

Sewer Study

FOR

Tract 5487
City of Moorpark, California

Prepared for:

West Pointe Homes
Rasmussen Development

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JN 10-10115

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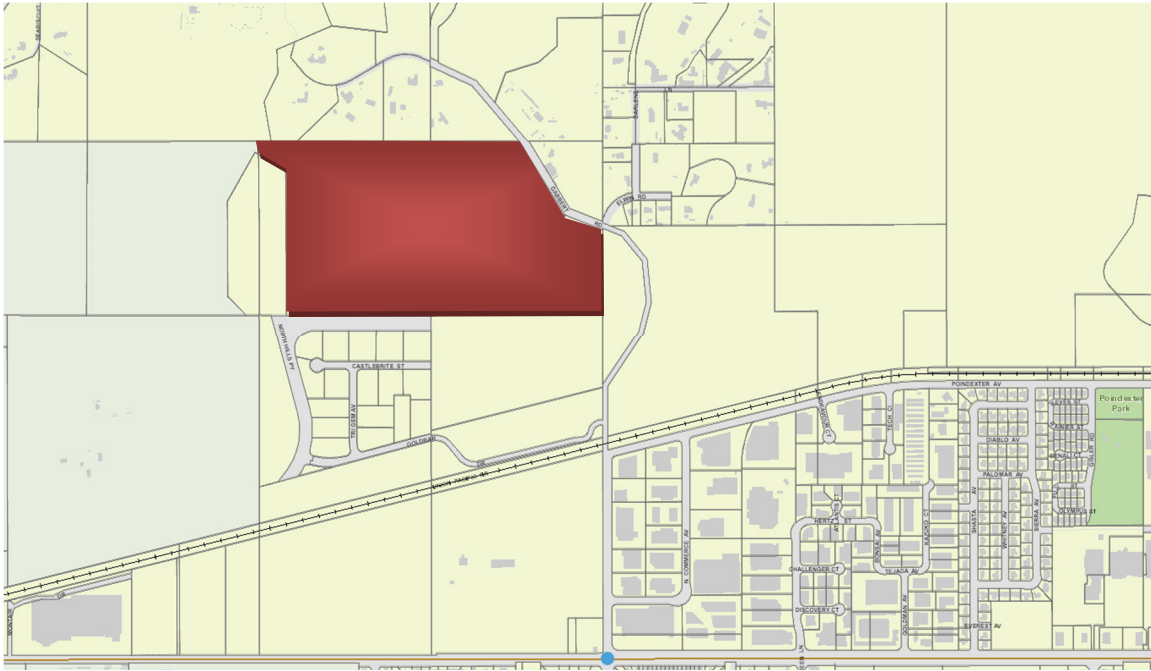


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INTRODUCTION

The project site is in the northwest area of Moorpark, north of the Union Pacific Railroad and west of Gabbert Avenue. It is approximately 68 acres and is currently undeveloped A-E (Agricultural exclusive) zoning.



LOCATION PLAN

NTS

The existing surrounding developments comprise of Single Family Residential and Agricultural Exclusive land use areas. Anticipated future developments within the surrounding area will comprise of similar projects built for Residential Planned Development (RPD).

PROJECT DESCRIPTION

Tract 5487 proposes to develop 139 single family dwelling units and 4 open space lots on approximately 68 acres.

EXISTING SEWER SYSTEM

The Ventura County Waterworks District No. 1 shall provide sewer service for the project site. The proposed project shall connect to the existing 8" sewer in Gabbert Road (Drawing No. 55994), south of Poindexter Road and ultimately drain via gravity to the 27" sewer main along the Arroyo Simi flood control channel.

PROPOSED SEWER SYSTEM

The proposed sewer system serving Tract 5487 shall drain via 8" gravity mains to Gabbert Road. An 8" sewer main in Gabbert Road from North Hills Parkway to Poindexter Road will be constructed (at 0.75% minimum) and shall connect to the existing 8" sewer at Gabbert Road and Poindexter Road. An 8" stub out in the manhole at North Hills Parkway and Gabbert Road will provide a point of connection for future development upstream of the project site.

METHODOLOGY

Analysis will be done for the new sewer system and the existing point of connection to ensure that sizing and performance meets the County of Ventura Design guidelines.

