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SEWER SYSTEM ANALYSIS FOR THE 501 OCEAN BLUFF WAY PROJECT

July 20, 2023

2234 FARADAY AVENUE • CARLSBAD, CA • (760) 438-4422

SEWER SYSTEM ANALYSIS
FOR THE
501 OCEAN BLUFF WAY PROJECT

July 20, 2023

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EXP. 12/31/2024
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7-20-23

Prepared by:
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Job No. 1115-003

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July 20, 2023 1115-003

501 Ocean Bluff LLC
5315 Avenida Encinas, Suite 200
Carlsbad, CA 92008

Attention: Kevin Dunn, Managing Member

Subject: Sewer System Analysis for 501 Ocean Bluff Way in the City of Encinitas

INTRODUCTION

This letter-report provides a sewer system analysis for the 501 Ocean Bluff Way project in the City of Encinitas (City). This report will evaluate sewer service to the project with recommended required onsite facilities to serve the project and an evaluation of the project's impacts to the City's offsite sewer system.

PROJECT OVERVIEW

The 501 Ocean Bluff Way project is located in the City of Encinitas along the north side of Ocean Bluff Way, south of Encinitas Boulevard. Figure 1 presents a vicinity map showing the subject property.

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\\ARTIC\DWG\1115003\REPORT\OBW_FIGURE-1_VICMAP.DWG 7/14/2023 11:30:18 AM LAYOUT:8x11 USER:Karam

