ATTACHMENT D

MITIGATED NEGATIVE DECLARATION

APPENDIX K

WATER & SEWER STUDY

VALLECITOS WATER DISTRICT

MULBERRY 9-LOT SUBDIVISION WATER AND SEWER STUDY

WORK ORDER # 253403

DRAFT TECHNICAL MEMORANDUM

June 13, 2022

Prepared By: Elizabeth Lopez, P.E. Senior Engineer – Development Services Supervisor, and Lisa Whitesell, Engineering Technician III

INTRODUCTION

The proposed Mulberry 9-Lot Subdivision (Project) is a 9-Lot Single Family Project on 10.06-acres, located on the southwest corner of Cox Road and Mulberry Drive (APN 182-131-14).

The Project property is located within VWD's boundary for water service but not located within the boundary for wastewater service. The property will need to annex into the wastewater boundary service area so that connections can be provided by the Vallecitos Water District (VWD).

Due to the elevations of the proposed project and existing District sewer, the project cannot connect to the public sewer system in the area. A private sewer pump and private force main will be required to serve the Mulberry 9-Lot Subdivision.

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 Developer.

WATER SYSTEM ANALYSIS

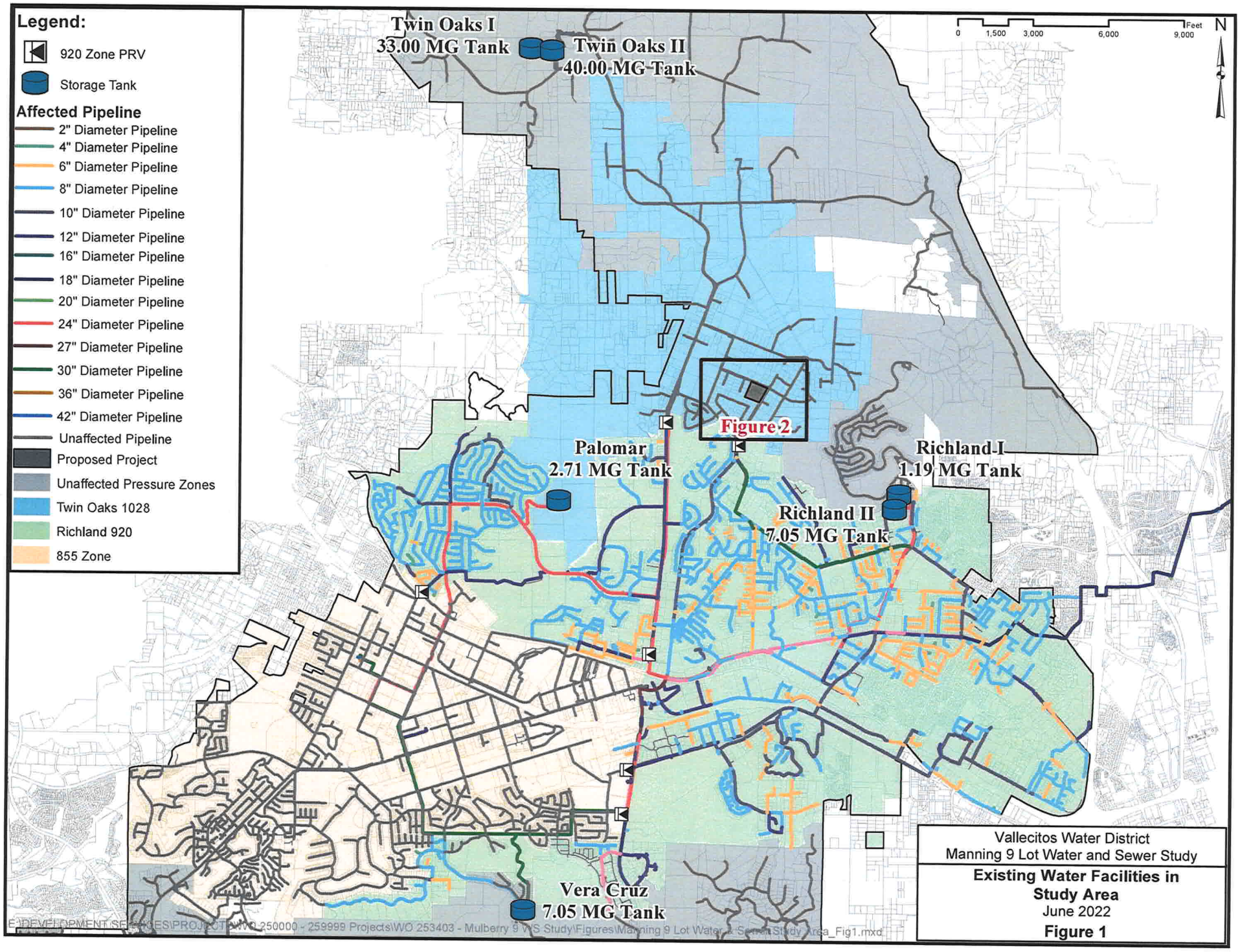
The proposed 10.06-acre Project lies completely within VWD's 1028 Pressure Zone. Figures 1 and 2 show the development's location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

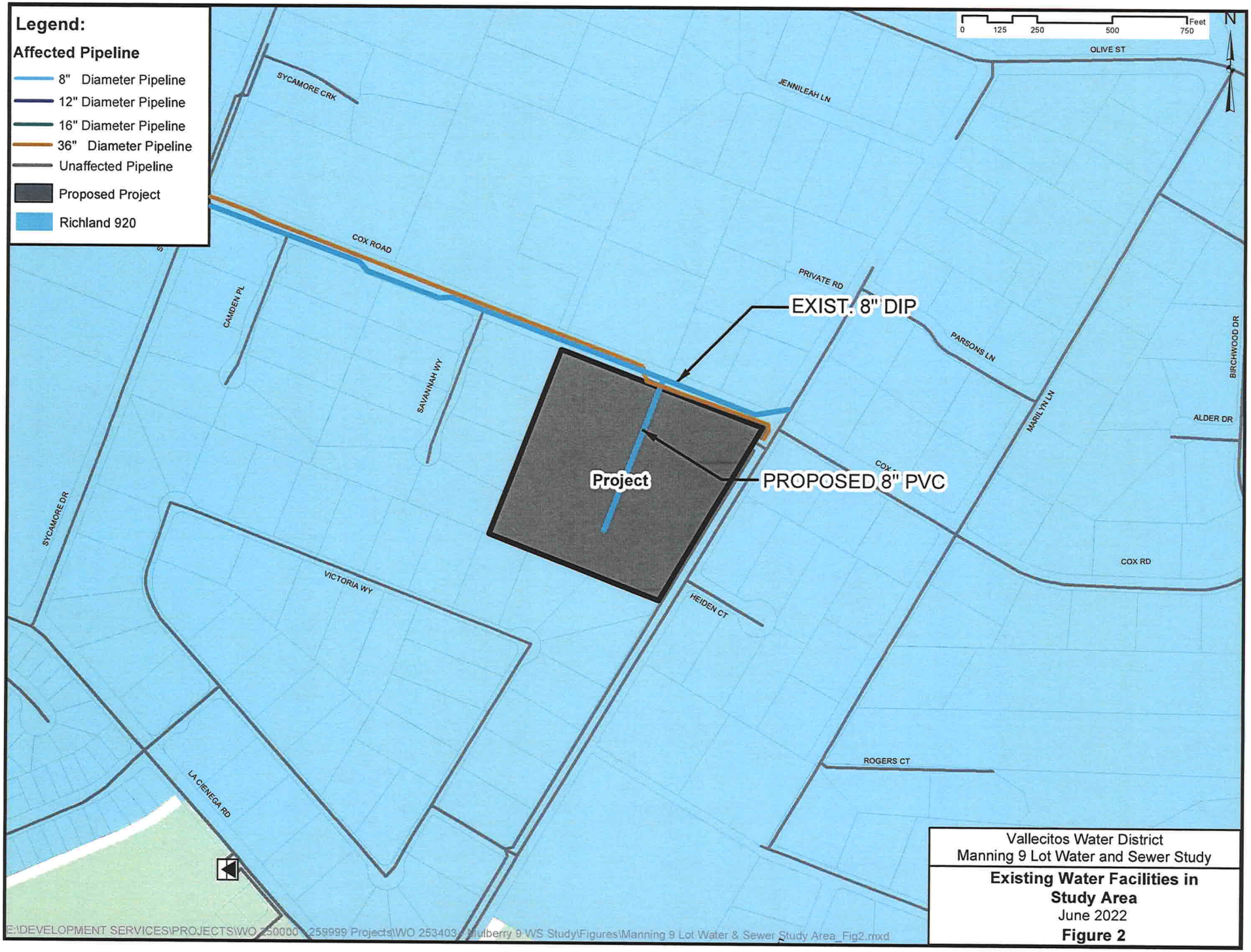
Water Demand Projections

The Project property's City of San Marcos approved land use designation for the proposed Project is Agricultural-1. The 2018 Master Plan based its ultimate water demand on the same land use Agricultural/Residential (0.125-0.5 du/ac). Table 1 provides the average water demand generated both under the density planned for the 2018 Master Plan and with the proposed Project. The table shows that Mulberry 9-Lot Subdivision will not increase the projected average water demand from the 2018 Master Plan land use.

