

APPENDIX 3.1.9-2
Overview of Sewer

**OVERVIEW OF SEWER
FOR THE
ESCONDIDO COUNTRY CLUB PROJECT
IN THE CITY OF ESCONDIDO**

May 23, 2017

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Job No. 736-015

INTRODUCTION

This report provides an overview of sewer service for the Escondido Country Club project in the City of Escondido. This report will develop conceptual sewer service plans for the project and will also evaluate capacity of the existing offsite sewer system under existing conditions as well as proposed conditions based on the development of the Escondido Country Club project.

PROJECT OVERVIEW

The Escondido Country Club project is located in the northwestern section of the City of Escondido west of Interstate 15, and north of El Norte Parkway. Figure 1 presents a vicinity map showing the subject property.

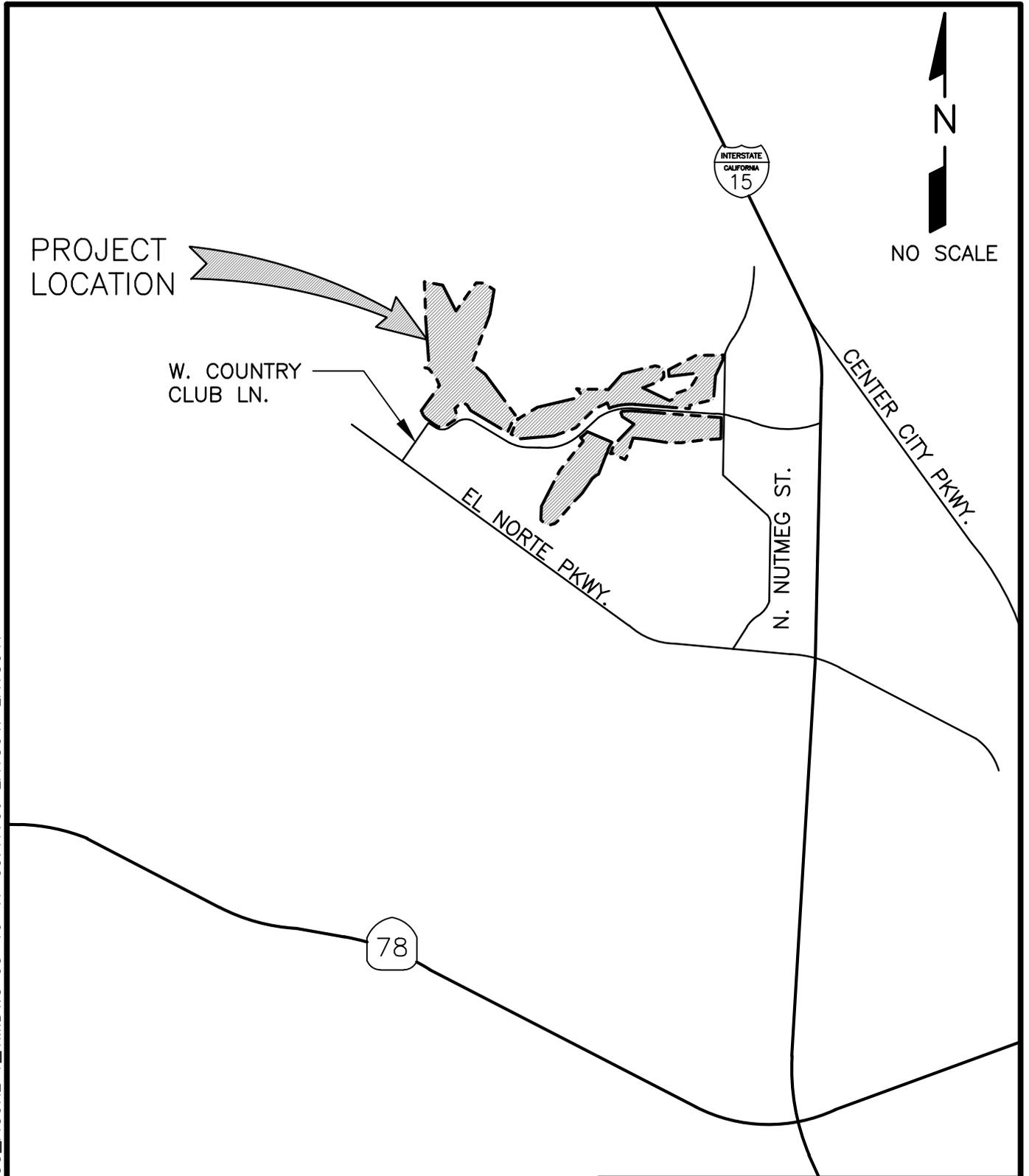
DEVELOPMENT PLAN

The Escondido Country Club project plans to develop the site into 392 dwelling units on approximately 109 acres.

TOPOGRAPHY

The existing topography on the property ranges in elevation from a low of approximately 725 feet to a high of approximately 785 feet. The topography generally increases from south to north.

\\ARTIC\DWG\736015\ECC_FIGURE 1_VM.DWG 03-10-17 09:17:06 LAYOUT: LAYOUT1



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FIGURE 1
VICINITY MAP
ESCONDIDO COUNTRY CLUB

SEWER SERVICE

Sewer service for the Escondido Country Club project will be provided by the City of Escondido (City). The project is planning to construct new gravity sewer pipelines that will abut to the existing sewer collection system. The existing sewer collection system in the vicinity of the Escondido Country Club project consists of 8-inch, 10-inch and 12-inch piping. The sewer system flows south to the City of Escondido's Lift Station No. 4, which is located north of El Norte Parkway and east of Woodland Parkway. Lift Station No. 4 ultimately conveys sewage flow to the Hale Avenue Resource Recovery Facility (HARRF).

All proposed lines for the project will connect to existing infrastructure. There are a total of eight proposed connections for the project: four connections in Country Club Lane, one connection in Jason Glenn, one connection in Gary Lane, one connection in La Brea Street, and one connection near Foxfire Place.

The design criteria used to generate sewer flow estimates is based on the City of Escondido Sewer Design Standards, updated April 2014. To estimate average sewage flows from residential developments, an average dry weather generation factor of 200 gpd/DU was utilized. The projected average dry weather flow from the Escondido Country Club project is 78,400 gpd (392 DUs). Using Table 3-1 in the 2012 Escondido Wastewater Master Plan the project's peak flow was determined to be 128,400 gpd. The City of Escondido Capacity Fee is \$7,500 per unit or \$2,940,000 for 392 dwelling units.

In order to analyze the impact of the Escondido Country Club project on the existing offsite sewer system the sewer system downstream of the project was analyzed under existing peak flow conditions and under existing peak flows plus proposed peak flow from the Escondido Country Club project. Existing sewer system as-builts were utilized for the analysis. Appendix A provides the analysis of the sewer system under the two peak sewer flow scenarios. Exhibit A provides the sewer manhole diagram for the sewer system analysis.

