

APPENDIX J1

Water Service Study

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

OVERVIEW OF WATER SERVICE FOR OTAY RANCH VILLAGE 4 SOUTH

December 2016

**OVERVIEW OF WATER SERVICE
FOR
OTAY RANCH VILLAGE 4 SOUTH**

December 2016



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CHAPTER 1

INTRODUCTION

This report provides an overview of water service for the Otay Ranch Village 4 South Project. This report projects water demands for the project, outlines regional water facilities to be constructed, and recommends onsite facilities to accommodate project demands. This report recommends water facilities specific to the needs of Otay Ranch Village 4 South, but takes into account Otay Water District (OWD) regional planning for the area. A discussion of recycled water is also provided.

DEVELOPMENT PLAN

The project location is provided in Figure 1-1 and Figure 1-2 provides the proposed development plan. Table 1-1 provides a land use summary table for the project and a description is provided below.

**TABLE 1-1
VILLAGE 4 SOUTH
LAND USE SUMMARY**

Planning Area	Gross Acres	Maximum Residential Units
Single Family		
R-1	15.18	73
Subtotal	15.18	73
Multi-Family		
R-2A	7.91	110
R-B	4.24	40
R-3	7.16	127
Subtotal	19.31	277
Open Space		
OS-1	0.59	0
OS-2	3.03	0
OS-3	3.08	0
OS-4	1.57	0
OS-5	0.58	0
OS-6	3.11	0
OS-8	1.35	0
OS-9	6.87	0
Subtotal	20.19	0
Preserve		
OS-7	1.37	0
OS-10	6.67	0
OS-11	44.27	0
OS-12	44.89	0
Subtotal	97.20	0
Community Purpose		
CPF-1	1.21	0
CPF-2	0.87	0
Subtotal	2.08	0
Circulation		
Internal Circulation	1.24	
External Circulation	10.82	0
Subtotal	12.06	0
TOTAL	166.02	350

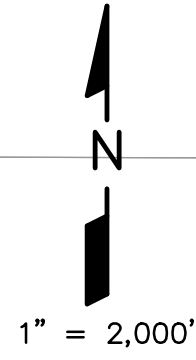
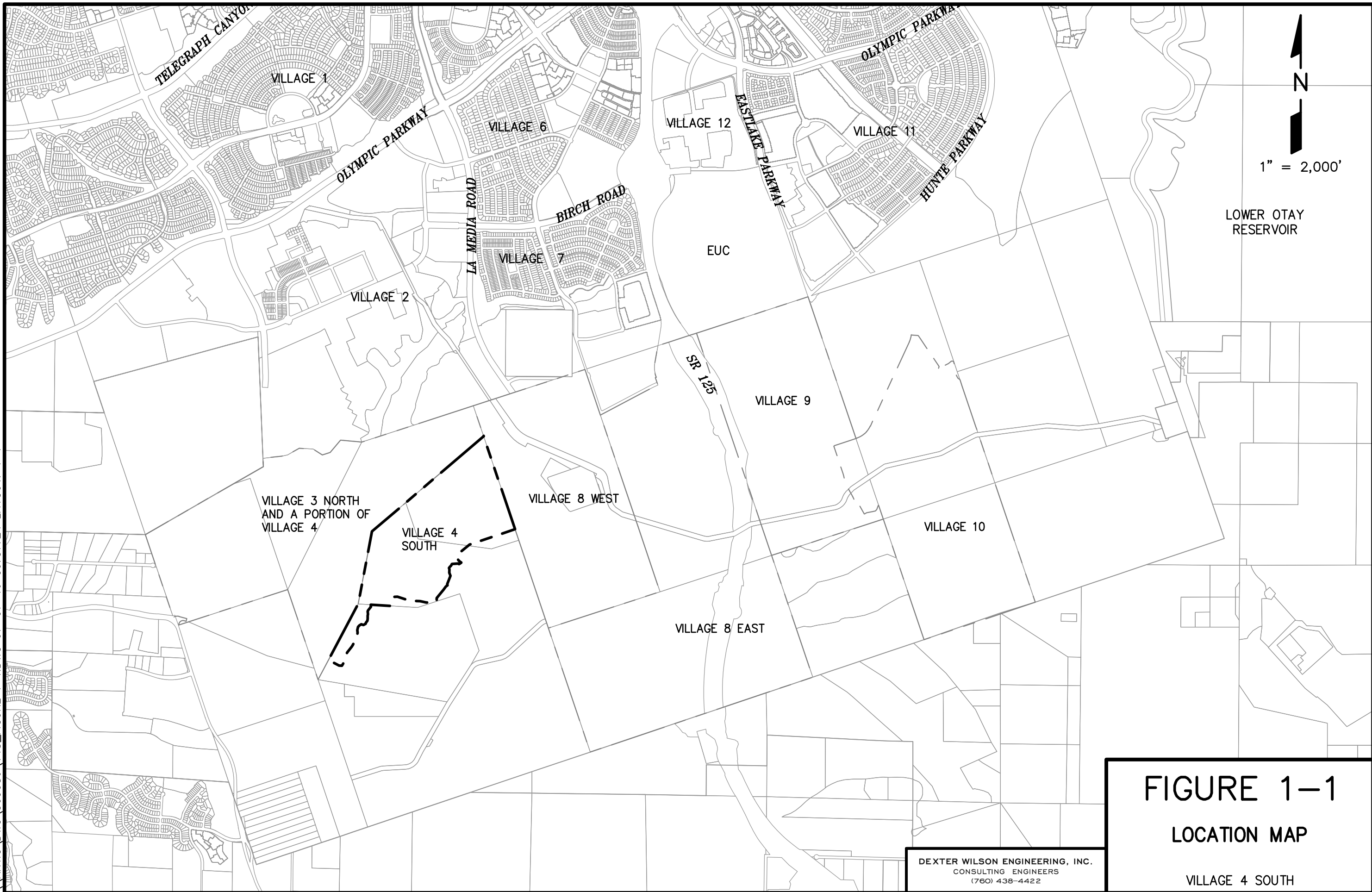
The proposed Village 4 South land plan proposes one single family neighborhood and three multi-family residential sites with a project total of 350 units. The remainder of the property is a mix of community facility use, open space, and preserve lands with circulation roads to support the project.

