City of Calistoga General Plan

Infrastructure Element

2020 Update

As recommended by Planning Commission Res. 2020-1

and Modified and Approved by the City Council

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7 INFRASTRUCTURE ELEMENT

The Infrastructure Element provides information and policy guidance related to utility infrastructure available in Calistoga and its Planning Area.

State law does not require a General Plan Element covering the following topics, however it does require the Land Use Element to include "the proposed general distribution and general location and extent of the uses of the land for...solid and liquid waste disposal facilities..."[1] and it requires the Circulation Element to include information on "the general location and extent of existing and proposed...public utilities and facilities."[2] This information is included in this Infrastructure Element, which covers the following topics:

- Water Supply and Service
- Wastewater Collection and Treatment
- Stormwater Collection and Discharge

I. WATER SUPPLY AND SERVICE

A. Background Information

Municipal Water Supply and Service

The City's municipal water system includes facilities and infrastructure for the collection, treatment, storage, and distribution of water to its customers. The City provides water service within its city limits and to several unincorporated properties located within the Planning Area of the General Plan (Figure I-1). The major type of user receiving municipal water is residential; no water is used for agricultural irrigation purposes.

A total of 1,594 "customers" receive water service, 83 of which are located outside the city limits. "Customers" are defined as the number of utility billing accounts and do not take into consideration multiple users on individual accounts. For example, there are 4 accounts for the mobile home parks that provide water to 555 mobile homes.

Calistoga Municipal Code §13.16.040(C) prohibits additional properties located outside of Calistoga's city limits from connecting to the City's water system in a manner that would increase consumption of municipal water capacity.

Funding for City water service is provided through fees charged to customers to cover the cost of service. The City also receives funding through development connection fees, capital grants and contributions.

[1] Government Code Section 65302(a).
[2] Government Code Section 65302(b).

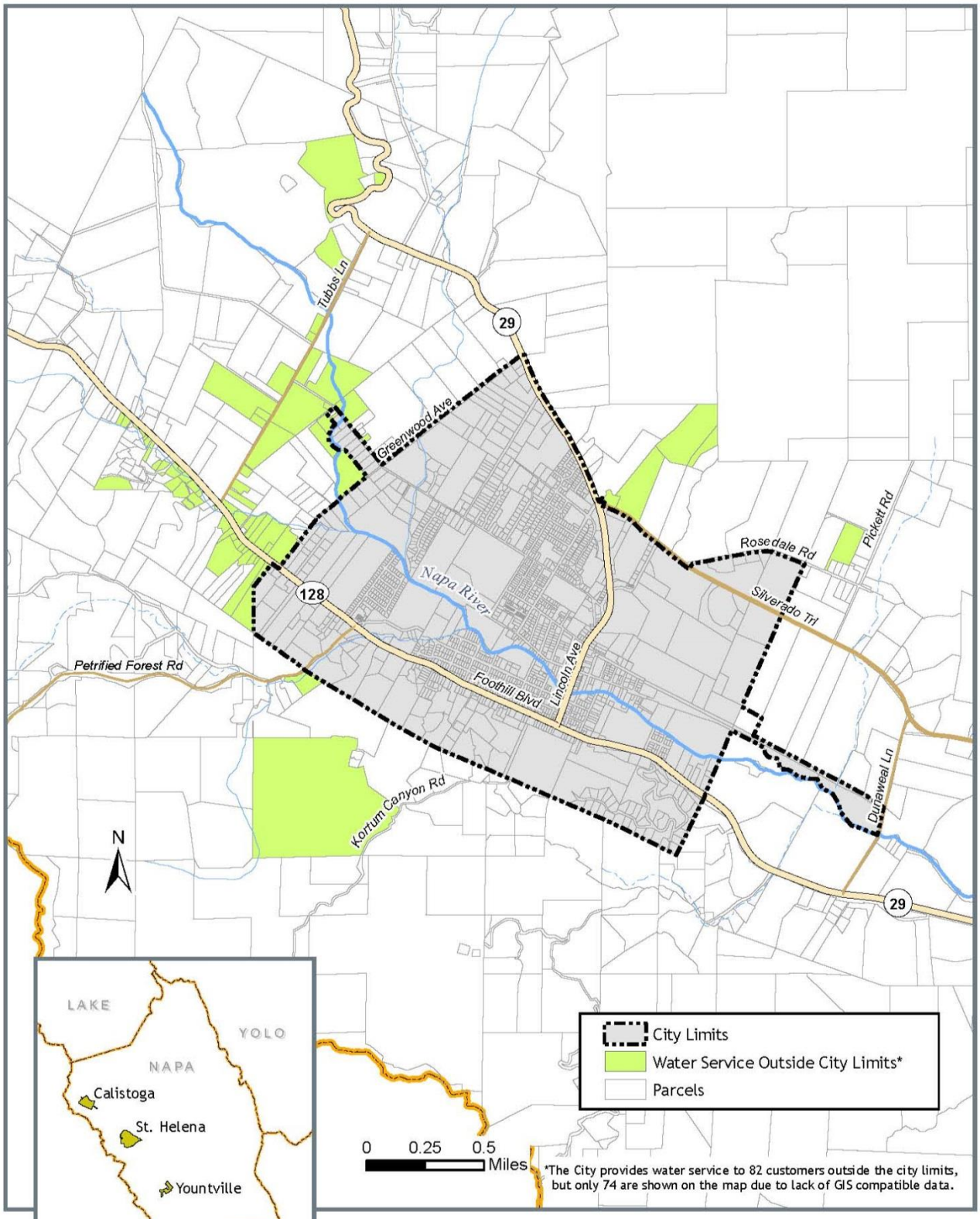


Figure I-1: Parcels Outside City Limits Receiving City Water

City of Calistoga

Although Calistoga is not required to have an urban water management plan, the City participates in the Bay Area Integrated Regional Water Management Plan.

Municipal Water Supply

Calistoga obtains its public water supply from two major sources: the California State Water Project (SWP) and Kimball Reservoir.

State Water Project

The City purchases water via a contract from the SWP. The SWP is managed by the California Department of Water Resources (DWR), and collects, stores and distributes water from rivers in Northern California.

Calistoga's maximum SWP entitlement is 1,925 acre-feet per year (afy) and includes:

- Original agreement of 500-acre feet through the year 2035
- Water transfer/purchase with American Canyon for 500 acre-feet
- Water transfer/purchase with Kern County for 925 acre-feet

Drought, increased statewide water demand, and Sacramento Delta issues affect the reliability of this water source. The City's SWP allocation varies annually and has averaged 53.2% of its total entitlement over the past 10 years. The City therefore actively manages its water supply, including carryover water, to ensure that annual demands are met, including during critically dry years.

Physical access to the SWP is provided via the North Bay Aqueduct (NBA), a series of underground pipelines totaling 27.4 miles (44.1 km) that serve Napa and Solano Counties. The SWP has rights to water originating from the Sacramento River, which it stores in Lake Oroville. Since the NBA is not able to deliver the full 175 cubic feet per second (cfs) flow it was designed and contracted for, DWR and the NBA users are investigating methods to increase its capacity through the proposed North Bay Aqueduct Alternate Intake Project. Calistoga is expected to pay its fair share for the costs of this project through various agreements.

Since Calistoga does not have a direct connection to the NBA, it entered into a 1982 agreement with the Napa County Flood Control and Water Conservation District, and the City of Napa. Napa treats the water from SWP at its Jamison Canyon water treatment plant and transmits it through an interconnected pipeline to Calistoga. This pipeline interconnection is sized such that flow is limited to approximately 0.9 million gallons per day (gpd).

The City is working with the cities of Napa and St. Helena to replace the Dwyer Road Pump Station, which is an integral part of the NBA delivery system. Replacement would boost the pressure in the existing system to improve the reliability and consistency of water delivery to customers.

Kimball Reservoir

Kimball Reservoir is a local water supply that accounts for 13 percent of the City's total available water supply and satisfies approximately 40 percent of annual demand. The reservoir is located northeast of Calistoga in unincorporated county area, and was created in 1940 through the construction of Kimball Dam across Kimball Creek, a tributary of the Napa River. The dam was raised in 1948 to increase the reservoir's storage capacity. It is an earthen-filled structure, approximately 300 feet long, 200 feet wide at the base and about 75 feet tall. The spillway crest elevation is 575 feet.

