

VALLECITOS WATER DISTRICT

MERITAGE TWIN OAKS WATER AND SEWER STUDY

WORK ORDER # 297402

DRAFT TECHNICAL MEMORANDUM

October 17, 2025

Prepared By: Elizabeth Lopez, Senior Engineer, and Caitlin Tran, Assistant Engineer

INTRODUCTION

The proposed Meritage Twin Oaks project (Project) is a 145 single family residential development and 112 multi-family residential development on 137.70-acres, located along Twin Oaks Valley Road between Deerbrook Drive and Legacy Drive (APNs 218-110-02, 218-110-03, 218-330-05, 218-330-08, 218-330-09, 218-330-13, 218-330-26, 218-330-27, 218-330-28).

The Project is partially located within Vallecitos Water District's (VWD) boundaries for water and wastewater service. The property does not need to annex for water but will need to annex for wastewater services.

All new projects undergo evaluation by VWD to determine if the current water and sewer infrastructure is sufficient to accommodate the proposed water demands and sewage generation.

This study projects water demand and sewage generation increases due to the project densification. It analyzes the following aspects of VWD's infrastructure and makes recommendations for capital improvements for impacts that are created due to the land use change:

- 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).
- Existing VWD water and/or sewer facilities not being utilized for proposed development will need to be abandoned per VWD Standards and Specifications. Asbestos cement pipe shall be properly removed and legally disposed of by the Developer.

WATER SYSTEM ANALYSIS

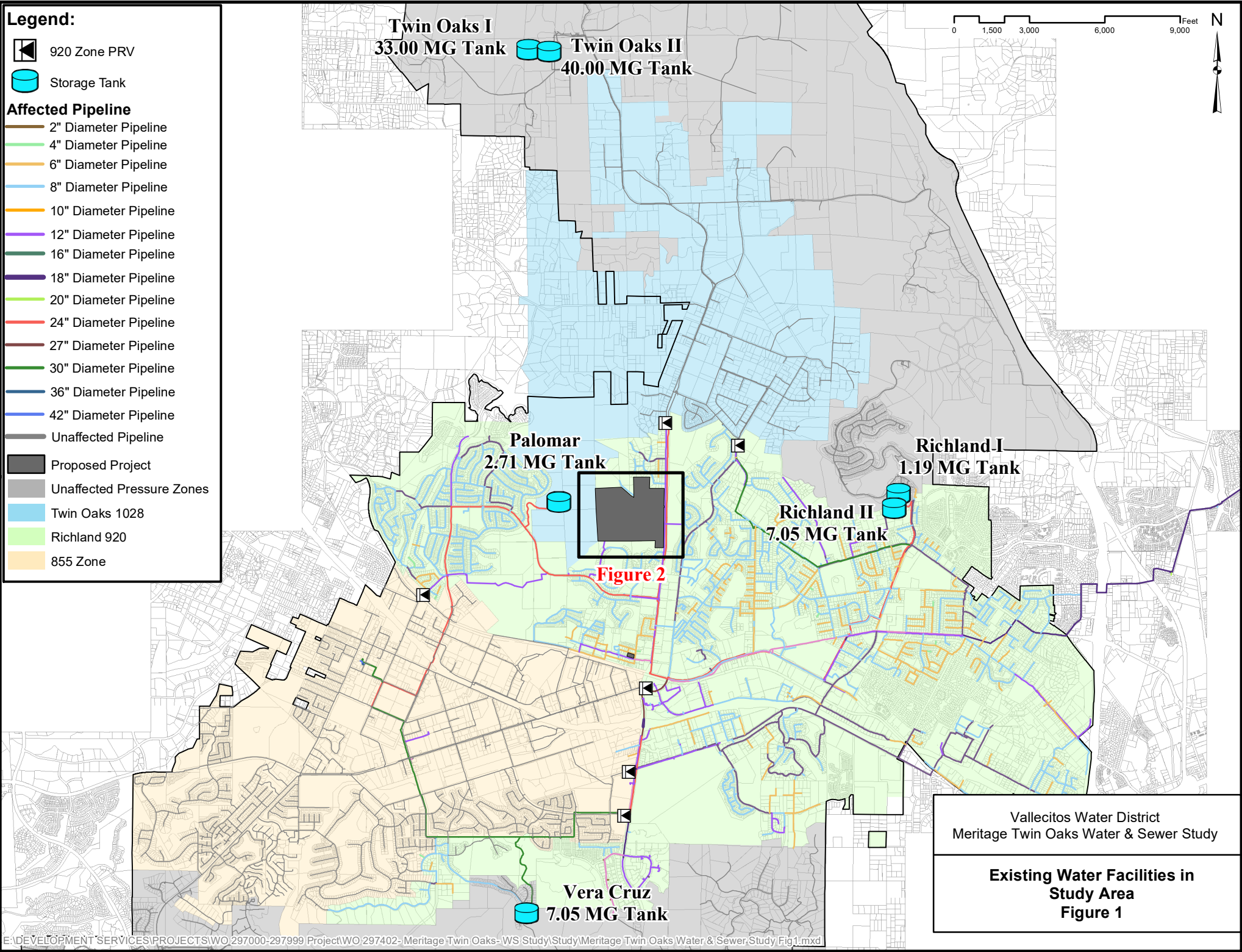
The proposed 137.70-acre Project lies completely within VWD's 920 Pressure Zone. Figures 1 and 2 show the development's location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

Water Demand Projections

The City of San Marcos' approved land use designation for the proposed Project is Open Space and Mobile Home. The VWD 2018 Master Plan based its ultimate water demand planning on Residential and Open Space. Table 1 provides the average water demand generated both under the density planned for the 2018 Master Plan and for the proposed Project. The table shows that the Project will not increase the projected average water demand from the 2018 Master Plan land use

Table 1 – Project Estimated Water Demands for Project

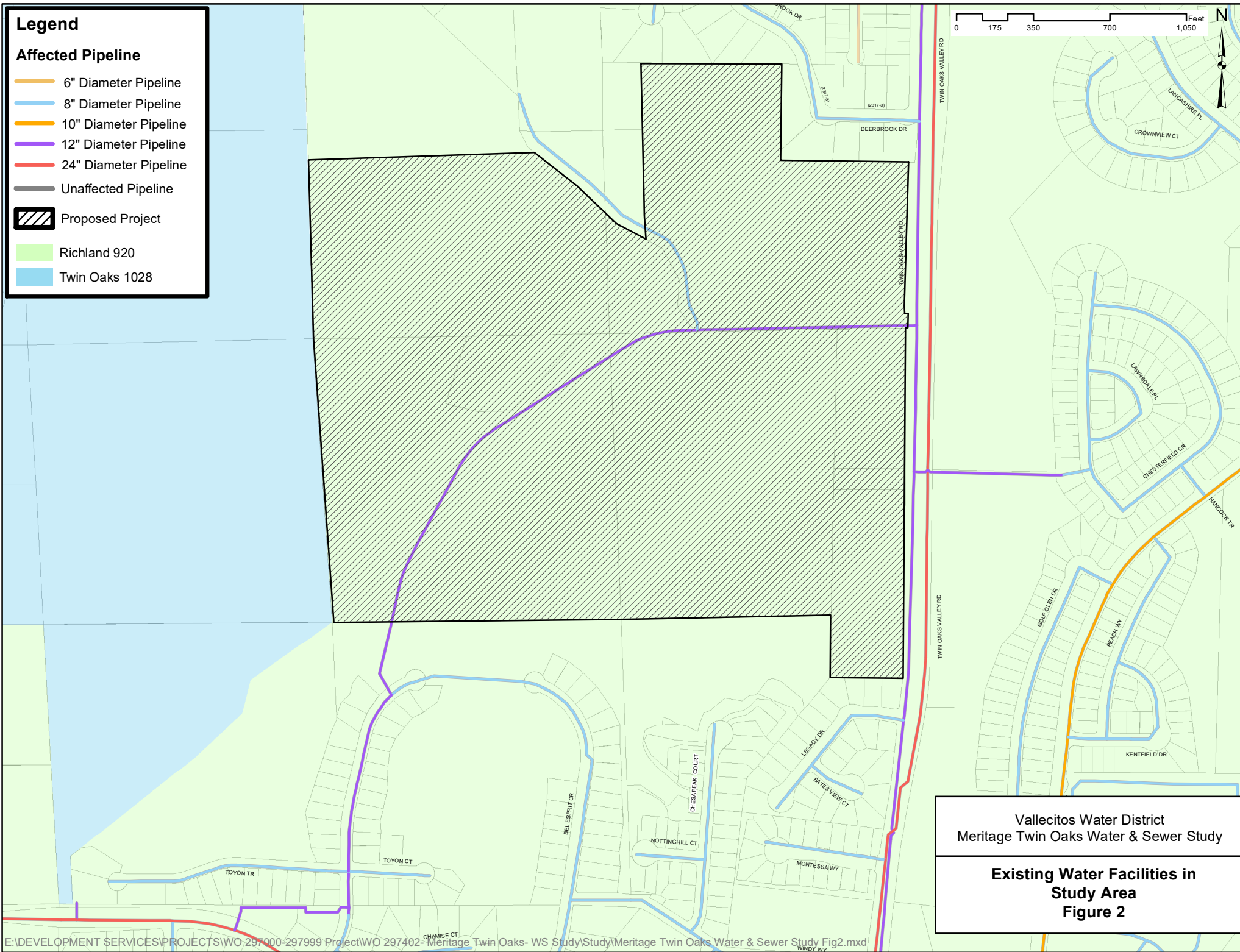
Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/ac)	Water Demand (gpd)
2018 Master Plan Land Use Demand				
Ag/ Res. (0.125-0.5 du/ac)	24.74		800	19,792
Residential (<1 du/ac)	48.91		800	39,128
Residential (1-2 du/ac)	63.67		1,400	89,138
Total	137.32			148,058
Proposed Project Demand				
Residential (2-4 du/ac)	69.58	257	1,800	125,244
Right of Way	8.93		200	1,786
Open Space	52.59		200	10,518
Park	6.22		1,500	9,330
Total	137.32			146,878
Water Demand Increase				0