The project access will be through the adjacent Village 8 West project to the east. The Village 4 South project will extend Main Street westerly to the location of a future bridge across Wolf Canyon. The Main Street bridge and extension of Main Street to the west will be constructed by others through City of Chula Vista development impact fees.

WATER SERVICE

Water service for the project will be provided by the Otay Water District (OWD). Annexation into Improvement District 22 will be required prior to water service being provided. As detailed in Chapter 3 and 4, the OWD has existing and planned facilities in the vicinity of the project; water service can be provided by expanding the existing system. This report provides recommendations for improvements in the 624 and 711 Zones needed to provide water service to the proposed development. The OWD will also be the purveyor of recycled water to the project.

\\ARTIC\DWG\509086\V4S_FIGURE 1-1.DWG 07-07-16 09:57:24 LAYOUT: 1-1



LOWER OTAY RESERVOIR

FIGURE 1-1
LOCATION MAP
 VILLAGE 4 SOUTH

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\\ARTIC\DWG\509086\V4S_FIGURE 1-2.DWG 12-13-16 10:13:33 LAYOUT: 1-2

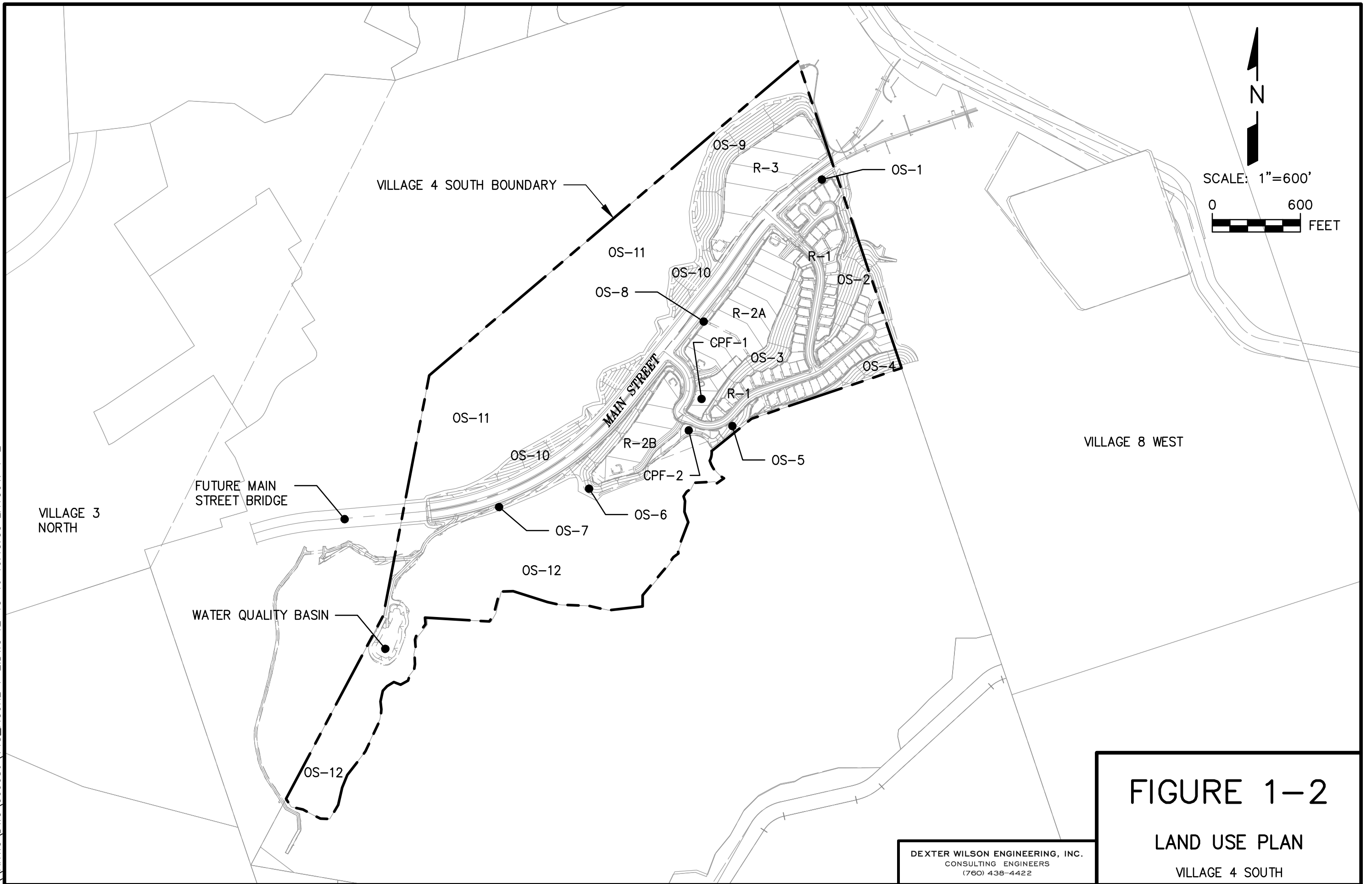


FIGURE 1-2
LAND USE PLAN
 VILLAGE 4 SOUTH

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PURPOSE OF STUDY

This report provides an overview of potable and recycled water service for the Otay Ranch Village 4 South project. This document is prepared as a supporting document for the project's SPA Plan and associated Environment Impact Report (EIR). The developer of the project will be required to prepare, for review and approval by the OWD, a Subarea Master Plan (SAMP). The SAMP will be initiated prior to the approval of the project tentative map, but OWD does not require the SAMP to be approved until prior to approval of final engineering improvement plans. The SAMP will provide more detailed information on project phasing, recycled water system improvements, processing requirements, and computer modeling to justify recommended pipe sizes.

CHAPTER 2

DESIGN CRITERIA AND PROJECTED WATER DEMANDS

This chapter presents the design criteria used to evaluate the potable and recycled water systems for the project. The design criteria are utilized to analyze the existing water system as well as for design and sizing of proposed improvements and expansions required to accommodate demands in the study area. Unless otherwise noted, the design criterion was obtained from the October 2008 Otay Water District Water Resources Master Plan (WRMP), last amended in April 2013.

Duty Factors and Peaking Factors

