2023 Water Supply and Demand Assessment

For the Time Period July 1, 2022, through June 30, 2024

Whale Rock Reservoir and Spillway.

I. INTRODUCTION

California Water Code (***CWC §10632.1.***)[1] directs urban water suppliers (Suppliers) to conduct an Annual Water Supply and Demand Assessment (Water Supply Assessment) for the purpose of (i) evaluating its water supply reliability for the current year and one subsequent dry year and (ii) generating and submitting an Annual Shortage Report by July 1 every year starting July 1, 2022. The procedures for conducting a Water Supply Assessment shall include the following:

> *(A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.*
> *(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:*
> *(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.*
> *(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.*
> *(iii) Existing infrastructure capabilities and plausible constraints.*
> *(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.*
> *(v) A description and quantification of each source of water supply.*

The City's 2023 Water Supply Assessment was prepared in accordance with the *General Plan, Water and Wastewater Management Element*, Policy A5.3.1.[2] The methods for calculating water supply and water demand have been modified to match the reporting requirements of the Water Supply Assessment and are described below.

II. DECISION MAKING PROCESS

The CWC does not specify the type of year the Suppliers should use to do the Water Supply Assessment (Calendar or Fiscal). However, the California Department of Water Resources (DWR) recommends that the one Dry Year begin in July.[3] For this Water Supply Assessment, which will be submitted by July 1, 2023, the Dry Year will therefore cover the twelve months from July 2023 to June 2024. Each subsequent Water Supply Assessment will define the Dry Year period as July 1st of the Water Supply Assessment year through June of the next calendar year. The Current Year for this Water Supply Assessment will cover

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[1] Cal. Water Code §10632.1. can be accessed at:
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10632
[2] The City's *General Plan, Water and Wastewater Element* is available at:
https://www.slocity.org/home/showdocument?id=6649
[3] The State of California's *Water Supply and Demand Assessment Draft Guidance* states *"Characteristic of a dry year is at the discretion of the Supplier, but it should be adequately defined and ideally align with one of the WSCP water shortage levels. The assumed Dry Year conditions are often based on a previous historic dry year, such as the driest year on record. Suppliers presented their defined historic Dry Year in their UWMP Table 7-1. For the purpose of this Guidance, the Dry Year data will be applied over the twelve-month period beginning July 1st (the due date of the current Annual Shortage Report)."*

the twelve months from July 2022 through June 2023. The Current Year and Dry Year periods for this Water Supply Assessment are concurrent with the City's 2022 and 2023 Fiscal Year periods, respectively.

The City utilizes a Water Projection Model to test both hypothetical and actual water demand scenarios and to forecast how long water supplies will sustain the community under specific conditions. The Water Projection Model accounts for the storage in the City's surface water reservoirs, in conjunction with other available resources (i.e., groundwater and recycled water), needed to meet the City's water demand. The model uses historical hydrologic information (rainfall, evaporation, inflow) based on the average for the worst drought period (2012 to 2014). Other data included in the model are:

a. Water entitlement
b. Current reservoir levels/storage
c. Average gallons per capita per day community water demand
d. Rainfall
e. Temperature
f. Evaporation
g. Existing population
h. Estimated population growth

Utilizing the Water Projection Model as part of its water supply management strategy, the City can foresee whether a water supply shortage is anticipated in any given year and the severity of a shortage based on the availability of the City's different sources of supply and water demand trends. The City uses the Water Projection Model to study the potential impacts of various intensities of drought conditions, including increased air temperature and evaporation rates, along with decreased precipitation. Per the City's 2020 Water Shortage Contingency Plan, the Water Supply Assessment will utilize the Water Projection Model to determine current demand, future demand, and any associated water shortages.[4]

Water supply and demand are presented in the units of acre-feet (AF). Annual available supply is determined using existing methods (*General Plan Water and Wastewater Management Element (WWME),* Section 3).[5] Annual demand for the purposes of estimating Current Year and Dry Year demand is determined using a modification of the methods described in the City's method for determining Primary Water Supply (*WWME,* Section 5) as described below. Current Year monthly demand is determined using actual metered data when available; however, for the months when metered data have not been collected, demand is calculated using the methods described in this report.

III. WATER SUPPLY REALIABILITY EVALUATION

Description and Quantification of Each Water Supply Source

Per the *General Plan Water and Wastewater Management Element*, Policy A2.2.1, the City uses multiple water sources to meet its water supply needs.[6] The City has four primary water supply sources: Nacimiento Reservoir, Whale Rock Reservoir, Salinas Reservoir, and recycled water. The City prioritizes using contractual water supply from Nacimiento Reservoir first, with Whale Rock Reservoir and Salinas Reservoir used as needed to meet the City's overall potable water demand, while recycled water is used

[4] The City's *Water Shortage Contingency Plan* is available at:
https://www.slocity.org/home/showpublisheddocument/30334/637575513697770000
[5] The City's *General Plan, Water and Wastewater Element* is available at:
https://www.slocity.org/home/showdocument?id=6649
[6] General Plan, Water and Wastewater Management Element, Program A 2.2.1, states *"The City shall utilize multiple water resources to meet its water supply needs."*

as a non-potable source for irrigation and construction purposes within City limits. A comprehensive upgrade to the City's Water Resource Recovery Facility (WRRF) is currently underway and will increase the volume of recycled water available for use in the future. Additionally, groundwater serves as the City's fifth supplemental water source. Substantial work efforts are being made to better understand the City's groundwater supplies and how they may be fully utilized in the future.

