Barry Hecht

Hydrologist

# Watershed Sanitary Survey, 2026

# RAINERI MUTUAL WATER COMPANY

# Santa Clara County, CA

*Prepared for:*

**Raineri Mutual Water Company Board of Directors**

*Prepared by:*

**Barry Hecht**

*Assisted by:*

**Gustavo Porras-Leiva, BHH**
**Kelly Archer, Archer Engineering; and**
**Wade Bastien, Raineri Mutual Water Company**

*July 2026*

Barry Hecht
Hydrologist

barryhechthydrologist@outlook.com | 510.367.7860

A report prepared for:

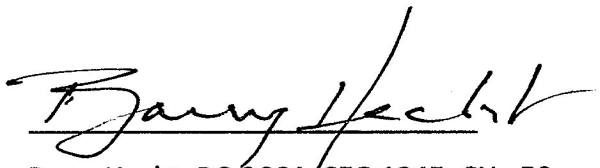
Raineri Mutual Water Company

**Raineri Mutual Water Company**
**PO Box 11**
**Los Gatos, CA 95031**
info@rainerimutual.org

**Raineri Mutual Water Company**
**Santa Clara County, CA**

Barry Hecht Hydrologist Assignment 2522

*by*



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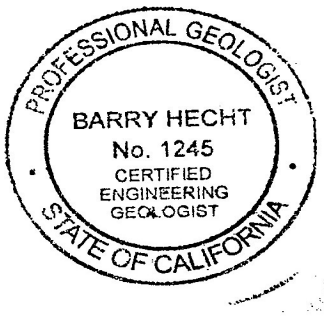



July 30, 2026

# Contents

# 1. Introduction

## 1.1 Purpose

A Watershed Sanitary Survey is required by the State of California under the Surface Water Filtra on and Disinfection Treatment Rule (SWFDTR), Title 22, Chapter 17, Article 7, Section 64665. The State's authority is delegated from the US EPA Safe Drinking Water Authority. This 2026 report has been authorized by the RMWC to meet this requirement.

The primary objectives of the Watershed Sanitary Survey are to identify current or potential sources of contamination within the watershed, and to evaluate the effects of each source on the watershed and surface water supply. Additionally, the survey satisfies the SWFDTR requirement and serves as one of the bases for the Watershed Management Plan. The information contained in this report may also be used to develop and integrate future watershed management practices, including voluntarily coordinating with nearby purveyors, but does not obligate an entity to do so.

## 1.2 The Community Water-Supply Setting

RMWC serves properties zoned for hillside and open space land use according to the Santa Clara County General Plan. The majority of the land use is classified as "hillside" which is defined by the Santa Clara County General Plan item LU 18: "mountainous lands unplanned or unsuitable for city development shall be preserved in an open space condition with uses which support and enhance a rural character, which protect and promote wise use of natural resources, and which avoid the risks imposed by natural hazards found in these areas."

RMWC lies within Los Gatos watershed, within the Santa Cruz Mountains portion of Santa Clara County. It shares a landscape setting with other water purveyors, including Redwood Estates Services Agency Company, Chemeketa Park Road and Water Company, the San Jose Water Company (SJWC, recently renamed H20America), Aldercroft, and Ridge and Old Well Road Water Companies, among others. It adjoins MidPeninsula Open Space District's Black Creek Preserve Watershed, an open space preserve which provides potable water to visitors. Most entities have a separate water system, managed by an elected board, with different state-licensed operators, and contend with various different contaminant sources. While they differ in scale, they share, however, common hazards and threats to their water supply including potential drought, seismicity, wildfire hazards, weather events of varying kinds, and the watershed management complexities inherent in residential and infrastructural land uses in a dynamic mountain environment. They also share drainage to Los Gatos Creek and Lexington Reservoir, a source of water to the Santa Clara Valley Water District and a stream-related ecosystem including valued fish and riparian-corridor resources, including aqua c habitat supporting anadromous fish and wildlife.
RMWC is a mutual water company responsible for operating a water system, with very limited other responsibilities. Unlike many of its neighbors, it does not maintain a road system, provide security, or other services. RMWC has 47 members, with 45 members actively receiving water for their properties, each entitled to one connection. The MWC took ownership of a privately owned water system in 2014 in a transfer abetted by Santa Clara County and by the state PUC (which regulates private-owned entities, including water systems) in response to diminishing capacity of the private water company, which traced its origins to original subdivision of the area. While a healthy and vibrant organization, RMWC has yet to pass its 13$^{th}$ anniversary, retaining many of the infrastructure and institutional practices originating during its decades of private ownership, and remains focused on modernizing and growing beyond its rural history. RMWC does not own heavy equipment, vehicles, water trucks, a meeting area, or general

workshop space. It works, quite effectively, through contractors, many of which have a long-term relationship with RMWC.

## 1.3 Key metrics

Key metrics for RMWC are:

System name: RMWC, DDW system number 430052

Type of water source: Surface, primary station code 430052-0001

DIWQS ID No. W001518 (water rights data base WRIMS)

Current connections served: 45 (Letter to Scott Miller, June 8, 2026 )

47 member properties (source: notice of July 13, 2026 Annual Meeting)

Typical daily water production: 10-19 gallons/minute (Kelly Archer, pers comm)

Connections reported in prior WSSs: 42 (2009); 42 (2018), (see Appendix A, this report)

## 1.4 History of Raineri Mutual Water Company

RMWC was formed in 2011 by the homeowners connected to the old Idylwild Water System[1]. The system had been placed in receivership by the California Department of Public Health when the long-time owner, Bruce Franks, abandoned the system. It remained in receivership until April 2014 when all assets – including the collection pipe in Moody Gulch – the distribution system, storage tanks, and water rights were transferred to the new mutual benefit company, owned by its users who purchased shares in all of its assets as well as all liabilities. Its only purpose is to supply the users with a quality water source for household and land-use needs. Unlike many of the neighboring small water companies, its purview does not include road and access maintenance. RMWC does not own heavy equipment, with such needs met through a set of at-will contractors.

RMWC does not use wells for water supply. At least 5 homes within the Company's boundaries meet at least portions of their domestic water supply needs from wells, which are subject to jurisdiction of Santa Clara County Environmental Health division. No information is available regarding their yields, depths, water levels, fluctuations, or water quality.

Watershed protection was implemented shortly afterward by purchase of the open-space lands within the Moody Gulch by several of the mountain systems that use or used Moody Gulch water, with the

[1] One of the motivations in the name change to RMWC is the sound-alike name of the Idyllwild Water District, a larger water district in Riverside County, which previously had been distinguished only by the two 'l's in the name, which remain in latter's name. While most state databases have suitably revised, users of digital searches and artificial intelligence platforms are forewarned. It is not pre y.

purchase financed by a special tax assessment. The initial owner of the newly purchased lands was Santa Clara County, which transferred ownership to the Mid-Peninsula Open Space District (MidPen) in conjunction with establishment of the Bear Creek Preserve in the Webb and Aldercroft watersheds to the west. MidPen has made certain commitments regarding future use of this land, still pending ratification or acceptance by the water companies.[2] A useful map of this Moody watershed protected area is attached to the 2009 Watershed sanitary survey (available as Appendix A of this report).

## 1.5 Summary of Water System Elements:

The key elements of the RMWC system are summarized in Table 1, and in the following elaboration:

1. Diversion is from 'Moody Gulch Stream' through a gravel-packed covered spring box dug into the bed of Moody Gulch Stream; diversions from the spring are via a perforated 2-inch PVC pipe. The location of the source is shown in Figure 1.
2. A 5/8-mile pipeline begins with a blank 2" PVC pipe, and is a patched blend of PVC and galvanized pipe past or beneath many deep and shallow landslides, under the Highway 17 culverts to the RMWC main plant on Raineri Lane. A 50-gallon tank at its head controls air entrainment and sorts out coarse debris which may have entered through the spring box.
3. Treatment begins with a decision on whether to accept water on a given day or time period based on ambient turbidity as measured at the plant. Excessive turbidity is bypassed. Otherwise, water is diverted through prefilters graduated at 75 to 5 microns, which were installed during 2017, one of rainiest of the past 10 winters, with multiple large storms, and turbidity persisting longer than usual.
4. Water is then treated through the 6 units of slow sand filter packages, operated in parallel. Following slow-sand-filter treatment, turbidity is monitored to be below 0.1 NTU.[3]
5. If turbidity is suitable, water passes through chlorination before passing into Tank 1 (20,000 gal), which serves as a contact time tank and where disinfectant (sodium hypochlorite) is added daily at midnight to maximize disinfection.
6. Water is distributed throughout the system via two 40,000-gallon tanks. Tank 2 distributes to the southern part of the system while Tank 3 supplies the middle and northern parts of the system, both while maintaining a required chlorine residual (0.2 mg/L). Locations are shown in Figure 2.
7. Raw water turbidity, pH, and approximate (among other parameters) volume are measured at the plant inlet and following disinfection.

All distribution is by gravity flow, an important consideration in maintaining service continuity.

[2] A redlined draft of an agreement between MidPen and the water companies is given in Appendix E of the December 2021 Chemeketa Park WSS. To our knowledge, that appendix holds the most recent work on this agreement (dated in 2014).

[3] One of the units will soon re-enter service a er being inoperative for the past 2 years while geotechnical repairs have been underway to its foundation. The terms of bringing this unit back up are now being discussed with DDW (c.f., Tsang le er of October 7, 2025, and other correspondence from Wade Bastien, RMW Board president).)

## 1.6 Organization of this report

This report contains our analysis of RMWC's supply situation. The data used to develop it is summarized from that given in a state database (cited in figures 2 and 3) and also in RMWC website presentation of its Consumer Confidence Reports.

The RMWC's Board and Source are identified with capital letters, as is customary at RMWC. There is only one of each.

Readers can reach their own interpretations about water supply and the watersheds. To aid the readers, Barry Hecht's prior reports on the area and topic considered are cited where appropriate, which will make discussion easier and more fruitful. It is our hope to provide RMWC with copies of these cited documents should the Board so wish, such that they can be incorporated in future watershed sanitary surveys, as historical baselines or designs or to carry out actual protective measures.

## 1.7 Acknowledgments

My colleague, Gustavo Porras, researched various aspects of our findings. Wade Bastien, Board chair, has been a fountain of knowledge about the system and its history, providing key documents at all stages in our work. Kelly Archer, the new licensed operator for the system, contributed in discussions, documenting the elements of the system, making measurements in the field, and generally shaping our work. Rod Fagan developed the facilities map of the RMWC system, mostly from primary sources. Other Board members assisted in their areas of expertise.

# 2. Watershed and Hydrologic Setting

This section of the report describes the environment from which the Source and Moody Gulch in general obtain their water, and pertinent factors influencing water quality and contamination potential. Emphasis is on geology and hydrology, as these are not only essential factors in providing reliable water quality and sufficient yield, but they have not been critically and practically considered in previous watershed sanitary surveys for RMWC (see Appendix A). This emphasis leads to seeing RMWC's resource base and coming challenges in a different way.

## 2.1 Climate and rainfall

RMWC is entirely within the Santa Cruz Mountains, located just south of Lexington Reservoir, and is part of the Los Gatos Creek watershed. As with all of the Santa Cruz Mountains, it has a Mediterranean climate with its main rainfall season extending from November through April. The mean annual temperature at RMWC is about 14 degC (or 57 degF), which is the temperature of soils and waters found deeper than about 5 feet below ground.

The main climatic episodic events affecting these watersheds are intense frontal and atmospheric river rainstorms – some which can extend for a week or two – windstorms, rare snowfalls which bring down limbs and trees, and droughts or sequences of wet years. All pose issues for RMWC in maintaining continuity of service and access to its Source.

### 2.1.1 Rainfall

Rainfall averages about 45 inches per year at the head of the Source watershed, and about 35 inches per year near the more sheltered downstream portion of the service area near the mouth of Moody Creek. Extreme drought rainfall is often about 40 percent of mean annual rainfall, while extremely wet years can report about 240 percent. Severe droughts persist for two or three years, but it is not unusual to see below-average rainfall for five or six consecutive seasons.

Despite several extended droughts, RMWC seems to never have run out of water attributable to yield of the Source (2018 WSS, see Appendix A).

### 2.1.2 Physiography and watershed

The source has a composite watershed drawing upon the two main forks of upper Moody Gulch (Figure 1). The Source itself is a reach of the west branch of the upper Moody Gulch creek bottom from which water emanates year-round. The east branch also yields water of strikingly similar quality, also emanating from the creek bottom. We believe both streams are fed from a common aquifer, which pours over a mudstone ledge. Because the flows are sustained even through multi -year regional droughts with a very constant ionic composition, it is very likely that aquifer is large by local standards, and may receive recharge from areas beyond the topographic catchment.

The Source is within about 100 yards of the confluence of two main forks of upper Moody Gulch. Both forks are the effective watershed of the Source. The yield of the Source itself is sustained by spills from highly fractured blocks of sandstone which is effectively an interconnected aquifer, lying atop mudstone and shale beds which limit further downhill groundwater movement. The flow of the two forks mixes in the aquifer before emanating from the Source. Hence, contamination (say, from a chemical spill) would move toward the source both through direct runoff to the west branch of Moody Gulch and also from

the fractured rock aquifer which sustains both the Source and the East branch of Moody Gulch. For the purposes of the Watershed Sanitary Survey, we should recognize potential contaminant sources in both the west and east branches (see Figure 1). And protecting the Source from present and future contamination involves aspects of both surface-water and groundwater management.

The composite watershed of the Source encompasses 247 acres, with about 110 homes and 4.5 miles of roadway.[4] Almost all residential areas are in the east branch subwatershed. Of this total, the west branch topographic watershed of 129 acres holds about 12 structures and homes, and about 1.5 miles of roadway.

### 2.1.3 Recharge

While RMWC is classified as having a surface water source, the Source has many similarities to yields from groundwater-supported springs. Therefore, recharge is an important influence on the reliability of supply. It seems to be non-uniform, reaching an inferred maximum near the head of the Source watershed, where rainfall is greatest, slopes are relatively gentle, soils are loamy and generally lacking in hardpans or claypans, and perhaps augmented by mel ng of occasional snows in areas above about 1200 feet in elevation. Slope debris deposits further downstream tend to have higher rates of runoff (hence less recharge) from steeper slopes.

One indication that recharge is an important dynamic in the Source watershed is its persistent low sodium and chloride contents. These are essentially identical to the concentrations reported in local rainfall. As discussed below, sodium and chloride concentrations are among the lowest reported in the central Santa Cruz Mountains. Protecting the volume and quality of recharge to the Source would appear to be a sound approach for RMWC going forward.

### 2.1.4 Storminess

Persistent turbidity from large and prolonged storms was rightfully identified (we believe) as a perhaps the main environmental threat to RMWC's water supply, compounded by accompanying slides and slope instabilities in the 2018 watershed sanitary survey. Big storms mean potentially big problems, either directly or indirectly. But all storm events are not the same, especially when compounding with other episodic occurrences, such as wildfires or seismic events, with different and perhaps unexpected results. Anticipating these is useful; RMWC's current trend of developing event-based management plans (discussed later in this section) can be a major factor in promoting shorter and less costly interruptions in normal operations, and a particular boon to a district which really has only one Source approved for supply.

## 2.2 Vegetation

Vegetation provides the slope stability, renews and is renewed by the soils, and provides habitat for the wildlife of the Source and other areas in the Moody watershed. Vegetation changes over time through natural cycles, with succession, disease, and climate change and human all ac ng on the plant communities. Loss of vegetation -- whether by human agency or natural process such as wildfire,

[4] Nearly all of roadways are built to Redwood Estates minimum standards of 20 feet of paved or compacted traveled way within a larger right of way.

landsliding, windthrow, drought, blight, or the loss or disturbance of soils by any process – threatens water quality and may require repair or management.

Three communities comprise most of the vegetation within the Source area, each with its own set of processes and hazards. Vegetation is predominantly perennial, and primarily coniferous, reflecting the relatively high annual rainfall. Additionally, most of the Source (and the Moody Creek watershed in general) is an area of north-facing slopes, with diminished exposure to wind and sun, and with resilience to re-growth.

Mixed evergreen woodlands occupy the areas with the most moisture, typically both in the form of precipitation and stored in the soil and weathering rock. In the Moody watershed, mixed evergreen woodlands tend to be either dominated by Douglas fir at the highest elevations, or by redwood on the steeper lower slopes with a blend or mosaic reflecting local conditions. The woodlands dominated by Douglas fir are maintained in part by fog. Snowfall, although relatively rare, creates openings as limbs and whole trees are weighed down and fall. Wildfires are the predominant vegetation-altering episodes calling for active management. Redwood-dominant mixed evergreen woodland prevail on the steeper slopes surrounding the Source, and along the pipeline which conveys yield to the RWMC's treatment plant. As with Douglas firs, Redwood vegetation is also susceptible to wildfire, but in different ways, with many larger trees able to survive to hold the slopes in place, but prone to prolonged windfall risks, calling for more active monitoring of potential hazard trees near pipelines and other facilities, including those downstream of the treatment plant. As their names imply the mixed evergreen woodland supports non-coniferous species such as oaks, tanoaks, baytrees, and in wetter microsites, buckeyes and maples. The diversity of tree species lends resilience to the woodlands, protecting wildlife, slope stability, and soil retention.

Drier sites, including those with thinner soils or facing to the south or west, locally support oak woodlands or chaparral, a critically important wildlife habitat in this mosaic. These sites are prone to periodic wildfires, with rapid post-fire succession. Chamise, buckbrush, and live oak are often dominant species, supplemented by sage, toyon, poison oak, manzanita, broom, and occasional coyote brush. The chaparral species are able to expand quickly to disturbed patches, which may lose their tree cover to fire and slope instabilities. The chaparral is an important part of the resilience of the soil cover on slopes, in addition to the wildlife habitat it provides.

Riparian species, of limited extent throughout the Moody watershed and especially in the Source area, include scattered patches of willows, maples, elderberry, box elder, buckeyes, and occasional alders, cottonwoods and bays mixed in with poison oak and hydrophytic species such as sedges, horsetail, woodwardia, and reeds. These are almost exclusively streamside plants. Riparian vegetation tends to remain through a wildfire episode, providing local protection from eroding or unraveling banks. Clusters of riparian pants tend to form small check dams which settle sediment and reduce turbidity from disturbed areas. The number and vigor of riparian species will vary through a cycle of wet and drought years. In general, riparian species provide habitat benefits through a variety of climate conditions, requiring little management, although they warrant prudent protection.

Just as there are no outcrops of serpentine bedrock in the Moody watershed, there are no patches of serpentine vegetation.

## 2.3 Fish and wildlife dynamics

By all accounts, wildlife occurrence and use are typical for the central Santa Cruz Mountains. Wildlife as a source of fecal contamination is discussed separately in Section 3. It may prove worthwhile for RMWC to stay updated on wildlife trends, particularly for feral pigs or other large animals prone to population spikes and disruptive behavior, or to species which may have large swings in population that can have unexpected consequences in introducing pathogens or parasites, or bring nuisance disruptions, such as rodent or predator population cycles.

RMWC has greater flexibility than most regional purveyors who divert from surface waters, as construction of Lexington Reservoir has prevented valued migratory fish species from limiting the amount or season of diversion. In recent years, however, SJWC has agreed to a bypass of 2 cfs (900 gallons/minute) at their diversion from Los Gatos Creek just upstream of the mouth of Moody Gulch. It may be that SJWC will seek its neighbors and partners to participate in sustaining flows or water quality, so 'fish flows may eventually become a topic of interest, warranting discussion in future watershed sanitary surveys.

## 2.4 Geologic and hydrogeologic setting

Understanding the geologic setting is simply vital to assessing the resources and potential challenges facing RMWC and some of the advantages and strengths available to meet those meeting its missions. Geology includes knowing the properties of the fractured bedrock aquifer which sustains the Source, RMWC's one major source of water. It is essential to recognizing geologic hazards, and how the two fundamentally different geologic properties of the upper and lower halves of the Moody watershed affect maintaining the supply and quality of water available to RMWC and its neighbors. One of the world's major faults bisects the Company, which has a number of implications, including how to maintain supply in the face of what is an almost inevitably seismic event of large magnitude with unknown recovery times and paths. Finally, the rocks themselves are sources of 'contaminants', or perhaps better called constituents of concern, which can potentially have adverse effects on members; health and trigger regulatory action over laboratory reports which are within the range of reason given this geologic setting. We know of no document which present these issues from the perspective of how to keep a water system running in light evolving hazards and dynamic processes as active and changeable in the Moody Creek watershed as anywhere in the state.

### 2.4.1 The two halves of the Moody Creek, both sides now.

Moody Creek is a watershed with two pairs of two halves. The first bifurcation is one of slope stability and seismic hazard. Upstream from Moody Curve, the watershed is cut into hard deformed and deforming bedrock; downstream of the Highway 17, huge compound landslides dominate the landscape, covering the traces of the San Andreas fault which likely has triggered them and provides multiple hazards and so ground on which to found a reliable water distribution system. These two different underlying geologies are distinguished in Figure 4 (taken from SJWC 2021 Watershed Sanitary Survey), where deforming bedrock is shown in brown, and the compound landslides are designated by a light tan shading. Areas near RMWC are characterized by the San Andreas fault bisecting the near-continuous ground underlain by the large compound landslides. Springs and wells are seldom sources of water in this belt, both within the Moody watershed and in the adjoining Aldercroft and Webb Creek and Bear Creek watersheds to the west.

There is a second, equally foundational division into shallow vs deep geology and water quality. Deep groundwater along the crest of the middle Santa Cruz Mountains tends to be rich in sodium chloride, well beyond drinkable limits. These sodium-chloride waters prevent use of the deep waters for water companies or for individual parcels, often with salt concentrations exceeding 10,000 mg/L. The Portola Improvement and Mutual Water Company (in the very headwater of the Pescadero watershed along Slate Creek) periodically experiences unusable water quality following droughts as well as after the Loma Prieta earthquake (Woyshner and Hecht, 2022). A band of salty water just south of the San Andreas fault is found throughout the mountains to the west, especially in the Pescadero, San Gregorio and upper Waddell watersheds (Zatkin and Hecht, 2011) Within three or four miles of the Source, a number of very saline domes c wells have been drilled (c.f., Hecht, 1975; Hecht, 2012) or 'went salty' following the Loma Prieta earthquake. The old exploratory oilfield boreholes at Moody Curve which we filled by the State (shown on topographic maps which RMWC uses) yielded very salty water until repaired (Crawford, 1970; Hecht, 1975). We believe that this is connate[5] water being squeezed by the tectonic forces associated with uplift of the Santa Cruz Mountains (c.f., Bruggmann and others, 2022), and is only incidentally due to drilling or other industrial ac vi es, and further, that such water remains at depth beneath the Source watershed and RMWC service area. It is naturally occurring and not controllable by land-use regula on. Further, sodium chloride water may eventually be detected in RMWC's and nearby purveyors' waters following seismic activity. We suggest monitoring for increases in sodium, chloride, or their surrogate (specific conductance) in surface waters at seasonal low flows or in groundwater as wells are drilled or as springs (including specific conductance) are placed back in service after a seismic event. This is an easy and very inexpensive measure which RMWC can implement to track how its sources are being affected by these widespread pool(s) of salty water (see Sec. 3.1.15). Above the salty deep ground waters, very non-saline 'fresh' waters are often found. RMWC's Source appears to draw on such a shallow groundwater lens. It is remarkably free of both sodium and chloride, yielding water which contains both constituents at concentrations not distinguishable from rainfall which recharges the groundwater that emanates at the Source.

