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Annual Water Supply and Demand Assessment

27 June 2023

Prepared for

South Tahoe Public Utility District

1275 Meadow Crest Dr.
South Lake Tahoe, CA 96150

KJ Project No. 2368001

Contents

GLOSSARY

AF: Acre-feet

AFY: Acre-feet per year

AWSDA: Annual Water Supply and Demand Assessment

Alternative Plan: Alternative to a GSP developed pursuant to Part 2.75 of the Water Code

CSLT: City of South Lake Tahoe

CY: Calendar Year

DWR: California Department of Water Resources

gpm: Gallons per minute

GSA: Groundwater Sustainability Agency

Kennedy Jenks: Kennedy/Jenks Consultants, Inc.

LBWC: Lukins Brothers Water Company

South Tahoe Public Utility District
Annual Water Supply and Demand Assessment
(WY 2023)

MBR: Mountain Block Recharge

RPO: Regional Power Outage

SNOTEL: NRCS snow telemetry station

STGM: South Tahoe Groundwater Model, Groundwater flow model developed by DRI for the TVS Subbasin and its surrounding watersheds using MODFLOW-NWT

STPUD: South Tahoe Public Utility District

TKWC: Tahoe Keys Water Company

TVS Subbasin: Tahoe Valley South Subbasin (6-005.01) of the Tahoe Valley Groundwater Basin (6-005)

UWMP: South Tahoe Public Utility District 2020 Urban Water Management Plan

WSCP: Water Shortage Contingency Plan

WY: Water Year

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Executive Summary

The Annual Water Supply and Demand Assessment (AWSDA) provides data and projections for the current water year (WY 2023) and the subsequent water year (WY 2024) assuming drought.

The South Tahoe Public Utility District (District) is 100% reliant on groundwater sources pumping from the Tahoe Valley South Subbasin (TVS Subbasin). The TVS Subbasin is a California Department of Water Resources (DWR) designated medium-priority groundwater basin located at high elevation within the Lake Tahoe Hydrologic Basin. Groundwater is the primary source of drinking water for the communities overlying the TVS Subbasin. Surface water for recharge or in-lieu use is not presently used.

Water year type for the TVS Subbasin is based on total precipitation measured at SNOTEL 508. Water year type for WY 2023 is based on total precipitation measured at SNOTEL 508 from October 1, 2022, through May 31, 2023 (50.2 inches). Water year type for WY 2024 is projected based on total precipitation measured at SNOTEL 508 during a preceding dry water year (WY 2001). Groundwater recharge for the TVS Subbasin is derived from the water budget calculated by the South Tahoe Groundwater Model (STGM) for the TVS Subbasin. Using the amount of precipitation recorded at SNOTEL 508 during WY 2011 (51.1 inches), which is similar to WY 2023, the model-simulated groundwater recharge for WY 2023 is projected at 26,730 acre-feet (AF). Like WY 2023, WY 2011 was a very wet water year following a normal water year. Using the amount of precipitation recorded at SNOTEL 508 during WY 2001 (16.4 inches), the model-simulated groundwater recharge for WY 2024 is projected at 17,900 AF. WY 2024 is assumed to be a dry water year like WY 2001 for the purposes of this assessment.

The District is the primary user of groundwater with the TVS Subbasin. More than ninety percent (90%) of groundwater produced from the TVS Subbasin is from drinking water wells operated by the District, Tahoe Keys Water Company (TKWC), and Lukins Brothers Water Company (LBWC). Eighty percent (80%) of this amount is from District wells. The remaining balance of groundwater production is pumped from private small water system and domestic wells. District pumpage projected for WY2023 (6,109 AF) uses the current monthly groundwater production from October 2022 through May 2023 plus the long-term (WY2005 - WY2022) monthly average groundwater production from District wells to estimate June 2023 through September 2023. Total pumpage for WY 2023 (7,331 AF) uses the sum of the WY 2023 District monthly groundwater production multiplied by 1.2 to account for pumpage from TKWC, LBWC and private wells. Total pumpage for WY 2024 uses groundwater production records from WY 2001 to assess groundwater supply during a dry water year (Total = 9,500 AF; STPUD = 8,079 AF). Groundwater pumpage within the TVS Subbasin is significantly less than sustainable yield (13,200 AFY).

Available groundwater supply is calculated as the difference between the volume of groundwater in storage and the minimum threshold for reductions of groundwater in storage for the TVS Subbasin (-32,050 AF relative to WY 2005) (Rybarski, et al., 2022). The available groundwater supply for the TVS Subbasin through the end of WY 2022 is 40,207 AF and is projected at 48,108 AF for WY 2023 and at 42,849 AF for WY 2023.

Annual testing of District groundwater wells indicate that all active wells are pumping at expected rates, except for the Paloma Well which has been removed from service for well repair and is expected to be operational by the end of CY 2023. The District water system would likely experience water shortage conditions under the following scenarios:

- A water shortage in a neighboring water system could result in an emergency condition requiring the District to provide emergency water through inter-tie(s) under a mutual aid agreement. Under below normal water year or dry water years, unexpected delivery of emergency water could possibly trigger 10%-20% water shortage for the District's system.

- An extended regional power outage (RPO) during a maximum demand in summertime would result in 40%-50% water shortage.

- A wildfire with extended RPO during a maximum demand in summertime would result in >50% water shortage.

