

2023

Stockton Creek Watershed
Sanitary Survey



Mariposa Public Utility District

11/30/2023

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History and Introduction

The Mariposa Public Utility District (MPUD) was established in 1947 under the "Public Utilities Act of 1921". The District was formed in response to a report and recommendation prepared by the Mariposa County Planning Commission. At issue was the provision of a safe adequate water supply, sanitary disposal of wastewater and adequate fire protection for the Town of Mariposa.

The documents which establish the MPUD do not delineate any specific purposes or functions for the District. Presently, MPUD provides water and wastewater services. The District consists of 873 acres of land.

MPUD is an independent district; policy is established by a Board of Directors. The Board consists of five members elected at large. Directors must be a resident and qualified elector of the District. Directors meet the first Tuesday of each month at 6:30 p.m.

MPUD is basically an enterprise district. The Board sets charges for services provided by the District. These charges are collected on a monthly basis for each service (water and wastewater).

Up until the creation of MPUD, the domestic water supply was derived from springs and wells of small capacity and poor quality. As the community grew, the privately owned springs and wells proved to be insufficient to meet the water demands of the community. Engineering studies for fire protection and water supply completed in 1948 identified Stockton Creek as a potential water source to meet the needs of the growing community. On September 10, 1948, the voters within the District authorized the sale of general obligation bonds to finance the local cost share of the public water system in Mariposa.

MPUD received bids for the construction of a dam on Stockton Creek on December 20, 1949, and construction was completed November 15, 1950. The dam failed during the first filling on November 19, 1950. Repairs were made in 1951 and the dam has been in service since that time.

The initial capacity of the Stockton Creek Reservoir was 380-acre feet (123,815,000 gallons). In 1969 the District constructed a flashboard structure in the spillway which increased the capacity to 440-acre feet (143,365,000 gallons).

When the reservoir was first constructed, the District acquired a water right license for the impoundment of 320-acre feet per year by storage and a maximum withdrawal of 245-acre feet per year.

After the improvements at the spillway, the water rights license was amended to 428-acre feet by storage and maximum withdrawal of 302-acre feet per year. History indicates a safe annual yield of 200-acre feet per year.

Subsequent development and the drought of 1976-77 proved the Stockton Creek Reservoir was an inadequate source of supply for the District. During the 1980's, MPUD developed and acquired several ground water wells that eventually proved to be unreliable as adequate water sources.

The District completed construction of a pumping plant and water transmission main to convey water from the Merced River to the MPUD Water Treatment Facility in 1997. A watershed sanitary survey of the Merced River has been prepared as a separate report on file with State Water Resources Control Board. The purpose of this report is to address the condition of the Stockton Creek watershed.

MPUD maintains two surface water sources. The Stockton Creek Reservoir is a 440-acre foot impoundment approximately one mile east of the town of Mariposa. The Stockton Creek Reservoir collects runoff from a six square mile watershed in the Sierra foothills. Elevation ranges from 2,000 to 3,200 feet. All runoff is from seasonal rainfall. There is no significant snow accumulation in the Stockton Creek watershed. There is a 7,000 foot long 10" pipeline from the dam to the Surface Water Treatment Facility near town. The Stockton Creek Reservoir is the primary surface water source for the MPUD water system. In the event of low run-off in the Stockton Creek watershed, the District can divert water from the Saxon Creek water project to the Stockton Creek Reservoir.

The drought beginning in 2013 caused the District to rely more heavily on its ground water sources. Three water wells were pumped, totaling 46,728,810 gallons of water in 2015. During this period, the Stockton Creek Reservoir saw insignificant rain fall accumulation. Water from the Saxon Creek water project was diverted from the Merced River in an attempt to fill the Stockton Creek Reservoir, but pumping was curtailed in April. The reservoir was recharged to 353-acre feet.

The existing sources of water including Merced River, Stockton Creek and four groundwater wells are adequate for future growth of the District. Major changes in the town's growth rate and water quality/water rights requirements could affect the future capacity of these sources.

Stockton Creek Watershed

1. General Description:

The impoundment on Stockton Creek collects runoff from 5.37 square miles of watershed. The elevation ranges from 2,200 to 3,600 feet and is located within Townships 4 and 5 South and Ranges 18 and 19 East (USGS map). This area is considered to be part of the foothills of the Sierra Nevada mountain range. Snowfall in the watershed is considered to be insignificant with respect to water supply as there is no snowpack accumulated. Generally, snowfall at an elevation lower than 5,000 feet is transient and may accumulate and melt several times during a winter season. Snow at the 3,500-foot elevation will melt and runoff within a few days after snowfall. The average rainfall is 28 inches per year ranging from a low of 12 inches to a high of 50 inches. Rainfall usually occurs between the months of November and April. The gauging station for rainfall nearest the watershed is at the MPUD Surface Water Treatment Facility. MPUD has maintained periodic rainfall records since 1947. See page 16 for the most recent five-year period.

2. Geology:

Stockton Creek Reservoir is in the Western Sierra Nevada geomorphic province. The province consists essentially of a great block which has been uplifted on the eastern boundary faults while the western margin has remained relatively stationary and rotated as a hinge. As a result of this tectonic uplift (which continues in present time) the eastern edge of the province consists of a series of steep fault scarps culminating in high mountain peaks, while west of those peaks the province slopes gently westerly with an average inclination of about two degrees.

Bedrock exposed in the eastern half of the province, where uplift (and consequent erosion) has been greatest, consists largely of Mesozoic granitic rock from the batholiths which forms the provincial core, and scattered bodies of Mesozoic through recent volcanic rock. Surface rocks on the western half of the province, as far south as the town of Mariposa, include a belt of metamorphosed late Paleozoic, early Mesozoic sedimentary and eugeosynclinal deposits. This belt, which generally follows the presently active Sierra Foothills fault zone, is bordered on both sides by broad Mesozoic through Recent volcanic and alluvial deposits. South of the town of Mariposa, however, the volcanic and alluvial zones are truncated by granitic rocks of the provincial core. From that point to the southern limit of the province, the bedrock consists essentially of granitic rock except for scattered bodies of colluvium and locally deep bodies of valley fill alluvium.

3. Vegetation:

Most of the area within the watershed is covered with moderately dense brush consisting primarily of Chaparral, Toyon, Manzanita and Chamise. Mixed with the brush and in small open areas there are Redbud, California Buckeye, Gray Digger Pine, Interior Live Oak, Canyon Oak and at higher elevations Ponderosa Pine and Black Oak. Areas cleared for development, grazing and fire protection are covered with annual grasses, larger trees, and Ponderosa Pine.

