Water System Design Report for Amended Vesting Tentative Tract No. 53138 Deerlake Ranch

Las Virgenes Municipal Water District

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Las Virgenes Municipal Water District
Preliminary Water System Design Report
for
Amended Vesting Tentative Tract No. 53138
Deerlake Ranch
Los Angeles County, California

Table of Contents

Section 1 - Introduction 1-1

Section 2 - Proposed Development 2-1

Section 3 - Potable Water Demand 3-1

Section 4 - Existing Potable Water System 4-1

Section 5 - Proposed Potable Water System 5-1

Section 6 - Recycled Water 6-1

Section 7 - Sewer System 7-1

Section 8 - Construction Phasing and Acceptance 8-1

Section 9 - Water Conservation 9-1

Section 10 - Financial Impact on District 10-1

Section 11 - Environmental Review 11-1

Section 12 - Conclusions and Recommendations 12-1

Section 13 - Limitations 13-1

References

Plates

Appendices

Las Virgenes Municipal Water District
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for
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Deerlake Ranch
Los Angeles County, California

Section 1 - Introduction

Amended Vesting Tentative Tract No. 53138 is located on approximately 232.87 acres in the hills northeast of the Topanga Canyon Blvd. interchange with California Highway 118 (Simi Valley Freeway) in Los Angeles County, California. The development includes 314 single-family residential lots, one recreation building, one sheriff facility, and 31 open space/slope lots.

The purpose of this Water System Design Report (WSDR) is to investigate the feasibility of providing potable water service to Amended Vesting Tentative Tract No. 53138, and to develop criteria for the facilities required to provide adequate service. Potable water demand for the proposed development is based on the HDR Technical Memorandum Water Demand Estimate Study, May 2 2017. Fire protection requirements are as determined by the Los Angeles County Fire Department.

The owner and developer of Amended Vesting Tentative Tract No. 53138 is Forestar Chatsworth, LLC, 4590 MacArthur Blvd., Suite 600, Newport Beach, California 92660, (949) 748-6714. The developer's engineer is United Civil Inc., 30141 Agoura Road, Suite 215, Agoura Hills, California 91301, (818) 707-8648.

The Preliminary WSDR for Amended Vesting Tentative Tract No. 53138 was completed by Boyle Engineering Corporation on April 24, 2001. The report has since undergone five revisions, which were completed in January 2002, July 2003, March 2004, and December 2014 and August 2017 (Reference 2). Revision 5 included the Kennedy Jenks Consultants Storage and Pumping Capacity Study dated July 16, 2016 and the HDR Technical Memorandum Water Demand Estimate Study dated May 2, 2017.

Section 2 - Proposed Development

Amended Vesting Tentative Tract No. 53138, shown on **Plate 1**, comprises approximately 232.87 acres, in an unincorporated area of Los Angeles County, northeast of the Topanga Canyon Boulevard Interchange with California State Highway 118. Access to the proposed development will be from Topanga Canyon Boulevard on the west and from Canoga Avenue on the south.

The proposed development is zoned R-1-6000 (Low Density Urban Residential) and A-1-1 (Non-urban Residential), and includes 314 single-family residential lots, one recreation building, one sheriff facility, and 31 open space/slope lots. The grading quantity is 1,874,600 CY which will be balanced on site. According to the developer's tentative tract map (**Appendix A**), ground elevations within the proposed development range from approximately 1,160 feet at the horse trail in the southeast corner, to 1,485.1 at the end of Wurster Way on the north edge of the tract. Proposed building pad elevations range from 1,261.5 feet on Poema Place (lot 18), east of the bridge, to 1,485.1 feet at lot 174 on Wurster Way.

Section 3 - Potable Water Demand

The potable water demand estimated for the proposed development is shown in **Tables 1, 2, and 3**. Each table represents a different phase of the project. Demand will be generated by residential use and landscape irrigation. The demands are based on the HDR Technical Memorandum dated May 2, 2017; (**Appendix D)** The Los Angeles County Fire Department requires that a 1,250 gpm fire flow be available to serve the residential units, with a residual pressure of 20-psi maintained for two hours at the flowing fire hydrants. The recreation building and sheriff facility requires a 1,500 gpm fire flow at 20 psi for a duration of 2 hrs. Pipeline sizes were determined by analyzing maximum day demand with concurrent fire flow, and peak hour demand. However, The Church at Rocky Peak is the largest structure within the subsystem with a required fire flow of 3,750 gpm for three (3) hrs.

TABLE 1

Phase 1 Estimated Potable Water Demand for Amended Vesting Tentative Tract No. 53138

				Estimated Water Demand (gpm)		
Hydraulic Gradient Zone	**Land Use**	**No. of Units or Acres**	**Demand Criteria**	**Avg. Day Demand**	**Max. Day Demand**	**Peak Hour Demand**
1585	Interior Residential	103 Units	240 gpd/unit (1)	17.5	64.8	87.6
1585	Level Landscaped Private Areas	7.83	5 acre-ft./acre/year (2) (3.08 gpm/acre)	24.3	89.8	121.3
1585	Sloped Private Areas	16.58	1.3 acre-ft./acre/year(3) (.80 gpm/acre)	13.4	49.4	66.8
1585	Common Landscaped Areas	20.65	2.5 acre-ft./acre/year(4) (1.55 gpm/acre)	32.0	118.4	160.0
1585	Sheriff Station	0.44	3 acre-ft./acre/year (5) (1.85 gpm/acre)	0.82	2.63	4.1
1585	Rec Center	1.96	3 acre-ft./acre/year(5) (1.85 gpm/acre)	3.64	11.7	18.2
			Total Demand	**91.6**	**336.8**	**458.00**

MDD factor - 3.7 & PHD factor = 5.0 from HDR report

(1) Interior demand criteria from HDR report 80 gpcd * 3 persons per unit.

(2) Level landscaped private areas = 3,310.61 sf per lot, from HDR table 7 entry divided by 314 units

(3) Sloped private areas = 7,011.69 sf per lot, from HDR table 7 entry divided by 314 units

(4) Common area = 44.7 ac from HDR report prorated to phase I & II based on 2/9/2016 WSDR

(5) Sheriff & Rec center from 2/9/2016 WSDR

TABLE 2

Phases 1 & 2 Estimated Potable Water Demand for Amended Vesting Tentative Tract No. 53138

				Estimated Water Demand (gpm)		
Hydraulic Gradient Zone	**Land Use**	**No. of Units or Acres**	**Demand Criteria**	**Avg. Day Demand**	**Max. Day Demand**	**Peak Hour Demand**
1585	Interior Residential	245 Units	240 gpd/unit (1)	41.7	64.8	208.3
1585	Level Landscaped Private Areas	18.62	5 acre-ft./acre/year (2) (3.08 gpm/acre)	57.7	89.8	288.6
1585	Sloped Private Areas	39.44	1.3 acre-ft./acre/year(3) (0.80 gpm/acre)	31.8	49.4	158.9
1585	Common Landscaped Areas	29.05	2.5 acre-t./acre/year(4) (1.55 gpm/acre)	45.0	118.4	225.1
1585	Sheriff Station	0.44	3 acre-ft./acre/year (5) (1.85 gpm/acre)	0.82	2.63	4.1
1585	Rec Center	1.96	3 acre-ft./acre/year (5) (1.85 gpm/acre)	3.64	11.7	18.2
			Total Demand	**180.6**	**666.2**	**903.2**

MDD factor - 3.7 & PHD factor = 5.0 from HDR report

(1) Interior demand criteria from HDR report 80 gpcd * 3 persons per unit.

(2) Level landscaped private areas = 3,310.61 sf per lot, from HDR table 7 entry divided by 314 units

(3) Sloped private areas = 7,011.69 sf per lot, from HDR table 7 entry divided by 314 units

(4) Common area = 44.7 ac from HDR report prorated to phase I & II based on 2/9/2016 WSDR

(5) Sheriff & Rec center from 2/9/2016 WSDR

TABLE 3

Phases 1, 2, & 3 Estimated Potable Water Demand for Amended Vesting Tentative Tract No. 53138

				Estimated Water Demand (gpm)		
Hydraulic Gradient Zone	**Land Use**	**No. of Units**	**Demand Criteria**	**Avg. Day Demand**	**Max. Day Demand**	**Peak Hour Demand**
1585	Interior Residential	314 Units	240 gpd/unit (1)	53.4	197.5	266.9
1585	Level Landscaped Private Areas	23.86	5 acre-ft./acre/year (2) (3.08 gpm/acre)	74.0	273.7	369.9
1585	Sloped Private Areas	50.54	1.3 acre-ft./acre/year(3) (0.80 gpm/acre)	40.7	150.7	203.7
1585	Common Landscaped Areas	44.70	2.5 acre-ft./acre/year(4) (1.55 gpm/acre)	69.3	256.4	346.4
1585	Sheriff Station	0.44	3 acre-ft./acre/year (5) (1.85 gpm/acre)	0.82	2.63	4.1
1585	Rec Center	1.96	3 acre-ft./acre/year (5) (1.85 gpm/acre)	3.64	11.7	18.2
			Total Demand	**241.8**	**892.6**	**1,209.2**

MDD factor - 3.7 & PHD factor = 5.0 from HDR report

(1) Interior demand criteria from HDR report 80 gpcd * 3 persons per unit.

(2) Level landscaped private areas = 3,310.61 sf per lot, from HDR table 7 entry divided by 314 units

(3) Sloped private areas = 7,011.69 sf per lot, from HDR table 7 entry divided by 314 units

(4) Common area = 44.7 ac from HDR report prorated to phase I & II based on 2/9/2016 WSDR

(5) Sheriff & Rec center from 2/9/2016 WSDR

Section 4 - Existing Potable Water System

Amended Vesting Tentative Tract No. 53138 will be served from the District's 1,585-foot gradient Twin Lakes Subsystem. At present, the 1,585-foot Twin Lakes Subsystem is isolated from the rest of the District. The Subsystem is supplied by Twin Lakes Pump Station via Metropolitan Water District's West Valley Feeder No. 2 at the LV-3 Turnout with an emergency connection to Los Angeles Department of Water and Power. The tanks have a combined capacity of 2.0 MG. The pump station is designed to be operated 18-hours, for 24-hour period per the LVWMD Potable Water Master Plan Update 2014.

The pump station maintains the gradient in the Twin Lakes Tanks (HWL=1,585 feet). This source was represented in the hydraulic model as a reservoir with an HGL of 1,580 feet at the intersection of Topanga Canyon Boulevard and Poema Place in the LVMWD Potable Water Mater Plan. This HGL accounts for the head loss in the pipelines from the storage tanks to the intersection of Topanga Canyon Boulevard and Poema Place as simulated in the LVMWD's 2014 Master Plan model. The Upper Twin Lakes subsystem was not used as a source because it has a nominal capacity of only 400 gpm which would not be enough to satisfy Deerlake Ranch's maximum day demand of 892.6 gpm.

The pump station currently has a nominal capacity of 2,500 gpm. Duty pumps include two 430 gpm, one 585 gpm, two 225 gpm pumps and one standby 585 gpm pump. The existing maximum day demand for the Twin Lakes system is 1,200 gpm, with Upper Twin Lakes drawing an additional 400 gpm, yielding a total maximum day demand of 1,600 gpm.

The total projected demand within the Twin Lakes Subsystem after the development of Amended Vesting Tentative Tract No. 53138 is shown in **Tables 4, 5, and 6** depending on the construction phase.

TABLE 4

Required Tank and Pump Station Capacities For Twin Lakes Subsystem with Proposed Development (Phase 1)

Projected Demands:		**Maximum Day Demand (MDD)**
Existing Twin Lakes Subsystem:		1,200 gpm
Projected Infill Demand		13
Projected Tract 53138 Demand:		337 gpm
Total Projected Demand:		**=1,550 gpm**
Pumping Capacity:		**Capacity**
MDD (pumping required)	= (MDD*(24 hr. /18 hr.))[6]	= 2,061 gpm
Upper Twin Lakes Requirement	= (MDD*(24 hr. /18 hr.))[6]	= 532 gpm
Total Pumping Capacity		= **2,593 gpm**
Existing Pumping Capacity	=2,593 gpm (24 hr/18 hr.)	= **2,500 gpm**
Required Pumping Capacity		**= 93 gpm**
Tank Capacity:		**Capacity**
Daily Regulation Storage		= 929,880 gallons
Fire Storage	= (MDD*(600 min))	= 675,000 gallons
Emergency Storage	= (3750gpm*3 hrs.*60/min/hr.)[7]	= 464,940 gallons
Total Required Storage	= (MDD*(5 hr.)(60 min/hr.)) [6]	**= 2,069,820 gallons**
Existing Storage		**= 2,000,000 gallons**
Required Storage		**= 69,820 gallons**

Notes:

(6) Upper Twin Lakes MDD = 400 gpm from HDR Technical Memorandum, pumping is based on 18 hrs which yields a pumping rate of 532 gpm.

(7) Fire flow of 3,750 gpm for 3 hrs. is required in the subsystem for the Church at Rocky Peak

TABLE 5

Required Tank and Pump Station Capacities For Twin Lakes Subsystem with Proposed Development (Phases 1 & 2)

Projected Demands:		**Maximum Day Demand (MDD)**
Existing Twin Lakes Subsystem:		1,200 gpm
Projected Infill Demand		13
Projected Tract 53138 Demand:		666 gpm
Total Projected Demand:		**=1,879 gpm**
Pumping Capacity:		**Capacity**
MDD (pumping required)	= (MDD*(24 hr. /18 hr.))[6]	= 2,499 gpm
Upper Twin Lakes Requirement	= (MDD*(24 hr. /18 hr.))[6]	= 532 gpm
Total Pumping Capacity		= **3,031 gpm**
Existing Pumping Capacity		= **2,500 gpm**
Required Pumping Capacity		**= 531 gpm**
		Capacity
Tank Capacity:		
Daily Regulation Storage		= 1,127,520 gallons
Fire Storage		= 675,000 gallons
Emergency Storage	= (3750gpm*3 hrs.*60/min/hr.)[7]	= 563,760 gallons
Total Required Storage	= (MDD*(5 hr.)(60 min/hr.)) [6]	**= 2,366,280 gallons**
Existing Storage		**= 2,000,000 gallons**
Required Storage		**= 366,280 gallons**

NOTE:

(6) Upper Twin Lakes MDD = 400 gpm from HDR Technical Memorandum, pumping is based on 18 hrs.

(7) Fire flow of 3,750 gpm for 3 hrs. is required in the subsystem for the Church at Rocky Peak

TABLE 6

Required Tank and Pump Station Capacities For Twin Lakes Subsystem with Proposed Development (Phases 1, 2, & 3)

Projected Demands:		**Maximum Day Demand (MDD)**
Existing Twin Lakes Subsystem:		1,200 gpm
Projected Infill Demand		13
Projected Tract 53138 Demand:		893 gpm
Total Projected Demand:		**=2,106 gpm**
Pumping Capacity Calculations:		**Capacity**
MDD (pumping required)	= (MDD*(24 hr. /18 hr.)) [6]	= 2,800 gpm
Upper Twin Lakes Requirement	= (MDD*(24 hr. /18 hr.))[6]	= 532 gpm
Total Pumping Capacity		**=3,332 gpm**
Existing Pumping Capacity	=3,332 gpm (24 hr. /18 hr.)	**=2500 gpm**
Required Pumping Capacity		**= 832 gpm**
		Capacity
Tank Capacity Calculations:	=MDD (600 min)	
Daily Regulation Storage		= 1,263,360 gallons
Fire Storage		= 675,000 gallons
Emergency Storage	= ((3750gpm*3 hrs.*60/min/hr.)) [7]	= 631,680 gallons
Total Required Storage	=MDD (5 hr.)(60 min/hr.) [6]	**= 2,570,040 gallons**
Existing Storage		**= 2,000,000 gallons**
Required Storage		**= 570,040 gallons**

Notes:

(6) Upper Twin Lakes MDD = 400 gpm from HDR Technical Memoradum, pumping is based on 18 hrs

(7) Fire flow of 3,750 gpm for 3 hrs. is required in the subsystem for the Church at Rocky Peak

Demand generated by Tract No. 53138 exceeds current pumping and storage capacity in the Twin Lakes zone for all proposed construction phases. In **Table 4**, which details pumping and storage capacity calculations for Phase 1, the recommended pumping capacity is 93 gpm over the 2,500 gpm available and the recommended storage capacity is 0.346 million gallons (MG) over the 2.0 MG available. **Table 5** contains the pumping and storage capacity calculations for Phases 1 and 2, the recommended additional pumping capacity is 531 gpm over the existing 2,500 gpm available and the recommended additional storage capacity is 0.366 MG over the 2.0 MG available. Finally, in **Table 6**, are the pumping and storage capacity calculations for Phases 1, 2, and 3, the recommended pumping capacity is 832 gpm over the 2,500 gpm available and the recommended storage capacity is 0.570 MG over the 2.0 MG available.

Phase 1 does not require any changes due to the negligible impact in the subsystem. However, to provide the capacity needed in Phase 2, a seventh pump having a capacity of approximately 500 gpm is required. This would increase the capacity of Twin Lakes Pump Station to 3,000 gpm with all pumps running. To maintain a stand-by pump unit, an eighth pump having a capacity of approximately 500-600 gpm is recommended. Phase 3 requires the addition of a ninth pump with a capacity of approximately 400 gpm for a total pumping capacity of 3,400 gpm at the Twin Lakes Pump Station. Additional storage of 0.36 MG is required for Phase 2 and 0.21 MG for Phase 3. It is not practical to build storage in these increments so 0.6 MG of storage should be provided in Phase 2.

An existing 8-inch suction line transmits water from the LV-3 turnout to the Twin Lakes Pump Station. Modifications to the existing turnout were not analyzed in this report. Additionally, physical modifications to the Twin Lakes Pump Station and Tanks were not analyzed in this report.

Section 5 - Proposed Potable Water System

The proposed potable water system necessary to serve Amended Vesting Tentative Tract No. 53138 is shown on **Plates 2, 3, and 4,** depending on the phase of the project. Different distribution pipeline sizes and configurations were sized ranging from 8 to 16 inches in diameter based on the grading plans provided by the Developer showing finished pad elevations ranging from 1261 feet to 1485 feet. The adequacy of the proposed distribution system to serve Deerlake Ranch was analyzed under maximum day demand plus concurrent fire flow.

The maximum day demand of 893 gpm for Phases 1, 2, and 3 was analyzed concurrently with fire flows. The required fire flow of 1,250 gpm for residential, was analyzed at all fire hydrants within the distribution system. The recreation building and sheriff facility, which had a fire flow of 1,500 gpm was not used in the analysis, however the proposed water main to the recreation bldg. will be a 10-inch pipeline and is capable of providing the 1500 gpm fire flow. It was assumed that there will be only one fire at a time within the development. The analysis shows that all fire hydrants will be able to supply the required fire flows while maintaining residual pressures above 20 psi as required by Los Angeles County Fire Department fire flow requirements.

The peak hour demand of 1,209.2 gpm for all three phases of development was analyzed. The peak hour demand pressure distribution shows that the pressures would be approximately 35 psi at the higher elevations of 1,480 feet up to approximately 140 psi at lower elevations of 1,240 feet all of which meet the 35 psi minimum pressure and 150-psi maximum criteria of LVMWD. However, some locations along the southern part of Canoga Avenue such as open space lot 322 have pressures up to approximately 170 psi which should not present significant problems since these are landscape areas. Locations with elevations below approximately 1370 feet will have pressures in excess of the maximum 80-psi required by the Uniform Plumbing Code and therefore would require pressure regulators. All pipelines have been adequately sized with pipeline velocities below the maximum 5 fps as required by LVMWD’s design criteria.

The final water distribution system configuration that satisfied LVMWD’s design criteria for Phase 1 of development is described as follows:

- The water main between the Twin Lakes tanks and the intersection of Topanga Canyon Boulevard and Poema Place should be 16-inches in diameter.

- The water main along Poema Place from Topanga Canyon Boulevard to Bulfinch Road should be 16 inches in diameter.

- The water main from the intersection of Poema Place and Bullfinch Road, along Poema Place to the intersection of Poema Place and Canoga Avenue should be 10 inches in diameter.

- The water main from the intersection of Poema Place and Bullfinch Road, along Bullfinch Road to the intersection of Bullfinch Road and Nogan Drive should be 10 inches in diameter.

- The water main from the intersection of Bullfinch Road and Nogan Drive, along Nogan Drive and Canoga Ave to the intersection of Poema Place and Canoga Avenue should be 10 inches in diameter.

- The water main from the intersection of Poema Place and Canoga Avenue, going south along Canoga Avenue should be 6 inches in diameter since it will be tied into the existing system and will mainly be used for landscape irrigation.

- The remaining mainline pipelines should be 8-inches and should be reduced to 4-inch to 6-inch after the last fire hydrant terminating in cul-de-sacs.

The final water distribution system configuration that satisfied LVMWD's design criteria for Phase 2 and 3 of development is described as follows:

- The water main from the intersection of Nogan Drive and Canoga Avenue, along Canoga Avenue and Bullfinch Road to the intersection of Bullfinch Road and Nogan Drive should be 10 inches in diameter.

- The remaining pipelines including those terminating in cul-de-sacs should be 8-inches and should be reduced to 4-inch to 6-inch in diameter after the last fire hydrant terminating in cul-de-sacs.

- The water main from the intersection of Bullfinch Road and Schindler Way, along Schindler Way and Sullivan Way to the intersection of Sullivan Way and Bullfinch Road should be 10 inches in diameter.

- The remaining pipelines including those terminating in cul-de-sacs should be 8-inches and should be reduced to 4-inch to 6-inch in diameter after the last fire hydrant due to residential and landscaping demands.

The Los Angeles County Fire Department has determined that the development will require 37 new fire hydrants, located throughout the development (**Appendix B**). These hydrants shall conform to AWWA Standard C503 with 6”x 4"x 2-1/2" bronze heads. The minimum flow required is 1250 gpm for 2 hours at all locations except the recreation building, which requires 1500 gpm for 2 hours. The proposed system will be capable of providing fire flow to all hydrants at pressures greater than the current required minimum residual pressure of 20 psi.

In order to serve the proposed development for all three phases, the water main between the Twin Lakes tanks and the intersection of Topanga Canyon Boulevard and Poema Place should be 16-inches in diameter. Phase 1 does not require any additional pumping or storage because the changes have negligible impact in the subsystem. However, to provide the capacity needed in Phase 2, a seventh pump having a capacity of approximately 500 gpm is required. This would increase the capacity of Twin Lakes Pump Station to 3,000 gpm with all pumps running. To maintain a stand-by pump unit, an eighth pump having a capacity of approximately 500-600 gpm is recommended. Phase 3 requires the addition of a ninth pump with a capacity of approximately 400 gpm for a total pumping capacity of 3,400 gpm at the Twin Lakes Pump Station. Additional storage of 0.36 MG is required for Phase 2 and 0.21 MG for Phase 3. It is not practical to build storage in these increments so 0.6 MG of storage should be provided in Phase 2.

There is a possibility of future development within the District’s service boundary in the area north of Tract 53138. However, the terrain, elevation, and location of this property, along with environmental concerns, suggest that the likelihood of development is remote. Access to the property through Tract 53138 would be unlikely because of steep slopes and rugged terrain. Because development is unlikely in

this area, and would probably not be accessed through Tract 53138, the proposed facilities needed to serve Tract 53138 were not sized to serve any future developments.

Section 6 - Recycled Water

There are currently no reclaimed water facilities adjacent to the proposed development (Reference 3). The development is located in the northeast corner of the District's service area, far from any of the District's recycled water facilities. A connection to the District's recycled water system would be impractical, so the landscape will be irrigated with potable water as discussed in the previous sections.

Section 7 - Sewer System

Amended Vesting Tentative Tract No. 53138 is presently located within the Las Virgenes Municipal Water District's sewer service area. The District has extended the existing Sanitation Improvement District B by annexation to include the new development. Sanitation Improvement District B presently covers both areas west and east of Topanga Canyon Blvd. The estimated average daily sewage that will be generated by Tract 53138 is shown in **Table 5**.

TABLE 5

Sewage Generation

Land Use	Units	Daily Generation Rate (gallons/unit/day)	Daily Total (gallons/day)
Residential	314	280	87,920
Sheriff Office(10)	1,100 SFT	120 GPD/1000 SFT	132
Recreational Center (10)	4,340 SFT	200 GPD/1000 SFT	868
Existing Twin Lakes Sewer	492	224	110,146
Septic Conversion of Existing Old Twin Lake	213 (191 units + 22 undeveloped)	360	76,680
		TOTAL	**275,746**

This development is located in an area that is not within reach of the District's sewerage collection facilities (Reference 4). The Las Virgenes Municipal Water District is under agreement with the City of Los Angeles to convey and treat sewage from developments in the area.

The City of Los Angeles requires the metering of flows into their sewer system above 0.5 cfs (323,160 gallons/day) or if sewer discharge includes surface water runoff[11] this report assumed surface water runoff will not be collected and discharged to the sewer system. A separate storm drain system will collect and remove storm water from the tract. The estimated sewage generated is approximately 85% of the minimum flow required to install a meter, so a meter is not required. However, the City of Los Angeles may require a meter to be installed based on their analysis of the system. The Developer will be responsible to install an additional meter if required by the County of Los Angeles.

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(10) Sewer Area Study for Outlet Point 1 & 2, January 5 2016

[11] Agreement Between the City of Los Angeles and the Las Virgenes Municipal Water District for the Conveyance, Treatment, and Disposal of Wastewater, July 1, 1999, Section IV.B.1.b

Section 8 - Construction Phasing and Acceptance

Construction of Amended Vesting Tentative Tract No. 53138 is anticipated to be performed in three phases. The first phase involves the construction of 102 residential units, Sheriff Facility, Recreation Building, and 21 open space lots. Phase 2 will result in the construction of 143 residential units and two open space lots. Phase 3 will complete tract development with 69 residential units and seven open space lots.

Analysis of the potable water demands, system upgrades, and proposed potable water systems were performed in Sections 3, 4, and 5, respectively. These sections analyzed the impact each construction phase.

In accordance with standard policy, the District will consider final acceptance of the potable water system when a previously defined, separately bonded phase of the project is completed. Construction shall be considered complete for a phase when all facilities related to the potable and recycled water systems have been installed in accordance with the District's standards and the approved Water System Design Report, and all meter boxes have been set to grade in concrete sidewalks.

The Developer must comply with the Special Conditions for bonds, temporary risers and hose bibs, and repair of damage to accepted water system components set forth in the District's memorandum entitled, "Review of Policy - Acceptance of Tract Water Systems (July 14, 1989)."

Section 9 - Water Conservation

To obtain maximum benefit of the limited water resources of the State of California, the State of California and the District have adopted ordinances that require plant materials and irrigation systems to be water efficient.

The State of California Model Water Efficient Landscape Ordinance (Cal. Code Regs. Titl 23, § 492.3 (2015)) specifies the development of a Landscape Documentation Package for new and rehabilitated landscaping. Significant provisions include:

- New construction projects with an aggregate landscape area equal to or greater than 500 square feet require a building or landscape permit, plan check or design review.
- Rehabilitation projects with an aggregate landscape area equal to or greater than 2,500 square feet require a building or landscape permit, plan check, or design review.
- The Maximum Applied Water Allowance (MAWA) is calculated based on an Evapotranspiration Adjustment Factor (ETAF) of 55% for residential areas and 45% for non-residential projects.
- Dedicated landscape water meters or private sub-meters are required for residential landscapes over 5,000 square feet and non-residential landscapes (in conjunction with California Code Water Code 535) of 1,000 square feet or greater.
- Turf shall not exceed 25% of the landscape area in residential areas, and there shall be no turf in non-residential areas. Turf shall not be planted on sloped areas which exceed a slope of 1 foot vertical elevation change for every 4 feet of horizontal length.

In an effort to assure the appropriate use of water, the District assesses penalties for the wasteful use of water. In 2016, the District established a water budget based billing system that designates a specific amount of water for each property. Exceeding the designated water budget for a property could result in escalating penalties. Water District Code 3-4.202 specifies:

- No customer shall knowingly permit waste or leaks of water. Where water is wastefully or negligently used on the customer's premises, the District may discontinue the service, if such conditions are not corrected within five days after the General Manager gives the customer written notice.
- A water budget shall be established for each customer of the District, and customers shall be notified of the basis for calculating their water budgets. Water use exceeding twice a customer's water budget is a waste of water, a violation of the District's rules and regulations, and shall be subject to escalating administrative penalties.

In accordance with Water District Code 3-4.402, the following water conservation measures are required:

- Customers shall conserve water supplied by the District by the prevention and elimination of all waste or leakage of water.

- For residential development, all toilets installed shall use 1.6 gallons or less per flush, and all showerheads shall flow at 2.5 gallons per minute, or less, at 80 psi.

In addition, if a model home display is to be provided, one of the models must be landscaped with water efficient (Xeriscape) plant materials and irrigated with appropriate water conserving irrigation system. Further, the Xeriscape model shall be designed to be drought tolerant, and irrigation and intensive planting are discouraged. Turf shall occupy no more than 30% of the landscaping. The model home display shall draw attention to the specific landscape materials and irrigation techniques utilized.

In accordance with Water District Code 3-4.404, specific water conservation actions must be performed including:

- Potable water shall not be used to clean or sweep hard surfaces such as sidewalks, walkways, driveways, or parking areas and only as necessary to protect the public health and safety.
- Car washing is permitted only with the use of a nozzle having an automatic shut-off.

- Fountains and other decorative water features shall recirculate water.
- Irrigation shall occur after 5:00 p.m. and before 10:00 a.m. No irrigation is permitted during and within 48 hours after measurable rainfall.
- Irrigation shall not run off to streets, gutters or adjacent properties.
- Limit the number of watering days, if and as determined by the Board, except that watering is permitted at any time with a hand-held hose equipped with an automatic shut-off, a faucet filled bucket of five gallons or less, or a drip irrigation system.

Section 3-4.406 of the Water District Code specifies that violations of ordinances are subject to penalties including increasing penalties for non-compliance.

Section 10 - Financial Impact on District

The 2014 Potable Water Master Plan determined that an additional 1.5 MG of storage and 1,878 gpm of pumping is needed in the Twin Lake Subsystem by the year 2035. The estimated cost for these future improvements were included in the total estimated cost of $32,159,050 for the facilities needed for future demand for the entire District. This total was then used in the 2016 Capacity Fee Study when calculating the incremental component of the potable water capacity fee.

Because the costs of additional storage and pumping in the Twin Lakes Subsystem were anticipated an incremental component of the potable water capacity fee the District should participate in the construction of these improvements. However, the Master Plan's estimated cost for storage did not include acquiring or construction of a tank site, providing an inlet/outlet piping to the tank or the design of the facilities. These costs are the responsibility of the developer.

In summary the responsibilities are:
Developer:

- Pay full capacity fee.
- Provide a tank site ready for construction and an inlet/outlet piping before service to any Phase 2 lots[1].
- Fund design of the facilities.

District:

- Participate in the construction of a 600,000 gallon tank concurrent with Phase 2
- Participate in the construction of 500 gpm of pumping capacity including 500 gpm of stand-by pumping concurrent with Phase 2 and 400 gpm of pumping concurrent with Phase 3 at the Twin Lakes Pump Station.

[1] The preferred location is site S-9 per the KJ Study.

Section 11 - Environmental Review

The District is a "Responsible Agency" for the purpose of environmental review of this project under the California Environmental Quality Act (CEQA). The "Lead Agency" for the environmental review of this project under the CEQA is the County of Los Angeles, Board of Supervisors. On August 10, 2004, the County Board of Supervisors certified the Final Environmental Impact Report (FEIR) (**Appendix C**). On September 16, 2008, an Amended Vesting Tentative Tract Map was approved by the County Hearing Officer. CEQA Section 15164 authorizes a Lead Agency to prepare an Addendum to a previously certified Environmental Impact Report if changes or additions to the document are necessary, provided the changes meet conditions outlined in Section 15164.

The Amended Vesting Tentative Tract No. 53138 will implement the same mitigation measures as previously approved on an appropriate pro rata basis. Since the current Amended Vesting Tentative Track Map results in a reduction of each potential impact identified in the original FEIR, a subsequent EIR is not required.

The District will act as "Lead Agency" if any further environmental reviews are required for water facilities. The developer will fund further environmental reviews for supporting improvements which were not identified or included within previous drafts of the Water System Design Report or as included within the certified FEIR. These improvements include but are not limited to additional pumping capacity, additional storage tank and site, and other improvement required for water facilities.

Section 12 - Conclusions and Recommendations

A. It is concluded that:

1. To provide adequate potable water service to the proposed development, the following facilities must be installed by the developer:

   a) The water mains shown on **Plates 2, 3, and 4**, depending on the construction phase. This study does not address in detail the alignment of this pipe and related easements.

   b) Thirty –seven (37) new fire hydrants. 35 residential fire hydrants and 2 commercial fire hydrants along with necessary mainline valves at locations approved by the District

   c) Pipeline from Twin Lakes Tanks to development's point of connection, the intersection of Topanga Canyon Boulevard and Poema Place.

   d) Twin Lakes Pump Station and Tank upgrades for capacity based on the construction phase. This study does not address in detail of the upgrades required.

   e) District to participate in the tank and pump upgrades construction.

2. All units served by the 1585-ft pressure zone below 1400-feet will experience pressures in excess of 80 psi. Each of these service connections will require an individual pressure regulator ahead of building plumbing in accordance with the 80 psi limitation imposed by the Uniform Plumbing Code.

3. All potable water system improvements served by the 1585-ft pressure zone should be designed to accommodate hydraulic gradients not less than 1585 feet.

4. Pipe appurtenances, such as backflow devices and meters, were not considered in this analysis, but maybe required by the District based on actual conditions.

5. The developer must be required to dedicate rights-of-way to the District for all pipelines, including off-site facilities, not within public streets.

6. Recycled water will not be available for irrigation of common areas within Tract 53138. Common areas will be irrigated with potable water.

7. The proposed development is located within the service area of the District's Sanitation Improvement District. The district has expanded Sanitation Improvement District B by annexation. Developer is not responsible to install a new meter as required by the agreement between City of Los Angeles Sanitation and LVMWD since the total sewage flow is less than the threshold of 0.5 cfs (323.160 gallons/day).

8. Developer may be required to install a new Sewer Meter base on County of Los Angeles flow requirement.

9. Environmental documentation, in compliance with CEQA, has been completed. However, if additional documentation is required for water facilities the District will act as “Lead Agency”.

B. It is recommended that:

1. The potable water system facilities shown on **Plates 2, 3, and 4** and outlined above be approved for installation by the developer.

2. The District requires the developer to dedicate rights-of-way for all pipelines, including off-site piping not in public streets.

3. The District require all above-ground District-owned facilities (i.e. meters larger than 2 inches, detector check installations, and backflow prevention devices) be installed above ground and screened from view in accordance with District standard plans.

4. The District will participate in the construction of additional pumping capacity and storage. The Developer shall pay in full connection fees for sewer and water services.

5. The Developer shall provide a tank ready site as well as the inlet/outlet piping before service to any lot for Phase 2 and Phase 3.

Section 13 - Limitations

Report Intent. This Water System Design Report is intended only to develop the hydraulic information necessary to design a water system. No effort has been made at this time to precisely locate existing or proposed facilities. Conflicts may develop as more information is discovered about both existing and proposed pipelines, street grades, etc. Corrections of conflicts related to this project will be the responsibility of the applicant.

Project Changes. This Water System Design Report is based upon maps of Tract 53138 prepared by United Civil Inc. dated July 2015 and upon information submitted by the developer of the subject property and his representatives. Accordingly, this design report may be subject to modification to reflect changes made by the applicant or conditions imposed by the environmental review process. This report may also be subject to modification to reflect additions or amendments to the District's Water Ordinance and the District's Design Standards prior to approval of the final design. Any revision in the above information or development map or deviation therefrom may invalidate the conclusions and recommendations. A supplemental or amended report must be prepared for the use of the District at the applicant's sole expense if the project or the data is changed.

Other Agency Approvals. This Water System Design Report has been prepared at the request of the developer of Tract 53138. Approval of this report does not indicate the District either supports or opposes the underlying project or any related project. District staff will answer questions concerning this report. However, the project proponent is solely responsible for securing necessary project approvals from state, regional, and local agencies with jurisdiction by law without the express or implied intervention or support of the District.

Project Delays. This Water System Design Report is based upon the assumption that the project will be implemented in due course. A supplement, amendment or complete report must be prepared for the use of the District at the proponent's sole expense if the project is unduly delayed.

Warranty of Supply. The approval of this Water System Design Report does not constitute a commitment by the District to supply water or provide sanitation service to the project. The project will

be assured of connection to the water and sanitation systems of the District only if the proponent also satisfies all terms and conditions for service as set forth in the District's code, and capacity is available at the time arrangements for service are finalized.

References

1. *Potable Water System Master Plan Update 2014 for the Las Virgenes Municipal Water District*, Kennedy/Jenks Consultants, June 2014 (LVMWD Report No. 2562.00).

2. *Preliminary Water System Design Report for Tentative Tract No. 53138 Chatsworth Ridge:*

   - Revision 0, LVMWD Report 2130.00, April 2001 (Boyle Engineering Corporation)
   - Revision 1, LVMWD Report 2130.01, January 2002 (Boyle Engineering Corporation)
   - Revision 2, LVMWD Report 2130.02, July 2003 (Boyle Engineering Corporation)
   - Revision 3, LVMWD Report 2130.03, March 2004 (Boyle Engineering Corporation)
   - Revision 4, LVMWD Report 2130.04, December 2014 (AECOM)

3. *Recycled Water Master Plan Update 2014 for the Joint Powers Authority of: Las Virgenes Municipal Water District and Triunfo Sanitation District and Calleguas Municipal Water District*, Kennedy/Jenks Consultants, June 2014 (LVMWD Report No. 2561.00).

4. *Sanitation Master Plan Update 2014 for the Joint Powers Authority of: Las Virgenes Municipal Water District and Triunfo Sanitation District*, Kennedy/Jenks Consultants, June 2014 (LVMWD Report No. 2560.00).