Nacimiento Reservoir

In 1959, the San Luis Obispo Flood Control and Watershed Protection District (San Luis Obispo District) entered into an agreement with Monterey County Flood Control and Water Conservation District (now Monterey County Water Resources Agency) to secure rights to 17,500 AF of water per year (AFY) from Nacimiento Reservoir. Nacimiento Reservoir is located entirely within San Luis Obispo County, California (County), and was built by Monterey County Flood Control and Water Conservation District who continues to control reservoir ownership and operations. Nacimiento Reservoir has a storage capacity of 377,900 AF and serves the purpose of abating seawater intrusion in the groundwater aquifers of the Salinas River Valley, while also providing flood protection and groundwater recharge for the Salinas Valley. Of the San Luis Obispo District's entitlement, 1,750 AFY have been designated for uses around the lake, leaving 15,750 AFY for allocation to other areas within the County of San Luis Obispo. Water is delivered via a 45-mile pipeline from Nacimiento Reservoir to participating agencies and cities.

The "dependable yield" from Nacimiento Reservoir is the contractual amount of water that the City has rights to from Nacimiento Reservoir. The City's original amount contracted for was 3,380 AFY. Engineering studies, environmental impact reports, dependable yield analyses, and preliminary design reports were completed to ensure water needs within the County were met. In 2004, the County requested interested agencies to approve the contractual agreements for participation in the Nacimiento Project. The four initial project participants included the cities of San Luis Obispo and Paso Robles, the Atascadero Mutual Water Company, and the Templeton Community Services District. All of these agencies executed participation agreements with San Luis Obispo County for entitlements of water which totaled 9,630 AF. In 2004, the County Service Area 10A in Cayucos became a project participant securing 25 AFY. On June 29, 2004, the San Luis Obispo City Council authorized participation in the Nacimiento Water Project for the delivery of the original 3,380 AF of water. In 2004, the County Service Area 10A in Cayucos became a project participant (25 AFY).

In March 2016, the City Council approved the addition of 2,102 AFY from Nacimiento Reservoir to the City's water supply. This addition brought the City's total Nacimiento Reservoir allocation to 5,482 AFY. With uncertainty of future climatic conditions, regulation, and aging infrastructure, the additional supply of Nacimiento water to the City's portfolio reduces pressure on the use of water supplies in the Whale Rock and Salinas reservoirs, extending these stored supplies during future critical water shortages.

During the worst-case drought on record in the region (2012 to 2014), Nacimiento Reservoir remained a resilient water supply capable of providing a consistent and reliable source of water for San Luis Obispo County. To confirm the prior analysis with more recent data, the City reviewed rainfall and inflow data from 2013 which was the driest year on record. Over that year, Nacimiento Reservoir received 35,000 acre-feet of inflow. Though this is significantly below the average inflow into the reservoir, the San Luis Obispo District's entitlement could still be met if inflow remained at this level due to the District's primary rights.

High streamflow in the Salinas River corresponding to a large precipitation event on January 9, 2023, exposed and damaged the pipeline that delivers water from Nacimiento Reservoir to the City, disrupting delivery of water to the City. At the date that this report was published, deliveries of water from Nacimiento Reservoir to the City were expected to resume in September 2023. This disruption in delivery

of water from Nacimiento Reservoir is accounted for later in this report and points to the importance of the City having a multi-source supply portfolio.

Whale Rock Reservoir

Whale Rock Reservoir is located on Old Creek Road approximately one-half mile east of the community of Cayucos, California. The project was planned, designed, and constructed under the supervision of the California State Department of Water Resources (DWR). Construction took place between October 1958 and April 1961. The reservoir is jointly owned by the City of San Luis Obispo, the California Men's Colony, and the California Polytechnic State University at San Luis Obispo (Cal Poly). These three agencies form the Whale Rock Commission which is responsible for operation and administration of the reservoir and associated water deliveries. Day-to-day operation is provided by the City.

Whale Rock Reservoir is formed by an earthen dam and had capacity to store an estimated 40,662 AF of water at the time of construction. The dam is 266 feet tall with a crest length of 850 feet and crest width of 30 feet. The top of dam elevation is 232.2 feet. The Reservoir covers an area close to 600 acres. In 2022, the maximum storage capacity is 38,967 AF. The City owns 55.05 percent of the water storage rights at the reservoir (22,364 AF). The remaining water storage rights are apportioned between the two State agencies with Cal Poly owning 33.71 percent and the California Men's Colony owning 11.24 percent. Over the life of the Whale Rock Reservoir and dam, the lake has filled to capacity and the spillway has been used 13 times, most recently spilling in March 2023.

The Whale Rock pipeline is approximately 17 miles long, connecting the reservoir to the member agencies, and terminating at the City's Water Treatment Plant. The design capacity of the pipeline is 18.94 cubic feet per second (approximately 8,500 gallons per minute). The line consists of modified pre-stressed concrete cylinder pipe at most locations. Cement mortar lined steel pipe is used at creek crossings and junctions.

Salinas Reservoir

The Salinas Reservoir (also known as Santa Margarita Lake) is located on the upper Salinas River, approximately nine miles southeast of the community of Santa Margarita. The project was originally built by the War Department to ensure an adequate water supply for Camp San Luis Obispo, as well as the City of San Luis Obispo. The dam and appurtenances were declared surplus by the War Department on April 14, 1947 and the U.S. Army Corps of Engineers assumed responsibility for the facilities. On July 11, 1947, the Corps entered into an agreement with the San Luis Obispo District for the operation and maintenance of the dam and related facilities. The City has an agreement with the Corps for use of the reservoir, as well as a water right permit to divert water from the Salinas River for storage within the reservoir. Salinas Reservoir is formed by a concrete arched dam. Immediately following construction, the

reservoir had an estimated storage capacity of 24,000 AF with a surface area of 793 acres, and a drainage area of 112 square miles.

