MEMORANDUM

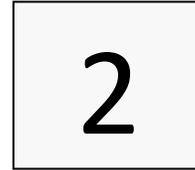TO: **UTILITIES ADVISORY COMMISSION**

FROM: **UTILITIES DEPARTMENT**

DATE: **December 5, 2018**

SUBJECT: **Discussion of CPAU's Role in Community Resilience Including Workshop Summary and Draft Vision and Goals**

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RECOMMENDATION

This report is provided for discussion by the Utilities Advisory Commission (UAC). Feedback is requested on: 1) the preliminary resilience vision and goals for the Utilities Department identified during the August 28, 2018 Special UAC Resilience Workshop; and 2) plans for a second workshop focused on topics to inform solutions.

EXECUTIVE SUMMARY

The purpose of this report is to summarize key findings from the August 28 workshop, present a draft proposal of a resilience vision and goals for the Utilities Department for the UAC's review and feedback, and discuss next steps. Draft minutes of the workshop are included as Attachment A, and the draft Initial Framework as Attachment B.

A couple of common themes emerged from the group discussions: creating resilient community hubs with infrastructure, supplies, and materials to support the ability of residents to stay in place or return quickly to their community after an emergency; and assisting local businesses to survive and recover. From the discussions the following key areas of focus for the Utilities Department started to emerge:

- Develop a roadmap to Smart grid / Smart Utility
- Manage critical utility facilities
- Help support Community Emergency Response Training (C.E.R.T.) and neighborhood emergency volunteers
- Develop and manage a technical utility volunteer group (possibly assist with service shut downs)
- Communication about what to do after utility outages. E.g. "What to turn on first" and "what not to turn on"

DISCUSSION

The UAC hosted a community workshop on August 28, 2018 to better understand how the community's resilience goals, community priorities, and needs relate to utility services and improving resilience. Approximately 80 community members, city staff, and commissioners attended the meeting. The context and purpose of the meeting was to better understand what aspects of resilience are important to the community and to begin framing the role of the utilities in achieving the community's vision. To help establish a common understanding of

resilience and start the conversation, a panel of experts gave presentations covering regional resilience efforts, the potential economic impacts of disasters, and an overview of alternative energy approaches to address some resilience issues. This was followed by speakers from the City specific to the risks in Palo Alto.

The video HayWired (USGS video depicting a 7.0 earthquake and the cascading impacts) was shown followed by a large group discussion of "What does resilience mean to Palo Alto?" The video and discussion helped to set up a small group break out conversation on the impacts and vulnerabilities that the Utility should prioritize with the question in mind of "What are the problems we need to address?" The small groups reported back on top priorities and focus areas for the Utility. Mindy Craig, BluePoint Planning (consultant), facilitated and graphically recorded the meeting.

Resilience and Palo Alto: "What Does Resilience Mean to Palo Alto?"
Following the HayWired video, there was a group discussion on what resilience means for Palo Alto. The following is a summary of the comments, concerns and questions raised:
- Resilience means that my family is self-sufficient
- Is my home "safe" after a disaster?
- Disaster plans need to be vetted by Devils' Advocate (someone to ask the hard questions)
- Critical facilities need to be available
- Want to be able to shelter at home - stay in the neighborhood
- Community needs to be self sufficient
- Community survivability
    - The community needs to be resilient to work together to build and recover and stay in Palo Alto. Surviving together
    - Community organization and leadership. Have a known plan - Not ad hoc
- Social Equity – All economic levels/ communities have access to services
- Schools are safe and functional after a disaster
- Streets are "clear" – supplies are able to be brought in
- Communications
    - Organized internal communications
    - Partner with companies like Google to create a pilot program for cell phone backup
- Are there reasonable investments the City can make to mitigate disasters within hours/ days not months?
    - Bounce back ASAP
- Charging stations
- Conducting emergency drills
- Neighbors knowing each other which can create networks
- Creating decentralized hubs for action

Small Group Report Back - "What are the problems we need to address?"
The attendees broke into small groups of about 10 people per group and discussed which earthquakes impacts and vulnerabilities the Utility should prioritize in dedicating resources, funding, and staff. Each group had a table facilitator, a Palo Alto map, and a scenario to consider and responded to questions regarding the following assets.

- People & Community
- Critical Services
- Built Environment
- Economy
- Natural Environment

The small groups reported back to the large group their top priorities. Below is a summary of the top areas of focus/priority for the Utility.

