

VALLECITOS WATER DISTRICT
SAN MARCOS HIGHLANDS WATER AND SEWER STUDY
WORK ORDER # 130305

DRAFT TECHNICAL MEMORANDUM

Revised July 28, 2016

Prepared By: Robert Scholl, P.E. and Eileen Koonce

INTRODUCTION

The proposed San Marcos Highlands Development (Project) is a residential development located along a proposed northerly extension of Las Posas Road, north of Borden Road. It consists of approximately 262.14 acres that would include 189 single-family homes, 3 parks and open space.

The Project property is located outside of Vallecitos Water District's (VWD) sewer service area and a portion of the project property is located within VWD's water service boundary and Sphere of Influence. The property located outside of VWD's Sphere of Influence is within Vista Irrigation District's (VID) boundary.

PREVIOUS STUDY

A water and sewer study for the San Marcos Highlands Project was completed on April 9, 2015. Both water and wastewater services were proposed to be provided by Vallecitos Water District (VWD). Approximately 37.5 acres of the proposed Project's 262.14 acres are currently located within the VWD water service area. The Project proposed to adjust the District's water service boundary so that 38.48 acres of the Project were within the VWD water service area (see Figure 3). Within the 38.48 acres, the Project proposed 43 single-family homes on 6.91 acres, 4.87 acres dedicated as public right of way and 26.70 acres of open space. The remaining 68.46 acres were proposed to be served water by Vista Irrigation District (VID). The portion of the Project outside VWD's Sphere of Influence would require LAFCO approval for annexation.

CURRENT STUDY

The Project proposes to develop 66.53 acres of the property, which will include 189 single-family homes on 29.28 acres, 1.56 acres of parks, 15.02 acres dedicated as public right of way and 20.67 acres of open space. The remaining 195.61 acres will be dedicated open space.

The Developer has proposed that VWD provide sewer service to the Project. VWD's Ordinance No. 196 requires that all properties requiring service must annex into the District for both water and sewer service. On July 20, 2016, the Vallecitos Water District Board of Directors granted the developer a variance to District Ordinance No. 196. The variance excludes 195.61 acres of dedicated open space from annexation requirements. The remaining 66.53 acres of developable land must be annexed into VWD's sewer service area. Approximately 22.47 acres of the 66.53 acres are currently located within VWD's water service area. Therefore, 44.06 acres would also need to annex into VWD's water service area. The portion of the Project outside VWD's Sphere of Influence would require LAFCO approval for annexation.

This Study considers the projected water demand and sewage generation from the Project to determine if the current water and sewer infrastructure is sufficient to accommodate the Project and provides recommendations for needed capital improvements to provide service.

The Study will evaluate the following infrastructure systems:

- Water distribution system, including the need to upsize pipelines, install new pipelines, or install flow control facilities
- Water storage, including the need for additional storage and the adequacy of existing storage tanks and reservoirs to serve the proposed development
- Water pump stations, including the need to install new pump stations or upsize existing pump stations to serve the proposed development
- Wastewater collection system, including the need to upsize pipelines and manholes, or the need to install new pipelines and manholes
- Wastewater lift stations, including the need to install new lift stations or upsize existing lift stations to serve the proposed development
- Wastewater land outfall, including the need to construct a parallel land outfall to serve this and other proposed developments
- Wastewater treatment facilities, including the need for obtaining additional capacity at the Encina Water Pollution Control Facility (EWPCF) or for expanding the Meadowlark Water Reclamation Facility (MRF)

WATER SYSTEM ANALYSIS - PREVIOUS STUDY

In the previous study, the Project proposed VWD water service to 38.48 acres which is located partially within VWD’s 920 Pressure Zone. Figures 1 and 2 show the Project’s location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

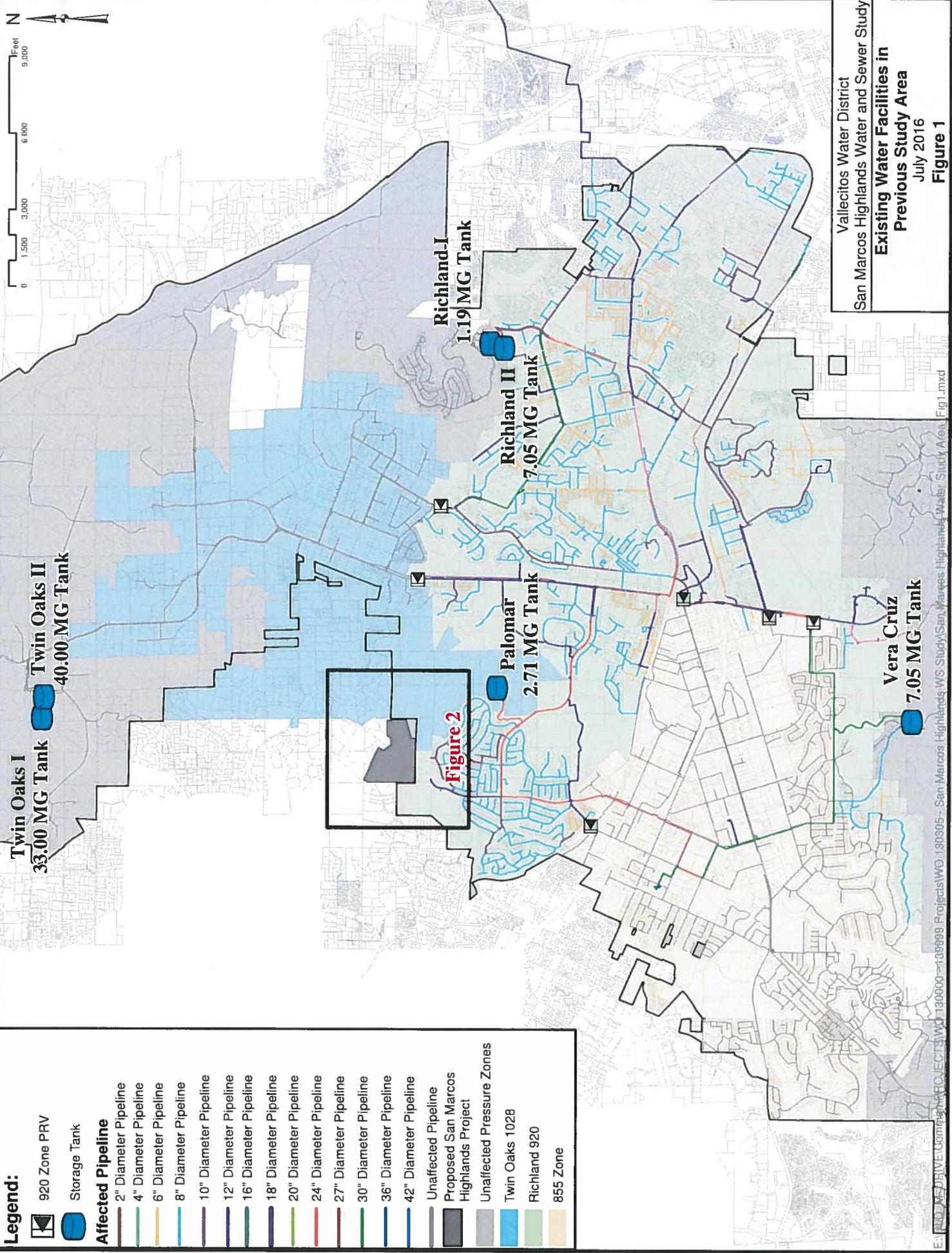
Water Demand Projections

The Project property’s General Plan designation by the City of San Marcos (as of June 30, 2008) for the 37.5 acres of the Project currently within the VWD Sphere of Influence is designated Rural Residential in the 2008 Master Plan. VWD’s 2008 Master Plan based its ultimate water demand planning on these approved land uses. The 38.48-acre Project proposed VWD water service to 43 single-family homes on 6.91 acres, 4.87 acres of right of way and 26.70 acres of open space.

