Burney Water District

SOURCE WATER PROTECTION PLAN

December 2016

Burney Water District

Adopted by the Source Water Protection Plan Steering Committee:

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Date

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Introduction

Background

In 1996, the Safe Drinking Water Act (SDWA) was amended to require that each state develop and implement a source water assessment program.

California Department of Public Health responded to this amendment by creating and implementing the Drinking Water Source Assessment and Protection (DWSAP) Program[1] to evaluate each drinking water source in the state. This evaluation includes a determination of how susceptible each drinking water source is to contamination and uses these key elements as the basis for the assessment:

- A delineation of the area around a drinking water source through which contaminants might move and reach that drinking water supply.
- An inventory of possible contaminating activities (PCAs) that might lead to the release of microbiological or chemical contaminants within the delineated area.
- A determination of the PCAs to which the drinking water source is most vulnerable.

California Department of Public Health has overseen the completion of assessments for every drinking water source in the state. Considering that the potential threats to the sources of drinking water have been identified, the natural extension to the assessment is the development of a source water protection plan.

Purpose

A source water protection plan is a document, created with the assistance of members of the community, which identifies possible contaminating activities within drinking water source protection areas and provides specific recommendations to manage these potential threats in order to maintain quality drinking water. The recommendations necessary to make this document viable include:

- Prevention of Possible Contaminating Activities (PCAs)
- Contingency planning in the event of a water supply emergency
- Community education and outreach

Why Source Water Protection?

1. **Because the most cost-effective method to ensure the safety of the drinking water supply is to protect the source from contamination.**
2. **Because it is part of a "multi-barrier" approach to providing safe drinking water; treatment alone cannot always be successful in removing contaminants.**
3. **To improve public perception of the safety of drinking water.**
4. **Because safe drinking water is essential to the public health and economic well-being of communities.**

Source protection planning benefits include:

- Increased consumer awareness about drinking water sources
- Creation of consumer confidence that a drinking water source will continue to be protected and reliable;
- Reduction of risk of contamination incidents with costly and/or potentially harmful results;
- Fostering of positive, proactive relationships with regulatory agencies, water system operators and the public
- Documentation of groundwork to support financial assistance proposals on behalf of the watershed.

Groundwater a Hidden Resource

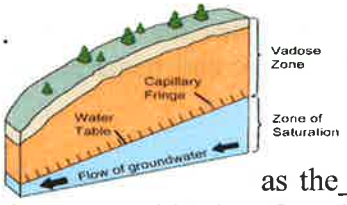
Water. It's vital for all of us. We depend on its good quality-and quantity-for drinking, recreation, use in industry and growing crops. It also is vital to sustaining the natural systems on and under the earth's surface.

Groundwater is a hidden resource. At one time, its purity and availability were taken for granted. Now contamination and availability are serious issues. The importance of groundwater has been confirmed many times. Scientists estimate groundwater accounts for more than 95% of all fresh water available for use. Approximately 50% of Americans obtain all or part of their drinking water from groundwater. Nearly 95% of rural residents rely on groundwater for their drinking supply. About half of irrigated cropland uses groundwater. Approximately one third of industrial water needs are fulfilled by using groundwater. About 40% of river flow nationwide (on average) depends on groundwater.

Thus, groundwater is a critical component of management plans developed by an increasing number of watershed partnerships.

Groundwater ABCs

Groundwater is the water that saturates the tiny spaces between alluvial material (sand, gravel, silt, clay) or the crevices or fractures in rocks.



Aeration zone: The zone above the water table is known as the zone of aeration (unsaturated or vadose zone; also termed as the unsaturated zone).Water in the soil (in the ground but above the water table) is referred to as soil moisture. Spaces between soil, gravel and rock are filled with water (suspended) and air.