Table 2-1 presents the duty factors used in projecting the total average day potable and recycled water demands for the project. The required fire flows and durations are also listed. The City of Chula Vista utilizes the California Fire Code for determining required fire flows and durations for new development. The Fire Code utilizes a number of factors to determine the required fire flow for a building. These factors include building footprint, building construction materials, and whether or not the building has sprinklers. Since this level of detail is not known at the planning stage, this report uses the fire flow requirements from recent similar project in Chula Vista.

Land Use Designation	Unit Domestic Demand	Required Fire Flow (gpm)	Required Fire Flow Duration Hours
Single Family-Medium (1-3 DU/AC)	850 gpd/unit	1,500 ¹	2
Single Family-High (3-8 DU/AC)	500 gpd/unit	1,500 ¹	2
Single Family Detached (>8 DU/AC)	300 gpd/unit	2,500	2
Multi-Family Attached (>8 DU/AC)	255 gpd/unit ²	5,000	4
Community Facility Use	714 gpd/ac ²	3,500	3
Irrigation (Recycled Water)	2,155 gpd/ac	---	---

¹Applies to single family homes that are less than 3,600 sf.

²Demand factors for these land uses are from Table 4-27 of the OWD Master Plan, assuming the use of recycled water.

To convert average day potable water demands to maximum day demands and peak hour demands, Figures 4-2 and 4-3 from the Water Resources Master Plan were utilized, respectively. These figures have been provided in Appendix A for reference.

System Pressures

Generally, the potable water distribution system is designed to maintain static pressures between 65 psi and 200 psi. This criteria is used to initially divide a project between water service zones. The potable water distribution system has been designed to yield a minimum of 40 psi residual pressure at any location under peak hour demand flows, and a minimum residual pressure of 20 psi during maximum day demand plus fire flow conditions. Potable water mains are sized to maintain a maximum velocity of 10 feet per second under a maximum day demand plus fire flow scenario and a maximum velocity of 6 feet per second under peak hour flow conditions.

Projected Water Demands

Table 2-2 provides the projected potable water demand for the Village 4 South project by water pressure zone. Table 2-3 provides a demand summary by land use. The total estimated average day demand potable water use is 0.109 mgd. The resulting maximum day demand and peak hour factors are 3.0 and 7.0, respectively. Thus, the maximum day potable demand is 0.327 mgd (227 gpm) and the peak hour potable demand is 0.763 mgd (630 gpm).

Table 2-4 provides the projected recycled water demand for the project. The estimated recycled water demand is 0.064 mgd.

TABLE 2-2 OTAY RANCH VILLAGE 4 PROJECTED WATER DEMANDS					
Planning Area	Land Use	Quantity	Unit Demand	Total Average Demand, gpd	EDUs
624 Zone					
R-1	SF	22 units	500 gpd/unit	11,000	22
R-2A	MF	110 units	255 gpd/unit	28,050	56
R-2B	MF	40 units	255 gpd/unit	10,200	20
R-3	MF	127 units	255 gpd/unit	32,385	65
CPF-1, CPF-2	CPF	2.08 acres	714 gpd/ac	1,485	3
Subtotal 624 Zone				83,120	166
711 Zone					
R-1	SF	51 units	500 gpd/unit	25,500	51
Subtotal 711 Zone				25,500	53
TOTAL				108,620	217