Table 1 provides the average water demand calculations under the density planned for in the 2008 Master Plan and under the proposed Project. The table shows that the proposed VWD portion of the Project will increase the projected average water demand, from the 2008 Master Plan land use, by approximately 1,089 gallons per day

Table 1 – Project Estimated Water Demands – Previous Study

Land Use Type	Area (acres)	Multi-Family Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
2008 Master Plan Land Use Demand				
Rural Residential (0.125-1.0 du/ac)	37.50		600	22,500
Total	37.50	-		22,500
Proposed San Marcos Highlands Demand				
Residential 4-8 du/ac (43 du)	6.91		2,500	17,275
Public Right of Way	4.87		200	974
Open Space	26.70		200	5,340
Total	38.48	-		23,589
Additional Water Demand				1,089



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Legend:

Affected Pipeline

- 8" Diameter Pipeline
- 15" Diameter Pipeline
- Proposed San Marcos Highlands
- Richland 920
- La Cienega 1275
- Twin Oaks 1028

SUBDIVISION BOUNDARY

WATER SERVICE BOUNDARY

POINT OF CONNECTION TO LAS POSAS WATER MAIN

EXIST. 10" MAIN

EXIST. 12" MAIN

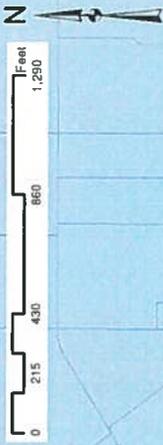
ARDILLA WY

POINT OF CONNECTION TO ARDILLA WAY WATER MAIN

BORDEN RD

LAS POSAS RD

San Marcos Highlands Development



Vallecitos Water District
San Marcos Highlands Water and Sewer Study
Existing Water Facilities in Previous Study Area
July 2016
Figure 2

WATER SYSTEM ANALYSIS - CURRENT STUDY

In the current study, after annexation, the Project proposed VWD water service to 66.53 acres which are partially within VWD's 920 Pressure Zone. Figures 3 and 4 show the Project's location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

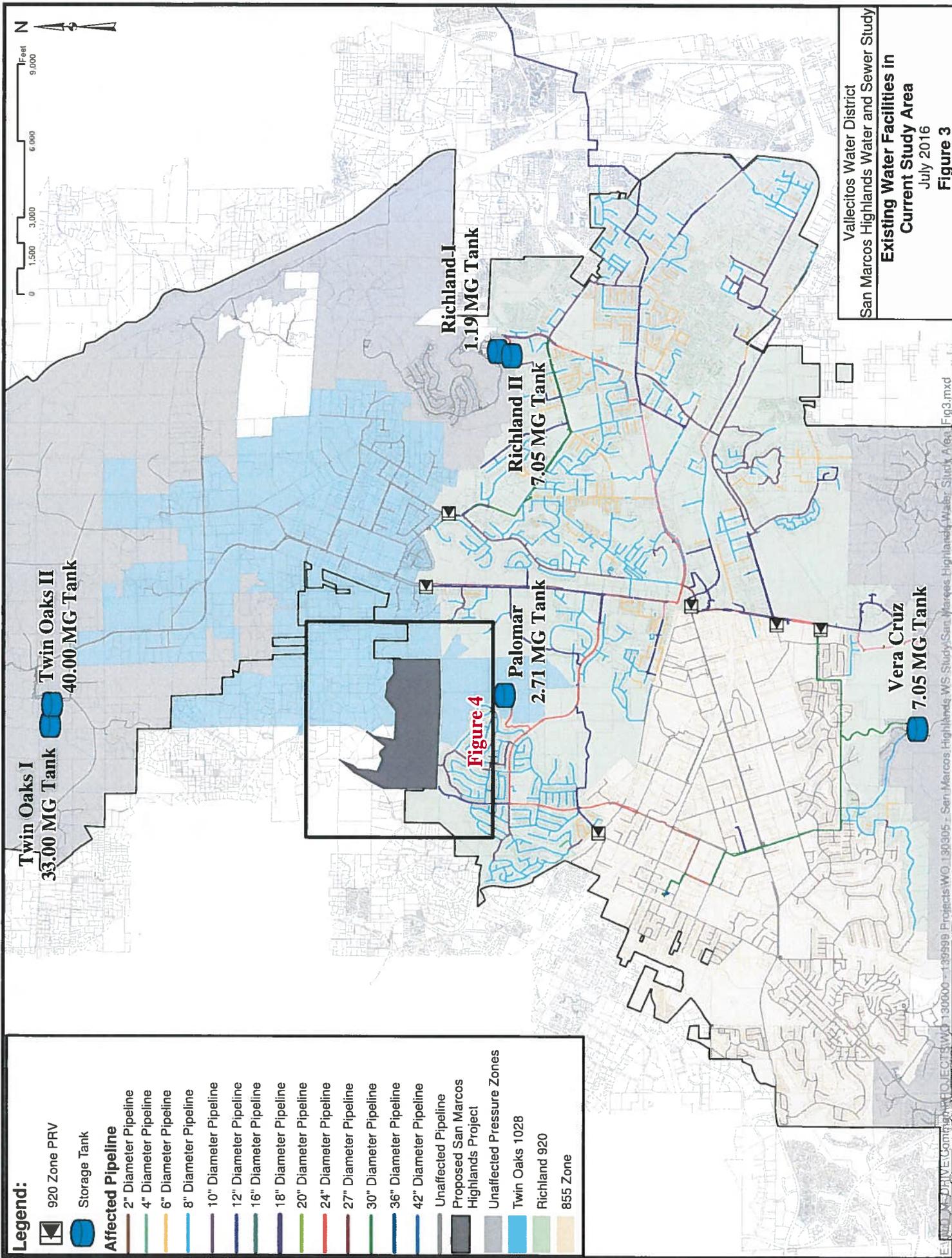
Water Demand Projections

The Project property's General Plan designation by the City of San Marcos (as of June 30, 2008) for the 22.47 acres of the Project currently within the VWD Sphere of Influence is Rural Residential. VWD's 2008 Master Plan based its ultimate water demand planning on these approved land uses. The 66.53-acre Project proposes a density increase with 189 single-family homes on 29.28 acres (Residential 4-8 du/ac), 15.02 acres of public right of way, 1.56 acres of parks and 20.67 acres of open space within the contiguous boundary of the Project.

Table 2 provides the average water demand calculations under the density planned for in the 2008 Master Plan and under the proposed Project. The table shows that the Project will increase the projected average water demand, from the 2008 Master Plan land use, by approximately 69,508 gallons per day.

