# VALLECITOS WATER DISTRICT

## *WOODWARD 46 WATER AND SEWER STUDY*

*WORK ORDER # 269767*

FINAL TECHNICAL MEMORANDUM

April 6, 2023

Prepared By: Elizabeth Lopez, Development Services Senior Engineer, and Eileen Koonce

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### INTRODUCTION

The proposed Woodward 46 project (Project) is a 46-unit multi-family residential development on 8.6-acres, located on Woodward Street north of Mission Road in the City of San Marcos (APN 220-210-49).

The Project is located within Vallecitos Water District's (VWD) boundaries for water and wastewater service. The property does not need to annex, both water and wastewater services can be provided by VWD.

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

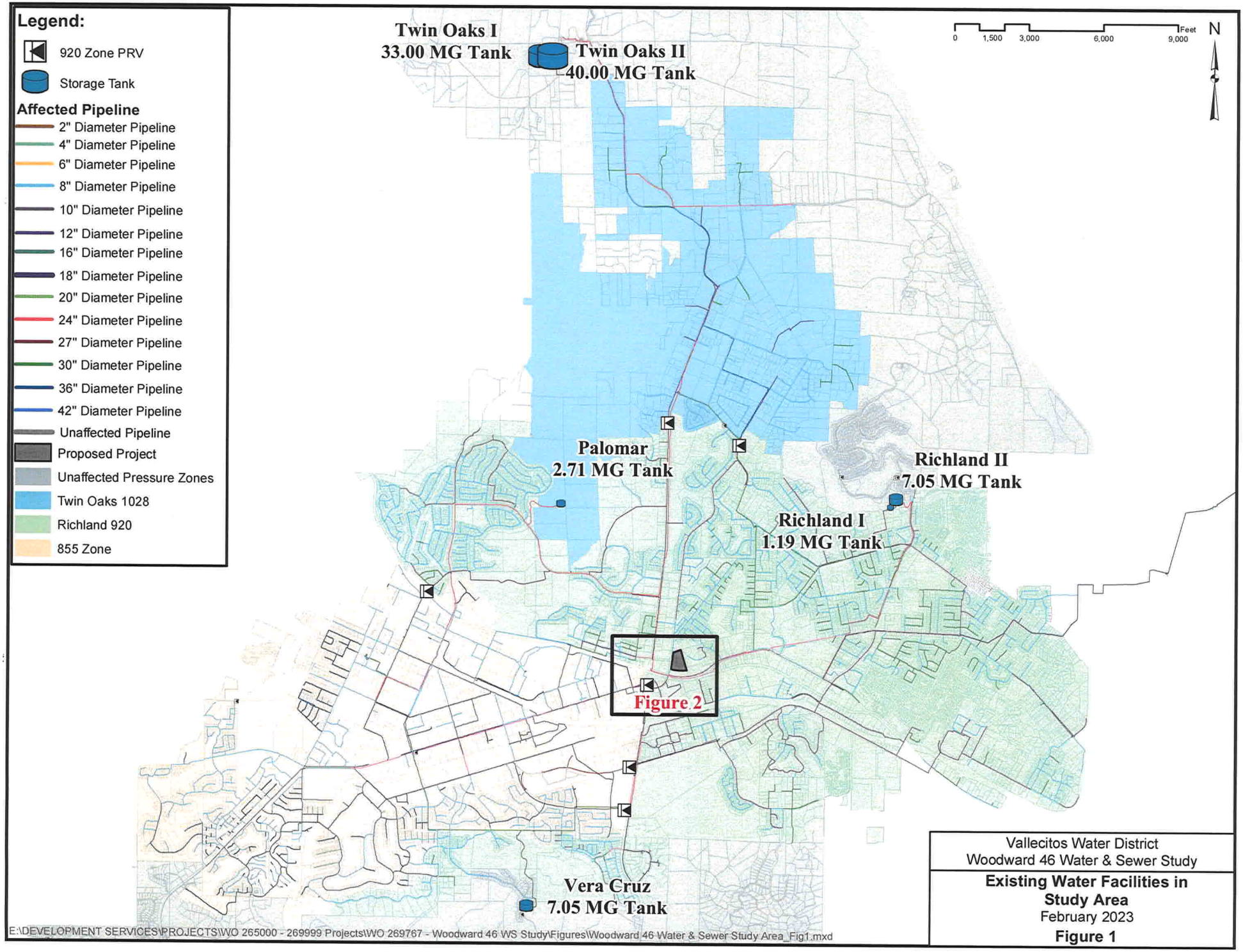
The proposed 8.6-acre Project lies completely within VWD's 920 Pressure Zone. Figures 1 and 2 show the development's location in relation to pressure zone boundaries, identify pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

### *Water Demand Projections*

The Project property is within the City of San Marcos' Richmar Specific Plan Area which allows for mixed-use, residential, retail and office uses. VWD's 2018 Master Plan based its ultimate water demand planning on the Residential 2-4 du/ac land use. The Project is proposing 46 multi-family residential units on 8.6 acres (Residential 4-8 du/ac). 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 Woodward 46 project will increase the projected average water demand from the 2018 Master Plan land use by **6,020** gallons per day.

**Table 1 – Project Estimated Water Demands for Woodward 46**

| Land Use Type | Area (acres) | Residential Units | Duty Factor (gpd/ac) | Water Demand (gpd) |
|---|---|---|---|---|
| **2018 Master Plan Land Use Demand** | | | | |
| Residential 2-4 du/ac | 8.60 | | 1,800 | 15,480 |
| **Total** | **2.51** | | | **15,480** |
| **Proposed Project Demand** | | | | |
| Residential 4-8 du/ac | 8.60 | 46 | 2,500 | 21,500 |
| **Total** | **2.51** | | | **21,500** |
| **Water Demand Increase** | | | | **6,020** |


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
Palomar
2.71 MG Tank
Richland II
7.05 MG Tank
Richland I
1.19 MG Tank
Figure 2
Vera Cruz
7.05 MG Tank
0
1,500
3,000
6,000
9,000
Feet
N
E:\DEVELOPMENT SERVICES\PROJECTS\WO 265000 - 269999 Projects\WO 269767 - Woodward 46 WS Study\Figures\Woodward 46 Water & Sewer Study Area_Fig1.mxd
Vallecitos Water District
Woodward 46 Water & Sewer Study
Existing Water Facilities in Study Area
February 2023
Figure 1

