DEXTER WILSON ENGINEERING, INC.

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MASTER PLAN OF SEWER FOR THE NEWLAND SIERRA PROJECT

January 30, 2017

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MASTER PLAN OF SEWER
FOR THE
NEWLAND SIERRA PROJECT

January 30, 2017

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Job No: 990-001

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CHAPTER 1

INTRODUCTION

This report provides a master plan of sewer for the Newland Sierra project. This report will provide information concerning projected sewage flows, existing facilities, proposed major facilities and onsite improvements necessary to provide adequate sewer service to the project. An offsite sewer system evaluation has been prepared by the Vallecitos Water District.

PROJECT OVERVIEW

The Newland Sierra project is located within an unincorporated portion of the County of San Diego. The project is located on the north side of Deer Springs Road, just west of Interstate 15. Figure 1-1 provides a location map of the project. The project application includes a general plan amendment, specific plan, rezone, EIR, and tentative map.

DEVELOPMENT PLAN

The Newland Sierra project encompasses a total of approximately 1,985 acres. The development plan for the project includes seven neighborhoods (also called planning areas). The land planning for the project is in the tentative map submittal stage. The project will also include parks, commercial, school, and open space land uses. Table 1-1 summarizes the proposed land use plan for the project and Figure 1-2 graphically shows the land use plan.

TABLE 1-1
NEWLAND SIERRA
PROPOSED LAND USE SUMMARY

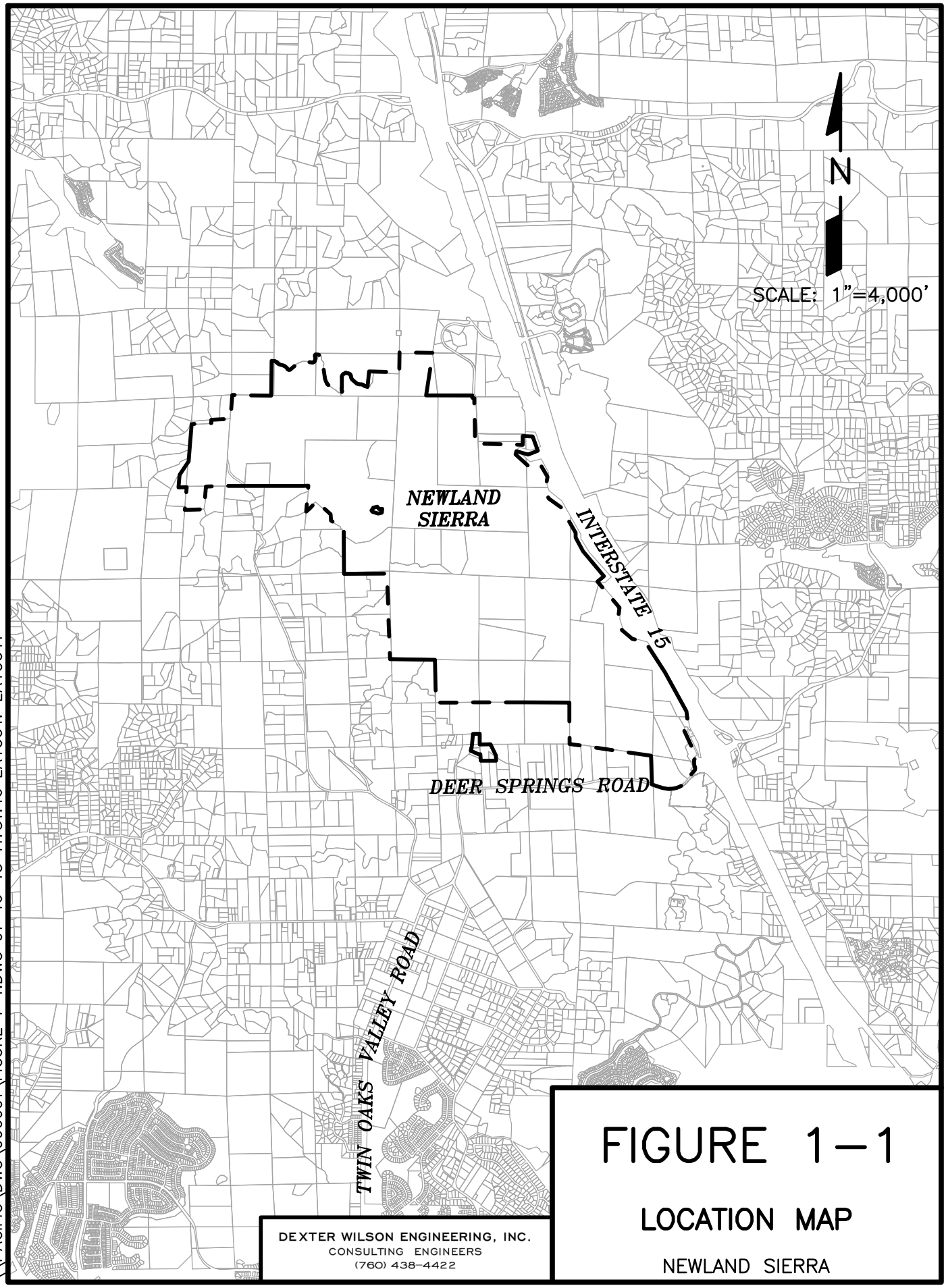
Neighborhood	Land Use	Acres	Units
Town Center	Commercial	7.4	---
	School	3.6	---
	Park	5.7	---
	Multi-Family	7.2	95
Subtotal		**23.9**	**95**
Valley	Multi-Family	23.8	316
	Single Family	32	189
	Park	12.3	---
Subtotal		**68.1**	**505**
Terraces	Multi-Family	28.4	446
	Water Tank	1.3	---
Subtotal		**29.7**	**446**
Hillside	Single Family	36.5	241
	Park	2.3	---
Subtotal		**38.8**	**241**
Mesa	Multi-Family	6.1	60
	Single Family	53.6	265
	Park	4.1	---
Subtotal		**63.8**	**325**
Lower Knoll	Multi-Family	4.8	29
	Single Family	44.5	203
	Park	8.9	---
Subtotal		**58.2**	**232**
Upper Knoll	Single Family	26.1	140
	Park	0.6	--
Subtotal		**26.7**	**140**
Summit	Multi-Family	14.9	49
	Single Family	35.4	102
	Water Tank	2.9	---
	Park	2.0	---
Subtotal		**55.2**	**151**
---	Backbone Roads	34.0	---
---	Fuel Modification	378.2	---
---	Open Space	1209.0	---
TOTAL		**1,985.6**	**2,135**