The sewage flow rate for the 139 lots of Tract 5487 are calculated based on the following formula:

Average Sewage Flow Rate:

$$Q_{ave}(cfs) = 0.00012 * (\text{Number of Dwelling Units}) * (\text{Population Density})$$

Where : Q_{ave} = Sewer Discharge (cfs)

Number of Dwelling Units = 139 units

Population Density = 3.5 persons/Dwelling Unit (Per 2.121)

The sewage flow rate for the undeveloped upstream project areas are calculated based on Planning Zone R-O using the following formula:

Average Sewage Flow Rate:

$$Q_{ave}(\text{cfs}) = 0.00012 * (\text{Area}) * (\text{Population Density}) * (\text{Building Density})$$

Where : Q_{ave} = Sewer Discharge (cfs)

0.00012 cfs/persons

Area = Area (acres)

Population Density = 3.5 persons/Dwelling Unit (Per 2.121)

Building Density = 1.9 Dwelling Units/acres (Per 2.122)

A = Area (acres)

Sewer Peaking Factor:

$$PF = 2.65 * Q_{ave}^{-0.1}$$

Peak Sewage Flow Rate:

$$Q_{peak}(\text{cfs}) = PF * [2.65 * Q_{ave}^{-0.1}]$$

ANALYSIS

Hydraulic analysis was performed using the Manning Equation.

Equation: $V = 1.486R^{2/3}S^{1/2}/n$; fps
 $n = 0.013$

Pipe capacity was analyzed based on their size. If sewer mains are 12-inches in diameter or less, they should be no more than 2/3- full depth, while mains 12-inches and over are designed to flow at a maximum of 3/4-full depth.

Potential offsite flows from the Hitch Ranch Specific Plan all drain to Sierra Avenue to the east. PA5 and PA-6 are open space areas with non-contributing flows to the sewer system.

MITIGATION

Per calculation, the existing 8" sewer @ 0.075% slope in Gabbert Road can service the existing and proposed improvements.

CONCLUSIONS

The point of connection of the new sewer remains in the same tributary service area. Hydraulic Calculations shows that the system maintains design parameters of pipes flowing 2/3 full for pipe sizes less than or equal to 12-inches and under 3/4full for pipes greater than or equal to 12-inch diameter.

REFERENCES

- County of Ventura Sewage Manual dated 11/16/82
- Hitch Ranch Specific Plan (Table 2-1, Figure 2-1, Figure 3-3)