Table 2 – Project Estimated Water Demands – Current Study

Land Use Type	Area (acres)	Multi-Family Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
2008 Master Plan Land Use Demand				
Rural Residential (0.125-1.0 du/ac)	22.47		600	13,482
Total	22.47	-		13,482
Proposed San Marcos Highlands Demand				
Residential 4-8 du/ac (189 du)	29.28		2,500	73,200
Public Right of Way	15.02		200	3,004
Parks	1.56		1,700	2,652
Open Space	20.67		200	4,134
Total	66.53	-		82,990
Additional Water Demand				69,508



Legend:

- 920 Zone PRV
- Storage Tank
- Affected Pipeline**
- 2" Diameter Pipeline
- 4" Diameter Pipeline
- 6" Diameter Pipeline
- 8" Diameter Pipeline
- 10" Diameter Pipeline
- 12" Diameter Pipeline
- 16" Diameter Pipeline
- 18" Diameter Pipeline
- 20" Diameter Pipeline
- 24" Diameter Pipeline
- 27" Diameter Pipeline
- 30" Diameter Pipeline
- 36" Diameter Pipeline
- 42" Diameter Pipeline
- Unaffected Pipeline
- Proposed San Marcos Highlands Project
- Unaffected Pressure Zones
- Twin Oaks 1028
- Richland 920
- 855 Zone

Feet
0 1,500 3,000 6,000 9,000

Vallecitos Water District
San Marcos Highlands Water and Sewer Study
Existing Water Facilities in Current Study Area
July 2016
Figure 3

Figure 4

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Legend:

Affected Pipeline

- 8" Diameter Pipeline
- 15" Diameter Pipeline
- Proposed San Marcos Highlands
- Richland 920
- La Cienega 1275
- Twin Oaks 1028

SUBDIVISION BOUNDARY

WATER SERVICE BOUNDARY

POINT OF CONNECTION TO LAS POSAS WATER MAIN

EXIST. 10" MAIN

EXIST. 12" MAIN

ARDILLA WY

POINT OF CONNECTION TO ARDILLA WAY WATER MAIN

BORDEN RD

LAS POSAS RD

SAN MARCOS HIGHLANDS DEVELOPMENT

OPEN SPACE

SPHERE OF INFLUENCE BOUNDARY

San Marcos Highlands Development



Vallecitos Water District
San Marcos Highlands Water and Sewer Study
Existing Water Facilities in Current Study Area
July 2016
Figure 4

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Water Distribution System Analysis

The 2008 Master Plan water system distribution design and pressure criteria are as follows:

Water Distribution Infrastructure Criteria

The water service pressure criteria to be met by this development are as follows:

- Minimum allowable pressure at peak hour demand: 40 psi
- Minimum allowable pressure at max day plus fire demand: 20 psi
- Maximum allowable pressure: 150 psi

The Developer has represented to the District that the City of San Marcos Fire Marshall has set the required fire demand for this Project at 1,500 gpm. If the actual fire flow requirements exceed 1500 gpm, additional analysis will be required.

- Maximum allowable velocity: 7 feet per second
- Maximum allowable head loss gradient: 15 feet per 1,000 feet
- Hazen-Williams C-factor: 130

Water Model Scenarios

The following scenarios were modeled to identify system impacts that may be created by the proposed water demands, and to recommend any improvements required to provide service to the Project:

- Average Day Demand with existing demands at the Project
- Average Day Demand with the proposed Project
- Maximum Day Demand with existing demands at the Project
- Maximum Day Demand with the proposed Project
- Peak Hour Demand with existing demands at the Project
- Peak Hour Demand with the proposed Project
- Maximum Day Demand plus Fire Flow with existing demands at the Project
- Maximum Day Demand plus Fire Flow with the proposed Project

Per the 2008 Master Plan, maximum day demands for this Project are 300% those of average day demands, and peak hour demands are 620% those of average day demands.

Water Model Results

Modeling focused on the infrastructure in the direct vicinity of the Project, as shown in Figure 2 and Figure 4. The analysis found that the Project did not create any deficiencies in the existing distribution system under average day demand, maximum day demand, peak hour conditions or fire flow demand conditions in either the previous study or the current study.

Water Storage Analysis

The 2008 Master Plan outlines VWD’s potable water storage reservoirs for each pressure zone as follows:

1.5 times average day demand (ADD) (operational storage) + 3.0 times ADD (emergency storage) + fire flow demand = 4.5 times ADD + fire flow demand:

OR

5.0 times ADD, whichever is greater.

After annexation, the Project will be located entirely within the VWD 920 pressure zone. Water storage for this zone is located within the 920 Richland and 1028 Twin Oaks pressure zones, as shown in Figure 1. Table 3 shows the required storage in the 855, 920 Richland, and 1028 Twin Oaks pressure zones for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing storage provided within each zone.

Table 3 – Existing Reservoir Storage Capacity and Requirements

Pressure Zone	Year 2015 ADD (MGD)	Year 2015 Storage Requirement (MG)	Year 2030 ADD (MGD)	Year 2030 Storage Requirement (MG)	Existing Storage Available (MG)
855	6.33	31.7	6.33	31.7	0
920 Richland	9.66	48.3	9.66	48.3	18
1028 Twin Oaks	1.41	7.1	2.34	11.7	73
Totals	17.40	87.1	18.33	91.7	91

Water Storage – Previous Study

In the previous study, the proposed VWD portion of the Project would increase the projected average water demand by approximately 1,089 gallons per day as shown in Table 1.

Therefore, the amount of additional reservoir storage required is 500% of the VWD portion of the Project’s average day demand, or:

$$1,089 \text{ gallons} * 500\% = 5,445 \text{ gallons}$$

The analysis finds that water storage capacity is currently available to serve the Project’s increased storage requirements under the previous study. Master Plan projects address and accommodate the existing storage deficiency and Water Capital Facility Fees paid by this Project will be used for any increase in facility size necessitated by the Project’s demand calculated above.

Water Storage – Current Study

In the current study, the proposed Project will increase the projected average water demand by approximately 69,508 gallons per day as shown in Table 2.

Therefore, the amount of additional reservoir storage required is 500% of the Project's average day demand, or:

$$69,508 \text{ gallons} * 500\% = \mathbf{347,540 \text{ gallons}}$$

The analysis finds that water storage capacity is currently available to serve the Project's increased storage requirements under the current study. Master Plan projects address and accommodate the existing storage deficiency and Water Capital Facility Fees paid by this Project will be used for any increase in facility size necessitated by the Project's demand calculated above.

Water Pump Station Analysis

Since the proposed Project is located in a pressure zone that is not served by pumping, there are no impacts to existing or proposed pump stations by this Project under the previous study or the current study.

WASTEWATER SYSTEM ANALYSIS

For both the previous study and the current study, after annexation, the Project's 66.53-acre developable area would lie completely within VWD sewer shed 10C. Figures 5 - 8 show the development's location in relation to sewer shed boundaries, identify wastewater infrastructure within the vicinity of the development, proposed connection points and identifies the downstream collection infrastructure providing service to the Project.

Wastewater Flow Projections

The Project property's General Plan designation by the City of San Marcos (as of June 30, 2008) for the 22.47 acres of the Project currently within the VWD Sphere of Influence is designated Rural Residential. VWD's 2008 Master Plan based its wastewater flow planning on these approved land uses. The 66.53-acre developable area is proposed to have a density increase with 189 single-family homes on 29.28 acres (Residential 4-8 du/ac), 15.02 acres of public right of way, 1.56 acres of parks and 20.67 acres of open space within the contiguous boundary of the Project.

Table 5 provides the average wastewater flow generated under the density planned for in the 2008 Master Plan and under the proposed Project density. The table shows that the Project will increase the projected average wastewater flow from the 2008 Master Plan land use by approximately 35,910 gallons per day.