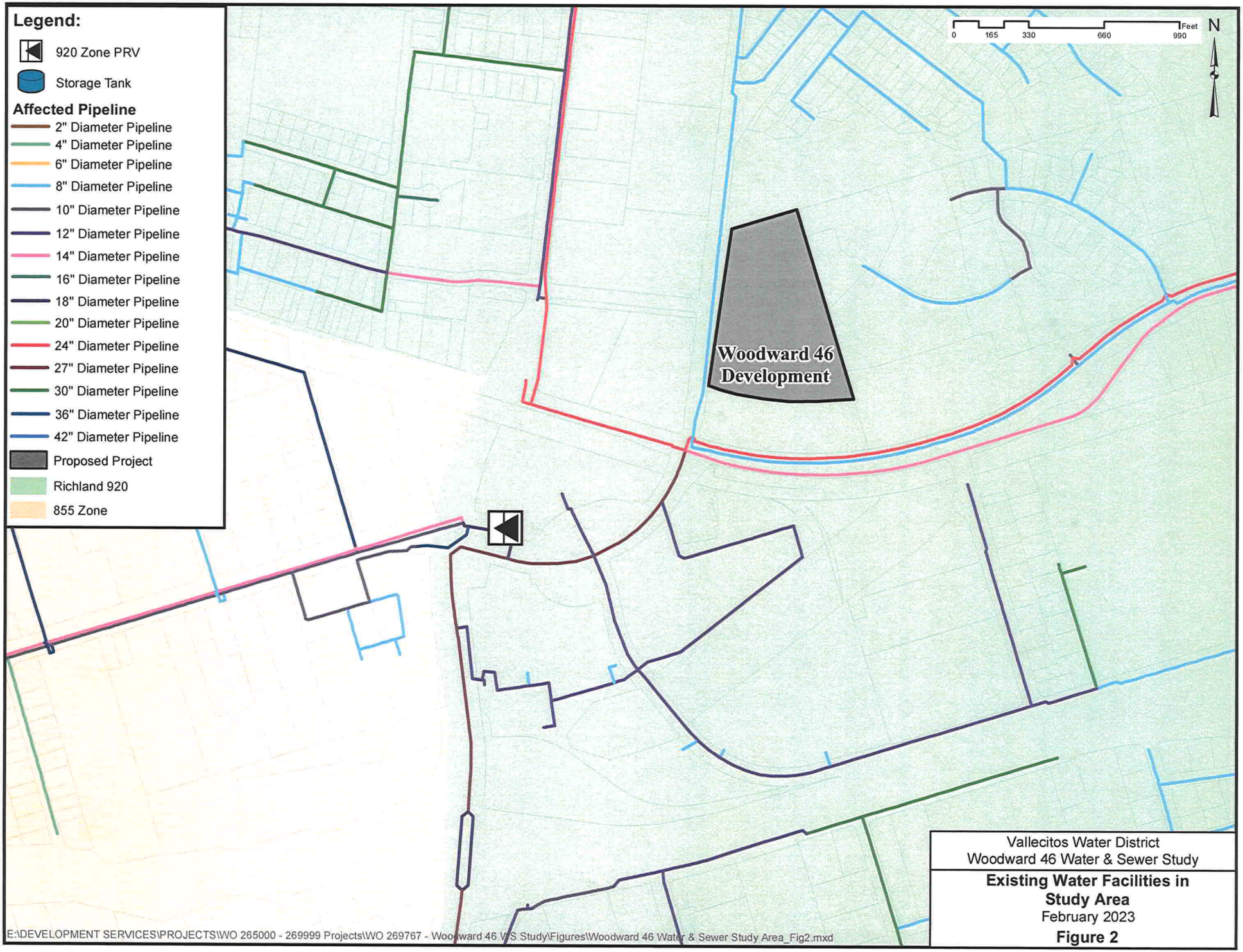

Legend:
920 Zone PRV
Storage Tank
Affected Pipeline
2" Diameter Pipeline
4" Diameter Pipeline
6" Diameter Pipeline
8" Diameter Pipeline
10" Diameter Pipeline
12" Diameter Pipeline
14" Diameter Pipeline
16" Diameter Pipeline
18" Diameter Pipeline
20" Diameter Pipeline
24" Diameter Pipeline
27" Diameter Pipeline
30" Diameter Pipeline
36" Diameter Pipeline
42" Diameter Pipeline
Proposed Project
Richland 920
855 Zone
0 165 330 660 990 Feet
N
Woodward 46 Development
Vallecitos Water District
Woodward 46 Water & Sewer Study
Existing Water Facilities in Study Area
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Figure 2
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***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 **500 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. The model 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 855 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 increase the projected average water demand by approximately **6,020** gallons per day as shown in Table 1.

The amount of additional reservoir storage required is 500% of the development's average day demand or:

**6,020 gallons * 500% = 30,100 gallons**

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 8.6-acre Project lies completely within VWD sewer shed 17C. Figures 3 through 6 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 property is within the City of San Marcos' Richmar Specific Plan Area which allows for mixed-use, residential, retail and office uses. VWD's 2018 Master Plan based its ultimate water demand planning on the Residential 2-4 du/ac land use. The Project is proposing 46 multi-family residential units on 8.6 acres (Residential 4-8 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 Project will increase the projected average wastewater generation from the 2018 Master Plan land use by **4,730** gallons per day.