**TABLW 2-3
OTAY RANCH VILLAGE 4 SOUTH
POTABLE WATER DEMAND SUMMARY BY LAND USE**

Land Use	Quantity	Unit Demand	Total Demand, gpd
Single Family (3-8 DU/acre)	73 units	500 gpd/unit	36,500
Multi Family	277 units	255 gpd/unit	70,635
Community Purpose Facility Use	2.08 acres	714 gpd/ac	1,485
TOTAL			108,620

**TABLE 2-4
OTAY RANCH VILLAGE 4 SOUTH
PROJECTED RECYCLED WATER DEMANDS**

Land Use	Quantity	Units	Percentage to be Irrigated	Irrigated Acreage	Recycled Water Irrigation Factor	Average Recycled Water Demand, gpd
Open Space Slopes	20.19	Acres	100	20.19	2,155 gpd/ac	43,509
Parkway Landscaping ¹	1.70	Acres	100	1.7	2,155 gpd/ac	3,664
Multi Family	277	Units	15	--	45 gpd/unit	12,465
Community Purpose Facility	2.08	Acres	20	0.42	2,155 gpd/ac	905
TOTAL						60,543

¹ Parkway landscaping estimated as 19 feet of landscape buffer for stretch of 3,800 feet on Main Street

CHAPTER 3

EXISTING WATER SYSTEM

The Village 4 South project will be served by the Central Service Area of the OWD. This area of the District is supplied water from Connection Number 10 and 12 to the SDCWA aqueduct which fills 624 Zone reservoirs. Water is then distributed within the 624 Zone and pumped to the 711 Zone storage and distribution systems.

To receive potable water service, the project must expand the existing 624 and 711 Zone systems. The following details the existing potable water facilities located in the vicinity of the project. Figure 3-1 graphically shows the location of major facilities in the vicinity of the project.

624 Zone

The 624 Zone has three existing storage reservoirs. The 624-2 Reservoir is located adjacent to the San Diego County Water Authority aqueduct between Otay Lakes Road and East H Street, has a capacity of 8.0 million gallons, and is supplied by Connection Number 10 to the San Diego County Water Authority aqueduct. The 624-1 and 624-3 Reservoirs are supplied by Connection Number 12 and have a capacity of 12.4 million gallons and 30 million gallons, respectively. The 624-1 reservoir is located adjacent to the eastern boundary of Otay Ranch Village 5 and the 624-3 reservoir is located along Eastlake Parkway, just north of Olympic Parkway. There are currently no 624 Zone facilities in the vicinity of Village 4. Water will be supplied to the 624 Zone in this area of the District by pressure reducing off the 711 Zone system.

711 Zone

There is currently one pump station in the 711 Zone, referred to as the Central Area Pump Station, located at the 624-1 Reservoir site adjacent to the eastern boundary of Otay Ranch Village 5. This station pumps water from the 624 Zone system into the 711 Zone distribution system and into two existing 711 Zone reservoirs located in the Eastlake Greens development. The 711 Zone Pump Station currently has five pumps (one of which is a standby pump), each rated for 2,500 gpm which results in a firm station capacity of 10,000 gpm.

There are three existing reservoirs in the 711 Zone. Two reservoirs are located at the same site within the Eastlake Greens development and have capacities of 2.8 and 2.2 million gallons for a total of 5.0 million gallons. A 16.0 million gallon reservoir, 711-3, was constructed north of the Rolling Hills Ranch project. With the construction of this reservoir, the District now has enough storage within the 711 Zone to meet the demands from ultimate development in this zone.

The major 711 Zone pipelines in the vicinity of the Village 4 South project include 12-inch lines in La Media Road and Magdalena Avenue.

