

## **Distribution Infrastructure and Emergency Preparedness**

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This is an inventory of the existing water distribution network with emphasis on the ability to (potentially) intertie systems, and to assess the general emergency preparedness of County-wide water systems. This is not intended to establish the hydraulic gradient interfaces, capacities, or condition of existing pipelines. These elements must be defined on a case-by-case basis in order to accomplish a systems intertie.

Information regarding existing and potential system interties by Water Planning Areas (WPA) is:

### ***WPA 1 - North Coast Area***

The communities of San Simeon and Cambria share no common source of supply nor are their distribution systems intertied. Systems are approximately two miles apart. A supply line from the proposed Cambria desalination plant was to have linked the two systems. Plans for both the desalination plant and the San Simeon supply line are on hold as of this date. No distribution linkages to other WPAs exist.

### ***WPA 2 - Cayucos Area***

Three separate purveyors supply domestic water to the community of Cayucos. They share a common source of supply (Whale Rock Reservoir) and operate a common water treatment plant. Interties exist among Morro Rock Mutual Water Company, Paso Robles Beach Water Association, and County Service Area 10A.

Further, Whale Rock Reservoir is located just outside of Cayucos. Whale Rock Reservoir supplies the City of San Luis Obispo, CMC, and Cal Poly via the Whale Rock Pipeline. By virtue of the Whale Rock Pipeline, Cayucos is intertied with the City of San Luis Obispo, CMC, and Cal Poly. It is further possible that the City of Morro Bay could intertie with Cayucos and the others mentioned, as the Whale Rock Pipeline passes through Morro Bay.

The Whale Rock Pipeline is a 17 mile, 30" diameter prestressed concrete cylinder pipeline that was constructed in the 1960s to convey untreated water. Two pump stations convey water to the City of San Luis Obispo water treatment plant. As with any transmission main, use of the Whale Rock Pipeline for conveying a) treated water, b) higher flows/pressures or c) bi-directional flows must be carefully considered. It is noted here as an existing link among systems that may prove valuable in an emergency. This is further discussed in the Emergency Preparedness Section.

### ***WPA 3 - Morro Bay/Los Osos Area***

The City of Morro Bay's distribution system is not adjacent to neighboring systems, however, the City is linked to the State Water Pipeline via the Chorro Valley Pipeline. The Whale Rock Pipeline traverses the City as discussed above.

The community of Los Osos receives water service from three primary purveyors -- County Service Area 9, Cal Cities Water Company, and S&T Mutual Water Company. Similar to Cayucos, the three purveyors' systems share common boundaries. Cal Cities

and CSA 9 systems are interconnected with flow ability in both directions. Cal Cities also shares an interconnection with S&T Mutual Water Company. Los Osos is not intertied with other communities. It is about three to three-and-one-half miles distant from Morro Bay, and six miles distant from San Luis Obispo.

CMC, Cuesta College, Camp San Luis Obispo, County Main Jail and Operations Center, and County Superintendent of Schools share a common water system. These facilities receive water via CMC. CMC receives water from Whale Rock as well as the State Water Project.

#### ***WPA 4 - San Luis Obispo/Avila Area***

The City of San Luis Obispo receives water from Whale Rock Reservoir as discussed above and from Salinas Reservoir (Santa Margarita Lake). The Coastal Branch of the State Water Project traverses the City, although the City does not have an entitlement nor turnout from the system.

Water from Salinas Reservoir is conveyed to the City water treatment plant via 9.2 miles of 24" diameter reinforced concrete pipe. One primary pump station conveys water. Also, Salinas Water gravity flows through Cuesta Tunnel.

Avila Beach Community Services District purveys water to Avila and is one of the Lopez contractors. Lopez Reservoir provides supplies to Avila Beach, Port San Luis, Pismo Beach, Grover Beach, Oceano, and Arroyo Grande via the Lopez pipeline system. All of these communities are interconnected by virtue of the Lopez system. Further, Avila Community Services District's water system is within two miles of the Port San Luis Obispo system. Avila Beach CSD, San Miguelito MWC, and San Luis Coastal Unified School District also receive State Water.

The Diablo Canyon Nuclear Power Plant complex is supplied by a seawater desalination plant and does not share common elements with neighboring systems.

#### ***WPA 5 - Five Cities Area***

The Five Cities (Arroyo Grande, Pismo Beach, Shell Beach, Oceano, and Grover Beach) are all on ground water wells and the Lopez system as previously described. The systems share common service area boundaries that do facilitate emergency interconnections; several system interties are in place today.