5. *HDR Technical Memorandum Water Demand Estimate Study, Revised August 30, 2017*

6. *Kennedy/Jenks Consultants Storage and Pumping Capacity Study, July 25, 2017*

7. *United Civil Inc. - Sewer Area Study TR No. 53138 January 5, 2016*

Plates

1. Vicinity Map
2. Phase 1 Potable Water Distribution System
3. Phase 2 Potable Water Distribution System
4. Phase 3 Potable Water Distribution System

Appendices

A. Amended Vesting Tentative Tract No. 53138 drawings, July 22, 2015

B. County of Los Angeles Fire Department, Water System Requirements

C. Regional Planning Commission County of Los Angeles, Addendum to Final EIR, June 6, 2017

D. HDR Technical Memorandum Water Demand Estimate Study, Revised August 30, 2017

E. Kennedy/Jenks Consultants Storage and Pumping Capacity Study, July 25, 2017

F. United Civil Inc. Sewer Area Study January 5, 2016

G. Amended Vesting Tentative Tract No. 53138 drawings Fire Hydrant Locations, July 22, 2015

APPENDIX A

TRACT
NO. 53138

TWIN LAKES
TANKS

TWIN LAKES
PUMP STATION

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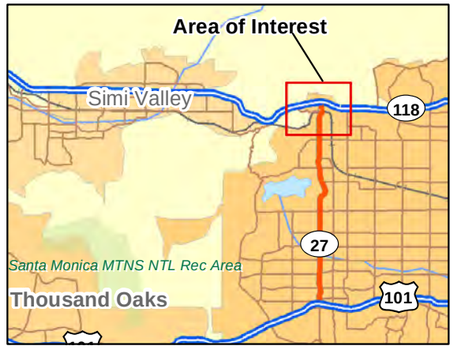
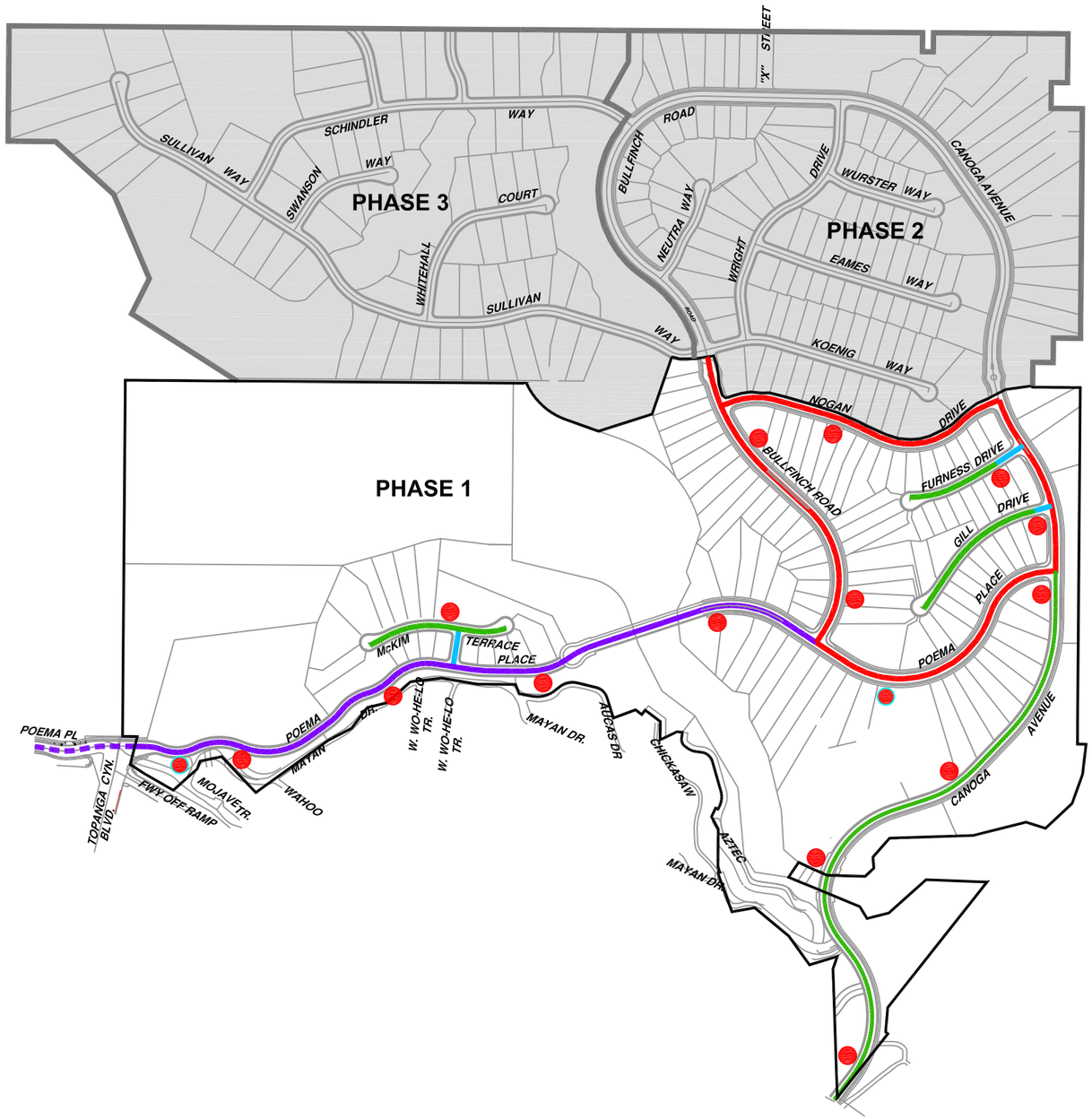


AECOM

Las Virgenes Municipal Water District
Water System Design Report
Deerlake Ranch

Amended Vesting Tentative
Tract No. 53138
Vicinity Map

60322621	August, 2017	**Plate 1**



LEGEND

- NEW 16"Ø PIPE
- NEW 10"Ø PIPE
- NEW 8"Ø PIPE
- NEW 6"Ø PIPE
- EXISTING 16"Ø PIPE
- RESIDENTIAL FIRE HYDRANTS
- COMMERCIAL FIRE HYDRANTS

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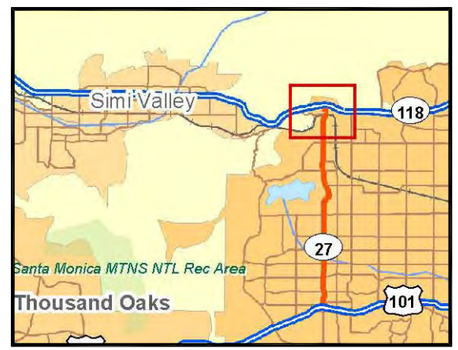

AECOM

Las Virgenes Municipal Water District
Water System Design Report
Deerlake Ranch

Amended Vesting Tentative
Tract No. 53138
Phase 1 Potable Water Distribution System

60322621 AUGUST 2017 **Plate 2**

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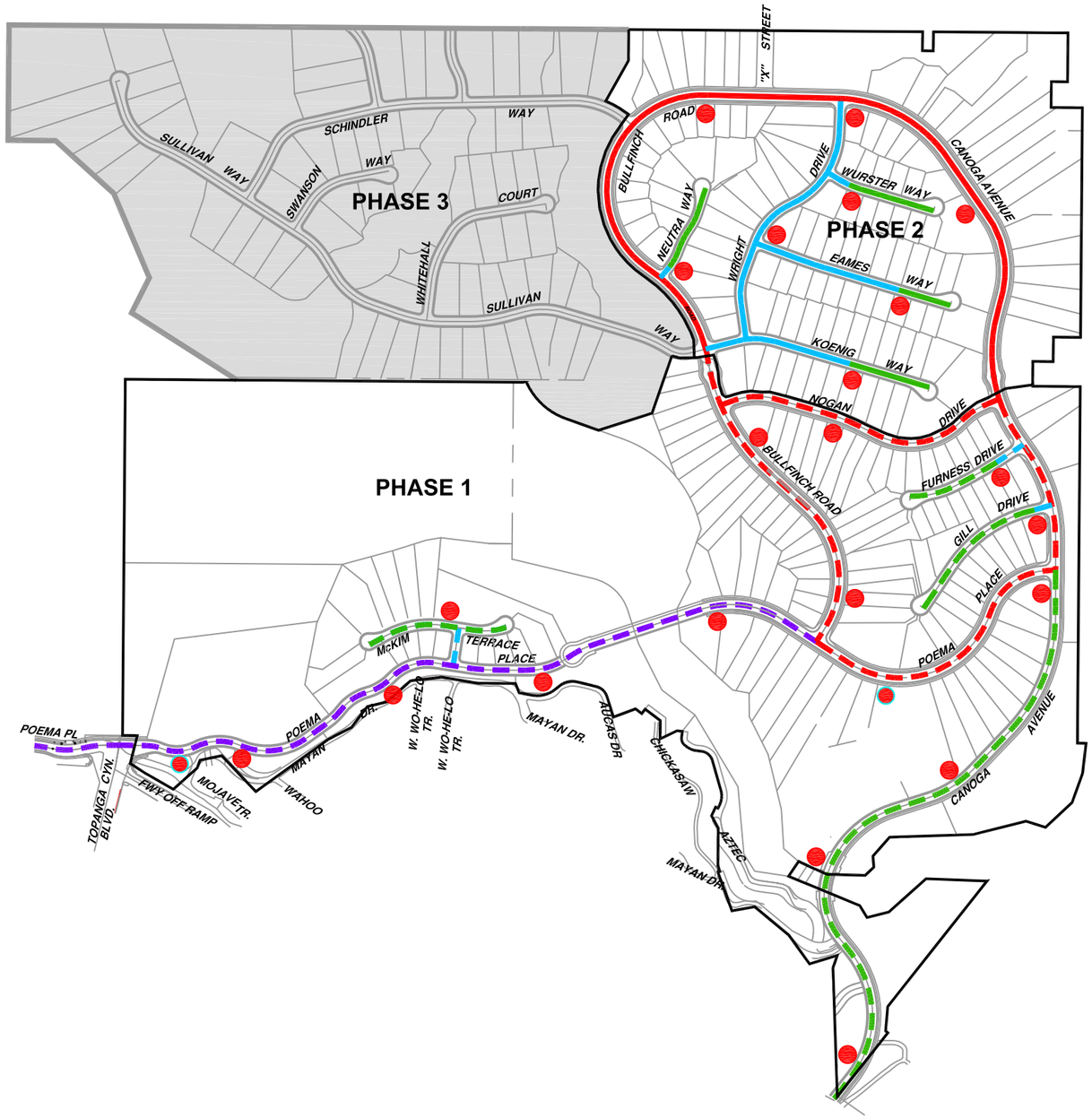

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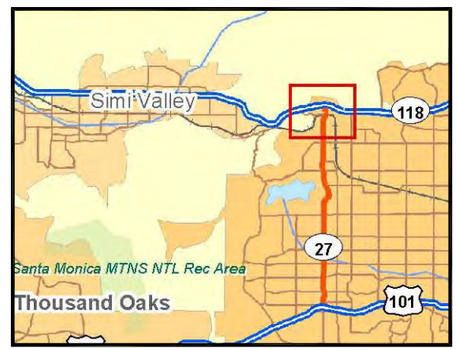
- EXISTING 16"Ø PIPE
- EXISTING 10"Ø PIPE
- EXISTING 8"Ø PIPE
- EXISTING 6"Ø PIPE
- NEW 10"Ø PIPE
- NEW 8"Ø PIPE
- NEW 6"Ø PIPE
- RESIDENTIAL FIRE HYDRANTS
- COMMERCIAL FIRE HYDRANTS



AECOM

Las Virgenes Municipal Water District
Water System Design Report
Deerlake Ranch

Amended Vesting Tentative
Tract No. 53138
Phase 2 Potable Water Distribution System

60322621 AUGUST 2017 **Plate 3**

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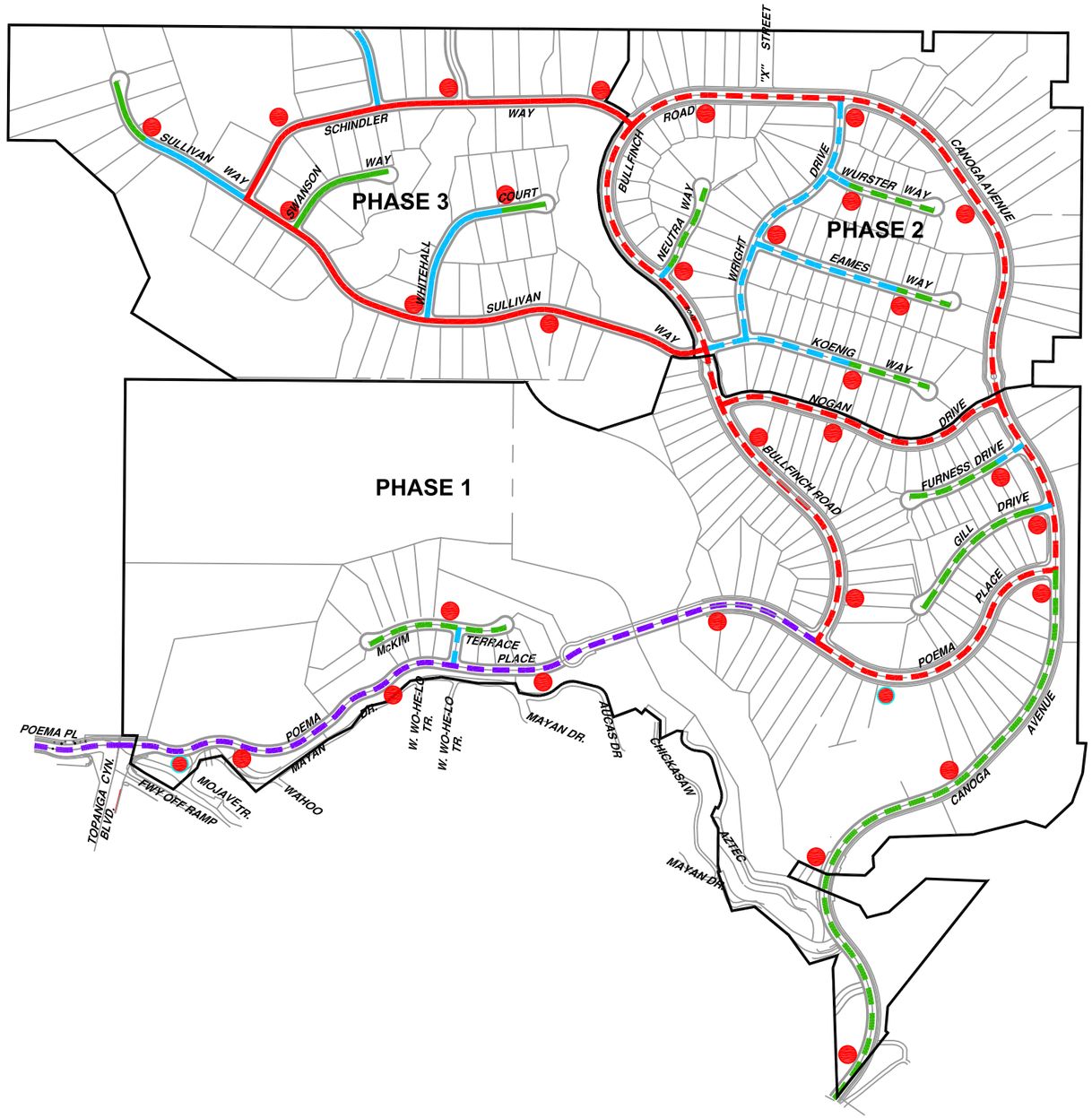

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- EXISTING 16"Ø PIPE
- EXISTING 10"Ø PIPE
- EXISTING 8"Ø PIPE
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- NEW 10"Ø PIPE
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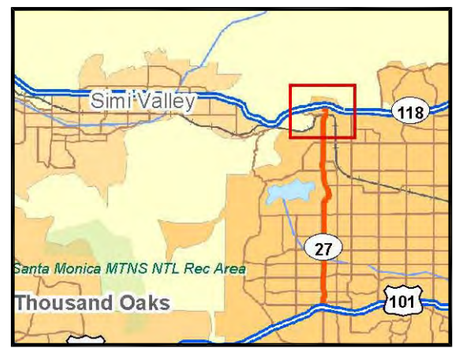
- NEW 6"Ø PIPE
- RESIDENTIAL FIRE HYDRANTS
- COMMERCIAL FIRE HYDRANTS



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SCALE IN FEET

AECOM

Las Virgenes Municipal Water District
Water System Design Report
Deerlake Ranch

Amended Vesting Tentative
Tract No. 53138
Phase 3 Potable Water Distribution System

60322621 AUGUST 2017 **Plate 4**

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APPENDIX B

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

APPENDIX C

Los Angeles County
Department of Regional Planning

Planning for the Challenges Ahead

Richard J. Bruckner
Director

June 6, 2017

Keltie Cole, Vice President of Community Development
Foremost Companies
16130 Ventura Blvd, Suite 480
Encino, CA 91436

REGARDING: **PROJECT NO. 99-239-(5)**
OAK TREE PERMIT NO. RPPL 2017005567
ADDENDUM TO FINAL ENVIRONMENTAL IMPACT REPORT NO. 99-239

NORTH OF 118 FREEWAY BETWEEN TOPANGA CANYON ROAD AND CANOGA AVENUE, CHATSWORTH

Dear Applicant,

The Hearing Officer, Ms. Gina Natoli, by her action of June 6, 2017, has **APPROVED** the above-referenced project. Enclosed are the Hearing Officer's Findings and Conditions of Approval. Please carefully review each condition. This approval is not effective until the appeal period has ended and the required documents and applicable fees are submitted to the Regional Planning Department (see enclosed Affidavit of Acceptance Instructions).

Appeals:

The applicant or any other interested persons may appeal the Hearing Officer's decision. The appeal period for this project will end at 5:00 p.m. on June 20, 2017. **Appeals must be delivered in person.**

To file an appeal, please contact:
Regional Planning Commission, Attn: Commission Secretary
Room 1350, Hall of Records
320 West Temple Street, Los Angeles, CA 90012
(213) 974-6409

Upon completion of the appeal period, the notarized Affidavit of Acceptance and any applicable fees must be submitted to the planner assigned to your case. Please make an appointment to ensure that processing will be completed in a timely manner. Failure to submit these documents and applicable fees within 60 days will result in a referral to Zoning Enforcement for further action.

In addition, any applicable CEQA fees for the Department of Fish and Wildlife shall be paid, and a Notice of Determination, if applicable must be filed with the County Clerk according to the instructions with the enclosed Affidavit of Acceptance. A Notice of Exemption, if applicable, may also be filed according to the instructions in the enclosed Affidavit of Acceptance.

For questions or for additional information, please contact Lynda Hikichi of the Land Divisions Section at (213) 974-6433, or by email at lhikichi@planning.lacounty.gov. Our office hours are Monday through Thursday, 7:30 a.m. to 5:30 p.m. We are closed on Fridays.

Sincerely,
DEPARTMENT OF REGIONAL PLANNING
Richard J. Bruckner

Kim K. Szalay, AICP
Supervising Regional Planner
Land Divisions Section

Enclosures: Findings and Conditions of Approval
Affidavit of Acceptance (Permittee's Completion)
Notice of Determination (1 original, 1 copy)

c.: Board of Supervisors
DPW (Building and Safety)
Zoning Enforcement
Steve Cameron (Foremost Companies)

KKS:LKH

FINDINGS OF THE HEARING OFFICER
COUNTY OF LOS ANGELES
PROJECT NO. 99-239- (5)
OAK TREE PERMIT RPPL 2017005567

1. The Los Angeles County Hearing Officer ("Hearing Officer"), Ms. Gina Natoli, conducted a duly noticed public hearing in the matter of Project No. 99-239, consisting of Oak Tree Permit ("OTP") RPPL 2017005567 on June 6, 2017.

2. The applicant, Forestar Chatsworth ("permittee"), requests an oak tree permit to authorize the removal (retroactive) of two oak trees of the oak genus *(Quercus agrifolia)* and encroachment within the protected zone of one oak tree ("Project"). The Deerlake Ranch Project entails 368 lots, including 314 single-family lots (including three flag lots), one park lot, one Sheriff Station lot, one horse rest area lot, one debris basin lot, one helispot lot (later revised as a dog park), one recreational center lot, 25 open space lots, 23 private driveway and fire lane lots, and one remainder parcel. The Deerlake Ranch Project has been conditioned to provide off-site improvements to extend a sewer line to provide service to the Twin Lakes residential community.

3. The Deerlake Ranch and Twin Lakes Sewer Improvement project sites are located north of 118 Freeway (Ronald Reagan Freeway) between Canoga Avenue and Topanga Canyon Boulevard, within the Chatsworth Zoned District.

4. The Deerlake Ranch Project site is 232 gross acres and irregularly-shaped with flat to hilly terrain. A large portion of the property is generally a plateau that is bordered to the west and south by Devil's Canyon and to the east by Brown's Canyon. The Deerlake Ranch Project site is vacant. Twin Lakes is a residential community located south of the Deerlake Ranch Project site.

5. The access to the Deerlake Ranch Project site is via Poema Place (a 64-foot-wide dedicated public street) and Canoga Avenue (a variable-width dedicated public street). The proposed two entry gates are located at the intersections of Poema Place and Bull Finch Road, and Poema Place and Canoga Avenue. The residences located behind the entry gates will take access from internal private driveways and fire lanes, which take access from Poema Place and Canoga Avenue.

6. The Deerlake Ranch property is depicted within the Non-Urban (R) and Rural Communities (RC) land use categories of the Los Angeles Countywide General Plan ("General Plan"). The Rural Communities designation permits residential density of one to six dwelling units per acre. The Non-Urban designation permits a maximum density of one dwelling unit per acre.

7. The Deerlake Ranch project site is currently zoned A-1-1 (Light Agricultural – One-Acre Minimum Required Lot Area) and R-1-6,000 (Single-Family Residential - 6,000 Square Feet Minimum Required Lot Area). The project site has been

zoned R-1-6,000 and A-1-1 since the adoption of Ordinance 7505 on April 14, 1959. The Ordinance became effective on May 15, 1959.

8. The Deerlake Ranch Project is required to comply with the development standards of the A-1-1 and R-1-6,000 Zones. Single-family residences are permitted uses within the A-1-1 and R-1-6,000 Zones.

9. The Exhibit "A" to Oak Tree Permit RPPL 2017005567 depicts both the Deerlake Ranch and Twin Lakes Sewer Improvement Project sites. The Exhibit "A" shows the locations and their impacts for the 154 inventoried oak trees. Sheet 1 of the Oak Tree Impact Exhibit and Protection Plan is illustrated in larger scale, and shows the Twin Lakes Sewer Improvement Project site and the southern portion of the Deerlake Ranch Project site. Sheet 2 of the Oak Tree Impact Exhibit and Protection Plan is also illustrated in larger scale and shows the northern portion of the Deerlake Ranch Project site. The Exhibit maps depict 153 oak trees. Oak tree #85 is located 1,400 feet northeast of the project site and is not depicted on the maps. The Exhibit maps list 154 oak trees, which includes 58 oak tree removals, 39 encroachments (24 encroachments within the Deerlake Ranch and 15 encroachments within the Twin Lakes Sewer Improvement project sites), and 57 oak trees (55 oak trees within the Deerlake Ranch and two oak trees within Twin Lakes) with no impacts.

10. Per Oak Tree Permit No. 201200001 and Oak Tree Permit RPPL 2016003378, fifty-five (55) oak trees have already been removed: 1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 14, 31, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 64, 66, 73, 76, 83, 86, 87, 95, 96, 97, 98, 99, 100, 101, 102, 103, 110, 111, 112, 113, 114, 115, 117, 118, 119, 120, 121, 122, and 123. Oak Tree #124 is permitted for removal per Oak Tree Permit RPPL 2016003378 but still standing.

11. Per Oak Tree Permit RPPL 2016003378, the following oak trees are approved for encroachments into their protected zones within the Deerlake Ranch Project site: 8, 9, 21, 22, 23, 24, 25, 26, 27, 57, 58, 59, 60, 67, 68, 74, 84, 142, 143, 144, 145, 146, and 154. Within the Twin Lakes Sewer Improvement Project site, a total of 15 encroachments into the protected zones are approved: 125, 126, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, and 147.

12. Oak Tree Permit RPPL 2017005567 authorizes the retroactive removal of two oak trees (#54 and #56) and encroachment into the protected zone of one oak tree (#29). Oak Trees No. 54 and 56 were permitted for encroachment under Oak Tree Permit RPPL 2016003378. Oak Trees No. 54 and 56 were accidentally removed on December 6, 2016. Oak Tree No. 29 is a new encroachment and has a potential for impact due to its close proximity to the Poema bridge construction activities.

13. The Forester recommends approval of this Project and finds that the Oak Tree Report is accurate and complete as to the location, size, condition and species of the oak trees on the site.

14. The Forester issued a letter on March 8, 2017 recommending approval of the OTP, which included a list of requirements and conditions.

15. An Addendum to the certified Final Environmental Impact Report ("FEIR") No. 99-239 for the original tentative tract map and associated permits was prepared in compliance with the California Environmental Quality Act ("CEQA") and the County environmental guidelines. The Addendum concluded that the proposed oak tree permit would not result in any increased or additional environmental impacts beyond those which were analyzed in the FEIR, and therefore concluded that a supplemental environmental analysis was not required.

16. The Deerlake Ranch property contains an Oak Woodland, as defined by the California Department of Fish and Game Code Section 1361.h and by the *Los Angeles County Oak Woodlands Conservation Management Plan Guide.* Regional Planning staff has determined there may be impacts to this resource for the Project.

17. No comments have been received from the public at this time.

18. At the June 6, 2017 public hearing, Keltie Cole (Vice President of Community Development, Forestar Chatsworth, LLC) made a presentation. Ms. Cole stated that the two removals were accidental. Immediately after the removals, the Forester and the Department of Regional Planning were notified of the accidental removals. Ms. Cole expressed that even though Forestar has met the mitigation requirements pursuant to the FEIR, Forestar has already purchased 16 big boxed oak trees (eight per removal) to provide as additional mitigation. Ms. Cole asked if the seven-year monitoring period may be modified to two years.

    The Hearing Officer addressed the issue of the monitoring period and stated that it takes longer to determine whether the oaks are going to survive and therefore, the monitoring period is seven years and not two years. The Hearing Officer expressed that she was concerned with the long-term survival rate of big boxed trees, and therefore, will require an eight to one (8:1) mitigation of 1-gallon and 15-gallon trees.

    Christy Cuba (arborist) and Peter Gutierrez (applicant's representative from Latham & Watkins) were also available to answer questions.

19. The Hearing Officer finds that the Deerlake Ranch Project site is located within the Non-Urban (R) and Rural Communities (RC) land use categories of the Los

Angeles Countywide General Plan ("General Plan"). The Rural Communities designation permits residential density of one to six dwelling units per acre. The Non-Urban designation permits a maximum density of one dwelling unit per acre. Non-urban residential uses are permitted subject to established density, design and service standards, and rural communities are essentially clustered non-urban settlements that vary in terms of size and intensity of development. The proposed clustered development of 314 single-family residential lots is consistent with the permitted uses of the underlying land use categories.

20. The Hearing Officer finds that the Deerlake Ranch Project site is located within the R-1-6,000 and A-1-1 Zones. The proposed single-family residential uses are consistent with the permitted uses of the underlying zones. The proposed project will be subject to all development standards and guidelines of the R-1 and A-1 Zones.

21. The Hearing Officer finds that the Project satisfies the Oak Tree Permit Burden of Proof findings in Section 22.56.2060 of the County Code. The proposed use can be accomplished without endangering the health of the remaining oak trees on the project sites. An oak tree report has been prepared by Carlberg Associates, the consulting arborist.

22. In addition to the mitigation measures, protective measures recommended by the Forester, consulting arborist, and Department staff biologist will be placed to help protect the remaining trees and will help to avoid harmful effects. The removals were undertaken for the development of 314 single-family residences, driveways and fire lanes, etc. The encroachments are also necessary and unavoidable for the development of 314 single-family homes and the sewer line extensions within the Twin Lakes residential community. The oak tree removals and encroachments for the Deerlake Ranch Project and the Twin Lakes Sewer Improvement Project will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure. The subject two oak trees were accidentally removed and should have been avoided.

23. The Hearing Officer finds that, at the suggestion of the applicant, mitigation trees of the oak genus must be provided at a ratio of eight to one for each oak tree removed for a minimum total of 16 required mitigation trees, in accordance with the provisions of County Code Section 22.56.2180.A.6.

24. Although the permittee has already delivered 122 mitigation oak trees to the MRCA for planting, which was based on the proposed 61 oak tree removals in 2004, pursuant to the FEIR, the permittee proposed to plant an additional 16 oak trees for the two oak tree removals.

25. The Hearing Officer finds that an acorn of the same species must be planted within the irrigation circle of each mitigation oak tree.

26. The Hearing Officer finds that the property is within an Oak Woodland as defined by the California Department of Fish and Game Code Section 1361.h as "an oak stand with a greater than 10 percent canopy cover or that may have historically supported greater than 10 percent canopy cover." The staff biologist has confirmed that the Deerlake Ranch Project site contains Oak Woodland. Because of the Oak Woodland, the Project was reviewed by the staff biologist, who provided recommendations for the project. The policies of the *Los Angeles County Oak Woodlands Conservation Management Plan Guide* were also used to review the Project.

27. The Hearing Officer finds that the proposed Project may have a substantial adverse effect on the Oak Woodland. Implementation of the Forester's recommendations will protect the remaining trees and the integrity of the Oak Woodland. Planting of mitigation trees in the off-site conserved area will establish new oak woodland and restore oak woodland in a conserved area of the same watershed and comply with the State Oak Woodlands requirements of PRC §21083.4.

    The Hearing Officer finds that the recommendation by the staff biologist for a monitoring period of seven years instead of two for the oak trees is necessary.

28. An addendum to the Final Environmental Impact Report has been recommended as the appropriate environmental document for this project pursuant to the California Environmental Quality Act ("CEQA") and the Los Angeles County Environmental Guidelines. It was determined that, pursuant to CEQA Guidelines Section 15164, some changes to the previously certified FEIR are necessary but none of the conditions described in CEQA Guidelines Section 15162, calling for the preparation of a subsequent EIR, have occurred.

29. The Hearing Officer finds that pursuant to the provisions of Section 22.56.2130 of the County Code, the community was appropriately notified of the public hearing by newspapers (The Daily News and La Opinion), library postings, and Department of Regional Planning ("Regional Planning') website posting. A total of 15 postcard notices were mailed to those on the courtesy mailing list. Library packages consisting of project materials were sent to the Chatsworth Branch Library and the San Fernando County Library.

30. A duly noticed public hearing was held on June 6, 2017 before the Hearing Officer. Staff recommended approval of the oak tree permit and Addendum to the Final Environmental Impact Report.

31. The location of the documents and other materials constituting the record of proceedings upon which the Hearing Officer's decision is based in this matter is the Los Angeles County Department of Regional Planning, 13th Floor, Hall of Records, 320 West Temple Street, Los Angeles, California 90012. The custodian of such documents and materials shall be the Section Head of the Land Divisions Section, Regional Planning.

BASED ON THE FOREGOING, THE HEARING OFFICER CONCLUDES THAT:

A. The proposed construction of the proposed use will be accomplished without endangering the health of the remaining trees subject to Part 16 of Chapter 22.56, Title 22 of the County Code, on the subject property. Monitoring the health of the remaining trees will provide information on whether additional mitigation trees are needed for planting on the off-site mitigation area.

B. In addition to the above facts, the following finding applies: The removal of the oak trees proposed is necessary as continued existence at the present locations frustrates the planned improvement or proposed use of the subject property to such an extent that placement of such trees precludes the reasonable and efficient use of such property for a use otherwise authorized.

C. The removal or the encroachment of the oak trees proposed will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure.

THEREFORE, THE HEARING OFFICER

1. Adopts the addendum to the FEIR and certifies that it has been completed in compliance with CEQA and the State and County guidelines related thereto.

2. Approves Oak Tree Permit RPPL 2017005567, subject to the attached conditions and recommendations.

KKS:LKH
June 6, 2017

CONDITIONS OF APPROVAL
COUNTY OF LOS ANGELES
PROJECT NO. 99-239-(5)
OAK TREE PERMIT RPPL 2017005567

PROJECT DESCRIPTION

The applicant, Forestar Chatsworth ("permittee"), requests an oak tree permit to authorize the removal (retroactive) of two oak trees of the oak genus *(Quercus agrifolia)* and encroachment within the protected zone of one oak tree ("Project"). The Deerlake Ranch Project entails 368 lots, including 314 single-family lots (including three flag lots), one park lot, one Sheriff Station lot, one horse rest area lot, one debris basin lot, one helispot lot (later revised as a dog park), one recreational center lot, 25 open space lots, 23 private driveway and fire lane lots, and one remainder parcel. The Deerlake Ranch Project has been conditioned to provide off-site improvements to extend a sewer line to provide service to the Twin Lake residential community.

GENERAL CONDITIONS

1. Unless otherwise apparent from the context, the term "permittee" shall include the applicant, owner of the property, and any other person, corporation, or other entity making use of this grant.

2. This grant shall not be effective for any purpose until the permittee, and the owner of the subject property if other than the permittee, have filed at the office of the County Department of Regional Planning ("Regional Planning") their affidavit stating that they are aware of and agree to accept all of the conditions of this grant. Notwithstanding the foregoing, this Condition No. 2 and Conditions No. 4, 5, and 8 shall be effective immediately upon the date of final approval of this grant by the County.

3. Unless otherwise apparent from the context, the term "date of final approval" shall mean the date the County's action becomes effective pursuant to Section 22.60.260 of the County Code.

4. The permittee shall defend, indemnify, and hold harmless the County, its agents, officers, and employees from any claim, action, or proceeding against the County or its agents, officers, or employees to attack, set aside, void, or annul this permit approval, which action is brought within the applicable time period of Government Code Section 65009 or any other applicable limitations period. The County shall promptly notify the permittee of any claim, action, or proceeding and the County shall reasonably cooperate in the defense. If the County fails to promptly notify the permittee of any claim, action, or proceeding, or if the County fails to cooperate reasonably in the defense, the permittee shall not thereafter be responsible to defend, indemnify, or hold harmless the County.

5. In the event that any claim, action, or proceeding as described above is filed against the County, the permittee shall within 10 days of the filing make an initial deposit with Regional Planning in the amount of up to $5,000.00, from which actual costs and expenses shall be billed and deducted for the purpose of defraying the costs or expenses involved in Regional Planning's cooperation in the defense, including but not limited to, depositions, testimony, and other assistance provided to permittee or permittee's counsel.

   If during the litigation process, actual costs or expenses incurred reach 80 percent of the amount on deposit, the permittee shall deposit additional funds sufficient to bring the balance up to the amount of $5,000.00. There is no limit to the number of supplemental deposits that may be required prior to completion of the litigation.

   At the sole discretion of the permittee, the amount of an initial or any supplemental deposit may exceed the minimum amounts defined herein. Additionally, the cost for collection and duplication of records and other related documents shall be paid by the permittee according to County Code Section 2.170.010.

6. If any material provision of this grant is held or declared to be invalid by a court of competent jurisdiction, the permit shall be void and the privileges granted hereunder shall lapse.

7. Upon any transfer or lease of the property during the term of this grant, the permittee, or the owner of the subject property if other than the permittee, shall promptly provide a copy of the grant and its conditions to the transferee or lessee of the subject property.

8. This grant shall expire unless used within two (2) years from the recordation date of the final phasing map. A single one-year time extension may be requested in writing and with the payment of the applicable fee prior to such expiration date.

9. The subject property shall be maintained and operated in full compliance with the conditions of this grant and any law, statute, ordinance, or other regulation applicable to any development or activity on the subject property. Failure of the permittee to cease any development or activity not in full compliance shall be a violation of these conditions. The permittee shall deposit with the County the sum of **$1,400.00**. The deposit shall be placed in a performance fund, which shall be used exclusively to compensate Regional Planning for all expenses incurred while inspecting the premises to determine the permittee's compliance with the conditions of approval. The fund provides for **seven** annual inspections. The required inspection shall be unannounced.

10. If additional inspections are required to ensure compliance with the conditions of this grant, or if any inspection discloses that the subject property is being used in violation of any one of the conditions of this grant, the permittee shall be

financially responsible and shall reimburse Regional Planning for all enforcement efforts necessary to bring the subject property into compliance. The amount charged for inspections shall be $200.00 per inspection, or the current recovery cost at the time any additional inspections are required, whichever is greater.

11. Notice is hereby given that any person violating a provision of this grant is guilty of a misdemeanor. Notice is further given that the Regional Planning Commission ("Commission") or a Hearing Officer may, after conducting a public hearing, revoke or modify this grant, if the Commission or Hearing Officer finds that these conditions have been violated or that this grant has been exercised so as to be detrimental to the public's health or safety or so as to be a nuisance, or as otherwise authorized pursuant to Chapter 22.56, Part 13 of the County Code.

12. All development pursuant to this grant must be kept in full compliance with the County Fire Code to the satisfaction of the Fire Department.

13. All development pursuant to this grant shall conform with the requirements of the County Department of Public Works to the satisfaction of said department.

14. All development pursuant to this grant shall comply with the requirements of Title 22 of the County Code and of the specific zoning of the subject property, unless specifically modified by this grant, as set forth in these conditions, including the approved Exhibit "A," or a revised site plan approved by the Director of Regional Planning ("Director").

15. The permittee shall maintain the subject property in a neat and orderly fashion. The permittee shall maintain free of litter all areas of the premises over which the permittee has control.

16. All structures, walls and fences open to public view shall remain free of graffiti or other extraneous markings, drawings, or signage that was not approved by Regional Planning. These shall include any of the above that do not directly relate to the business being operated on the premises or that do not provide pertinent information about said premises. The only exceptions shall be seasonal decorations or signage provided under the auspices of a civic or non-profit organization.

    In the event of graffiti or other extraneous markings occurring, the permittee shall remove or cover said markings, drawings, or signage within 24 hours of notification of such occurrence, weather permitting. Paint utilized in covering such markings shall be of a color that matches, as closely as possible, the color of the adjacent surfaces.

17. The permittee shall record the conditions and provide a copy of the recordation to the Department of Regional Planning.

PERMIT-SPECIFIC CONDITIONS

18. The permittee shall comply with all mitigation measures contained in the Mitigation Monitoring Program ("MMP") associated with Final Environmental Impact Report ("FEIR") 99-239.

19. This grant shall authorize the removal of two oak trees (#54 and #56) and one encroachment (#29) as shown on the Exhibit Maps.

20. The permittee shall plant one acorn of the same species of oak (Quercus agrifolia), at the same time as and within the irrigation circle of each mitigation oak tree.

21. The permittee shall comply with all conditions and requirements contained in the County Forester and Fire Warden, Forestry Division, letter dated March 8, 2017 (attached hereto), to the satisfaction of said Division, except as otherwise required by said Division, and as specified by these conditions below:

    a. The maintenance period for mitigation trees, as addressed in Condition No. 14 in the letter, shall be seven (7) years.
    b. With respect to removal of tree canopy as addressed in Condition No. 8 in the letter, no more than 15 percent of the canopy of any one tree shall be removed.
    c. The permittee shall provide mitigation trees of the species Quercus agrifolia at a rate of eight to one (8:1) for each of the two trees removed, for a total of 16 trees. The permittee shall provide mitigation trees of the species Quercus agrifolia at a rate of three to one (3:1) for Oak Tree #29, if Oak Tree #29 dies as a result of the approved encroachment.
    d. With respect to the size of the mitigation trees as addressed in Condition No. 11 in the letter, eight of the 16 mitigation trees shall each be one gallon in size and shall be planted in the vicinity where Oak Trees #54 and #56 were removed. Eight of the 16 mitigation trees shall be 15-gallon specimens and shall be provided to the Mountains Recreation and Conservation Authority for planting in the Brown's Canyon mitigation site, or adjacent to the onsite oak woodland south of the Sullivan Bridge.

