Appendix H: Water Supply Assessment and Sewer Capacity Study

City of Santa Clara
The Center of What's Possible

AGENDA ITEM #: 13.A6

AGENDA REPORT

Date: August 22, 2017

To: City Manager for Council Action

From: Director of Water and Sewer Utilities

Subject: Resolution to Approve the Water Supply Assessment for the proposed Gateway Crossings Project at 1205 Coleman Avenue

EXECUTIVE SUMMARY

California Water Code Section 10910 and Section 15155(b) of the Guidelines to the California Environmental Quality Act require a water utility to prepare a water supply assessment ("Assessment") for any development project that, among other criteria, includes more than 500 dwelling units, 500,000 square feet of retail space, 250,000 square feet of office space, employs more than 1,000 people or would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project. The proponent of a development located at 1205 Coleman Avenue ("Applicant") requested an Assessment which proposes to construct new buildings consisting of 33,000 gross square feet (gsf) of retail space, 182,000 gsf of hotel development, 213,800 gsf of irrigation, and up to 1,600 multifamily residential units. Therefore, this Assessment is required to be brought to Council for the Council's approval, denial, or other direction.

The Assessment requires an analysis of the utility's current and future water supplies as well as the current and projected water demands in the utility's service area. The Assessment must include a determination as to whether additional water supplies are necessary or if sufficient water supplies exist for the proposed development. The law also requires that the water utility's governing body approve water supply assessments. The City Council is the governing body for the City's Water Utility.

City staff has prepared an Assessment for the proposed Gateway Crossings Project. The Assessment provides a detailed analysis of the amount of water necessary to meet the needs of the proposed development and the City's ability to supply that amount of water based on the projections identified in the City's Urban Water Management Plan through 2040.

The assessment found that the City's water utility has sufficient water supplies to meet the projected water demand of this development during normal, single dry year, and multiple dry year scenarios.

A copy of the Water Supply Assessment can be viewed on the City's website or is available in the City Clerk's Office for review during normal business hours.

ADVANTAGES AND DISADVANTAGES OF ISSUE

Council's approval of the Assessment is necessary for the development to be approved. However, Council's approval, denial, conditional approval or any act on the Assessment does not guarantee that the Project will be approved, and does not obligate the City to approve, deny, conditionally approve, take any action on, or make any decision on the associated Project application.

ECONOMIC/FISCAL IMPACT

The acceptance or rejection of this water supply assessment does not have a fiscal impact on the City. However, the approval of this water supply assessment is a required part of the development process. The development will have an economic/fiscal impact on the City. That impact is not analyzed as part of this report.

RECOMMENDATION

That the Council adopt a resolution approving the Water Supply Assessment for the Gateway Crossings Project located at 1205 Coleman Avenue.

Gary Welling
Acting Director of Water and Sewer Utilities

APPROVED:

Rajeev Batra
City Manager

Documents Related to this Report:
1) Resolution
2) Gateway Crossings Development Application Water Supply Assessment

RESOLUTION NO. _____

A RESOLUTION OF THE CITY OF SANTA CLARA, CALIFORNIA APPROVING A WATER SUPPLY ASSESSMENT FOR THE GATEWAY CROSSINGS PROJECT AT 1205 COLEMAN AVENUE

BE IT RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

WHEREAS, the City of Santa Clara ("City") approved and adopted an Urban Water Management Plan in 2016;

WHEREAS, California Water Code Section 10910 and Section 15155(b) of the Guidelines to the California Environmental Quality Act ("CEQA") require a water utility to prepare a Water Supply Assessment for development applications for "water-demand projects";

WHEREAS, the City is a public water supplier within the City limits and the City Council of the City of Santa Clara is the governing body of the City's public water system;

WHEREAS, the City of Santa Clara requires that landscaping for projects be drought tolerant and recycled water be used for irrigation, cooling towers and other permitted uses when properties are proximate to recycled water resources to reduce the cumulative use of potable water;

WHEREAS, on April 19, 2017, Hunter Storm Development ("Applicant") requested a Water Supply Assessment for a proposed development at 1205 Coleman Avenue ("Gateway Crossings");

WHEREAS, under Section 15155(a)(1)(G) of the CEQA Guidelines and Section 10912(a)(7) of the Water Code, a project that includes more than 500 dwelling units requires a Water Supply Assessment; and,

WHEREAS, City Staff prepared a Water Supply Assessment for the Gateway Crossings Project ("Development WSA").

NOW THEREFORE, BE IT FURTHER RESOLVED BY THE CITY OF SANTA CLARA AS FOLLOWS:

1. That the Water Supply Assessment for the proposed the Gateway Crossings Project

located at 1205 Coleman Avenue is attached to the agenda report for the Council meeting of August 22, 2017.

2. Approval of Development WSA. The Council has reviewed the Development WSA at a regular public meeting conducted on August 22, 2017. Based upon the data and conclusions set forth therein, and the evidence and testimony presented at the public meeting, the Council hereby finds that there is adequate water to supply the Gateway Crossings Project without creating negative impact on the groundwater basin and that the City has an adequate supply to provide water for the project during single or multiple dry years for at least a 20-year projection, and, the Council hereby approves the Development WSA.

3. No Obligation to Act on the Gateway Crossings Development Application. The Council's approval of the Development WSA is limited to approving the Development WSA; approving the Development WSA does not approve the application for the Gateway Crossings project. Nothing in this resolution or the Council's approval of the Development WSA shall be construed as requiring the City or its Council to consider, act on, approve, conditionally approve, deny, or take any other action on the application to develop the Gateway Crossings project.

4. Direction to Staff. Staff is hereby directed to include the Development WSA, the 2015 City of Santa Clara Urban Water Management Plan, and any other applicable Urban Water Management Plan related documents in the appendix of the Environmental Impact report for the Gateway Crossings project.

5. Constitutionality, severability. If any section, subsection, sentence, clause, phrase, or word of this resolution is for any reason held by a court of competent jurisdiction to be unconstitutional or invalid for any reason, such decision shall not affect the validity of the remaining portions of the resolution. The City of Santa Clara, California, hereby declares that it would have passed this resolution and each section, subsection, sentence, clause, phrase, and word thereof, irrespective of the fact that any one or more section(s), subsection(s), sentence(s), clause(s), phrase(s), or word(s) be declared invalid.

6. Effective date. This resolution shall become effective immediately.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE COPY OF A RESOLUTION PASSED AND ADOPTED BY THE CITY OF SANTA CLARA, CALIFORNIA, AT A REGULAR MEETING THEREOF HELD ON THE ___ DAY OF _________, 2017, BY THE FOLLOWING VOTE:

AYES: COUNCILORS:

NOES: COUNCILORS:

ABSENT: COUNCILORS:

ABSTAINED: COUNCILORS:

ATTEST: ______________________________
ROD DIRIDON, JR.
CITY CLERK
CITY OF SANTA CLARA

Attachments incorporated by reference: None

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Gateway Crossings
1205 Coleman Avenue
Development Application

Water Supply Assessment for Compliance with California Water Code Section 10910

Approved by City Council

Resolution #TBD

Table of Contents

Introduction

Senate Bill 610 (2001) codified at Water Code Section 10910 et seq, requires detailed information on water supply availability for certain projects that meet or exceed the following criteria:

- A residential development of more than 500 dwelling units
- A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
- A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
- A proposed hotel or motel, or both, having more than 500 rooms.
- A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
- A mixed-use project that includes one or more of the projects specified in this subdivision.
- A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

The Gateway Crossings Project ("Gateway Crossings" or the "Project"), located in the City of Santa Clara ("City") at Coleman Avenue and Brokaw Road is subject to a Water Supply Assessment ("WSA" or Assessment") in accordance with the California Water Code and the California Environmental Quality Act.

The City of Santa Clara's City Council approved and adopted an Urban Water Management Plan in 2016 ("UWMP" or "2015 UWMP"). The 2015 UWMP did not specifically include or address this Project since it was proposed and evaluated after the adoption of the UWMP. However, the UWMP included projected increases in water demand due to densification and intensification of both residential and non-residential land uses. Projected uses within the proposed development are described in further detail in the Projected Water Demand for the Proposed Project section.

This Assessment relies on the data contained in and used to develop the 2015 UWMP to analyze the availability of the City's water supply to serve the Project along with existing and planned future uses. Unless noted, all figures in this Assessment are in acre-feet (AF) and are for total water demand or supply, i.e. both potable and recycled water.

The findings of this Assessment will be submitted to the City Council for approval and included in the environmental review process. The City's approval, denial, conditional approval or any act on this Assessment does not guarantee that the Project will be approved and does not obligate the City to approve, deny, conditionally approve, take any action, or make any decision on the Project application.

Water Supply

The City of Santa Clara has four sources of water. These sources include two treated water sources from the Santa Clara Valley Water District ("SCVWD" or "District") and the San Francisco Public Utilities Commission ("SFPUC"), groundwater pumped from the Santa Clara sub-basin through the City's owned and operated groundwater wells, and recycled water purchased from South Bay Water Recycling ("SBWR").

Recycled water use within the City is limited by the availability of acceptable uses and proximity to the recycled water distribution system. The use of treated surface water from SCVWD and SFPUC is limited by their respective executed contracts.

Potable Water Supply

The Santa Clara potable water system is separated into four interconnected zones in order to provide optimum pressures throughout the City. The four pressure zones and the location of the Project are shown in Figure 1.

Figure 2 shows the water source by area. Treated water purchased from SFPUC is used to supply water north of Highway 101. Treated water purchased from the SCVWD is used in conjunction with groundwater to supply water to the southern portion of the City.

Table 1 below summarizes the amount of water pumped by the City's groundwater wells from 2012-2016. Table 1A summarizes purchased volumes from the City's two wholesalers.