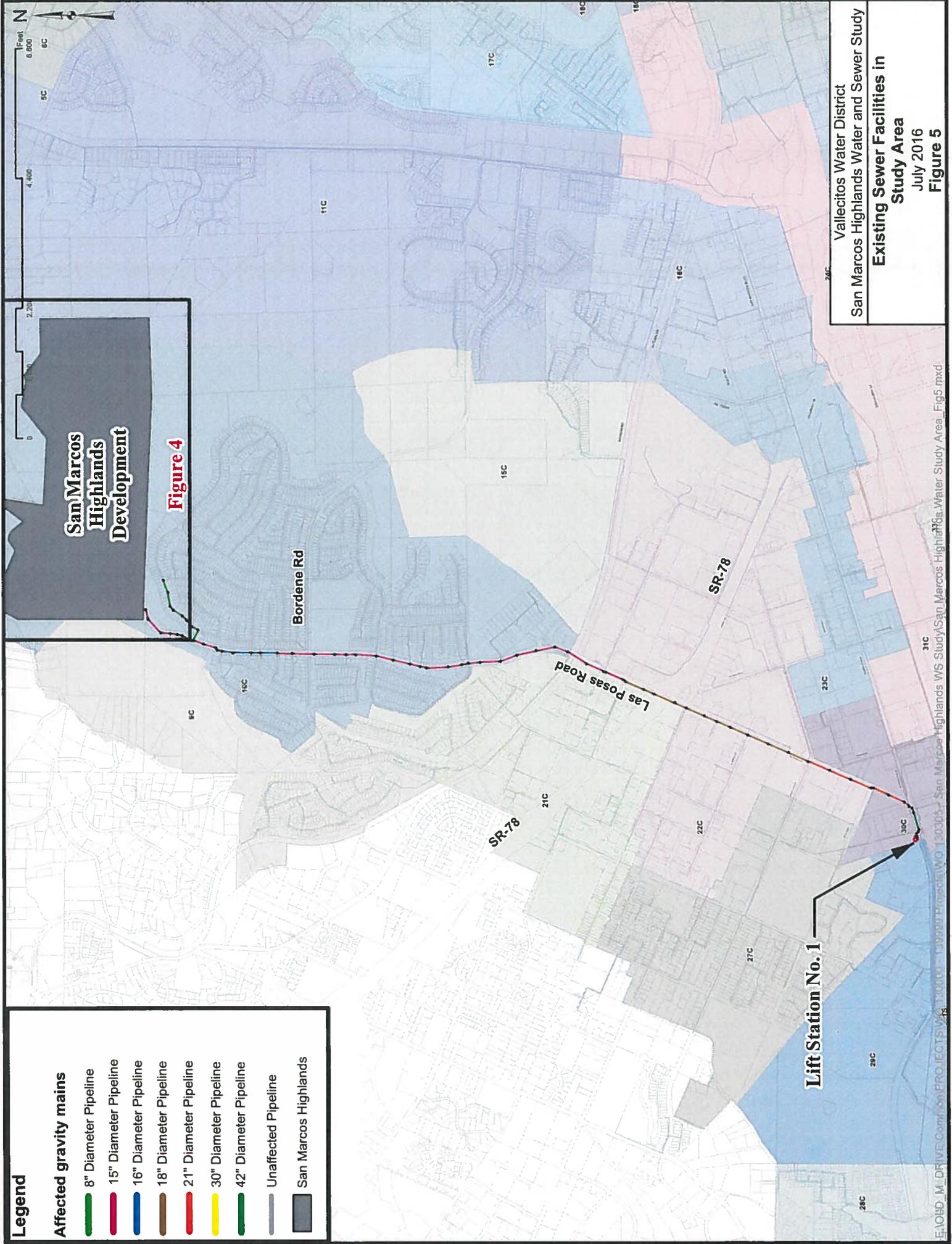
Table 5 – Project Estimated Wastewater Flows – Current Study

Land Use Type	Area (acres)	Multi-Family Residential Units	Duty Factor (gpd/acre)	Wastewater Flow (gpd)
2008 Master Plan Land Use Flows				
Rural Residential (0.125-1.0 du/ac)	22.47		150	3,371
Total	22.47	-		3,371
Proposed San Marcos Highlands Flows				
Residential (4-8 du/ac)	29.28	189	1,300	38,064
Right of Way	15.02		0	0
Parks	1.56		250	390
Open Space	20.67		40	827
Total	66.53	-		39,281
Additional Sewer Generation				35,910

Legend

Affected gravity mains

- 8" Diameter Pipeline
- 15" Diameter Pipeline
- 16" Diameter Pipeline
- 18" Diameter Pipeline
- 21" Diameter Pipeline
- 30" Diameter Pipeline
- 42" Diameter Pipeline
- Unaffected Pipeline
- San Marcos Highlands

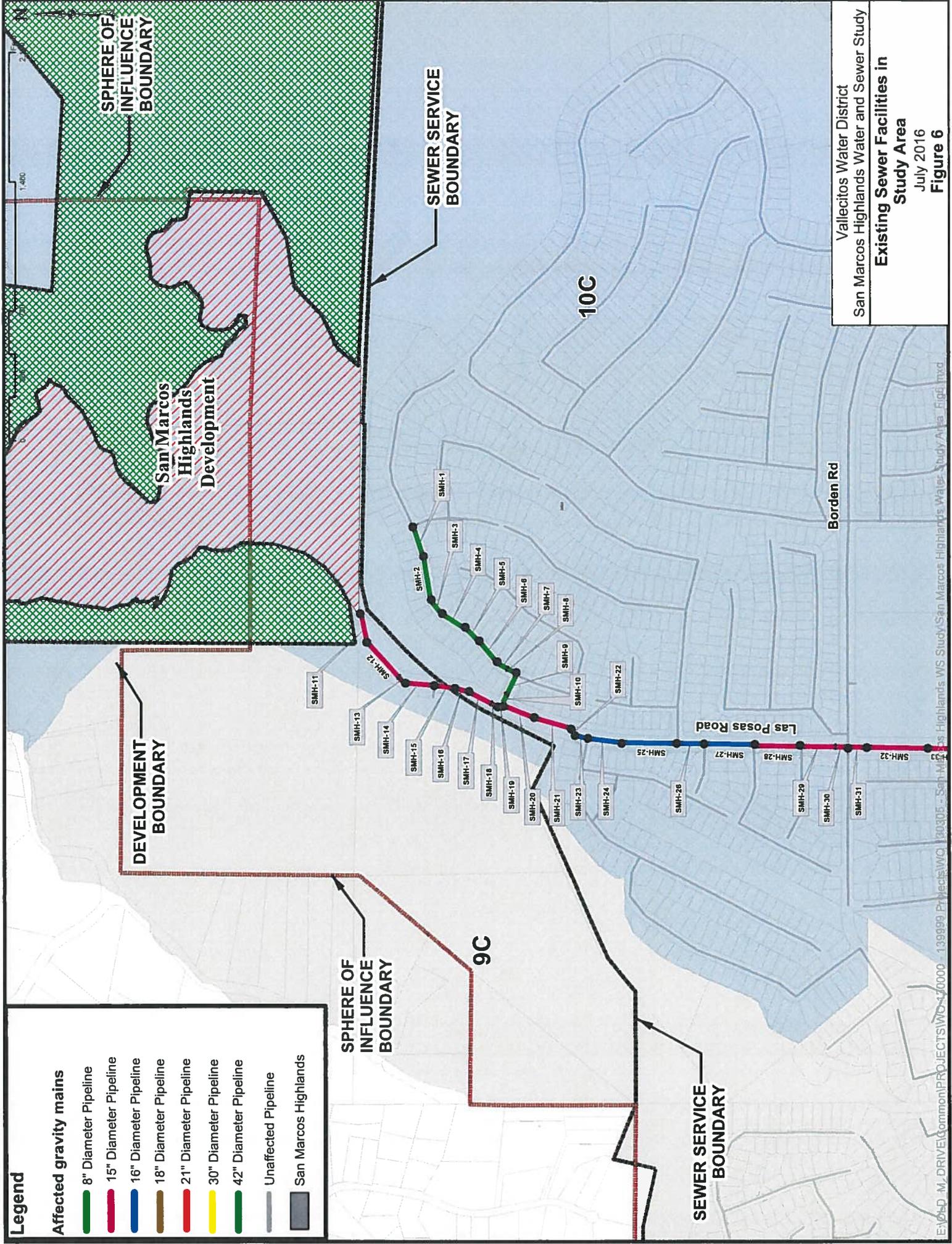


Vallecitos Water District
San Marcos Highlands Water and Sewer Study
Existing Sewer Facilities in Study Area
July 2016
Figure 5