Attachments:

County Forester's Letter dated March 8, 2017

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 881-2401

DARYL L. OSBY
FIRE CHIEF
FORESTER & FIRE WARDEN

March 8, 2017

Lynda Hikichi, Planner
Department of Regional Planning
Zoning Permits Section
320 West Temple Street
Los Angeles, CA 90012

Dear Lynda Hikichi:

OAK TREE PERMIT NUMBER RPPL 2017-005567
PROJECT NUMBER 99-239
DEERLAKE RANCH PROJECT, CHATSWORTH

We have reviewed the "Request for Oak Tree Permit #RPPL 2017-005567." The project is located at Deerlake Ranch Project in the unincorporated area of Chatsworth. The Oak Tree Report is accurate and complete as to the location, size, condition and species of the Oak trees on the site. The term "Oak Tree Report" refers to the document on file by Christy Cuba, the consulting arborist, dated January 10, 2017.

We recommend the following as conditions of approval:

OAK TREE PERMIT REQUIREMENTS:

1. This grant shall not be effective until the permittee and the owner of the property involved (if other than the permittee), have filed at the office of the Department of Regional Planning their affidavit stating that they are aware of and agree to accept all conditions of this grant. Unless otherwise apparent from the context, the term "permittee" shall include the applicant and any other person, corporation or other entity making use of this grant.

2. The permittee shall, prior to commencement of the use authorized by this grant, deposit with the County of Los Angeles Fire Department a sum of $300. Such fees shall be used to compensate the County Forester $100 per inspection to cover expenses incurred while inspecting the project to determine the permittee's compliance with the conditions of

approval. The above fees provide for one (1) initial inspection prior to the commencement of construction and two (2) subsequent inspections until the conditions of approval have been met. The Director of Regional Planning and the County Forester shall retain the right to make regular and unannounced site inspections.

3. Before commencing work authorized or required by this grant, the consulting arborist shall submit a letter to the Director of Regional Planning and the County of Los Angeles Fire Department's Forestry Division stating that he or she has been retained by the permittee to perform or supervise the work, and that he or she agrees to report to the Director of Regional Planning and the County Forester, any failure to fully comply with the conditions of the grant. The arborist shall also submit a written report on permit compliance upon completion of the work required by this grant. The report shall include a diagram showing the exact number and location of all mitigation trees planted as well as planting dates.

4. The permittee shall arrange for the consulting arborist or a similarly qualified person to maintain all remaining Oak trees on the subject property that are within the zone of impact as determined by the County Forester for the life of the Oak Tree Permit or the Conditional Use Permit.

5. The permittee shall install temporary chainlink fencing, not less than four (4) feet in height, to secure the protected zone of all remaining Oak trees on site as necessary. The fencing shall be installed prior to grading or tree removal, and shall not be removed without approval of the County Forester. The term "protected zone" refers to the area extending five (5) feet beyond the dripline of the Oak tree (before pruning), or fifteen (15) feet from the trunk, whichever is greater.

6. Copies of the Oak Tree Report, Oak tree map, mitigation planting plan and conditions of approval shall be kept on the project site and available for review. All individuals associated with the project as it relates to the Oak resource shall be familiar with the Oak Tree Report, Oak tree map, mitigation planting plan and conditions of approval.

PERMITTED OAK TREE REMOVAL AND ENCROACHMENT:

7. This grant allows the removal of two (2) trees of the Oak genus (*Quercus agrifolia*) identified as Tree Number 54 and 56 on the applicant's site plan and Oak Tree Report. This grant allows encroachment within the protected zone of one (1) tree of the Oak genus identified as Tree Number 29 on the applicant's site plan and Oak Tree Report. Trenching, excavation, or clearance of vegetation within the protected zone of an Oak tree shall be accomplished by the use of hand tools or small hand-held power tools. Any major roots encountered shall be conserved and treated as recommended by the consulting arborist.

8. In addition to the work expressly allowed by this permit, remedial pruning intended to ensure the continued health of a protected Oak tree or to improve its appearance or structure may be performed. Such pruning shall include the removal of deadwood and stubs and medium pruning of branches two-inches in diameter or less in accordance with

the guidelines published by the National Arborist Association. Copies of these guidelines are available from the County of Los Angeles Fire Department, Forestry Division. In no case shall more than 20% of the tree canopy of any one tree be removed.

9. Except as otherwise expressly authorized by this grant, the remaining Oak trees shall be maintained in accordance with the principles set forth in the publication, "Oak Trees: Care and Maintenance," prepared by the County of Los Angeles Fire Department, Forestry Division. A copy of the publication is enclosed with these conditions.

MITIGATION TREES:

10. The permittee shall provide mitigation trees of the Oak genus at a rate of two to one (2:1) for each tree removed for a total of four (4) trees. The permittee shall provide mitigation trees of the Oak genus at a rate of two to one (2:1) for any tree specified above that dies as a result of the approved encroachments. In addition, any tree that reaches ordinance size during the life of the project shall be included in this permit and subject to these conditions of approval.

11. Each mitigation tree shall be at least a 15-gallon specimen in size and measure one (1) inch or more in diameter one (1) foot above the base. Free form trees with multiple stems are permissible provided the combined diameter of the two (2) largest stems of such trees measure a minimum of one (1) inch in diameter one (1) foot above the base.

12. Mitigation trees shall consist of indigenous varieties of *Quercus agrifolia*, grown from a local seed source.

13. Mitigation trees shall be planted within one (1) year of the permitted Oak tree removals. Mitigation trees shall be planted either on site or at an off-site location approved by the County Forester. Alternatively, a contribution to the County of Los Angeles Oak Forest Special Fund may be made in the amount equivalent to the Oak resource loss. The contribution shall be calculated by the consulting arborist and approved by the County Forester according to the most current edition of the International Society of Arboriculture's "Guide for Plant Appraisal."

14. The permittee shall properly maintain each mitigation tree and shall replace any tree failing to survive due to a lack of proper care and maintenance with a tree meeting the specifications set forth above. The two-year maintenance period will begin upon receipt of a letter from the permittee or consulting arborist to the Director of Regional Planning and the County Forester indicating that the mitigation trees have been planted. The maintenance period of the trees failing to survive two (2) years will start anew with the new replacement trees. Subsequently, additional monitoring fees shall be required.

15. All mitigation Oak trees planted as a condition of this permit shall be protected in perpetuity by the Los Angeles County Oak Tree Ordinance once they have survived the required maintenance period.

NON-PERMITTED ACTIONS AND VIOLATIONS:

16. Encroachment within the protected zone of any additional tree of the Oak genus on the project site is prohibited.

17. Should encroachment within the protected zone of any additional tree of the Oak genus on the project site not permitted by this grant result in its injury or death within two (2) years, the permittee shall be required to make a contribution to the Los Angeles County Oak Forest Special Fund in the amount equivalent to the Oak resource damage/loss. Said contribution shall be calculated by the consulting arborist and approved by the County Forester according to the most current edition of the International Society of Arboriculture's "Guide for Plant Appraisal."

18. No planting or irrigation system shall be installed within the dripline of any Oak tree that will be retained.

19. Utility trenches shall not be routed within the protected zone of an Oak tree unless the serving utility requires such locations.

20. Equipment, materials and vehicles shall not be stored, parked, or operated within the protected zone of any Oak tree. No temporary structures shall be placed within the protected zone of any Oak tree.

21. Violations of the conditions of this grant shall result in immediate work stoppage or in a notice of correction depending on the nature of the violation. A time frame within which deficiencies must be corrected will be indicated on the notice of correction.

22. Should any future inspection disclose that the subject property is being used in violation of any one of the conditions of this grant, the permittee shall be held financially responsible and shall reimburse the County of Los Angeles Fire Department, Forestry Division, for all enforcement efforts necessary to bring the subject property into compliance.

To schedule a County Forester inspection, please contact the Environmental Review Unit at (818) 890-5719.

If you have any additional questions, please contact this office at (818) 890-5758.

Very truly yours,

J. LOPEZ, ASSISTANT CHIEF, FORESTRY DIVISION
PREVENTION SERVICES BUREAU

JL:jl

Enclosure

APPENDIX D

Technical Memo

Date: Wednesday, July 05, 2017 Revised 8-30-17[1]

Project: Tract 53138 (Deerlake Ranch)

To: Eric Schlageter, Las Virgenes MWD

From: Dan Ellison, PE

Subject: Water Demand Estimate Study

This memorandum summarizes the results of HDR's analysis of the water demands projected for Tract 53138 (Deerlake Ranch). These estimated demands are intended to guide the sizing of water facilities to service this tract. Deerlake Ranch is a long-planned development at the extreme northern boundary of the Las Virgenes MWD (LVMWD) system, in the hills north of the San Fernando Valley. This development will receive water from the Twin Lakes Subsystem—part of the Las Virgenes MWD system.

As with other water demand estimates, this analysis is intended to be conservative—meaning it needs to be equal to or higher than the actual demands, otherwise fire flows and customer demands will not be met. For this particular case, a conservative estimate is particularly needed, since the existing Twin Lakes Pump Station and Tanks cannot be readily increased in capacity, should the estimates fall short. To avoid over-conservatism, a detailed estimate has been prepared, using the best available information.

Overview - How Water Demands are Estimated

Water demands vary by the hour, the season, and the year. Weather plays a major factor. Hot-dry weather drives up irrigation demands, while conservation measures created by severe droughts can suppress demands. In the District's 2014 Master Plan, it was demonstrated that economic conditions also play a major role, with demands significantly depressed during economic recessions. Water system planning must factor in these many variables, with the goal of meeting the demands of the peak hour, on the maximum day, when the development is fully built-out and occupied.

Water demand estimates for residential developments are typically computed by combining estimates of average annual indoor and outdoor use, then applying peaking factors that account for variations in seasonal and daily demands. Because outdoor use dominates, maximum-day demands occur in the summer. Peak-hour demands generally occur around 7AM, when irrigation systems are operating while residents are also showering before work and school.

LVMWD recently adopted a rate structure based on individual "water budgets". Like rates at most California water utilities, the prices are tiered, with rates escalating as usage increases. The purpose is to encourage water conservation. In budget-based rates, different tiers are set

[1] Several small errors have been corrected. See highlighted text on p.10.

for each residential customer, based on the number of persons residing in the home, the landscaped area, and other factors. Budget goals are for efficient water use. The study which established these rates found that only 40 percent of customers were expected to conform to their budgets, and more than 40 percent were expected to exceed their budgets by at least 50 percent. A recent analysis of billing data from LVMWD showed that 27 percent of all customers were exceeding their budgets by 100 percent or more, with many consistently paying significant monetary penalties. A similar exceedance is found in the Twin Lakes zone. It is thus expected that many Deerlake Ranch customers will also exceed their water budget goals.

Relevant Features of Deerlake Ranch

Demands at a typical Deerlake Ranch residence are expected to be somewhat higher than for the average LVMWD customer, for several reasons:

- The average lot size is relatively large (one-third acre).
- The tract is well inland, so is generally hotter and drier than many other areas of the District.
- New developments such as this also tend to have larger houses, and newer houses are also generally purchased by more affluent buyers.

Somewhat countering these factors, new developments are constructed with water-efficient appliances and plumbing fixtures, and frequently employ drought-tolerant landscaping. Similar relatively young developments nearby are LVMWD's Upper Twin Lakes Zone to the west and LADWP's Porter Ranch area to the east.

Water for the Deerlake Ranch development will be delivered through Metropolitan Water District's LV-3 Turnout and pumped through LVMWD's Twin Lakes Pump Station (PS). Twin Lakes Tanks 1 and 2 serve to moderate between pumping capacity and demands and also store water for emergencies and fire protection. During peak morning hours, water flows from these tanks, and during afternoons and evenings, storage is replenished. Twin Lakes PS also provides flows to the Upper Twin Lakes (UTL) system. Although the UTL system has its own tank, all its water must first be pumped by the Twin Lakes PS.

The Twin Lakes system is designed for pumping to occur 18 hours on peak days. By avoiding pumping during the afternoons, peak electricity rates are avoided. The difference between 18-hour and 24-hour operations also provides a buffer for emergencies and for refilling the tanks following a fire. The 18-hour pumping criterion also provides a small margin for error.

Table 1 shows the current capacities and current demands of the Twin Lakes facilities, based on the District's 2014 Water Master Plan.

Table 1. 2014 Capacities and Demands on Twin Lakes System Facilities – 18-hour Pumping Criterion

	Capacity	Required	Surplus
Twin Lakes PS	1875 gpm[2]	1533 gpm	342 gpm
Twin Lakes Tanks 1 & 2	2.0 MG[3]	1.96 MG	0.04 MG

Indoor Water Use

Estimated indoor water use is based on: (1) the number of homes and other facilities, (2) the number of persons per household, and (3) estimated per capita indoor use.

(1) Deerlake Ranch will consist of 314 single-family homes. Additionally a sheriff's substation and community center with swimming pool are planned.

(2) The number of persons per household is conservatively taken as 3.0, based on the following data from the 2010 Census:

Table 2. Population Data for Deerlake Ranch Area

Census Tract	9203.03	1082.02	1082.01
Area	Twin Lakes / Deerlake Ranch	Western Porter Ranch	Eastern Porter Ranch
Population	1,446	4,895	5,551
Households	560	1,826	1,848
Persons per household	2.6	2.7	3.0

(3) Per capita indoor use is conservatively taken as 80 gallons per capita per day (gpcd), based on the following data:

Table 3. Per capita indoor water consumption

Reference	GPCD	Remarks
LVMWD Water Budget Goal	55	Based on State Water Conservation Act SBx7-7
2014 LVMWD Sanitation Master Plan	90	Based on influent to Tapia Water Recycling Facility of 240 to 280 gallons per day per ERU[4]
2008 LVMWD Sanitation Master Plan	95	Based on influent to Tapia Water Recycling Facility of 247 gallons per day per ERU

Over the last 20 years, indoor use has steadily decreased, as water-efficient toilets, washers, and other devices have been adopted. Deerlake Ranch homes will have modern, water-efficient plumbing fixtures and appliances, therefore water use should be less than 90 gallons per capita per day. However, consumption elsewhere shows that usage will be above the 55 gallons per day budget goal.

[2] Pump station capacity: 2500 gpm for 18 hours per day, is average of 1875 gpm
[3] Actual usable capacity is 1.87 MG, producing a ~0.1MG deficit.
[4] ERU = Equivalent residential unit; e.g., a house, apartment, or equivalent commercial / industrial property.

If indoor usage exceeds budget allocations in proportion to the overall budget exceedances, 80 GPCD would be expected.[5]

Estimated Indoor Use

Using the figures above, estimated average annual indoor water use is as shown below.

Table 4. Estimated Indoor Water Use

Customer Type	Units	Persons per Unit	Daily Per Capita Use (gal)	Total (gallons/day)
Houses	314	3.0	80	75,000[6]
Substation	1	2	30	60
Recreation Center	1	5	50	250
Total (rounded)				75,000
Total in gpm				**52**

Outdoor Water Use

Estimated outdoor water use is based on: (1) the types of land use, (2) the land areas irrigated, and (3) the estimated unit irrigation demands.

(1) **Land Use**. The Deerlake Ranch development will be constructed in hilly terrain. Houses will sit on level pads, with varying amounts of backyard space. Frequently, the lots are very deep, extending into large sloped areas that are either natural or graded. Outside of the individually owned lots, common-area properties abut many of the roads or have terrace drains for conveyance of runoff. Many of these common areas will be graded, but some will be left in a natural state. All graded areas (both cut and fill) will have landscaping, which must be irrigated. Figure 1 (next page) illustrates some of the various conditions.

(2) **Irrigated Areas**: The various land areas, based on an analysis of data provided by the developer, are summarized in Table 5 (next page). For this analysis, 75 percent of the level area of each lot is assumed to be irrigated, after subtracting the areas occupied by the house and driveway. The other 25 percent is assumed to be hardscaped (patio, walkways, etc.)

(3) **Unit Demands**. Unit irrigation demands vary, depending on the types of plants, rainfall, the evapotranspiration rate (ETo) and the efficiency of water use. Various unit demands are shown in Table 6 (next page).

[5] Using budget exceedance figures, 80 gpcd is the overall result if: (1) 40% use 55 gpcd; (2) 27% use 2 x 55 gpcd, and (3) 33% use 1.5 x 55 gpcd.
[6] This compares to a water budget of 50,000 per day.

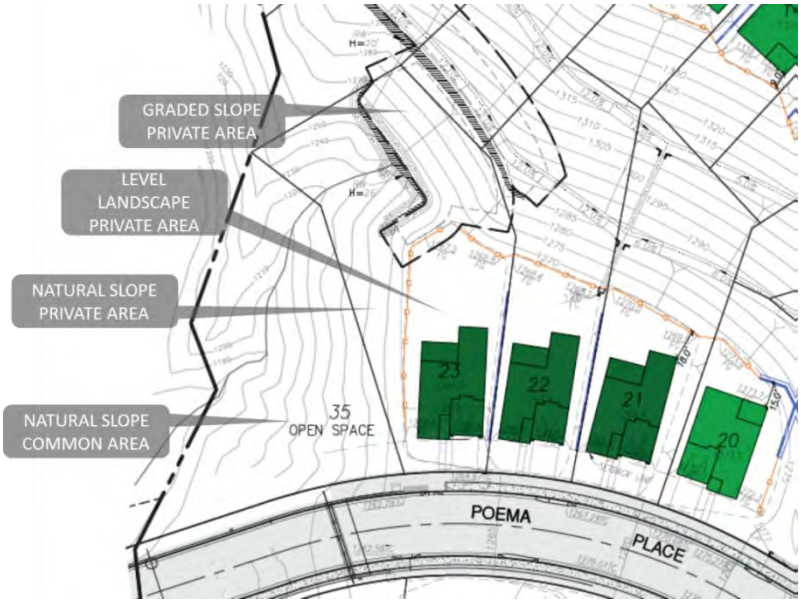

Figure 1. Illustration of various site conditions at Deerlake Ranch

Table 5. Calculated areas in Deer Lake Ranch

Land Use	Areas (SF)	Remarks
Level, landscaped private areas	1,039,530	75% x {[Pad area] – [std home footprint][7] – [std driveway][8]}
Sloped private areas	2,201,671	[Gross lot size] – [pad area]
Common landscaped areas	1,950,000	From developer's 2016 landscaping plans
Mini Park	9,076	From 2016 developer's landscaping plan
Swimming Pool	~3,000	From developer's 2016 landscaping plans

Table 6. Various Unit Irrigation Demands

Landscaping Type	Feet / Year	Remarks
ETo[9] for Chatsworth, CA	5	Based on CIMIS Station 215, April 2016 - March 2017
LVMWD Std Water Budget Goal	4	80% of ETo based on SBx7-7
Parks	3.5	Based on analysis of 42 recycled water LVMWD accounts performed for the 2007 Master Plan
Golf Courses	3.5	
Common area slopes	2.6 – 2.8	
Medians/parkways	5.5	

[7] Standard home footprint = 2400 SF
[8] Standard driveway = 690 SF
[9] ETo for CIMIS Station 215 (Chatsworth), April 2016 - March 2017 is 60.09 inches

Both state law and local ordinances impose restrictions on what types of landscaping may be employed, including limits on the areas that may be planted in turf. As a new development, Deerlake Ranch must submit landscaping plans for plan check that comply with these requirements, but over time, individual property owners are not prevented from modifying the landscaping designs. It should be anticipated that many of the natural slope areas will eventually be planted and receive some amount of irrigation.

Estimated Outdoor Use

As noted earlier, a majority of LVMWD customers do not meet their water budget goals, and a substantial portion exceed their goals by 100% or more (i.e., consumption is 2 times the goal or more). In designing water facilities for this development, it needs to be assumed that water budgets here will be also be exceeded. Taking these factors into consideration, conservative estimates of irrigation quantities are as shown below.

Table 7. Estimated Outdoor Water Use

Land Use	Areas (SF)	Unit Demands	Acre-Ft / Yr	Gallons/Day
Level, landscaped private areas	1,039,530	5[10]	119	107,000[11]
Sloped private areas	2,201,671	1.3[12]	66	58,700
Common landscaped areas	1,950,000	2.5[13]	112	100,000
Mini Park	9,076	4[14]	1	750
Swimming Pool	3,000	6	0	350
TOTAL (rounded)				266,000
Total in gpm				**185**

Peaking Analysis

Figure 2 and Figure 3 show the general seasonal variations in demands for the Twin Lakes and Upper Twin Lakes zones. These graphs compare average monthly demands with average annual demands for the years 2010 through 2016, including pre-drought and drought conditions, and recession and post-recession periods. While the patterns are similar from year to year, variations in peak values are seen. No particular drivers for the variations are apparent: the peak values for 2010 and 2016 are very similar, although the weather and economic situations were different.

[10] Using budget exceedance figures, if (1) 40% use 4 ft (water budget); (2) 27% use 2 x 4 ft, and (3) 33% use 1.5 x 4 gpcd, the result is 5.7 feet. This has been rounded down to account for more drought-tolerant landscaping at Deerlake Ranch.
[11] This compares to an annual water budget of 85,000 gallons per day (80% of 5 feet, or 4 feet).
[12] Assumes 50% of these areas will eventually be landscaped and 2.6 feet of water will be applied per year.
[13] Based on 2.6-2.8 feet per year, from 2007 Master Plan, but factoring in more drought-tolerant plantings.
[14] 80% of ETo; assumes mostly turf.

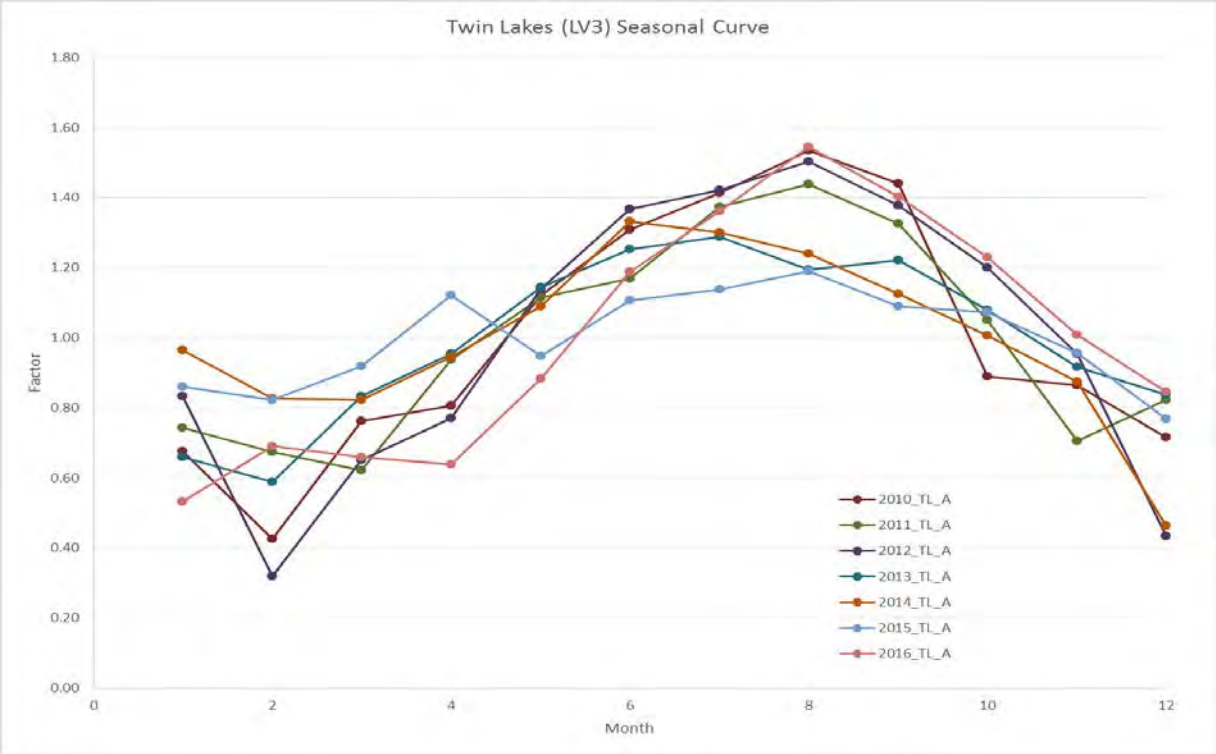

Figure 2. Seasonal Curve - Twin Lakes Subsystem

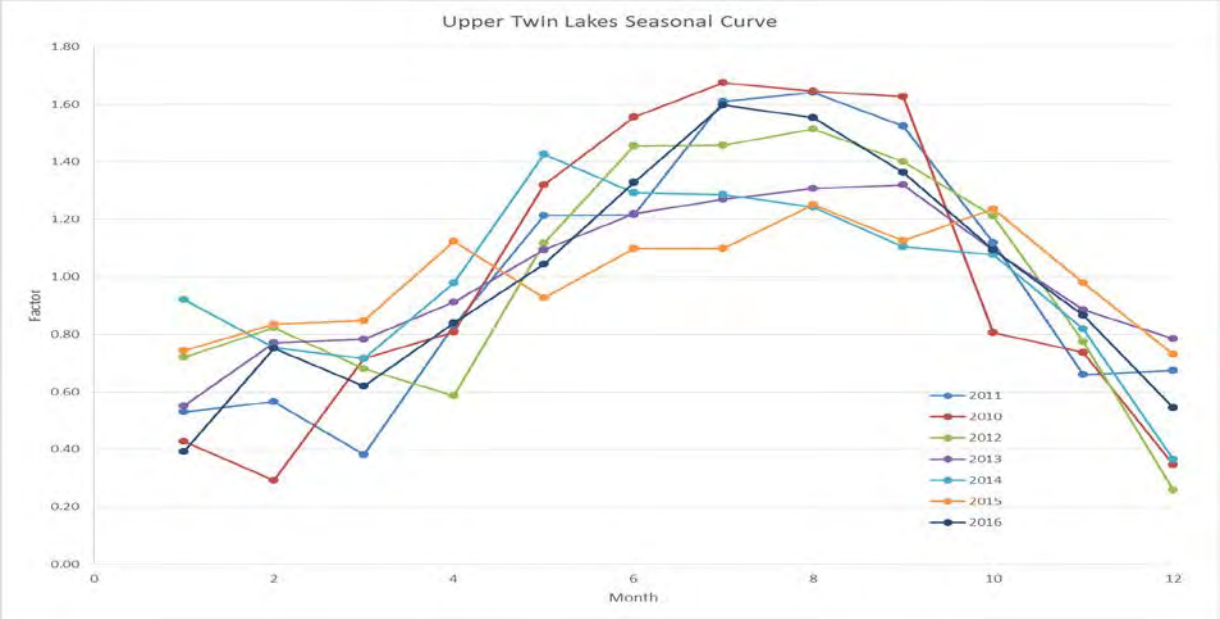

Figure 3. Seasonal Curve – Upper Twin Lakes Subsystem

Average Day Demand

Average day demand (ADD) is the volume of water consumed on the average day. For the Deerlake Ranch development, it is estimated to be the sum of the estimated indoor and outdoor usage as computed above.

Deerlake Ranch ADD = average indoor and outdoor use
= 52[15] + 185[16] = 240 gpm (rounded)

Maximum Day Demand

For sizing of pumping and storage facilities, the maximum daily demand (MDD) is important. The MDD peaking factor (PF) is the ratio of the volume of water used on the maximum demand day to the ADD. Table 8 shows calculations of the MDD PF for the last seven years for both the Twin Lakes and Upper Twin Lakes zones.

Table 8. Recent MDD, ADD, and MDD PF for Twin Lakes and Upper Twin Lakes Zones

	Twin Lakes System			Upper Twin Lakes System		
YEAR	MDD (gpm)	ADD (gpm)	MDD PF	MDD (gpm)	ADD (gpm)	MDD PF
2010	1187	321	3.7	196	90	2.2
2011	855	341	2.5	377	103	3.7
2012	1192	342	3.5	333	109	3.1
2013	1052	382	2.8	399	120	3.3
2014	891	366	2.4	353	116	3.0
2015	783	304	2.6	229	93	2.6
2016	783	337	2.3	237	93	2.6
DESIGN	1200	400	3.7	400	120	3.7

For its last two master plans, LVMWD has used a MDD PF of 3.2, based on calculations performed in 2007. For design of a new system, the MDD PF should be the highest that is reasonably expected to be experienced without a fire or other emergency. A MDD PF of 3.7 is therefore appropriate.

Deerlake Ranch MDD = MDD PF x ADD = 3.7 x 240 = 890 gpm

Peak Hour Demand

Similarly, the peak-hour demand (PHD) is important for the sizing of pipelines and other facilities that must handle instantaneous demands. The PHD is the maximum flow required on the peak hour of the maximum demand day. The PHD PF (as used in this analysis) is the ratio of this flow to the average flow for the year.

Table 9 shows calculations of the MDD PF for the last seven years for both Twin Lakes and Upper Twin Lakes pressure zones.

[15] From Table 4.
[16] From Table 7.

Table 9. Recent PHD Peaking Factors for Twin Lakes and Upper Twin Lakes Zones

YEAR	Twin Lakes System	Upper Twin Lakes System
2010	2.6	4.5
2011	n/a	4.1
2012	4.6	3.8
2013	n/a	3.7
2014	4.8	3.8
2015	3.6	4.2
2016	4.7	4.2

n/a = not available (poor data)

Figure 4 illustrates hourly peaking factors for Upper Twin Lakes, calculated from operational data (SCADA data) provided by the District. As expected, flows peak between 6AM and 7AM, and bottom out at mid-day. This figure also illustrates errors inherent in the calculations. The negative values are fictitious, produced when a tank level rise is recorded after the pump has shut down.

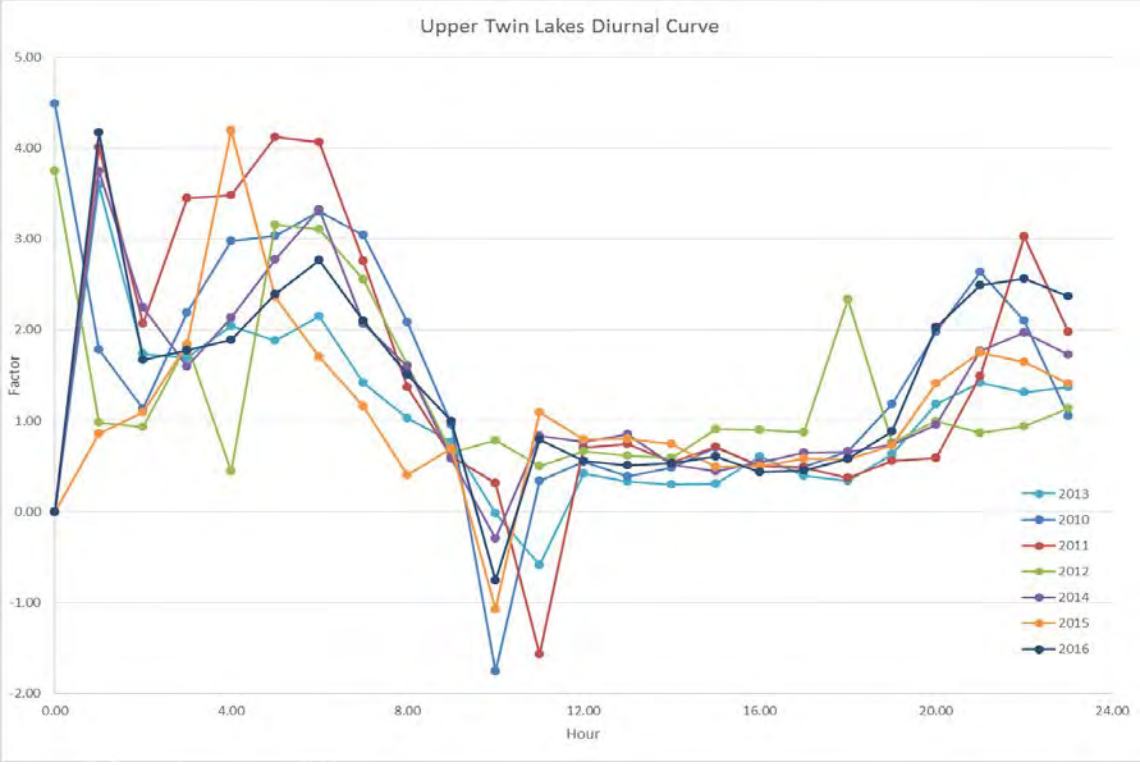

Figure 4. Hourly peaking factors for the Upper Twin Lakes Subsystem

For its last two master plans, LVMWD has used a PHD PF of 8.5, based on calculations performed in 2007.

For design of a new system, the MDD PF should be the highest that is reasonably expected to be experienced without a fire or other emergency. Therefore, a PHD PF of 5.0 is appropriate.

Deerlake Ranch PHD = PHD PF x ADD = 5 x 240 = 1200 gpm (rounded)

Summary of Results

Table 10 summarizes the estimated demands on the Twin Lake PS upon build-out of the Deerlake Ranch development.

Table 10. Analysis of Twin Lakes Pressure Zone Maximum Day Demands

	Flow rate (gpm)
Existing Twin Lakes Zone MDD	1200
Upper Twin Lake Zone MDD	400
Allowance for Undeveloped Lots in TL and UTL zones	50
Estimated Deerlake Ranch MDD	890
Total Demand on Twin Lakes PS	2540
Fire Flow (per Church of the Rocky Peak, record drawings, for 3 hours) [17]	3750

Pumping and storage facilities will need to be adequately sized to meet the above demands. In addition, pipelines will need to be sized to meet peak-hour demands within the zone of 1200 gpm.

Closure

Estimating water demands for Deerlake Ranch is inherently problematic since it involves predicting the future behavior of hundreds of future customers. Because these demands will be imposed on existing facilities, the ability to absorb these demands is very limited, so the estimates need to be both accurate and conservative.

Elsewhere in the LVMWD system, demands from new developments have exceeded estimates that were based on historical consumption data. In the cases of the Upper Twin Lakes and Upper Oaks systems, new pump stations serving these facilities were sized for demands that were less than what was ultimately experienced, but because these facilities had been designed for 9-hour pumping, they had significant capacity to absorb additional demands by extending operations for more than 9 hours. While the pumping time at Twin Lakes PS could be extended a little (from 18 hours to 24 hours), the added capacity is less substantial, and no margins for operational errors would exist.

* * *

HDR appreciates the opportunity to provide this analysis. If there are any questions, please don't hesitate to contact Dan Ellison at 213.200.5152, dan.ellison@HDRinc.com.

[17] Fire flow is determined by the largest structure in the zone.

APPENDIX E

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Deerlake Ranch
Tract No. 53138
Storage and Pumping Capacity Study

25 July 2016

Signed: 25 July 2016

Prepared for

Las Virgenes Municipal Water District
4232 Las Virgenes Road
Calabasas, CA 91302

K/J Project No. 1644221*00

Table of Contents

List of Tables ..... *ii*

List of Figures ..... *ii*

List of Appendices ..... *ii*

Section 1: Introduction 1-1

Section 2: Alternatives 2-1

2.1 Pumping 2-1
2.1.1 Alternative P-1: Modifications at Twin Lakes Pump Station 2-1
2.1.2 Alternative P-2: Emergency Pump and Power at Twin Lakes Pump Station 2-3
2.1.3 Alternative P-3: Modifications at Upper Twin Lakes Pump Station 2-4
2.2 Storage 2-4
2.2.1 Alternative S-1: Replace Twin Lakes Tank 1 2-4
2.2.2 Alternative S-2: New Upper Twin Lakes Tank 2 2-5
2.2.3 Alternative S-3: New Tank near Fern Ann Falls Rd 2-6
2.2.4 Alternative S-4: New Tank near Johnson Mountain Way 2-6
2.2.5 Alternative S-5: New Tank Northwest of Deerlake Ranch 2-6
2.2.6 Alternative S-6: New Tank at Horse Rest Area 2-6
2.2.7 Alternative S-7: New Tank at Mountain Peak North of Deerlake Ranch 2-7
2.2.8 Alternative S-8: New Tank Beyond Mountain Peak North of Deerlake Ranch 2-7
2.2.9 Alternative S-9: New Tank Northwest of Unit 205 at Deerlake Ranch Property Boundary 2-7

Section 3: Evaluation of Alternatives 3-1

3.1 Evaluation of Pumping Alternatives 3-1
3.2 Evaluation of Storage Alternatives 3-1
3.3 Capital and O&M Costs 3-3

Section 4: Conclusion 4-1

4.1 Meeting Deerlake Phase 2 Demands 4-1
4.2 Meeting Deerlake Phase 2 and 3 Demands 4-2
4.3 Meeting Twin Lakes 2035 Demands 4-2

References ..... *i*

List of Tables

Table 1: Twin Lakes and Upper Twin Lakes System Features
Table 2: Deerlake Ranch Pumping and Storage Analysis by Construction Phase
Table 3: Twin Lakes Pump Station Electrical Loads
Table 4: Twin Lakes Pump Station Electrical Load Tabulation
Table 5: Twin Lakes Pump Station Electrical Load with New Pumps P7 and P8
Table 6: Twin Lakes Pump Station Electrical Load with New Pump P9
Table 7: Twin Lakes Pump Station Electrical Upgrades Required for New Pumps
Table 8: Summary of New and Proposed Storage Tanks at Existing Sites
Table 9: Storage Evaluation Matrix
Table 10: Pumping and Storage Cost Evaluation
Table 11: Upper Twin Lakes Tank Storage Analysis

List of Figures

Figure 1: Twin Lakes Pump Station Modifications: Alternative P-1
Figure 2: Twin Lakes Tank 1 Replacement: Alternative S-1
Figure 3: Upper Twin Lakes Tank 2: Alternative S-2
Figure 4: Partial Twin Lakes System with Storage Tank Alternatives
Figure 5: New Tank Alternatives near Indian Hills Development
Figure 6: New Tank Alternatives near Deerlake Ranch Development

List of Appendices

Appendix A: Figures
Appendix B: Storage Alternative S-9 Site Layout
Appendix C: Opinion of Probable Construction Cost

Section 1: Introduction

Deerlake Ranch, Tract No. 53138, is a proposed development encompassing approximately 233 acres west of Porter Ranch and northeast of the Topanga Canyon Boulevard interchange with California Highway 118 (Ronald Reagan Freeway). The proposed development consists of 314 single-family residential lots, one recreation building, one sheriff facility, and 31 open space lots. Due to the large size of the development, Deerlake Ranch will be constructed in three phases.

Potable water will be delivered to Deerlake Ranch by the Las Virgenes Municipal Water District (District). Deerlake Ranch is situated within the District's Twin Lakes pressure zone. Water supply enters the pressure zone through the LV-3 turnout, which is an 8-inch connection to Metropolitan Water District of Southern California's West Valley Feeder No. 2. The Twin Lakes Pump Station adds approximately 530 feet of head to reach the Twin Lakes system hydraulic grade line of 1,585 feet. Twin Lakes also supplies water to the Upper Twin Lakes system via the Upper Twin Lakes Pump Station. Upper Twin Lakes has a hydraulic grade line of 1,805 feet. Features of both systems are presented in Table 1. Deerlake Ranch will be served by the Twin Lakes system, but one alternative involves adding a new reservoir and additional pumping/pressure reducing capacity to the Upper Twin Lakes system to satisfy the Deerlake demand (see Section 2).

