AMOUNT AND CYCLE: Cycle: Annual. Pilot program launched in 2020, followed by three more annual cycles in 2021, 2022, and 2023.

LINK: <https://oldcc.gov/defense-community-infrastructure-program-dcip#:~:text=The%20Defense%20Community%20Infrastructure%20Program%20%28DCIP%29%20is%20designed,is%20authorized%20under%20Public%20Law%20115-232%20Section%202861.>

RANK AND REASONING: 4. DoD communities only means a limited applicant pool. Targets general infrastructure projects, but not only infrastructure resilience projects, so may have a larger applicant pool. Projects must be construction-ready.

- GROUNDWATER
- ENERGY
- KERR MCGEE
- COMMUNICATIONS
- FLOODING
- GENERAL**

TOC

RAP



B

C

D

GENERAL FUNDING SOURCES (APPLY TO MULTIPLE ASSETS):

- ▶ DoD Installation Resilience Program
- ▶ Building Resilient Infrastructure and Communities (BRIC) Program
- ▶ Adaptation Planning Grant Program
- ▶ Hazard Mitigation Grant Program
- ▶ Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Revolving Loan Fund Program
- ▶ DoD Defense Community Infrastructure Pilot (DCIP) Program
- ▶ **Infrastructure State Revolving Fund (ISRF) Program**

Infrastructure State Revolving Fund (ISRF) Program:

CATEGORY: Stormwater, Wastewater/Clean Water, Community Development

AGENCY: CA Infrastructure and Economic Development Bank (Ibank)

PURPOSE/GOALS: Public infrastructure and economic expansion projects (excluding housing) that improve and sustain communities.

ELIGIBLE APPLICANTS: Public agencies

ELIGIBLE USE OF FUNDS: Wide variety of infrastructure from drainage and flood control, environmental mitigation measures, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, etc. Housing infrastructure is an ineligible use.

TERMS/REQUIREMENTS/NOTES: No matching requirement.

TYPE: Loan

FUNDING AMOUNT AND CYCLE: Continuous ISRF financing is available in amounts ranging from \$50,000 to \$25 million, with loan terms for the useful life of the project, up to 30 years.

LINK: <https://www.grants.ca.gov/grants/infrastructure-state-revolving-fund-isrf-program/>

RANK AND REASONING: 2. Loan rather than a grant. Could be a good backup option, particularly if the City of Ridgecrest has a lower than “A” rated municipal credit rating, as they can receive additional subsidy due to lower than statewide median household income.

GROUNDWATER ENERGY KERR MCGEE
 COMMUNICATIONS FLOODING **GENERAL**

TOC

RAP



B

C

D



THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX B: SAMPLE MOU

TOC

RAP



B

C

D



SAMPLE

City of Ridgecrest | Naval Air Weapons Station China Lake Partnership

MEMORANDUM OF AGREEMENT

WHEREAS the City of Ridgecrest recognizes defense communities are essential to supporting military installations that maintain national security; and

WHEREAS the City of Ridgecrest and the communities surrounding NAWS China Lake provide essential operations, services, and infrastructure necessary for the installation to maintain mission assurance and mission-essential functions; and

WHEREAS the City of Ridgecrest recognizes community infrastructure and services must not only protect and preserve military readiness and defense capabilities, but also provide safe places for service members their families to live, work, and play; and

WHEREAS the *Military Installation Resiliency Study for City of Ridgecrest and Naval Air Weapons Station (NAWS) China Lake, California* (February 2023), hereinafter *Military Installation Resiliency Study*, provided the opportunity for the City of Ridgecrest, NAWS China Lake and the surrounding Indian Wells Valley region to strengthen their existing partnerships; assess shared vulnerabilities and risks to natural and man-made hazards not only independently but also in coordination with threats to installation resiliency; and

WHEREAS the *Military Installation Resiliency Study Resilience Action Plan* includes identified priority critical assets and specific recommended resilience actions and projects focused on shared critical infrastructure, programs, and services; and

WHEREAS the City of Ridgecrest and NAWS China Lake want to protect the health, safety, and welfare of residents across the Indian Wells Valley region; enhance and maintain the local and regional quality of life; guide compatible community development in support of continued military operations; maintain local and regional economic vitality; and provide for sustainable and resilient growth; and

WHEREAS the City of Ridgecrest and NAWS China Lake recognize the need to plan, design, and finance a resilient future, together, to create a thriving community while maintaining support for the NAWS China Lake mission making the Indian Wells Valley region stronger, now and in the future; and

TOC

RAP



B

C

D

City of Ridgecrest | Naval Air Weapons Station China Lake Partnership

MEMORANDUM OF AGREEMENT

WHEREAS the City of Ridgecrest and NAWS China Lake recognize where open communication and coordination among all parties is recognized as paramount to provide for continued military operations and sustainable and resilient growth for all;

NOW, THEREFORE, BE IT AGREED AMONG THE CITY OF RIDGECREST AND NAWS CHINA LAKE THAT:

The undersigned parties and hereto it is agreed as follows.

Section 1 - Establishment of Partnership

This Memorandum of Agreement (MOA) establishes the structure, roles and responsibilities of the City of Ridgecrest and NAWS China Lake Partnership (Partnership).

Section 2 – Purpose of Partnership

This Partnership provides a framework for collaboration among the City of Ridgecrest; NAWS China Lake; Indian Wells Valley residents, businesses, and organizations; state agencies; and federal agencies to better coordinate efforts in areas such as: military relations; sustainability and resilience; transportation and land use planning; housing; environmental protection; emergency preparedness; data coordination; funding requests (e.g., grant applications); health care coordination; population forecasting; workforce development; education; community development; economic development; and other issues that may arise. The Partnership will provide actionable recommendations to local, regional, state and federal leaders on initiatives, programs, and topics that strengthen the resilience and sustainability of the City of Ridgecrest, NAWS China Lake, and the Indian Wells Valley region; the economic health and vitality of the City of Ridgecrest, Indian Wells Valley region, and the State of California.

Section 3 – Membership

The following organizations/entities are participating in the Partnership and will work together to achieve its objectives.