Table 1 – Project Estimated Water Demands for Mulberry 9-Lot Subdivision

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/ac)	Water Demand (gpd)
2018 Master Plan Land Use Demand				
Agricultural/Res (0.125-0.5 du/ac)	10.06		800	8,048
Total	**10.06**			**8,048**
Proposed Project Demand				
Residential (<1.0 du/ac)	10.06	9	800	8,048
Total	**10.06**			**8,048**
Water Demand Increase				**0**


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 Project
Unaffected Pressure Zones
Twin Oaks 1028
Richland 920
855 Zone
Twin Oaks I
33.00 MG Tank
Twin Oaks II
40.00 MG Tank
Figure 2
Palomar
2.71 MG Tank
Richland I
1.19 MG Tank
Richland II
7.05 MG Tank
Vera Cruz
7.05 MG Tank
0 1,500 3,000 6,000 9,000 Feet
N
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Water Facilities in Study Area
June 2022
Figure 1
E:\DEVELOPMENT SERVICES\PROJECTS\WO 250000 - 259999 Projects\WO 253403 - Mulberry 9 WS Study\Figures\Manning 9 Lot Water & Sewer Study Area_Fig1.mxd


Legend:
Affected Pipeline
8" Diameter Pipeline
12" Diameter Pipeline
16" Diameter Pipeline
36" Diameter Pipeline
Unaffected Pipeline
Proposed Project
Richland 920
0 125 250 500 750 Feet
N
OLIVE ST
JENNILEAH LN
SYCAMORE CRK
COX ROAD
PRIVATE RD
EXIST. 8" DIP
PARSONS LN
BIRCHWOOD DR
CAMDEN PL
SAVANNAH WY
MARILYN LN
ALDER DR
Project
PROPOSED 8" PVC
SYCAMORE DR
COX RD
VICTORIA WY
HEIDEN CT
ROGERS CT
LA CIENEGA RD
E:\DEVELOPMENT SERVICES\PROJECTS\WO 250000 - 259999 Projects\WO 253403 - Mulberry 9 WS Study\Figures\Manning 9 Lot Water & Sewer Study Area_Fig2.mxd
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Water Facilities in Study Area
June 2022
Figure 2

Water Distribution System Analysis

The 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 1,000 gpm for the Project.

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, as shown in Figure 2. The modeling results from this analysis found that the Project did not create any distribution system deficiencies under average day demand or maximum day plus fire flow demand conditions.

Water Storage Analysis

The 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 1028 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 Richland	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

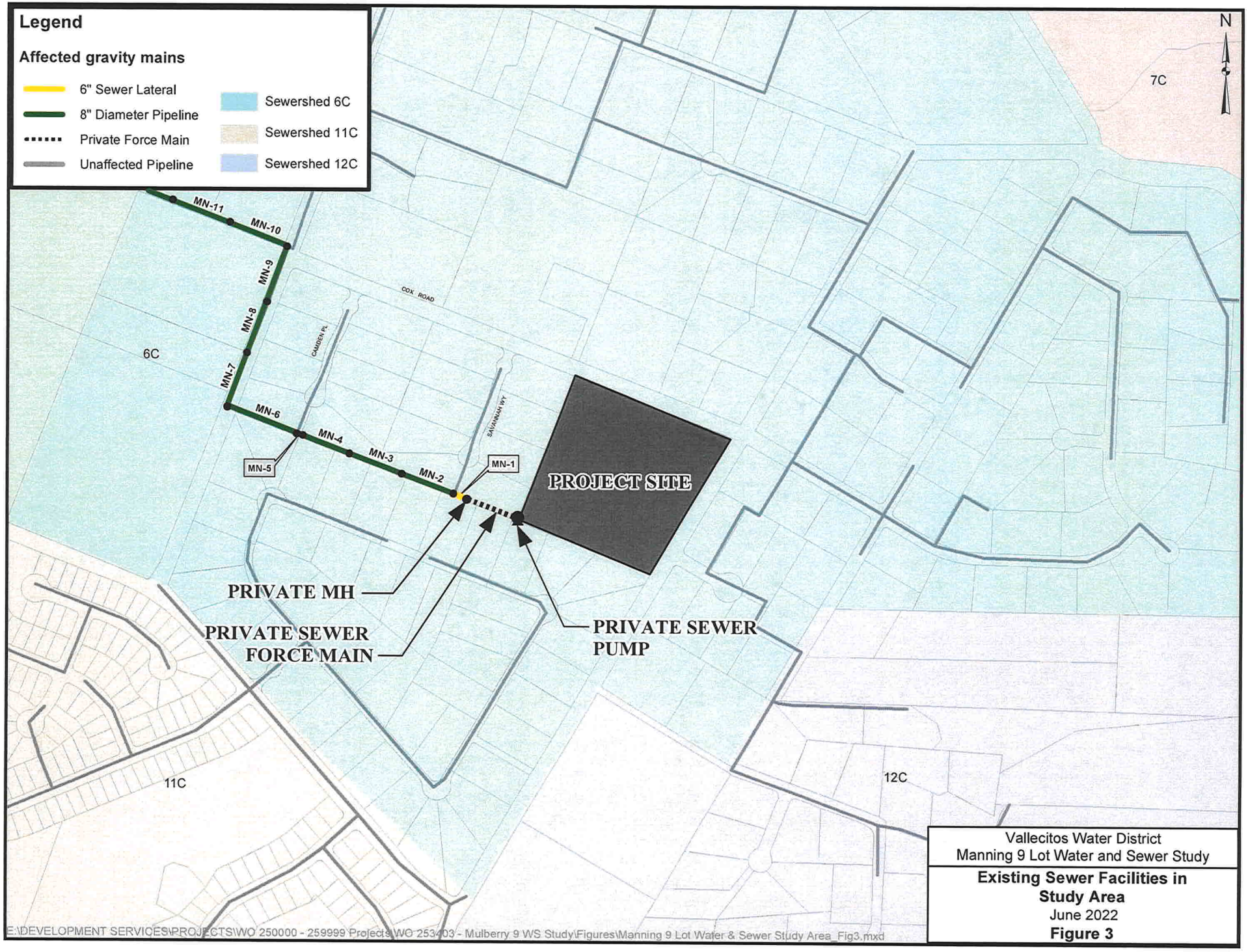
The proposed 10.06-acre Project lies completely within VWD sewer shed 6C. Figures 3 through 10 show the development's location in relation to sewer shed boundaries, identify wastewater infrastructure within the vicinity of the development, and identify the downstream collection infrastructure that will be impacted by the development.

Wastewater Flow Projections

The Project's City of San Marcos approved land use designation for the proposed Project is Agricultural-1. The 2018 Master Plan based its ultimate wastewater generation planning on this same land use Agricultural/Residential (0.125-0.5 du/ac). 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 Mulberry 9-Lot Subdivision project will increase the projected average wastewater generation from the 2018 Master Plan land use by **704** gallons per day.

Table 3 – Project Estimated Wastewater Flows for Mulberry 9-Lot Subdivision

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/ac)	Wastewater Flow (gpd)
2018 Master Plan Land Use Flows				
Agricultural/Residential (0.125-0.5 du/ac)	**10.06**		80	805
Total				**805**
Proposed Project Demand				
Residential(<1.0 du/ac)	10.06	9	150	1,509
Total	**10.06**			**1,509**
Sewer Generation Increase				**704**