STUDY AREA

The entire project is within the Vallecitos Water District Sphere of Influence. The developed area of the project will require annexation into the sewer improvement district prior to sewer service being available.

PURPOSE OF STUDY

The purpose of this report is to provide the recommended onsite sewer facilities that are necessary to provide sewer service to Newland Sierra. This plan will be compatible with the Vallecitos Water District Master Plan and the recommended facilities will be consistent with the Master Plan. The District prepared a separate study to analyze the offsite improvements necessary to support this project.



\\PACIFIC\DWG\990001\FIGURE 1-1.DWG 01-16-15 11:51:16 LAYOUT: LAYOUT1

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FIGURE 1-1

LOCATION MAP

NEWLAND SIERRA

SUMMIT

MESA

KNOLL

HILLSIDE

VALLEY

TERRACES

TOWN CENTER

INTERSTATE 15

DEER SPRINGS ROAD

N

SCALE: 1"=1000'

FIGURE 1–2

LAND USE PLAN

NEWLAND SIERRA

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CHAPTER 2

DESIGN CRITERIA

This chapter presents the design criteria used to evaluate recommended sewer system improvements for the Newland Sierra project. The criteria utilized in this study are in accordance with the 2008 Vallecitos Water District Water, Wastewater, and Recycled Water Master Plan Update, unless otherwise noted. This report was prepared by PBS&J and finalized in August 2010. The design criteria are used for evaluating the existing system as well as for design and sizing of proposed improvements to accommodate development in the study area.