There is no anticipated water supply deficit under current conditions, therefore no actions are triggered from the water supply and demand assessment for Water Year 2023. The District will adhere to Executive Order N-7-22, as amended by Executive Order N-5-23, and any additional restrictions required by the State of California.

1 Introduction

The Annual Water Supply and Demand Assessment (AWSDA) provides data and projections for the current water year (WY 2023) and the subsequent water year (WY 2024) assuming drought. This assessment encompasses the period from October 1, 2022, through September 30, 2024.

Kennedy Jenks, on behalf of the District, prepared this AWSDA in compliance with the annual reporting requirements of urban water suppliers to conduct an AWSDA pursuant to subdivision (a) of Section 10632 on or before July 1 of each year. This AWSDA is the second AWSDA prepared since adoption of the District's 2020 Urban Water Management Plan (2020 UWMP) in June 2021 (Kennedy Jenks, 2021).

The District is 100% reliant on groundwater to meet water demands. Groundwater production is currently provided by ten (10) active and three (3) stand-by wells which pump groundwater from the Tahoe Valley South Subbasin (TVS Subbasin). The District is the largest producer of groundwater within the TVS Subbasin and serves as the Groundwater Sustainability Agency (GSA) for the majority portion of the Subbasin located within its jurisdiction, responsible to manage groundwater in a sustainable manner for all users and beneficial uses in accordance with the objectives of the Sustainable Groundwater Management Act (SGMA). Information on groundwater conditions and water demands presented in the AWSDA is consistent with information presented in the District's water year (WY) 2022 Annual Report (Kennedy Jenks, 2023). Projections for groundwater conditions and water demands for the current WY 2023 and a subsequent dry water year (WY 2024) follow the annual assessment procedures described in Chapter 2 of the District's 2020 Water Shortage Contingency Plan, included as Appendix F of the 2020 UWMP.

1.1 TVS Subbasin

Drinking water is the primary use of groundwater within the TVS Subbasin. The TVS Subbasin is a DWR designated medium-priority groundwater basin located at high elevation within the Lake Tahoe Hydrologic Basin (Figure 1-1).

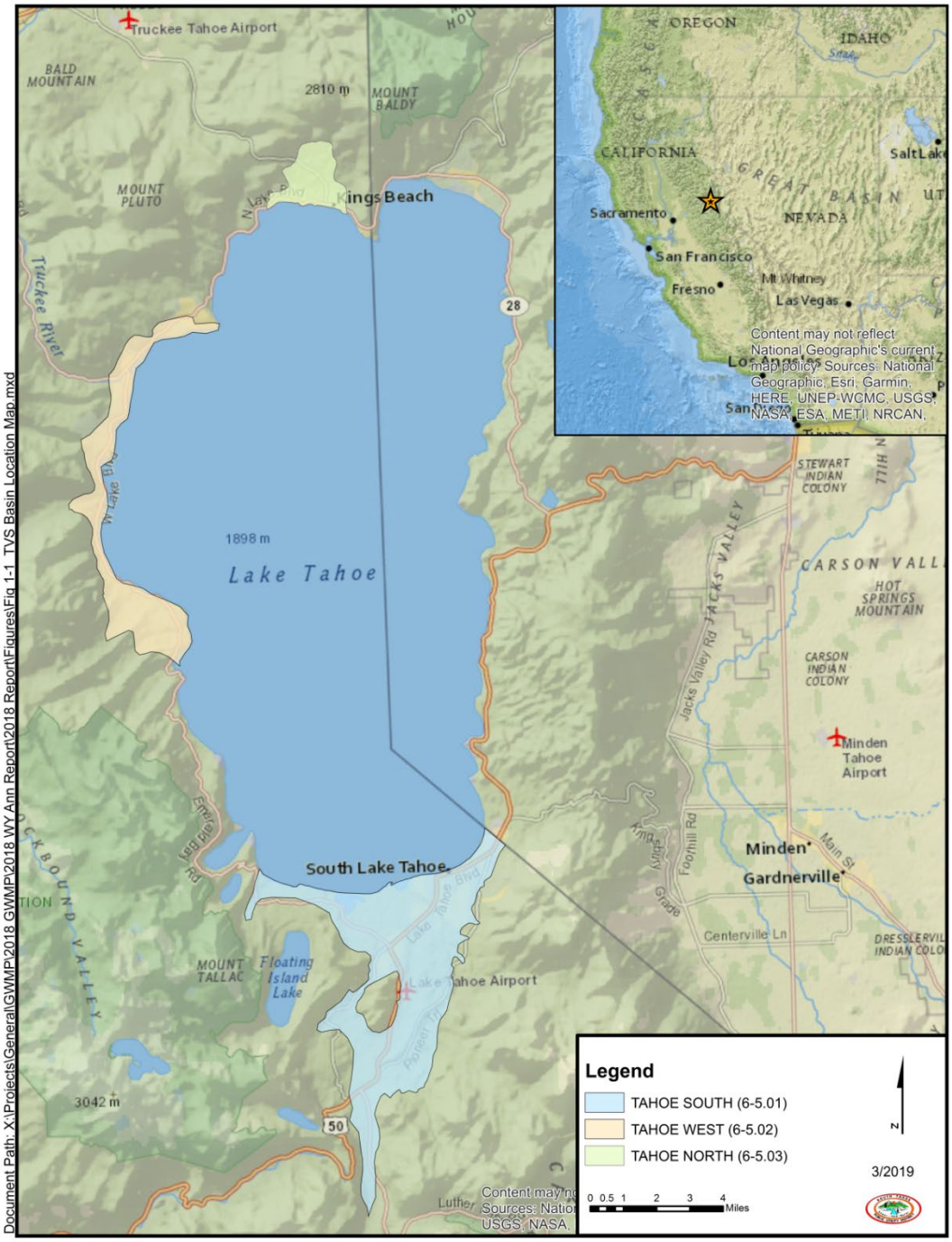

Figure 1-1. Lake Tahoe area regional map with Department of Water Resources (DWR) designated groundwater subbasins.