Legend

Affected Pipeline

- 6" Diameter Pipeline
- 8" Diameter Pipeline
- 10" Diameter Pipeline
- 12" Diameter Pipeline
- 24" Diameter Pipeline
- Unaffected Pipeline
- Proposed Project
- Richland 920
- Twin Oaks 1028



Vallecitos Water District
Meritage Twin Oaks Water & Sewer Study

Existing Water Facilities in Study Area Figure 2

Legend

Affected Pipeline

- 8" Diameter Pipeline
- 12" Diameter Pipeline
- 24" Diameter Pipeline
- Unaffected Pipeline
- Proposed Project
- Richland 920

Affected Pipeline

8" Diameter Pipeline

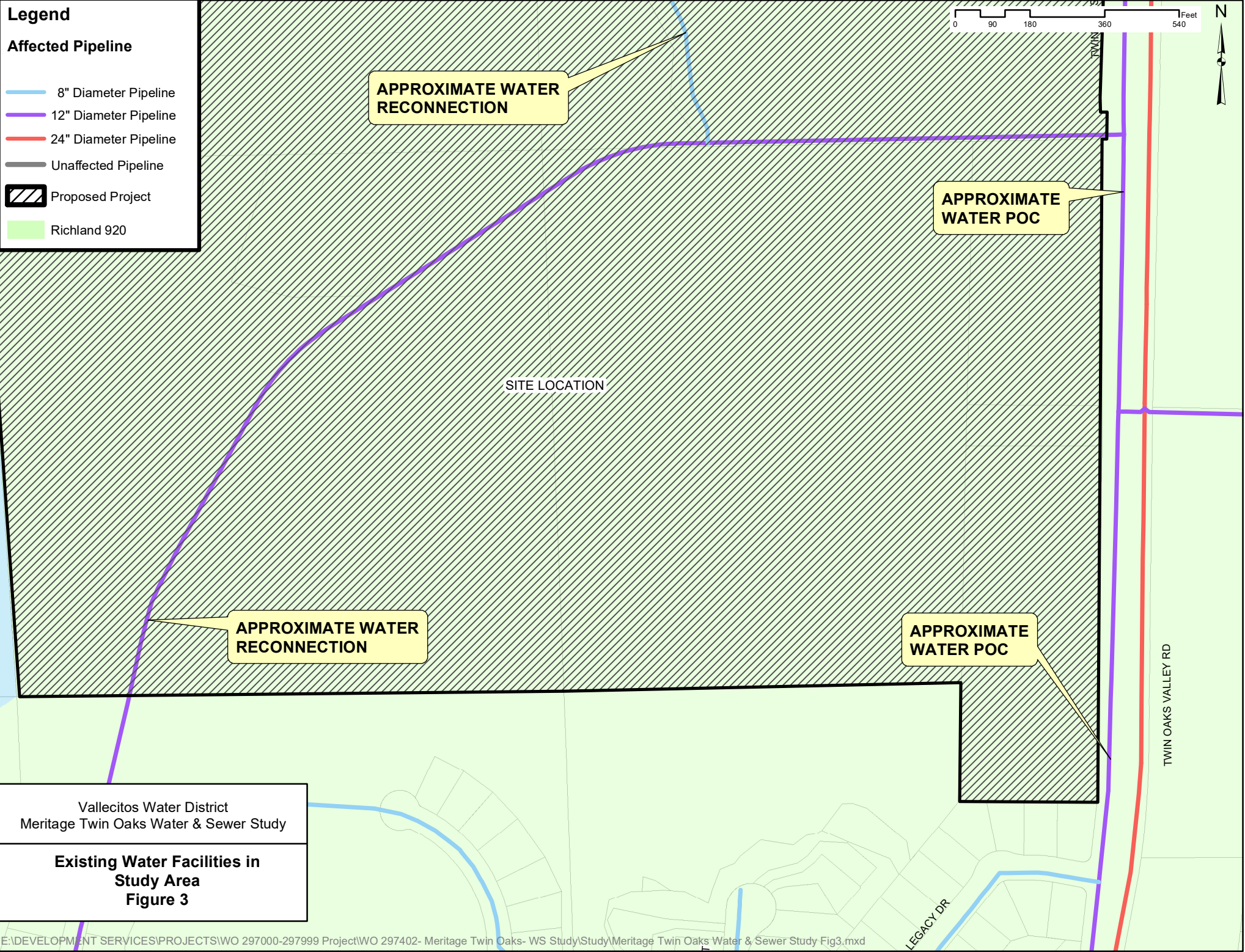
12" Diameter Pipeline

— 24" Diameter Pipeline

— Unaffected Pipeline

 Proposed Project

Richland 920



Vallecitos Water District
Meritage Twin Oaks Water & Sewer Study

Existing Water Facilities in Study Area Figure 3

Water Distribution System Analysis

The VWD 2018 Master Plan water system distribution 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 City of San Marcos Fire Marshall has set the required fire demand at 500 gpm for the Project. At the request of the Developer, this study has evaluated a fire demand of 1,500 gpm.

To avoid excessive velocity and headloss within the distribution system, the following pipeline design criteria was also utilized:

- Maximum allowable velocity: 7 feet per second
- Maximum allowable headloss 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 site
- Average Day Demand with the proposed Project
- Maximum Day Demand with existing demands at the Project site
- Maximum Day Demand with the proposed Project
- Peak Hour Demand with existing demands at the Project site
- Peak Hour Demand with the proposed Project
- Maximum Day Demand plus Fire Flow with existing demands at the Project site
- Maximum Day Demand plus Fire Flow with the proposed Project

Per the 2018 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. The model found that the Project did not create any distribution system deficiencies under average day demand.

System deficiencies did not appear under maximum day plus fire flow demand conditions.

Water Storage Analysis

The VWD 2018 Master Plan outlines VWD's potable water storage reservoirs for each pressure zone as follows:

1.5 times 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.

The Project is located entirely within the VWD 920 pressure zone. Water storage for this zone is located within the 920 zone and 1028 Twin Oaks pressure zones, as shown in Figure 1. Table 2 shows the required storage in the 855, 920, and 1028 Twin Oaks pressure zones for existing and ultimate build-out (Master Plan) conditions relative to the existing storage provided within each zone.

Table 2 – Existing Reservoir Storage Capacity and Requirements

Pressure Zone	Existing ADD (MGD)	Existing Storage Requirement (MG)	Ultimate ADD (MGD)	Ultimate Storage Requirement (MG)	Existing Storage Available (MG)
855	3.74	50.05	6.79	101.25	0
920	5.61		10.40		18
1028 Twin Oaks	0.66		3.06		73
Totals	10.01	50.05	20.25	101.25	91

The Project will not increase the projected average water demand as shown in Table 1.