Legend
Affected gravity mains
6" Sewer Lateral
8" Diameter Pipeline
Private Force Main
Unaffected Pipeline
Sewershed 6C
Sewershed 11C
Sewershed 12C
N
7C
MN-11
MN-10
MN-9
MN-8
MN-7
MN-6
MN-5
MN-4
MN-3
MN-2
MN-1
COX ROAD
CAMDEN PL
SAVANNAH WY
6C
PROJECT SITE
PRIVATE MH
PRIVATE SEWER FORCE MAIN
PRIVATE SEWER PUMP
11C
12C
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 3
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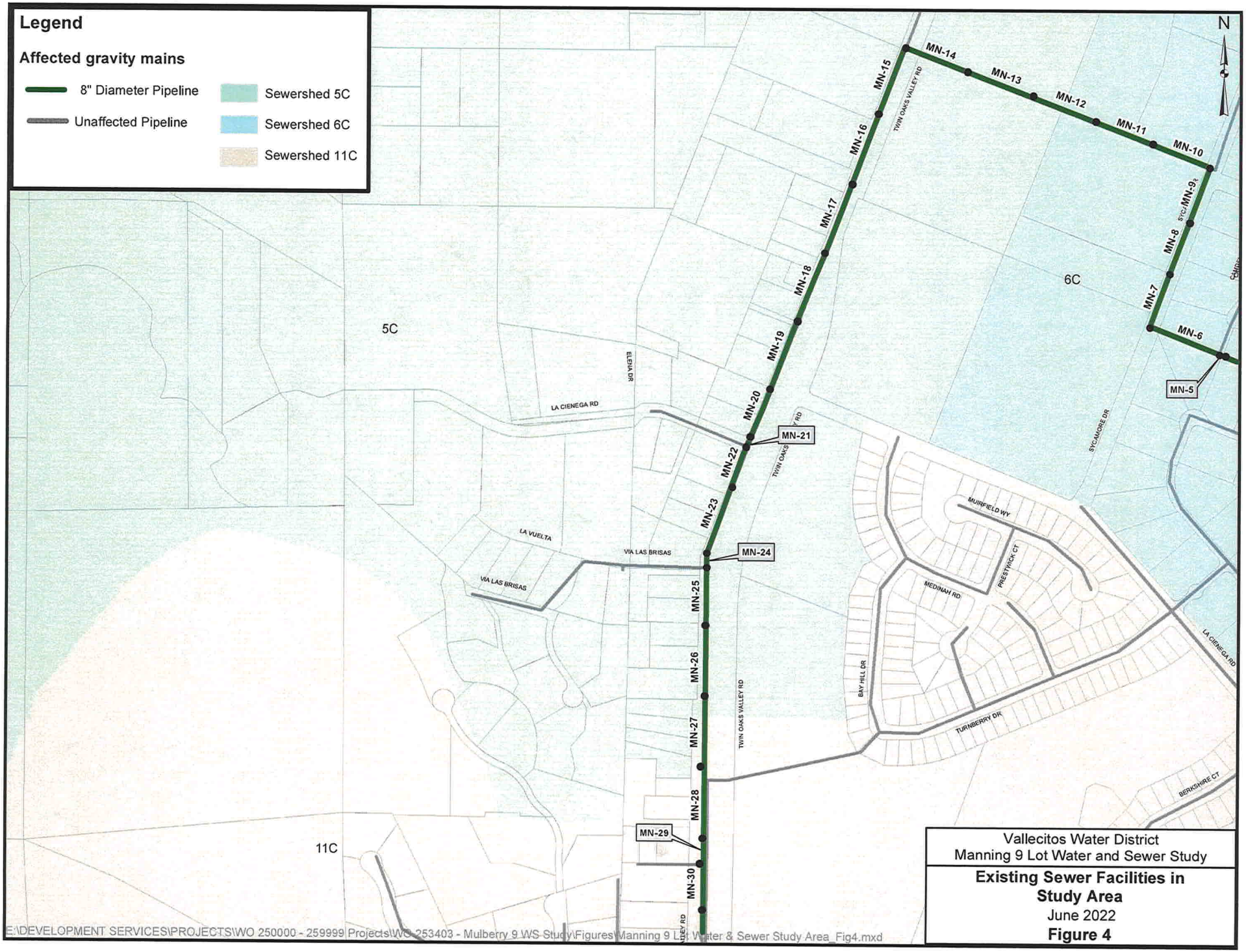
Legend
Affected gravity mains
8" Diameter Pipeline
Unaffected Pipeline
Sewershed 5C
Sewershed 6C
Sewershed 11C
N
MN-14
MN-13
MN-12
MN-11
MN-10
MN-15
MN-16
MN-17
MN-18
MN-19
MN-20
MN-21
MN-22
MN-23
MN-24
MN-25
MN-26
MN-27
MN-28
MN-29
MN-30
MN-9
MN-8
MN-7
MN-6
MN-5
TWIN OAKS VALLEY RD
5C
6C
11C
ELENA DR
LA CIENEGA RD
LA VUELTA
VIA LAS BRISAS
SYCAMORE DR
MUIRFIELD WY
PRESTWICK CT
MEDINAH RD
BAY HILL DR
TURNBERRY DR
BERKSHIRE CT
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 4
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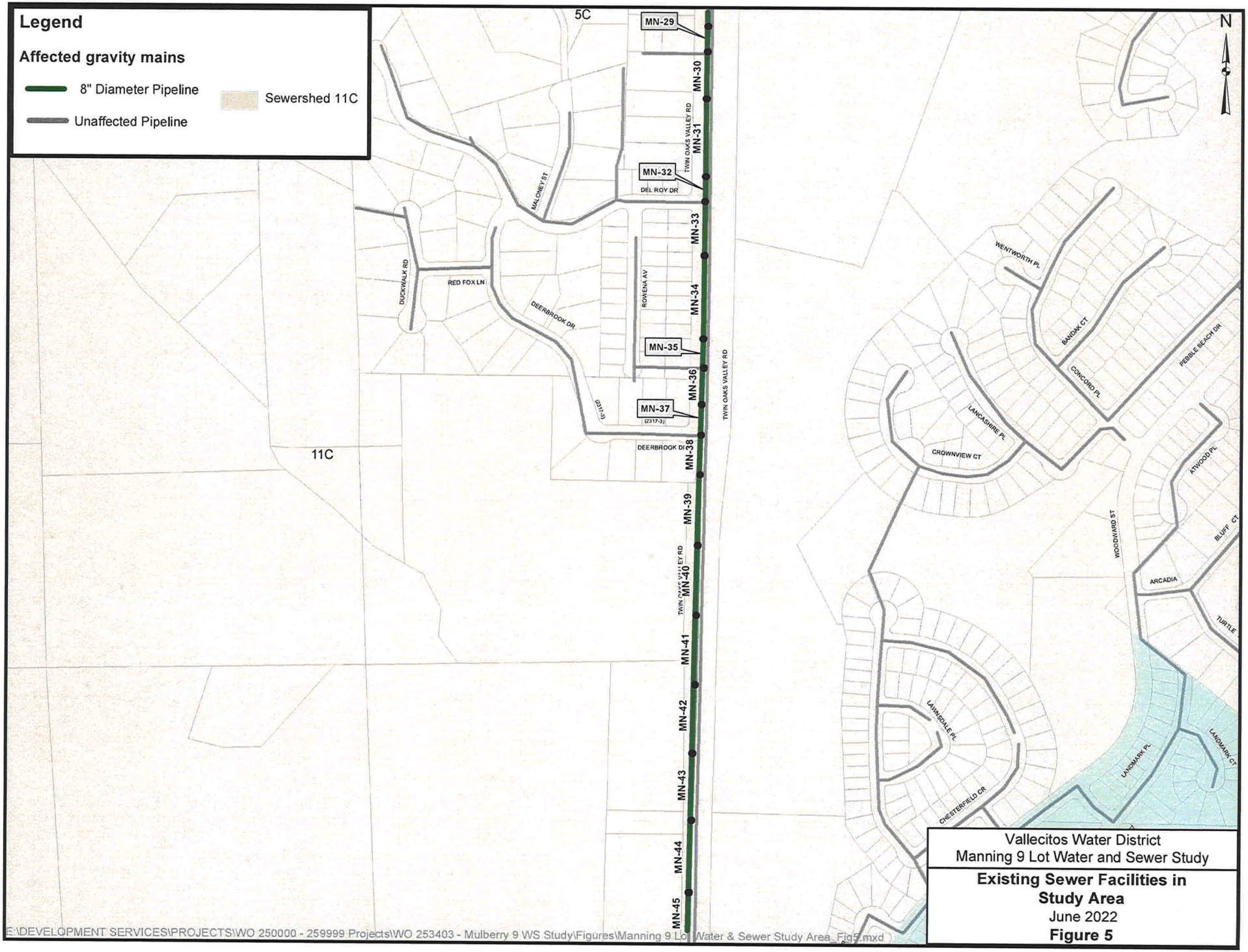
Legend
Affected gravity mains
8" Diameter Pipeline
Unaffected Pipeline
Sewershed 11C
5C
11C
MN-29
MN-30
MN-31
MN-32
MN-33
MN-34
MN-35
MN-36
MN-37
MN-38
MN-39
MN-40
MN-41
MN-42
MN-43
MN-44
MN-45
TWIN OAKS VALLEY RD
DEL ROY DR
MALONEY ST
DUCKWALK RD
RED FOX LN
DEERBROOK DR
ROWENA AV
(2317-3)
WENTWORTH PL
BANDAK CT
CONCORD PL
PEBBLE BEACH DR
LANCASHIRE PL
CROWNVIEW CT
WOODWARD ST
ATWOOD PL
BLUFF CT
ARCADIA
TURTLE
LAWNSDALE PL
LANDMARK PL
LANDMARK CT
CHESTERFIELD CR
N
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 5
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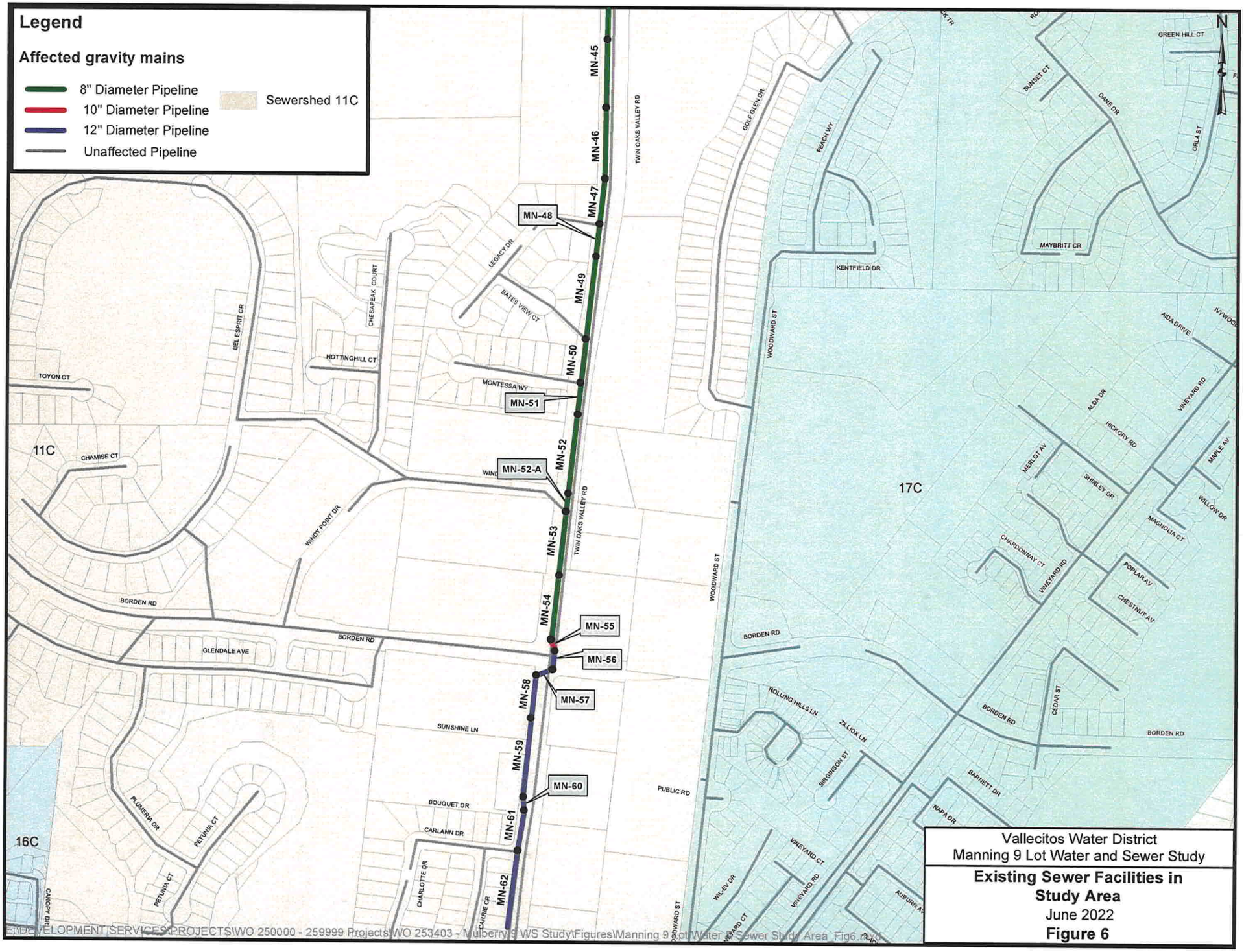
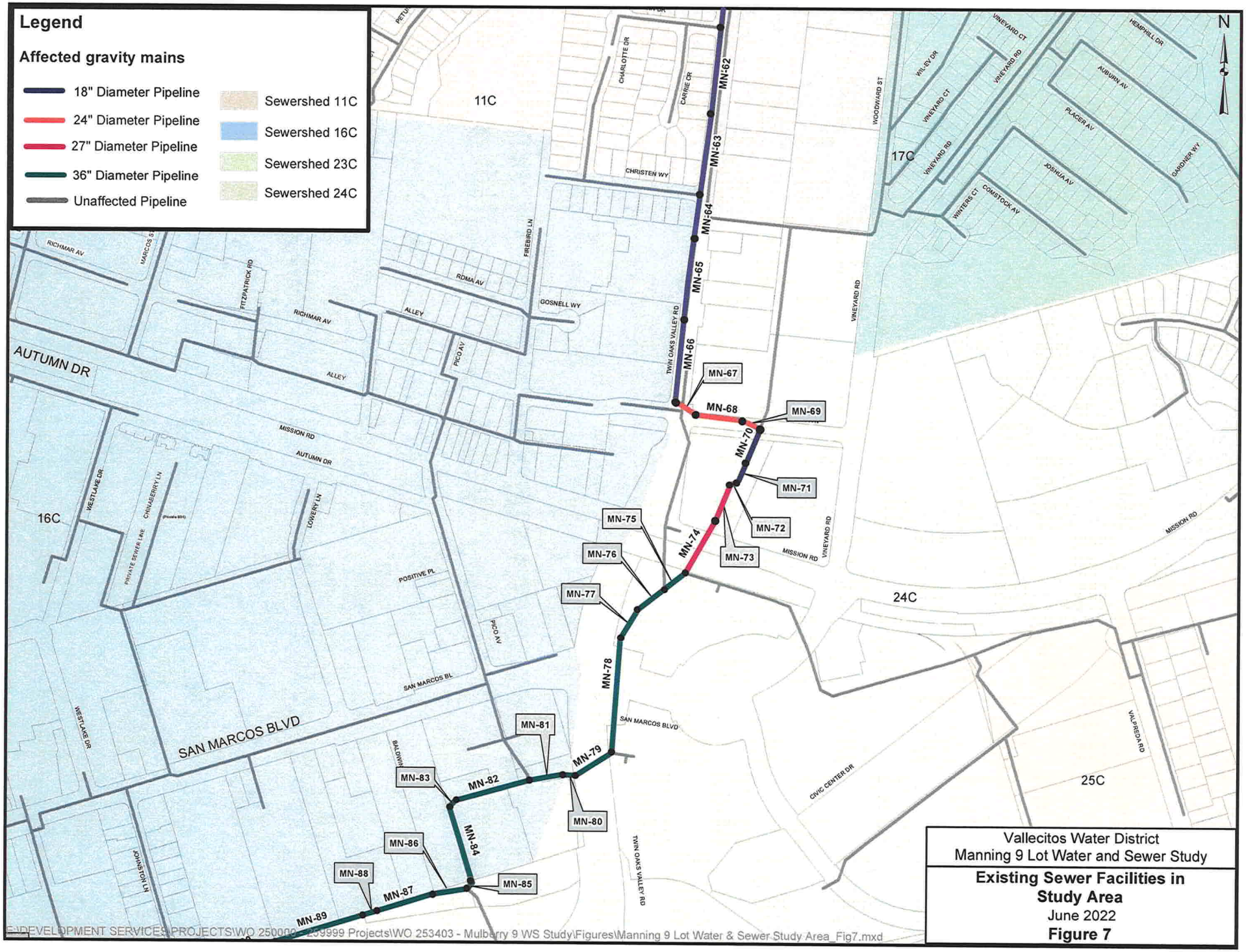