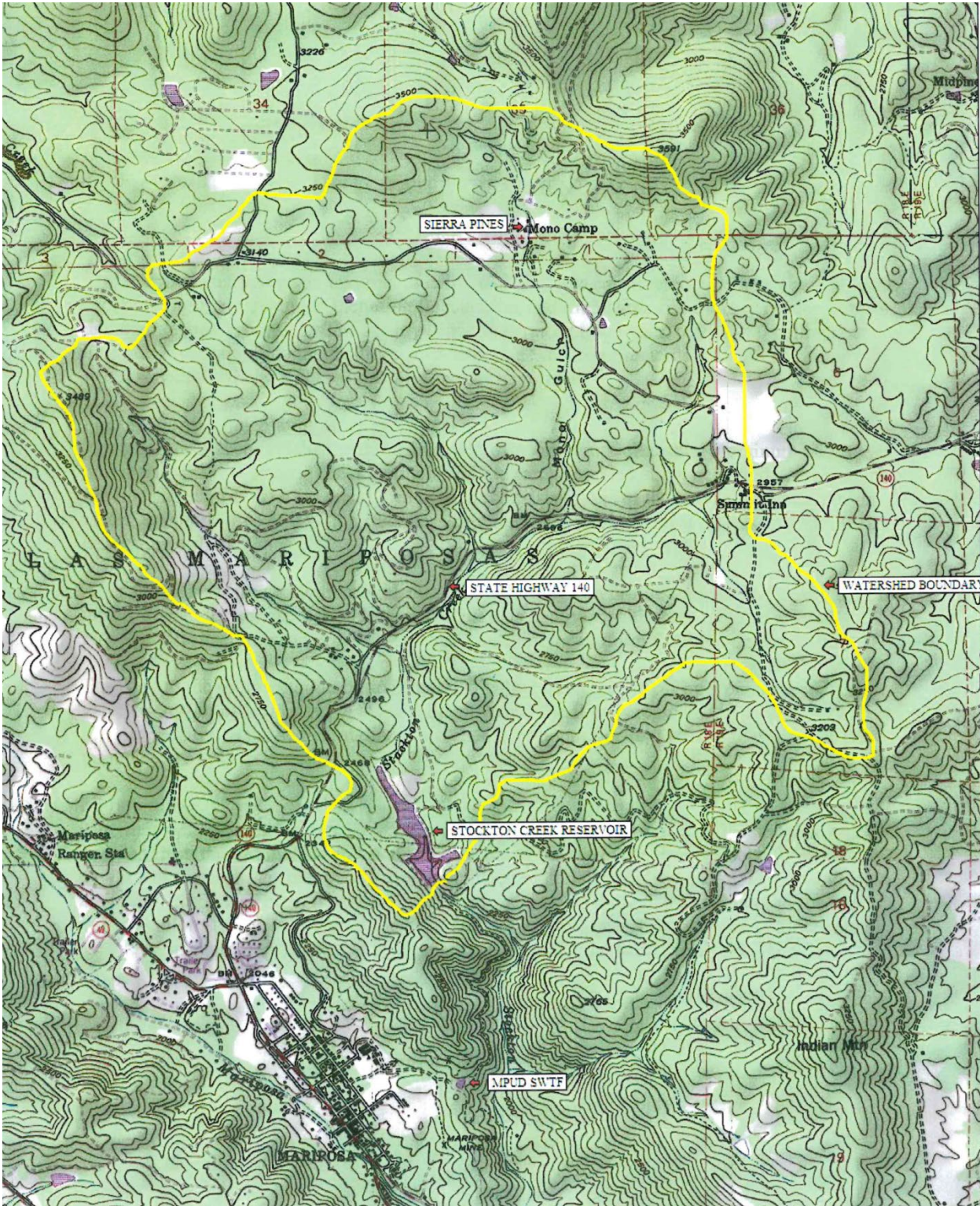
4. Wildlife:

Wildlife in the watershed could be considered typical for the Sierra Nevada foothill areas. Species in the area include deer, coyote, bobcat, raccoon, skunk, and fox. There have been some reports of mountain lion and bear observed in the watershed area. There are no known populations of fish in the streams draining into the watershed.

5. Recreation:

In general, the MPUD Board of Directors does not allow public recreational use of the Stockton Creek Reservoir. On a case-by-case basis, the Board has allowed well organized and supervised groups to fish at the reservoir. Usually, the groups will be required to supply their own sanitary and solid waste facilities. Under no circumstances is the public allowed to make body contact with the water in the reservoir.

Map of Watershed



6. Stockton Creek Watershed Preserve and Trails

In 2011, the District, in collaboration with the Sierra Nevada Conservancy (SNC) and the Sierra Foothill Conservancy (SFC) acquired 410 acres of land in 2011 adjacent to and upstream of the Stockton Creek Reservoir. MPUD and SFC have been constructing public use trails and sponsoring fuel reduction projects and organizing tours in the watershed. Over 4 miles of trails and two trail head kiosks are available for public access to the preserve. Over time the project is expected to reduce the risk of catastrophic fire, improve water quality, and enhance wildlife habitat in the watershed.

The District Board of Directors adopted the following policies for public access to the Stockton Creek Preserve and Trails:

- Motorized vehicles are prohibited outside of Slaughter House Road and Highway 140 except for MPUD authorized vehicle access for water system and conservancy land maintenance.
- Public access to the waters of Stockton Creek Reservoir is prohibited.
- Overnight camping and campfires are prohibited on the District owned property within the preserve and Stockton Creek Reservoir.
- Recreational Mining is permitted and means the extraction of minerals primarily for recreation on a seasonal basis and using such devices as pan, rockers, sluices, glassing or sniping and metal detectors. Any mechanical or motorized devices are prohibited including suction dredges as specified by the California Department of Fish and Game for specified waters in the state. In addition, soils and overburden, including any material processed through permitted means, shall be returned back to their origin and all excavation sites filled in upon completion.



Stockton Creek Preserve Trails Map (2022)

Surface Water Treatment Facility

General Description

The MPUD Surface Water Treatment Facility (SWTF) is licensed by the State Water Resources Control Board (SWRCB), system number 2210001. All major components of the public water supply system, including the SWTF, are monitored by staff on a daily basis. The SWTF is in operation 24 hours per day. The SWTF treats from .15 million gallons per day to approximately .66 million gallons per day, depending upon the time of year.

The Surface Water Treatment Facility is located at 4888 Trabucco Street at an elevation of approximately 2,200 feet. The facility provides treatment of the two surface water sources – Stockton Creek Reservoir and the Saxon Creek water project (Merced River). The original water treatment facility was constructed at the same site in 1950 to take advantage of the geography for gravity flow from the Stockton Creek Reservoir. This location is a natural saddle on an unnamed minor mountain ridge extending from the confluence of Stockton and Mariposa Creeks to the south, north to Highway 140. The first facility installed in 1950 provided sedimentation and storage in an unlined pond. Sometime between 1950 and 1960 chlorine was added to the public water supply. In the 1960's the regulating basin was cement lined with one baffle to improve sedimentation and water quality. In 1963 gravity filters were installed. Improvements to the 1984 water treatment facility provided complete treatment including coagulation, flocculation, sedimentation, filtration, corrosion inhibitor and disinfection processes.

The District completed construction of a new Surface Water Treatment Facility (SWTF) in August of 2013. The design capacity is one million gallons per day. All surface water sources are treated at the SWTF.

The primary components of the new facility include a clarifier/flocculation tank, membrane filters, granular activated carbon reactors, emergency power generator, replacement of all chemical feed systems and a new operations building. The new facility is required to meet a .1 NTU turbidity standard. The facility will enable the District to consistently meet current safe drinking water standards adopted by the USEPA and the SWRCB.

Raw Surface Water Source Bacteriological Monitoring

The raw surface water is monitored once a month from its intake sampling station. The surface water results have occasional spikes of 1600 MPN/100 mL for total coliform and 118 MPN/100 mL for E. coli that coincide with heavy rain events. The permit provision requires that the raw surface water monitoring frequency must increase to weekly samples from the source when the total coliform results exceed 1000 MPN/mL and/or the E. coli bacteria results exceed 200 MPN/100 mL. If the analytical test method employs the MMO-MUG test media, only the E. coli of 200 MPN/100 mL shall trigger the increased monitoring.

