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February 3, 2024

Alpine Water Company
100 Nutcracker Road
Bishop, CA 93514
Re: Water System Evaluation

System Evaluation – Purpose is to evaluate the water system & identify problems, improvements or recommendations that will ensure a reliable water system.

INTRODUCTION

An initial onsite meeting was arranged to meet with Board Members and walk the system to understand the scope of work and the system. The Board indicated they wanted an evaluation their current water system to help identify problems and improvements that would ensure a reliable water system into the future.

SYSTEM DESCRIPTION

The Alpine Water Company is a small community water system that serves tract 2 of the Aspendell development located in Aspendell, CA. It is serving 32 homes and 14 undeveloped lots. The Inyo County Environmental Health Department is the system regulator. The design is a looped distribution pipe system consisting of two closely-spaced wells with submersible electric well pumps, a tank level and well pump start control system, approximately 3,500 feet of 4" or 6" distribution pipe with associated isolation/control valves, fire hydrants with shutoff valves, and a 50,000-gallon reservoir.

Construction of the water system was completed in 1978, 46 years ago. Most of the original infrastructure is still in place. Only bits and pieces of the system have been replaced and upgraded in response to occasional failures over the years. This means that much of the system has many parts that are near or past their typical design lifetime.

DATA COLLECTION

The system was walked several times, one time with Jerry Billings and separately with Brian Nix. The major elements were identified including the well facility, reservoir/storage tank, valves, hydrants, etc. Jerry and Brian provided information and the history of the system layout, operation, and repair. The system was walked again with the original plan sheets to make notes, take photos, and confirm the features and locations. The original plans were used to verify the as-built system and produce a more accurate map of the system. The spreadsheet of the system components was reviewed and updated based on the field observations. The system component spreadsheet will be used for a capital improvement plan.

SUMMARY OF RECOMMENDATIONS

A list of recommended priorities followed by a complete list of specific items and comments on the components was compiled.

Following is a list of recommended **Immediate** priorities –

1. Develop a relationship with a California Certified D1 water system operator for guidance on system operation. Work toward community members obtaining D1 certifications. California Rural Water has classes.
2. Repair the fire hydrant at the bottom of Sumac Road.

3. Storage Tank: Excavate the southside (backside) and east & west sides of the reservoir, per inspection report find and plug leaks in the concrete wall and liner, reseal the concrete roof-ceiling panels to the walls inside and outside. Seal the roof joints between the panels.

Following is a list of recommended **Short-Term** priorities, concurrent with above-

1. System Valves: Perform isolation valve maintenance and condition assessment. Develop a plan to replace or repair the valves that are found to be inoperative or defective. If valves are replaced, retain samples of the removed pipe for evaluation of the pipe condition. Develop a valve maintenance program.
2. Find the existing or install new valves at the bottom of Alpine and Sumac. So, the water pipe along the tract North boundary (downhill) can be isolated if needed.
3. Fire Hydrants: Perform flow testing, valve maintenance and condition assessment for the fire hydrants, replace them as needed.
4. Repair or replace the non-sealing main 3" check valve in the vault at the well lot.
5. Obtain laboratory sample testing for asbestos fiber leaching from the pipe matrix into the water.
6. Well Power System: Reconfigure the well area to upgrade/relocate controls above ground (including surge/lightning protection), provide emergency power capability, and provide better access into the well piping vault.
7. Install a remote monitoring system to provide alarms e.g. phone or text if the water system is operating out of tolerance.
8. Inspect well casing and pumps. Perform typical maintenance procedures to maintain performance.
9. Develop system operation and maintenance manual to meet the intent of State of California regulations.
10. Identify, train, and obtain certification for individuals who will run the system, this is recommended to include AB-54 training requirements for Board Members. Cal Rural Water has the AB-54 classes online https://calruralwater.org/?s=ab54

List of **Longer-Term** priorities

1. Include a dedicated discrete well-to-reservoir fill pipe or positive flow scheme to ensure the storage tank has proper changeover of water. Install a second distribution pipeline from the storage tank to Alpine Dr. for redundancy and increased flow.
2. Add isolation valves to each well so they can be isolated from the system and be flushed individually. Provide individual sample taps for each well.
3. Investigate possible engineered solutions to boost the water pressure to the higher elevation homes on Alpine Drive.
4. Identify a new well facility location that would be suitable for a replacement well. In addition to backup power for the wells.