- NAWS China Lake
- City of Ridgecrest
- Kern County
- China Lake Alliance
- Indian Wells Valley Water District
- Indian Wells Economic Development Corporation
- Southern California Edison
- Frontier Communications
- California Department of Transportation
- California Governor's Office of Emergency Services

APPENDIX B: SAMPLE MOU

APPENDIX B: SAMPLE MOU

TOC

RAP



B

C

D

City of Ridgecrest | Naval Air Weapons Station China Lake Partnership

MEMORANDUM OF AGREEMENT

Section 4 – Meetings

- 1) Partnership meeting will be held, at minimum, quarterly, of which one will be the Command Overview.
- 2) The Chairperson and responsible party for convening and facilitating the meetings will be the City of Ridgecrest City Manager.
- 3) Agenda for the meetings shall be provided by the Chairperson one calendar week prior to the date of the meeting.
- 4) The Chairperson shall also be responsible for ensuring meeting minutes are produced and distributed within two weeks after the date of the meeting.
- 5) Individual commitments for members and goals of the Partnership will be tracked in the agendas of each meeting.
- 6) Establishment of Working Groups may focus on and support Partnership goals and priorities.

Section 5 – Resources

Nothing in this MOU shall obligate members to expend financial resources, other monies, or enter into any contract or other obligations.

Section 6 – Other

This MOU is an internal agreement and does not confer any rights upon any individual or other entity. This MOU sets forth mutual goals and approaches. The MOU is not intended to create any rights, benefits, or other responsibilities, either substantive or procedural, nor is it enforceable as law or equity by a party against the U.S., its agencies, its officers, or any other person.

Nothing in this MOU shall be interpreted as limiting, superseding, or otherwise affecting the Parties' normal operations or decisions in carrying out their statutory or regulatory duties. This MOU does not limit or restrict members from participating in similar activities or arrangements with other agencies.

Section 7 – Amendments to MOU

The signatories (or their successors) will review this MOU periodically. Proposed changes will be in writing and shall be subject to approval in any event by the signatories or their successors.

Section 8 – Terms and Conditions

This MOU will remain in effect until a majority of the Partnership membership votes to terminate. Any member may terminate its membership in the Partnership by providing written notice to the Partnership of the desired termination date.

TOC

RAP



B

C

D

City of Ridgecrest | Naval Air Weapons Station China Lake Partnership

MEMORANDUM OF AGREEMENT

Section 9 – Points of Contact

To facilitate implementation of this MOU, Partnership membership shall provide a single point of contact.

- NAWS China Lake
- City of Ridgecrest
- Kern County
- China Lake Alliance
- Indian Wells Valley Water District
- Indian Wells Economic Development Corporation
- Southern California Edison
- Frontier Communications
- California Department of Transportation
- California Governor's Office of Emergency Services

Section 10 – IN WITNESS THEREOF

The Parties hereto have caused this MOU to be executed by their duly authorized representatives.

SIGNATORY:
City of Ridgecrest

SIGNATORY:
NAWS China Lake

SIGNATORY:
Kern County

SIGNATORY:
China Lake Alliance

SIGNATORY:
Indian Wells Valley Water District

APPENDIX B: SAMPLE MOU

TOC

RAP



B

C

D

City of Ridgecrest | Naval Air Weapons Station China Lake Partnership

MEMORANDUM OF AGREEMENT

SIGNATORY:
Indian Wells Economic Development Corporation

SIGNATORY:
Southern California Edison

SIGNATORY:
Frontier Communications

SIGNATORY:
California Governor's Office of Emergency Services

SIGNATORY:
California Department of Transportation

SAMPLE

TOC

RAP



B

C

D

APPENDIX C: MAPS

APPENDIX C: RISK ASSESSMENT MAPS

APPENDIX C: RISK ASSESSMENT MAPS

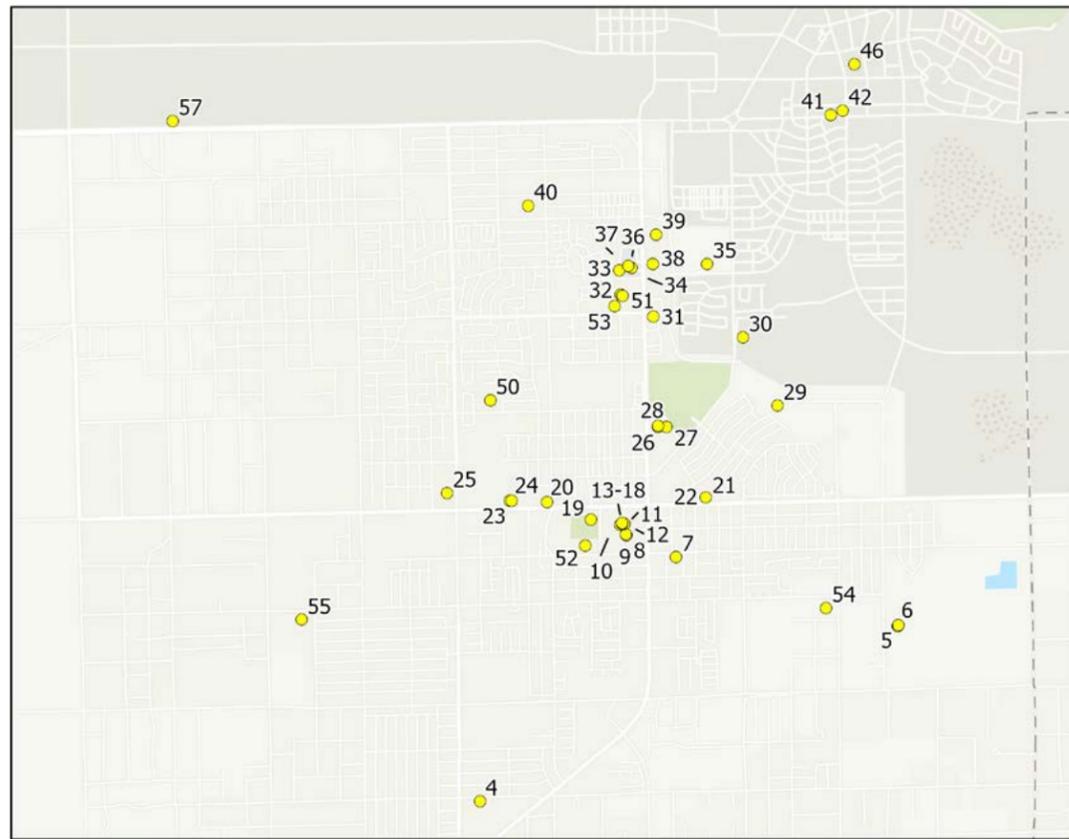
Map Summary

This appendix includes maps showing the Critical Facilities locations and also the results of the exposure analysis identifying risks to specific hazards to these critical facilities, completed for the City of Ridgecrest's MIRR project.