### 2.4.2 Geological structure

The geological relationships in this middle segment of the Santa Cruz Mountain central ridge are now becoming clearer after field work conducted for this study and others. And following a separate review (below) of what water quality tells us about movement of water to the source spring.

We now believe the Source watershed has evolved over the Pleistocene and Holocene as a block of bedrock that has twice been arched and uplifted, as shown in Figure 6. First, roughly 20 million years ago, the rocks beneath the Summit were downwarped into a syncline, a downfold in which the Vaqueros sandstone was enveloped by less pervious clays and mudstones. New forces have domed up the downfold. The Source watershed is almost entirely underlain by consolidated bedrock being folded over the past million or more years into an anticline. Moody Gulch is actively downcutting into the summit ridge. The strong, steady flow to the Source spring likely emanates from large fractures in the bedrock, whose voids are filled with high-quality recharge moving downward through the clean rock. Redwood Estates has been developed on top of this arch, on the flatter lands near its crest. The fractured rocks likely extend probably 300 to 500 feet below the surface. Much of the recharge probably occurs near the southern (summit) side of the broken rock wedge, both because that is where soil and broken rock is

[5] Connate water is water that was originally in the forma on during deposition and consolidation. The host geologic units are thought to be the upper Butano, Vaqueros, San Lorenzo, and (locally) Purisima formations. The San Lorenzo forma on includes both the Rices mudstone and Twobar shales (see Clark and Rietman, 1981). All units are marine sedimentary rocks, so the connate water likely originated as seawater.

thickest, and the rainfall is the highest right at the summit. The source spring can draw on as large and deep a zone of saturated bedrock as any along Summit Ridge. These conditions extend westward about 0.7 miles to the Williams well (see fig. 2 to this report), which our staff re-drilled and renovated for MidPen (Woyshner and others, 2017), and which yields very similar water. What it means is that yields seem to be more persistent than many springs along the summit, and the quality of the water changes little from year to year or season to season.[6] At one time (prior to the discontinuing of the Redwood Estates diversion in 2005), this wedge yielded water reliably enough so that Redwood Estates, RMWC (then the Idylwild Water District), and most of Chemeketa Park all drew water from this geologic structure. The logic of a gradually rising, fracturing and deforming bedrock aquifer is consistent with the persistent flows flowing to the Source, telling a very similar story to water-quality signatures of waters which RMWC has diverted over time from the Source.

The composition and quality of water which RMWC diverts at the source tells a similar tale of a large volume of good-quality groundwater within the broken-rock wedge which continues to yield very-similar low-flow water quality year after year at the Source. Despite more than 100 onsite waste disposal systems (or septic tanks) perched atop of fractured bedrock wedge, very small traces of human and animal wastes are seen in water emanating at the Source. Some of these onsite systems are quite sizable and concentrated, such as those receiving spikey loadings from the commercial areas and the event center. The water quality data show the concentrations of sodium, chloride, and potassium fluctuate within a very narrow range of low values, indistinguishable from concentrations in rainfall, the origin of the water emanating at the Source. Putting real world numbers of below detection levels to a maximum of 0.4 mg/L as N on diversions from the Source compare with observed values of 10 to 25 Mg/L as N in groundwater near leachfields in the San Lorenzo Valley (Hecht and Johnson, 1981; Johnson and others, 1982); detergents (a near-universal indicator of septic effluent presence) has been below detection levels through the past 6 years at the RMWC source). Values of 20 to 27 mg/L, 10 to 16 mg/L, and 0.9 to 1.3 mg/L are reported in the most recent 6 years of RMWC's annual analyses for the three elements, respectively, while values of 55 to 120, 45 to 110, and 30 to 50 mg/L are reported from groundwater just downstream of septic systems in the San Lorenzo Valley (Hecht and Johnson, 1981; Johnson and others, 1982, and similar geologic environments elsewhere in the country.

The rocks forming the Summit Syncline and fractured bedrock wedge are exposed and visible in roadcuts along Highway 17 for 200 yards south of the Summit Road overpass at Patchen Pass. White or light buff sandy beds with thinner interbeds of dark grey or black shale can be seen in the roadcuts, and can help interested individuals "see" what the bedrock aquifer(s) feeding the Source looks like when exposed. Steady-over- time water quality and groundwater yields are two independent lines of evidence which demonstrate a sizable volume of water stored in the bedrock wedge. They jointly suggest that the

[6] At our request, Kelly Archer measured specific conductance es mated flow in Moody Gulch at the Source and also above the mouth of the main le -bank tributary flowing east from the vicinity of the Williams into Moody Gulch just downstream of the Source. She found nearly as much flow and measured equal total dissolved solids in both streams, implying that the structure which we interpret here as highly fractured bedrock extends at least several hundred yards east of Moody Gulch. Our work at the Holmes well and at springs in the upper Aldercroft Creek channel shows contras ng chemistry and structure. Geologic mapping by Clark (1981) and McLaughlin and others (2002; see Figure 5 this report) shows highly contorted strikes and dips consistent with this interpretation (see fig. 5, this report).

aquifer feeding the Source is uniquely suited to providing a drinking water source. RMWC is fortunate to have access to a resource of this quality.

## 2.5 Episodes and Emergency Plans

During the past two or three years, RMWC has responded to requests for emergency plans to anticipate and deal with episodes of varying types. Episodes are events which lead to hydrologic responses which are different in kind or frequency than what may have occurred in the past. Certainly, the Santa Cruz Mountains is one of the more episode-prone watershed-management landscapes in the country, especially those associated with compound(ing) events, such as major storms following wildfires. These plans can be regarded as taking preparation and protection to a deeper level, one particularly relevant to smaller districts dependent on volunteers and to RMWC with limited sources of supply.

RMWC has benefited from three significant efforts which bear mention and continued attention in future watershed sanitary surveys:

### 2.5.1 Fire-Safe (Los Gatos watershed) Council:

The Los Gatos Fire Safe Council is now concluding a plan to take and coordinate action (q) in preparation for a large watershed-scale fire, (b) mitigating damage and problems with water management during first few years after a fire, and (c) preparing for the next fire afterwards.

RMWC has been participating, and has taken pride in its accomplishment. In particular, fuel reduction and traffic management in preparation for a wildfire are important steps for RMWC to be involved with. At the same time, RMWC has somewhat different goals and conditions to consider than do the five or six large entities which dominate much of the FSC's direction, in part because they have paid staff to follow and follow through each month's ac vi es, and because they (almost) all have alternate source of water supply. They will also be looking to the same equipment or expertise contractors used by RMWC, such that clear communication and other steps to enhance RMWCs nimbleness should be seen as way of protecting your water quality.

### 2.5.2 Cross-connection planning.

RMWC is well along on developing a plan to control cross connections, including enabling all members to be aware of the needs of those immediately above and below a given home to take ac on. We understand this will be discussed at the forthcoming July 13, 2026 RMWC annual shareholders' meeting.

### 2.5.3 Drought planning

RMWC has recently developed a plan to respond to year-to-year diminishing supplies during droughts, particularly protracted ones. Guidelines for the plan were provided by DDW as part of a statewide effort to promote drought resilience. They emphasize taking measures to avoid running out of water, and contingency planning for what to do in case of that eventually.

This is a sound step to add, and RMWC has taken to the challenge. A copy of the draft plan, pending DDW approvals, is given in Appendix D. It might be noted that the plan seems to have been designed with larger districts and ones in mind having multiple sources or at least with both surface and groundwater/imported supplies so implementing the plan may take some effort on RMWC's part. It has the advantage of moving the company toward a backup emergency supply from the Montevista pipeline, which we understand is a priority of the Board.

### 2.5.4 Seismic event preparation plan

Although not explicitly a Board priority, a plan to prepare for maintaining water supply and quality in the face of a likely event on the San Andreas fault – which cuts right across RMWCs service area – would be consistent with this recent trend in developing action plans. We have outlined what a simple, straightforward plan of this sort might look like in Sec. 3.1.15. In this case, the focus would be on making some simple regular observations to focus on the question of "how long will it take for our Source to recover and allow us to resume full operations? How can operations be planned so that the effects of aftershocks not set back the plans in place?" Was the recent earthquake large enough (?) or near enough (?) to possibly affect the RMWC system? This plan is probably most effectively developed and carried out in tandem with your neighbors such Chemeketa Park, Redwood Estates, Bear Creek Preserve (MROSD), and possibly SJWC or SCVWD. It is low cost, especially if shared with your neighbors.

# 3. Potential Contaminant Sources

## 3.1 Potential Sources of Contamination

Each of the potential contaminant sources outlined in the Watershed Sanitary Survey Guidance Manual (AWWA, 1993) are applied to the RMWC area.

### 3.1.1 Wastewater

There are no municipal wastewater treatment plants that discharge within either the Moody Gulch watershed or Los Gatos Creek catchment. The residences in Redwood Estates are served by a community services district which discharges outside of the Moody Creek watershed. Residences along Old Well and Brush Roads west of Highway 17 are served by individual septic tank and leachfield systems. Most non-sewered residences located within the Moody Gulch watershed, primarily along ridge tops, are usually positioned many hundreds of feet from the stream.

Septic systems have the potential to contaminate surface water either by percolation of wastewater through the soil into ground water which recharges surface water, or by direct surface runoff. Surface water contamination from septic systems can also occur by system failure or via insufficient percolation rates leading to ponding and surfacing of effluent. Conventionally, a failing septic system resulting in effluent surfacing nearby can allow large amounts of nutrients, viruses, and bacteria to contaminate nearby surface waters. Pollutant contributions from onsite wastewater treatment systems (generally consisting of a septic tank and leachfield(s)) are probably greatest during or following wet periods when runoff can convey surfacing sewage to streams. In nearby Santa Cruz County, where some of these formations outcrop over larger areas, failure by excessive percolation rates through certain coarse-grained, highly-permeable sandstones[7] is more common (c.f., Ricker, 1983; White and Hecht, 1993). Infiltration through these units occurs at rates too high to enable attenuation of bacteria or chemical constituents expected of functional leach fields. These coarse-grained sandstones are not mapped within the Moody Gulch watershed above Highway 17.[8]

Given these geologic and soil conditions, on-site wastewater systems may be expected to effectively attenuate both pathogens and chemical constituents. Santa Cruz County, formerly through its Office of Watershed Management and currently through its Environmental Health Division, has conducted extensive tests of effects of non-performing on-site wastewater systems on local streams and ephemeral drainages in areas underlain by the Vaqueros sandstone and the derivative Hugo and Maymen soils. Low

[7] Excessive percolation rates, where observed in the San Lorenzo and Soquel watersheds, are almost entirely associated with semi-consolidated units of the Santa Margarita sandstone, and secondarily the Lompico and Purisima sandstones plus certain units of the Butano sandstone, and alluvial or landslide deposits derived from them. These units are not mapped in the Moody or Los Gatos watersheds, and we did not observe outcrops in the course of our field visits in 2013 and 2020, nor in the adjacent portions of the Aldercroft Creek watershed (Hecht and Ruttenberg, 2016; Woyshner and others, 2016. We rely heavily on Santa Cruz County work, because the soils and geology underlying RMWC's service area are quite similar to those in Santa Cruz (with the notable exception of the Santa Margarita and Lompico sandstones), which lies entirely west of the San Andreas fault.

[8] The coarse-grained arkosic sandstones are readily recognized by the size of typical sand grains (often about 0.5 to 1 mm); additionally, nearly all grains are angular, and are predominantly of granitic mineralogies. The Vaqueros sandstone found beneath much of RMWC Source and service areas is composed primarily of much smaller (commonly 0.15 mm, with noticeable silt and clay content) but is only rarely reported to have excessive percolation rates.

bacterial loadings are typical of this terrain, even at the high system densities observed in the San Lorenzo watershed.[9] Nitrogen species, and especially nitrates, are usually found at concentrations below 2.25 mg/L (as $NO_3$, equivalent to about 0.5 Mg/L of $NO_3$-N), or about 5 percent of the drinking water limit (MCL), with very few readings above 3 mg/L. These values are typical of mountain valleys throughout the Santa Cruz Mountains, including those in parks and preserves (Ricker, 1993). Other constituents commonly associated with onsite waste treatment systems are MBAS (methylene blue active substances, generally surfactants and detergents) and household contaminants. Slightly to moderately elevated bacterial counts, MBAS concentrations, and odors are the most likely indicators of failing onsite wastewater systems at the densities and distances from the channel seen in the upper Moody Gulch area, but are not reported by RMWC in sampling its raw water. Additionally, the very low and near-constant concentrations of sodium, chloride, potassium in RMWC's tests are consistent with little if any wastewater contamination.

Santa Clara County's Environmental Health Division does not routinely inspect single-family septic systems once their installation has been approved. Inspections are only conducted when complaints are filed or during upgrades and remodeling. Since the 1980s, permitting of new systems has become routine and a computerized tracking system was implemented at the County in 2005. New and upgraded systems must meet County standards. Disposal of untreated greywater is prohibited. Additionally, the County General Plan prohibits development of commercial enterprises which generate high levels of sanitary waste in areas served by septic systems. There are no commercial enterprises in the RMWC area. Redwood Estates Services Agency (RESA) operates a mountain resort/event center and contains a small commercial area within the Moody Creek Source area, discussed below in the last few headings of Section 3.

Even in the absence of current waste system issues, continued attention is warranted. One of the most likely potential sources of waste contamination for this area is the structural failure of either a septic tank or leachfield if these are exposed by erosion, slope instabilities, or seismic events. Reports or rumors of breached on-site systems, especially above the source, should be taken seriously and conveyed to the responsible agency, which in this case is the Santa Clara County Environmental Health division of the County's Public Health Department. Telltale signs of such breaches are odor, persistent foam in the water, and deposits of films best characterized as unpleasant or offensive on streambeds and bank.

### 3.1.2 Reclaimed water

There is no known use of reclaimed water in the source watershed, and therefore reclaimed water is not presently a potential contaminant source. Also, it should be noted again that use of greywater is not allowed in Santa Clara County.

### 3.1.3 Urban and industrial area runoff

Urban runoff is that portion of stream flow originating from roads, urban, and dense residential areas. Many contaminants originate disseminate from such areas, of which runoff with vehicle byproducts, those associated with homes and yards, pets, recreation/visitor use, and the increased flows resulting from urban drainage itself. At Moody Gulch, the primary source of urban- and industrial-area-like runoff

[9] Santa Cruz County reports about 18,000 on-site systems in the 106 square miles of the San Lorenzo watershed upstream of the Big Trees gage. The overall density of 170 systems per square mile in the San Lorenzo basin is sharply exceeded in individual valleys or canyons.

is Redwood Estates, a 100-year-old community often considered out of sight in the headwaters of watershed.

While it is difficult to discern exactly which portions of Redwood Estates drain to the Moody Gulch source waters, we estimate that more than 180 homes are located in the watershed. Additionally, about 30 lots are zoned for eventual residential use. We estimate by eye that about 1.5 of the 11 miles of community-maintained roadway in Redwood Estates fall within the watershed. Also present is a large commercial facility with meeting rooms and event space, with an allowed capacity of 125, available for full-day rental to the public, with a large landscaped pool and lawn. This space, we estimate, can attract 60 to 70 vehicles for an event. Additional loadings come from a small commercial area nearby. No industrial activity, other than a fire station which probably does not drain to Moody Gulch, nor irrigated agriculture is reported. The roads and facilities are operated and maintained by Redwood Estates Services Authority (RESA), a California Nonprofit Mutual Benefit Private Trust.

Redwood Estates is served by onsite waste-disposal systems ('septic tanks with leachfields') which are thought to discharge via leach lines to the unsaturated zone above the groundwater system which likely supplies RMWC's source. Human and household wastes can potentially flow to the source, although much attenuated and renovated by the distance of subsurface travel. The design and installation of onsite waste disposal systems are closely regulated by state and local ordinances, administered by the Santa Clara County Environmental Health branch. Their cumulative significance as potential contaminant sources is discussed in Section 3.2 below.

RESA has adopted a number of standards which tend to reduce its watershed effects, such as prohibiting pets at the event space and at the two parks it maintains. Roads are seldom more than 20 feet wide, about half the width of subdivisions with comparable density in the flatlands of the Bay Area. And it might be noted that the most urban portions of Redwood Estates are near the edge of the Source watershed, providing distance through which contaminants and the accelerated runoff of urban areas can be par ally attenuated. It is not clear whether RESA and RWMC have discussed or interacted on water-quality or drainage-control issues which are the focus of a watershed sanitary survey. Discussion of road drainage, the fertilizers and agricultural chemicals applied at the community center, and future expansion are among measures which might minimize contaminant delivery to the source watershed. The envelope of residential and light urban areas within Redwood Estates occupies about 60 of the 247 acres within the catchment to the source, or about 24 percent of the composite watershed. The urban runoff contaminants of most concern to drinking water are microbial organisms from pets and septic systems, suspended sediments caused by increased flow rates resulting from impervious surfaces and management of drainage[10], and trace constituents from combustion or abrasion and weathering of res or vehicle exteriors. Other common contaminants of concern include pesticides and fertilizers used in landscaping. Urban runoff flows and associated contaminant concentrations are highly variable. Some

[10] Erosion, incision, and expansion of channels downstream from urban or residential areas is widespread throughout Santa Clara County, as well as nationally. Local conditions and some treatment options are discussed in Hecht and others (2007) and Donaldson and Hecht (2019), among others. Erosion, incision, and widening of Moody Gulch both above and downstream from the source are considered some of the main challenges facing RMWC, both because of effects on water quality and on the structural integrity of the pipeline conveying water from the source to the treatment plant.

factors affecting this variability include the duration and intensity of rain events, specific land use, and the length of the preceding dry period during which pollutants build up on roads and the land surface.[11]

With the notable exception of Redwood Estates, there are few residential, industrial, or agricultural infrastructure near the Source. There are several significant hills between the Source and the nearest residential areas, and the closest industrial and agricultural sites are several miles from this Source. The water source is at a higher elevation than any abandoned oil well or mine located in this watershed, and there are few roads which can produce runoff that would impact this Source.

### 3.1.4 Agricultural crop land use

There is no commercial agricultural land use in the Moody watershed.

### 3.1.5 Grazing animals

There are no grazing animal facilities in the Moody watershed. The last ranch burned in the 1970s, and was not rebuilt.

### 3.1.6 Concentrated animal facilities

There are no reports of stables, paddocks, or kennels in the Moody watershed.

### 3.1.7 Risk of unauthorized activity

RMWC's water source is in a very remote location that is not open to public, industrial, or agricultural use. The source is located in a steep narrow valley that is accessed from a primitive unmarked trail that requires a 30+ minute hike to access from the gate next to CA HWY17. The gate on HWY17 is clearly marked with a no trespassing sign. It is unlikely that unauthorized individuals are visiting the source due posted "No Trespassing" sign, the rugged landscape, and no infrastructure to support recreational. It is very unlikely that the source is visited by unauthorized individuals.

### 3.1.8 Wild or feral animals

The source area and pipeline corridor is likely visited by many of the animals found in the Santa Cruz Mountains. Wade Bastien, RMWC's Board chair, has written:
". . .I have had trail cameras monitoring trails in the woods on my property[12] for the past six years. I have never seen any wild pigs on my cameras (which makes me think they are very rare in the general area). The following are animals I have seen at least a few times every year:

- Squirrels (dozens, every day)
- Deer (3-6, almost daily)
- Grey fox (1-3, almost daily)
- Mountain lions (1-2, about 5 times a year)

[11] This is consistent with RMWC's practices (Kelly Archer, pers. comm.) Nearby Chemeketa Park's Operations and Maintenance Manual (Farmer, 2020, see Hecht, 2021, Appendix B) specifies bypass of all runoff in Moody Creek during first several storms of the year, largely to minimize road-related pollution.

[12] Mr. Bastien's property is located immediately to the south of the RMWC main plant and Tanks 1 and 2. (See Figure 2_)

- Bobcats (1-2, about 10 times a year)
- Coyotes (1-2, a few times per week for 4-6 months of each year).
- Turkeys (1 to 10, almost every day for about 8 months of every year, then very infrequently)
- Lots of smaller birds commonly found in the Santa Cruz Mountains (both permanent and migratory)
- Skunks (1-2, 2-3 times per week)
- Opossums (2-3, 3-4 times per month)
- Raccoons (1-5, about once per month)."

This catalog is broader, but includes all large species listed in the 2018 Watershed Sanitary Survey prepared by RMWC's Board at the time. It is also likely that cougars occasionally pass through the Source watershed, given the widely publicized increase in Santa Cruz Mountain populations.

### 3.1.9 Mine runoff

No mines or quarries are known to exist in the source area or along the pipeline corridor. Four exploratory oil wells drilled during a regional oil boom in the decade following World War II were sealed under contract to the State during the early 1970s (Crawford, 1972). They are Located just upstream of the Big Moody Curve, downstream of the source area, at least some of these wells leaked a distinct high-concentrated sodium chloride water (see Hecht, 1975), very distinct from RMWC's product, which (as noted below) is very low in these analytes. No action is indicated.

### 3.1.10 Solid and hazardous waste disposal facilities

None are known in the watershed.

### 3.1.11 Recreational use

None are known, beyond those described above for Redwood Estates.
Midpen has drafted an agreement to construct a trail system in the Moody Creek corridor. The roots of this plan date back about 20 years, when the County held the land as open space before giving it to Midpen for inclusion in the Bear Creek Preserve. Likely facilities to be considered by Midpen are construction of trails (not specified in the proposed agreement as to pedestrian, cycling, or equestrian), plus the ancillary staging areas, and parking facilities. No action has been taken over the past 12 years, since this entitlement was reported last discussed. Midpen has committed to coordinating with both RMWC and Chemeketa Park to protect water quality in any recreational plan. A draft memo was written by Midpen and exchanged in 2014. Details are presented in the 2021 WSS for Chemeketa Park as its Appendix E.

These uses, alone or in combination could lead to (a) destabilizing the channel in the Source watershed along the pipeline corridor, (b) allowing unpatrolled entry into a no-trespass area, given evolving regional efforts to better manage wildfires, posing a risk of trails designed for hikers to become trails eventually opened to ebikes, mountain bikes, and equestrian uses without the approval of those who were taxed to pay for acquiring this land.
It is hard to imagine any of these activities taking place without putting the source area and the pipeline corridor at risk of erosion, sedimentation, and channel incision, plus the contaminant loadings and vandalism which might come with increased use. RMWC may wish to consider continued inattention to any proposal to use the Source area and pipeline corridor for recreational use.