The listed conditions or observations are what was ascertained at the time of the evaluation. It may not be exhaustive or list every issue possible with the system.

Submitted by:

Tim Rudolph

Feb 3, 2024

Tim Rudolph, P.E. Date
C 63207

DETAILED NOTES on issues or recommendation resulting from observations of the water system.

WELL AREA

1. It is recommended the electrical service & breaker panel be reinforced or shielded to resist or avoid potential avalanche forces.
2. The electrical equipment for tank level control, well starters, and motor protection relays are in the below grade vault. The electrical equipment enclosures in the vault are not approved for wet location use. The plywood electrical mounting board is water stained and appears have mold or fungus on it. There is extensive corrosion on the electrical wire gutter enclosure and conduit. The location of the electrical equipment in the vault is also a worker safety issue.
3. The main electrical panel should be examined by an electrician. It appears the 100-amp main breaker that would not deenergize the entire panel. The panel should also be checked to make sure the breaker contacts are corrosion free and properly torqued and seated in the common bus bars properly. A 15-amp breaker is not properly labeled in the panel. The operating amperages of the pumps should be checked and verified they are within manufacture specification.
4. An electrician should be scheduled for a maintenance check with SCE. They should open the SCE meter panel to retorque the meter wire lugs and visually inspect the installation.
5. A transient voltage surge suppression (TVSS) device should be installed on the main electrical panel to protect the electrical equipment from surges or nearby lighting strikes. The tank level control wires should be protected on each end with a TVSS device, to prevent damage from a nearby lighting strike on the electrical equipment.
6. The pump control switch panel mounted off the to the main circuit breaker panel has conduit that is installed incorrectly. The enclosure has open mounting holes that can let moisture in the box.
7. The plug outlet in the vault is not a GFCI device.
8. The vault access hatch size and depth of the vault is a concern for worker access and safety. The rebar lifting lugs should be cut flush with the concrete surface to eliminate a trip hazard. The lid can be replaced with a double leaf opening cover that would allow better access.
9. The heater should be checked for operation, it should be replaced if is needed, and installed on a GFCI circuit breaker.
10. The 3" check valve in the vault seems to be not working. It leaks the system pressure back to the well piping and should be replaced. This check valve is to keep the system pressure off the pump check valves.
11. The well vault should have an external valve to isolate the vault from the system. So that entry to the vault is not needed to isolate the vault from the system.
12. The wells do not have individual isolation valves. Each well should have an isolation valve so it can be shut down while the system remains operational. The well piping should provide for each the wells to be flushed directly to waste, and each well should have an individual sample tap.
13. The 3"diameter piping in the vault is covered with foam insulation. The insulation should be removed and the pipe and joints inspected for damage and rust. The insulation should be replaced after the inspection. The piping should be fully documented when the insulation is removed. A rattling sound is heard from the piping when the wells are running, this should be investigated when the insulation is removed. It may be a flow verification valve that is inoperative.
14. Well 1 & 2 are too close to the adjacent building sewer pipes. The California standard is to have a 50-foot distance to any sewer pipe. It is recommended to have a plumber inspect the sewer pipes in the adjacent building every 5 years. This will ensure the pipes are kept in a water tight condition. Thus, preventing possible contamination of the well area.
15. Well 1 & 2 casing pipes are exposed PVC plastic. This opens the potential of catching fire in a wildland fire event. The pipes should be covered with a noncombustible covering.
16. Well 1 & 2 conduit should be sealed at the well head & electrical panel with approved electrical putty.