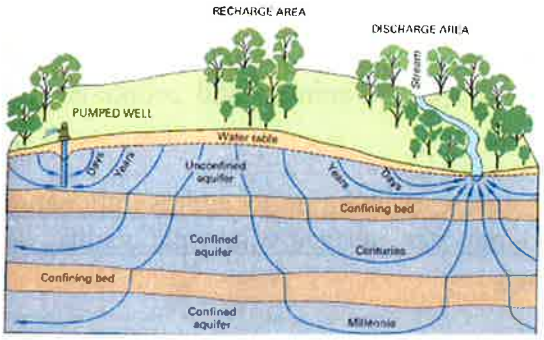
Capillary water: Just above the water table, in the aeration zone, is capillary water that moves upward from the water table by capillary action. This water can move slowly in any direction, from a wet particle to a dry one. While most plants rely on moisture from

the Greek *phrear*, *phreat-* meaning "well" or "spring"). "Phreatic surface" is a synonym for "water table".

The **phreatic zone** is the layer(s) of soil or rock below the water table in which voids are permanently saturated with groundwater, as opposed to the higher *vadose zone* in which the pore spaces are not completely filled with water.

Water-bearing rocks: Several types of rocks can hold water, including:

Sedimentary deposits (i.e. sand and gravel)
Channels in carbonate rocks (i.e. limestone)
Lava tubes or cooling fractures in igneous rocks
Fractures in hard rocks



How Groundwater and Surface Water connect

It's crystal clear. Groundwater and surface water are fundamentally interconnected. In fact, it is often difficult to separate the two because they "feed" each other. This is why one can contaminate the other.

A way to study this connection is by understanding how water recycles in the hydrologic (water) cycle.

As rain or snow falls to the earth's surface, some water runs off the land to rivers, lakes, streams and oceans (surface water). Water also can move into those bodies by percolation below ground. Water entering the soil can infiltrate deeper to reach groundwater which can discharge to surface water or return to the surface through wells, springs and marshes. Here it becomes surface water again. And, upon evaporation, it completes the cycle. This movement of water between the earth and the atmosphere through evaporation, precipitation, infiltration and runoff is continuous.

How groundwater "feeds" surface water

One of the most commonly used forms of groundwater comes from unconfined shallow water table aquifers.

These aquifers are major sources of drinking and irrigation water. They also interact closely with streams, sometimes flowing (discharging) water into a stream or lake and sometimes receiving water from the stream or lake.

An unconfined aquifer that feeds streams is said to provide the stream's base-flow. This is called a gaining stream. In fact, groundwater can be responsible for maintaining the hydrologic balance of surface streams, springs, lakes, wetlands and marshes.