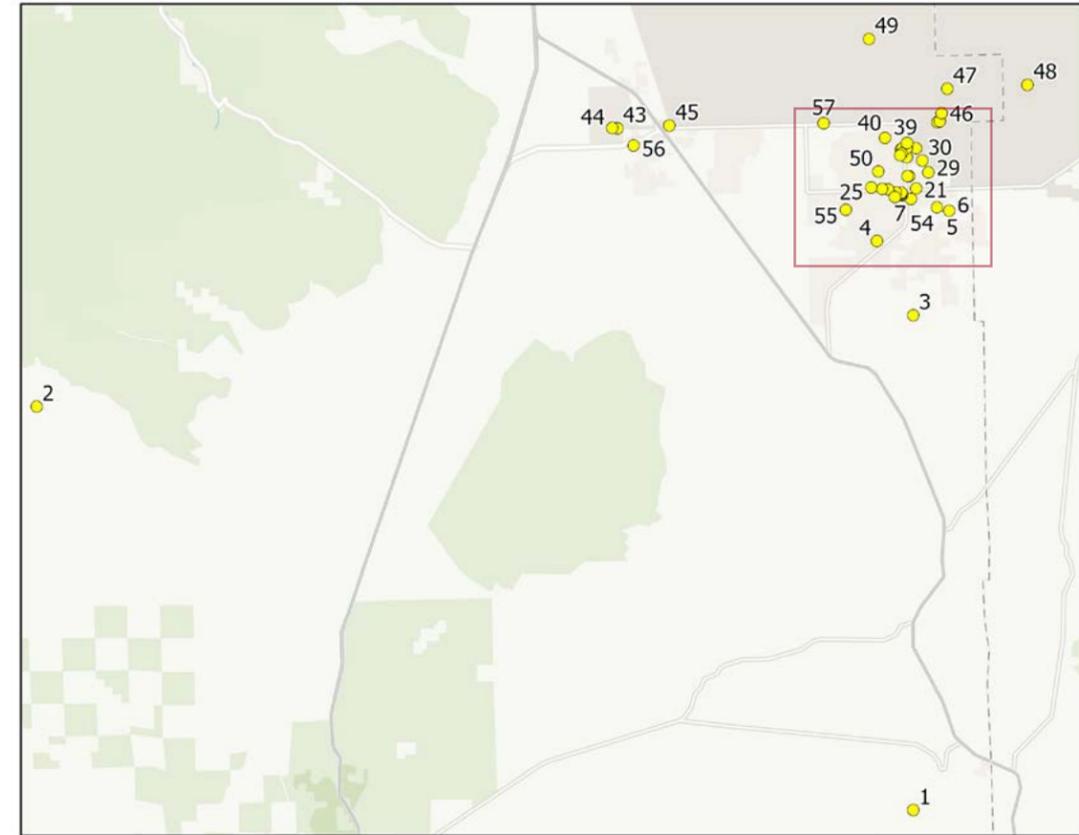
The critical facilities identified by the planning team are shown at a local level and a regional level on this page and the following page.

The exposure analysis included hazards that could be addressed from a geospatial perspective; these hazards were: earthquake, flood, and wildfire. Each of these hazards were analyzed using appropriate geospatial hazard data and comparing this data with the location of the identified critical facilities. The results for each hazard's exposure analysis are shown at two scales: a small-scale view to show impacts at a regional level and a large-scale view to show impacts at a more localized/city level.