SEWER SYSTEM

Sewage Flows

The sewage generation factors used to project average flows for the project are based on the Draft 2014 VWD Master Plan and are listed in Table 2-1. To convert average daily flows to peak wet weather flows, the following formula is used:

$$\text{Peak Factor} = 2.78Q^{-0.0867},\ Q = \text{Average flow, mgd}$$

Gravity Sewers

All gravity sewers have been designed to convey peak wet weather flow. For pipes with a diameter of 12-inches and smaller, the sewers have been designed to convey this flow when flowing half full. For pipes with a diameter of 15-inches and larger, the sewers have been designed to convey peak wet weather flow when flowing three-fourths full by depth. Manning's Equation with an "n" value of 0.013 was used to size all gravity sewers. All new sewers were designed to maintain a minimum velocity of two feet per second at design capacity to prevent the deposition of solids. A maximum velocity of 10 feet per second is also allowed.

TABLE 2-1 RECOMMENDED UNIT SEWAGE GENERATION FACTORS[1]	
Land Use Category	**Unit Flow Factor (gpd/ac)**
Residential (2-4 du/ac)	750
Residential (4-8 du/ac)	1,300
Residential (8-12 du/ac)	2,100
Residential (12-15 du/ac)	2,500
Residential (15-20 du/ac)	3,300
Residential (20-30 du/ac)	4,500
Commercial	1,200
Office Professional	1,200
Schools/Public Facilities	800
Parks	250
Open Space	0
Roads, Right-of-Way	0

[1] Per Draft 2014 VWD Master Plan

CHAPTER 3

PROJECTED SEWAGE FLOWS

This chapter provides the projected sewage flows from the Newland Sierra project. A small portion of the project is already within the Vallecitos Water District sewer service boundary. The remainder of development areas on the project propose annexation to Vallecitos Water District Sewer Improvement Districts 5 and 6 for sewer service.

Newland Sierra Sewage Flows

Table 3-1 provides the projected sewage flows for the Newland Sierra project. The portion of the property that does not drain south does not propose any development and is not included in the projected flows for the sewer system analysis. The projected average daily flow for the project that will flow by gravity to the south is 0.54 mgd. The projected peak wet weather flow is 1.57 mgd.

Table 3-1
NEWLAND SIERRA
PROJECTED SEWER FLOWS

Neighborhood	Land Use	Acres	Dwelling Units	Density, du/ac	Generation Factor, gpd/ac	Average Sewage Flow, gpd
Areas Tributary to South Drainage Area						
Town Center	Commercial	7.4	---	---	1,200	8,880
	School	3.6	---	---	800	2,880
	Park	5.7	---	---	250	1,425
	Multi-Family	7.2	95	13.2	2,500	18,000
Subtotal		**23.9**	**95**			**31,185**
Valley	Multi-Family	23.8	316	13.3	2,500	59,500
	Single Family	32	189	5.9	1,300	41,600
	Park	12.3	---	---	250	3,075
Subtotal		**68.1**	**505**			**104.175**
Terraces	Multi-Family	28.4	446	15.7	3,300	93,720
	Water Tank	1.3	---	---	800	1,040
Subtotal		**29.7**	**446**			**94,760**
Hillside	Single Family	36.5	241	6.6	1,300	47,450
	Park	2.3	---	---	250	575
Subtotal		**38.8**	**241**			**48,025**
Mesa	Multi-Family	6.1	60	9.8	2,100	12,810
	Single Family	53.6	265	4.9	1,300	69,680
	Park	4.1	---	---	250	1,025
Subtotal		**63.8**	**325**			**83,515**
Lower Knoll	Multi-Family	4.8	29	6.0	1,300	6,240
	Single Family	44.5	203	4.6	1,300	57,850
	Park	8.9	---	---	250	2,225
Subtotal		**58.2**	**232**			**66,315**
Upper Knoll	Single Family	26.1	140	5.3	1,300	33,930
	Park	0.6	--		250	150
Subtotal		**26.7**	**140**			**34,080**
Summit	Multi-Family	14.9	49	3.4	750	11,175
	Single Family	35.4	102	2.9	750	26,550
	Water Tank	2.9	---	---	800	2,320
	Park	2.0	---	---	250	500
Subtotal		**55.2**	**151**			**40,545**
---	Backbone Roads	34.0	---	---	0	0
---	Fuel Modification – Irrigated	131.0	---	---	250	32,750
---	Open Space	544.4	---	---	0	0
South Drainage Area Subtotal		**1,073.8**	**2,135**			**535,350**
Areas Tributary to North Drainage Area						
---	Open Space	911.8	---	---	0	0
North Drainage Area Subtotal		**911.8**				**0**
TOTAL		**1,985.6**	**2,135**			**535,350**