People & Community
- Worker Housing
    - Need affordable housing. Work with hotels for affordability
    - Need workforce housing to give to city workers
    - Staff retention
- City workers (who live outside Palo Alto) should be considered part of the community and integrated into planning.
- Track of senior centers / at risk community members
- Encourage Community Emergency Response Training (C.E.R.T.) and neighborhood emergency volunteering
- Resource maps distributed indicating resilience hubs. Include special needs population
- Utility services volunteers
    - Train residents with technical backgrounds to help volunteer in specialized utility areas in emergencies
- Schools should be to be open to support parents (ties with *Economy* category so parents can work)

Critical Services
- Develop a plan/hierarchy for maximizing utility resilience and planning resource/infrastructure projects:
    - Electricity – for emergency services i.e: water pumps, 911, police and fire, hospitals
    - Water – for fire suppression then drinking water
    - Communications
- Address the critical items to keep the city moving. A hierarchy created for each utility
- Location of the utilities needs to be considered. All are within the liquefaction zone. The infrastructure of the Utilities needs to be on a secured location
- Fuel Reserves are important (backup generators, Tesla batteries…)

Built Environment

- Open/clear roads are needed
- Fault detection to mitigate damage
- Community "Hubs"
  - Identify locations for community services /shelters
    - Schools, community centers, etc., hotels?
  - "Hubs" have supplies
    - Water, power, food, etc.
- Keep water supply available and pumps powered (well water can be pumped indefinitely as long as there is power)
- Building codes
  - There could be some unintended consequences. i.e. sprinklers using too much water needed for fire trucks
- Keep the mantra of "Surviving as a Community"
  - Create safer housing: bolting foundations
  - Building "safe" places to go. Build in resilience at the community "Hubs"
  - Offer neighborhood bulk ordering for battery backups, food/water drums, bolting of foundations

Economy

- Keep services available to high priority retail that support the community
  - Hardware stores, gas, grocery, pharmacy, big box retail
  - How will you know if they are open? Have electricity? Enough water? Enough employees?
- Large Headquarter companies can work remotely if internet is available
- Need schools in service/open so parents can work and provide the needed services/retail
- What will be used for money if ATM's down or credit card machines do not work?
- Need highway recovery (clear roads) "delivery systems" so supplies/goods can be brought in

Natural Environment

- Seasonal concerns: Summer - fire (Foothills) Winter - flood (king tides, storms)
  - Impacts in both concerns to creeks (debris), landslides, wildlife (possibly more wildlife brought into the City looking for food, sick, etc.)
- Use parks as gathering places
  - "Housing" for people displaced from homes
  - Provide key resources: health, etc.
  - Potential for disease then parks could be used as a quarantine area
- Management of natural areas
- Manage and protect the natural infrastructure
- Water supply
- Communications
- Electricity and power

NEXT STEPS
Workshop #2. Review and Refine Framework and Scenarios
The second workshop will be designed to refine and establish a working Resiliency Framework and Guiding Principles. This second workshop will be more solution orientated and may include scenarios such as developing a second transmission line and/or developing a robust Distributed Energy Resources network. The workshop may be incorporated into the regular UAC meeting in November or December.

Implementation of identified resiliency efforts
In addition to new efforts identified through the workshops, CPAU has the following ongoing activities related to resiliency:
- An assessment of the City's electric distribution system ability to accommodate Distributed Energy Resources (DER) growth;
- A community DER survey to assess residential customers' interests, issues, concerns, priorities, and preferences to inform CPAU's DER Plan development. The purpose of the survey is to identify the various attitudinal and/or behavioral characteristics within each customer segment toward different home energy investment options and more broadly, their interest in energy and water use issues;
- Evaluation of a second transmission line to provide redundant (backup) connection of the City's electric distribution system to the California electric grid;
- Water reservoir study, which, when the system model is complete, can be used to analyze the City's ability to maintain water delivery under a number of disaster/system failure scenarios;
- Recycled water strategic plan: while the purpose of this is to look at long-term options for alternative water sources, it may also provide insight for short term emergency supplies;
- Smart grid applications that may enhance trouble-shooting capability to more efficiently detect and fix faults and resume service, and also increase customer control over their energy use and allow customers to respond in the event the utility requests reductions in load use; and
- Day-to-day maintenance and infrastructure replacement plans designed to keep our utility systems safe and reliable.

RESOURCE IMPACT
Funds of $12,310 for this work are included in the FY 2018 budget. Staffing resources to manage the consultant and to finalize the work product have also been identified within existing staff. Funding for projects identified for implementation will be subject to Council approval in subsequent years.