**Table 3 – Project Estimated Wastewater Flows for Woodward 46**

| Land Use Type | Area (acres) | Residential Units | Duty Factor (gpd/ac) | Wastewater Flow (gpd) |
|---|---|---|---|---|
| **2018 Master Plan Land Use Flows** | | | | |
| Residential 2-4 du/ac | **8.60** | | 750 | 6,450 |
| **Total** | | | | **6,450** |
| **Proposed Project Demand** | | | | |
| Residential 4-8 du/ac | 8.60 | 46 | 1,300 | 11,180 |
| **Total** | **1.09** | | | **11,180** |
| **Sewer Generation Increase** | | | | **4,730** |

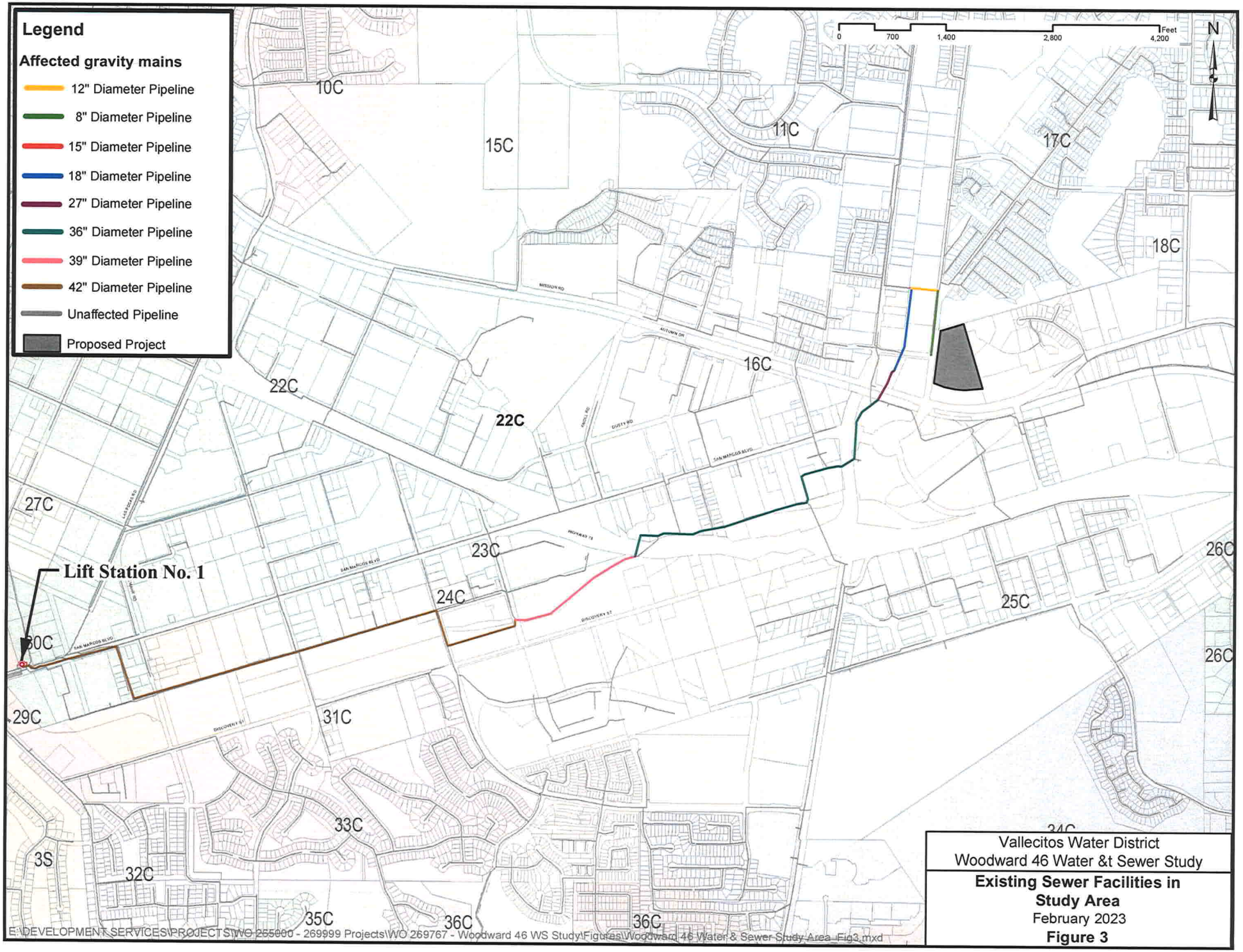
Legend
Affected gravity mains
12" Diameter Pipeline
8" Diameter Pipeline
15" Diameter Pipeline
18" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Proposed Project
0
700
1,400
2,800
4,200
Feet
N
Lift Station No. 1
10C
15C
11C
17C
18C
16C
22C
22C
27C
23C
24C
25C
26C
26C
30C
29C
31C
33C
3S
32C
35C
36C
36C
MISSION RD
AUTUMN DR
DUSTY RD
SAN MARCOS BLVD
DISCOVERY ST
Vallecitos Water District
Woodward 46 Water &t Sewer Study
Existing Sewer Facilities in Study Area
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Figure 3
