VALLECITOS WATER DISTRICT

NEWLAND SIERRA OFF-SITE WATER AND SEWER STUDY

WORK ORDER # 170267

FINAL TECHNICAL MEMORANDUM

OCTOBER 28, 2016

PREPARED BY: ROBERT SCHOLL, P.E. AND EILEEN KOONCE

PROJECT DESCRIPTION

The proposed Newland Sierra development (Project) is located on approximately 1,985 acres of unincorporated land in the County of San Diego. The Project is located north of Deer Springs Road and west of Interstate 15. The proposed Project will consist of 1,137 single-family residential units on 228.1 acres, 998 multi-family residential units on 85.2 acres, 7.4 acres of commercial property, 3.6 acres of school property, 35.9 acres of park space, 378.2 acres of fuel modification space, 1,209 acres of open space, 4.2 acres for water tanks and 34 acres of dedicated public right of way. The proposed development is seeking approval from the County of San Diego.

The Project property is located within VWD's water service boundary. A portion of the Project is located within VWD's sewer service area. However, the majority of the Project is outside of the sewer service area and must be annexed into VWD's sewer service area in order to be eligible for sewer service. Both water and wastewater services are proposed to be provided by Vallecitos Water District (VWD). All 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.

Dexter Wilson Engineering has prepared "Master Plan of Water for the Newland Sierra Project" dated August 31, 2016 and "Master Plan of Sewer for the Newland Sierra Project" dated September 30, 2016 which analyze the proposed on-site water and sewer facilities. This Study will consider water demand and sewage generation from the proposed project to determine if the current off-site water and sewer infrastructure is sufficient to accommodate the Project and provides recommendations for capital improvements to provide service.

The Study will evaluate the following systems:

- Water distribution system, including the need to upsize pipelines, install new pipelines, or install flow control facilities
- Water storage, including the need for additional storage and the adequacy of existing storage tanks and reservoirs to serve the proposed development
- Water pump stations, including the need to install new pump stations or upsize existing pump stations to serve the proposed development
- Wastewater collection system, including the need to upsize pipelines and manholes, or the need to install new pipelines and manholes

- Wastewater lift stations, including the need to install new lift stations or upsize existing lift stations to serve the proposed development
- Wastewater land outfall, including the need to construct a parallel land outfall to serve this and other proposed developments
- Wastewater treatment facilities, including the need for obtaining additional capacity at the Encina Water Pollution Control Facility (EWPCF) or for expanding the Meadowlark Water Reclamation Facility (MRF)

WATER SYSTEM ANALYSIS

The Project consists of approximately 1,985-acres which lie within the following VWD pressure zones:

- Twin Oaks 1028 Zone
- North 1228 Zone
- Deer Springs 1235 Zone
- North Twin Oaks 1330 Zone
- Coggan 1608 Zone
- Proposed 1475 Zone

Figures 1 and 2 show the Project's location in relation to pressure zone boundaries, identify existing and proposed pipelines within the vicinity of the development, and identify storage reservoirs that supply the development area.

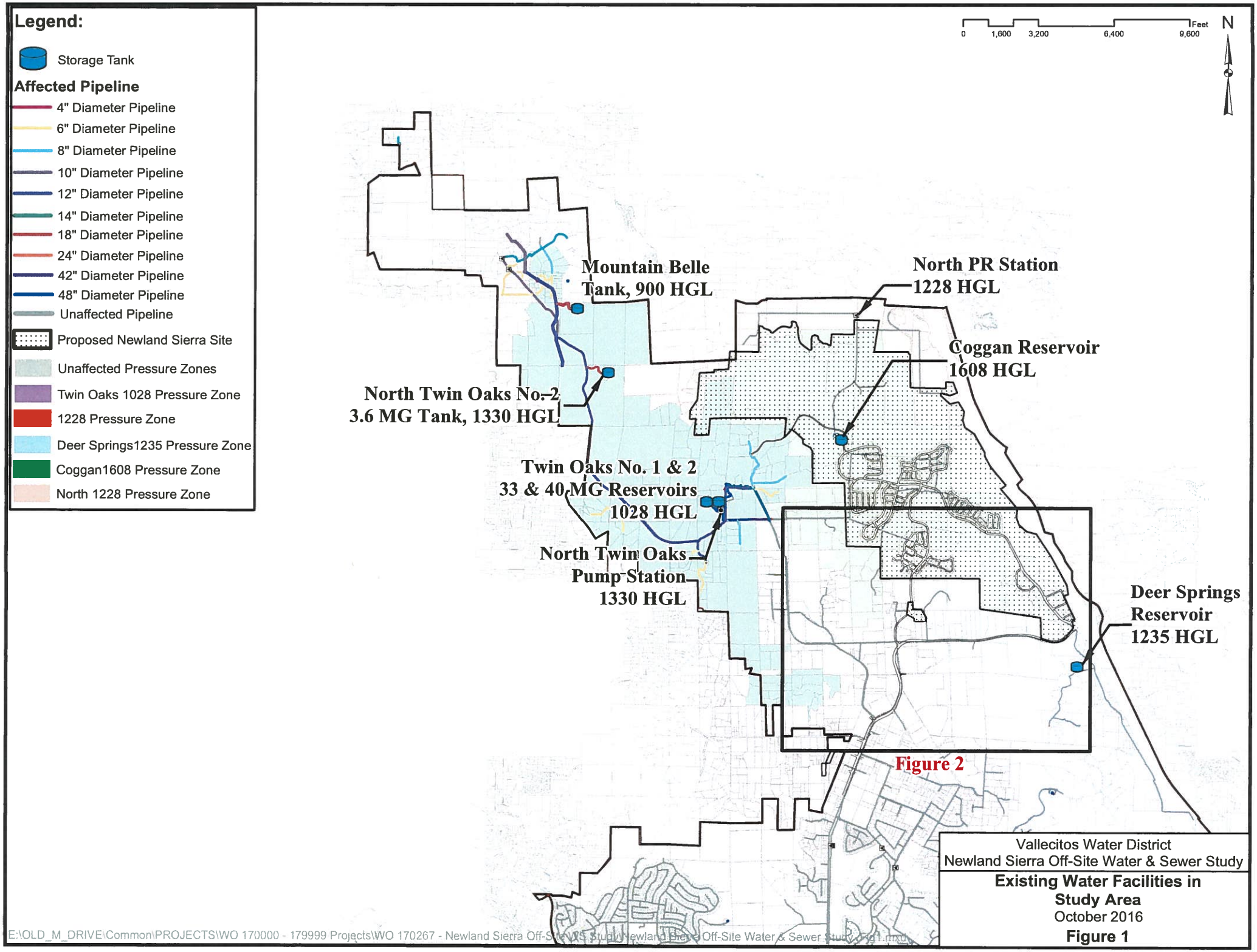
Water Demand Projections

The existing land use, per the County of San Diego 2011 General Plan Update, is designated as 1,927.4 acres of Residential under 1 dwelling unit per acre, 4.6 acres of general commercial and 53.6 acres of Office Professional use. The 1,985-acre Project proposes water service to 1,137 single-family residential units on 228.1 acres, 998 multi-family residential units on 85.2 acres, 7.4 acres of commercial property, 3.6 acres of school property, 35.9 acres of park space, 378.2 acres of fuel modification space, 1,209 acres of open space, a 4.2 acre parcel for a water tank and 34 acres of dedicated public right of way.

Table 1 provides the average water demand generated both under the density planned for in the County of San Diego 2011 General Plan Update and under the proposed Project. The table shows that the Project will not increase the projected average water demand from the County of San Diego 2011 General Plan Update land use. Duty factors utilized in Table 1 are based on VWD's 2014 draft Master Plan.

Table 1 – Project Estimated Water Demands

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
County of San Diego 2011 General Plan Update Land Use Demand				
Residential (<1 du/ac)	1,927.40		800	1,541,920
Office Professional	53.60		1,500	80,400
Commercial	4.60		1,500	6,900
Total	**1,985.60**	**-**		**1,629,220**
Proposed Project Demand				
Single Family Residential (2-4 du/ac)	35.40	101	1,800	63,720
Single Family Residential (4-8 du/ac)	192.70	1,036	2,500	481,750
Multi-Family Residential (2-4 du/ac)	14.90	50	1,800	26,820
Multi-Family Residential (4-8 du/ac)	4.80	30	2,500	12,000
Multi-Family Residential (8-12 du/ac)	6.10	60	2,800	17,080
Multi-Family Residential (12-15 du/ac)	31.00	412	4,500	139,500
Multi-Family Residential (15-20 du/ac)	28.40	446	5,000	142,000
Parks	35.90		1,500	53,850
Commercial	7.40		1,500	11,100
School	3.60		1,000	3,600
Open Space	1,209.00		200	241,800
Right of Way	34.00		200	6,800
Fuel Modification (irrigated)	131.00		1,500	196,500
Fuel Modification (non-irrigated)	247.20		200	49,440
Public Facility (Water Tank)	4.20		1,000	4,200
Total	**1,985.60**	**2135**		**1,450,160**
Additional Water Demand				**0**