Table 1: Historical Volume of Groundwater Pumped					
Source	2012	2013	2014	2015	2016
Wells	14,958	14,194	14,096	11,450	10,108

Table 1A: Historical Treated Water Purchases										
Source	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
SCVWD	4,392	4,248	4,105	4,372	4,527	3,971	4,949	3,634	3,701	4,683
SFPUC	4,345	3,278	2,778	2,454	2,225	2,264	2,457	2,069	2,470	2,371

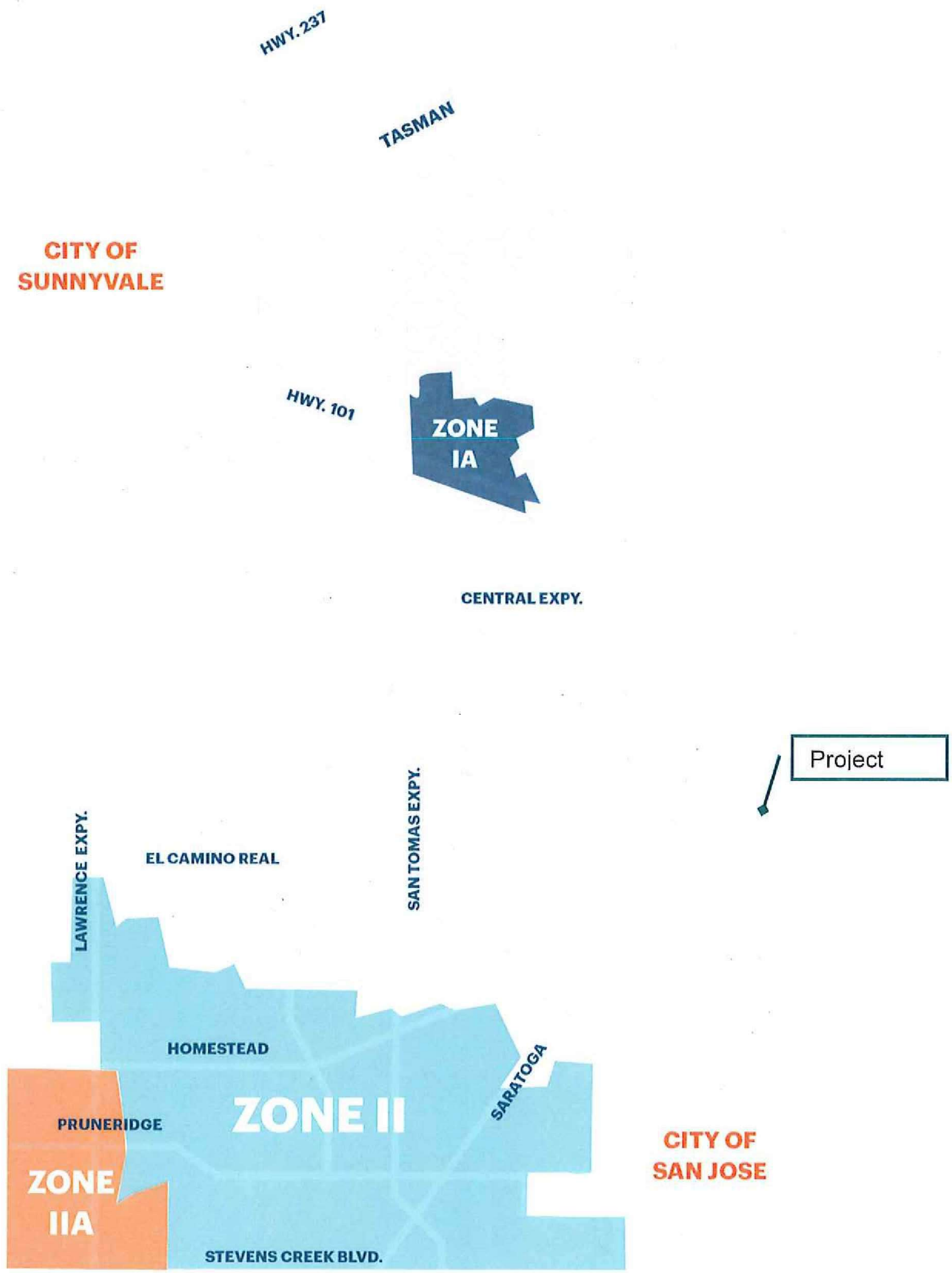

Figure 1: Pressure Zones

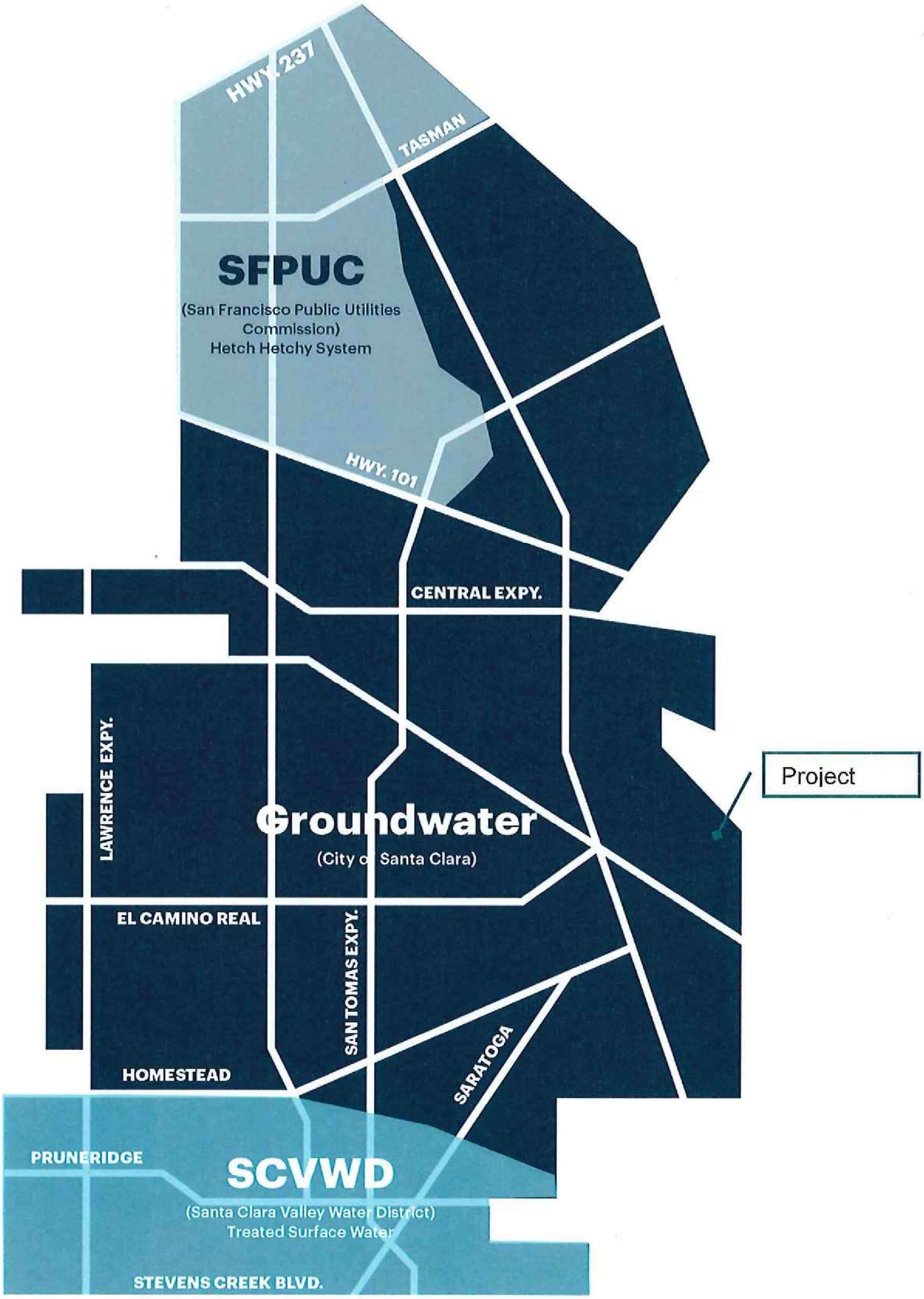

Figure 2: Sources of Water by Area

Groundwater Supply

The local groundwater basin currently provides about two thirds of the City's potable water supply. It is the primary source of water for domestic, industrial, and agricultural use in the City since the area was first settled. This aquifer acts as a large underground reservoir that the City's 26 wells use as a water source.

The Santa Clara Valley groundwater basin extends from the Coyote Narrows at Metcalf Road in San Jose to Santa Clara County's northern boundary. It is bounded on the west by the Santa Cruz Mountains and on the east by the Diablo Range: these two mountain ranges converge at the Coyote Narrows to form the southern limit of the sub-basin. The sub-basin is 22 miles long and 15 miles wide at its widest point, with a surface area of 225 square miles. The southern area is an unconfined zone, or "forebay", where confining clay layers do not extend. SCVWD staff estimates the operational storage capacity of the sub-basin to be 350,000 AF. The Santa Clara Valley groundwater basin is shown in Figure 3 (225 square miles, 144,000 acres) and is the largest of three interconnected groundwater basins occupying a total of 240,000 acres of the 849,000 acres in Santa Clara County.

The Santa Clara Valley groundwater basin is not adjudicated. The most recent information from DWR indicates that the Santa Clara Sub-basin is a medium-priority sub-basin based on criteria that include overlying population, projected growth, number of wells, irrigation acreage, groundwater reliance, and groundwater impacts[1]. The sub-basin is not currently listed as overdrafted[2]. Even when the City was at the historic peak for groundwater production FY1986/87, the basin was not approaching overdraft. Though the Santa Clara Valley groundwater basin is not considered overdrafted by the Department of Water Resources and is not adjudicated, the District monitors the basin for local subsidence and works with various water retailers in the area to prevent subsidence and overdraft of the basin.

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[1] Department of Water Resources, Groundwater Basin Prioritization Results – June 2014 http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm

[2] Department of Water Resources, California's Groundwater Update 2003, DWR Bulletin 118 (California Department of Water Resources, 2003)