The analysis finds that water storage capacity is currently available to serve the Project's increased storage requirements. Master Plan projects address and accommodate the ultimate build-out storage deficiency and Water Capital Facility Fees paid by this project will be used for the increase in storage 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.

WASTEWATER SYSTEM ANALYSIS

The proposed 137.70-acre Project lies completely within VWD sewer shed 11C. Figures 4 through 9 show the development's location in relation to sewer shed boundaries, identify wastewater

infrastructure within the vicinity of the development, and identify the downstream collection infrastructure that will be impacted by the development.

Wastewater Flow Projections

The City of San Marcos' approved land use designation for the proposed Project is Open Space and Mobile Home. The VWD 2018 Master Plan based its ultimate water demand planning on Residential and Open Space. Table 3 provides the average wastewater flow generated both under the density planned for the 2018 Master Plan and with the proposed Project. The table shows that the Project will increase the projected average wastewater generation from the 2018 Master Plan land use by **12,589** gallons per day.

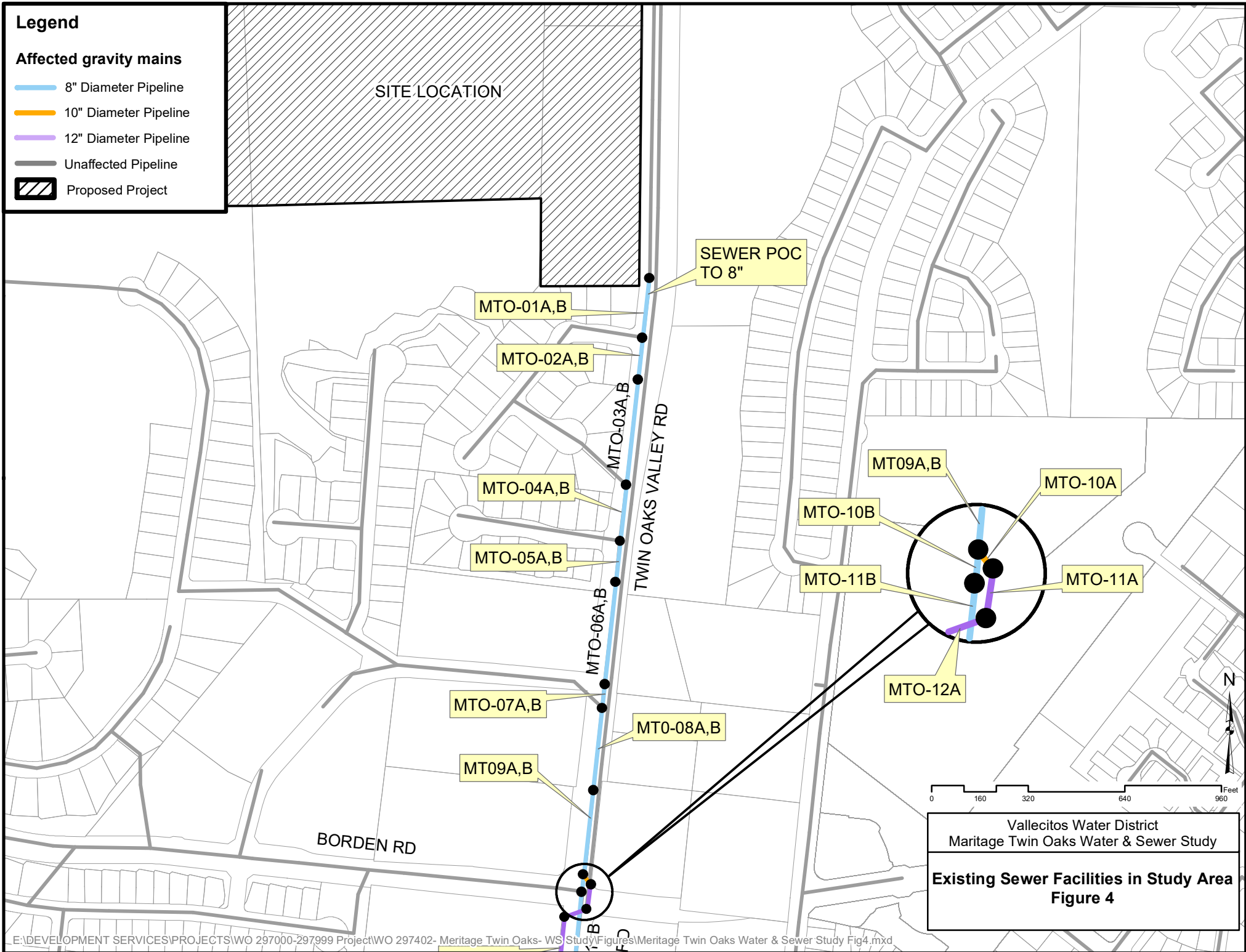
Table 3 – Project Estimated Wastewater Flows for Project

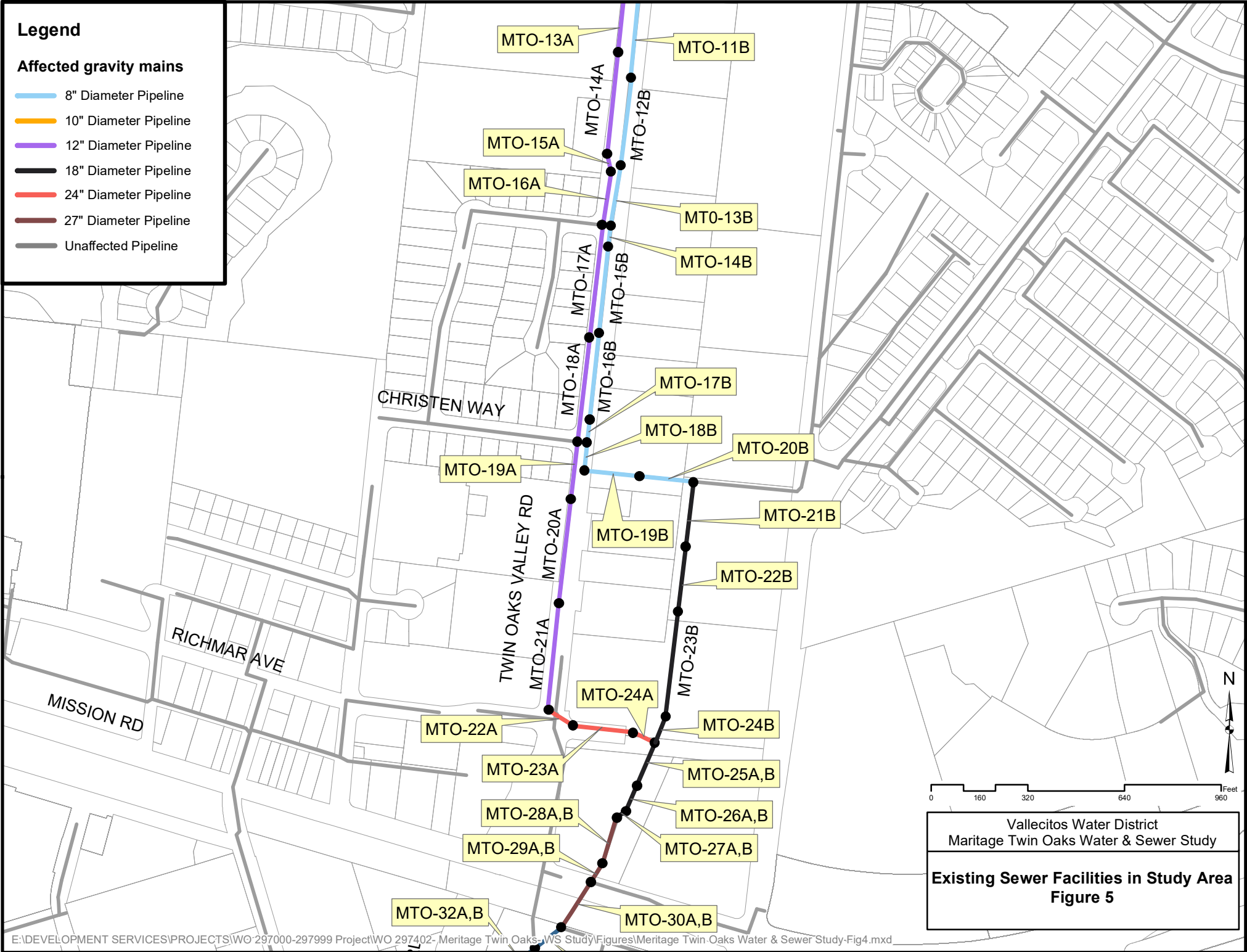
Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/ac)	Wastewater Flow (gpd)
2018 Master Plan Land Use Flows				
Intensive Ag/Residential (0.125-0.5 du/ac)	24.74		80	1,979
Residential (<1 du/ac)	48.91		150	7,337
Residential (1-2 du/ac)	63.67		500	31,835
Total	137.32			41,151
Proposed Project Demand				
Residential (2-4 du/ac)	69.58	257	750	52,185
Right of Way	8.93		0	0
Open Space	52.59		0	0
Park	6.22		250	1,555
Total	137.32			53,740
Sewer Generation Increase				12,589