### 3.1.12 Traffic accidents and spills

Highway 17, and the attendant accidents, spills, and maintenance, is an ever-changing origin source of water-quality concerns for areas downstream of the highway at the RMWC plant. At present, no raw water sources are located downstream of the road. The perchlorate contributed by traffic flares that are a significant source of concern at Chemeketa Park MWC do not affect RMWC because RMWC's intake is entirely upstream of the highway. If RMWC were to consider using local groundwater, contributions from the highway may have to be taken into consideration. Such sources include highway runoff, runoff from spills and accidents, and contributions from chronic stockpiling of highway repair materials along the highway near the Idylwild Road intersections. The minor channels and swales draining Highway 17 do appear to recharge groundwater in the general vicinity of Tanks 1, 2, and 3.

### 3.1.13 Groundwater which influences surface-water quality

Beyond items already discussed above, we do not believe there to be such influences.

### 3.1.14 Sea-water intrusion

RMWC Source area is located at elevations 1200 to 2200 feet above mean sea level, and is not subject to ongoing impact by sea water.

### 3.1.15 Geologic hazards

RMWC's system is located within or adjacent to the San Andreas fault system in segments of the fault known to be active, such as during the 1906 earthquake, when 1.8 meters of displacement was measured at the Rices railroad tunnel about 2 miles to the east of the Source. (Prentice and Ponti, 2006). One potential action plan is discussed in this section of the WSS report.

Landslides, mudflows, and erosion and incision of segments of Moody Gulch and its tributaries can occur at any time. Flooding, windstorms and other climatic events may be considered geologic hazards. In these respects, geologic hazards are additive to other hazards. Access to RMWC's facilities should be periodically evaluated by the Board, and the MWC's members.

#### 3.1.15.1 Seismic event action plan

Earthquakes and seismic events have the potential to disrupt water supply from the RMWC's Source or its quality. We can learn from what happened during the Loma Prieta earthquake (October 17, 1989; M 7.1) which caused significant changes in the hydrology of other Santa Cruz Mountains watersheds, especially that northwest of the epicenter. Streamflow increased at most gauging stations within 15 min after the earthquake. Overall salinity, ionic concentrations and the calcite saturation index of the stream water also increased. Streamflow and solute concentrations decayed significantly over a period of several months following the earthquake. Ground-water levels in the highland parts of the basins were locally lowered by as much as 21 m within weeks to months after the earthquake. The hydrologic response suggests that the earthquake first increased rock permeability and temporarily enhanced groundwater flow rates in the region, par ally draining the fractured aquifers. The sudden increase then attenuated, and diminished until the groundwater storage areas were replenished over periods of months and years. (e.g., Rojstaczer and Wolf, 1992; Briggs, 1992)

The efforts that can repair or restore the water are unknown and the primary activity that the Board can lead with is patience until the natural recovery is well underway. Perhaps no cause for contamination is as volatile or challenging to RMWC as dealing with the spectrum of seismic hazards.

Rudiments of a seismic action program, customized for RMWC, might include some of the following elements, with an intended duration set by inclusion in the next watershed sanitary survey, nominally in 5 years. Such a program would be tailored for RMWC, with its main susceptibilities of (a) anticipated faulting through the heart of the system, (b) dependence on a single source of supply subject to disruption for a week or two or a month or two at a time, (c) limited physical infrastructure and heavy equipment, including no place to store spare parts, and (d) no wells drawing on a groundwater supply (which tends to be more resilient than a surface water source), and with a long pipeline across oversteepened terrain, and (e) vulnerability to limited areas to store debris from distressed slopes or damaged homes.

**3.1.15.2 It's a matter of when, not if**

By all accounts, a major earthquake or a series of more minor events are expected to strike this segment of the Sam Andreas fault over the next few decades, within the time window for which a WSS should be considering risks. The Loma Prieta event is at the larger end of an expected minor event; the 1906 earthquake (Pren ce,2006; Lawson, 1908) might be a useful set of experiences for a major event. Each comes with aftershocks, generally a magnitude or two lesser than the main event, and possibly with preshocks – both of which may delay and complicate response of the water company. Directors and operators should know where the known fault trace is located, as indications are that future earthquake (if along the San Andreas) will be near former traces. Although not so much so for what actually happened in Loma Prieta. Focusing the water district's preparedness on the 100 feet on either side of mapped trace is a good beginning, with other key areas perhaps to follow.

A checklist of pre-event actions appropriate to RMWC's situation is:

**A vulnerable-to-damage list:** Locations where treefalls, pipeline, and distribution system ruptures might be expected based on observations and prior experience.

**Spare parts:** Acquire key spare parts for the plant, tanks, pipeline and distribution system, especially meters and sensors needed to enhance continued opera on

**Policies:** A set of good-neighbor guidelines. Remember that Chemeketa Park exhausted its storage during the 1985 Austrian Gulch fire because some members chose to open their sprinkler systems before evacuating, which could have been avoided with minor anticipation**.**

**Stockpiling and storage:** Choose and designate areas for stockpiling (separate) household and facility debris, leaving RMWC facilities and distribution areas fully accessible for making repairs and replacing broken parts with spares. Anticipate that Caltrans and other large entities will also be seeking such space. And that it may be raining when those spaces will be needed. Also, consider that Highway 17 may not be usable, perhaps for some time, and that many people will want to use the Old Santa Cruz Highway for the interim.

**Communications:** The Board can and should set scripts for who will speak for RMWC to issue warnings or statements, and to whom. The same should hold for contacting the equipment operators with whom RMWC regularly subcontracts. What gets posted on the bulletin board at the main plant? Remember that even those who work or go to school a few miles away may not be able to return to their homes for hours or days after such an event, and that technology links may or may not be usable.

**In working order: Continue** RMWC's practice of routinely operating and 'firing up' your backup generator and other essential components to make sure that key anticipated actions are do-able.

**The Source and pipeline:** Arrange for knowledgeable individuals to walk the pipeline up to the source as soon as possible after a moderate or large event, making notes and taking images of immediate and less immediate needs to keep them working. Earthquakes go better with good amounts of good-quality water. RMWC does not have a lot of water storage, so taking measures right after an event to walk the pipeline protects usable storage from depletion by leakage, and prevents contamination from entering the pipeline. We suggest a goal of completing the reconnaissance within 72 hours, as RMWC has only a few days of storage at best, so every hour counts.

Nothing listed above or below is intended to stop RMWC from joining other or regional efforts to anticipate and deal with earthquakes. The measures in this report are offered as a means of focusing attention on, and star ng to solve, the earthquake threats unique to the water district.

### 3.1.15.3 Anticipated hydrogeological response to a large or moderate earthquake

Likely geological and hydrogeological response to an earthquake or some size is:

a. **Groundwater** storage areas will drain almost immediately to the stream system, then take months or years to gradually refill, resuming past levels or water quality after many months or years. Based on the post-Loma Prieta experience, flows increased 20 to 50 times over their normal early-October stream discharges in streams from Gazos and Whitehouse Creeks to the East Fork of Soquel Creek, gradually decreasing over months or years back to former levels and rainfall-runoff relationships. The Source might usefully be considered a groundwater storage area, discharging to a spring in this context, given our interpretation of its geology discussed in Section 2.4 and Section 3.2.

b. **Overall salinity** (as measured as specific conductance or as total dissolve solids, or TDS) often increases substantially, as the deeper sodium-chloride water discussed in Section 2 became a larger proportion of the flow. It has been feasible for water companies to monitor in real time the salinity of the sources and storage in real time. RMWC ideally might wish to be positioned to make a decision as to (a) bypass all diversions or (b) make adjustments in treatment as quickly as a few hours after an earthquake. Generally, it appears that salinities diminish gradually as the aquifers refill over periods of several months or years.

c. **Turbidity** increases substantially over the short term in wells and in streams with oversteepened slopes, and large trees are toppled. RMWC tracks turbidity every 15 minutes, effectively continuously, so the first indications of changes in the Source area may come from these sensors, provided the data are accessible and not complicated by concurrent rainfall.

d. **Trace metals** concentrations may increase as deeper waters become a large proportion of the flow of small streams and springs; a set of trace-element lab results should be considered.

### 3.1.15.4 Monitoring post-quake recovery of the Source

Once immediate post-event response is underway, the RMWC Board will need to evaluate how long it may take for the source to resume the quantity and quality of its pre-event yield. This question will affect decisions on what to repair and when, and what backup plans should look like, and usefully might be considered as a primary question. Certainly the state, through the Division of Drinking Water, will want to know what amendments to RMWC's operating permit may eventually be needed. While technical assistance might be provided by regional groups and state and local governments, experience has shown that theoretical considerations and regional assessments of priorities often take longer than the recovery

of the physical systems. Much of the local assessments and aids to local water road and water companies came months or years after the Loma Prieta event, as one example. Company members will want such information to guide their own private decisions about rebuilding and repair, and experience has shown that their insurers will base their coverage and payment decisions on likely recovery arcs. Individual members may want to know (and quickly) how and if aftershocks have affected their water supply.

RMWC's setting allows likely recovery curves to be estimated from simple metrics, if you collect them for a base period prior to a seismic event and can compare them with values measured following the event. These measurements include making measurements at springs, seeps, and wells in and surrounding your watershed. Metrics measured would be:

- Estimate of flow, with a portable weir or by visual estimate (for springs, intakes, or streams), or flow meter (for operating wells),
- Depth to water (in wells only)
- Specific conductance and temperature with a field meter.

Pre-quake measurements would be for a base period prior to an event (likely quarterly sampling for the first year, followed by annual measurements in June or July). Post-quake measurements would depend on the event and conditions following it, but would be likely to begin as monthly measurements for the first three months diminishing to quarterly and then annual frequency as the recovery curves become established. Concurrent tracking of turbidity from the automated sensors might optionally and usefully be added.

Examples of Locations for which it would be useful having these systematic measurements, with permissions, might be:

- Source or plant intake
- Main eastside tributary to Moody Creek just downstream of the Source
- Holmes well
- Springs on Aldercroft Creek about 500 yards downstream of Holmes well (compared with measurements in Ruttenberg and others, 2017)
- One or two wells within the RMWC service area, if made available by owners
- Chemeketa's Moody intake
- SJWC's Montevista pipeline

The area could very usefully be expanded to incorporate other sites in the Bear Creek Preserve or Chemeketa or springs in northern part of the RMWC service area or adjoining districts. The program could very well be conducted cooperatively, with the slight costs shared. Data are available for most sites from 2016 to anchor the baseline period.

**3.1.16 Fires**

Watershed-scale fires are in important dynamic in RMWC WSS and related planning. Wildfire is a known and partly familiar process which can lead to largely-scale loss of property and facilities, post-fire erosion of burned areas, loss of slope stability (a particularly local concern), creating hazardous materials within

the burn perimeter which can enter your water source and distribution system, and serious and ongoing damage to RMWC facilities.

#### 3.1.16.1 What can be learned from the local history of wildfires?

Wildfires have always been an episodic event in the Santa Cruz Mountains landscape. Burn scars on old-growth trees, soils with fire-modified soils, and charcoal deep in the soils are evidence of recurring fires over hundreds and thousands of years of human occupancy, and over geologic time. They are expected to recur, bring with them water-quality consequences, especially those related to the direct and indirect effects of turbidity.

There are no known historical incidents of extensive fires in the Moody Gulch watershed. However, the Lexington Fire in the summer of 1985, which did not enter the watershed, caused a temporary disruption in water supply in the Chemeketa Park district. Residents were ordered to evacuate and many deployed sprinkler systems before leaving, quickly depleting storage tanks. A disruption in power supply compounded the problem by limiting the ability to treat more water.

The SJWC sanitary survey update (2016) describes two major historical fires in the Los Gatos Creek watershed. In 1985, 14,000 acres of grassland and shrubbery burned in the vicinity of Soda Springs Canyon and to the south ("Lexington fire". In 1961, 5,300 acres burned in watersheds tributary to Lake Elsman as part of a much larger fire ("Austrian Gulch fire") involving most of the Uvas watershed in addition to burning much of the upper Los Gatos Creek watershed and resulting in near-complete sedimentation of Willliams Reservoir.

Past fire responses have focused primarily on emergency revegetation, and adapting to altered water quality in reservoirs. More recent watershed practices are focused on vegetation management/reduction and limiting the spread of fires once ignited.

#### 3.1.16.2 What might RMWC expect from a watershed-scale fire?

Most narrowly, RMWC can expect damage to its pipelines and distribution system from large fires, especially if the source watershed is partly or completely within the burn periphery. Damage includes more frequent treefalls involving larger trees, increased sediment entering the channel, both during the months following the fire (largely as dry ravel) and the influx of post-fire erosion and sedimentation with the subsequent winter storms. With the resulting turbidity, spikes in organic matter (including complex compounds formed by the charring of the topsoil and its content of humus and natural waxes), and the loadings of sediment, slope debris, and burned ashy ma er. The duration of these post-fire spikes in similar watersheds depends primarily on the amount of debris which reaches the channel, and how quickly this delivered material can wash out. Other water systems in watersheds with similar steepness, size, vegetation, and incident rainfall has ranged from several storms to 3 to 5 years before the quality of raw water returns to near-normal conditions, but the range of recovery rates is wide and not readily predictable. Our work has shown that sediment transport and turbidities have often returned to levels measured during pre-fire baselines during the first winter after a wildfire in 6 or 7 watersheds in the Los Padres/Carmel area of Monterey County which is similarly vegetated and has similar rainfall to the Moody catchment (Hecht, 1981).

Further, large mudflows or debris flows can be generated by intense rainfall following such fires, and based on considerations described above, RMWC should expect at least as much such activity as in nearby watersheds.
From the perspective of post-fire management, RMWC is fortunate in not depending on surface reservoirs, where effects can persist longer and be more complex (Taylor and others, 1993).
Beyond the source watershed, RMWC should anticipate post-fire related management issues, such as:

- *slope-stability and sediment control*, most notably unstable slopes and mudflows, particularly from the west, such as from the main tributary just below the source, along the pipeline route, and potentially from across Highway 17 in the vicinity of the main plant.
- *access and utility issue*s, including road closures to avoid hazards, including hazard trees, which may persist longer than RMWC might prefer; utility interruptions or curtailment following the fire (as note in anecdote above from Chemeketa) may interrupt both operations and contaminant sensing at RMWC.
- *regulatory and neighboring district cooperation*, where FSC (or other) may focus on larger districts, more complex watersheds which may be slower to recover, and impoundment management challenges, where lake-operating entities such as SJWC (now HydroAmerica), SCVWD, and MidPen can priori ze activities and seeking of grants toward those which favor lake management, rather than those of primary interest to RMWC.

Finally, summer baseflows tend to remain elevated for several years following a watershed-scale fire in the mixed evergreen woodland area typical of RMWC. The summer flows tend to be about 3 to 6 times greater than just before the fire during the first year or two of recovery, gradually diminishing to the prefire flows after 4 to 6 years. We have seen this 'post-fire premium' in many California streams, particularly those with brushlands and woodland areas such as RMWC, including the 2008 Summit fire area about 10 miles to the east along the ridge of the Santa Cruz Mountains, and universally throughout the Carmel and Big Sur watersheds (Hecht, 1981; Hecht and Richmond, 2011). The Additional flows seem to be a direct result of diminished evapotranspiration after a fire. For RMWC, it affords the opportunity to provide establishment irrigation for restored vegetation both on water company lands and on private holdings. The Additional flows may allow time for RMWC members and operator staff to take on other challenges, perhaps those resulting from the fire.

**3.1.16.3 What measures might RMWC consider specific to protecting its water quality?**
Based on a site visit, RMWC might expect greater treefall, more and large mudslides, and can adopt measures to avoid excessive contaminants entrainment, and provide for more and more rapid watershed repair.

Pre- and post-fire planning has largely been assumed by the Los Gatos Watershed Fire Safe Council (FSC), supported by County infrastructure and numerous vegetation- and fire-management grants. The FSC is a 501(c)(3) entity governed by a board of 11 appointed individuals affiliated with various organizations within and around the mountain areas of the county. RMWC does not have a representative on the board, although (for the immediate future) informal liaison may be possible through FSC board member Brad Hartzell (long- time Chemeketa board member) or Jeff Bates (Redwood Estates). The FSC is developing a plan to prepare for a watershed-scale fire which might likely including most or all of the RMWC watershed and service area. The plan is based on fairly aggressive vegetation management and promoting forest health, added to strategic efforts such as fire breaks, shaded fire lines, and equipment staging which were the hallmark of what is effective its predecessor organization, the Lexington Hills Wildfire Protection Plan. FSC's precursor, Lexington Hills Fire Management Council, traditionally used

post-fire revegetation as its primary approach to post-fire erosion control, which remains a suitable op on for the source watershed and Moody Gulch in general, especially if complemented with a broader spectrum of slope-stabilization strategies.

Some measures RMWC may wish to consider go beyond the standard set of recommendations and management activities which the FSC may want to implement:

1. We see benefits in integrating RMWC's likely priorities on stabilizing slopes to protect the source watershed and pipeline and FSC's revegetation emphasis to minimize erosion control to minimize sedimentation and constituent delivery to Lexington Reservoir and other nearby reservoirs.

2. Implement policies designed to protect your specific supply and distribution system, which does not have surface storage or impoundments, such as:

(a) bypassing the first several runoff events following a watershed-scale fire to minimize entrainment of burned toxic materials, ash, muck, sediment and turbidity and waxes and oils eroded by rilling of the burned forest floor; this might be implemented by limiting any raw water diversions to the storage tanks during the first few storms, then limiting diversions to after peak runoff in the subsequent several storms has occurred.

(b) seeking to include cutting down burned or 'hazard' trees along your pipeline and distribution network (especially where the pipes do not follow roads), since you appear to be unusually subject to windfall damage, and the rapid canvass of the road systems for hazard trees can be expanded to include pipeline rights of way.

(c) Anticipating and identifying areas which you do not want used for marshalling or staging heavy equipment during and immediately following the firefight, or stockpiling of burned debris during the initial stages of post-fire hazardous waste removal and clearance; one of the reasons for doing so is to protect your water system, and/or aquifer recharge areas. If done prior to a fire, this can be a particularly effective means of protecting your system over the long term. Note that RMWC may need to use such areas to stockpile mudflow debris – more so than other cooperators.

Since pre- and post-fire management is a rapidly evolving field, RMWC may wish to establish a group of interested members who are prepared to advise the Board on an ongoing basis. This group may be standing committee composed both of board members and individuals who serve over several board cycles who follow the emerging science and community action associated with fires. They might at their op on participate in various working groups appointed by the County or the FSC, and interact with any similar groups associated with nearby water companies, making periodic recommendations to RMWC and its Board. Because continuity is important in trying to implement changes in an evolving discipline such as post-fire watershed management, it makes sense to include members willing to serve for 5 to 10 years, if possible.

### 3.1.17 Naturally occurring contaminants

A number of naturally occurring contaminants are geologically distributed in central coastal California, and the Santa Cruz Mountains in particular. None of these contaminants have been found at levels exceeding primary standards for Maximum Contaminant Levels, but occasional spikes may be expected based on regional experience. It will be helpful to know of such inorganic contaminants and anticipate

occasional and temporary spikes or exceedances. Table 1 includes results of sampling RMWC's Source for these constituents.

Detrital contaminants: Spikes may be expected in trace elements and heavy metals which are present in the local sedimentary rocks because they are in part composed of sand grains or other sediments which were enriched in the formations which were eroded to form the current sedimentary formations. Examples of such sources are serpentinites and other ultrabasic rocks, of which fragments rich in chromium, mercury, and nickel (among others) are reported. Volcanic rocks were eroded to contribute sediment for some of the rocks found beneath RMWC, which may be enriched to a small extent in titanium, arsenic, vanadium, cadmium, and other transition metals. Two special cases are cadmium which is occasionally found at elevated levels in the Monterey formation and related mudstones (Majmundar, 1980; Golling and Hecht, 1982), and also radium, which is found in fine-grained black shales worldwide. The Rices mudstone, Twobar Shales, and perhaps the upper Butano formation and Lambert shale contain abundant mudstone units which are possible cadmium and cadmium-related sources. Other specific geologic units in which other naturally-occurring analytes originating in detrital sources have been found in the past include the massive sands of the Vaqueros formation, and the black shales interbeds within in it, the Twobar shale, Rices mudstone, and upper Butano formation (see figs. 5,6).[13]

Emanative contaminants: Some constituents, such as boron and fluoride, are borne by fluids which circulate through the local geologic units. These elements are common contents of hydrothermal and hot springs waters which often are associated with fault zones. None are found at levels approaching or exceeding primary drinking water limits in the central Santa Cruz Mountains, but occur in many Locations in Santa Clara and Santa Cruz Coun es, and might be encountered locally, such as following seismic events. Sodium, chloride, and arsenic are frequently constituents of such waters, but in volumes smaller than in other potential sources.

We suggest resampling the source waters if occasional spikes are encountered.

## 3.2 Significance of Potential Contaminant Sources

Although septic systems have a potential to impact water sources in the RMWC study area, they do not appear to be a significant potential contaminant. This follows from the parallel experience of Santa Cruz County in the same geologic and soils units, and often higher densities of onsite systems. Despite a century of discharge to septic tanks and other onsite systems, no disease outbreaks have been traced to the Redwood Estates use of onsite systems have been reported, nor have other associated water quality problems (such as algal blooms) been noted. The relative health significance related to microbial contamination is high; however, particularly where tanks, leach lines or connections may be breached or exposed by erosion or slope instabilities . The Santa Clara County On-site Sewage Disposal System Ordinance (Section B11-92) requires minimum 100-foot setbacks from wells, springs, or watercourses. To get some idea of whether leachate from the system may be a chronic source of contamination, we reviewed RMWC's analytical history for sodium and chloride concentrations in raw water during its period of operation as a mutual water company (2014- present). We like using sodium and chloride as potential indicators of onsite system leachate because they are conservative tracers, which are neither

[13] The San Lorenzo forma on includes both the Rices mudstone and Twobar shale. Newer work uses the Rices and Twobar terminology, but much the literature still uses San Lorenzo forma on. See figure 5 for how this change affects discussions of the Source geology.

altered nor adsorbed during subsurface flow. The raw water results from Moody Gulch show that sodium has consistently been analyzed at 20 to 30 l,mg/L to those in the rain which recharges the source system, and likely unaffected by much effluent. By contrast, USGS sources in eastern states (Virginia Institute of Technology, (2007)e, and Tennessee (Putnam and others, 2012) show that sodium (80-150 mg/L) and chloride (37-125 mg/L) is typically reported in residential onsite-system leachate Additionally, potassium analyses -- which can also be an indicator of human and animal wastes -- are also very constant and within the range of concentrations in local groundwaters unaffected by leachate. Potassium concentrations in water from the source typically is in the range of 0.8 to 1.5 mg/L, while values in effluent are reported to be 30 to 50 mg/L Finally, the magnitude of the potential contaminant source is moderate to low by comparison with the more-studied streams in Santa Cruz County, where the densities of onsite systems is up to an order of magnitude higher (Ricker and others, 1994). Trail-related contamination will be minimized by MPOSD's commitment to minimize water-quality impacts in the design of the trail system in the 168-acre Moody Creek corridor (shown in the 2009 WSS in Appendix A) which it obtained from the County (see Appendix E).