Since its construction, the reservoir's original storage capacity of 409 acre-feet has been reduced to 330 acre-feet (with all flash boards installed) due to the gradual buildup of sediment behind the dam.

Kimball Reservoir is subject to state-mandated bypass requirements to support fish and other environmental resources in Kimball Creek. With adoption of the Kimball Interim Bypass Plan (2011), the reservoir's supply yield was reduced to 295 afy. Water from the reservoir is treated at the adjacent Kimball Water Treatment Plant, which has a daily treatment capacity of 350,000 gallons per day.

The water system and plant are inspected annually by the State Water Resources Control Board. The City is in the process of replacing and rehabilitating aging infrastructure at Kimball Reservoir, including an intake tower, a 24-inch reservoir drain valve and conveyance piping.

Wastewater Recycling

In addition to the fresh water supplies described above, Calistoga provides water to some of its customers through the recycling of wastewater produced at the Dunaweal Wastewater Treatment Plant. By re-using recycled water, Calistoga reduces treated effluent discharged to the Napa River and provides a valuable resource as a substitute for potable water for landscape irrigation. Refer to the Wastewater section for further information about the City's wastewater recycling program.

Municipal Water Consumption and Availability

Historic Water Consumption

Between 1994 and 2018, the City saw a reduction in water consumption of approximately 33% from an annual demand of 924 acre feet to approximately 621 acre feet. This reduction can be attributed to a number of factors, including an increase in recycled wastewater for irrigation, the retrofitting of residences and businesses with more-efficient water fixtures, increased rates, and the replacement of high water use landscaping with lower-demand plantings.

Water Conservation

Water conservation can function as a water "source" during droughts.

Beginning in 2013, in response to what ultimately was a four-year drought, the City declared a series of water emergencies that promoted increasingly-proactive conservation measures, such as limiting irrigation to early morning hours and prohibiting it entirely 48 hours after measurable rainfall; implementing an odd/even address watering schedule; prohibiting the use of potable municipal water for the filling of pools and spas, or for dust control or compaction at construction sites; requiring commercial, residential and industrial customer using one million gallons of potable water or more per year to conduct a water audit and prepare a water conservation plan; prohibiting the service of water to restaurant customers except upon request; and encouraging guest accommodations to change bed linens and towels only upon a request by the guest.

The City applied for and received grants to fund rebates for water fixture and landscaping replacement, conduct student educational outreach programs, and hold water conservation workshops. It also conducted over 60 water assessments and leak detections for residential and commercial customers. The City has adopted the State's Water Efficient Landscape Ordinance, which establishes limits on the amount of water used for irrigation. These efforts resulted in a reduction in potable water usage in 2013 of approximately 14 percent in 2014, 18 percent in 2015 and 18.7 percent in 2016.

In 2017, most of northern California received record rainfall, leading the governor to issue an executive order declaring an end to the drought state of emergency for most counties, including Napa County. The city is currently under a Stage I Water Emergency in order to meet local conservation goals, primarily by following best management practices for irrigation, prohibiting use of potable water for construction projects, providing water to restaurant guests only upon request and encouraging guests at visitor accommodations to promote the reuse of towels.

Municipal Water Availability

Table I-1 shows the available municipal water supply as of July 2019, adjusted for a below-normal supply year and reflecting the range of supply that can occur in the city's water supply. It takes into account allocations for the approved or under-construction projects shown in Appendix A as well as standby allocations (for customers with a water meter which is not in use), paid allocations, development agreements and bottling works unused obligations.

TABLE I-1 **ESTIMATED MUNICIPAL WATER AVAILABILITY** (July 2019)

1	Annual water demand	656 afy
2	Demand management [Line 1 x 10%]	66 afy
3	Adjusted annual demand [Line 1 - Line 2]	590 afy
4	Firm yield supply [Kimball Reservoir + NBA]	1249 - 1288 afy
5	Unused supply [Line 4 – Line 3]	659 - 698 afy
6	Approved development and standby allocations	194 afy
	Range of Available Supply [Line 5 – Line 6]	**465 to 504 afy**

Notes:

1 Calistoga's average water demand 2014–2018, as measured by the Napa & Kimball meters

2 Assumes 10% reduction through voluntary conservation during a below normal year

3 Maximum demand minus demand management

4 a. Kimball Reservoir supply is 328 afy[3]. With adoption of the Kimball Interim Bypass Plan (2011), Kimball Reservoir's supply yield is reduced by 41 afy[4] to 287 afy.

b. The North Bay Aqueduct (NBA) sources include 500 afy of original NBA, 925 afy of Kern County water, and 500 afy of American Canyon-purchased water for a total of 1,925 afy. A firm yield of 52% delivery can be expected[5] which equals a firm yield of 1,001 afy.

c. Alternately, the average NBA water allocation from the State Water Project for the past 10 years has been 52% (1001 afy). The average NBA water allocation from the State Water Project for the past five years has been 50% (962 afy). The 2019 allocation is 85% (1,636 afy).

5 Estimated current supply available before standby and other obligations are subtracted.

6 Standby and allocations (rounded):

Standby (customers with meter but no use)	30.28 afy
Paid allocations and development agreements	77.74 afy
Bottling works unused obligations	86.28 afy
Total	194.30 afy

[3] Per December 2013 reservoir survey

[4] Kimball Interim Bypass Plan, Appendix 34

[5] Water Facilities Plan, Section 2.2.4, Summit Engineering, May 2000

In 2016, the City submitted a report to the Division of Drinking Water, State Water Resources Control Board outlining the City's water supply and availability. The State found that, "The Water Availability Report does meet the requirements of the required Source Capacity Planning Study and will be used to fulfill this requirement."

Future Municipal Water Demand and Supply

Potential municipal water demand through 2035 (in addition to the demand noted in Table I-1) is shown in Table I-2. The additional demand reflects the following potential development between 2020 and 2035 that was included in the 2014 development impact fee study, updated to reflect development that has occurred since then[6].

TABLE I-2 **POTENTIAL DEVELOPMENT BY 2035**

Single-family units	62
Multi-family units	140
Accessory dwelling units	15
Transient lodging units	155
Commercial square feet	173,000
Restaurant square feet	5,000
Winery	1

As can be seen in Table I-3, there is sufficient water supply to accommodate current and potential demand through 2035.

TABLE I-3 **EXISTING AND PROJECTED WATER DEMAND AND SUPPLY** (afy)

	2020		**2035**	
	Demand + Standby + Allocations[1]	**Remaining Supply**	Total Demand[2]	**Remaining Supply**
Normal year	850	**399 – 438**	953	**296 – 335**
Below normal year (90%)	784	**465 – 504**	887	**362 – 401**

[1] Sum of Lines 1 & 6 from Table I-1

[2] 2020 demand from Table I-1 + projected additional demand from Table I-2

Future additional water supply sources/projects may include expansion of the recycled water program, construction of wells with wellhead treatment down valley, banking water from the SWP, improve pump supply of SWP source, and/or increased water use efficiency.

Municipal Water Quality

The City of Calistoga is compliant in meeting the California State Water Resource Control Board Division

[6] Economic & Planning Systems, Inc. and W-Trans, *City of Calistoga Development Impact Fee Study*, September 2014; updated by City staff November 1, 2019.

of Drinking Water (DDW) current drinking water standards. These standards are made up of the Primary and Secondary Drinking Water Regulations. The Primary Standards set levels of contaminants that may pose a health risk when present in drinking water supplies and are known or anticipated to occur in public water systems. The Secondary Standards are non-enforceable guidelines that establish recommendations for mainly aesthetic effects such as taste, odor and color.

The City performs daily monitoring and routine laboratory analysis of water samples to ensure that primary standards are met and a safe and healthy water supply is delivered to customers. Operations staff also reports and addresses secondary water complaints, and provides testing and flushing to ensure the best water quality is delivered to customers. Under state law, all public water systems are required to send monthly and annual water monitoring reports to the DDW. These documents ensure compliance with all applicable rules and regulations associated with domestic drinking water. In addition, the regulations direct public water systems to provide an annual Consumer Confidence Report (CCR) to all water customers and is. Because Calistoga also buys water from the City of Napa, access to their CCR information is also provided.