Legend

Affected gravity mains

- 8" Diameter Pipeline
- 10" Diameter Pipeline
- 12" Diameter Pipeline
- Unaffected Pipeline
- Proposed Project

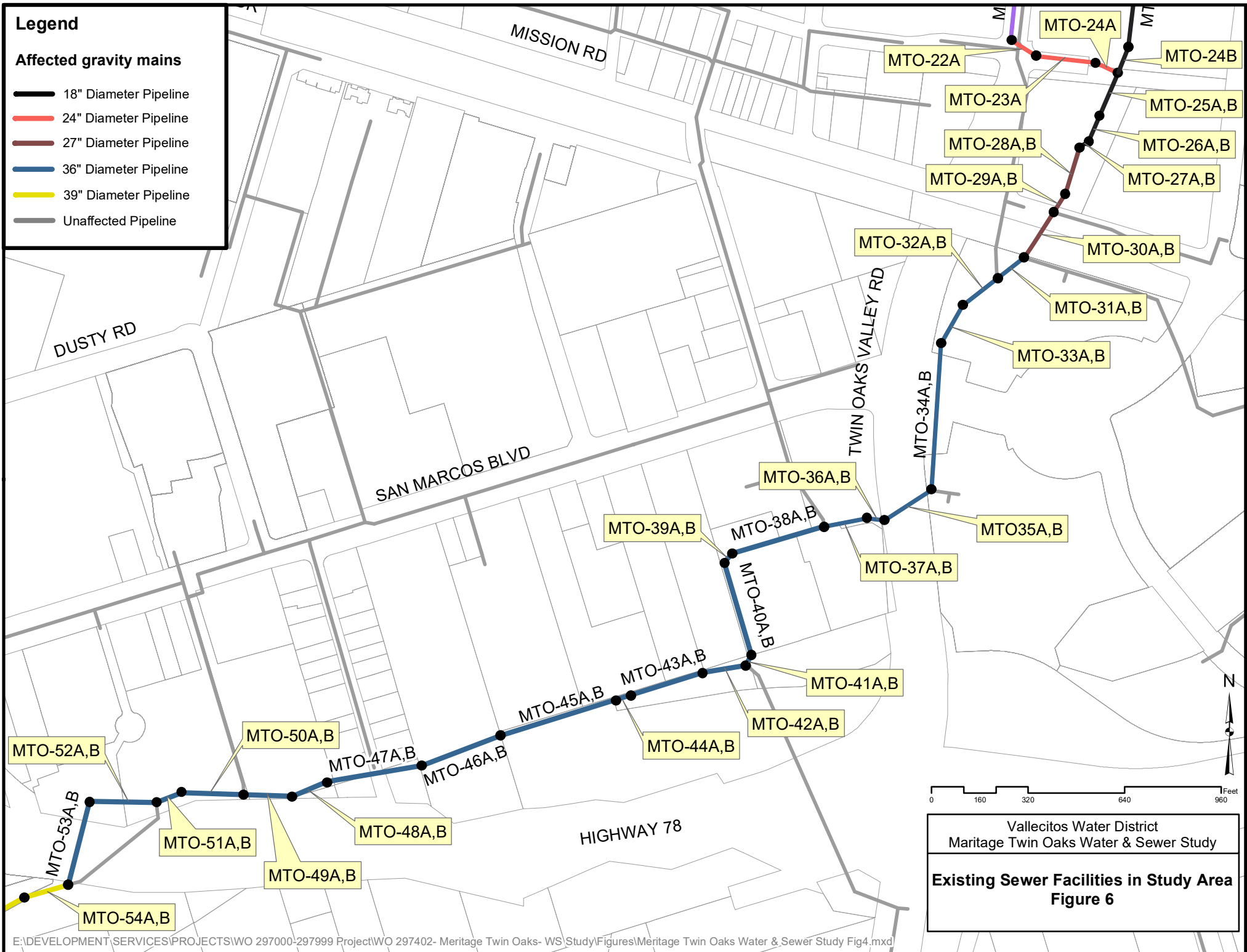




Legend

Affected gravity mains

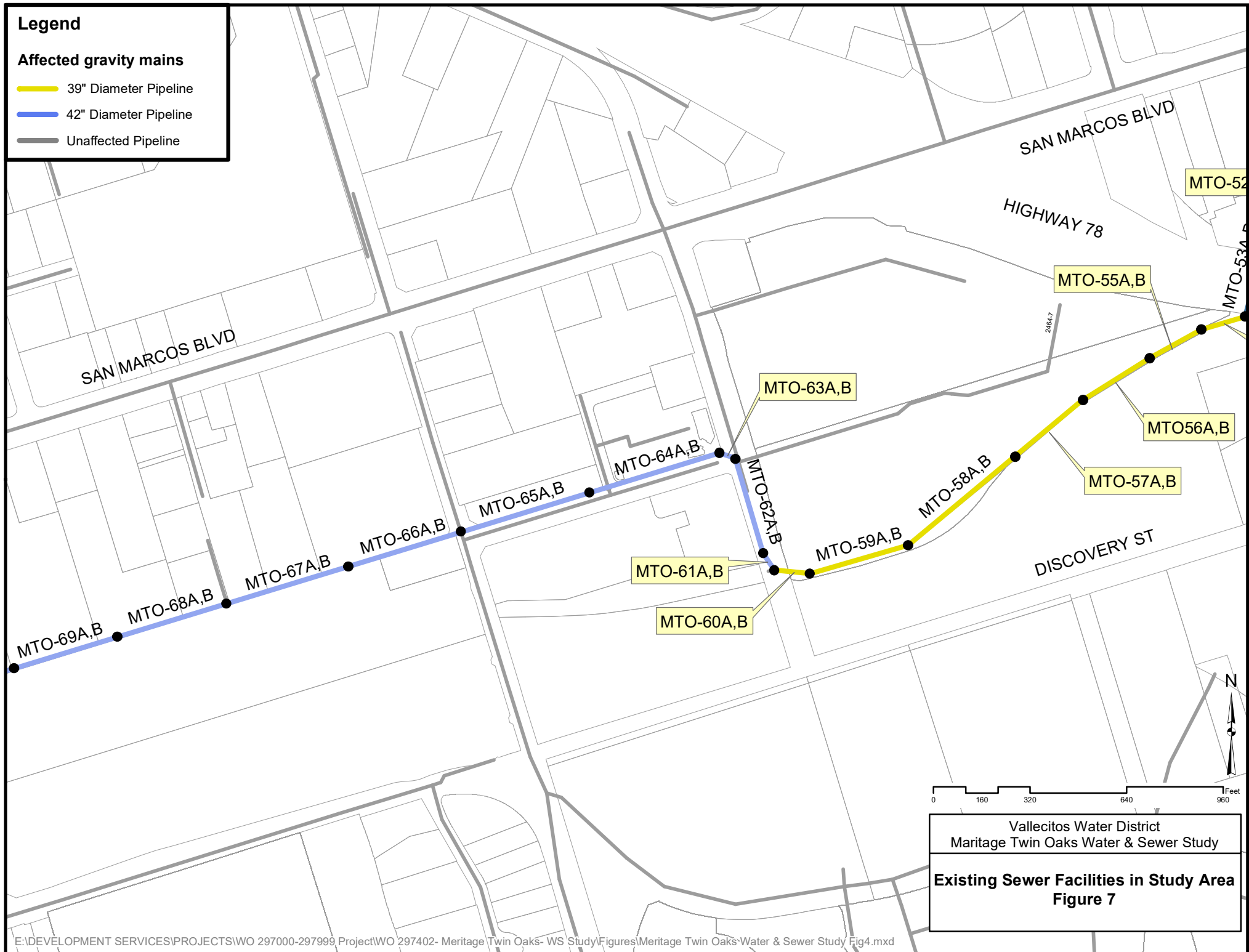
- 18" Diameter Pipeline
- 24" Diameter Pipeline
- 27" Diameter Pipeline
- 36" Diameter Pipeline
- 39" Diameter Pipeline
- Unaffected Pipeline