17. Well 1 is missing an atmospheric vent. A new downturned screened vent should be installed. The current vent path would have the well exchanging air thru the electrical conduit. The conduit terminates in the vault where the air is stale and has an earthy smell from the subsurface drain system that serves the vault.
18. Well 1 – The electrical connections in the well casing use common wire nuts. They not approved connectors for a wet location. They should be replaced with approved connectors.
19. Well 1 concrete well slab has bolts sticking up from the old well dog house. The bolts should be cut off flush with the concrete for worker safety.
20. Well 2 electrical connections are a conduit body. Common wire nuts are used to connect the wires. The electrical connection should be checked and upgraded if needed.
21. Well 2 atmospheric vent seems undersized. A new larger downturned screened vent should be installed. Or the vent size should calculated to verify it is adequate.
22. Well 1 flow rate- the new pump in well 1 has a flow control valve to prevent excessive drawdown of the well. The well should be investigated by pulling the pump and performing a video inspection of the well casing flow slots. The well casing can be brushed and surged to clear the well screen to improve well production.

STORAGE TANK

1. The information provided in the tank inspection report should be followed up on. The tank cleaning report indicated on the holes on the south wall need to be sealed.
2. The bushes growing adjacent the tank should be removed to prevent root growth thru the block tank walls. The walls should have a drainage plane installed to prevent outside water pressure from damaging the interior tank liner. The plans show a drain system around the tank. The drain pipes should be located and video inspected.
3. The coating manufacturer should be consulted on how to patch the new Polyuro coating where the roots have grown thru the coating.
4. The precast concrete roof and ceiling panels should be resealed to prevent water entry into the tank, from the outside and inside. From the inside of the tank, the tank ceiling panels should be caulked to the walls and beams. The vertical joints between the panels on the roof and the joint for the wall to the roof should be made water tight. The asphalt tar based roof seam seals are degraded where exposed. The caulking should be approved for use in potable water systems. The original plan indicates the slabs were placed with Kent Seal. Kent seal is not approved for use in potable water systems, it is a butyl rubber product and may impart taste to the water. The top of the tank should not be covered with dirt so the roof panel joints can be inspected & maintained. The wall to roof joint should be left uncovered so it can be easily inspected for damage.
5. The precast roof/ ceiling panels may move in an earthquake or avalanche event. The panels could be bolted to the walls to prevent movement.
6. The tank access riser should have more anchor bolts installed on the upslope side. It looks like a bolt is missing. More bolts would help keep the access pipe & lid from getting displaced in an avalanche.
7. The tank lid gasket does not full seal the lid to the riser. It has a small gap near the hinge location. A proper gasket should be installed.
8. Inside the tank access lid, the electrical connections for the tank level control are exposed. They should be in a water tight electrical box. The conduit body inside the access riser is missing a cover. The flex conduit inside the access riser should be redone to maintain proper worker clearance. The mounting tab for the level probes should have a guard to prevent worker contact with the metal plate on entry or exit when using the access ladder.
9. The ground wire for the tank level control is not supported correctly. It should be in conduit and securely fastened to the structure. The bare ground wire entering the earth should be have an approved ground rod and connectors added to the system, while keeping the existing ground wire in use.
10. The valves at the tank were not found on the site visit. They should be clearly marked so they can be found quicky if needed.
11. The tank over flow and vent are 6" PVC pipe fittings. They should be replaced with a non-combustible pipe material to prevent combustion in a wildfire. They should be relocated further above the ground so musty earth air cannot be inhaled by the tank. The screen material could be replaced with a finer screen No. 24 size to ensure small gnats cannot get in.

12. The tank drain piping should be enclosed in a concrete vault to prevent wildfire ignition from the exposed ABS pipe.
13. The tank lacks a discrete tank fill pipe that fills the tank from the top, with an air gap. Tanks are typically designed to fill on the surface on the opposite end of the bottom outlet pipe. This is done for water quality reasons.