Disinfection byproducts

The City continues to work towards reducing trihalomethanes (THM) and haloacetic acid disinfection byproducts below DDW regulations. The City has installed THM-removal equipment on its two storage tanks and has conducted a study on further water quality improvements specific to reducing these constituents. Future capital improvements are being identified, and will be programmed and budgeted for in order to continue a reduction of these constituents.

Backflow prevention

In addition to protecting its water quality and distribution system, Calistoga has a backflow prevention program and recently completed a cross-connection control survey of all of its customers. Multi-family and commercial customers, as well as properties that have private wells, elevated storage tanks, reservoirs, swimming pools, spas or fire sprinklers are required to install a backflow prevention device. Once installed, the City requires annual testing of the device annually to ensure proper operation.

Polybutylene

Polybutylene is a form of plastic resin that was used extensively in the manufacture of water service/lateral piping from 1978 until 1995. Polybutylene piping was used for underground water laterals in some city neighborhoods. It is believed that oxidants in the public water supplies, such as chlorine, react with the polybutylene piping and acetal fittings causing them to scale and flake and become brittle. Micro-fractures result and the basic structural integrity of the system is reduced. Thus, the system becomes weak and may fail without warning. The City has replaced this piping in several neighborhoods and will replace more in the future.

Municipal Storage and Distribution Facilities

The City must provide adequate water storage to meet the daily demand of customers, satisfy peak demands plus minimum fire flow rates, and provide emergency reserve in the event of an interruption in supply or transmission of potable water.

In addition to Kimball Reservoir, the City's water storage facilities include three tanks:

- The 1.5 million-gallon Mt. Washington storage tank, which has water quality improvements that include a THM-removal system, chlorination dosing and recirculation/mixing.
- The recently-replaced 1 million-gallon Feige storage tank, which has water quality improvements that include a THM-removal system, automated chlorination dosing and recirculation/mixing.
- The 24,000-gallon High Street storage tank.

The total storage capacity of the City's water system is over 2.5 MG. The maximum delivery is approximately 1.2 mgd. In order to distribute its water, the City maintains 40½ miles of water mains, 184 fire hydrants, 752 valves, 1594 meters and two pump stations (see Figure I-2). Approximately 15 percent of the water mains and valves are in poor condition due to their age and need to be replaced, and another 15 percent are nearing the end of their useful life, and are in need of replacement in the next 20 years. Continued improvements to Calistoga's water delivery system will be important to ensure a consistent, redundant and adequate supply to meet peak delivery demands.

Other Water Resources

Calistoga is located in a geothermal area that essentially underlies the entire city and much of the surrounding area. The geothermal aquifer in the area has relatively low temperature, on the order of 165 to 250 degrees Fahrenheit. Because the geothermal temperatures are fairly low, the geothermal resource is most suitable for direct-use applications. Calistoga's spa/resort industries rely on the City's world-famous mineral water resources. Calistoga's historic roots lie in its development as a spa. Since those early days, the name "Calistoga" has continued to invoke associations with healing waters and rural relaxation.

Calistoga's cold-water aquifer provides water for a number of properties that are not connected to the City's municipal water supply and instead rely on wells. Maintenance of sufficient quantity and quality of the cold-water aquifer water is therefore vital to these properties.

Mineral waters are derived from the mixing zone between the cold water aquifer and the geothermal resource. Calistoga Mineral Water once operated a large water extraction and bottling plant under the same branded name, but has closed and now extracts a very minimal amount of water. The city's other bottling plant, Crystal Geyser, also uses a minimal amount of water as a large amount of their water is trucked in from offsite.

B. Key Findings

1. The existing water system is generally well-designed and operated. The city has two sources of supply that adequately meet water demands in normal year and below-normal year situations, and will effectively meet water needs in the future.
2. Calistoga's needs during the most extreme dry year occurrences can be addressed by full use of State Water Project water and water reserves, and water conservation measures.
3. Continuous changes to state laws and regulations related to water supply and quality require pro-active and potentially-costly responses by the City.

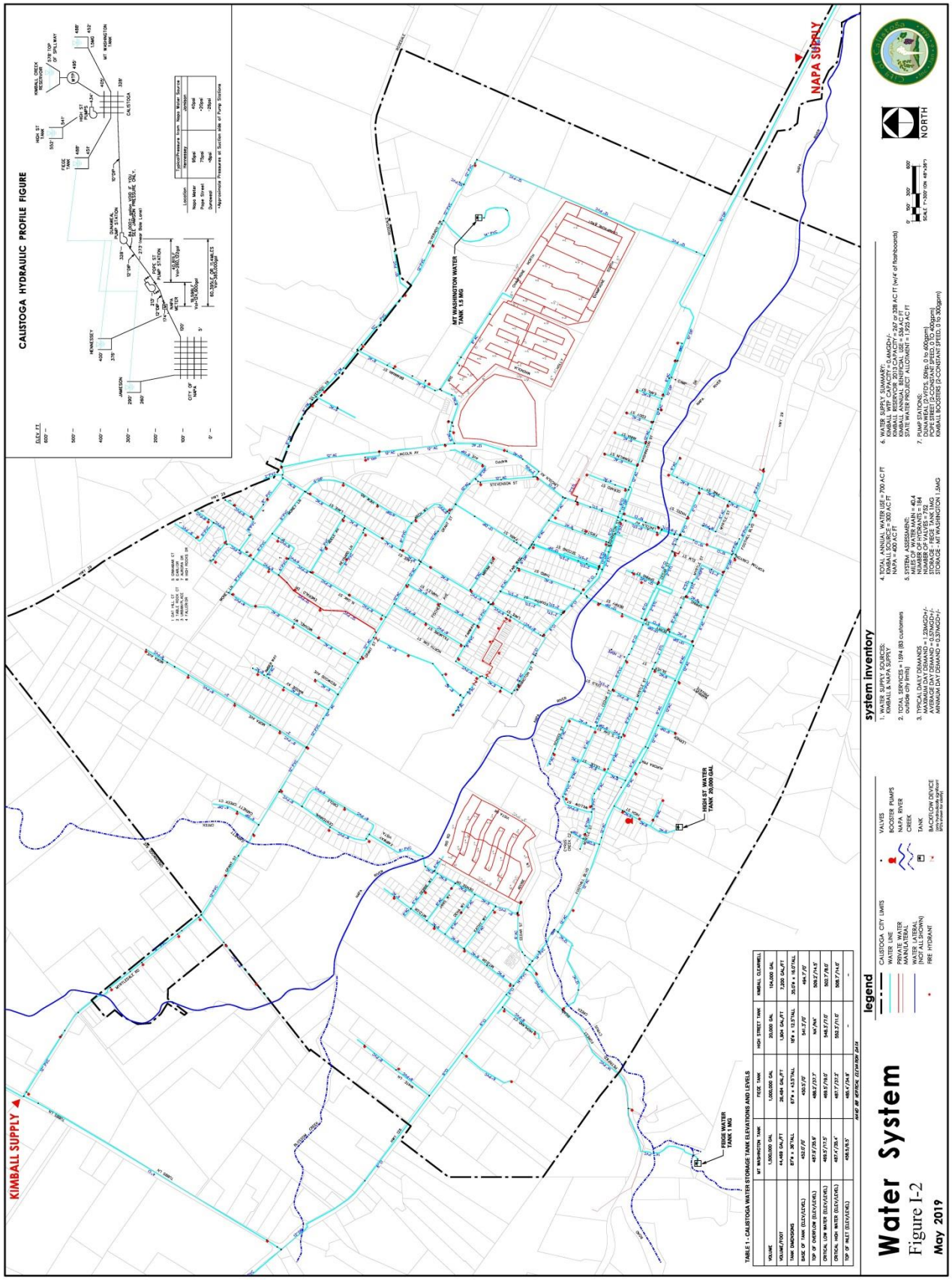


TABLE 1 - CALISTOGA WATER STORAGE TANK ELEVATIONS AND LEVELS

	MT WASHINGTON TANK	FEDE TANK	HIGH STREET TANK	KIMBALL CLEARWELL
VOLUME	1,500,000 GAL	1,000,000 GAL	20,000 GAL	134,000 GAL
VOLUME/FOOT	44,488 GAL/FT	26,484 GAL/FT	1,804 GAL/FT	7,200 GAL/FT
TANK DIMENSIONS	87'H x 36'TALL	87'H x 43.5'TALL	30'H x 12.7'TALL	30.6'H x 18.9'TALL
BASE OF TANK (ELEV/LEVEL)	452.5'/0'	450.5'/0'	341.3'/0'	484.7'/0'
TOP OF OVERFLOW (ELEV/LEVEL)	487.5'/35'	488.5'/37.5'	NA*/NA*	506.3'/14.5'
CRITICAL LOW WATER (ELEV/LEVEL)	469.5'/17.5'	469.5'/16'	344.5'/1.5'	502.7'/10.9'
CRITICAL HIGH WATER (ELEV/LEVEL)	487.5'/35'	487.5'/35'	353.5'/10'	506.7'/14.9'
TOP OF INLET (ELEV/LEVEL)	484.5'/32'	486.5'/34'	-/-	-/-