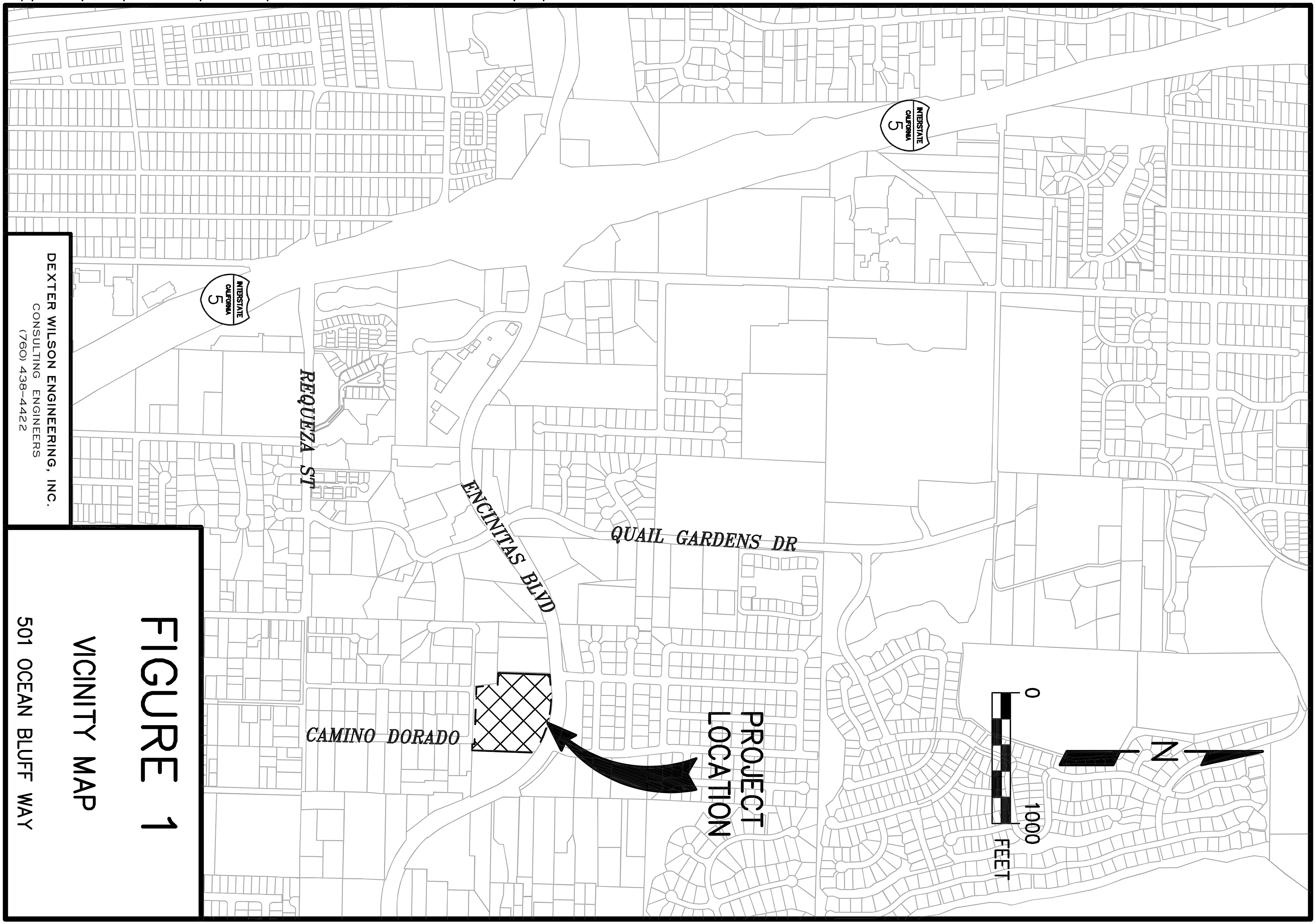


FIGURE 1
VICINITY MAP
501 OCEAN BLUFF WAY

The project site is approximately 7.2 acres and the project development plan is to construct 27 single family residential units. Pad elevations for the project will range from 303.1 feet to 314.4 feet and generally the site will slope from the southeast to the northwest. Appendix A includes the preliminary site plan for the project.

SEWER SERVICE

Sewer service to the 501 Ocean Bluff Way project will be provided by the City of Encinitas. The project is situated within the Encinitas Sanitary Division service area. The Encinitas Trunk Sewer is located just north of the project in Encinitas Boulevard.

PLANNING CRITERIA

Sewer system planning criteria are based on the criteria provided in the 2009 City of Encinitas Engineering Design Manual and May 2023 Master Plan Update. The pertinent criteria applicable to this study are summarized in Table 1 below and detailed in Appendix B. These criteria are provided for the sizing of new sewer lines. The City may allow the d/D in existing sewer lines to exceed the criteria for new sewer lines on a case-by-case basis.

TABLE 1 PLANNING CRITERIA SUMMARY		
Description	**Criteria**	**Source**
SF Residential Sewer Flow (EDU)	180 gpd/unit	2023 Master Plan
Peak Dry Weather Flow Factor	$Q_{PK} = 2.64 \times (Q_{AVG})^{0.905}$, Q in cfs	2009 Engineering Design Manual
Minimum Pipe Diameter	8-inch	2023 Master Plan
Minimum Pipeline Slope	1.0%	2023 Master Plan
Minimum Velocity at Peak Flow	2.0 fps	2023 Master Plan
Manning's Roughness Coefficient	0.013	2023 Master Plan
Maximum Depth-to-Diameter Ratio, 16" and Smaller	0.50	2023 Master Plan

PROJECTED SEWER FLOWS

Based on the criteria presented above, Table 2 summarizes the projected average sewer flows for the 501 Ocean Bluff Way project. The projected peak flow is 20,417 gpd (14 gpm).

TABLE 2 501 OCEAN BLUFF WAY PROJECTED SEWER FLOWS			
Land Use	**Quantity**	**Flow Factor**	**Average Flow, gpd**
SF Residential	27 units	180 gpd/unit	4,860

EXISTING SEWER FACILITIES

The existing sewer system in the vicinity of the project consists of gravity sewer pipelines. There is an 8-inch gravity sewer line Ocean Bluff Way that conveys flow east to a sewer line in an easement that then flows north to Encinitas Boulevard. The Encinitas Trunk Sewer is located in Encinitas Boulevard and conveys flow west to the Moonlight Beach Pump Station located west of Interstate 5. This pump station conveys flow north for treatment and disposal. The location of existing sewer facilities in the vicinity of the project are shown on Figure 2.