The City of Escondido Design Criteria requires that the depth of flow in sewer lines with diameters less than 12 inches do not exceed half the diameter. For diameters 12 inches and larger, the depth of flow shall not exceed three-fourths of the diameter.

The results of the existing flow analysis indicate that the 8-inch diameter sewer lines have a maximum d/D ratio of 0.41 and the 10-inch diameter sewer lines have a maximum d/D ratio of 0.40, which are both less than the maximum allowable d/D of 0.50. The existing 12-inch

diameter sewer lines have a maximum d/D ratio of 0.44 which is less than the maximum allowable d/D ratio of 0.75.

With the addition of flows from the Escondido Country Club project, the analysis indicates that the 8-inch diameter sewer lines have a maximum d/D ratio of 0.46 and the 10-inch diameter lines have a maximum d/D ratio of 0.45; both of which remain less than half full. For the 12-inch diameter sewer lines analyzed, the maximum d/D ratio is 0.49 which remains less than the maximum allowable d/D ratio of 0.75.

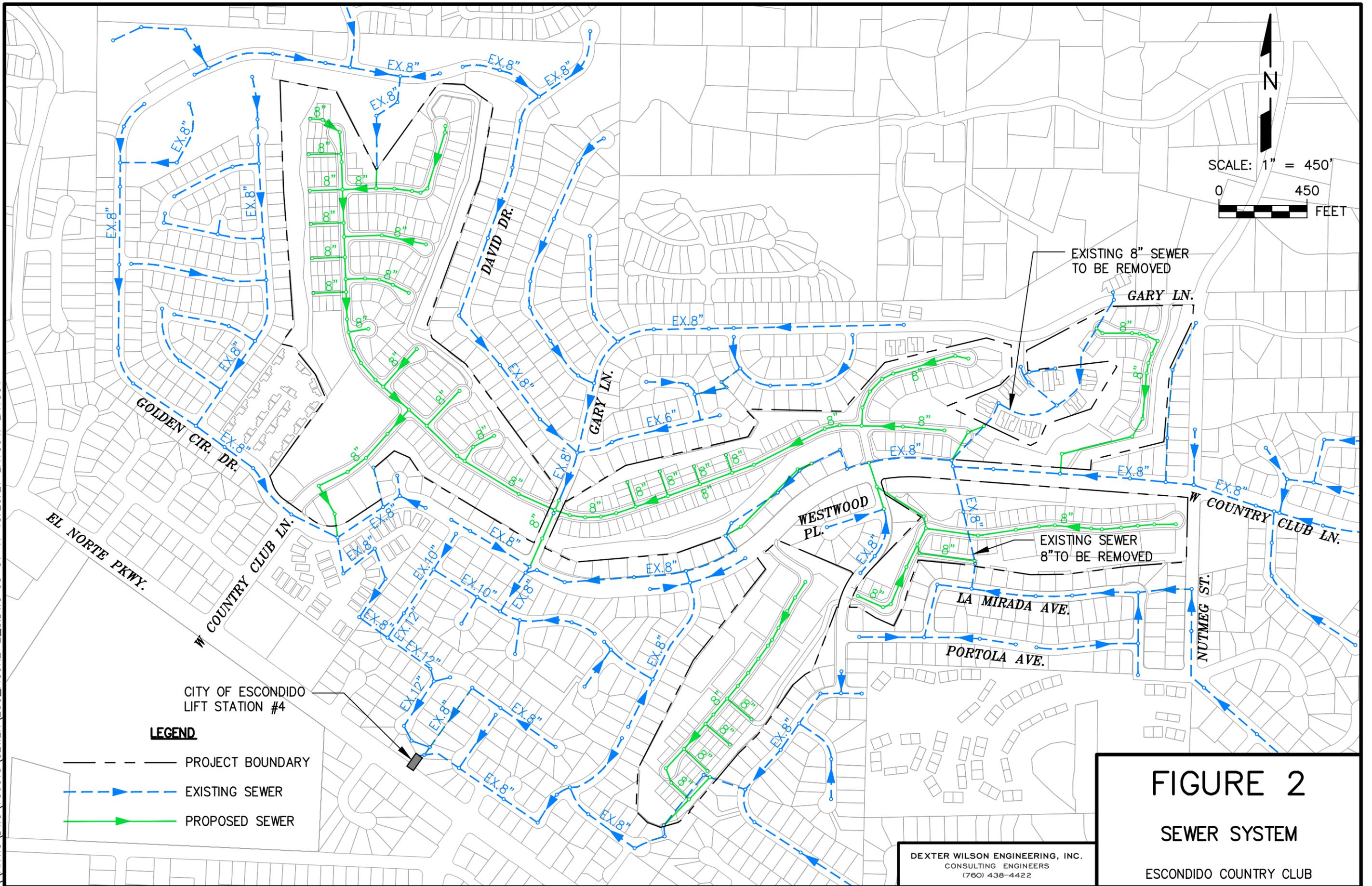
These results indicate that the addition of the Escondido Country Club project sewer flows do not result in any downstream sewer reaches exceeding the design criteria of one-half full pipe capacity for 8-inch and 10-inch reaches or three-fourths full pipe capacity for 12-inch reaches.

The City of Escondido Design Criteria also requires that a minimum velocity of 2 feet per second be maintained at average flow volume. In order to analyze the impact of the Escondido Country Club project on the velocities in the existing offsite sewer system the sewer system downstream of the project was analyzed under existing average flow conditions and under existing average flows plus proposed average flow from the Escondido Country Club project. This analysis is presented in Appendix B. The sewer manhole diagram presented in Exhibit A also corresponds to this appendix. The results show that several sewer reaches do not meet the velocity design criterion under existing flows. With the addition of flows from the Escondido Country Club project the velocities improve; however, there are still several reaches that do not meet the velocity design criterion.

As previously mentioned, sewage flow from the Escondido Country Club project will be conveyed to Lift Station No. 4. Lift Station No. 4 has a maximum capacity of 1,008,000 gpd. The estimated existing peak flow to Lift Station No. 4 is 650,880 gpd. At the project's buildout, the peak flow to the pump station will be approximately 779,300 gpd. Because this is less than the maximum capacity of Lift Station No. 4, there may be no upgrades necessary for it to continue to serve this zone. Although there is plenty of theoretical capacity after the addition of flows from the Escondido Country Club project, inflow is a known concern at this lift station and peak flows in February 2017 were near the capacity of the station. This could have been from inflow or from diminished station capacity. A more detailed analysis of Lift Station No. 4 is recommended to assess its capacity.

Figure 2 provides the layout of the existing and proposed sewer system, and identifies the sewer service analysis boundary.