The TVS Subbasin has an area of approximately 23 square miles (14,814 acres) and is in El Dorado County, California (Figure 1-2). The TVS Subbasin is roughly triangular-shaped, bounded on the southwest by the Sierra Nevada Range, on the southeast by the Carson Range, and on the north by the southern shore of Lake Tahoe. The TVS Subbasin generally conforms to the valleys of the Upper Truckee River and Trout Creek. The TVS Subbasin does not share a boundary with any other DWR groundwater basin or sub-basin. The City of South Lake Tahoe (CSLT) overlies the northern portion of the TVS Subbasin. The southern boundary extends about 3 miles south of the unincorporated town of Meyers. The northeast boundary of the TVS Subbasin is defined by the California-Nevada state line.

Groundwater is the primary source of drinking water for the communities overlying the TVS Subbasin. Surface water for recharge or in-lieu use is not presently used.

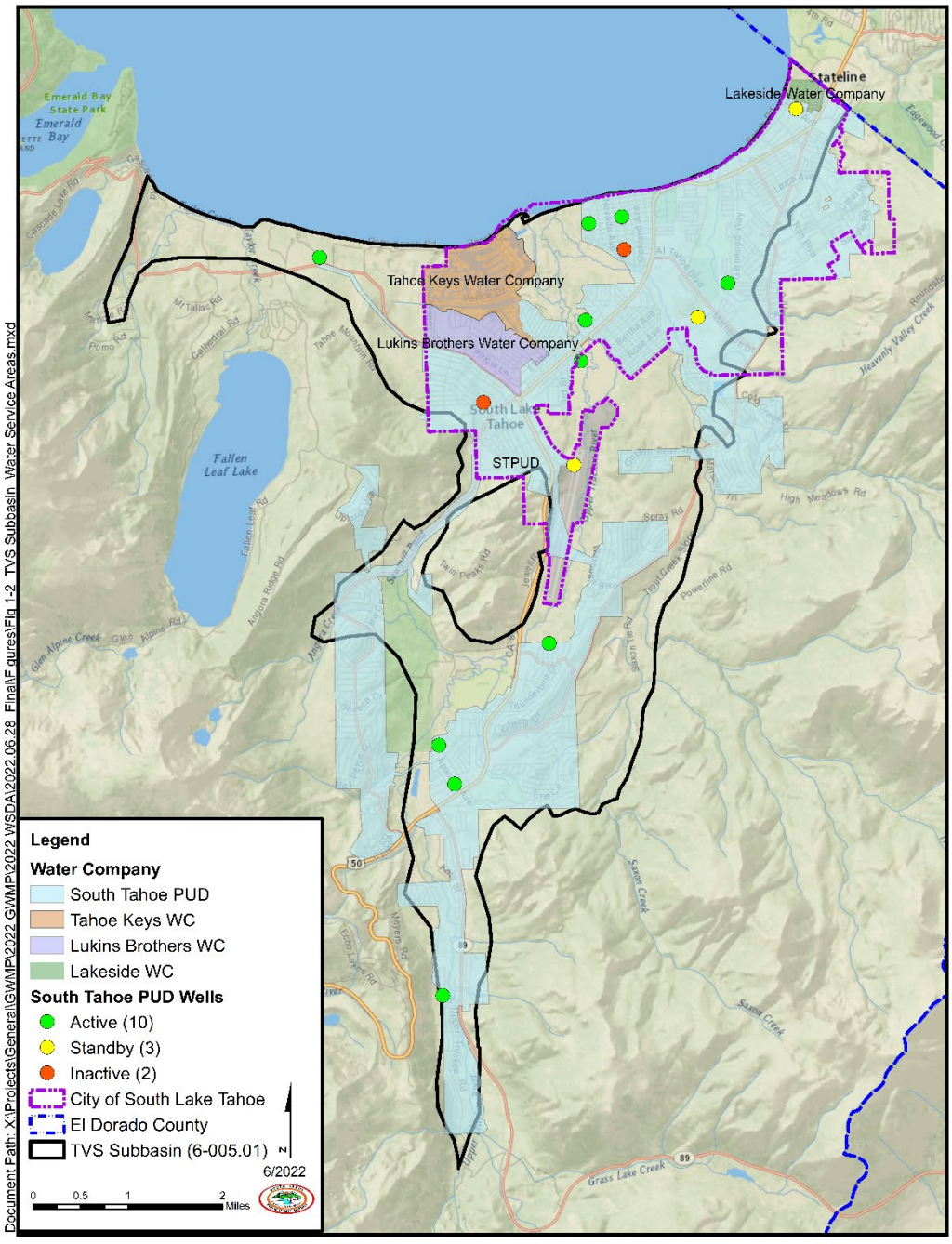

Figure 1-2. Water service areas overlying the Tahoe Valley South Subbasin (6-005.01).