	Stockton Creek, E. coli *Saxon Creek MPN/100 mL						Stockton Creek, Total Coliform *Saxon Creek MPN/100 mL					
	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
Jan.	1.0	<1	53.1	1.0	<1	<1	11	<1.8	540	4.5	<1.8	4.5
Feb.	11.1	<1	118.4	2.0	118.4	<1	1600	2.0	220	2.0	1600	2.0
March	1.0	27.1	30.6	<1	<1	<1	17.0	79	920	<1.8	13	<1.8
April	<1	7.5	6.4	8.7	2.0	2.0	11	13	34	17	6.8	4.5
May	<1	2.0	<1	<1	<1	<1	13	13	<1.8	4.5	23	4.5
June	<1	<1	<1	<1	<1	<1	<1.8	2.0	1.8	<1.8	22	7.8
July	<1	2.0	1.0	1.0	<1	<1	4.5	<1.8	14	<1.8	33	4.5
Aug.	<1	<1	15.0	1.0	<1	1.0	170	<1.8	49	<1.8	21	6.8
Sept.	<1	<1	2.0	<1	<1	<1	33	4.0	110	2.0	7.8	24
Oct.	<1	1.0	5.3	<1	<1	<1	<1.8	6.8	11	2.0	22	17
Nov.	1.0	<1	<1	<1	<1.0	<1	13	4.5	3.7	<1	<1.8	6.8
Dec.	2.0	9.9	2.0	<1	<1	7.5	<1.8	70	7.8	4.5	<1.8	49

Raw Water Chemical Monitoring							
<u>Stockton Creek</u>							
Constituent	Unit	Year					
		2017	2018	2019	2020	2021	2022
Primary Drinking Water Standards - Detection of Contaminants							
Aluminum	mg/L		0.025				
Barium	mg/L		0.013				
Nickel	µg/L		1.1				
Secondary Drinking Water Standard - Detection of Contaminants							
Calcium	mg/L	21	19	22	21	22	25
Magnesium	mg/L	11	9	11	10	11	12
Total Alkalinity as CaCO ₃	mg/L	95	91	94	93	93	100
Bicarbonate Alkalinity	mg/L	120	110	110	110	110	100
Sulfate as SO ₄	mg/L	8.7	7.3	7.7	6.1	10	11
Chloride	mg/L	2.5	2.0	2.2	1.8	2.4	2.4
Specific Conductance	umho/cm	200	200	210	200	210	230
Total Dissolved Solids	mg/L	120	160	120	120	140	140
Color	CU	5	15	5	25	25	15
Odor	TON		1				
Langelier Index		-0.20		0.19	-0.39	-0.54	0.22
Potassium	mg/L		1.2				
Iron	µg/L		110		130	120	99
Manganese	µg/L		32	25	49	35	55

Raw water chemical monitoring is consistent over time. The Saxon Creek surface water source was not used during the reporting period.

Specific Potential Hazards

Transportation:

A. State Highway:

California State Highway 140 is an all-year access to Yosemite National Park. There are approximately 2.5 miles of State Highway located within the watershed. Commercial use of the highway consists of transportation for fuels, Yosemite National Park visitors (via bus), food and supplies bound for Yosemite National Park. If a spill of fuels (gasoline, diesel, or propane) occurred, the amount of contaminate would be limited to a maximum 10,000 gallons. Some of the product may be carried by Stockton Creek to the reservoir which is possible six to eight months of the year. There is approximately 1,000 feet of creek from the nearest point on the highway to the reservoir. The nearest supply of log booms and absorbent pads is in Yosemite National Park and the US Forest Service in Oakhurst. These two sources for cleanup material have been used effectively for a fuel spill in the Merced River in the past.

Most vehicle accidents involve one or two vehicles. Contaminates from these types of accidents do not migrate much beyond the immediate accident scene or highway right-of-way. The small amount of contaminants is either cleaned up by Cal-Trans or the other state and local agencies with haz-mat responsibility.

Cal-Trans chemically treats each side of the road with a four (4) foot "fire strip", equaling 3.0 acres total, for control of weeds and shrubs. The typical annual treatment consists of a pre-emergence applied in October/November and Round-Up applied to existing weeds once during the summer. The amount of treatment is considered insignificant as a threat to the watershed.

The brand name of each chemical used, and the number of ounces has been calculated for 3 acres are:

- Milestone- 34.72 ounces
- Esplanade Sure- 24.8 ounces
- Roundup Pro- 317.44 ounces
- Smoke- 79.36 ounces

The Cal-Trans applicators have been trained by their Pest Control Advisor yearly and spray under the supervision of a Licensed Qualified Applicator certificate holder.

The Midpines Cal-Trans maintenance yard did not apply any chemical or brine to MPA 140 within post miles 23.0 – 25.48. Sand is generally applied beyond post mile 25.48.

The result from lack of vegetation on the edge of the highway is a small contribution of turbidity during runoff.

B. Local Agency:

There are four miles of paved road and 2.5 miles of unpaved roads maintained by the Mariposa County Department of Public Works. The ditches along the side of the paved road are cleaned once a year with the use of a motor grader. The road surface and ditches on the unpaved roads are also maintained with the use of a motor grader. The maintenance on the public roads takes place primarily in the late spring. This schedule provides time during the summer and fall for the disturbed areas to stabilize before the winter rainfall and runoff. Road shoulders are treated annually to control weeds and shrubs with Landmark and Ranger. A certified weed spraying contractor applies chemicals to the two-to-three-foot road shoulder.

The annual treatment is similar to the method utilized by Cal-Trans on the State right-of-ways. There appears to be significant contribution of turbidity from the unpaved roads during winter runoff.

C. Private Roads:

There are several dirt roads on private property throughout the watershed. Dirt roads normally open for general use and provide access to more than one property owner and represents approximately three miles of the unpaved road inventory of the watershed. Although the roads are for public use, they are not necessarily maintained by a public agency. In most cases, the roads are maintained by property owners that use the roads for private property access. Maintenance on the unpaved roads is unscheduled and takes place as needed and determined by the private property owners. The maintenance usually consists of adding gravel to the road surface and mechanical grading to smooth the drivable surface and reinstate drainage ditches. The unpaved roads present a potential of increased turbidity in stream courses within the watershed through runoff during rain events which carry soil to the reservoir. The resulting high turbidity in the water can carry or mask other contamination. The water is harder to treat during the heavier runoff season. Public information has been effective to increase awareness of property owners of water quality in the watershed. The local USDA Soil Conservation Service has been very active in encouraging property owners to maintain their unpaved roads properly. In general, the privately maintained roads in the watershed are in better condition than the average private road system (and in some cases the public road systems) in the County.

There is a well-established rural residential area just north of Highway 140 referred to as the Grosjean Road and Lakeview Road areas. The property owners within the Grosjean Road area have been very cooperative and proactive in the maintenance of community roads. The property owners paved approximately .5 miles of privately owned community use access roads. Today the paved and unpaved roads in the Grosjean and Lakeview Road area appear to be well maintained.

Erosion and Turbidity

The annual average rainfall in the Stockton Creek watershed area is approximately 28 to 30 inches. In the past ten (10) years, rainfall events have ranged from 57 inches in 2016-17 to 20 inches in 2021-22. The intensity and timing of the rainfall events is significant with respect to water quality. Heavy rains early in the rainy season trigger high turbidity and organic loading in the Stockton Creek Reservoir. The picture below shows a large plume of muddy red water in the reservoir during heavy rain in January of 1993 (January was the first significant rainfall for the 1992-1993 water year.) The relationship of seasonal turbidity, rainfall and TOC for the most recent five-year period is shown in page 16.



Storm Event Impact January 1993
Note turbidity plume.