Legend:
Storage Tank
Affected Pipeline
4" Diameter Pipeline
6" Diameter Pipeline
8" Diameter Pipeline
10" Diameter Pipeline
12" Diameter Pipeline
14" Diameter Pipeline
18" Diameter Pipeline
24" Diameter Pipeline
42" Diameter Pipeline
48" Diameter Pipeline
Unaffected Pipeline
Proposed Newland Sierra Site
Unaffected Pressure Zones
Twin Oaks 1028 Pressure Zone
1228 Pressure Zone
Deer Springs1235 Pressure Zone
Coggan1608 Pressure Zone
North 1228 Pressure Zone
0 1,600 3,200 6,400 9,600 Feet
N
Mountain Belle Tank, 900 HGL
North PR Station 1228 HGL
Coggan Reservoir 1608 HGL
North Twin Oaks No. 2 3.6 MG Tank, 1330 HGL
Twin Oaks No. 1 & 2 33 & 40 MG Reservoirs 1028 HGL
North Twin Oaks Pump Station 1330 HGL
Deer Springs Reservoir 1235 HGL
Figure 2
Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study
Existing Water Facilities in Study Area
October 2016
Figure 1
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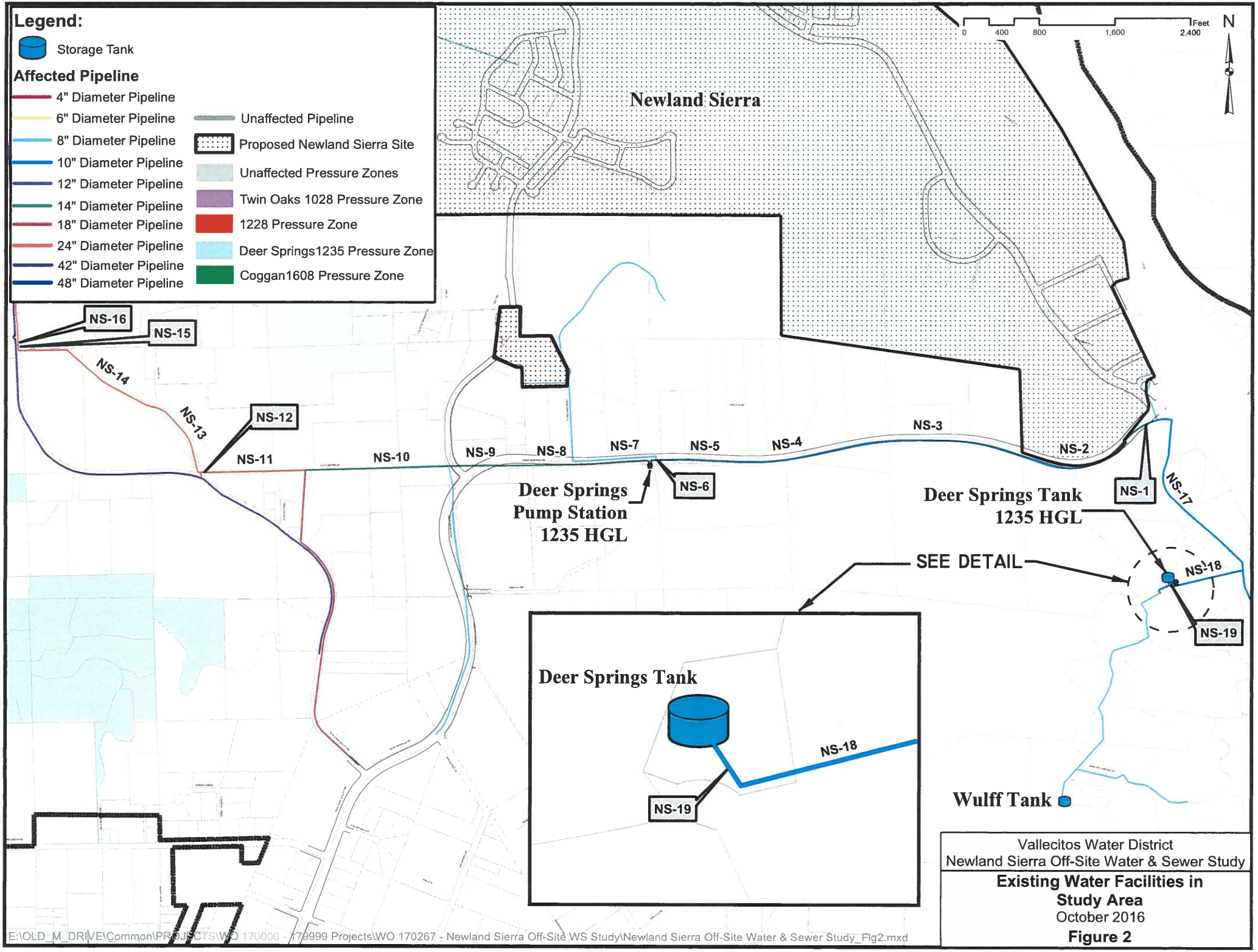


Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study

Existing Water Facilities in Study Area
October 2016
Figure 2

Water Distribution System Analysis

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

Water Distribution Infrastructure Criteria

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

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

The majority of the project is located in the Deer Springs Fire Protection District. A small portion of the project is located within the San Marcos Fire District. At this time, neither Fire Protection District has set the required fire demand for this Project. The "Master Plan of Water for the Newland Sierra Project" prepared by Dexter Wilson Engineering has assumed the following fire flows per land use area:

- Residential (<1 du/ac) 1,500 gpm
- Residential (1-2 du/ac) 1,500 gpm
- Residential (2-4 du/ac) 1,500 gpm
- Residential (4-8 du/ac) 1,500 gpm
- Residential (8-12 du/ac) 2,500 gpm
- Residential (12-15 du/ac) 2,500 gpm
- Residential (15-20 du/ac) 2,500 gpm
- Residential (20-30 du/ac) 2,500 gpm
- Commercial 2,500 gpm
- Schools and Public Facilities 3,500 gpm

These fire flow requirements were used in this study.

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

Per the 2008 Master Plan, maximum day demands for this project are 230% of average day demands, and peak hour demands are 440% of average day demands.

Water Model Results

The Project proposes to construct new local water mains and replace an existing 10-inch main in Deer Springs Road with 12-inch pipe.

Modeling focused on the off-site infrastructure in the direct vicinity of the Project, as shown in Figure 2. The modeling showed that some deficiencies appeared under maximum day plus fire flow demand conditions. Table 2 presents a summary of the modeling results from this analysis along with proposed off-site pipeline upsizing in order to meet fire flow requirements.

Table 2 – Potable Water Pipeline Results under Maximum Day Demand plus Fire Flow Conditions

Pipe ID Number	Length (ft)	Existing Pipe Diameter (in)	Velocity under Average Day Demand (ft/s)	Velocity under Maximum Day + Fire Flow (ft/s)	Upsized Pipe Diameter (in)	Velocity under Maximum Day + Fire Flow w/ Upsized Pipe (ft/s)
NS-1	212	10	5.66	7.15	12	4.47
NS-2	1779	10	5.70	7.17	12	5.47
NS-3	2571	10	6.01	7.83	12	5.93
NS-4	395	10	6.09	7.99	12	6.04
NS-5	736	10	6.09	7.99	12	6.04
NS-6	53	10	6.36	8.55	12	6.43
NS-7	58	14	3.24	4.36		
NS-8	619	14	3.24	4.36		
NS-9	453	14	3.24	4.36		
NS-10	1527	14	2.94	3.99		
NS-11	1049	24	1.52	1.93		
NS-12	78	24	1.52	1.93		
NS-13	848	24	1.54	1.97		
NS-14	1673	24	1.58	2.07		
NS-15	40	24	1.58	2.07		
NS-16	35	24	1.58	2.07		
NS-17	1981	10	5.66	7.15	12	5.34
NS-18	792	10	5.41	7.67	12	5.71
NS-19	62	10	5.41	7.67	12	5.71

Water Storage Analysis

The 2008 Master Plan outlines VWD's potable water storage reservoirs for each pressure zone criteria 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 within VWD pressure zones as shown in Table 3.

Table 3 – Pressure Zone Areas

Pressure Zone	Existing Area (acres)	Proposed Area (acres)
Twin Oaks 1028	85.19	200.20
Deer Springs 1235	192.08	193.90
North Twin Oaks 1330	64.53	0.00
Coggan 1608	1,643.80	615.1
Proposed 1475		627.4
North 1228		349
Total	**1,985.60**	**1,985.60**

The North 1228 Zone is currently fed from the Coggan Tank through the Buckshot Pressure Reducing Station. The new 1475 zone is also proposed to be fed from the Coggan 1608 Zone through a pressure reducing station per the "Master Plan of Water for the Newland Sierra Project" dated August 31, 2016.

Table 1 shows the average water demand generated both under the density planned for in the County of San Diego 2011 General Plan Update and under the proposed Project. The table shows that the overall Project will not increase the projected average water demand from the County of San Diego 2011 General Plan Update land use. However, the proposed redistribution of property and land use between the various pressure zones will affect each pressure zone as shown in Tables 4 through 13.

Twin Oaks 1028 Zone

Table 4 provides the average water demand generated under the proposed Project in the Twin Oaks 1028 Zone.

Table 4 – Project Estimated Water Demands in the Twin Oaks 1028 Zone

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
Proposed Project Demand				
Open Space	195.70		200	39,140
Right of Way	4.50		200	900
Total	**200.20**	**-**		**40,040**

Water storage for this zone is located within the 920 Richland and 1028 Twin Oaks pressure zones, as shown in Figure 1. Table 5 shows the required storage in the 855, 920 Richland, and 1028 Twin Oaks pressure zones for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing storage provided within each zone.

Table 5 – Existing Twin Oaks 1028 Zone Reservoir Storage Capacity and Requirements

Pressure Zone	Year 2015 ADD (MGD)	Year 2015 Storage Requirement (MG)	Year 2030 ADD (MGD)	Year 2030 Storage Requirement (MG)	Existing Storage Available (MG)
855	6.33	87.0	6.33	91.7	0
920 Richland	9.66		9.66		18.07
1028 Twin Oaks	1.41		2.34		73.00
Totals	17.40	**87.0**	18.33	**91.7**	**91.07**

Table 5 shows that there is currently storage available but a deficiency is projected by the Year 2030. Master Plan projects address and accommodate the proposed storage deficiency and Water Capital Facility Fees paid by this Project will be used for any increase in facility size needed for this pressure zone.

Deer Springs 1235 Zone

Table 6 provides the average water demand generated under the proposed Project in the Deer Springs 1235 Zone.

Table 6– Project Estimated Water Demands in the Deer Springs 1235 Zone

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
Proposed Project Demand				
Commercial	7.40		1,500	11,100
School	3.60		1,000	3,600
Park	5.70		1,500	8,550
Single Family Residential (4-8 du/ac)	32.00	188	2,500	80,000
Multi-Family Residential (12-15 du/ac)	31.00	412	4,500	139,500
Park	12.30		1,500	18,450
Right of Way	9.00		200	1,800
Fuel Modification (Irrigated)	32.40		1,500	48,600
Fuel Modification (Non-Irrigated)	60.50		200	12,100
Total	**193.90**	**600**		**323,700**

Water storage for this zone is located within the Deer Springs 1235 pressure zone, as shown in Figure 1. Table 7 shows the required storage in the Deer Springs 1235 pressure zones for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing storage provided within the pressure zone.

Table 7 – Existing Deer Springs 1235 Zone Reservoir Storage Capacity and Requirements

Pressure Zone	Year 2015 ADD (MGD)	Year 2015 Storage Requirement (MG)	Year 2030 ADD (MGD)	Year 2030 Storage Requirement (MG)	Existing Storage Available (MG)
Deer Springs 1235	0.50	2.55	0.79	3.94	0.57
Totals	0.50	**2.55**	0.79	**3.94**	**0.57**

The reservoir storage required for the proposed Project is 450% of the Developments' average day demand in the Deer Springs 1235 Zone plus fire flow demand, or:

(323,700 gallons * 450%) + (1500 gpm x 2 hrs) = **1,756,650 gallons**

Deer Springs 1235 Zone (continued)

The replacement of the existing 0.57 MG Deer Springs Tank with a 1.0 MG tank is identified as CIP # R-4 in the 2008 VWD Master Plan with the remaining storage deficit accommodated in the 1028 Twin Oaks Zone.