Vallecitos Water District
Manning 9 Lot Water and Sewer Study

Existing Sewer Facilities in Study Area
June 2022
Figure 6


Legend
Affected gravity mains
18" Diameter Pipeline
24" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
Unaffected Pipeline
Sewershed 11C
Sewershed 16C
Sewershed 23C
Sewershed 24C
N
11C
16C
17C
24C
25C
MN-62
MN-63
MN-64
MN-65
MN-66
MN-67
MN-68
MN-69
MN-70
MN-71
MN-72
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MN-77
MN-78
MN-79
MN-80
MN-81
MN-82
MN-83
MN-84
MN-85
MN-86
MN-87
MN-88
MN-89
AUTUMN DR
SAN MARCOS BLVD
MISSION RD
VINEYARD RD
TWIN OAKS VALLEY RD
WOODWARD ST
CHRISTEN WY
GOSNELL WY
RDMA AV
PICO AV
POSITIVE PL
CIVIC CENTER DR
VALPREDA RD
WESTLAKE DR
JOHNSTON LN
BALDWIN
RICHMAR AV
FITZPATRICK RD
FIREBIRD LN
ALLEY
CHARLOTTE DR
CARRIE DR
VILLEV DR
VINEYARD CT
HEMPHILL DR
AUBURN AV
PLACER AV
GARDNER WY
JOSHUA AV
WINTERS CT
COMSTOCK AV
CHINABERRY LN
LOWERY LN
PRIVATE SEWER LINE
(Private MH)
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 7
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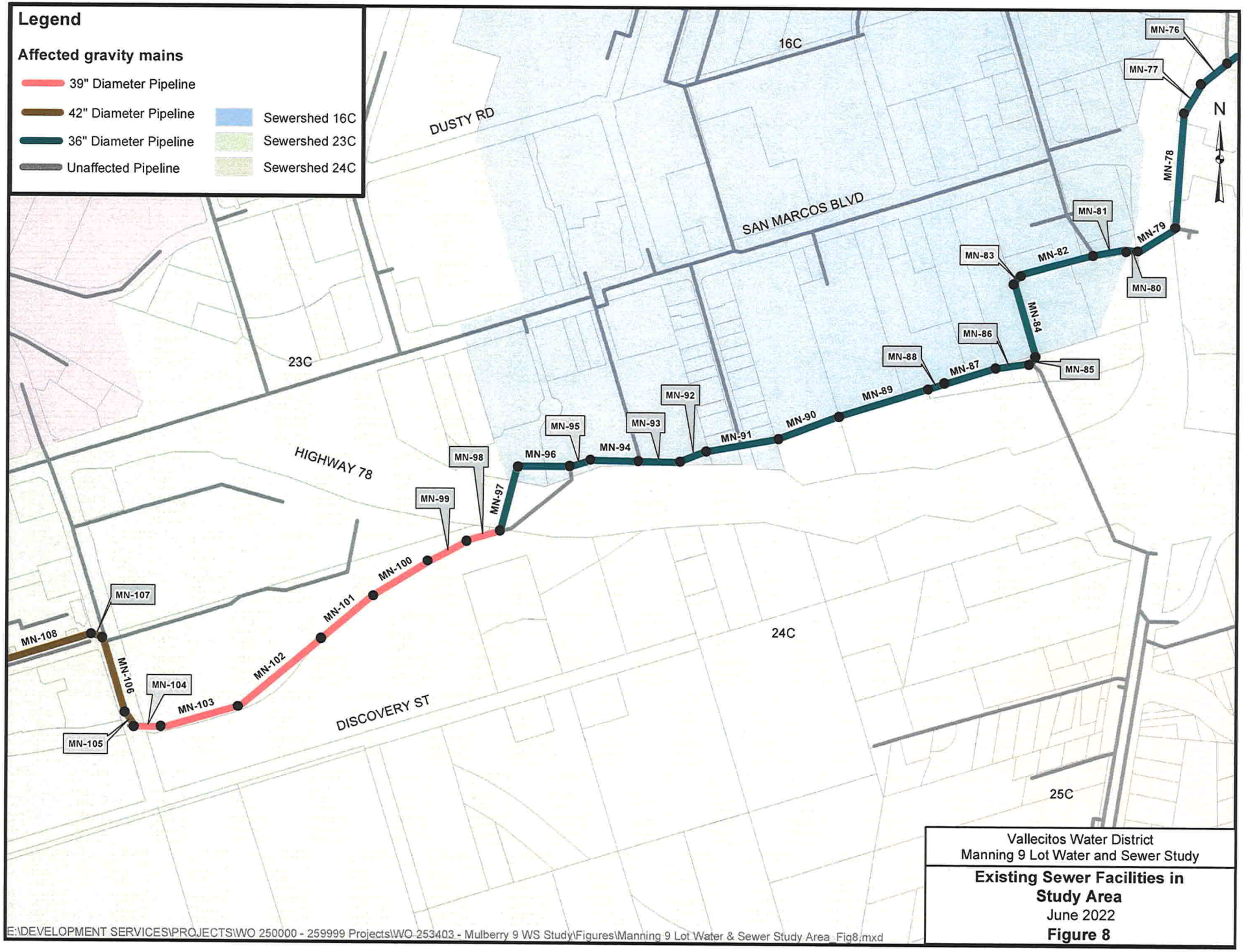
Legend
Affected gravity mains
39" Diameter Pipeline
42" Diameter Pipeline
36" Diameter Pipeline
Unaffected Pipeline
Sewershed 16C
Sewershed 23C
Sewershed 24C
16C
23C
24C
25C
DUSTY RD
SAN MARCOS BLVD
HIGHWAY 78
DISCOVERY ST
N
MN-76
MN-77
MN-78
MN-79
MN-80
MN-81
MN-82
MN-83
MN-84
MN-85
MN-86
MN-87
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MN-101
MN-102
MN-103
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MN-108
Vallecitos Water District
Manning 9 Lot Water and Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 8
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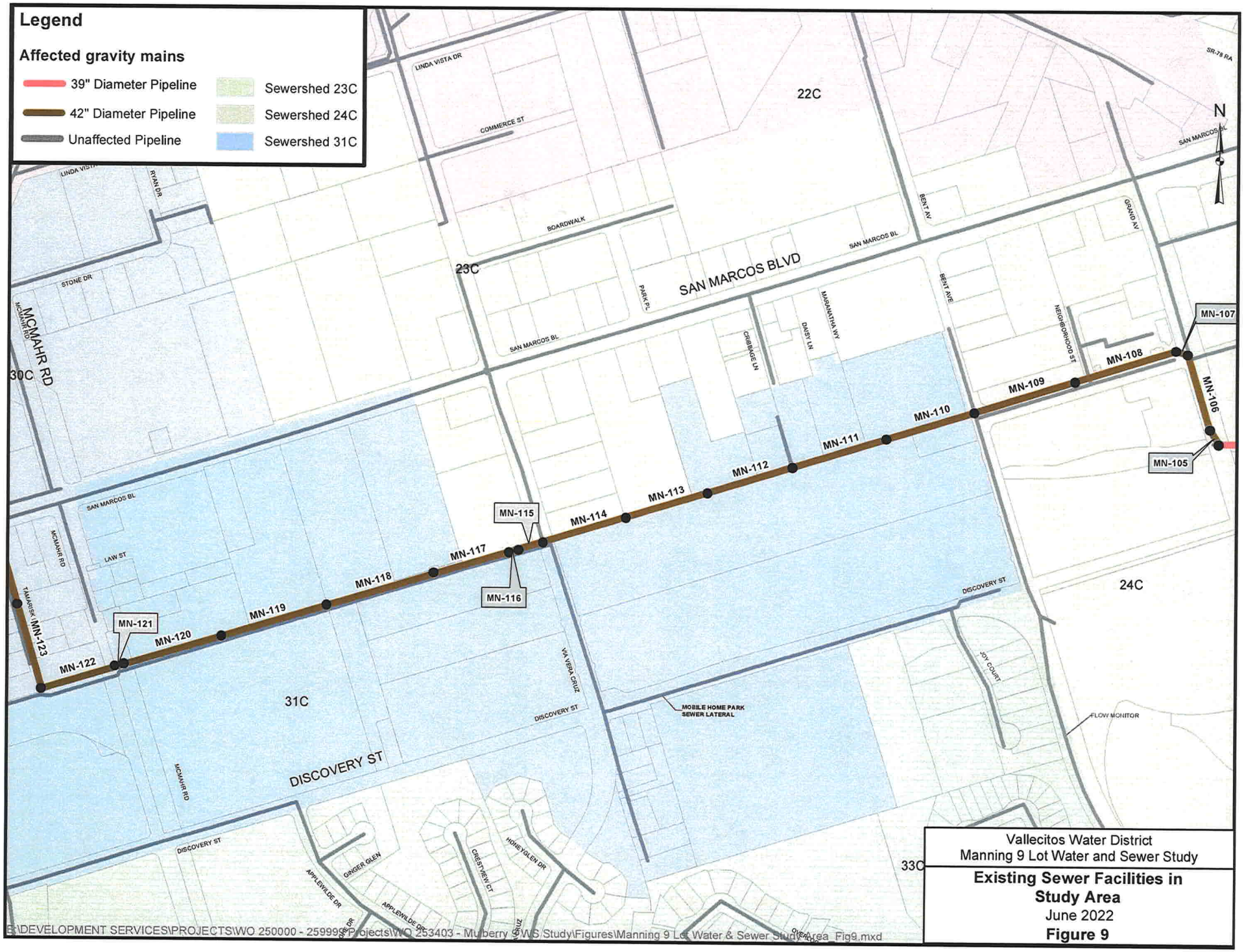