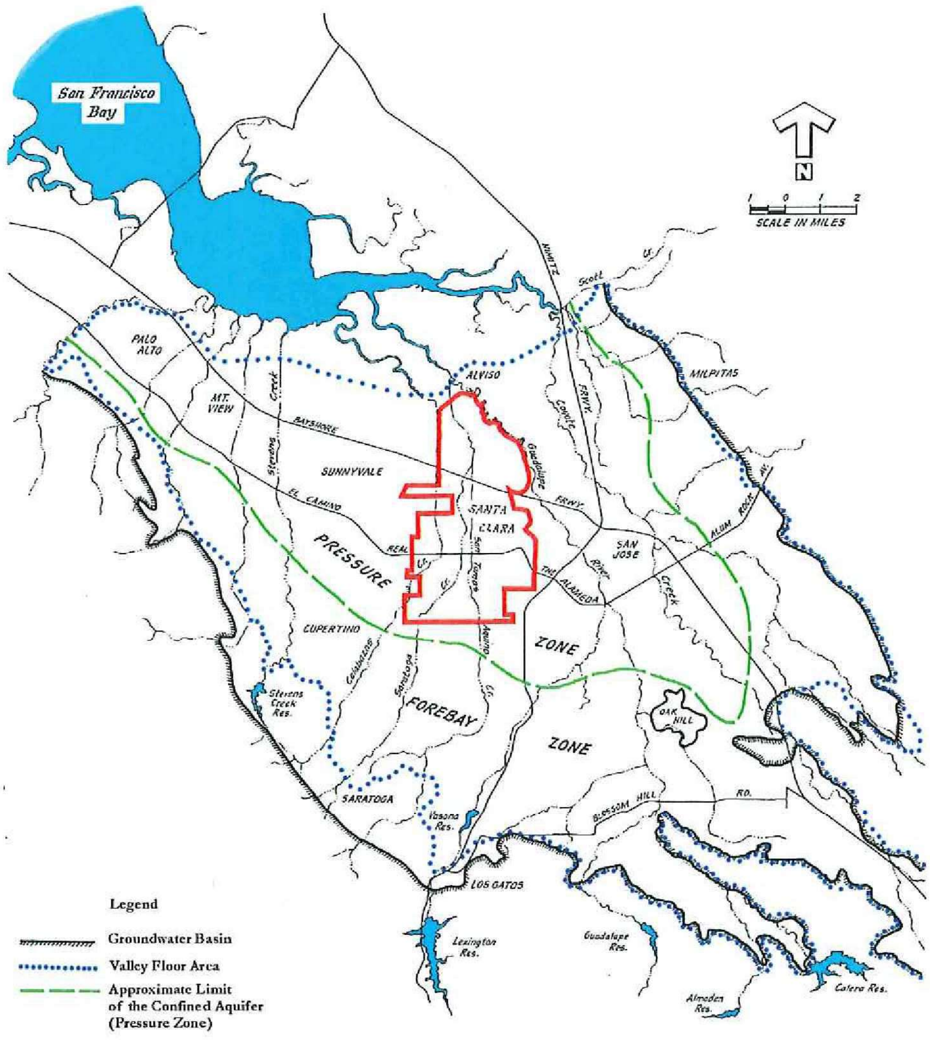

Figure 3: Map of Groundwater Basin

The allowable withdrawal or safe yield of groundwater by the City of Santa Clara is dependent upon a number of factors including: withdrawals by other water agencies, quantity of water recharged and the carry over storage from the previous year. Development and agricultural needs in the 1920s increased the demand on the water systems within the Santa Clara Valley. This increased extraction of groundwater led to subsidence in several of the aquifers. The Santa Clara Valley Water Conservation District (currently Santa Clara Valley Water District) was originally formed in 1929 to alleviate land surface subsidence in and around San Jose through artificial recharge of the groundwater. The rapid development of Santa Clara County occurred again in the 1960s and the corresponding increased demand on the existing water supply again resulted in the over-drafting of the groundwater basin. The continued over-drafting of the basin resulted in a significant lowering of the groundwater table, significant subsidence of the land in the northern portion of the valley and compaction of several aquifers. When an aquifer is compacted the storage capacity of the aquifer can be substantially reduced. Once lost, storage capacity cannot be regained.

In order to avoid any further subsidence and loss of aquifer capacity the District has attempted to operate the basin to maintain or increase groundwater storage through managed recharge with local supplies augmented with imported raw water. In the late 1960s/ early 1970s the District's conjunctive management of surface water and groundwater effectively halted the over-drafting and resulting subsidence. The District is currently using projected supply, carryover capacity and anticipated demand to predict potential water shortages. The 2012 Santa Clara Valley Water District Groundwater Management Plan describes the groundwater recharge program in detail. This Groundwater Management Plan, the most recent formally adopted plan, is included in the 2015 UWMP[3].

The City's wells are strategically distributed around the City. The exact location of the wells is not included in this Assessment for security reasons. This distribution of wells adds to the reliability of the water system and minimizes the possibility of localized subsidence due to localized over-drafting. To eliminate the possibility of long-term overdraft conditions, at all of the City's 26 production wells, the City monitors groundwater levels and meters the groundwater pumping. To further ensure that no over-drafting is occurring the City operates a recycled water system and requires new development along the recycled water distribution system to use recycled water for approved irrigation and industrial uses. Additionally, as an effort to minimize the amount of groundwater used, the City encourages and promotes water conservation. The SCVWD recharges the groundwater basins to bank water locally and protect against drought or emergency outages. This strategy allows the District to store surplus water in the groundwater basins and enables part of the county's supply to be carried over from wet years to dry years. The District operates and maintains major recharge systems, which consist of both in-stream and off-stream facilities. Most of the local supply is recharged into the groundwater basin, either through natural stream channels, through canals, or through in-stream and off-stream ponds. In addition, imported water is delivered by the raw water conveyance system to streams and ponds for the District managed groundwater recharge program.

Recycled Water Supply

The recycled water available in the City is provided by South Bay Water Recycling (SBWR) and meets current regulations of the California State Water Resources Control Board, Division of Drinking Water (DDW) for unrestricted use. This designation allows for the use of recycled water for irrigation and industrial use within specific guidelines. The recycled water distribution system is shown in Figure 4 below.

The recycled water system has operated since 1989 with minimal interruptions in service. SBWR strives to reduce the number of instances, duration, and magnitude of any service interruptions. The use of recycled water at any site is contingent upon the completion of the necessary arrangements in accordance with SBWR, City of Santa Clara and DDW rules and regulations regarding the use of recycled water. In addition, payment must be made of

[3] City of Santa Clara 2015 Urban Water Management Plan, Appendix F

applicable fees, rates and charges. These fees/rates and charges may include but are not limited to charges for major facilities described above and delivery charges for the recycled water used.

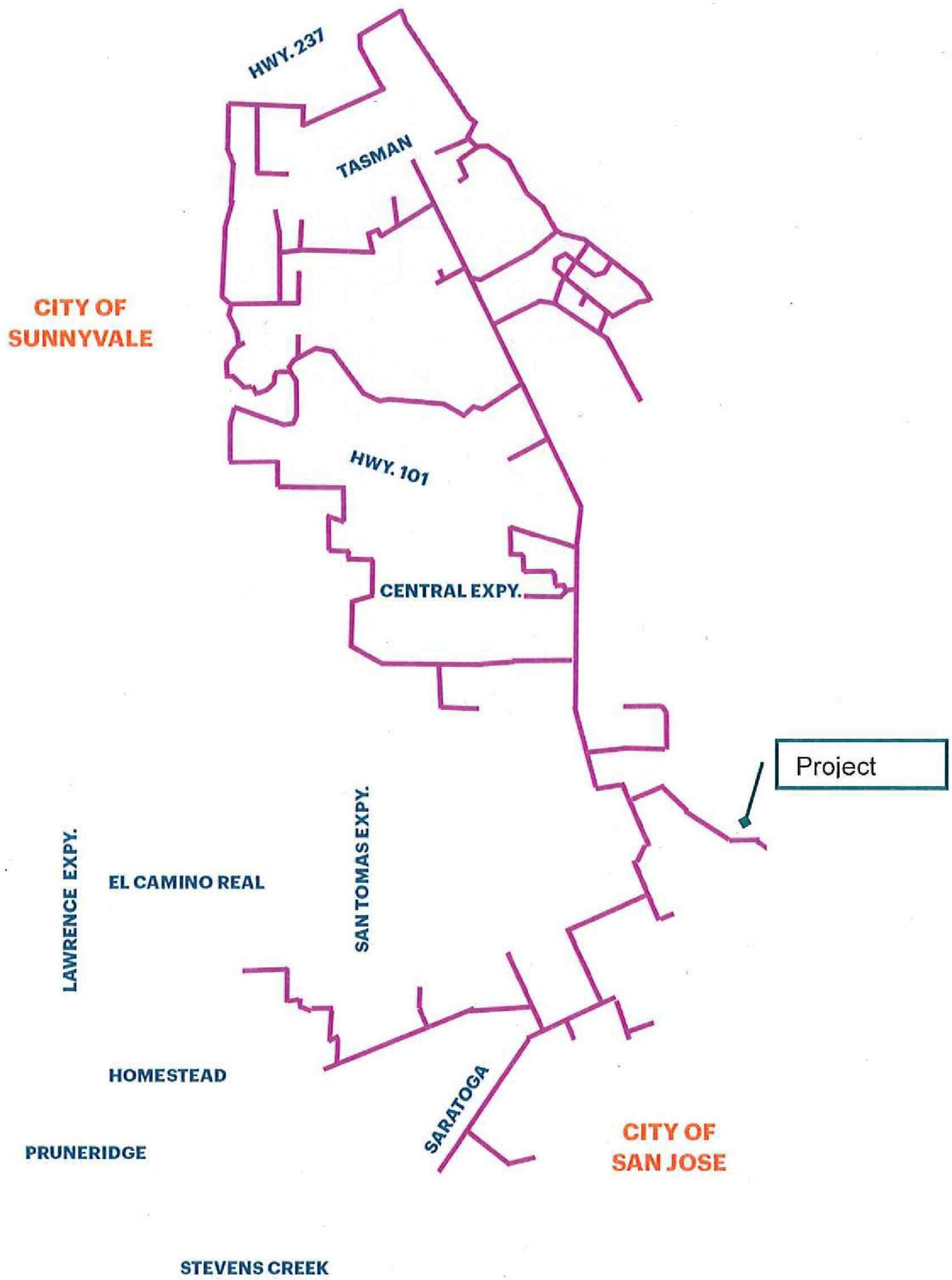

Figure 4: Recycled Water Distribution System

Water Supply Projections

The tables below show the City's projected water supplies in acre-feet for 2020-2040. Table 2A accounts for the possibility of the City's SFPUC water supply being interrupted, which is discussed later in the section titled, Water Supply and Demand Comparisons (Single, Dry, Multiple Dry Year Scenarios).

Table 2A: Projected Water Supplies (AF) (2015 UWMP)					
Water Supply	Projected Water Supply				
	2020	2025	2030	2035	2040
SCVWD	5,236	5,236	5,236	5,236	5,236
SFPUC	0	0	0	0	0
Wells	23,048	23,048	23,048	23,048	23,048
Recycled Water	5,200	5,700	6,100	6,500	6,900
Total	33,484	33,984	34,384	34,784	35,184
NOTES: Assumes interruption of SFPUC water supply after 2018.					

Table 2B: Projected Water Supplies (AF) (2015 UWMP)					
Water Supply	Projected Water Supply				
	2020	2025	2030	2035	2040
SCVWD	5,236	5,236	5,236	5,236	5,236
SFPUC	5,040	5,040	5,040	5,040	5,040
Wells	23,048	23,048	23,048	23,048	23,048
Recycled Water	5,200	5,700	6,100	6,500	6,900
Total	38,524	39,024	39,424	39,824	40,224
NOTES: Assumes no interruption of SFPUC water supply after 2018.					

Water Demands

The water demand projections were developed using an "End Use" model. Two main steps are involved in developing an End Use model: 1) Establishing base year water demand at the end-use level (such as toilets, showers) and calibrating the model to initial conditions; and, 2) Forecasting future water demand based on future demands of existing water service accounts and future growth in the number of water service accounts.

Establishing the base-year water demand at the end-use level is accomplished by breaking down total historical water use for each type of water service account (single family, multifamily, commercial, irrigation, etc.) to specific end uses (such as toilets, faucets, showers, and irrigation).

Forecasting future water demand is accomplished by determining the growth in the number of water service accounts. Once these rates of change were determined, they were input into the model and applied to those accounts and their end water uses. The end use model also incorporates the effects of the plumbing (California Plumbing Code 401.3) and appliance codes on fixtures and appliances including toilets (1.6 gal/flush), showerheads (2.5 gal/minute), and washing machines (lower water use) on existing and future accounts.

The basic methodology of the model is to break down water usage into an average consumption per account type. Projections are made regarding potential reductions in average consumption based on water conservation programs, and natural replacement of less water efficient processes with more efficient processes. These projections are used to adjust the future average consumption per account figures. Projections of the future number of accounts for each user type of the future number of accounts are also calculated, typically based on other technical studies such as Association of Bay Area Governments (ABAG) projections or census data. The projected number of accounts is based on the projected number of housing units for residential or the projected number of jobs in the case of the industrial and commercial categories. Once the number of accounts and the average consumption per account are calculated, the number of accounts for each future year is multiplied by the average consumption per account for that year to arrive at a total water demand for each user type. The 2015 UWMP Demand Projections by Category are listed below in Table 3. Projected increases in demands for each use category are found in Table 3A.