Table 1: Twin Lakes and Upper Twin Lakes System Features

Feature	Twin Lakes	Upper Twin Lakes
Duty Pumps	3 x 100 hp 2 x 75 hp	1 x 40 hp
Standby Pumps	1 x 100 hp	1 x 40 hp
Nominal Flow	2,500 gpm	400 gpm
Standby Flow	585 gpm	400 gpm
Pump Station TDH	530 ft	240 ft
Storage	2.0 MG	0.385 MG
Reservoir High Water Level	1,585 ft	1,805 ft

Source: Kennedy/Jenks Consultants, Potable Water Master Plan Update 2014, dated 30 June 2014.

AECOM prepared a DRAFT Water System Design Report (Report) to evaluate the impact of Deerlake Ranch on the District's existing infrastructure. Phase 1 of Deerlake Ranch consists of 103 single-family units, Sheriff Station, Recreation Center, and 16.2 acres of landscape demands. Phase 2 consists of an additional 142 single-family units and 8.4 acres of landscape. Phase 3 consists of an additional 69 single-family units and 11.2 acres landscape. The findings of the Report are summarized in Table 2. Phase 1 can be supplied by the Twin Lakes system without any upgrades; however, Phases 2 and 3 require expansion of the Twin Lakes pumping and storage capacities.

Table 2: Deerlake Ranch Pumping and Storage Analysis by Construction Phase

Deerlake Ranch Phase	Twin Lakes Pumping Demand	Twin Lakes Pumping Surplus / (Deficit)	Twin Lakes Storage Demand	Twin Lakes Storage Surplus / (Deficit)
Phase 1	2,457 gpm	43 gpm	1.84 MG	0.16 MG
Phase 2	2,865 gpm	(365 gpm)	2.11 MG	(0.11 MG)
Phase 3	3,120 gpm	(620 gpm)	2.29 MG	(0.29 MG)

Source: AECOM, DRAFT Water System Design Report for Amended Vesting Tentative Track No. 53138 Deerlake Ranch, Dated 18 March 2016.

Construction of the entire Deerlake Ranch development will require an additional 620 gpm of pumping capacity and 0.29 MG of storage capacity to the Twin Lakes system. Concurrently, the District's Potable Water Master Plan Update 2014 identified pumping and storage deficits for year 2035 of 1,878 gpm and 1.5 MG, respectively, for the Twin Lakes system. Demands from Deerlake Ranch are included in the 2035 pumping and storage deficits identified in the Master Plan.

The primary objective of this study is to evaluate alternatives and recommend project(s) to add 620 gpm of pumping and 0.29 MG of storage capacity to the Twin Lakes System as a result of the deficit created by construction of the Deerlake Ranch development. A secondary objective is to identify opportunities for upsizing recommended project(s) that can advance the District toward meeting the 2035 pumping and storage deficits.

Section 2: Alternatives

2.1 Pumping

Three alternatives were evaluated to increase the pumping capacity in the Twin Lakes system to meet the needs of the Deerlake Ranch development.

2.1.1 Alternative P-1: Modifications at Twin Lakes Pump Station

The Twin Lakes Pump Station was expanded in anticipation of the Deerlake Ranch and Indian Hills developments (Boyle, 2004), with construction at the Pump Station completed in 2009. However, current demand projections through Phase 3 of Deerlake Ranch show the Twin Lakes Pump Station is deficient in pumping capacity. To overcome a deficit of 620 gpm due to Deerlake Ranch, two additional 75 hp pumps can be installed to provide an additional 430 gpm each, totaling 860 gpm for the pump station. The 2009 upgrades to the pump station included two flanged tees on the eastern outlet manifold in anticipation of installing additional pumps. The flanged tees were placed to accommodate future 100 hp pumps. Installation of larger pumps is not recommended since the maximum water velocity past the pump bowl would exceed 5 ft/s (Boyle, 2004). To allow for future expansion, the two new 75 hp pumps can be installed in pump cans sized for 100 hp pumps. A layout of the pump station is presented in Figure 1 of Appendix A with the two new pumps identified as P7 and P8 located on the east discharge manifold.

Twin Lakes Pump Station has a nominal capacity of 2,500 gpm; however, the pump station currently operates at a capacity of 1,600 gpm. This flow restriction is due to the 8-in suction pipeline connecting the District's turnout (LV-3) to the pump station. The District plans to install a parallel 14-in suction pipe to increase suction capacity, including emergency supply, to allow for a higher pumping output (AECOM, 2016).

An opportunity exists to add one additional 100 hp pump to the west discharge manifold. This manifold houses two 100 hp pumps, one 75 hp pump, and one standby 75 hp pump. In the Preliminary Design Report for the original Twin Lakes Pump Station Expansion, Boyle Engineering proposed installing two new pump cans north of the existing west discharge manifold. Space is available to install one new pump at this location. This new pump is shown as P9 in Figure 1 of Appendix A. With the three additional pumps, the maximum total water flow through the east discharge manifold is 2,030 gpm and through the west discharge manifold is 2,615 gpm. The new pump station rating would be 4,060 gpm, assuming one 100 hp pump is on standby. Under this plan, the District would only have a 433 gpm pumping deficit for 2035.

Additional pumps require increasing the capacity of the suction and discharge surge tanks. The suction surge tank has a capacity of 1930 gal and is rated for 350 psi, while the discharge surge tank has a capacity of 2500 gal and is rated for 500 psi. The discharge surge tank was installed as part of the pump station expansion in 2009, while the suction surge tank was installed with the original pump station construction in 1966. Pumps P7 and P8 will require a new suction surge tank to be installed upstream of the east manifold discharge. Pump P9 may also require replacement of the existing suction surge tank. The discharge surge tank was sized with pumps P7 and P8 included, so modifications to the discharge surge tank may not be required.

Evaluation of the existing surge tanks and sizing of new surge tank(s) requires a detailed surge analysis and design, which is beyond the scope of this study.

The Twin Lake Pump Station is supplied electricity through a 500 kilovolt-amp (kVA), 480 volt (V) utility transformer. This utility transformer is feeding an 800 amp (A) distribution switchboard (DSB) 103 that feeds a 600A motor control center (MCC) 103 and a 600A DSB 101. DSB 101 in turn feeds 600A MCC 101. Current electrical loads are shown in Table 3 and the tabulation is shown in Table 4. Assuming the worst case scenario where the 100 hp standby pump is in operation and the 75 hp pump is offline, the existing 500 kVA transformer is at 100 percent capacity and the loads on 600A MCC-101 and MCC-103 are at 79 percent and 47 percent, respectively, when tabulating the electrical loads with 25 percent extra load assigned to the largest motor.

Table 3: Twin Lakes Pump Station Electrical Loads

Load	Size (HP/kVA)	Status	Max Demand (kVA)	Max Demand (Amps)	Load on
P1	75 HP	Duty	80	96	MCC 101
P2	75 HP	Duty	80	96	MCC 101
P3	100 HP	Duty	103	124	MCC 101
P4	100 HP	Duty	103	124	MCC 101
P5	100 HP	Duty	103	124	MCC 103
P6	100 HP	Standby	103	124	MCC 103
Air Compressor	3 HP	Duty	4	4.8	MCC 103
Light Panel	3 kVA	Duty	3	6.25	MCC 101

Source: Boyle Engineering Corporation, Preliminary Design Report, Twin Lakes Pump Station Expansion, Dated September 2004.

Table 4: Twin Lakes Pump Station Electrical Load Tabulation

Load	Max Demand (kVA)	Max Demand (Amps)	Load Capacity (%)
Total Loading on 500 kVA XFMR[(a)]	499	603	100
Total Loading on MCC 101[(b)]	369	446.25	74
Total Loading on MCC 101 with 25% Extra of Largest Motor[(b)]	394.75	477.25	79
Total Loading on MCC 103[(c)]	210	252.8	42
Total Loading on MCC 103 with 25% Extra of Largest Motor[(c)]	235.75	283.8	47

Notes:
(a) Assumes P1 is offline and P6 is online.
(b) Assumes all loads on MCC 101 are online.
(c) Assumes all loads on MCC 103 are online.

Adding two additional pumps P7 and P8 to the eastern discharge manifold impacts the 500 kVA transformer, 600A DSB 103, and 600A MCC 103. Table 5 shows that P7 overloads the utility transformer. P7 and P8 overload the utility transformer and the feeder breaker to MCC 103. Adding pump P9 to the western discharge manifold further impacts the 500 kVA transformer,

600A DSB 103, and 600A MCC 101. It is assumed pumps P7 and P8 are installed before pump P9 as the eastern discharge manifold was constructed to accommodate two additional pumps. Table 5 and Table 6 show that P7, P8, and P9 overload the utility transformer and DSB 103. MCCs 101 and 103 are not overloaded with the additional pumps.

Table 5: Twin Lakes Pump Station Electrical Load with New Pumps P7 and P8

New Load on MCC 103	Size (hp)	Total Transformer Loading (kVA)	Total Transformer Loading (%)	MCC 103 Loading (Amps)	MCC 103 Loading (%)	DSB 103 Loading (Amps)	DSB 103 Loading (%)
P7	75	579	116	380	63	696	87
P7 & P8	150	659	132	476	79	793	99

Table 6: Twin Lakes Pump Station Electrical Load with New Pump P9

New Load on MCC 101	Size (hp)	Total Transformer Loading (kVA)	Total Transformer Loading (%)	MCC 101 Loading (Amps)	MCC 101 Loading (%)	DSB 103 Loading (Amps)	DSB 103 Loading (%)
P9	100	762	152	505	84	917	115

The 500 kVA utility transformer is fully loaded under current electrical loads. Adding one 75 hp pump (P7) on MCC 103 would require the utility transformer to be upgraded to 750 kVA. Adding two 75 hp pumps (P7 and P8) would also require upgrading the utility transformer to 750 kVA as well as upgrading feeder breaker to MCC 103. Adding two 75 hp pumps (P7 and P8) on MCC 103 and one 100 hp pump (P9) on MCC 101 require upgrading the transformer to 1,000 kVA, upgrading DSB 103 from 800A to 1000A, and upgrading the feeder breaker to MCC 103. Table 7 summarizes electrical upgrades at the Twin Lakes Pump Station for new pumps.

Table 7: Twin Lakes Pump Station Electrical Upgrades Required for New Pumps

Upgrade Required	P7	P7, P8	P7, P8, P9
Upsize Transformer from 500 kVA to 750 kVA	X	X	
Upsize Transformer from 500 kVA to 1,000 kVA			X
Upgrade DSB 103 from 800A to 1,000A			X
Upgrade Feeder Breaker to MCC 103 from 400AT to 500AT		X	X

2.1.2 Alternative P-2: Emergency Pump and Power at Twin Lakes Pump Station

To meet the required pumping capacity without permanently expanding the Twin Lakes Pump Station, an emergency pump and power trailer can be installed at the pump station. The pump would be an above grade vertical turbine pump with hard piping connections to the inlet and outlet pipe manifolds. Emergency power in the form of a trailer mounted generator would also

be required to power the pump. This setup allows the pump to operate as an emergency backup supply primarily to pump water for meeting the system-wide peak demand. The emergency pump can also supply water if power to the pump station is interrupted, allowing the District to continue pumping into the Twin Lakes system until the District's temporary emergency power trailer is brought to the site and put into operation.

A new pipe connection to the suction and discharge pipes is required to supply water to the temporary above grade pump. This requires excavation across the eastern portion of the pump station site, crossing existing water pipes and electrical conduits. The temporary power generator, assumed to be trailer mounted, will need to be exercised periodically to ensure proper operation. Operation of the temporary pump will require integration with SCADA. While a temporary pump may be viable to meet the Phase 2 demands, it is not a permanent solution. This alternative also requires permitting through the Air Quality Management District, increased maintenance for operations staff, development and executing of a testing schedule, and exposes the District to risk for maintaining a temporary pump and generator in perpetuity. Due to these reasons, this alternative is eliminated.

2.1.3 Alternative P-3: Modifications at Upper Twin Lakes Pump Station

The Upper Twin Lakes Pumping Station is equipped with two 40 hp pumps, each capable of providing 400 gpm of pumping capacity. One pump is operated as a duty pump and the other is reserved for standby, although the pump station and supporting infrastructure were sized to allow for both pumps to operate simultaneously for a total capacity of 800 gpm (Boyle, 2001). The connecting pipeline between the Upper Twin Lakes Pump Station and Tank is sized at 12 inches. A 6-inch PRV inside the pump station allows Upper Twin Lakes to supply emergency water to the Twin Lakes system. The PRV has a maximum suggested flow of 1,800 gpm and an intermittent maximum flow of 2,250 gpm. The CMU building housing the pumps and PRV was constructed on a small lot without space reserved for future expansion. Since Deerlake Ranch is within the Twin Lakes pressure zone, adding pumping capacity to the Upper Twin Lakes zone does not satisfy the 620 gpm pumping deficit in the Twin Lakes zone. Therefore, this alternative is eliminated.

2.2 Storage

Nine alternatives were evaluated to increase the storage capacity in the Twin Lakes system to meet the needs of the Deerlake Ranch development. The first alternative consists of replacing the existing 0.4 MG Twin Lakes Tank 1 with a 0.7 MG tank, the second consists of a new 0.3 MG Upper Twin Lakes Tank 2, and the remaining seven alternatives consist of new 0.3 MG tanks located within the Twin Lakes system.

2.2.1 Alternative S-1: Replace Twin Lakes Tank 1

Twin Lakes Tank 1 has a capacity of 0.4 MG. The bottom floor of Tank 1 is approximately six feet higher than the bottom floor of Tank 2. By re-grading the site around Tank 1 to match the bottom floor of Tank 2, a replacement 0.7 MG tank can be constructed with the same bottom floor and high water elevations to match Tank 2. The replacement 0.7 MG Tank 1 will have an

internal diameter of 63 feet, which is 10.5 feet larger than the existing 0.4 MG Tank 1. A preliminary layout of the replacement 0.7 MG Tank 1 is presented in Figure 2. To limit the amount of re-grading required for the replacement 0.7 MG Tank 1, the center of the tank can be shifted closer to Tank 2 while still maintaining a 15-ft wide access road around and between both tanks.

Purchasing additional land to accommodate the larger Tank 1 is not required, but a temporary easement is likely needed for construction. The District has a maintenance easement for the access road to the tank site. Since the easement does not allow improvements to the access road, no access road improvements are considered in this alternative. Visual impact of the new tank to the communities below is anticipated to be minimal since the new tank will have the same height as the original tank, although it will be 10.5 feet wider and 6 feet lower. Due to the significant grading required to lower the tank site by approximately six feet, retaining walls may be required and spoils must be hauled off-site through the Indian Hills neighborhood.

2.2.2 Alternative S-2: New Upper Twin Lakes Tank 2

The Upper Twin Lakes tank has a current capacity of 0.385 MG and resides on an oversized lot designed to support a temporary tank. The space reserved for the temporary tank is not large enough to construction a 0.3 MG tank with a 15-ft wide access road; however, by utilizing the temporary tank space and extending the property line, a 0.3 MG tank can be constructed at the site. Figure 3 shows a preliminary layout of the Upper Twin Lakes Tank site with the new 0.3 MG tank. The adjacent property owner is the Mountains Recreation and Conservation Authority (MRCA). A land purchase agreement or easement is required to construct the 0.3 MG tank. Visual impact of the new tank to the communities below is minimal since the tank is located behind a hillside. An existing storm drain pipeline will also need to be relocated to accommodate the new tank.

The 12-in pipeline currently serving the Upper Twin Lakes Tank can also serve the new 0.3 MG tank. At the District's maximum acceptable velocity of 10 feet per second (fps), approximately 3,500 gpm of water can flow down to the Upper Twin Lakes Pump Station. The limiting factor allowing flow from the Upper Twin Lakes system to the Twin Lakes system is the 6-in PRV, which has a maximum continuous flow of 1,800 gpm and an intermittent maximum flow of 2,250 gpm. A parallel pipe with an above grade PRV can be installed at the Upper Twin Lakes Pump Station to increase the amount of water that can flow from Upper Twin Lakes to Twin Lakes. The two booster pumps in the Upper Twin Lakes Pump Station have a combined supply of 800 gpm, which limits the rate at which the Upper Twin Lake Tanks can refill.

A summary of the existing Twin Lakes and Upper Twin Lakes tanks, along with the proposed tank at each site, is presented in Table 8.

Table 8: Summary of New and Proposed Storage Tanks at Existing Sites

Feature	Twin Lakes 1	Twin Lakes 2	Upper Twin Lakes 1	New Twin Lakes 1 (Alt. S-1)	New Upper Twin Lakes 2 (Alt. S-2)
Storage	0.4 MG	1.6 MG	0.385 MG	0.7 MG	0.3 MG
Internal Diameter	52'-6"	95'-0"	60'-0"	63'-0"	54'-0"
Reservoir High Water Level	1585 ft	1585 ft	1805 ft	1585 ft	1805 ft
Reservoir Bottom Floor	1561 ft	1555 ft	1787 ft	1555 ft	1787 ft

2.2.3 Alternative S-3: New Tank near Fern Ann Falls Rd

A new 0.3 MG tank can be constructed near Fern Ann Falls Road in the existing Indian Falls development with a bottom elevation of 1560 ft. This tank location, shown in Figures 4 and 5, requires the purchase of property from a private land owner. Access to the tank is via a private driveway, likely owned by the same property owner. The pipeline connection to the new tank would be off the existing 8-in pipeline in Fern Ann Falls Rd. Approximately 625 linear feet (LF) of 8-in pipe is required to reach the proposed tank. Since the property is owned by a private owner and the tank is located within the Indian Hills development, this alternative is eliminated.

2.2.4 Alternative S-4: New Tank near Johnson Mountain Way

A new 0.3 MG tank can be constructed near Johnson Mountain Way in the existing Indian Falls development with a bottom elevation of 1560 ft. This tank location, shown in Figures 4 and 5, requires the purchase of property from a private land owner. A new access road following a similar alignment of an existing dirt needs to be constructed. The pipeline connection to the new tank would be off the existing 12-in pipeline at the intersection of Ewana Place and Annepe Way. Approximately 675 LF of 8-in pipe is required to reach the proposed tank. Since the property is owned by a private owner and the tank is located within the Indian Hills development, this alternative is eliminated.

2.2.5 Alternative S-5: New Tank Northwest of Deerlake Ranch

A new 0.3 MG tank can be constructed northwest of Deerlake Ranch with a bottom elevation of 1560 ft. This tank location, shown in Figures 4 and 6, requires the purchase of property from a private land owner and easements from private owners and the MRCA for the pipeline. A new access road needs to be constructed. The pipeline connection to the new tank would be off a proposed 8-in pipe in the Deerlake Ranch development, on Schindler Way. Approximately 3,500 LF of 8-in pipe constructed through rolling hills is required to reach the proposed tank. Due to the long pipeline and the multiple property owners, this alternative is eliminated.

2.2.6 Alternative S-6: New Tank at Horse Rest Area

A new 0.3 MG tank can be constructed at the “Horse Rest Area” within the Deerlake Ranch development. This tank location, shown in Figures 4 and 6, does not require the purchase of property since the developer already owns the land. However, the bottom elevation of a tank proposed at this site is 1530 ft. In order to reach the high water elevation of 1585 ft, the tank

needs to be 55 ft tall or the site needs to be significantly built-up. Since the site does not meet the elevation requirements for a new storage tank within the Twin Lakes pressure zone, this alternative is eliminated.

2.2.7 Alternative S-7: New Tank at Mountain Peak North of Deerlake Ranch

This alternative considers a new 0.3 MG tank on a ridgeline north of Deerlake Ranch. The location is shown in Figures 4 and 6, and requires purchase of land from a private owner. Additional easements from private owners and MRCA are required for a supply pipeline and access road. Approximately 1,925 LF of 8-in pipe from the tank will follow the access road and connect to the proposed 8-in pipe within Deerlake Ranch on Canoga Avenue. The bottom elevation of the tank is 1670 ft, well above the targeted elevation of 1560 ft. To reach the elevation of 1670 ft, a booster pump station needs to be constructed near the 1570 ft elevation to pump the water to the new tank. A PRV also needs to be installed to reduce the head of the water down to 1585 ft to enter the Twin Lakes pressure zone (similar to alternative S-2). Since alternative S-2 has preferable existing conditions including an existing pump station, PRV, and partially graded site, this alternative is eliminated.

2.2.8 Alternative S-8: New Tank Beyond Mountain Peak North of Deerlake Ranch

A new 0.3 MG tank can be constructed north of Deerlake Ranch, beyond the ridgeline, with a bottom elevation of 1560 ft. This tank location, shown in Figures 4 and 6, requires the purchase of property from MRCA for the tank and an easement from MRCA for the connecting pipeline. The 8-in pipe is 1,925 LF with the majority of the pipeline following an existing trail. Since the tank is located behind the ridgeline, there is no visual impact to the Deerlake Ranch community. However, since the entire pipeline and tank are located within MRCA property, this alternative is eliminated.

2.2.9 Alternative S-9: New Tank Northwest of Unit 205 at Deerlake Ranch Property Boundary

This alternative considers a new 0.3 MG tank at the northern border of Deerlake ranch, northwest of Unit 205. This tank location, shown in Figures 4 and 6, requires property within Deerlake Ranch to be dedicated to the District. A draft layout of the tank was created by the developer and is attached as Appendix B. Extensive grading is required to build up a site large enough to house a tank that is approximately 30 ft in height and 50 ft in diameter; however, the grading work is not part of the tank construction since it would be conducted by the developer as part of the Deerlake Ranch construction. Retaining walls ranging from 1-ft to 25-ft tall are required. A new access road is to be constructed between units 203 and 204, with slopes ranging from 15 to 18.5 percent. A temporary grading easement with MRCA has already been granted to the developer for soil work in this area, so additional permitting is not anticipated at this time, assuming the final design of the tank and access road are entirely within Deerlake Ranch's development limits. Approximately 675 LF of 8-in pipe is required to reach the tank, with the pipe connection in Canoga Avenue.

Visual impact is high as the tank will be fully visible by the community below. If additional land is acquired from MRCA, the tank can be shifted north and landscaping can be planted to limit the visual impact. MRCA may be more willing to sell additional land for the tank construction if the tank access road is allowed to be used as a horse trail connecting an existing horse trail near the tank with Canoga Avenue. Through negotiations with MRCA, it may be possible to move the tank location north further onto MRCA property. This move allows the slope of the access road and the retaining wall heights to be reduced, which can result in significant cost savings.

Section 3: Evaluation of Alternatives

3.1 Evaluation of Pumping Alternatives

Deerlake Ranch requires an additional pumping capacity in the Twin Lakes system of 365 gpm for Phase 2 and an additional 620 gpm for Phases 2 and 3 (365 gpm for Phase 2 and 255 gpm for Phase 3). Alternatives P-1 and P-2 involve modifications and/or additions to the Twin Lakes Pump Station, whereas alternative P-3 considers modifications to the Upper Twin Lakes Pump Station. Since the supply to Upper Twin Lakes Pump Station is the Twin Lakes system, adding pumping capacity to the Upper Twin Lakes system only exacerbates the pumping shortage in the Twin Lakes system. Therefore, Alternative P-3 is not a viable option.

Alternative P-1 includes the addition of up to two 75 hp and one 100 hp pumps at the Twin Lakes Pump Station. The east discharge manifold has two flanged outlets in anticipation of additional pumps sized for 100 hp. Adding one 75 hp pump will meet the Phase 2 demands and adding an additional 75 hp pump will meet the Phase 3 demands, although the pumps should be installed in pump cans sized for 100 hp pumps to allow the District to upsize the pumps in the future. It is more cost effective and less interruptive to operations at the pump station to install both pumps at one time to meet the entire Deerlake Ranch demands. A separate study of the suction and discharge surge tanks will need to be undertaken to evaluate the adequacy of the tanks; however, it appears that the 2,500 gallon discharge surge tank is adequately sized since it was installed during the previous pump station expansion which was designed while considering the future impact of adding two more pumps. Adding two pumps will require upgrading the 500 kVA transformer to 750 kVA and the distribution switchboard from 800 A to 1,000 A.

Alternatives P-2 and P-3 were eliminated due to fatal flaws discussed in the previous section.

3.2 Evaluation of Storage Alternatives

Nine storage alternatives were considered in this study. S-1 involved replacing the existing 0.4 MG Twin Lakes Tank 1 with a 0.7 MG tank, S-2 consisted of a new 0.3 MG Upper Twin Lakes Tank 2, and Alternatives S-3 through S-9 evaluated locations for a new 0.3 MG tank at a site not currently owned by the District. Alternatives S-3 through S-8 had fatal flaws that resulted in their elimination from consideration as described in Section 2.2. As a result, only Alternatives S-1, S-2 and S-9 are considered further. To determine which storage alternative is preferable, an evaluation matrix is presented in Table 9.

Table 9: Storage Evaluation Matrix

Evaluation Criteria	S-1	S-2	S-9
Visual Impact	+	+	-
Ease of Construction	-	-	+
Acquisition of Additional Property	+	-	0
Ease of Operations	+	-	0
Service Interruptions / Impacts	-	+	+
Distribution System Reliability	-	-	+
Upgrades to Adjacent Infrastructure	+	0	0
Overall Assessment	**+2**	**-2**	**+2**

The storage alternatives are evaluated with a '+', '-', or '0' system. Alternatives considered advantageous for the criterion receive a '+' while alternatives that are disadvantageous receive a '-' score and neutral receive a '0' score.

- Visual Impact: Storage alternatives with minimal aesthetic impacts to the nearby communities receive a positive score.
- Ease of Construction: Minimal construction work receives a positive score.
- Acquisition of Additional Property: Alternatives that do not require additional acquisition receive a positive score.
- Ease of Operations: Alternatives that have minimal impact on the existing system operations receive a positive score.
- Service Interruptions / Impacts: Minimal service interruptions during construction receive a positive score.
- Distribution System Reliability: Increased redundancy receives a positive score.
- Upgrades to Adjacent Infrastructure: Alternatives that do not require upsizing upstream pipes or pumps receive a positive score.

Based on these criteria, storage alternatives S-1 and S-9 are preferred. Alternative S-1 received a high score since the visual impact of a replacement tank is negligible, a replacement tank can be constructed within the existing property limits, system operations will be unchanged, and the supply pipeline appears to be sufficient for the larger tank. Hydraulic modeling is needed to confirm additional flow to the larger tank meets the requirements outlined in the Master Plan for existing piping, which is beyond the scope of this report. The cons to this alternative are the significant grading required through hard rock anticipated to be encountered during excavation, the site is relatively tight for construction, the District will be without 0.4 MG of storage during construction, spoil materials must be hauled out through the Indian Hills development, and the tank does not improve distribution system reliability.

The other preferred alternative is S-9. Alternative S-9 has the highest ease of construction since the developer will perform the site grading leaving a level pad for constructing the new

tank. Additionally, service interruptions will be negligible since the existing system will not be affected while the tank is under construction. The reliability of the system is also increased since the new tank will be located a different area of the zone where if a water main break occurs on the supply pipeline feeding Twin Lakes Tanks 1 and 2, the new tank with Alternative S-9 will continue to provide water supply. However, the alternative will have a visual impact to the Deerlake Ranch community, may require property acquisition from MRCA, requires the District to operate and maintain a third tank in the Twin Lakes system, and may require upgrades to the existing 8-in supply pipelines northeast of Highway 118. Hydraulic modeling is needed to confirm that additional flow to the new tank meets the requirements outlined in the Master Plan, which is beyond the scope of this report.

Alternative S-2 is not a preferred alternative. While it has a negligible impact since the new tank will be constructed adjacent to the existing tank, has minimal service interruptions, and does not require an upgrade to the supply pipeline or pump station, the site is tight for construction, additional property must be acquired from MRCA, and the District's system operational strategy may need to change to account for water storage in a higher pressure zone. Pumping to a higher pressure zone results in added electricity cost to operate the pump, maintenance cost for pump and PRV upkeep, and it operates the system inefficiently. This alternative may be suitable for a temporary solution, but the permanent loss of a standby pump is unacceptable to the District. This alternative is eliminated.

3.3 Capital and O&M Costs

The capital cost for a new above grade welded steel tank is dependent on the size of the tank. Smaller tanks have a higher unit cost, expressed as a cost per gallon, than larger tanks. Fixed fees such as mobilization are spread over a larger tank volume and materials are more efficient on a structure to volume basis. For the purposes of this study, a unit cost of $1.05 per gallon is used for 0.3 MG tanks and $0.85 is used for 0.7 MG tanks. These unit costs include excavation for the ring wall footing, construction of the ring wall, fabrication and erection of the welded steel tank, coating of the interior and exterior of the tank, and tank appurtenances including but not limited to inlet and outlet piping connections, overflow piping, ventilation, measurement instrumentation, and mixing equipment.

Similarly to welded steel tanks, pump stations are also expressed as a unit cost per horsepower. A unit cost of $1,750 per horsepower is used for new pumps. This unit cost includes excavation for the new pump can, procurement and installation of the pump and motor, suction and discharge piping, two butterfly valves, control valve, pressure transmitter, and site repaving. Pump electrical panel and related cable runs are additional. Electrical supply upgrades such as a larger transformer and larger switchgear, if applicable, are estimated separately and in addition to the $1,750 per horsepower unit cost.

Welded steel storage tanks require operation and maintenance (O&M) costs after the initial capital expenditure. Every ten to fifteen years the interior and exterior coating of the tank needs to be removed and recoated to prevent corrosion of the steel. Operations staff also have costs associated with valve and equipment maintenance. O&M costs are assumed to be 2 percent of the initial capital cost per year.

Pump O&M requires servicing the pump and rebuilding the pump components every ten to fifteen years. Energy costs are also included in O&M costs. This study assumes 2 percent of the initial capital costs per year are required for O&M and 14.5 cents per kilowatt hour ($0.145/kWh) for energy costs.

Based on the above assumptions, a conceptual opinion of probable construction cost was developed for pumping alternative P-1 and storage alternatives S-1 and S-9. The opinion of probable construction cost is a Class 5 estimate in accordance with American Association of Cost Engineers. A Class 5 estimate contains an assumed accuracy of +50% to -30% of the actual cost of the alternatives. O&M and energy costs are included in the analysis for a 30 year period, in which the future annual costs are calculated in present value dollars. A summary of the estimated project lifecycle costs for each alternative is presented in Table 10 and the detailed capital cost estimate is attached as Appendix C.

Table 10: Pumping and Storage Cost Evaluation

Cost	P-1	S-1	S-9
Capital Cost	$465,000	$1,656,000	$1,724,000[(a)]
Tank O&M Cost	$0	$150,000[(b)]	$170,000
Pump O&M Cost	$214,000	$0	$0
Pump Energy Cost	$275,000	$0	$0
Total	**$954,000**	**$1,806,000**	**$1,894,000**

Notes:
(a) Alternative S-9 includes a cost of $1,200,000 for retaining wall construction related to the tank construction. Moving the tank to the north and refining the design may reduce the cost of grading, reducing the overall cost.
(b) Tank O&M cost for alternative S-1 reflects only the net increase in O&M for the 0.7 MG tank in lieu of the existing 0.4 MG tank.

As shown in Table 10, alternatives S-1 and S-9 are nearly equal in cost. Alternative S-2 requires significant grading required to lower the existing Twin Lakes Tank 1 site by 6 ft. Over 1,400 cubic yards (CY) of grading is required at a cost of $700 per CY. Alternative S-9 requires two retaining walls. One wall is approximately 130 ft long with heights ranging from 1 ft to 7 ft, and the other wall is approximately 400 ft long with heights ranging from 5 ft to 25 ft. While the grading costs for this alternative will be borne by the developer, the costs of the retaining walls push the overall cost higher than the other alternatives. If additional land is acquired from MRCA, the tank can be moved further north which reduces the extent of retaining walls required and lowers the overall cost of the alternative.

O&M costs were calculated per the assumptions stated previously and projected over a 30 year planning horizon. Annual inflation was assumed to be 2 percent and the discount rate was assumed to be 2.84 percent based on the 2015 average nominal rate of a 30 year U.S. Treasury note.

Section 4: Conclusion

Based on the evaluation in the previous section, this reviews preferred projects to meet Deerlake Phase 2 and Phase 3 demands, as well as identify any opportunities for meeting the Twin Lakes 2035 demands.

4.1 Meeting Deerlake Phase 2 Demands

Deerlake Phase 2 requires 365 gpm of pumping capacity and 0.11 MG of storage capacity to be added to the Twin Lakes system. To meet the 365 gpm pumping shortfall, one 75 hp pump can be installed at the Twin Lakes Pump Station to provide 430 gpm of pumping capacity. This requires upgrading the transformer, as described in Section 2.1.1. An analysis of the suction and discharge surge tanks is also suggested.

To meet the 0.11 MG storage shortfall, it may be possible to use the Upper Twin Lakes Tank as supplemental storage for the Twin Lakes system since the 2014 Master Plan identified a 0.15 MG existing storage surplus in the tank. An existing 6-in PRV connection between the Upper Twin Lakes and Twin Lakes zones allows water to move downgradient to the 1585 ft HGL. To confirm this excess storage volume, SCADA data from 01 June 2015 through 30 June 2016 for daily tank minimum and maximum levels were analyzed. After removing data outliers that showed a minimum tank level of 0 ft, the average minimum tank level was 8.94 ft and the average maximum tank level was 14.26 ft. This amounts to 112,500 gal of daily water use. The Master Plan defines storage as being composed of three components: fire, emergency, and daily operational storage. The required fire and emergency storage for the Upper Twin Lakes system is 150,000 gal and 18,000 gal, respectively. Table 11 details the volume calculations for using the Upper Twin Lakes Tank to meet the storage requirements for Deerlake Phase 2.

Table 11: Upper Twin Lakes Tank Storage Analysis

Value	Volume (gal)
Fire Storage	150,000
Emergency Storage	18,000
Daily Operational Storage	112,500
Total Required	**280,500**
Tank Capacity	**385,000**
Available	104,500
Deerlake Phase 2	110,000
Deficit	**-5,500**

As shown in Table 11, the Upper Twin Lakes Tank is not large enough to meet the storage requirement for Deerlake Phase 2. While a temporary 10,000 gal Baker Tank could be installed adjacent to the tank to allow for temporary additional storage, this is not advisable. In addition to requiring the District to modify its current operations to accommodate the temporary tank, the daily operational storage required for the Upper Twin Lakes Zone is variable. The current daily operational storage is at its lowest level in years due to drought restrictions. With the loosening

of the drought restrictions, demand and the corresponding daily operational storage will increase. Therefore the excess storage currently at Upper Twin Lakes Tank is not a reliable source for future storage. To meet Deerlake Phase 2 storage demand, a permanent storage alternative (S-1 or S-9) should be constructed.

4.2 Meeting Deerlake Phase 2 and 3 Demands

Deerlake Phases 2 and 3 require a total of 620 gpm of pumping capacity and 0.29 MG of storage capacity to be added to the Twin Lakes system. To satisfy the pumping shortfall, an additional 75 hp pump can be installed in a pump can sized for 100 hp at the Twin Lakes Pump Station. Installing the pumps in oversized pump cans allows the District to replace the 75 hp pumps in the future with 100 hp pumps. Since both Phase 2 and Phase 3 require an additional pump, the combined pumping capacity of two 75 hp pumps totals 860 gpm. The two pumps require an upgraded electrical transformer and feeder breaker, as described in Section 2.1.1. An analysis of the suction and discharge surge tanks is also suggested.

To meet the 0.29 MG of storage deficit, the existing 0.4 MG Twin Lakes Tank 1 can be replaced with a new 0.7 MG tank, a new 0.3 MG Upper Twin Lakes Tank 2 can be constructed, a new 0.3 MG tank within Deerlake Ranch can be constructed. An evaluation of the storage alternatives summarized in Table 9 determined replacing the Twin Lakes Tank 1 or constructing a new 0.3 MG tank within Deerlake Ranch to be the preferred alternatives. This cost difference between the two alternatives may change after incorporating the cost of land acquisition from MRCA and potential redesign of Alternative S-9 to reduce the retaining walls. Hydraulic modeling should be performed to evaluate the impact of the new tank on the existing distribution piping.

4.3 Meeting Twin Lakes 2035 Demands

The 2014 Master Plan Update identified a 1,878 gpm pumping deficit and 1.5 MG storage deficit in the Twin Lakes zone. Replacing 75 hp pumps P7 and P8 with 100 hp pumps will provide a total pumping supply of 1,170 gpm. Figure 1 shows an additional pump, P-9, which can be added to the west discharge manifold to provide an additional 585 gpm, bringing the total up to 1,755 gpm. Other modifications to the pump station can be undertaken to increase the suction pipe capacity to allow for larger pumps to be installed in order to meet the required 1,878 gpm of pumping capacity required. A detailed evaluation of the existing pump station will need to be undertaken to determine how much the pump station can be expanded and at what cost.

To meet the 1.5 MG storage deficit, which will be 1.2 MG after constructing the storage required for Phase 3 of Deerlake Ranch, the District can elect to construct a larger Twin Lakes Tank 1, a larger Deerlake Ranch tank, or pursue other storage alternatives identified in this report. Constructing Alternative S-9 first allows the District to delay construction of Alternative S-1 until it is needed. If Alternative S-1 is constructed and Alternative S-9 delayed, Alternative S-9 may not be viable for construction in the future after the Deerlake Ranch is developed. A detailed evaluation of each storage alternative and the resulting impact on the system will need to be conducted.

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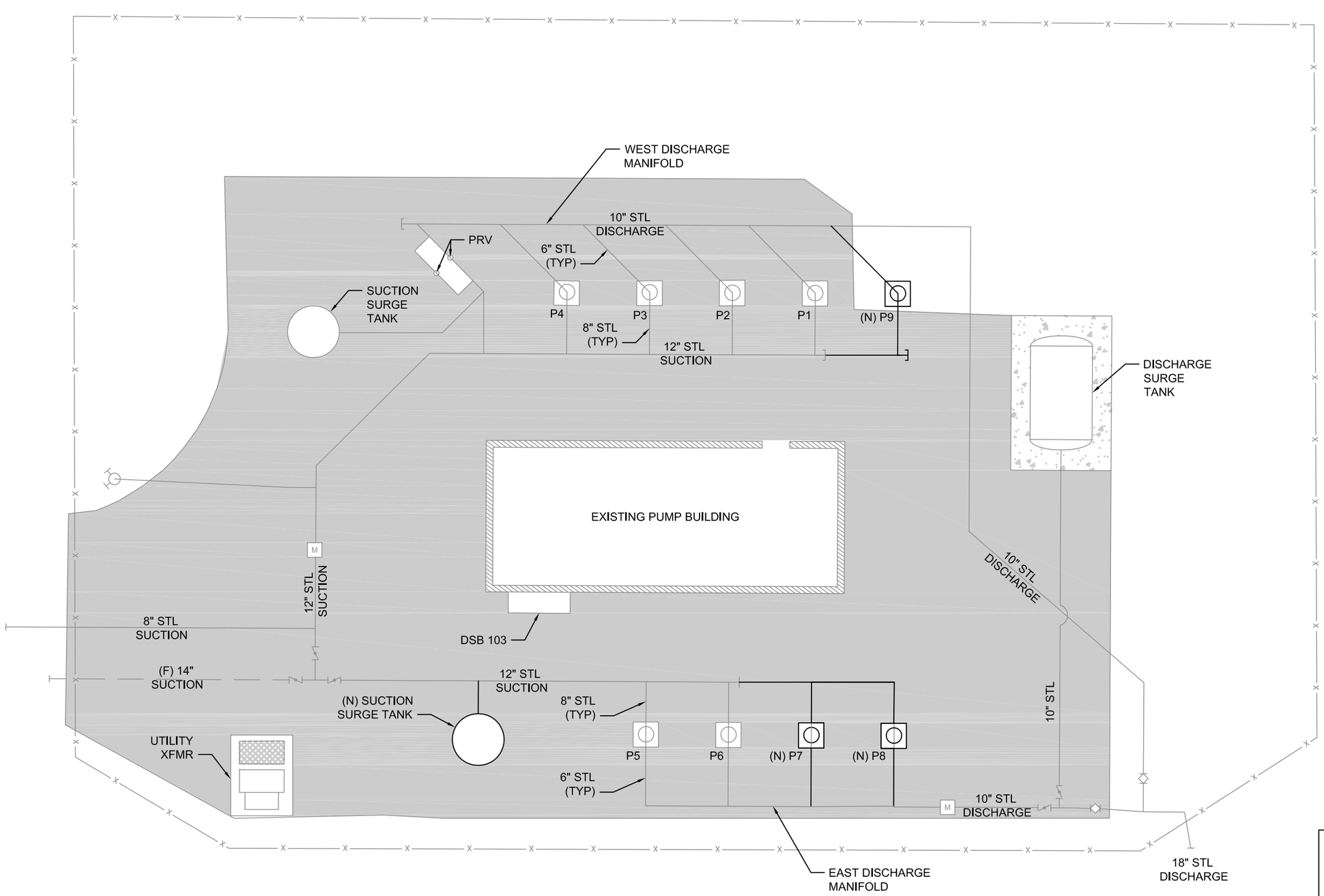
Boyle Engineering Corporation. Preliminary Design Report, Twin Lakes Pump Station Expansion. LVMWD #2297.00. Dated September 2004.