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LEGEND

- PROJECT BOUNDARY
- - - - - EXISTING SEWER
- PROPOSED SEWER

FIGURE 2

SEWER SYSTEM

ESCONDIDO COUNTRY CLUB

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APPENDIX A

SEWER SYSTEM ANALYSIS RESULTS – PEAK FLOWS

DATE: 5/23/2017**SEWER STUDY SUMMARY**FOR: Escondido Country Club Offsite Sewer without Project Flows - Peak Flow AnalysisSHT 1 OF 2JOB NUMBER: 736-015BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET: _____

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK 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.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	2	4	154.0	154.0	200	30,800	51,617	0.052	0.080	8	1.60	0.024201	0.10354	0.155	0.0777	2.31
	4	8	0.0	154.0	200	30,800	51,617	0.052	0.080	8	1.51	0.024912	0.10503	0.158	0.0793	2.27
	8	10	259.0	413.0	200	82,600	135,056	0.135	0.209	8	0.40	0.126646	0.23823	0.357	0.2520	1.87
	10	12	0.0	413.0	200	82,600	135,056	0.135	0.209	8	1.71	0.061252	0.16374	0.246	0.1497	3.14
	12	16	0.0	413.0	200	82,600	135,056	0.135	0.209	8	1.82	0.059372	0.16119	0.242	0.1464	3.21
	16	20	0.0	413.0	200	82,600	135,056	0.135	0.209	8	0.46	0.117587	0.22901	0.344	0.2388	1.97
	20	24	2.0	415.0	200	83,000	135,694	0.136	0.210	8	0.46	0.118143	0.22958	0.344	0.2397	1.97
	24	28	1.0	416.0	200	83,200	136,013	0.136	0.210	8	0.44	0.121884	0.23342	0.350	0.2451	1.93
	28	32	2.0	418.0	200	83,600	136,650	0.137	0.211	8	0.48	0.117343	0.22876	0.343	0.2385	1.99
	32	36	1.0	419.0	200	83,800	136,969	0.137	0.212	8	0.43	0.123448	0.23500	0.352	0.2474	1.93
	36	40	0.0	419.0	200	83,800	136,969	0.137	0.212	8	0.44	0.123022	0.23457	0.352	0.2468	1.93
	40	44	4.0	423.0	200	84,600	138,244	0.138	0.214	8	0.66	0.100920	0.21139	0.317	0.2140	2.25
	44	48	42.0	465.0	200	93,000	151,611	0.152	0.235	8	0.66	0.110679	0.22185	0.333	0.2286	2.31
	48	52	3.0	468.0	200	93,600	152,565	0.153	0.236	8	1.38	0.077023	0.18391	0.276	0.1763	3.01
	52	54	2.0	470.0	200	94,000	153,200	0.153	0.237	8	3.15	0.051193	0.14962	0.224	0.1318	4.05
	54	64	0.0	470.0	200	94,000	153,200	0.153	0.237	8	0.60	0.117297	0.22872	0.343	0.2384	2.24
	56	60	562.0	562.0	200	112,400	182,371	0.182	0.282	8	1.46	0.089666	0.19881	0.298	0.1966	3.23
	60	62	0.0	562.0	200	112,400	182,371	0.182	0.282	8	2.60	0.067077	0.17138	0.257	0.1597	3.98
	62	64	7.0	569.0	200	113,800	184,586	0.185	0.286	8	1.47	0.090414	0.19967	0.300	0.1977	3.25
	64	68	2.0	1041.0	200	208,200	332,643	0.333	0.515	8	1.47	0.162714	0.27279	0.409	0.3024	3.83
	68	70	20.0	1061.0	200	212,200	338,873	0.339	0.524	10	0.50	0.156758	0.33409	0.401	0.2943	2.57
	70	72	9.0	1070.0	200	214,000	341,675	0.342	0.529	10	0.50	0.158054	0.33560	0.403	0.2961	2.57
	72	76	11.0	1081.0	200	216,200	345,099	0.345	0.534	10	1.08	0.108520	0.27449	0.329	0.2254	3.41
	76	104	6.0	1087.0	200	217,400	346,967	0.347	0.537	12	0.41	0.108999	0.33016	0.330	0.2261	2.37
	80	84	262.0	262.0	200	52,400	86,658	0.087	0.134	8	0.50	0.072682	0.17857	0.268	0.1692	1.78
	84	88	3.0	265.0	200	53,000	87,625	0.088	0.136	8	0.50	0.073493	0.17961	0.269	0.1706	1.79
	88	92	11.0	276.0	200	55,200	91,170	0.091	0.141	8	0.50	0.076466	0.18323	0.275	0.1754	1.81
	92	96	5.0	281.0	200	56,200	92,780	0.093	0.144	8	0.50	0.077817	0.18487	0.277	0.1776	1.82
	96	104	20.0	301.0	200	60,200	99,212	0.099	0.154	8	1.87	0.043028	0.13719	0.206	0.1165	2.97
	104	108	10.0	1398.0	200	279,600	443,439	0.443	0.686	12	0.41	0.138967	0.37554	0.376	0.2696	2.55
	108	112	0.0	1398.0	200	279,600	443,439	0.443	0.686	12	0.38	0.145662	0.38523	0.385	0.2790	2.46
	112	116	12.0	1410.0	200	282,000	447,149	0.447	0.692	12	0.24	0.183601	0.43760	0.438	0.3304	2.09
	116	120	2.0	1412.0	200	282,400	447,768	0.448	0.693	12	0.29	0.167256	0.41549	0.415	0.3086	2.25
	120	124	0.0	1412.0	200	282,400	447,768	0.448	0.693	12	0.29	0.167256	0.41549	0.415	0.3086	2.25
	124	156	16.0	1428.0	200	285,600	452,714	0.453	0.701	12	10.16	0.028570	0.16844	0.168	0.0873	8.02

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK 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.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	128	132	66.0	66.0	200	13,200	22,595	0.023	0.035	8	1.97	0.009548	0.06624	0.099	0.0405	1.94
	132	136	3.0	69.0	200	13,800	23,596	0.024	0.037	8	2.19	0.009456	0.06592	0.099	0.0402	2.04
	136	140	10.0	79.0	200	15,800	26,925	0.027	0.042	8	1.70	0.012247	0.07458	0.112	0.0482	1.95
	140	142	3.0	82.0	200	16,400	27,921	0.028	0.043	8	1.70	0.012700	0.07583	0.114	0.0494	1.97
	142	144	9.0	91.0	200	18,200	30,905	0.031	0.048	8	1.93	0.013193	0.07720	0.116	0.0507	2.12
	144	146	3.0	94.0	200	18,800	31,898	0.032	0.049	8	1.00	0.018918	0.09195	0.138	0.0654	1.70
	146	148	5.0	99.0	200	19,800	33,551	0.034	0.052	8	3.00	0.011488	0.07236	0.109	0.0461	2.53
	148	152	10.0	109.0	200	21,800	36,851	0.037	0.057	8	1.45	0.018150	0.09012	0.135	0.0635	2.02
	152	156	9.0	118.0	200	23,600	39,815	0.040	0.062	8	1.00	0.023613	0.10232	0.153	0.0764	1.81
	156	PS	0.0	1546.0	200	309,200	489,151	0.489	0.757	12	0.50	0.139151	0.37581	0.376	0.2698	2.80