## 3.3 Anticipated Growth and Projected Changes in Sources of Contaminants

RMWC sees and seeks little or no growth in demand, aiming for three Additional connections to add to the 54 which it now serves. Development in both the source watershed and the service areas is limited by steep slopes and County zoning ordinances which restrict both the type and amount of construction. Additionally, the Moody Creek corridor agreement which has been discussed amongst MROSD, the three water companies and Santa Clara County anticipates future land-management challenges with specific water-quality protection measures, and little or growth in recreational usage in coming years.
There are currently no planned subdivisions or development projects in either watershed. Episodes and upsets (including seismic activity, fire, windstorms and major storms) are perhaps the main expected arena of change in sources of future contaminants.

# 4. Water Quality

## 4.1 Drinking Water Regulations

### 4.1.1 Surface water treatment Regulation

The U.S. Environmental Protection Agency (EPA) and/or State agencies regulate the water quality of drinking water systems. EPA delegates primary enforcement responsibility for drinking water program implementation and enforcement to the State. To maintain primacy, the authority to enforce drinking water regulations, under the Safe Drinking Water Act (SDWA), DPH must adopt drinking water regulations at least as stringent as the Federal regulations and meet other relevant criteria. State drinking water regulations may be more stringent than the Federal regulations, but not less stringent.

Drinking water regulations address both microbial and chemical risks. Microbial risks stem from two sources - pathogens present in the source water, and opportunistic pathogens, typically bacteria, that tend to grow in distribution system materials and consumer plumbing. Diseases of concern from source water include giardiasis and cryptosporidiosis, while opportunistic pathogens include *Legionella*, *Mycobacterium avium* infections, and other gastrointestinal upsets.

Chemical risks include reproductive effects, neurological effects, and cancer. The primary regulatory concerns are with chemical compounds formed during disinfection of drinking water (termed 'disinfection byproducts', or DBPs), synthetic organic contaminants from agricultural or industrial pollution, and trace metals associated with corrosion (e.g., lead, copper, and others) and (more rarely) naturally-occurring metals and elements disseminated within geologic materials (see Section 3.1.17)

The California Surface Water Treatment Rule (SWTR) establishes water treatment and performance requirements for public water systems which use a surface water source for their water supply. The SWTR requires that filtra on and disinfection processes are employed to protect consumers from turbidity and microbial contamination. The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), promulgated in 2006, imposes more stringent requirements on water systems serving 10,000 or fewer persons. The LT2ESWTR requires that water suppliers monitor raw water sources for *E. coli* according to an approved sampling schedule. If *E. coli* results exceed established trigger levels, then samples must be analyzed for *Cryptosporidium*. Additional treatment may be required if *Cryptosporidium* results exceed certain levels. Also promulgated in 2006, the Stage 2 Disinfectants and Disinfection Byproduct Rule (Stage 2 DBP) requires water systems to identify Locations within their system with potentially high concentrations of disinfection byproducts (TTHM and HAA5) and monitor those sites.

In addition to SWTR requirements, the EPA sets primary (mandatory health-related standards) standards for microbial constituents, organic chemicals, inorganic chemicals, and radionuclides. Secondary (aesthetic or customer-discretion standards) are set by the EPA for chloride, color, iron, manganese, odor threshold, specific conductance, and total dissolved solids. The EPA has established maximum contaminant levels (MCLs) for both primary and secondary standards.

### 4.1.2 Constituents of concern

The following constituents are of primary concern to RMWC:

- Microbiology – Although there are no wastewater treatment plants in the Moody Gulch watershed, residential septic systems which could be a source of microbial contamination. In addition, feral or wild animals, or humans living off the land could generate pathogens.

- Turbidity – The watershed is characterized by steep slopes which have the potential to erode during rainfall events, particularly (as noted above) if disturbed by wildfire or seismic activity. Roads and other graded areas often compound erosion through concentration of runoff and artificial steepening of slopes. RMWC must meet a standard (<1.0 NTU for turbidity) after treatment at the plant.
- Disinfection and disinfection byproducts (DBPs) – DBPs can form when disinfectants, such as chlorine, react with naturally occurring organic matter dissolved in the water. Although total organic carbon (TOC) levels are reported to be less than 2 mg/L in local streams, DBP precursors are present as both trihalomethanes and as haloacetic acids.
- Iron and manganese – These constituents, found in both surface and (especially) groundwater sources, occur widely throughout the Santa Cruz Mountains. Regulated through secondary (and discretionary) standards, they can cause staining, taste, and odor problems.
- Synthetic organic chemicals (SOCs) – SOCs are a minor concern due to the small amount of agricultural and landscaping chemicals applied in the Source watershed and environs.

Recent analyses for selected compounds in these groups are given in Table 2. We have chosen compounds that we believe are or have been in recent use in the Moody watershed.

## 4.2 Existing Water Quality

### 4.2.1 Monitoring program

RMWC monitors both untreated and treated water in conformance with DPH regulations. A summary of the overall monitoring program is attached as Table 3, with an approximate schedule. The current monitoring program consists of the following:

- Bacteriological – Raw water sources are sampled monthly for total coliforms and *E. coli*.
- Turbidity – Raw water is monitored essentially continuously (at 15-minute intervals) for turbidity as it enters the treatment plant, and is generally bypassed at levels exceeding 0.1 NTU.
- General mineral and physical constituents – Raw water sources are sampled yearly, submitted for analysis, and then circulated to members as part of the required consumer confidence report, as well as reported to the DDW.
- Nutrients – Raw water is sampled for nitrogen, potassium, and phosphatic compounds, which can lead to accelerated growth of pathogens. Background potassium is often augmented by animal wastes, including those from relatively small sources, such as chicken coops. Local rocks and soils are uniquely rich in phosphatic materials so the origins and fates of phosphorus compounds sources are often equivocal. Sampling is at least annual but often occurs more frequently.
- Other parameters – Raw water sources are sampled yearly for inorganic chemicals, volatile and synthetic organic chemicals, nitrate, cyanide, perchlorate, and MTBE. Nitrite and asbestos are sampled once every three years.
- Radiological – Raw water sources are sampled yearly for gross alpha and radium 228.

- Treated water - Treated water is continuously analyzed for turbidity. Treated water is also sampled monthly for total coliforms. Although it has never been necessary, if the treated water sample tests positive for total coliforms, Additional *E. Coli* testing is performed. Asbestos, lead, and copper samples are collected once every three years. None of these three materials are known to occur in the Source watershed, so triennial sampling seems appropriate.

### 4.2.2 Evaluation of monitoring data

#### 4.2.2.1 Bacteria

RMWC samples raw water sources monthly for total coliforms and *E. coli.* Results are reported as the most probable concentration (MPN) of the bacteria present in a 100 ml sample (MPN/100ml). Total coliform bacteria are a relatively broad group, which includes species that can live for extended periods outside a host body. These sometimes-termed "environmental" coliform bacteria are omnipresent in waters exposed to areas with urban development and wildlife ac vi es. *E. coli* bacteria are commonly found in the lower intestine of warm-blooded animals. Because they can survive for brief periods outside a host body, they are used as an indicator for fecal contamination. Although most strains are harmless, some can cause food poisoning.

Moody Gulch samples are collected directly at the pipeline from the Source and from various Locations at the slow sand filter disinfection plant. As required, a limited number of samples are taken and tested from the distribution system and from taps inside homes.

Review of available data for the past several years shows now exceedances of existing MCLs in the treated plant water and none in samples drawn from the distribution system. No laboratory data were available for the 2023 water year, but we understand that there were no exceedances during that year. Similarly, Crytosporidium and Shigella were not detected.

#### 4.2.2.2 Nitrate

The primary MCL for nitrate in drinking water is 10 mg/L as nitrogen, or 45 mg/L as nitrate. Historically, the nitrate concentrations measured in Moody Gulch are low. The highest concentrations reported over the past six years are about 0.4 mg/L as N, less than five percent of the drinking water limit (Table 1). Nitrate levels are typically one-fifth or one-tenth of those reported in streams of similar size, geology, and land use in the San Lorenzo Valley of Santa Cruz County, and lower than levels found in Santa Cruz Mountains streams thought to have natural background levels (Aston and Ricker, 1977; White and Hecht, 1992; Ricker and others, 1994).

#### 4.2.2.3 Other constituents

Water from RMWC's Source is consistently within primary MCLs both for common inorganic substances (Table 2) and for pathogen and miscellaneous organic constituents (Table 3). Occasional exceedances for iron are reported, above secondary MCLs – discretionary standards involving taste and aesthetic substances. Iron (and often manganese) levels are ubiquitous in the Santa Cruz Mountains, with a primary origin in soils and weathering bedrock. Occasional exceedances are regionally widespread, as they are within RMWC, often occurring at the same time as elevated levels of turbidity are reported. Hence controlling turbidity through operations (including plant maintenance), bypassing turbid Source water, and filtra on can all be seen as iron and manganese control. Manganese or iron are not reported from the distribution system at present. Both constituents are probably transported in large part bound or complexed with organic acids. Turbidity associated with runoff following wildfires, seismic events, or other land-disrupting activities can raise levels of both compounds, especially if the sediment gets embedded in the piping system.

Potassium at levels of 0.9 mg/L to 1.3 mg/L tells a very similar story as sodium and chloride. As noted above in Section 3, the latter two constituents are present at levels much lower than is the norm for the Santa Cruz Mountains (c.f., Aston, 1977; Sylvester and Covay, 1978). Levels are similar to those reported in local rainfall. The same holds true for potassium, which is a nutrient which often does not get the attention of coliform or sodium chloride, but is a powerful indicator of large animal wastes. Effluent water quality from septic systems of 40 to 50 mg/L are reported nationally. Potassium's presence at such low concentrations in the Source water informs us that substantial inflow of contaminated waste to your Source is not likely.

Other constituents as summarized in Table 2 fall within both primary and secondary standards, both for contaminants and for naturally-occurring substances such as boron, fluoride, and radium.

## 4.3 Evaluation of Ability to Meet Surface Water Treatment Regulation Requirements

RMWC meets the primary components of SWTR compliance:

- Turbidity – RMWC controls turbidity primarily by minimizing entrainment of sediment and by filtra on, and by bypassing diversion to the plant at times where elevated turbidities are expected. Turbidity of the treated water is continuously monitored by a pair of range-matched turbidimeters which are reported to function well under existing conditions. We suggest that diversions be bypassed when turbidity may be elevated due to episodic conditions in the watershed, such as following wildfires or seismic events. Topping off storage tanks with diversions *between* storms (when turbidities are much lower) during such episodes may require more operator effort but is a solid approach to protecting the distribution system.
- Disinfection – Disinfection is accomplished by adding chlorine in the form of sodium hypochlorite to the drinking water. The treated water is regularly monitored for disinfection residuals and meets SWTR requirements. RMWC automatically injects the disinfectant daily at about midnight, during a regular period of low use such that contact times tend to be lengthened. Additionally, the disinfection residual contact time (CT) is sufficient to meet the SWTR requirements.
- Monitoring – Raw and treated water are monitored according to Title 22 requirements, and reported regularly to the membership through the consumer confidence reporting (CCR) requirements of the Board's bylaws and of RMWC's license to operate (as amended).
- Treatment reliability – An alarm system for operator notification of plant problems increases treatment reliability.
- Alarm functions -- Certain parameters are remotely monitored - influent turbidity, filtered water turbidity, tank 1 chlorine level, tank 1 water level, chlorine day tank level. The monitoring system has plant shut down and alarm capabilities.

Further information about the existing system is discussed in Section 1.5.

## 4.4 Recommended Water Quality Monitoring Program

The current water quality monitoring program being implemented by RMWC for both untreated and treated water is in compliance with DHS and DDW requirements. RMWC anticipates adjusting its monitoring program in response to region-wide recommendations for water management after wildfire (RMWC website). We also have recommended a simple monitoring program involving yield, specific conductance or salinity, and water temperature to address immediate uncertain es following earthquakes or other seismic events (see Sec. 3.1.17). Given the relative absence of known significant contaminant sources within the Moody Gulch watersheds, existing monitoring schedules may be appropriate.

No changes are recommended to conform with the SWTR. The RMWC Board may wish to consider implementing a program to anticipate seismic activity and plan to minimize upset and inconvenience of an earthquake(s) on their water supply.

## 4.5 Evaluation of Ability to Meet Surface-Water Treatment Regulation

RMWC meets the primary components of SWTR compliance at level which can be informed by a watershed sanitary survey.

- Turbidity: Turbidity of the treated water is continuously monitored using approved turbidity sensors. The filtered water is consistently in compliance with the MCL for turbidity (1 NTU). The nests of turbidity filters is a useful approach for a company which lacks flatwater storage for turbidity control. RMWC installed pre-filtra on at the main plant following the major storms in 2017 to avoid adverse effects from persistent turbidity from high flows entering the pipeline and reaching the treatment plant. The Additional filters are still in use.

- Also, as RMWC moves toward bypassing more peak storm runoff, especially early in a season or early in a sediment-producing episode, a favorable trend in source-water turbidity may emerge.
- Disinfection – Disinfection is accomplished by adding chlorine or sodium hypochlorite to the drinking water. The treated water is continuously monitored for disinfection residuals and SWTR requirements. During the past 5 years, RMWC has remained within the MCLs. Additionally, RMWC has found that disinfection residual contact time (CT) when disinfectant is added daily at midnight has traditionally been sufficient to meet the SWTR requirements. Turbidity control with filters has yet to prove its value through a post-fire epicycle with radically varying turbidity as the source area and pipeline must deal with recurring mudflows or slope instabilities. There is no reason that filtra on might not meet this challenge, but it has not yet been tested.
- Monitoring – Raw and treated water are monitored to meet Title 22 requirements, and have a good record of success.
- Treatment reliability – We suggest that an alarm system for operator notification of plant problems should be fully implemented and kept operational. The nature of slope stability in the source area and along the pipeline route is such that once a moderately-size mudflow or landslide occurs, continued spalling of its slopes and headscarps puts RMWC at risk of repetitive turbidity spikes from the same area of instability. Operators will want and need more time to keep the plant operating and will likely appreciate the automated alarm feature.

## 4.6 Recommended Water Quality Monitoring Program

The current water quality monitoring program being implemented by RMWC for both untreated and treated water is in compliance with DDW requirements. It is considered by RMWC and by the author of this report to be adequate in that contaminant sources within the Moody Gulch watershed are limited and increases in such sources are anticipated to be limited. No changes in constituents, protocols, or sampling frequency are recommended. That said, most water-quality professionals practicing in coastal California understand that supplemental monitoring of selected constituents may be warranted after fires, floods, or other episodic events, even if specific adjustments for these events are not mandated Operators and RMWC members are likely to make various adjustments, including supplemental sampling following such events. Similarly, periodic changes in protocols, frequency of sampling, and standards are likely as regulatory standards evolve and as water-quality practices evolve.

One useful addition to RMWC's operations would be simply to take more and more regular photographs of (a) the source area, and (b) the pipeline corridor. We recommend approximately 10 to 15 photographs be taken quarterly during ongoing monthly visits to the source. We also suggest that aerial photographs or other routinely-flown aerial imagery (such as Google Earth) be archived annually with the other photograph of events, facilities, and/or potential problem areas. Preference should be placed on retaining or cataloguing winter imagery, when leaf cover is at a seasonal minimum and during the three hours on either side of noon to limit the effects of shadow.

# 5. Mandatory Findings

## 5.1 Summary of governance

RMWC is a California Mutual benefit non-profit organization overseen by an elected voluntary board consisting of five members, usually with two alternates. The organization has managed to keep a rotation of board members, including both veterans familiar with the water supply system and new members.

Current Board members are Alison Armstrong, Wade Bastien (chair), Westin Bolliger, Rod Fagan, and Stephanie Massei.

## 5.2 Water Conservation

RMWC seeks to encourage water conservation. Conservation measures include (a) facilities maintenance and repair, and (b) control of demand. Appendix D includes a detailed punch list of repairs and upgrades which RMWC has projected for the period ending in June 2026, with a refreshed list anticipated in the near future, perhaps in part a reflection of bringing on a new operator.

Keeping demand within reasonable amounts is an important means of not overtaxing source-water and distribution facilities in a small mountain water system. Adoption of a cross-connection program, good Communications between the board and membership, and Adoption of the state's drought year self-regulation program are all measures consistent with regulation supply.

Water rates are set to be consistent with this policy:

- 0 to 1,000 gallons $2.50 per 1000 gallons
- 1,001 to 5,000 gallons $3.10 per 1000 gallons
- 5,001 to 15,000 gallons $5.60 per 1000 gallons
- 15001 to 25,000 gallons $11.60 per 1000 gallons
- 25,001+ gallons $23.00 per 1000 gallons

## 5.3 Meetings

All members of the system are invited to an annual meeting, which typically occurs in mid-summer. The Board meets monthly. Meetings are virtual, and are open to all RMWC members.

The Board selects and contracts with a licensed operator for the treatment and distribution system. All other contracts are authorized by vote of the board.

RMWC does not have a meeting room or equipment yard or other facilities beyond the treatment plant. Notifications are circulated electronically and posted at https://rainerimutual.org.

## 5.4 Quality and currency of (Board) meeting notes

Minutes are taken from every meeting and posted on the web: RMWC board minutes (Google search). Accuracy and quality of the minutes are sound, and are available for each meeting by date going back several years into the past.

Consumer Confidence Reports, required by the Division of Drinking Water, are posted for calendar years 2019 through 2025 on the RMWC website in the Consumer Confidence Report portal.

# 6. Conclusions and Recommendations

## 6.1 Conclusions

1. RMWC, which serves 45 homes near Lexington Reservoir in Santa Clara County, became a mutual water company in 2011, assuming the assets and roles of the former Idylwild Water Company. Previously, it was organized as a privately owned utility under the jurisdiction of the California PUC.
2. This document is the third watershed sanitary survey (WSS) conducted for the water company. A watershed sanitary survey (WSS) was prepared in 2009 by the former private owner. A second, abbreviated WSS was prepared by the RWMC Board in 2018. The two prior Watershed Sanitary Surveys are presented in Appendix A, as they have substantial residual value.
3. A WSS is an assessment of a purveyor's likelihood to be able to continue distributing water meeting the requirements and standards of the federal Safe Water Drinking Act of 1970, as amended. Basically, it is broad and systematic assessment of the entity's source water supply, its treatment, the distribution of the treated water, how the supply can avoid being affected by sources of contamination within the area contributing to the water supply, and the nature of its governance and agreements affecting water supply with neighboring purveyors or oversight agencies. Watershed sanitary surveys are to be submitted by the purveyor to the agency overseeing the quality of water they purvey. Changes within the watershed, the regulations, community standards, and events affecting the purveyor since the last WSS are an explicit focus of a helpful WSS, one which will serve as basis for discussion between the water-supply vendor and its regulatory overseers. A strong watershed survey is a community asset, in that it can point out the value of existing resources and practices, and be a useful precursor to a water supply plan.
4. The 2026 RWMC WSS is the first to be prepared by a watershed scientist or a registered environmental professional It addresses both the regulatory need to prepare and submit a WSS as required under law, but also tries to bring RWMC to a new level where water yield, quality, and distribution can all be addressed with the needed underpinnings of science, management, and resilience needed in a community utility, such that contamination can be anticipated, avoided, and controlled. But it is not the only means of providing these the assurance needed by a community, especially a mountain community somewhat remote from sources of public support and assistance. Other key roles are those of (a) the purveyor's treatment operator, a licensed professional charged with maintaining, repairing, and verifying on a daily basis that water-quality standards are met, (b) public health professionals working for State and County governments charged with enforcing the standards and (c) the water company's Board, whose

responsibility is to make sure that it all works, is all funded, and understood by the community which has chosen them for the task.

5. During recent years, RMWC has successfully provided water meeting all primary Title 22 standards.
6. RMWC has had to adapt to several events over the past few years which have made it more difficult to provide the assurances of past actions, and the look-ahead functions intrinsic to a smooth WSS process. The district changed its contract operator, and also had to contend with slope instabilities beneath a portion of its water-treatment plant. Both conditions have been fiscally and managerially challenging. The board replaced the contract operator in April 2026, and has submitted plans to address the slope instabilities with the Santa Clara County Department of Planning and Development in June of 2026.
7. RMWC operates a spring source in Moody Creek and a five-eighth mile pipeline to a bank of slow-sand filters in a central part of its district. A recurring threat to the supply system is falling trees, which damage the pipeline or distribution system. Interruptions of up to a week or longer sometimes arise, such as occurred during the 2025-2026 winter, and also during 2017.
8. RMWC has been able to sustain general-mineral and trace-element quality meeting Title 22 standards throughout the previous 5 years.
9. RMWC has also been able to keep bacterial or pathogenic loadings within allowable standards. Likewise TTHM, haloacetic acids, synthetic organics, volatile and semi-volatile constituents and general physical analytes within MCLs. Iron and manganese are usually managed within secondary limits, although occasional spikes are recorded.
10. The system has the managerial ability to continue operating within limits, and consistent with its licenses and bylaws.
11. This report contains substantial analysis of the supply to RMWC's source. Independent lines of evidence point toward a large fractured rock aquifer system near Redwood Estates which receives reliable and high-quality recharge, providing a relatively constant supply of consistent high quality. Protecting this asset is a direction that RMWC may choose to go.
12. Unlike some neighboring water systems, RMWC's system is not directly threatened by contamination associated with Highway 17, such as spills, upsets and flare-affected runoff containing perchlorate (among other constituents).
13. RMWC is making good progress toward adopting and implementing plans to maintain quality and service during episodic events to which the local mountains are prone. This includes developing programs for managing cross-connections, coordinating with nearby districts to manage fire risks. Water supply to RMWC members has not experienced long-term effects from the periodic droughts to which water-supply systems in the Santa Cruz Mountains are prone. RMWC has only asked its members to limit water use to replenish water reserves after pipe breaks that drew down its storage tanks. RMWC has never needed to ration potable water due to drought conditions.
14. Naturally-occurring deep saline groundwater and periodic accounts of trace-metals exceedances are known from the region as a whole, but have not been reported from the RMWC service area, or from the adjoining large purveyors (Midpen's Black Creek Preserve or Chemeketa Park MWC]. None are expected at RMWC; should they occur, prompt retesting is recommended.
15. Over the past 5 years, pre- and post-fire watershed management has been largely assumed by an autonomous county agency [Los Gatos Watershed Fire Protection Council]. The Board

believes that regular contact is being maintained with this entity such that their policies accord with those of RMWC and bring RMWC's maintenance program in line with those of the larger entity. Fire is an important acute and long-term threat to water quality and facilities throughout the RMWC, and in the watershed of the source. Relative to other regional sources, RMWC's is more prone to erosion and mudflow hazards following fires, and perhaps less to persistent post-fire inputs of turbidity, sediment, and nutrients than districts drawing their supplies from reservoir storage.