CHAPTER 4

EXISTING AND PROPOSED SEWER FACILITIES

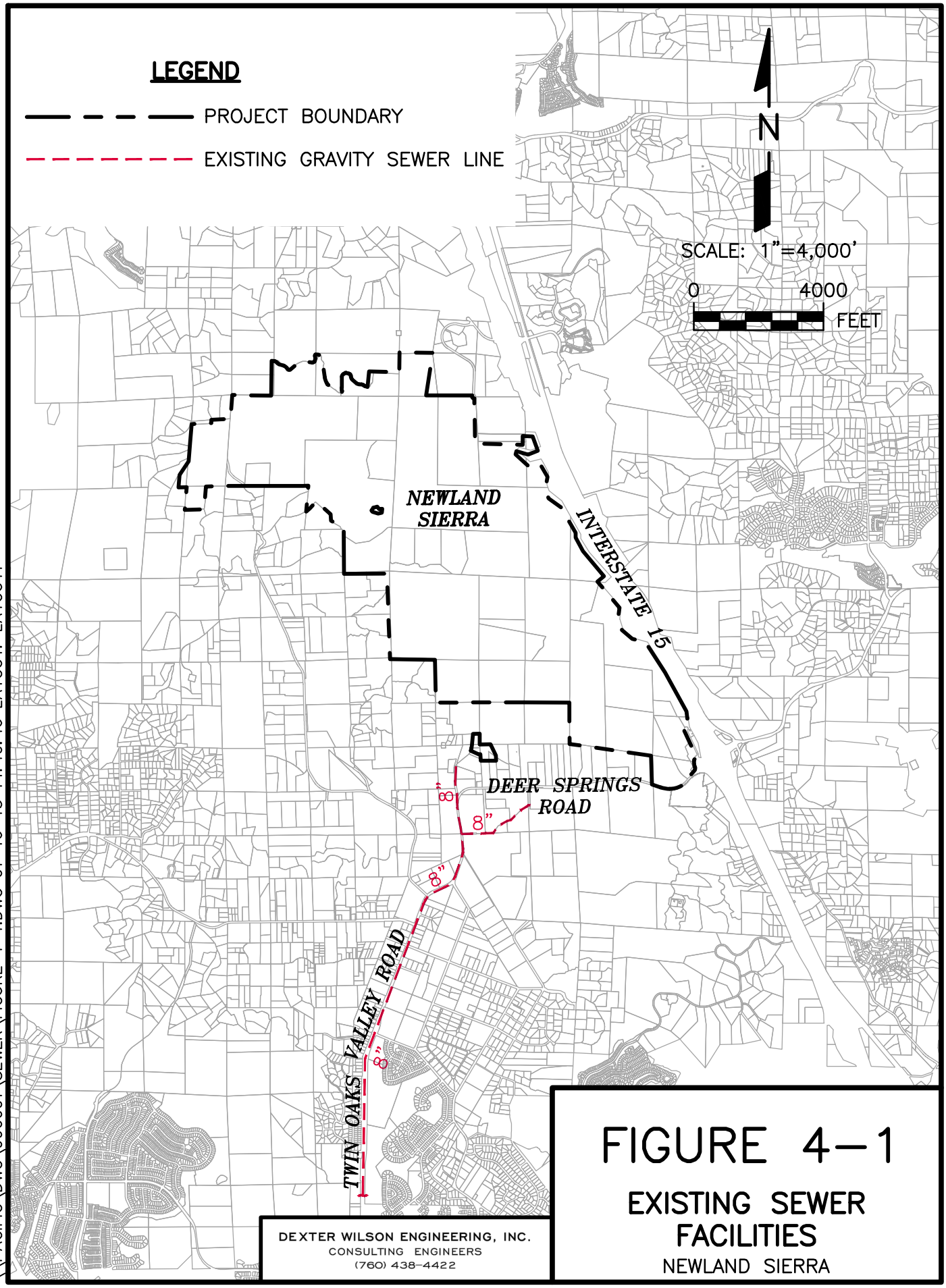
There are existing sewer facilities in the vicinity of the Newland Sierra project, but offsite sewer facility improvements will be necessary to serve the project. This chapter provides a description of existing facilities and summarizes new facilities that will be required to serve the project. Figure 4-1 graphically shows existing sewer facilities in the vicinity of the project.