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,546

Min Slope
0.24

Max dn/D
0.44

DATE: 5/23/2017

SEWER STUDY SUMMARY

JOB NUMBER: 736-015

FOR: Escondido Country Club Offsite Sewer with Project Flows - Peak Flow Analysis
 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 2
 REFER TO PLAN SHEET: _____

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK 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.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	128	132	150.0	150.0	200	30,000	50,310	0.050	0.078	8	1.97	0.021258	0.09724	0.146	0.0710	2.47
	132	136	3.0	153.0	200	30,600	51,291	0.051	0.079	8	2.19	0.020555	0.09568	0.144	0.0693	2.58
	136	140	10.0	163.0	200	32,600	54,557	0.055	0.084	8	1.70	0.024816	0.10482	0.157	0.0791	2.40
	140	142	3.0	166.0	200	33,200	55,535	0.056	0.086	8	1.70	0.025261	0.10575	0.159	0.0801	2.41
	142	144	9.0	175.0	200	35,000	58,469	0.058	0.090	8	1.93	0.024960	0.10513	0.158	0.0794	2.56
	144	146	3.0	178.0	200	35,600	59,446	0.059	0.092	8	1.00	0.035256	0.12437	0.187	0.1012	2.04
	146	148	5.0	183.0	200	36,600	61,074	0.061	0.095	8	3.00	0.020912	0.09647	0.145	0.0701	3.03
	148	152	10.0	193.0	200	38,600	64,325	0.064	0.100	8	1.45	0.031681	0.11811	0.177	0.0939	2.38
	152	156	9.0	202.0	200	40,400	67,248	0.067	0.104	8	1.00	0.039883	0.13214	0.198	0.1104	2.12
	156	PS	0.0	1938.0	200	387,600	609,725	0.610	0.943	12	0.50	0.173451	0.42399	0.424	0.3169	2.98

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,938

Min Slope
0.24

Max dn/D
0.49

DATE: 5/23/2017

SEWER STUDY SUMMARY

FOR: Escondido Country Club Offsite Sewer with Project Flows - Peak Flow Analysis
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 2
 REFER TO PLAN SHEET: _____

JOB NUMBER: 736-015

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK 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.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	2	4	170.0	170.0	200	34,000	56,840	0.057	0.088	8	1.60	0.026650	0.10853	0.163	0.0832	2.38
	4	8	0.0	170.0	200	34,000	56,840	0.057	0.088	8	1.51	0.027433	0.11006	0.165	0.0849	2.33
	8	10	0.0	170.0	200	34,000	56,840	0.057	0.088	8	0.40	0.053300	0.15274	0.229	0.1358	1.46
	10	12	0.0	170.0	200	34,000	56,840	0.057	0.088	8	1.71	0.025779	0.10682	0.160	0.0813	2.43
	12	16	320.0	490.0	200	98,000	159,553	0.160	0.247	8	1.82	0.070141	0.17531	0.263	0.1649	3.37
	16	20	0.0	490.0	200	98,000	159,553	0.160	0.247	8	0.46	0.138916	0.25031	0.375	0.2695	2.06
	20	24	2.0	492.0	200	98,400	160,188	0.160	0.248	8	0.46	0.139468	0.25085	0.376	0.2703	2.06
	24	28	1.0	493.0	200	98,600	160,505	0.161	0.248	8	0.44	0.143833	0.25508	0.383	0.2764	2.02
	28	32	2.0	495.0	200	99,000	161,140	0.161	0.249	8	0.48	0.138372	0.24978	0.375	0.2687	2.09
	32	36	1.0	496.0	200	99,200	161,458	0.161	0.250	8	0.43	0.145519	0.25668	0.385	0.2788	2.02
	36	40	0.0	496.0	200	99,200	161,458	0.161	0.250	8	0.44	0.145017	0.25621	0.384	0.2781	2.02
	40	44	4.0	500.0	200	100,000	162,727	0.163	0.252	8	0.66	0.118793	0.23025	0.345	0.2406	2.35
	44	48	42.0	542.0	200	108,400	176,041	0.176	0.272	8	0.66	0.128513	0.24011	0.360	0.2548	2.41
	48	52	3.0	545.0	200	109,000	176,991	0.177	0.274	8	1.38	0.089354	0.19845	0.298	0.1961	3.14
	52	54	2.0	547.0	200	109,400	177,624	0.178	0.275	8	3.15	0.059354	0.16116	0.242	0.1464	4.22
	54	64	0.0	547.0	200	109,400	177,624	0.178	0.275	8	0.60	0.135997	0.24745	0.371	0.2653	2.33
	56	60	562.0	562.0	200	112,400	182,371	0.182	0.282	8	1.46	0.089666	0.19881	0.298	0.1966	3.23
	60	62	153.0	715.0	200	143,000	230,628	0.231	0.357	8	2.60	0.084826	0.19325	0.290	0.1889	4.25
	62	64	7.0	722.0	200	144,400	232,829	0.233	0.360	8	1.47	0.114045	0.22536	0.338	0.2336	3.47
	64	68	2.0	1271.0	200	254,200	404,116	0.404	0.625	8	1.47	0.197675	0.30419	0.456	0.3490	4.03
	68	70	20.0	1291.0	200	258,200	410,315	0.410	0.635	10	0.50	0.189806	0.37156	0.446	0.3387	2.70
	70	72	9.0	1300.0	200	260,000	413,103	0.413	0.639	10	0.50	0.191096	0.37300	0.448	0.3404	2.70
	72	76	11.0	1311.0	200	262,200	416,511	0.417	0.644	10	1.08	0.130976	0.30316	0.364	0.2582	3.59
	76	104	6.0	1317.0	200	263,400	418,370	0.418	0.647	12	0.41	0.131431	0.36446	0.364	0.2589	2.50
	80	84	340.0	340.0	200	68,000	111,726	0.112	0.173	8	0.50	0.093708	0.20340	0.305	0.2029	1.92
	84	88	3.0	343.0	200	68,600	112,688	0.113	0.174	8	0.50	0.094514	0.20431	0.306	0.2041	1.92
	88	92	11.0	354.0	200	70,800	116,210	0.116	0.180	8	0.50	0.097468	0.20762	0.311	0.2087	1.94
	92	96	5.0	359.0	200	71,800	117,810	0.118	0.182	8	0.50	0.098810	0.20908	0.314	0.2108	1.95
	96	104	20.0	379.0	200	75,800	124,204	0.124	0.192	8	1.87	0.053867	0.15356	0.230	0.1368	3.16
	104	108	10.0	1706.0	200	341,200	538,448	0.538	0.833	12	0.41	0.168742	0.41756	0.418	0.3106	2.68
	108	112	0.0	1706.0	200	341,200	538,448	0.538	0.833	12	0.38	0.176871	0.42861	0.429	0.3215	2.59
	112	116	12.0	1718.0	200	343,600	542,140	0.542	0.839	12	0.24	0.222605	0.48847	0.488	0.3812	2.20
	116	120	2.0	1720.0	200	344,000	542,755	0.543	0.840	12	0.29	0.202737	0.46291	0.463	0.3556	2.36
	120	124	0.0	1720.0	200	344,000	542,755	0.543	0.840	12	0.29	0.202737	0.46291	0.463	0.3556	2.36
	124	156	16.0	1736.0	200	347,200	547,678	0.548	0.847	12	10.16	0.034563	0.18478	0.185	0.0998	8.49