PROPOSED SEWER SYSTEM

To receive sewer service, the project proposes to construct a public backbone sewer system within the project. This onsite public line location is still tentative, but generally will be located within the proposed roadway and will convey flow to a point of connection with the existing 8-inch sewer line in Ocean Bluff Way near the western project driveway.

This existing sewer line conveys flow west and then north before connecting to the Encinitas Trunk Sewer in Encinitas Boulevard. Laterals from all of the proposed residential units will be connected to the onsite backbone sewer line. Figure 2 provides the proposed sewer system improvements for the project.

A local sewer system analysis was prepared for the proposed onsite sewer lines and for the existing 8-inch offsite sewer line up to the connection with the 8-inch sewer line in Encinitas Boulevard. Downstream of this location, the buildout City flows in the Encinitas Trunk Sewer were evaluated as part of the 2023 Sewer Master Plan and it was found that no capacity-based CIP projects were needed in this area. The local sewer system analysis is provided in Appendix C and indicates that all existing and proposed sewer lines analyzed will have a d/D ratio of less than 0.50 during proposed peak flow conditions, so no offsite sewer improvements are required.

Since the final onsite sewer alignment is not known, the proposed onsite sewer was analyzed at a slope of 1% (the minimum slope allowed by the City). Should the project grading and connection point to the existing system allow the onsite slope to be increased to 2.4%, then the onsite sewer would reach the minimum desirable velocity of 2 fps. There are multiple existing sewers that do not currently meet this velocity criteria, but the addition of the project flows will help increase velocities in these sewers.

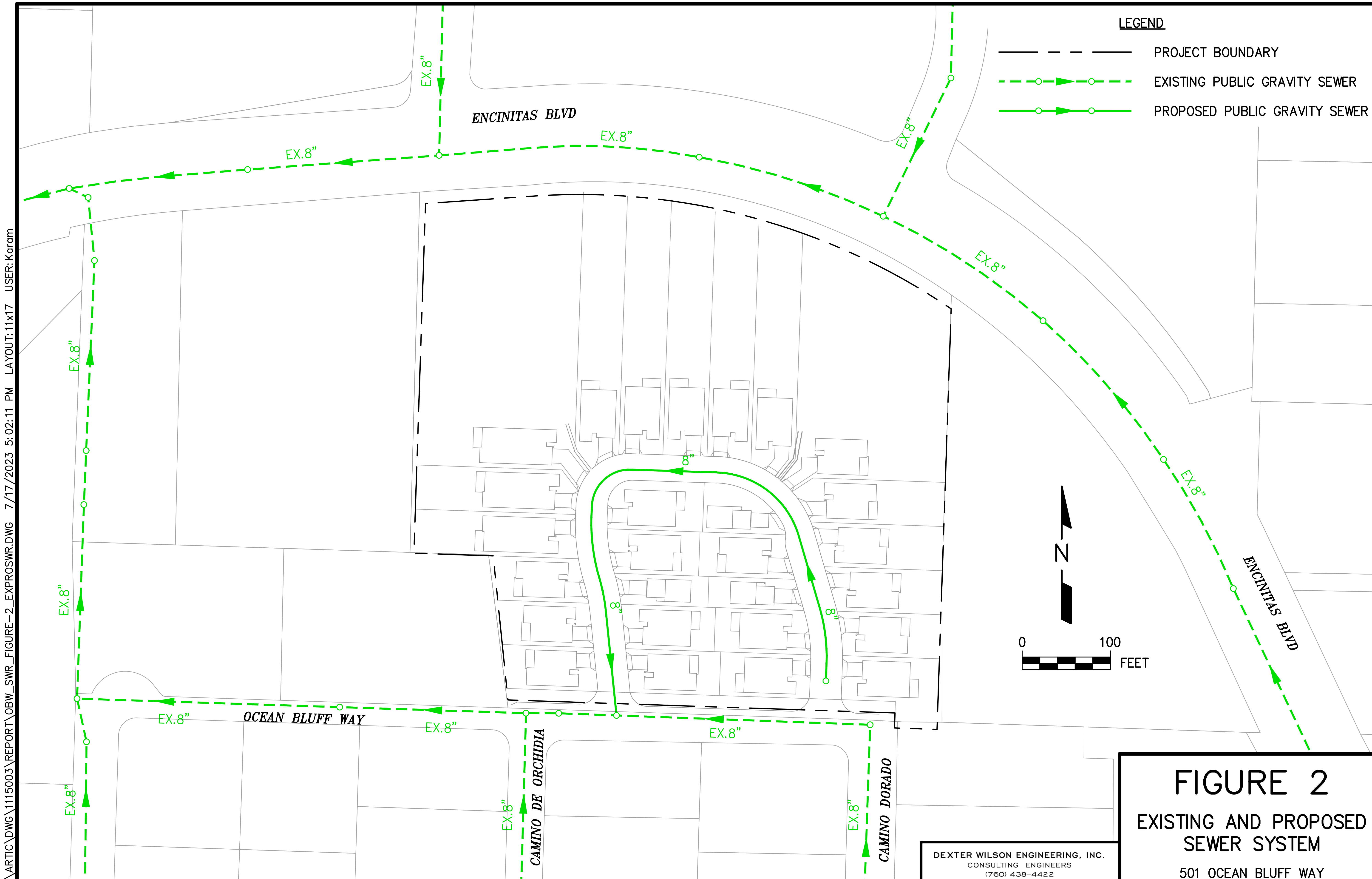
Thank you for the opportunity to work on this project. If you have any questions on the content of this report, please let us know.