Kennedy/Jenks Consultants. Potable Water Master Plan Update 2014 for the Las Virgenes Municipal Water District. LVMWD #2562.00. Dated 30 June 2014.

Appendix A: Figures



LEGEND

(F)	FUTURE
(N)	NEW
DSB	DISTRIBUTION SWITCHBOARD
P	PUMP
PRV	PRESSURE REDUCING VALVE
STL	STEEL
TYP	TYPICAL
XFMR	TRANSFORMER

Kennedy/Jenks Consultants

Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

Twin Lakes Pump Station Modifications: Alternative P-1

K/J 1644221*00
July 2016

Figure 1

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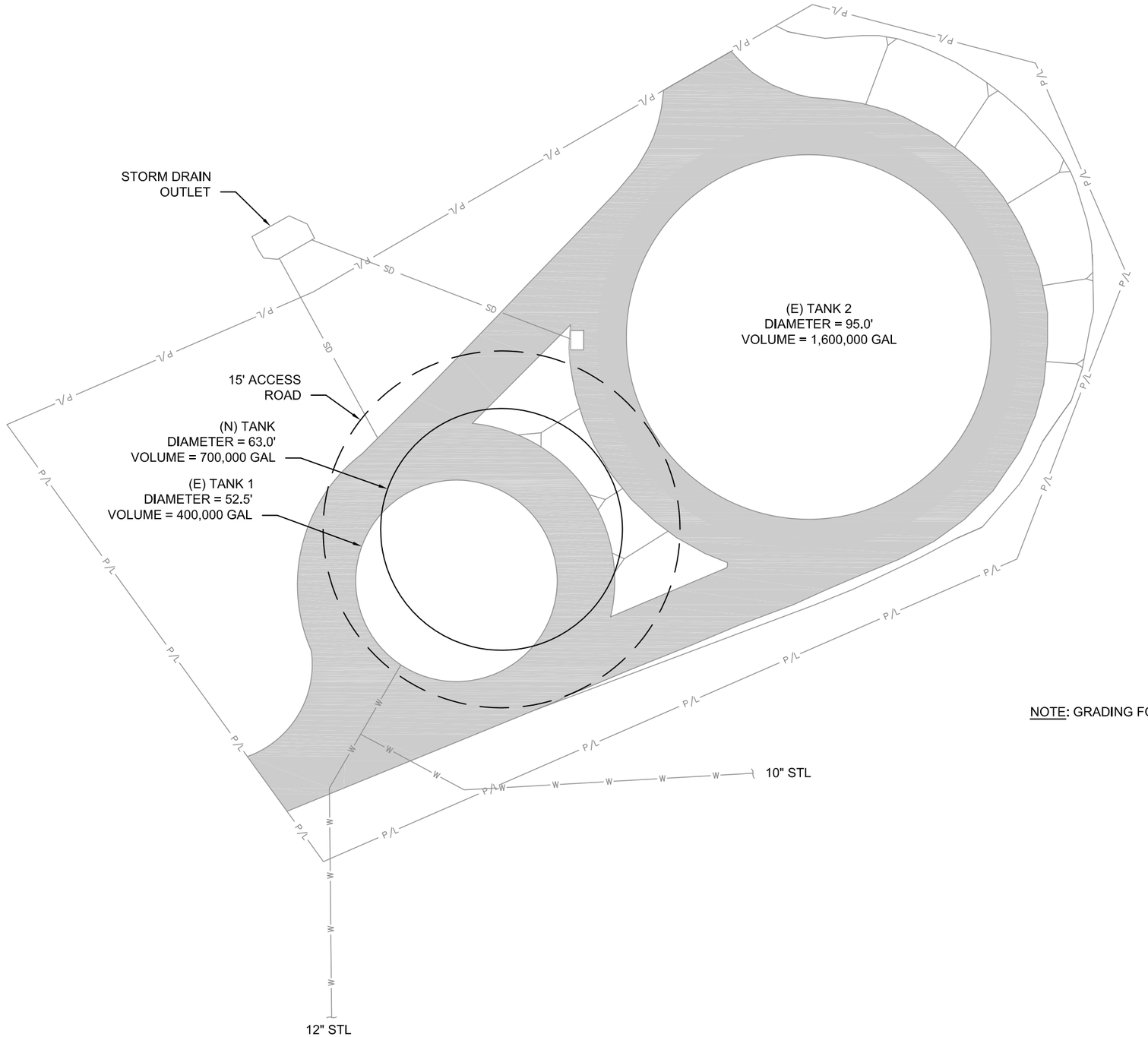

LEGEND

(E)	EXISTING
(N)	NEW
P/L	PROPERTY LINE
GAL	GALLON
SD	STORM DRAIN
STL	STEEL
W	WATER

NOTE: GRADING FOR REPLACEMENT TANK NOT SHOWN.

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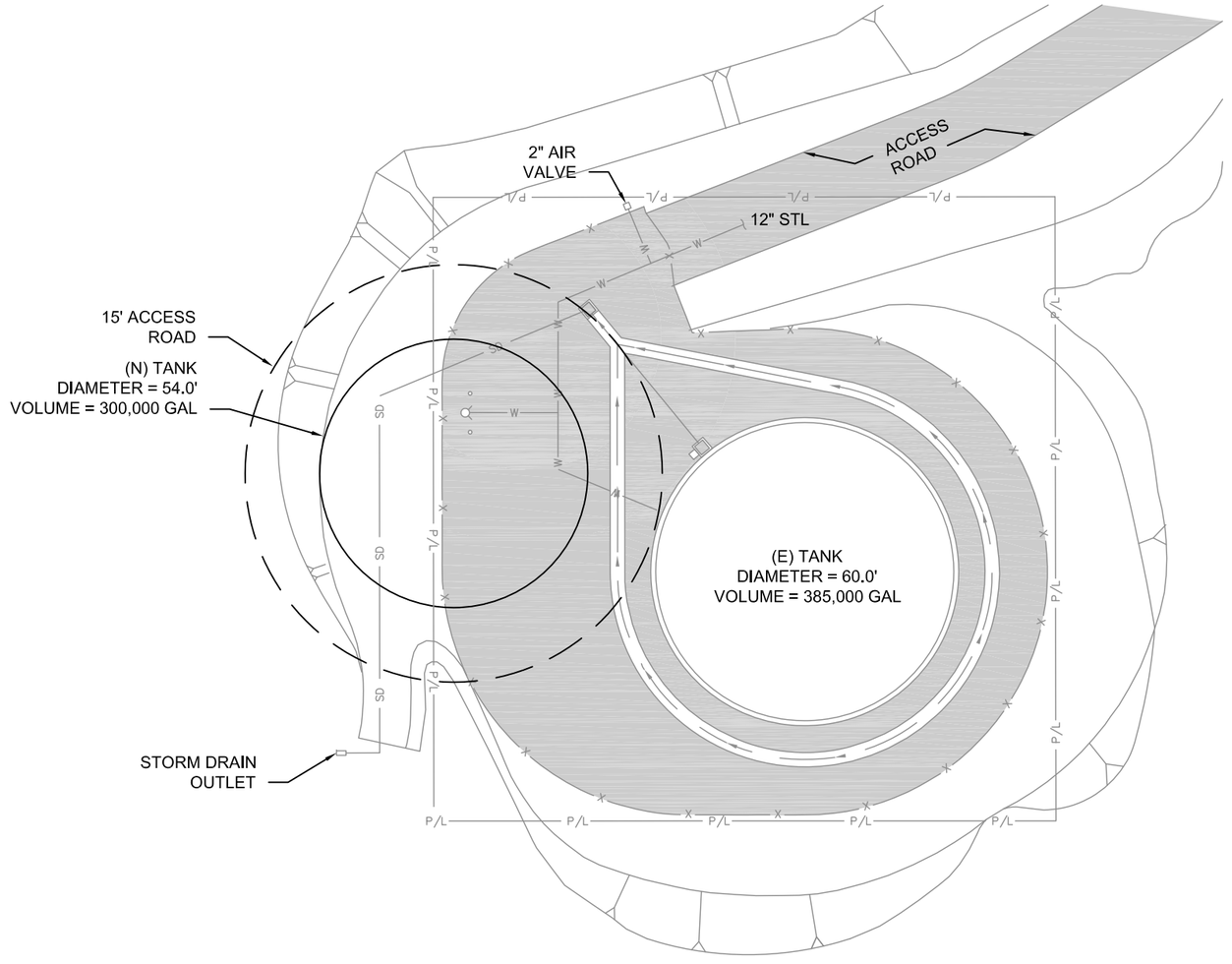
Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

Twin Lakes Tank S-1 Replacement: Alternative S-1

K/J 1644221*00
July 2016

Figure 2



N

LEGEND

(E)	EXISTING
(N)	NEW
P/L	PROPERTY LINE
GAL	GALLON
SD	STORM DRAIN
STL	STEEL
W	WATER

NOTE: GRADING FOR NEW TANK NOT SHOWN.

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Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

Upper Twin Lakes Tank 2:
Alternative S-2

K/J 1644221*00
July 2016

Figure 3

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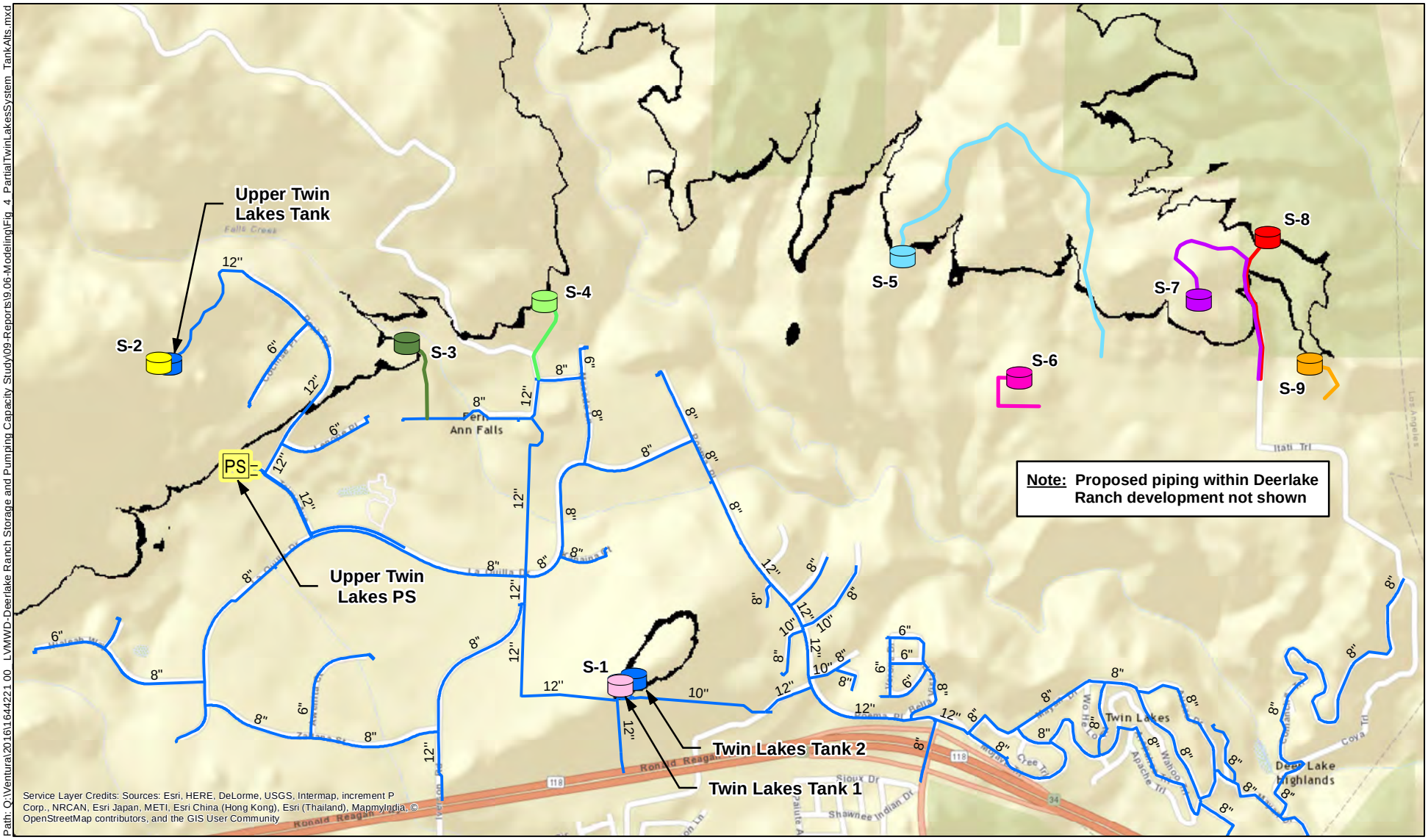

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LEGEND

Potential Tanks

- S-1
- S-2
- S-3
- S-4
- S-5
- S-6
- S-7
- S-8
- S-9

Pipelines to Potential Tanks

- S-3 Pipeline
- S-4 Pipeline
- S-5 Pipeline
- S-6 Pipeline
- S-7 Pipeline
- S-8 Pipeline
- S-9 Pipeline

- Existing Pump Station
- Existing Tank
- Existing Potable Water Lines
- Elevation Band 1,555 ft - 1,565 ft

N

0 500 1,000

Scale: Feet

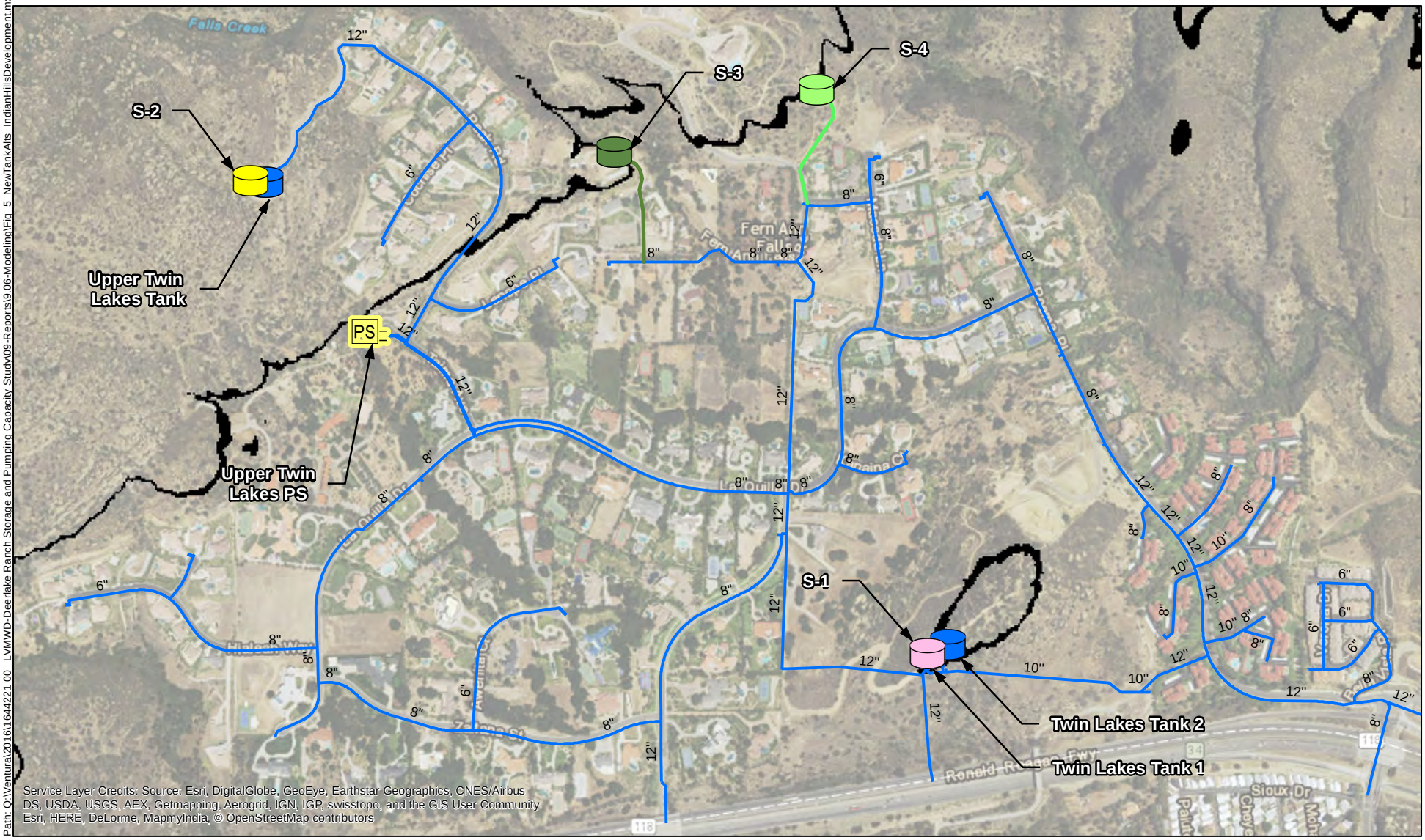
Kennedy/Jenks Consultants

Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

Partial Twin Lakes System with Storage Tank Alternatives

K/J 1644221*00
July 2016

Figure 4



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LEGEND

- PS — Existing Pump Station
- Existing Tank
- Existing Potable Water Lines
- Elevation Band 1,555 ft - 1,565 ft

Potential Tanks

- S-1
- S-2
- S-3
- S-4

Pipelines to Potential Tanks

- S-3 Pipeline
- S-4 Pipeline

N

0 400 800

Scale: Feet

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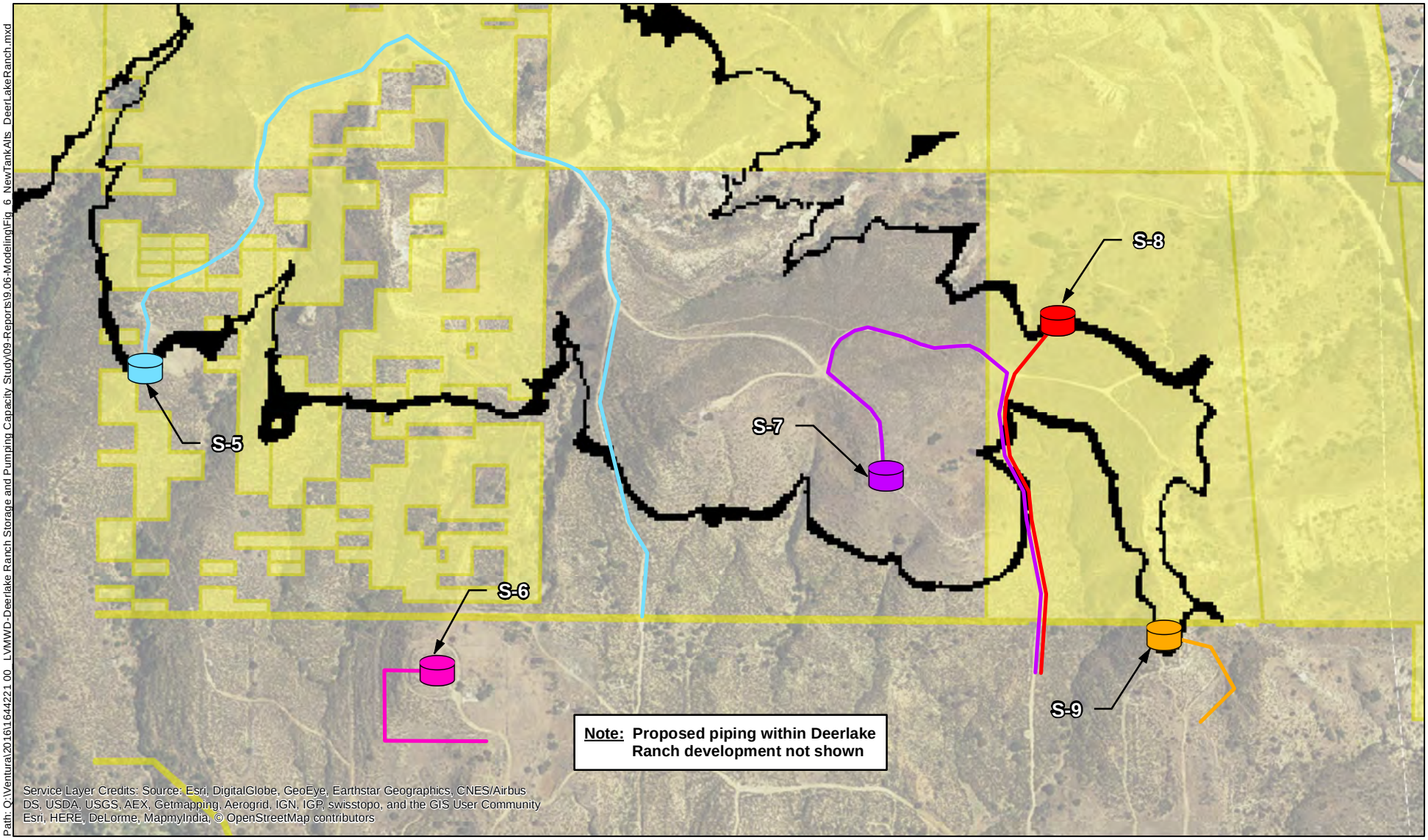
Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

New Tank Alternatives near Indian Hills Development

K/J 1644221*00
July 2016

Figure 5



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LEGEND

Potential Tanks

- S-5
- S-6
- S-7
- S-8
- S-9

Pipelines to Potential Tanks

- S-5 Pipeline
- S-6 Pipeline
- S-7 Pipeline
- S-8 Pipeline
- S-9 Pipeline

- MRCA Parcels
- Elevation Band 1,555 ft - 1,565 ft

N

0 250 500

Scale: Feet

Kennedy/Jenks Consultants

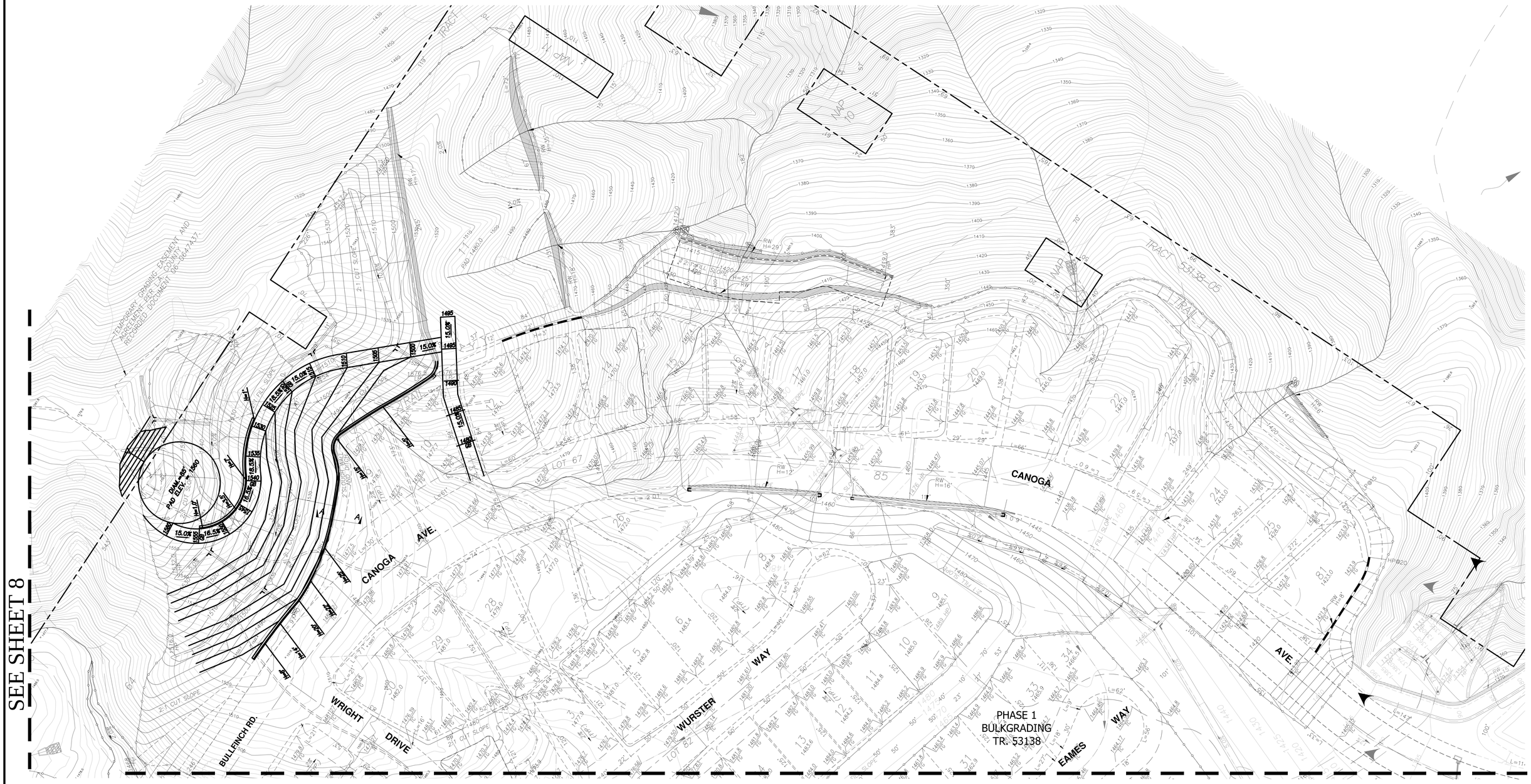
Las Virgenes Municipal Water District
Deerlake Ranch Storage and Pumping Capacity

New Tank Alternatives near Deerlake Ranch Development

K/J 1644221*00
July 2016

Figure 6

Appendix B: Storage Alternative S-9 Site Layout



CONSTRUCTION NOTES:

1. CONSTRUCT EDGE BERM PER DETAIL A/2
2. CONSTRUCT TERRACE DRAIN PER DETAIL B/2
3. CONSTRUCT INTERCEPTOR DRAIN PER DETAIL C/2
4. CONSTRUCT TRAIL PER DETAIL D/2 TYPE PER PLAN
5. CONSTRUCT V-DITCH PER DETAIL E/2
6. CONSTRUCT SPLASH WALL PER DETAIL M/2
7. ~~CONSTRUCT PEDESTRIAN TRAIL AND TERRACE DRAIN PER DETAIL~~ NOT USED
8. PREVIOUSLY ABANDONED OIL WELL TO BE PROTECTED IN PLACE
9. CONSTRUCT SLOUGH WALL PER DETAIL H/2
10. CONST. RET. WALL PER SEPARATE PERMIT
11. CONSTRUCT TERRACE AND DOWNDRAIN INTERSECTION PER DETAIL J/2
12. CONSTRUCT CONTECH ARMORFLEX PER DETAIL C/2
13. CONSTRUCT GROUTED RIP RAP APRON PER DETAIL K/2
14. CONSTRUCT CONCRETE ACCESS DRIVEWAYS PER DETAIL L/2
15. CONSTRUCT DITCH TO PIPE TRANSITION PER DETAIL N/2
16. CONSTRUCT DOWN DRAIN TO CONCRETE TO CONCRETE CHANNEL TRANSITION PER DETAIL O/2
17. CUT LOT AND CUT/FILL TRANSITION LOT PER DETAIL P/3
18. CONSTRUCT OPEN DOWN DRAIN PER DETAIL O/3
19. TYPICAL VERDURA WALL PER DETAIL R/3 PER SEPARATE PLAN
20. CONSTRUCT FAN INLET PER DETAIL S/3
21. CONSTRUCT WALL DRAIN 1 PER DETAIL T/3
22. CONSTRUCT TRAIL DRAIN CROSSING PER DETAIL U/3
23. INSTALL SUBDRAIN PER DETAIL V/3 AND GEOTECHNICAL CONSULTANT'S DIRECTION.
24. CONSTRUCT WALL DRAIN AT VERDURA WALL PER DETAIL W/3
25. CONSTRUCT ROUGH GRADE PAD DRAINAGE PIPE X/3 INLET AND OUTLET PER DETAIL
26. CONSTRUCT PIPE CULVERT HEADWALL, STRAIGHT, PER CALTRANS STD. D89 H=5'-8", L=21', D1=D2=24"
27. CONSTRUCT DOWN DRAIN TO PARKWAY DRAIN PER AWPA 151-2.
28. EXISTING POWER POLE TO REMAIN - PROTECT IN PLACE.
29. EXISTING POWER POLE TO RELOCATED - PER SEPARATE PLAN.
30. EXISTING FIRE HYDRANT TO REMAIN - PROTECT IN PLACE.
31. EXISTING FIRE HYDRANT TO BE REMOVED.
32. EXISTING 8" ACP WATER LINE TO BE REMOVED.
33. CONSTRUCT DRIVEWAY APPROACH PER SPPWC 110-2, TYPE 2, RESIDENTIAL.
34. CONSTRUCT DRIVEWAY APPROACH PER SPPWC 110-2, TYPE 3, COMMERCIAL.
35. CONSTRUCT END OF WALL CATCH BASIN PER DETAIL Y/3
36. CONSTRUCT WALL DRAIN PER DETAIL W1/3

HATCH LEGEND

- LIMITS OF GEOGRID
- LIMITS OF RESTRICTED USE ZONE

SCALE 1" = 40'

40 0 20 40 80 160

Scale: 1 inch = 40 ft.

OWNER/SUBDIVIDER:
FORESTAR CHATSWORTH, LLC
4590 MACARTHUR BLVD.
SUITE 600
NEWPORT BEACH, CA 92660
PH: (949) 748-6714

NO.	DATE	REVISIONS	APPROVED BY

DESIGNER	J.V.F.
DESIGNED BY:	J.V.F.
DRAFTED BY:	J.V.F.
CHECKED BY:	M.S.

REGISTERED PROFESSIONAL ENGINEER SIEW HUAT NG NO. 46026 EXP.12-31-16 CIVIL STATE OF CALIFORNIA

PLANS PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

6/24/2016
SIEW HUAT NG DATE
R.C.E. 46026 EXP. 12-31-2016

PHASE 2
BULK GRADING PLAN
VTTM 53138

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT NO. 14-1264

SHEET 10 OF 10

Appendix C: Opinion of Probable Construction Cost

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Building, Area: Alternative P-1: Modifications at Twin Lakes Pump Station

Prepared By: BH
Date Prepared: 8-Jul-16
K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 1 - GENERAL REQUIREMENTS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 1						0		0		0	0
DIVISION 2 - SITE WORK											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 2						0		0		0	0
DIVISION 3 -CONCRETE											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 3						0		0		0	0
DIVISION 4 -MASONRY											
						0		0		0	0
								0		0	0
SUBTOTAL - DIVISION 4						0		0		0	0
DIVISION 5 -METALS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 5						0		0		0	0
DIVISION 6 -WOOD & PLASTICS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 6						0		0		0	0
DIVISION 7 -THERMAL & MOISTURE PROTECTION											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 7						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Prepared By: BH
Date Prepared: 8-Jul-16
K/J Proj. No. 1644221*00

Building, Area: Alternative P-1: Modifications at Twin Lakes Pump Station

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 8 -DOORS & WINDOWS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 8						0		0		0	0
DIVISION 9 -FINISHES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 9						0		0		0	0
DIVISION 10 -SPECIALTIES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 10						0		0		0	0
DIVISION 11 - EQUIPMENT											
11215	2	100 hp Pumps	200	hp	900.00	180,000	850.00	170,000		0	350,000
						0		0		0	0
SUBTOTAL - DIVISION 11						180,000		170,000		0	350,000
DIVISION 12 - FURNISHINGS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 12						0		0		0	0
DIVISION 13 - SPECIAL CONSTRUCTION											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 13						0		0		0	0
DIVISION 14 - CONVEYING SYSTEMS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 14						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Building, Area: Alternative P-1: Modifications at Twin Lakes Pump Station

Prepared By: BH
Date Prepared: 8-Jul-16
K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 15 - MECHANICAL											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 15						0		0		0	0
DIVISION 16 - ELECTRICAL											
	1	Replace 500kVA xfmr with 750kVA xfmr	1	LS		0		0	10,000.00	10,000	10,000
	2	Replace 800A swbd with 1000A swbd	1	LS		0		0	50,000.00	50,000	50,000
	3	Replace 400AT feeder breaker with 600 AT	1	LS		0		0	5,000.00	5,000	5,000
	4	Pump Panels	2	EA		0		0	25,000.00	50,000	50,000
SUBTOTAL - DIVISION 16						0		0		115,000	115,000
DIVISION 17 - INSTRUMENTATION											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 17						0		0		0	0
TOTAL						**$ 180,000**		**$ 170,000**		**$ 115,000**	**$ 465,000**

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$698,000	**$465,000**	**$326,000**

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Prepared By: BH
Date Prepared: 8-Jul-16

Building, Area: Alternative S-1: Replace Twin Lakes Tank 1

K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 1 - GENERAL REQUIREMENTS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 1						0		0		0	0
DIVISION 2 - SITE WORK											
02050	1	Demolish 0.4 MG Tank	1	LS		0	25,000.00	25,000		0	25,000
02301	2	Grading	1,415	CY	375.00	530,625	325.00	459,875		0	990,500
02705	3	Paving	3,015	SF	3.50	10,553	3.00	9,045		0	19,598
SUBTOTAL - DIVISION 2						541,178		493,920		0	1,035,098
DIVISION 3 -CONCRETE											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 3						0		0		0	0
DIVISION 4 -MASONRY											
						0		0		0	0
								0		0	0
SUBTOTAL - DIVISION 4						0		0		0	0
DIVISION 5 -METALS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 5						0		0		0	0
DIVISION 6 -WOOD & PLASTICS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 6						0		0		0	0
DIVISION 7 -THERMAL & MOISTURE PROTECTION											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 7						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Building, Area: Alternative S-1: Replace Twin Lakes Tank 1

Prepared By: BH
Date Prepared: 8-Jul-16
K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 8 -DOORS & WINDOWS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 8						0		0		0	0
DIVISION 9 -FINISHES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 9						0		0		0	0
DIVISION 10 -SPECIALTIES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 10						0		0		0	0
DIVISION 11 - EQUIPMENT											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 11						0		0		0	0
DIVISION 12 - FURNISHINGS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 12						0		0		0	0
DIVISION 13 - SPECIAL CONSTRUCTION											
13211	1	Welded Steel Tank	700,000	gal	0.45	315,000	0.40	280,000		0	595,000
						0		0		0	0
SUBTOTAL - DIVISION 13						315,000		280,000		0	595,000
DIVISION 14 - CONVEYING SYSTEMS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 14						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Prepared By: BH
Date Prepared: 8-Jul-16
Building, Area: Alternative S-1: Replace Twin Lakes Tank 1
K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 15 - MECHANICAL											
15050	1	8-in CML&C Steel Pipe	50	LF	60.00	3,000	60.00	3,000		0	6,000
15050	2	Storm Drain Piping	1	LS	5,000.00	5,000	5,000.00	5,000		0	10,000
SUBTOTAL - DIVISION 15						8,000		8,000		0	16,000
DIVISION 16 - ELECTRICAL											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 16						0		0		0	0
DIVISION 17 - INSTRUMENTATION											
17010	1	Communication Equipment	1	LS		0		0	10,000	10,000	10,000
						0		0		0	0
SUBTOTAL - DIVISION 17						0		0		10,000	10,000
TOTAL						**$ 864,178**		**$ 781,920**		**$ 10,000**	**$ 1,656,098**

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$2,484,000	**$1,656,000**	**$1,159,000**

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Prepared By: BH
Date Prepared: 8-Jul-16

Building, Area: Alternative S-9: New Tank Northwest of Unit 205 at Deerlake Ranch Property Boundary

K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: **X** **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 1 - GENERAL REQUIREMENTS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 1						0		0		0	0
DIVISION 2 - SITE WORK											
02705	1	Paving	11,575	SF	3.50	40,513	3.00	34,725		0	75,238
						0		0		0	0
SUBTOTAL - DIVISION 2						40,513		34,725		0	75,238
DIVISION 3 -CONCRETE											
03300	1	Retaining Wall	1,200	CY	500.00	600,000	500.00	600,000		0	1,200,000
						0		0		0	0
SUBTOTAL - DIVISION 3						600,000		600,000		0	1,200,000
DIVISION 4 -MASONRY											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 4						0		0		0	0
DIVISION 5 -METALS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 5						0		0		0	0
DIVISION 6 -WOOD & PLASTICS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 6						0		0		0	0
DIVISION 7 -THERMAL & MOISTURE PROTECTION											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 7						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST **KENNEDY/JENKS CONSULTANTS**

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Building, Area: Alternative S-9: New Tank Northwest of Unit 205 at Deerlake Ranch Property Boundary

Prepared By: BH
Date Prepared: 8-Jul-16
K/J Proj. No. 1644221*00

Current at ENR
Escalated to ENR
Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**
Preliminary (w/o plans) **Change Order**
Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 8 -DOORS & WINDOWS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 8						0		0		0	0
DIVISION 9 -FINISHES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 9						0		0		0	0
DIVISION 10 -SPECIALTIES											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 10						0		0		0	0
DIVISION 11 - EQUIPMENT											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 11						0		0		0	0
DIVISION 12 - FURNISHINGS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 12						0		0		0	0
DIVISION 13 - SPECIAL CONSTRUCTION											
13211	1	Welded Steel Tank	300,000	gal	0.55	165,000	0.50	150,000		0	315,000
						0		0		0	0
SUBTOTAL - DIVISION 13						165,000		150,000		0	315,000
DIVISION 14 - CONVEYING SYSTEMS											
						0		0		0	0
						0		0		0	0
SUBTOTAL - DIVISION 14						0		0		0	0