16. RMWC's district is within the San Andreas fault zone. It will be affected by some type of seismic event within the foreseeable future. The Board may consider a program to (a) retrofit key facilities, (b) monitor water quality of your source(s) and (c) maintain backups and spares for key components of the treatment and distribution facilities. You and your vendors may be without access to parts and chemicals for up to several months after a large event.
17. While Additional sources of supply are not currently needed to meet normal demand, RMWC would likely benefit from ongoing efforts to periodically review alternative sources. Currently, likely sources might include (a) groundwater, (b) SJWC's Montevina pipeline (which crosses the district), and (c) conservation. RMWC signed a Covenant for Domestic Water Service with SJWC on July 2, 2026; signing this covenant is the first of many required steps to actually getting a connection to the Montevina pipeline. In the recent past, state or institutional grants have been available to pursue sources which add to resiliency and safety of mountain residents' water supply, and it may be worthwhile for RWMC to periodically inquire about potential funding opportunities. It might be noted that many such opportunities come through the Regional Water Quality Control Board, with which the Division of Drinking Water is affiliated, and may be a source of such information and opportunities.
18. Because of its unique recharge dynamics, the Source provides water that has one of the lowest concentrations of sodium of any of the Santa Cruz Mountain systems. It consistently yields sodium concentrations of 15 to 25 mg/L, at or near the EPA recommendations of maintaining sodium at or below 20 mg/L to protect individuals with strict low-sodium dietary requirements. Members may wish to know more about this asset, in part so that they are prepared to evaluate the tradeoffs which may offered to them individually to use water softeners, which add considerable sodium to potable water.

## 6.2 Recommendations

1. RMWC should consider its exposures to residential and commercial contaminants in runoff from the Redwood Estates community, and engage in discussions to reduce loadings from hardened areas, fertilized areas, and from outbuilding next to drainageways.
2. We also suggest that RMWC develop action plans anticipating damage and upsets specifically from (a) seismic events and (b) watershed-scale wildfires drawing from the regional emergency planning efforts, which also recognize RMWC's situations which is unique in having only one source of supply, a source area with oversteepened slopes, and an uncertain duration and trajectory of post-event recovery.
3. Recognizing that the slopes of Moody Gulch may be naturally oversteepened, RMWC may wish to incorporate clearing fallen wood in selected reaches near homes and improvements (such as locations where the pipeline is threatened from severe windstorms and seismic events. The same reaches might be protected after a snowfall, such as the January 2, 1974 event, but

snowfalls are so rare that a specific plan does not appear to needed. It needs to be noted that this 1974 event closed roads and trails in the region for weeks or months. due to the amount of fallen wood; such events will also choke Moody Creek and its tributaries, such that immediate post-storm clearing portions of the channels will be warranted. Managing large wood in general would logically include (a) criteria for deciding when to open and shut the Source intake, (b) when to walk the channels looking for broken mains or other problems, and (c) designating a wood stockpiling area within the RMWC, as there may be competition for space to stockpile the fallen wood before its removal.

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# TABLES

Table 1. Raineri Mutual Water Company System – System Description

| | |
|---|---|
| Source | Moody Gulch Stream – typically influent rate at plant varies between 10-19 gpm. |
| Treatment | Required to provide three-log reduction of *Giardia*, four-log reduction of viruses and 2 log reduction of *Cryptosporidium*. Must maintain detectable chlorine residual in the distribution system.<br><br>Pre-filtration: Two cartridge roughing filters in series, typical 20 micron polyester filter followed by a 10 or 5 polyester filter.<br><br>Surface Water Treatment: Six slow sand filters in parallel (one is currently out of commission). Combined filter effluent turbidity is typically below 0.1 NTU.<br><br>Hypochlorination – 1% solution of sodium hypochlorite is injected into the combined filter effluent.<br><br>Contact tank – Chlorine, pH, temperature, and outflow rate are monitored to ensure chlorine contact time for disinfection are met. |
| Storage | Tank #1 (Chlorine contact tank): 20,000 gal<br>Tank #2 (serves Tank #3 and ~4 residents): 40,000 gal<br>Tank #3 (serves the rest of the distribution system): 40,000 gal |

Source: Table developed by Kelly Archer, of Archer Engineering, operator of record.

Table 2. Range of inorganic analytes observed in RMWC source water, with emphasis on 2021-2026

| Analyte | Units | Number | Range | | MCL | Linkage to drought or wet year conditions | Implications | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | Low | High | | | | |
| Nitrate, Nitrite | mg/L-N | 15 | < | 0.43 | 10 | None | Universal indicator of waste contamination Poss contam if concentration > 5 to 10 | |
| Potassium | mg/L | 5 | 0.9 | 1.3 | na | | onsite waste leachate; deep natural gw | Decreased since 2020 |
| Sodium | mg/L | 7 | 20 | 27 | na | slightly inverse to precip | | Steadiness tends to |
| Chloride | mg/L | 7 | 8 | 12 | 250/500 | | Very steady readings | |
| Sulfate | mg/L | 7 | 51 | 72 | 250/500 | slightly higher during wet years | | counterindicate contami |
| Cadmium | ug/L | 7 | < | < | 5 | | | |
| Chromium (total) | ug/L | 7 | < | 4 | 10 | | | detrital sedimentary sources |
| Chromium (hexa) | ug/L | 2 | 0.11 | 0.18 | 10 | | | |
| Mercury | ug/L | 7 | < | < | 2 | since 2024 only sl higher | | |
| Lead | ug/L | 5 | < | < | 5 | | | non-naturally occurring |
| Radium | PCl/L | 3 | < | < | na | | | |
| Boron | mg/L | 5 | 51 | 64 | na | during wet years slightly | very typical of local analyses; no problem | Important given black shales in watershed chosen lab well -known for good work on boron temp dependent MCL |
| Fluoride | mg/L | 8 | 0.2 | 0.32 | 1.2-2.9 | inverse to precip | very typical of local analyses; no problem in close ratio with Mg | |
| Calcium | mg/L | 7 | 40 | 57 | na | | | |
| Magnesium | mg/L | 7 | 9.7 | 12 | na | -- | in close ratio with Ca | suggests steady and regular flows from source |
| | | | | | | no relationship to wet yrs | | suggests steady and regular flows from source |

~ Continued p. 2/2 ~

Table 2. Range of inorganic analytes observed in Raineri source water, with emphasis on 2021-2026 (continued, 2/2)

| Analyte | Units | Number | Range | | MCL | Linkage to drought or wet year conditions | Implications | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | Low | High | | | | |
| | | | | | | | | suggest large volume of storage to source |
| pH | units | 8 | 6.7 | 8.2 | 8.3 | | | |
| TDS | mg/L | 265 | 265 | 299 | 1000 | all but 2 values are 8.2 | | |
| Spec. Conduct, | umhos | 10 | 350 | 490 | 900/1600 | Higher values during drier years too many different methods for comparison | Unusually steady for S Cz Mountains Normal values | |

Notes

Source of data: State of California DPH cumulative database, Raineri

| | |
|---|---|
| < | Less than detection level for a given lab or method |
| Number | Number of individual samples reported in the state database, generally for 2021-2025 or 2022-2025 or 2026 |

Most samplings are annual analyses reported to RMWC members in consumer confidence reports

| | |
|---|---|
| MCL | Maximum contaminant level per primary drinking water standards (in most cases) |

Linkage to wetness or dryness of a year, implications and comments are generally opinion of the author, not regulatory standards.

| | |
|---|---|
| umhos | Specific conductance values are generally lab readings, adjusted to 25degC. Best to measure in field. |

Table 3. Ranges of Bacterial Counts and Organic Analyses for Available Lab Determinations, RMWC

| Analyte class | Number | Year Range | Min | Max | MCL | Units | Comments |
|---|---|---|---|---|---|---|---|
| E coli | | | | | | | |
| E coli, treatment plant outlet | | | | | | | |
| | 14 | 2026 | absent | <1 | 1 | mpn/100ml | |
| | 11 | 2025 | absent | 1 | 1 | mpn/100ml | |
| | 12 | 2024 | <1 | 1 | 1 | mpn/100ml | |
| | 13 | 2023 | <1 | <1 | 1 | mpn/100ml | |
| Distribution system, often Tank 3 | | | | | | | |
| | 2 | 2026 | absent | <1 | 1 | mpn/100ml | |
| | 5 | 2025 | <1 | 1 | 1 | mpn/100ml | |
| | 6 | 2024 | <1 | 1 | 1 | mpn/100ml | |
| | 8 | 2023 | <1 | <1 | 1 | mpn/100ml | |
| Other | | 2020-2024 | 41-76 | | 80 | ug/L | State DB and BSK reports |
| Total THMs | | 2023-2024 | | | 60 | ug/L | do |
| Total Haloacetics | 8 | 2020-2026 | < | 2 | 3 | | |
| Odor | | | | | | | |
| Synthetic organics | 3 | 2021-2024 | < | < | 2 | ug/L | |
| Lasso | 3 | 2022 -2024 | < | < | 50 | ug/L | |
| 2,4,5-TP | 2 | 2022-2024 | < | < | 700 | ug/L | |
| Glyphosate | 6 | 2020-2025 | < | < | 150 | ug/L | detection levels of 5 - 100 ug/L |
| Cyanide | 6 | 2020-2025 | < | < | 6 | ug/L | |
| Perchlorate | 6 | 2020-2025 | < | < | 13 | ug/L | |
| MTBE | 7 | 2020-2025 | < | < | 1.5 | ug/L | Detection limit of 0.5 ug/L; good tracer |
| Benzene | 6 | 2020-2026 | < | < | 100 | ug/L | |
| Styrene | 28 | 2020-2026 | < | 729 | 300 | ug/L | One reading of 729; all others below MCL |
| Iron | 10 | 2020-2026 | < | 38 | 50 | ug/L | One reading of 38; all others <10 ug/L |
| Manganese | | | | | | | |

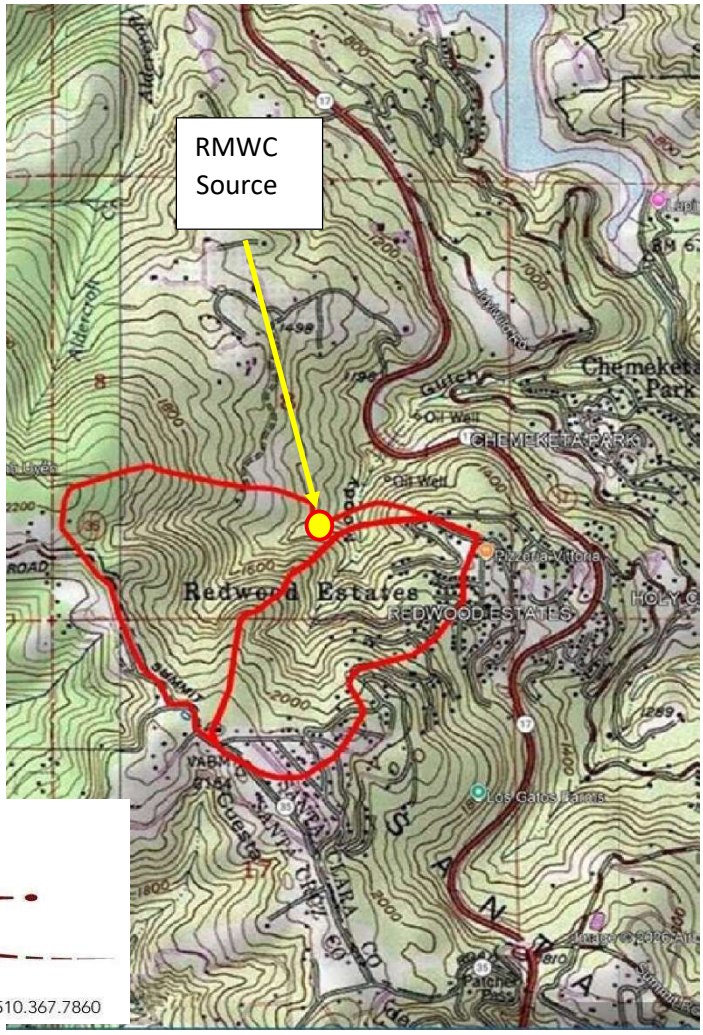
Notes

From State database for Raineri, supplemented with individual lab report sheets, primarily BSK Labs.

Constituents chosen to be representative of analyte categories routinely monitored Pesticides

selected based on known usage in area

# FIGURES




Barry Hecht
Hydrologist
barryhechthydrologist@outlook.com | 510.367.7860

*Figure 1. The RMWC Source Location.*

The RMWC Source is within about 100 yards of the confluence of two main forks of upper Moody Gulch. Both forks are the effective watershed of the Source. The yield of the Source itself is sustained by outflow from highly fractured blocks of sandstone which is effectively an interconnected aquifer, lying atop mudstone and shale beds which limit further downhill groundwater movement. The flow of the two forks mixes in the aquifer before emanating from the Source. Hence, contamination (say, from a chemical spill) would move toward the source both through direct runoff to the west branch of Moody Gulch and also from the fractured rock aquifer which sustains both the Source and the East branch of Moody Gulch. For the purposes of the Watershed Sanitary Survey, we should recognize potential contaminant sources in both the west and east.

Given that beds and geologic structures extend to the northwest and southeast, the area contributing recharge almost certainly extends beyond the topographic catchment lines.

The composite watershed of the Source encompasses 247 acres, in with about 110 homes and approximately 1.8 miles of roadway. Almost all residential areas are in the east branch subwatershed. Of this total, the West Branch topographic watershed of 129 acres holds about 12 structures and homes, and about 0.65 miles of roadway. Nearly all of roadways are built to Redwood Estates minimum standards of 20 feet of paved or compacted traveled way within a larger right of way.

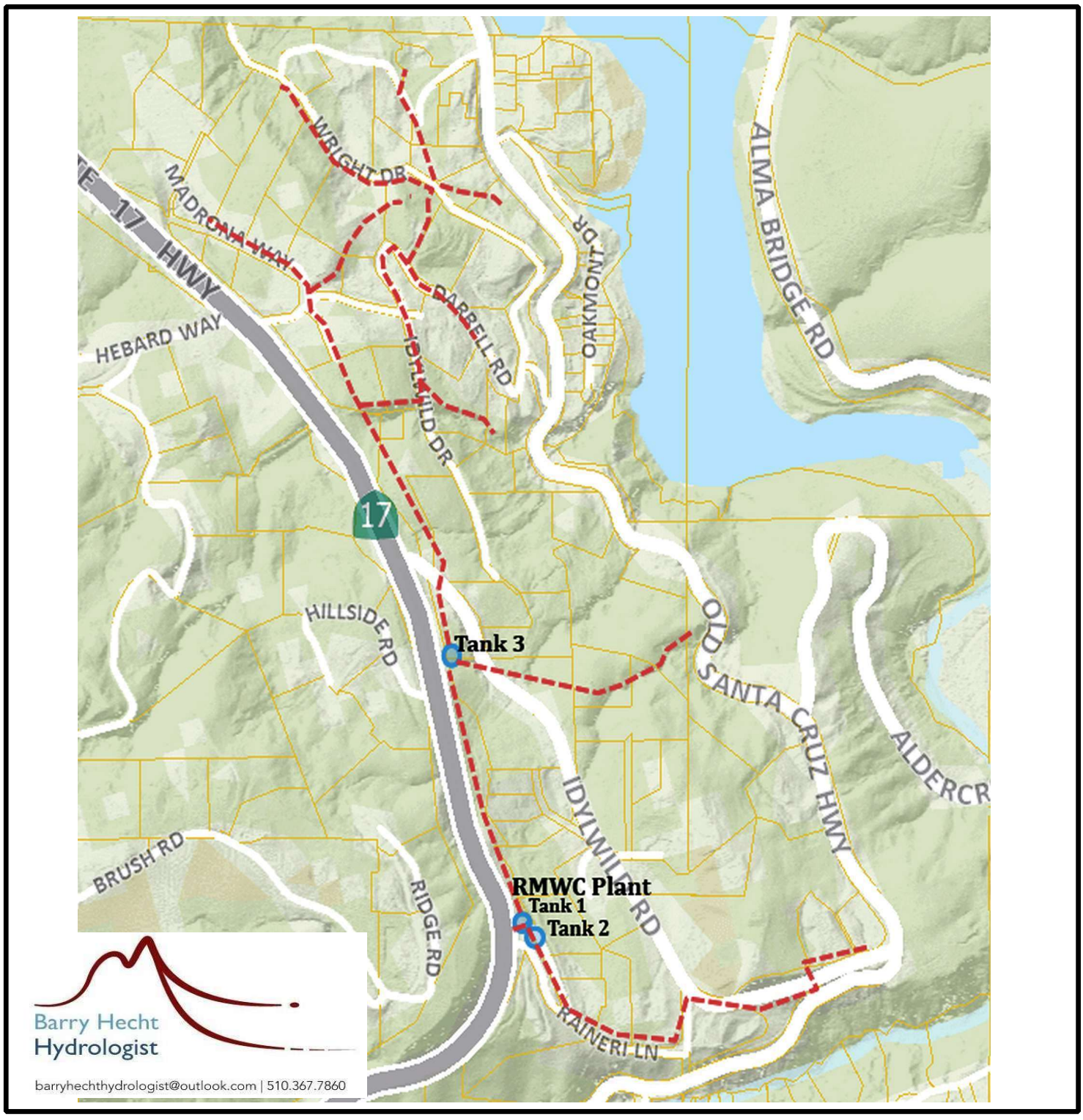



*Figure 2. Plant location and distribution System, Raineri Mutual Water District*

Map intended for approximate use in a cross-connection plan, compiled by Rod Fagan, RMWC Board member, from Santa Clara County documents.

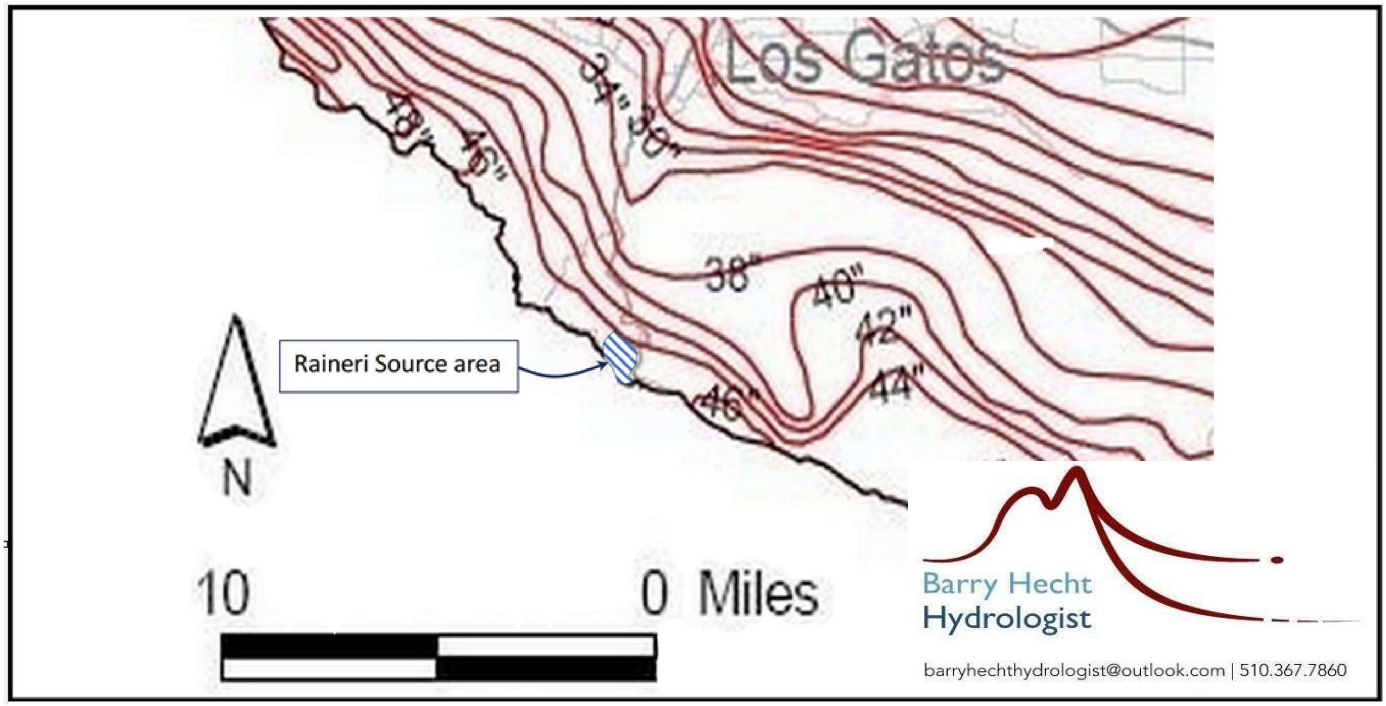



*Figure 3. Mean annual rainfall in inches in the Raineri Source Area, Santa Cruz Mountains. Source: Santa Clara County Drainage Manual (2007).*

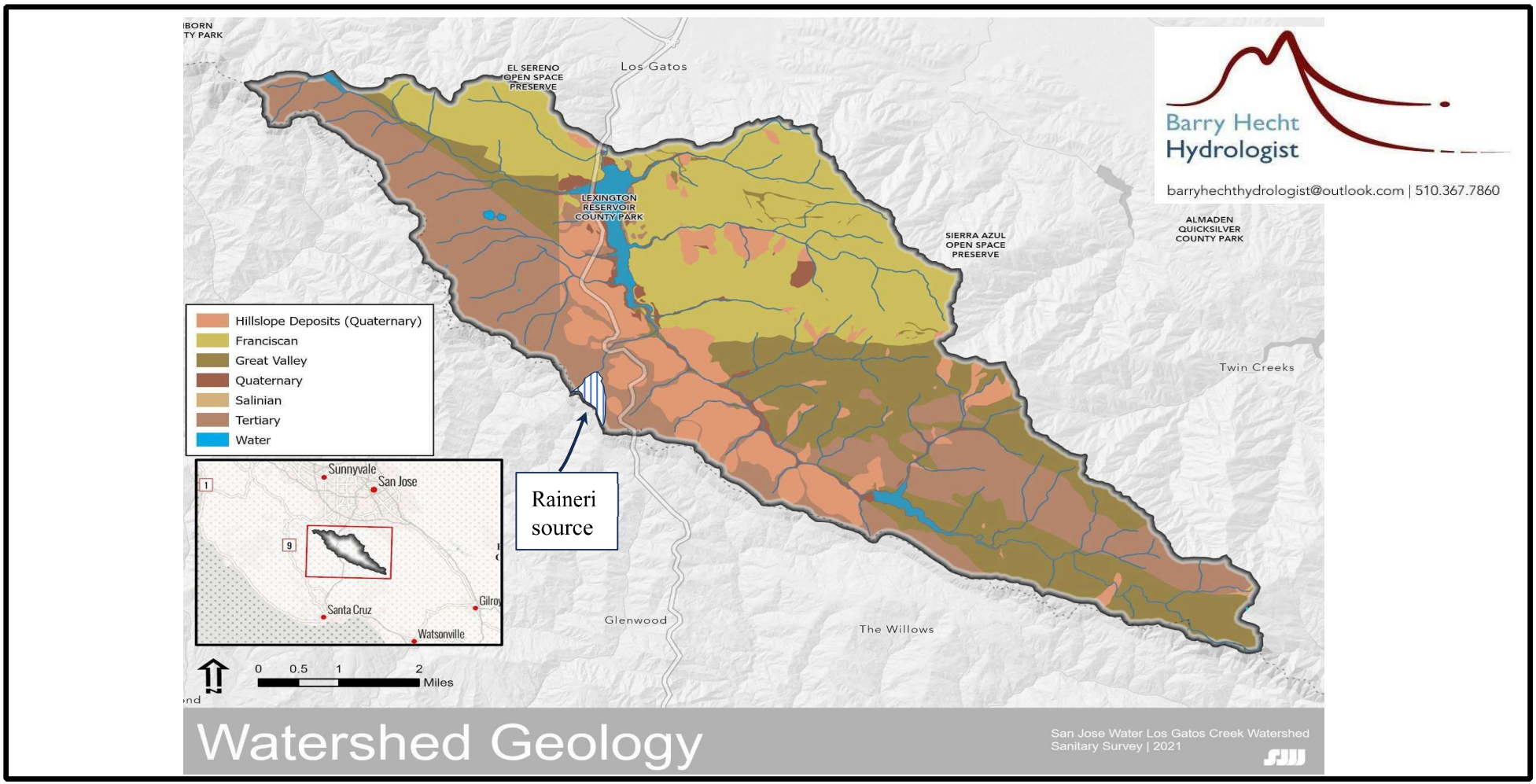



*Figure 4. General geology of the Los Gatos watershed, including the Raineri Source.*

Source watershed is cut into fractured bedrock (deep brown) while the remainder of the Moody watershed is covered with deep slope deposits associated with the San Andreas fault.