Legend

Affected gravity mains

- 39" Diameter Pipeline
- 42" Diameter Pipeline
- Unaffected Pipeline



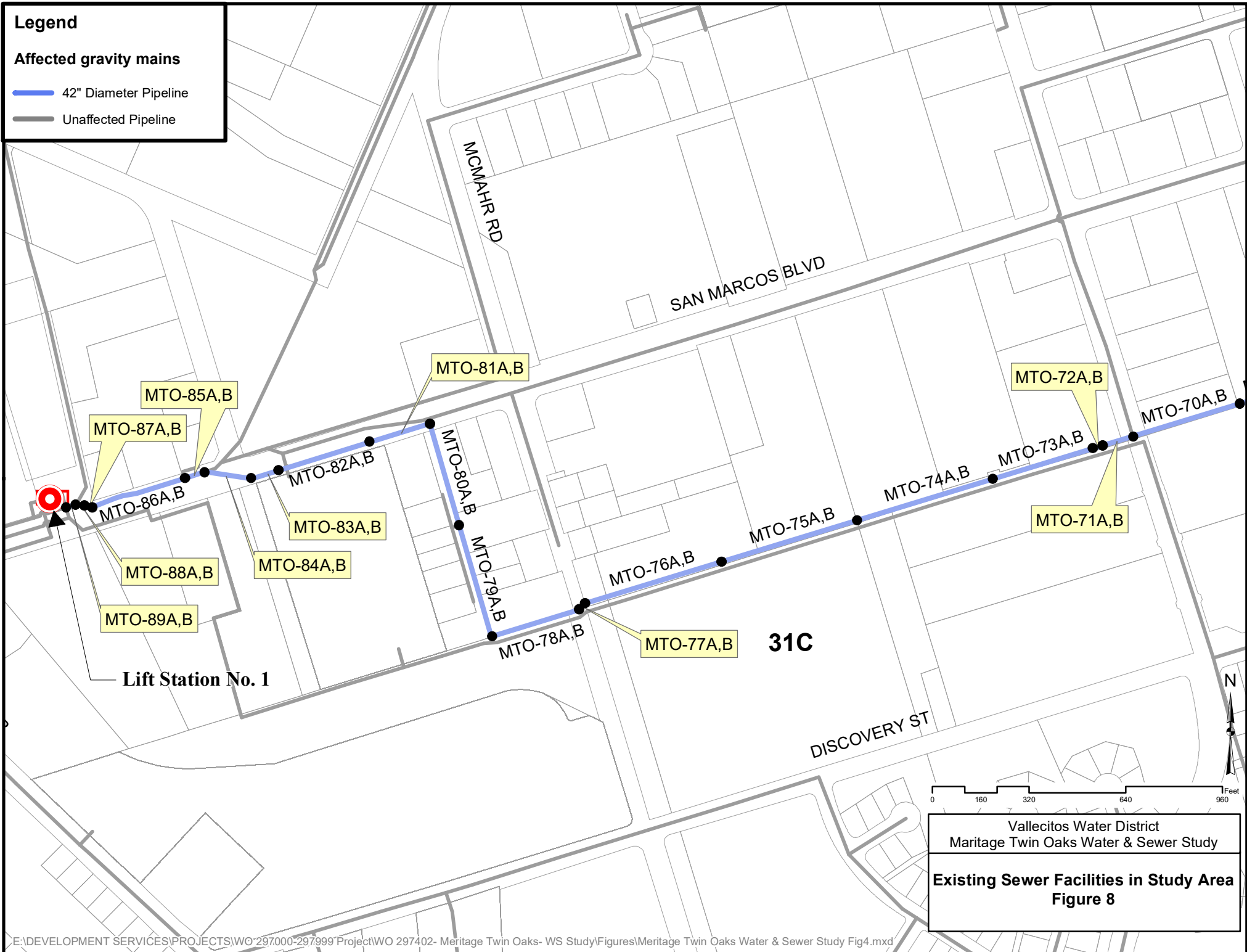
Vallecitos Water District
Meritage Twin Oaks Water & Sewer Study

**Existing Sewer Facilities in Study Area
Figure 7**

Legend

Affected gravity mains

- 42" Diameter Pipeline
- Unaffected Pipeline



Wastewater Collection System Analysis

The VWD 2018 Master Plan outlines VWD's wastewater system design criteria which 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: $\frac{1}{2}$ full maximum at peak flow
- Pipes over 12 inches in diameter: $\frac{3}{4}$ 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 8 inches in diameter and smaller: 0.4% minimum
- Slope for pipes over 8 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 site
- Average Dry Weather Flow with the proposed Project
- Peak Dry Weather Flow with existing flows at the Project site
- Peak Dry Weather Flow with the proposed Project
- Peak Wet Weather Flow with existing flows at the Project site
- 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 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 proposed Project flows (see Figures 4 - 9).

Table 4 presents a summary of the modeling results from this analysis. The modeling results showed that deficiencies have been identified under the 2018 Master Plan land use density (pipeline segments MTO-01 through MTO-20). The modeling results also showed that the proposed Project resulted in deficiencies under peak wet weather flows during ultimate build-out conditions in pipe segments MTO-01 through MTO-20. Pipeline segments MTO-01 through MTO-09 will require upsizing from 8-inch to 18-inch diameter, pipeline segment MTO-10 will require upsizing from 10-inch to 18-inch diameter, and pipeline segment MTO-11 through MTO-20 will require upsizing from 12-inch to 18-inch diameter to mitigate the deficiencies. Segments MTO-01 through MTO-09 have been identified to be upsized to 18-inch diameter pipelines by CIP SP-31 in VWD's 2008 Master Plan. Segment MTO-25 through MTO-26 have been identified to be upsized from 18-inch diameter pipelines to 24-inch by CIP SP-34 in VWD's 2008 Master Plan.

VWD's 2018 Master Plan identifies CIP projects SP-11, SP-12, SP-31 and SP-34 which encompass the affected pipe sections. SP-11 and SP-12 are Phase 1 projects and have been completed. SP-31 and SP-34 are CIP projects that are to be completely funded by development without contribution from the VWD capacity fund. These projects are Phase 4 projects and are anticipated to be completed in the 2031 through 2035 timeframe.

Option A utilizes the existing District sewer infrastructure which diverts flows from the existing 8-inch sewer main in Twin Oaks Valley Road north of Borden Road to the existing 12-inch sewer main south of Borden Road. Option B is in alignment with District CIP project SP-31 which does not divert flows to the 12-inch sewer main. Instead, flows will continue in the 8-inch sewer main until the pipe diameter increases to 18-inches approximately 0.3 miles south of Borden Road.

Option A:

- The 1,659-foot section of 8-inch sewer main located in Twin Oaks Valley Road from approximately 303 feet north of Legacy Drive to Windy Way (MTO-01A through MTO-06A) has been identified for upsizing to 15-inch as part of TOVR SAMP.
- The 623-foot section of 8-inch sewer main located in Twin Oaks Valley Road from approximately Windy Way to Borden Road (MTO-07A through MTO-09A) has been identified for upsizing to 18-inch as part of TOVR SAMP.
- The 19-foot section of 10-inch sewer main located in Twin Oaks Valley Road at Borden Road (MTO-10A) has been identified for upsizing to 18-inch.
- The 2,534-foot section of 12-inch sewer main located in Twin Oaks Valley Road (MTO-11A through MTO-21A) has been identified for upsizing to 18-inch.
- The 232-foot section of 18-inch sewer main located in San Marcos Creek (MTO-25A through MTO-26A) has been identified for upsizing to 24-inch as part of CIP SP-34.

Option B:

- The 1,659-foot section of 8-inch sewer main located in Twin Oaks Valley Road from approximately 303 feet north of Legacy Drive to Windy Way (MTO-01B through MTO-06B) has been identified for upsizing to 15-inch as part of TOVR SAMP.

- The 2,733-foot section of 8-inch sewer main located in Twin Oaks Valley Road from approximately Windy Way to Borden Road (MTO-07B through MTO-20B) has been identified for upsizing to 18-inch as part of TOVR SAMP.
- The 232-foot section of 18-inch sewer main located along San Marcos Creek north of Mission Road (MTO-25B through MTO-26B) has been identified for upsizing to 24-inch as part of CIP SP-34.