Legend

Affected gravity mains

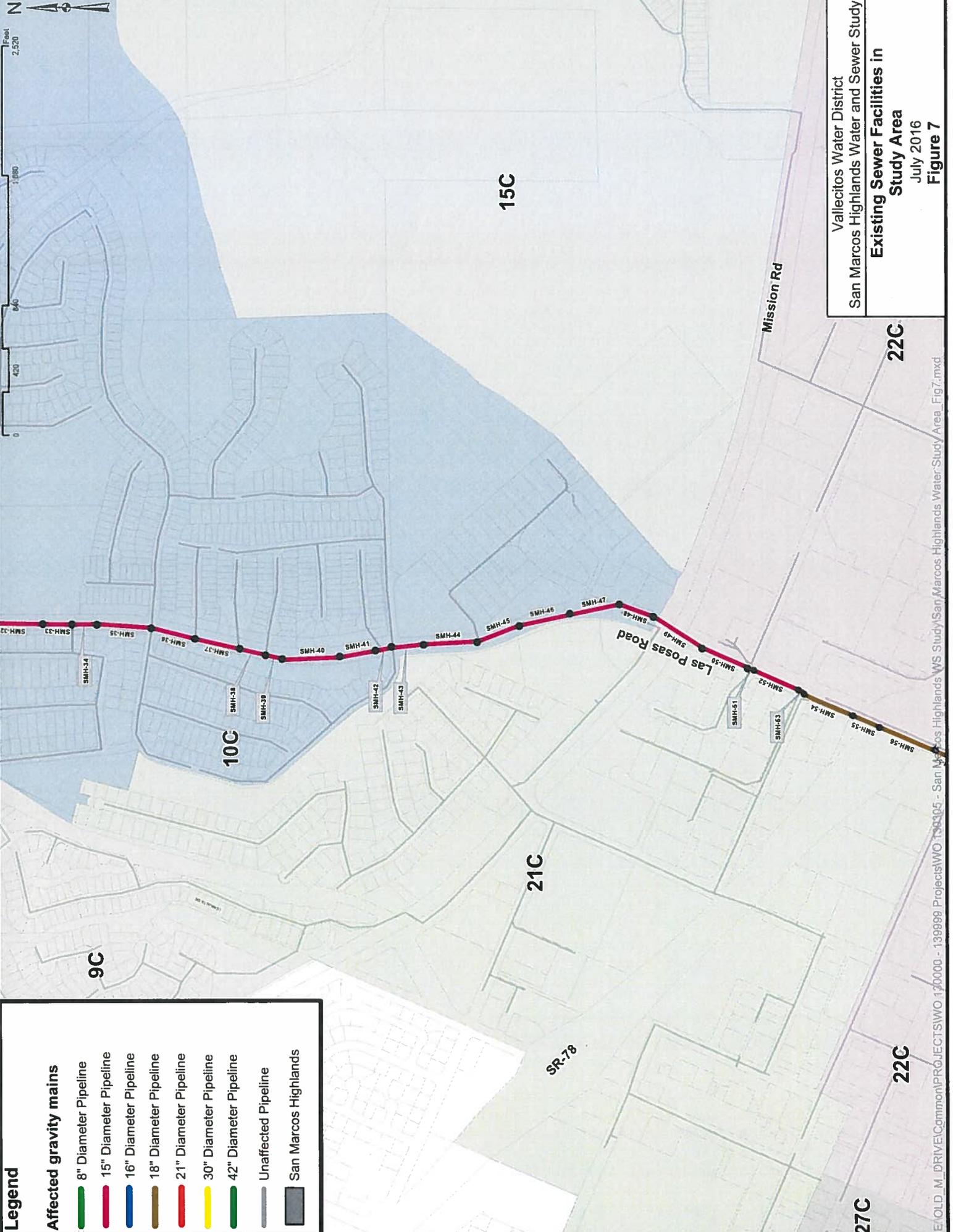
- █ 8" Diameter Pipeline
- █ 15" Diameter Pipeline
- █ 16" Diameter Pipeline
- █ 18" Diameter Pipeline
- █ 21" Diameter Pipeline
- █ 30" Diameter Pipeline
- █ 42" Diameter Pipeline
- █ Unaffected Pipeline
- San Marcos Highlands



Vallecitos Water District
 San Marcos Highlands Water and Sewer Study
Existing Sewer Facilities in Study Area
 July 2016
Figure 6



Vallecitos Water District
 San Marcos Highlands Water and Sewer Study
**Existing Sewer Facilities in
 Study Area**
 July 2016
Figure 7