Figure 1: Hydrologic Cycle

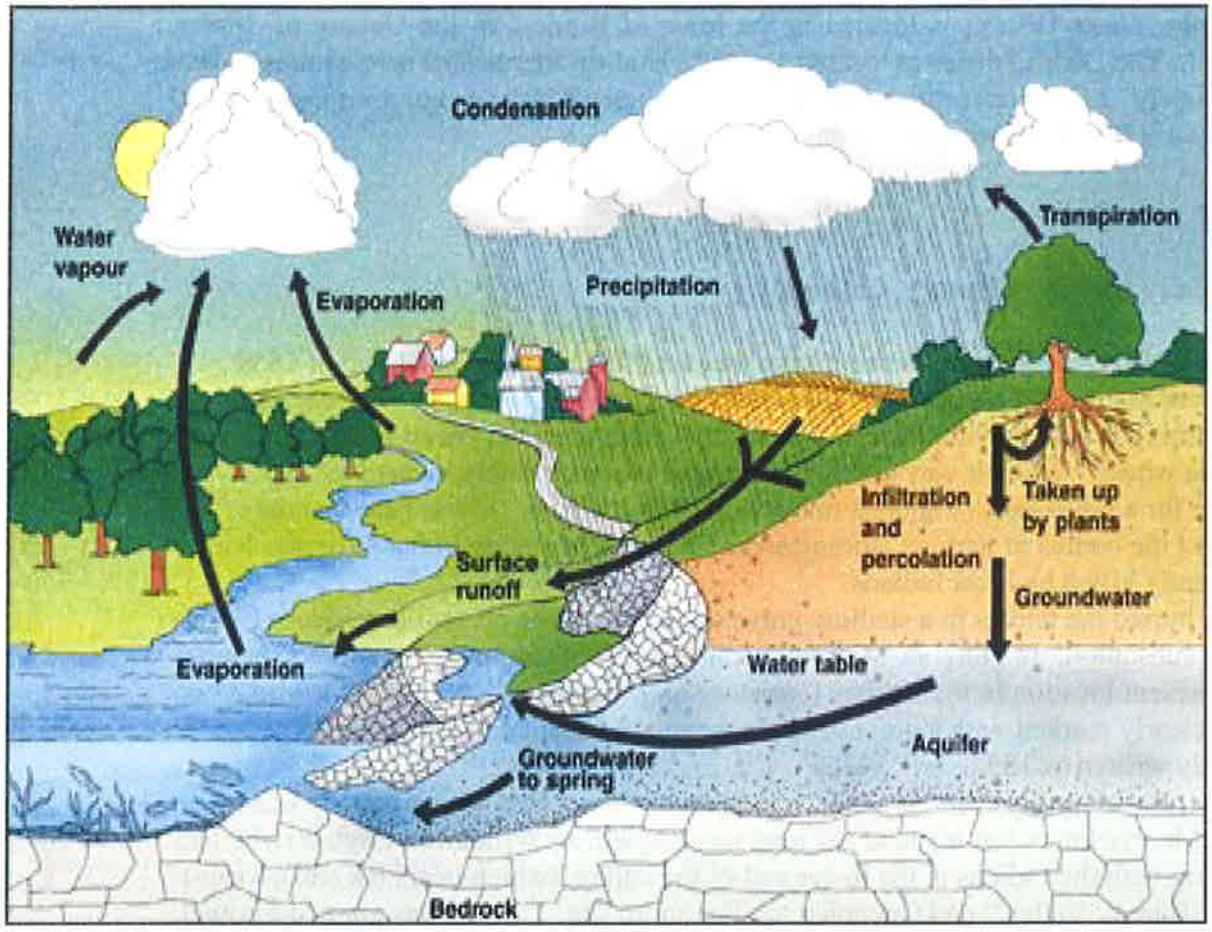


Figure 1 represents a general illustration of the hydrologic cycle that occurs in the Yucaipa area. This illustration is by no means site specific and is simply being used as a reminder of how groundwater and surface water are influenced by this natural cycle.

1881. Dr. Pierce and A. W. Gale opened a general merchandise store, hotel and post office in the 1880's that was located along main street.

Local Historian: Thelma Shiplet
Source Credit: Burney Chamber of Commerce

Hydrology & Geology

Sacramento River Hydrologic Region California's Groundwater
Burney Creek Valley Groundwater Basin Bulletin 118
Last update 2/27/04

Burney Creek Valley Groundwater Basin

- Groundwater Basin Number: 5-48
- County: Shasta
- Surface Area: 2,350 acres (4 square miles)

Basin Boundary and Hydrology

The Burney Creek Valley Groundwater Basin consists of Quaternary lake deposits bounded to the west by north trending faults. The basin is bounded on all sides by Pleistocene basalt (Gay 1958). Burney Creek drains the valley to the north. Annual precipitation is approximately 27 inches.

Hydrogeologic Information

Hydrogeologic information was not available for the following:

Water-Bearing Formations
Groundwater Level Trends
Groundwater Storage
Groundwater Budget (Type B)

The estimate of groundwater extraction for Burney Creek Valley Basin is based on a 1995 survey conducted by the California Department of Water Resources. The survey included land use and sources of water. Groundwater extraction for municipal and industrial uses is estimated to be 790 acre-feet. Deep percolation of applied water is estimated to be 490 acre-feet.

Groundwater Quality

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	0	0
Radiological	0	0
Nitrates	1	0
Pesticides	0	0
VOCs and SVOCs	0	0
Inorganics – Secondary	0	0

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).