Dexter Wilson Engineering, Inc.

Kathleen Heitt, P.E.

KH:ah

Attachment(s)



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(760) 438-4422

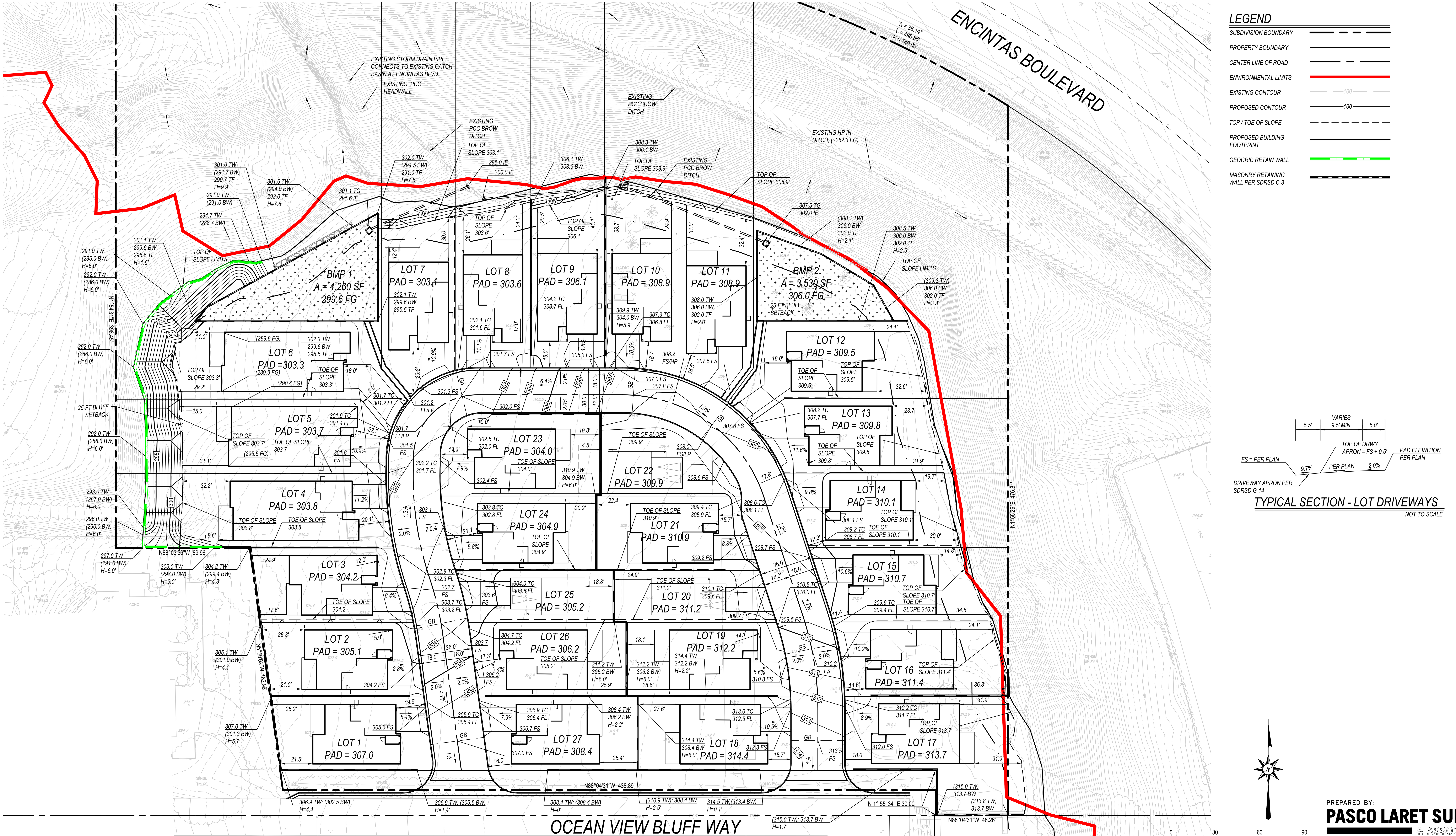
FIGURE 2

EXISTING AND PROPOSED SEWER SYSTEM

501 OCEAN BLUFF WAY

APPENDIX A

PRELIMINARY SITE PLAN



PLAN VIEW - PRELIMINARY SITE PLAN

SCALE: 1" = 30'

PREPARED BY:
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J:\ACTIVE JOBS\3877 RINCON OCEAN BLUFF\CIVIL\DRAWING\EXHIBITS

APPENDIX B

SEWER PLANNING CRITERIA

CITYWIDE SEWER MASTER PLAN UPDATE

Prepared For:

CITY OF ENCINITAS
505 South Vulcan
Avenue Encinitas, CA
9202

N|V|5

15092 Avenue of Science, Suite 200
San Diego, CA 92128

PROJECT NUMBER 227519-0000687.00

Division does not include 0.210 MGD of flow originating from RSFCSD and San Elijo Hills as they are not within the CSD boundary. Thus, the average flow from these two areas have been subtracted from the total average flow of CSD.

Table 4-E Wastewater Unit Generation Rate Based on Land Use

Category	Units	Unit Generation Rate	Estimated Wastewater Generation (MGD)
Cardiff Sanitary Division			
Single-Family Residential	5,946 DUs	180 gpd / DU	1.070
Multi-Family Residential	1,785 DUs	110 gpd / DU	0.196
Mobile Home Park	239 DUs	80 gpd / DU	0.019