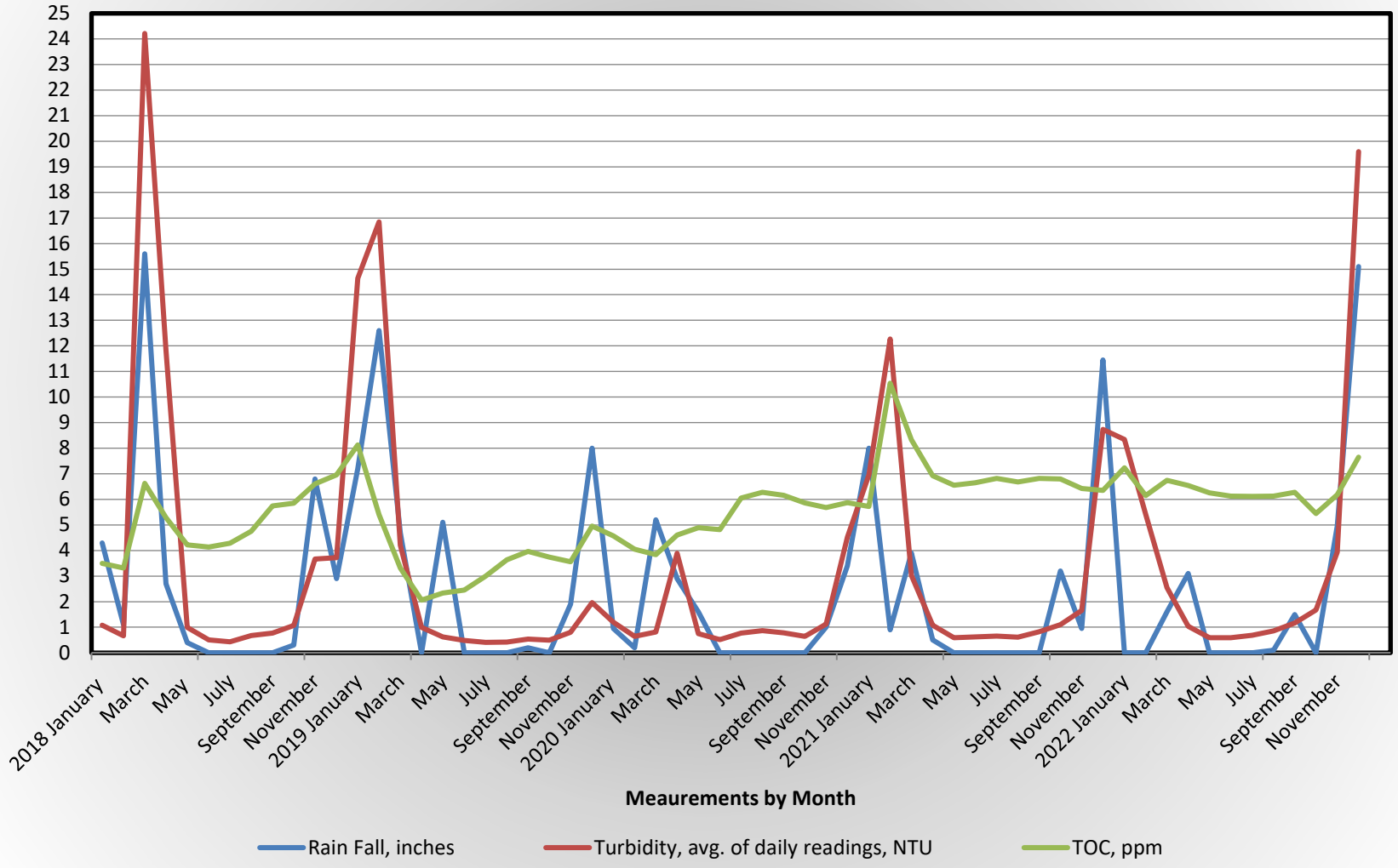
Five Year Summary
Rainfall/Turbidity/Total Organic Carbon

	2018			2019			2020			2021			2022		
	Rain Fall	Turbidity	TOC	Rain Fall	Turbidity	TOC	Rain Fall	Turbidity	TOC	Rain Fall	Turbidity	TOC	Rain Fall	Turbidity	TOC
	inch	NTU	ppm	inch	NTU	ppm	inch	NTU	ppm	inch	NTU	ppm	inch	NTU	ppm
January	4.3	1.077	3.50	7.2	14.642	8.13	0.95	1.200	4.57	8.0	6.953	5.72	0	8.342	7.23
February	1.1	0.662	3.32	12.6	16.850	5.40	0.2	0.648	4.05	0.9	12.266	10.54	0	5.410	6.15
March	15.6	24.215	6.63	4.7	4.207	3.32	5.2	0.814	3.84	3.9	3.023	8.33	1.6	2.552	6.74
April	2.7	11.820	5.28	0	0.991	2.06	2.9	3.893	4.60	0.5	1.082	6.93	3.1	1.041	6.54
May	0.4	0.996	4.22	5.1	.621	2.34	1.6	0.753	4.89	0	0.590	6.55	0	0.592	6.25
June	0	0.503	4.14	0	0.481	2.45	0	0.513	4.82	0	0.618	6.65	0	0.595	6.13
July	0	0.435	4.28	0	0.408	3.00	0	0.768	6.05	0	0.649	6.82	0	0.690	6.12
August	0	0.674	4.75	0	0.417	3.63	0	0.866	6.28	0	0.610	6.68	0.1	0.852	6.13
September	0	0.773	5.74	0.2	0.539	3.97	0	0.778	6.16	0	0.823	6.82	1.5	1.161	6.28
October	0.3	1.066	5.85	0	0.491	3.74	0	0.644	5.86	3.2	1.103	6.80	0	1.673	5.44
November	6.8	3.665	6.61	1.9	0.805	3.56	1.0	1.118	5.68	0.95	1.655	6.42	4.95	3.932	6.18
December	2.9	3.720	6.96	8.0	1.968	4.95	3.4	4.521	5.87	11.45	8.738	6.35	15.1	19.599	7.65
	34.1			39.7			15.25			28.9			26.35		

Turbidity: Average of daily readings.

TOC: Average of samples.

5 Year View of Rain Fall Influence on Turbidity and TOC at Stockton Creek Reservoir



Wildland Fire:

Fuels reduction projects in the watershed have reduced the risk of catastrophic fire by reducing fuel load in critical areas, and mitigating the risk of the vital MPUD water infrastructure that supplies the town of Mariposa.

Most of the area in the watershed is covered with dense brush. Therefore, wildland fire is a significant threat to water quality. The total area of the watershed is State Responsibility Area (SRA) with respect to fire protection. The California Department of Forestry and Fire Protection (Cal-Fire) is the lead agency for fire protection of SRA. The Cal-Fire headquarters for Mariposa, Merced, and Madera Counties, including a fire station, is within two miles of the watershed. The Mariposa County Fire Department has several volunteer fire companies throughout the county. The closest county station is within two miles of the watershed. Fire suppression facilities available in the area of the watershed could be considered above average for a rural area. There are 19,500 feet of 12" pipeline supplied by a one-million-gallon water tank located within the watershed. There are nine fire hydrants located along the pipeline and convenient road access for fire protection. This pipeline and water tank is part of the Saxon Creek water project which is owned and operated by MPUD.

Typically, wildland fire suppression includes fire engines, dozers, hand crews and aircraft. When heavy equipment such as dozers are utilized in the suppression effort, the ground disturbance from the effort is later (after fire control) treated with water bars and in some cases surrounding brush is placed on the disturbed areas to reduce silt movement during subsequent rain events.

Aircraft use on fires includes the application (from the air) of fire-retardant chemicals consisting of water and diammonium phosphate (DAP). Cal-Fire policy for the application of DAP is to avoid drops on stream courses if possible.

The watershed did experience a major wildland fire that burned vegetation adjacent to the Stockton Creek Reservoir in 2004. Heavy rainfall occurred within thirty days of the fire. The result included longer periods of high turbidity and total organic carbon (TOC) levels of up to 18 mg/L. Normal source water TOC levels range from 3 to 8 mg/L.

Vegetation Management:

In 2010, MPUD, in partnership with Sierra Foothill Conservancy (SFC), acquired approximately four hundred ten (410) acres of land adjacent to the Stockton Creek Reservoir. The acquisition leveraged projects and funding to reduce the risk of wildland fire, provided habitat enhancements, watershed protections and public hiking trails.

One hundred sixty (160) acres of land in the watershed was mechanically masticated in 2014. The fuels reduction project dramatically reduced dense brush and small trees in the area, allowing for increased seasonal run-off to the reservoir, however, may be a short-term contribution of TOC.