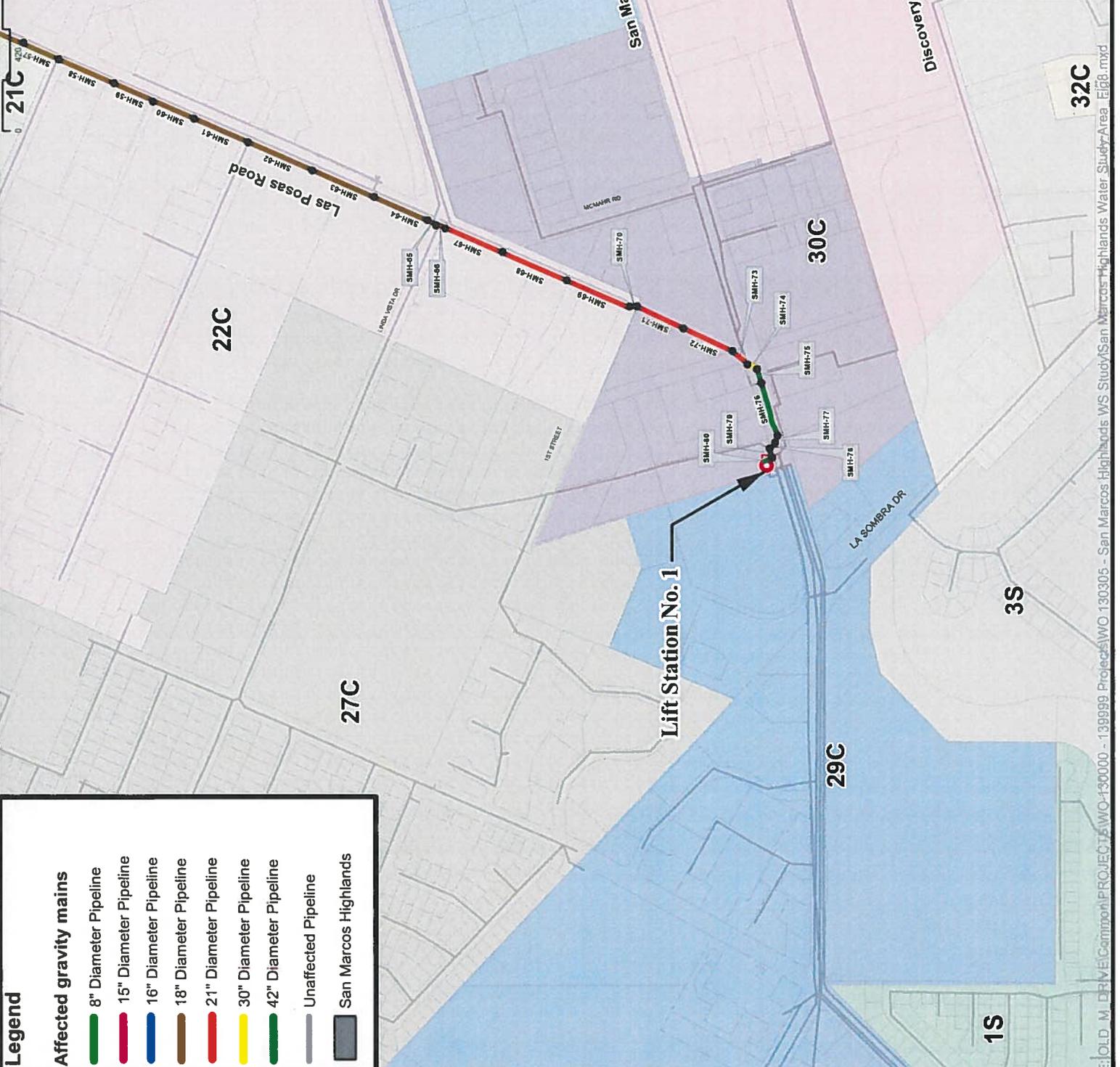


Legend

Affected gravity mains

- 8" Diameter Pipeline
- 15" Diameter Pipeline
- 16" Diameter Pipeline
- 18" Diameter Pipeline
- 21" Diameter Pipeline
- 30" Diameter Pipeline
- 42" Diameter Pipeline
- Unaffected Pipeline
- San Marcos Highlands

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Legend

Affected gravity mains	
	8" Diameter Pipeline
	15" Diameter Pipeline
	16" Diameter Pipeline
	18" Diameter Pipeline
	21" Diameter Pipeline
	30" Diameter Pipeline
	42" Diameter Pipeline
	Unaffected Pipeline
	San Marcos Highlands

Vallecitos Water District
 San Marcos Highlands Water and Sewer Study
Existing Sewer Facilities in Study Area
 July 2016
Figure 8

Wastewater Collection System Analysis

The 2008 Master Plan wastewater system design criteria are as follows:

Wastewater Collection Infrastructure Criteria

The wastewater pipeline criteria to be met both within and downstream of the development are as follows:

- Pipes 12 inches in diameter and smaller: ½ full maximum at peak flow
- Pipes over 12 inches in diameter: ¾ full maximum at peak flow
- Minimum velocity: 2 feet per second
- Maximum velocity: 10 feet per second
- Manning's n for gravity pipes: .013
- Hazen-Williams C-factor for force mains/siphons: 120
- Slope for pipes 12 inches in diameter and smaller: 0.4% minimum
- Slope for pipes over 12 inches in diameter: to be determined by VWD

When flow depth in gravity pipes exceeds maximum levels as stated above, a pipe upsize will be specified.

Wastewater Model Scenarios

The following scenarios were modeled to identify system impacts that may be created by the proposed sewer generation, and to recommend any improvements required to provide service to the Project:

- Average Dry Weather Flow with existing flows at the Project
- Average Dry Weather Flow with the proposed Project
- Peak Dry Weather Flow with existing flows at the Project
- Peak Dry Weather Flow with the proposed Project
- Peak Wet Weather Flow with existing flows at the Project
- Peak Wet Weather Flow with the proposed Project

The peak dry weather curve is:

$$\text{Peak Dry Weather Factor} = 2.16 \times (\text{Average Dry Weather Flow Rate})^{-0.1618}$$

The wet weather peak curve is:

$$\text{Peak Wet Weather Factor} = 2.78 \times (\text{Average Dry Weather Flow Rate})^{-0.087}$$

Wastewater Model Results

Modeling for the study focused not only on the sewer collection infrastructure in the direct vicinity of the Project, but also on all downstream infrastructure from the development to Lift Station No. 1 on San Marcos Boulevard that would be impacted by the Project flows (see Figures 5 through 8). The modeling results showed that the wastewater flow from the proposed Project does not result in system deficiencies under peak wet weather flows during ultimate build-out conditions in either study. Table 6 presents a summary of the modeling results from this analysis.

Table 6 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at San Marcos Highlands Development Site				Wastewater Flows with Proposed San Marcos Highlands Development			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
SMH-1	215	8	0.0730	27	0.09	-	-	117	0.20	-	-
SMH-2	228	8	0.0724	29	0.10	-	-	119	0.20	-	-
SMH-3	90	8	0.0356	30	0.12	-	-	120	0.24	-	-
SMH-4	183	8	0.0301	33	0.13	-	-	123	0.25	-	-
SMH-5	102	8	0.0196	33	0.14	-	-	123	0.28	-	-
SMH-6	160	8	0.0081	35	0.18	-	-	125	0.35	-	-
SMH-7	24	8	0.0071	36	0.19	-	-	126	0.36	-	-
SMH-8	95	8	0.0045	37	0.22	-	-	127	0.41	-	-
SMH-9	156	8	0.0308	52	0.16	-	-	142	0.27	-	-
SMH-10	19	8	0.0263	52	0.17	-	-	142	0.28	-	-
SMH-11	166	15	0.0050	253	0.24	-	-	343	0.28	-	-
SMH-12	291	15	0.0075	254	0.21	-	-	344	0.26	-	-
SMH-13	21	15	0.0076	254	0.21	-	-	344	0.25	-	-
SMH-14	169	15	0.0152	254	0.18	-	-	344	0.21	-	-
SMH-15	122	15	0.0041	255	0.25	-	-	345	0.30	-	-
SMH-16	152	15	0.0021	255	0.30	-	-	345	0.35	-	-
SMH-17	152	15	0.0053	255	0.23	-	-	345	0.28	-	-
SMH-18	36	15	0.0042	255	0.25	-	-	345	0.30	-	-
SMH-19	43	15	0.0047	256	0.24	-	-	346	0.29	-	-
SMH-20	173	15	0.0052	309	0.26	-	-	399	0.30	-	-

Table 6 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at San Marcos Highlands Development Site				Wastewater Flows with Proposed San Marcos Highlands Development			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
SMH-21	241	15	0.0050	310	0.26	-	-	400	0.30	-	-
SMH-22	32	16	0.0063	310	0.23	-	-	400	0.26	-	-
SMH-23	45	16	0.0111	310	0.20	-	-	400	0.23	-	-
SMH-24	188	16	0.0053	354	0.25	-	-	444	0.29	-	-
SMH-25	323	16	0.0056	354	0.25	-	-	444	0.29	-	-
SMH-26	153	16	0.0033	395	0.30	-	-	485	0.34	-	-
SMH-27	275	16	0.0055	398	0.27	-	-	488	0.30	-	-
SMH-28	260	15	0.0050	407	0.30	-	-	497	0.34	-	-
SMH-29	200	15	0.0050	413	0.30	-	-	503	0.34	-	-
SMH-30	67	15	0.0045	413	0.31	-	-	503	0.35	-	-
SMH-31	120	15	0.0042	695	0.42	-	-	785	0.46	-	-
SMH-32	350	15	0.0040	695	0.43	-	-	785	0.46	-	-
SMH-33	180	15	0.0039	695	0.43	-	-	785	0.47	-	-
SMH-34	170	15	0.0041	715	0.43	-	-	805	0.47	-	-
SMH-35	350	15	0.0214	715	0.28	-	-	805	0.30	-	-
SMH-36	301	15	0.0073	794	0.39	-	-	884	0.42	-	-
SMH-37	236	15	0.0174	802	0.31	-	-	892	0.33	-	-
SMH-38	167	15	0.0144	806	0.33	-	-	896	0.35	-	-
SMH-39	145	15	0.0145	813	0.33	-	-	903	0.35	-	-
SMH-40	350	15	0.0146	813	0.33	-	-	903	0.35	-	-