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	C _a for Velocity ⁽³⁾	Page 2 VELOCITY (f.p.s.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	128	132	150.0	150.0	200	30,000	50,310	0.050	0.078	8	1.97	0.021258	0.09724	0.146	0.0710	2.47
	132	136	3.0	153.0	200	30,600	51,291	0.051	0.079	8	2.19	0.020555	0.09568	0.144	0.0693	2.58
	136	140	10.0	163.0	200	32,600	54,557	0.055	0.084	8	1.70	0.024816	0.10482	0.157	0.0791	2.40
	140	142	3.0	166.0	200	33,200	55,535	0.056	0.086	8	1.70	0.025261	0.10575	0.159	0.0801	2.41
	142	144	9.0	175.0	200	35,000	58,469	0.058	0.090	8	1.93	0.024960	0.10513	0.158	0.0794	2.56
	144	146	3.0	178.0	200	35,600	59,446	0.059	0.092	8	1.00	0.035256	0.12437	0.187	0.1012	2.04
	146	148	5.0	183.0	200	36,600	61,074	0.061	0.095	8	3.00	0.020912	0.09647	0.145	0.0701	3.03
	148	152	10.0	193.0	200	38,600	64,325	0.064	0.100	8	1.45	0.031681	0.11811	0.177	0.0939	2.38
	152	156	9.0	202.0	200	40,400	67,248	0.067	0.104	8	1.00	0.039883	0.13214	0.198	0.1104	2.12
	156	PS	0.0	1938.0	200	387,600	609,725	0.610	0.943	12	0.50	0.173451	0.42399	0.424	0.3169	2.98

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,938

Min Slope
0.24

Max dn/D
0.49

DATE: 5/23/2017

SEWER STUDY SUMMARY

FOR: Escondido Country Club Offsite Sewer without Project Flows - Peak Flow Analysis

SHT 2 OF 2

JOB NUMBER: 736-015

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET: _____

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	PEAK 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.)
			IN-LINE	TOTAL				M.G.D.	C.F.S.							
	128	132	66.0	66.0	200	13,200	22,595	0.023	0.035	8	1.97	0.009548	0.06624	0.099	0.0405	1.94
	132	136	3.0	69.0	200	13,800	23,596	0.024	0.037	8	2.19	0.009456	0.06592	0.099	0.0402	2.04
	136	140	10.0	79.0	200	15,800	26,925	0.027	0.042	8	1.70	0.012247	0.07458	0.112	0.0482	1.95
	140	142	3.0	82.0	200	16,400	27,921	0.028	0.043	8	1.70	0.012700	0.07583	0.114	0.0494	1.97
	142	144	9.0	91.0	200	18,200	30,905	0.031	0.048	8	1.93	0.013193	0.07720	0.116	0.0507	2.12
	144	146	3.0	94.0	200	18,800	31,898	0.032	0.049	8	1.00	0.018918	0.09195	0.138	0.0654	1.70
	146	148	5.0	99.0	200	19,800	33,551	0.034	0.052	8	3.00	0.011488	0.07236	0.109	0.0461	2.53
	148	152	10.0	109.0	200	21,800	36,851	0.037	0.057	8	1.45	0.018150	0.09012	0.135	0.0635	2.02
	152	156	9.0	118.0	200	23,600	39,815	0.040	0.062	8	1.00	0.023613	0.10232	0.153	0.0764	1.81
	156	PS	0.0	1546.0	200	309,200	489,151	0.489	0.757	12	0.50	0.139151	0.37581	0.376	0.2698	2.80

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,546

Min Slope
0.24

Max dn/D
0.44

APPENDIX B

SEWER SYSTEM ANALYSIS RESULTS – AVERAGE FLOWS

DATE: 5/23/2017

SEWER STUDY SUMMARY

FOR: Escondido Country Club Offsite Sewer without Project Flows - Avg. Flow Analysis
 JOB NUMBER: 736-015 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 2
 REFER TO PLAN SHEET: _____

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	AVG. DRY WEATHER FLOW (cfs)	PEAK 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 AT AVG. FLOW (f.p.s.)
			IN-LINE	TOTAL					M.G.D.	C.F.S.							
	128	132	66.0	66.0	200	13,200	0.020	22,595	0.023	0.035	8	1.97	0.005578	0.05126	0.077	0.0278	1.65
	132	136	3.0	69.0	200	13,800	0.021	23,596	0.024	0.037	8	2.19	0.005530	0.05105	0.077	0.0276	1.74
	136	140	10.0	79.0	200	15,800	0.024	26,925	0.027	0.042	8	1.70	0.007187	0.05780	0.087	0.0332	1.66
	140	142	3.0	82.0	200	16,400	0.025	27,921	0.028	0.043	8	1.70	0.007460	0.05887	0.088	0.0340	1.68
	142	144	9.0	91.0	200	18,200	0.028	30,905	0.031	0.048	8	1.93	0.007770	0.06007	0.090	0.0351	1.81
	144	146	3.0	94.0	200	18,800	0.029	31,898	0.032	0.049	8	1.00	0.011150	0.07130	0.107	0.0451	1.45
	146	148	5.0	99.0	200	19,800	0.031	33,551	0.034	0.052	8	3.00	0.006780	0.05622	0.084	0.0318	2.17
	148	152	10.0	109.0	200	21,800	0.034	36,851	0.037	0.057	8	1.45	0.010737	0.07001	0.105	0.0440	1.73
	152	156	9.0	118.0	200	23,600	0.037	39,815	0.040	0.062	8	1.00	0.013996	0.07943	0.119	0.0529	1.55
	156	PS	0.0	1546.0	200	309,200	0.478	489,151	0.489	0.757	12	0.50	0.087959	0.29527	0.295	0.1939	2.47

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,546

Min Slope
0.24

Max dn/D
0.34

DATE: 5/23/2017

SEWER STUDY SUMMARY

FOR: Escondido Country Club Offsite Sewer without Project Flows - Avg. Flow Analysis
 BY: Dexter Wilson Engineering, Inc.