APPENDIX

OFFSITE - SEE SHEET 2

LOT 2

LOT 3

LOT 4

LOT 1

LOT 5

LOT F

LOT C

POINT D

THOROUGHRED DRIVE

THOROUGHRED DRIVE

POINT E

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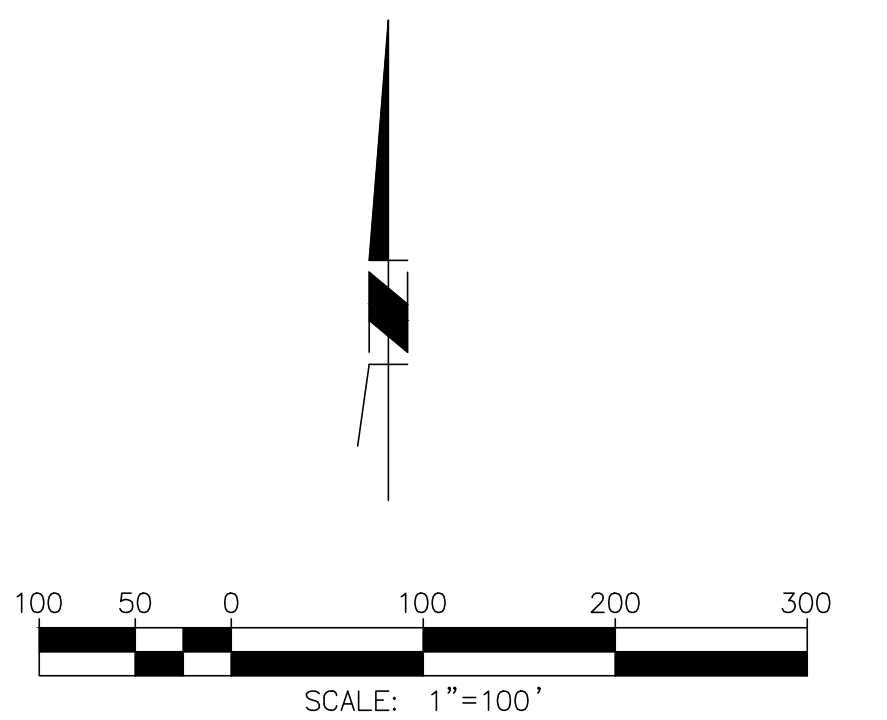
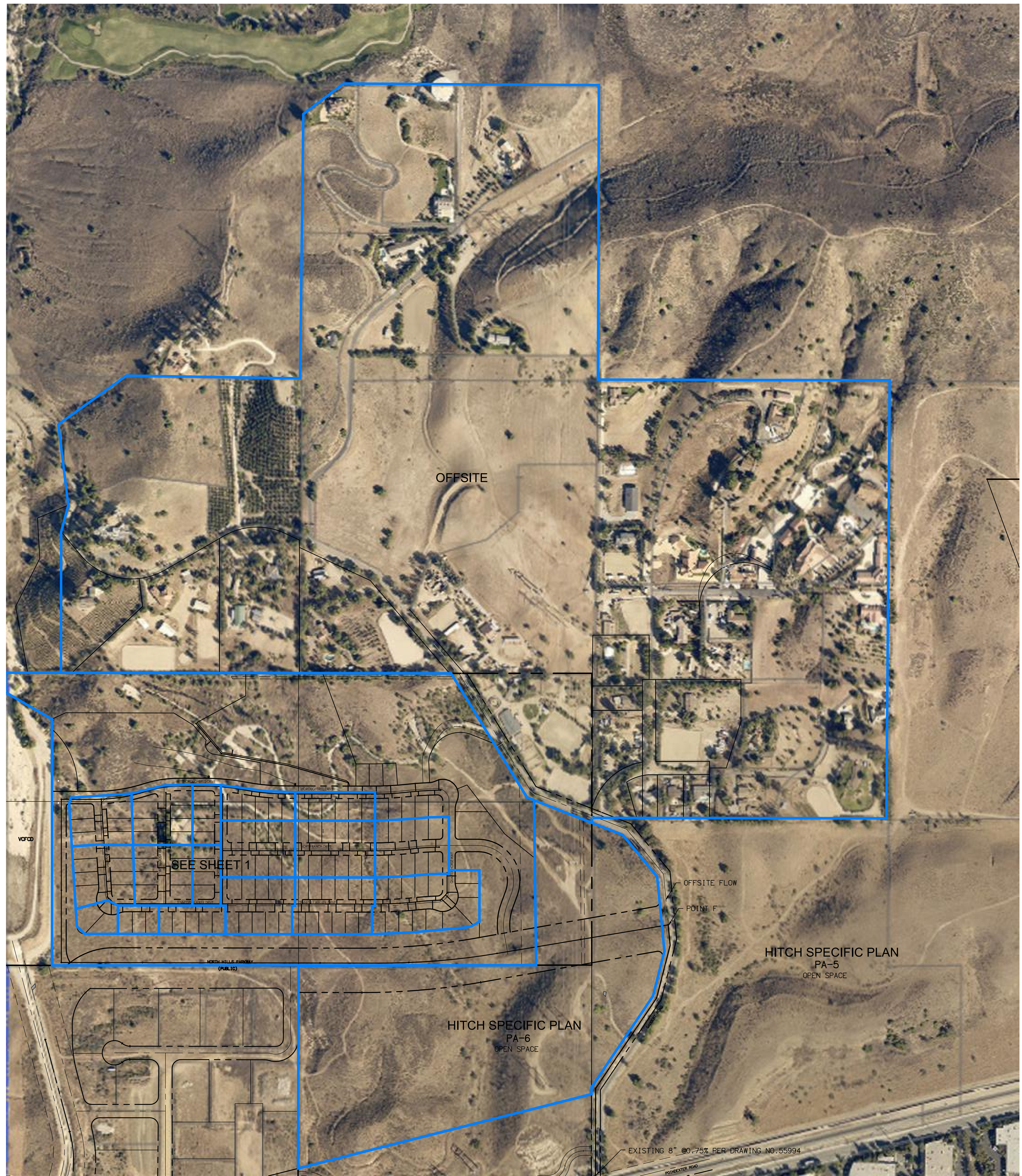
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<div>PREPARED BY</div> <div> DELANE ENGINEERING</div> <div><small>2812 SANTA MONICA BLVD. SUITE 206 SANTA MONICA, CA 90404 PHONE: 310.546.5711 WWW.DELANEENGINEERING.COM</small></div>	VTTM NO. 5847	
	SEWER STUDY - OFFSITE	
	OWNER/SUBDIVIDER	
<div>WEST POINTE HOMES RASMUSSEN DEVELOPMENT</div> <div><small>26500 WEST AGOURA ROAD #652 CALABASAS, CA 91302 OFFICE: 805.370.0165 JAMES RASMUSSEN</small></div>	SHEET	
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	OF SHEETS	