Commercial	57.6 acres	400 gpd / acre	0.023
Industrial	0.3 acres	400 gpd / acre	0.000
		Subtotal =	1.309
		Metered 2017 Flow =	1.275
		Percent Error =	2.68%
Encinitas Sanitary Division			
Single-Family Residential	4,169 DUs	180 gpd / DU	0.750
Multi-Family Residential	1,252 DUs	110 gpd / DU	0.138
Mobile Home Park	168 DUs	80 gpd / DU	0.013
Commercial	113.4 acres	400 gpd / acre	0.045
Industrial	24.7 acres	400 gpd / acre	0.010
		Subtotal =	0.957
		Metered 2017 Flow =	0.981
		Percent Error =	-2.48%

Notes:
DUs = dwelling units
gpd = gallons per day

4.3.3 Recommended Unit Generation Rates

The City of Encinitas Engineering Design Manual (EDM) currently recommends a sewer flow contribution of 80 gpcd for projected residential flows. The EDM also uses the concept of Equivalent Dwelling Units (EDUs), which converts the sewer flows to an equivalent multiple of residential dwelling unit (DU) usage. The EDM guidelines are based on the assumption that one EDU is equivalent to 280 gpd/DU (280 gpd / 80 gpcd = 3.5 people per dwelling unit). For the City, the SANDAG Series 13 Regional Growth Forecast calculates a persons per household value of 2.51 in 2020 while the 2010 Census has a calculated 2.47 persons per household.