The "Master Plan of Water for the Newland Sierra Project" prepared by Dexter Wilson Engineering identified the need for 1.76 MG of storage in the Deer Springs Zone to serve the Project. The Project proposes to replace the existing 0.57 MG Deer Springs 1235 Tank with a new 2.0 MG tank.

A new 2.0 MG tank will accommodate the 0.57 MG replacement storage for the Deer Springs #1 reservoir plus 1.43 MG of the 1.76 MG storage requirement for the proposed Project. Additional space shall be reserved in the Coggan Pressure Zone for the accommodation of the remaining 0.33 MG Project storage requirement.

The "Master Plan of Water for the Newland Sierra Project" also proposes a normally closed 1475/1235 pressure reducing station to supplement water supply to the Deer Springs 1235 pressure zone during fire flow events.

North Twin Oaks 1330 Zone

Table 8 provides the average water demand generated under the proposed Project in the North Twin Oaks 1330 Zone. Since none of the proposed development will be served by this zone, the table shows that the Project will not increase the projected average water demand in the North Twin Oaks 1330 Zone.

Table 8 – Project Estimated Water Demands in the North Twin Oaks 1330 Zone

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
Proposed Project Demand				
Residential (< du/ac)	0.00		0	0
Total	**0.00**	**-**		**0**

The Proposed Project will not have an impact in the North Twin Oaks 1330 Zone.

Coggan 1608 Zone, North 1228 Zone and Proposed 1475 Zone

Water storage for these zones are located within the Coggan 1608 pressure zone, as shown in Figure 1. Table 9 provides the average water demand generated by the proposed Project in the Coggan 1608 Zone, North 1228 Zone and the Proposed 1475 Zone.

Table 9 – Project Estimated Water Demands in the Coggan 1608, North 1228 and Proposed 1475 Zones

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Water Demand (gpd)
Proposed Project Demand				
North 1228 Zone				
Open Space	349.00		200	69,800
Proposed 1475 Zone				
Single Family Residential (4-8 du/ac)	134.60	709	2,500	336,500
Multi-Family Residential (4-8 du/ac)	4.80	30	2,500	12,000
Multi-Family Residential (8-12 du/ac)	6.10	60	2,800	17,080
Multi-Family Residential (15-20 du/ac)	28.40	446	5,000	142,000
Public Faclities (Water Tank)	1.30		1,000	1,300
Park	15.30		1,500	22,950
Right of Way	15.80		200	3,160
Fuel Modification (Irrigated)	72.40		1,500	108,600
Fuel Modification (Non-Irrigated)	147.80		200	29,560
Open Space	200.90		200	40,180
Coggan 1608 Zone				
Single Family Residential (2-4 du/ac)	35.40	101	1,800	63,720
Single Family Residential (4-8 du/ac)	26.10	139	2,500	65,250
Multi-Family Residential (2-4 du/ac)	14.90	50	1,800	26,820
Public Faclities (Water Tank)	2.90		1,000	2,900
Park	2.60		1,500	3,900
Right of Way	4.70		200	940
Fuel Modification (Irrigated)	26.20		1,500	39,300
Fuel Modification (Non-Irrigated)	38.90		200	7,780
Open Space	463.40		200	92,680
Total	**1,591.50**	**1535**		**1,086,420**

Coggan 1608 Zone, North 1228 Zone and Proposed 1475 Zone (continued)

Water storage for these zones is located within the Coggan 1608 pressure zone, as shown in Figure 1. The North Tank has been abandoned and the North 1228 Zone is currently fed from Coggan Tank though the Buckshot Pressure Reducing Station. The Newland Sierra development also proposes to create a new 1475 Pressure Zone which will be fed from the Coggan 1608 Zone through a proposed 1608/1475 pressure reducing station.

Table 10 shows the required storage in the Coggan 1608 and North 1228 pressure zones for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing storage provided within each zone.

Table 10 – Existing Coggan 1608 Zone Reservoir Storage Capacity and Requirements

Pressure Zone	Year 2015 ADD (MGD)	Year 2015 Storage Requirement (MG)	Year 2030 ADD (MGD)	Year 2030 Storage Requirement (MG)	Existing Storage Available (MG)
Coggan 1608	0.29	1.61	2.09	10.45	1.30
North 1228	0.1	0.75	0.3	1.65	0.00
Totals	0.39	**2.36**	2.39	**12.10**	**1.30**

The reservoir storage required for the proposed Project is 500% of the Developments' average day demand in the Coggan 1608, North 1228 and proposed 1475 Zones, or:

1,086,420 gallons * 500% = **5,432,100 gallons**

A storage deficiency currently exists for these pressure zones as shown in Table 10. The replacement of the existing 1.3 MG Coggan #1 Tank with a 6.0 MG Coggan #2 tank is identified as CIP # R-5 in the 2008 VWD Master Plan. An additional 6.1 MG Coggan #3 tank is identified as CIP #R-11 in the VWD 2008 Master Plan.

Per the "Master Plan of Water for the Newland Sierra Project" dated August 31, 2016, the Developer proposes to construct the 6.0 MG Coggan #2 reservoir. This study recommends that the development construct CIP #R-5 adjacent to the existing Coggan #1 tank to accommodate the 5.43 MG storage needed for these pressure zones plus the 0.33 MG carry-over storage requirement for the Deer Springs Zone.

Water Pump Station Analysis

Deer Springs 1235 Zone

A portion of the proposed Project is located within the Deer Springs 1235 pressure zone which is served by the Deer Springs 1235 Pump Station.

The 2008 Master Plan pump station design criteria are as follows:

- Pumping Period: During SDGE off-peak and semi-peak rates only
- Pumping Capacity: Max Day Demand + 150 gpm Fire Storage Replenishment

Table 11 shows the required off-peak pumping capacity for the Deer Springs 1235 pump station for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing pumping capacity provided.

Table 11 – Existing Pump Station Capacity and Requirements

Pump Station	Year 2015 ADD (gpm)	Max Day Peaking Factor	Year 2015 16 hour Off-Peak Pumping Requirement (gpm)	Year 2030 ADD (MGD)	Max Day Peaking Factor	Year 2030 16 hour Off-Peak Pumping Requirement (gpm)	Existing Pumping Capacity (gpm)
Deer Springs 1235	347	2.62	1,581	776	2.50	3,119	1,550

The analysis shows that there is a deficit in pumping capacity at the Deer Springs 1235 Pump Station to meet current requirements. The analysis has also identified a deficit in pump capacity at the Deer Springs 1235 Pump Station in the year 2030. An upgrade of the existing Deer Springs 1235 Pump Station is identified in the VWD 2008 Master Plan as CIP # PS-3.

The Deer Springs pump station will need to be expanded per CIP #PS-3 prior to serving the development because of the existing deficit capacity and the 0.32 MGD (222 gpm) average demand that the development will add.

Twin Oaks 1028 Zone

Since this zone is not served by a pump station, there is no pumping analysis required.

North Twin Oaks 1330 Zone

Since no demand is being proposed in this zone by the development, there is no pumping analysis required.

Coggan 1608 Zone, North 1228 Zone and Proposed 1475 Zone

A portion of the proposed Project is located within the Coggan 1608 pressure zone which is served by the Coggan 1608 Pump Station.

The 2008 Master Plan pump station design criteria are as follows:

- Pumping Period: During SDGE off-peak and semi-peak rates only
- Pumping Capacity: Max Day Demand + 150 gpm Fire Storage Replenishment

Table 12 shows the required off-peak pumping capacity for the Coggan 1608 pump station for Year 2015 (current) and Year 2030 (Master Plan) relative to the existing pumping capacity provided.

Table 12 – Existing Pump Station Capacity and Requirements

Pump Station	Year 2015 ADD (gpm)	Max Day Peaking Factor	Year 2015 16 hour Off-Peak Pumping Requirement (gpm)	Year 2030 ADD (MGD)	Max Day Peaking Factor	Year 2030 16 hour Off-Peak Pumping Requirement (gpm)	Existing Pumping Capacity (gpm)
Coggan 1608	201	2.70	1,039	1,660	2.30	5,952	4,000

The analysis shows that there is adequate pumping capacity in the Coggan 1608 Pump Station to meet current requirements. However, a deficit in pumping capacity is identified in the Year 2030. An upgrade of the existing Coggan 1608 Pump Station is identified in the VWD 2008 Master Plan as CIP # PS-7.

The Project will generate an average demand of 1,086,420 gpd (754 gpm) in the Coggan 1608, North 1228 and proposed 1475 zones as shown in Table 9. Therefore, there is currently adequate pumping capacity in the Coggan 1608 Pump Station to support the proposed Project.

Master Plan projects address and accommodate the proposed pumping deficiency and Water Capital Facility Fees paid by this Project will be used for any increase in facility size necessitated by the Project's demand calculated in Table 9.

WASTEWATER SYSTEM ANALYSIS

The Newland Sierra project consists of approximately 1,985 acres. The majority of the property lies outside of VWD's sewer service boundary. 54.63 acres are within VWD's sewer service boundary. The remaining 1,930.97 acres of the project property will require annexation into VWD's sewer service area per current VWD annexation rules and regulations. Figures 3 – 9 show the development's location in relation to sewer service area boundaries and also identify existing wastewater infrastructure within the vicinity of the development. The Project proposes to construct on-site and off-site sewer conveyance facilities per the "Master Plan of Sewer for the Newland Sierra Project" dated September 20, 2016. All flows are proposed to flow through Sarver Lane and Deer Springs Road to the existing sewer mains in Twin Oaks Valley Road and ultimately to Lift Station 1 as shown in Figures 4 - 9. This study will also identify the downstream collection infrastructure providing service to the Project.