Table 3: 2015 Demand and 2020-2040 Demand Projections by Category (AF)

Use Type	2015	2020	2025	2030	2035	2040
Single Family	4,153.0	5,926.6	6,320.5	6,405.2	6,467.3	6,492.7
Multi-Family	4,075.0	5,633.8	6,128.3	6,340.5	6,544.8	6,719.8
Commercial	5,240.0	7,101.4	7,640.0	7,819.2	8,043.0	8,217.3
Industrial	1,903.0	2,282.1	2,430.6	2,459.9	2,487.5	2,500.8
Institutional	577.0	827.0	910.1	951.8	991.8	1,027.6
Municipal	405.0	593.9	653.6	683.5	712.2	737.8
Recycled Water	3,529.0	4,700.0	5,700.0	6,100.0	6,500.0	6,900.0
Losses	1,267.0	1,167.2	1,256.9	1,287.0	1,317.6	1,341.0
TOTAL	21,149.0	28,232.0	31,040.0	32,047.1	33,064.2	33,937.0

Table 3A: Projected Changes in Water Demands (AF) (2015 UWMP)					
Use Type	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Single Family	1,773.6	393.9	84.7	62.1	25.4
Multi-Family	1,558.8	494.5	212.2	204.3	175.0
Commercial	1,861.4	538.6	179.2	223.8	174.3
Industrial	379.1	148.5	29.3	27.6	13.3
Institutional	250.0	83.1	41.7	40.0	35.8
Municipal	188.9	59.7	29.9	28.7	25.6
Recycled Water	1,717.0	1,000.0	400.0	400.0	400.0
Losses	-99.8[a]	89.7	30.1	30.6	23.4
TOTAL	7,083.0	2,808.0	1,007.1	1,017.1	872.8

[a] negative losses for 2015-2019 are due to anticipated reductions in water loss due to system improvements and increased water loss monitoring

Water Supply and Demand Comparisons (Normal, Single, Dry, Multiple Dry Year Scenarios)[4]

Average, single, and multiple dry years based on historic hydrologic and water supply conditions were identified by the SCVWD. During normal water years, water supplies should be adequate to meet projected demands through 2040.

Table 4A Retail: Normal Year Supply and Demand Comparison (AF)					
	2020	2025	2030	2035	2040
Supply	33,484	33,984	34,384	34,784	35,184
Demand	28,232	31,040	32,047	33,064	33,937
Difference	5,252	2,944	2,337	1,720	1,247
NOTES: Assumes SFPUC supply does *not* exist beyond 2018					

Table 4B Retail: Normal Year Supply and Demand Comparison (AF)					
	2020	2025	2030	2035	2040
Supply	38,524	39,024	39,424	39,824	40,224
Demand	28,232	31,040	32,047	33,064	33,937
Difference	10,292	7,984	7,377	6,760	6,287
NOTES: Assumes SFPUC supply exists beyond 2018					

[4] City of Santa Clara 2015 Urban Water Management Plan

During a single dry year, the City projects no reduction in supplies from groundwater. Per the SCVWD handout dated May 18, 2016[5], treated surface water is not expected to be reduced in a single dry year event until 2040, when it could be reduced anywhere from 5-10%. For planning purposes, the 10% worst case scenario will be used in all single dry year projections. SFPUC has indicated that during a single critical dry year it will follow the Tier 2 reduction plan described in the 2015 UWMP. SFPUC will reduce their total water supply by 10% from 184 mgd to 152.6 mgd in a single dry year as shown in Table 1 of the letter from the SFPUC[6]. City of Santa Clara will receive 1.17% of the 152.6 mgd as shown in Table 3 of the letter from the SFPUC. Recycled water use and water conservation are projected to remain unchanged or potentially increase due to public awareness, during a critical dry year. The resulting analysis of available supplies is shown in Table 5A and Table 5B below. During a single critical dry year, there are no projected shortfalls in total available water supplies independent of whether the City receives or does not receive SFPUC water supply water after contract negotiations in 2018.

Table 5A Retail: Single Dry Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply	33,484	33,984	34,384	34,784	34,660
Demand	28,232	31,040	32,047	33,064	33,937
Difference	5,252	2,944	2,337	1,720	723
NOTES: Assumes SFPUC supply does *not* exist beyond 2018					

Table 5B Retail: Single Dry Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply	35,485	35,985	36,385	36,785	36,661
Demand	28,232	31,040	32,047	33,064	33,937
Difference	7,253	4,945	4,338	3,721	2,724
NOTES: Assumes SFPUC supply exists beyond 2018					

During a multiple dry year event, the City projects no reduction in supplies from groundwater. Per a SCVWD handout dated May 18, 2016[7], treated surface water is expected to be reduced in a multiple dry year event beginning in 2020, when it could be reduced anywhere from 0-40%. For planning purposes, a 30% worst case scenario will be used in 2020 projections, 15% in 2025 projections, 25% in 2030 projections, 35% in 2035 projections, and 40% in 2040 projections based on SCVWD demand reductions. SFPUC has indicated that during multiple critical dry years the City can expect a maximum reduction of SFPUC water supplies of 33% of

[5] City of Santa Clara 2015 Urban Water Management Plan, Appendix H
[6] City of Santa Clara 2015 Urban Water Management Plan, Appendix I
[7] City of Santa Clara 2015 Urban Water Management Plan, Appendix H

normal. SFPUC has indicated that in the second and third year of a drought, they will reduce their water supply from 184 mgd to 129.2 mgd. For SFPUC supplies, Table 6B assumes a worst-case scenario based on a replication of the 1987-1992 multiple dry year event. The City of Santa Clara will still receive 1.17% of the 129.2 mgd amount as shown in Table 3 of SFPUC's Tier 2 plan in the 2015 UWMP[8]. Table 6A assumes that SFPUC water is unavailable after 2018. Recycled water use and water conservation are projected to remain unchanged during a multiple dry year event. The resulting analysis of all available supplies is shown in Table 6A and 6B below. During a multiple critical dry year event, there is a projected shortfall in available water supplies after 2035 if the City does not receive SFPUC water supply after contract negotiations in 2018, as shown below in Table 6A. However, the difference in supply can be made-up through water provided by projected future water supply projects discussed in the 2015 UWMP. These assumptions also yield a conservative estimate since during a critical multiple dry year event, mandatory conservation measures and increased recycled water usage would be expected to reduce potable water demand.

Table 6A: Multiple Dry Years Supply and Demand Comparison (AF)

		2020	2025	2030	2035	2040
First year	Supply	31,913	33,199	33,075	32,951	33,090
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	3,681	2,159	1,028	-113	-847
Second year	Supply	31,913	33,199	33,075	32,951	33,090
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	3,681	2,159	1,028	-113	-847
Third year	Supply	31,913	33,199	33,075	32,951	33,090
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	3,681	2,159	1,028	-113	-847
NOTES: Assumes SFPUC supply does *not* exist beyond 2018						

[8] City of Santa Clara 2015 Urban Water Management Plan, Appendix L

Table 6B: Multiple Dry Years Supply and Demand Comparison (AF)						
		2020	2025	2030	2035	2040
First year	Supply	33,914	35,200	35,076	34,952	35,091
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	5,682	4,160	3,029	1,888	1,154
Second year	Supply	33,607	34,892	34,768	34,645	34,783
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	5,375	3,852	2,721	1,581	846
Third year	Supply	33,607	34,892	34,768	34,645	34,783
	Demand	28,232	31,040	32,047	33,064	33,937
	Difference	5,375	3,852	2,721	1,581	846
NOTES: Assumes SFPUC supply exists beyond 2018						

With the uncertainties inherent in future imported water supplies, the City plans to meet future demand growth by pumping additional groundwater, relying on more recycled water, and increased conservation. Given the potential for decreased SFPUC imported surface deliveries, CEQA requires disclosure of the environmental impacts, if any, of meeting future demand growth with increased supplies coming from pumping more groundwater. There are not anticipated to be any reasonably foreseeable impacts associated with increased use of recycled water and conservation, which is anticipated to occur through replacement of more water-efficient appliances, i.e. clothes washers, dishwashers, toilets, etc., and programs to encourage drought-tolerant landscaping on private property and on City properties. Mandatory conservation during a multiple year drought may also require prohibitions on outdoor use (irrigation, car washing, washing down pavement, etc.) and water rationing. As noted above, numerous conservative assumptions were made regarding both water supply and demand. Therefore, it is the conclusion of the Water Utility that adequate water supplies are available to meet the water demands projected until 2040.

Projected Water Demand for the Proposed Project

The total water demand for this Project is calculated to be 335.0 AF/yr. This represents an increase in water demand of 320.3 AF/yr over the historic water demand at the Project site. Historic water usage at the original Project site was taken into account in the 2015 UWMP, therefore this Assessment will only address the City's ability to meet the increased water demand. Average historical usage was calculated using the site's existing water demand from 2011-2015, excluding the period from August 2014 through 2015 when the City implemented its Water Shortage Contingency Plan in an effort to meet potable water demand reduction targets in response to the Governor's Emergency Drought Regulations. The proposed increase, tabulated in Table 9 of this section, is within the growth projections in the 2015 UWMP (Table 3A of this Assessment).

Water Demand to Be Met by Recycled Water

Recycled water is currently available at the Project site to provide landscape irrigation to the proposed on-site landscaping. This would result in an 18.4 AF/yr reduction in potable water demands for the Project. Although recycled water service is available to serve the project site and would result in significant potable water savings, all water demands will be calculated as potable water demand for this assessment.

Summary of Existing and Estimated Water Demands

A summary of the existing and estimated water demands for the Plan are found in Table 7 below. The existing and estimated water demands are further broken down in Table 7A into projected annual demand increases based on construction timelines submitted by the Applicant.

Table 7: Existing and Estimated Water Demand per Year for Project

	Status	Development	Units	Gal/Day	Acre-Ft/Yr
Retail Space	Proposed	33,000	sq. ft.	1,650.0	1.8
Hotel Development	Proposed	182,000	sq. ft.	87,360.0	97.9
Residential	Proposed	1,600	Multi-Family	193,600.0	216.9
Irrigation	Proposed	213,800	sq. ft.	16,462.6	18.4
Historic Usage	Existing	Commercial		(13,110.8)	(14.7)
TOTAL DEMAND (increase per year)				285,961.8	320.3

Table 7A: Project Water Demand Increase (Acre-Ft/Yr)

	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Retail Space	0.7	0.6	0.4	0.0	0.0
Hotel Development	0.0	0.0	97.9	0.0	0.0
Residential	35.4	181.5	0.0	0.0	0.0
Irrigation	3.0	13.7	1.8	0.0	0.0
Historic Usage	(14.7)	0.0	0.0	0.0	0.0
TOTAL	24.4	195.8	100.1	0.0	0.0

Projected Water Demand for Other Proposed Projects

Tables 8 and 9 show a summary of the projected water demand changes by user category. If the timeframe for a project to be built spans several years, the earliest possible date was used to calculate the changes in Table 9. The use categories of Single Family, Multi-Family, Commercial, Industrial, Institutional, and Municipal match the use categories used in the development of the 2015 UWMP. The values in Tables 8 and 9 below summarize the projected changes in water demand for each user category and the planning period in which the change is expected to occur. If a proposed project resulted in a change of use, such as a commercial building being converted to single-family residential housing, the existing water demand was subtracted from the corresponding category and the new water demand was added to the category for the new use. Since this Project represents the first water supply assessment since the adoption of the 2015 UWMP, Table 8 summarizes previous WSAs for projects that were incorporated into the 2015 UWMP that have not yet been completed. A complete listing of these projects and their associated water demands are contained in Appendix A.