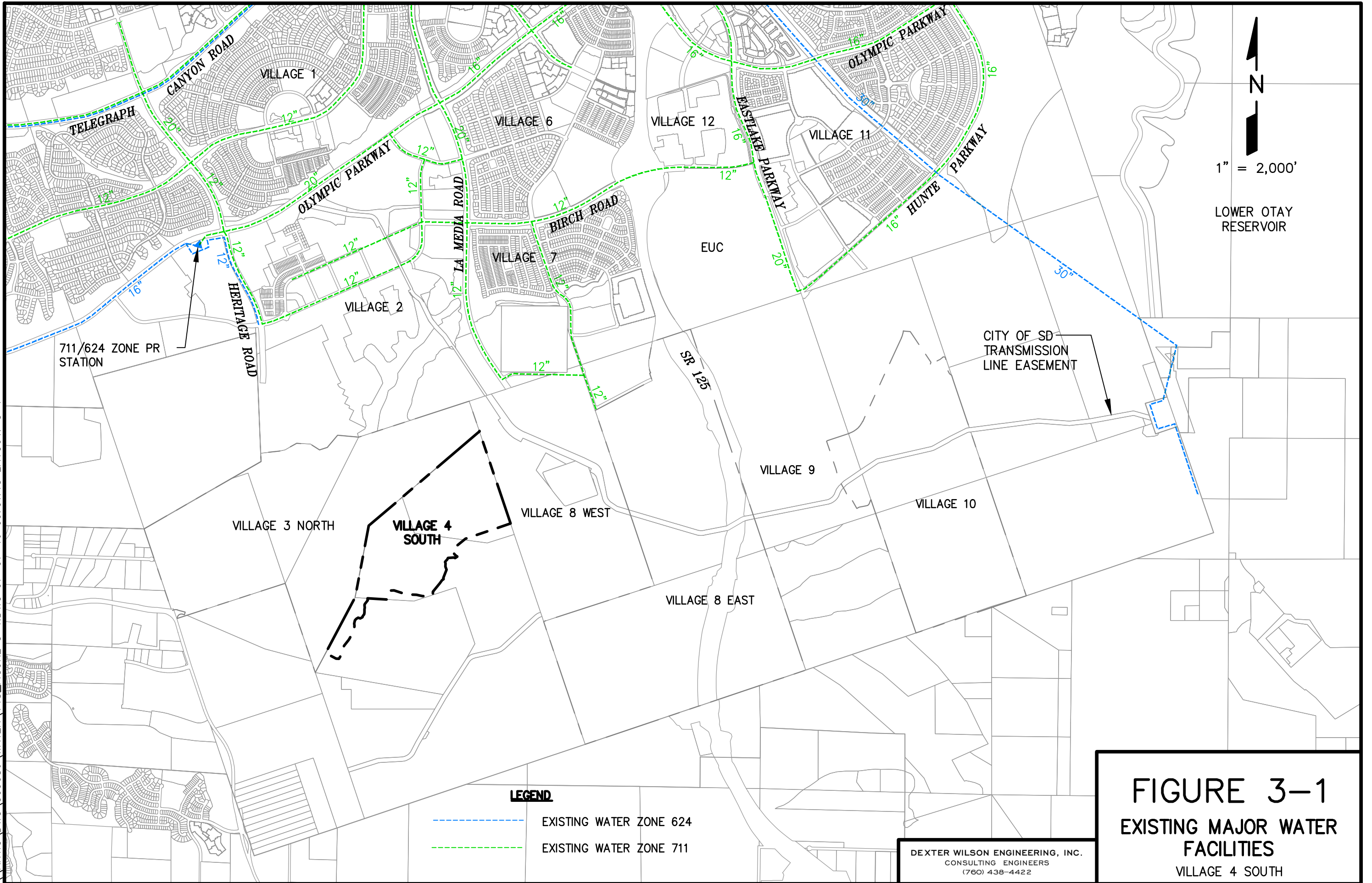
Recycled Water

The Ralph W. Chapman Water Recycling Facility currently has a rated capacity of 1.3 mgd with a maximum production of approximately 1.1 mgd and could be expanded to an ultimate capacity of 2.5 mgd. Typically, summer demands exceed the 1.1 mgd plant capacity. The District has the capability to supplement the recycled water supply with the potable 980 Zone water system which has facilities in the area. The South Bay Water Treatment Plant has an ultimate rated capacity of 15 mgd and the OWD obtained capacity rights of 8.0 mgd of recycled water. This additional source of recycled water will allow the District to meet existing and future recycled water demands. The District has master planned a series of pump stations, reservoirs, and transmission lines to integrate this source of water into the existing recycled water system. A number of these facilities have already been constructed.

680 Zone. Storage of the effluent from the Ralph W. Chapman facility is provided by two ponds in the District's Recycled Use Area. The storage ponds have a high water line of approximately 944 feet and 927 feet and provide the storage and supply for the 927 Zone distribution system. The 680 Zone distribution system has been supplied by pressure reducing off the 927 Zone system, but ultimately will be supplied by the South Bay Water Reclamation Plant.

Conveyance facilities to convey water from the South Bay Treatment Plant to the use areas including the 680 Zone use areas are currently being implemented. A 12-inch 680 Zone pipeline has been constructed in Hunte Parkway along the southern boundary of Village 11 and 680 Zone pipelines have been constructed in La Media Road and Heritage Road.

\\ARTIC\DWG\509086\WATER\V4S_FIGURE 3-1.DWG 07-07-16 09:01:13 LAYOUT: 3-1



LEGEND

- EXISTING WATER ZONE 624
- EXISTING WATER ZONE 711

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FIGURE 3-1
EXISTING MAJOR WATER
FACILITIES
 VILLAGE 4 SOUTH

CHAPTER 4

RECOMMENDED WATER FACILITIES

The Otay Ranch Village 4 South project can receive water service by expanding the existing 624 and 711 Zone water systems. Figure 4-1 provides the recommended onsite water facilities for Village 4. To size water facilities in this study, the worst case fire flow scenario for the neighborhoods was taken into consideration. A Subarea Master Plan (SAMP) will be prepared prior to the approval of the first final map for the project. In general, the project will be phased and must ensure that the OWD looping criteria is met during all phases of development. This criteria limits development to a maximum of 70 EDUs or 1,320 feet of piping on an unlooped system.





All facilities within the boundaries of the project will be required to be constructed by the developer. Final location, sizing, phasing, and hydraulic modeling of the project water system will be presented in the SAMP that is prepared for the project. The developer will be eligible for reimbursement for the construction of facilities that are included in the District's Capital Improvement Program. A brief description of facilities by water service zone is provided below.