2 Water Supply Assessment

The following section presents data collected by the District and derived from numeric groundwater models to show the current state of the TVS Subbasin in terms of precipitation and groundwater recharge.

2.1 Precipitation

Water year classification refers to the categories used to assess the amount of annual precipitation in a basin. The water year classification system for the TVS Subbasin was created in collaboration with development of the South Tahoe Groundwater Model (STGM) to help describe hydrologic conditions as either Critical, Dry, Below Normal, Normal, Above Normal, Wet, or Very Wet, based on total accumulated precipitation recorded at SNOTEL 508: Hagan's Meadow, CA (Rybarski, et al., 2022)). Precipitation measured at this station has the best correlation of any weather station within the South Lake Tahoe area to model-simulated groundwater recharge. Figure 2-1 is a graph of annual precipitation measured at SNOTEL 508 and accompanying water year type since WY 2001. Water year type for WY 2023 is based on the total precipitation recorded at SNOTEL 508 through May 31, 2023 (50.2 inches) typed as a very wet year. Water year type for WY 2024 is assumed to be a dry year with total precipitation the same as WY 2001 (16.4 inches).

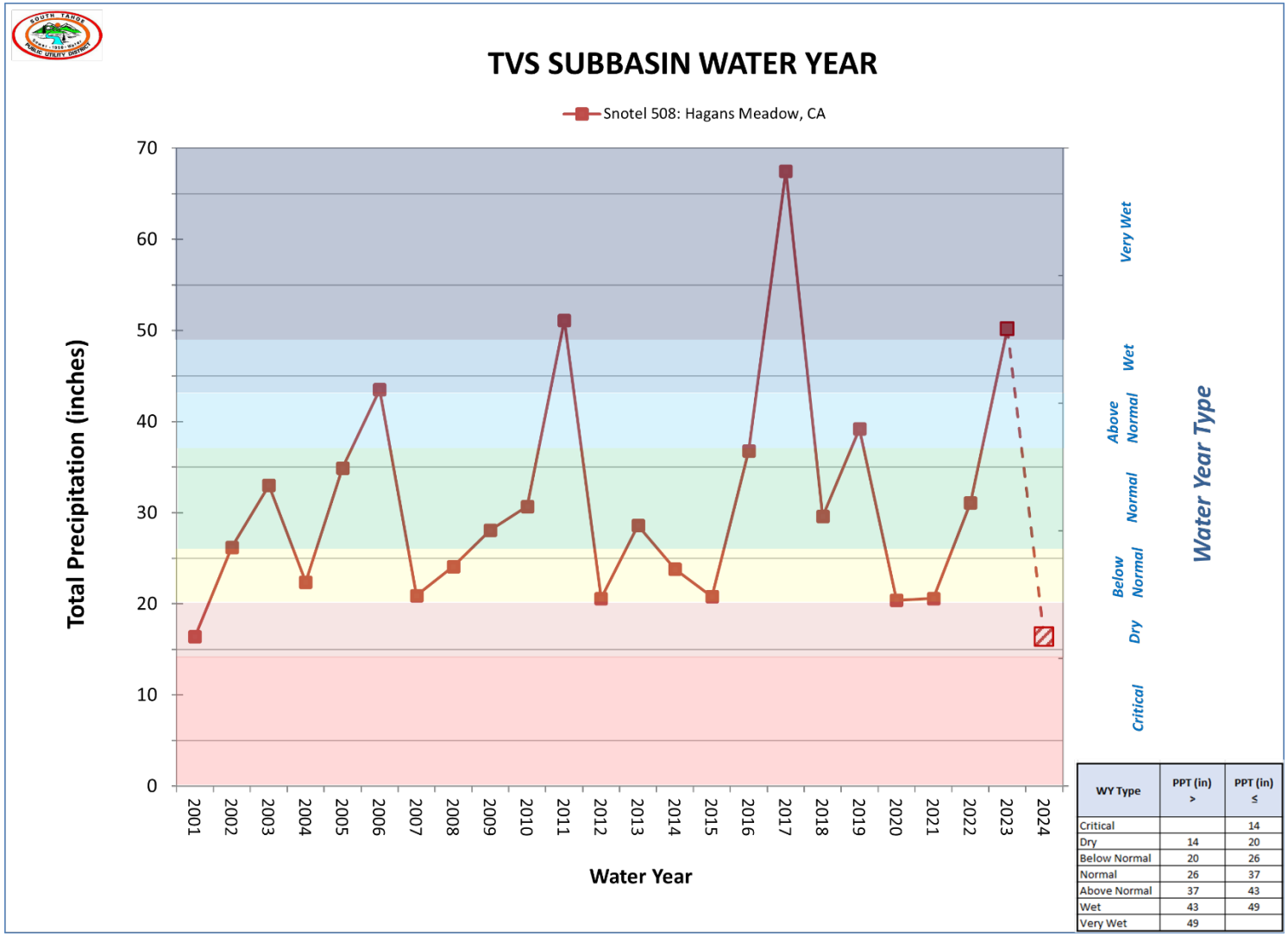

Figure 2-1. Water year type for the TVS Subbasin based on total precipitation measured at SNOTEL 508 (WY 2001 through May 31, 2023) and projected for a subsequent dry water year (WY 2024).