Based on the analysis conducted, the City has relatively uniform wastewater generation for land use and population projections. To project flows based on projected future development, it is recommended that wastewater generation rates included in Table 4-F be applied.

Table 4-F Recommended Wastewater Unit Generation Rates

Category	Recommended Unit Generation Rate
Population	
Residential Population	70 gpcd
Land Use	
Single-Family	180 gpd / DU
Multi-Family Residential	110 gpd / DU
Mobile Home Park	80 gpd / DU
Commercial	400 gpd / acre
Industrial	400 gpd / acre

The City may need to consider updating the EDM to reflect the lower 70 gpcd. It should be noted that the rate may continue to decrease due to continued conservation efforts and the incorporation of Green Building Codes. Additionally, as the State allows agencies to permit accessory dwelling units as a method to achieve housing goals, the impact to the City's system will need to be evaluated to account for such additional flows.

5.0 SEWER COLLECTION SYSTEM DESIGN CRITERIA

The level of service that is provided to a community is directly related to compliance with applicable regulations and implementation of improvements planned and designed in accordance with accepted criteria. The capacity of the collection system is analyzed with a hydraulic model and findings are evaluated against established and verified design criteria to identify capacity deficiencies.

Included in this chapter is a description of the design criteria and hydraulic modeling methodology used to evaluate the collection system based on current flow conditions. The evaluation method employs the use of the InfoSWMM hydraulic modeling software, which performs hydraulic calculations with extended period simulations (EPS) and fully dynamic flow routing to calculate water depth in open channels and pipelines, velocities and headloss in force mains.

Also included is a description of the City's criteria associated with designing and operating the City's sewer system, the design criteria used for planning and design of new sewer infrastructure, and "trigger" criteria for evaluating capacity of existing and future infrastructure.

5.1 DESIGN CRITERIA BACKGROUND

The CSD and ESD collection system is operated and maintained by City staff. The City provides a level of service that complies with state and federal sanitary sewer regulations to assure the collection system is efficiently and effectively managed to meet public health and safety standards. The City has developed and adheres to the criteria included in its 2009 Engineering Design Manual (EDM) which serves to assist the professional design community and the general public by consolidating information related to the City's engineering standards. Chapter 4.0 of the manual includes specific requirements related to the City's sewer system.

The design criteria used in this Master Plan Update is based on existing City design standards. Similar to previous master plans, the peaking factors used in the hydraulic analysis are based on historical dry and wet weather peak flows observed from metering data, as previously presented in Chapter 4.0 of this Master Plan Update and discussed in more detail at the end of this chapter.

5.2 GRAVITY MAIN DESIGN CRITERIA

The primary evaluation criteria for gravity sewers are the depth of flow and velocity, which are calculated in the hydraulic model based on Manning's Equation. The capacity of each gravity sewer is based on the relative depth of flow within the respective pipeline reach. Gravity sewers are not typically designed to flow full, as unoccupied space at the top of the pipe is required for conveyance of sewage gasses and to provide contingent capacity for wet weather inflow and infiltration. Pipeline sizing is typically based on the pipeline flowing 75 percent full at the PWWF if the pipe is larger than 16-inches in diameter (d/D = 0.75). For a pipeline with a diameter of 16-inches, or smaller, a d/D factor of 0.50 is generally used.

Friction (roughness) factors for pipelines are a required input to the model. The factors vary with the material and the age of the pipe. A roughness factor as indicated by a Manning's coefficient ("n") of 0.013 is typically used to evaluate existing gravity sewers and for projection of future sizing needs. Previous studies have shown that this value typically accounts for the roughness of most pipes, joints, and fouling that occurs after several years of operation. EDM design standards are summarized in Table 5-A.