On-Site Sewage Waste Disposal Systems:

All existing development and improvements within the watershed that produce wastewater must dispose of the wastewater "on-site". There are no community facilities to receive and treat wastewater for properties in the watershed. The primary method for on-site disposal of wastewater is by on-site septic tank and leach-field. On-site wastewater treatment systems are permitted and administered by the Mariposa County Health Department - Environmental Health Services. System installation requirements and as-built drawings are kept on new/repair projects that are properly permitted through the Environmental Health Department by the homeowner/contractor. The availability of installation records prior to 1960 is non-existent; 1960 through the 1970's is scarce and progressively improve beginning with 1980. Mariposa County Code, Chapter 17.6, Section 17.60.010 Open Watershed Overlay (OWO) states that all development proposals shall require approved percolation tests. Septic systems shall be installed at a specific location wherein an approved percolation test has been conducted in accordance with this code.

Environmental Health Services does not have protocol in place for the continued monitoring of existing on-site wastewater systems. Lending institutions typically require an inspection of wastewater systems prior to closing of a real estate transaction which can bring failing systems to the attention of the Environmental Health Services department. They will respond rapidly to complaints or information that indicates a system is failing. The typical action taken by Environmental Health is to require repairs

be made to a failing system within fifteen days of notification and require subsequent inspection.

A review of the Mariposa County tax records indicates there are approximately one hundred (100) improved properties that utilize an on-site wastewater system in the watershed. An inspection of all sites would be impractical. On-site wastewater systems are installed below ground and in many cases property owners are not aware of their exact location. Homeowners are encouraged by Environmental Health Services to pump their septic tanks every three to five years and make permitted repairs as necessary.

A public education mailing (Attachment A) was mailed to the 100 property owners, with improvements) notifying them of their location in the watershed and the importance to properly maintain their on-site sewage disposal systems to prevent failures.

Solid Waste:

Solid waste generated within the watershed is generally taken to the Mariposa County Landfill outside of the watershed. Annually, the County accepts limited amounts of hazardous substances from homeowners to facilitate proper disposal. There are no known private solid waste dump sites in the watershed.

The District and two of the larger property owners have experienced unauthorized dumping of solid waste on their lands. The primary component of the waste is used tires. District staff and property owners pick up and haul the material to the County Landfill as needed.

Commercial Sites:

The Mariposa Pines Villa, Board and Care Facility was listed as a commercial site on previous Stockton Creek Watershed Sanitary Surveys.

The facility closed in October 2020. The 2023 tax record shows the current use type as residential single family.

Land Use

Existing land use in the watershed consists of a few commercially developed parcels, paved and unpaved public roads, residential development and primarily vacant land.

There are no incorporated cities or Special Districts within the watershed boundary. The Mariposa County Supervisors, in conjunction with the Mariposa County Planning Commission, have regulatory control over land use. Land use is specifically regulated by the Mariposa County zoning ordinance. Within the zoning ordinance there are special conditions for land use within the watershed specified in the Open Watershed Overlay (OWO). All parcels of land that are totally or partially located in the Stockton Creek watershed are subject to the OWO restriction (20 acre minimum).

The OWO would still limit the development of parcels to a 20-acre minimum. Although a zoning change would be required to actually provide a land use change from 160 acres to 5 acres minimum, MPUD views the new General Plan land use proposal as a first step to allow for higher density development in the future.

The rural area in the watershed is addressed under the following land use designations:

Agricultural Exclusive	-	"AE"
Mountain Home	-	"MH"
Mountain Transition	-	"MT"

LAND USE POLICIES:

"AE" Agricultural Exclusive

A. General Description:

The "AE" classification as designated on the Mariposa County Land Use Map is applied to land considered to be the most desirable land to be maintained for agricultural use for the purpose of preserving the agricultural industry of Mariposa County as a viable economic activity.

B. Development Policy:

1. Uses:

- a. Permitted Uses - Permitted uses include unlimited agriculture, low density residential including a second single family dwelling for the use of family members or employees, all agricultural uses, quarters for farm labor or servants employed on the premises, accessory building and accessory uses including barns, stables, farm equipment and other out buildings, home enterprises, rural home industry when operated in conjunction with a bona-fide agricultural activity, public schools/public parks and other public facilities including volunteer fire departments, mining & mineral processing in accordance with surface mining regulations and mineral or construction material processing site standards and feed lots and slaughter houses with a 1,500 foot setback from state highways and adjacent higher density land use on classifications or property lines, and Public Utility Transmission and distribution lines, towers, poles & substations.
 - b. Prohibited Uses - Motorcycle, vehicular racing or other similar uses, mobile home parks, recreational vehicle parks or campgrounds, industrial or manufacturing (except home industry or home enterprise) uses, commercial recreation or tourist service facilities except commercial hunting clubs, dude or guest ranches, riding stables or animal boarding facilities and similar activities when operated in conjunction with a bona-fide agricultural activity.
2. Minimum Parcel or Lot Size:

No parcel of real property can be divided or split into two or more parcels by voluntary transfer, court action or other conveyance where any one parcel so created will be less than 160 acres or a legal quarter section in gross area.
 3. Density:

One single-family residence or, in accordance with permitted standards above, per 160 acres or a legal quarter section.

C. Agricultural Advisory Committee:

1. An Agricultural Advisory Committee is appointed by the Board of Supervisors comprised of representatives of the agricultural community. The Mariposa County Farm Advisory may be an ex-officio advisory member of the committee.
2. The recommendation of the Agricultural Advisory Committee is obtained prior to the inclusion of any land to the "AE" classification or the removing of any

land presently in the "AE" classification as shown on the Mariposa County Land Use Map.

"MH" Mountain Home:

A. General Description:

The "MH" Classification, designated on the Mariposa County Land use Map is applied to land best suited for moderate residential densities based upon suitability of terrain, location adjacent to population centers and service areas. This land use classification is provided to accommodate the major portion of the rural home site growth of the County.

B. Development Policy:

1. Uses:

Permitted Uses - Permitted uses include residential, home enterprises, agriculture, rural home industry, public schools, public parks, and other public facilities including volunteer fire department facilities, and Public Utility Transmission and distribution lines, towers, poles and substations.

2. Minimum Parcel or Lot Size:

No parcel of real property can be divided or split into two or more parcels by voluntary transfer, court action or other conveyance where any one of the parcels so created will be less than five acres in gross area.

3. Density:

One single-family residence per five-acre parcel.

"MT" Mountain Transition:

A. General Description:

The "MT" Classification, designated on the Mariposa County General Plan Use Map, is applied to lands with diverse development potential, as opposed to other classifications within which development policies are necessarily specific, to allow primarily for unique circumstances or needs within an area.

B. Development Policy:

1. Uses:

Permitted Uses - Permitted uses include residential, home enterprises, rural home industry, agriculture, public schools, and parks and other facilities including volunteer fire department facilities; Public Utility transmission and distribution lines, towers, poles and substations, and those other uses as may be specified.

2. Minimum Parcel or Lot Size:

No parcel of real property in the MT can be divided or split into two (2) or more parcels by voluntary transfer, court action, or other conveyance where one (1) of the parcels so created will be less than twenty (20) acres or one-half of one legal quarter-quarter section in gross area.

3. Density:

One single-family residence per twenty (20) acres or one-half of a legal quarter-quarter section.