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Confluence Point

Table 1: Proposed Conditions:Sakioka Specific Plan																		
		Segment		Pipe		n	Capacity (cfs) ₂	Area (acres)	Zoning	# Dwelling Units	Population Density ₁	Building Density ₂	Calculated Avg Flows (cfs)	Peaking Factor	Calculated Peak Flows (cfs)	Cumulative Peak Flow (cfs)	% Full of Maxium Capacity	Reference Plan
	Street Name	MH #	MH #	Size (in)	Slope (%)		2/3 Depth (<12"); 3/4 Depth (>12")						Qavg=.00012* Pop. Density * Dwelling Unit	PF=2.65 * (Q _{avg}) ^{-0.1}	Peak Flow = Avg Flow * Peak Factor		(Cumulative Flows / Capacity) X100	
A	Sub-Area																	
	A1	North Ranch Drive		8	0.40	0.013	0.615	-	RPD	10	3.50	30.00	0.004	4.58	0.02	0.02	3.13%	
	A2	North Ranch Drive		8	0.40	0.013	0.615	-	RPD	12	3.50	30.00	0.005	4.50	0.02	0.04	6.81%	
	A3	North Ranch Drive		8	0.40	0.013	0.615	-	RPD	10	3.50	30.00	0.004	4.58	0.02	0.06	9.94%	
	A4	Morgan Way		8	0.40	0.013	0.615	-	RPD	4	3.50	30.00	0.002	5.02	0.01	0.07	11.31%	
				8	0.40	0.013	0.615	-								0.07	11.31%	
B	B1	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	14	3.50	30.00	0.006	4.43	0.03	0.03	4.23%	
	B2	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	12	3.50	30.00	0.005	4.50	0.02	0.05	7.92%	
	B3	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	10	3.50	30.00	0.004	4.58	0.02	0.07	11.05%	
	B4	Morgan Way		8	0.40	0.013	0.615	-	RPD	4	3.50	30.00	0.002	5.02	0.01	0.08	12.42%	
	A+B			8	0.40	0.013	0.615	-								0.15	23.73%	
C																		
	C1	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	5	3.50	30.00	0.002	4.91	0.01	0.01	1.68%	
	C2	Appaloosa Way		8	0.40	0.013	0.615	-	RPD	8	3.50	30.00	0.003	4.68	0.02	0.03	4.24%	
	C3	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	7	3.50	30.00	0.003	4.75	0.01	0.04	6.50%	
D	A+B+C			8	0.40	0.013	0.615	-								0.19	30.24%	
	D1	Thoroughbred Drive		8	0.40	0.013	0.615	-	RPD	9	3.50	30.00	0.004	4.63	0.02	0.02	2.85%	
	D2	Thoroughbred Drive		8	0.40	0.013	0.615	-	RPD	10	3.50	30.00	0.004	4.58	0.02	0.04	5.97%	
E	D3	Thoroughbred Drive		8	0.40	0.013	0.615	-	RPD	5	3.50	30.00	0.002	4.91	0.01	0.05	7.65%	
				8	0.40	0.013	0.615									0.05	7.65%	
	E1	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	3	3.50	30.00	0.001	5.17	0.01	0.01	1.06%	
	E2	Tennessee Walker Drive		8	0.40	0.013	0.615	-	RPD	2	3.50	30.00	0.001	5.38	0.00	0.01	1.79%	
F	E3	Shetland Way		8	0.40	0.013	0.615	-	RPD	8	3.50	30.00	0.003	4.68	0.02	0.03	4.35%	
	E4	Thoroughbred Drive/Shetland Way		8	0.40	0.013	0.615	-	RPD	6	3.50	30.00	0.003	4.82	0.01	0.04	6.33%	
	A+B+C+D+E			8	0.40	0.013	0.615	-								0.22	36.57%	

F	A+B+C+D+E	Potential Offsite Flows		8	0.75	0.13	0.843	179.56	R-O	-	3.50	1.90	0.143	3.22	0.46	0.69	81.38%	
		Hitch PA-6 (Open Space) ₃						28.76	-	-	-	-	-	-	-		-	

Gabbert/Poindexter

	EXISTING 8" @0.75%			8	0.75	0.13	0.843									0.69	81.38%	Drawing No. 55994
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- Notes:
1. Per Section 2.121 of Sewage Design Manual of Ventura County
 2. Per Section 2.122 of Sewage Design Manual of Ventura County. Only used for offsite and Area F4
 3. Open space area per Hitch Ranch Specific Plan and no contributing sewer flows.