*HIGH ST SERVICE, ELEVATION 353

4. The city's aging water distribution infrastructure requires a pro-active and continuous maintenance effort.

5. Calistoga's geothermal resources are a significant contributor to the local economy, supporting its reputation as a spa destination, with the associated hospitality, restaurant and retail sectors.

C. Goals, Objectives, Policies and Actions

Goal I-1 Provide adequate and safe supplies of water to all types of users.

Objective I-1.1 Plan, manage and develop the municipal water storage and distribution systems in a logical, timely and appropriate manner.

Policies

P1.1-1 The City shall base water capacity, supply plans and projections on the "below normal year," while seeking ways to decrease the impacts of a "dry year."

P1.1-2 The City shall not extend water infrastructure to new development areas until existing infrastructure is brought to adequate standards or unless such extensions contribute to infrastructure improvements.

P1.1-3 Potable water should be made available to all city residents and businesses unless extenuating circumstances exist that preclude its provision.

P1.1-4 Properties that utilize an on-site well where municipal water is available may connect to the City's water system provided that there are sufficient resources. Where resources are limited, priority for potable water should be given to vacant parcels and existing developed parcels proposing an expansion of use.

Actions

A1.1-1 Identify and budget for development and operation costs necessary to implement the Water Supply Capital Improvements Plan.

A1.1-2 Seek funding from outside sources to finance water system improvements.

A1.1-3 Pursue additional water supply sources, such as expansion of the recycled water program, construction of wells with wellhead treatment outside of the city limits, expansion of the water treatment plant, improved peak delivery, banking water from the SWP and increased water use efficiency.

Objective I-1.2 Promote water conservation and the use of recycled water in order to maximize the availability of the city's water supply.

Policies

P1.2-1 Voluntary reductions in water use by existing customers shall be encouraged.

P1.2-2 The City's recycled water network shall be expanded whenever feasible.

Actions

A1.2-1 Continue to implement the State Water Efficient Landscape Ordinance for projects involving new or substantially-rehabilitated landscaping.

A1.2-2 Implement incentives to reduce water consumption, such as funding plumbing retrofits, leak detection and the replacement of lawn with low water-use landscaping, when a Stage II Emergency or higher is declared.

A1.2-3 Enforce state law that requires the replacement, under certain conditions, of non-compliant plumbing fixtures with water-conserving fixtures within buildings constructed before 1994.

A1.2-4 Promote and enforce best management practices for water conservation during non-drought years.

A1.2-5 Maximize the availability and use of the recycled water supply.

Objective I-1.3 Encourage coordination between land use planning and water facilities and service.

Policies

P1.3-1 The approval of new development shall be conditional on the availability of sufficient water for the project.

P1.3-2 The City shall ensure the fair and equitable distribution of costs for water service maintenance and expansion.

P1.3-3 Structures with plumbing that are located within city limits shall connect to the water system, unless topography, distance from the public water system, or other factors indicate a need for an exemption.

P1.3-4 Extension of water service beyond the City's current service area is prohibited.

P1.3-5 Needed water supply and pressure for maximum day and fire suppression shall be maintained or improved.

P1.3-6 Continue to annually monitor the capacity of water supply, water storage, and water distribution systems to accommodate new development. If and when 90 percent of the capacity of existing water storage, supply and/or distribution systems has been reached, further development in Calistoga is prohibited until the City has provided sufficient new capacity to accommodate new development.

Actions

A1.3-1 Undertake appropriate engineering studies and infrastructure improvements when the City determines that any of these components of the water system will be inadequate to accommodate projected development.

Objective I-1.4 Protect the quality of the city's water supply.

Policies

P1.4-1 Protect potable water supplies from contamination by continuing to implement a cross-connection or backflow prevention program.

Actions

A1.4-1 Continue to implement backflow inspection program with XC2 system that tracks inspections on city wide backflow devices.

A1.4-2 Require the installation of backflow prevention devices based on the identified hazard or potential hazard.

Goal I-2 Provide adequate water infrastructure and maintain it in good condition.

Objective I-2.1 Provide sufficient water storage, conveyance and treatment infrastructure and maintain it in good condition.

Actions

A2.1-1 Maintain the NBA water supply pipeline and the network of pipelines within the city.

A2.2-2 Implement necessary capital improvements, including those that:

- Increase the capacity of distribution lines from the NBA
- Improve pump delivery facilities
- Provide necessary upgrades to the water treatment plant
- Repair and replace distribution lines and transmission mains

II. WASTEWATER FACILITIES AND SERVICE

A. Background Information

Primary services provided by the City for the wastewater system are collection, treatment, disposal, and system maintenance. The City provides sewer service to approximately 1,370 connections. Customers are defined as the number of utility billing accounts and do not take into consideration multiple users on individual accounts. For example, there are 4 accounts for the mobile home parks that provide water to 555 mobile homes. Approximately 84% of Calistoga's sewer connections are for residential uses.

The City's wastewater collection system serves approximately 62 percent of the geographic area within the city limits. Private individual septic systems are used elsewhere to dispose of wastewater. The Municipal Code requires all structures with plumbing that are on properties within 200 feet of a sewer main to connect to the public system, a requirement that is implemented as new development or substantial remodeling occurs.

Connections to the wastewater collection system by new development are allowed as outlined in the Growth Management Allocation process. The City has issued several "will serve" letters for projects that will ultimately connect to the system. The City has no plans to provide wastewater service outside its current boundary.

Funding

Funding for City sewer service is provided through fees the City charges to customers to cover the cost of services. In FY 19/20, Calistoga's budgeted expenditures for its sewer enterprise is $3.3 million. Anticipated revenues for sewer service are $3.2.

The City has recently completed a wastewater rate study, which will serve as the basis for changes to rates. The City also receives funding through capital grants and recently applied for a $5 million grant to replace the riverside storage ponds, required by a Cease and Desist Order from the San Francisco Regional Water Quality Control Board.

As part of its annual budget, the City updates its capital improvements plan, which serves as a comprehensive plan to identify new construction and rehabilitation capital projects.