624 Zone

The majority of development within Village 4 South will be served by the 624 Zone. Service to the Village 4 South development will be provided by extending a 16-inch 624 Zone water line from Main Street to the east. This line is proposed to be stubbed to the property boundary by Village 8 West. A redundant source of 624 Zone water to the project will ultimately be provided by a 16-inch line in Main Street to the west to the proposed Village 3 North system. Since this offsite line to the west, which is tied to the construction of the Main Street bridge timing, is not required to be constructed by the Village 4 South project, a temporary 711/624 Zone pressure reducing station within the project will be required. Onsite development will be served by constructing 8-inch and 12-inch lines off this backbone 624 Zone loop.

\\ARTIC\DWG\509086\WATER\4S_FIGURE 4-1.DWG 12-13-16 10:14:29 LAYOUT: 4-1

LEGEND

-  PROJECT BOUNDARY
-  PROPOSED 624 ZONE WATER LINE
-  EXISTING 711 ZONE WATER LINE
-  PROPOSED 711 ZONE WATER LINE
- P2404 OWD CIP NUMBER

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

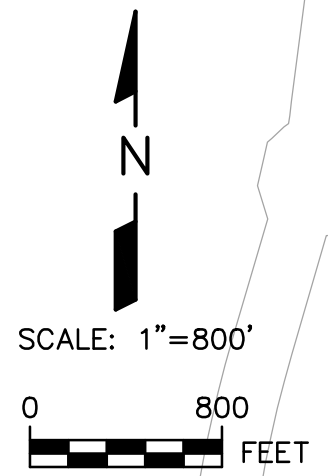
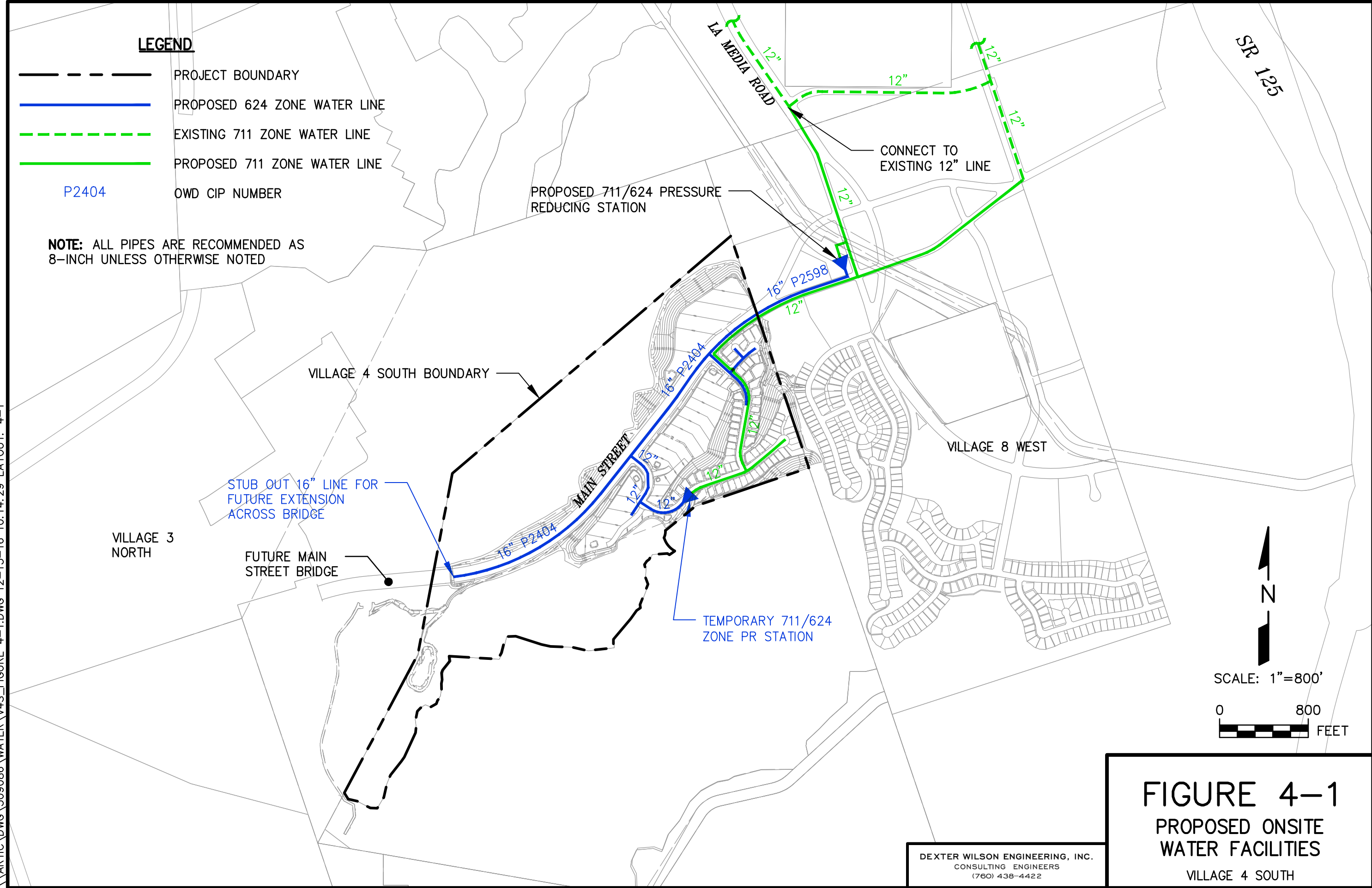