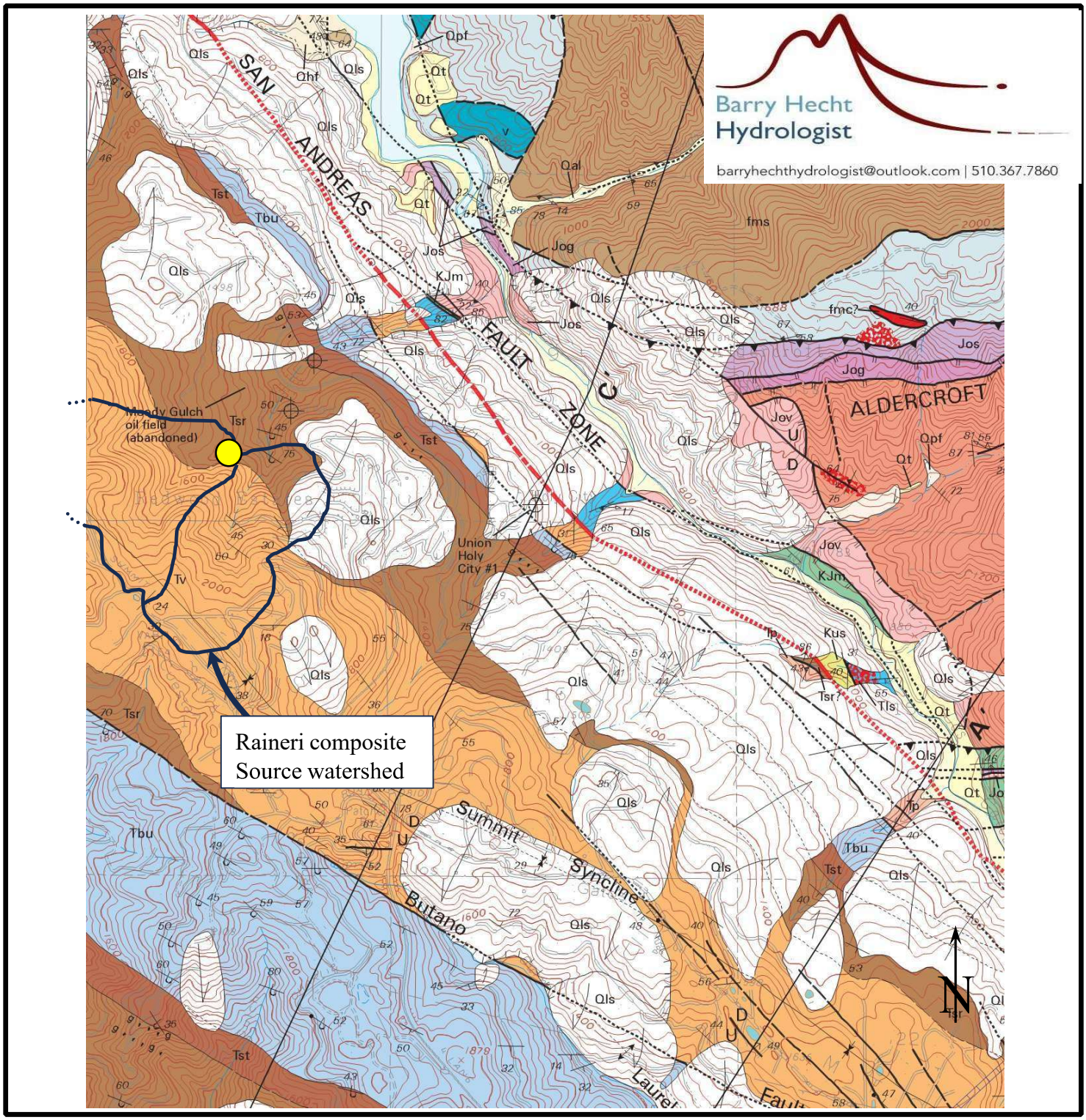



*Figure 5. Geologic map of the Source area and RMWC sevice area.*

The red line in Figure 5 is the trace if the San Andreas fault 1906 rupture. White areas are landslides or mudflows large enough to be mapped (labeled Qls). Robin egg blue denotes Butano sandstones and shales (Tbu), while burnt orange shows Vaqueros sandstone with interbedded shales (Tv). Brown areas show Rices mudstones (Tsr); a few smaller areas of chocolate Twobar shales (labeled Tst) are also indicated. Numbers mainly show strikes and dips depicting the intense folding. The location of the geologic cross section (Figure 6) is shown as straight line about one mile east of the Source. Map source: USGS (McLaughlin and others, 2002).

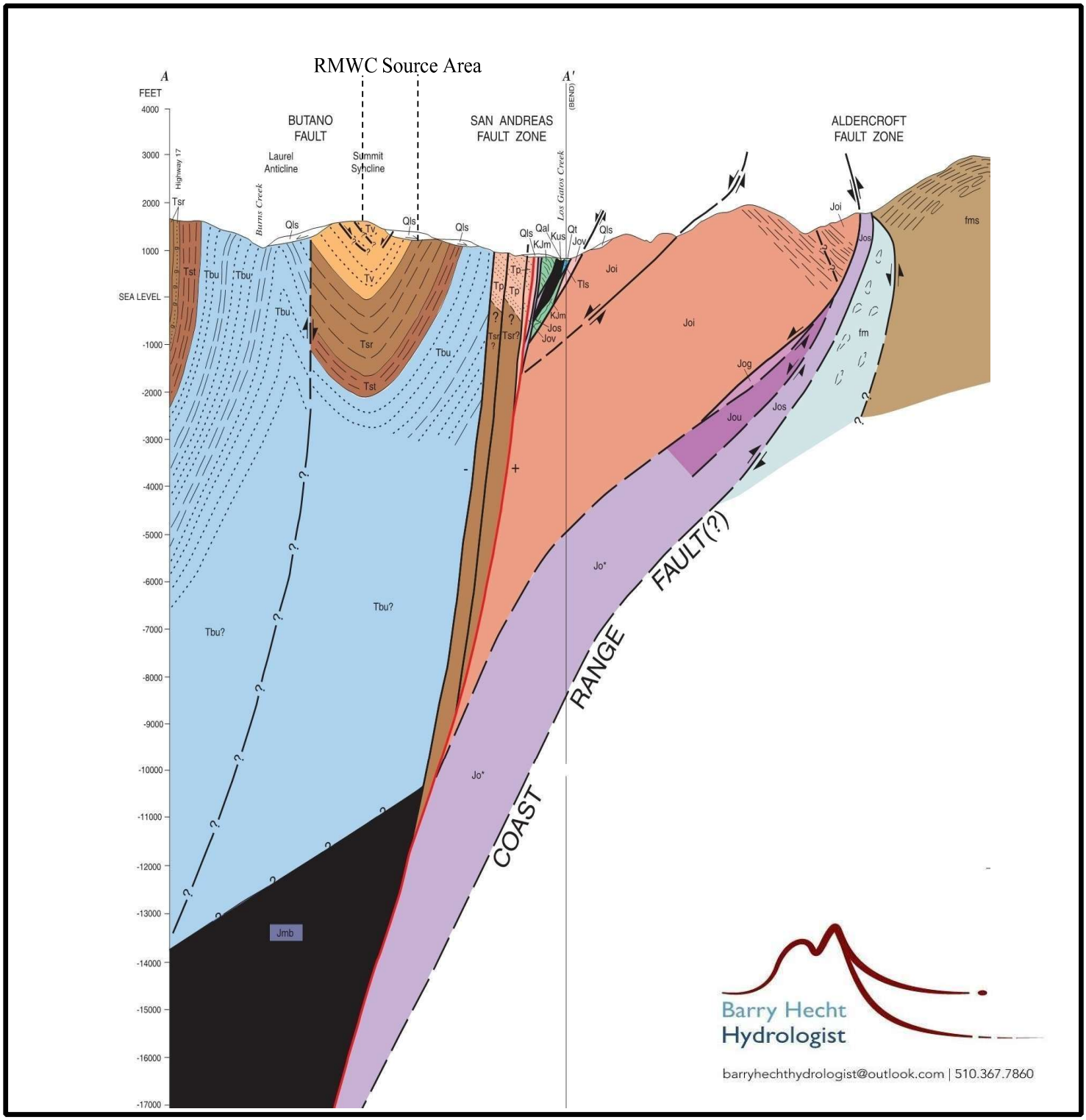



*Figure 6. Geologic cross section of the Source area and RMWC service area.*

Figure 6. Shows the Summit syncline of highly fractured Vaqueros sandstone enveloped in less permeable beds of the Rices mudstone and other units. Source is where water held in the Vaqueros spills over the sides of the enveloping fine sediments. Source: USGS (McLaughlin and others, 2002).

Barry Hecht Hydrologist

# APPENDICES

Barry Hecht Hydrologist

# APPENDIX A

Sanitary Survey : Idylwild Water System October 30, 2009

Water System No.4300520

Idylwild Water Co.

20915 Old Santa Cruz Hwy.

Los Gatos, Ca. 95030

NOV 03 2009

Idylwild Water System is a community water system located in an unincorporated area south of the town of Los Gatos, Ca. ,Santa Clara county. The service area is bounded by Idylwild road, Raineri Lane, Old Santa Cruz Highway, Hebard Road,and Wright Road. Idylwild provides potable water to approximately 135 residents through 44 service connections.

The only source of water is the Moody Gulch Stream, surface water, (primary station code 4300520-001), located above highway 17. (See attached topo map)

Idylwild watershed has remained unchanged for over 100 years. The only resident that was within influence of the stream, the Biddle Ranch, has been long gone, burning down in the 1970's. The said property is now under the control of the Mid-Pen open space, and there are no other sources of contaminants, i.e.(septic systems , industry or new construction).

The intake consists of a 2" perforated pipe located in the stream bed of the Moody gulch. A new spring box has been added, which is covered to keep debris from the intake. The water is fed to a 50 gal poly storage tank, on site at the intake, which allows for some trapping of natural sediments, and to create some head pressure and allows for air to escape before the water travels to the storage facilitys.

From this intake, the water is piped and flows by gravity to the chlorination facility for treatment at the first 20,000 gallon storage tank on Raineri Lane. Sodium hypochlorite is continuously injected into this 1st contact tank. At this time, the reserve piping has been removed, and water is now fed from the bottom of this tank, which allows for more contact time, but limits the amount of water that can be protected and stored, in case of a main break, or loss of water.

Water at this location is fed to the distribution system or overflows into the second 20,000 gallon storage tank for distribution. Water is also fed by gravity to the 40,000 gallon storage facility located on Idylwild Road.

Water from the Moody Gulch Stream is chlorinated but not filtered prior to storage and delivery. Beginning September 1,2009 to provide a 3-log reduction of Giardia lamblia cysts and a 4-log reduction of viruses, a minimum chlorine residual of 3.2 mg/l is maintained.

All efforts are made to produce a safe, clean, and potable water for the residents of the Idylwild Water system.

# Raineri Mutual Water Company

## Watershed Sanitary Survey Report

May 6, 2018

## Table of Contents



## Attachments

## Introduction:

The Raineri Mutual Water Company (RMWC), a non-profit mutual benefit corporation, was formed in 2011 by the homeowners connected to the old Idylwild Water System. It had been placed in receivership by CDPH when the long-time-owner, Bruce Franks, abandoned the system. The system remained in receivership until April 2014, when RMWC purchased the water system including all assets included all of the storage tanks, distribution systems, the collection pipe in Moody Gulch, and the water rights for the water supply in the Moody Gulch Stream. The RMWC was organized as a mutual company and all assets and liabilities belong to the water users who purchased shares in the Mutual Company. Its only purpose is to supply the users with a quality water source for household and land use needs.
The RMWC is located in the Santa Cruz Mountains outside of Los Gatos and near the Lexington Reservoir.

The water system is located in Santa Clara County and the service area is bound by the following roads: Hwy. 17, Idylwild Road, Raineri Lane, Old Santa Cruz Highway, Hebard Road, and Wright Drive. There are 42 properties supplied by RMWC with several more to be added soon. The only water source for RMWC is the Moody Gulch Stream which is uphill and to the west of Hwy. 17. It is a surface water source. (See attached topo map). Primary Station Code 430052-0001

Deeded water rights were transferred to RMWC on 04/07/2014. The assigned DIWQS is ID# S001518. These water rights are the most upstream of all of the other water rights for Moody Gulch Stream giving RMWC first collection rights to this water supply. This also assures RMWC of a very low risk of contamination or inadequate supply of water.

The Moody Gulch water supply has not seen any recent changes, and the one resident of the Gulch (Biddle Ranch) burned in the 1970s so there are no dwellings or human sources of contamination (septic systems, ranches, industry, or new home construction). This was insured by the purchase of Moody Gulch by several mountain water systems that use Moody Gulch water, paid for by a special tax assessment. The adjacent property is owned by Mid Peninsula Open Space, so future contamination sources are very unlikely.
I

## Water System Status:

The intake pipe for RMWC water is a 2" perforated PVC pipe (about 24" long) that lies in a collection spring box in the stream bed of the Moody Gulch Stream. This pipe connects to a 2" PVC pipe on the downhill side of the box. It lies above Hwy 17 in elevation and about 2,500 feet uphill from the road. Access is blocked by a locked gate, and there are no hiking or horse trails in the Gulch. As noted, the intake pipe is located above all the other water users for the stream.
A spring box has been added to keep debris from the intake. The water is then fed into a 50 gal. poly storage tank at the intake site to trap some of the natural sediments and to create a pressure head and remove air before the water travels by gravity flow to the storage tanks on the opposite side of Hwy. 17. The pipe runs downhill, then through a large culvert pipe under the roadway until it reaches the treatment plant on Raineri Lane( 3500 to 4000 feet). At the treatment plant, the water first runs through pre-filters, then a system of slow-sand filter tanks; after which the water is chlorinated in a 20,000 gal. chlorination tank before it goes to two 40,000 storage tanks from which it is sent to the users—all by gravity flow. Pre- filters were added before the filtration tanks after the 2016-2017 heavy storm season to reduce sediment and turbidity from storms. The tanks also underwent inspection and sediment cleaning in 2017.

There are no wells supplying water to the system as noted, and the water in the distribution system is fed to the homes by gravity flow. The treatment system and all of the homes supplied are thousands of feet downhill and down stream from the site of the water collection.

The water supply has been reliable and safe for more than 50 years and was sufficient even during the years of drought.

## Thoughts on improvements: Preventing contamination of a surface water source.

The watershed is in a remote and difficult to reach area, not open to human traffic or hiking, and the path to the collection pipe is blocked by a locked gate.
Adding a "NO TRESPASSING" sign to the gate area is planned.

There are plans to improve the intake pipe and collection area with the intake surrounded by filtering gravel to further reduce the possible intake of solids or debris at the source.

Sources of contamination at this time—and in the future is limited to airborne pollutants, wildlife living in the area that includes deer, wild turkey, raccoon, opossum, bobcat, rodents, etc.

Monitoring of the water quality according to required standards are being met and automation of the tests are being implemented as time and cost allow.
The goal is to increase compliance and reduce cost where possible.

Respectfully submitted by:
Philip Miller, RMWC Board Member, on behalf of the
RMWC Board of Directors.


## Exhibit 2 Preserve Location

- MROSD Preserves
- Other Protected Open Space or Park Lands
- Watershed Land
- Urban Area
- MROSD Conservation or Agricultural Easement
- Easement over MROSD
- Existing Roads
- Highways

Midpeninsula Regional Open Space District *(MROSD)*

June, 2015

0 0.25 0.5 Miles

While the District strives to use the best available digital data, this data does not represent a legal survey and is merely a graphic illustration of geographic features.

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CIWQS

## e-WRIMS Water Right Search Results

**Criteria: Displaying Water Rights where County = Santa Clara; Source = Moody.**

Search Results: previous 1-6 of 6 next

| Appl ID | Permit ID | License ID | Water Right Type | Status | Holder Name | Date | Face Amt | County | Source | View Reports | Water Right | Open in GIS | Export Excel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S001518 | | | Statement of Div and Use | Claimed | RAINERI MUTUAL WATER COMPANY | 04/07/2014 | 0 acre-ft/yr | | | View Reports | View Statement | Open in GIS | Downlo to Exc |
| S013265 | | | Statement of Div and Use | Inactive | BARRY WIDEN | 06/08/2007 | 0 acre-ft/yr | | | View Reports | View Statement | Open in GIS | Downlo to Exc |
| S002157 | | | Statement of Div and Use | Claimed | CHEMEKETA PARK MUTUAL WATER CO | 01/01/1975 | 0 acre-ft/yr | Santa Clara | MOODY CREEK | View Reports | View Statement | Open in GIS | Downlo to Exc |
| S001641 | | | Statement of Div and Use | Claimed | SAN JOSE WATER COMPANY | 01/01/1975 | 0 acre-ft/yr | Santa Clara | MOODY CREEK | View Reports | View Statement | Open in GIS | Downlo to Exc |
| S003731 | | | Statement of Div and Use | Claimed | E. BRUCE, DANIEL B. AND THE FRANKS FAMILY | 01/01/1975 | 0 acre-ft/yr | Santa Clara | MOODY GULCH | View Reports | View Statement | Open in GIS | Downlo to Exc |
| A012066 | 007102 | 003424 | Appropriative | Licensed | CHEMEKETA PARK MUTUAL WATER CO | 09/03/1947 | 21.8 acre-ft/yr | Santa Clara | MOODY GULCH | View Reports | View License | Open in GIS | Downlo to Exc |

Return to Water Right Public Search Form

Download to Excel

# APPENDIX B

**SURFACE WATER ASSESSMENT FORMS**

# Checklist for Drinking Water Source Assessment – Surface Water Source

Public water system: Raineri Mutual Water Company ID No.: 4300520

Name of source: Raineri Source ID No.: 430052--001

Assessment date: July 15, 2026 Assessment conducted by Barry Hecht, PG, CEG, CHg

Water System Contact Name: Wade Bastien, Wadebastien0@yahoo.com Phone #: 408.309.2867

Water System Contact Address: PO Box 11, Los Gatos, CA 95031

The following information should be contained in the drinking water source assessment submittal.

If another report that is the functional equivalent to the drinking water assessment (e.g., Watershed Sanitary Survey) is included in this assessment, the part of that report that fulfills the components of the source water assessment should be clearly indicated.

x Delineation of source area and protection zones

x Source Data Sheet

x Physical Barrier Effectiveness Checklist

x Possible contaminating activities (PCA) inventory form

x Assessment map with source location, source area (watershed), and protection zones (if defined).

_____ Additional maps (optional) (e.g. local maps of zones and PCAs, recharge area maps, or maps indicating direction of ground water flow)

_____ Means of Public Availability of Report (indicate those that will be used)

Copy
- x Notice in the Consumer Confidence Report* (minimum) https://rainerimutual.org/consumer-confidence
- x Copy in regulatory agency (DHS or LPA) office (minimum) (DDW office)
- Copy in public water system office (recommended)
- x in public library/libraries (Los Gatos Library System
- x Internet (indicate Internet address: (https://rainerimutual.org/consumerconfidence_____) x
- Other (describe) On file at Santa Clara County Environmental Health

*The CCR should indicate where customers can review the assessments.



**SURFACE WATER ASSESSMENT FORMS**

## Delineation for Surface Water Source Area and Protection Zones

Public water system: Raineri MWC ID No.: 4300520

Name of source: Raineri Source ID No.:430052-001

Delineation date: July 15, 2026 Delineation conducted by Barry Hecht, PG, CEG, CHg

The delineation of protection zones for a surface water source is optional. The source area for a surface water source is the watershed.