Existing Sewer Facilities

Many of the existing residences to the west and south of the project are served by septic sewer systems. There is an existing 8-inch gravity sewer line adjacent to Sarver Lane to the south of the project. This line conveys flow south in Twin Oaks Valley Road. The gravity sewer line generally follows Twin Oaks Valley Road to the south and increases in size before eventually crossing Freeway 78. From this location, a gravity sewer interceptor conveys sewage westerly to Lift Station Number 1 near the intersection of San Marcos Boulevard and Pacific Street. From this location, the District has the option of pumping flow through Lift Station Number 1 to their Meadowlark Treatment Plant or sewage can flow by gravity through the District land outfall to the Encina Wastewater Authority. The Encina Wastewater Authority operates a treatment plant and ocean outfall in Carlsbad.

Proposed Sewer Facilities

Sewer service to the Newland Sierra project will require the construction of onsite and offsite sewer conveyance facilities, as described in more detail below.



\\PACIFIC\DWG\990001\SEWER\FIGURE 4-1.DWG 01-16-15 14:40:46 LAYOUT: LAYOUT1

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FIGURE 4-1

EXISTING SEWER FACILITIES

NEWLAND SIERRA

Onsite Sewer Facilities. The onsite sewer system will consist of gravity sewer lines that collect flow and convey it south to Deer Spring Road. Figure 4-2 graphically shows the proposed onsite sewer system improvements for the project. Sewer lines are generally located in street right-of-ways, but there are a two locations where onsite easements will be dedicated to VWD to maintain gravity flow.

A hydraulic analysis was conducted in order to determine sewer line sizes. Slopes were assumed based on a review of the project tentative map. These slopes and the associated sewer line sizing will be verified as engineering progresses on the project and actual pipe slopes become known. Appendix A contains the sewer system analysis and Exhibit A provides the corresponding node diagram for the system analysis. The analysis demonstrates that sewage can be conveyed from the project using 8-inch through 12-inch sewer lines.

Offsite Sewer Facilities. The District has performed an analysis dated October 28, 2106 of offsite sewer facility requirements that evaluates the impact of flows from the project on the existing and proposed sewer system. This analysis evaluates the impact from the project boundary to the Encina Wastewater Authority.

N

SCALE: 1"=1000'

0 1000 FEET

LEGEND

PROJECT BOUNDARY

PROPOSED GRAVITY SEWER

NOTE: ALL PIPELINES ARE RECOMMENDED AS 8-INCH UNLESS OTHERWISE NOTED.

10"

12"

12"

12"

12"

12"

12"

12"

12"

INTERSTATE 15

DEER SPRINGS ROAD

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FIGURE 4-2

PROPOSED ONSITE SEWER FACILITIES

NEWLAND SIERRA

\\ARTIC\DWG\990001\SEWER\NS_SEWER_FIGURE 4-2.DWG 03-03-16 08:28:22 LAYOUT: LAYOUT

APPENDIX A

SEWER ANALYSIS

BASE DATA FOR SEWER HYDRAULIC ANALYSIS										
From	To	From Elev	To Elev	Distance	Slope[1]	Units Added	Node Base Flow, gpd[2]	Added Flow, gpd	Total Added Flow,gpd	Added Flow Components
28	26	1312	1268	800	5.50%	290	2977	74,625	77,602	Upper Knoll, Summit
26	24	1268	1225	1050	4.10%	393	2977	102,798	105,776	Mesa, 1/3 Lower Knoll SF
24	22	1225	1195	1100	2.73%	68	2977	19,283	22,261	1/3 Lower Knoll SF
22	20	1195	915	1335	20.97%	98	2977	27,748	30,726	1/3 Lower Knoll SF, Lower Knoll MF, Lower Knoll Park
20	18	915	885	800	3.75%	182	2977	34,950	37,927	1/2 Valley MF, 1/8 Valley SF
18	12	885	875	800	1.25%	24	2977	5,200	8,177	1/8 Valley SF
16	14	919	896	1250	1.84%	288	2977	58,425	61,402	Hillside, 1/4 Valley SF
14	12	896	875	730	2.88%	47	2977	10,400	13,377	1/4 Valley SF
12	4			3500	1.61%	206	2977	43,225	46,202	1/2 Valley MF, 1/4 Valley SF, Valley Park
10	8			2200	4.62%	446	2977	94,760	97,737	Terraces
8	4			7500	0.29%	95	2977	31,185	34,162	Town Center
4	2			350	3.16%				0	---
TOTAL						**2,135**	**32,750**	**502,600**	**535,350**	