Purveyors in WPA 5 that are State Water Contractors include Oceano Community Services District and Pismo Beach.

#### ***WPA 6 - Nipomo Mesa Area***

Nipomo Community Services District and Cal Cities Water Co. are the largest purveyors in WPA 6, though there are many smaller purveyors in the area such as Rural Water Company, Black Lake Canyon Water, Mesa Dunes Mobile Home Park, Evergreen, Challenger, and Laguna Negra Mutual Water Companies, and Rim Rock Water Company. Opportunities for system interties exist. Some purveyors share common service area boundaries while others are miles apart. The Coastal Branch of the State

Water Project traverses WPA 6. One turnout to agricultural users (Nipomo Valley CSD) is planned for WPA 6.

Cal Cities and Nipomo CSD have an emergency intertie in place, which was most recently activated in February 1998. Nipomo CSD supplied 200-300 gpm of water to Cal Cities during a power outage. The Nipomo CSD distribution system is approximately five miles from the Arroyo Grande water system, its closest neighbor serving more than 500 customers.

***WPA 7 - Cuyama Area***

Water service to the Cuyama area is provided by small isolated water systems that lack interties.

***WPA 8 - California Valley Area***

Water service to the California Valley area is provided by small isolated water systems that lack interties.

***WPA 9A - Salinas Area***

The three largest communities in WPA 9A (Paso Robles, Atascadero, and Templeton) operate separate water distribution systems. Templeton CSD and Paso Robles have a system intertie on 12" diameter distribution lines at Highway 46 and Theater Drive. The distance between Templeton and Atascadero's systems is approximately a mile and a half.

Similarly, Santa Margarita's water system does not adjoin any other community systems, though the Salinas Pipeline (which delivers water to City of San Luis Obispo and Cal Poly) traverses the Santa Margarita service area.

San Miguel does not adjoin any other community water system.

***WPA 9B - Creston Area***

Water service to the Creston area is provided by small, isolated water systems that lack interties.

***WPA 9C - Shandon Area***

Water service to the Shandon area is provided by small, isolated water systems that lack interties.

***WPA 10 - Nacimiento Area***

Development around Lake Nacimiento is served by Heritage Ranch Community Services District and Oak Shores. These two water systems are approximately eight miles apart. There currently are no facilities to interconnect WPA 10 with other Water Planning Areas.

## **Conclusions Regarding Distribution Infrastructure**

Only about half of our community water systems share common boundaries or supply lines, such that an intertie could successfully be put into place within a matter of days.

The Whale Rock, Lopez, Salinas, Chorro Valley, and State Water pipelines provide important connections among many communities.

The north coast communities of San Simeon and Cambria are particularly isolated from neighboring systems. The same is the case with San Miguel, Creston, Shandon and California Valley. Purveyors in these communities, in particular, should provide sufficient water storage and back-up power to remain self-sufficient during the 72-hour disaster recover period.<sup>1</sup>

Though there are many independent systems in the Nipomo Area, few are interconnected to each other and none have a turnout from the State Water System. An emergency connection to the State Water system would benefit this area which otherwise is wholly dependent upon ground water supplies.

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<sup>1</sup> State and Federal emergency guidelines advise local communities to plan for a 72-hour post-disaster period without benefit of outside resources.

## **Emergency Preparedness**

Emergency preparedness from the standpoint of water supply translates into the ability to respond to or recover from disasters that impact water supply.

Four emergency events are examined herein --- earthquake, wild land fire, prolonged power interruption, and drought.

### **Earthquake**

For the purposes of this Master Water Plan Update, possible water system damage scenarios associated with earthquakes on the San Andreas, Rinconada, and Oceanic/West Huasna Faults were considered.

#### ***Effects from Earthquake on Water Supply***

##### **San Andreas Fault**

The San Andreas Fault runs north-west to south-east through California Valley and near the communities of Cholame and Shandon.. The California Division of Mines and Geology (CDMG) classifies the fault as “active”.

A major quake along the San Andreas Fault could affect the reliability of water from the State Water pipeline if the epicenter is located near the communities of Cholame or Shandon. The State Water pipeline is the only major water supply line that crosses this fault.