Table 8: Changes in Water Demand (excluding Gateway Crossings)

	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Single Family	0.0	0.0	0.0	0.0	0.0
Multi-Family	609.2	399.1	29.8	151.8	80.6
Commercial	1034.8	535.6	458.1	186.8	12.0
Industrial	0.0	0.0	0.0	0.0	0.0
Institutional	82.9	0.0	0.0	0.0	0.0
Municipal	0.0	0.0	0.0	0.0	0.0
TOTAL	1,726.9	934.7	487.9	338.6	92.6

Table 9: Changes in Water Demand (including Gateway Crossings)

Use Type	2015-2019	2020-2024	2025-2029	2030-2034	2035-2040
Single Family	0.0	0.0	0.0	0.0	0.0
Multi-Family	644.6	580.6	29.8	151.8	80.6
Commercial	1023.8	549.9	558.2	186.8	12.0
Industrial	0.0	0.0	0.0	0.0	0.0
Institutional	82.9	0.0	0.0	0.0	0.0
Municipal	0.0	0.0	0.0	0.0	0.0
TOTAL	1,751.3	1,130.5	588	338.6	92.6

Conclusion

This Assessment analyzed the impacts of changes in contractual limitations on water supply, development projects, and other additional factors that have occurred since the original 2015 UWMP was developed. Therefore, based on the analysis contained in this Assessment, the City of Santa Clara Water Utility has determined that there are sufficient water supplies to provide service to the proposed Project.

References

California Department of Water Resources. (2003). *California's Groundwater: Bulletin 118.* Retrieved 2017, from http://www.water.ca.gov/groundwater/bulletin118/index.cfm/

California Department of Water Resources. (2014, June). *Groundwater Basin Prioritization.* Retrieved 2017, from Final CASGEM Basin Prioritization Results: http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm

City of Santa Clara. (2016). *City of Santa Clara 2015 Urban Water Management Plan.* Retrieved from www.santaclaraca.gov/uwmp

Appendix A

Project	Address	Number	Units	Use	Water Demand (AF)	Existing Demand (AF)	Demand Delta (AF)	Recycled Water Available?	Buildout Completion Date
Gateway Crossings	1205 Coleman Avenue	33,000	Sq. ft.	Retail	1.8	14.7	320.3	No	2019-2025
		182,000	Sq. ft.	Hotel	97.9			No	2025
		1,600	Dwelling Units	Residential	216.9			No	2019-2022
		213,800	Sq. ft.	Irrigation	18.4			Yes	2019-2025
BART Santa Clara Station and Joint Development WSA	335 Brokaw Road	30,000	Sq. ft.	Retail	1.7	6.7	80.6	No	2025
		500,000	Sq. ft.	Office	50.4				
		9,000	Sq. ft.	BART Station/Maintenance Yard	5.4				
		220	Dwelling Units	Residential	29.8				
Santa Clara University Development Plan	500 El Camino Real	528,900	Sq. ft.	Institutional	82.9	43.0	60.4	No	2016-2019
		151	Dwelling Units	Residential	20.5				
Lawrence Station Area Plan (Phase I)	TBD	53,040	Sq. ft.	Retail	3.0	45.4	232.7	No	2020
		12,904	Sq. ft.	Amenity	1.6				
		366,351	Sq. ft.	Irrigation	31.6				
		1,785	Dwelling Units	Residential	241.9				
Lawrence Station Area Plan (Phase II)	TBD	33,280	Sq. ft.	Retail	1.9	28.5	146.0	No	2030
		8,097	Sq. ft.	Amenity	1.0				
		229,867	Sq. ft.	Irrigation	19.8				
		1,120	Dwelling Units	Residential	151.8				
Lawrence Station Area Plan (Phase III)	TBD	17,680	Sq. ft.	Retail	1.0	15.1	77.5	No	2035
		4,301	Sq. ft.	Amenity	0.5				
		122,117	Sq. ft.	Irrigation	10.5				
		595	Dwelling Units	Residential	80.6				

Project	Address	Number	Units	Use	Water Demand (AF)	Existing Demand (AF)	Demand Delta (AF)	Recycled Water Available?	Buildout Completion Date
Santa Clara Square Apartments	TBD	4,500	Sq. ft.	Office	0.5	119.5	168.3	Yes	2018
		40,000	Sq. ft.	Retail	2.2				
		38,000	Sq. ft.	Amenity	4.7				
		422,000	Sq. ft.	Irrigation	36.4				
		1,800	Dwelling Units	Residential	244.0				
City Place Parcel 5 (Phase 1)	TBD	258,000	Sq. ft.	Office	26.0	311.3	(95.3)	Yes	2019
		87,000	Sq. ft.	Retail	4.9				
		280,000	Sq. ft.	Hotel	150.5				
		87,100	Sq. ft.	Irrigation	7.5				
		200	Dwelling Units	Residential	27.1				
City Place Parcel 4 (Phases 2-4)	TBD	1,386,400	Sq. ft.	Office	139.8	0*	656.6	Yes	2020-2023
		1,415,000	Sq. ft.	Retail	79.2				
		298,000	Sq. ft.	Hotel	160.2				
		1,393,900	Sq. ft.	Irrigation	120.2				
		1,160	Dwelling Units	Residential	157.2				
City Place Parcel 3 (Phase 5)	TBD	720,000	Sq. ft.	Office	72.6	0*	152.6	Yes	2025
		927,800	Sq. ft.	Irrigation	80.0				
City Place Parcel 1 (Phase 6)	TBD	1,200,000	Sq. ft.	Office	121.0	0*	192.8	Yes	2027
		832,000	Sq. ft.	Irrigation	71.8				
City Place Parcel 2 (Phase 7)	TBD	1,080,000	Sq. ft.	Office	108.9	0*	164.1	Yes	2029
		640,350	Sq. ft.	Irrigation	55.2				
City Place Parcel 2 (Phase 8)	TBD	1,080,000	Sq. ft.	Office	108.9	0*	164.1	Yes	2031
		640,350	Sq. ft.	Irrigation	55.2				
Santa Clara Square	2465-2727	138,000	Sq. ft.	Retail	7.7	46.8	207.7	Yes	2014-2015
		1,862,100	Sq. ft.	Office	189.7				

Project	Address	Number	Units	Use	Water Demand (AF)	Existing Demand (AF)	Demand Delta (AF)	Recycled Water Available?	Buildout Completion Date
	Augustine 3333 Bowers	661,900	Sq. ft.	Irrigation	57.1				
3515 Monroe St.	3515 Monroe St.	825	Dwelling Units	Residential	158.0	6.1	179.2	No	2015-2017
		14,929	Sq. ft.	Amenity	1.3				
		15,200	Sq. ft.	Retail	0.9				
		20,000	Sq. ft.	Market	5.4				
		5,000	Sq. ft.	Restaurant	5.8				
		161,483	Sq. ft.	Irrigation	13.9				
3333 Scott Blvd.	3333 Scott Blvd.	1,358,647	Sq. ft.	Office	137.0	9.5	154.5	Yes	2015-2017
		284,000	Sq. ft.	Irrigation	27.0				
3700 El Camino Real	3700 El Camino Real	475	Dwelling Units	Residential	159.6	1.2	283.7	No	2016-2019
		86,388	Sq. ft.	Retail	4.8				
		133,000	Sq. ft.	Irrigation	120.5				
2200 Lawson Lane	2200 Lawson Lane	300,000	Sq. ft.	Office	30.2	5.8	110.8	No	2014-2016
		95,300	Sq. ft.	Irrigation	86.4				
3000 Bowers Avenue	3000 Bowers Avenue	300,000	Sq. ft.	Office	30.2	0.7	113.7	No	2013-2015
		92,925	Sq. ft.	Irrigation	84.2				

*Existing demand accounted for in Phase 1 of City Place Project

Water demands were recalculated using the updated water use factors in the 2015 UWMP: Office (0.09 gpd/sf); Retail (0.05 gpd/sf)

gpd = gallons per day

sf = square feet

City of Santa Clara

Gateway Crossing Mixed Use Sewer Capacity Study

Prepared for: Tod Brokaw LLC
Hunter Properties Inc.
10121 Miller Avenue, Suite 200
Cupertino, CA 95014

Date: June 2017

Prepared by: V&A consulting engineers

<V&A Project No. 17-0099>

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Tables

Figures

Photo Log

1 Introduction

V&A Consulting Engineers (V&A) was retained by Tod Brokaw LLC (Brokaw) to perform sanitary sewer flow monitoring and a sewer capacity study within the City of Santa Clara, California (City). Open-channel flow monitoring was performed at one manhole for two weeks from May 12, 2017 through May 26, 2017. The purpose of this study was to identify the average and peak flows and determine the available capacity of the subject pipeline.

Flow monitoring sites are identified as the manholes where the flow monitors were secured and the pipelines wherein the flow sensors were placed. Capacity analysis and flow rate information is presented on a site-by-site basis.

The flow monitoring site was selected and approved by Brokaw. Information regarding the flow monitoring location is listed in Table 1-1 and shown in Figure 1-1. Figure **1-1** also illustrates the location of the proposed new development at Coleman Avenue and Brokaw Road and its proximity to the flow monitoring site. A detailed description of the flow monitoring site, including photographs, is included in Appendix A.

Table 1-1. List of Flow Monitoring Locations

Manhole ID	Location	Pipe Diameter	Pipe Material	Inlet
MH 24	Coleman Avenue and Brokaw Road	10"	VCP	South

Figure 1-1. Map of Flow Monitoring Site

2 Methods and Procedures

2.1 Confined Space Entry

A confined space (Photo 2-1) is defined as any space that is large enough and so configured that a person can bodily enter and perform assigned work, has limited or restricted means for entry or exit and is not designed for continuous employee occupancy. In general, the atmosphere must be constantly monitored for sufficient levels of oxygen (19.5% to 23.5%), and the presence of hydrogen sulfide (H_2S) gas, carbon monoxide (CO) gas, and lower explosive limit (LEL) levels. A typical confined space entry crew has members with OSHA-defined responsibilities of Entrant, Attendant and Supervisor. The Entrant is the individual performing the work. He or she is equipped with the necessary personal protective equipment needed to perform the job safely, including a personal four-gas monitor (Photo 2-2). If it is not possible to maintain line-of-sight with the Entrant, then more Entrants are required until line-of-sight can be maintained. The Attendant is responsible for maintaining contact with the Entrants to monitor the atmosphere using another four-gas monitor and maintaining records of all Entrants, if there is more than one. The Supervisor is responsible for developing the safe work plan for the job at hand prior to entering.