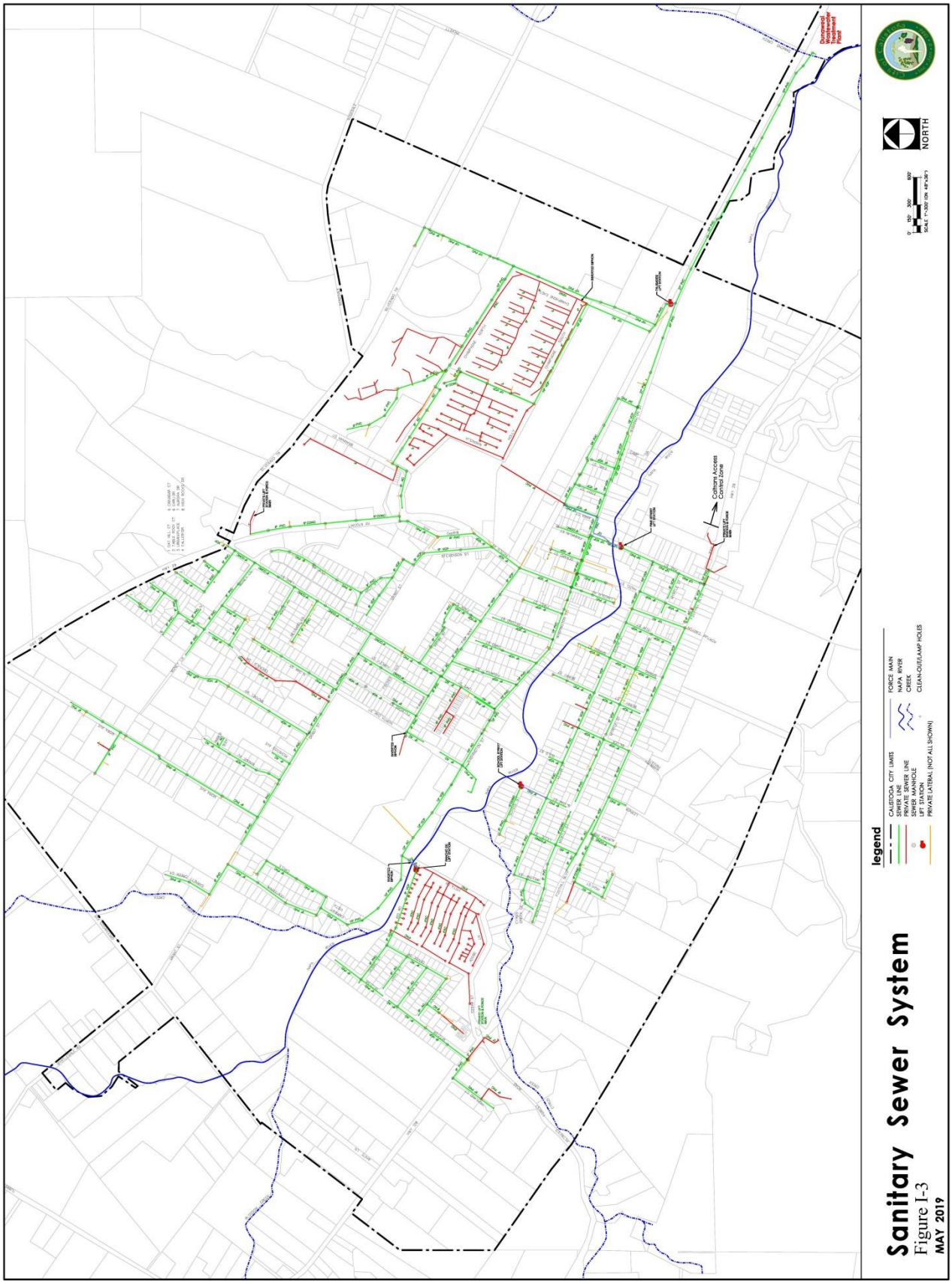
Wastewater Collection System

The City maintains over 18 miles of sewer mains that collect sewage from homes and businesses. A developer completed a large sewer trunk replacement and replaced the Pine Street Lift Station in 2016. The City completed lift station upgrades to the Palisades Lift Station in 2019.

Private lateral lines connect a house to the City's main line, typically located within a street right-of-way. The City's collection system also includes 321 public manholes and 4 lift stations (see Figure I-3).

Most of the City's sewer lines were built many decades ago. Although for the most part they are functioning adequately, the wastewater collection system faces challenges including:

- The clay material used in much of the collection system, which is prone to fracture
- The discharge of geothermal water into the system
- Grease and oil from restaurants that lack grease traps or interceptors, which can clog sewer lines
- Dilution of sewage from infiltration and inflow (I&I), which decreases the efficiency of treatment, and may cause sewage volumes to exceed design capacity. Infiltration of groundwater enters the sewer system through cracks and/or leaks in the pipes caused by age-related deterioration, loose joints, damage from heavy vehicle traffic on roadways above the sewer and root infiltration. Inflow occurs from inappropriate connections to the sewer, such as sump pumps, roof drains and yard drains. High rates of I&I may cause street manholes to overflow.


Sanitary Sewer System
Figure I-3
MAY 2019
legend
CALISTOGA CITY LIMITS
SEWER LINE
PRIVATE SEWER LINE
SEWER MANHOLE
LIFT STATION
PRIVATE LATERAL (NOT ALL SHOWN)
FORCE MAIN
NAPA RIVER
CREEK
CLEAN-OUT/LAMP HOLES
NORTH
Dunaweal Wastewater Treatment Plant
Common Access Overflow Basin

The City continues to work to address these challenges, such as requesting that private development include facilities to separate oil and grease from domestic sewer.

Wastewater Treatment System

The collection system brings sewage to the City's wastewater treatment plant (WWTP) on Dunaweal Lane, just south of the main part of the city. The WWTP is an activated sludge tertiary treatment plant. The treatment processes consist of the following:

- primary treatment by coarse bar screening at the headworks structure;
- secondary treatment by aeration and clarification;
- tertiary treatment by coagulation, filtration and disinfection;
- effluent disposal by beneficial reuse for irrigation or discharge to the Napa River.

After secondary or tertiary treatment, effluent may be discharged directly to the Napa River between November 1 and June 15. During the remaining months, effluent is treated to tertiary standards and either beneficially reused for irrigation, sprayed on irrigation fields, or stored in ponds for later irrigation or discharge to the river.

Seven wastewater storage ponds (20 MG, 10 MG and 16.4 MG ponds; and four riverside ponds) hold approximately 48 million gallons of recycled water. The City intends to reconstruct and line the riverside ponds to mitigate potential impacts from flooding, remove them from the floodway, address riverside bank erosion and prevent effluent from seeping into the river during low flow conditions. This project will also include stabilizing Simmons Creek adjacent to the existing headworks structure.

Bio-solids are generated as part of the treatment process. Some anaerobic digestion occurs to reduce the amount sludge produced and to improve the final quality of the bio-solids to secondary sludge. Sludge is dewatered on drying beds and delivered to an approved solid waste facility, used as a soil amendment or processed to Class A-level compost.

Plant Capacity and Flow Demands

The WWTP has a permitted dry-weather capacity of 0.84 million gallons per day (mgd), or 2.58 acre-feet.[7] The average dry-weather sewer flow over the last five years is 0.44 mgd (1.35 acre-feet). The average daily wastewater flows within Calistoga's sewer system are very different between dry-weather and wet-weather periods. The treatment plant can treat up to 4.0 mgd during wet weather.

The maximum influent into WWTP during the 2018-2019 discharge season was 4.6 mgd. These differences suggest improvements are needed to the collection system to address suspected deficiencies involving excessive storm and groundwater intrusion. The recent replacements of the sewer trunk main and Pine Street Lift Station have already reduced flows to the WWTP. The City also conducted smoke testing to identify areas where infiltration and inflow was occurring and several developers were required to cap and abandon old laterals on old sewer mains, which has further helped reduce I&I.

Table I-4 shows the currently-available wastewater treatment capacity. It takes into account allocations for the approved or under-construction projects shown in Appendix A as well as standby allocations (for

[7] The WWTP operates under NPDES Permit No. CA0037966 approved on April 13, 2016 by the San Francisco Bay Regional Water Quality Control Board

customers with a wastewater meter which is not in use), paid allocations and development agreements, and bottling works unused obligations.

TABLE I-4 ESTIMATED WASTEWATER TREATMENT CAPACITY AVAILABILITY (July 2019)

1	Permitted average dry-weather flow capacity	.84 mgd
2	Average dry-weather flow	.44 mgd
3	Excess capacity [Line 1 - Line 2]	.40 mgd
4	Excess capacity in acre feet [Line 3 x 1,120]	448 afy
5	Approved development and standby allocations	215.5 afy
6	Capacity buffer [Line 4 x 10%]	44.8 afy
7	Total reserved [Line 5 + Line 6]	260.3 afy
	Available Treatment Capacity [Line 4 – Line 7]	**187.7 afy**

Notes:

2 Average dry weather flow over the last five years (2014-2019), based on metered influent flows to the WWTP between July through September.