If protection zones are established, the recommended distances are as follows:

Zone A: 400 feet from reservoir banks or primary stream boundaries
200 feet from tributaries
Zone B: 2,500 feet from intakes

Protection zones established for this source are:

Zone A: _____feet from reservoir banks or primary stream boundaries

_____feet from tributaries

Zone B: _____feet from intakes

# SURFACE WATER ASSESSMENT FORMS

## SURFACE WATER DATA SHEET

*Complete as much information as possible. Leave blank if information is not available, use N.A. if not applicable.*

** Indicates items required for Source Water Assessment*

| | *(separate multiple entries in field with semi-colon)* | Actual, Estimated or Default? |
|---|---|---|
| **GENERAL INFORMATION** | | |
| System Name | Raineri MWC | *from DHS database* |
| System Number | 430052 | *from DHS database* |
| Source of Information *(well log, DHS/County files, system, etc.)* | WSS Consultant | (Hecht) |
| Organization Collecting Information *(DHS, County, System, other)* | On behalf of RMWC | |
| Date Information Collected/Updated | June 24, 2026 | |
| **SOURCE IDENTIFICATION** | | |
| * Source Name | Raineri Source | *from DHS database* |
| * DHS Source Identification Number (**FRDS ID No.**) | 430052-001 | *from DHS database* |
| Source Status (Active, Standby, Inactive) | Active | *from DHS database* |
| **SOURCE LOCATION** | | |
| Inlet Ground Surface Elevation (ft above Mean Sea Level) | 1200 +/- | Actual topo quad |
| Street or Road | na | |
| Nearest Cross Street | na | |
| City | Los Gatos | Zip code map |
| County | Santa Clara | |
| Site plan on file? ("YES" or "NO") | no | no |
| **TYPE OF SOURCE** | | |
| Type of Source: (Lake, Reservoir, River, Stream, Creek, Other) | spring | |
| Production (gallons per year) | 10-19 gpm | DDW letter 10/7/26 |
| Frequency of Use (hours/year) | Perpetual | Except when shut down |
| **LAKE/RESERVOIR DATA (If Applicable)** | | |
| Name of Lake or Impounding Reservoir | na | |
| Date Dam Constructed | | |
| Dam Length (feet) | | |
| Dam Height (feet) | | |
| Dam Width - Base (feet) | | |
| Dam Width - Top (feet) | | |
| Surface Area when full (acres) | | |
| Capacity (acre-feet) | | |
| Reservoir Yield (gallons per day) | | |
| Yield Reliability (% of time the above yield can be supplied) | | 99+% |

| | | |
|---|---|---|
| Outlet Location | | |
| Outlet Level(s) (distance below maximum water surface) (feet) | | |
| Multiple Outlet Depths Available? "YES" or "NO" | | |
| Outlet Distance to Inflow (feet) | | |
| Algae Control Measures | | |
| Type of Recreational Activities in Reservoir *(list all that apply: boating, swimming, fishing, water skiing, etc.)* | | NA |
| Distance to Nearest Sewage Facilities to Outlet (feet) | | |
| **STREAM INTAKE DATA (If Applicable)** | | |
| Name of River, Stream or Creek | Moody Gulch | |



| | | |
|---|---|---|
| Intake Location | latitude: 37.15948728 and longitude: -121.99280669 | |

| SURFACE WATER DATA SHEET (continued) | | |
|---|---|---|
| **STREAM INTAKE DATA (If Applicable) (continued)** | | |
| Stream Flow - Maximum (ft3/sec) | ~120 cfs | Est. 50-yr event |
| Stream Flow - Minimum (ft3/sec) | NA | |
| Stream Flow - Average (ft3/sec) | NA | |
| Date Diversion Structure Constructed | >100 yr | Rebuilt 2017 |
| Diversion Structure Type (direct, infiltration gallery, etc.) | Spring box | |
| Distance to Nearest Sewage Facilities to Diversion Structure (feet) | NA | |
| **WATERSHED DATA** | | |
| Area of Watershed (acres) | 247 | Google |
| Area Owned or Controlled by Water System (acres) | Most | Est .>90 ac |
| Primary Tributaries | Unnamed RB toward Summit Rd | |
| Topography<br>*(list all that apply: flat terrain, hilly, mountainous, etc.)* | mountainous | |
| Percent slopes (range) | >50% | |
| Geology | Fractured Vaqueros shale | Oversteepened surficial deposits |
| Watershed prone to landslides? "YES" or "NO" | yes | |
| Predominant Soil Types<br>*(list all that apply: sand, loam, silt, clay, gravel, rock, fractured rock)* | Loam, sandy loam, clay loam | |
| Predominant Vegetation<br>*(list all that apply: grass, shrubs, chaparral, trees, forested, etc.)* | forested | |
| Watershed prone to erosion? "YES" or "NO" | yes | |
| Mean Seasonal Precipitation (inches/year) | 44 in | SCCo Drainage Manual |
| Significant Groundwater Recharge? "YES" or "NO" | | Yes |
| * Neighborhood/Surrounding Area *(see Note 1)* | Ru, Re | |
| Wastewater measures (septic systems, sewer treatment, etc.) | septic | |
| Watershed control measures | No trespass signs | |
| **INTAKE PIPE** | | |
| Material | Galvanized, PVC | |
| Diameter | 2” | |
| Length | 5/8 mi | |
| Depth | Varied v. shallow burial | |
| Pumped or Gravity flow | gravity | |
| Discharges to: *(i.e., distribution system, storage, etc.)* | Treatment plant | |
| **INTAKE PUMP INFORMATION** | | |
| Number | NA (all gravity) | |
| Make | NA | |

| | | |
|---|---|---|
| Type | | |
| Size (hp) | | |
| * Capacity (gpm) | | |
| Lubrication Type | | |
| Type of Power: *(i.e., electric, diesel, etc.)* | | |
| Auxiliary power available? ("YES" or "NO") | | |
| Operation controlled by: *(i.e., level in tank, pressure, etc.)* | | |
| | | |
| **REMARKS AND DEFECTS (use additional sheets as necessary)** | | |
| | | |



**NOTES**

1. Neighborhood/Surrounding Area (list all that apply): A= Agricultural, Ru = Rural, Re = Residential, Co = Commercial, I = Industrial, Mu = Municipal, P = Pristine, O = Other

**SURFACE WATER ASSESSMENT FORMS**

# Physical Barrier Effectiveness Checklist -- Surface Water Source

Public water system: _____ID No.:_____4300520_____

Name of source: _____
ID No.: _____

Assessment date:_____ Assessment conducted by _Barry Hecht, PG, CEG, CHg_____

**Drinking Water Source/ Watershed Information**

Note: Most of the following information should be available from the Watershed Sanitary Survey of the water source.

1. Is the source an impounded reservoir or a direct stream intake?
    a. Reservoir
    b. Stream intake
    c. Other, describe: _____b_____

2. Source Characteristics
    a. Area of tributary watershed:_____247 ac acres or square miles
    b. Area of water body within watershed:___na____acres or square miles
    c. Volume of water body: _____na____acre-feet
    d. Maximum rate of withdrawal through intake:___19____gallons per day
    e. Are the primary tributaries seasonal, perennial or both? Usually perennial
3. What is the approximate travel time to the intake for water at farthest reaches of the water body?
    a. ***Source is direct intake, no impounded water body a.***
    b. Less than 30 days
    c. More than 30 days and less than 1 year
    d. More than 1 year

4. What is the general topography of the watershed?
    a. Flat terrain (<10% slopes)
    b. Hilly (10 to 30% slopes)
    c. ***Mountainous (> 30% slopes)***
    d. Not sure

5. What is the general geology of the watershed?
    a. M***aterials prone to landslides***
    b. Materials not prone to landslides
    c. Not sure

6. What general soil types are on the watershed?
    a. Rock

b. ***Loams, sands***
c. Clay
d. Not sure



## Physical Barrier Effectiveness Checklist -- Surface Water Source (continued)

***Note: Answers are bold and italicized***

7. What type of vegetation covers most of the watershed?
   a. Grasses
   b. Low growing plants and shrubs
   c. ***Trees***
   d. Not sure

8. What is the mean seasonal precipitation on the watershed?
   ***a. More than 40 inches/year***
   ***b.*** 10 to 40 inches/year
   ***c.*** Less than 10 inches/year
   ***d.*** Not sure

9. Is there significant ground water recharge to the water body?
   ***a. Yes***
   ***b.*** No
   ***c.*** Not sure

**Physical Barrier Effectiveness Determination**

Parameters indicating **Low Physical Barrier Effectiveness**
(A source with any of the parameters listed below would be considered to have less effective physical barrier properties)

***3a***
***4c or 4d 5a***
***or 5c 7c or***
***7d***
***8a or 8d***
***9a***

Parameters indicating **High Physical Barrier Effectiveness**
(A source would need to have all of the parameters listed below to be considered to have highly effective physical barrier properties)

3d and
4a and
5b and
7a and

8c and
9b

All other sources are considered to have **Moderate Physical Barrier Effectiveness**

Determination for this source:

***Low***

Moderate

High

# Possible Contaminating Activities (PCA) Inventory Form

## Surface Water Source

Public water system name: Raineri MWC ID No. 4300 520

Name of drinking water source: ID No. 4300520 001

Inventory date: July 15.2026

Inventory conducted by: Barry Hecht

Name of Surface Water Body : Moody Gulch Stream

Indicate PCAs pertinent to the drinking water source, its source area (watershed) and protection zones (if established), from the following tables, as applicable: See Watershed Sanitary Survey report text

Commercial/Industrial _____

Residential/Municipal _____

Agricultural/Rural _____

Other (required for all) _____

Are zones established? YES or NO

Proceed to appropriate checklist or checklists. Indicate whether the PCA is located in the zone or watershed by placing a Y (yes), N (no), or U (unknown) in the appropriate boxes. Example:

| |
|---|
| **Y** |
| **N** |
| **U** |

Risk Ranking of PCAs, where VH = Very High Risk, H = High Risk, M = Moderate Risk, L = Low Risk

**Note: If zones are not established use higher risk ranking. If zones are established, use higher risk ranking in zones, lower risk ranking for remainder of watershed.**

# PCA Checklist COMMERCIAL/INDUSTRIAL

| | If Zones Established | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| Automobile-related activities | | | | |
| Body shops (H) | | | | |
| Car washes (M) | | | | |
| Gas stations (VH) | | | | |
| Repair shops (H) | | | | |
| Boat services/repair/ refinishing (H) | | | | |
| Chemical/petroleum processing/storage (VH) | | | | |
| Chemical/petroleum pipelines (H) | | | | |
| Dry cleaners (VH) | | | | |
| Electrical/electronic manufacturing (H) | | | | |
| Fleet/truck/bus terminals (H) | | | | |
| Furniture repair/ manufacturing (H) | | | | |
| Home manufacturing (H) | | | | |
| Junk/scrap/salvage yards (H) | | | | |
| Machine shops (H) | | | | |
| Metal plating/ finishing/fabricating (VH) | | | | |
| Photo processing/printing (H) | | | | |
| Plastics/synthetics producers (VH) | | | | |
| Research laboratories (H) | | | | |
| Wood preserving/treating (H) | | | | |
| Wood/pulp/paper processing and mills (H) | | | | |
| Lumber processing and manufacturing (H) | | | | |
| Sewer collection systems (H, if in Zones, otherwise L) | | | | |
| Parking lots/malls (>50 spaces) (M) | | | | |
| Cement/concrete plants (M) | | | | |
| Food processing (M) | | | | |
| Funeral services/graveyards (M) | | | | |
| Hardware/lumber/parts stores (M) | | | | |
| Appliance/Electronic Repair (L) | | | | |
| Office buildings/complexes (L) | | | | |
| Rental Yards (L) | | | | |

| | | | | |
|---|---|---|---|---|
| RV/mini storage (L) | | | | |
| | | | | |
| | | | | |



## PCA Checklist RESIDENTIAL/MUNICIPAL

| | If Zones Established | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| Airports - Maintenance/ fueling areas (VH) | | | | |
| Landfills/dumps (VH) | | | | |
| Railroad yards/ maintenance/ fueling areas (H) | | | | |
| Septic systems - high density (>1/acre) (VH if in Zones, otherwise M) | | | | |
| Sewer collection systems (H, if in Zones, otherwise L) | | | | |
| Utility stations - maintenance areas (H) | | | | |
| Wastewater treatment and disposal facilities (VH in Zones, otherwise H) | | | | |
| Drinking water treatment plants (M) | | | | |
| Golf courses (M) | | | | |
| Housing - high density (>1 house/0.5 acres) (M) | | | | |
| Motor pools (M) | | | | |
| Parks (M) | | | | |
| Waste transfer/recycling stations (M) | | | | |
| Apartments and condominiums (L) | | | | |
| Campgrounds/ Recreational areas (L) | | | | |
| Fire stations (L) | | | | |
| RV Parks (L) | | | | |
| Schools (L) | | | | |

| | | | | |
|---|---|---|---|---|
| Hotels, Motels (L) | | | | |
| | | | | |



## PCA Checklist AGRICULTURAL/RURAL (Page 1 of 2)

| | If Zones Established | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| Grazing (> 5 large animals or equivalent per acre) (H in Zones, otherwise M) | | | | |
| Concentrated Animal Feeding Operations (CAFOs) as defined in federal regulation[1] (VH in Zones, otherwise H) | | | | |
| Animal Feeding Operations as defined in federal regulation[2] (VH in Zones, otherwise H) | | | | |
| Other Animal operations (H in Zones, otherwise M) | | | | |
| Concentrated Aquatic Animal Production Facilities, as defined in federal regulation (VH in Zones, otherwise H) | | | | |
| Other Aquatic Animal production operations (H in Zones, otherwise M) | | | | |
| Managed Forests (VH in Zones, otherwise H) (unless additional detail provided*) | | | | |

| | | | | |
|---|---|---|---|---|
| Farm chemical distributor/ application service (H) | | | | |
| Farm machinery repair (H) | | | | |
| Septic systems – Low density (<1/acre) (H in Zones, otherwise L) | | | | |
| Lagoons / liquid wastes (H) | | | | |
| Machine shops (H) | | | | |
| Pesticide/fertilizer/ petroleum storage & transfer areas (H) | | | | |
| Agricultural Drainage (H in Zones, otherwise M) | | | | |
| Wells - Agricultural/ Irrigation (H) | | | | |
| Crops, irrigated (Berries, hops, mint, orchards, sod, greenhouses, vineyards, nurseries, vegetable) (M) | | | | |
| Sewage sludge/biosolids application (M) | | | | |
| Fertilizer, Pesticide/ Herbicide Application (M) | | | | |
| Crops, non-irrigated (e.g., Christmas trees, grains, grass seeds, hay, pasture) (L) (includes drip-irrigated crops) | | | | |



## PCA Checklist AGRICULTURAL/RURAL (Page 2 of 2)

| | If Zones Established | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| * Additional Detail for Managed Forests<br>The following categories can be used in lieu of the default risk ranking for Managed Forests: | | | | |
| * Managed Forests - Broadcast fertilized areas (M in Zones, otherwise L) | | | | |
| * Managed Forests - Clearcut harvested <30 years (VH in Zones, otherwise H) | | | | |

| | | | | |
|---|---|---|---|---|
| * Managed Forests - Partial harvested <10 years (H in Zones, otherwise M) | | | | |
| * Managed Forests - Road density > 2 mi/sq. mi) (H in Zones, otherwise M) | | | | |
| | | | | |

1. Concentrated Animal Feeding Operation: Animal Feeding Operation (requires NPDES permit) with greater than:

| **If pollutants discharged (directly or indirectly) to navigable waters** | **If pollutants not discharged** |
|---|---|
| 300 slaughter or feeder cattle | 1,000 slaughter or feeder cattle |
| 200 mature dairy cows | 700 mature dairy cows |
| 750 swine | 2500 swine |
| 150 horses | 500 horses |
| 3000 sheep or lambs | 10,000 sheep or lambs |
| 16,500 turkeys | 55,000 turkeys |
| 9,000 laying hens or broilers (liquid manure system) | 30,000 laying hens or broilers (liquid manure system) |
| 1500 ducks | 5000 ducks |
| 300 animal units | 1000 animal units |

2. Animal Feeding Operation: lot or facility where animals (other than aquatic) have been or will be stabled or confined and fed or maintained for total of 45 days or more in any 12-month period.



## PCA Checklist OTHER ACTIVITIES (Page 1 of 2)

| | **If Zones Established** | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| NPDES/WDR permitted discharges (H) | | | | |

| | | | | |
|---|---|---|---|---|
| Underground Injection of Commercial/Industrial Discharges (VH) | | | | |
| Historic gas stations (VH) | | | | |
| Historic waste dumps/ landfills (VH) | | | | |
| Illegal activities/ unauthorized dumping (H) | | | | |
| Injection wells/ dry wells/ sumps (VH) | | | | |
| Known contaminant plumes (VH) | | | | |
| Military installations (VH) | | | | |
| Mining operations - Historic (VH) | | | | |
| Mining operations – Active (VH) | | | | |
| Mining - Sand/Gravel (H) | | | | |
| Wells – Oil, Gas, Geothermal (H) | | | | |
| Salt Water Intrusion (H) | | | | |
| Recreational area – surface water source (H) | | | | |
| Snow Ski Areas (H in Zones, otherwise M) | | | | |
| Recent (< 10 years) Burn Areas (H in Zones, otherwise M) | | | | |
| Dredging (H in Zones, otherwise M) | | | | |
| Underground storage tanks | | | | |
| Confirmed leaking tanks (VH) | | | | |
| Decommissioned - inactive tanks (L) | | | | |
| Non-regulated tanks (tanks smaller than regulatory limit) (H) | | | | |
| Not yet upgraded or registered tanks (H) | | | | |
| Upgraded and/or registered - active tanks (L) | | | | |
| Above ground storage tanks (M) | | | | |
| Wells – Water supply (M) | | | | |
| Construction/demolition staging areas (M) | | | | |
| Contractor or government agency equipment storage yards (M) | | | | |
| Freeways/state highways (M) | | | | |
| Railroads (M) | | | | |
| Historic railroad right-of-way (M) | | | | |
| Road Right-of-ways (herbicide use areas) (M) | | | | |
| Roads/ Streets (L) | | | | |
| Hospitals (M) | | | | |

| | | | | |
|---|---|---|---|---|
| Storm Drain Discharge Points (M) | | | | |
| Storm Water Detention Facilities (M) | | | | |



## PCA Checklist OTHER ACTIVITIES (Page 2 of 2)

| | If Zones Established | | | |
|---|---|---|---|---|
| **PCA (Risk Ranking)** | **PCA in Zone A?** | **PCA in Zone B?** | **PCA in Watershed?** | **Comments** |
| | | | | |
| Artificial Recharge Projects | | | | |
| Injection wells (potable water) (L) | | | | |
| Injection wells (non-potable water) (M) | | | | |
| Spreading Basins (potable water) (L) | | | | |
| Spreading Basins (non-potable water) (M) | | | | |
| Medical/dental offices/clinics (L) | | | | |
| Veterinary offices/clinics (L) | | | | |
| Surface water - streams/ lakes/rivers (L) | | | | |
| | | | | |

# Instructions for Surface Water Assessment Map

The assessment map for a surface water source should be submitted on USGS topographic maps ("quad maps") at 1:24,000 scale. The map should show:

- Location of the water system intake
- Watershed boundaries
- Zones within the watershed (optional, but recommended)
- Significant Possible Contaminating Activities (PCAs) within the watershed (optional, but recommended)

The watershed is the area that contributes water to an intake point on a stream or reservoir. The watershed boundaries are determined by tracing the ridge lines on a topographic map that divide the watershed from adjacent basins. Zones within the watershed may be established using these recommended distances:

| | |
|---|---|
| Zone A: | 400 feet from reservoir banks or primary stream boundaries |
| | 200 feet from tributaries |
| Zone B: | 2,500 feet from intake |

USGS quad maps may be obtained from map or backpacking retailers. There are also several computer software programs that include USGS quad maps.

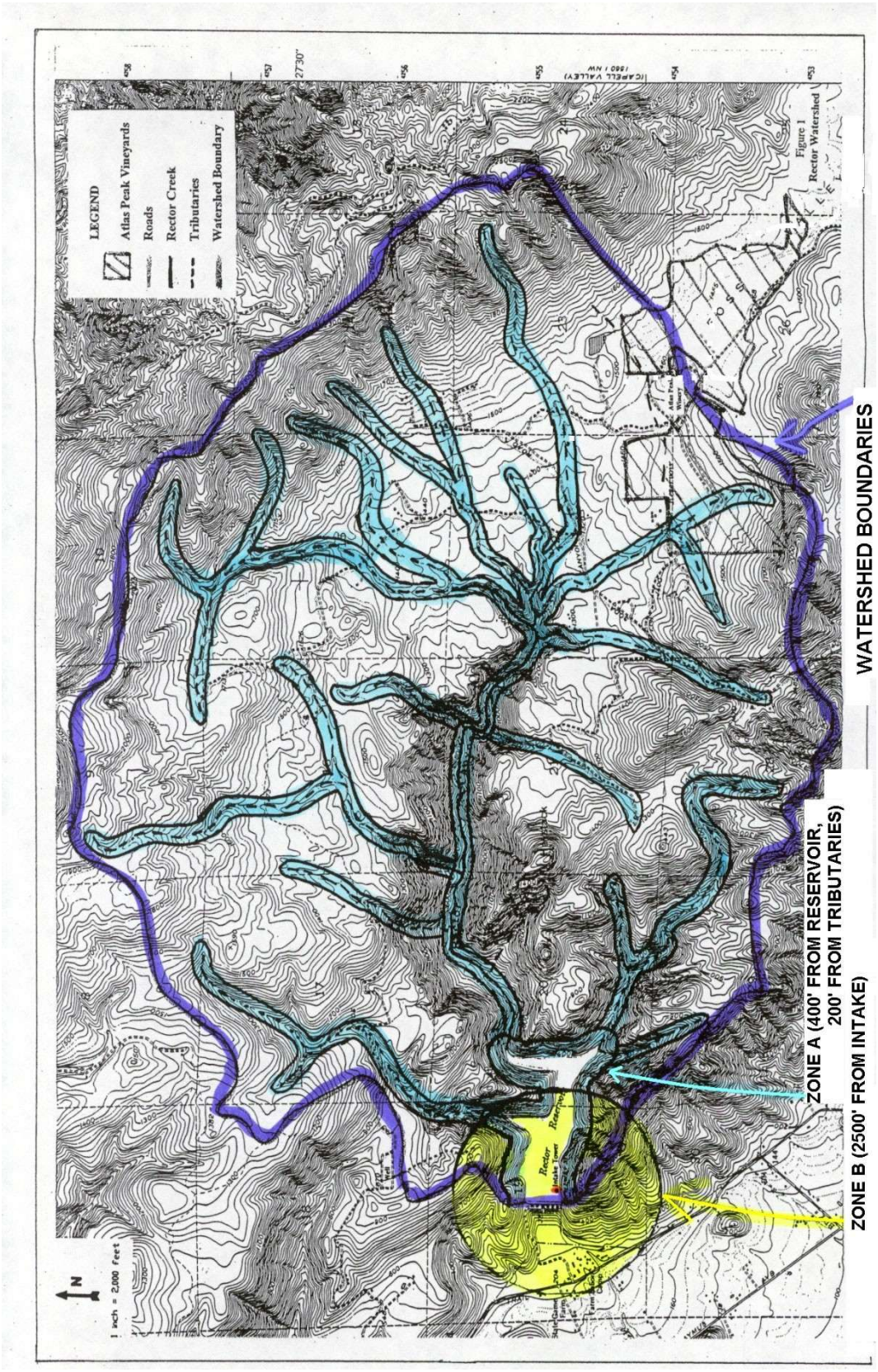
For large watersheds, the watershed boundaries may spread onto multiple USGS quad maps, or the map may be of large size. In these cases, it is acceptable to submit another type of map, or a map at a different scale, for the watershed boundaries. In this case, the zones in the vicinity of the surface water intake should be shown on a separate USGS quad map at a size not to exceed 8 ½ x 11 inches.

At the discretion of the regulatory agency, the water system may request that the regulatory agency prepare a map displaying watershed boundaries and zones.

An example map is attached.