SHT 1 OF 2
 REFER TO PLAN SHEET: _____

JOB NUMBER: 736-015

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	AVG. DRY WEATHER FLOW (cfs)	PEAK 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 AT AVG. FLOW (f.p.s.)	
			IN-LINE	TOTAL					M.G.D.	C.F.S.								
	2	4	154.0	154.0	200	30,800	0.048	51,617	0.052	0.080	8	1.60	0.014441	0.08064	0.121	0.0540	1.98	
	4	8	0.0	154.0	200	30,800	0.048	51,617	0.052	0.080	8	1.51	0.014865	0.08177	0.123	0.0552	1.94	
	8	10	259.0	413.0	200	82,600	0.128	135,056	0.135	0.209	8	0.40	0.077456	0.18443	0.277	0.1770	1.62	
	10	12	0.0	413.0	200	82,600	0.128	135,056	0.135	0.209	8	1.71	0.037462	0.12810	0.192	0.1056	2.72	
	12	16	0.0	413.0	200	82,600	0.128	135,056	0.135	0.209	8	1.82	0.036312	0.12617	0.189	0.1033	2.78	
	16	20	0.0	413.0	200	82,600	0.128	135,056	0.135	0.209	8	0.46	0.071916	0.17758	0.266	0.1679	1.71	
	20	24	2.0	415.0	200	83,000	0.128	135,694	0.136	0.210	8	0.46	0.072264	0.17803	0.267	0.1685	1.71	
	24	28	1.0	416.0	200	83,200	0.129	136,013	0.136	0.210	8	0.44	0.074557	0.18092	0.271	0.1723	1.68	
	28	32	2.0	418.0	200	83,600	0.129	136,650	0.137	0.211	8	0.48	0.071788	0.17742	0.266	0.1677	1.74	
	32	36	1.0	419.0	200	83,800	0.130	136,969	0.137	0.212	8	0.43	0.075527	0.18209	0.273	0.1739	1.68	
	36	40	0.0	419.0	200	83,800	0.130	136,969	0.137	0.212	8	0.44	0.075267	0.18178	0.273	0.1735	1.68	
	40	44	4.0	423.0	200	84,600	0.131	138,244	0.138	0.214	8	0.66	0.061759	0.16443	0.247	0.1506	1.96	
	44	48	42.0	465.0	200	93,000	0.144	151,611	0.152	0.235	8	0.66	0.067892	0.17243	0.259	0.1611	2.01	
	48	52	3.0	468.0	200	93,600	0.145	152,565	0.153	0.236	8	1.38	0.047254	0.14372	0.216	0.1245	2.62	
	52	54	2.0	470.0	200	94,000	0.145	153,200	0.153	0.237	8	3.15	0.031411	0.11761	0.176	0.0934	3.50	
	54	64	0.0	470.0	200	94,000	0.145	153,200	0.153	0.237	8	0.60	0.071971	0.17765	0.266	0.1680	1.95	
	56	60	562.0	562.0	200	112,400	0.174	182,371	0.182	0.282	8	1.46	0.055264	0.15551	0.233	0.1392	2.81	
	60	62	0.0	562.0	200	112,400	0.174	182,371	0.182	0.282	8	2.60	0.041341	0.13451	0.202	0.1132	3.46	
	62	64	7.0	569.0	200	113,800	0.176	184,586	0.185	0.286	8	1.47	0.055742	0.15617	0.234	0.1401	2.83	
	64	68	2.0	1041.0	200	208,200	0.322	332,643	0.333	0.515	8	1.47	0.101842	0.21240	0.319	0.2154	3.37	
	68	70	20.0	1061.0	200	212,200	0.328	338,873	0.339	0.524	10	0.50	0.098161	0.26047	0.313	0.2098	2.25	
	70	72	9.0	1070.0	200	214,000	0.331	341,675	0.342	0.529	10	0.50	0.098994	0.26160	0.314	0.2110	2.26	
	72	76	11.0	1081.0	200	216,200	0.335	345,099	0.345	0.534	10	1.08	0.067986	0.21568	0.259	0.1613	2.99	
	76	104	6.0	1087.0	200	217,400	0.336	346,967	0.347	0.537	12	0.41	0.068296	0.25942	0.259	0.1618	2.08	
	80	84	262.0	262.0	200	52,400	0.081	86,658	0.087	0.134	8	0.50	0.043949	0.13865	0.208	0.1183	1.54	
	84	88	3.0	265.0	200	53,000	0.082	87,625	0.088	0.136	8	0.50	0.044452	0.13945	0.209	0.1192	1.55	
	88	92	11.0	276.0	200	55,200	0.085	91,170	0.091	0.141	8	0.50	0.046298	0.14227	0.213	0.1227	1.57	
	92	96	5.0	281.0	200	56,200	0.087	92,780	0.093	0.144	8	0.50	0.047136	0.14354	0.215	0.1243	1.57	
	96	104	20.0	301.0	200	60,200	0.093	99,212	0.099	0.154	8	1.87	0.026108	0.10747	0.161	0.0820	2.56	
	104	108	10.0	1398.0	200	279,600	0.433	443,439	0.443	0.686	12	0.41	0.087623	0.29469	0.295	0.1933	2.24	
	108	112	0.0	1398.0	200	279,600	0.433	443,439	0.443	0.686	12	0.38	0.091844	0.30194	0.302	0.2000	2.16	
	112	116	12.0	1410.0	200	282,000	0.436	447,149	0.447	0.692	12	0.24	0.115790	0.34075	0.341	0.2362	1.85	
	116	120	2.0	1412.0	200	282,400	0.437	447,768	0.448	0.693	12	0.29	0.105486	0.32449	0.324	0.2209	1.98	
	120	124	0.0	1412.0	200	282,400	0.437	447,768	0.448	0.693	12	0.29	0.105486	0.32449	0.324	0.2209	1.98	
	124	156	16.0	1428.0	200	285,600	0.442	452,714	0.453	0.701	12	10.16	0.018024	0.13473	0.135	0.0632	6.99	

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	AVG. DRY WEATHER FLOW (cfs)	PEAK FLOW (gpd)	PEAK FLOW (DESIGN FLOW)		LINE SIZE (inches)	DESIGN SLOPE (%)	DEPTH K' ⁽¹⁾	dn (feet)	dn/D ⁽²⁾	Page Velocity ⁽³⁾	VELOCITY AT AVG. FLOW (f.p.s.)
			IN-LINE	TOTAL					M.G.D.	C.F.S.							
	128	132	66.0	66.0	200	13,200	0.020	22,595	0.023	0.035	8	1.97	0.005578	0.05126	0.077	0.0278	1.65
	132	136	3.0	69.0	200	13,800	0.021	23,596	0.024	0.037	8	2.19	0.005530	0.05105	0.077	0.0276	1.74
	136	140	10.0	79.0	200	15,800	0.024	26,925	0.027	0.042	8	1.70	0.007187	0.05780	0.087	0.0332	1.66
	140	142	3.0	82.0	200	16,400	0.025	27,921	0.028	0.043	8	1.70	0.007460	0.05887	0.088	0.0340	1.68
	142	144	9.0	91.0	200	18,200	0.028	30,905	0.031	0.048	8	1.93	0.007770	0.06007	0.090	0.0351	1.81
	144	146	3.0	94.0	200	18,800	0.029	31,898	0.032	0.049	8	1.00	0.011150	0.07130	0.107	0.0451	1.45
	146	148	5.0	99.0	200	19,800	0.031	33,551	0.034	0.052	8	3.00	0.006780	0.05622	0.084	0.0318	2.17
	148	152	10.0	109.0	200	21,800	0.034	36,851	0.037	0.057	8	1.45	0.010737	0.07001	0.105	0.0440	1.73
	152	156	9.0	118.0	200	23,600	0.037	39,815	0.040	0.062	8	1.00	0.013996	0.07943	0.119	0.0529	1.55
	156	PS	0.0	1546.0	200	309,200	0.478	489,151	0.489	0.757	12	0.50	0.087959	0.29527	0.295	0.1939	2.47

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,546

Min Slope
0.24

Max dn/D
0.34

DATE: 5/23/2017

SEWER STUDY SUMMARY

FOR: Escondido Country Club Offsite Sewer with Project Flows - Avg. Flow Analysis
 JOB NUMBER: 736-015 BY: Dexter Wilson Engineering, Inc.