##### **Rinconada Fault**

The Rinconada fault lies near Nacimiento Lake and near the communities of Paso Robles, Atascadero, and Santa Margarita. The fault is considered seismically active. Due to the location of the fault, a event could affect many parts of the County depending on the location of the epicenter.

If the epicenter occurs in the north county near the communities of Paso Robles, Atascadero, and Templeton, it could cause disruption to local systems due to either ruptures in the transmission lines and/or power failure. Due to the fact that these systems are supplied from groundwater, a power failure would effect electrically powered wells that do not have emergency power supply. The systems are also under pressure from booster pumps. Without power, water pressure would be lost in hilly areas.

If the epicenter of an earthquake on Rinconada Fault were located near the Cuesta Grade, the disruption could affect two major water supply lines. The first is the State Water line. A break of this pipeline would affect any purveyor south of the break that receives water from the State Water pipeline. The second major pipeline goes from the Salinas Reservoir to the City of San Luis Obispo. This waterline services the City of San Luis Obispo. Another result of a quake in this area may be power outage. This would effect all wells that do not have emergency backup and booster pumps for pressure zones.

The Rinconada Fault also runs near Lopez Lake. The affects of an earthquake in this area would be less severe, but could possibly affect the communities of Avila Beach, Arroyo Grande, Grover Beach, and Oceano. All of these communities receive part of their water from the Lopez pipeline. If there is a break on the Lopez waterline east of Arroyo Grande, the communities could use the pipeline as an interconnection. This could help with any shortages in the region.

### **Oceanic/West Huasna Fault**

The Oceanic/West Huasna Fault runs from the San Simeon area, and goes inland between Santa Margarita and San Luis Obispo and down to the Arroyo Grande area.

A seismic event on this fault in the area that lies between Santa Margarita and San Luis Obispo could potentially disrupt several major waterlines (State Water line and Salinas pipeline). A rupture of the State Water pipeline would affect the City of Morro Bay and any community south that receives State Water. A break of the waterline from the Salinas Reservoir would only effect the City of San Luis Obispo. This same event could cause power outages. These outages may disable electrically powered groundwater wells that do not have emergency backup. It would also effect the water supply in areas that are pressurized. Booster pumps may not be able to keep these zones under pressure.

If the event occurs further south, near Arroyo Grande, the potential for disruption could affect the communities of Avila Beach, Pismo Beach, Grover Beach, Oceano, and Arroyo Grande. These communities receive water from Lopez Lake. A break on the Lopez waterline would decrease the quantity of water available in these areas. Depending on the epicenter location there is a possibility that the State Water pipeline would also rupture. This would affect the communities in the area of the rupture and south that receive State Water. There is also the potential for power failure in the area of the earthquake. This could lessen the available of groundwater supply to communities. Unless the wells have backup power, they would not be able to pump from these wells.

A high magnitude event resulting in lateral acceleration due to gravity up to 0.7g is projected to cause Lopez Dam to fail. Studies are underway to plan a remediation to the dam.

### **Wild Land Fire**

Another taxing event on our water supply systems is wild land fire. Not only does fire fighting call upon all of our hydraulic resources, it also often comes hand-in-hand with electrical power outages that takes pumps, treatment plants, and wells out of service.

For the purposes of this Master Water Plan Update, possible impacts on the water system associated with a wild land fire in the North and South County and near San Luis Obispo were considered.

## *Effects of Fire on Water Supply*

### **North County**

A wildfire in the north county has the potential to dramatically impact several water systems. With most of the population centers in areas of moderate fire hazard (as classified by the California Department of Forestry) and the outlying acreage located in areas of high fire hazard, the effects to the water supply could be dramatic. Where no interties exist between service areas, the effects would be felt by individual systems. Where service area interties exist, the effects could be shared by several purveyors, thus minimizing the impacts on water supply.

A larger threat is prolonged electrical power outages due to a wildfire. With the communities getting their water from wells and some of the areas relying on pumps, the long-term effect of a power outage could be significant. Systems with no interties would be limited to the amount of water held in their storage tanks and the capacity of their emergency generators. This available water may need to be used for fire fighting, thus leaving little water for other community needs. Service areas with interties would have the ability to receive water from neighboring systems to sustain water supplies.

### **South County**

The effects of a major wildland fire in the south county could range from little to severe, depending on the location of the fire. If the location is close to any of the population centers (Arroyo Grande, Pismo Beach, Nipomo, etc.) there could be a dramatic effect. These population centers are located in areas of moderate fire hazard with some of the outlying areas being high fire hazard.