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS

Project: Las Virgenes Municipal Water District - Deerlake Ranch Pumping and Storage Analysis

Prepared By: BH

Date Prepared: 8-Jul-16

Building, Area: Alternative S-9: New Tank Northwest of Unit 205 at Deerlake Ranch Property Boundary

K/J Proj. No. 1644221*00

Current at ENR

Escalated to ENR

Months to Midpoint of Construct

Estimate Type: X **Conceptual** **Construction**

Preliminary (w/o plans) **Change Order**

Design Development @ **% Complete**

Spec. Section	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Sub-contractor $/Unit	Sub-contractor Total	Total
DIVISION 15 - MECHANICAL											
15050	1	8-in CML&C Steel Pipe	700	LF	60.00	42,000	60.00	42,000		0	84,000
15050	2	Storm Drain Piping	1	LS	10,000.00	10,000	10,000.00	10,000		0	20,000
SUBTOTAL - DIVISION 15						52,000		52,000		0	104,000
DIVISION 16 - ELECTRICAL											
						0		0		0	0
						0				0	0
SUBTOTAL - DIVISION 16						0		0		0	0
DIVISION 17 - INSTRUMENTATION											
17010	1	Communication Equipment	1	LS		0		0	30,000	30,000	30,000
						0		0		0	0
SUBTOTAL - DIVISION 17						0		0		30,000	30,000
TOTAL						**$ 857,513**		**$ 836,725**		**$ 30,000**	**$ 1,724,238**

Estimate Accuracy	
+50%	-30%

Estimated Range of Probable Cost		
+50%	Total Est.	-30%
$2,586,000	**$1,724,000**	**$1,207,000**

PUMP Net Present Value Calculation 1

Assumptions/Conversions

1 hp =	0.7457	kw
Cost =	$ 0.145	kw/hr
Inflation =	2%	
Discount rate[1] =	2.84%	
Cost for new hp[2] =	$ 2,000	$/hp

Twin Lakes Pump Station:

200 hp =	149	kw
Cost for 1 hour =	$ 21.63	
Cost for 9 hour operation =	$ 194.63	
Cost for 365 day operation =	$ 10,300.67	
Cost for new pumps =	$ 400,000	

1. Nominal average 2015 rate for 30 year U.S. treasury note
2. Price includes cost of new electrical equipment

Year	Elec Cost	O&M Cost
0	$ 10,301	$ 8,000
1	$ 10,507	$ 8,160
2	$ 10,717	$ 8,323
3	$ 10,931	$ 8,490
4	$ 11,150	$ 8,659
5	$ 11,373	$ 8,833
6	$ 11,600	$ 9,009
7	$ 11,832	$ 9,189
8	$ 12,069	$ 9,373
9	$ 12,310	$ 9,561
10	$ 12,556	$ 9,752
11	$ 12,808	$ 9,947
12	$ 13,064	$ 10,146
13	$ 13,325	$ 10,349
14	$ 13,592	$ 10,556
15	$ 13,863	$ 10,767
16	$ 14,141	$ 10,982
17	$ 14,423	$ 11,202
18	$ 14,712	$ 11,426
19	$ 15,006	$ 11,654
20	$ 15,306	$ 11,888
21	$ 15,612	$ 12,125
22	$ 15,925	$ 12,368
23	$ 16,243	$ 12,615
24	$ 16,568	$ 12,867
25	$ 16,899	$ 13,125
26	$ 17,237	$ 13,387
27	$ 17,582	$ 13,655
28	$ 17,934	$ 13,928
29	$ 18,292	$ 14,207
30	$ 18,658	$ 14,491
NPV	**$ 275,299**	**$ 213,811**

TANK Net Present Value Calculation 1

300,000 gal Tank

Cost =	$ 1.05	$/gal
Inflation =	2%	
Discount rate[1] =	2.84%	

New Deerlake Ranch Tank

Cost for 300,000 gal tank $ 315,000

1. Nominal average 2015 rate for 30 year U.S. treasury note

Year	O&M Cost
0	$ 6,300
1	$ 6,426
2	$ 6,555
3	$ 6,686
4	$ 6,819
5	$ 6,956
6	$ 7,095
7	$ 7,237
8	$ 7,381
9	$ 7,529
10	$ 7,680
11	$ 7,833
12	$ 7,990
13	$ 8,150
14	$ 8,313
15	$ 8,479
16	$ 8,649
17	$ 8,822
18	$ 8,998
19	$ 9,178
20	$ 9,361
21	$ 9,549
22	$ 9,740
23	$ 9,934
24	$ 10,133
25	$ 10,336
26	$ 10,543
27	$ 10,753
28	$ 10,968
29	$ 11,188
30	$ 11,412
TOTAL	**$ 168,376**

TANK Net Present Value Calculation 2

700,000 gal Tank

Cost =	$ 0.85	$/gal
Inflation =	2%	
Discount rate[1] =	2.84%	

New Upper Twin Lakes Tank 1

Cost for 700,000 gal tank $ 595,000

1. Nominal average 2015 rate for 30 year U.S. treasury note

Year	O&M Cost
0	$ 11,900
1	$ 12,138
2	$ 12,381
3	$ 12,628
4	$ 12,881
5	$ 13,139
6	$ 13,401
7	$ 13,669
8	$ 13,943
9	$ 14,222
10	$ 14,506
11	$ 14,796
12	$ 15,092
13	$ 15,394
14	$ 15,702
15	$ 16,016
16	$ 16,336
17	$ 16,663
18	$ 16,996
19	$ 17,336
20	$ 17,683
21	$ 18,036
22	$ 18,397
23	$ 18,765
24	$ 19,140
25	$ 19,523
26	$ 19,914
27	$ 20,312
28	$ 20,718
29	$ 21,133
30	$ 21,555
TOTAL	**$ 318,043**

APPENDIX F

Sewer Area Study

TR No 53138

(FOR OUTLET POINTS **1** & **2**)

January 5, 2016 JN 99610-01

PC11775AS

SEWER AREA STUDY
APPROVED

APPROVED BY:_____RCE NO. 70745 DATE 03/08/2016

CHECKED BY: Imelda Ng DATE 03/08/2016

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

THIS APPROVAL EXPIRES TWO YEARS FROM THE DATE OF APPROVAL

This approval is also subject to the City of Los Angela's conditional approval on pages 45-49

PREPARED BY:

UNITED CIVIL INC.

30141 Agoura Road, Suite 215
Agoura Hills, CA 91301
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TABLE OF CONTENTS

PAGE NO.

I. INTRODUCTION/PROJECT DESCRIPTION..…....….3

II. SEWER PIPE CAPACITY ANALYSIS……4

III. EXISTING SEWER SYSTEM DESCRIPTION……7

IV. CONCLUSION……...7

V. CALCULATIONS……..8

VI. BACKUP FOR CALCULATIONS……..11

LIST OF EXHBITS/APPENDICES

Exhibit 1	Sewer Area Study Area Exhibit for Calculations
Exhibit 2	Sewer Area Study Zone Overlay
Exhibit 3	CSMD 1224
Exhibit 4	CSMD 1224 Overlay
Exhibit 5	CSMD 1224 Upstream
Exhibit 6	Area Map
Exhibit 7	Topo Map
Exhibit 8	City of Los Angeles Letter (6/18/2015)
Exhibit 9	LVMWD Will serve Letter (1/5/16)

I. INTRODUCTION/PROJECT DESCRIPTION

The purpose of this sewer area study is to determine the amount of sewage flow generated by the tract development using the Los Angeles County area study standard. TR 53138 is located in the unincorporated Chatsworth area of the County of Los Angeles north of the Ronald Reagan Freeway, between Canoga Avenue and Topanga Canyon Blvd. Sewage flows from this tract are discharged into the City of Los Angeles sewer systems. A separate Sewer Area Study was prepared per City of Los Angeles Standards to determine the adequacy of the existing sewer system. That Sewer Area Study was reviewed and approved by the City of Los Angeles on June 18, 2015. Sewage flows from this tract are discharged at two locations into the City of Los Angeles Sewer System. One point of discharge is Outlet Point No. 1 (intersection of Topanga Canyon Blvd and Poema Place), and the other point of discharge is at Outlet Point No. 2 (Canoga Avenue, south of Ronald Reagan Freeway). Discharge to Outlet Point No. 2 (Canoga Avenue Sewer System) was conditionally approved by the City of Los Angeles based on the offsite construction of an 8-inch sewer along Canoga Avenue from Candice Pl to Celtic St per the previously approved sewer study Report as stated in a letter dated June 18, 2015 (see Exhibit 8). Offsite requirement from the City of Los Angeles can be seen in Exhibit 1 page 2, and will be per separate permit through the City of Los Angeles. A will serve letter from LVMWD is included (see Exhibit 9).

This tract development (TR 53138) was included in and part of the approved Sewer Area Study for TR 53235 (PC #11834AS). A copy of this approved study is included for reference. Tributary areas to the North and West of Connection Point 1 were shown and included in PC #11834AS. SEA areas and zoning of these offsite areas remain consistent today as when this approval was made. The total outlet flows at Connection Point 1 will be slightly less than the flow previously approved since the number of lots contributing from this project (TR 53138) at Connection Point 1 have been reduced from 31 lots to 17 lots.

The proposed project, TR 53138, consists of a possible 325 residential lots, a recreation center, a sheriff substation, and 29 open space lots (which include a pocket park, a horse rest area, and a helispot). The onsite sewer system is all gravity flow. A portion of the sewer mainline from Poema Place to Canoga Avenue runs across slopes and through an 8’ wide multi-use trail per approval of LA County Sewer Maintenance District to eliminate the need of any sewer lift stations.

II. SEWER PIPE CAPACITY ANALYSIS

Sewer Pipe Capacity Analysis for Tract No 53138 Outlet Point No. 1

Sewage flows were calculated per County Standard using flow coefficient of 0.0012 cfs/unit or lot per direction from the County Engineers. The results are as follows:

The tabulated comparisons between the County and City methodologies are as follows:

Q = 0.61 cfs…….County Standard

Q = 0.71 cfs…….City Standard

The preceding tabulation shows that at Outlet Point No. 1, the city standard has a higher value than the county standard, therefore, the existing sewer systems are adequate.

This Sewer Area Study also includes sewage discharged from the Twin Lakes community shown in Area 12 & Area 15 in the enclosed map (see Exhibit 1).

The total unit/lot count north of Poema Place and west of Topanga Canyon Blvd per approved PC#11834AS and based on the County of Los Angeles Consolidated S.M.D map S-1224 (see Exhibit 5) is as tabulated below:

West of Topanga Cyn Blvd:

Tract 34108----------58 Units

Tract 44334----------202 Units

Tract 44327----------33 Lots

Tract 44335----------20 Units

Tract 33622----------18 Lots

Tract 42353----------57 Lots

Tract 53235----------65 Units

Non-Tract Property----------10 Lots

Subtotal----------463 Units/Lots

NOTE: Any future subdivision in these offsite properties is subject to provide an updated sewer area study.

East of Topanga Cyn Blvd:

Area 11----------17 Lots

Area 12, 15 & Sheriff --32 Lots [Twin Lakes, Sheriff (Office 1200sf = .0009 cfs -see calc)]

Subtotal----------49 Lots

TOTAL Unit/Lot count = 463 + 49 = 512 Units/Lots

The revised flow to Outlet No. 1 for **County** of Los Angeles Standard is:

Q = .0012 cfs (peak) x 512 units/lots = **0.61 cfs (peak)**

The revised flow to Outlet No. 1 for **City** of Los Angeles Standard is:

Q = 4 persons/lot x 512 lots x 90gpcd x 1.5472×10^{-6} cfs/gpd = 0.285 cfs (ave)

0.285 cfs x 2.5 (peak factor) + Sheriff = **0.71 cfs (peak)**

Sewer Pipe Capacity Analysis for Tract No 53138 Outlet Point No. 2

Sewage flows were calculated per County Standard using flow coefficient of 0.0012 cfs/unit or lot per direction from the County Engineers.

The tabulated comparisons between the County and City methodologies are as follows:

Q = 0.63 cfs…….County Standard

Q = 0.73 cfs…….City Standard

The preceding tabulation shows that at Outlet Point No. 2, the city standard has a higher value than the county standard. Since analysis downstream of these outlet points were done using the City standard, therefore the existing sewer systems are adequate provided that the recommendations in the City of Los Angeles approved Sewer Area Study are implemented.

This study takes into consideration 40 acres of undeveloped land directly to the North of said project in A-2-2 zoning equaling 20 potential lots. The Santa Monica Mountains Conservancy (SMMC) owns a 10' strip immediately to the north of the entire project boundary and over half of another 40 acres directly west of the previously mentioned 40-acres.. The ≤20 acres north of this line that is owned by private owners is included per zoning (A-2-2, 10 lots) in the event that this area is allowed to be developed in the future.

Area 1 includes the potential 10 offsite lots mentioned above, and Area 4 includes the 20 potential offsite lots mentioned above. All "Not A Part" (NAP) potential lots (per VTTM 53138) within the tract were included in this study and added to their respective areas. Area 8 includes one offsite lot that was included in the flow calculations (see Exhibit 1).

This Sewer Area Study also includes sewage discharge from the Twin Lakes Community as shown on the enclosed map (see Exhibit 1).

Areas upstream of Connection Point 2:

Area 1----------24 Lots (14 + 10 Offsite per zoning)
Area 2----------18 Lots
Area 3----------31 Lots
Area 4----------55 Lots (35 + 20 Offsite per zoning)
Area 5----------94 Lots
Area 6----------28 Lots
Area 7----------23 Lots + Rec Ctr (Auditorium 60 cap = .001cfs -see calc.)
Area 8----------59 Lots (58 + 1 Offsite)
Area 9----------4 Lots
Area 10----------2 Lots
Area 13----------157 Lots (130 + 27 per zoning)
Area 14----------31 Lots

TOTAL Unit/Lot count = 526 Units/Lots + Rec Ctr

The revised flow to Outlet No. 2 for **County** of Los Angeles Standard is:

Q = .0012 cfs (peak) x 526 units/lots + Rec Ctr = **0.63 cfs (peak)**

The revised flow to Outlet No. 2 for **City** of Los Angeles Standard is:

Q = 4 persons/lot x 526 lots x 90gpcd x 1.5472×10^{-6} cfs/gpd = 0.293 cfs (ave)

0.293 cfs x 2.5 (peak factor) + Rec Ctr = **0.73 cfs (peak)**

III. EXISTING SEWER SYSTEM DESCRIPTION

See attached LA City Sewer Area Study.

IV. CONCLUSION

Subsequent capacity calculations of pipes downstream showed the existing system is adequate to handle the additional flows.

In regards to the outlet approval, a letter dated June 18, 2015 from Mr. Ali Poosti, Division Manager, Wastewater Engineering Services Division, LA Sanitation states that there is sufficient capacity for the City of Los Angeles to accept the flows of this project with the construction of an 8-inch sewer along Canoga Avenue from Candice Pl to Celtic St. (See Exhibit 8).

SEWER AREA STUDY FLOW CALCULATIONS

TRACT 53138

FLOW COEFFICIENT = 0.0012 CFS/UNIT OR LOT

AREA 1 : 24 LOTS (14 + 10 OFFSITE) ON SCHINDLER WAY @ SULLIVAN WAY

Q_1 = 0.0012 X 24 = 0.0288 CFS

8" PIPE @ 5.0% SLOPE, MAX DISCHARGE = 2.71 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.355 CFS, 1.355 > 0.0288 OK

AREA 1-2 : 42 LOTS ON SULLIVAN WAY (WORST CASE)

Q_{1-2} = 0.0012 X 42 = 0.0504 CFS

8" PIPE @ 0.4% SLOPE, MAX DISCHARGE = 0.76 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.38 CFS, 0.38 > 0.0504 OK

AREA 1-3 : 75 LOTS ON SULLIVAN WAY @ BULLFINCH (WORST CASE)

$Q_{1-3} = Q_{1-2}+Q_3$ = 0.0504+(0.0012 X 31) = 0.0876 CFS

8" PIPE @ 0.4% SLOPE, MAX DISCHARGE = 0.76 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.38 CFS, 0.38 > 0.0876 OK

AREA 4 : 55 LOTS ON SULLIVAN WAY (WORST CASE)

Q_4 = 0.0012 X 55 = 0.066 CFS

8" PIPE @ 7.0% SLOPE, MAX DISCHARGE = 3.25 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.63 CFS, 1.63 > 0.066 OK

AREA 5 : 94 LOTS ON KOENIG WAY @ BULLFINCH (WORST CASE)

Q_5 = 0.0012 X 94 = 0.1128 CFS

8" PIPE @ 5.0% SLOPE, MAX DISCHARGE = 1.82 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.91 CFS, 0.91 > 0.1128 OK

AREA 1-6 : 250 LOTS ON BULLFINCH @ POEMA (WORST CASE)

$Q_{1-6} = Q_{1-3} + Q_4 + Q_5 + Q_6 = 0.0876+0.066+0.1128+(0.0012 \text{ X } 28) = 0.300$ CFS

8" PIPE @ 3.0% SLOPE, MAX DISCHARGE = 2.13 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.07 CFS , 1.07 > 0.300 OK

AREA 1-7 : 273 LOTS + REC CTR ON TRAIL TO CANOGA (WORST CASE)

REC CTR = 60 SEAT AUDITORIUM X 5G/SEAT X 2.5 PEAK /646272

CONVERSION = 0.001 CFS

$Q_{1-7} = Q_{1-6+} Q_7 + \text{Rec Ctr} = 0.300 + (0.0012 \text{ X } 23) + 0.001 = 0.3286$ CFS

8" PIPE @ 0.6% SLOPE, MAX DISCHARGE = 0.95 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.48 CFS , 0.48 > 0.3286 OK

AREA 8 : 58 LOTS + 1 OFFSITE ON CANOGA (WORST CASE)

$Q_8 = 0.0012 \text{ X } 59 = 0.0708$ CFS

8" PIPE @ 5.0% SLOPE, MAX DISCHARGE = 2.75 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.38 CFS , 1.38 > 0.0708 OK

AREA 9 : 4 LOTS ON POEMA PL @ CANOGA (WORST CASE)

$Q_9 = 0.0012 \text{ X } 4 = 0.0048$ CFS

8" PIPE @ 3.0% SLOPE, MAX DISCHARGE = 2.13 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.07 CFS , 1.07 > 0.0048 OK

AREA 8-10 : 65 LOTS ON CANOGA (WORST CASE)

$Q_{8-10} = Q_8+Q_9+Q_{10} = 0.0708+0.0048+(0.0012 \text{ X } 2) = 0.0780$ CFS

8" PIPE @ 6.0% SLOPE, MAX DISCHARGE = 2.75 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.38 CFS , 1.38 > 0.0780 OK

AREA 1-10, 14 : 369 LOTS ON POEMA PL @ CANOGA (WORST CASE)

$Q_{1-10,14} = Q_{1-7}+Q_{8-10}+Q_{14} = 0.3286+0.0780+(31 \text{ X } 0.0012) = 0.4438$ CFS

8" PIPE @ 0.76% SLOPE, MAX DISCHARGE = 1.05 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.525 CFS , 0.525 > 0.4438 OK

AREA 13 : 130 LOTS + 22 PER ZONING IN TWIN LAKES @ CANOGA (WORST CASE)

431971 SF OF WHICH 348982=A-1-1 (8.0 LOTS), 82989=R-1-6000 (13.8 LOTS)

Q_{13} = 0.0012 X 152 = 0.1824 CFS

8" PIPE @ 0.4% SLOPE, MAX DISCHARGE = 0.77 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.39 CFS , 0.39 > 0.1824 OK

ALL CONNECTION POINT 2 (WORST CASE)

$Q_{1\text{-}10,14} + Q_{13}$ = 0.4438 + 0.1824 = 0.6262 CFS

8" PIPE @ 5.0% SLOPE, MAX DISCHARGE = 2.75 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 1.38 CFS , 1.38 > 0.6262 OK

AREA 11 : 17 LOTS ON JOHNSON WAY @ POEMA PL (WORST CASE)

Q_{11} = 0.0012 X 17 = 0.0204 CFS

8" PIPE @ 2.4% SLOPE, MAX DISCHARGE = 1.90 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.95 CFS , 0.95 > 0.0204 OK

AREA 11-12,15 : 46 + SHERIFF ON POEMA PL @ TOPANGA (WORST CASE)

AREA 15 = 18 LOTS AND SHERIFF (*1200 SF OFFICE X 200GPD/1000SF X 2.5 PEAK/646272 CONVERSION TO CFS = .0009CFS*)

$Q_{11\text{-}12,15} = Q_{11} + Q_{12,15}$ = 0.0204 + [(0.0012 X 11) + (0.0012 X 18) + 0.0009 SHERIFF] = 0.0561 CFS

8" PIPE @ 0.4% SLOPE, MAX DISCHARGE = 0.77 CFS (SEE CALC PRINTOUT)

½ FLOW ALLOWED = 0.39 CFS , 0.39 > 0.0561 OK

ALL CONNECTION POINT 1 @ EX. MH 1 TO EX. CITY ON TOPANGA (WORST CASE)

OFFSITE 463 UNITS + $Q_{11\text{-}12,15}$ = (463 X 0.0012) + 0.0561 = 0.61 CFS

12" PIPE @ 1.68% SLOPE, MAX DISCHARGE = 4.81 CFS (SEE CALC PRINTOUT) ½ FLOW ALLOWED = 2.41 CFS , 2.41 > 0. 61 OK

Worksheet for Area 1: 24 Units (Incl 10 Offsite) on Schindler @Sullivan

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05000	ft/ft
Diameter	0.67	ft
Discharge	0.03	ft³/s

Results

Normal Depth	0.06	ft
Flow Area	0.01	ft²
Wetted Perimeter	0.39	ft
Hydraulic Radius	0.04	ft
Top Width	0.37	ft
Critical Depth	0.08	ft
Percent Full	8.5	%
Critical Slope	0.01294	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energy	0.12	ft
Froude Number	1.81	
Maximum Discharge	2.71	ft³/s
Discharge Full	2.48	ft³/s
Slope Full	0.00002	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	8.49	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 1&2: 42 Lots on Sullivan (worst case)

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	0.67	ft
Discharge	0.05	ft³/s

Results

Normal Depth	0.13	ft
Flow Area	0.05	ft²
Wetted Perimeter	0.61	ft
Hydraulic Radius	0.08	ft
Top Width	0.53	ft
Critical Depth	0.10	ft
Percent Full	19.2	%
Critical Slope	0.01106	ft/ft
Velocity	1.07	ft/s
Velocity Head	0.02	ft
Specific Energy	0.15	ft
Froude Number	0.63	
Maximum Discharge	0.76	ft³/s
Discharge Full	0.70	ft³/s
Slope Full	0.00004	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	19.22	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 1-3: 73 Lots on Sullivan @Bullfinch

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	0.67	ft
Discharge	0.09	ft³/s

Results

Normal Depth	0.17	ft
Flow Area	0.07	ft²
Wetted Perimeter	0.70	ft
Hydraulic Radius	0.10	ft
Top Width	0.58	ft
Critical Depth	0.13	ft
Percent Full	24.7	%
Critical Slope	0.00955	ft/ft
Velocity	1.29	ft/s
Velocity Head	0.03	ft
Specific Energy	0.19	ft
Froude Number	0.67	
Maximum Discharge	0.77	ft³/s
Discharge Full	0.71	ft³/s
Slope Full	0.00009	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	24.68	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 4: 35 Lots, & 20 Offsite on Bullfinch

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.07000	ft/ft
Diameter	0.67	ft
Discharge	0.07	ft³/s

Results

Normal Depth	0.08	ft
Flow Area	0.02	ft²
Wetted Perimeter	0.46	ft
Hydraulic Radius	0.05	ft
Top Width	0.42	ft
Critical Depth	0.12	ft
Percent Full	11.3	%
Critical Slope	0.01031	ft/ft
Velocity	3.00	ft/s
Velocity Head	0.14	ft
Specific Energy	0.22	ft
Froude Number	2.33	
Maximum Discharge	3.25	ft³/s
Discharge Full	2.97	ft³/s
Slope Full	0.00006	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	11.31	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 5: 94 Lots on Koenig @Bullfinch

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02200	ft/ft
Diameter	0.67	ft
Discharge	0.11	ft³/s

Results

Normal Depth	0.12	ft
Flow Area	0.05	ft²
Wetted Perimeter	0.60	ft
Hydraulic Radius	0.08	ft
Top Width	0.52	ft
Critical Depth	0.15	ft
Percent Full	18.6	%
Critical Slope	0.00920	ft/ft
Velocity	2.49	ft/s
Velocity Head	0.10	ft
Specific Energy	0.22	ft
Froude Number	1.49	
Maximum Discharge	1.82	ft³/s
Discharge Full	1.67	ft³/s
Slope Full	0.00013	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	18.61	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 1-6: 240 Lots on Bullfinch @Poema

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03000	ft/ft
Diameter	0.67	ft
Discharge	0.30	ft³/s

Results

Normal Depth	0.18	ft
Flow Area	0.08	ft²
Wetted Perimeter	0.74	ft
Hydraulic Radius	0.11	ft
Top Width	0.60	ft
Critical Depth	0.25	ft
Percent Full	27.4	%
Critical Slope	0.00821	ft/ft
Velocity	3.83	ft/s
Velocity Head	0.23	ft
Specific Energy	0.41	ft
Froude Number	1.86	
Maximum Discharge	2.13	ft³/s
Discharge Full	1.95	ft³/s
Slope Full	0.00076	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	27.39	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 1-7: 273 Lots & Rec onTrail @Canoga (worst)

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Diameter	0.67	ft
Discharge	0.33	ft³/s

Results

Normal Depth	0.29	ft
Flow Area	0.14	ft²
Wetted Perimeter	0.96	ft
Hydraulic Radius	0.15	ft
Top Width	0.66	ft
Critical Depth	0.27	ft
Percent Full	43.0	%
Critical Slope	0.00818	ft/ft
Velocity	2.27	ft/s
Velocity Head	0.08	ft
Specific Energy	0.37	ft
Froude Number	0.86	
Maximum Discharge	0.95	ft³/s
Discharge Full	0.87	ft³/s
Slope Full	0.00090	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	42.95	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 8: 58 Lots & 1 Offsite on Canoga @Poema

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05000	ft/ft
Diameter	0.67	ft
Discharge	0.07	ft³/s

Results

Normal Depth	0.08	ft
Flow Area	0.03	ft²
Wetted Perimeter	0.48	ft
Hydraulic Radius	0.05	ft
Top Width	0.44	ft
Critical Depth	0.12	ft
Percent Full	12.5	%
Critical Slope	0.01007	ft/ft
Velocity	2.77	ft/s
Velocity Head	0.12	ft
Specific Energy	0.20	ft
Froude Number	2.04	
Maximum Discharge	2.75	ft³/s
Discharge Full	2.51	ft³/s
Slope Full	0.00007	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	12.54	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 9: 4 Lots on Poema @Canoga

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03000	ft/ft
Diameter	0.67	ft
Discharge	0.00	ft³/s

Results

Normal Depth	0.03	ft
Flow Area	0.01	ft²
Wetted Perimeter	0.28	ft
Hydraulic Radius	0.02	ft
Top Width	0.27	ft
Critical Depth	0.03	ft
Percent Full	4.4	%
Critical Slope	0.02388	ft/ft
Velocity	0.89	ft/s
Velocity Head	0.01	ft
Specific Energy	0.04	ft
Froude Number	1.12	
Maximum Discharge	2.13	ft³/s
Discharge Full	1.95	ft³/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	4.37	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 8-10: 65 Lots on Canoga

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.06000	ft/ft
Diameter	0.67	ft
Discharge	0.08	ft³/s

Results

Normal Depth	0.08	ft
Flow Area	0.03	ft²
Wetted Perimeter	0.49	ft
Hydraulic Radius	0.05	ft
Top Width	0.44	ft
Critical Depth	0.13	ft
Percent Full	12.6	%
Critical Slope	0.01001	ft/ft
Velocity	3.04	ft/s
Velocity Head	0.14	ft
Specific Energy	0.23	ft
Froude Number	2.23	
Maximum Discharge	3.01	ft³/s
Discharge Full	2.75	ft³/s
Slope Full	0.00008	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	12.57	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 1-10, 14: Area 1-10 & 31 Lots on Canoga Ave

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00760	ft/ft
Diameter	0.67	ft
Discharge	0.44	ft³/s

Results

Normal Depth	0.32	ft
Flow Area	0.16	ft²
Wetted Perimeter	1.02	ft
Hydraulic Radius	0.16	ft
Top Width	0.67	ft
Critical Depth	0.31	ft
Percent Full	47.7	%
Critical Slope	0.00823	ft/ft
Velocity	2.70	ft/s
Velocity Head	0.11	ft
Specific Energy	0.43	ft
Froude Number	0.96	
Maximum Discharge	1.05	ft³/s
Discharge Full	0.96	ft³/s
Slope Full	0.00164	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	47.75	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 13: 130 Ex. Lots & 22 Lot per Zoning (worst)

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Diameter	0.67	ft
Discharge	0.18	ft³/s

Results

Normal Depth	0.21	ft
Flow Area	0.10	ft²
Wetted Perimeter	0.80	ft
Hydraulic Radius	0.12	ft
Top Width	0.62	ft
Critical Depth	0.20	ft
Percent Full	31.9	%
Critical Slope	0.00854	ft/ft
Velocity	1.89	ft/s
Velocity Head	0.06	ft
Specific Energy	0.27	ft
Froude Number	0.85	
Maximum Discharge	0.95	ft³/s
Discharge Full	0.87	ft³/s
Slope Full	0.00030	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	31.85	%
Downstream Velocity	Infinity	ft/s

Worksheet for Connection Point 2: All upstream to Ex MH

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05000	ft/ft
Diameter	0.67	ft
Discharge	0.63	ft³/s

Results

Normal Depth	0.23	ft
Flow Area	0.11	ft²
Wetted Perimeter	0.84	ft
Hydraulic Radius	0.13	ft
Top Width	0.64	ft
Critical Depth	0.37	ft
Percent Full	34.6	%
Critical Slope	0.00870	ft/ft
Velocity	5.77	ft/s
Velocity Head	0.52	ft
Specific Energy	0.75	ft
Froude Number	2.47	
Maximum Discharge	2.75	ft³/s
Discharge Full	2.51	ft³/s
Slope Full	0.00315	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	34.65	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 11: 17 Lots on Johnson @Poema

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02400	ft/ft
Diameter	0.67	ft
Discharge	0.02	ft³/s

Results

Normal Depth	0.06	ft
Flow Area	0.01	ft²
Wetted Perimeter	0.40	ft
Hydraulic Radius	0.04	ft
Top Width	0.37	ft
Critical Depth	0.06	ft
Percent Full	8.5	%
Critical Slope	0.01422	ft/ft
Velocity	1.40	ft/s
Velocity Head	0.03	ft
Specific Energy	0.09	ft
Froude Number	1.26	
Maximum Discharge	1.90	ft³/s
Discharge Full	1.74	ft³/s
Slope Full	0.00001	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	8.53	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area 11-12, 15 & Sheriff: 47 Lots @ Ex. MH on Topanga

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	0.67	ft
Discharge	0.06	ft³/s

Results

Normal Depth	0.13	ft
Flow Area	0.05	ft²
Wetted Perimeter	0.62	ft
Hydraulic Radius	0.08	ft
Top Width	0.54	ft
Critical Depth	0.11	ft
Percent Full	20.0	%
Critical Slope	0.01072	ft/ft
Velocity	1.11	ft/s
Velocity Head	0.02	ft
Specific Energy	0.15	ft
Froude Number	0.64	
Maximum Discharge	0.77	ft³/s
Discharge Full	0.71	ft³/s
Slope Full	0.00005	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	20.05	%
Downstream Velocity	Infinity	ft/s

Worksheet for Connection Pt 1: All upstream to Ex. MH on Topanga

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01680	ft/ft
Diameter	0.83	ft
Discharge	0.57	ft³/s

Results

Normal Depth	0.27	ft
Flow Area	0.15	ft²
Wetted Perimeter	1.00	ft
Hydraulic Radius	0.15	ft
Top Width	0.77	ft
Critical Depth	0.33	ft
Percent Full	32.1	%
Critical Slope	0.00719	ft/ft
Velocity	3.78	ft/s
Velocity Head	0.22	ft
Specific Energy	0.49	ft
Froude Number	1.51	
Maximum Discharge	2.88	ft³/s
Discharge Full	2.64	ft³/s
Slope Full	0.00081	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	32.10	%
Downstream Velocity	Infinity	ft/s

Worksheet for OFFSITE Canoga (worst)

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05000	ft/ft
Diameter	0.67	ft
Discharge	0.63	ft³/s

Results

Normal Depth	0.23	ft
Flow Area	0.11	ft²
Wetted Perimeter	0.84	ft
Hydraulic Radius	0.13	ft
Top Width	0.64	ft
Critical Depth	0.37	ft
Percent Full	34.9	%
Critical Slope	0.00876	ft/ft
Velocity	5.78	ft/s
Velocity Head	0.52	ft
Specific Energy	0.75	ft
Froude Number	2.46	
Maximum Discharge	2.70	ft³/s
Discharge Full	2.47	ft³/s
Slope Full	0.00325	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	34.93	%
Downstream Velocity	Infinity	ft/s

Worksheet for OFFSITE Topanga (worst) Ex. MH 1 to Ex. LA City Sewer

Project Description

Friction Method	Kutter Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01680	ft/ft
Diameter	1.00	ft
Discharge	0.61	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.16	ft²
Wetted Perimeter	1.07	ft
Hydraulic Radius	0.15	ft
Top Width	0.88	ft
Critical Depth	0.32	ft
Percent Full	25.8	%
Critical Slope	0.00658	ft/ft
Velocity	3.80	ft/s
Velocity Head	0.22	ft
Specific Energy	0.48	ft
Froude Number	1.56	
Maximum Discharge	4.81	ft³/s
Discharge Full	4.42	ft³/s
Slope Full	0.00035	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	25.82	%
Downstream Velocity	Infinity	ft/s

EXHIBIT 1

10 OFFSITE (20ac. @ A 2-2)

20 OFFSITE (40 ac. @ A 2-2)

10' MOUNTAINS RECREATION & CONSERVATION AUTHORITY EASMT

10' MOUNTAINS RECREATION & CONSERVATION AUTHORITY EASMT

AREA 2
18 LOTS

AREA 1
14 LOTS & 10 OFFSITE

AREA 4
35 LOTS & 20 OFFSITE

AREA 3
31 LOTS

AREA 5
94 LOTS

AREA 6
28 LOTS

AREA 8
58 LOTS & 1 OFFSITE

AREA 9
4 LOTS

AREA 7
23 LOTS
& REC CTR

AREA 10 &
2 EX LOTS

AREA 11
17 LOTS

AREA 12
11 LOTS

AREA 13
130 LOTS + 22 POSSIBLE

AREA 14
31 LOTS

AREA 15
19 LOTS

OS

NOT A PART

NOT A PART OF THIS SUBDIVISION

TWIN LAKES

Q=0.029
AREA 1

Q=0.050 CFS
AREAS 1-2

Q=0.066 CFS
AREA 4

Q=0.088 CFS
AREAS 1-3

Q=0.113 CFS
AREA 5

Q=0.300 CFS
AREAS 1-6

Q=0.071 CFS
AREA 8

Q=0.005 CFS

Q=0.020 CFS
AREA 11

Q=0.056 CFS
AREAS 11-12, 15 & SHERIFF

Q=0.034 CFS
AREA 11-12

Q=0.018 CFS
AREA 15

Q=0.329 CFS
AREAS 1-7

Q=0.037 CFS
AREA 14

Q=0.406 CFS
AREAS 1-10

Q=0.444 CFS
AREAS 1-10, 14

Q=0.188 CFS
AREA 13

Q=0.626 CFS
AREAS 1-10, 13-14

OFFSITE LOT

SEE EXHIBIT 5
Q=0.71 CFS
TRIBUTARY AREA
LA COUNTY MH #2 PER N-1224

CONNECTION POINT 1
ALSO INCLUDED ON
CITY OF LA SEWER STUDY
LISTED AS MH #35505001

CONNECTION POINT 2
SEE CITY OF IA
SEWER STUDY

AREAS 12-15 ARE PART
OF TWIN LAKES

118 FREEWAY

CALTRANS R.W.

SCALE: 1"=400'

TG: 480 7-A,B, 500 1-A,B

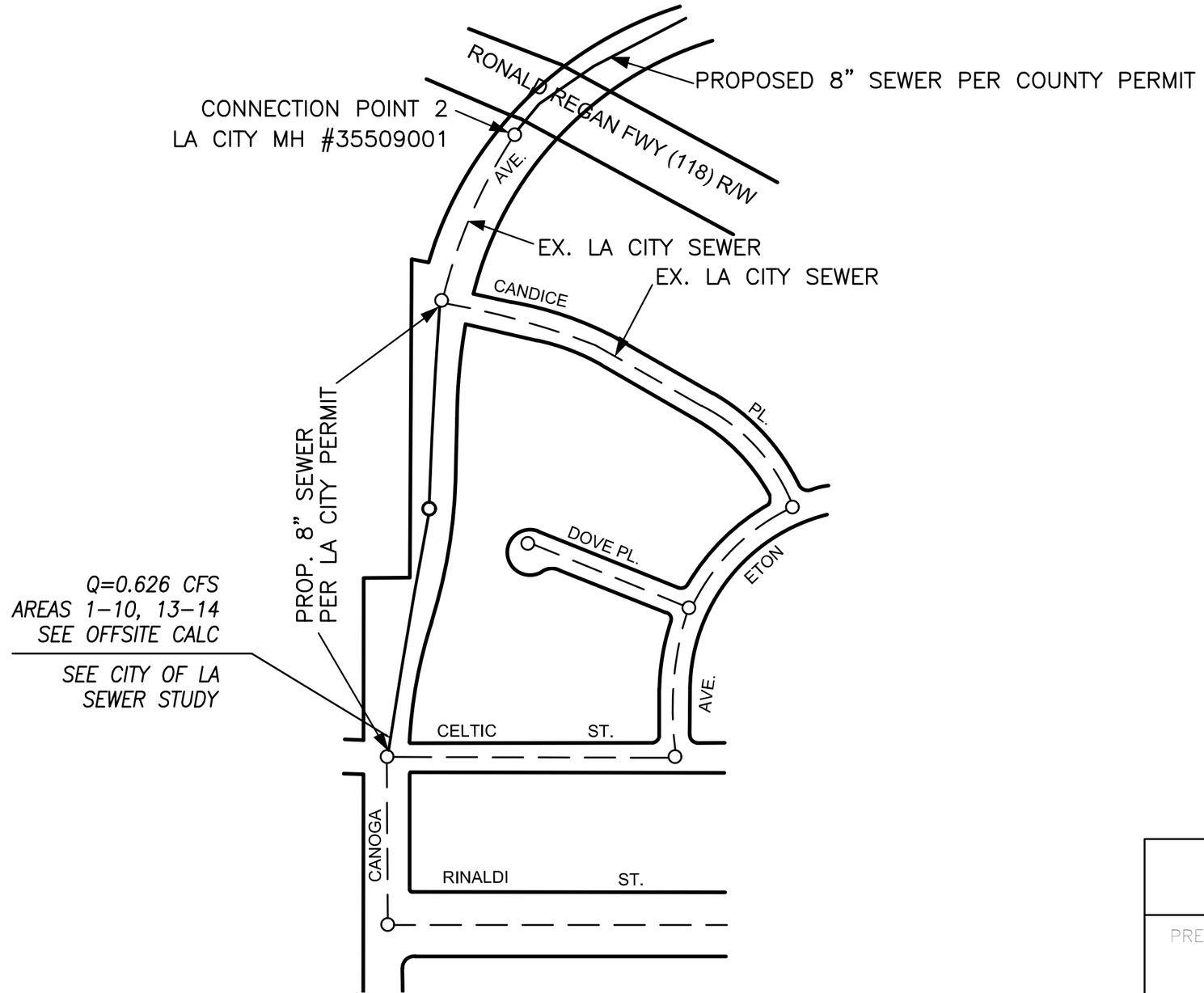
SEWER AREA STUDY
TRACT NO 53138

PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

SIEW HUAT NG
R.C.E. 46026 EXP. 12-31-2016

DATE: 12/23/2015



SCALE: 1"=200'

TG: 480 7-A,B, 500 1-A,B

SEWER AREA STUDY
TRACT NO 53138

PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

SIEW HUAT NG
R.C.E. 46026 EXP. 12-31-2016

DATE: 12/23/2015

EXHIBIT 2

NOT A PART

NOT A PART OF THIS SUBDIVISION

SCHINDLER WAY

SULLIVAN WAY

SULLIVAN COURT

CANOGA DRIVE

WURSTER WAY

EAMES WAY

KOENIG WAY

INGRAM DRIVE

FURNESS DRIVE

POEMA PLACE

POEMA TERRACE

MAYAN DR.