DISTRIBUTION SYSTEM

1. The valve covers are marked with yellow or red paint. To prevent confusion the yellow paint should be changed to blue. Yellow is used to mark gas piping systems. A white stripe could be used to differentiate the fire hydrant valves.
2. The valves that interconnect Alpine Water Company with Aspendell MWC should have an engraved plastic tag affixed under the steel lid to indicate that it is the interconnect valve. So, it is not mistakenly operated.
3. The fire hydrants should be properly color coded to indicated the flow rate of the hydrant. A brass tag or painted sign could be affied to the 4" port on the hydrants to indicated a 250-gpm flow rate. This to warn visiting fire teams of the limited capacity available at the hydrant.
4. The fire hydrant at the bottom of Sumac should be repaired. It should have the finish grade brought up to the correct level on the hydrant barrel, so that the pipe has proper cover and will not freeze. While waiting for repair it should have an out of service sign on it. The signs are available for USA Bluebook.
5. The fire hydrants should have snow stakes that are different from normal snows stakes so they can be easily identified. They should have blue reflective tape on them.
6. The distributing isolation valves and fire hydrants valves should be operated yearly. The number of turns should be recorded to note any changes from the prior results. The system should be systematically flushed to verify the valve operation and sealing. The system should be chlorinated when flushing is done to prevent possible contamination issues.
7. The 6" diameter waterline at the bottom of development should have isolation valves installed. The valves should isolate a damaged pipe section while allowing the rest of the system to operate normally. Consideration of new valve locations should account for the two-houses with lateral connections off the 6" line.
8. The isolation valve at the bottom of Alpine Drive was not found. The sewer manhole was found, this can provide a benchmark to help located the valve. A old plan notes the valve is in the driveway.
9. The fire hydrant isolation valves on Alpine Drive are next to the edge of pavement in the shoulder and down about 8", they should be raised about 6" and have concrete collars around them. This is so they can be found easier.
10. The fire hydrant near 190 Alpine Drive should have the isolation valved moved closer to the hydrant at the edge of pavement or 3' from the hydrant. So that it is in a standard location making it quicker to locate if it needed to be shutoff.
11. The hose hydrant at the tank should have a vacuum breaker installed.
12. A cross connection control and back flow prevention program should be part of the system operation plan.
13. The hose cabinets were not opened or examined.

WATER SUPPLY

1. ISO flow tests indicate the flow rate was 250 gpm at a single hydrant. The 2022 ISO Report states the basic fire flow is 500 gpm for 1 hour (page 12 of the ISO Report) This translates to 30,000 gallons of water storage plus the maximum daily demand for domestic water use. The Water Company has no records for the daily water usage for the system. The water meter should be read and recorded to develop such records.
2. The California Fire Code would currently require 1,000 gpm to be supplied for one hour, so 60,000 gallons. This can be available from the water storage tank or from a well source. The average day demand of the system is added on to the required fire flow for both flow rate and storage. The 4-inch diameter pipe would not be able to support a flow rate of 1,000 gpm to the fire hydrants, larger pipes would be needed.
3. The current water supply to the system is about 75 gpm from the combined output of well one (25 gpm) and two (50 gpm). The wells do not have a backup power source.