POLICY IMPLICATIONS
This recommendation sets no new Council policy and is consistent with the Council-approved 2011 Utilities Strategic Plan's strategy objectives for reliable supply of utility resources.

ENVIRONMENTAL REVIEW

Discussion of workshops to develop a framework and principles for resiliency planning and efforts does not meet the definition of a project, pursuant to Section 21065 of the California Environmental Quality Act, thus no environmental review is required.

ATTACHMENTS

A. Draft minutes of August 28, 2018 Special UAC Resilience Workshop
B. Draft Initial Framework

PREPARED BY: **DEBRA LLOYD,** Acting Assistant Director, Utilities Engineering

REVIEWED BY: **DEAN BATCHELOR**, Chief Operating Officer, Utilities

DEPARTMENT HEAD:

ED SHIKADA
General Manager of Utilities

DRAFT

UTILITIES ADVISORY COMMISSION MEETING
MINUTES OF AUGUST 28, 2018 SPECIAL MEETING

CALL TO ORDER

Ed Shikada, Utilities General Manager, called the meeting of the Utilities Advisory Commission (UAC) to order at 4:03 p.m.

Present: Chair Danaher, Vice Chair Schwartz, Commissioners Ballantine, Forssell, Segal, and Trumbull
Absent: Commissioner Johnston

ORAL COMMUNICATIONS

None

RESILIENCE WORKSHOP #1: DEFINE RESILIENCE, VISION AND GOALS

A. Introductions and Meeting Objectives

Ed Shikada, Utilities General Manager, explained that the workshop is intended to identify aspects of resilience that are important to the community and to explore the roles of the Utilities Department and utilities in general in a new and evolving vision of community resilience. During the update of the Strategic Plan, stakeholders related that resilience is an important dimension of utility services. Shikada shared definitions of resilience provided by stakeholders. Given the range of concepts, staff decided to engage the UAC and community in a discussion to understand community assets, potential hazards, and resilience needs related to utility services. Utility investments in infrastructure are typically large and long-term; thus, changing the priorities and practices for utility investments is difficult to effect quickly. Questions for consideration are how should the City of Palo Alto Utilities' (CPAU) role in building public infrastructure be balanced with encouraging private investment and development on individual properties; what investments should be prioritized for resilience while continuing to meet other City needs; how is resilience impacted by staffing strategies and human resources; and other similar questions.

Mindy Craig, facilitator, advised that the intent of the workshop is to develop a common vocabulary, to learn about CPAU activities, and to begin to establish goals, priorities, and a vision for resiliency. A future workshop will explore solutions. A panel of experts will provide broad perspectives, and then staff will share CPAU projects and studies. Hopefully, a video presentation will create a sense of urgency that resiliency is important because of the many things that can impact CPAU. Participants will talk about what resilience means to the City of Palo Alto, and small groups will identify details of resilience. Lastly, participants will identify priorities and next steps.

B. Resilience Experts Panel

Corinne Bartshire, Urban Areas Security Initiative (UASI), related the background of UASI. One of UASI's tasks is to prepare a Threat and Hazard Identification and Risk Assessment (THIRA), which is a tool for looking at threats and risks across the Bay Area. The THIRA does take into account the interconnections of utilities and transportation. UASI manages several working groups that facilitate conversations throughout the Bay Area. The Emergency Management Work Group has focused on large special event planning and sharing law

enforcement and security; commodity points of distribution; and on local agency capabilities for care and shelter. An upcoming area of focus is critical transportation. UASI materials are available to the public on UASI's website.

Josh Schellenberg, Nexant, reported on the difficulties of assessing the risk of a resilience investment for an electric system. The focus on assessing risk has increased because of the increasing frequency and severity of significant disasters. The Department of Energy, Lawrence Berkeley National Laboratory, and Nexant will publish reports that provide guidance and recommendations for assessing the costs and benefits of resilience investments. Nexant has conducted many studies of the value of grid resiliency and the direct and indirect costs to businesses. Electricity is highly valued due to the high level of business productivity in the Bay Area. The cost of a long-duration power outage is highest for small and medium businesses because they cannot easily shift production from one time period to another. Methodological debate and challenges continue around understanding the economic impacts of disasters. Based on information obtained in prior studies, a power interruption lasting multiple weeks in the Bay Area could cost billions of dollars. The impacts to critical infrastructure may require a separate assessment for the potential of a micro grid or grid islanding capabilities.