TWIN LAKES

GARDEN OF THE GODS PARK

FWY ON RAMP

FWY OFF RAMP

TOPANGA CYN. BLVD.

CANOGA AVE.

HORNET

LOS ANGELES

SCALE: 1"=400'

PREPARED BY:

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

EXHIBIT 3

A B C D

211
212

THIS MAP IS INTENDED FOR USE ONLY AS OPERATIONS MAP BY LOS ANGELES COUNTY SEWER MAINTENANCE DISTRICTS. LOS ANGELES COUNTY EXPRESSLY DISCLAIMS ANY LIABILITY FOR ANY INACCURACIES WHICH MAY BE PRESENT IN THIS MAP.

AUTOMATED GRAPHICS

METERS 0 50 100 200 250
0 200 400 600 800 FEET

LEGEND

- CLAY SEWERS MAINTAINED BY SMD. 8" UNLESS OTHERWISE NOTED
- PLASTIC SEWERS
- CONCRETE SEWERS
- CLAY SEWERS, LINED
- CEMENT SEWERS, LINED
- FORCE MAINS
- SEWERS NOT MAINTAINED BY SMD
- TRUNK SEWERS
- CITY BOUNDARY
- STANDARD MANHOLE
- DROP MANHOLE
- SHALLOW MANHOLE
- TRAP MANHOLE
- WEIR MANHOLE
- C.O. CLEANOUT
- L.H. LAMP HOLE
- PUMP STATION

TOTAL MH'S THIS MAP: 128

MAP REV
10-02-13

DATA BASE REV
01-07-88

CONSOLIDATED S.M.D.

N-1224

T: 500 A-1

2007.2009.1224

EXHIBIT 4

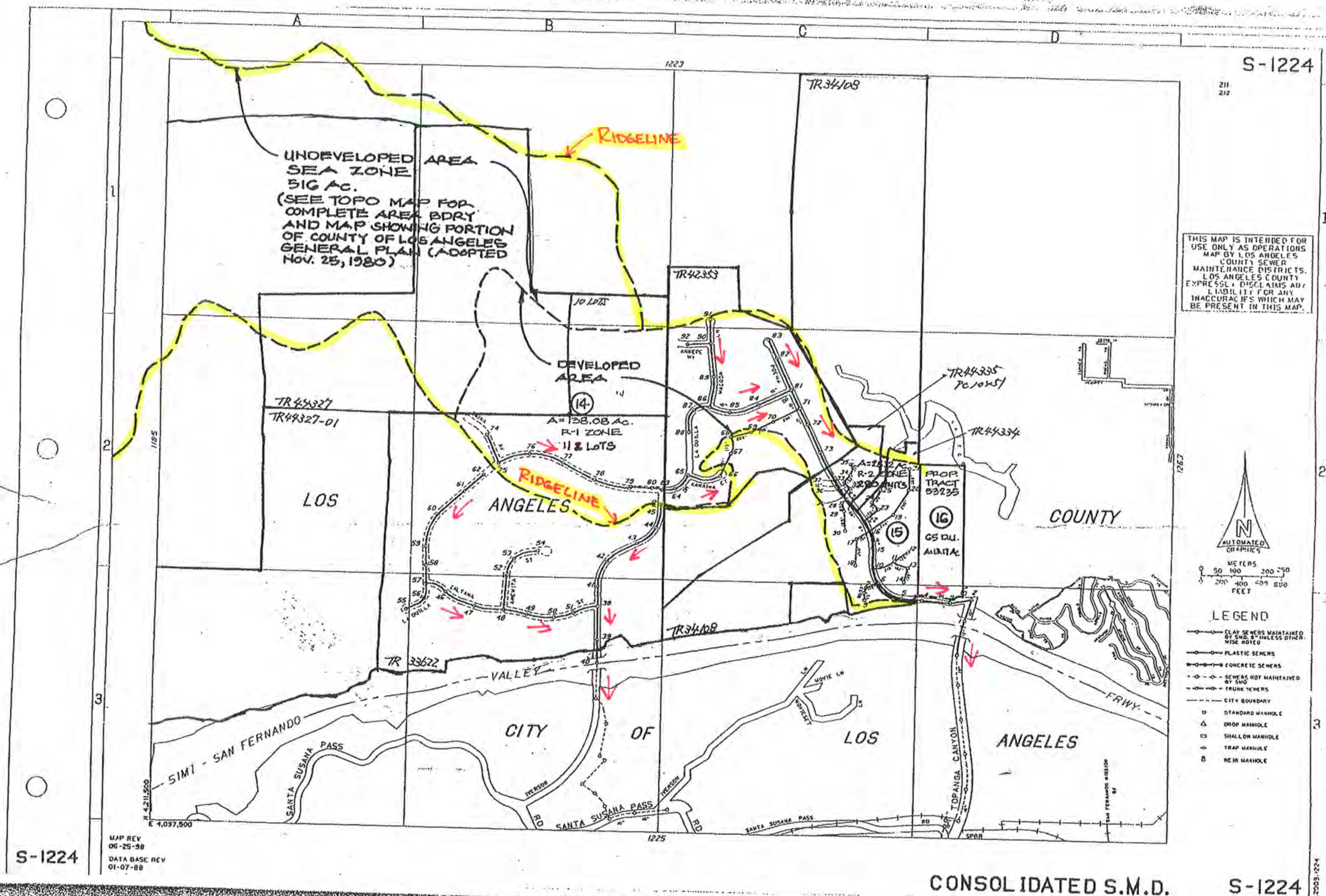
THIS MAP IS INTENDED FOR USE ONLY AS OPERATIONS MAP BY LOS ANGELES COUNTY SEWER MAINTENANCE DISTRICTS. LOS ANGELES COUNTY EXPRESSLY DISCLAIMS ANY LIABILITY FOR ANY INACCURACIES WHICH MAY BE PRESENT IN THIS MAP.

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

DATE: 2/24/2015

N-1224

EXHIBIT 5



S-1224
RIDGELINE
UNDEVELOPED AREA
SEA ZONE
516 Ac.
(SEE TOPO MAP FOR COMPLETE AREA BDRY AND MAP SHOWING PORTION OF COUNTY OF LOS ANGELES GENERAL PLAN (ADOPTED NOV. 25, 1980)
TR34108
TR42353
10 LOTS
DEVELOPED AREA
14
A=138.08 Ac.
R-1 ZONE
118 LOTS
TR44335
PC10451
TR44334
TR45327
TR49327-01
A=25.2 Ac.
R-2 ZONE
280 UNITS
15
PROP. TRACT 53235
16
65 D.U.
RIDGELINE
TR 33622
TR34108
LOS ANGELES
COUNTY
CITY OF LOS ANGELES
SIMI - SAN FERNANDO VALLEY FRWY.
SANTA SUSANA PASS
SANTA SUSANA PASS RD
TOPANGA CANYON
THIS MAP IS INTENDED FOR USE ONLY AS OPERATIONS MAP BY LOS ANGELES COUNTY SEWER MAINTENANCE DISTRICTS. LOS ANGELES COUNTY EXPRESSLY DISCLAIMS ANY LIABILITY FOR ANY INACCURACIES WHICH MAY BE PRESENT IN THIS MAP.
AUTOMATED GRAPHICS
METERS
FEET
LEGEND
MAP REV 06-25-98
DATA BASE REV 01-07-88
CONSOLIDATED S.M.D.
S-1224

RECEIVED
JUN 19 2006
PROCESSING CENTER
LAND DEVELOPMENT DIVISION

SEWER AREA STUDY
APPROVED
APPROVED BY: NTH RCE NO. DATE 6-22
CHECKED BY: DATE 6-22-06
COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

REGISTERED PROFESSIONAL ENGINEER
RAMY F. AWAD
No. 41729
Exp. 3-31-08
CIVIL
STATE OF CALIFORNIA

Ramy F. Awad
6/19/06

EXHIBIT 6

ies

gical areas

es

TRACT 31358

TOPANGA CYN. BLVD.

FWY 118

FWY 101

SEA

SP-1

PORTION OF COUNTY OF
LOS ANGELES GENERAL PLAN
NOV. 1980

MAP SCALE: 1" = 2 Mi

EXHIBIT 7

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SEWER AREA STUDY
APPROVED

APPROVED BY: _____ RCE NO. _____ DATE 6.22.06

CHECKED BY: _____ DATE 6.22.06

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

MAP SCALE: 1"=600'

JN 2004123 FEB. 8, 2005

RECEIVED
JUN 19 2006
PROCESSING SECTION
LAND DEVELOPMENT DIVISION

REGISTERED PROFESSIONAL ENGINEER
RAMY F. AWAD
No. 41729
Exp. 9-31-08
CIVIL
STATE OF CALIFORNIA

6/19/06

EXHIBIT 8

WASTEWATER ENGINEERING SERVICES DIV.
2714 MEDIA CENTER DRIVE
LOS ANGELES, CA 90065
FAX: (323) 342-6210
(323) 342-6211

June 18, 2015

File: SC.CE.

Mr. Matthew Sawyer, Project Engineer
UNITED CIVIL INC
30141 Agoura Road, Suite 215
Agoura Hills, CA 91301

Dear Mr. Sawyer:

DEERLAKE TRACT 53138 LOS ANGELES COUNTY-REQUEST FOR WASTEWATER SERVICE INFORMATION

This is in response to your April 14, 2015 letter requesting a review of your proposed mixed-use project which resides within the Las Virgenes Municipal Water District boundary for sewer and water service but then connects to the City of Los Angeles sewer systems at the north end of Canoga Ave and Topanga Canyon Blvd, Los Angeles, CA 91311. LA Sanitation has conducted a preliminary evaluation of the potential impacts to the wastewater and stormwater systems for the proposed project.

WASTEWATER REQUIREMENT

LA Sanitation, Wastewater Engineering Services Division (WESD) is charged with the task of evaluating the local sewer conditions and to determine if available wastewater capacity exists for future developments. The evaluation will determine cumulative sewer impacts and guide the planning process for any future sewer improvements projects needed to provide future capacity as the City grows and develops.

Projected Wastewater Discharges for the Proposed Project:

Type Description	Average Daily Flow per Type Description (GPD/UNIT)	Proposed No. of Units	Average Daily Flow (GPD)
Proposed: Point (1)			
Residential: 3-BDRMS	230/ DU	30	6,900
Residential: 4-BDRMS	275/ DU	17	4,675
Sheriff Station	120 GPD/1000 SQ.FT	1,100 SQ.FT	132
Total			**11,707**
Proposed: Point (2)			
Residential: 3-BDRMS	230/ DU	217	49,910
Residential: 4-BDRMS	275/ DU	165	45,375

Residential: 5-BDRMS	320/ DU	65	20,800
Residential: 6-BDRMS	365/ DU	70	25,550
Recreation Center	200 GPD/1000 SQ.FT	4,340 SQ.FT	868
Total			**142,503**
Net Total			**154,210**

SEWER AVAILABILITY

The sewer infrastructure in the vicinity of the proposed project includes two (2) discharge routes. Discharge Route (1) starts with an existing 10-inch line on Topanga Canyon Blvd for Point (1). The flow from the 10-inch line on Topanga Canyon Blvd passes into an 18-inch line on Shoup Ave before feeding into the 21-inch line on Topanga Canyon Blvd. Discharge Route (2) starts with an existing 8-inch line on Canoga Ave for Point (2). The flow from the 8-inch line on Canoga Ave passes into an 18-inch line on Topanga Canyon Blvd and then to another 18-inch line on Nordhoff St. On Canoga Ave the flow from the 21-inch line on Topanga Canyon Blvd from Point (1) join the flow from the 18-inch line on Nordhoff St from Point (2) to feed a 24-inch line before discharging into a 30-inch sewer line on Roscoe Blvd. Figure 1 shows the details of the sewer system within the vicinity of the project. The current flow level (d/D) in some of the lines cannot be determined at this time without additional gauging.

The current approximate flow level (d/D) and the design capacities at d/D of 50% in the sewer system are as follows:

Pipe Diameter (in)	Pipe Location	Current Gauging d/D (%)	50% Design Capacity
Point (1) Route			
10	Topanga Canyon Blvd.	*	1.63 MGD
18	Shoup Ave.	24	2.67 MGD
21	Topanga Canyon Blvd.	20	2.93 MGD
Point (2) Route			
8	Canoga Ave.	*	978,324 GPD
8	Eton Ave.	18	397,199 GPD
10	Canoga Ave.	24	509,236 GPD
18	Topanga Canyon Blvd.	28	1.84 MGD
18	Nordhoff St.	27	2.18 MGD
Point (1) & Point (2)			
24	Canoga Ave.	25	6.07 MGD
30	Roscoe Blvd.	32	6.74 MGD
30	Roscoe Blvd.	38	6.74 MGD

* No gauging available

Based on the estimated flows, it appears the sewer system might be able to accommodate the total flow for your proposed project based on the following;

- Construction of 8-inch sewer along Canoga Avenue from Candice Pl to Celtic St per the sewer study Report
- Additional requirements such as installation of gauging equipment may be required in order for the City to Bill for Sewer Service Charges.
- Operation of the pumping infrastructure at P1 will not be in the Jurisdiction of the City.

Further detailed gauging and evaluation will be needed as part of the permit process to identify a specific sewer connection point. If the public sewer has insufficient capacity then the developer will be required to build sewer lines to a point in the sewer system with sufficient capacity. A final approval for sewer capacity and connection permit will be made at that time. Ultimately, this sewage flow will be conveyed to the Hyperion Treatment Plant, which has sufficient capacity for the project.

If you have any questions, please call Kwasi Berko of my staff at (323) 342-1562.

STORMWATER REQUIREMENTS

The LA Sanitation, Watershed Protection Division (WPD) is charged with the task of ensuring the implementation of the Municipal Stormwater Permit requirements within the City of Los Angeles. We anticipate the following requirements would apply for this project.

POST-CONSTRUCTION MITIGATION REQUIREMENTS

The project requires implementation of stormwater mitigation measures. These requirements are based on the Standard Urban Stormwater Mitigation Plan (SUSMP) and the recently adopted Low Impact Development (LID) requirements. The projects that are subject to SUSMP/LID are required to incorporate measures to mitigate the impact of stormwater runoff. The requirements are outlined in the guidance manual titled "*Development Best Management Practices Handbook – Part B: Planning Activities*". Current regulations prioritize infiltration, capture/use, and then biofiltration as the preferred stormwater control measures. The relevant documents can be found at: www.lastormwater.org. It is advised that input regarding SUSMP requirements be received in the early phases of the project from WPD's plan-checking staff.

GREEN STREETS

The City is developing a Green Street Initiative that will require projects to implement Green Street elements in the parkway areas between the roadway and sidewalk of the public right-of-away to capture and retain stormwater and urban runoff to mitigate the impact of stormwater runoff and other environmental concerns. The goals of the Green Street elements are to improve the water quality of stormwater runoff, recharge local ground water basins, improve air quality, reduce the heat island effect of street pavement, enhance pedestrian use of sidewalks, and encourage alternate means of transportation. The Green Street elements may include infiltration systems, biofiltration swales, and permeable pavements where stormwater can be easily directed from the streets into the parkways and can be implemented in conjunction with the SUSMP/LID requirements.

CONSTRUCTION REQUIREMENTS

The project is required to implement stormwater control measures during its construction phase. All projects are subject to a set of minimum control measures to lessen the impact of stormwater pollution. In addition for projects that involve construction during the rainy season that is between October 1 and April 15, a Wet Weather Erosion Control Plan is required to be prepared. Also projects that disturb more than one-acre of land are subject to the California General Construction Stormwater Permit. As part of this requirement a Notice of Intent (NOI) needs to be filed with the State of California and a Storm Water Pollution Prevention Plan (SWPPP) needs to be prepared. The SWPPP must be maintained on-site during the duration of construction.

If there are questions regarding the stormwater requirements, please call Kosta Kaporis at (213) 485-0586, or WPD's plan-checking counter at (213) 482-7066. WPD's plan-checking counter can also be visited at 201 N. Figueroa, 3rd Fl, Station 18.

SOLID RESOURCE REQUIREMENTS

The City has a standard requirement that applies to all proposed residential developments of four or more units or where the addition of floor areas is 25 percent or more, and all other development projects where the addition of floor area is 30 percent or more. Such developments must set aside a recycling area or room for onsite recycling activities. For more details of this requirement, please contact Daniel Hackney of the Special Project Division at (213)485-3684.

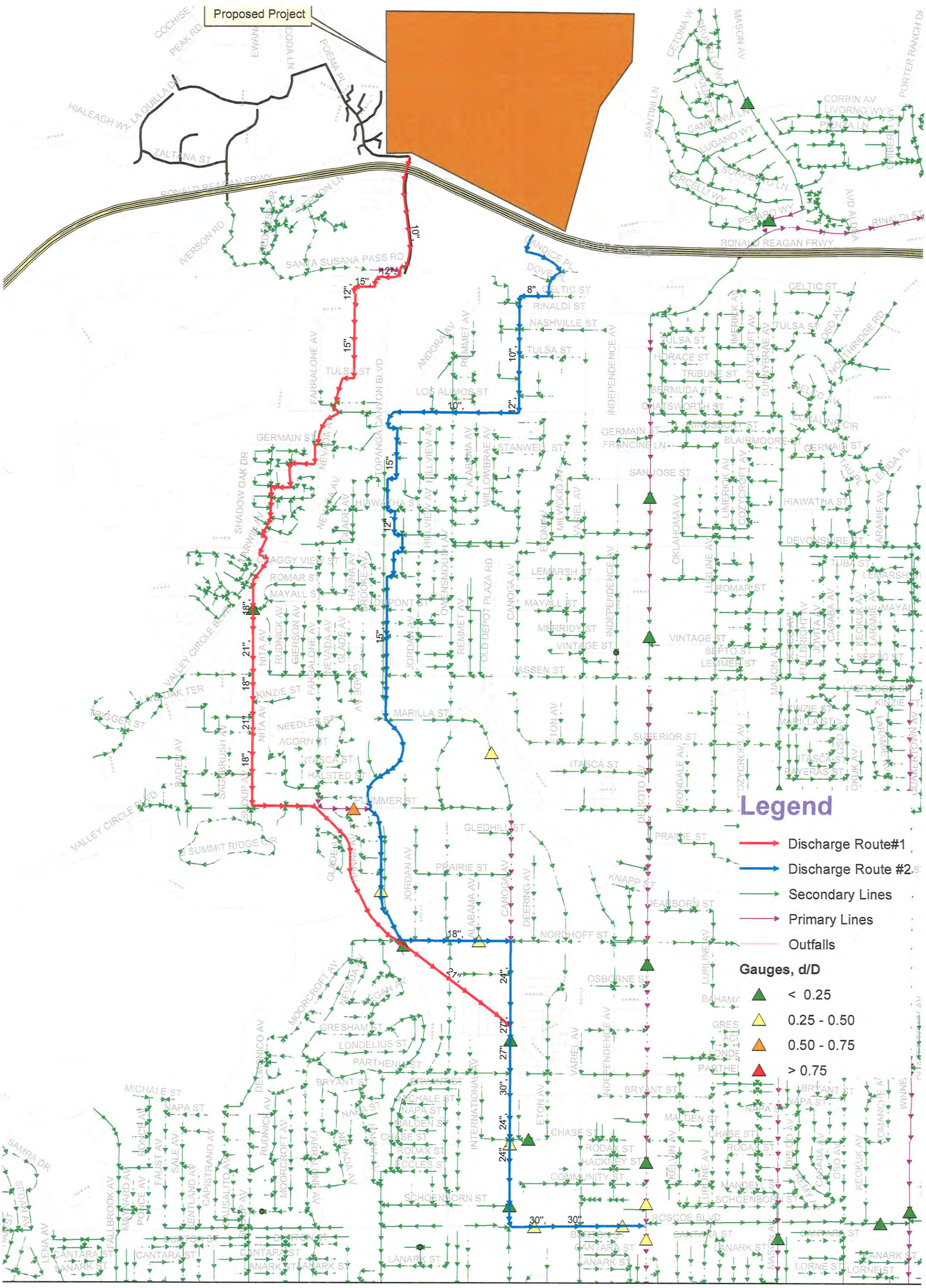
Sincerely,

Ali Poosti, Division Manager
Wastewater Engineering Services Division
LA Sanitation

KB\AP:tn

Attachment: Figure 1 – Sewer Map

c: Kosta Kaporis, LASAN
Daniel Hackney, LASAN
Eduardo Perez, LASAN
Susan Rocha, LASAN



Wastewater Engineering Services Division
Bureau of Sanitation
City of Los Angeles

FIGURE 1
Deerlake Tract 53138
Los Angeles County
Sewer Map

N
W
E
S

0 1,400 2,800 4,200 5,600 Feet

EXHIBIT 9

LAS VIRGENES MUNICIPAL WATER DISTRICT
EST. 1958

Dedicated to Providing Quality
Water & Wastewater Service

HEADQUARTERS
4232 Las Virgenes Road
Calabasas, CA 91302
(818) 251-2100
Fax (818) 251-2109

WESTLAKE
FILTRATION PLANT
(818) 251-2370
Fax (818) 251-2379

TAPIA WATER
RECLAMATION FACILITY
(818) 251-2300
Fax (818) 251-2309

RANCHO LAS VIRGENES
COMPOSTING FACILITY
(818) 251-2340
Fax (818) 251-2349

www.LVMWD.com

MEMBER AGENCY OF THE
METROPOLITAN WATER
DISTRICT
OF SOUTHERN CALIFORNIA

January 5, 2016

CONDITIONAL STATEMENT OF SEWER SERVICE

TO WHOM IT MAY CONCERN:

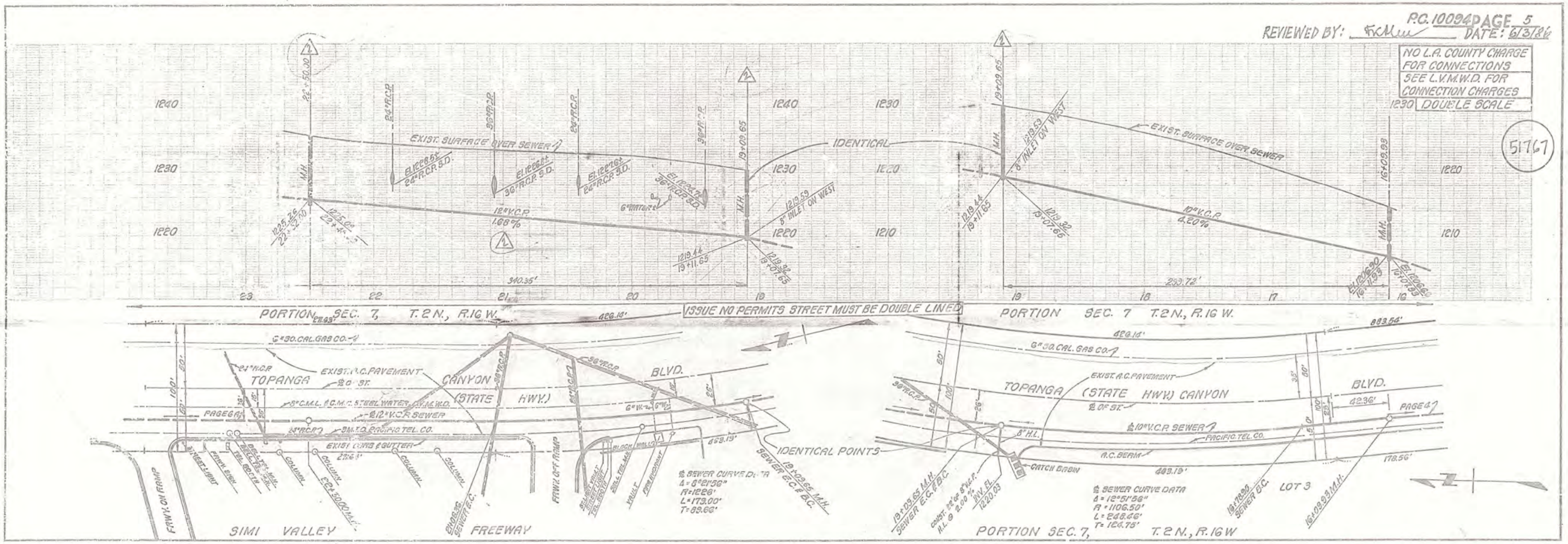
SUBJECT: T 53138 Deerlake

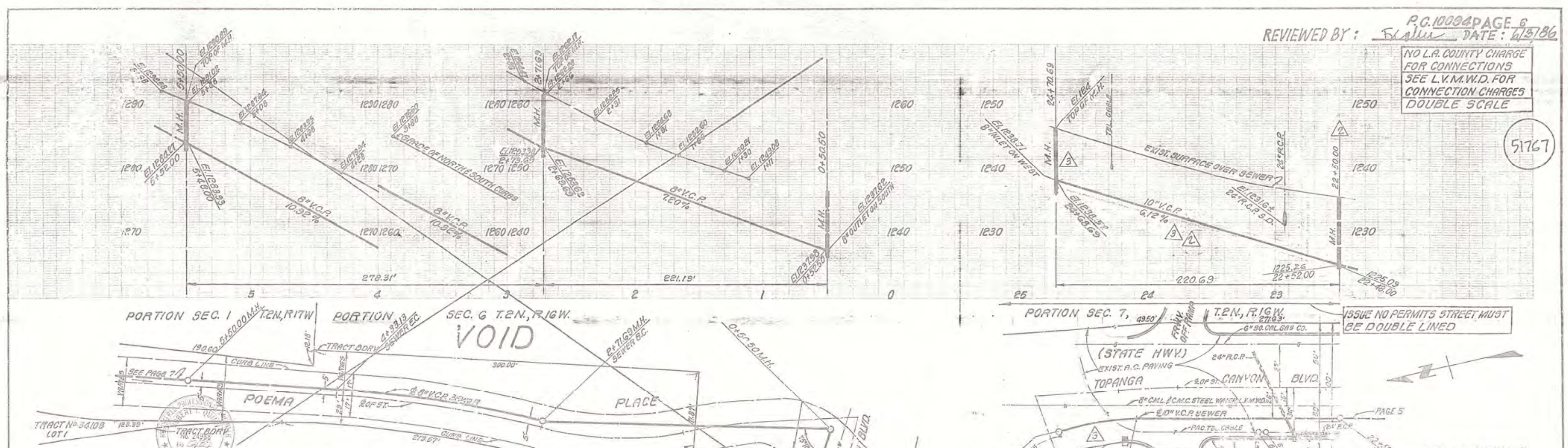
This is to advise you that the above tract sewer service will be served by Las Virgenes Municipal Water District.

This project will be assured of connection to the sewer system of the district only if the proponent satisfies all terms and conditions for service as set forth in the district's Code.

Sincerely,

Joanne Bodenhamer
Planning & New Development Technician


REVIEWED BY:
P.C. 10094 PAGE 5
DATE: 6/3/86
NO L.A. COUNTY CHARGE FOR CONNECTIONS
SEE L.V.M.W.D. FOR CONNECTION CHARGES
DOUBLE SCALE
51767
EXIST. SURFACE OVER SEWER
IDENTICAL
12" V.C.P.
1.09%
10" V.C.P.
4.20%
8" INLET ON WEST
PORTION SEC. 7, T.2N., R.16W.
ISSUE NO PERMITS STREET MUST BE DOUBLE LINED
6" 30. CAL. GAS CO.
EXIST. A.C. PAVEMENT
TOPANGA CANYON (STATE HWY.) BLVD.
TOPANGA (STATE HWY.) CANYON BLVD.
10" V.C.P. SEWER
PACIFIC TEL. CO.
IDENTICAL POINTS
CATCH BASIN
SEWER CURVE DATA
LOT 3
PAGE 4
SIMI VALLEY FREEWAY
FRWY. ON RAMP
FRWY. OFF RAMP
PORTION SEC. 7, T.2N., R.16W


REVIEWED BY:
P.C. 10094 PAGE 6
DATE: 6/3/86
NO L.A. COUNTY CHARGE FOR CONNECTIONS
SEE L.V.M.W.D. FOR CONNECTION CHARGES
DOUBLE SCALE
51767
8" V.C.P.
10.92%
8" V.C.P.
7.20%
10" V.C.P.
6.12%
EXIST. SURFACE OVER SEWER
8" OUTLET ON SOUTH
8" INLET ON WEST
PORTION SEC. 1 T.2N., R.17W.
PORTION SEC. 6 T.2N., R.16W.
VOID
POEMA PLACE
TRACT No. 34108
LOT 1
SEE PAGE 7
TRACT BDRY.
CURB LINE
8" V.C.P. SEWER
SEWER CURVE DATA
TOPANGA CANYON BLVD.
PORTION SEC. 7, T.2N., R.16W.
ISSUE NO PERMITS STREET MUST BE DOUBLE LINED
(STATE HWY.)
EXIST. A.C. PAVING
TOPANGA CANYON BLVD.
8" V.C.P. SEWER
PAGE 5
POEMA PLACE
FRWY. ON RAMP
SIMI VALLEY FREEWAY
SEWER CURVE DATA
Δ = 17°58'12"
R = 200.00'
L = 62.73'
T = 31.62'

NO.	REVISION		APPROVED BY	DATE
1	MOVED M.H.'S FROM 19+27.50 TO 19+09.65 AND FROM 22+75.00 TO 22+50.00 / SEWER GRADE	7-29-86 R.C.E. 24918		
3	REV. ALIGNMENT, GRADE & M.H. LOC.	23-Feb-87 R.C.E. 24989		

APPENDIX G

RECEIVED
DEPT OF REGIONAL PLANNING
TR53138-4 AMENDMENT PG 1
DATE: 22 JUL 2015

LOT AREAS

LOT NO.	●	●●	GROSS AREA (SF)	NET AREA	ZONE A-1 (SF)	ZONE R-1 (SF)
1	50	52	17133	17083	17133	N/A
2	50	53	16865	16815	16865	N/A
3	50	50	15637	15586	15637	N/A
4	88		27236	27148	27236	N/A
5	43	71	27736	27133	27736	N/A
6	31	47	15504	14674	15504	N/A
7	21	21	22820	20475	22820	N/A
8	42	58	6345	6237	6345	N/A
9	71		6240	5699	6240	N/A
10	71		6201	5727	6201	N/A
11	71		6168	5696	6168	N/A
12	62		6136	5680	6136	N/A
13	58	58	6243	5902	6243	N/A
14	50	53	6082	5896	6082	N/A
15	52	56	6879	6753	6879	N/A
16	40		8150	8035	8150	N/A
17	40		15119	14793	15119	N/A
18	50		22422	22422	7779	14643
19	57		16412	16412	N/A	16412
20	55		15037	15037	N/A	15037
21	95		12410	12410	N/A	12410
22	128		18945	18945	1474	17471
23	75		17509	16310	N/A	17509
24	67		15637	14817	N/A	15637
25	62		19328	18478	N/A	19328
26	68		24892	23336	N/A	24892
27	67		27510	26822	N/A	27510
28	56		29820	28402	N/A	29820
29	50		15409	15409	N/A	15409
30	50		17352	17352	N/A	17352
31	51		11790	11790	N/A	11790
32	50		34898	34898	2138	32760
33	52		16670	16670	173	16497
34	58		18483	18483	N/A	18483
35	54		19387	19387	N/A	19387
36	54		17707	17707	N/A	17707
37	54		15713	15713	N/A	15713
38	60		12316	12316	N/A	12316
39	188		18004	18004	N/A	18004
40	72		11757	11680	N/A	11757
41	70		11060	10990	N/A	11060
42	70		10451	10382	N/A	10451
43	70		9991	9922	N/A	9991
44	70		9704	9634	N/A	9704
45	68		9606	9537	N/A	9606
46	60		9837	9777	N/A	9837
47	55		13014	12959	N/A	13014
48	41	56	16762	16721	N/A	16762
49	30	47	17029	16999	N/A	17029
50	10	10	29882	28470	N/A	29882
51	36	51	14177	13212	N/A	14177
52	28	55	15161	14669	N/A	15161
53	10	10	15367	13908	N/A	15367
54	10	10	27931	26225	N/A	27931
55	74		11521	11447	N/A	11521
56	194		18229	18035	N/A	18229
57	114		15460	12205	N/A	15460
58	74		17755	16843	N/A	17755
59	162		28459	26217	N/A	28459
60	102		20491	20293	N/A	20491
61	59		10347	10223	N/A	10347
62	59		10227	10104	N/A	10227
63	58		11468	11333	N/A	11468
64	60		6030	5970	N/A	6030
65	61		6437	6376	N/A	6437
66	46	59	6142	6095	N/A	6142
67	30	40	13681	13651	N/A	13681
68	31	50	15092	14577	N/A	15092
69	58		34251	33875	N/A	34251
70	97		15689	15592	N/A	15689
71	60		8820	8760	N/A	8820
72	56		9989	9909	N/A	9989
73	56		10588	10507	N/A	10588
74	56		10967	10885	N/A	10967
75	56		6822	6822	N/A	6822

LOT NO.	●	●●	GROSS AREA (SF)	NET AREA	ZONE A-1 (SF)	ZONE R-1 (SF)
76	56		6640	6640	N/A	6640
77	56		7170	7170	N/A	7170
78	59		19856	19255	N/A	19856
79	60		17272	16772	N/A	17272
80	60		16213	15713	N/A	16213
81	60		15115	14609	N/A	15115
82	71		12837	12470	N/A	12837
83	78		10782	10566	N/A	10782
84	124		15059	13338	N/A	15059
85	163		14837	14837	N/A	14837
86	57		7482	7482	N/A	7482
87	55		8082	8082	N/A	8082
88	90		11332	11332	N/A	11332
89	85		10072	10072	N/A	10072
90	59		8493	8493	N/A	8493
91	56		8916	8916	N/A	8916
92	54		15110	15110	N/A	15110
93	54		20136	20136	6748	13388
94	56		15141	15141	6083	9058
95	56		15356	15356	8930	6426
96	54		15177	15177	11159	4018
97	54		15085	15085	13293	1792
98	49	51	15005	15005	14810	195
99	49	50	15126	15126	15126	N/A
100	49	51	9048	9048	9048	N/A
101	50		9761	9761	8551	1210
102	50		7291	7291	725	6566
103	65		6974	6876	N/A	6974
104	84		13992	12062	N/A	13992
105	66		8826	8517	N/A	8826
106	63		8592	8232	N/A	8592
107	50		8100	7634	N/A	8100
108	50		7565	7111	N/A	7565
109	50		7380	6930	N/A	7380
110	50		7533	7080	N/A	7533
111	50		7907	7452	N/A	7907
112	50		8300	7845	N/A	8300
113	50		8693	8238	N/A	8693
114	50		9086	8631	N/A	9086
115	50		9478	9024	N/A	9478
116	50		9746	9295	N/A	9746
117	50		9632	9178	N/A	9632
118	139		29635	29137	N/A	29635
119	40		22123	22048	N/A	22123
120	51		6865	6814	N/A	6865
121	50		6810	6760	N/A	6810
122	50		6783	6733	N/A	6783
123	50		6757	6707	N/A	6757
124	50		6731	6681	N/A	6731
125	50		6704	6654	N/A	6704
126	50		6678	6628	N/A	6678
127	50		6652	6602	N/A	6652
128	50		6626	6576	N/A	6626
129	50		6599	6549	N/A	6599
130	50		6573	6523	N/A	6573
131	50		6547	6497	N/A	6547
132	50		6521	6471	N/A	6521
133	50		6518	6468	N/A	6518
134	52		10008	9815	N/A	10008
135	73		9801	9603	N/A	9801
136	52		6760	6708	N/A	6760
137	52		6760	6708	N/A	6760
138	52		6760	6708	N/A	6760
139	52		6760	6708	N/A	6760
140	50		6500	6450	N/A	6500
141	50		6500	6450	N/A	6500
142	50		6500	6450	N/A	6500
143	50		6500	6450	N/A	6500
144	50		6500	6450	N/A	6500
145	50		6500	6450	N/A	6500
146	50		6500	6450	N/A	6500
147	50		6500	6450	N/A	6500
148	50		6500	6450	N/A	6500
149	74		26125	26050	N/A	26125
150	62		21808	21746	N/A	21808