Map of Critical Assets: Local/City Assets



Map of Critical Assets: Regional Assets



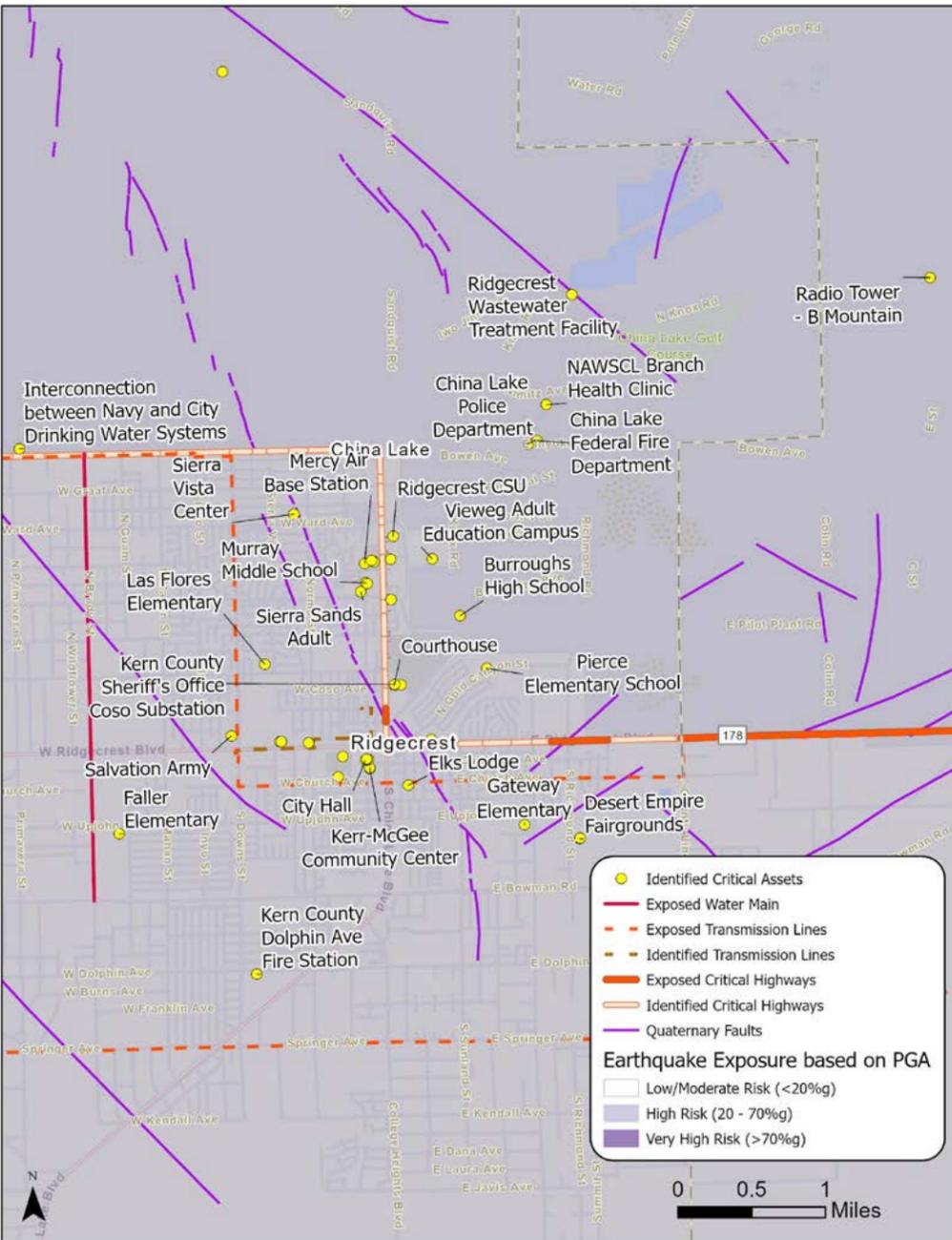
Critical Assets Key

1 - Government Peak Communication Tower	13 - AT&T 911 Control System	29 - Pierce Elementary School	43 - Kern County Monache Mountain Ave Fire Station
2 - Birds Springs Communication Tower	14 - Dispatch Center Server Room	30 - Burroughs High School	44 - Mercy Air - Base Station
3 - Cerro Coso Community College	15 - Dispatch Center	31 - Welcome Center	45 - SCE Inyokern Substation
4 - Kern County Dolphin Ave Fire Station	16 - Dispatch Center Diesel Generator	32 - Murray Middle School	46 - NAWSCS Branch Health Clinic
5 - Desert Empire Fairgrounds	17 - Council Chambers	33 - Base station at the hospital	47 - Ridgecrest Wastewater Treatment Facility
6 - Desert Empire Fairgrounds	18 - City Hall Radio Tower	34 - Ridgecrest Regional Hospital	48 - Radio Tower - B Mountain
7 - Elks Lodge	19 - Seniors' Center	35 - Adult School - St. Vieweg Campus	49 - NAWSCS Airfield
8 - Kerr-McGee Community Center	20 - Indian Wells Valley Water District Primary SCADA system	36 - Ridgecrest Regional Hospital Diesel Emergency Generators	50 - Las Flores Elementary
9 - Emergency Services Council/Committee	21 - Liberty Ambulance	37 - Ridgecrest Regional Hospital Diesel Substations	51 - Mesquite Continuation High
10 - Public Works & Inspections Operations and command Centre	22 - Liberty Ambulance	38 - Southern Sierra Medical Clinic	52 - James Monroe Middle
11 - Ridgecrest Police Department	23 - City Yard	39 - Ridgecrest CSU	53 - Sierra Sands Adult
12 - RACIES HAM Radio Operator	24 - City of Ridgecrest Fueling Pumps	40 - Sierra Vista Center	54 - Gateway Elementary
	25 - Salvation Army	41 - China Lake Police Department	55 - Faller Elementary
	26 - Courthouse	42 - China Lake Federal Fire Department	56 - Inyokern Elementary
	27 - Kern County Las Flores Ave Fire Station		57 - Interconnection between Navy and City Drinking Water Systems
	28 - Kern County Sheriff's Office Coso Substation		