Photo 2-1. Confined Space Entry

Photo 2-2. Typical Personal Four-Gas Monitor

2.2 Flow Meter Installation

V&A installed one Isco 2150 area-velocity flow meter for temporary metering within the collection system. Isco 2150 meters use submerged sensors with a pressure transducer to collect depth readings and an ultrasonic Doppler sensor to determine the average fluid velocity. The ultrasonic sensor emits high-frequency (500 kHz) sound waves, which are reflected by air bubbles and suspended particles in the flow. The sensor receives the reflected signal and determines the Doppler frequency shift, which indicates the estimated average flow velocity. The sensor is typically mounted at a manhole inlet to take advantage of smoother upstream flow conditions. The sensor may be offset to one side to lessen the chances of fouling and sedimentation where these problems are expected to occur. Manual level and velocity measurements were taken during installation of the flow meters and again when they were removed and compared to simultaneous level and velocity readings from the flow meters to ensure proper calibration and accuracy. Figure 2-1 shows a typical installation for a flow meter with a submerged sensor.

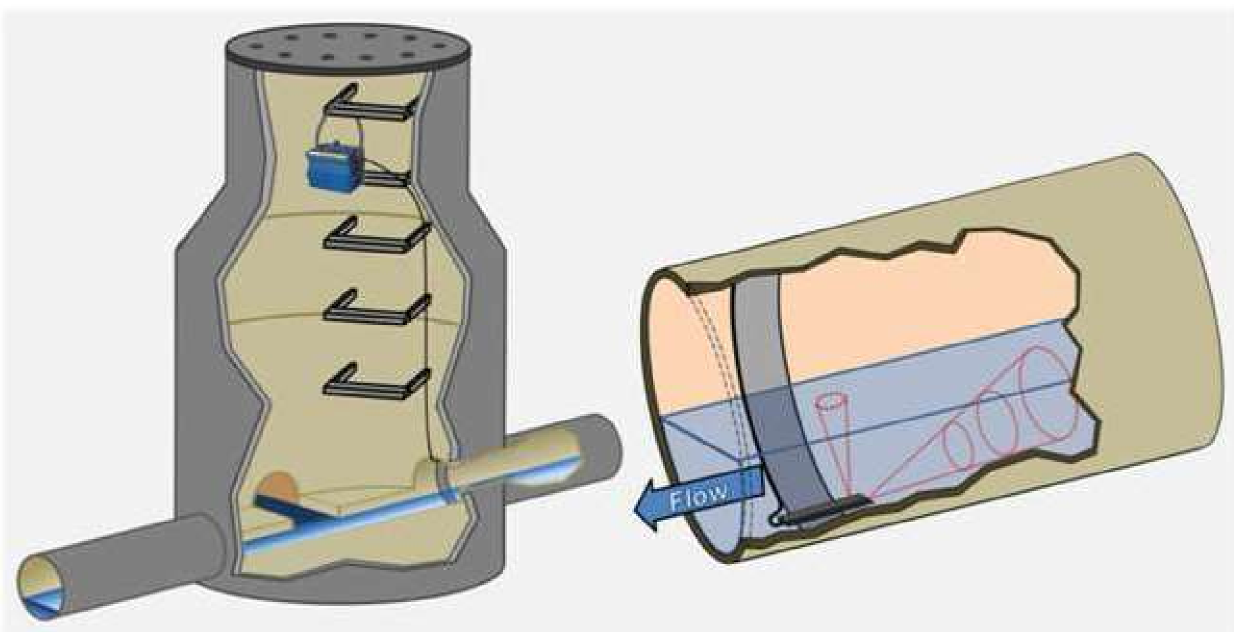


Figure 2-1. Typical Installation for Flow Meter with Submerged Sensor

2.3 Flow Calculation

Data retrieved from the flow meter was placed into a spreadsheet program for analysis. Data analysis includes data comparison to field calibration measurements, as well as necessary geometric adjustments as required for sediment (sediment reduces the pipe's wetted cross-sectional area available to carry flow). Area-velocity flow metering uses the continuity equation,

$$Q = v \cdot A = v \cdot (A_T - A_S)$$

where Q : volume flow rate
v: average velocity as determined by the ultrasonic sensor
A: cross-sectional area available to carry flow
A_T: total cross-sectional area with both wastewater and sediment
A_S: cross-sectional area of sediment.

For circular pipe,

$$A_T = \left[\frac{D^2}{4}\cos^{-1}\left(1 - \frac{2d_W}{D}\right)\right] - \left[\left(\frac{D}{2} - d_W\right)\left(\frac{D}{2}\right)\sin\left(\cos^{-1}\left(1 - \frac{2d_W}{D}\right)\right)\right]$$

$$A_S = \left[\frac{D^2}{4}\cos^{-1}\left(1 - \frac{2d_S}{D}\right)\right] - \left[\left(\frac{D}{2} - d_S\right)\left(\frac{D}{2}\right)\sin\left(\cos^{-1}\left(1 - \frac{2d_S}{D}\right)\right)\right]$$

where d_W: distance between wastewater level and pipe invert
d_S: depth of sediment
D: pipe diameter

3 Flow Monitoring Results

3.1 Design Flow Determination

The flow monitoring design flow determination as defined by the City Standard is as follows:

$Q_D = Q_M + Q_{WWGWI} + Q_{RD\ I/I} + Q_{PD}$

Where:

Q_D = Design Flow

Q_M = Monitored Flow

Q_{WWGWI} = Wet Weather Groundwater Infiltration

$Q_{RD\ I/I}$ = Rainfall-Dependent Infiltration and Inflow

Q_{PD} = Proposed Development Peak Flow

3.2 Flow Monitoring Results

Table 3-1 lists the ADWF, peak measured flow and other calculated factors used to determine the pipeline capacity. Detailed graphs of the flow monitoring data are included in *Appendix A*.

Table 3-1. Dry Weather Flow Monitoring Summary

Item	Value
Pipe Diameter:	10 in.
Mon-Thu ADWF:	3.3 gpm
Friday ADWF:	3.3 gpm
Saturday ADWF:	3.7 gpm
Sunday ADWF:	2.6 gpm
Overall ADWF:	3.3 gpm
Peak Flow:	13.1 gpm
Peak Level:	2.41 in.
d/D Ratio:	0.24

The following information should be noted:

- There was no rainfall during the flow monitoring period. The impact of inflow and infiltration was not evaluated as this is a dry weather study. Under wet weather flow conditions, the available capacity may be less due to inflow and infiltration.

3.3 Pipeline Capacity Analysis

The pipeline capacity was estimated by using the Manning equation:

$$Q = \frac{669 \times R^{2/3} \times S^{1/2} \times A}{n}$$

where

A: Cross-sectional area of flow (ft^2)
R: hydraulic radius (ft), calculated from flow level *d* and pipe diameter *D*
S: Pipeline slope (ft/ft)
n: Roughness coefficient (unitless)
Q: Flow rate (ft^3/s)

The following factors were selected to determine the pipeline capacity.

- **Roughness coefficients:** 0.013 for VCP pipe is a widely accepted number for sanitary sewer design.
- **Pipeline Slope:** The pipeline slope (was derived from the City's Sanitary Sewer System Index Map (page S48).
- **Design Flow Depth:** The City Standard requires that sewer should be designed for peak flow rate not to exceed 75% full pipe.

Table 3-2. Pipeline Capacity

Item	Value
CAPACITY	
Manhole ID	MH 27
Pipe Diameter	10.0
Full-Pipe Capacity (gpm)	436.8
FLOW MEASUREMENT	
Monitored Average Flow (gpm)	3.3
Measured Peak Flow (gpm)	13.1

Per the City's Standards for the flow monitoring design flow determination, the monitored flow (QM) is the greater of the following:

- **Monitored Flow:** Per the City's Standards for the flow monitoring design flow determination, the monitored flow (Q_M) is the greater of the following:

  Q_M = Monitored Peak Flow = 13.1 gpm

  OR

  Q_M = 2.5 X Monitored Average Flow = 2.5 x 3.3 gpm = 8.25 gpm

THEREFORE,

$$Q_M = 13.1 \text{ gpm}$$

3.4 Derived Flow Results

3.4.1 Proposed Development Flows

The proposed development is a mix of commercial and residential space. The peak development flow is calculated in Table 3 2. The Base Wastewater Unit Flow Factors established by the City can be found in Appendix B.

Table 3-3. Flow Generation from Proposed Development

Use/Type	Unit/ft^2	Sewage Generation Rate[1]	Flow (Gal/Day)
Studio	213 units	154 gpd/DU	32,802
1-Bedroom (1BR, 1BA)	792 units	154 gpd/DU	121,968
2-Bedroom (2BR, 1BA)	595 units	175 gpd/DU	104,125
Commercial Space	215,000 ft^2	0.1 gpd/ft^2	21,500
Q_{PD}, Proposed Development Peak Flow			**280,395 (195 GPM)**

THEREFORE,

$$Q_{PD} = 195 \text{ gpm}$$

3.4.2 Wet Weather Groundwater Infiltration (QWWGWI)

The wet weather groundwater infiltration (QWWGWI) is derived from multiplying the wet weather groundwater infiltration (factor) by the tributary area served by the sanitary sewer main being monitored. The tributary areas upstream of the monitored site are shown in Figure 3 3. The project site is located within the tributary area M_15 (Appendix B). The factor for this area is 700 gpd/acre established by the City Standard as shown in Appendix B.

QWWGWI Site = WWGWI x Tributary Area

= 700 gpd/acre x 20 acres = 14000 gpd or 9.72 gpm

THEREFORE,

Q_{WWGWI} = 9.7 gpm

Figure 3-1. Approximate Tributary Area of Development

3.4.3 Rainfall-Dependent Infiltration and Inflow (QRDI/I)

The rainfall-dependent infiltration and inflow (QRDI/I) is derived the same way as the wet weather groundwater infiltration. Per City Standards, 1,000 gpd/acre is used for QRDI/I flow determination.

QRDI/I Site 1 = RDI/I x Tributary Area

= 1,000 gpd/acre x 20 acres = 20,000 gpd or 13.9 gpm

THEREFORE,

$Q_{RDI/I}$ = 14.0 gpm

3.4.4 Design Flow (QD)

Table 3-4 shows the summary of the design flow results including both monitored flow results and derived flow results.

Table 3-4. Design Flow Results

Item	Value
Q_M, Monitored Peak Flow (gpm)	13.1
Q_{WWGWI}, Wet Weather Groundwater Infiltration (gpm)	9.7
$Q_{RDI/I}$, Rainfall Dependent Infiltration and Inflow (gpm)	14.0
Q_{PD}, Proposed Development Peak Flow (gpm)	195.0
Q_D, Design Flow (gpm)	231.8

THEREFORE,

Q_D = 231.8 gpm

3.4.5 Estimated Pipeline Capacity

Table 3-5 summarizes the capacity analysis for the pipelines that would be affected by the proposed development area. The affected pipelines have adequate capacity to convey additional post-development peak flows per the City's peak allowable flow standards.