Safe Annual Yield, or the maximum amount that could be withdrawn each year without drawing the reservoir below its minimum pool constraint, for Whale Rock and Salinas reservoirs was updated in 2018 following the addition of data from the most recent drought that ended in 2016 and analysis of three independent climate change models by the U.S. Environmental Protection Agency (EPA), San Luis Obispo Council of Governments (SLOCOG) as part of the 2014 Regional Transportation Plan, and Nature Communications. As a result of siltation since the original construction, the reservoir capacity has been reduced and accounted for in the Safe Annual Yield for Whale Rock and Salinas reservoirs.

Water is conveyed from Salinas Reservoir through 48,700 feet (9.2 miles) of 24-inch diameter reinforced concrete pipe to a three million gallon regulating reservoir at the Santa Margarita booster pump station near the northerly base of Cuesta Grade adjacent to Highway 101. The pipeline is designed to flow by gravity from the Reservoir to the regulating reservoir when the lake level is above the elevation of 1,267 feet. A booster pump station at the base of the dam, consisting of two horizontal centrifugal pumps, is capable of maintaining the rated flow of 12.4 cubic feet per second (approximately 5,565 gallons per minute) when the water surface elevation falls below 1,267 feet.

Accounting for Siltation

Siltation at reservoirs is a natural occurrence that can reduce the storage capacity over long periods. The reduction of available storage reduces the safe annual yield of the reservoirs. Siltation at reservoirs varies depending on factors such as rainfall intensity and watershed management practices. Climate change could have an impact on future water availability in the form of increased siltation in reservoirs resulting from wildland fires which could affect the safe annual yield of the City's reservoirs. Numerous studies and reports addressing siltation at Salinas Reservoir have been completed. The latest study, conducted by the County of San Luis Obispo in 1990, indicated that the siltation rate is on the order of 40 AFY.[7]

The Whale Rock Reservoir Bathymetric Survey and Volumetric Study was completed in May 2013. The study concluded that sedimentation has reduced reservoir capacity by 4.2% in 52 years, but this impact, considering 52 years of sedimentation is relatively minimal. The City has policies and programs in the WWME to anticipate the loss of storage at Whale Rock and Salinas Reservoirs. WWME Policy A 4.2.2

[7] A summary of the results of the siltation study done at Salinas Reservoir can be found in the City's *General Plan, Water and Wastewater Element, Section 4* at: https://www.slocity.org/home/showdocument?id=6649

relates to Accounting for Future Siltation.[8] The policy states *"The City will account for estimated safe annual yield losses at Salinas and Whale Rock Reservoirs through 2060 by deducting 500 acre-feet of available water supplies to account for these future losses.*" The siltation rate will be updated as information becomes available from subsequent siltation analyses. Accounting for siltation of reservoirs contributes to the overall reliability of the City's water supply portfolio as it ensures that the City is planning for this occurrence. Siltation at Nacimiento Reservoir does not need to be accounted for in The City's water supply portfolio calculations because the contractual right for San Luis Obispo County agencies is not dependent on reservoir capacity.

Recycled Water

The City's Water Resource Recovery Facility (WRRF) produces over 3,200 AF of disinfected tertiary-treated effluent per year. A minimum of 1,810 AF is discharged to San Luis Obispo Creek annually to provide satisfactory habitat and flow volume for fish species (steelhead trout) within the Creek environment. The balance makes up the City's available recycled water resource which is available for approved uses. A consistent flow of wastewater to the WRRF enables the City to produce a volume of recycled water that exceeds current seasonal demand for landscape irrigation. The distribution and delivery of recycled water is via a pump station located within the WRRF. The pump station does not have backup power during a power outage. However, because power outage events have been infrequent, the City's recycled water supply is considered a reliable, non-potable water supply.

The primary use of recycled water in the City is for landscape irrigation with 75 percent of the City's recycled water demand occurring from May through October. The City began issuing annual construction water permits in July 2009. Permit holders have access to recycled water for dust control and compaction on construction sites in the City. The City has four metered wharf head hydrant filling stations located throughout city limits. During calendar year 2022, 291 AF of recycled water was used for landscape irrigation and construction water. The City has identified a "seasonal surplus" of recycled water available in excess of required discharge to San Luis Obispo Creek (4.96 AF per day as required by the National Oceanic and Atmospheric Association, National Marine Fisheries Service in 2005) for landscape irrigation. As only a limited amount of landscape irrigation takes place from November to April (seasonal off-peak period), more than 4 AF per day of recycled water is available during the seasonal off-peak period. An upgrade of the WRRF is underway, which will accommodate the City's buildout and maximize recycled water production. These upgrades will enable the City to maximize beneficial use of recycled water, including consideration of either direct or indirect potable reuse in the future. Until potable reuse is implemented, the City is focused on expanding the use of recycled water within City limits to help offset potable water use. Per the City's 2017 Recycled Water Master Plan, recycled water use is projected to increase by 10 AF per year.