Inventory of Parcels, Acreage, Zoning and Land Use

APN NUMBER	ZONING	EXISTING USE	ACREAGE
008-240-011-000	MH	IMPROVED	11.36
008-240-013-000	MH	IMPROVED	10.29
008-240-015-000	MT	SOME IMPROVED	15.48
008-240-017-000	MH	VACANT	25.01
008-240-042-000	MH	IMPROVED	20.52
008-240-044-000	MH	IMPROVED	25.74
008-240-054-000	MH	IMPROVED	12.17
008-240-056-000	MH	IMPROVED	32.23
008-240-061-000	MH	VACANT	31.17
008-240-063-000	MH	IMPROVED	2.53
008-350-051-000	MH	COUNTY	65.53
008-350-085-000	MT	VACANT	20.49
008-350-086-000	MT	VACANT	25.1
008-350-087-000	MT	VACANT	26.09
008-420-003-000	MH	IMPROVED	1
008-420-005-000	MH	BLM	19.98
008-420-006-000	MH	VACANT	46.26
008-420-007-000	MH	IMPROVED	20.04
008-420-008-000	MH	SOME IMPROVED	20.1
008-420-011-000	MH	SM IMP	0.76
008-420-012-000	MH	VACANT	0.76
008-420-013-000	MH	VACANT	0.76
008-420-016-000	MH	IMPROVED	40
008-420-017-000	MH	IMPROVED	9.42
008-420-020-000	MH	VACANT	0.58
008-420-021-000	MH	IMPROVED	4.77
008-420-022-000	MH	VACANT	0.63
008-420-023-000	MH	VACANT	6.53
008-420-024-000	MH	VACANT	6.57
008-420-025-000	MH	IMPROVED	7.75
008-420-026-000	MH	IMPROVED	3
008-420-027-000	MH	IMPROVED	4
008-420-030-000	MH	IMPROVED	15.1
008-420-031-000	MH	IMPROVED	7.49
008-420-037-000	MH	IMPROVED	10
008-420-038-000	MH	VACANT	10
008-420-039-000	MH	IMPROVED	10.17
008-420-040-000	MH	VACANT	6.12

APN NUMBER	ZONING	EXISTING USE	ACREAGE
008-420-042-000	MH	SOME IMPROVED	7.54
008-420-047-000	MH	SOME IMPROVED	8.11
008-420-048-000	MH	VACANT	20
008-420-049-000	MH	IMPROVED	6.83
008-420-050-000	MT	VACANT	20.16
008-420-051-000	MT	VACANT	21.12
008-420-053-000	MH	IMPROVED	18.01
008-420-054-000	MH	IMPROVED	1.56
012-010-010-000	MT	IMPROVED	9.93
012-010-012-000	MT	IMPROVED	11.81
012-010-013-000	MT	IMPROVED	4.06
012-010-014-000	MH	IMPROVED	3.97
012-010-015-000	MH	IMPROVED	16
012-010-017-000	MH	IMPROVED	20.21
012-010-018-000	MH	IMPROVED	20.21
012-010-020-000	MH	IMPROVED	9.18
012-010-021-000	MT	IMPROVED	9.89
012-010-023-000	MT	IMPROVED	10.15
012-010-024-000	MT	IMPROVED	9.29
012-010-025-000	MT	SOME IMP.	39.48
012-010-029-000	MT	IMPROVED	44
012-010-034-000	MT	IMPROVED	40.75
012-010-035-000	MT	IMPROVED	40.71
012-010-036-000	MT	IMPROVED	40.67
012-010-078-000	MH	IMPROVED	4.95
012-010-084-000	MT	VACANT	10.11
012-010-085-000	MT	IMPROVED	38.62
012-010-086-000	MT	IMPROVED	43.2
012-010-088-000	MT	IMPROVED	10.55
012-010-089-000	MH	IMPROVED	21.43
012-010-092-000	MT	IMPROVED	20.32
012-010-093-000	MT	IMPROVED	20.32
012-010-097-000	AE	VACANT	182.48
012-012-002-000	MH	IMPROVED	45.39
012-012-004-000	MH	VACANT	20.06
012-012-009-000	MT	VACANT	540.05
012-012-010-000	MH	VACANT	272.07
012-020-001-000	MH	IMPROVED	5.72
012-020-003-000	MH	VACANT	4.85

APN NUMBER	ZONING	EXISTING USE	ACREAGE
012-020-004-000	MH	IMPROVED	5
012-020-005-000	MH	IMPROVED	5.21
012-020-006-000	MH	IMPROVED	14.06
012-020-007-000	MH	IMPROVED	14
012-020-009-000	MH	IMPROVED	1.79
012-020-010-000	MH	IMPROVED	6.31
012-020-018-000	MH	IMPROVED	5.67
012-020-019-000	MH	IMPROVED	5.12
012-020-020-000	MH	IMPROVED	5.41
012-020-021-000	MH	IMPROVED	32
012-020-022-000	MH	IMPROVED	7.11
012-020-026-000	MH	SOME IMPROVED	46.35
012-020-027-000	MH	VACANT	21.84
012-020-029-000	MH	IMPROVED	10.02
012-020-030-000	MH	IMPROVED	5.01
012-020-035-000	MH	IMPROVED	2
012-020-036-000	MH	SOME IMP.	5
012-020-037-000	MH	IMPROVED	1
012-020-038-000	MH	IMPROVED	2
012-020-039-000	MH	IMPROVED	2.25
012-020-040-000	MH	SOME IMPROVED	1.29
012-020-041-000	MH	IMPROVED	7.2
012-020-042-000	MH	IMPROVED	6.44
012-030-002-000	MT	IMPROVED	14.05
012-030-003-000	MT	IMPROVED	10.24
012-030-004-000	MT	IMPROVED	11.2
012-030-006-000	MT	VACANT	7.94
012-030-007-000	MT	IMPROVED	7.5
012-030-008-000	MT	IMPROVED	7.41
012-030-013-000	MT	SOME IMP.	16.73
012-030-014-000	MT	IMPROVED	12.87
012-030-018-000	MT	IMPROVED	2.4
012-030-019-000	MT	IMPROVED	7.98
012-030-020-000	MT	IMPROVED	3.35
012-030-024-000	MT	IMPROVED	4.63
012-030-025-000	MT	IMPROVED	5.7
012-030-027-000	MT	IMPROVED	6.5
012-030-029-000	MT	IMPROVED	19.21
012-030-030-000	MT	IMPROVED	10

APN NUMBER	ZONING	EXISTING USE	ACREAGE
012-030-032-000	MT	IMPROVED	20.61
012-030-037-000	MT	IMPROVED	16.7
012-030-038-000	MT	IMPROVED	11.9
012-030-041-000	MT	IMPROVED	6.79
012-030-043-000	MT	IMPROVED	10.21
012-030-046-000	MT	IMPROVED	6.23
012-030-047-000	MT	VACANT	20.41
012-030-048-000	MT	IMPROVED	21.89
012-030-049-000	MT	IMPROVED	20.31
012-030-053-000	MT	IMPROVED	9.87
012-030-055-000	MT	IMPROVED	6.87
012-030-056-000	MT	VACANT	11.01
012-030-058-000	MT	IMPROVED	11.32
012-060-003-000	MT	IMPROVED	4.72
012-060-004-000	MT	IMPROVED	4.72
012-150-068-000	TPA	VACANT	17.46
012-260-002-000	MT	VACANT	10.55
012-260-004-000	MT	IMPROVED	12.84
012-260-005-000	MT	IMPROVED	36.1
014-010-032-000	MH	IMPROVED	6.5
014-010-092-000	MH	IMPROVED	64.11
014-020-001-000	MH	IMPROVED	0.7

Open Watershed Overlay (OWO)

The Open Watershed Overlay (OWO) designated on the Mariposa County Zoning Map, is an overlay district and shall be applied to lands utilized or proposed to be utilized as watersheds for public or community surface water supply, as defined by the engineering studies for that project. Within any OWO, the specific policies, standards and regulations of the principal zone with which the OWO is combined, are modified in accordance with this chapter.