Channel Report

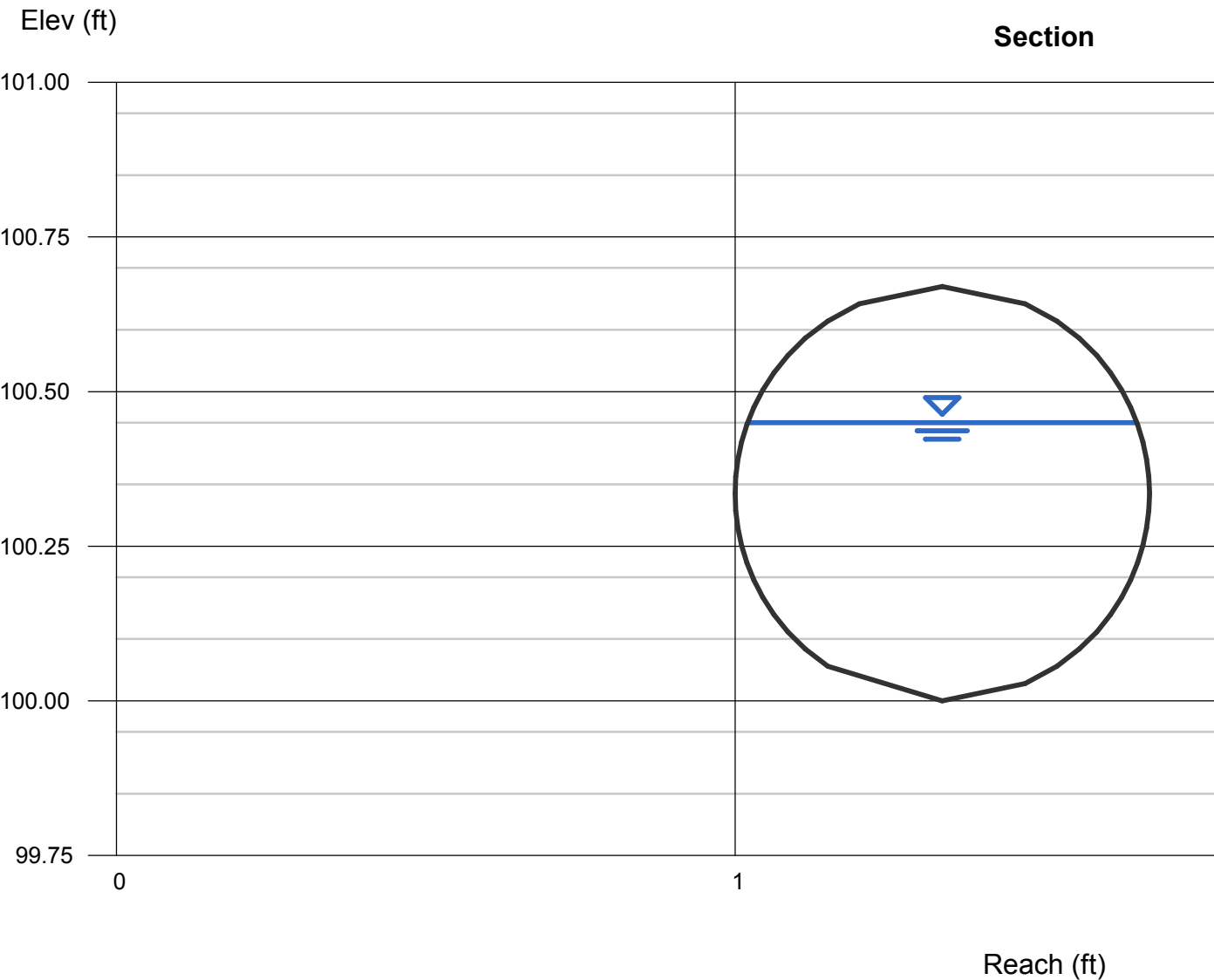
2/3 Full 8inch PVC @ 0.40%

Circular

Diameter (ft)	= 0.67
Invert Elev (ft)	= 100.00
Slope (%)	= 0.40
N-Value	= 0.013
Calculations	
Compute by:	Known Depth
Known Depth (ft)	= 0.45

Highlighted

Depth (ft)	= 0.45
Q (cfs)	= 0.615
Area (sqft)	= 0.25
Velocity (ft/s)	= 2.44
Wetted Perim (ft)	= 1.29
Crit Depth, Yc (ft)	= 0.37
Top Width (ft)	= 0.63
EGL (ft)	= 0.54