[8] The City's *General Plan, Water and Wastewater Element* is available at: https://www.slocity.org/home/showdocument?id=6649

Groundwater

Although the City suspended using groundwater for potable purposes in April 2015, the City has maintained its groundwater wells in an operable, stand-by position should the use of groundwater be needed. In July of 2020, the City received a nearly $2 million planning-phase grant, funded through Proposition 1, to study Tetrachloroethylene (PCE) contamination of the groundwater basin. This study aims to provide a more detailed understanding of the extent of PCE contamination and to identify potential remediation options for the City to fully utilize it's groundwater pumping opportunities. The planning phase of the project was completed in 2022 and an additional $5.9 million implementation-phase grant was awarded in 2023. The implementation phase will result in the construction or outfitting of at least two new production wells with treatment systems to provide the City with an additional source of potable water, while simultaneously removing contaminated groundwater from the groundwater basin. Several new monitoring wells planned for installation in the implementation phase will provide an understanding of changing groundwater conditions resulting from renewed groundwater pumping.

In January 2022, the City and the County of San Luis Obispo, acting as Groundwater Sustainability Agencies, submitted a draft of the Groundwater Sustainability Plan (GSP) for the San Luis Obispo Valley Groundwater Basin to the California Department of Water Resources (DWR). The GSP was a result of several years of work conducted to better understand the hydrology of the basin and will be instrumental in guiding sustainable use of groundwater in the basin, including the City's utilization of groundwater as a source of supply. The GSP estimates a groundwater surplus (recharge minus withdraws) of approximately 700 AFY for the portion of the groundwater basin underlying the City.

Assessment Methodology: Locally Applicable Evaluation Criteria

Water supply reliability is the City's ability to meet the water needs of its customers under varying conditions. The City estimates annual Water Supply based on *Water and Wastewater Management Element,* Section 3. The City's fiscal year 2022-2023 water supply that was estimated using this method is shown in Table 1. This method incorporates Safe Annual Yield from Salinas and Whale Rock Reservoirs as determined through the City's Safe Annual Yield Model, the City's contractual amount of water from Nacimiento Reservoir (Dependable Yield), the prior Calendar Year volume of Recycled Water utilized by the City, and reduction in reservoir storage caused by siltation as directed in WWME Policy A 4.2.2. The values shown in Table 1 are preliminary estimates that can change with regulatory variability, climate conditions, and other factors that may affect the City's water supplies and customer water uses.[9] As described in Chapter 6 of the City's 2020 Urban Water Management Plan (UWMP), the City assesses water supply reliability by analyzing the hydrological variability of the City surface water reservoirs (Salinas, Whale Rock, and Nacimiento). This analysis is done using the City's Water Projection model and applies worst-case drought conditions according to guidelines set forth in the UWMP plan documentation.

[9] The City's *2020 Urban Water Management Plan* can be accessed from the California Department of Water Resources, WUEdata Portal at: https://wuedata.water.ca.gov/uwmp_plans.asp?cmd=2020

Table 1: Estimated Fiscal Year 2022-2023 Annual Water Supply

Water Resource	Acre-Feet	Description
Nacimiento Reservoir	5,482	Dependable Yield [1]
Salinas & Whale Rock Reservoirs	4,910	Safe Annual Yield [2]
Recycled Water	291	2022 Annual Usage [3]
Siltation from 2010 to 2060	(500)	WWME Policy A 4.2.2 [4]
	10,183	**Total Availability[5]**

NOTES:

1. Dependable Yield is the contractual amount of water the City has rights to from Nacimiento Reservoir.
2. The City's Safe Annual Yield model was updated in 2018.
3. The quantity of recycled water included (291 AF) is the actual prior year's usage (calendar year 2022) per *General Plan Water and Wastewater Management Element* Policy A 7.2.2.
4. Reservoir siltation is a natural occurrence that reduces storage capacity over long periods, resulting in the reduction of safe annual yield.
5. Preliminary estimate that can change with regulatory variability, climate conditions, and other factors that may affect the City's water supplies and customer water uses.

The City accounts for annual demand, or the water supplies necessary to meet community needs, using the methods detailed in the *General Plan Water and Wastewater Management Element (WWME),* Section 5.[10] The amount of water needed to serve the City's future residential and non-residential water demand is termed the primary water supply. The primary water supply is calculated using the build-out population identified in the General Plan, Land Use Element (2014) and the maximum allowed per capita water use under Senate Bill X7-7, which is 117 gallons per capita per day (GPCD).[11] For this Water Supply Assessment, Current Year population (2022) and Dry Year population (Current Year population plus one percent) are used in lieu of the build-out population when calculating total annual demand. When utilizing the Water Projection Model to estimate future water supply and demand, GPCD decreases in accordance with the 2020 Water Shortage Contingency Plan (WSCP). For example, water demand is calculated using an initial value of 117 GPCD and decreases by ten percent (corresponding to a ten-percent decrease in water use) to 105 GPCD when available supply is less than 5-years of estimated annual demand. This ten percent reduction is in alignment with the demand reduction that the City projects it would achieve from conservation measures outlined in the WSCP.

The annual water supply and demand volumes calculated using the methods described above are converted to monthly volumes for the purposes of this Water Supply Assessment so that potential seasonal water shortages are highlighted. Monthly supply and demand volumes are calculated using average monthly demand as a percent of average annual demand for the seven-year period 2016-2022; the period following the previous drought (2015-2017) and including the most recent drought. These monthly average demand percentages are then applied to the annual supply and demand to provide monthly volumes.