4. Identify a suitable location for a replacement well and work toward obtaining the needed easements or ownership.

OTHER

1. A distribution water sample should be tested for asbestos contamination. It is a test for leaching of the asbestos out of the pipe matrix. The test requirement is per CA section 64432.2 (3). The water should be evaluated for the corrosivity of the water in relation to the asbestos-cement pipe, typically an onsite pH test.
2. The waterline at the bottom of the development should be replaced with a better pipe material. Better pipe materials that can resist displacement from tree roots or seismic movement better than asbestos-cement pipe. The plans show the pipe very close to the sewer line, a 10 ft separation is the current standard for sewer to waterline distance. The plans show the pipe on adjacent public lands. This will require approvals from the Forest Service to replace.
3. A second pipeline from the tank to the subdivision street is recommended to provide redundancy and increased flow from the tank to the distribution pipe network. A well fill pipe can be installed to meet the requirement for fill the tank from the top with an air gap.
4. A larger capacity well should be installed to provide a continuous water supply in case of a wildfire. The new well should have a permanently installed backup generator with an automatic transfer switch. This will provide for an uninterrupted water supply in a wildfire event. See attached sketch of one possible location off Alpine Drive near Sumac Road on the parcel owned by Aspendell Mutual Water Company. An easement or purchase would be needed to acquire the land.
5. Backup power should be provided to the existing wells. A transfer switch can be installed to provide quick installation of a rental generator or large residential generator. The best backup power system is a permanent installation so no operator intervention is required. In a wildfire event SCE will often turn off the power without notice.
6. The low pressures at the upper end of the development would not comply with the current CA Water Regulations. If new distribution system was to be installed an upper pressure zone with pumps should be installed. It may be possible to add a booster pump to raise the pressure in the entire system so the minimum pressure can be met at all the services. Or a new pipeline can be installed on Alpine Drive fed by a booster pump to provide a higher-pressure zone.
7. A pressure regulated water supply connection with Aspendell MWC should be planned. This would regulate the pressure fed to Aspendell MWC to not overflow the tanks or increase the service pressures at the low end of AMWC. A pump system should provide water to Alpine Water Company from AMWC so the service pressures will not drastically change when AMWC provides water to Alpine Water Company.
8. Develop a relationship with a water system operator for on call needs. Work toward community members obtaining a distribution certification for operating the system.
9. Perform a yearly well pump test. Measure the pump flow rate, drawdown, and motor amperage. This will help to chart the wear on the pump and schedule a replacement pump. It will also provide data needed to select a replacement pump.
10. Future buildings will require residential fire sprinkler systems, they will require approximately 16 gpm and essentially 40 psi is that is required on new water systems. An owner powered and installed booster pump may meet the intent but if a fire occurred the fire department might turn off the power to the building, thus stopping the sprinklers. This lower pressure seems to impact the homes on the uphill side of Alpine Drive. It may impact multi story homes on the undeveloped lots downhill of Alpine Drive.
11. A remote monitoring system should be installed to provide alarms via phone or text if the water system is operating out of tolerance. It could be a monitoring only system or a two-way system, typically called a SCADA system that allows remote operation and changing of system parameters over the internet.
12. See June 2022 California Water Board SB552 New Drought Requirements for Small Water Suppliers two-page summary, included in this document. It has requirements for measuring the ground water levels, metering all connections and meeting fire flow requirements. These are to be met by the specified dates, subject to funding availability.

Alpine Water Company

1/19/2024

Calculated System Pressures

elevations from Google Earth

Alpine Water Company

Water Storage tank
8571.2 ft Over flow elev.
8567.67 ft avg tank level
8562.67 ft Bottom of tank

Water fed from Aspendell MWC Water Storage tank

8533 ft top of tank
8525 ft average water level
42.67 ft lower than Alpine Tank
18.5 psi less than Alpine Tank!!

at tank pipe intersection						
Alpine Road	8498 ft	69.67 ft	**30.2** psi	8498 ft	27 ft	**11.7** psi
Top of Alpine Road	8498 ft	69.67 ft	**30.2** psi	8498 ft	27 ft	**11.7** psi
Top of Manzantia Road	8495 ft	72.67 ft	**31.5** psi	8495 ft	30 ft	**13.0** psi
Top of Sumac Road	8484 ft	83.67 ft	**36.2** psi	8484 ft	41 ft	**17.8** psi
Bottom of Alpine Road	8452 ft	115.67 ft	**50.1** psi	8452 ft	73 ft	**31.6** psi
Bottom of Manzantia Road	8440 ft	127.67 ft	**55.3** psi	8440 ft	85 ft	**36.8** psi
Bottom of Sumac Road	8437 ft	130.67 ft	**56.6** psi	8437 ft	88 ft	**38.1** psi