5 Standby allocations and obligations (rounded):

Standby	18.0 afy
Paid allocations and development agreements	106.6 afy
Bottling works unused obligation	90.9 afy
Total	215.5 afy

6 Capacity Buffer is 10% of the excess available capacity before standby and other obligations are deducted.

7 Estimated total reserved is the combined total of the standby and other obligations plus a 10% capacity buffer.

Effluent Quality

As required by its NPDES permit, the City must undertake pollution prevention activities to reduce certain constituents in its final effluent prior to discharge to the Napa River. Pollutants of concern include constituents that could cause or contribute to an exceedance of water quality objectives in the river, such as mercury, boron, antimony, cyanide, chlorodibromo-methane, dichlorobromomethane, ammonia, copper, oil and grease, and polychlorinated biphenyls. The Municipal Code regulates the content and concentration of a broad array of constituents in discharged waters from all sources into the wastewater system.

Geothermal water and volcanic ash. Calistoga is located in a geothermal area that essentially underlies the entire city and much of the surrounding area. Historically, small spas and resorts have utilized geothermal waters and volcanic ash as a part of therapeutic treatments and various spa activities. Geothermal waters are also used regularly as a component of heating and cooling facilities. In the past, it was common practice for users of geothermal water to directly discharge the waters to the storm drain and/or the wastewater sewer systems for disposal.

The discharge of ground water to the wastewater system impacts the volume of water that requires treatment and discharge. Additionally, geothermal water, by its nature, contains certain minerals – notably boron, antimony, and arsenic – that persist after normal wastewater treatment processes. Therefore, the

Municipal Code prohibits the discharge of uncontaminated geothermal water to the City's wastewater system unless permission has been granted by the City Engineer. Recently, more-modern facilities use a closed-loop heat exchanger and/or re-inject geothermal water into the geothermal aquifer for system recharge.

In 2016, the Regional Water Quality Control Board issued a Cease and Desist Order (CDO) directing the City to significantly reduce antimony concentrations in effluent discharged to the Napa River. The CDO requires the City to prepare a Pollution Prevention Plan for antimony that includes the identification and estimation of the loading from sources, including the application of local limits to commercial dischargers and identification of pollution prevention techniques. The CDO further requires identification of methods to reduce antimony discharges and implement metering, monitoring and charging for commercial discharges of geothermal water.

The effects on the wastewater system by the discharge of volcanic ash are not entirely known, but based on empirical evidence, it appears that volcanic ash may be a contributing factor to the presence of antimony. The City has begun requiring the installation and monitoring of mud separators at resorts and spas in order to avoid or minimize the amount discharged into the system.

Wastewater Recycling

Approximately 250 to 360 acre-feet of recycled wastewater are used annually. Recycled wastewater users include the fairgrounds, schools, City-owned lands, resort properties, parks, a multi-family apartment complex, churches, and several hotels as shown in Figure I-4. The effluent's boron concentration effectively limits its use to boron-tolerant crops like turf grasses and precludes its use for vineyard irrigation.

Future Wastewater Treatment Plant Demand

WWTP demand and capacity can be influenced by new development occurring within the City. Other factors that impact supply in the City are prolonged drought and stormwater intrusion.

Projected municipal wastewater generation through 2035 (in addition to the demand noted in Table I-4) is shown in Table I-5. The projected additional demand includes the potential development between 2015 and 2035. As can be seen from Table I-5 below, there is sufficient plant capacity to accommodate current and projected demand.

TABLE I-5 **EXISTING AND PROJECTED TREATMENT DEMAND/RESERVE AND CAPACITY**

	2019		**2035**	
	Demand + Reserve[1]	**Remaining Capacity**	Total Demand[2]	**Remaining Capacity**
Average dry weather flow	708 afy	**232 afy**	800 afy	**140 afy**

[1] Sum of Lines 2 and 5 from Table I-4

[2] 2019 demand/reserve + projected additional demand

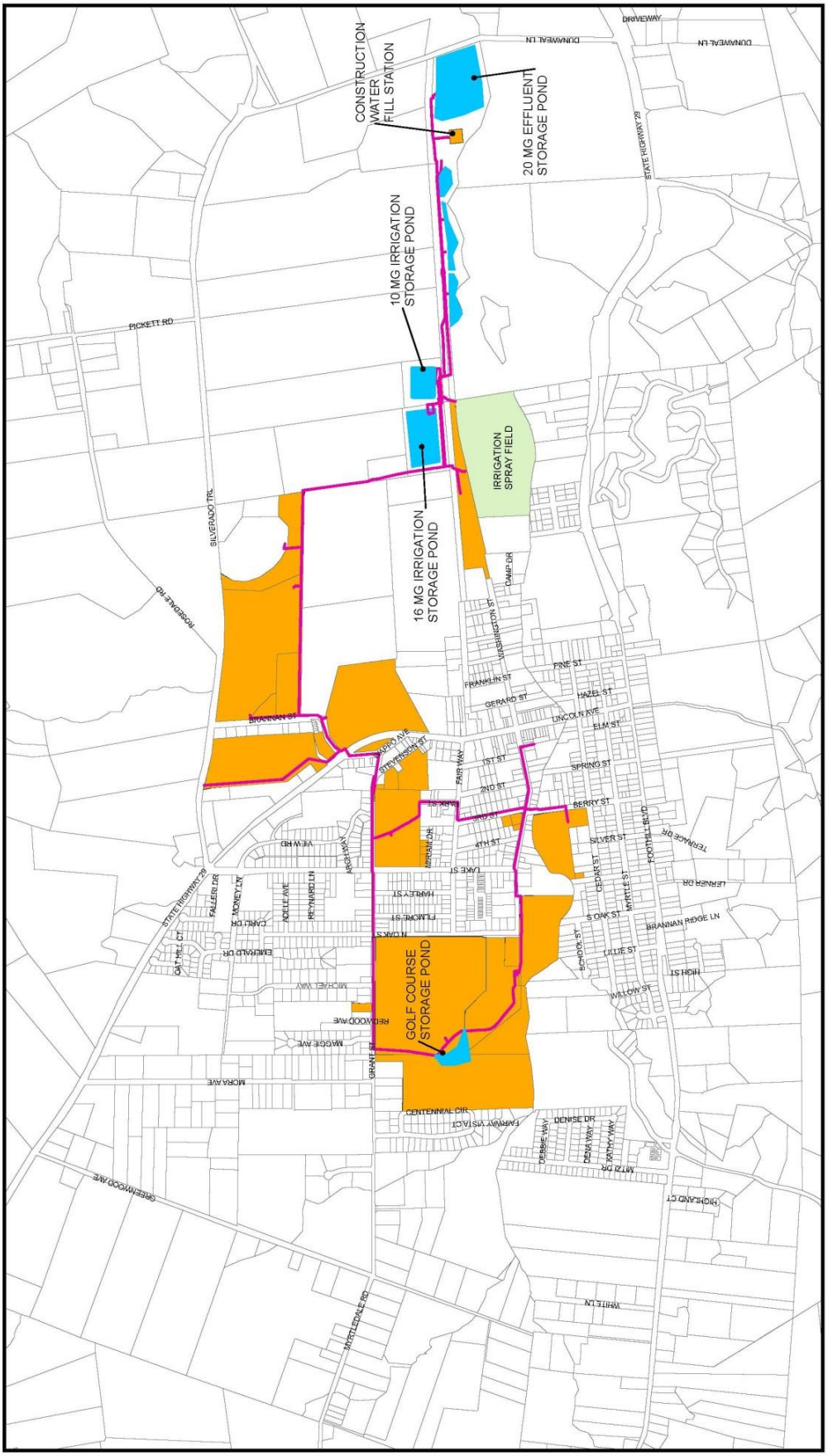


Figure I-4
RECLAIMED WATER SYSTEM
CITY OF CALISTOGA
2020 INFRASTRUCTURE ELEMENT UPDATE

B. Key Findings

1. The City's wastewater collection system faces challenges including the age of its infrastructure; the clay material used in much of the collection system, which is prone to fracture; insufficient line capacity in some areas; grease and oil from restaurants, which can clog sewer lines; and dilution of sewage from infiltration and inflow (I&I), which decreases the efficiency of treatment, and may cause sewage volumes to exceed design capacity,
2. A broad range of improvements needed for the collection system have been identified by City consultants and staff, including improvements to the collection system to address suspected deficiencies involving excessive storm and groundwater intrusion, the reconstruction and lining of the riverside wastewater storage ponds, and the replacement and upsizing of sewer mains.
3. Limiting existing geothermal users to their historic discharge and substantially reducing constituent levels is important and has been a longstanding practice of the City.
4. There is sufficient wastewater treatment plant capacity to accommodate current and projected demand through 2035.