Channel Report

EXISTING 8INCH VCP @ 0.75%

Circular

Diameter (ft) = 0.67

Invert Elev (ft) = 100.00

Slope (%) = 0.75

N-Value = 0.013

Calculations

Compute by: Known Depth

Known Depth (ft) = 0.45

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Depth (ft) = 0.45

Q (cfs) = 0.843

Area (sqft) = 0.25

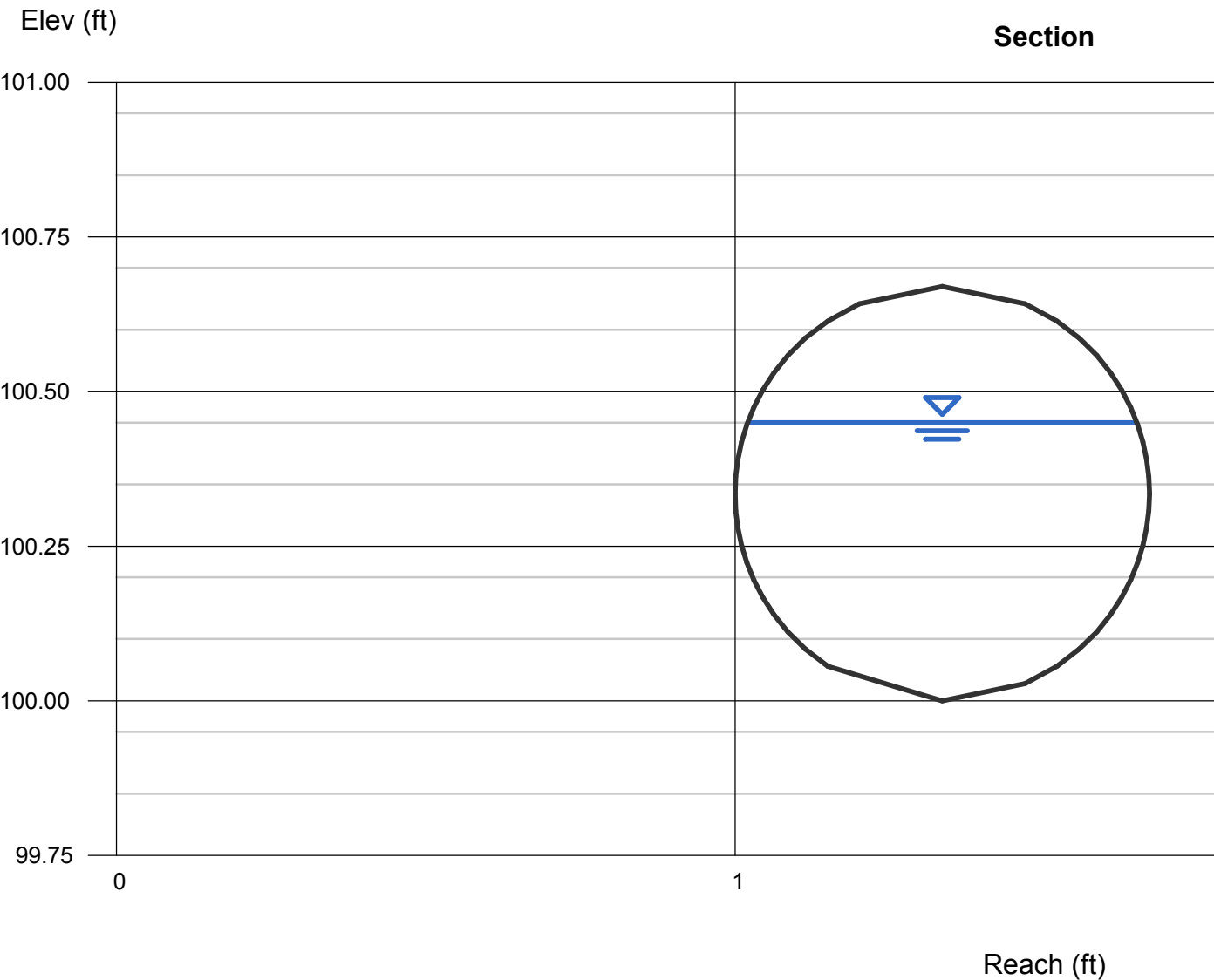
Velocity (ft/s) = 3.34

Wetted Perim (ft) = 1.29

Crit Depth, Yc (ft) = 0.44

Top Width (ft) = 0.63

EGL (ft) = 0.62



2.0 DESIGN CRITERIA

2.1 SEWER CAPACITIES

2.11 General

Sewers shall be designed to carry the peak flow rates from all areas tributary to them. Sewers shall be designed for both size and depth to accommodate developments in upstream tributary areas which would logically be served by them. The peak flow rate at any point shall be the average flow of all tributary areas times the factor
 $(2.65 * (\text{AVE CFS})^{-0.1})$.

Zoning shown in this section is that in effect in March 1986 as shown in the Ventura County Ordinance Code. Changes in zoning regulations shall be taken into consideration in computing flows.

2.12 Residential

2.121 Population Densities

Population The following population densities shall be used in establishing sewage flow:

<u>Type of Development</u>	<u>per Residential Unit</u>
Trailers and mobile homes on lots under 3000 S.F. in area	2.0
Multiple unit buildings with 5 or more residential units	2.2
Multiple unit buildings with 3 or 4 residential units	2.4
Multiple unit buildings with 2 residential units	2.8
Mobile homes on lots of 3000 to 6000 S.F. in area	2.8
Single family units and mobile homes on lots larger than 6000 S.F.	3.5

2.122 Building Density

Residential building density for undeveloped areas shall be taken from the following table.