APPENDIX C: RISK ASSESSMENT MAPS

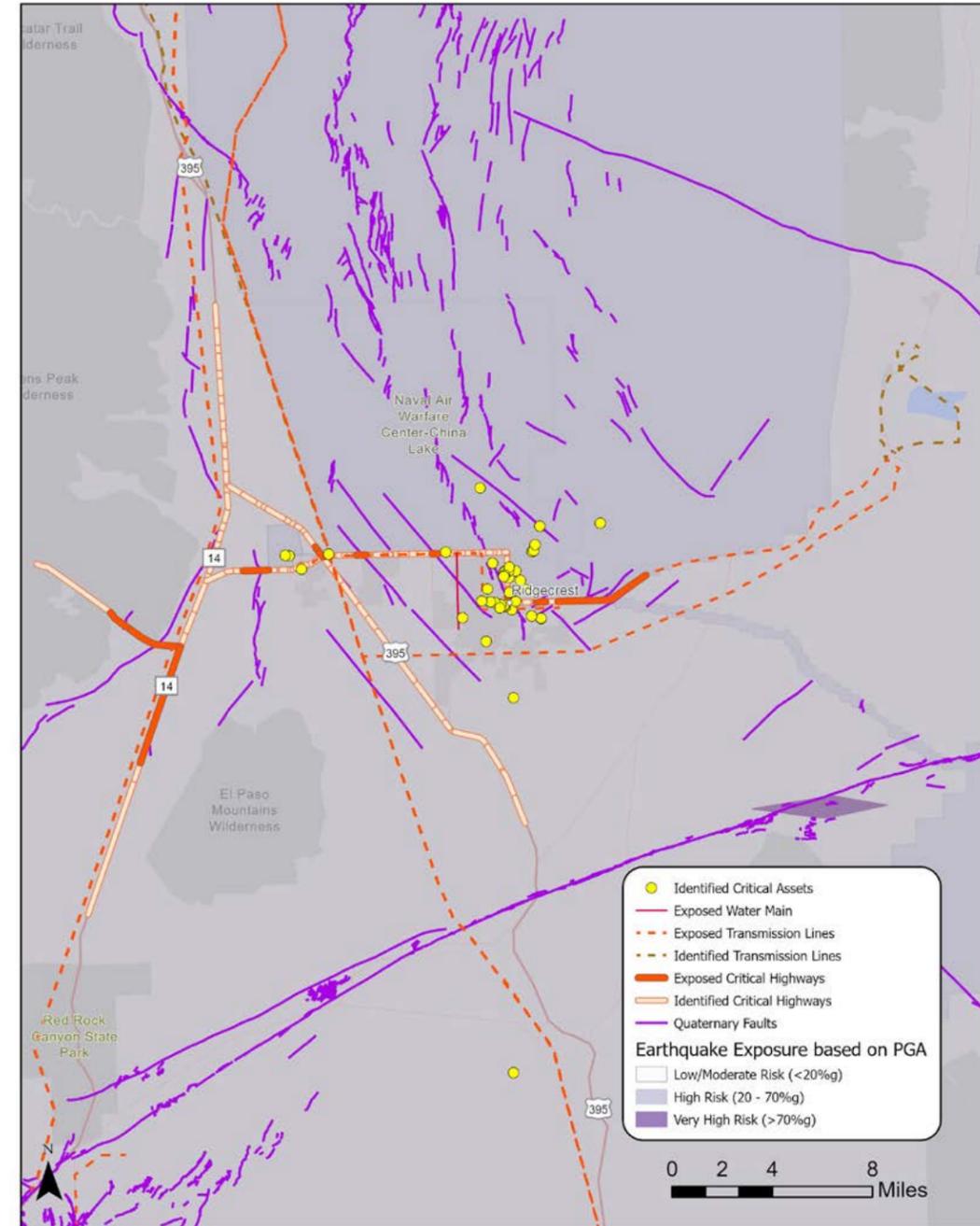
APPENDIX C: RISK ASSESSMENT MAPS

Map of Earthquake Hazards: Local/City



City of Ridgecrest Quaternary Faults and Earthquake Exposure

Map of Earthquake Hazards: Regional



City of Ridgecrest Quaternary Faults and Earthquake Exposure

TOC

RAP



B

C

D

TOC

RAP



B

C

D

APPENDIX C: RISK ASSESSMENT MAPS

APPENDIX C: RISK ASSESSMENT MAPS

Map of Wildfire Hazards: Local/City

Map of Wildfire Hazards: Regional

TOC

TOC

RAP

RAP



B

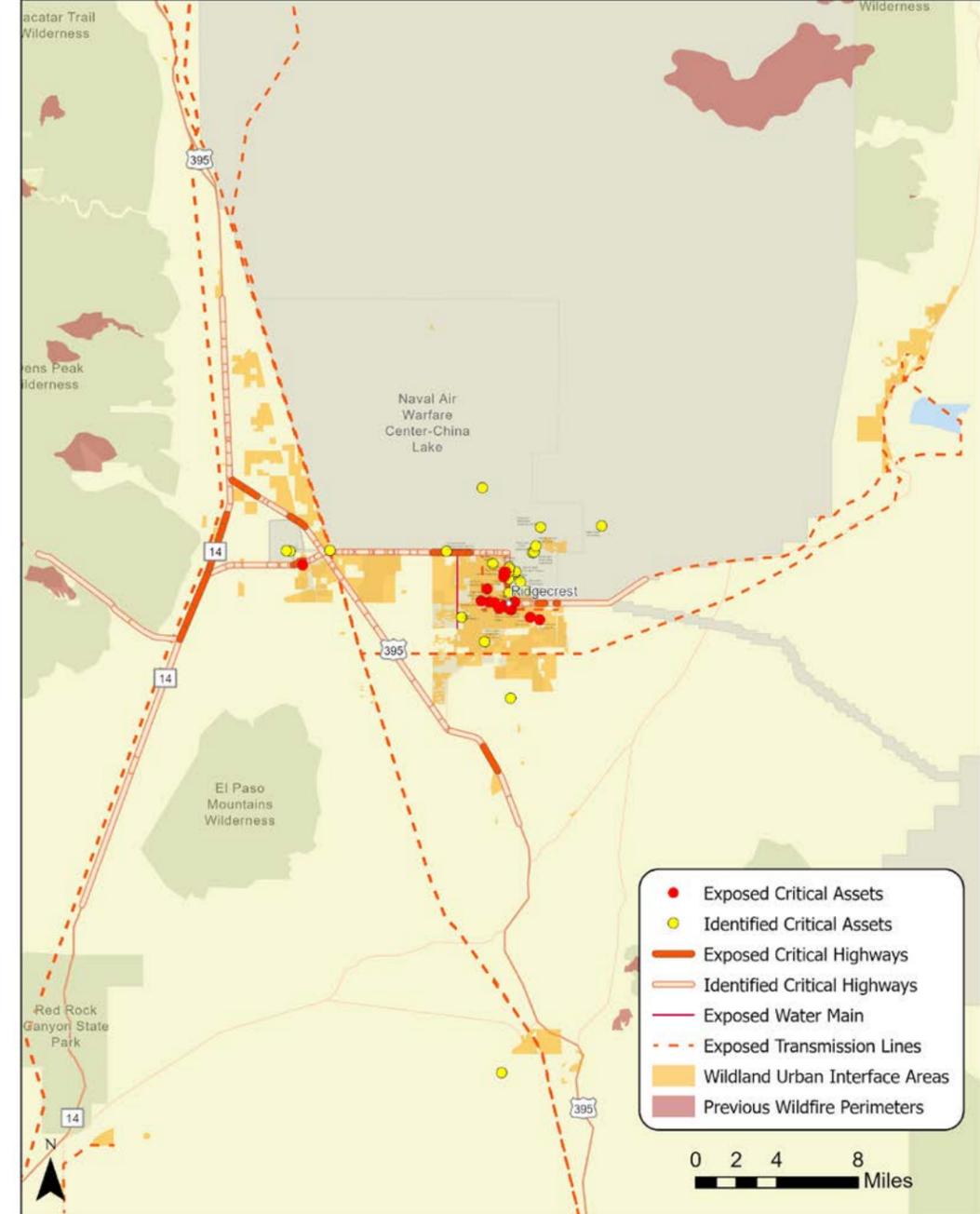
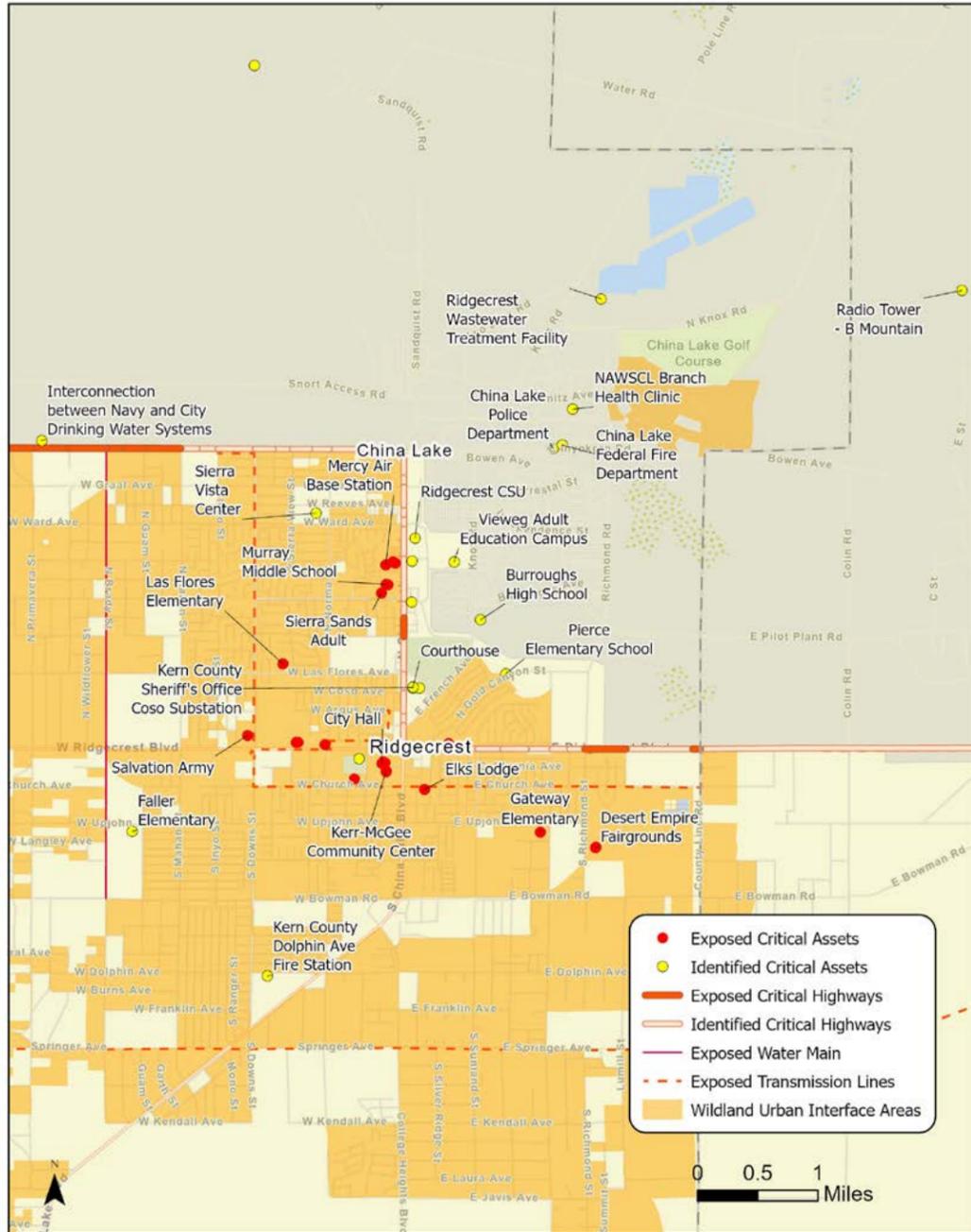
B