C. Goals, Objectives, Polices and Actions

Goal I-3 Plan, manage and develop wastewater conveyance, treatment and disposal systems in a logical, timely and appropriate manner

Objective I-3.1 Promote coordination between land use planning and wastewater treatment and conveyance.

Policies

P3.1-1 Extension of sewer service beyond the current service area shall be prohibited unless such extensions contribute to city-wide wastewater infrastructure improvements or correct septic problems.

P3.1-2 Municipal sewer treatment should generally be available to the City's residents and businesses.

P3.1-3 New development shall only be approved if there is sufficient capacity in the wastewater treatment system to serve the project.

P3.1-4 Structures with plumbing that are located within city limits shall connect to the public wastewater collection system, unless topography, distance from the public water system or other factors indicate a need for an exemption.

P3.1-5 Continue to annually monitor the capacity of the Wastewater Treatment Plant to accommodate new development. If / when wastewater flows to the Wastewater Treatment Plant reach 90 percent of the plant's design capacity, development in Calistoga shall be halted until the City provides additional treatment capacity sufficient to accommodate new development.

Actions

A3.1-1 Prepare a wastewater master plan to identify current deficiencies, quantify needs based on projected development, describe necessary improvements and establish priorities. Issues to cover include:

- Comprehensive analysis of the overall collection system
- Evaluation of the feasibility of alternative rehabilitation techniques
- Infiltration and inflow analysis
- Assessment of modifications to the system needed for changes in user type (i.e., groundwater dischargers vs. conventional households)
- State and federal pollution control and discharge requirements
- Feasible water conservation measures
- Evaluating benefits associated with the expanded use of graywater/reclaimed water
- Identifying the number of failed or failing septic systems and evaluating the associated environmental and health risks

A3.1-2 Enforce the City code requiring all properties with plumbing, located within 200 feet of a wastewater sewer, to connect to the public sewer system.

A3.1-3 Continue to annually monitor the flows to the Wastewater Treatment Plant in terms of the plant's design capacity and undertake appropriate engineering studies and infrastructure improvements when the City determines that the capacity of the wastewater treatment plant will be inadequate to accommodate projected development.

Objective I-3.2 Maintain wastewater infrastructure in good condition.

Actions

A3.2-1 Complete a sewer model of the entire collection system and calibrate to dry and wet weather flows.

A3.2-2 Conduct a study to assess the costs and benefits of phasing out clay and concrete pipe, and replacing it with ductile iron or plastic pipe, or the use of other means to reduce the seasonal inflow/infiltration problem.

Goal I-4 Collect, treat and dispose of wastewater in ways that are safe, sanitary and environmentally-acceptable

Objective I-4.1 Reduce impacts from discharge into the wastewater treatment system.

Policies

P4.1-1 Restaurants and others that discharge grease into the wastewater treatment system shall reduce system impacts.

P4.1-2 The amount of antimony discharged into the wastewater treatment system shall be minimized.

Actions

A4.1-1 Require the installation of grease interceptors where needed.

A4.1-2 Vigorously enforce the provisions of the Municipal Code along with State and County requirements with respect to proposed new geothermal users.

A4.1-3 Pursue the installation and monitoring of volcanic ash/mud separators at resorts and spas in order to avoid or minimize the amount of antimony discharged into the wastewater treatment system.

Objective I-4.2 Promote innovation in the treatment of wastewater.

Actions

A4.2-1 Complete automation of ammonia chloramine disinfection treatment to reduce THMs for compliance with the state Cease and Desist Order.

A4.2-2 In the next wastewater master plan, incorporate the evaluation of options to separate and/or eliminate boron from the primary wastewater stream to reduce the level of boron in reclaimed water, making it a viable source of water for local vineyards.

Objective I-4.3 Provide adequate financial support for the wastewater treatment system.

Policies

P4.3-1 The City shall strive to recover costs for sewer service expansion.

P4.3-2 The City shall recover maintenance costs for its wastewater treatment system to the maximum extent feasible.

Action

A4.3-1 The City shall conduct rate studies and nexus studies as needed to determine and assess equitable charges for the expansion and maintenance of the wastewater treatment system.

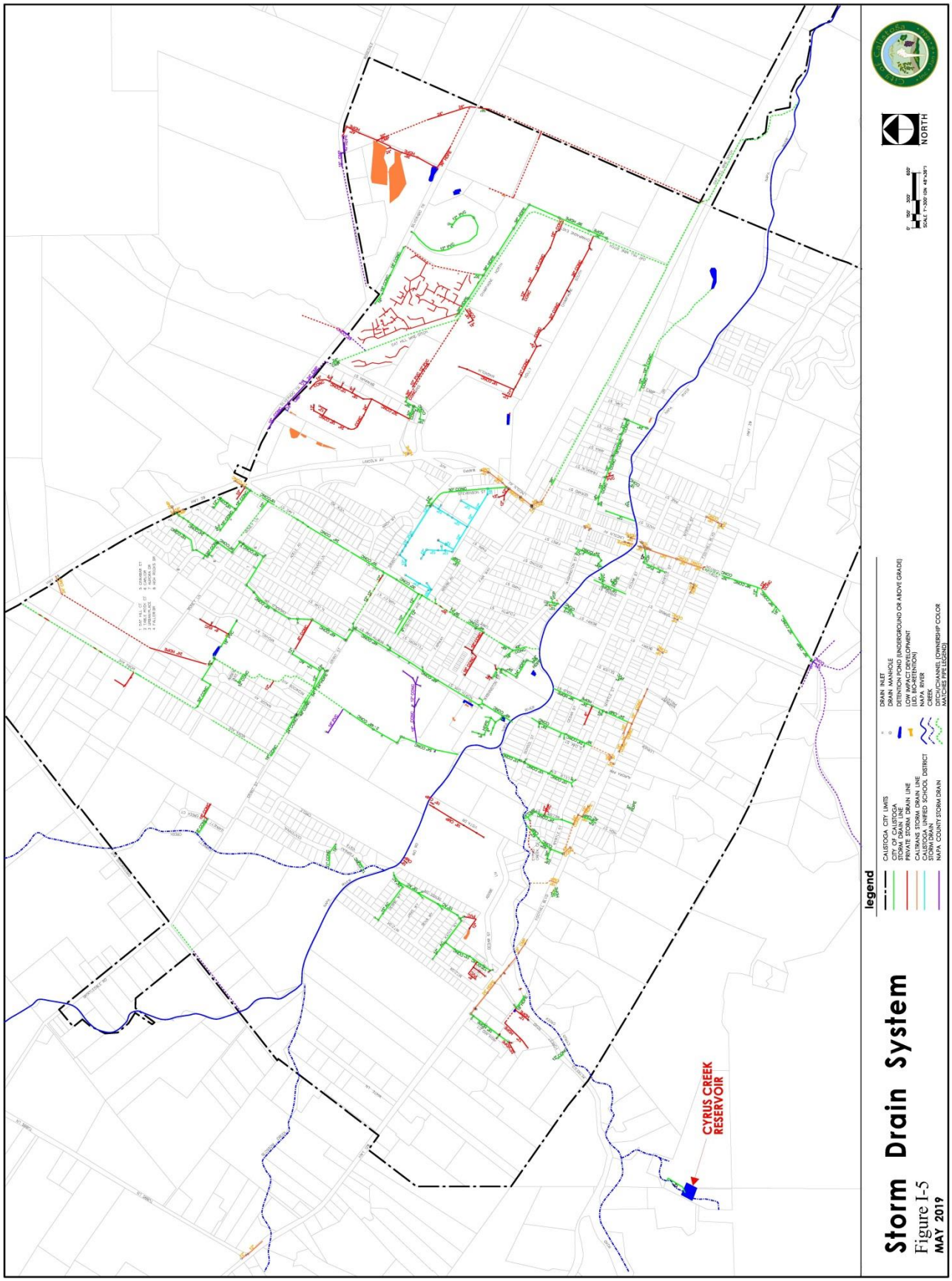
III. STORMWATER COLLECTION AND DISCHARGE

A. Background Information

Existing Stormwater System

As shown in Figure I-5, the City maintains a storm drainage system that consists of pipes and ditches serving a portion of the developed areas of the City. Pipes range in diameter from 6 to 54 inches. Shallow drainage ditches comprise approximately 50 percent of the current drainage network. All precipitation and runoff going into the City storm drains eventually runs to the Napa River then onward to San Pablo Bay. Other natural drainage features include, Cyrus Creek, Blossom Creek and Garnett Creek.