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[10] The City's *General Plan, Water and Wastewater Element* is available at:
https://www.slocity.org/home/showdocument?id=6649

[11] *Senate Bill No. 7 – Water conservation*, is available at:
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920107SB7

Current Year Precipitation and Reservoir Storage

Current Year precipitation in the City is above average, leading to increased reservoir storage volumes (Table 2). Average annual precipitation for the previous ten-year period (2012-2021) at the SLO Reservoir station was 16.23 inches (in.). Precipitation is generally greatest in the winter months, November through April, and can be absent in the summer months, May-September. As of March 31, 2023, the Current Year precipitation is 41.87 inches, with 39.37 inches falling between December 1, 2022 and March 13, 2023. For that same December through March period, reservoir storage volumes increased 268,600 AF in Nacimiento Reservoir, 13,072 AF in Salinas Reservoir, and 11,575 AF in Whale Rock Reservoir[12]. During the extreme precipitation event on January 9, 2023 storage in Salinas Reservoir exceeded 100 percent capacity and water flowed over the spillway. Salinas Reservoir remained above 100 percent capacity through the month of March. The volume of water in Whale Rock Reservoir exceeded 100-percent capacity on March 10, 2023 and water flowed over the spillway.

Table 2: Precipitation Measured at the SLO Reservoir Station[1]

(in inches)

Water Year	Accumulation (in inches)
2012	12.36
2013	8.50
2014	10.51
2015	19.02
2016	35.14
2017	13.08
2018	26.56
2019	15.59
2020	11.54
2021	10.01
2012-2021 Average	16.23
2022 (October-March)	41.87

Notes:

1. Precipitation data measured at the SLO Reservoir – P (749) station can be found at: https://wr.slocountywater.org/site/?site_id=27&view=51a30d03-3991-46af-9d23-7bc0f56a118f.

Current Year Water Supply and Demand Assessment

Analysis of the supply and demand data from the previous year allows for a better understanding of how annual demand is met with the available water supplies. As shown in Table 3, the City's 2021-2022 Fiscal Year demand was 5,263 AF. The per-capita demand, including recycled water, during this period was 99 GPCD. Eighty-five percent (85%) of this demand was supplied by Nacimiento Reservoir, 10% was supplied by Whale Rock and Salinas Reservoirs, and 5% was supplied by recycled water. The volume of water used from Nacimiento Reservoir in Fiscal Year 2022 was greater than any previous year, helping to accomplish the City's strategy to utilize an annually allocated resource to preserve water in Whale Rock and Salinas Reservoirs, which provide long-term storage.

[12] Increases in reservoir storage do not account for inflow to the reservoir that was subsequently released from the reservoir for flood protection or beneficial uses.

Table 3: City Water Supply by Source during the 2021-2022 Fiscal Year[1]
(in acre-feet)

Nacimiento Reservoir	Whale Rock Reservoir [2]	Salinas Reservoir	Recycled Water	Groundwater [3]	Total City Water Demand
4,460	100	426	277	0	5,263
85%	2%	8%	5%	0%	100%

Notes:
1. Values are rounded.
2. Water delivered to Cal Poly State University at San Luis Obispo (Cal Poly) is excluded from the City's water demand, as Cal Poly has its own water storage and water diversion rights in Whale Rock Reservoir.
3. Groundwater was not used for potable purposes during Fiscal Year 2021-2022.

Current Year available water supply is 8,962 AF; 6,498 AF potable water and 2,464 AF non-potable water (Table 4). In the Current Year the City planned to utilize its water sources similarly to Fiscal Year 2021-2022 by prioritizing water from Nacimiento Reservoir to preserve or increase storage volumes in Whale Rock and Salinas Reservoirs. However, the damage to the Nacimiento pipeline, previously detailed in this report, is estimated to prevent the City from using water from Nacimiento from mid-January, 2023 until September, 2023. The City's Current Year water supply (Table 4) summarizes actual supply volumes delivered to the City's distribution system for the period July 2022 through February 2023 and estimated supply volumes for March through June 2023. The estimated potable water supply volumes reflect the absence of Nacimiento Reservoir and the increased utilization of water from Whale Rock and Salinas Reservoirs to meet anticipated demands. Should the actual supply volumes from Whale Rock and Salinas reservoirs match the estimated values, the total volume utilized from those reservoirs would be equal to the safe annual yield. Utilizing a volume less than or equal to the sustainable yield helps to ensure that the reservoirs remain a reliable long-term water supply. The subtraction of 41.67 AF for March through June 2023 represents the City's methods to account for siltation in the reservoirs (500 AFY evenly divided among twelve months) and ensures that the volume of water used from Whale Rock and Salinas Reservoirs is in alignment with the *General Plan Water and Wastewater Management Element (WWME),* Section 5.

The Current Year estimated potable demand is 6,245 AF. This value is the demand calculated using the 2022 population of 47,653 and per-capita daily demand of 117 GPCD.[13] The actual Current Year demand shown in Table 5 (5,603 AF) is lower than the estimated demand because of more efficient water use (93 GPCD calculated using actual data for the period July 2022 through February 2023) and variations in water needs caused by annual climate variations. Therefore, the monthly values estimated in Table 5 are likely conservative estimates of demand that overestimate the actual demand.