<u>Zoning</u>	<u>Dwelling Units per Acre</u>
R-O	1.9
R-1	4.8
R-2	9.6
R-A	0.9
R-E	3.5
R-P-D	30

Densities given in this table may be reduced for areas where the average slope of the land exceeds 5% by multiplying the values in the table by $(1 - 0.025 * \text{Slope in } \%)$.

Existing developments or proposed developments with approved plans shall use the actual number of units.

2.123 Average Flow Rate

The average flow rate in cubic feet per second (CFS) shall be 0.00012 times the number of persons to be served.

2.13 Commercial and Manufacturing

Average flow rates for design shall be taken from the following table unless special conditions require additional capacity or an approved study indicates less capacity is required.

<u>Zoning</u>	<u>Average Flow Rate CFS per Acre</u>
C-O	0.005
C-I	0.003
C-P-D	0.006
M-I	0.009
M-2	0.009
M-3	0.012
PC	0.008

2.14 Hydraulic Design

2.141 Pipe size, flow quantity and hydraulic slope relationships shall be computed using the Manning Formula with $n=0.013$ or Hazen-Williams Formula with $C=100$ for pipes running full with adjustment of results for partially filled pipe based on ASCE Manual No. 37 (See Section 1.12) curves for Discharge and velocity when varies with depth.

2.142 To use full flow pipe formulas to determine pipe diameter or slope, multiply design flow or Manning's "n" by Factor A from the table below.

To use full flow pipe formulas to determine flow for a given pipe diameter and slope with $n=0.013$, divide the resultant flow by Factor A from the table below.

<u>Pipe Diameter</u>	<u>Maximum Depth at Design Peak Flow</u>	<u>Factor A for use with full pipe formula</u>
Less than 12"	2/3 Pipe Diam.	1.54
12" & greater	3/4 Pipe Diam.	1.25

2.15 Minimum Size

Minimum street sewer size shall be 8", except that 6" pipe may be used where all of the following conditions are met:

- The minimum slope is at least 0.8%.
- The length does not exceed 200 feet with no possibility of extension.
- Not more than 10 house laterals contribute to the 6" portion.

2.2 Minimum Sewer Slopes

2.21 Purpose

Minimum slope requirements are necessary to assure self-cleansing and self-oxidizing velocities in order to avoid significant generation of hazardous, odorous, and corrosive sulfur compounds.

2.22 Minimum Slopes

Slopes of sewers shall equal or exceed those set forth in the following table:

<u>Pipe Diameter</u>	<u>Corrosion Resistant Sewer Pipe Material (Sec. 3.41)</u>	<u>Other Sewer Pipe Material (Sec. 3.42)</u>
6"	0.0080	0.0100
8"	0.0040	0.0088
10"	0.0028	0.0060
12"	0.0024	0.0056
14"	0.0020	0.0048
15"	0.0020	0.0044
16"	0.0016	0.0040
18"	0.0016	0.0036
20"	0.0012	0.0032
21"	0.0012	0.0028
24"	0.0012	0.0024
27"	0.0012	0.0020
30"	0.0012	0.0016
33"	0.0012	0.0016
36"	0.0012	0.0012

2.23 Substandard Slopes

Slopes below the minimum slopes may be used in order to avoid pumping only upon specific approval of the Engineer. Such approval should be solicited well in advance of completion of design.

2.24 Pipe for Substandard Slopes

Pipe, in substandard slope areas and pipe in all areas downstream from substandard slope areas to the point where the peak flow rate is four times that in the section with substandard slope, shall be corrosion-resistant sewer pipe in accordance with Section 3.41.

2.3 Sewer Location

2.31 Roads

The centerline of sewers constructed in County roads shall not be closer than 4 feet to the centerline of the road nor closer than 4 feet to the curb. On divided highways, a separate sewer shall be installed to serve each side of the highway. Exceptions to these location requirements may be made only on approval of the Engineer.

The Specific Plan provides a variety of housing types and residential densities. Additionally, the plan provides for a 14+ acre public park along High Street. Private recreation and open space lands are also integrated throughout the plan. A statistical summary of the land use mix is provided in Table 2-1 and the Land Use Plan is illustrated in Figure 2-1.