2.2 Groundwater Recharge

Groundwater recharge for the TVS Subbasin is derived from the water budget calculated by the STGM for the TVS Subbasin. Recharge is calculated as the sum of areal recharge over the TVS Subbasin (Zone 10) and the subsurface inflow of groundwater from the adjoining mountains (Zone 1) referred to as Mountain Block Recharge (MBR). MBR is calculated in the water budget as the difference between the areal recharge within Zone 1 and the sum of the baseflow to streams plus discharge to Lake Tahoe within Zone 1 (Rybarski et al, 2022). Figure 2-2 is a graph of model-simulated groundwater recharge for the TVS Subbasin since WY 2001. The amount of precipitation recorded at SNOTEL 508 through May 31, 2023, is 50.2 inches. Using the amount of precipitation recorded at SNOTEL 508 for a similar water year (WY 2011 with 51.1 inches), the model-simulated total recharge to the TVS Subbasin for WY 2023 is projected at 26,730 AF. Using the amount of precipitation recorded at SNOTEL 508 for a dry year (WY 2001 with 16.4 inches), the model-simulated total recharge to the TVS Subbasin for WY 2024 is projected at 17,900 AF.

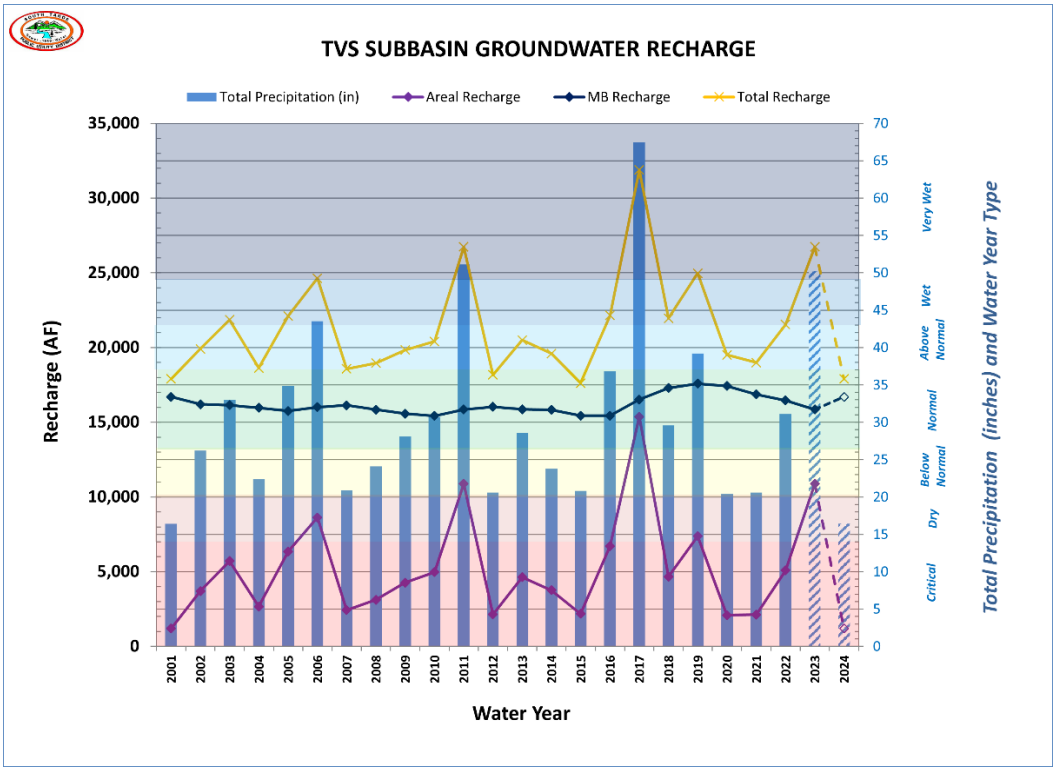

Figure 2-2. Annual groundwater recharge derived from the water budget calculated by the STGM for the TVS Subbasin (WY 2001 through WY 2022) and projected for the current WY 2023 and a subsequent dry water year (WY 2024).

3 Water Demand Assessment

This section presents the current unconstrained water demand using the groundwater pumpage data and planned water demand for WY 2023 and a subsequent dry year (WY 2024).

3.1 Groundwater Production

Groundwater is the primary source of drinking water within the TVS Subbasin. More than ninety percent (90%) of groundwater produced from the TVS Subbasin is from drinking water wells operated by the District, Tahoe Keys Water Company (TKWC), and Lukins Brothers Water Company (LBWC). Eighty percent (80%) of this amount is from District wells. The remaining balance of groundwater production is pumped from private small water system and domestic wells. Pumpage from the District, TKWC and LBWC is metered using propeller or turbine type flowmeters with a register for total flow and a flow rate indicator. Totalizer readings are recorded daily by the District and monthly by TKWC, and LBWC. These records are compiled annually following the end of the water year for annual update of the STGM. Accuracy of measurement for these flow meters is typically on the order of +/- 2%. Pumpage from private small water system and domestic wells are typically not metered.

Annual District and total groundwater production from metered wells since WY 2001 is shown below in Figure 3-1. District pumpage projected for WY 2023 uses the current monthly groundwater production from October 2022 through May 2023, plus the long-term average (WY2005 - WY2022) monthly groundwater production to estimate June 2023 through September 2023, to complete an estimate for WY2023. Total pumpage for WY 2023 uses the sum of the WY 2023 District monthly groundwater production multiplied by 1.2 to account for pumpage from TKWC, LBWC and private wells. By this method the total pumpage for WY 2023 is projected at 7,331 AF, of which 6,109 AF is extraction from District wells. Total pumpage for WY 2024 uses groundwater production records from WY 2001 to assess groundwater supply for a dry water year (Total = 9,500 AF; STPUD = 8,079 AF).