C

C

D

D



City of Ridgecrest Wildfire Exposure Analysis

City of Ridgecrest Wildfire Exposure Analysis

APPENDIX C: RISK ASSESSMENT MAPS

APPENDIX C: RISK ASSESSMENT MAPS

Map of 1% Flood Hazards: Local/City

Map of 1% Flood Hazards: Regional

TOC

RAP



B

C

D



City of Ridgecrest 1% Annual Chance Flood Exposure Analysis

TOC

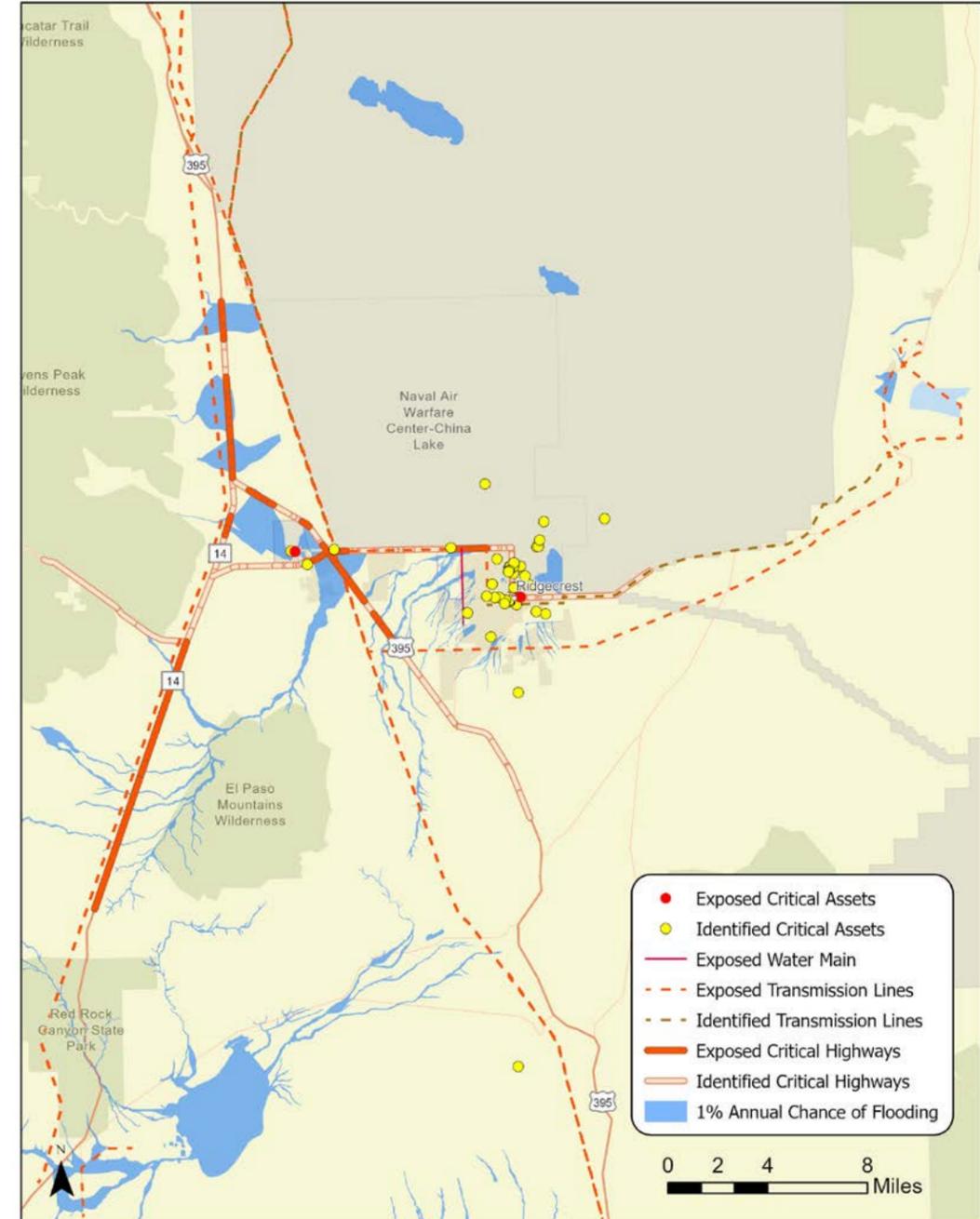
RAP



B

C

D



City of Ridgecrest 1% Annual Chance Flood Exposure Analysis

APPENDIX C: RISK ASSESSMENT MAPS

APPENDIX C: RISK ASSESSMENT MAPS

Map of 0.2% Flood Hazards: Local/City

Map of 0.2% Flood Hazards: Regional

TOC

TOC

RAP

RAP



B

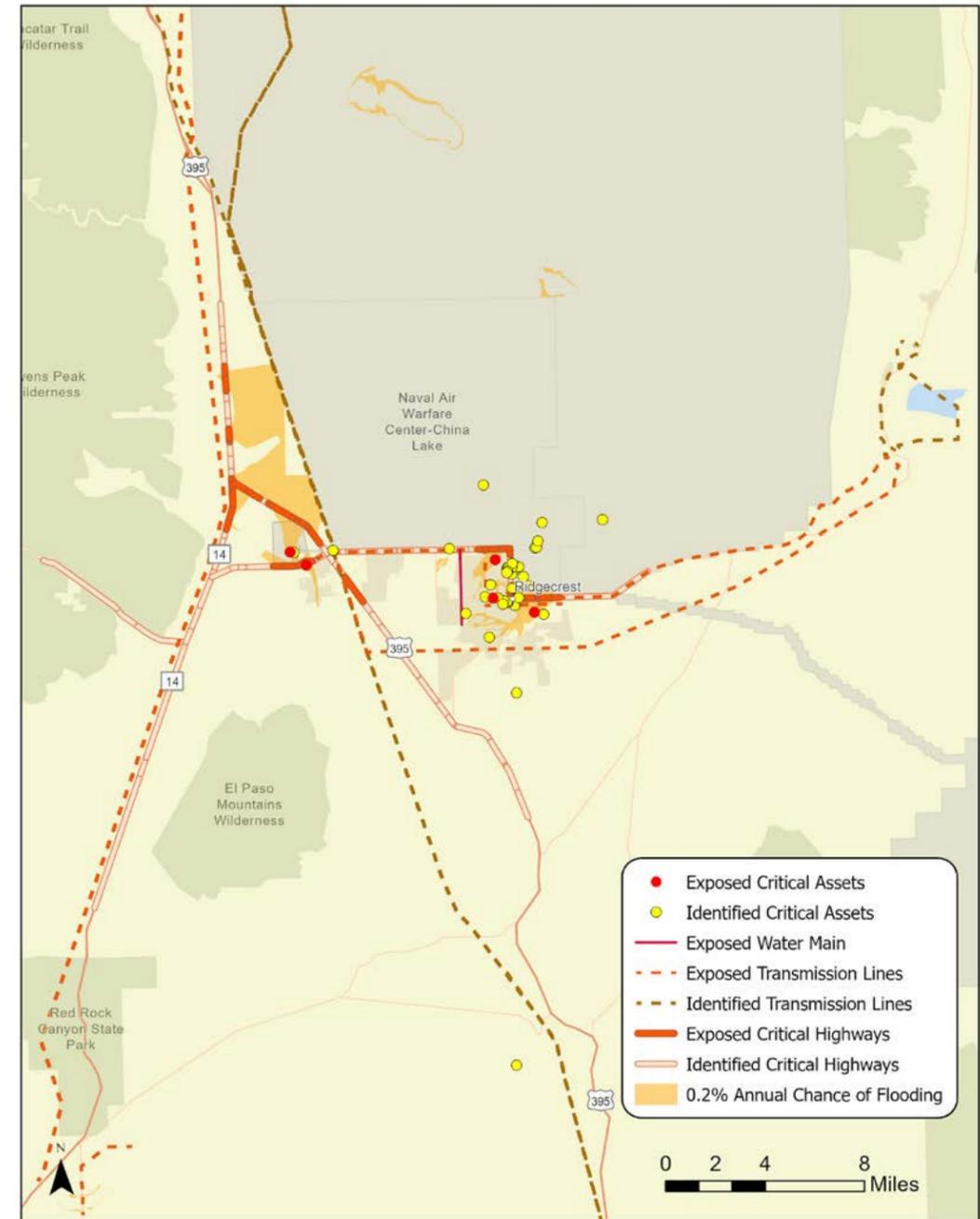
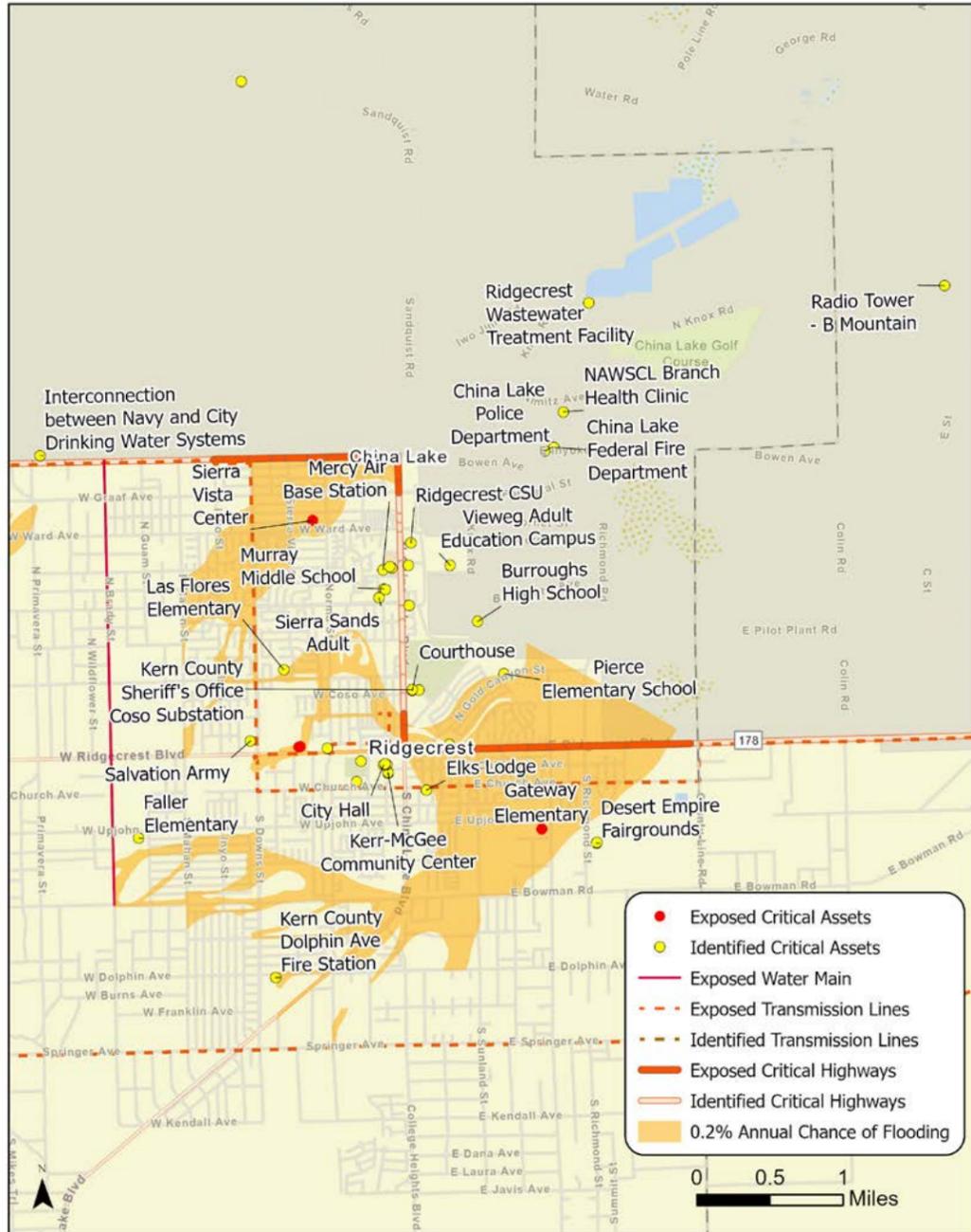
B