The City has an inspection program to routinely inspect and maintain storm water inlets and outfalls for debris and obstructions, sand and gravel build-up, structural damage, and vandalism. Maintenance of the storm drain system by City staff includes actively watching for potential hazards, such as storm drain blockages. The capacity of the existing storm drain piping is exceeded regularly during average precipitation events at several locations, which causes localized flooding. Many of the existing storm drainage problems


CYRUS CREEK RESERVOIR
legend
CALISTOGA CITY LIMITS
CITY OF CALISTOGA STORM DRAIN LINE
PRIVATE STORM DRAIN LINE
CALTRANS STORM DRAIN LINE
CALISTOGA UNIFIED SCHOOL DISTRICT STORM DRAIN
NAPA COUNTY STORM DRAIN
DRAIN INLET
DRAIN MANHOLE
DETENTION POND (UNDERGROUND OR ABOVE GRADE) (LID, BIO-RETENTION)
OPEN CHANNEL (OWNERSHIP COLOR MATCHES PIPE LEGEND)
NAPA RIVER
CREEK
NORTH
Storm Drain System
Figure I-5
MAY 2019

reflect the city's incremental development; as impervious surfaces increased, more water was directed to insufficiently-sized storm drains. In areas without drain pipes, rain causes sheet flows to the river and creeks, which can also result in localized flooding, especially in the area between Foothill Boulevard and the Napa River. The low amount of naturally-occurring ground slope is also a contributing factor.

Deficiencies in the storm drainage system also exist in the southeast quadrant of the city, an area containing a watershed of approximately 1,282 acres. Several natural tributaries of the Napa River intersect in this area, some of which drain into public and privately-owned drainage ditches and culverts that are at or over their existing capacities, resulting in periodic localized flooding and erosion during large storm events.

Recent and Planned Improvements

In 2004, a master drainage plan was prepared for the northeast quadrant of the city that includes improvements needed to accommodate stormwater associated with its buildout under the General Plan. Subsequently, a bypass culvert was installed to handle increased flows and the main ditch was widened, among other improvements. Development projects in this area are required to pay a proportionate share of these projects.

Recent significant improvements in another area of the city include the Grant Street drainage project between Maggie Street and Michael Way to address long-standing flooding issues. In 2018, drainage improvements included replacing a 36-inch drain pipe bottleneck under the fairgrounds race track with dual 48-inch diameter drain pipes (equivalent to a single 60-inch diameter pipe), as called for by a 1991 drainage study for the northwest area. These projects were almost completely funded by Measure A, a half-cent sales tax measure that provided revenue for flood protection improvements throughout Napa County since 1998. The City received nearly $9 million in funding from this source.

Stormwater Quality

Calistoga is within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board, Region II. The Board has adopted water quality objectives in its Stormwater Quality Management Plan, which is designed to ensure that stormwater achieves compliance with receiving water limitations. The City has adopted a stormwater runoff pollution control ordinance to ensure new developments comply with the Plan. It requires the implementation of an erosion and sediment control plan for projects to prevent sedimentation and discharges of construction-related pollutants to the storm drain system and the Napa River, and that a project's post-construction stormwater include best management practices consistent with those described in the Bay Area Stormwater Management Agencies Post-Construction Manual, including "no net increase" in peak storm runoff.

The City's stormwater discharges are also regulated by a Phase II National Pollutant Discharge Elimination System Permit for Small Municipal Separate Storm Sewer Systems issued by the State Water Resource Control Board in 2013. The City is part of the Napa Countywide Stormwater Pollution Prevention Program, a joint effort with other Phase II agencies in Napa County.

A review conducted in 2016[8] concluded that the City is implementing a strong pollution prevention program, including monitoring erosion and sediment control plans, conducting regularly-scheduled construction site inspections and requiring post-construction maintenance agreements. The review recommended that the City finalize its Enforcement Response Plan as soon as possible in order to provide consistent enforcement of stormwater regulations in its jurisdiction and use a work-order system for catch basin maintenance.

The City is implementing recent state regulations that require it to trap all particles in runoff that are five millimeters or larger before they enter the storm water system. The City is required to complete installation of the "trash full-capture systems" within 10 years at 10 percent per year. Most of the systems are being installed by development projects; however, they will need to be cleaned prior to every major rain event, which will result in an ongoing cost to the City.

B. Key Findings

1. Although a citywide stormwater collection system analysis has not been done, a broad range of needed improvements to stormwater collection systems has already been identified by City consultants and staff.
2. The need for stormwater collection facilities can be minimized through appropriate planning and design that allows for on-site percolation detention/retention and avoids or reduces peak runoff.
3. Frequent changes to federal and state stormwater quality regulations requires pro-active measures by City staff and decision makers, as well as increased funding.

C. Goals, Objectives, Policies and Actions

Goal I-5 Collect and dispose of stormwater in a manner that is safe, sanitary and environmentally-acceptable.

Objective I-5.1 Plan, manage and develop the City's stormwater collection system in a logical, timely and appropriate manner.

Actions

A5.1-1 Prepare a citywide master plan of the storm drainage system in order to accurately determine existing and projected storm drainage flows and needed improvements.

A5.1-2 Undertake further study to determine the optimal replacement of undersized pipes and the installation of new pipes between Foothill Boulevard and the Napa River.

[8] Dunaweal Wastewater Treatment Plant 2016 Pollution Prevention and Minimization Program Report, Larry Walker Associates, February 2017

Objective I-5.2 Maintain storm water collection infrastructure in good condition.

Actions

A5.2-1 Make capital improvements related to the replacement of stormwater drain pipes.

A5.2-2 Install drain pipe and new inlets on Spring Street from Myrtle Street to the Napa River.

Objective I-5.3 Ensure coordination among land use planning, site design and stormwater control.

Policies

P5.3-1 The approval of new development shall be conditional on the extension of necessary stormwater infrastructure.

P5.3-2 New development shall be required to incorporate appropriate measures to minimize the impacts of stormwater runoff as specified in federal, state and regional regulations.

Actions

A5.3-1 Require new development to install appropriate on- and off-site storm drainage improvements.

A5.3-2 Require through the permit review process that post-construction peak runoff does not exceed pre-construction levels.

A5.3-3 Require development to install bio-retention or other BASMAA-approved devices.

APPENDIX A

Potential Water Usage and Wastewater Generation (July 2019)

Potential Water Usage

Standby (customers with meter but no use)		30.280
Paid Allocations and Development Agreements		77.737
Calistoga Hills Development Agreement	30.000	
Silver Rose Development Agreement	42.040	
Oak Villa Townhomes	2.520	
Rivers-Marie Winery	.722	
919 Highland	.428	
920 Highland	.428	
929 Highland	.428	
930 Highland	.428	
939 Highland	.428	
1413 Lake ADU	.165	
1329 C Lincoln Apartment	.150	
Bottling Works Unused Obligation		86.280
Calistoga Mineral: 70.0 baseline (5-yr. average: 2.50)		
Crystal Geyser: 23.3 baseline (5-yr. average: 4.52)		
	Total	**194.30 acre-feet/year**

Potential Wastewater Generation

Standby		18.000
Paid Allocations and Development Agreements		106.543
Calistoga Hills Development Agreement	60.000	
Silver Rose Development Agreement	45.650	
Rivers-Marie Winery	.150	
919 Highland	.224	
920 Highland	. 224	
929 Highland	. 224	
930 Highland	. 224	
939 Highland	. 224	
1413 Lake ADU	.146	
1329 C Lincoln Apartment	.073	
Calistoga Motor Lodge Expansion	.300	
Bottling Works Unused Obligation		90.910
Calistoga Mineral: 95.0 baseline (5-yr. average: 4.09)		
	Total	**215.543 acre-feet/year**