The sustainable yield for the TVS Subbasin is 13,200 AFY, which is the maximum annual quantity of water that can theoretically be drawn from a groundwater supply without causing an undesirable result (Rybarski, et al, 2022). Figure 3-1 shows that groundwater pumpage within the TVS Subbasin is significantly less than sustainable yield.

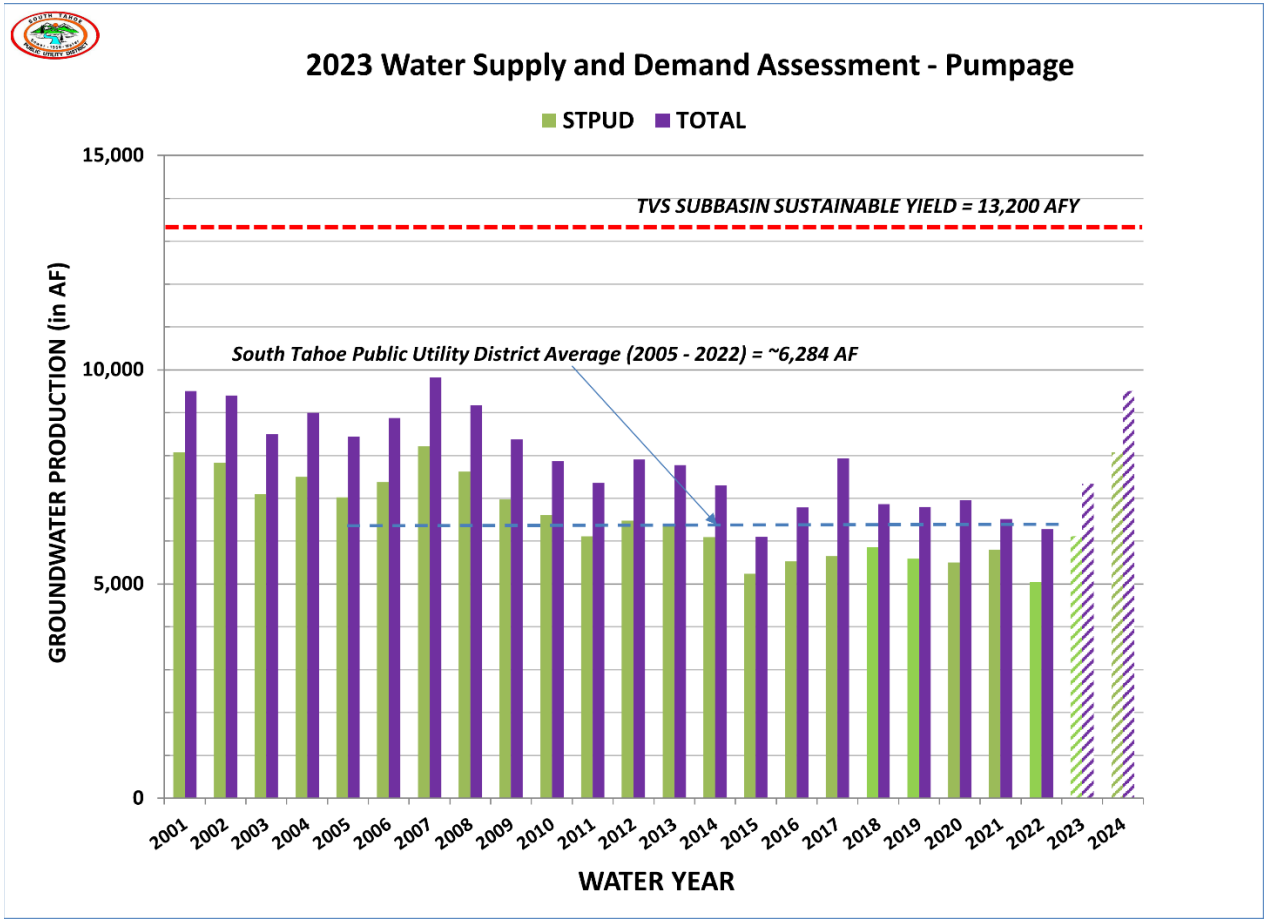

Figure 3-1. Annual groundwater production for South Tahoe Public Utility District (District) wells and total groundwater production including District, Tahoe Keys Water Company, and Lukins Brothers Water Company wells.

4 Water Supply Reliability Assessment

This section uses the water budget calculated by the STGM to assess the available groundwater supply within the TVS Subbasin considering projected changes in precipitation, groundwater recharge, groundwater pumping and changes in groundwater storage.

4.1 Groundwater Supply

When developing the first five-year update of the Alternative Plan (Rybarski et al., 2022), the District updated water budgets derived from the STGM and used the updated water budget to assess current year available groundwater supply.