[13] Population estimate for the City website at: of San Luis Obispo is from the California Department of Finance website at: www.dof.ca.gov/Forecasting/Demographics/Estimates/e1/

Table 4: Current Year 2022-23 Water Supply, in acre-feet

Potable Water	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Nacimiento Reservoir	395	311	369	395	306	275	46	0	0*	0*	0*	0*	2,097
Salinas and Whale Rock Reservoirs	79	164	78	54	70	125	296	354	793*	816*	854*	885*	4,568
Groundwater	0	0	0	0	0	0	0	0	0	0	0	0	0
Siltation from 2010 to 2060	-	-	-	-	-	-	-	-	(41.67)	(41.67)	(41.67)	(41.67)	(167)
Total by Month (Potable)	**474**	**475**	**447**	**449**	**376**	**400**	**342**	**354**	**751***	**774***	**812***	**843***	**6,498**

Non-Potable	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Recycled Water for non-potable use	36	39	30	27	13	6	3	4	10*	18*	33*	39*	258
Recycled Water available for use	87	87	124	162	137	229	527	272	224*	165*	114*	78*	2,206
Total by Month (non-potable)	**123**	**126**	**154**	**189**	**150**	**235**	**530**	**276**	**234***	**183***	**147***	**117***	**2,464**

Notes:

1. * Denotes estimated values.
2. Values are estimated assuming an annual potable water supply of 7,608 acre-feet.
3. Values are estimated assuming an annual non-potable water supply of 1,917 acre-feet.

Table 5: Current Year 2022-23 Water Supply and Demand, in acre-feet

Potable Water	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Unconstrained Demand	474	474	446	448	375	400	343	351	478*	561*	610*	643*	5,603
Total Water Supply[2]	474	474	447	449	376	400	343	354	832*	857*	899*	934*	6,839
Surplus/Shortage	0	0	0	1	1	0	0	3	354	296	289	291	1,236
% Surplus/Shortage	0%	0%	0%	0%	0%	0%	0%	1%	74%	53%	47%	45%	22%
State Standard Shortage Level	0	0	0	0	0	0	0	0	0	0	0	0	0

Non-Potable	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Unconstrained Demand	36	39	30	27	13	6	3	4	10*	18*	33*	39*	258
Total Water Supply[3]	87	87	124	162	137	229	527	272	224*	165*	114*	78*	2,206
Surplus/Shortage	51	48	94	135	124	223	524	268	214	147	81	39	1,948
% Surplus/Shortage	142%	123%	313%	500%	954%	3,717%	17,467%	6,700%	2,140%	817%	245%	100%	755%

Notes:

1. * Denotes estimated values.
2. Values are estimated assuming an annual potable water supply of 7,608 acre-feet.
3. Values are estimated assuming an annual non-potable water supply of 1,917 acre-feet.

Thanks to a history of collaboration between the City and its community members, community-wide water conservation has resulted in more efficient water use over the last 15 years. This water conservation ethic is supported by City programs such as the water conservation rebate program, school education program, community outreach program, customer water audits, and the retrofit upon sale program. Additionally, the City is improving the water efficiency of its operations by identifying and repairing leaking infrastructure, annually testing and upgrading water meters, and supplying parks with non-potable recycled water. The City will conduct regular assessments of the water conservation program to ensure the most effective use of City resources to provide the greatest water savings.

Current Year water supply and demand data are shown on a monthly time-step in Table 5. The values demonstrate the seasonal differences in demand and the supplies needed to meet those demands. As demonstrated by a water surplus (supply greater than demand) in each month, the City is not anticipating entering into a water shortage emergency at any point in the Current Year. Monthly potable surpluses range from 289 to 354 AF, or 45% to 74% of monthly demand. This surplus is a result of drought resilient water supply sources and community-wide water conservation efforts. Additionally, the City makes projections of future water demand using a conservative per capita potable water use rate of 117 GPCD which is the City's SB X7-7 target, while actual water use within the community is currently less than 100 GPCD and not anticipated to increase beyond minor year-to-year variations over time. The difference between projected demand and actual demand provides a water supply source that acts as a buffer against unexpected changes in supply or demand.

The Current Year non-potable demand is 258 AF. This represents recycled water used for irrigation and construction purposes and acts to offset potable water use. The Current Year non-potable supply and demand assessment shows large surpluses for every month and a total annual surplus of about 1,948 AF. The total non-potable supply includes the total volume of water treated at the City's WRRF minus 4.9 AF per day creek discharge requirement. The non-potable supply and demand assessment provides insight on seasonal fluctuations in non-potable water supply and will assist the City in determining the ability to meet increases in future demands for irrigation and the volume of water available for potable reuse projects. Large non-potable supply volumes in December 2022, January 2023, and February 2023 are the result of above average precipitation and the resulting increase in influent to WRRF.

Dry Year Water Supply

The City's estimated Dry Year water supply is 10,895 AF (potable supply plus recycled water for non-potable reuse in Table 6). The Dry Year water supply is equivalent to the Fiscal Year 2022-2023 supply, and reflects a return to normal operations, namely restoration of water supply from Nacimiento Reservoir once repairs are scheduled for completion in September 2023. The City is confident including the full dependable yield from Nacimiento Reservoir in the Dry Year water supply budget because, as mentioned previously in this report, studies and recent drought-period data show that even during extended periods of below average rainfall inflows to Nacimiento Reservoir are sufficient to meet the Citys annual entitlement. The City's potable and non-potable water supplies are shown on a monthly time-step in Table 6.