FIGURE 4-1
PROPOSED ONSITE
WATER FACILITIES
 VILLAGE 4 SOUTH

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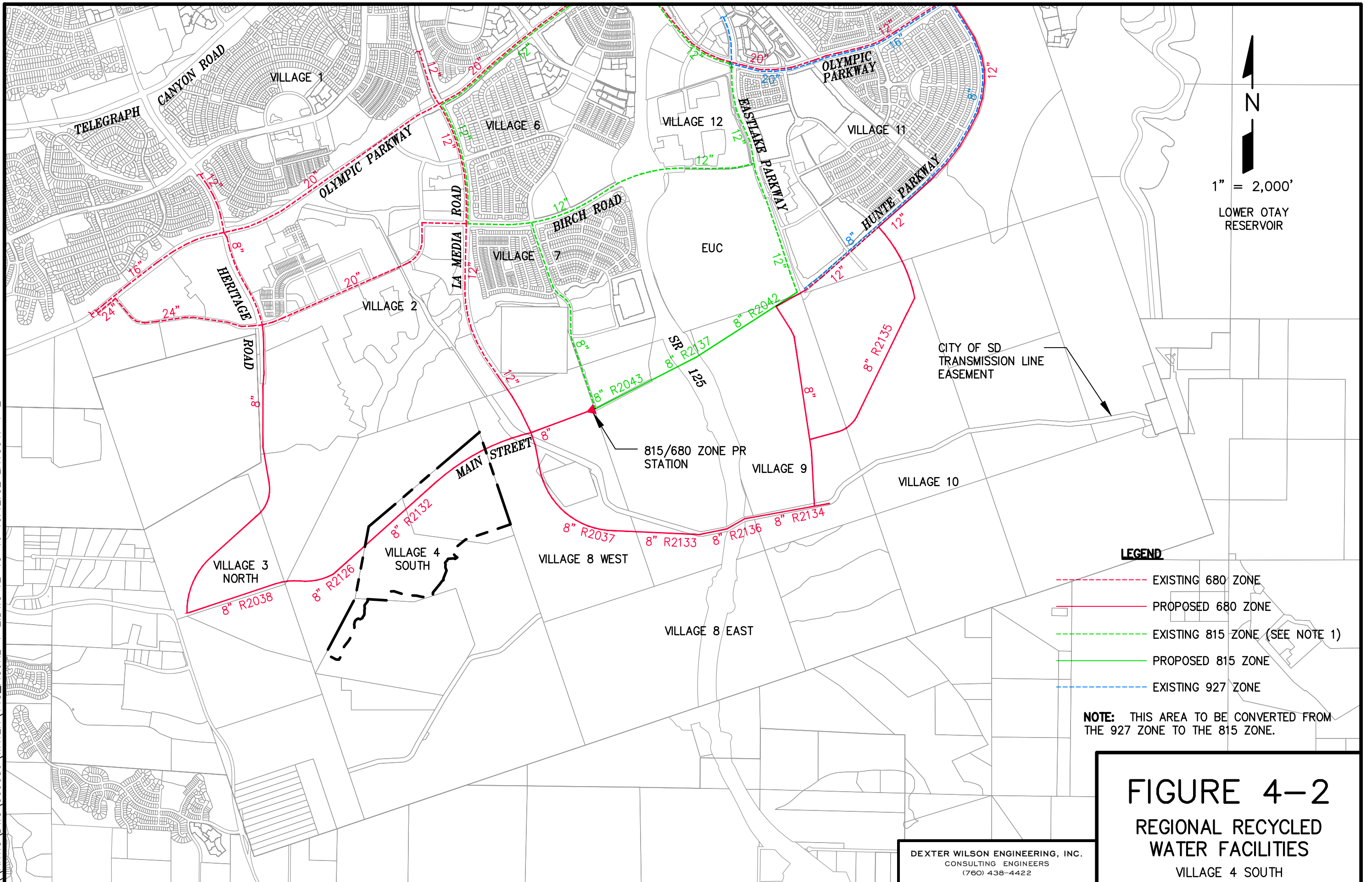
711 Zone

There are 51 single family residential lots in the southeast corner of the project that will require service from the 711 Zone. These lots are proposed to be served by a connection to the Village 8 West 711 Zone system. The proposed length of unlooped 711 Zone piping will exceed the length that the OWD criteria allows. A minor design deviation will be requested from OWD for the proposed 711 Zone onsite system.

RECYCLED WATER

The largest potential recycled water use areas in Village 4 South include open space slopes and parkway landscaping. Recycled water may also be utilized to irrigate the common areas of the multi-family residential site as well as Community Purpose Facility areas. The project will be served by extending the 680 Zone and recycled water system in Main Street. The primary source of supply for the 680 Zone is the 680-1 Pump Station and the 3.4 MG 680 Zone Reservoir. Figure 4-2 provides the existing and proposed regional recycled water system in the vicinity of the project. Figures 4-3 provides the recommended recycled water requirements for Village 4 South. The slopes at the southeast corner of the site are at elevations that are too high to receive adequate service pressures from the 680 Zone system. These areas can be served by installing a private irrigation pump at the point of connection to the public 680 Zone system.