Table 6 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at San Marcos Highlands Development Site				Wastewater Flows with Proposed San Marcos Highlands Development			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
SMH-41	235	15	0.0196	813	0.30	-	-	903	0.33	-	-
SMH-42	115	15	0.0043	821	0.46	-	-	911	0.49	-	-
SMH-43	252	15	0.0044	864	0.47	-	-	954	0.50	-	-
SMH-44	356	15	0.0051	864	0.45	-	-	954	0.48	-	-
SMH-45	284	15	0.0042	880	0.48	-	-	970	0.51	-	-
SMH-46	344	15	0.0041	885	0.49	-	-	975	0.52	-	-
SMH-47	321	15	0.0040	888	0.49	-	-	978	0.52	-	-
SMH-48	239	15	0.0046	892	0.47	-	-	982	0.50	-	-
SMH-49	350	15	0.0166	893	0.33	-	-	983	0.36	-	-
SMH-50	320	15	0.0228	895	0.31	-	-	985	0.33	-	-
SMH-51	35	15	0.0143	895	0.35	-	-	985	0.37	-	-
SMH-52	367	15	0.0159	903	0.34	-	-	993	0.36	-	-
SMH-53	367	15	0.0050	905	0.47	-	-	995	0.50	-	-
SMH-54	325	18	0.0108	905	0.29	-	-	995	0.31	-	-
SMH-55	180	18	0.0072	1288	0.39	-	-	1378	0.41	-	-
SMH-56	389	18	0.0082	1288	0.38	-	-	1378	0.40	-	-
SMH-57	204	18	0.0049	1288	0.43	-	-	1378	0.46	-	-
SMH-58	281	18	0.0057	1321	0.42	-	-	1411	0.44	-	-
SMH-59	280	18	0.0039	1321	0.47	-	-	1411	0.49	-	-
SMH-60	226	18	0.0031	1321	0.50	-	-	1411	0.53	-	-

Table 6 - Wastewater Model Results and Recommended Gravity Main Improvements

Pipe ID Number	Length (ft)	Diameter (in)	Slope	Wastewater Flows with Existing Density at San Marcos Highlands Development Site				Wastewater Flows with Proposed San Marcos Highlands Development			
				Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diameter Ratio	Replacement Diameter (in)	Replacement PWWF Depth-to-Diameter Ratio
SMH-61	363	18	0.0044	1321	0.45	-	-	1411	0.48	-	-
SMH-62	385	18	0.0078	1321	0.39	-	-	1411	0.41	-	-
SMH-63	380	18	0.0081	1325	0.38	-	-	1415	0.40	-	-
SMH-64	339	18	0.0086	1325	0.38	-	-	1415	0.40	-	-
SMH-65	41	18	0.0063	2090	0.53	-	-	2180	0.55	-	-
SMH-66	81	21	0.0053	2508	0.49	-	-	2598	0.51	-	-
SMH-67	304	21	0.0053	2508	0.49	-	-	2598	0.51	-	-
SMH-68	312	21	0.0029	2508	0.59	-	-	2598	0.61	-	-
SMH-69	380	21	0.0047	2508	0.51	-	-	2598	0.52	-	-
SMH-70	33	21	0.0182	2560	0.35	-	-	2650	0.36	-	-
SMH-71	297	21	0.0054	2560	0.49	-	-	2650	0.51	-	-
SMH-72	295	21	0.0064	2560	0.47	-	-	2650	0.48	-	-
SMH-73	112	21	0.0143	2562	0.38	-	-	2652	0.39	-	-
SMH-74	15	42	0.0533	9598	0.20	-	-	9688	0.21	-	-
SMH-75	138	42	0.0029	9598	0.44	-	-	9688	0.44	-	-
SMH-76	347	42	0.0009	9598	0.62	-	-	9688	0.63	-	-
SMH-77	18	42	0.0056	9598	0.36	-	-	9688	0.37	-	-
SMH-78	9	42	0.0333	9598	0.23	-	-	9688	0.24	-	-
SMH-79	9	42	0.0111	9697	0.31	-	-	9787	0.31	-	-
SMH-80	73	42	0.0641	10371	0.20	-	-	10461	0.21	-	-

Wastewater Lift Station Analysis

Lift stations are sized for peak wet weather flow with manufacturer's recommended cycling times for pumping equipment. Since the proposed Project is not located in a sewer shed that is served by a lift station, there are no lift station upgrade requirements for this Project.

Parallel Land Outfall Analysis

VWD's existing land outfall is shown in Figure 9. The outfall is approximately 8 miles in length and consists of 4 gravity pipeline sections and 3 siphon sections varying in diameter from 20 inches to 54 inches. VWD maintains the entire pipeline from Lift Station No. 1 to the Encina Water Pollution Control Facility (EWPCF). From Lift Station No. 1 to El Camino Real, VWD is the sole user of this pipeline. From El Camino Real to the EWPCF, the ownership capacity is as shown in Table 7 below:

Table 7 – Land Outfall Capacity Ownership by Agency

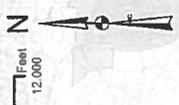
Agency	Ownership Percentage	Capacity (MGD)
Carlsbad	23.98%	5.00
Vista	17.99%	3.75
VWD	58.03%	12.10
Totals	100.00%	20.85

The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

VWD's 2014 average daily wastewater flow was 7.2 MGD. This corresponds to a peak wet weather flow of 16.9 MGD, which falls within VWD's combined peak wet weather collection capacity.

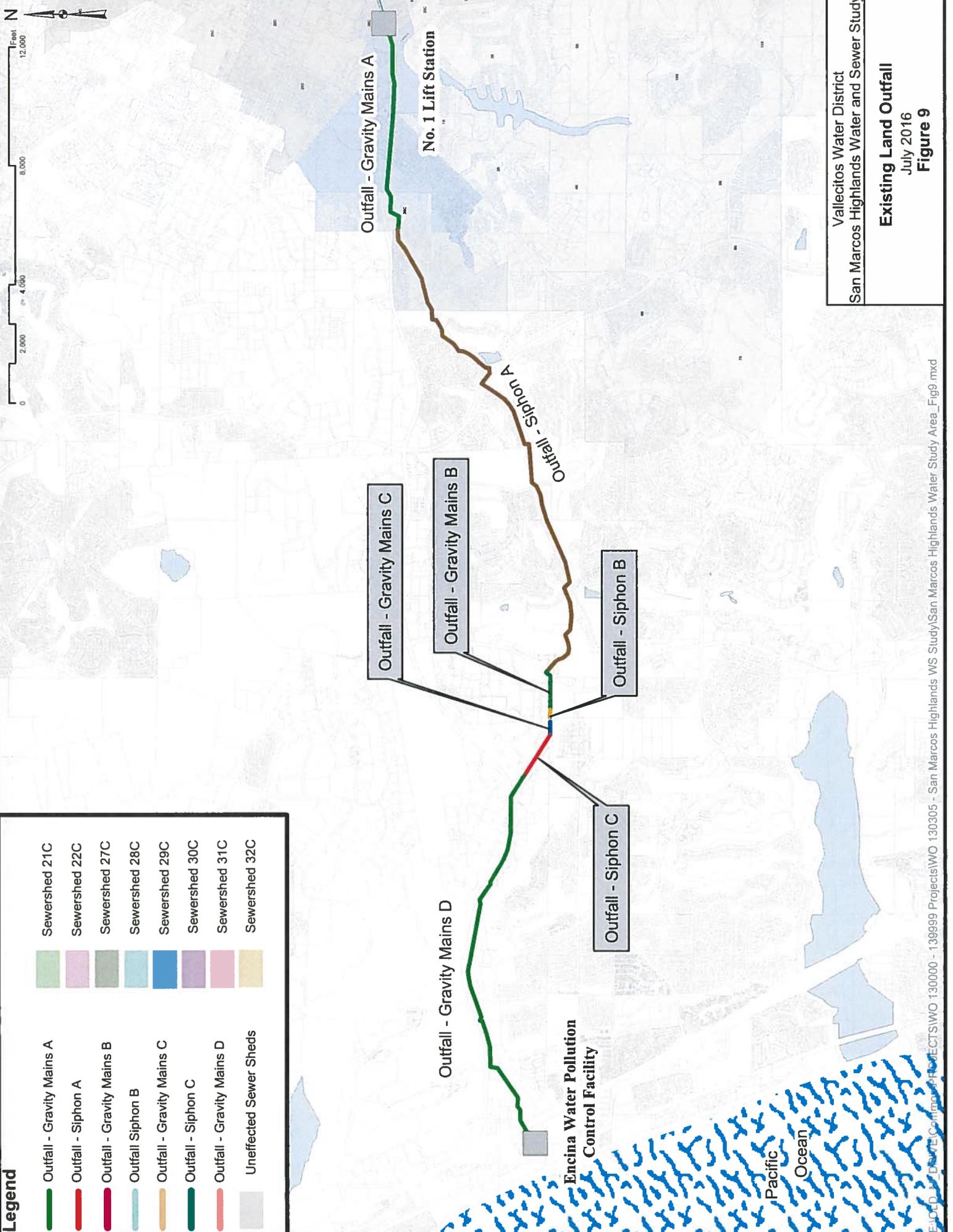
The 2008 Master Plan estimated that, under approved land uses, VWD has an ultimate build-out average daily flow of 13.3 MGD. This corresponds to a peak wet weather flow of 29.5 MGD, which exceeds VWD's peak wet weather collection capacity. To accommodate additional wastewater flows from planned development, the 2008 Master Plan recommended conveyance of peak flows to the EWPCF through a parallel land outfall.