Highest house on Alpine ,second floor	30.2 ft	**13.1** psi	Lot 40

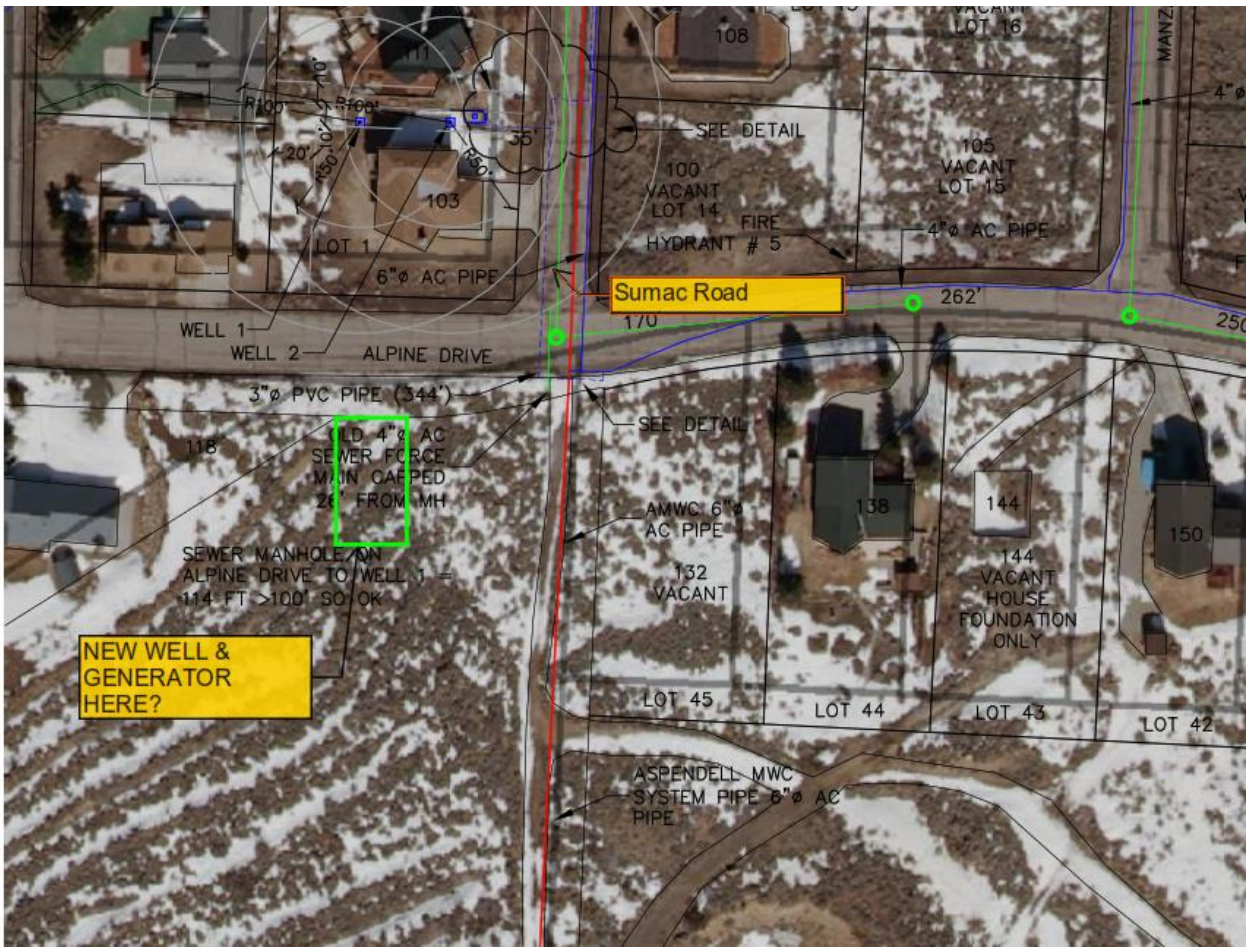
Possible location of a higher capacity well & generator facility.