SHT 2 OF 2
 REFER TO PLAN SHEET: _____

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	AVG. DRY WEATHER FLOW (cfs)	PEAK 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.)	
			IN-LINE	TOTAL					M.G.D.	C.F.S.								
	128	132	150.0	150.0	200	30,000	0.046	50,310	0.050	0.078	8	1.97	0.012676	0.07577	0.114	0.0493	2.12	
	132	136	3.0	153.0	200	30,600	0.047	51,291	0.051	0.079	8	2.19	0.012263	0.07462	0.112	0.0482	2.21	
	136	140	10.0	163.0	200	32,600	0.050	54,557	0.055	0.084	8	1.70	0.014829	0.08168	0.123	0.0551	2.06	
	140	142	3.0	166.0	200	33,200	0.051	55,535	0.056	0.086	8	1.70	0.015101	0.08240	0.124	0.0558	2.07	
	142	144	9.0	175.0	200	35,000	0.054	58,469	0.058	0.090	8	1.93	0.014941	0.08198	0.123	0.0554	2.20	
	144	146	3.0	178.0	200	35,600	0.055	59,446	0.059	0.092	8	1.00	0.021113	0.09692	0.145	0.0706	1.76	
	146	148	5.0	183.0	200	36,600	0.057	61,074	0.061	0.095	8	3.00	0.012532	0.07537	0.113	0.0490	2.60	
	148	152	10.0	193.0	200	38,600	0.060	64,325	0.064	0.100	8	1.45	0.019011	0.09217	0.138	0.0656	2.05	
	152	156	9.0	202.0	200	40,400	0.063	67,248	0.067	0.104	8	1.00	0.023960	0.10304	0.155	0.0772	1.82	
	156	PS	0.0	1938.0	200	387,600	0.600	609,725	0.610	0.943	12	0.50	0.110262	0.33213	0.332	0.2280	2.63	

*Based on Peaking Factor Formula: $Q_{peak} = 2.17(Q_{avg})^{0.975}$

Total EDU
1,938

Min Slope
0.24

Max dn/D
0.38

DATE: 5/23/2017

SEWER STUDY SUMMARY

Page 1

FOR: Escondido Country Club Offsite Sewer with Project Flows - Avg. Flow Analysis

SHT 1 OF 2

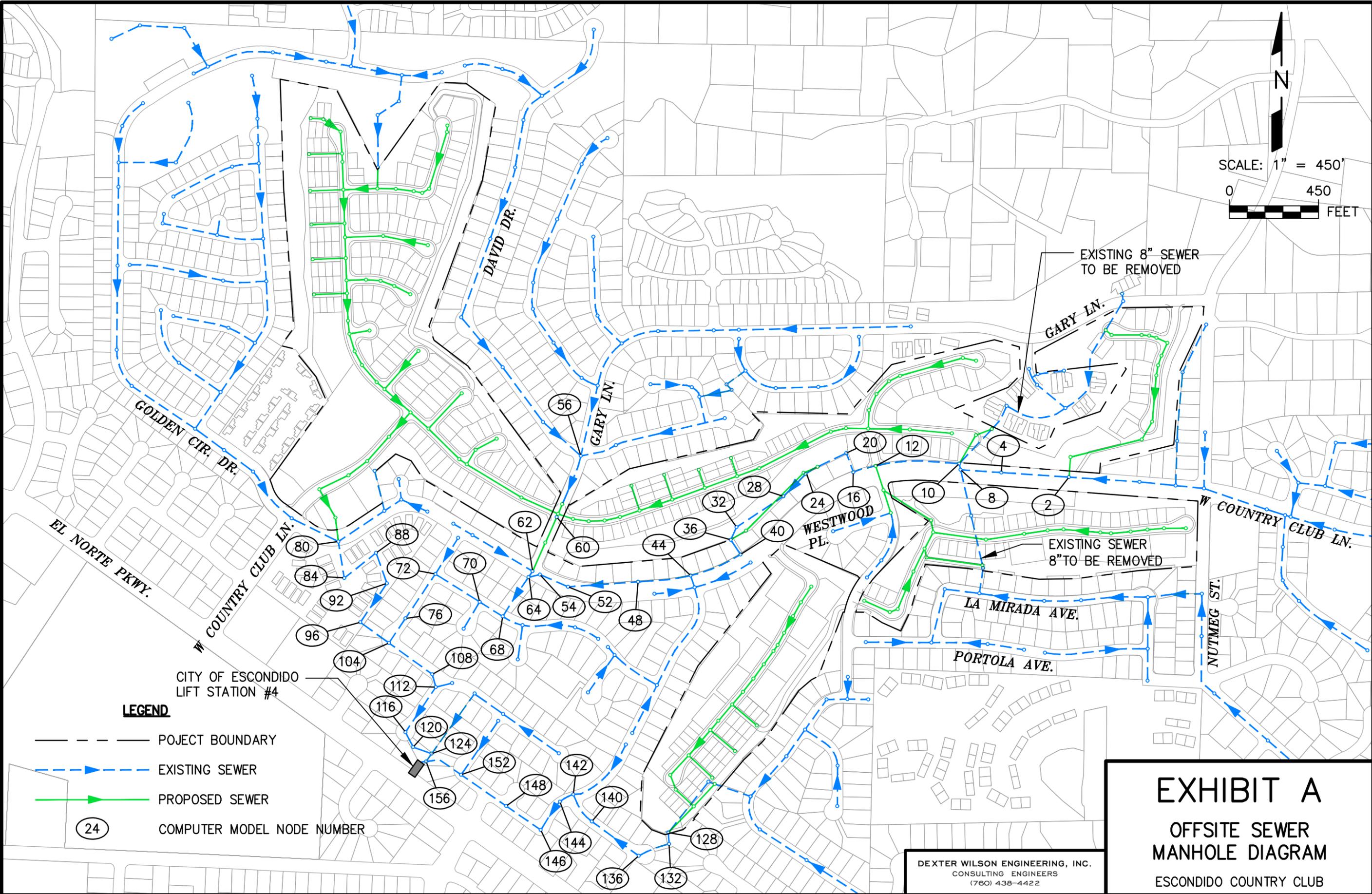
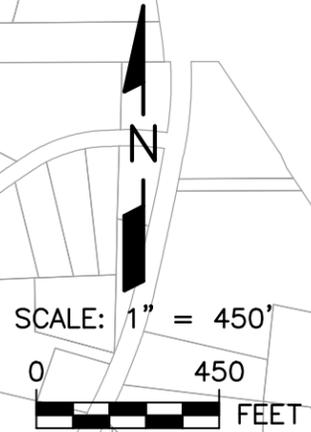
JOB NUMBER: 736-015

BY: Dexter Wilson Engineering, Inc.