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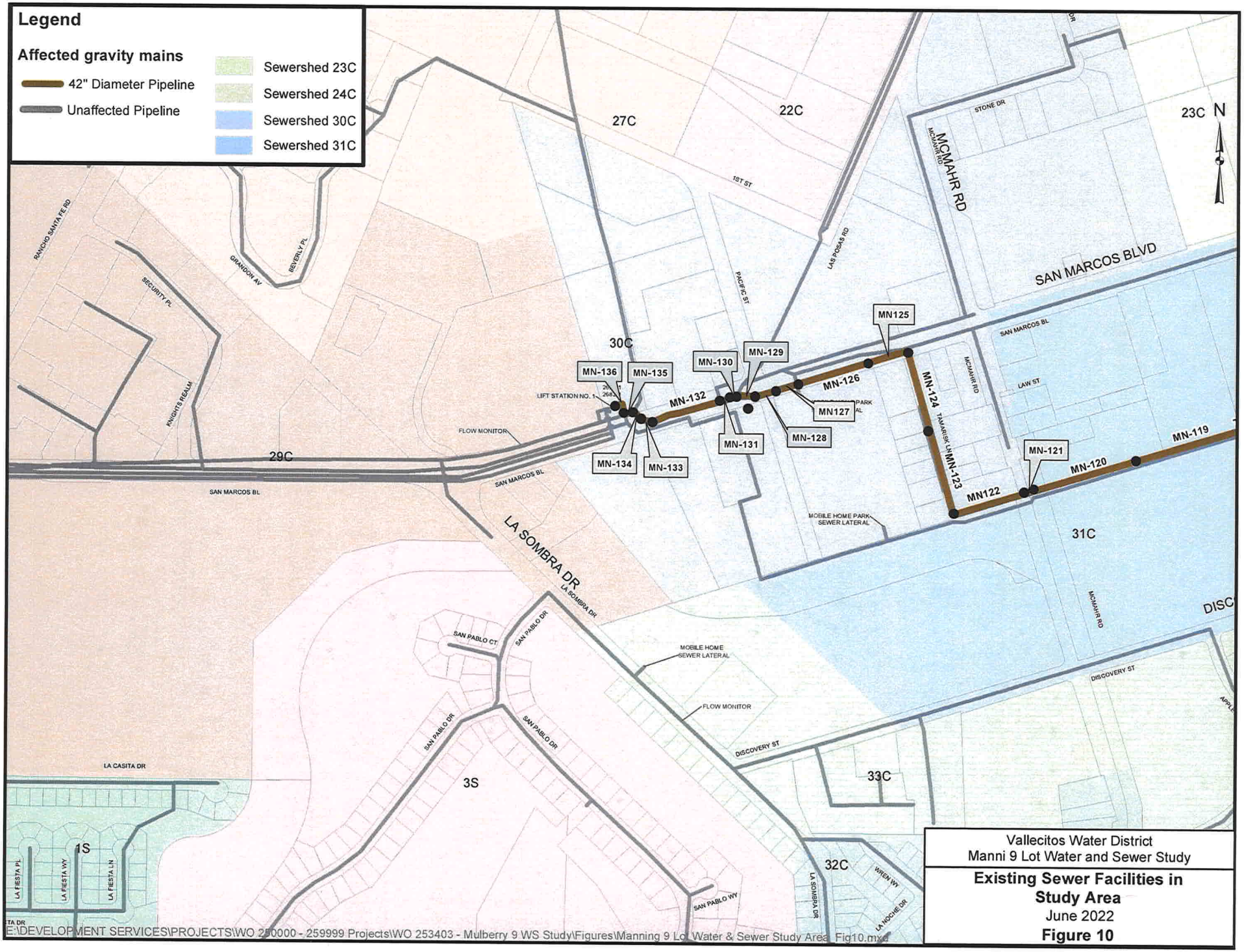
Vallecitos Water District
Manning 9 Lot Water and Sewer Study

Existing Sewer Facilities in Study Area

June 2022

Figure 9



Vallecitos Water District
Manni 9 Lot Water and Sewer Study

Existing Sewer Facilities in Study Area
June 2022
Figure 10

Wastewater Collection System Analysis

The 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: 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 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 Project flows (see Figures 3 - 10).

In addition, this study included proposed wastewater flows for the proposed Kiddie Academy project in accordance with the Water and Sewer study dated June 9, 2022, WO# 258218. The Kiddie Academy project is located downstream from Mulberry 9-Lot Subdivision.

Table 4 presents a summary of modeling results from this analysis. The modeling results showed that deficiencies have been identified under the currently approved density under peak wet weather flows during ultimate build-out conditions (Pipeline Segments MN-10 through MN-66).

The following improvements are required to mitigate these deficiencies:

- Upsize approximately 1,401 feet of existing 8-inch diameter sewer main along N. Twin Oaks Valley Road to 10-inch diameter sewer main (MN-10 through MN-14).
- Upsize approximately 8,075 feet of existing 8-inch diameter sewer main along N. Twin Oaks Valley Road to 15-inch diameter sewer main (MN-15 through MN-55).
- Upsize approximately 19 feet of existing 10-inch diameter sewer main along N. Twin Oaks Valley Road to 15-inch diameter sewer main (MN-56).
- Upsize approximately 2,415 feet of existing 12-inch diameter sewer main along N. Twin Oaks Valley Road to 15-inch diameter sewer main (MN-57 through MN-66).

VWD's 2018 Master Plan has identified pipe segments (MN-15 through MN-54) for upsizing from 8-inch to 18-inch as CIP SP-31. CIP SP-31 is a Phase 4 CIP project and is completely funded by Development without contribution from the District's capacity fund.

The proposed private pump for the private force main was modelled in this study with the pump information included in Exhibit "A" (provided by Engineer of Work). Changes to this pump information on the construction drawings may necessitate a revision to this Water and Sewer study to serve this project.