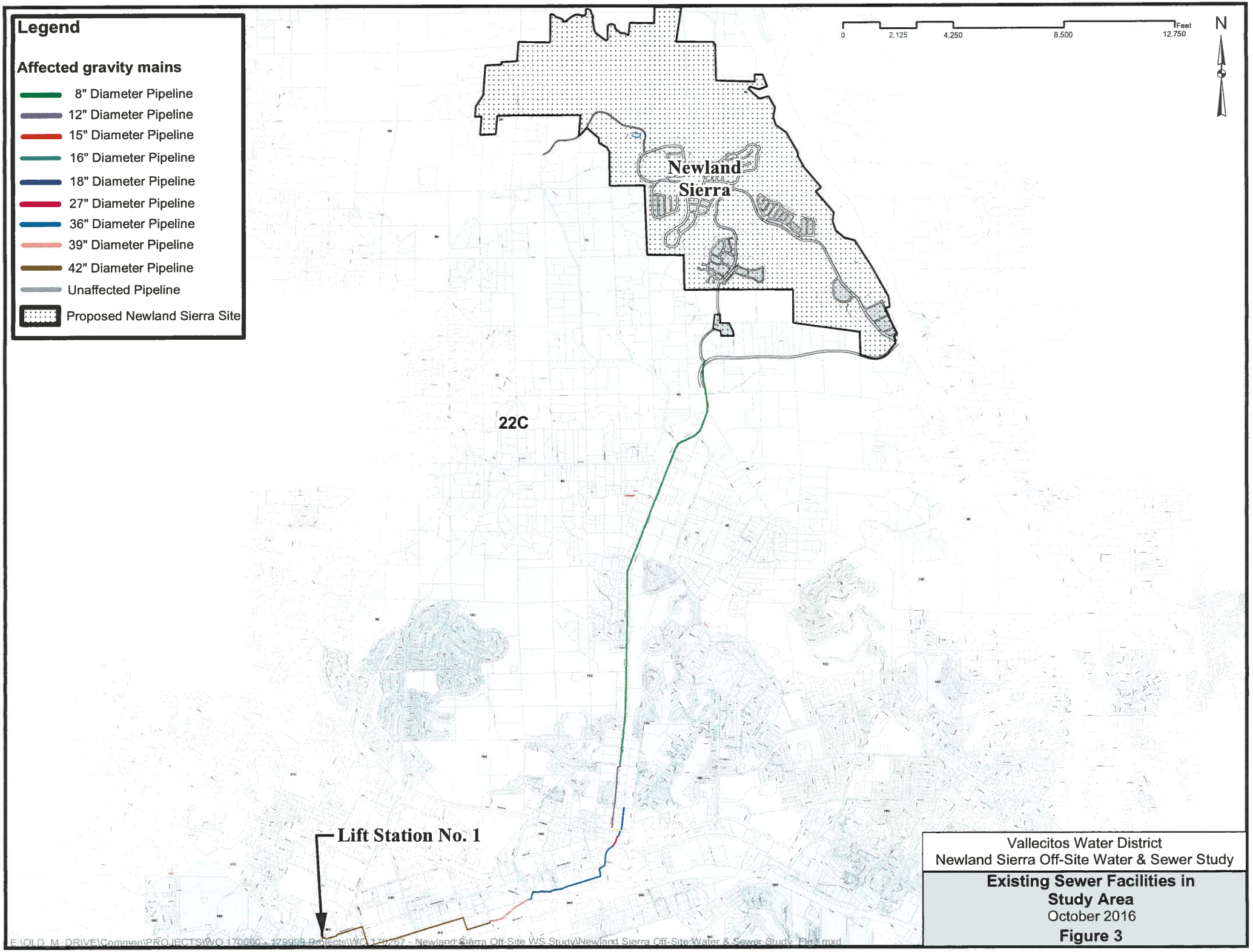
Wastewater Flow Projections

The existing land use, per the County of San Diego 2011 General Plan Update is designated as 1,927.4 acres of Residential under 1 dwelling unit per acre, 4.6 acres of general commercial and 53.6 acres of Office Professional use. The 1,985-acre Project proposes water service to 1,137 single-family residential units on 228.1 acres, 998 multi-family residential units on 85.2 acres, 7.4 acres of commercial property, 3.6 acres of school property, 35.9 acres of park space, 378.2 acres of fuel modification space, 1,209 acres of open space, a 2.9 acre parcel for a water tank and 34 acres of dedicated public right of way.

Table 13 provides the average wastewater flow generated under the density planned for in the County of San Diego 2011 General Plan Update and under the proposed Project. Duty factors utilized in Table 13 are based on VWD's 2014 draft Master Plan. The table shows that the Project will increase the projected average wastewater flow above the County of San Diego 2011 General Plan Update land use by approximately 176,400 gallons per day.

Table 13 – Project Estimated Wastewater Flows

Land Use Type	Area (acres)	Residential Units	Duty Factor (gpd/acre)	Wastewater Flow (gpd)
County of San Diego 2011 General Plan Update Land Use Wastewater Flows				
Residential (<1 du/ac)	1,927.40		150	289,110
Office Professional	53.60		1,200	64,320
Commercial	4.60		1,200	5,520
Total	**1,985.60**	**-**		**358,950**
Proposed Project Wastewater Flows				
Single Family Residential (2-4 du/ac)	35.40	101	750	26,550
Single Family Residential (4-8 du/ac)	192.70	1036	1,300	250,510
Multi-Family Residential (2-4 du/ac)	14.90	50	750	11,175
Multi-Family Residential (4-8 du/ac)	4.80	30	1,300	6,240
Multi-Family Residential (8-12 du/ac)	6.10	60	2,100	12,810
Multi-Family Residential (12-15 du/ac)	31.00	412	2,500	77,500
Multi-Family Residential (15-20 du/ac)	28.40	446	3,300	93,720
Parks	35.90		250	8,975
Commercial	7.40		1,200	8,880
School	3.60		800	2,880
Open Space	1,209.00		0	0
Right of Way	34.00		0	0
Fuel Modification (irrigated)	131.00		250	32,750
Fuel Modification (non-irrigated)	247.20		0	0
Public Facility (Water Tank)	4.20		800	3,360
Total	**1,985.60**	**2135**		**535,350**
Additional Wastewater Flow				**176,400**


Legend
Affected gravity mains
8" Diameter Pipeline
12" Diameter Pipeline
15" Diameter Pipeline
16" Diameter Pipeline
18" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Proposed Newland Sierra Site
0
2,125
4,250
8,500
12,750
Feet
N
Newland
Sierra
22C
Lift Station No. 1
Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study
Existing Sewer Facilities in
Study Area
October 2016
Figure 3
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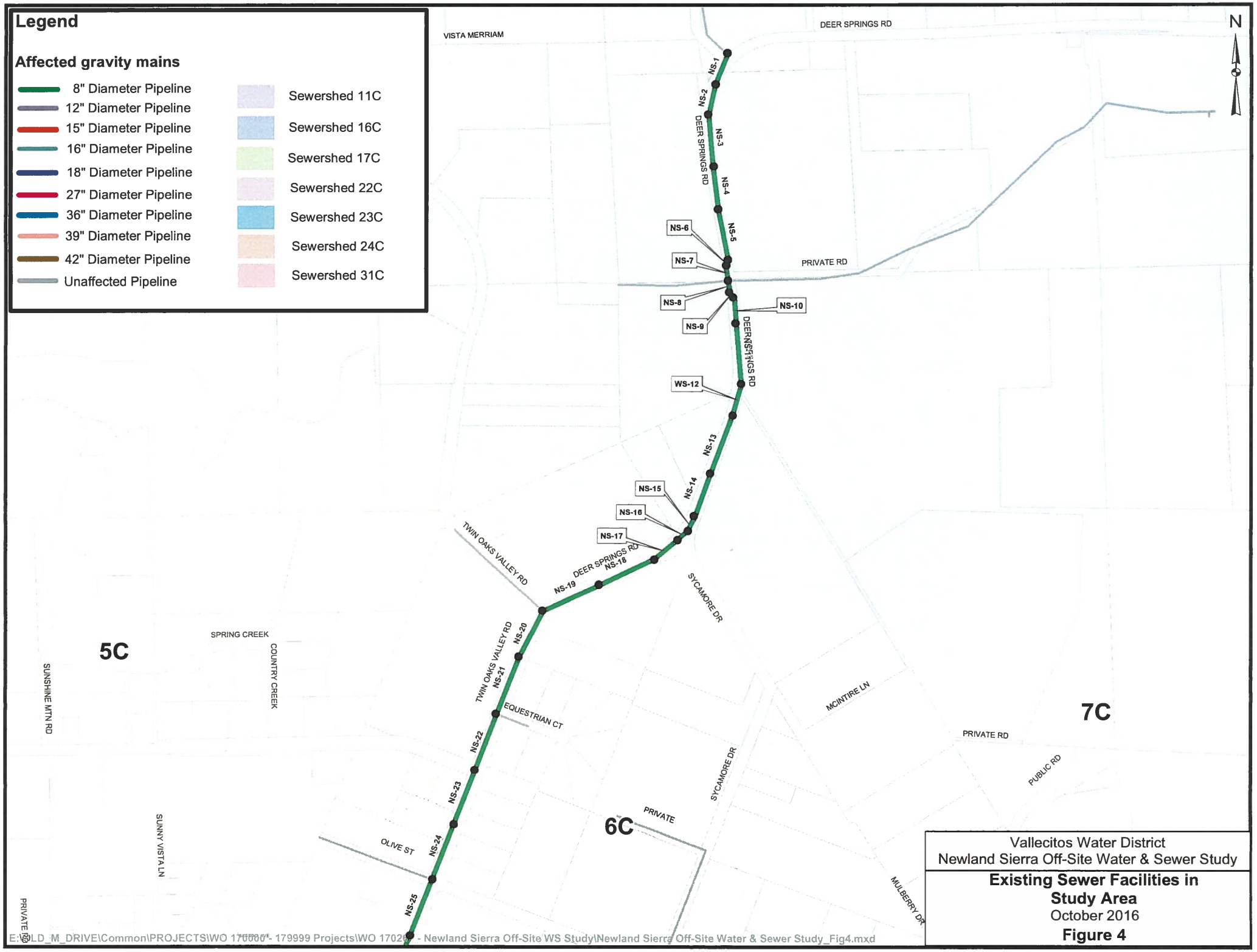
Legend
Affected gravity mains
8" Diameter Pipeline
12" Diameter Pipeline
15" Diameter Pipeline
16" Diameter Pipeline
18" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Sewershed 11C
Sewershed 16C
Sewershed 17C
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
N
VISTA MERRIAM
DEER SPRINGS RD
NS-1
NS-2
NS-3
NS-4
NS-5
NS-6
NS-7
NS-8
NS-9
NS-10
PRIVATE RD
WS-12
NS-13
NS-14
NS-15
NS-16
NS-17
NS-18
NS-19
NS-20
NS-21
NS-22
NS-23
NS-24
NS-25
TWIN OAKS VALLEY RD
SYCAMORE DR
SPRING CREEK
COUNTRY CREEK
SUNSHINE MTN RD
EQUESTRIAN CT
MCINTIRE LN
PUBLIC RD
SUNNY VISTA LN
OLIVE ST
PRIVATE
MULBERRY DR
5C
6C
7C
Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study
Existing Sewer Facilities in Study Area
October 2016
Figure 4
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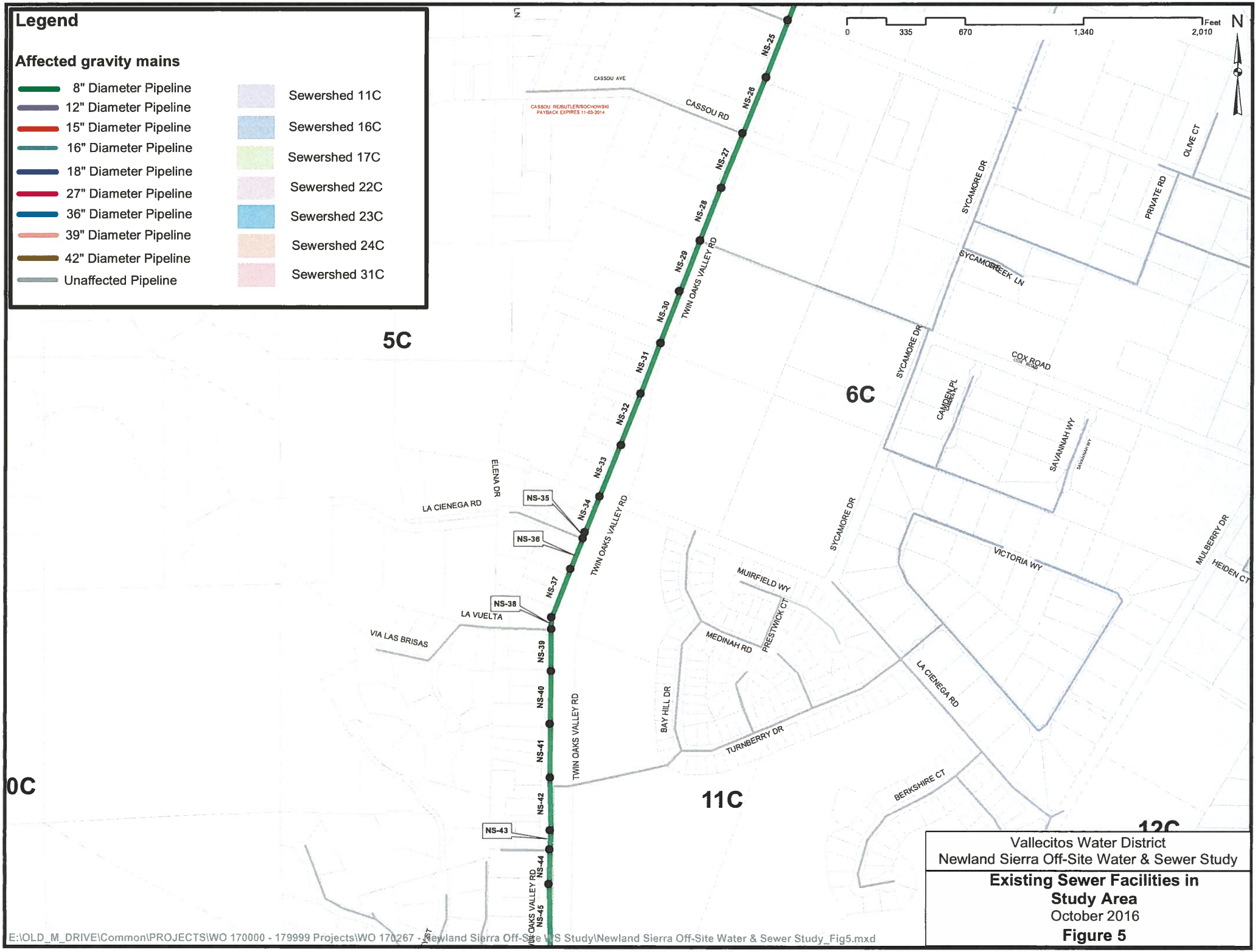

Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study

Existing Sewer Facilities in Study Area
October 2016
Figure 5

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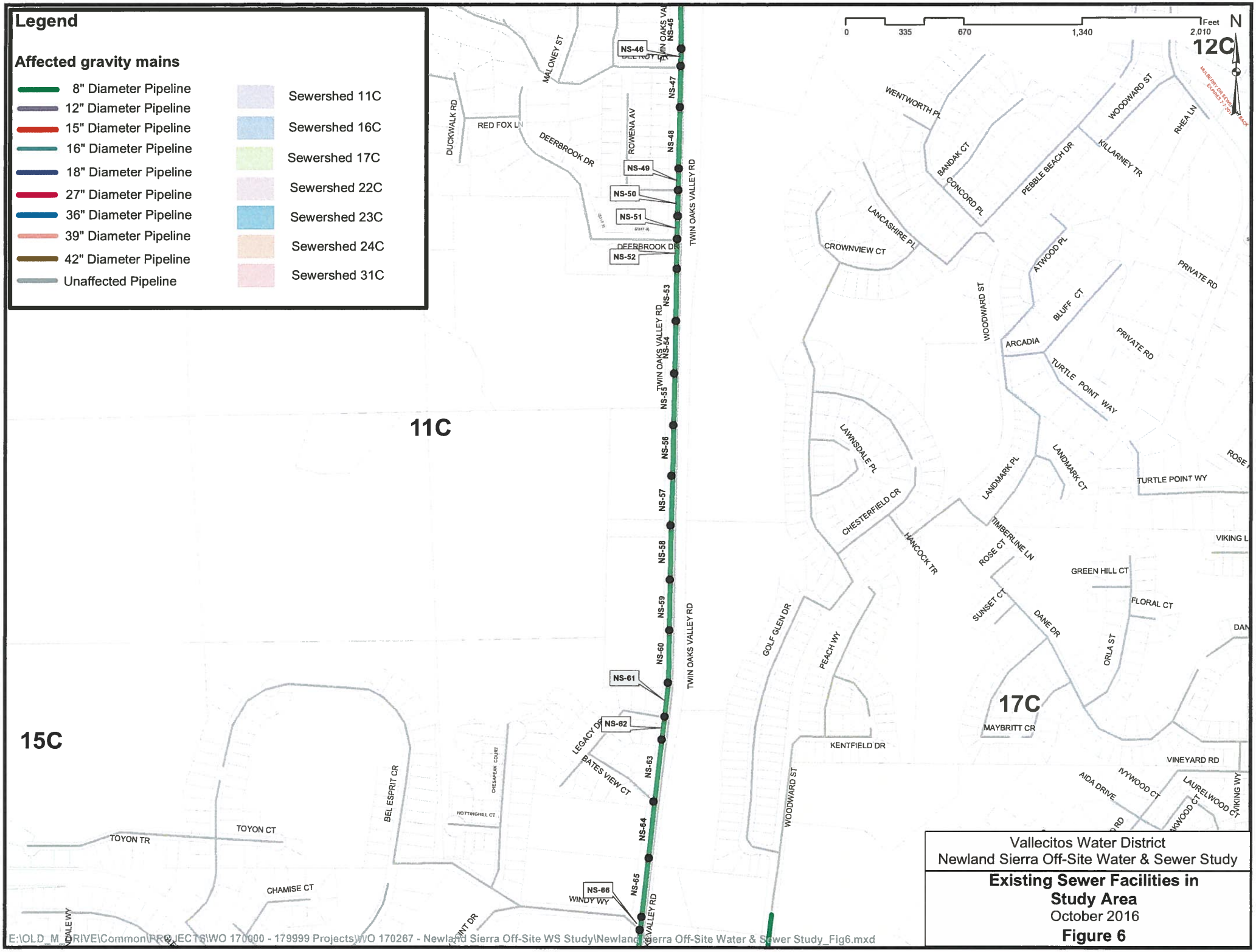
Legend
Affected gravity mains
8" Diameter Pipeline
12" Diameter Pipeline
15" Diameter Pipeline
16" Diameter Pipeline
18" Diameter Pipeline
27" Diameter Pipeline
36" Diameter Pipeline
39" Diameter Pipeline
42" Diameter Pipeline
Unaffected Pipeline
Sewershed 11C
Sewershed 16C
Sewershed 17C
Sewershed 22C
Sewershed 23C
Sewershed 24C
Sewershed 31C
0
335
670
1,340
2,010
Feet
N
12C
11C
15C
17C
NS-45
NS-46
NS-47
NS-48
NS-49
NS-50
NS-51
NS-52
NS-53
NS-54
NS-55
NS-56
NS-57
NS-58
NS-59
NS-60
NS-61
NS-62
NS-63
NS-64
NS-65
NS-66
TWIN OAKS VALLEY RD
MALONEY ST
DUCKWALK RD
RED FOX LN
DEERBROOK DR
ROWENA AV
WENTWORTH PL
BANDAK CT
CONCORD PL
PEBBLE BEACH DR
KILLARNEY TR
WOODWARD ST
RHEA LN
LANCASHIRE PL
CROWNVIEW CT
ATWOOD PL
BLUFF CT
PRIVATE RD
ARCADIA
TURTLE POINT WAY
TURTLE POINT WY
LAWNSDALE PL
CHESTERFIELD CR
LANDMARK PL
LANDMARK CT
TIMBERLINE LN
ROSE CT
HANCOCK TR
GREEN HILL CT
FLORAL CT
SUNSET CT
DANE DR
ORLA ST
GOLF GLEN DR
PEACH WY
KENTFIELD DR
MAYBRITT CR
VINEYARD RD
AIDA DRIVE
IVYWOOD CT
LAURELWOOD CT
VIKING WY
LEGACY DR
BATES VIEW CT
BEL ESPRIT CR
CHESAPEAK COURT
NOTTINGHILL CT
TOYON TR
TOYON CT
CHAMISE CT
WINDY WY
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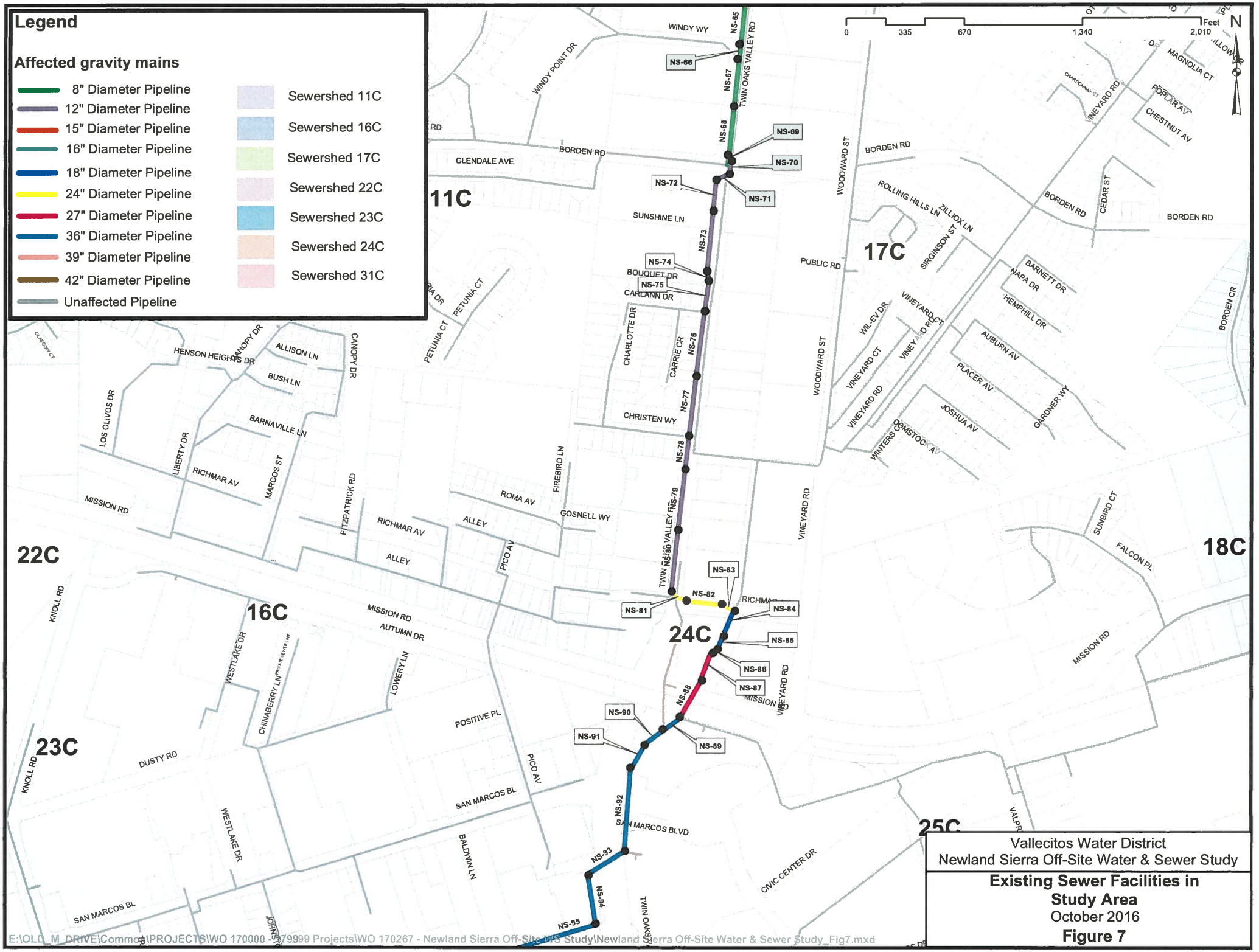
Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study
Existing Sewer Facilities in Study Area
October 2016
Figure 6



Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study

Existing Sewer Facilities in Study Area
October 2016
Figure 7

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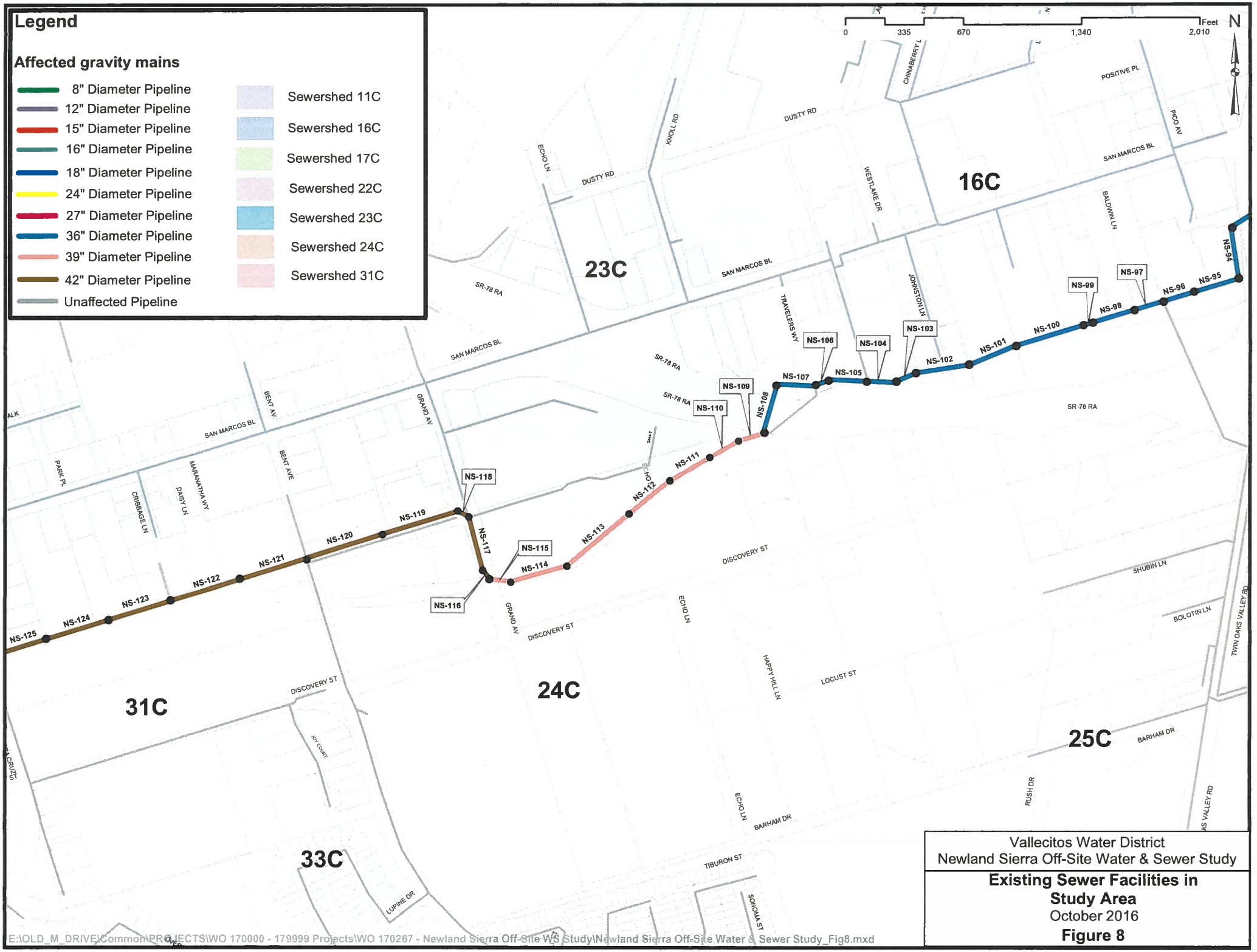

Vallecitos Water District
Newland Sierra Off-Site Water & Sewer Study

Existing Sewer Facilities in Study Area
October 2016
Figure 8

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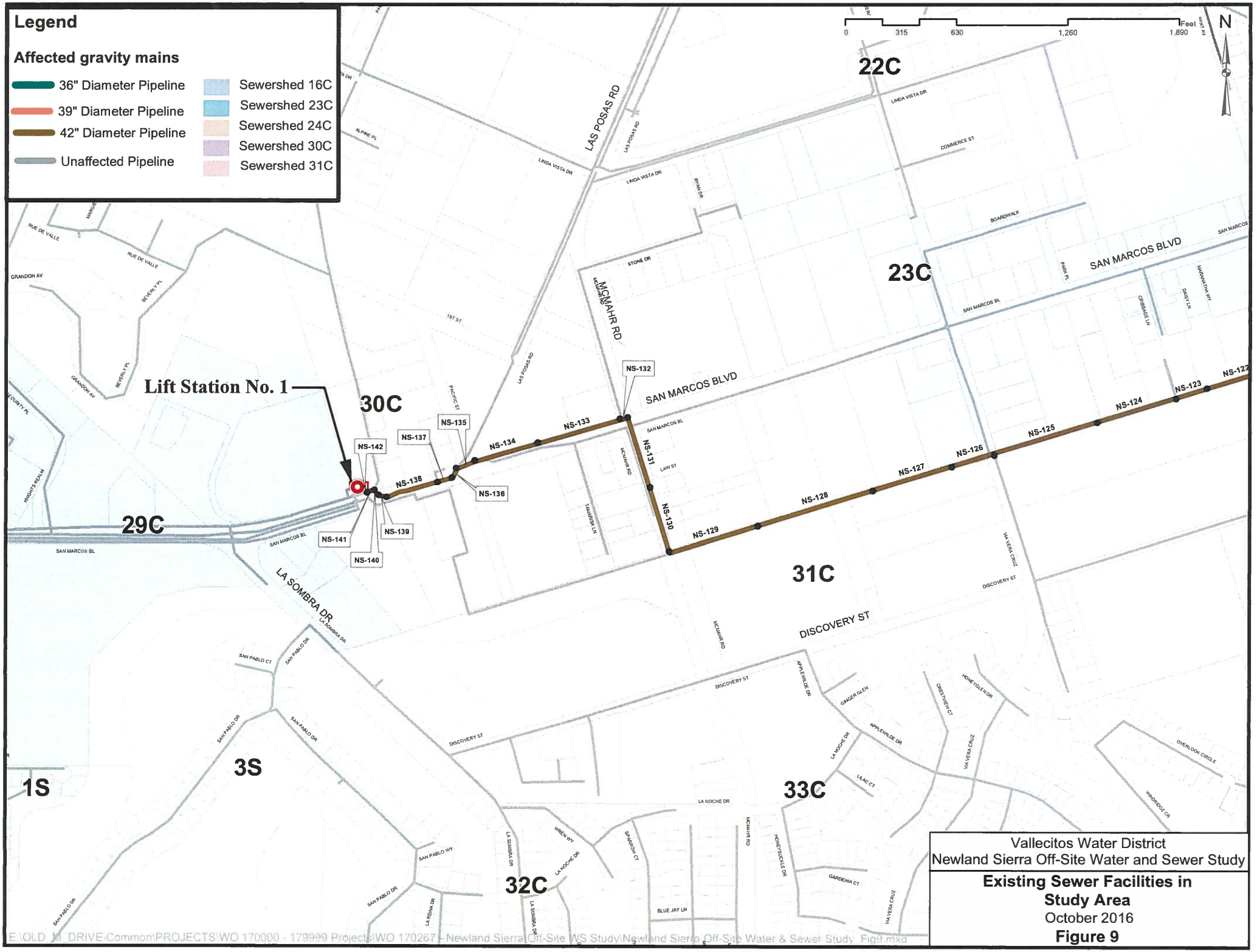

Vallecitos Water District
Newland Sierra Off-Site Water and Sewer Study

Existing Sewer Facilities in Study Area
October 2016
Figure 9

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Wastewater Collection System Analysis

The 2008 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 12 inches in diameter and smaller: 0.4% minimum
- Slope for pipes over 12 inches in diameter: to be determined by VWD

When flow depth in gravity pipes exceed 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 as shown in Figures 4 – 9.