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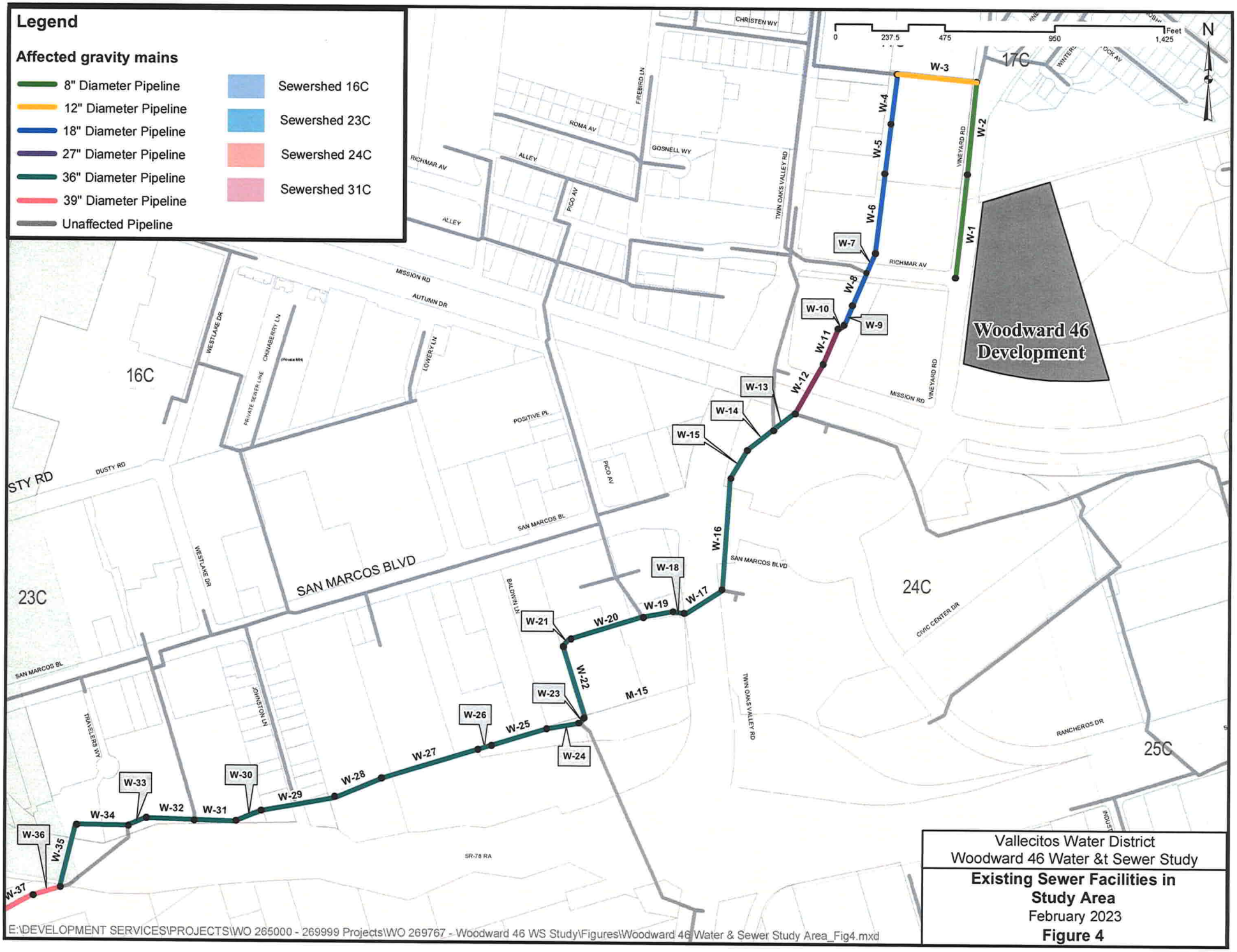
Legend
Affected gravity mains
8" Diameter Pipeline
12" Diameter Pipeline
18" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
Unaffected Pipeline
Sewershed 16C
Sewershed 23C
Sewershed 24C
Sewershed 31C
0
237.5
475
950
1,425
Feet
N
Woodward 46 Development
16C
17C
23C
24C
25C
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
W-10
W-11
W-12
W-13
W-14
W-15
W-16
W-17
W-18
W-19
W-20
W-21
W-22
W-23
W-24
M-15
W-25
W-26
W-27
W-28
W-29
W-30
W-31
W-32
W-33
W-34
W-35
W-36
W-37
SAN MARCOS BLVD
SAN MARCOS BL
MISSION RD
AUTUMN DR
RICHMAR AV
ALLEY
ROMA AV
GOSNELL WY
FIREBIRD LN
CHRISTEN WY
TWIN OAKS VALLEY RD
VINEYARD RD
PICO AV
WESTLAKE DR
CHIMBERRY LN
LOWERY LN
POSITIVE PL
DUSTY RD
BALDWIN LN
CIVIC CENTER DR
RANCHEROS DR
TRAVELERS VY
JOHNSTON LN
SR-78 RA
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Existing Sewer Facilities in Study Area
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Figure 4
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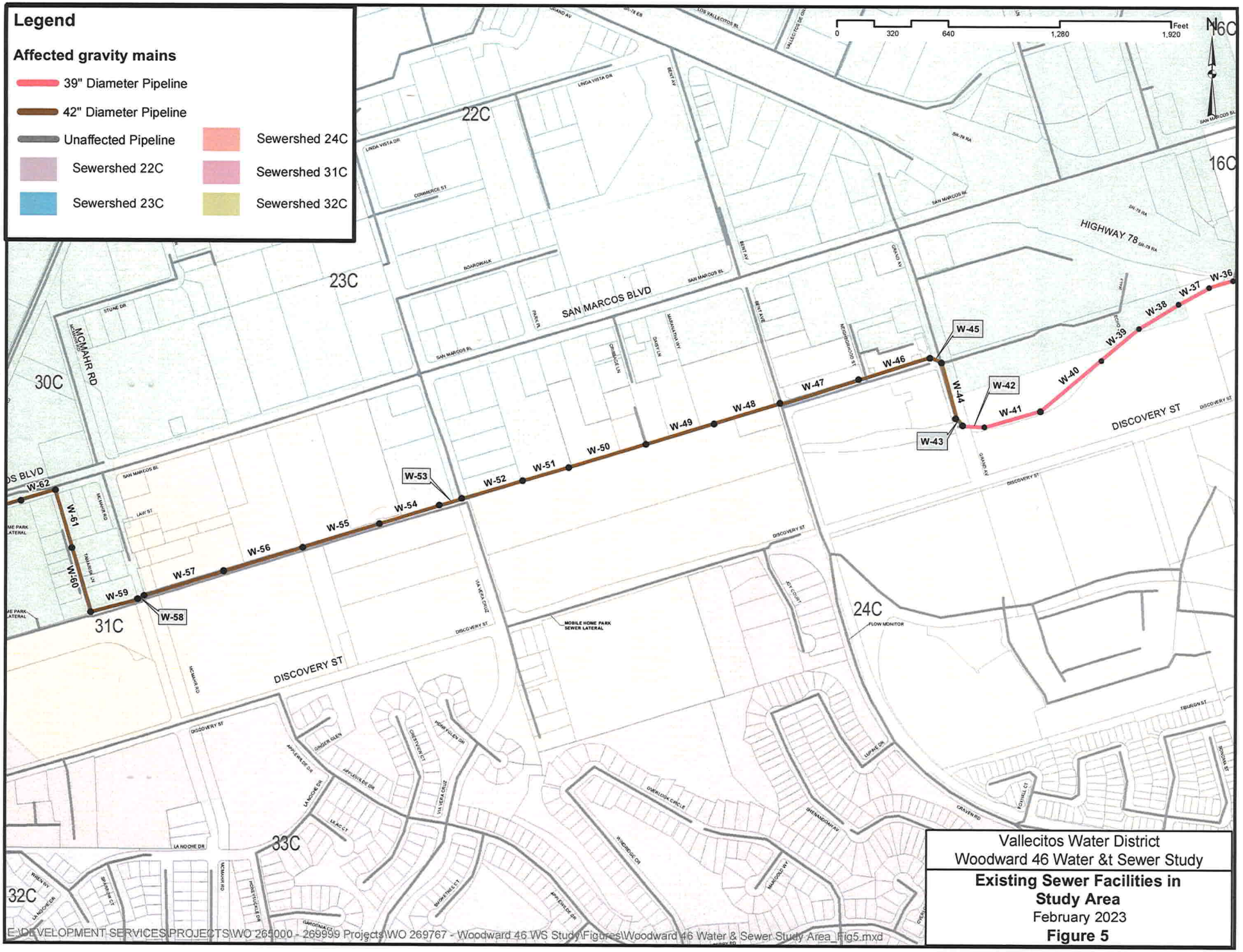