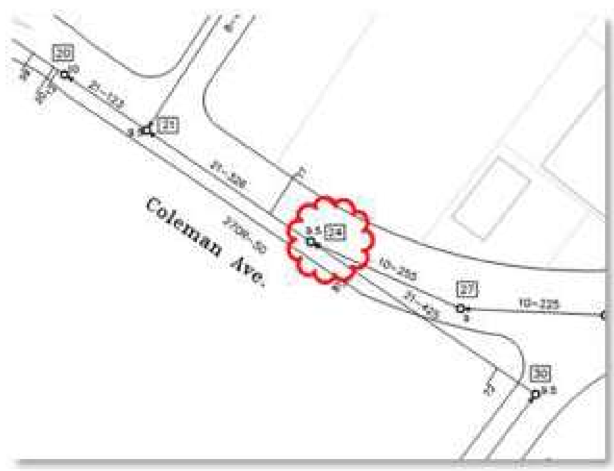
Table 3-5. Pipeline Capacity Results Summary

Item	Value
Estimated 100% Capacity of Pipeline (gpm)	436.8
City Allowable Peak Flow at 0.75 d/D (gpm)	333.3
Q_D, Design Flow (gpm)	231.8
Available Capacity (gpm)	101.5
Has Capacity?	**YES**

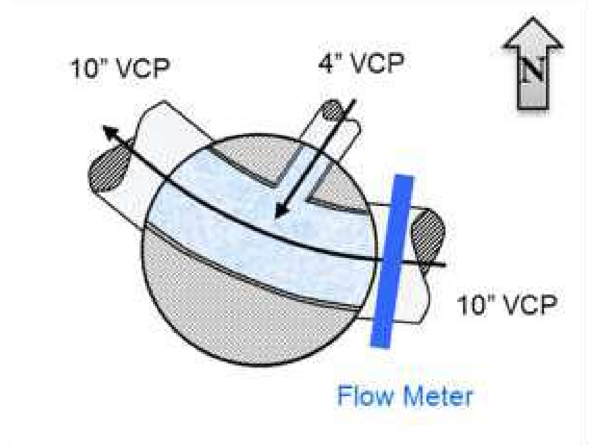
Appendix A
Flow Monitoring Site Reports: Data, Graphs, Information

Satellite View

Street View



Sanitary Sewer Map



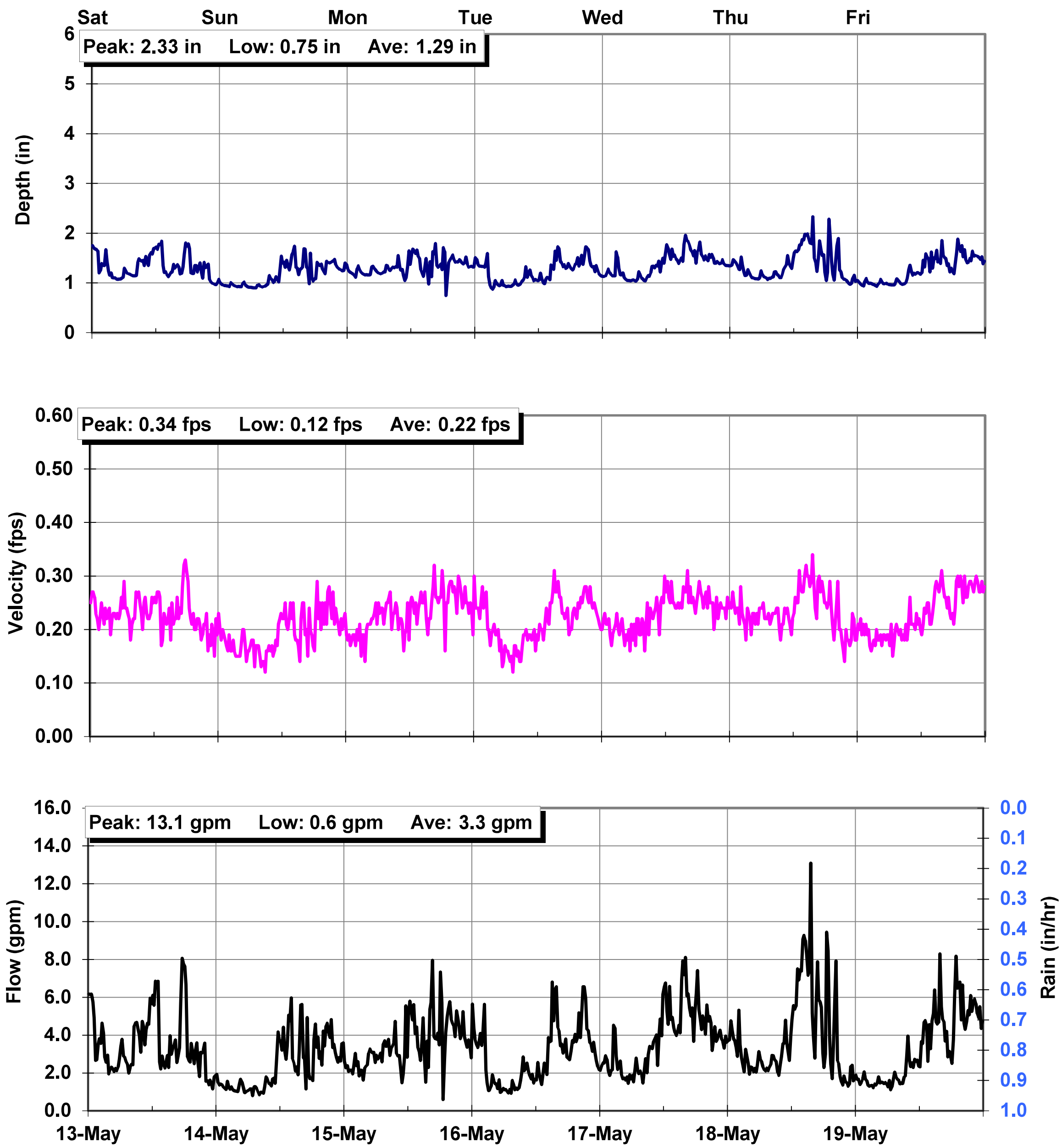
Flow Diagram

Plan View

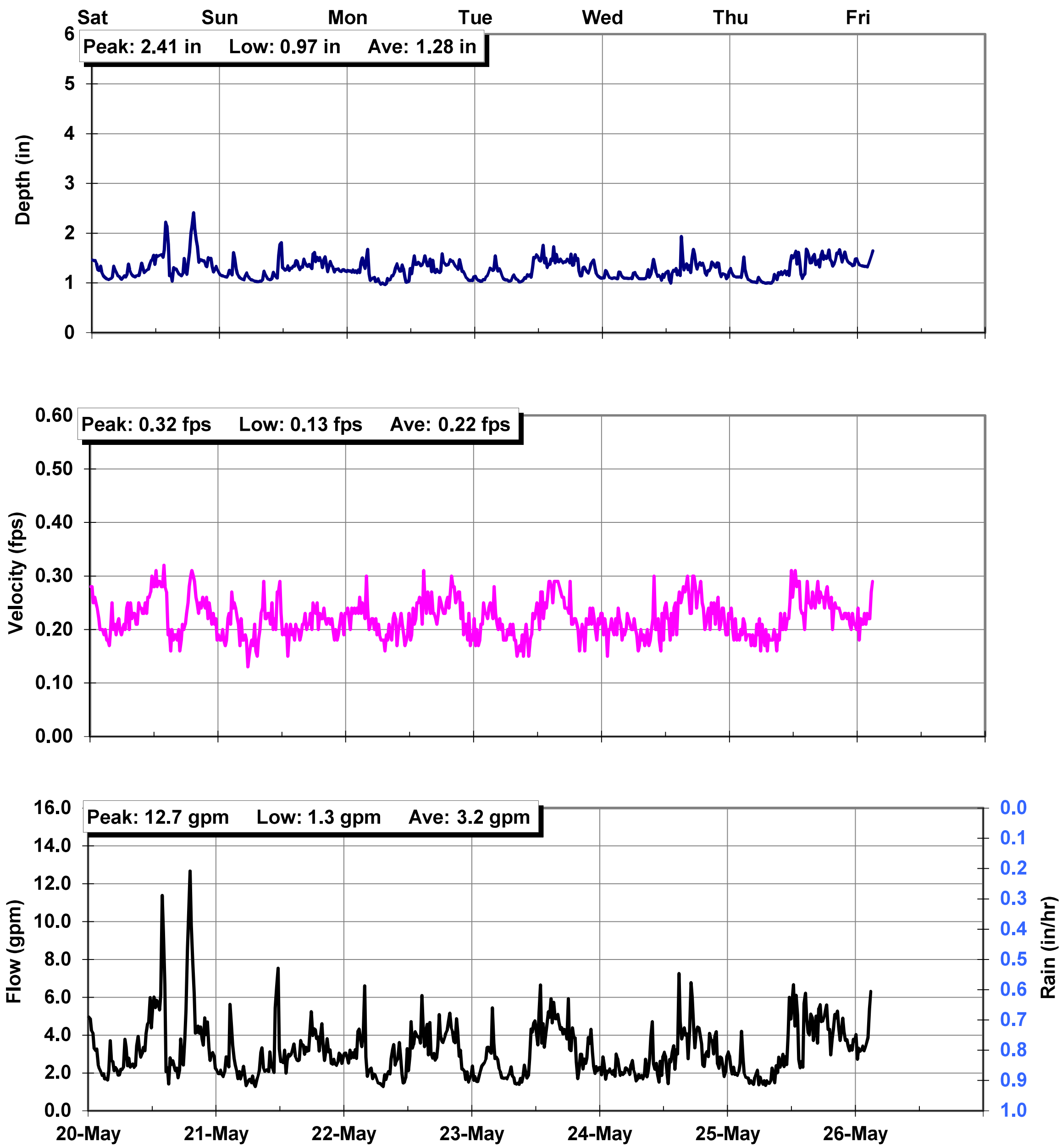
Effluent Pipe

Influent Pipe

Lateral Pipe



Flow Monitoring Details (5/13/17 to 5/19/17)



Flow Monitoring Details (5/20/17 to 5/26/17)

Appendix B
City of Santa Clara: Sanitary Sewer Capacity Assessment Standards

DESIGN CRITERIA

for Improvements in Public Right-of-Ways and City Easements

City of Santa Clara

Public Works Department

September 2014

Prior to any flow monitoring work, the proposed monitoring location(s) shall be reviewed and approved by the Director of Public Works/City Engineer. Flow monitoring measurements to determine average and peak flows, in existing pipes, shall be done over a period of at least seven (7) consecutive days with continuous mechanical/electronic measurements in a manner acceptable to the Director of Public Works/City Engineer.

An Encroachment Permit (EP) is required to allow developer to monitor the sanitary sewer flows.