Table 14 presents a summary of the modeling results from this analysis. The modeling showed that, in order to accommodate the additional wastewater flows from the project, the sewer mains beginning at Deer Springs Road and Sarver Lane and continuing through Twin Oaks Valley Road south to Richmar Avenue must be upsized as listed below:

- 931 feet of 8-inch main must be replaced with 12-inch pipe
- 11,067 feet of 8-inch main must be replaced with 15-inch pipe
- 4,616 feet of 8-inch main must be replaced with 18-inch pipe
- 32 feet of 10-inch main must be replaced with 18-inch pipe
- 2,419 feet of 12-inch main must be replaced with 18-inch pipe

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-1	200	8	0.0260	758	0.72	10	0.49	1092	>1.0	12	0.46
NS-2	179	8	0.0250	758	0.74	10	0.50	1092	>1.0	12	0.46
NS-3	300	8	0.0220	758	0.78	12	0.39	1092	>1.0	12	0.48
NS-4	252	8	0.0210	758	0.79	12	0.40	1092	>1.0	12	0.49
NS-5	287	8	0.0180	759	0.87	12	0.42	1093	>1.0	15	0.37
NS-6	23	8	0.0480	759	0.59	12	0.32	1093	>1.0	15	0.29
NS-7	89	8	0.0370	759	0.62	12	0.34	1093	>1.0	15	0.31
NS-8	102	8	0.0050	913	>1.0	15	0.47	1247	>1.0	15	0.57
NS-9	19	8	0.0040	914	>1.0	15	0.50	1248	>1.0	15	0.61
NS-10	157	8	0.0040	914	>1.0	15	0.50	1248	>1.0	15	0.61
NS-11	350	8	0.0140	914	>1.0	15	0.36	1248	>1.0	15	0.42
NS-12	191	8	0.0140	892	>1.0	15	0.35	1226	>1.0	15	0.42
NS-13	350	8	0.0110	1007	>1.0	15	0.40	1341	>1.0	15	0.47
NS-14	266	8	0.0090	998	>1.0	15	0.42	1332	>1.0	15	0.50
NS-15	85	8	0.0040	990	>1.0	15	0.53	1324	>1.0	15	0.63
NS-16	76	8	0.0110	983	>1.0	15	0.40	1317	>1.0	15	0.47
NS-17	173	8	0.0050	976	>1.0	15	0.49	1310	>1.0	15	0.59
NS-18	350	8	0.0040	970	>1.0	15	0.52	1304	>1.0	15	0.63
NS-19	350	8	0.0040	966	>1.0	15	0.52	1300	>1.0	15	0.63
NS-20	299	8	0.0040	1150	>1.0	15	0.58	1484	>1.0	15	0.69
NS-21	350	8	0.0040	1150	>1.0	15	0.58	1484	>1.0	15	0.69
NS-22	350	8	0.0120	1152	>1.0	15	0.42	1486	>1.0	15	0.49

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-23	337	8	0.0040	1185	>1.0	15	0.59	1519	>1.0	15	0.70
NS-24	339	8	0.0040	1186	>1.0	15	0.59	1520	>1.0	15	0.70
NS-25	350	8	0.0200	1188	>1.0	15	0.37	1522	>1.0	15	0.43
NS-26	346	8	0.0220	1176	>1.0	15	0.36	1510	>1.0	15	0.41
NS-27	276	8	0.0040	1208	>1.0	15	0.60	1542	>1.0	15	0.71
NS-28	325	8	0.0350	1177	>1.0	15	0.32	1511	>1.0	15	0.37
NS-29	310	8	0.0040	1230	>1.0	15	0.60	1564	>1.0	15	0.72
NS-30	315	8	0.0040	1208	>1.0	15	0.60	1542	>1.0	15	0.71
NS-31	315	8	0.0040	1193	>1.0	15	0.59	1527	>1.0	15	0.70
NS-32	315	8	0.0050	1179	>1.0	15	0.55	1513	>1.0	15	0.64
NS-33	315	8	0.0150	1168	>1.0	15	0.40	1502	>1.0	15	0.46
NS-34	225	8	0.0070	1160	>1.0	15	0.49	1494	>1.0	15	0.57
NS-35	43	8	0.0050	1152	>1.0	15	0.54	1486	>1.0	15	0.64
NS-36	182	8	0.0070	1185	>1.0	15	0.50	1519	>1.0	15	0.58
NS-37	306	8	0.0070	1178	>1.0	15	0.50	1512	>1.0	15	0.58
NS-38	50	8	0.0068	1169	>1.0	15	0.50	1503	>1.0	15	0.58
NS-39	306	8	0.0068	1177	>1.0	15	0.50	1511	>1.0	15	0.58
NS-40	305	8	0.0070	1167	>1.0	15	0.49	1501	>1.0	15	0.57
NS-41	305	8	0.0270	1158	>1.0	15	0.34	1492	>1.0	15	0.39
NS-42	305	8	0.0040	1152	>1.0	15	0.58	1486	>1.0	15	0.69
NS-43	83	8	0.0040	1145	>1.0	15	0.58	1479	>1.0	15	0.69
NS-44	222	8	0.0050	1137	>1.0	15	0.54	1471	>1.0	15	0.63

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-45	305	8	0.0110	1128	>1.0	15	0.43	1462	>1.0	15	0.49
NS-46	110	8	0.0120	1119	>1.0	15	0.41	1453	>1.0	15	0.48
NS-47	225	8	0.0080	1149	>1.0	15	0.47	1483	>1.0	15	0.55
NS-48	335	8	0.0100	1143	>1.0	15	0.44	1477	>1.0	15	0.51
NS-49	190	8	0.0070	1140	>1.0	15	0.49	1474	>1.0	15	0.57
NS-50	160	8	0.0130	1143	>1.0	15	0.41	1477	>1.0	15	0.47
NS-51	130	8	0.0020	1139	>1.0	15	0.73	1473	>1.0	18	0.62
NS-52	147	8	0.0130	1179	>1.0	15	0.42	1513	>1.0	18	0.37
NS-53	300	8	0.0140	1177	>1.0	15	0.41	1511	>1.0	18	0.36
NS-54	300	8	0.0040	1178	>1.0	15	0.59	1512	>1.0	18	0.51
NS-55	300	8	0.0040	1178	>1.0	15	0.59	1512	>1.0	18	0.51
NS-56	295	8	0.0040	1178	>1.0	15	0.59	1512	>1.0	18	0.51
NS-57	290	8	0.0060	1178	>1.0	15	0.52	1512	>1.0	18	0.45
NS-58	290	8	0.0120	1179	>1.0	15	0.43	1513	>1.0	18	0.38
NS-59	290	8	0.0120	1177	>1.0	15	0.43	1511	>1.0	18	0.38
NS-60	303	8	0.0080	1178	>1.0	15	0.48	1512	>1.0	18	0.42
NS-61	183	8	0.0200	1178	>1.0	15	0.37	1512	>1.0	18	0.33
NS-62	153	8	0.0160	1170	>1.0	15	0.39	1504	>1.0	18	0.35
NS-63	340	8	0.0150	1166	>1.0	15	0.40	1500	>1.0	18	0.35
NS-64	340	8	0.0150	1168	>1.0	15	0.40	1502	>1.0	18	0.35
NS-65	340	8	0.0040	1167	>1.0	15	0.58	1501	>1.0	18	0.51
NS-66	64	8	0.0070	1169	>1.0	15	0.49	1503	>1.0	18	0.43

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-67	276	8	0.0030	1233	>1.0	15	0.67	1567	>1.0	18	0.57
NS-68	275	8	0.0050	1236	>1.0	15	0.56	1570	>1.0	18	0.49
NS-69	32	10	0.0630	1236	0.51	15	0.28	1570	0.58	18	0.25
NS-70	71	12	0.0060	1352	>1.0	15	0.56	1686	>1.0	18	0.48
NS-71	82	12	0.0050	1352	>1.0	15	0.60	1686	>1.0	18	0.51
NS-72	173	12	0.0050	1351	>1.0	15	0.60	1685	>1.0	18	0.51
NS-73	339	12	0.0050	1350	>1.0	15	0.60	1684	>1.0	18	0.51
NS-74	61	12	0.0050	1350	>1.0	15	0.60	1684	>1.0	18	0.51
NS-75	176	12	0.0050	1349	>1.0	15	0.60	1683	>1.0	18	0.51
NS-76	358	12	0.0050	1366	>1.0	15	0.60	1700	>1.0	18	0.51
NS-77	350	12	0.0060	1365	>1.0	15	0.57	1699	>1.0	18	0.48
NS-78	206	12	0.0050	1395	>1.0	15	0.61	1729	>1.0	18	0.52
NS-79	253	12	0.0080	1394	0.80	15	0.53	1728	>1.0	18	0.45
NS-80	350	12	0.0110	1419	0.71	15	0.49	1753	>1.0	18	0.42
NS-81	107	24	0.0280	1418	0.20			1752	0.22		
NS-82	213	24	0.0240	1418	0.21			1752	0.23		
NS-83	84	24	0.0260	1417	0.21			1751	0.23		
NS-84	170	18	0.0040	2111	0.63			2445	0.69		
NS-85	62	18	0.0150	2111	0.42			2445	0.46		
NS-86	31	27	0.0030	2111	0.36			2445	0.39		
NS-87	165	27	0.0050	2110	0.32			2444	0.34		
NS-88	261	27	0.0080	2117	0.28			2451	0.31		

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-89	135	36	0.0030	4577	0.37			4911	0.38		
NS-90	128	36	0.0050	4577	0.32			4911	0.33		
NS-91	140	36	0.0070	4576	0.29			4910	0.31		
NS-92	470	36	0.0040	4573	0.34			4907	0.35		
NS-93	235	36	0.0020	4578	0.41			4912	0.42		
NS-94	291	36	0.0040	4574	0.34			4908	0.35		
NS-95	272	36	0.0030	4580	0.37			4914	0.38		
NS-96	116	36	0.0050	4578	0.32			4912	0.33		
NS-97	136	36	0.0060	5925	0.35			6259	0.36		
NS-98	249	36	0.0040	5922	0.39			6256	0.40		
NS-99	51	36	0.0070	5920	0.34			6254	0.35		
NS-100	400	36	0.0060	5916	0.35			6250	0.36		
NS-101	278	36	0.0040	5911	0.39			6245	0.40		
NS-102	321	36	0.0050	5906	0.37			6240	0.38		
NS-103	124	36	0.0050	5903	0.37			6237	0.38		
NS-104	162	36	0.0050	5901	0.37			6235	0.38		
NS-105	206	36	0.0040	6539	0.41			6873	0.42		
NS-106	91	36	0.0050	6537	0.39			6871	0.40		
NS-107	220	36	0.0050	6584	0.39			6918	0.40		
NS-108	286	39	0.0050	6578	0.35			6912	0.36		
NS-109	152	39	0.0030	6573	0.40			6907	0.41		
NS-110	176	39	0.0030	6570	0.40			6904	0.41		