LOT NO.	●	●●	GROSS AREA (SF)	NET AREA	ZONE A-1 (SF)	ZONE R-1 (SF)
151	57		6164	6106	N/A	6164
152	50		6275	6225	N/A	6275
153	50		6244	6194	N/A	6244
154	50		6239	6189	N/A	6239
155	50		6233	6183	N/A	6233
156	50		6227	6177	N/A	6227
157	50		6221	6171	N/A	6221
158	50		6216	6166	N/A	6216
159	50		6210	6160	N/A	6210
160	50		6204	6154	N/A	6204
161	50		6199	6149	N/A	6199
162	50		6193	6143	N/A	6193
163	50		6187	6137	N/A	6187
164	72		8179	7927	N/A	8179
165	50		13774	13571	N/A	13774
166	52		6860	6808	N/A	6860
167	50		6376	6326	N/A	6376
168	50		6251	6201	N/A	6251
169	50		6250	6200	N/A	6250
170	50		6250	6200	N/A	6250
171	50		6250	6200	N/A	6250
172	50		6250	6200	N/A	6250
173	50		6250	6200	N/A	6250
174	40		6562	6428	N/A	6562
175	40		23175	23134	N/A	23175
176	89		12271	12181	N/A	12271
177	73		6656	6583	N/A	6656
178	50		6017	5967	N/A	6017
179	50		6032	5982	N/A	6032
180	50		6047	5997	N/A	6047
181	61		6384	6322	N/A	6384
182	60		6339	6280	N/A	6339
183	54		7850	7676	N/A	7850
184	71		8736	8633	N/A	8736
185	73		8996	8996	N/A	8996
186	74		9523	9523	N/A	9523
187	73		8897	8897	N/A	8897
188	201		16252	16252	N/A	16252
189	274		39290	34627	N/A	39290
190	61		16344	15592	N/A	16344
191	62		20796	17348	N/A	20796
192	57		18621	17536	N/A	18621
193	57		19052	18028	N/A	19052
194	86		24760	22807	N/A	24760
195	58		28403	25046	N/A	28403
196	61		22223	19894	N/A	22223
197	61		22354	19879	N/A	22354
198	66		36360	31356	N/A	36360
199	58		21934	21108	N/A	21934
200	58		54248	43746	N/A	54248
201	58		29563	28678	N/A	29563
202	58		8845	7991	N/A	8845
203	60		7659	7062	N/A	7659
204	61		33176	32279	N/A	33176
205	130		22370	19808	N/A	22370
206	53		15070	15013	N/A	15070
207	73		13786	13713	N/A	13786
208	85		11892	11807	N/A	11892
209	92		15612	15520	N/A	15612
210	90		16353	16263	N/A	16353
211	56		12259	12203	N/A	12259
212	56		13952	13896	N/A	13952
213	55		15446	15391	N/A	15446
214	56		15029	14973	N/A	15029
215	61		12786	12725	N/A	12786
216	57		15037	14980	N/A	15037
217	54		18031	17977	N/A	18031
218	61		10740	10679	N/A	10740
219	52		10477	10356	N/A	10477
220	88		16084	15996	N/A	16084
221	88		15502	15414	N/A	15502
222	121		16017	15896	N/A	16017
223	81		18662	18582	N/A	18662
224	77		18565	18488	N/A	18565
225	78		16752	16674	N/A	16752

LOT NO.	●	●●	GROSS AREA (SF)	NET AREA	ZONE A-1 (SF)	ZONE R-1 (SF)
226	80		15522	15442	N/A	15522
227	77		17695	17618	N/A	17695
228	77		19482	19405	N/A	19482
229	80		20036	19955	N/A	20036
230	109		22363	22254	N/A	22363
231	81		19871	19523	N/A	19871
232	160		14347	14187	N/A	14347
233	84		16407	16117	N/A	16407
234	91		15381	15290	N/A	15381
235	99		15574	15476	N/A	15574
236	79		15314	15235	N/A	15314
237	74		16658	16584	N/A	16658
238	72		15096	15024	N/A	15096
239	116		15108	14992	N/A	15108
240	99		15272	15173	N/A	15272
241	90		15003	14913	N/A	15003
242	95		15004	14909	N/A	15004
243	201		15015	14814	N/A	15015
244	97		15016	14919	N/A	15016
245	84		16187	16102	N/A	16187
246	80		15447	15367	N/A	15447
247	81		15308	15227	N/A	15308
248	85		17971	17886	N/A	17971
249	94		15920	15826	N/A	15920
250	91		15125	15034	N/A	15125
251	112		16282	16170	N/A	16282
252	137		23574	23291	N/A	23574
253	134		15906	15772	N/A	15906
254	92		15512	15419	N/A	15512
255	79		18543	18463	N/A	18543
256	168		16249	16082	N/A	16249
257	95		15739	15644	N/A	15739
258	84		15011	14927	N/A	15011
259	85		16382	16298	N/A	16382
260	140		18581	18441	N/A	18581
261	149		22290	22141	N/A	22290
262	108		20428	20153	N/A	20428
263	137		23096	22959	N/A	23096
264	99		17761	17662	N/A	17761
265	91		18991	18900	N/A	18991
266	80		16521	16441	N/A	16521
267	169		27793	24064	N/A	27793
268	89		19797	19707	N/A	19797
269	89		20737	20649	N/A	20737
270	87		32829	32743	N/A	32829
271	87		36527	36440	N/A	36527
272	40	71	96424	96384	N/A	96424
273	43	75	34301	34257	N/A	34301
274	96		16506	16410	N/A	16506
275	105		17173	17068	N/A	17173
276	209		23899	23690	N/A	23899
277	191		34019	29682	N/A	34019
278	132		30689	28236	N/A	30689
279	84		22496	22412	N/A	22496
280	80		25860	22709	N/A	25860
281	80		22796	21558	N/A	22796
282	92		20447	19307	N/A	20447
283	84		29822	25506	N/A	29822
284	95		23614	22370	N/A	23614
285	85		25501	23758	N/A	25501
286	78		23560	22134	N/A	23560
287	80		19552	18531	N/A	19552
288	76		20535	19687	N/A	20535
289	78		18789	14344	N/A	18789
290	59		15277	14464	N/A	15277
291	58		15266	14302	N/A	15266
292	57		15356	14354	N/A	15356
293	60		12453	11726	N/A	12453
294	63		13136	12370	N/A	13136
295	55		14209	13355	N/A	14209
296	109		8749	8749	N/A	8749
297	61		7111	7111	N/A	7111
298	61		6769	6769	N/A	6769
299	61		6426	6426	N/A	6426
300	76		6949	6949	N/A	6949

LOT NO.	●	●●	GROSS AREA (SF)	NET AREA	ZONE A-1 (SF)	ZONE R-1 (SF)
301	97		7473	7473	N/A	7473
302	87		7499	7499	N/A	7499
303	87		7524	7524	N/A	7524
304	87		7472	7472	N/A	7472
305	71		7651	7651	N/A	7651
306	76		8367	8367	N/A	8367
307	81		8458	8458	N/A	8458
308	81		7968	7968	N/A	7968
309	108		12412	12302	N/A	12412
310	102		10035	9933	N/A	10035
311	68		11187	11119	N/A	11187
312	71		19869	19798	N/A	19869
313	49	81	23966	23916	N/A	23966
314	42	49	19526	19480	N/A	19526
R4			10489	10489	N/A	10489
TOTAL ACRES			104.924	101.863		

OPEN SPACE LOTS					
LOT NO.		AREA (SF)	AREA (ACRE)	ZONE A-1	ZONE R-1
315	PARK	29549	0.678	29549	N/A
316	SHERIFF STATION	19236	0.442	19236	N/A
317		240696	5.526	240696	N/A
318		593313	13.621	593313	N/A
319		120255	2.761	120255	N/A
320		85084	1.953	85084	N/A
321		26453	0.607	26453	N/A
322		117412	2.695	3982	113430
323		41829	0.960	N/A	41829
324		117732	2.703	52982	64750
325		41548	0.954	41548	N/A
326		167642	3.849	120967	46675
327		36521	0.838	N/A	36521
328		85649	1.966	4388	81261
329		10794	0.248	N/A	10794
330		22612	0.519	22337	275
331		20250	0.465	20178	71
332		127353	2.924	85474	41879
333		163553	3.755	N/A	163553
334		122314	2.808	N/A	122314
335		342753	7.869	N/A	342753
336	HORSE REST AREA	172416	3.958	N/A	172416
337	DEBRIS BASIN	27838	0.639	N/A	27838
338		11692	0.268	N/A	11692
339		226520	5.200	N/A	226520
340		100460	2.306	N/A	100460
341	HELISPOT	44171	1.014	N/A	44171
342		51240	1.176	51240	N/A
343		19821	0.455	19821	N/A
344	RECREATION CENTER	85287	1.958	N/A	85287
345		329157	7.556	329157	N/A
TOTAL ACRES			82.671		

PRIVATE DRIVEWAY & FIRE LANE LOTS			
LOT NO.	AREA (SF)	ZONE A-1	ZONE R-1
346	12384	12384	N/A
347	66722	66722	N/A
348	3242	3242	N/A
349	28654	28654	N/A
350	80246	N/A	80246
351	112481	N/A	112481
352	38603	N/A	38603
353	53955	N/A	53955
354	51135	N/A	51135
355	26961	N/A	26961
356	20552	N/A	20552
357	52341	N/A	52341
358	39664	N/A	39664
359	33767	N/A	33767
360	21307	N/A	21307
361	39383	N/A	39383
362	15570	N/A	15570
363	109607	N/A	109607
364	31282	N/A	31282
365	16730	N/A	16730
366	64337	N/A	64337
367	11991	N/A	11991
368	10372	N/A	10372
TOTAL ACRES	21.609		

NOTE: ● LOT WIDTH AT STREET R/W (FEET) ●● LOT WIDTH AT BUILDING SETBACK (FEET)

EASEMENT NOTES:

EASEMENTS ARE BASED UPON TITLE REPORT NO. NHSC-4770098, DATED 11-6-2014 AND PREPARED BY FIRST AMERICAN TITLE COMPANY CORONA, CA

**⑤ NATURE OF INTEREST: AN EASEMENT FOR DITCHES AND CANALS
NAME OF PARTY: THE UNITED STATES OF AMERICA
BY DOCUMENT RECORDED: JUNE 6, 1917 AS BOOK 13, PAGE 302 OF PATENTS.

**⑥ NATURE OF INTEREST: AN EASEMENT FOR THE RIGHT TO STORE WATER, THE RIGHT TO BUILD A BY-PASS OR DITCH AND FOR PUBLIC HIGHWAY
NAME OF PARTY: N. A. GRAY AND MINNIE A. GRAY
BY DOCUMENT RECORDED: OCTOBER 30, 1919 AS INSTRUMENT NO. 106 IN BOOK 6967, PAGE 279 OF DEEDS.

**⑦ NATURE OF INTEREST: AN EASEMENT FOR INGRESS, EGRESS AND UTILITIES
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: JUNE 18, 1927 AS BOOK 7001, PAGE 258 OF OFFICIAL RECORDS.

**⑧ NATURE OF INTEREST: AN EASEMENT FOR HIGHWAYS, ROADS AND PUBLIC UTILITIES
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: DECEMBER 30, 1929 AS BOOK 9666, PAGE 58 OF OFFICIAL RECORDS.

⑨ NATURE OF INTEREST: AN EASEMENT FOR WATER TANKS AND PIPELINES
NAME OF PARTY: COUNTY OF LOS ANGELES
BY DOCUMENT RECORDED: AUGUST 31, 1934 AS BOOK 12982, PAGE 117 OF OFFICIAL RECORDS.

⑩ NATURE OF INTEREST: AN EASEMENT FOR HIGHWAYS, ROADS AND PUBLIC UTILITIES
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: FEBRUARY 13, 1946 AS BOOK 22756, PAGE 378 OF OFFICIAL RECORDS.

⑪ NATURE OF INTEREST: AN EASEMENT FOR POLELINES
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: MARCH 18, 1947 AS BOOK 24324, PAGE 347 OF OFFICIAL RECORDS.

*⑫ NATURE OF INTEREST: AN EASEMENT FOR INGRESS AND EGRESS
NAME OF PARTY: MOUNTAINS RECREATION AND CONSERVATION AUTHORITY, A LOCAL PUBLIC AGENCY
BY DOCUMENT RECORDED: MAY 23, 1950 AS BOOK 33203, PAGE 137 OF OFFICIAL RECORDS.

⑬ NATURE OF INTEREST: AN EASEMENT FOR THE TRANSPORTATION OF WATER
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: SEPTEMBER 25, 1950 AS BOOK 34389, PAGE 21 OF OFFICIAL RECORDS.

**⑭ NATURE OF INTEREST: AN EASEMENT FOR THE TRANSPORTATION OF WATER
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: SEPTEMBER 25, 1950 AS BOOK 34389, PAGE 22 OF OFFICIAL RECORDS.

⑮ NATURE OF INTEREST: AN EASEMENT FOR PIPELINES
NAME OF PARTY: TWIN LAKES PARK COMPANY
BY DOCUMENT RECORDED: SEPTEMBER 25, 1950 AS BOOK 34389, PAGE 24 OF OFFICIAL RECORDS.

⑯ NATURE OF INTEREST: AN EASEMENT FOR POLELINES
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: SEPTEMBER 8, 1952 AS BOOK 39790, PAGE 334 OF OFFICIAL RECORDS.

*⑰ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: CITY OF LOS ANGELES DEPARTMENT OF WATER AND POWER
BY DOCUMENT RECORDED: JUNE 14, 1956 AS BOOK 51454, PAGE 158 OF OFFICIAL RECORDS.

⑱ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: AUGUST 1, 1956 AS BOOK 51907, PAGE 152 OF OFFICIAL RECORDS.

⑲ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: MARCH 14, 1960 AS BOOK D780, PAGE 214 OF OFFICIAL RECORDS.

⑳ NATURE OF INTEREST: AN EASEMENT FOR UNDERGROUND WIRES AND CONDUCTORS
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: FEBRUARY 20, 1967 AS INSTRUMENT NO. 2796 OF OFFICIAL RECORDS.

㉑ NATURE OF INTEREST: AN EASEMENT FOR UNDERGROUND WIRES AND CONDUCTORS
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: FEBRUARY 20, 1967 AS INSTRUMENT NO. 2797 OF OFFICIAL RECORDS.

㉒ NATURE OF INTEREST: AN EASEMENT FOR UNDERGROUND WIRES AND CONDUCTORS
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: JULY 7, 1967 AS INSTRUMENT NO. 3491 OF OFFICIAL RECORDS.

**㉓ NATURE OF INTEREST: AN EASEMENT FOR PUBLIC UTILITIES
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: APRIL 5, 1968 AS INSTRUMENT NO. 3867 OF OFFICIAL RECORDS.

㉔ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: APRIL 11, 1968 AS INSTRUMENT NO. 3195 OF OFFICIAL RECORDS.

㉕ NATURE OF INTEREST: AN EASEMENT FOR UNDERGROUND WIRES AND CONDUCTORS
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: AUGUST 2, 1968 AS INSTRUMENT NO. 2680 OF OFFICIAL RECORDS.

㉖ NATURE OF INTEREST: AN EASEMENT FOR PIPELINES AND LANDSCAPING
NAME OF PARTY: LAS VIRGENES WATER COMPANY
BY DOCUMENT RECORDED: AUGUST 20, 1968 AS INSTRUMENT NO. 2305 OF OFFICIAL RECORDS.

㉗ NATURE OF INTEREST: AN EASEMENT FOR POLELINES
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: OCTOBER 24, 1968 AS INSTRUMENT NO. 3139 OF OFFICIAL RECORDS.

**㉘ NATURE OF INTEREST: AN EASEMENT FOR INGRESS AND EGRESS
NAME OF PARTY: ROLLS ROYCE CONSTRUCTION COMPANY
BY DOCUMENT RECORDED: JANUARY 2, 1980 AS INSTRUMENT NO. 80-1075 OF OFFICIAL RECORDS.

㉙ NATURE OF INTEREST: AN EASEMENT FOR ROAD
NAME OF PARTY: ROLLS ROYCE CONSTRUCTION COMPANY
BY DOCUMENT RECORDED: JANUARY 3, 1980 AS INSTRUMENT NO. 80-6388 OF OFFICIAL RECORDS.

㉚ NATURE OF INTEREST: AN EASEMENT FOR UNDERGROUND WIRES AND CONDUCTORS
NAME OF PARTY: THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
BY DOCUMENT RECORDED: MAY 1, 1981 AS INSTRUMENT NO. 81-436645 OF OFFICIAL RECORDS.

㉛ NATURE OF INTEREST: AN EASEMENT FOR SURFACE ENTRY RIGHTS TO MINE, DIG AND BORE FOR WATER, OIL AND MINERALS
NAME OF PARTY: W. E. LAWRENCE
BY DOCUMENT RECORDED: AUGUST 1, 1989 AS INSTRUMENT NO. 89-1232366 OF OFFICIAL RECORDS.

㉜ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: NOVEMBER 2, 1993 AS INSTRUMENT NO. 93-2135209 OF OFFICIAL RECORDS.

㉝ NATURE OF INTEREST: AN EASEMENT FOR POLELINES AND CONDUITS
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: NOVEMBER 2, 1993 AS INSTRUMENT NO. 93-2135211 OF OFFICIAL RECORDS.

㉞ NATURE OF INTEREST: AN EASEMENT FOR DRIVEWAY, INGRESS, EGRESS AND UTILITIES
NAME OF PARTY: MARY LIMA, TRUSTEE, ET.AL.
BY DOCUMENT RECORDED: OCTOBER 30, 1997 AS INSTRUMENT NO. 97-1721511 AS AMENDED BY
DOCUMENT RECORDED MAY 26, 2004 AS INSTRUMENT NO. 04-1344880, BOTH OF OFFICIAL RECORDS.

**㉟ NATURE OF INTEREST: AN EASEMENT FOR CONSERVATION PURPOSES
NAME OF PARTY: THE MOUNTAINS RECREATION AND CONSERVATION AUTHORITY
BY DOCUMENT RECORDED: DECEMBER 31, 1997 AS INSTRUMENT NO. 97-2043879 OF OFFICIAL RECORDS.

**㊱ NATURE OF INTEREST: AN EASEMENT FOR ROAD, FUEL MODIFICATION AND UTILITIES
NAME OF PARTY: HARRY HORNER AND SABINE HORNER
BY DOCUMENT RECORDED: DECEMBER 31, 1997 AS INSTRUMENT NO. 97-2043880 OF OFFICIAL RECORDS.

㊲ NATURE OF INTEREST: AN EASEMENT FOR VEHICULAR AND PEDESTRIAN INGRESS AND EGRESS
NAME OF PARTY: ALL THE RECORD OWNERS OF PARCELS SHOWN ON MAPS FILED IN BOOK 22, PAGE 3; BOOK 24, PAGE 15 AND 16; BOOK 25, PAGES 37, 38 AND 39; AND IN BOOK 28, PAGE 39, ALL OF RECORDS OF SURVEY
BY DOCUMENT RECORDED: JULY 6, 2000 AS INSTRUMENT NO. 00-1026656 OF OFFICIAL RECORDS.

**㊳ NATURE OF INTEREST: AN EASEMENT FOR INGRESS, EGRESS AND UTILITIES
NAME OF PARTY: WEST COAST FINANCIAL SERVICES, INC., A NEVADA CORPORATION AND YVONNE PECORA, AN INDIVIDUAL
BY DOCUMENT RECORDED: SEPTEMBER 10, 2004 AS INSTRUMENT NO. 20042329031 OF OFFICIAL RECORDS.

**㊴ NATURE OF INTEREST: AN EASEMENT FOR ACCESS AND UTILITIES
NAME OF PARTY: LINDA CORBRIDGE
BY DOCUMENT RECORDED: MARCH 23, 2005 AS INSTRUMENT NO. 05-661338 OF OFFICIAL RECORDS.

**㊵ NATURE OF INTEREST: AN EASEMENT FOR ELECTRICAL DISTRIBUTION AND COMMUNICATION FACILITIES
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: AUGUST 10, 2006 AS INSTRUMENT NO. 06-1780766 OF OFFICIAL RECORDS.

**㊶ NATURE OF INTEREST: AN EASEMENT FOR ELECTRICAL DISTRIBUTION AND COMMUNICATION FACILITIES
NAME OF PARTY: SOUTHERN CALIFORNIA EDISON COMPANY
BY DOCUMENT RECORDED: JUNE 27, 2007 AS INSTRUMENT NO. 20071543837 OF OFFICIAL RECORDS.

**㊷ NATURE OF INTEREST: AN EASEMENT FOR SANITARY SEWER
NAME OF PARTY: COUNTY OF LOS ANGELES
BY DOCUMENT RECORDED: DECEMBER 14, 2009 AS INSTRUMENT NO. 20091897245 OF OFFICIAL RECORDS.

**㊸ NATURE OF INTEREST: AN EASEMENT FOR SANITARY SEWER
NAME OF PARTY: COUNTY OF LOS ANGELES
BY DOCUMENT RECORDED: DECEMBER 14, 2009 AS INSTRUMENT NO. 20091897248 OF OFFICIAL RECORDS.

**㊹ NATURE OF INTEREST: AN EASEMENT FOR PUBLIC HIGHWAY
NAME OF PARTY: STATE OF CALIFORNIA
BY DOCUMENT RECORDED: MARCH 23, 2011 AS INSTRUMENT NO. 20110433225 OF OFFICIAL RECORDS.

(*) DENOTES EASEMENT IS BLANKET IN NATURE
(**) DENOTES EASEMENT IS NOT PLOTTABLE

NOT A PART (N A P) POTENTIAL DEVELOPMENT DATA TABLE

N.A.P. #	LOT	RECORD OF SURVEY	OWNER	AREA (S.F.)	POTENTIAL FUTURE LOTS
1	1725	24-15	CHATSWORTH HABITAT LAND, LLC	2700	1
~~2~~	~~1299~~	~~22-3~~	~~CHATSWORTH HABITAT LAND, LLC~~	~~2250~~	~~1~~
~~3~~	~~476~~	~~22-3~~	~~CHATSWORTH HABITAT LAND, LLC~~	~~2000~~	~~1~~
4	996	22-3	CHATSWORTH HABITAT LAND, LLC	2100	1
5	399	25-37 , 38	SANDOVAL	3775	1
6	303 , 304 , 333 , 334 338 , 339 , 340 , 341 342 , 343 & 398	25-37 , 38	WATTERS	30218	3
7	306 , 308 , 320 , 321 322 & 323	25-37 , 38	CHATSWORTH HABITAT LAND, LLC	16081	2
8	1221	22-3	SANDIFUR	2212	1
9	813	22-3	DELPASAND	2800	1
10	2051	22-3	CHATSWORTH HABITAT LAND, LLC	4250	1
11	2098	22-3	SANTA MONICA MOUNTAINS/CONSERVANCY	3300	1
TOTAL	21				12

LOT LINE ADJUSTMENT WITH ADJACENT OPEN SPACE LOT ALLOWED FOR FUTURE POTENTIAL LOTS

GENERAL NOTES

1. SEWER DISPOSAL TO BE BY SANITARY SEWER.
2. WATER PURVEYOR IS LAS VIRGENES MUNICIPAL WATER DISTRICT.
3. REQUEST PERMISSION TO HAVE 2 GATES ON THE PRIVATE DRIVEWAYS AND FIRELANES AS SHOWN ON SHEET 2 AND PER DETAIL HEREON, TO THE SATISFACTION OF D.P.W.
4. ALL SLOPES ARE PLOTTED AT 2:1 RATIO, EXCEPT AS SHOWN.
5. REQUEST PERMISSION TO CREATE MORE OPEN SPACE LOTS ON THE FINAL MAP, TO THE SATISFACTION OF D.R.P.
6. REQUEST PERMISSION TO FILE MAP IN PHASES AND TO ADJUST LOT LINES ON THE FINAL MAP, TO THE SATISFACTION OF D.R.P.
7. A HOMEOWNERS ASSOCIATION OR LANDSCAPE MAINTENANCE DISTRICT WILL BE FORMED TO MAINTAIN THE OPEN SPACE/SLOPE LOTS AND THE PRIVATE DRIVEWAYS AND FIRELANES.
8. NO PUBLIC STREETS EXCEED 10% GRADE.
9. REQUEST PERMISSION TO USE ALTERNATE STREET SECTIONS AND TO REDUCE PKWY WIDTH FOR SINGLE LOADED STREETS, TO THE SATISFACTION OF D.P.W.
10. REQUEST PERMISSION TO MODIFY LOT DIMENSIONS AT STREET FRONTAGE FOR LOTS 1-3, 6, 7, 13-15, 49, 51, 52, 67-68, AND 98-100. AS SHOWN ON LOT AREA TABLE HEREON TO THE SATISFACTION OF D.R.P. (EXCEPT FOR FLAG LOTS 50, 53 AND 54)
11. REQUEST PERMISSION TO WAIVE STREET FRONTAGE REQUIREMENTS AND USE PRIVATE DRIVEWAYS AND FIRE LANES.
12. 8' AND 12' WIDE TRAIL EASEMENTS TO BE DEDICATED TO THE COUNTY OF LOS ANGELES.
13. REQUEST PERMISSION TO RECORD TRACT NO. 53138-01 AS A LARGE LOT SUBDIVISION (20+ ACRES).
14. GRADE ELEVATIONS SHOWN ON THE VTTM AND THE EXHIBIT MAP ARE APPROXIMATE. THE ELEVATIONS DEPICTED ON THE TENTATIVE MAP AND EXHIBIT MAP WHICH WILL NOT SUBSTANTIALLY ALTER THE APPROVED GRADING PLAN OR RESULT IN PAD ELEVATION CHANGES OF MORE THAN 10 FEET ARE PERMITTED TO THE SATISFACTION OF THE DPW AND DRP.
15. LOT LINES CAN BE ADJUSTED TO THE SATISFACTION OF DRP PROVIDED NO ADDITIONAL DEVELOPMENT LOTS ARE CREATED. THE DEGREE OF ADJUSTMENT SHALL BE CONSISTENT WITH THE INTENT OF THE SUBDIVISION MAP ACT.
16. ALL WALLS AND FENCES HAVE BEEN PREVIOUSLY APPROVED WITH AMENDEMENT #2.

PROJECT DATA

1. EXISTING AND PROPOSED GENERAL PLAN
   (1) NON-URBAN HILLSIDE DEVELOPMENT (NU)
   (2) RURAL COMMUNITY (RC)
2. EXISTING AND PROPOSED ZONING
   (1) A-1-1 63.5ac.
   (2) R-1-6000 168.55ac.
3. NUMBER OF LOTS
   a. RESIDENTIAL LOTS (1-314)
   b. OPEN SPACE/SLOPE LOTS (315, 317-345)
   c. FUTURE L.A. COUNTY SHERIFF FACILITY (316)
   d. PRIVATE DWY & FIRELANE LOTS (346-354)
   TOTAL 354 LOTS
4. REMAINDER PARCEL PER SECTION 66424.6 (4)
5. GROSS AREA INCLUDING APN 2818-24-900 & APN 2818-22-902
   232.19 ACRES

GRADING QUANTITY

CUT - 1,874,600 CY
FILL - 1,874,600 CY
OVER EX - 150,000 CY
BALANCED ON SITE

NOTE: OVER-EX WILL BE REMOVED AND RECOMPACTED ON-SITE

TOPANGA BLVD.
NOT TO SCALE

STREET SECTION
POEMA PL. BETWEEN CANOGA AVE. & W'LY END OF POEMA PL. BRIDGE;
CANOGA AVE. N/O POEMA PL.; BULLFINCH RD. BETWEEN POEMA PL. & SULLIVAN WAY

VICINITY MAP
NOT TO SCALE

CANOGA AVENUE
UNDER 118 FREEWAY
NOT TO SCALE

STREET SECTION
CANOGA AVE. S/O POEMA PL.; NOGAN DR.

***20' OFFER TO DEDICATE FOR FUTURE STREET

MAYAN DR. / AUCAS DR.
SECTION 1-1

PRIVATE DRIVEWAY AND FIRE LANE
STREET SECTION

CANOGA AVE.
SECTION 2-2

PRIVATE DRIVEWAY AND FIRE LANE
STREET SECTION
SWANSON WAY, NEUTRA WAY
SW 4' PRIVATE SIDEWALK ALONG LOT FRONTAGES TO BE MAINTAINED BY HOA

STREET SECTION
BULLFINCH RD. BETWEEN SCHINDLER WAY & SULLIVAN WAY

POEMA PLACE BRIDGE TYPICAL SECTION
N.T.S.

CANOGA AVENUE BRIDGE TYPICAL SECTION
N.T.S.

BULLFINCH GATE
SCALE: 1"=60'

DETAIL "A"
N.T.S.

SWITCH BACK DETAIL
N.T.S.

CANOGA GATE
SCALE: 1"=60'

DETAIL "B"
N.T.S.

POEMA PLACE BRIDGE
N.T.S.

DETAIL "C"
N.T.S.

CANOGA AVENUE BRIDGE
N.T.S.

DETAIL "D"
N.T.S.

DETAIL "E"
N.T.S.

DETAIL "F"
TYPICAL INTERIOR TRAIL
N.T.S.

** DIRT OR DECOMPOSED GRANITE AND SOIL CEMENT MIX STABILIZATION

HORSE TRAIL / ACCESS DETAILS
DESIGN CRITERIA 300' @ 15% MAX FOLLOWED BY 100' @ 10% MAX

TRAIL NOTE:
TRAILS SHOWN HEREON AND WITHIN GRADING LIMITS WILL BE DESIGNED TO LACDPW REQUIREMENTS AND WILL BE PLAN CHECKED BY LACDPW.
TRAILS OUTSIDE OF GRADING LIMITS WILL BE DESIGNED PER PARK AND RECREATIONAL DEPARTMENT AND NOT CHECKED BY LACDPW

● **Residential Fire Hydrants**
Install **35** public fire hydrants
Required fire flow **1250gpm @20psi for 2hrs** duration

● **Commercial Fire Hydrant**
Install **2** public fire hydrants
Required fire flow **1500gpm @20psi for 2hrs** duration

Juan Padilla
05/03/16

LEGEND

SDL- LINE OF SIGHT
Ⓐ-Street easements per R.S. 24-17 & R.S. 24-14
Ⓟ-PRIVATE DRWY & FIRELANE
⊛ PORTION OF EXIST PVT. ROAD OR DRWY TO BE RELOCATED AND JOIN EXIST.
Ⓔ-PROPOSED INGRESS AND EGRESS ACCESS EASEMENT FOR N.A.P. AND ADJACENT PROPERTY OWNERS TO BE RESERVED IN SEPARATE DOCUMENTS.
(12'T)-PROPOSED TRAIL EASEMENT TO COUNTY OF L.A.
(FC) -PROPOSED FEE LOT TO L.A.C.F.C.D. FOR STORM DRAIN PURPOSES.
(FD) -PROPOSED 20' EASEMENT TO L.A.CO. FIRE DEPT. FOR INGRESS & EGRESS PURPOSES
(8'T)-PROPOSED 8' TRAIL EASEMENT TO THE COUNTY OF L.A.
RW -RETAINING WALL
RUA -RESTRICTED USE AREA
NAP -NOT A PART OF THIS SUBDIVISION
Ⓡ-REMAINDER PARCEL PER SECTION 66424.6

BENCH MARK: USGS C1452
24.9m (81.7ft) NORTH OF THE CENTER OF THE WESTBOUND LANES OF FREEWAY 118, 17.5m (57.4ft) NORTH OF THE NORTHWEST CORNER OF THE WESTBOUND FREEWAY OVERPASS OF THE HIGHWAY 7.3m (24.0ft) SOUTH OF THE CENTERLINE OF THE WESTBOUND FREEWAY ON-RAMP, 0.8M (2.6ft) ABOVE THE LEVEL OF THE RAMP AND 0.3m (1.0ft) WEST OF A WITNESS POST.
ELEV. 1247.92 1995 ADJ

LEGAL DESCRIPTION:
BEING A SUBDIVISION OF PORTIONS OF SECTIONS 6 AND 7, TOWNSHIP 2 NORTH, RANGE 16 WEST, S.B.M. IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

CUP MODIFICATION 201100160
OAK TREE PERMIT 201200001
CASE No. 99-239

SIEW HUAT NG
NO.46026
EXP.12-31-16

OWNER/SUBDIVIDER:
FORESTAR CHATSWORTH, LLC
4590 MACARTHUR BLVD.
SUITE 600
NEWPORT BEACH, CA 92660
PH: (949) 748-6714

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

MAJOR LAND DIVISION
AMENDED VESTING TENTATIVE TRACT NO. 53138
4TH AMENDMENT
LOCATED IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

DATE: 7/22/2015

7/22/2015
SIEW HUAT NG DATE
R.C.E. 46026 EXP. 12-31-2016

SCALE: NTS
JN 14-1264
SHT. 1 OF 3 SHTS.

RECEIVED
DEPT OF REGIONAL PLANNING
TR53138-4 AMENDMENT PG 2
DATE: 22 JUL 2015
MATCH LINE
SEE SHEET 3
FH Location
See Sheet 3
NATURAL UNIMPROVED TRAIL
A-1-1
R-1-6000
TWIN LAKES
NOT A PART OF THIS SUBDIVISION
POEMA PLACE
MCKIM TERRACE
BULLFINCH ROAD
NOGAN DRIVE
FURNESS DRIVE
GILL PLACE
CANOGA AVENUE
MAYAN DR.
W. WO-HE-LO TR.
W. MAYAN DR.
AUCAS DR.
AZTEC DR.
CHICKASAW
WAHOO
MOJAVE TR.
TOPANGA CYN BLVD
FWY ON RAMP
FWY OFF RAMP
SHERIFF STATION 316
PARK 315
344 REC LOT
LIMA ROCK
BRIDGE EASEMENT
R.S. 24-17
SCALE 1"=100'
SECTION X-X
N.T.S.
8' TRAIL
EXIST. GROUND
SECTION Y-Y
N.T.S.
PROP. GRADED SLOPE
SECTION Z-Z
N.T.S.
TYPICAL LOT LINE WALL WHERE ADJACENT PADS VARY IN GRADE BY 1' TO 5'
PROP. COMBINATION WALL FREE STANDING ATOP RETAINING
MAYAN DR. / AUCAS DR.
SECTION 1-1
***10' OFFER TO DEDICATE FOR FUTURE STREET
SECTION W-W
N.T.S.
POEMA PLACE
CANOGA AVE.
SECTION 2-2
PROPOSED CURB
EXIST. IMPROVEMENTS
SECTION "C"
N.T.S.
SECTION "E"
N.T.S.
** DIRT OR DECOMPOSED GRANITE AND SOIL CEMENT MIX STABILIZATION
SECTION "F"
TYPICAL INTERIOR TRAIL
N.T.S.
LEGEND
SDL - LINE OF SIGHT
(A) - Street easements per R.S. 24-17 & R.S. 24-14
(P) - PRIVATE DRWY & FIRELANE
(*) PORTION OF EXIST PVT. ROAD OR DRWY TO BE RELOCATED AND JOIN EXIST.
(E) - PROPOSED INGRESS AND EGRESS ACCESS EASEMENT FOR N.A.P. AND ADJACENT PROPERTY OWNERS TO BE RESERVED IN SEPARATE DOCUMENTS.
(12'T) - PROPOSED 12' TRAIL EASEMENT TO COUNTY OF L.A.
(FC) - PROPOSED FEE LOT TO L.A.C.F.C.D. FOR STORM DRAIN PURPOSES.
(FD) - PROPOSED 20' EASEMENT TO L.A.CO. FIRE DEPT. PURPOSES FOR INGRESS & EGRESS PURPOSES.
(8'T) - PROPOSED 8' TRAIL EASEMENT TO THE COUNTY OF L.A.
RW - RETAINING WALL
RUA - RESTRICTED USE AREA
NAP - NOT A PART OF THIS SUBDIVISION
(R) - REMAINDER PARCEL PER SECTION 66424.6
(FL) - EASEMENT TO L.A.C.F.C.D. FOR INGRESS & EGRESS PURPOSES
(HOA) - EASEMENT TO HOME OWNERS ASSOCIATION FOR DRAINAGE PURPOSES

LEGAL DESCRIPTION:
BEING A SUBDIVISION OF PORTIONS OF SECTIONS 6 AND 7, TOWNSHIP 2 NORTH, RANGE 16 WEST, S.B.M. IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

CASE No. 99-239

UNITED CIVIL, INC.
30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

MAJOR LAND DIVISION
AMENDED VESTING TENTATIVE TRACT NO. 53138
4TH AMENDMENT
LOCATED IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

OWNER/SUBDIVIDER:
FORESTAR CHATSWORTH, LLC
4590 MACARTHUR BLVD.
SUITE 600
NEWPORT BEACH, CA 92660
PH: (949) 748-6714

DATE: 7/22/15
SCALE: 1"=100'
JN 14-1264
SEW HUAT NG R.C.E. 46026 EXP. 12-31-2016 — 7/22/15 DATE
SHT. 2 OF 3 SHTS.

TEMPORARY GRADING EASEMENT AND AGREEMENT PER L.A. COUNTY RECORDED DOCUMENT 06-0847437.

R-1-6000

NOT A PART

MATCH LINE

R-1-6000
A-1-1

MATCH LINE

R.S. 24-14

SEE SHEET 2

SCALE 1"=100'

LEGEND

SDL – LINE OF SIGHT

(A) – Street easements per R.S. 24-17 & R.S. 24-14

(P) – PRIVATE DRWY & FIRELANE

(*) **PORTION OF EXIST PVT. ROAD OR DRWY TO BE RELOCATED AND JOIN EXIST.**

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(HOA) – EASEMENT TO HOME OWNERS ASSOCIATION FOR DRAINAGE PURPOSES

CASE No. 99-239

SECTION "A"
N.T.S.

SECTION "B"
N.T.S.

** DIRT OR DECOMPOSED GRANITE AND SOIL CEMENT MIX STABILIZATION

SECTION "D"
N.T.S.

SECTION Z-Z
N.T.S.
TYPICAL LOT LINE WALL WHERE ADJACENT PADS VARY IN GRADE BY 1' TO 5'

TR 53138-07
TR 53138
TR 53138-06
TR 53138-04
TR 53138-02
TR 53138-03
TR 53138-05
N.A.P.
TWIN LAKES
NOT A PART OF THIS SUBDIVISION
RONALD REAGAN FREEWAY

TRACT NO.	RES. LOTS	OPEN SPACE
TR 53138-01	--	--
TR 53138-02	00	4
TR 53138-03	17	10
TR 53138-04	53	3
TR 53138-05	33	5
TR 53138-06	81	0
TR 53138-07	62	2
TR 53138	68	7
TOTAL	314	31

N.T.S.

PHASING MAPS EXHIBIT

RECEIVED
DEPT OF REGIONAL PLANNING
TR53138-4 AMENDMENT PG 3
DATE: 22 JUL 2015

LOT 7
60.04 AC

LOT 6
29.39 AC

LOT 5
20.46 AC

LOT 1
25.08 AC

LOT 2
29.70 AC

N.A.P.
17.62 AC

LOT 4
20.11 AC

LOT 3
29.80 AC

N.T.S.

LARGE LOT MAP
TRACT 53138-01

- PUBLIC STREETS AND ACCESS EASEMENTS TO BE DEDICATED WITH THIS MAP.
- LARGE LOT MAP IS FOR FINANCIAL PURPOSES
- N.A.P. (APN 2818-24-900 AND 2818-22-902) PREVIOUSLY DEDICATED TO MOUNTAIN RESTORATION CONSERVATORY AGENCY.

2

1b

1a

N.T.S.

GRADING PHASING EXHIBIT

LEGAL DESCRIPTION:
BEING A SUBDIVISION OF PORTIONS OF SECTIONS 6 AND 7, TOWNSHIP 2 NORTH, RANGE 16 WEST, S.B.M. IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

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30141 AGOURA ROAD, SUITE 215
AGOURA HILLS, CA 91301
PH: (818) 707-8648
FAX: (818) 707-8649

REGISTERED PROFESSIONAL ENGINEER SIEW HUAT NG NO. 46026 EXP. 12-31-16 CIVIL STATE OF CALIFORNIA

MAJOR LAND DIVISION
AMENDED VESTING TENTATIVE TRACT NO. 53138
4TH AMENDMENT
LOCATED IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

DATE: 7/22/2015

7/22/2015
SIEW HUAT NG DATE
R.C.E. 46026 EXP. 12-31-2016

SCALE: 1"=100'

JN 14-1264

SHT. 3 OF 3 SHTS.