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diameter (In)	Replacement PWWF Depth-to-Diamater Ratio
MN-1	16	6	0.005	9	0.16	-	-	11	0.17	-	-
MN-2	241	8	0.012	9	0.09	-	-	11	0.10	-	-
MN-3	232	8	0.005	11	0.12	-	-	13	0.13	-	-
MN-4	230	8	0.005	13	0.13	-	-	15	0.14	-	-
MN-5	12	8	0.005	15	0.14	-	-	17	0.15	-	-
MN-6	316	8	0.048	23	0.10	-	-	25	0.11	-	-
MN-7	244	8	0.006	25	0.17	-	-	27	0.18	-	-
MN-8	239	8	0.004	27	0.20	-	-	29	0.20	-	-
MN-9	239	8	0.004	29	0.20	-	-	31	0.20	-	-
MN-10	281	8	0.004	237	**0.62**	**10**	0.43	239	**0.62**	**10**	0.44
MN-11	250	8	0.004	239	**0.62**	**10**	0.44	241	**0.62**	**10**	0.44
MN-12	290	8	0.004	241	**0.62**	**10**	0.44	243	**0.62**	**10**	0.44
MN-13	290	8	0.004	243	**0.63**	**10**	0.44	245	**0.63**	**10**	0.44
MN-14	290	8	0.004	252	**0.64**	**10**	0.45	254	**0.64**	**10**	0.45
MN-15	310	8	0.004	669	**>1**	**15**	0.42	671	**>1**	**15**	0.42
MN-16	315	8	0.004	671	**>1**	**15**	0.42	673	**>1**	**15**	0.42
MN-17	315	8	0.004	671	**>1**	**15**	0.42	673	**>1**	**15**	0.42
MN-18	315	8	0.005	671	**>1**	**15**	0.40	673	**>1**	**15**	0.40
MN-19	315	8	0.015	671	**>1**	**15**	0.30	673	**>1**	**15**	0.30
MN-20	225	8	0.007	671	**>1**	**15**	0.36	673	**>1**	**15**	0.37

CIP SP-31 (MN-15 THROUGH MN-54) - Phase 4

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm)	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
MN-21	43	8	0.005	671	>1	15	0.40	673	>1	15	0.40
MN-22	182	8	0.007	671	>1	15	0.36	673	>1	15	0.37
MN-23	306	8	0.007	671	>1	15	0.36	673	>1	15	0.37
MN-24	50	8	0.002	671	>1	15	0.52	673	>1	15	0.52
MN-25	306	8	0.007	671	>1	15	0.36	673	>1	15	0.37
MN-26	305	8	0.007	671	>1	15	0.36	673	>1	15	0.37
MN-27	305	8	0.027	671	0.65	15	0.26	673	>1	15	0.26
MN-28	305	8	0.004	671	>1	15	0.42	673	>1	15	0.42
MN-29	83	8	0.004	671	>1	15	0.42	673	>1	15	0.42
MN-30	222	8	0.005	671	>1	15	0.40	673	>1	15	0.40
MN-31	305	8	0.011	671	>1	15	0.32	673	>1	15	0.32
MN-32	110	8	0.012	671	>1	15	0.32	673	>1	15	0.32
MN-33	225	8	0.008	671	>1	15	0.35	673	>1	15	0.35
MN-34	335	8	0.01	671	>1	15	0.33	673	>1	15	0.33
MN-35	190	8	0.007	671	>1	15	0.36	673	>1	15	0.37
MN-36	160	8	0.013	671	>1	15	0.31	673	>1	15	0.31
MN-37	130	8	0.002	671	>1	15	0.52	673	>1	15	0.52
MN-38	147	8	0.013	671	>1	15	0.31	673	>1	15	0.31
MN-39	300	8	0.014	671	>1	15	0.30	673	>1	15	0.31
MN-40	300	8	0.004	671	>1	15	0.42	673	>1	15	0.42

CIP SP-31 (MN-15 THROUGH MN-54) - Phase 4

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm) *with proposed Kiddie Academy	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
MN-41	300	8	0.004	671	**>1**	**15**	0.42	673	**<1**	**15**	0.42
MN-42	295	8	0.004	671	**>1**	**15**	0.42	673	**<1**	**15**	0.42
MN-43	290	8	0.006	671	**>1**	**15**	0.38	673	**<1**	**15**	0.38
MN-44	290	8	0.012	671	**>1**	**15**	0.32	673	**<1**	**15**	0.32
MN-45	290	8	0.012	671	**>1**	**15**	0.32	673	**<1**	**15**	0.32
MN-46	303	8	0.008	672	**>1**	**15**	0.35	674	**<1**	**15**	0.35
MN-47	183	8	0.02	677	**0.73**	**15**	0.28	679	**0.74**	**15**	0.28
MN-48	153	8	0.016	681	**0.82**	**15**	0.30	683	**0.82**	**15**	0.30
MN-49	340	8	0.015	684	**0.85**	**15**	0.30	686	**<1**	**15**	0.30
MN-50	166	8	0.015	696	**0.88**	**15**	0.31	698	**<1**	**15**	0.31
MN-51	174	8	0.015	696	**0.88**	**15**	0.31	698	**<1**	**15**	0.31
MN-52	340	8	0.004	702	**<1**	**15**	0.43	704	**<1**	**15**	0.43
MN-52 - A	64	8	0.007	709	**<1**	**15**	0.38	711	**<1**	**15**	0.38
MN-53	276	8	0.003	801	**<1**	**15**	0.51	803	**<1**	**15**	0.52
MN-54	283	8	0.005	805	**<1**	**15**	0.44	807	**<1**	**15**	0.44
MN-55	19	10	0.105	807	**0.35**	**15**	0.20	809	**0.35**	**15**	0.2
***MN-56**	86	12	0.005	1,165	**0.85**	**15**	0.54	1,168	**0.86**	**15**	0.55
***MN-57**	82	12	0.005	1,166	**0.86**	**15**	0.55	1,169	**0.86**	**15**	0.55
***MN-58**	173	12	0.005	1,168	**0.86**	**15**	0.55	1,171	**0.86**	**15**	0.55
***MN-59**	339	12	0.005	1,173	**0.86**	**15**	0.55	1,176	**0.87**	**15**	0.55

CIP SP-31 (MN-15 THROUGH MN-54) - Phase 4

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm) *with proposed Kiddie Academy	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
***MN-60**	61	12	0.005	1,175	**0.87**	**15**	0.55	1,178	**0.87**	**15**	0.55
***MN-61**	176	12	0.005	1,180	**0.87**	**15**	0.55	1,183	**0.87**	**15**	0.55
***MN-62**	358	12	0.005	1,197	**0.89**	**15**	0.55	1,200	**0.90**	**15**	0.55
***MN-63**	350	12	0.005	1,199	**0.90**	**15**	0.55	1,202	**0.90**	**15**	0.56
***MN-64**	206	12	0.009	1,220	**0.68**	**15**	0.47	1,223	**0.69**	**15**	0.47
***MN-65**	253	12	0.008	1,222	**0.72**	**15**	0.49	1,225	**0.72**	**15**	0.49
***MN-66**	350	12	0.011	1,243	**0.65**	**15**	0.45	1,246	**0.65**	**15**	0.45
*MN-67	107	24	0.028	1,245	0.19	-	-	1,248	0.19	-	-
*MN-68	213	24	0.024	1,247	0.20	-	-	1,250	0.20	-	-
*MN-69	84	24	0.026	1,248	0.19	-	-	1,251	0.19	-	-
***MN-70**	170	18	0.004	2,725	0.75	-	-	2,728	0.75	-	-
***MN-71**	62	18	0.018	2,727	0.46	-	-	2,730	0.46	-	-
*MN-72	31	27	0.003	2,729	0.42	-	-	2,732	0.42	-	-
*MN-73	165	27	0.005	2,731	0.37	-	-	2,734	0.37	-	-
*MN-74	261	27	0.008	2,741	0.32	-	-	2,744	0.32	-	-
*MN-75	135	36	0.003	6,237	0.43	-	-	6,240	0.43	-	-
*MN-76	128	36	0.005	6,262	0.38	-	-	6,265	0.38	-	-
*MN-77	140	36	0.007	6,263	0.35	-	-	6,266	0.35	-	-
*MN-78	470	36	0.004	6,265	0.40	-	-	6,268	0.40	-	-
*MN-79	184	36	0.003	6,279	0.43	-	-	6,282	0.43	-	-

CIP SP-34 (MN-70 & MN-71) - Phase 4

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm) *with proposed Kiddie Academy	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
*MN-80	36	36	0.002	6,281	0.49	-	-	6,284	0.49	-	-
*MN-81	146	36	0.005	6,281	0.38	-	-	6,284	0.38	-	-
*MN-82	318	36	0.004	6,637	0.41	-	-	6,640	0.41	-	-
*MN-83	39	36	0.004	6,637	0.41	-	-	6,640	0.41	-	-
*MN-84	319	36	0.004	6,637	0.41	-	-	6,640	0.41	-	-
*MN-85	38	36	0.004	6,637	0.41	-	-	6,640	0.41	-	-
*MN-86	139	36	0.004	8,750	0.48	-	-	8,753	0.48	-	-
*MN-87	294	36	0.003	8,751	0.52	-	-	8,754	0.52	-	-
*MN-88	12	36	0.017	8,752	0.33	-	-	8,755	0.33	-	-
*MN-89	438	36	0.005	8,754	0.45	-	-	8,757	0.45	-	-
*MN-90	229	36	0.005	8,756	0.45	-	-	8,759	0.45	-	-
*MN-91	371	36	0.006	8,757	0.43	-	-	8,760	0.43	-	-
*MN-92	124	36	0.005	8,759	0.45	-	-	8,762	0.45	-	-
*MN-93	167	36	0.005	8,761	0.45	-	-	8,764	0.45	-	-
*MN-94	201	36	0.004	9,056	0.49	-	-	9,059	0.49	-	-
*MN-95	91	36	0.005	9,057	0.46	-	-	9,060	0.46	-	-
*MN-96	220	36	0.005	9,059	0.46	-	-	9,062	0.46	-	-
*MN-97	286	36	0.005	9,061	0.46	-	-	9,064	0.46	-	-
*MN-98	210	39	0.004	9,155	0.44	-	-	9,158	0.44	-	-
*MN-99	176	39	0.003	9,157	0.48	-	-	9,160	0.48	-	-