- A. Development Standards for the OWO. Development standards shall be as follows:
1. Uses:

Permitted Uses - Single family residences, home enterprise, agriculture, public parks, and the managed production and harvesting of timber and those applicable uses listed in the Mariposa County Zoning Ordinance.
 2. Minimum parcel of lot size:

No parcel of real property in the OWO can be divided or split into two (2) or more parcels by voluntary transfer, court action, or other conveyance where one (1) of the parcels so created will be less than twenty (20) acres or a legal one-half of a quarter-quarter section except where larger parcel sizes are required in the principal zone shall apply.
 3. Density:

Standards required in the principal zone or one (1) single family residence per twenty (20) acres, whichever is more restrictive.
- B. Improvement Standards for OWO. For the purposes of insuring adequate protection of water quality within an area designated OWO, the following improvement standards are required on all building permits, use permits, variances, or subdivision proposals:
1. Land located within an OWO is designated as "erosion hazard areas" in accordance with provisions of this code with respect to grading.
 2. All development proposals require approved percolation tests.
 3. No septic system may be installed unless such septic system is installed on a specific location wherein an approved percolation test has been conducted in accordance with this Code.

- C. Amendment standards. Wherever it can be proven that a parcel, or part of a parcel, lies outside the watershed, the Open Watershed Conservation (OWC) shall be modified to exclude that parcel or part of parcel.

Emergency Notification Plan

MPUD has an Emergency Notification Plan (ENP) dated March 2023, which has current contact information. The plan would use MPUD, local fire, county health department and sheriff personnel to distribute notices, phone calls and sound trucks, depending on the severity of the situation. The estimated time using the described staff is estimated to require up to 4 to 8 hours. The plan lists critical facilities such as schools, hospitals, health treatment centers, food establishments, etc. The MPUD has templates for boil water orders, unsafe water alerts and water outages or low water pressure.

Depending on incident factors, multiple agencies (MPUD, fire, law enforcement, or public health) may respond to a hazardous materials incident or immediate threat to the water source. Many of these agencies have some statutory functional responsibility for incident mitigation. In order to ensure effective information flow and coordination between the responding agencies at the scene of a multi-agency incident, a Unified Command Post and the use of Unified Command shall be implemented whenever possible. Each response agency should provide a representative to remain at the command post who will have authority to speak for and commit agency resources.

1. State Emergency Management Agency Spill/Release Guidelines

All significant releases or threatened releases of a hazardous material, including oil and radioactive materials require immediate verbal notification. Notification must be made to the California Emergency Management Agency (Cal EMA), State Warning Center for the following:

- ✓ Discharges of any hazardous substances or sewage, into or on any waters of the state
- ✓ Discharges that may threaten or impact water quality
- ✓ Discharges of oil or petroleum products, into or on any waters of the state.

2. Notification Information Needed

If there is a potential or actual hazardous materials release, the following information must be reported:

- ✓ Identity of caller
- ✓ Location, date and time of spill, release, or threatened release
- ✓ Location of threatened or involved waterway or storm drains.
- ✓ Substance, quantity involved

- ✓ Chemical name
- ✓ Description of event

The Mariposa County Sheriff's Department is the Public Safety Access Point (PSAP) for all hazardous material incidents involving county responders. The IC will make the determination regarding who is to be notified. It is assumed that the general public will use 911 to report incidents. The 911 emergency call system provides notification to the correct jurisdiction. It is the responsibility of all agencies who may receive a non-911 Hazardous Material Incident call to forward the call to the Sheriff's Office non-emergency line at 966-3615. The Sheriff's Office will then alert the proper agency.

The public agency arriving first on-scene should request needed resources through their dispatch and take whatever immediate counteractions necessary to contain and reduce the spread of the material and its effects within the training limitations of the responding personnel.

3. Informing Medical and Health Facilities of the Nature of Incident and the Substances involved including pesticides.

The Incident Commander will be responsible for notifying the medical facilities and the John C. Fremont Emergency Room of any exposure or possible exposure to hazardous substance(s) and appropriate information (e.g., the number of people affected, or the chemical substances encountered.) The Incident Commander should provide the medical facility with as much information as possible prior to any personnel or member of the public being transported to the medical facility. The local base hospital is John C. Fremont Hospital at 5189 Hospital Road in Mariposa and will coordinate and activate the inter-hospital mutual aid plans for large volume hazardous material related injuries and their treatment. The hospital has specific internal decontamination procedures.

4. Hazardous Materials Group Positions

The FIRESCOPE (Firefighting Resource of California Organized for Potential Emergencies) Hazardous Materials Module to the Incident Command System provides an organizational structure for responding to hazardous materials incidents. The primary functions are directed by the Hazardous Materials Group Supervisor.

Reporting to the Hazardous Materials Group Supervisor are six positions including Site Access Control Leader, Decontamination Leader, Safe Refuge Area Manager, Entry Leader, Assistant Safety Officer-Hazardous Materials and Technical Specialist – Hazardous Materials Reference.

5. State Water Resources Control Board – Division of Drinking Water

- ✓ Respond on request and assist local authority in determining any impact and/or necessary mitigation steps involving the State Water project
- ✓ Assist in compiling a final incident report and the California Hazardous Material Incident Report Form.

6. State Water Resources Control Board - Regional Water Quality Control Board

- ✓ Respond on request and assist local authority in determining the impact of an incident on any nearby waterways and/or underground aquifers.
- ✓ Primary responsibility is to protect the State's surface, coastal and ground water resources.
- ✓ Issues cleanup and abatement or cease and desist orders to responsible parties, assesses fines and pursues recovery of costs for abatement, mitigation or contract cleanup.
- ✓ Provide laboratory analysis of water samples when required to substantiate contamination.
- ✓ Assist in compiling a final incident report.

7. Emergency Notification List

The following is a list of personnel/agencies to be notified in the event of an emergency.

Mariposa Public Utility District	
Administrative Office, 4992 7 th Street, business hours	209-966-2515
MPUD Emergency Pager, non-business hours	209-282-0100
Susan Wages, General Manager	
Chris Toledo, Operations Supervisor	
State and Other Local Agencies: *or 911	
California Highway Patrol	209-966-3656
California Water Resources Control Board	559-447-3300
Cal Fire	*209-966-3622
Mariposa County Fire Department	*209-966-4330
Mariposa County Health Department	209-966-3689
Mariposa County Sheriff's Department, Dispatch	209-966-3614
J.C. Fremont Hospital	209-966-3631
Mariposa County Administration	209-966-3222
Mariposa County School District	209-742-0250
Media Contacts:	
ABC (KFSN Channel 30)	559-485-0930
CBS (KGPE Channel 47)	559-225-1133
NBC (KSEE Channel 24)	559-454-2400
KUBB Radio	209-383-7900

Recommendations and Conclusions

The land use and permits for improvements in the watershed are currently regulated by the Mariposa County Health Department and the Mariposa County Building/Planning Department. MPUD does not have jurisdiction in the watershed concerning land use. The local Health Department has been very responsive to suspected problems with on-site wastewater systems. The Planning Department has kept the District informed of proposed zoning changes, land use changes and proposed projects in the watershed. The communication between these departments should continue. MPUD staff is invited to attend biweekly County planning staff meeting to review proposed projects throughout the county. MPUD attends meetings when the agenda includes projects located in the Mariposa Town Planning Area and the Stockton Creek Open Watershed Overlay Area.

The water quality information gathered in the future should be tabulated and compared to information in this report to determine if there is a significant change and/or degradation of the watershed.

Local and state agency support of conservation easements and land purchases should be encouraged. In the last twenty years there has been significant improvement and protections of watersheds in the Sierra foothills through the activities of the Sierra Nevada Conservancy and the Sierra Foothill Conservancy. MPUD and SFC have submitted a proposal for funding through the California River Parkways Grant Program that includes land acquisition adjacent to and to be part of the existing Stockton Creek Preserve.

Park Service and US Forest Service fire prevention and suppression activities of the last fifty years has not only protected life and property, but has also allowed for an overload of heavy fuels that would support more catastrophic fires in the long term. The Federal agency response is to perform mechanical fuel modification and allow for small control burns to manage vegetation. On a smaller scale the Stockton Creek watershed has the same fire hazard risks. The District and appropriate agencies should continue to pursue vegetation management projects to reduce fuel loads in the watershed.