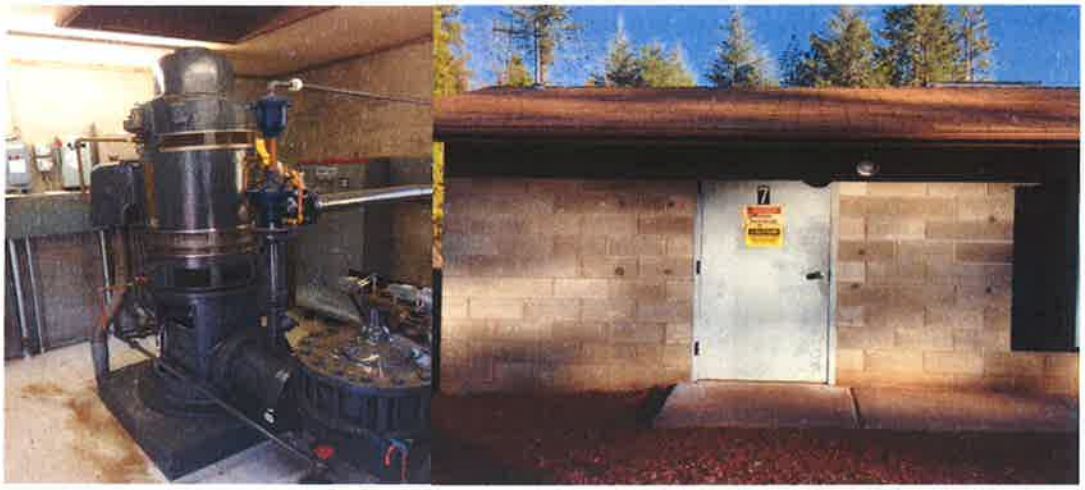
Paleotectonics in Northern California. Geological Society of America Bulletin 90:1458-1528.

Planert M, Williams JS. 1995. Ground Water Atlas of the United States, Segment 1, California, Nevada. USGS. HA-730-B.
Rose T P, Davisson ML. 1996. Radiocarbon in Hydrologic Systems Containing Magmatic Carbon Disoxide. Science 273: 1367 - 1370.
Rose, T P, Davisson ML, et al. 1996. Isotope Hydrology of Voluminous Cold Springs in Fractured Rock Form An Active Volcanic Region, Northeaster California. Journal of Hydrology 179.

Well #7

ID#: 4510003-004

Well #7 is a 16-inch diameter well located on the well-field parcel located at the south-central extremity of the District boundary. The well was constructed in 1982 using the cable-tool method to a total depth of 300 feet. The annual seal extends from the surface to 50 feet below ground surface and is constructed of cement grout. The 50 feet of production zone is screened from 250-300 feet below ground surface. The Byron-Jackson vertical turbine pump is driven by a 250 horsepower General Electric 3-phase motor.



Well #7 Pump-house and Vertical Turbine Pump

TABLE 1: Water System & Source Summary				
Well 6				
System #		**Population**	**Connections**	
4510003		3,120	1,300 (low pressure zone)	
Source Name	**Source #**	**Type**	**Yield (GPM)**	**Max. GPD**
Well 6	4510003-003	Ground	1,400	2,000,000
Well 7				
System #		**Population**	**Connections**	
4510003		883	368 (high pressure zone)	
Source Name	**Source #**	**Type**	**Yield (GPM)**	**Max. GPD**
Well 7	4510003-004	Ground	1,740	2,500,000
Well 8				
System #		**Population**	**Connections**	
4510003		3,120	1,300 (low pressure zone)	
Source Name	**Source #**	**Type**	**Yield (GPM)**	**Max. GPD**
Well 8	4510003-005	Ground	1,500	2,160,000

The delineation is divided into three different classifications with a minimum radii distance for each:

600 feet for **Zone A** (microbiological)
1,000 feet for **Zone B5** (chemical)
1,500 feet for **Zone B10** (chemical)

For fractured rock aquifers, the minimum radii are:

900 feet for **Zone A** (microbiological)
1,500 feet for **Zone B5** (chemical)
2,250 feet for **Zone B10** (chemical)

Protection Zones Glossary

Zone A: Is defined by a **two-year** time of travel. Purpose is to protect the drinking water supply from viral, microbial, and direct chemical contamination.