. Design flow determination shall be as follows:

$Q_D = Q_M + Q_{WWGWI} + Q_{RDI/I} + Q_{PD}$

Where:

Q	=	Flow
D	=	Design
M	=	Monitored
WWGWI	=	Wet Weather Groundwater Infiltration
RDI/I	=	Rainfall-Dependent Infiltration and Inflow
PD	=	Proposed Development

Q_D	=	Design Flow
Q_M	=	The Monitored Peak Flow or 2.5 times the Monitored Average Flow, whichever is greater.
Q_{WWGWI}	=	The gpd/acre value is obtained by using Figure 3-3 on page 3-5 (see Exhibit "D" of this Design Criteria) and Table 3-2 on page 3-11 (see Exhibit "E" of this Design Criteria) of the Sanitary Sewer Capacity Assessment Report, May 2007. Multiply the factor by the Tributary Area served by the sanitary sewer main being monitored.
$Q_{RDI/I}$	=	Same as Q_{WWGWI} above. For now, use 1,000 gpd/acre.
Q_{PD}	=	Proposed Development Peak Flow.

5.5 At all changes of direction, a drop in flow line shall be installed equal to the velocity head times the ratio of angular change to 90 degrees.

$$\frac{V^2}{2g} \times \frac{A^{\circ}}{90^{\circ}} = \text{Head Loss} = \text{drop in flow line*}$$

EXHIBIT D

Figure 3-3 of Sanitary Sewer Capacity Assessment Report, May 2007

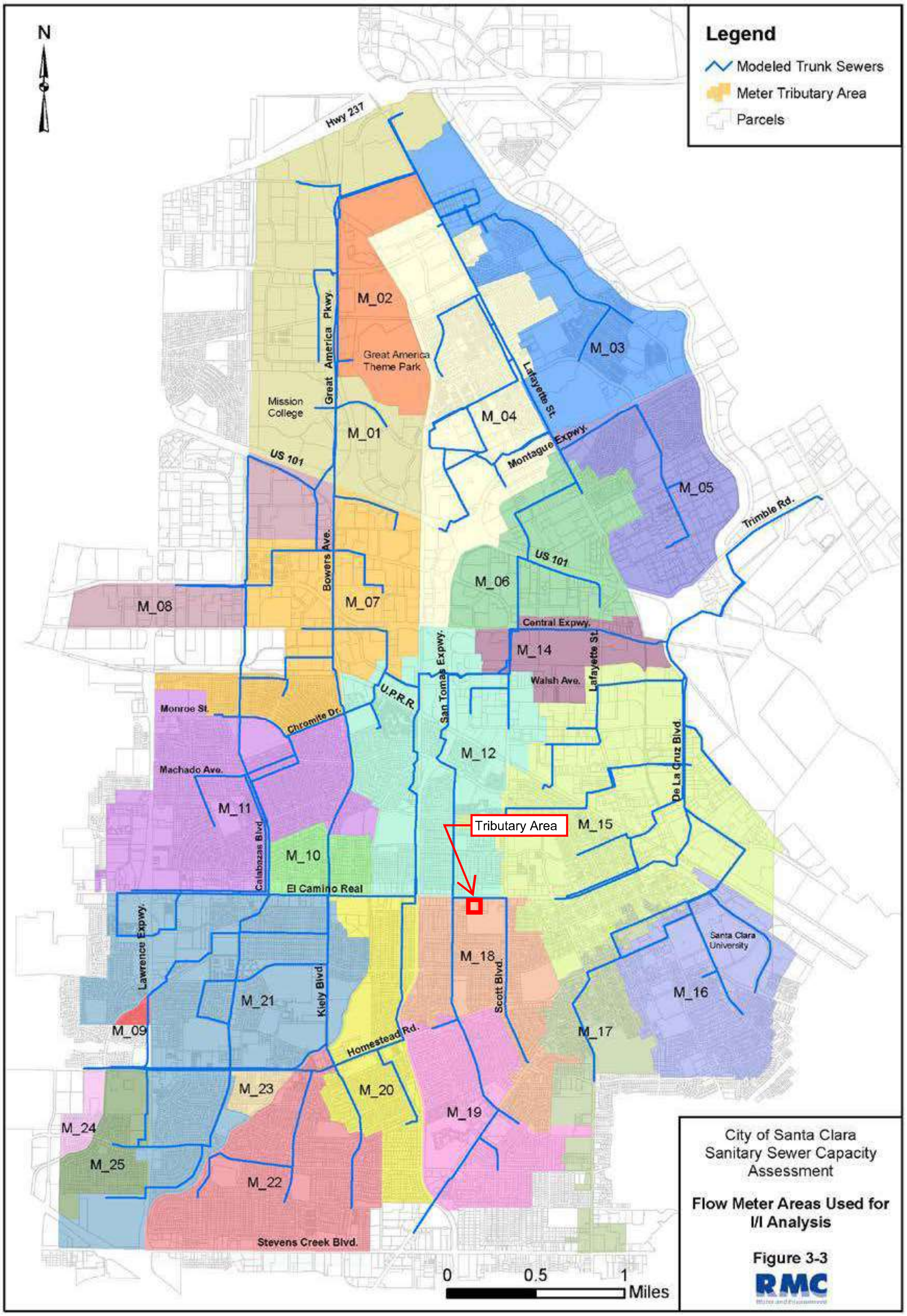


EXHIBIT E

Table 3-2 of Sanitary Sewer Capacity Assessment Report, May 2007

Table 3-2 GWI and RDI/I Parameters by Meter Area

Meter Area[a]	Dry Weather GWI[b] (gpd/acre)	Wet Weather GWI[c] (gpd/acre)	R1 RDI/I Vol. (%) (2 hrs. to peak)	R2 RDI/I Vol. (%) (6 hrs. to peak)	R3 RDI/I Vol. (%) (12 hrs. to peak)
M_01	0	0	0.5	0.8	0.8
M_02	0	0	0.5	0.8	0.8
M_03	0	0	0.6	0.1	0.1
M_04	500	1,300	0.6	0.1	0.1
M_05	700	1,000	0.6	0.1	0.1
M_06	0	0	0.6	0.1	0.1
M_07	1,900	1,900	0.3	0.5	0.5
M_08	0	0	0.3	0.5	0.5
M_09	0	0	0.6	0.1	0.1
M_10	0	0	0.6	0.1	0.1
M_11	1,600	2,300	0.9	1.7	6.0
M_12	0	0	0.9	1.0	0.5
M_14	0	0	0.6	0.1	0.1
M_15	300	700	1.0	0.2	0.2
M_16	900	1,600	1.0	0.2	0.2
M_17	200	200	0.6	0.1	0.1
M_18	0	0	0.8	1.0	0.1
M_19	0	0	0.3	0.1	0.1
M_20	0	0	0.6	0.1	0.1
M_21	0	0	0.6	0.1	0.1
M_22	0	0	0.6	0.1	0.1
M_23	0	0	0.6	0.1	0.1
M_24	0	0	0.6	0.1	0.1
M_25	0	0	0.6	0.1	0.1
CuSD	0	0	0.5	0.2	0.4

(a) See Figure 3-3.
(b) Represents GWI during non-rainfall periods (e.g., early to mid-February) of the 2006 flow monitoring period.
(c) Represents GWI immediately following rainfall events.

City of Santa Clara Water & Sewer Utility

Sewer System Management Plan

Approved by City Council: Resolution # [TBA]

Table 2-5 Base Wastewater Flow Unit Flow Factors

Type of Development	Unit Flow Factor	Basis
Single Family Detached	245 gpd/DU	3.5 people/DU @ 70 gpcd
Townhouses/Condominiums	175 gpd/DU	2.5 people/DU @ 70 gpcd
Apartments	154 gpd/DU	2.2 people/DU @ 70 gpcd
Hotels	100 gpd/room	
Commercial/Office	0.1 gpd/sq. ft.	
Office/R&D	0.15 gpd/sq. ft.	
Moderate Density Residential (Mixed Use)	3,200 gpd/acre	21 DU/acre @154 gpd/DU
Medium Density Residential (Transit-Oriented Mixed Use)	4,600 gpd/acre	30 DU/acre @ 154 gpd/DU
Commercial/Office/R&D Intensification[a]	+ 300 gpd/acre	+ 0.04 FAR @ 0.15 gpd/sq. ft.

(a) Applied to areas of North Santa Clara where existing development is anticipated to increase in intensity from a current average floor-area-ratio (FAR) of 0.41 to a future average of 0.45.

2.3.3 Diurnal Base Wastewater Flow Patterns

In most sewer systems, BWF exhibits typical diurnal patterns depending on the type of land use. For Santa Clara, typical diurnal curves were developed for residential, commercial, and industrial areas, for both weekend and weekday conditions. These curves are shown in **Figure 2-4**. Each area of the system was assigned a diurnal curve according to its predominant land use type.

APPENDIX K

2009 SANITARY SEWER CAPACITY ASSESSMENT

Table 2-1: Base Wastewater Unit Flow Factors

Land Use	Unit Flow Factor	Basis
Low Density Residential	245 gpd/DU[a]	2007 Capacity Assessment
Medium Density Residential	154 gpd/DU	2007 Capacity Assessment
High Density Residential	154 gpd/DU	2007 Capacity Assessment
Retail & Residential [b]	154 gpd/DU	2007 Capacity Assessment
Commercial [c]	0.1 gpd/sq. ft.[d]	2007 Capacity Assessment
Hotel	0.48 gpd/sq. ft.	Standard Unit Flow Factor per SJ/SC WPCP[e]
Industrial/Office/R&D[f] (higher intensity)	0.15 gpd/sq. ft.	2007 Capacity Assessment
Warehouse Manufacturing	0.052 gpd/sq. ft.	Standard Unit Flow Factor per SJ/SC WPCP
Public/Institutional	0.15 gpd/sq.ft	Assumed to be similar to Office/R&D uses
Parks/Recreation	--	Assumed to generate little or no flow

a. gpd/DU = gallons per day per dwelling unit
b. Flow assumed to be primarily residential
c. Including neighborhood and regional commercial services, retail, office, and auto sales
d. gpd/sq. ft. = gallons per day per square foot of building floor space
e. SJ/SC WPCP = San Jose / Santa Clara Water Pollution Control Plant
f. R&D = Research & Development

In some cases, the demolition of existing development was identified by City staff. In these cases, the estimated flow from the existing development was subtracted out from the model baseline flow.

In general, the BWF generated by a development parcel was calculated as follow:

BWF = (Size of New Development x Unit Flow Factor) – (Demolition of Existing Development x Unit Flow Factor)

A table of the computed BWF for each sewer subbasin can be found in **Appendix B**.

Table 2-2 shows the estimated average dry weather flow (ADWF), peak dry weather flow (PDWF), and peak wet weather flow (PWWF) for each of the three General Plan Update phases. As per the 2007 Capacity Assessment, flows from Cupertino Sanitary District were included in the model up to the District's contracted maximum capacity in the City's sewer system.

Table 2-2: Summary of Wastewater Flow Estimates

Scenario	ADWF [a] (MGD)	PDWF [a] (MGD)	PWWF [b] (MGD)
Phase 1	26.8	34.9	53.5
Phase 2	28.7	37.2	56.0
Phase 3	30.6	39.5	57.8

a. ADWF and PDWF represent a non-rainfall wintertime condition and include groundwater infiltration.
b. PWWF represents peak flow for a 10-year frequency design storm.

V&A Project No. 17-0099

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