**SURFACE WATER ASSESSMENT FORMS**

# EXAMPLE SURFACE WATER ASSESSMENT MAP (NOT TO SCALE)



Barry Hecht

Hydrologist

# APPENDIX C

Raineri Mutual Water Company Sampling Schedule

| Analyte | Monitoring Location | Monitoring Frequency |
|---|---|---|
| Total Coliform & E. Coli | Alterna ng Locations in the distribution system, combined filter effluent, Moody Gulch Stream | Monthly |
| Disinfection Byproducts (Total trihaloamethanes and haloacetic acids) | System Tap – near 20420 Idylwild Rd | Quarterly |
| Iron and Aluminum | Moody Gulch Stream and Finished treated water | Quarterly |
| Per/Polyfluoroalkyl Substances | Moody Gulch Stream | Quarterly for 2026 |
| Alkalinity, hardness, calcium, magnesium, pH, sodium | Moody Gulch Stream | Annual |
| Volatile organic compounds | Moody Gulch Stream | Annual |
| Hexavalent chromium | Moody Gulch Stream | Annual |
| Standard Title 22 Panel | Moody Gulch Stream | Annual |
| Synthetic organic compounds | Moody Gulch Stream | Triennial |
| Nitrite | Moody Gulch Stream | Triennial |
| Lead and copper | Five homes in distribution system | Every five years |
| Radiological – Radium, gross alpha | Moody Gulch Stream | Every nine years |
| Asbestos | Moody Gulch Stream | Every nine years |

_____Barry Hecht

Hydrologist

# APPENDIX D

# State Water Resources Control Board

## Division of Drinking Water

October 7, 2025

Mr. Wade Bastien
Board Member
Raineri Mutual Water Company
P.O. Box 11
Los Gatos, CA 95031

**2025 SANITARY SURVEY FINDINGS RAINERI MUTUAL WATER COMPANY WATER SYSTEM NO. 4300520**

This letter is to inform you of the findings of the May 7, 2025 sanitary survey of the Raineri Mutual Water Company (RMWC) water system conducted by the State Water Resources Control Board, Division of Drinking Water (Division) staff, George Chien. The sanitary survey consisted of inspecting the surface water source, surface water treatment plant, booster pump station, storage tanks, and distribution system. Topics covered were the service connection expansion, source capacity, drought and conservation reporting, water audit and loss control program, chlorine residual and temperature readings for CT calculations, chlorine dosage discussion, combined radium monitoring, integrity of the finished water storage tanks, Stage 2 Disinfectants/Disinfection Byproducts Rule Monitoring Plan, watershed sanitary survey, board member training, and drought resiliency. The purpose of this letter is to protect public health by documenting the current state of the water system, assessing any possible sanitary hazards, recommending water system improvements, and to inform you of the actions necessary for RMWC to be in full compliance with applicable sections of the California Health and Safety Code and the California Code of Regulations. Listed below are the items that need to be addressed. *Please provide a sanitary survey response letter, in writing, by* ***November 10, 2025****.*

RMWC's response to each section of this letter is in blue text, immediately below the original text of each section.

January 7, 2026 update:

RMWC is making a response update on January 7, 2026, update. All updates include this update date and are in a different shade of blue to make them easy to distinguish from the first response. RMWC hopes this update gives the State Water Resources Control Board the impression that RMWC Board is committed to work on all items, but

some items are requiring more time and effort to complete than the RMWC Board expected.

**Please do not forward the following information to Gary Mackenzie or his associates:**

The RMWC Board is now seeking to partner with a different water system operator, but RMWC needs to ensure its Gary Mackenzie's company continues operating the RMWC water system and will participate in an amicable knowledge transfer with the new water operations company. RMWC can't provide a date for when we expect to have a new water system operator. RMWC assumes there may be a few months of transition time after a new water system operator agrees to work with RMWC before this new water master transitions to assume all operation responsibilities from Gary Mackenzie's company.

**1. Slow Sand Filters Status**

Slow sand filter #6 has been offline since July 2024. This slow sand filter tank is located near the edge of an engineered platform and is slightly tilted due to an uneven foundation. The Division was informed that RMWC plans to temporarily remove both filter #5 and filter #6 from service, install a retaining wall along the edge of the engineered platform, then place filter #5 and filter #6 back into service. Before bringing the slow sand filters into service, RMWC must ensure that the slow sand bed is



matured, the schemutzdecke layer is properly formed, and the individual filter turbidity meets the performance standards.

After the re-installation of filter #5 and filter #6, RMWC must filter-to-waste at least 24 hours and until sampling results demonstrate that these two filters meet all the following operational goals:

- The individual filter effluent total coliform enumerated result is less than or equal to 5 most probable number per 100 milliliters (MPN/100ml).
- The individual filter effluent *E.coli* enumerated result shows 0 MPN/100 ml. The individual filter effluent turbidity result is less than or equal to 1.0 NTU.

RMWC must submit the operational results to the Division for review and approval prior to returning filter #5 and filter #6 to service.

RMWC acknowledges that RMWC must ensure that the slow sand bed is matured and meeting all operational goals described in the Sanitary Findings Letter and then submit the operational results to the State Water Resources Control Board Division of Drinking

Water for review and approval before returning the replacement for filter #5 and filter #6 to service.

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RMWC is currently working with construction professionals to get the necessary building permits to construct a reinforced foundation and other necessary infrastructure to support replacements for slow sand filters #5 and filter #6. The replacements for slow sand filters that will be very similar if not identical to the existing filters #5 and filter #6.

RMWC intends to complete this replacement construction project as quickly as possible, and RMWC will ask the Santa Clara County Department of Planning and Development to expedite the permitting process to help RMWC get replacement filters #5 and #6 constructed.

January 7, 2026 update:

The structural engineer's last visit to take measurements was on December 15, and he commented that the piers for the replacement wall will need more distance from the piers in the current retaining wall than he originally anticipated, and he would be in contact with RMWC in January regarding the design.

**2. Service Connection Expansion**

During the sanitary survey, RMWC inquired whether additional services can be connected to the water system. In the 2024 electronic Annual Report (eAR), RMWC reported a total of 44 active service connections served by RMWC. As specified in Permit Provision 1 of the Domestic Water Supply Permit issued on December 2, 1994, the water system must not serve more than 48 service connections without prior approval by the State. Thus, RMWC is allowed to have up to 48 service connections. If RMWC plans to serve more than 48 service connections, a Source Capacity Planning Study must be conducted in accordance with the requirements of California Code of Regulations, title 22, section 64558 and approved by the Division.

RMWC appreciates the comments in the Service Connection Expansion section of the 2025 SANITARY SURVEY FINDINGS. RMWC simply wanted guidance to documentation that describes the process we will need to follow if RMWC makes improvements that seem to indicate we could support additional customers without impacting our current membership.

RMWC hopes that a Source Capacity Planning Study would take into account any infrastructure improvements that reduce the percentage of unaccounted for produced water to help improve the likelihood of the state allowing RMWC to accept a new member because the 4 inactive members are not likely to start using water in the next few years, but there is a 3-person household that currently uses a well near our system that would be eager to join RMWC if RMWC could take on an additional member. This

house is on a small lot compared to most in the community and does not have any irrigation. This 3-person household would likely be in our bottom 25% for usage.

**3. Drought and Conservation Reporting**

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The SAFER Clearinghouse database indicated that RMWC hasn't submitted the monthly supply and demand data for October 2024 through June 2025. RMWC must submit these supply and demand data through the SAFER Clearinghouse as soon as possible.

Wade Bastien spoke with our water operator of record (Gary Mackenzie) regarding this issue on 10/17/2025, and Gary acknowledged that he was responsible for those reports. Wade recommended to Gary that Gary should delegate as many of those reports to other water operators in his company as possible, and Wade has been calling Gary on a weekly basis to check on progress to complete these reports.

January 7, 2026 update:

Wade Bastien met with Gary Mackenzie 5 times regarding the unsubmitted Drought and Conservation reports. Gary completed 2 reports during that time period, but the 3 additional reports were added to this list during that time period. Stephanie Massei and Rod Fagan tried having a similar call with Gary Mackenzie in December, but Gary has not submitted a single report since that meeting.

**4. Unaccounted Water and Water Audit and Loss Control Program**

The 2023 Annual Inventory Report revealed that the annual total production was 4,144,940 gallons, and the annual total demand was 3,107,110.33 gallons. The difference between the annual total production and the annual total demand was 1,037,830 gallons, which was equivalent to approximately 25% of the annual production as unaccounted water.

Small leaks often become large leaks or breaks. A high amount of water leakage can be indicative of a corroded pipe, deteriorated joints, or a stressed pipe. Unrepaired leaks can further deteriorate the leaking pipe by promoting external corrosion or by washing out pipe bedding, leading to bending and breakage of the pipe.

It is recommended that RMWC establish a water audit and loss control program, conduct water leak detection, improve the meter reading accuracy, and establish a water main replacement program to replace aging infrastructure before they catastrophically fail.

RMWC acknowledges that we need to establish a water audit and loss control program. RMWC established an infrastructure improvement fund to help us budget for large infrastructure improvements, but the construction costs related to replacing slow sand filters #5 and #6 are going to limit what RMWC can spend on other infrastructure improvements in the next year and are likely to limit pipe and meter replacements to obvious breaks and inaccurate meters.



During the summer of 2025, RMWC board members walked sections of the pipes from storage tank 2 to storage Tank 3, and then to the meter connections between Tank 3 and a few homes with addresses on Hebard and Idylwild. No signs of potential leaks were seen on these sections of the water infrastructure. RMWC intends to draw a more accurate map of all of the distribution infrastructure, and to conduct additional walking inspections to detect any potential leaks in the distribution infrastructure. RMWC cannot provide an estimated date for when we will complete an inspection of all lines between the RMWC plant and members' meters at this time.

RMWC also installed a remote-read meter on one member's connection, but we left the original meter in place to help us see if there is a large discrepancy in the new and old meter's readings. If there is a large discrepancy (indicating that the older meter is under-reporting usage), RMWC will use this information to come up with a plan to start replacing the meters throughout our membership. Such meter replacements will have to be prioritized against the importance and urgency of other infrastructure improvement projects.

A portion of the unaccounted for water is actually consumed by the water operators during plant maintenance. The RMWC water operator estimates that turbidity meter operation alone consumes approximately 60,000 gallons of water annually. Implementing infrastructure changes to measure the amount of processed water used for plant operation competes for the same funds RMWC uses to pay for other system improvements.

January 7, 2026 update:

In the first response, RMWC mentioned that one member has 2 meters installed on their service line. The new meter read 19,991 gallons of usage for the month of December and the older meter read 15,680 gallons (approximately a 24% difference). RMWC will consider the cost of replacing old meters during rate increase discussions. RMWC will plan on replacing a portion of meters per year then trying to replace all meters during 1 calendar year.

**5. Chlorine Residual Readings for CT Calculations**

The chlorine residual readings were measured every 15 minutes through a HACH CL17 online analyzer. However, as reported in the CT calculations of the monthly reports, the

operator used the lowest reading for the days when the operator was at the treatment plant and interpolated a value between the previous and next lowest daily readings for the days when the operator was not at the treatment plant. RMWC needs to improve the data consistency and ensure that the lowest chlorine residual reading of each day is used for the CT calculation.

RMWC acknowledges the need for improved accuracy, and will discuss this with our water operators (Gary Mackenzie and Bruce Carol) to ensure our water operator is



complying with this recommendation until we have a replacement online thermometer as mentioned in Section 6.

**6. Temperature Readings for CT Calculations**

RMWC has an online thermometer to collect the 15-minute temperature readings for the daily CT calculations. However, the thermometer sensor has been out of order since January 2025, and temperature readings were assumed to be 7 degrees Celsius for winter months, 10 degrees Celsius for spring months, and 12 degrees Celsius for summer months for the CT calculations. The operator informed the Division that multiple repairs were attempted; however, the sensor was still not functioning properly. Although historical data indicate that the temperature readings were not below 7 degrees Celsius, RMWC must ensure that the temperature readings are properly recorded and reported for the CT calculations in the monthly reports.

RMWC acknowledges the need to find a suitable online thermometer replacement. RMWC has asked our water operators (Gary Mackenzie and Bruce Carol) to identify a suitable replacement and RMWC will collaborate with our water operator to purchase, and install this device.

**7. Total Trihalomethanes Concentrations and Chlorine Dosage for CT calculations**

The total trihalomethanes (TTHM) maximum contaminant level (MCL) is 80 micrograms per liter (µg/L), and the compliance is based on the locational running annual average (LRAA) in the distribution system. According to Division records, the TTHM concentrations collected from the distribution system exceeded the MCL in March 2018, December 2019, March 2023, and March 2025. In March 2025, the TTHM concentration was 84 micrograms per liter (µg/L), and the locational running annual average (LRAA) was calculated to be 62.8 µg/L. In June 2025, the TTHM concentration dropped to 47 µg/L and the LRAA was calculated to be 61.3 µg/L. Although RMWC was in compliance with the MCL, the Division was informed that RMWC proposed to lower the assumed flow rates (i.e., 15 gallons per minute (gpm) during summer months and 12 gpm for winter months) for the CT calculations to reduce the required chlorine dosage, thereby lowering TTHM concentrations in the distribution system.

Currently, the flow rate for the daily CT calculations is based on an assumption of a transfer rate from the CT Tank (Tank 1) to Tank 2 at 20 gpm during summer months and 15 gpm during winter months. The fixed operational transfer rate between the CT Tank (Tank 1) and Tank 2 was at 12 gpm or lower, and the operators also verified the transfer rate and reported any adjusted transfer rates in the monthly reports. During the past 12 months, the reported transfer rates were consistently below the assumed transfer rates used in the CT calculations. However, the actual transfer rate readings may be under-measured, as two service connections were off the effluent pipe from the CT Tank (Tank 1), and the meter (for the transfer rate readings) is located after these branched connections on the influent pipe to Tank 2. Based on the available reported data, a more conservative monitoring location is at the influent meter to the surface



water treatment plant. During the past 12 months, the average flow rate was calculated to be 7.0 gpm with an estimated maximum flow rate of 12.2 gpm.

Therefore, based on the available information, the proposed adjustments to the assumed flow rates at 15 gpm during summer months and 12 gpm during winter months for the CT calculations are approved.

RMWC acknowledges the proposed adjustments and has discussed the procedural changes with our water operators (Gary Mackenzie and Bruce Carol).

**8. Aluminum Monitoring**

RMWC has conducted quarterly aluminum monitoring at Moody Gulch Stream (Primary Station Code (PS Code) CA4300520_001_001), and the aluminum results of the recent quarters were 0.758 milligrams per liter (mg/L) on February 10, 2025, non-detectable on March 24, 2025, 0.015 mg/L on June 2, 2025, 0.009 mg/L on July 1, 2025, and 0.055 mg/L on August 18, 2025. The secondary maximum contaminant level (sMCL) for aluminum is 0.2 mg/L. RMWC

Currently, the aluminum monitoring frequency at Slow Sand & CL2 – Treated (PS Code CA4300520_801_801) is one sample every quarter. Although all these results showed that aluminum results were either non-detectable or below the detection limit for purposes of reporting, to determine the aluminum concentration in the treated water supplied to the community, RMWC must monitor aluminum at Slow Sand & CL2 – Treated (PS Code **CA4300520_801_801**) **once every month**, starting in **October 2025**. The sample analyses must be conducted by a state-accredited laboratory. The samples must be labeled with their designated PS Code when samples are submitted to the laboratory. The laboratory results must be submitted to the state database via the California Laboratory Intake Portal (CLIP) no later than the tenth day of the month following the sampling. The updated source chemical monitoring schedule can be found at the following website: https://sdwis.waterboards.ca.gov/PDWW/.

Compliance with the aluminum sMCL at Moody Gulch Stream will be determined based on the average of four consecutive quarterly samples collected. For the Slow Sand & CL2 – Treated, aluminum compliance will be assessed using a running annual average calculated from the average of monthly aluminum results of each quarter. Corrective actions may be required if the running annual average for either source or treated water exceeds the sMCL for aluminum.

Note that the test results for the Slow Sand and CL2 treated samples have always resulted in “non-detectable or below the detection limit for the purposes of reporting”, even during the 2 instances (separated by several years) when the source samples showed the high aluminum levels. The fact that the aluminum levels in the Slow Sand and CL2 treated samples have always been “below the detection limit for purposes of reporting” (including during the months where the source levels of aluminum were high)
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should already provide some level of confidence that the RMWC filtering process is effective at removing aluminum from the raw water.

How many consecutive results of “non-detectable or below the detection limit for the purposes of reporting” will RMWC have to produce before the State Water Resources Control Board will consider allowing RMWC to return to a quarterly cadence for such testing? RMWC asks this question because the cost of conducting monthly instead of quarterly tests is significant, and RMWC could benefit from spending that money on infrastructure improvements instead of on tests that have always resulted in “non-detectable or below the detection limit for the purposes of reporting”, even in testing periods when the source samples have indicated high levels of aluminum.

**9. Finished Water Storage Tanks**

CT Tank / Tank 1 –
Corrosion areas, chipped paint, and lichen were observed on the exterior of the tank (Photo #1). Also, due to corrosion and gusty winds, the operator mentioned that the hatch was blown off and the roof was temporarily repaired (Photo #2). As required in California Code of Regulations, title 22, section 64585, the vent and other openings of a finished water reservoir must be constructed to prevent the entry of rainwater or runoff, and insects, rodents, or other animals; and must be designed to allow authorized access for interior inspection, cleaning, or repair. RMWC needs to ensure the hatch is properly re-installed and ensure its durability and watertightness. Also, it is recommended that RMWC re-paint the tank and clean the exterior on a regular basis.

Tank 2 –
Corrosion areas and lichen were observed on the exterior of the tank (Photo #3). It is recommended that RMWC re-paint the tank and clean the exterior on a regular basis.

Tank 3 –
A section of black plastic pipe was connected to the tank influent pipe and it was unknown where the other end connected to (Photo #4). RMWC needs to identify where

the black plastic pipe connects to. Corrosion spots were observed on the exterior of the tank. It is recommended RMWC re-paint the tank and clean the exterior on a regular basis

RMWC acknowledges the need to repair the hatch on Tank 1, to clean and re-paint all tanks, and to determine where the black plastic pipe connected to Tank 3 goes . RMWC will need to find companies to bid on these repairs, and RMWC will coordinate with our water operators (Gary MacKenzie and Bruce Carol) to ensure these improvement efforts will not interfere with normal operations.

January 7, 2026 update:

RMWC intends to look into these improvements after completing the slow sand filter project described in Section 1.



**10. Distribution System Operations and Maintenance**

According to the 2024 electronic Annual Report (EAR), RMWC has a total of 20 main valves in the distribution system, and the exercising frequency is annual, but only six main valves were exercised in 2024. RMWC needs to ensure that all main valves are exercised once per year.

RMWC will discuss this issue with our water operator. RMWC will ask our water operator of record (Gary MacKenzie) to exercise all valves that he believes are safe to exercise, and to describe the location of any valves that his water operators deems too risky to exercise (potentially emptying tanks if the valve fails to return to its normal operating position). RMWC will have to come up with a schedule to address the valves that are considered risky to exercise.

January 7, 2026 update:

RMWC intends to discuss a schedule for exercising these valves with a new water system operator.

**11. Stage 2 Disinfectants/Disinfection Byproducts Rule Monitoring Plan**

As required in the California Code of Regulations, title 22, section 64534.8, RMWC must submit a Stage 2 Disinfectants/Disinfection Byproducts Rule (D/DBPR) monitoring plan to the Division for review and approval. There is currently no approved D/DBPR monitoring plan on file. Please complete and submit the enclosed Stage 2 Disinfectants/Disinfection Byproducts Rule Monitoring Plan to the Division by **November 10**, **2025**.

RMWC spoke with water operator of record (Gary MacKenzie) about this report on

10/17, and every Friday since then. RMWC will continue to follow up with Gary MacKenzie on a weekly basis regarding this report as well as several other reports (mentioned in Section 3) that we need him to complete.

**12. Watershed Sanitary Survey**

According to California Code of Regulations, title 22, section 64665,a surface water system must conduct a watershed sanitary survey once every five years and identify actual or potential sources of contamination, or other watershed-related factors, that could potentially compromise the raw water quality. The watershed sanitary survey must include the following information:

- Physical and hydrogeological description of the watershed.
- A summary of source water quality monitoring data.
- A description of activities and sources of contamination.
- A description of any significant changes that have occurred since the last survey which could affect the quality of the source water.
- A description of watershed control and management practices.



- An evaluation of the system's ability to meet the requirements of the Surface Water Treatment Rule.
- Recommendations for corrective actions.

Our records showed that the last watershed sanitary survey was conducted in 2018. RMWC must complete a watershed sanitary survey and submit the watershed sanitary survey report by **January 7, 2026**.

RMWC has started seeking experts we need to hire to complete this survey.

January 7, 2026 update:

RMWC is sending a letter to George Chien to ask for an extension because of the difficult relationship RMWC has with its current water system operator, the difficulty in finding an expert to help RMWC to create this document, and the hazardous conditions on the trail to the source during the rainy seasons.

RMWC will forward that message to all email addresses George recommends RMWC to notify.

**13. Water System Mutual Water Company Board Member Training**

As specified in the California Health & Safety Code, division 104, section 116755, all board members must complete a minimum of a two-hour training regarding the duties of board members of a mutual water company. The Division was informed that several board members had completed the training, but the training certificates have not been provided to the Division. RMWC must provide a list of the current board members, a copy of the completion certification of all the board members, the person/organization

that provided the training, and if the trainer meets the qualification listed in the California Health & Safety Code section 116755.

The current RMWC Board Members are Wade Bastien, Stephanie Massei, Alison Armstrong, Westin Bolliger, and Roderick Fagan. Both Stephanie and Alison requested to take the AB 54 and AB 240 Ethics class from California Association of Mutual Water Companies in October, but they are still waiting for an email that will allow them to take the course.

Alison was elected to the RMWC Board in late July 0f 2025 (approximately 5 months ago). Stephanie's last training certificate is dated 12/17/2019. Both Stephanie and Alison have sent emails to Susan Allen at CalMutuals to try to expedite their entry to this class. RMWC intends to send copies of Alison and Stephanie's new training certificates as soon as they receive their certificates.

January 7, 2026 update:

The 2 attachments to this message are the 2 training certificates that were not provided with the first response.

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**14. Drought Resiliency**

As required by California Water Code, division 6, part 2.56, chapter 2, section 10609.62, a small water supplier needs to implement, subject to funding availability, the following drought resiliency measures: maintain membership in the California Water/Wastewater Agency Response Network (CalWARN); ensure continuous operations during power failures; have at least one backup source of water supply, or a water system intertie, that meets current water quality requirements and is sufficient to meet average daily demand; meter each service connection and monitor for water loss due to leakages; have source system capacity, treatment system capacity, and distribution system capacity to meet fire flow requirements. Please ensure that RMWC implements these drought resiliency measures if funding is available.

RMWC is working on getting an emergency connection to the San Jose Water Company. Once we have an agreement, we will work on the permit we will need to construct the necessary infrastructure for this connection.

RMWC has a backup generator for use in extended power outages. This backup generator is started on a monthly basis to ensure it is functional.

January 7, 2026 update:

RMWC had a brief discussion with Jim Bariteau at San Jose Water Company regarding an emergency connection in early December 2025, but RMWC does not have visibility into when RMWC will have an agreement and can start working on the design, permits,

etc. that will be needed before RMWC can actually connect to SJWC as an emergency backup.

If you have any questions regarding this letter, please contact Mr. George Chien at (510) 620-3461.

Sincerely,

Van Tsang, P.E.
District Engineer
Santa Clara District
Division of Drinking Water
State Water Resources Control Board

Enclosures: Sanitary Survey Photos
Stage 2 Disinfectants/Disinfection Byproducts Rule Monitoring Plan
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CC: Mr. Gary MacKenzie, operator (via Email)
Santa Clara County Environmental Health (via email: dehdrinkingwater@cep.sccgov.org)

Sincerely,

Wade Bastien
Board Member
Raineri Mutual Water Company

wbastien0@yahoo.com

Enclosures: Current AB 54 and AB 240 Ethics Training Certificates for Wade Bastien, Roderick Fagan, Westin Bolliger, and Stephanie Massei