Zone B5: Is defined by a **five-year** time of travel. Purpose is to provide for more response time for chemical spills than Zone A.

Zone B10: Is defined by a **ten-year** time of travel. Purpose is to allow for recognition of the long-term aspects of potential contamination.

TABLE 2: Ground/Sourcewater Delineation

Water System	Source Name	Calculated Fixed Radius (fractured rock)	ModifiedCalculated Fixed Radius (fractured rock)	Zone	Radius (feet)
Burney Water District	Wells 6,7,and 8	X		A	2,765
				B5	4,404
				B10	6,228
Burney Water District (upgradient)	Wells 6,7,and 8		X	A	4,177
				B5	6,606
				B10	9,346
Burney Water District (downgradient)	Wells 6,7,and 8		X	A	1,393
				B5	2,202
				B10	3,354

Notes for Clarification:

1. It is well documented in the supporting literature that groundwater flow in the Burney Groundwater Basin is south to north. Basically, groundwater flows from the mountains to the south of Burney northward and downgradient similarly to the flow of Burney Creek with much of the groundwater surfacing as spring flow at Burney Falls and Lake Britton.
2. Any potential contamination event south of the Burney Water District is much more likely to impact water quality at the Districts' well field than a contamination event north and downgradient of Burney.
3. This sourcewater protection plan utilizes the Modified Calculated Fixed Radius method of determining the area to be protected. In other words, the three zones of protection extend much further upgradient of the District's well field than downgradient of the well field.

Assessment of Threats

Definition

The assessment of threats consists of current and future vulnerabilities in the Source Protection Areas. Using the Drinking Water Source Assessments, information was compiled for the Burney Water District concerning zoning and land uses associated with activities that either are, or could threaten the quantity or quality of the area's water supplies.

Possible Contaminating Activities

These potential and known threats to the drinking water sources were determined from the Drinking Water Source Assessment and Protection Program and/or field observations from water system personnel:

TABLE 3: Possible Contaminating Activities (PCAs)

	Zone A	Zone B5	Zone B10
Sewer Collection System	X (High Risk)	X (Low Risk)	X (Low Risk)
High Density Housing	X (Moderate Risk)		
Parks		X (Moderate Risk)	
Apartments & Condominiums	X (Low Risk)		
Managed Forests	X (Moderate Risk)	X (Moderate Risk)	X (Moderate Risk)
Water Supply Wells	X (Moderate Risk)		
Historic Railroad Right-of-way	X (Moderate Risk)	X (Moderate Risk)	X (Moderate Risk)
Roads & Streets	X (Low Risk)	X (Low Risk)	X (Low Risk)
Storm Water Detention Facilities	X (Moderate Risk)	X (Moderate Risk)	X (Moderate Risk)
Surface Water Streams / Lakes	X (Low Risk)	X (Low Risk)	X (Low Risk)

3. Residents should be encouraged to properly dispose of waste oil and other fluids.

Who?	Date Implemented?
Burney Water District	

Managed Forestlands – Modern Forestry and Silvicultural practices result in some of the healthiest watersheds in the world. However, some specific forestry activities can harm watersheds and groundwater aquifers. Improper chemical treatment to control weed species has the potential to impair drinking water quality by introducing regulated contaminants to the water source. Catastrophic events such as wildfire & wind-throw can open up the forest floor leading to increased sediment loading in streams during subsequent storms. Also, timber harvesting operations must be planned carefully and executed properly to avoid excessive sediment loading in streams. California Forest Practice Rules, along with applicable Water Quality regulations ensure both, keeping the risk for this contamination lower than might exist in other regions of the country.

Best Management Practices:
The Board and Staff of the Burney Water District should seek to cultivate a *partnership* type relationship with the several Forestry and Wood Products firms located within the protection zones. Indeed, land use in vast areas to the south of the community of Burney (upgradient) is primarily forestry related.