Vallecitos Water District
Woodward 46 Water &t Sewer Study

**Existing Sewer Facilities in Study Area**

February 2023

**Figure 5**

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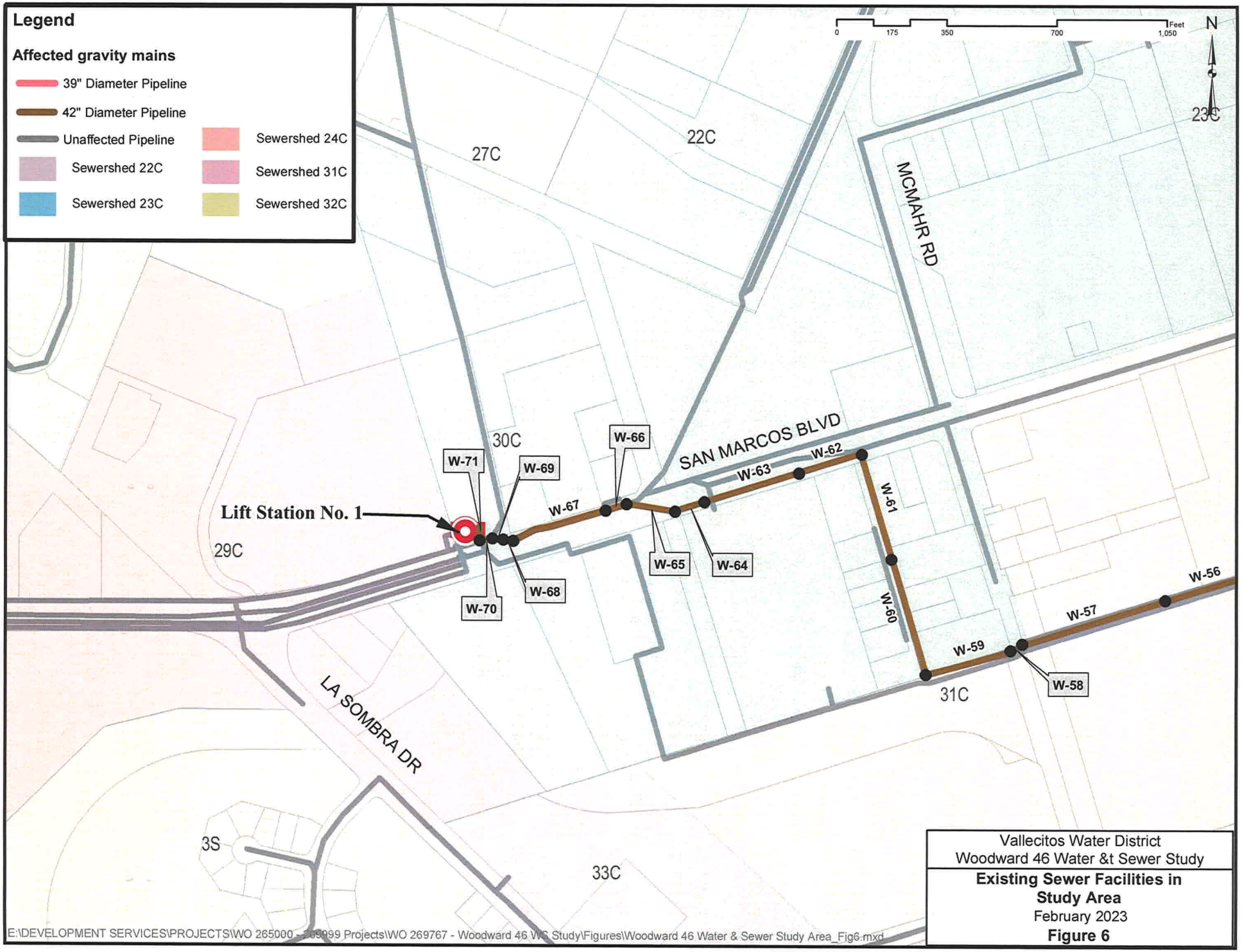
Legend
Affected gravity mains
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
Sewershed 32C
0
175
350
700
1,050
Feet
N
27C
22C
23C
MCMAHR RD
30C
SAN MARCOS BLVD
W-71
W-69
W-66
W-62
W-63
W-67
W-61
Lift Station No. 1
29C
W-65
W-64
W-68
W-70
W-60
W-56
W-57
W-59
W-58
31C
LA SOMBRA DR
3S
33C
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Woodward 46 Water &t Sewer Study
Existing Sewer Facilities in Study Area
February 2023
Figure 6
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## ***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 proposed Project flows (see Figures 3 - 6).

Table 4 presents a summary of the modeling results from this analysis. The modeling results showed that there are deficiencies in pipe segment W-8 under the currently approved density under peak wet weather flows during ultimate build-out conditions. The wastewater flows from the proposed Project will increase those deficiencies.

VWD's 2018 Master Plan has identified pipe segments W-8 and W-9 for upsizing from 18-inch to 24-inch diameter pipe. These segments are part of CIP project #SP-34, a phase 4 project. Phase 4 projects are planned for construction in the 2031 to 2035 timeline.