The "Five Cities" receive water supply from Lopez Lake, the State Water system, and from groundwater. In the event of a major fire, the Five Cities area has a good chance that at least one of the three water sources would remain in service. Communities that rely solely on ground water, such as Nipomo, would feel a drain on their water system. There is the possibility of an emergency connection to the State Water pipeline. This would make the South County inter connected through at least one supplemental water source.

As with most of the County, South County communities get much of their water supply from wells. In the event of power outage due to fire, the service districts would rely on water quantities stored in tanks plus the capacity of their emergency generators. Again, interconnections with other communities could lessen the effect on the supply interruptions.

### **San Luis Obispo Area**

The area around San Luis Obispo is considered to be of moderate to high fire hazard. The pressurized zones in the northern area of the City would be most vulnerable to wild land fire. The effects on the water system would be heavy demands for fire flows plus possible loss of power.

## **Prolonged Power Interruption**

In general, San Luis Obispo County water purveyors depend mostly on electrical power to treat and pressurize our water supplies. A prolonged power outage (lasting longer than 72 hours) would significantly hamper our ability to deliver water.

Major purveyors in San Luis Obispo County have elevated water storage and/or emergency power capability for the majority of their systems. These features are, for the most part, designed to keep the systems pressurized for up to three days. Beyond that time frame, our ability to maintain system pressure would be compromised, resulting in possible need to flush and disinfect waterlines prior to putting them back into service. Most purveyors own portable power generators to rotate around their systems as needed. Features to connect power generators to each pumping facility are needed throughout each system.

## **Drought**

It is difficult to imagine a drought scenario that would impact some, but not all, of our County water resources. It is plausible that one source could be reduced or interrupted for a prolonged period (Lopez Reservoir maintained at lower level, for example), but, by definition, droughts impact a wide-spread hydrologic region.

Every purveyor will be motivated by a prime goal --- to maintain water service. Because we can no better predict the closure of a drought than we could the onset, individual purveyors will be hard-pressed to share water with other communities during a drought. It is not advisable to build into our emergency plans the "safety valve" of acquiring supplies from neighboring purveyors.

Drought response would more reasonably take the shape of activating desalination plants, taking increased deliveries from the State Water Project, and demand management.

Advance planning consists of acquiring supplemental water that may not be as sensitive to years of below average rainfall. The Nacimiento Water Supply Project, for example, has been demonstrated to be capable of delivering San Luis Obispo County's full entitlement even in the fifth year of the 1987 to 1992 drought. The State Water Project imports waters from areas well outside the County and may sustain full deliveries when local supplies cannot.

Overall, the best positioning that San Luis Obispo County could achieve with regard to planning for droughts is to develop multiple sources of water as opposed to relying on few sources to meet our water needs.

## **Conclusions Regarding Emergency Preparedness**

Our examination of hypothetical emergency scenarios involving earthquake, fire, prolonged power outage, and drought emphasize several key points:

- Communities with a single source of water supply are more vulnerable to emergencies than those that have multiple sources of supply.
- Communities with system inerties are better positioned to fight wildland fires than those which are isolated from others.



- Individual purveyors should evaluate their ability to sustain system pressure in the event of a loss of electrical power. Consider gas driven motors in addition to electrically powered motors. Provide emergency power generators for key pumping and treatment facilities.
- Individual purveyors should store a minimum of three days' of emergency water to provide for basic sanitary needs following a disaster.
- Prudent planning for earthquake events includes design features at the anticipated fault line, preserving above-ground storage after the distribution system is damaged, and maintaining basic service until help arrives.

Regarding design features, it is a fact of life in California that water transmission mains must cross faults. Features that can be accommodated in design are:

- ⇒ crossing known faults near perpendicularly to limit length of damaged pipe in the event of an event
  - ⇒ providing flexible couplings to allow some pipe movement without rupture, and
  - ⇒ designing a pipe section "to fail" such that emergency shut down and repair is facilitated.
- Regarding preserving above-ground storage after a major earthquake, local emergency response plans should include valving off storage tanks after an earthquake when loss of system pressure is observed. Then, gradual re-activation of water service is advised to identify areas of the distribution system that are damaged. This will also reduce the amount of water damage associated with main breaks.
  - Overall, the best positioning that San Luis Obispo County could achieve with regard to planning for droughts is to develop multiple sources of water as opposed to relying on few sources to meet our water needs.