1. Facilitate informational meetings with the several large forestland owners to gain mutual understanding of the challenges inherent to public drinking water and forest management. Example: Knowledge of the location and protective infrastructure for Burney wells, both in service or abandoned, will enable forestland managers to incorporate appropriate protective measures into their plans for operations.
2. Collaborate to publish information about the partnership to protect the community's water supply.

Who?	Date Implemented?
Burney Water District	

Raymond Berry Community Pool & Park – Pool chemicals kept onsite could compromise the drinking water source if used or stored incorrectly. Furthermore, a chemical delivery accident could create an unforeseen emergency for water system personnel. Materials spilled, leaked, or lost from storage tanks may accumulate in soil or be carried away in storm water runoff.

Best Management Practices:

1. Review and evaluate SOP's for safe chlorine storage and handling.
2. Assess the vulnerability of the pool and park facilities with regards to vandalism / break-in.
3. Limit the use of herbicides and pesticides within the park area

Public Education and Outreach

Public education and outreach are some of the most effective actions a community can implement to protect their water supply. Most citizens are open to helping in the effort to protect their water supply, but many people are unaware of that their own behavior may cause great harm. It is recommended that the District publish some of the following internet links in their upcoming consumer confident reports to keep the general public informed:

EPA Recycling and Waste Homepage
http://www.epa.gov/epawaste/index.htm

Hazardous Waste Publications
http://www.epa.gov/epawaste/hazard/index.htm

Engine Oil Recycling
http://www.recycleoil.org

Disposal and Management of Leftover Paint
http://www.paintcare.org/drop-off-locations/

Non-Toxic Cleaning in the Home
http://www.ns-products.com/nontox.htm

Non-Point Source Protection for Kids
http://www.epa.gov/owowwtr1/NPS/kids/index.html

Septic Systems and Source Water Protection
http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm

Watershed Information
http://www.epa.gov/owow/watershed/why.html

Transportation

Caltrans District 2
1657 Riverside Drive
Redding, CA 96001
(530) 225-3426

Section 2 DESCRIPTION OF THE WATER SYSTEM

Name of System: Burney Water District

Population Served: 3,154

Service Connections: 1,313

Sources of Supply: 3 Active Wells / Single Source Aquifer

Interconnections with other Public Water Systems: None

Storage of Finished Water: Three Storage Tanks with a total capacity of 6.7 MG

Sources of Power: Normal: PG&E Emergency: Natural Gas Fueled Engine

Actual Location of System Maps and Records: 20222 Hudson Street, Burney, CA 96013

Section 3 SUMMARY OF POTENTIAL SOURCE OF CONTAMINATION

A. Potential Sources of Contamination: Sewage Spills, Abandoned Wells, Managed Forestland

B. Other Sources of Contamination: Park & Pool, Storm Water Detention Facilities

C. Spill Response Activities: Willie Rodriguez, District Manager (530) 335-3582

Section 4 ALTERNATIVE WATER SUPPLY OPTIONS

1. Emergency Conservation (Implement Emergency Notification Plan) – Media, Door to door, post flyers, and phone calls
2. Emergency Treatment – Direct chlorination applied at well heads
3. Boil Water Order
4. Bottled Water

Section 5 PRIORITY WATER USERS AND CONSERVATION MEASURES

A. Customers that would be requested to voluntarily reduce or eliminate water use:

1) Residential – Landscape Irrigation

B. Select conservation measures to be implemented in the event of the need to reduce demand:

1) Public Notice

References:

[1] California Department of Public Health: California's Drinking Water Source Assessment and Protection (DWSAP) Program, Overview, 2004.
[2] History of the Burney Water District / F.E. Jarrett, Bill Suppa, Valerie Dickinson
[3] California Groundwater Bulletin 118: California Department of Water Resources
[4] Groundwater Resource Evaluation of the Burney Basin / CH2M Hill / October 1988
[5] Burney-Hat Creek Basins Project / United States Forest Service / February 2011