**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 |
| W-1 | 217 | 8 | 0.0660 | 0 | 0.01 | 8 | 0.01 | 13 | 0.07 | 8 | 0.07 |
| W-2 | 222 | 12 | 0.0660 | 0 | 0.01 | 12 | 0.01 | 13 | 0.05 | 12 | 0.05 |
| W-3 | 359 | 12 | 0.0250 | 1236 | 0.50 | 12 | 0.50 | 1,249 | 0.50 | 12 | 0.50 |
| W-4 | 216 | 18 | 0.0030 | 1449 | 0.54 | 18 | 0.54 | 1,462 | 0.54 | 18 | 0.54 |
| W-5 | 217 | 18 | 0.0040 | 1451 | 0.50 | 18 | 0.50 | 1,464 | 0.50 | 18 | 0.50 |
| W-6 | 350 | 18 | 0.0040 | 1466 | 0.50 | 18 | 0.50 | 1,479 | 0.50 | 18 | 0.50 |
| W-7 | 80 | 18 | 0.0040 | 1475 | 0.50 | 18 | 0.50 | 1,488 | 0.50 | 18 | 0.50 |
| **W-8** | 170 | 18 | 0.0040 | 2725 | 0.76 | **24** | 0.46 | 2,738 | 0.76 | **24** | 0.46 |
| **W-9** | 62 | 18 | 0.0180 | 2727 | 0.46 | **24** | 0.31 | 2,740 | 0.47 | **24** | 0.31 |
| W-10 | 31 | 27 | 0.0030 | 2729 | 0.42 | 27 | 0.42 | 2,742 | 0.42 | 27 | 0.42 |
| W-11 | 165 | 27 | 0.0050 | 2731 | 0.37 | 27 | 0.37 | 2,744 | 0.37 | 27 | 0.37 |
| W-12 | 261 | 27 | 0.0080 | 2741 | 0.32 | 27 | 0.32 | 2,754 | 0.32 | 27 | 0.32 |
| W-13 | 135 | 36 | 0.0030 | 6222 | 0.43 | 36 | 0.43 | 6,235 | 0.43 | 36 | 0.43 |
| W-14 | 128 | 36 | 0.0050 | 6247 | 0.38 | 36 | 0.38 | 6,260 | 0.38 | 36 | 0.38 |
| W-15 | 140 | 36 | 0.0070 | 6248 | 0.35 | 36 | 0.35 | 6,261 | 0.35 | 36 | 0.35 |
| W-16 | 470 | 36 | 0.0040 | 6250 | 0.40 | 36 | 0.40 | 6,263 | 0.40 | 36 | 0.40 |
| W-17 | 184 | 36 | 0.0030 | 6265 | 0.43 | 36 | 0.43 | 6,278 | 0.43 | 36 | 0.43 |
| W-18 | 36 | 36 | 0.0020 | 6267 | 0.49 | 36 | 0.49 | 6,280 | 0.49 | 36 | 0.49 |
| W-19 | 146 | 36 | 0.0050 | 6268 | 0.38 | 36 | 0.38 | 6,281 | 0.38 | 36 | 0.38 |
| W-20 | 318 | 36 | 0.0040 | 6625 | 0.41 | 36 | 0.41 | 6,638 | 0.41 | 36 | 0.41 |

**CIP PROJECTS:** **W-8 & W-9 CIP SP-34 (Phase 4)**
**PROPOSED DENSITY:** **13** **GPM**

**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 |
| W-21 | 39 | 36 | 0.0040 | 6626 | 0.41 | 36 | 0.41 | 6,639 | 0.41 | 36 | 0.41 |
| W-22 | 319 | 36 | 0.0040 | 6627 | 0.41 | 36 | 0.41 | 6,640 | 0.41 | 36 | 0.41 |
| W-23 | 38 | 36 | 0.0040 | 6628 | 0.41 | 36 | 0.41 | 6,641 | 0.41 | 36 | 0.41 |
| W-24 | 139 | 36 | 0.0040 | 8764 | 0.48 | 36 | 0.48 | 8,776 | 0.48 | 36 | 0.48 |
| W-25 | 294 | 36 | 0.0030 | 8764 | 0.53 | 36 | 0.53 | 8,777 | 0.53 | 36 | 0.53 |
| W-26 | 12 | 36 | 0.0170 | 8764 | 0.33 | 36 | 0.33 | 8,777 | 0.33 | 36 | 0.33 |
| W-27 | 438 | 36 | 0.0050 | 8767 | 0.45 | 36 | 0.45 | 8,780 | 0.45 | 36 | 0.45 |
| W-28 | 229 | 36 | 0.0050 | 8769 | 0.45 | 36 | 0.45 | 8,782 | 0.45 | 36 | 0.45 |
| W-29 | 371 | 36 | 0.0060 | 8772 | 0.43 | 36 | 0.43 | 8,785 | 0.43 | 36 | 0.43 |
| W-30 | 124 | 36 | 0.0050 | 8774 | 0.45 | 36 | 0.45 | 8,787 | 0.45 | 36 | 0.45 |
| W-31 | 167 | 36 | 0.0050 | 8776 | 0.45 | 36 | 0.45 | 8,789 | 0.45 | 36 | 0.45 |
| W-32 | 201 | 36 | 0.0040 | 9070 | 0.49 | 36 | 0.49 | 9,083 | 0.49 | 36 | 0.49 |
| W-33 | 91 | 36 | 0.0050 | 9072 | 0.46 | 36 | 0.46 | 9,085 | 0.46 | 36 | 0.46 |
| W-34 | 220 | 36 | 0.0050 | 9073 | 0.46 | 36 | 0.46 | 9,086 | 0.46 | 36 | 0.46 |
| W-35 | 286 | 36 | 0.0050 | 9073 | 0.46 | 36 | 0.46 | 9,086 | 0.46 | 36 | 0.46 |
| W-36 | 210 | 39 | 0.0040 | 9165 | 0.44 | 39 | 0.44 | 9,178 | 0.44 | 39 | 0.44 |
| W-37 | 176 | 39 | 0.0030 | 9166 | 0.48 | 39 | 0.48 | 9,179 | 0.48 | 39 | 0.48 |
| W-38 | 271 | 39 | 0.0020 | 9167 | 0.54 | 39 | 0.54 | 9,180 | 0.54 | 39 | 0.54 |
| W-39 | 297 | 39 | 0.0020 | 9167 | 0.54 | 39 | 0.54 | 9,180 | 0.54 | 39 | 0.54 |
| W-40 | 452 | 39 | 0.0020 | 9168 | 0.54 | 39 | 0.54 | 9,181 | 0.54 | 39 | 0.54 |