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-111	271	39	0.0020	6566	0.44	-		6900	0.45		
NS-112	297	39	0.0020	6559	0.44	-		6893	0.45		
NS-113	452	39	0.0020	6549	0.44	-		6883	0.45		
NS-114	337	39	0.0040	6540	0.37	-		6874	0.38		
NS-115	123	39	0.0080	6639	0.31	-		6973	0.32		
NS-116	58	42	0.0040	6637	0.33	-		6971	0.34		
NS-117	308	42	0.0030	6643	0.36	-		6977	0.37		
NS-118	69	42	0.0010	6638	0.48	-		6972	0.50		
NS-119	448	42	0.0030	6631	0.36	-		6965	0.37		
NS-120	448	42	0.0030	6620	0.36	-		6954	0.37		
NS-121	404	42	0.0060	7206	0.31	-		7540	0.32		
NS-122	404	42	0.0060	7219	0.31	-		7553	0.32		
NS-123	368	42	0.0030	7219	0.37	-		7553	0.38		
NS-124	368	42	0.0030	7207	0.37	-		7541	0.38		
NS-125	368	42	0.0030	6903	0.37	-		7237	0.38		
NS-126	120	42	0.0020	7225	0.42	-		7559	0.43		
NS-127	457	42	0.0040	7216	0.35	-		7550	0.36		
NS-128	650	42	0.0040	7199	0.35			7533	0.36		
NS-129	677	42	0.0040	7179	0.35	-		7513	0.36		
NS-130	373	42	0.0040	7170	0.35	-		7504	0.35		
NS-131	420	42	0.0040	7161	0.35	-		7495	0.35		
NS-132	20	42	0.0050	7152	0.33	-		7486	0.33		

Table 14 - Wastewater Model Results and Recommended Gravity Main Improvements

				Wastewater Flows with Existing Density at Newland Sierra Site				Wastewater Flows with Proposed Newland Sierra Development			
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
NS-133	486	42	0.0040	7148	0.35	-		7482	0.35		
NS-134	500	42	0.0040	7131	0.35	-		7465	0.35		
NS-135	156	42	0.0060	7680	0.32	-		8014	0.33		
NS-136	15	42	0.0530	10188	0.22	-		10522	0.22		
NS-137	138	42	0.0030	10184	0.45	-		10518	0.46		
NS-138	347	42	0.0060	10177	0.37	-		10511	0.38		
NS-139	18	42	0.0330	10170	0.24	-		10504	0.25		
NS-140	9	42	0.0110	10169	0.32	-		10503	0.32		
NS-141	9	42	0.0040	10300	0.42	-		10634	0.43		
NS-142	73	42	0.0040	11281	0.44	-		11615	0.45		

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 10. 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 15 below:

Table 15 – Land Outfall Capacity Ownership by Agency

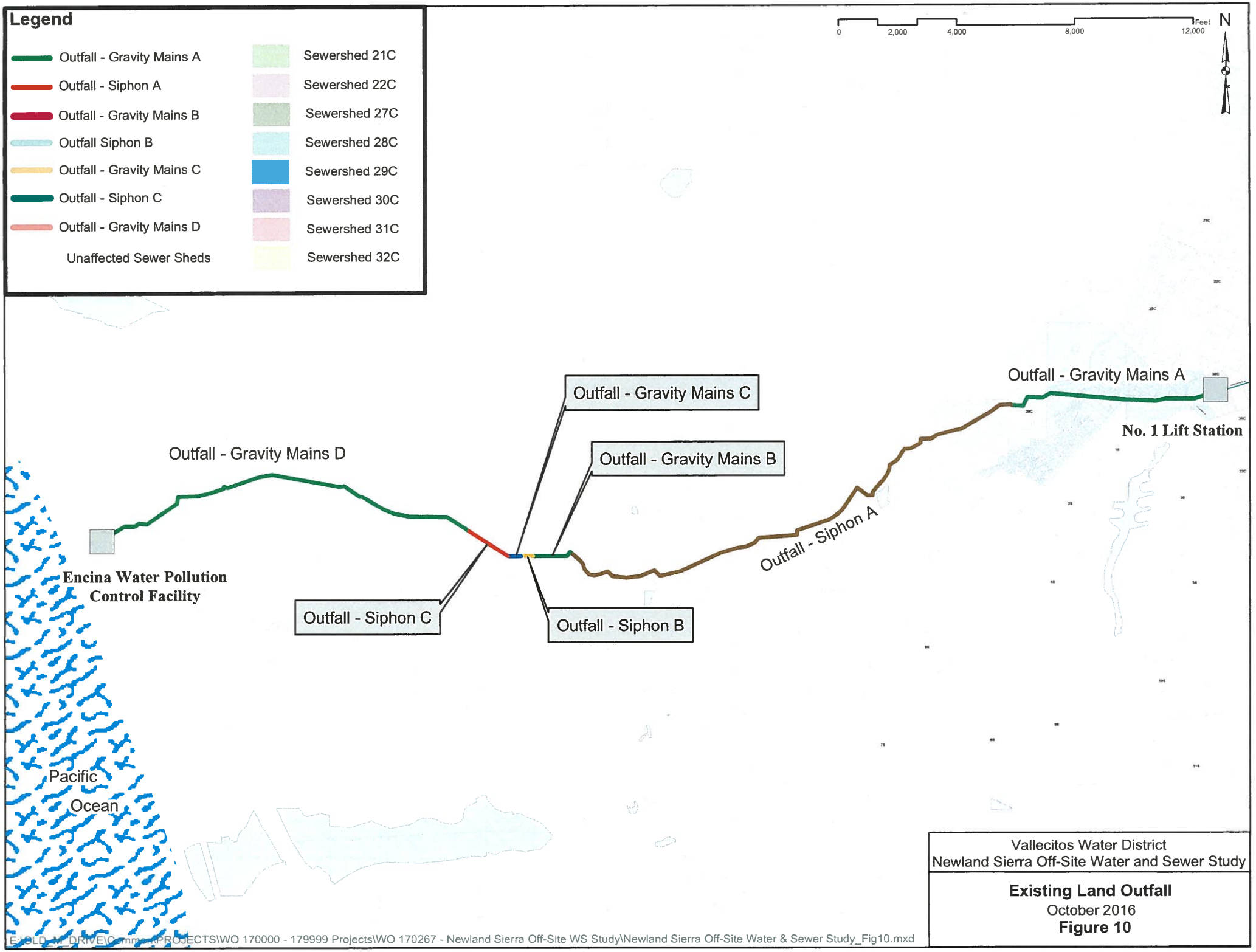
Agency	Ownership Percentage	Capacity (MGD)
Carlsbad	23.98%	5.00
Vista	17.99%	3.75
VWD	58.03%	12.10
Totals	**100.00%**	**20.85**

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

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

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

The 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 the 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
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
Newland Sierra Off-Site Water and Sewer Study
Existing Land Outfall
October 2016
Figure 10
E:\OLD_M_DRIVE\Comm\APROJECTS\WO 170000 - 179999 Projects\WO 170267 - Newland Sierra Off-Site WS Study\Newland Sierra Off-Site Water & Sewer Study_Fig10.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. The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected solids treatment capacity deficiency of 2.83 MGD.

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

Liquids Treatment Capacity

VWD currently owns 7.67 MGD of liquids treatment capacity at the EWPCF in addition to the liquids treatment capacity of 5.0 MGD at MRF for a total of 12.67 MGD of liquids treatment capacity. The ultimate average wastewater flow identified in the 2008 Master Plan is 13.3 MGD, resulting in a projected liquids treatment capacity deficiency of 0.63 MGD.

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

Ocean Disposal Capacity

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

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

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

CONCLUSIONS AND CONDITIONS

The proposed Project is not expected to increase average daily water demands over the ultimate demands projected in the County of San Diego 2011 General Plan Update. However, the proposed project will increase wastewater flow over the ultimate flows projected in the County of San Diego 2011 General Plan Update by 176,400 gpd.

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

- Annexation of 1,930.97 acres into VWD's sewer service area.
- Payment of all applicable Water and Wastewater Capital Facility fees in affect at the time service is committed in accordance with District rules and regulations.
- Construction and acceptance of all on-site water and sewer facilities identified in the "Master Plan of Water for the Newland Sierra Project" dated August 31, 2016 and the "Master Plan of Sewer for the Newland Sierra Project" dated September 20, 2016, prepared by Dexter Wilson, prior to service being provided in accordance with all rules and regulations in affect at the time service is provided. Those facilities shall include but not be limited to the following:
    - Local water and sewer distribution mains within the Project limits, including pressure reducing stations
    - Construction of the 2.0 MG Deer Springs #2 Reservoir.
    - Construction of the 6.0 MG Coggan #2 Reservoir per CIP #R-5.
    - Deer Springs Pump Station upgrade per CIP #PS-3 to provide additional pumping capacity.
- Construction and acceptance of all off-site water and sewer facilities identified in this Study prior to service being provided in accordance with all rules and regulations in affect at the time service is provided. Those facilities shall include but not be limited to the following:
    - Off-site water main replacements including:
        - 8,581 feet of 10-inch water main must be replaced with 12-inch pipe.
    - Off-site sewer main replacements including:
        - 931 feet of 8-inch main must be replaced with 12-inch pipe
        - 11,067 feet of 8-inch main must be replaced with 15-inch pipe
        - 4,616 feet of 8-inch main must be replaced with 18-inch pipe
        - 32 feet of 10-inch main must be replaced with 18-inch pipe
        - 2,419 feet of 12-inch main must be replaced with 18-inch pipe

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 annexations and build-outs of other development projects, continued reliable water supplies from the San Diego County Water Authority, the District's treatment capacity at the EWPCF, and other factors affecting growth in the District which may change over time.

This Study is based on the land use utilized in the County of San Diego 2011 General Plan Update. 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 this Study are necessary. Costs for revising this Study shall be borne by the Developer.