

## ABSTRACT

### City of Milpitas Strategic Plan to Protect and Restore Water Utility Service in the Event of a Magnitude 7 Earthquake on the Hayward Fault

The City of Milpitas has a strategic plan to prepare, respond, and recover from the impact of a major earthquake on its water utility. Located in the seismically active San Francisco Bay Area, this Silicon Valley community of 65,000 is vulnerable to seismic events on the nearby Calaveras, Hayward, and San Andreas Faults. There is a 70% chance of an M 6.7 or greater earthquake on these faults in the next 30 years and, in such an event, the City will experience strong ground shaking, liquefaction in the valley floor, and landslides in the hills. The City expects pipeline displacements of up to 8 inches and 150 water main breaks during a major earthquake.

The City depends on an intact water service to protect public health and safety after a major earthquake, as water is needed for fire protection as well as basic sanitation. Broken pressure mains may also damage transportation routes, hindering emergency response. Because it is infeasibly expensive to seismically upgrade all components of the water infrastructure within a reasonable timeframe, the City developed a multi-component plan to optimize expenditure of its scarce utility funds while building its ability to protect and restore its water services.

Planning included conducting an infrastructure risk assessment to define water system vulnerabilities and consequences of failure. The City's wholesale suppliers are also developing seismic response plans, so the assessment takes into account expected out-of-service times for supply. The City developed hazard maps for potential rupture zones, landslides, and liquefaction and mapped its water and transportation infrastructure into GIS such that emergency transportation routes are defined and water pipeline networks and nodes are defined. The City assessed its emergency response ability through a resources and needs evaluation for personnel, equipment, and contract supplies and services.

Response preparation includes training to address gaps in personnel skills and preparation of emergency kits for staff and mutual aid personnel. GIS maps are loaded into laptop computers for field personnel and the City's Emergency Operations Center. The City is stockpiling an inventory of temporary and replacement equipment and expects to eventually acquire over 5,000 feet of flexible hose, deployed from trailer-mounted reels, to allow temporary bypass from fire hydrants around water main breaks.

Seismic improvements are integrated into the City's development standards such that new and replacement infrastructure is designed and constructed to withstand damage

from ground displacement and hydraulic pressure surges caused by fault rupture, landslides and liquefaction. Standards apply to pipe material, joint design and geometry, and fittings, connections, and appurtenances. The incremental cost for these improvements is minor compared the benefits accruing as new infrastructure is built and aging infrastructure is replaced.

Finally, the City has a targeted capital improvement plan to harden critical water infrastructure defined as the “backbone” distribution system. The backbone includes supply turnouts, major pipelines, pump stations, reservoirs, pressure relief valves, and emergency power. This plan includes 31 projects to anchor aboveground reservoirs, install flexible joints at rigid connection and fault crossings, install isolation valves, and upgrade pipe materials.