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option A

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-01A	303	8	0.0080	672	>1	15	0.35	746	>1	15	0.37
MTO-02A	183	8	0.0200	677	0.73	15	0.28	751	0.81	15	0.29
MTO-03A	153	8	0.0160	681	1.00	15	0.30	756	>1	15	0.31
MTO-04A	340	8	0.0150	684	0.85	15	0.30	758	>1	15	0.32
MTO-05A	340	8	0.0150	696	0.88	15	0.31	770	>1	15	0.32
MTO-06A	340	8	0.0040	702	>1	15	0.43	777	>1	15	0.46
MTO-07A	64	8	0.0070	709	>1	18	0.29	783	>1	18	0.31
MTO-08A	276	8	0.0030	801	>1	18	0.39	875	>1	18	0.41
MTO-09A	283	8	0.0050	805	>1	18	0.34	880	>1	18	0.36
MTO-10A	19	10	0.1050	807	0.35			881	0.36	18	0.17
MTO-11A	86	12	0.0050	1,165	0.85	18	0.41	1,239	>1	18	0.43
MTO-12A	82	12	0.0050	1,166	0.86	18	0.41	1,241	>1	18	0.43
MTO-13A	173	12	0.0050	1,168	0.86	18	0.41	1,243	>1	18	0.43
MTO-14A	339	12	0.0050	1,173	0.86	18	0.41	1,247	>1	18	0.43
MTO-15A	61	12	0.0050	1,175	0.86	18	0.41	1,249	>1	18	0.43
MTO-16A	176	12	0.0050	1,180	0.87	18	0.42	1,254	>1	18	0.43
MTO-17A	358	12	0.0050	1,197	0.89	18	0.42	1,271	>1	18	0.43
MTO-18A	350	12	0.0050	1,199	0.89	18	0.42	1,273	>1	18	0.43
MTO-19A	206	12	0.0050	1,220	>1	18	0.42	1,294	>1	18	0.44
MTO-20A	350	12	0.0050	1,222	>1	18	0.42	1,296	>1	18	0.44

CIP PROJECTS: **MTO-01 THROUGH MTO-09 (TOVR SAMP)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option A

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-21A	353	12	0.0130	1243	0.61			1,317	0.63	18	0.34
MTO-22A	104.1	24	0.0260	1245	0.19			1,319	0.20		
MTO-23A	212.9	24	0.0260	1247	0.19			1,321	0.20		
MTO-24A	84	24	0.0260	1248	0.19			1,323	0.20		
MTO-25A	170	18	0.0040	2725	0.76	24	0.46	2,800	0.77	24	0.47
MTO-26A	62	18	0.0180	2727	0.46			2,801	0.47	24	0.31
MTO-27A	31	27	0.0030	2729	0.42			2,803	0.43		
MTO-28A	165	27	0.0050	2731	0.37			2,805	0.37		
MTO-29A	81	27	0.0060	2741	0.35			2,815	0.35		
MTO-30A	180	27	0.0080	2741	0.32			2,815	0.33		
MTO-31A	135	36	0.0030	6,243	0.43			6,318	0.44		
MTO-32A	128	36	0.0050	6,268	0.38			6,343	0.38		
MTO-33A	140	36	0.0070	6,270	0.35			6,344	0.35		
MTO-34A	470	36	0.0040	6,272	0.40			6,346	0.40		
MTO-35A	184	36	0.0030	6,287	0.43			6,361	0.44		
MTO-36A	36	36	0.0020	6,289	0.49			6,363	0.49		
MTO-37A	146	36	0.0050	6,289	0.38			6,363	0.38		
MTO-38A	318	36	0.0040	6,649	0.41			6,723	0.42		
MTO-39A	39	36	0.0040	6,649	0.41			6,724	0.42		
MTO-40A	319	36	0.0040	6,650	0.41			6,724	0.42		

CIP PROJECTS: **MTO-25 THROUGH MTO-26 (SP-34)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option A

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-41A	38	36	0.0040	6650	0.41			6,725	0.42		
MTO-42A	139	36	0.0040	8770	0.48			8,844	0.49		
MTO-43A	294	36	0.0030	8772	0.53			8,846	0.53		
MTO-44A	12	36	0.0170	8771	0.33			8,845	0.33		
MTO-45A	438	36	0.0050	8772	0.45			8,846	0.46		
MTO-46A	229	36	0.0050	8771	0.45			8,845	0.46		
MTO-47A	371.2	36	0.0060	8771	0.43			8,845	0.43		
MTO-48A	123.6	36	0.0050	8771	0.45			8,845	0.46		
MTO-49A	167.2	36	0.0050	8772	0.45			8,846	0.46		
MTO-50A	201	36	0.0040	9065	0.49			9,139	0.49		
MTO-51A	91.2	36	0.0050	9,066	0.46			9,141	0.46		
MTO-52A	220.4	36	0.0050	9,068	0.46			9,142	0.46		
MTO-53A	285.7	36	0.0050	9,070	0.46			9,144	0.46		
MTO-54A	210	39	0.0040	9,163	0.44			9,237	0.44		
MTO-55A	176	39	0.0030	9,164	0.48			9,238	0.48		
MTO-56A	271	39	0.0020	9,166	0.54			9,240	0.54		
MTO-57A	297	39	0.0020	9,167	0.54			9,241	0.54		
MTO-58A	452	39	0.0020	9,168	0.54			9,242	0.54		
MTO-59A	337	39	0.0020	9,170	0.54			9,245	0.54		
MTO-60A	123	39	0.0080	9,364	0.37			9,438	0.37		

CIP PROJECTS:

PROPOSED DENSITY: 74 GPM

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option A

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-61A	58	42	0.0040	9367	0.40			9,441	0.40		
MTO-62A	308	42	0.0030	9370	0.43			9,445	0.43		
MTO-63A	69	42	0.0010	9378	0.60			9,452	0.60		
MTO-64A	448	42	0.0030	9382	0.43			9,457	0.43		
MTO-65A	448	42	0.0030	9390	0.43			9,464	0.43		
MTO-66A	404	42	0.0060	9743	0.37			9,818	0.37		
MTO-67A	404	42	0.0060	9748	0.37			9,822	0.37		
MTO-68A	368	42	0.0030	9753	0.44			9,827	0.44		
MTO-69A	368	42	0.0030	9755	0.44			9,829	0.44		
MTO-70A	368	42	0.0030	9755	0.44			9,829	0.44		
MTO-71A	120	42	0.0020	9,809	0.50			9,883	0.50		
MTO-72A	14	42	0.0210	9,810	0.27			9,884	0.27		
MTO-73A	352	42	0.0040	9,809	0.41			9,883	0.41		
MTO-74A	185.2	42	0.0200	9,808	0.27			9,882	0.27		
MTO-75A	650	42	0.0030	9,808	0.44			9,882	0.44		
MTO-76A	677	42	0.0030	9,806	0.44			9,881	0.44		
MTO-77A	8	42	0.0290	9,811	0.25			9,885	0.25		
MTO-78A	310	42	0.0050	9,811	0.39			9,885	0.39		
MTO-79A	372	42	0.0040	9,810	0.41			9,884	0.41		
MTO-80A	355	42	0.0050	9,818	0.39			9,892	0.39		

CIP PROJECTS: **MTO-71 THROUGH MTO-76 (SP-11)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option A

[illegible]

CIP PROJECTS: MTO-85 THROUGH MTO-89(SP-12)