Figure 4-1 shows the available groundwater supply for the TVS Subbasin through the end of WY 2022 (40,207 AF) and projected groundwater supply for WY 2023 (48,108 AF) and WY 2024 (42,849 AF). The annual change of groundwater in storage is the difference in the volume of water in an aquifer from one year to the next. Figure 4-1 shows the annual trends of total groundwater production from the TVS Subbasin and the changes of groundwater in storage, as derived from the annual water budget calculated by the STGM (WY 2001 through WY 2022). The main components of the water budget include groundwater recharge; groundwater discharge to streams (baseflow); groundwater flux to Lake Tahoe; and groundwater pumping. Changes of groundwater in storage for the TVS Subbasin (Zone 10) are calculated from the differences in total inflow (MBR, areal recharge, inflow from Lake Tahoe, Storage) and total outflows (pumping, baseflow to streams, outflow to Lake Tahoe and Storage) (Rybarski, et al., 2022).

Available groundwater supply is calculated as the difference between the volume of groundwater in storage and the minimum threshold for reductions of groundwater in storage for the TVS Subbasin (-32,050 AF relative to WY 2005). This reduction of groundwater in storage corresponds to a seven (7) foot basin-wide decline in groundwater levels compared to WY 2005. A basin-wide reduction of groundwater levels of this magnitude would require the District to reduce pumping rates to prevent water levels from dropping below the top of District well screens, thereby inhibiting the District's ability to ensure a sustainable groundwater supply. Basin-wide groundwater level declines of this magnitude are not expected during interannual climate variations but may be expected during an extended long-term drought (Rybarski et al., 2022) This is a conservative estimate, as the change of groundwater in storage accounts for groundwater production from confirmed active public and private water wells operating within the TVS Subbasin. Under the reporting requirements for the AWSDA, only groundwater production from water wells serving the District's water system needs to be counted.

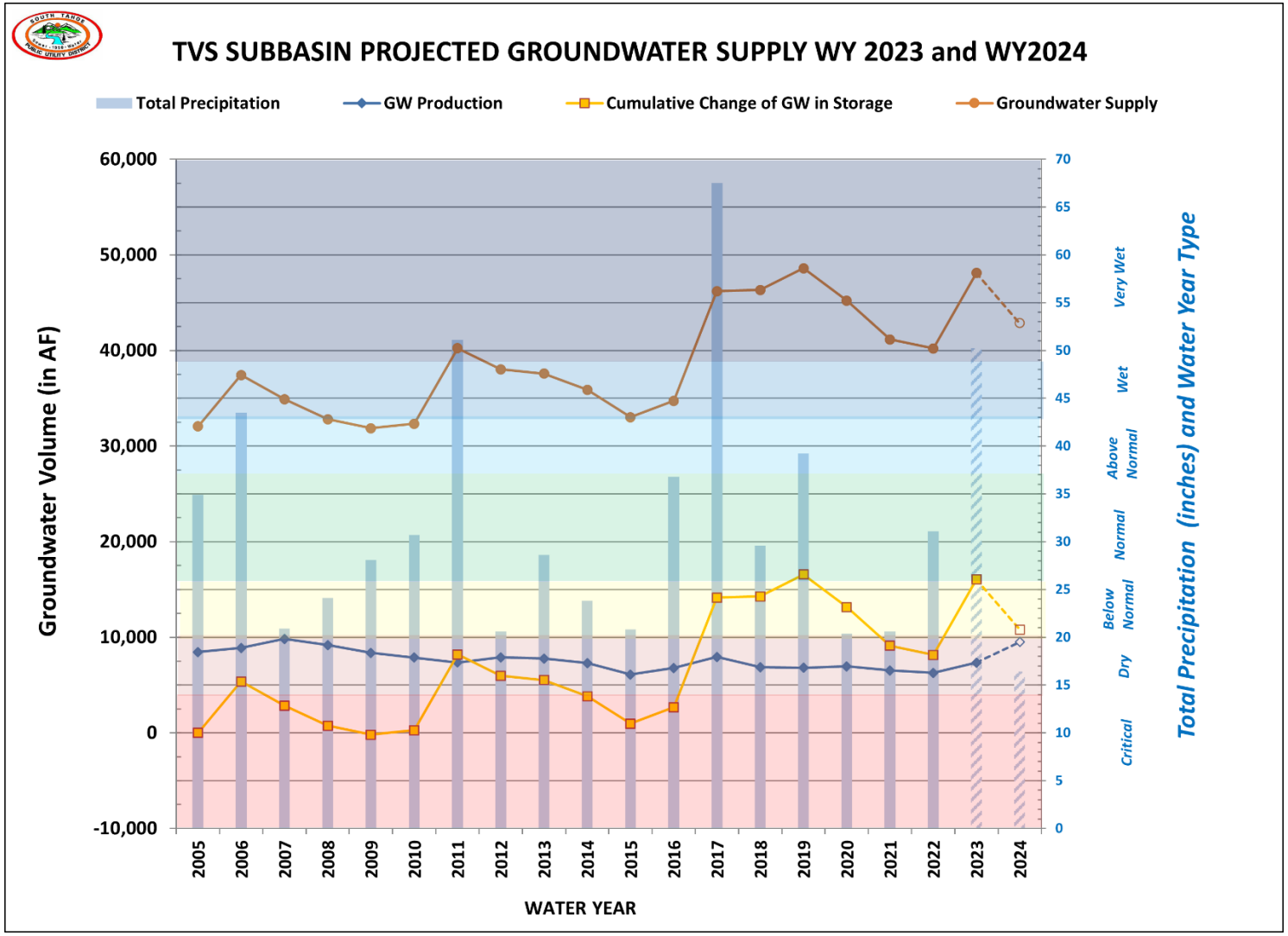

Figure 4-1. Available groundwater supply derived from the water budget calculated by the STGM for the TVS Subbasin through WY 2022 and projected for the current WY 2023 and a subsequent dry water year (WY 2024).