TABLE 2-1 LAND USE SUMMARY

Planning Area	Land Use Category	Land Use Description	Gross Area (Acres)	Net Area (Acres)	Units	Maximum Density (du/net ac)
Single-Family Residential						
1	RPD-3U	Single-family Residential	55.41	28.90	81	2.8
2	RPD-6U	Single-family Residential	59.76	35.70	188	5.3
3	RPD-11U	Mixed Residential	32.80	24.90	250	10.1
4	RPD-22U	Multi-family Residential	16.247	10.80	236	21.9
Total Residential			164.44	100.3	755	7.53
Other Uses						
5		Water Quality Treatment	2.33			
Park A&B		High Street Park	14.11			
6		Open Space Lot	28.78			
Other		Roadways, Detention Areas, Open Space and other Public Facilities	63.31			
Total Other			106.20			
Project Total			270.64		755	2.79 (Gross Density)



Figure 2-1: Illustrative Land Use Plan

3.2.2 Wastewater System

The Ventura County Waterworks District No. 1 will provide sanitary sewer service for the project site. The existing wastewater collection system is a gravity-collection system. The nearest wastewater lines to the project site are along Gabbert Road and Poindexter Avenue. Two sewer lines in Gabbert Road (12-inch) and Poindexter Avenue (18-inch) will provide sewer service for the project site. Both lines drain through a network of pipelines to the existing 27-inch wastewater trunk line along the north levee of the Arroyo Simi flood control channel. The District's Wastewater Master Plan does not indicate any current deficiencies in the system. The exact configuration of the sewage collection system for the project will be determined at the time individual tract maps are prepared for each phase of the Specific Plan. Figure 3-3 illustrates the proposed Wastewater System. District No. 1 requires that new development wastewater systems connect to the District's

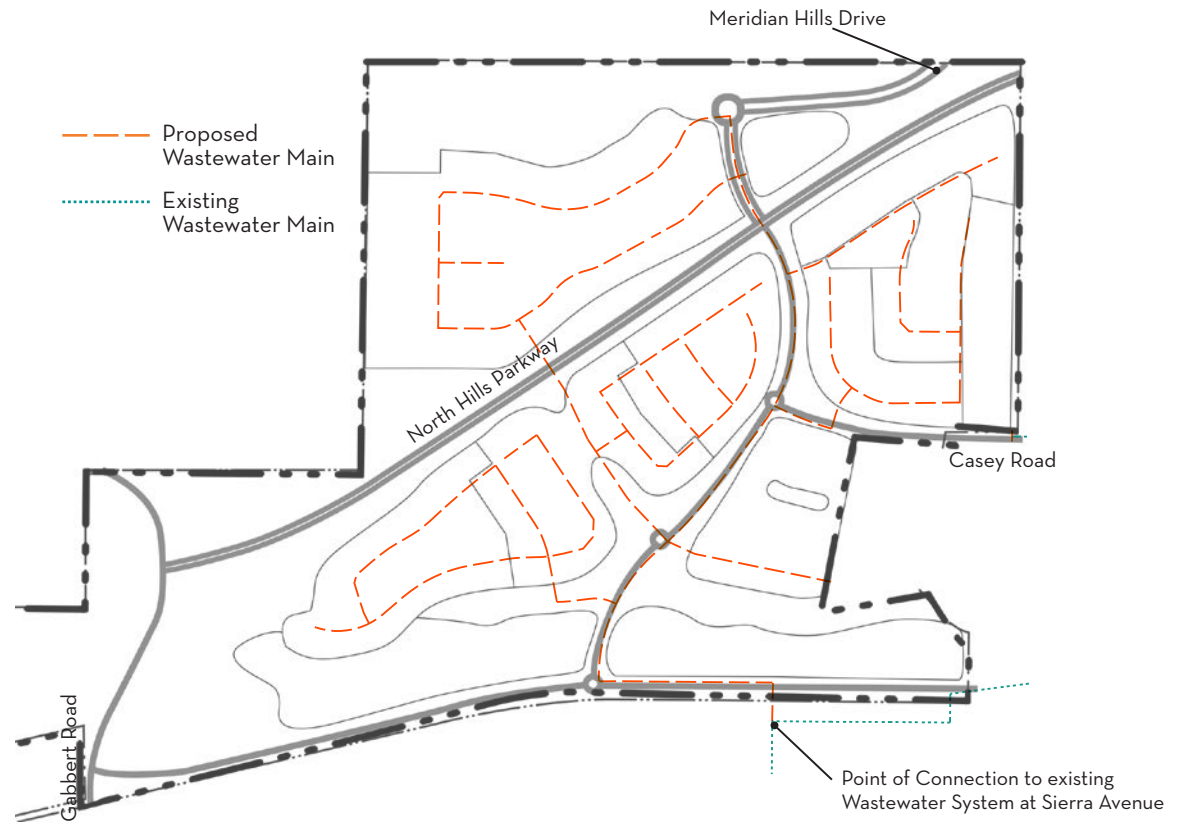


Figure 3-3: Wastewater System

existing wastewater system. Any developer constructing a new wastewater line is required to coordinate the construction and dedication of any such wastewater system with District No. 1 for future operation and maintenance. It would then be the responsibility of the

District to upgrade the wastewater collection and treatment system by providing relief for existing trunk lines nearing capacity and expanding treatment facilities.