C

C

D

D



City of Ridgecrest 0.2% Annual Chance Flood Exposure Analysis

City of Ridgecrest 0.2% Annual Chance Flood Exposure Analysis

APPENDIX C: RISK ASSESSMENT MAPS

APPENDIX C: RISK ASSESSMENT MAPS

Map of Flood Zone D Hazards: Local/City

Map of Flood Zone D Hazards: Regional

TOC

RAP



B

C

D



City of Ridgecrest Zone D Flood Exposure Analysis

TOC

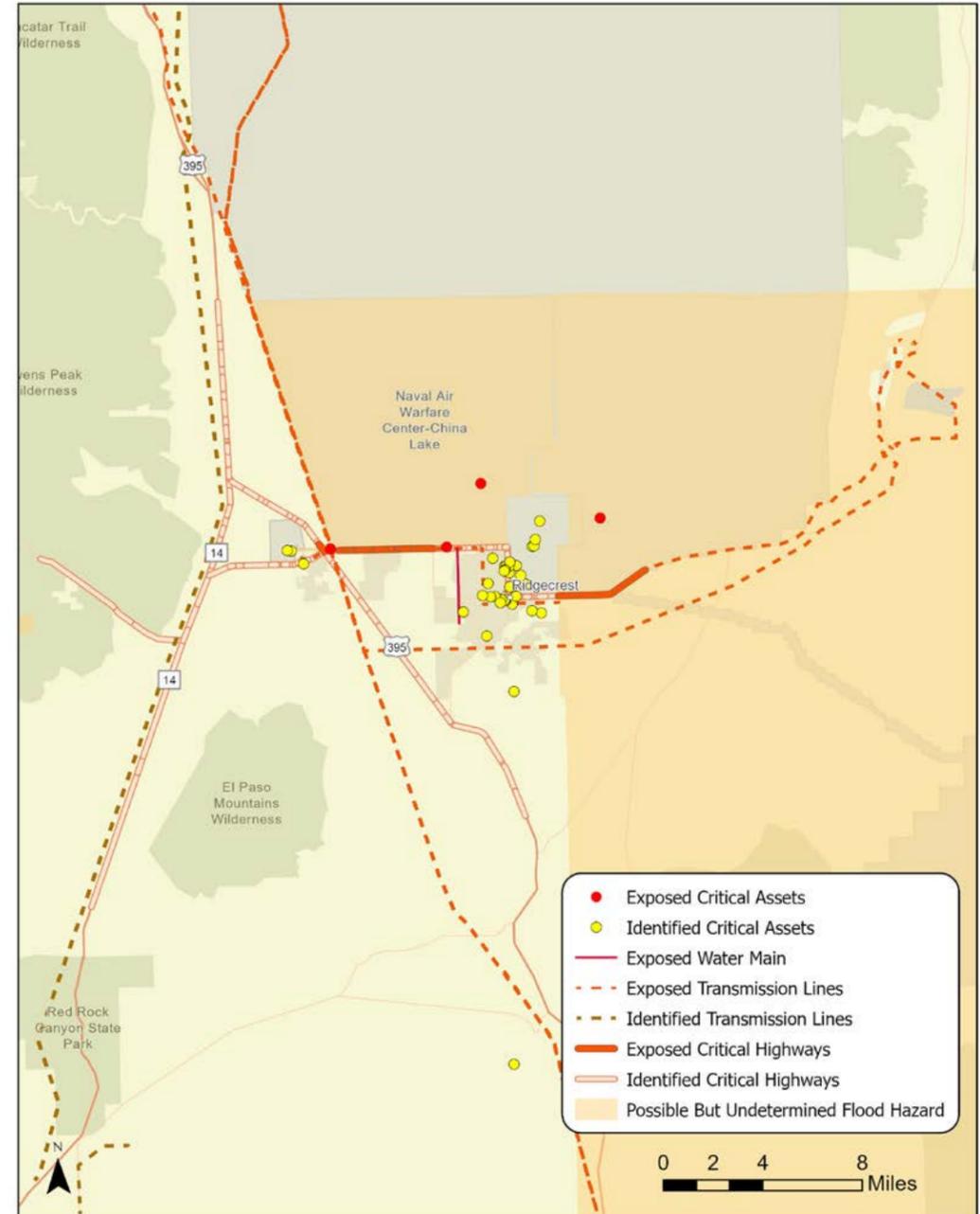
RAP



B

C

D



City of Ridgecrest Zone D Flood Exposure Analysis



THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX D: CLIMATE RISK DISCLOSURE STATEMENT

CLIMATE RISK DISCLOSURE STATEMENT

The conclusions in the Report titled Military Installation Resiliency Study | City of Ridgecrest | Naval Air Weapons Station China Lake, California are Stantec’s professional opinion, as of the time of the Study, and concerning the scope described in the Study. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes.

Information and reference data that is subject to change includes, but is not limited to, downscaled climate projections from applicable Intergovernmental Panel on Climate Change (IPCC) Assessment Reports available at the time of project execution. These climate change projections are typically reviewed and renewed approximately every five years. **It is advised that the City of Ridgecrest (Client) review the latest climate change projections at regular five-year intervals, engaging the support of a climate scientist.** The Study relates solely to the specific project for which Stantec was retained and the stated purpose for which the Study was prepared. The Study is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient’s own risk.

As noted more specifically in this Study, Stantec’s services rely upon existing models, research, and data regarding historical and projected climate patterns combined with information provided by the Client. The generated conclusions and recommendations in our deliverables will be estimates based on these inputs, and we cannot guarantee actual results. Stantec has assumed all information received from the Client and other parties in the preparation of the Study to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Study is intended solely for use by the Client in accordance with Stantec’s contract with the Client. While the Study may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The Study may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec’s discretion.

THIS PAGE INTENTIONALLY LEFT BLANK

TOC

RAP



B

C

D

TOC

RAP



B

C

D

MILITARY INSTALLATION RESILIENCY STUDY



CITY OF
RIDGECREST,
CALIFORNIA



NAVAL AIR
WEAPONS STATION
CHINA LAKE