Table 6: Dry Year 2023-24 Water Supply, in acre-feet

Water Supply Source	Additional Detail on Water Supply	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total Annual Water Supply
Nacimiento Reservoir	From dependable yield	0	0	521	501	447	371	346	410	467	481	503	522	4,569
Salinas and Whale Rock Reservoirs	From safe annual yield	944	1,001	338	325	290	241	224	266	303	312	327	339	4,910
Groundwater	Supplier-produced	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	Decrease in available supply from siltation in reservoirs	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(41.7)	(500)
Total Potable		**902.3**	**959.3**	**817.3**	**784.3**	**695.3**	**570.3**	**528.3**	**634.3**	**728.3**	**751.3**	**788.3**	**819.3**	**8,979**
Recycled Water for non-potable reuse	For irrigation and construction uses	43	42	36	31	20	10	5	10	10	18	35	40	300
Recycled Water available for use	Produced by the WRRF that is not allocated for non-potable reuse or creek discharge requirements	50	52	92	128	110	151	249	205	224	165	113	77	1,616
Total Non-Potable		**93**	**94**	**128**	**159**	**130**	**161**	**254**	**215**	**234**	**183**	**148**	**117**	**1,916**

Dry Year Unconstrained Demand

The Dry Year estimated potable demand is 6,937 AF (Table 7). This value is the sum of the metered demand (calculated using the estimated 2023 population of 48,130 and per-capita daily demand of 117 GPCD) and water loss (estimated as 10% of monthly metered demand). As was seen in the Current Year demand shown in Table 5, actual Dry Year demand will likely be lower than the estimated demand because of more efficient water use and variations in water needs caused by annual climate variations.

Most of the City's potable demand is for single-family residential use (42%), followed by muti-family residential (19%), and commercial (19%). Demands for industrial, institutional, and dedicated landscape are each below ten percent of the total annual demand. Single-family and multi-family residential demands are greatest during the period May through October when precipitation is generally low. This suggests that residential demand is driven by outdoor irrigation and the increased demand for irrigation during dry periods. Non-potable water is estimated to offset about 340 AF of potable demand during the Dry Year.

Existing Infrastructure Capabilities and Plausible Constraints

The utilization of water from three separate reservoirs provides the City with operational flexibility to meet water demands while maintaining optimal storage volumes in each reservoir; however environmental factors can inhibit reservoir storage or prevent utilization of stored water by degrading water quality. While inflow to Nacimiento has proven to be sufficient during the worst drought in recent history, it is conceivable that in the most extreme drought, when precipitation is near zero, that inflow is less than the City's contractual amount. The City has not typically experienced significant water quality issues with water stored in its reservoirs, but extreme heat and low reservoir levels associated with drought conditions are ideal conditions for biological processes that can impair water quality, including growth of algae, which can lead to secondary water quality complaints related to taste and odor. The City's water treatment plant is capable of producing water that meets all state and federal standards, even as water quality is deteriorated by ongoing drought.

Currently the City satisfies demand without utilizing the full dependable yield from Nacimiento Reservoir because pipeline capacity constraints and treatment operation only allow for the delivery and treatment of approximately 4,500 AFY. Projects are being developed to allow for the full utilization of dependable yield from Nacimiento Reservoir in preparation for future periods when demands require the full available water supply. Should the City need to utilize its full entitlement to Nacimiento for any reason, it could modify plant operation to accommodate this need. Because the City relies primarily on water supplied by its reservoirs, disruptions in delivery of water from a reservoir could be caused by damage to existing infrastructure. While temporary disruptions in water supply availability can be mitigated through utilization of water from the other available reservoirs, prolonged disruptions could result in water shortages.

The City is expanding its groundwater program and considering potable reuse of recycled water to provide water supply redundancy and increased operational flexibility in extreme drought scenarios and during disruptions in delivery of water from reservoirs. Additionally, the City produces recycled water that can be used to offset potable demand and during disruptions of water supply. To further increase potable demand offset, recycled water use could be temporarily expanded to meet irrigation needs beyond the current scope. Ultimately the City proactively pursues projects that help gain a better understanding of potential issues that may threaten its water supply and how to mitigate them.

Table 7: Dry Year 2023-24 Unconstrained Demand, in acre-feet

Water Use	Projected Monthly Water Demand[1]												Total Annual Demand
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Demands Served by Potable Supplies													
Single Family	273	288	275	272	235	204	204	198	203	243	265	275	2,935
Multi-Family	104	110	115	120	107	100	108	100	102	111	111	108	1,296
Commercial	123	126	116	118	106	105	104	98	101	107	109	121	1,334
Industrial	19	20	18	17	12	10	9	9	9	13	15	18	169
Institutional/Government	5	5	5	5	4	4	4	4	4	4	4	5	53
Landscape	67	70	62	54	37	20	13	21	20	37	55	63	519
Water Loss	59	62	59	59	50	44	44	43	44	52	56	59	631
Total by Month (Potable)	**650**	**681**	**650**	**645**	**551**	**487**	**486**	**473**	**483**	**567**	**615**	**649**	**6,937**
Demands Served by Non-Potable Supplies[2]													
Landscape	39	39	32	25	15	7	5	9	9	20	34	39	273
Golf Course Irrigation	5	7	4	3	1	1	0	1	1	3	4	6	36
Construction	4	4	3	4	3	1	1	2	1	2	3	5	33
Total by Month (Non-Potable)	**48**	**50**	**39**	**32**	**19**	**9**	**6**	**12**	**11**	**25**	**41**	**50**	**342**

Notes:

1. Estimated values.
2. Non-potable water treated to tertiary level.

IV. SUPPLY AND DEMAND ANALYSIS

Using the Water Projection Model described above, the City has more than ten years of water available under a drought scenario with current water supply and demand conditions. Analysis of supply and demand data at a monthly timescale shows that the City has ample supply to meet monthly demands for the Current Year and a subsequent Dry Year (Table 8). This is why the City does not expect to enter a water shortage emergency in any month during the Current Year and following hypothetical Dry Year. Monthly potable surpluses range from 54 to 263 AF, or 11% to 54% of monthly demand. Annually, the City is expecting to have a potable water supply surplus of about 2,037 AF (29% of annual demand).