Table 5-A Engineering Design Manual Criteria – Sewers

Category	Criteria
Minimum Pipeline Diameter	8-inches
Minimum Pipeline Slope	1.0%
Minimum Pipeline Velocity at Peak Design Flow	2 ft per sec
Pipeline Roughness Coefficient	n = 0.013
Maximum d/D Ratio, Diameter ≤ 16-inches	0.50
Maximum d/D Ratio, Diameter > 16-inches	0.75

5.3 PUMP STATION DESIGN CRITERIA

In the design of sewer lift stations, it is required that spare pumping units be included for mechanical reliability. The City requires that a wastewater facility be capable of conveying peak wet weather flows with the largest operating unit out of service. Lift stations are typically equipped with two or more pumps, including one pump of the largest size as a standby unit, and have a secondary or emergency power source consisting of either installed generators or a connection for a portable generator.

Force mains are evaluated based on maintenance of a minimum or maximum allowable flow velocity, varying between 2.5 and 8.0 fps. Velocities less than 2.5 fps can result in deposition of debris in the force main, while velocities greater than 8.0 fps can damage the pipeline through excessive abrasion. The relevant pump station design criteria used in the previous Master Plan, and which will apply to the Master Plan Update is summarized in Table 5-B.

Table 5-B Pump Station Design Criteria

Category	Criteria
Minimum Number of Pumps	Two
Minimum Pump Capacity	Duty Pumps Capable of Pumping Ultimate Peak Wet Weather Flow
Standby Capacity	100% of Largest Duty Pump Capacity
Emergency Power	Required
Emergency Storage Capacity	Six hours of Average Dry Weather Flow
Velocity for Force Mains	Minimum Allowable Velocity – 2.5 ft per sec Maximum Allowable Velocity – 8 ft per sec

- CIP Projects F1, G1, and H1, which total approximately 3,275 feet, all address 2020 conditions associated with the Cardiff Relief Trunk Sewer.
  - CIP Project F1 involves upsizing approximately 849 feet of pipe from a 12-inch to a 15-inch diameter.
  - CIP Project G1 involves upsizing approximately 284 feet of pipe from a 10-inch to a 15-inch diameter.
  - CIP Project H1 involves upsizing approximately 2,142 feet of pipe from a 10-inch to a 12-inch diameter.
- CIP Project I1, which addresses 2020 conditions, requires upsizing approximately 15 feet of pipe from a 10-inch diameter to a 12-inch diameter. This sewer is tributary to the Cardiff Relief Trunk Sewer.

10.2.1.2 ESD

There is one (1) CIP project identified in ESD that totals approximately 105 feet. There are no CIP projects identified that are associated with the Encinitas Trunk Sewer.

- CIP Project K4, which addresses 2035 conditions, requires upsizing approximately 105 feet of pipe from an 8-inch diameter to a 10-inch diameter.

The proposed CIP pipeline projects summarized above are tabulated in Table 10-B. A detailed description of the pipelines associated with the proposed CIP projects is provided in Appendix 8. Phase I though IV represent the planning horizons for which the hydraulic model was developed. However, ultimately, conditions will be dependent on actual development within CSD and ESD boundaries. Thus, the timing for implementation of the projects may ultimately be adjusted as actual development occurs. At that time, the City will evaluate and determine the actual needs and prioritize infrastructure improvements accordingly. As such, the proposed projects are presented as potential phases versus planning horizons.

It should be noted that the Olivenhain Trunk Sewer Improvement Project, which addresses several capacity issues identified at the northern end of the trunk sewer is nearing the start of construction and therefore is not included in the CIP project list. The planned improvement project, which is located in the vicinity of Lone Jack Road, includes the upsizing of approximately 2,900 feet of pipe from an 8-inch diameter to a 15-inch diameter pipeline. The improvement project also includes eliminating the surcharging that occurs at the 15 manholes as previously noted and removal of the existing siphon located in the vicinity of 4030 Manchester Avenue.