4.2 Water System Supplies

The District regularly conducts well and pump performance efficiency tests on its active groundwater sources. Information gathered from this testing program is used to schedule appropriate maintenance to recover lost well and pump efficiency. The Well Efficiency Test consists of a two-hour (120-minute) constant rate pumping test. During the test, the District measures pre-pumping (i.e., static water level) groundwater conditions. Then, during well operation, the District measures pumping water levels, flow rate, discharge line pressure, sand content and field water quality parameters. The average flow rate and drawdown at 120 minutes is used to monitor potential changes in each well's specific capacity and can also be used to monitor the long-term specific capacity for each source. Overall, the District's active groundwater wells are pumping at expected rates, except for the Paloma Well, which was removed from service for well repair. Table 4-1 lists the well capacities for the District's groundwater sources under normal conditions and those wells with stand-by generators that can operate under a regional power outage (RPO).

The maximum daily demand (MDD) for the District water system is calculated every five years, using the month with the highest water usage over the preceding 10 years. The MDD most recently calculated using WY 2011 – WY 2020 is 9.86 million gallons per day (MGD), equivalent to 6,849 gallons per minute (gpm) or 11,047 acre-feet per year (AFY) (Rybarski et al, 2022). During development of the Water Shortage Contingency Plan (WSCP) in 2020, shortages up to 50% of the total source capacity for the water system were compared to the District's monthly water production over the preceding 30 years (Kennedy Jenks, 2021). Comparison of these values indicates that the District would likely experience water shortage conditions under the following scenarios:

- A water shortage in a neighboring water system could result in an emergency condition requiring the District to provide emergency water through inter-tie(s) under a mutual aid agreement. Under below normal water year or dry water years, unexpected delivery of emergency water could possibly trigger a 10%-20% water shortage for the District's system.

- An extended RPO during a maximum demand in summertime would result in a 40%-50% water shortage.

- A wildfire with extended RPO during a maximum demand in summertime would result in >50% water shortage.

Source	Status	Source Capacity (GPM/MGD/AFY)*	Stand-By Generator (Y/N)	Regional Power Outage (GPM/MGD/AFY)	NOTES
Al Tahoe Well #2	Active	2500/3.6/4,000	Y	2500/3.6/4,000	
Arrowhead Well #3	Active	775/1.12/1,250	N		
Bakersfield Well	Active	1450/2.09/2,339	Y	1450/2.09/2,339	
Bayview Well	Active	3600/5.18/5,807	N		Backup power project in planning and design phase.
Elks Club Well #2	Active	500/0.72/807	Y	500/0.72/807	
Glenwood Well #5	Active	1,000/1.44/1,613	Y	1,000/1.44/1,613	
Helen Well #2	Active	240/0.35/387	N		
Paloma Well	Inactive	0/0/0	N		Temporarily out of service for well repair
Sunset Well	Active	650/0.94/1,048	N		
South Upper Truckee Well #3	Active	850 /1.22/1,371	Y	850 /1.22/1,371	
Valhalla Well	Active	600/0.86/968	Y	600/0.86/968	
Active Well Totals		12,165/17.52/19,622		6,903/9.94/11,134	
Airport Well	Stand-By	500/0.72/807	N		Restricted to emergency use
Blackrock Well	Stand-By	90/0.13/145	N		Restricted to emergency use
College Well	Stand-By	1100/1.58/1,774	Y	1100/1.58/1,774	Restricted to emergency use
Stand-By Well Totals		1,690/2.43/2,726		1100/1.58/1,774	
Active + Stand-By Well Totals		13,855/19.95/22,348		8,003/11.52/12,908	

Table 4-1. District water system well source capacities for active and stand-by wells under normal and emergency regional power outage conditions. *The source capacity values included in this table reference the most recent MDD data from 2022, which is calculated every 5 years using the preceding 10 years data.

5 Triggered Actions

As shown in Table 5-1, there is no anticipated water supply deficit under current conditions; therefore, no actions are triggered from the water supply and demand assessment for WY 2023. The District will adhere to Executive Order N-7-22, as amended by Executive Order N-5-23, and any additional restrictions required by the State of California.

Water Year (WY)	Unit	Demand	Supply	Sustainable Yield	Supply Surplus
2023	AF	6,109	48,108	13,200	41,999
2024	AF	8,079	42,849	13,200	34,770

Table 5-1. Projected District water supply and demand comparison.

6 Communication Actions

No actions are triggered since there is no anticipated water supply deficit. The District will adhere to Executive Order N-7-22, as amended by Executive Order N-5-23. and promote water conservation in our service area. The District continues to promote water conservation rebates for turf replacement, water efficient clothes washers, and water efficient toilets; water wise landscape consultations and water wise house calls; designated watering days; and water loss restrictions.

7 References

Kennedy Jenks, 2023. South Tahoe Public Utility District Tahoe Valley South Subbasin (6-005.01) Water Year 2022. March 30, 2023.

Kennedy Jenks, 2021. 2020 Urban Water Management Plan for South Tahoe Public Utility District Final, June 30, 2021.

Rybarski, S., Hausner, M. and Bergsohn, I., 2022. Alternative Plan for Tahoe Valley South Subbasin (6-005.01) first five-year update. April 22, 2022.