Benson Joe, ABB Enterprise Software, summarized regulations to increase renewable energy standards and to reduce carbon emissions. The California Independent System Operator (CAISO) power supply queue includes 8,000 megawatts (MW) of solar power, 3,000 MW of wind power, and 12,000 MW of energy storage. CAISO has to ensure the instantaneous supply of generation matches the instantaneous demand for generation. As the amount of renewable energy in the power system increases, the reliability of the system decreases. As a solution, adding more rooftop solar can be challenging in that too much generation without sufficient load can damage equipment. Another solution is a micro grid, but the business proposition must be considered. A discussion of grid resiliency has to include the question of what is the acceptable duration of a power outage.

In response to questions from participants, Schellenberg advised that a great deal of research into everyday outages has been conducted. The billions of dollars in cost applies to outages lasting multiple weeks. The cost of a single-day outage is closer to $100 million. Joe added that there are tradeoffs to increasing the resilience of existing infrastructure and building a micro grid for islanding during short-term outages. Mindy Craig, facilitator, remarked that the benefit of resilience includes having a better community or better resources as well as recovering from an outage. Schellenberg indicated most businesses believe that insurance would cover only physical damages caused by an outage. Business interruption insurance or another type of insurance probably would not cover the high cost of an extended outage. In many ways, investment in infrastructure could be considered insurance. Joe likened insurance for an outage to an extended warranty for a consumer product. The business has to compare the cost of a replacement product amortized over its lifespan to the annual cost of an extended warranty. Bartshire reported the regional THIRA identifies risks and resources but not action steps to respond to and recover from threats, which is the role of local jurisdictions, cities, counties, etc. A local THIRA identifies actions and implementation. Sharing and witnessing the effects of disasters has led to community preparedness. Schellenberg indicated a survey of Palo Alto businesses could provide a fiscal analysis of resilience, but existing research can be extrapolated to Palo Alto. Craig reported the community should help CPAU understand the qualitative values.

C. Community Risks and Resources for a Resilient Palo Alto

Kenneth Dueker, City of Palo Alto Office of Emergency Services Director, reported the City of Palo Alto is one of the only local jurisdictions to have a THIRA. The City's THIRA addresses natural disasters such as earthquakes and floods, accidents, and human-caused events. Resilience is the ability to suffer an event and return to a reasonable level of functionality. Public safety's mission is to prepare for, prevent when possible, mitigate, respond to, and recover from hazards. Following the airplane crash into the transmission line in 2010, the City considered spending millions of dollars to mitigate risks. However, the City has only identified options for mitigating risks.

Karla Dailey, CPAU Senior Resource Planner, noted the City of Palo Alto Comprehensive Plan and other City documents address resilience. Specifically, the Comprehensive Plan addresses cooperative planning with other agencies, community awareness, and long-term resilience for water and energy, community safety, and CPAU infrastructure. The City completed its Emergency Water Supply Plan by refurbishing five wells and developing three new wells. Along with the Santa Clara Valley Water District, staff is exploring an expansion of local resilient water supplies.

Debra Lloyd, CPAU Acting Assistant Director of Utility Engineering, remarked that a loss of water would be catastrophic on a long-term basis. Communications is a vital part of resilience and emergency planning. With respect to local distribution, resiliency means prevention, recovery, and survivability. Water, wastewater, and gas pipes are being replaced with pipes made of materials that are amenable to liquefaction. Electric systems are not loaded to capacity so that supply can be switched among systems. Vegetation management is important for the electric utility. Prevention strategies include installing barriers, elevating equipment, relocating equipment and infrastructure, and increasing security. Staff is investigating battery storage and smart grid pilot programs. Recovery plans, on-call field staff, and the outage management system aid in recovering from a disaster. Survivability strategies include battery backups at substations, natural gas generators to power low-voltage electronics, and communications to the community.

In reply to questions from participants, Dailey advised that lines for recycled water (purple pipes) are not being installed city wide. Romel Antonio, Senior Project Engineer, reported generators have been installed at El Camino Park and the Mayfield Pump Station to pump water, and three portable generators can be transported to facilities as needed. The City can provide 9 million gallons of water per day from ground wells if electricity is available. A participant suggested CPAU consider long-term power for cell towers and a rebate program for homeowner purchase of Tesla wall packs. Dueker agreed that City staff need to live in or near Palo Alto in order to provide manpower during an emergency situation.

D. Resilience and Palo Alto

The video HayWired (a USGS video depicting a 7.0 earthquake and the cascading impacts) was shown followed by a large group discussion of "What does resilience mean to Palo Alto?"