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm) *with proposed Kiddie Academy	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
*MN-100	271	39	0.002	9,159	0.54	-	-	9,162	0.54	-	-
*MN-101	297	39	0.002	9,161	0.54	-	-	9,164	0.54	-	-
*MN-102	452	39	0.002	9,163	0.54	-	-	9,166	0.54	-	-
*MN-103	337	39	0.002	9,165	0.54	-	-	9,168	0.54	-	-
*MN-104	123	39	0.008	9,358	0.37	-	-	9,361	0.37	-	-
*MN-105	58	42	0.004	9,359	0.40	-	-	9,362	0.40	-	-
*MN-106	308	42	0.003	9,362	0.43	-	-	9,365	0.43	-	-
*MN-107	69	42	0.001	9,364	0.60	-	-	9,367	0.60	-	-
*MN-108	448	42	0.003	9,367	0.43	-	-	9,370	0.43	-	-
*MN-109	448	42	0.003	9,369	0.43	-	-	9,372	0.43	-	-
*MN-110	404	42	0.006	9,691	0.36	-	-	9,694	0.37	-	-
*MN-111	404	42	0.006	9,694	0.37	-	-	9,697	0.37	-	-
*MN-112	368	42	0.003	9,698	0.44	-	-	9,701	0.44	-	-
*MN-113	368	42	0.003	9,701	0.44	-	-	9,704	0.44	-	-
*MN-114	368	42	0.003	9,703	0.44	-	-	9,706	0.44	-	-
*MN-115	120	42	0.002	9,756	0.50	-	-	9,759	0.50	-	-
*MN-116	14	42	0.001	9,758	0.61	-	-	9,761	0.61	-	-
*MN-117	352	42	0.005	9,758	0.38	-	-	9,761	0.38	-	-
*MN-118	472	42	0.004	9,761	0.41	-	-	9,764	0.41	-	-
*MN-119	467	42	0.004	9,764	0.41	-	-	9,767	0.41	-	-

Mulberry 9-Lot Table 4 - Wastewater Model Results and Recommended Gravity Main Improvements

				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-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio	Peak Wet Weather Flow (gpm) *with proposed Kiddie Academy	PWWF Depth-to-Diamter Ratio	Replacement Diamater (in)	Replacement PWWF Depth-to-Diamater Ratio
*MN-120	460	42	0.004	9,765	0.41	-	-	9,768	0.41	-	-
*MN-121	8	42	0.029	9,765	0.25	-	-	9,768	0.25	-	-
*MN-122	310	42	0.005	9,766	0.38	-	-	9,769	0.38	-	-
*MN-123	373	42	0.002	9,772	0.50	-	-	9,775	0.50	-	-
*MN-124	420	42	0.004	9,776	0.41	-	-	9,779	0.41	-	-
*MN-125	20	42	0.001	9,778	0.61	-	-	9,781	0.61	-	-
*MN-126	486	42	0.004	9,803	0.41	-	-	9,806	0.41	-	-
*MN-127	500	42	0.004	9,806	0.41	-	-	9,809	0.41	-	-
*MN-128	84	42	0.008	10,256	0.35	-	-	10,259	0.35	-	-
*MN-129	20	42	0.013	10,258	0.31	-	-	10,261	0.31	-	-
*MN-130	15	42	0.053	13,997	0.25	-	-	14,000	0.25	-	-
*MN-131	138	42	0.003	13,999	0.54	-	-	14,002	0.54	-	-
*MN-132	347	42	0.003	14,008	0.54	-	-	14,011	0.54	-	-
*MN-133	18	42	0.003	14,010	0.54	-	-	14,013	0.54	-	-
*MN-134	10	42	0.034	14,012	0.28	-	-	14,015	0.28	-	-
*MN-135	10	42	0.01	14,205	0.39	-	-	14,208	0.39	-	-
*MN-136	73	42	0.004	14,780	0.52	-	-	14,783	0.52	-	-

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 11. 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**

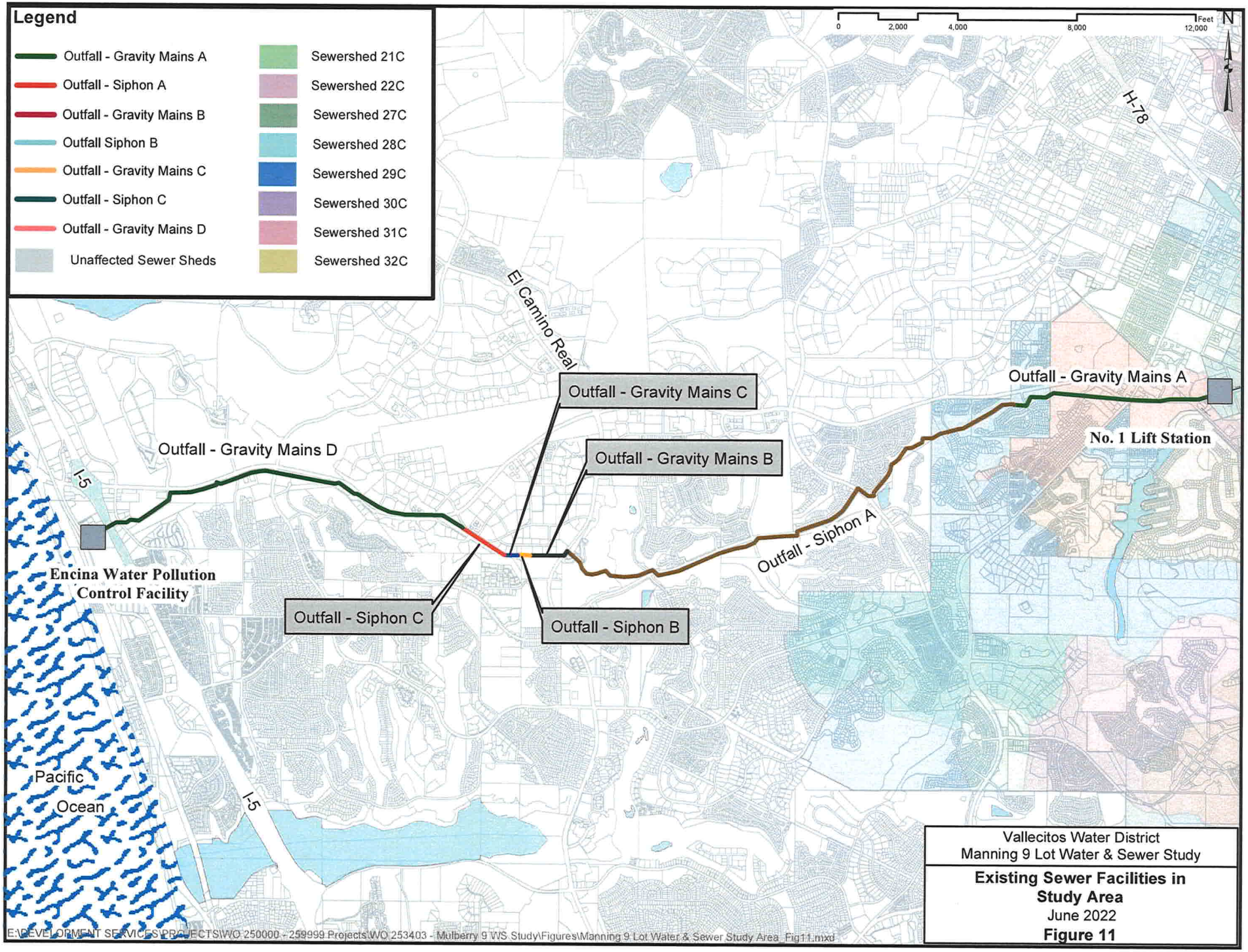
The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

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 will generate **704** gallons per day 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.


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
0
2,000
4,000
8,000
12,000
Feet
N
H-78
El Camino Real
Outfall - Gravity Mains A
No. 1 Lift Station
Outfall - Gravity Mains C
Outfall - Gravity Mains B
Outfall - Gravity Mains D
Outfall - Siphon A
I-5
Encina Water Pollution Control Facility
Outfall - Siphon C
Outfall - Siphon B
Pacific Ocean
I-5
Vallecitos Water District
Manning 9 Lot Water & Sewer Study
Existing Sewer Facilities in Study Area
June 2022
Figure 11
E:\DEVELOPMENT SERVICES\PROJECTS\WO 250000 - 259999 Projects\WO 253403 - Mulberry 9 WS Study\Figures\Manning 9 Lot Water & Sewer Study Area_Fig11.mxd

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 and Conditions.

CONCLUSION AND CONDITIONS

The proposed Mulberry 9-Lot Subdivision Project is not expected to increase average daily water demands but will increase wastewater flow by **704** gallons per day over the ultimate flows projected in the 2018 Master Plan.

The study concludes that there are deficiencies in the existing sewer facilities under peak wet weather flows during ultimate build-out conditions. The proposed Mulberry 9-Lot Subdivision will increase those deficiencies. The following improvements are needed to mitigate those deficiencies:

- Approximately 1,401 feet of existing 8-inch sewer main in Twin Oaks Valley Road must be replaced with 10-inch sewer main (MN-10 through MN-14).
- Approximately 8,075 feet of existing 8-inch sewer main in Twin Oaks Valley Road must be replaced with 15-inch sewer main (MN-15 through MN-55).
- Approximately 19 feet of existing 10-inch diameter sewer main along N. Twin Oaks Valley Road to 15-inch diameter sewer main (MN-56).
- Approximately 2,415 feet of existing 12-inch diameter sewer main along N. Twin Oaks Valley Road to 15-inch diameter sewer main (MN-57 through MN-66).