CITY OF ENCINITAS
ENGINEERING DESIGN MANUAL
OCTOBER 28, 2009

4.202.1 Peaking Factor. The sewer design flows may be calculated based upon peak dry weather flows. Use of the following equation shows the relationship between average dry weather flows (ADWF) and peak dry weather flows (PDWF) expressed in cubic feet per second (CFS):

$$Q_{PDWF} = 2.64 \, (Q_{ADWF})^{0.905}$$

4.202.2 Flow Contributions from Residential Populations. Flows from residential populations shall be based upon the ultimate density with the number of people per household determined as follows:

Residential Dwelling Unit = 3.5 people per unit

Accessory Unit = 70% of a dwelling unit =
(0 .70) x (3.5 people per unit) = 2.45 people per unit

Daily per capita residential sewer flow contributions shall be based upon 80 gallons per capita, per day (gpcd). The City of Encinitas bases sewer flow calculations on the concept of Equivalent Dwelling Units (EDUs) which converts various kinds of sewer usages to an equivalent multiple of residential dwelling unit usage.

1 EDU = (3.5 people/ residential dwelling unit) x 80 gpcd

Wastewater discharge fees are assessed as a predetermined sum per EDU multiplied by the number of EDUs of the proposed usage. Reference Municipal Code CHAPTER 18.08 for information on EDUs and Appendix 4.4 for information on the wastewater discharge fee.

4.202.3 Flow Contributions from Non-Residential Uses. Flow contributions from non-residential uses shall be determined consistent with the average daily sewer flow projections listed in Appendix 4.6.

APPENDIX C

SEWER SYSTEM ANALYSIS

DATE 7/17/2023

SEWER STUDY SUMMARY

FOR: 501 Ocean Bluff Way

SHT 1 OF 1

JOB NUMBER: 1115-003

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

LINE	FROM	TO	LENGTH (ft)	IN-LINE EDUs	EDUs SERVED		SEWAGE PER EDU/DAY (gpd/EDU)	AVERAGE DRY WEATHER FLOW		PEAK FLOW (DESIGN FLOW)		PEAKING FACTOR	LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' [1]	dn (feet)	dn/D[2]	C_a for Velocity[3]	VELOCITY (f.p.s.)	Notes
					IN-LINE	TOTAL		gpd	C.F.S.	M.G.D.	C.F.S.									
	2	4		27	27.0	27.0	180	4,860	0.008	0.020	0.032	4.20	8	1.00	0.012109	0.07419	0.111	0.0478	1.49	501 Ocean Bluff Way Project
	3215	4		10	10.0	10.0	180	1,800	0.003	0.008	0.013	4.62	8	2.23	0.003300	0.04011	0.060	0.0193	1.50	Existing homes on Camino El Dorado
	4	3216		0	0.0	37.0	180	6,660	0.010	0.027	0.042	4.08	8	2.23	0.010784	0.07015	0.105	0.0441	2.14	
	3216	3217		0	0.0	37.0	180	6,660	0.010	0.027	0.042	4.08	8	24.85	0.003231	0.03969	0.060	0.0190	4.98	
	3217	3219		12	12.0	49.0	180	8,820	0.014	0.035	0.054	3.97	8	5.14	0.009159	0.06489	0.097	0.0393	3.10	Existing homes on Camino De Orchidia
	3219	3218		4	4.0	53.0	180	9,540	0.015	0.038	0.058	3.94	8	12.14	0.006399	0.05473	0.082	0.0306	4.28	Existing homes on Ocean Bluff Way
	3218	3224		5	5.0	58.0	180	10,440	0.016	0.041	0.063	3.91	8	0.40	0.038247	0.12941	0.194	0.1072	1.33	Existing homes on Ocean Bluff Way
	3224	3225		0	0.0	58.0	180	10,440	0.016	0.041	0.063	3.91	8	51.03	0.003386	0.04056	0.061	0.0196	7.24	
	3224	3226		0	0.0	58.0	180	10,440	0.016	0.041	0.063	3.91	8	15.55	0.006134	0.05370	0.081	0.0297	4.78	
	3226	3227		0	0.0	58.0	180	10,440	0.016	0.041	0.063	3.91	8	1.18	0.022268	0.09948	0.149	0.0734	1.94	
	3227	3228		0	0.0	58.0	180	10,440	0.016	0.041	0.063	3.91	8	0.56	0.032324	0.11930	0.179	0.0953	1.49	

Total EDUS	Min Slope	Max dn/D
58.0	0.40	0.19

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