Participants offered their definitions of resilience, including self-sufficiency and organization, continuation of critical facilities, sheltering in home, the community working together, people of all income levels having access to resources, safe and functional schools, clear roadways, pre-planning to ensure recovery in hours or days, communications and charging of cell phones, and neighbor networks.

E. Small Group Exercise: What are the Problems We Need to Address?

Participants met in small groups to discuss the impacts and vulnerabilities that the Utility should prioritize with the question in mind of "What are the problems we need to address?" and then reported back their top priorities and focus areas for utilities. Each group had a scenario to consider and responded to questions focusing on one of five asset categories: Critical Services; Economy; Natural Environment; People & Community; or Built Environment.

- The critical services group identified a hierarchy of critical services, *i.e.,* electric service for water pumps, public safety, and communications; water for fire suppression, drinking, and medical services; and communications for emergency responders and individuals. They also discussed the location of utility infrastructure and risks of being in liquefaction zones.
- The economy group identified high priority retail services of hardware stores, pharmacies, gas stations, and grocery stores and the need for utilities and employees at those businesses. Employees may be able to work remotely if data centers and internet providers are operational. Daycares and schools will be needed for employees to return to work in physical locations. A barter system will be needed to replace cash and credit cards for purchases. The group also discussed the need for highway recovery as "delivery systems" so that supplies can be brought in.

- The natural environment group considered impacts on flora and fauna by season. People displaced from their homes could camp in parks, in which case health, safety, and utility resources will be needed in parks. Parks could be used as quarantine spaces to prevent the spread of disease. A second natural environment group considered priorities of natural infrastructure, wildlife, parks and recreation areas, and protecting and preserving the water supply, communications, and electricity.
- The people and community resources group identified priorities of housing for workers, integration of workers into the community, care facilities, and at-risk residents. Community Emergency Response Team (CERT) and Palo Alto Neighborhood Disaster Activities (PANDA) volunteers and resource maps will be needed. A second people and community group identified workforce housing for City staff and staff retention and recruitment as priorities. Volunteers could be trained to substitute for utility workers in the event of an emergency. Neighborhood leaders could compile information regarding residents with special needs to ensure they have the resources they need.
- The built environment group identified priorities of minimizing and mitigating damage, converting buildings to housing for displaced residents, and meeting Building Code and Code enforcement needs. A second built environment group, guided by the importance of surviving a disaster as a community, identified the priorities of safe housing, buildings, churches, schools, and water supply and distribution.

F. Wrap Up and Next Steps

Participants identified needs for a roadmap to a secure smart grid for electricity, water, and gas; waste disposal; secure CPAU infrastructure; decentralized operations for community hubs; meaningful support of emergency volunteers; utility volunteers; a list of appliances and products to be turned off when electric service resumes; and micro grids for community hubs that are distributed around Palo Alto.

Ed Shikada, Utilities General Manager, reported staff will provide information from the workshop to the UAC so that the UAC can direct staff.

Meeting adjourned at 7:05 p.m.

Respecfully Submitted
Rachel Chiu
City of Palo Alto Utilities

Utilities Advisory Commission
Initial Resilience Vision and Goals

Preliminary Vision

Support Palo Alto Community Resilience by advancing the City's Utilities to become "Smart" Utilities, able to assist the City prepare, respond, support, and rebound from manmade and natural disasters.

Goals

1. Assist the City in ensuring that residents can stay in place or return as soon as possible in the event of a disaster or emergency.
- Establish Community Resilience Hubs that provide residents access to power, water, communications, and other critical supplies.
- Provide educational materials related to managing utilities when a disaster occurs.
- Support Community Emergency Response Training (CERT) and neighborhood volunteers.
- Work with City Zoning to determine if codes support resilience and avoid unintended consequences.

2. Support Community resilience by prioritizing utility services and infrastructure support to critical facilities and retail establishments.
- Prioritize improvements and updates of utility services to critical facilities such as hospitals, emergency providers, transportation, etc. to enable effective (and fast) response and recovery.
- Evaluate and establish adequate power and water supplies (could be time specific – 1 week? 24 hours?) for these facilities.

3. Enhance the City's Utilities to ensure their overall resilience.
- Develop Workforce Management and Support Plan
- Strengthen Utility Facilities and Infrastructure to better withstand disasters – consider replacement, relocation, and upgrades
- Build partnerships with community and surrounding businesses to support the City's Utilities when needed.