PROPOSED DENSITY: 74 GPM

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option B

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-01B	303	8	0.0080	672	>1	15	0.35	746	>1	15	0.37
MTO-02B	183	8	0.0200	677	0.73	15	0.28	751	0.81	15	0.29
MTO-03B	153	8	0.0160	681	1.00	15	0.30	756	>1	15	0.31
MTO-04B	340	8	0.0150	684	0.85	15	0.30	758	>1	15	0.32
MTO-05B	340	8	0.0150	696	0.88	15	0.31	770	>1	15	0.32
MTO-06B	340	8	0.0040	702	>1	15	0.43	777	>1	15	0.46
MTO-07B	64	8	0.0070	709	>1	18	0.29	783	>1	18	0.31
MTO-08B	276	8	0.0030	801	>1	18	0.39	875	>1	18	0.41
MTO-09B	283	8	0.0050	805	>1	18	0.34	880	>1	18	0.36
MTO-10B	52	8	0.0060	807	>1	18	0.32	881	>1	18	0.34
MTO-11B	350	8	0.0030	993	>1	18	0.44	1,067	>1	18	0.45
MTO-12B	294	8	0.0130	998	>1	18	0.30	1,072	>1	18	0.31
MTO-13B	200	8	0.0140	1,001	>1	18	0.29	1,075	>1	18	0.30
MTO-14B	90	8	0.0130	1,003	>1	18	0.30	1,077	>1	18	0.31
MTO-15B	290	8	0.0020	1,006	>1	18	0.49	1,080	>1	18	0.51
MTO-16B	290	8	0.0060	1,009	>1	18	0.36	1,083	>1	18	0.38
MTO-17B	100	8	0.0030	1,011	>1	18	0.44	1,085	>1	18	0.46
MTO-18B	76	8	0.0080	1,012	>1	18	0.34	1,087	>1	18	0.35
MTO-19B	184	8	0.0330	1,014	0.85	18	0.24	1,089	>1	18	0.25
MTO-20B	184	8	0.0330	1,018	0.86	18	0.24	1,092	>1	18	0.25

CIP PROJECTS: **MTO-01 THROUGH MTO-09 (TOVR SAMP)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option B

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-21B	216	18	0.0030	2256	0.73			2,330	0.75		
MTO-22B	217	18	0.0040	2258	0.66			2,332	0.67		
MTO-23B	350	18	0.0040	2273	0.66			2,348	0.67		
MTO-24B	80	18	0.0040	2282	0.66			2,356	0.68		
MTO-25B	170	18	0.0040	2725	0.76	24	0.46	2,800	0.77	24	0.47
MTO-26B	62	18	0.0180	2727	0.46			2,801	0.47	24	0.31
MTO-27B	31	27	0.0030	2729	0.42			2,803	0.43		
MTO-28B	165	27	0.0050	2731	0.37			2,805	0.37		
MTO-29B	81	27	0.0060	2741	0.35			2,815	0.35		
MTO-30B	180	27	0.0080	2741	0.32			2,815	0.33		
MTO-31B	135	36	0.0030	5,992	0.42			6,066	0.43		
MTO-32B	128	36	0.0050	6,017	0.37			6,091	0.37		
MTO-33B	140	36	0.0070	6,018	0.34			6,093	0.34		
MTO-34B	470	36	0.0040	6,020	0.39			6,094	0.40		
MTO-35B	184	36	0.0030	6,034	0.42			6,109	0.43		
MTO-36B	36	36	0.0020	6,036	0.48			6,111	0.48		
MTO-37B	146	36	0.0050	6,037	0.37			6,111	0.37		
MTO-38B	318	36	0.0040	6,396	0.41			6,471	0.41		
MTO-39B	39	36	0.0040	6,397	0.41			6,471	0.41		
MTO-40B	319	36	0.0040	6,397	0.41			6,472	0.41		

CIP PROJECTS: **MTO-25 THROUGH MTO-26 (SP-34)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option B

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-41B	38	36	0.0040	6398	0.41			6,472	0.41		
MTO-42B	139	36	0.0040	8521	0.48			8,595	0.48		
MTO-43B	294	36	0.0030	8523	0.52			8,597	0.52		
MTO-44B	12	36	0.0170	8523	0.32			8,597	0.32		
MTO-45B	438	36	0.0050	8524	0.45			8,598	0.45		
MTO-46B	229	36	0.0050	8525	0.45			8,599	0.45		
MTO-47B	371.2	36	0.0060	8525	0.42			8,599	0.43		
MTO-48B	123.6	36	0.0050	8530	0.45			8,604	0.45		
MTO-49B	167.2	36	0.0050	8534	0.45			8,608	0.45		
MTO-50B	201	36	0.0040	8830	0.49			8,904	0.49		
MTO-51B	91.2	36	0.0050	8,832	0.46			8,907	0.46		
MTO-52B	220.4	36	0.0050	8,835	0.46			8,909	0.46		
MTO-53B	285.7	36	0.0050	8,838	0.46			8,912	0.46		
MTO-54B	210	39	0.0040	8,932	0.43			9,006	0.44		
MTO-55B	176	39	0.0030	8,934	0.47			9,009	0.47		
MTO-56B	271	39	0.0020	8,937	0.53			9,011	0.53		
MTO-57B	297	39	0.0020	8,940	0.53			9,014	0.53		
MTO-58B	452	39	0.0020	8,943	0.53			9,017	0.53		
MTO-59B	337	39	0.0020	8,947	0.53			9,021	0.53		
MTO-60B	123	39	0.0080	9,140	0.36			9,214	0.37		

CIP PROJECTS:

PROPOSED DENSITY: 74 GPM

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option B

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-61B	58	42	0.0040	9142	0.39			9,216	0.40		
MTO-62B	308	42	0.0030	9145	0.43			9,219	0.43		
MTO-63B	69	42	0.0010	9151	0.59			9,225	0.59		
MTO-64B	448	42	0.0030	9154	0.43			9,228	0.43		
MTO-65B	448	42	0.0030	9157	0.43			9,231	0.43		
MTO-66B	404	42	0.0060	9507	0.36			9,581	0.36		
MTO-67B	404	42	0.0060	9509	0.36			9,583	0.36		
MTO-68B	368	42	0.0030	9513	0.44			9,587	0.44		
MTO-69B	368	42	0.0030	9515	0.44			9,590	0.44		
MTO-70B	368	42	0.0030	9521	0.44			9,595	0.44		
MTO-71B	120	42	0.0020	9,583	0.49			9,657	0.49		
MTO-72B	14	42	0.0210	9,584	0.26			9,658	0.26		
MTO-73B	352	42	0.0040	9,585	0.40			9,659	0.41		
MTO-74B	185.2	42	0.0200	9,586	0.27			9,660	0.27		
MTO-75B	650	42	0.0030	9,591	0.44			9,665	0.44		
MTO-76B	677	42	0.0030	9,598	0.44			9,672	0.44		
MTO-77B	8	42	0.0290	9,606	0.24			9,680	0.24		
MTO-78B	310	42	0.0050	9,606	0.38			9,680	0.38		
MTO-79B	372	42	0.0040	9,608	0.40			9,682	0.41		
MTO-80B	355	42	0.0050	9,619	0.38			9,693	0.38		

CIP PROJECTS: **MTO-71 THROUGH MTO-76 (SP-11)**

PROPOSED DENSITY: **74 GPM**

Meritage Twin Oaks Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements - Option B

				Wastewater Flows with Existing Density				Wastewater Flows with Proposed Density			
Pipe ID Number	Length (ft)	Diameter (in)	Slope	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
MTO-81B	190	42	0.0050	9620	0.38			9,694	0.38		
MTO-82B	316	42	0.0040	9620	0.40			9,694	0.41		
MTO-83B	94	42	0.0060	9620	0.36			9,694	0.36		
MTO-84B	119.9	42	0.0060	9620	0.36			9,694	0.36		
MTO-85B	100	42	0.0020	13829	0.61			13,903	0.61		
MTO-86B	347	42	0.0020	13838	0.61			13,912	0.61		
MTO-87B	18	42	0.0030	13840	0.54			13,914	0.54		
MTO-88B	10	42	0.0320	13842	0.29			13,916	0.29		
MTO-89B	10	42	0.0120	14033	0.37			14,107	0.37		

CIP PROJECTS: **MTO-85 THROUGH MTO-89(SP-12)**

PROPOSED DENSITY: **74 GPM**

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 5 below:

Table 5 – 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

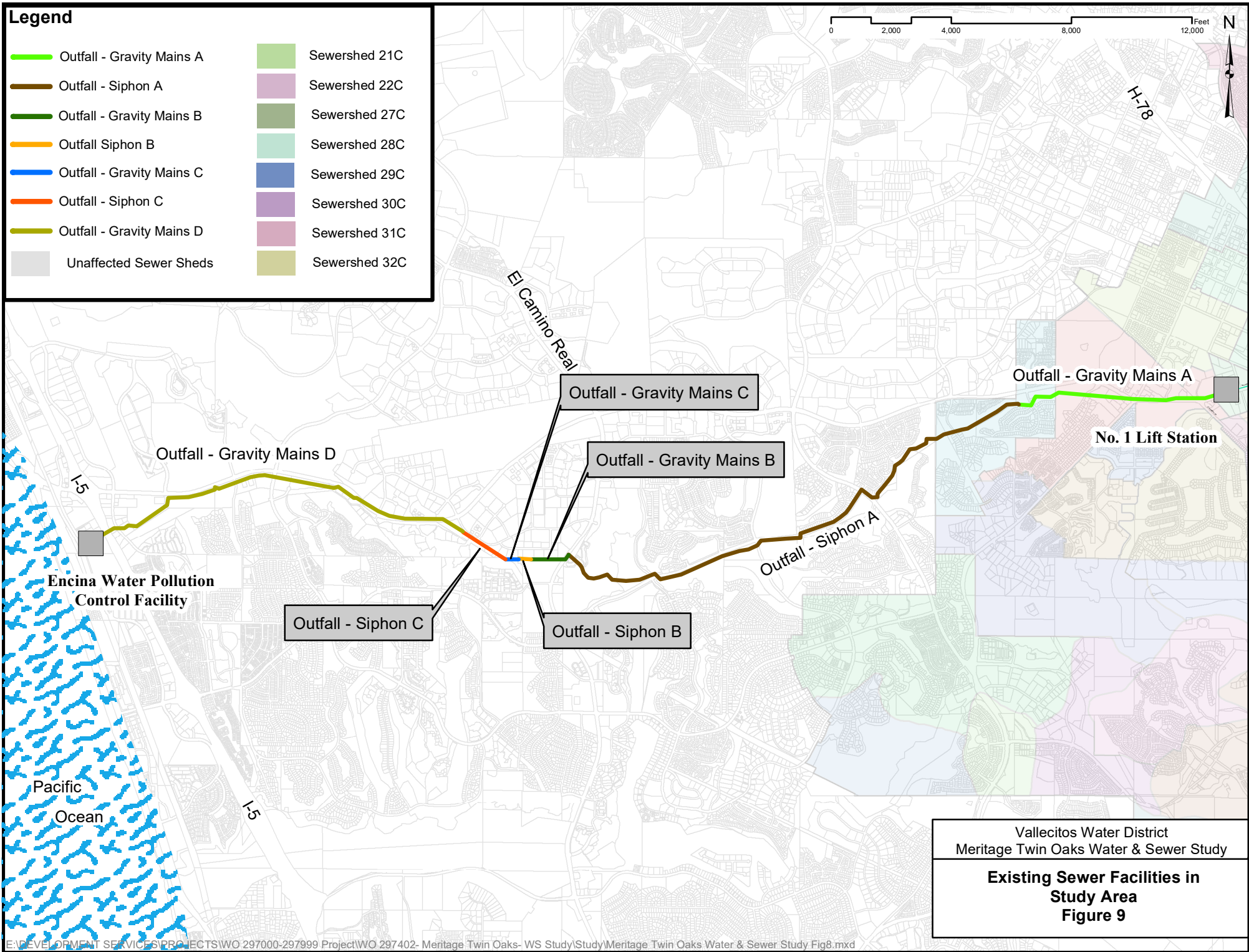
The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

VWD's 2014 average daily wastewater flow through the land outfall was 7.5 MGD. This corresponds to a peak wet weather flow of 17.5 MGD, which falls within VWD's combined peak wet weather collection capacity.

The 2018 Master Plan estimated that, under approved land uses, VWD has an ultimate build-out average dry weather flow of 14.4 MGD. This corresponds to a peak wet weather flow of 31.7 MGD, which exceeds VWD's combined peak wet weather collection capacity. To accommodate additional wastewater flows from planned development, the 2018 Master Plan recommended conveyance of peak flows to the EWPCF through a parallel land outfall.

The Project proposes to generate 69,562 gallons per day of additional average wastewater flow that was not accounted for in the Land Outfall's capacity studied in the 2018 Master Plan.

The analysis finds that outfall capacity is currently available to serve the Project's proposed wastewater generation. Wastewater Capital Facility Fees paid by this Project will be used toward design and construction of a parallel land outfall to be sized to accommodate ultimate build-out wastewater flows.



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 noted below.

Solids Treatment Capacity

VWD currently owns 10.47 MGD of solids treatment capacity at EWPCF. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate solids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in a projected solids treatment capacity deficiency of 3.93 MGD. Wastewater Capital Facility Fees paid by this Project will be used towards the deficiency to accommodate the solid treatment capacity wastewater flow.

Liquids Treatment Capacity

VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the liquid's treatment capacity of 5.0 MGD at MRF for a total of 12.67 MGD of liquids treatment capacity. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate liquids treatment capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in a projected liquids treatment capacity deficiency of 1.73 MGD. Wastewater Capital Facility Fees paid by this Project will be used towards the deficiency to accommodate the ultimate average wastewater flow.

Ocean Disposal Capacity

VWD currently owns 10.47 MGD of ocean disposal capacity at the EWPCF. VWD's 2014 average daily wastewater flow was 7.5 MGD. Therefore, the analysis finds that adequate ocean disposal capacity exists at this time to serve the Project.

The ultimate average wastewater flow identified in the 2018 Master Plan is 14.4 MGD, resulting in an ocean disposal deficiency of 3.93 MGD. Wastewater Capital Facility Fees paid by this Project will be used towards the deficiency to accommodate the ocean disposal wastewater flow.

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

CONCLUSION

The proposed Project is expected to increase average daily water demands by 0 gallons per day and wastewater flows by 12,589 gallons per day over the ultimate flows projected in the VWD 2018 Master Plan.

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

- An increase of 0 gallons in water demand for proposed project.
- An increase of 0 gallons of potable water storage requirement.
- An increase of 12,589 gallons per day in solids handling, liquids handling and ocean disposal capacity requirements at Encina Water Pollution Control Facility.
- An increase of 12,589 gallons per day in the parallel land outfall's capacity requirement.

The following are required for providing service to the proposed Project:

- 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 Board acceptance of all water and sewer facilities prior to service.
- Construction and acceptance of all off-site water and sewer facilities prior to service being provided including but not limited to the following:
 - Option A
 - Approximately 1,659 feet of 8-inch diameter sewer main (MTO-01A through MTO-06A) located in Twin Oaks Valley Road from approximately 303 feet north of Legacy Drive to Windy Way must be upsized to 15-inch diameter main as part of District CIP TOVR SAMP or by Developer with potential for partial reimbursement.
 - Approximately 623 feet of 8-inch diameter sewer main (MTO-07A through MTO-09A) located in Twin Oaks Valley Road from approximately Windy Way to Borden Road mut be upsized to 18-inch diameter main as part of District CIP TOVR SAMP or by Developer with potential for partial reimbursement.
 - Approximately 19 feet of 10-inch diameter sewer main (MTO-10A) in Twin Oaks Valley Road at Borden Road must be upsized to 18-inch diameter main.
 - Approximately 2,534 feet of 12-inch sewer main located (MTO-11A through MTO-21A) in Twin Oaks Valley Road must be upsized to 18-inch diameter main.
 - Approximately 232 feet of 18-inch sewer main (MTO-25A through MTO-26A) located in San Marcos Creek must be upsized to 24-inch diameter main as part of District CIP CP-34 or by Developer with potential for partial reimbursement.

○ Option B

- Approximately 1,659 feet of 8-inch diameter sewer main (MTO-01A through MTO-06A) located in Twin Oaks Valley Road from approximately 303 feet north of Legacy Drive to Windy Way must be upsized to 15-inch diameter main as part of District CIP TOVR SAMP or by Developer with potential for partial reimbursement.
- Approximately 2,733 feet of 8-inch diameter sewer main (MTO-07A through MTO-20A) located in Twin Oaks Valley Road from approximately Windy Way to Borden Road must be upsized to 18-inch diameter main as part of District CIP TOVR SAMP or by Developer with potential for partial reimbursement.
- Approximately 232 feet of 18-inch sewer main (MTO-25A through MTO-26A) located along San Marcos Creek must be upsized to 24-inch as part of District CIP CP-34 or by Developer with potential for partial reimbursement.

The District currently has water and sewer capacity available to serve the Project as proposed with the improvements identified (if any) in this study. However, the ability to provide water and sewer service in the future depends upon ultimate build-out of the Project and could change depending upon the timing of the build-out, as well as 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.

This Study is based on the current adopted land use utilized in VWD's 2018 Master Plan. The study addresses the incremental facility impacts of this Project only and does 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 the Study are necessary. Costs for revising this Study shall be borne by the Developer. The results of this study are not the accepted conditions for the development, final conditions shall be part of the Construction Agreement process or issued separately by the District.