REFER TO PLAN SHEET:

LINE	FROM	TO	EDUs SERVED		SEWAGE PER CAPITA/DAY (gpd/EDU)	AVG. DRY WEATHER FLOW (gpd)	AVG. DRY WEATHER FLOW (cfs)	PEAK 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.)	
			IN-LINE	TOTAL					M.G.D.	C.F.S.								
	2	4	170.0	170.0	200	34,000	0.053	56,840	0.057	0.088	8	1.60	0.015941	0.08464	0.127	0.0580	2.04	
	4	8	0.0	170.0	200	34,000	0.053	56,840	0.057	0.088	8	1.51	0.016409	0.08589	0.129	0.0592	2.00	
	8	10	0.0	170.0	200	34,000	0.053	56,840	0.057	0.088	8	0.40	0.031883	0.11849	0.178	0.0944	1.25	
	10	12	0.0	170.0	200	34,000	0.053	56,840	0.057	0.088	8	1.71	0.015420	0.08325	0.125	0.0566	2.09	
	12	16	320.0	490.0	200	98,000	0.152	159,553	0.160	0.247	8	1.82	0.043082	0.13727	0.206	0.1166	2.93	
	16	20	0.0	490.0	200	98,000	0.152	159,553	0.160	0.247	8	0.46	0.085324	0.19382	0.291	0.1897	1.80	
	20	24	2.0	492.0	200	98,400	0.152	160,188	0.160	0.248	8	0.46	0.085672	0.19422	0.291	0.1902	1.80	
	24	28	1.0	493.0	200	98,600	0.153	160,505	0.161	0.248	8	0.44	0.088358	0.19731	0.296	0.1945	1.77	
	28	32	2.0	495.0	200	99,000	0.153	161,140	0.161	0.249	8	0.48	0.085012	0.19346	0.290	0.1892	1.82	
	32	36	1.0	496.0	200	99,200	0.153	161,458	0.161	0.250	8	0.43	0.089407	0.19851	0.298	0.1961	1.76	
	36	40	0.0	496.0	200	99,200	0.153	161,458	0.161	0.250	8	0.44	0.089099	0.19816	0.297	0.1957	1.77	
	40	44	4.0	500.0	200	100,000	0.155	162,727	0.163	0.252	8	0.66	0.073002	0.17898	0.268	0.1697	2.05	
	44	48	42.0	542.0	200	108,400	0.168	176,041	0.176	0.272	8	0.66	0.079134	0.18647	0.280	0.1797	2.10	
	48	52	3.0	545.0	200	109,000	0.169	176,991	0.177	0.274	8	1.38	0.055029	0.15518	0.233	0.1388	2.73	
	52	54	2.0	547.0	200	109,400	0.169	177,624	0.178	0.275	8	3.15	0.036557	0.12659	0.190	0.1038	3.67	
	54	64	0.0	547.0	200	109,400	0.169	177,624	0.178	0.275	8	0.60	0.083762	0.19198	0.288	0.1872	2.03	
	56	60	562.0	562.0	200	112,400	0.174	182,371	0.182	0.282	8	1.46	0.055264	0.15551	0.233	0.1392	2.81	
	60	62	153.0	715.0	200	143,000	0.221	230,628	0.231	0.357	8	2.60	0.052596	0.15170	0.228	0.1344	3.70	
	62	64	7.0	722.0	200	144,400	0.223	232,829	0.233	0.360	8	1.47	0.070730	0.17606	0.264	0.1659	3.03	
	64	68	2.0	1271.0	200	254,200	0.393	404,116	0.404	0.625	8	1.47	0.124343	0.23590	0.354	0.2487	3.56	
	68	70	20.0	1291.0	200	258,200	0.400	410,315	0.410	0.635	10	0.50	0.119440	0.28864	0.346	0.2416	2.38	
	70	72	9.0	1300.0	200	260,000	0.402	413,103	0.413	0.639	10	0.50	0.120273	0.28971	0.348	0.2428	2.39	
	72	76	11.0	1311.0	200	262,200	0.406	416,511	0.417	0.644	10	1.08	0.082451	0.23802	0.286	0.1851	3.16	
	76	104	6.0	1317.0	200	263,400	0.408	418,370	0.418	0.647	12	0.41	0.082747	0.28616	0.286	0.1855	2.20	
	80	84	340.0	340.0	200	68,000	0.105	111,726	0.112	0.173	8	0.50	0.057033	0.15796	0.237	0.1423	1.66	
	84	88	3.0	343.0	200	68,600	0.106	112,688	0.113	0.174	8	0.50	0.057537	0.15866	0.238	0.1432	1.67	
	88	92	11.0	354.0	200	70,800	0.110	116,210	0.116	0.180	8	0.50	0.059382	0.16120	0.242	0.1464	1.68	
	92	96	5.0	359.0	200	71,800	0.111	117,810	0.118	0.182	8	0.50	0.060220	0.16234	0.244	0.1479	1.69	
	96	104	20.0	379.0	200	75,800	0.117	124,204	0.124	0.192	8	1.87	0.032874	0.12030	0.180	0.0964	2.74	
	104	108	10.0	1706.0	200	341,200	0.528	538,448	0.538	0.833	12	0.41	0.106927	0.32682	0.327	0.2230	2.37	
	108	112	0.0	1706.0	200	341,200	0.528	538,448	0.538	0.833	12	0.38	0.112078	0.33497	0.335	0.2307	2.29	
	112	116	12.0	1718.0	200	343,600	0.532	542,140	0.542	0.839	12	0.24	0.141083	0.37865	0.379	0.2726	1.95	
	116	120	2.0	1720.0	200	344,000	0.532	542,755	0.543	0.840	12	0.29	0.128495	0.36014	0.360	0.2547	2.09	
	120	124	0.0	1720.0	200	344,000	0.532	542,755	0.543	0.840	12	0.29	0.128495	0.36014	0.360	0.2547	2.09	
	124	156	16.0	1736.0	200	347,200	0.537	547,678	0.548	0.847	12	10.16	0.021911	0.14804	0.148	0.0725	7.41	

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EXISTING 8" SEWER TO BE REMOVED

GARY LN.

EXISTING SEWER 8" TO BE REMOVED

W COUNTRY CLUB LN.

LA MIRADA AVE.

PORTOLA AVE.

NUTMEG ST.

CITY OF ESCONDIDO LIFT STATION #4

LEGEND

- PROJECT BOUNDARY
- - - EXISTING SEWER
- PROPOSED SEWER
- (24) COMPUTER MODEL NODE NUMBER

EXHIBIT A

OFFSITE SEWER MANHOLE DIAGRAM

ESCONDIDO COUNTRY CLUB

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422