**CIP PROJECTS:** CA-4 through CA-14 (SP-23) Phase 4
**PROPOSED DENSITY:** 13 GPM

## 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 |
| W-41 | 337 | 39 | 0.0020 | 9171 | 0.54 | 39 | 0.54 | 9,184 | 0.54 | 39 | 0.54 |
| W-42 | 123 | 39 | 0.0080 | 9364 | 0.37 | 39 | 0.37 | 9,377 | 0.37 | 39 | 0.37 |
| W-43 | 58 | 42 | 0.0040 | 9366 | 0.40 | 42 | 0.40 | 9,379 | 0.40 | 42 | 0.40 |
| W-44 | 308 | 42 | 0.0030 | 9369 | 0.43 | 42 | 0.43 | 9,382 | 0.43 | 42 | 0.43 |
| W-45 | 69 | 42 | 0.0010 | 9375 | 0.60 | 42 | 0.60 | 9,388 | 0.60 | 42 | 0.60 |
| W-46 | 448 | 42 | 0.0030 | 9378 | 0.43 | 42 | 0.43 | 9,391 | 0.43 | 42 | 0.43 |
| W-47 | 448 | 42 | 0.0030 | 9382 | 0.43 | 42 | 0.43 | 9,395 | 0.43 | 42 | 0.43 |
| W-48 | 404 | 42 | 0.0060 | 9736 | 0.37 | 42 | 0.37 | 9,749 | 0.37 | 42 | 0.37 |
| W-49 | 404 | 42 | 0.0060 | 9742 | 0.37 | 42 | 0.37 | 9,755 | 0.37 | 42 | 0.37 |
| W-50 | 368 | 42 | 0.0030 | 9749 | 0.44 | 42 | 0.44 | 9,762 | 0.44 | 42 | 0.44 |
| W-51 | 368 | 42 | 0.0030 | 9752 | 0.44 | 42 | 0.44 | 9,765 | 0.44 | 42 | 0.44 |
| W-52 | 368 | 42 | 0.0030 | 9755 | 0.44 | 42 | 0.44 | 9,768 | 0.44 | 42 | 0.44 |
| W-53 | 120 | 42 | 0.0020 | 9809 | 0.50 | 42 | 0.50 | 9,822 | 0.50 | 42 | 0.50 |
| W-54 | 352 | 42 | 0.0040 | 9810 | 0.41 | 42 | 0.41 | 9,823 | 0.41 | 42 | 0.41 |
| W-55 | 472 | 42 | 0.0080 | 9810 | 0.34 | 42 | 0.34 | 9,823 | 0.34 | 42 | 0.34 |
| W-56 | 467 | 42 | 0.0040 | 9811 | 0.41 | 42 | 0.41 | 9,824 | 0.41 | 42 | 0.41 |
| W-57 | 460 | 42 | 0.0040 | 9812 | 0.41 | 42 | 0.41 | 9,825 | 0.41 | 42 | 0.41 |
| W-58 | 8 | 42 | 0.0290 | 9819 | 0.25 | 42 | 0.25 | 9,831 | 0.25 | 42 | 0.25 |
| W-59 | 310 | 42 | 0.0050 | 9817 | 0.39 | 42 | 0.39 | 9,830 | 0.39 | 42 | 0.39 |
| W-60 | 372 | 42 | 0.0040 | 9816 | 0.41 | 42 | 0.41 | 9,829 | 0.41 | 42 | 0.41 |

**CIP PROJECTS:** **CA-4 through CA-14 (SP-23) Phase 4**

**PROPOSED DENSITY:** **13** **GPM**

**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 |
| W-61 | 355 | 42 | 0.0050 | 9825 | 0.39 | 42 | 0.39 | 9,838 | 0.39 | 42 | 0.39 |
| W-63 | 190 | 42 | 0.0050 | 9823 | 0.39 | 42 | 0.39 | 9,836 | 0.39 | 42 | 0.39 |
| W-64 | 316 | 42 | 0.0040 | 9821 | 0.41 | 42 | 0.41 | 9,834 | 0.41 | 42 | 0.41 |
| W-65 | 94 | 42 | 0.0060 | 9820 | 0.37 | 42 | 0.37 | 9,833 | 0.37 | 42 | 0.37 |
| W-66 | 112 | 42 | 0.0060 | 9819 | 0.37 | 42 | 0.37 | 9,832 | 0.37 | 42 | 0.37 |
| W-67 | 100 | 42 | 0.0020 | 14041 | 0.62 | 42 | 0.62 | 14,054 | 0.62 | 42 | 0.62 |
| W-68 | 347 | 42 | 0.0020 | 14048 | 0.62 | 42 | 0.62 | 14,061 | 0.62 | 42 | 0.62 |
| W-69 | 18 | 42 | 0.0030 | 14049 | 0.54 | 42 | 0.54 | 14,062 | 0.55 | 42 | 0.55 |
| W-70 | 10 | 42 | 0.0020 | 14051 | 0.62 | 42 | 0.62 | 14,064 | 0.62 | 42 | 0.62 |
| W-71 | 10 | 42 | 0.0120 | 14243 | 0.37 | 42 | 0.37 | 14,255 | 0.37 | 42 | 0.37 |
| W-72 | 73 | 42 | 0.0040 | 14243 | 0.50 | 42 | 0.50 | 14,255 | 0.50 | 42 | 0.50 |

**CIP PROJECTS:** **CA-4 through CA-14 (SP-23) Phase 4**

**PROPOSED DENSITY:** **13** **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 7. 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** |