Per the 2018 Master Plan SP-31 (MN-15 through MN-54) calls to replace approximately 16,700 feet of 8-inch gravity main with 18-inch diameter pipe for ultimate build out that included the 1,900 Acre project Newland Sierra. Due to timing of Newland Sierra project an 18-inch sewer main is not needed at this time and 15-inch will be sufficient to serve the proposed Mulberry 9-Lot Subdivision Project.

In addition to remedying the above deficiencies, the following items are required as conditions of 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 acceptance of all on-site and offsite water and sewer facilities prior to service.
- Annexation into the District's wastewater service area and payment of all sewer annexation fees.

The District currently has water and sewer capacity available to serve the Project as proposed. 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, and The Kiddie Academy 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.

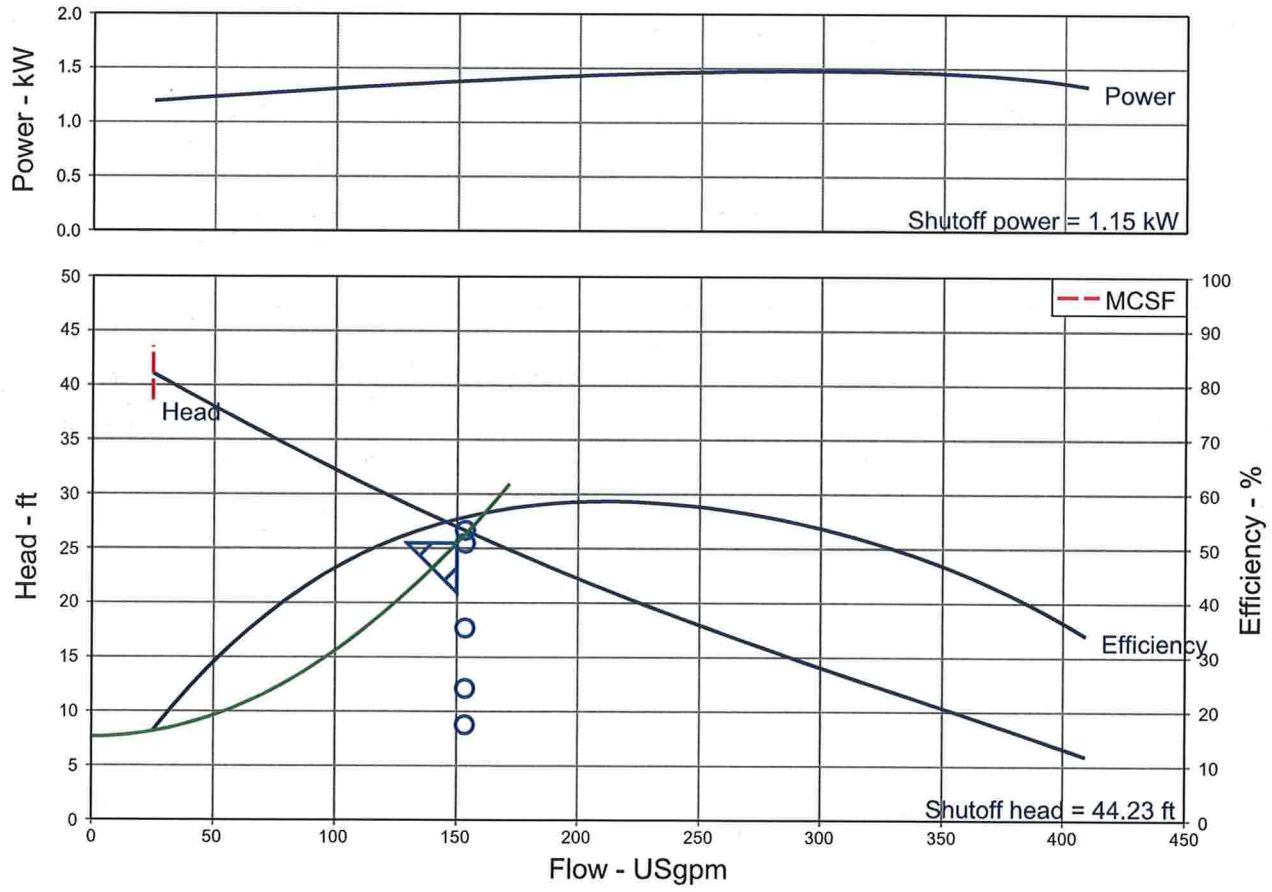
Exhibit "A"

ShinMaywa
VISION WITH INSIGHT

Technical Specifications of SUBMERSIBLE PUMP

Model: **3CNWX41.5T2E_15-4, 230V**

Pump			
Discharge size	76.20 mm	Weight	77.11 kg (excluding cable)
Impeller type	Non-clog scroll, Closed	Impeller number	15-4
Max. solid passage dia.	76.20 mm	Handling liquid temp.	0.00 ° C to 40.00 ° C
Motor			
Type	Ex-proof air-filled submersible induction motor	Rated output	1.49 kW
Number of poles	4	Insulation class	F
Rated voltage	230 V, 3 phase	Starting method	Direct on line
Rated current	7.0 A	Starting current	30.1 A
Power cable	STOW AWG16 x 7 cores x O.D. 0.54" x Standard length 50ft		
Motor protector	Thermal switches		
Leakage detector	Float type		
Standard Accessories			
Remarks			
Ex-proof for Class I, Division 1, Groups C and D, T3C STOW : 600V rated, Thermoplastic insulation/jacket, Oil-resistant jacket, Weather & water resistant cable			
Conditions			
Type of liquid	Water	Liquid temp.	20.00 ° C
Flow specified	150.0 USgpm		
Head specified	25.47 ft		
Curve tolerance	ISO9906:2012 3B		



Curve No. Y35283

ShinMaywa Industries, Ltd. Japan.

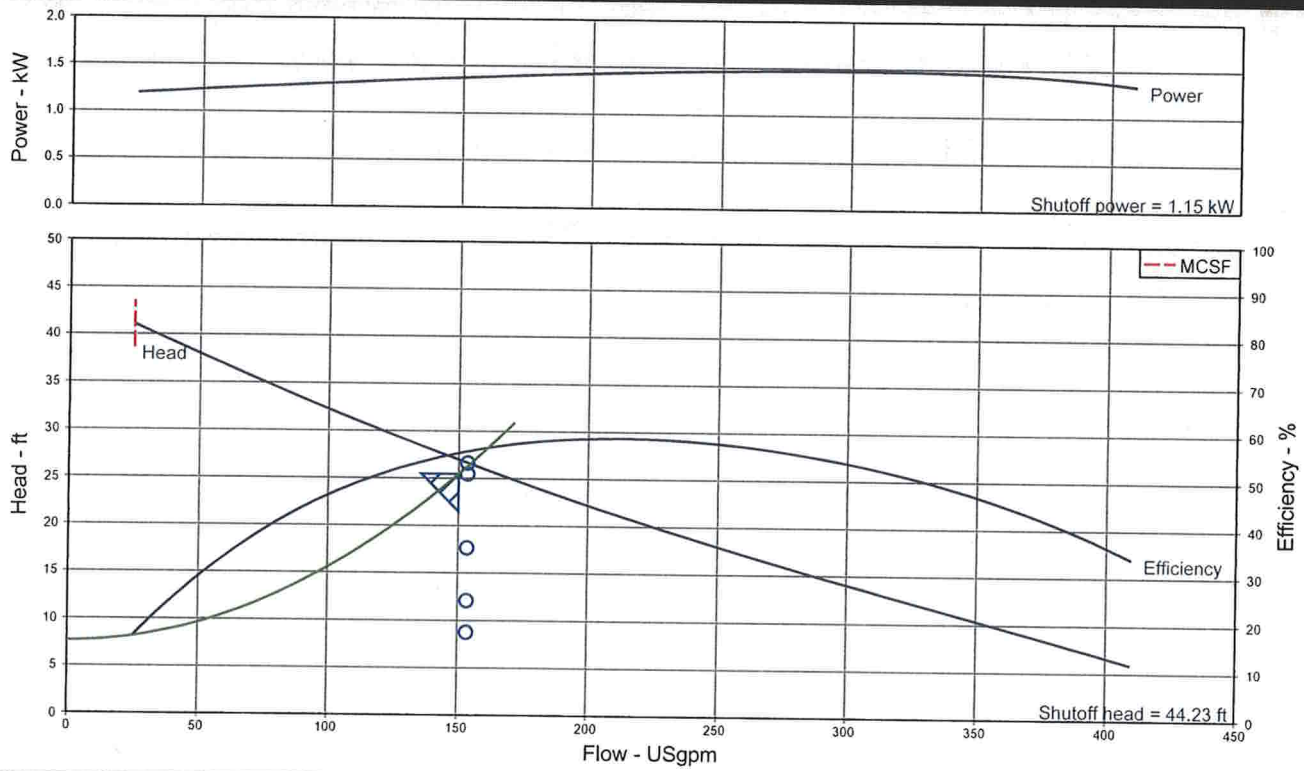
Rev. 2019001

Exhibit "A"

ShinMaywa
VISION WITH INSIGHT

ShinMaywa Pump Selector 21.4.0

Pump Performance Curve



Customer	:	Size	: 3CNWX41.5T2E_15-4, 230V	Flow, rated	: 150.0 USgpm
Customer reference	:	Stages	: 1	Head, rated	: 25.47 ft
Item number	: Default	Speed	: 1800 rpm	Fluid density	: 0.999 / 0.999 kg/dm3
Service	:	Based on curve number	: Y35283	Viscosity	: 1.00 cSt
Quantity	: 1	Efficiency	: 55.74 %	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Quote number	:	Power, rated	: 1.38 kW		
Date last saved	: 21 Oct 2021 12:35 PM	NPSH required	: -		