The Project proposes to generate an additional average wastewater flow of 35,910 gpd. The analysis finds that outfall capacity is currently available to serve the Project's increased wastewater generation. Wastewater Capital Facility Fees paid by this Project will be used for any increase in Master Plan Land Outfall pipeline size necessitated by the Project's additional wastewater generation.



Legend

-  Outfall - Gravity Mains A
-  Outfall - Siphon A
-  Outfall - Gravity Mains B
-  Outfall Siphon B
-  Outfall - Gravity Mains C
-  Outfall - Siphon C
-  Outfall - Gravity Mains D
-  Unaffected Sewer Sheds
-  Sewershed 21C
-  Sewershed 22C
-  Sewershed 27C
-  Sewershed 28C
-  Sewershed 29C
-  Sewershed 30C
-  Sewershed 31C
-  Sewershed 32C



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Figure 9
 Existing Land Outfall

Wastewater Treatment Facility Analysis

VWD utilizes two wastewater treatment facilities to treat wastewater collected within its sewer service area.

- The Meadowlark Reclamation Facility (MRF) has liquids treatment capacity of up to 5.0 MGD with a peak wet weather capacity of 8.0 MGD. MRF does not have solids treatment capacity, and therefore all solids are treated at the Encina Water Pollution Control Facility (EWPCF).
- The EWPCF is located in the City of Carlsbad. This is a regional facility with treatment capacity of up to 40.51 MGD. VWD's current ownership capacity is as noted below:

Solids Treatment Capacity

VWD currently owns 10.47 MGD of solids treatment capacity at EWPCF. The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected solids treatment capacity deficiency of 2.83 MGD.

VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate solids treatment capacity exists at this time to serve the Project.

Liquids Treatment Capacity

VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the liquids treatment capacity of 5.0 MGD at MRF for a total of 12.67 MGD of liquids treatment capacity. The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected liquids treatment capacity deficiency of 0.67 MGD.

VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate liquids treatment capacity exists at this time to serve the Project.

Ocean Disposal Capacity

VWD currently owns 10.47 MGD of ocean disposal capacity at the EWPCF. The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in an ocean disposal deficiency of 2.83 MGD.

VWD's 2014 average daily wastewater flow was 7.2 MGD. Therefore, the analysis finds that adequate ocean disposal capacity exists at this time to serve the Project.

The District has determined that adequate wastewater treatment and disposal capacity exists at this time for this Project subject to the qualifications referenced below.

CONCLUSIONS AND CONDITIONS – PREVIOUS STUDY

In the previous study, the proposed Project was expected to increase average daily water demands by 1,089 gallons per day and wastewater flow by 35,910 gallons per day over the ultimate flows projected in the 2008 Master Plan.

The study concluded that the proposed Project would result in the following:

- An increase of 5,445 gallons of potable water storage capacity.
- An increase of 35,910 gpd in solids and liquids treatment, and ocean disposal capacity at the Encina Water Pollution Control Facility.
- An increase of 35,910 gpd in the parallel land outfall's capacity.

The District determined that adequate water storage, wastewater treatment/disposal and land outfall capacities exist at this time and payment of Water and Wastewater Capital Facility Fees satisfies the Project's increases in capacity to water storage, wastewater treatment/disposal, and land outfall. No other conditions to water storage, wastewater treatment/disposal, or land outfall apply.

The following items were required as conditions of providing service to the proposed Project:

- The Project must be annexed into the VWD for Water and Sewer Service in accordance with Ordinance No. 196 and comply with any and all terms and conditions that may be required when considered by the District Board of Directors prior to service being provided
- Payment of all applicable Water and Wastewater Capital Facility fees in affect at the time service is committed in accordance with District rules and regulations.
- Construction and acceptance of all on-site water and sewer facilities prior to service being provided in accordance with all rules and regulations in affect at the time service is provided.

CONCLUSIONS AND CONDITIONS – CURRENT STUDY

In the current study, the proposed Project is expected to increase average daily water demands by 69,508 gallons per day and wastewater flow by 35,910 gallons per day over the ultimate flows projected in the 2008 Master Plan.

The study concludes that the proposed Project will result in the following:

- An increase of 347,540 gallons of potable water storage capacity.
- An increase of 35,910 gpd in solids and liquids treatment, and ocean disposal capacity at the Encina Water Pollution Control Facility.
- An increase of 35,910 gpd in the parallel land outfall's capacity.

The District has determined that adequate water storage, wastewater treatment/disposal and land outfall capacities exist at this time.

The following items are required as conditions of providing service to the proposed Project:

- The Project must be annexed into VWD's Water and Sewer Service areas in accordance with Ordinance No. 196 and variance granted by VWD Board of Directors on July 20, 2016. Project must comply with any and all terms and conditions for annexation prior to service being provided
- Payment of all applicable Water and Wastewater Capital Facility fees in affect at the time service is committed in accordance with District rules and regulations.
- Construction and acceptance of all on-site water and sewer facilities prior to service being provided in accordance with all rules and regulations in affect at the time service is provided.

The District currently has water and sewer capacity available to serve the Project as proposed under both the previous study and the current study. However, the ability to provide water and sewer service in the future depends upon ultimate build-out of the Project Subdivision and could change depending upon the timing of the build-out, as well as annexations and build-outs of other development projects, continued reliable water supplies from the San Diego County Water Authority, the District's treatment capacity at the EWPCF, and other factors affecting growth in the District which may change over time.

Both the previous study and the current study are based on the current adopted land use utilized in VWD's 2008 Master Plan. The studies address the incremental facility impacts of this Project Subdivision only and do not include or consider any additional projects within VWD's service area that have deviated from adopted Master Plan land uses. Any land use changes upstream and/or downstream of the Study area may necessitate a revision of any onsite and offsite studies. VWD shall determine if and when revisions to a study are necessary. Costs for revising this Study shall be borne by the Developer.