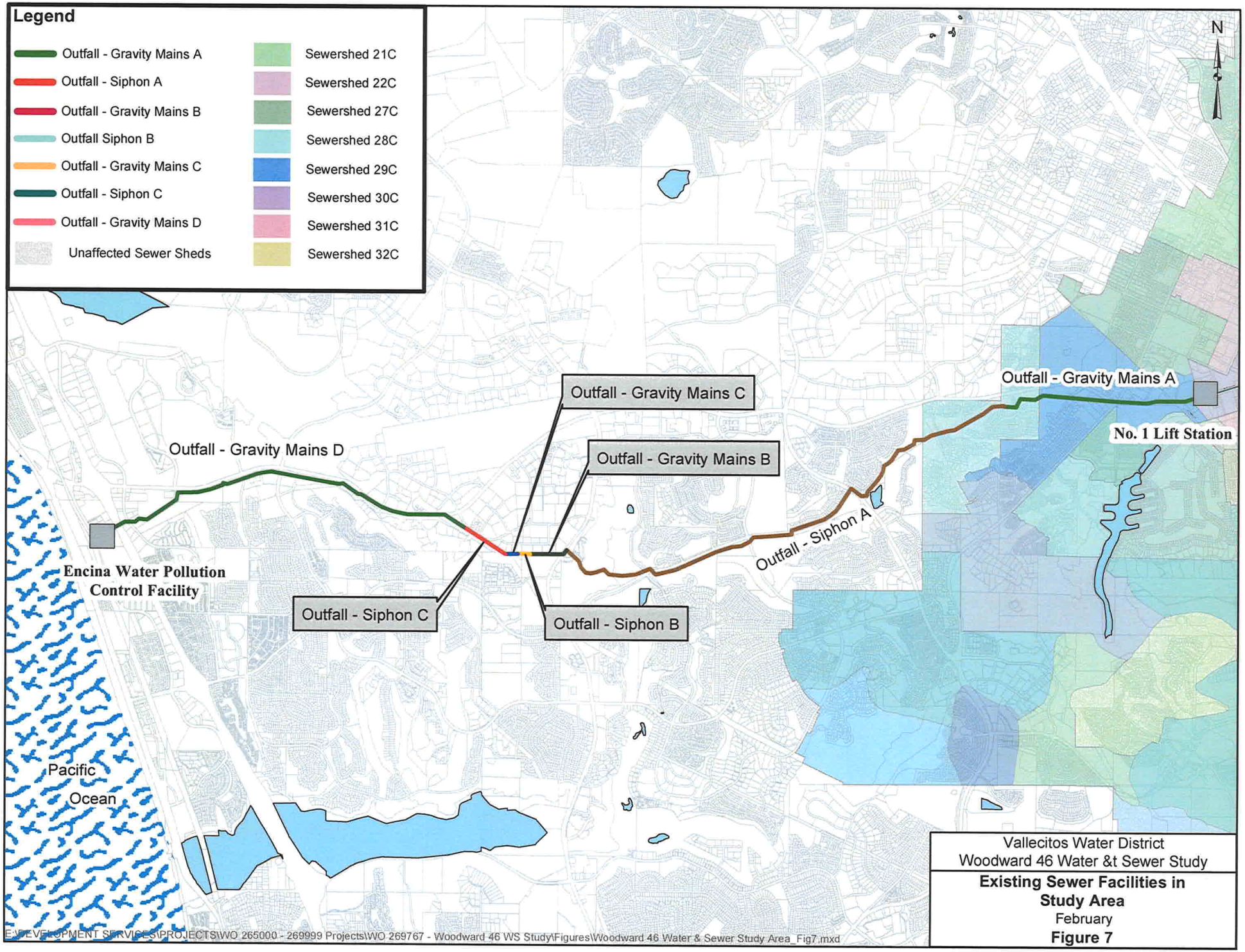
The Meadowlark Water Reclamation Facility (MRF) has a capacity of 5.0 MGD with a peak wet weather capacity of 8.0 MGD. Therefore, VWD has a combined peak wet weather wastewater collection capacity of 20.10 MGD (12.10 MGD + 8.0 MGD).

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 **4,730** 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.


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
N
Outfall - Gravity Mains A
No. 1 Lift Station
Outfall - Gravity Mains C
Outfall - Gravity Mains B
Outfall - Gravity Mains D
Outfall - Siphon A
Encina Water Pollution Control Facility
Outfall - Siphon C
Outfall - Siphon B
Pacific Ocean
Vallecitos Water District
Woodward 46 Water &t Sewer Study
Existing Sewer Facilities in Study Area
February
Figure 7
E:\DEVELOPMENT SERVICES\PROJECTS\WO 265000 - 269999 Projects\WO 269767 - Woodward 46 WS Study\Figures\Woodward 46 Water & Sewer Study Area_Fig7.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 Woodward 46 project is expected to increase average daily water demands by 6,020 gallons per day and wastewater flows by 4,730 gallons per day over the ultimate flows projected in the 2018 Master Plan.

The study concludes that the proposed development will result in the following impacts:

- An increase of 6,020 gallons per day in water demand for proposed project.
- An increase of 30,100 gallons of potable water storage requirement.
- An increase of 4,730 gallons per day in solids handling, liquids handling and ocean disposal capacity requirements at Encina Water Pollution Control Facility.
- An increase of 4,730 gallons per day in the parallel land outfall's capacity requirement.

The Study also concludes that there are deficiencies in the existing sewer facilities under peak wet weather flows during ultimate build-out conditions without the addition of the Project. The following improvements are needed to mitigate those deficiencies:

- Approximately 232 feet of existing 18-inch sewer main within a VWD easement along San Marcos Creek must be replaced with 24-inch main (W-8 and W-9).

VWD's 2018 Master Plan has identified pipe segments W-8 and W-9 for upsizing from 18-inch to 24-inch diameter pipe as part of CIP #SP-34, a Phase 4 project. Phase 4 projects are planned for construction in the 2031 to 2035 timeline.
Since there is currently capacity in pipes W-8 and W-9 and the need for additional capacity in these sewer mains is not anticipated until Phase 4, the CIP #SP-34 project will address and accommodate the pipeline deficiencies. Wastewater Capital Facility Fees paid by this Project will be used towards the construction of these pipelines.

The following conditions 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 onsite and offsite water and sewer facilities prior to service. Includes installation of Sewer Pipes W-1 and W-2.

The District currently has water and sewer capacity available to serve the Project as proposed with the conditions herein addressed by the Developer. 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 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.