This analysis provides valuable insight on the primary uses of water in the City and also highlights periods when disruptions in delivery of water from one or more of the City's reservoirs would be most impactful to the City's ability to meet demand. Monthly demands show that water supply is used primarily to meet residential demands. Additionally, monthly demands show the seasonal variation associated with the need for more water in the hot, dry summer months and the need for less water during the cool, wet winter months. Ultimately, the data show that water use within the City is driven by residential use during the dry, summer months, likely in response to outdoor irrigation needs. Because of this, water conservation programs that target reduction in outdoor irrigation may provide the greatest water savings.

The supply and demand analysis assumes reliable delivery of available water supplies during drought conditions similar to those experienced in recent history. More extreme drought conditions may present issues that decrease the volume of available water in storage or degrade the quality of water in storage. Available water supply may also be less than estimated because of disruptions in the delivery of available water supplies, whether temporarily caused by minor issues or prolonged disruptions caused by catastrophic events.

V. PLANNED SHORTAGE RESPONSE ACTIONS

The City does not plan to implement a water shortage response in the Current Year or following Dry Year; however, the City's Water Shortage Contingency Plan (WSCP) provides a framework for responding to water shortages when necessary.[14] The City's water shortage response is dependent on the ability to temporarily augment supply and/or reduce water demand. The goals of the WSCP are to extend the City's available water resources long enough to gain another winter rainfall period which could serve to add to reservoir storage. Extending available water resources through water demand reductions provides time for the City to bring on supplemental water supplies to meet demand. The City's water shortage response would combine a variety of strategies including outreach, indoor water efficiency regulations, and outdoor irrigation restrictions, each increasing in intensity as the shortage persists and the City's water supplies are further restricted. If necessary, implementation of these restrictions is critical to conserve the City's water supply for the greatest public benefit regarding domestic use, sanitation, and fire protection.

[14] The City's *Water Shortage Contingency Plan* is available at:
https://www.slocity.org/home/showpublisheddocument/30334/637575513697770000

Table 8: Dry Year 2023-24 Water Supply and Demand, in acre-feet

Potable Water	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Anticipated Unconstrained Demand	650	682	649	645	551	487	488	473	483	567	616	650	6,941
Anticipated Total Water Supply	819	871	837	803	713	584	542	649	746	769	807	838	8,978
Surplus/Shortage	169	189	188	158	162	97	54	176	263	202	191	188	2,037
% Surplus/Shortage	26%	28%	29%	24%	29%	20%	11%	37%	54%	36%	31%	29%	29%
State Standard Shortage Level	0	0	0	0	0	0	0	0	0	0	0	0	0

Non-Potable Water	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Anticipated Unconstrained Demand	49	50	39	31	19	9	6	12	10	24	41	50	340
Anticipated Total Water Supply	93	94	128	159	130	161	255	216	234	183	148	117	1,918
Surplus/Shortage	44	44	89	128	111	152	249	204	224	159	107	67	1,578
% Surplus/Shortage	90%	88%	228%	413%	584%	1,689%	4,150%	1,700%	2,240%	663%	261%	134%	464%

The City reads water meters monthly to ensure water consumption data is collected for tracking and analysis, as well as meeting state reporting requirements. Monitoring and reporting water use metrics are fundamental to water supply planning and management. Monitoring is essential in evaluating the effectiveness of expected response actions and identifying the need for new actions. While compliance tracking helps to ensure the effectiveness of enforcement programs. To monitor the functionality of the WSCP and ensure effectiveness, staff will track community response to water demand reduction measures, public outreach, enforcement, and other administrative actions at each water shortage response stage. This will include a review of monthly water consumption data for each customer class and evaluation of associated revenue and expenditure impacts. Based on these analyses, staff will recommend program refinements to the City Council as water shortage stages progress.

VI. SUMMARY

Based on the findings from this Water Supply Assessment, the City does not expect to enter a water shortage emergency and will not need to implement water shortage response actions between July 1, 2023 and June 30, 2024. In fact, the Water Supply Assessment shows that the City will have a water supply surplus on an annual and monthly timestep. The City will continue to monitor its supply and demand using its Water Projection Model to ensure that any water shortage emergencies may be identified well in advance so that programmatic and operational changes can be made to mitigate their effects. Finally, this Water Supply Assessment assumes reliable delivery of available water supplies during drought conditions similar to those experienced in recent history. Decreases in water availability caused by extreme drought conditions or disruptions in the delivery of available water supplies may create unexpected water shortage emergencies. If such water shortage emergencies arise, the City is prepared to implement its WSCP to extend the City's available water resources long enough to gain additional winter rainfall periods which could serve to add to reservoir storage or to bring on supplemental water supplies to meet demand.

In summary, the City maintains a robust water supply portfolio that can meet current and future demands, including during dry periods. To plan for potential future dry years, the City has secured a multi-source supply that provides reliability and operational flexibility. The City's estimates of water supply and demand account for both current and future build-out demands to ensure adequate water supply, and the use of conservative estimates provides a buffer that reduces the potential for water shortages even during unexpected disruptions in water supply or greater than expected increases in demand. This buffer is in part to the long-standing history of water conservation by the City and its community members, making water conservation a reliable component of the City's water shortage mitigation strategy. Additionally, the City is working to expand the use of recycled water within its limits to offset additional potable water use and to develop groundwater and potable reuse programs to provide supplementary sources of potable water supply that provide further operational flexibility during disruptions in water deliveries from reservoirs.