ATTACHMENTS

MARIPOSA PUBLIC UTILITY DISTRICT

*DIRECTORS:
WILLIAM H. BONDSHU
DANA L. FINNEY
FRANK MOCK
MIKE CLEARY
GORDON DULCICH*

*SUSAN A. WAGES,
GENERAL MANAGER
CLERK, EX-OFFICIO,
SECRETARY*

**P.O. Box 494
Mariposa, CA 95338
209-966-2515 FAX (209) 966-6615
www.mariposapud.org**

*water
wastewater*

September 22, 2023

Dear Property Owner:

California Surface Water Treatment Regulations adopted by the State Water Resources Control Board require public water systems, such as the Mariposa Public Utility District, to update their Watershed Sanitary Survey every five years to evaluate conditions that may affect compliance with State of California Drinking Water Standards. A Sanitary Survey is a review of a public water system's surface water sources for the purpose of identifying possible contaminating activities on the watershed.

You are receiving this mailer because you own property on the Stockton Creek watershed. A watershed is a land area that drains water into a creek, river, lake, wetland, bay, or groundwater aquifer. Runoff from your home, yard, and neighborhood flows to Stockton Creek. Stockton Creek feeds into the Stockton Creek Reservoir, surface water impoundment for the towns' drinking water. The impoundment on Stockton Creek collects runoff from 5.37 square miles of watershed.

There are one hundred improved properties that would require an on-site wastewater disposal system in the Stockton Creek watershed. It is important to properly maintain your on-site wastewater disposal system to prevent surface water pollution. The reverse side of this letter includes information regarding the proper care of your on-site wastewater disposal system.

Please help protect the watershed and the environment by periodically inspecting your system.

Regards,

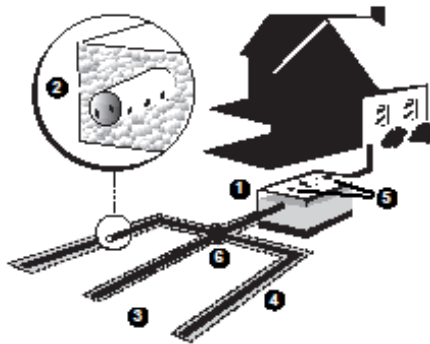
Susan A. Wages, REHS
General Manager

So . . . now you own a septic system

More than 25 million homes, encompassing almost 25 percent of the U.S. population, dispose of domestic wastewater through onsite (unsewered) systems. According to the American Housing Survey for the United States, in 1993 1.5 (million) out of every 4 (million) new owner-occupied home starts relied upon a form of onsite sewage disposal.

One of the major differences between owning an unsewered versus a sewer home is that unsewered wastewater treatment and disposal systems must be maintained by the homeowner. Treatment and disposal of wastewater should be one of the primary concerns of any homeowner in an unsewered area.

The most common way to treat and dispose of wastewater in rural homes is through the use of an onsite disposal system. The majority of onsite disposal systems in the United States are septic systems.



- 1 septic tank
- 2 4" perforated pipe
- 3 absorption field
- 4 crushed rock or gravel lined trench
- 5 inspection ports
- 6 distribution box

Typical Septic System Fig. 1

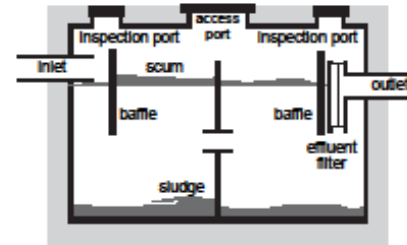
HOW IT WORKS

A typical septic system contains two major components: a septic tank and the absorption field (see Figure 1). Often, a distribution box is included as part of the system to separate the septic tank effluent evenly into a network of distribution lines that make up the absorption field. The septic tank is usually made of concrete, fiberglass, or plastic, is typically buried and should be watertight. All septic tanks have baffles (or tees) at the inlet and outlet to insure proper flow patterns (see Figure 2). Most septic tanks are single compartment; however, a number of states require two-compartment tanks or two single compartment tanks in series.

While typically designed to hold a minimum of 750–1000 gallons of sewage, the size of the tank may vary depending upon the number of bedrooms in the home and state and local regulatory requirements. The primary purpose of the septic tank is to separate the solids from the liquids and to promote partial breakdown of contaminants by microorganisms naturally present in the wastewater. The solids, known as sludge, collect on the bottom of the tank, while the scum floats on the top of the liquid. The sludge and scum remain in the tank and should be pumped out periodically (see Figure 2).

Solids that are allowed to pass from the septic tank may clog the absorption field. Keeping solids out of the absorption field not only prevents clogging, but also reduces potentially expensive repair or replacement costs and helps ensure the ability of the soil to effectively treat the septic tank effluent. Therefore, an additional safeguard in keeping solids out of the absorption field is the use of effluent filters on the outlet of the septic tank (see Figure 2).

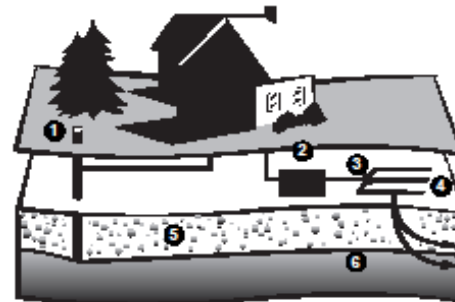
The wastewater (effluent) coming out of the septic tank may contain many potentially disease-causing microorganisms and pollutants (i.e., nitrates, phosphates, chlorides). The effluent is passed on to the absorption field through a connecting pipe or distribution box. The absorption field is also known as the soil drainfield, the disposal field, or the leachfield. The absorption field contains a series of underground perforated pipes, as indicated in Figure 1, that are



Cross-section of a two-compartment septic tank Fig. 2

sometimes connected in a closed loop system, as illustrated on the front cover, or some other proprietary distribution system

The effluent is distributed through the perforated pipes, exits through the holes in the pipes, and trickles through the rock or gravel where it is stored until absorbed by the soil. The absorption field, which is located in the unsaturated zone of the soil, treats the wastewater through physical, chemical, and biological processes. The soil also acts as a natural buffer to filter out many of the harmful bacteria, viruses, and excessive nutrients, effectively treating the wastewater as it passes through the unsaturated zone before it reaches the groundwater (see Figure 3).



- 1 drinking water well
- 2 septic tank
- 3 distribution box
- 4 absorption field
- 5 soil absorption (unsaturated zone)
- 6 groundwater (saturated zone)

Wastewater treatment and disposal in soil Fig. 3

Wastewater contains nutrients, such as nitrates and phosphates, that in excessive amounts may pollute nearby waterways and groundwater supplies. Excessive nutrients in drinking water supplies can be harmful to human health and can degrade lakes and streams by enhancing weed growth and algal blooms. However, the soil can retain many of these nutrients, which are eventually taken up by nearby vegetation.

What to Put In, What to Keep Out

- Direct all wastewater from your home into the septic tank. This includes all sink, bath, shower, toilet, washing machine and dishwasher wastewaters. Any of these waters can contain disease-causing microorganisms or environmental pollutants.
- Keep roof drains, basement sump pump drains, and other rainwater or surface water drainage systems away from the absorption field. Flooding of the absorption field with excessive water will keep the soil from naturally cleansing the wastewater, which can lead to groundwater and/or nearby surface water pollution.
- Conserve water to avoid overloading the septic system. Be sure to repair any leaky faucets or toilets. Use low-flow fixtures.
- Do not use caustic drain openers for a clogged drain. Instead, use boiling water or a drain snake to open clogs.
- Do not use septic tank additives, commercial septic tank cleansers, yeast, sugar, etc. These products are not necessary and some may be harmful to your system.
- Use commercial bathroom cleaners and laundry detergents in moderation. Many people prefer to clean their toilets, sinks, showers, and tubs with a mild detergent or baking soda.

continued . . .