It is close to the road and can have the drive way plowed. It fits the required distances from the sewer & manhole and from building sewer.

It could also include a PRV to step the pressure down to provide water to Aspendell MWC & a pumping station to boost the pressure from AMWC up to Alpine Water Company.

Alpine Water Company could ask Aspendell MWC for an easement or sell them a piece of the parcel.

All other locations are on Tony's property far off the paved & plowed road. They would need to be 100 ft from a sewer manhole and 50 ft from a sewer pipe or house sewer pipe.



New Drought Requirements for Small Water Suppliers

Senate Bill Number 552 (SB 552)

Signed in September 2021, SB 552 introduces and summarizes the new responsibilities and requirements for state and local government (counties and small water suppliers) in preparation of a water shortage event.

Scope of SB 552

Under SB 552, state and local governments will share the responsibility in preparing and acting in the case of a water shortage event. The new law outlines basic steps for small water suppliers, county governments, California Department of Water Resources, and the State Water Board to implement more proactive drought planning and impact prevention and to be better prepared for future water shortage events.

What does SB 552 require from Small Water Suppliers?

SB 552 considers several categories of small water suppliers: those suppliers with 15 to 999 connections, those with 1,000 to 2,999 connections inclusive, and non-transient non-community (NTNC) water systems that are schools (see Table 1).

Table 1. Requirements for Small Water Suppliers by Size, per SB 552

Summary of Requirement	Community Water Systems 1,000-2,999 connections	Community Water Systems 15-999 connections	NTNC Water System Schools
Drought Resiliency Measures	Yes	Yes	Yes
Abridged Water Shortage Contingency Plan	Yes	No	Yes
Drought Element added to Emergency Notification or Response Plan	No	Yes	No
Annual reporting of water supply condition information to the State Water Board	Yes	Yes	Yes
Annual water demand reporting to the State Water Board	Yes	Yes	Yes

For more information about the State's Drought Response and Assistance, please visit: drought.ca.gov.

Small Water Suppliers with 15-2,999 connections + NTNC schools

New Annual Reporting Requirements

All small water suppliers (community water systems with 15-2,999 connections) and non-transient non-community water systems that are schools (NTNC schools) must report water supply condition, production, and demand information to the State Board annually.

Implement drought resiliency measures, subject to funding availability

- Detect production well groundwater levels - *January 1, 2023*
- Mutual aid organization membership - *January 1, 2023*
- Continuous operation during power failures - *January 1, 2024*
- Backup source of water supply or a water system intertie - *January 1, 2027*
- Meter each service connection and monitor water loss - *January 1, 2032*
- Meet fire flow requirements - *January 1, 2032*

Water Shortage Contingency Planning

1,000-2,999 connections + NTNC schools: Small water suppliers serving 1,000 to 2,999 service connections and NTNC schools must develop and maintain a Water Shortage Contingency Plan that includes specified drought-planning elements no later than July 1, 2023. Suppliers must prepare an updated plan every five years thereafter. The State Water Board and Department of Water Resources are preparing a template for the water shortage contingency plan for small suppliers by December 31, 2022. Required plan elements include:

- Specified drought planning contacts
- Water shortage levels corresponding to water supply conditions
- Triggering mechanisms to acknowledge water shortage levels
- Response actions to address each of the shortage levels

15-999 connections: Small water suppliers serving 15-999 service connections must incorporate drought planning elements (including, but not limited to, drought-planning contacts and standard water shortage levels) into their Emergency Notification Plan (ENP) or Emergency Response Plan (ERP).

Resources

Tools, updates, events and other resources are available here:
https://water.ca.gov/Programs/Water-Use-And-Efficiency/SB552

Contact: drought@waterboards.ca.gov

For more information about the State's Drought Response and Assistance, please visit: drought.ca.gov.