Notes:

1. Maximum Slope used for hydraulic analysis is 15%
2. Node base flow is defined as the generation of sewer included for Fuel Modification, Open Space, and additional park space that is not within a neighborhood. This flow is factored equally among all nodes contributing to sewer system.

SEWER STUDY SUMMARY

DATE: 9/19/2016
JOB NUMBER: 990-001

Newland Sierra
Dexter Wilson Engineering, Inc.

SHT 1 OF 1
REFER TO PLAN SHEET:

FROM	TO	LENGTH (ft)	IN LINE FLOW (gpd)	AVG. DRY WEATHER FLOW (gpd)	PEAKING FACTOR AVG. DRY TO PEAK WET	PEAK WET WEATHER FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D [2]	C_a for Velocity [3]	VELOCITY (f.p.s.)
							M.G.D.	C.F.S.							
28	26	800.00	77,602	77,602	3.472	269,464	0.269	0.417	8	5.50	0.068143	0.17333	**0.26**	0.1623	5.78
26	24	1050.00	105,776	183,378	3.222	590,855	0.591	0.914	8	4.10	0.173159	0.28000	**0.42**	0.3130	6.57
24	22	1100.00	22,261	205,638	3.190	656,008	0.656	1.015	8	2.73	0.235468	0.33333	**0.50**	0.3930	5.81
22	20	1335.00	30,726	236,364	3.152	744,946	0.745	1.153	8	15.00	0.114073	0.22667	**0.34**	0.2355	11.01
20	18	800.00	37,927	274,291	3.111	853,360	0.853	1.320	10	3.75	0.144143	0.31667	**0.38**	0.2739	6.94
18	12	800.00	8,177	282,469	3.103	876,558	0.877	1.356	12	1.25	0.157708	0.40000	**0.40**	0.2934	4.62
12	4	3500.00	46,202	403,450	3.008	1,213,756	1.214	1.878	12	1.61	0.192245	0.45000	**0.45**	0.3428	5.48
4	2	350.00	-	535,350	2.935	1,571,416	1.571	2.432	12	3.16	0.177690	0.43000	**0.43**	0.3229	7.53
16	14	1250.00	61,402	61,402	3.544	217,599	0.218	0.337	8	1.84	0.095138	0.20667	**0.31**	0.2074	3.65
14	12	730.00	13,377	74,780	3.484	260,500	0.261	0.403	8	2.88	0.091089	0.20000	**0.30**	0.1982	4.58
10	8	2200.00	97,737	97,737	3.403	332,636	0.333	0.515	8	4.62	0.091827	0.20000	**0.30**	0.1982	5.84
8	4	7500.00	34,162	131,900	3.316	437,348	0.437	0.677	12	0.29	0.163364	0.41000	**0.41**	0.3032	2.23

Max dn/D
0.50

[1] K' based on n = 0.013
[2] dn/D using K' in Brater King Table 7-14
[3] From Brater King Table 7-4 based on dn/D

SUMMIT
MESA
HILLSIDE
KNOLL
VALLEY
TERRACES
TOWN CENTER
INTERSTATE 15
DEER SPRINGS ROAD
28
26
24
22
20
18
16
14
12
10
8
4
2
10"
12"
12"
12"
12"
12"
12"
12"

N

SCALE: 1"=1000'

0 1000 FEET

LEGEND

PROJECT BOUNDARY

PROPOSED GRAVITY SEWER

(24) COMPUTER MODEL NODE NUMBER

NOTE: ALL PIPELINES ARE RECOMMENDED AS 8-INCH UNLESS OTHERWISE NOTED.

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EXHIBIT A
PROPOSED ONSITE SEWER FACILITIES NODE DIAGRAM
NEWLAND SIERRA