\\ARTIC\DWG\509086\WATER\4S_FIGURE 4-2.DWG 12-13-16 10:12:52 LAYOUT: 4-2



N
 1" = 2,000'
 LOWER OTAY RESERVOIR

LEGEND

- - - EXISTING 680 ZONE
- PROPOSED 680 ZONE
- - - EXISTING 815 ZONE (SEE NOTE 1)
- PROPOSED 815 ZONE
- - - EXISTING 927 ZONE





NOTE: THIS AREA TO BE CONVERTED FROM THE 927 ZONE TO THE 815 ZONE.

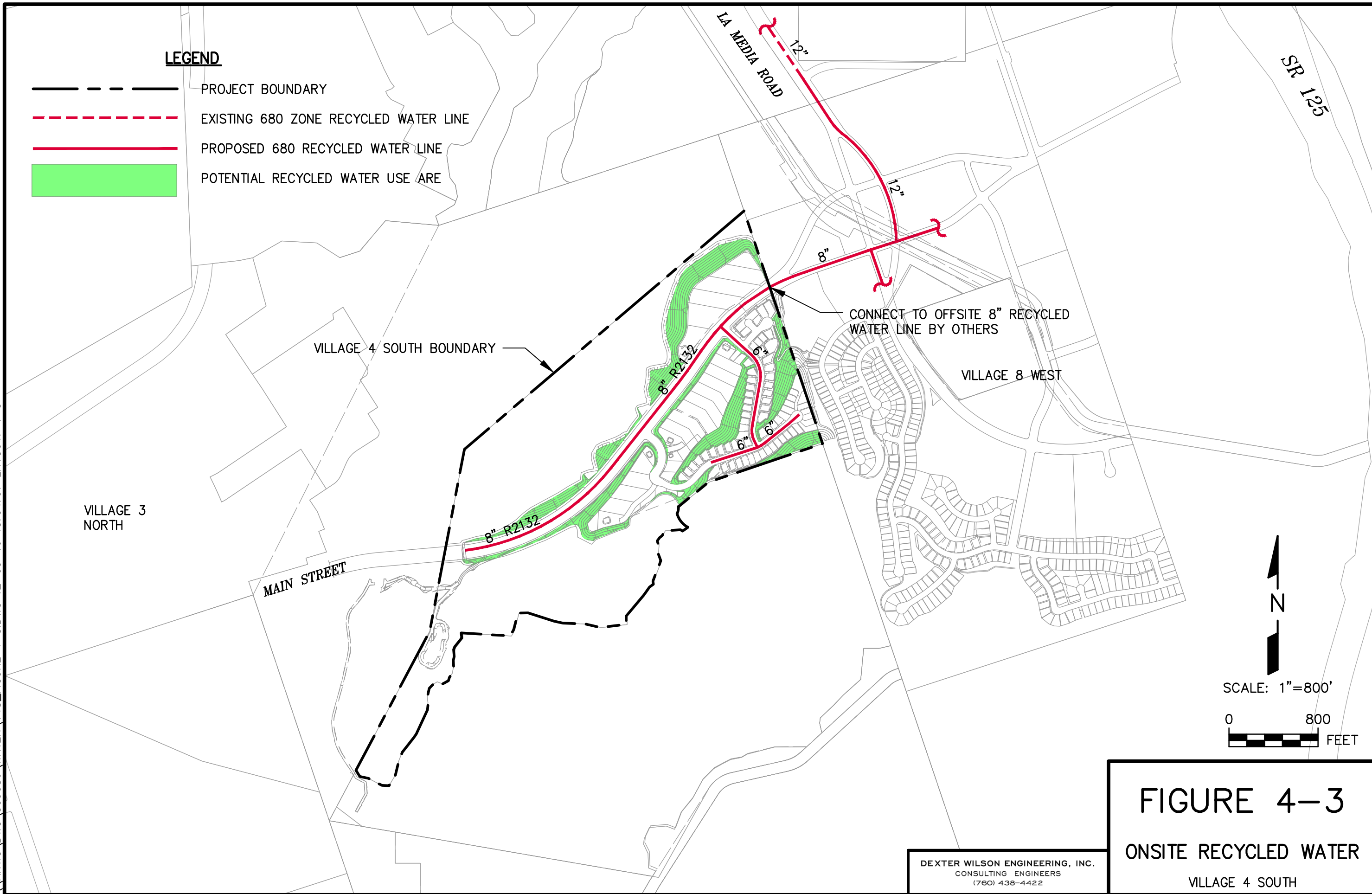
FIGURE 4-2
REGIONAL RECYCLED WATER FACILITIES
 VILLAGE 4 SOUTH

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LEGEND

-  PROJECT BOUNDARY
-  EXISTING 680 ZONE RECYCLED WATER LINE
-  PROPOSED 680 RECYCLED WATER LINE
-  POTENTIAL RECYCLED WATER USE ARE



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FIGURE 4-3
ONSITE RECYCLED WATER
 VILLAGE 4 SOUTH

REFERENCES

1. Otoy Water District Water Resources Master Plan Update, PBS&J, October 2008, last amended April 2013.
2. Overview of Water Service for Otoy Ranch Village 8 West, Dexter Wilson Engineering, November 2010.
3. Overview of Water Service for Otoy Ranch Villages 3 North, a Portion of 4, 8 East, and 10, Dexter Wilson Engineering, October 2014.

APPENDIX A

OWD PEAK FACTOR CURVES

Figure 4-2. MDD Peaking Factor Curve

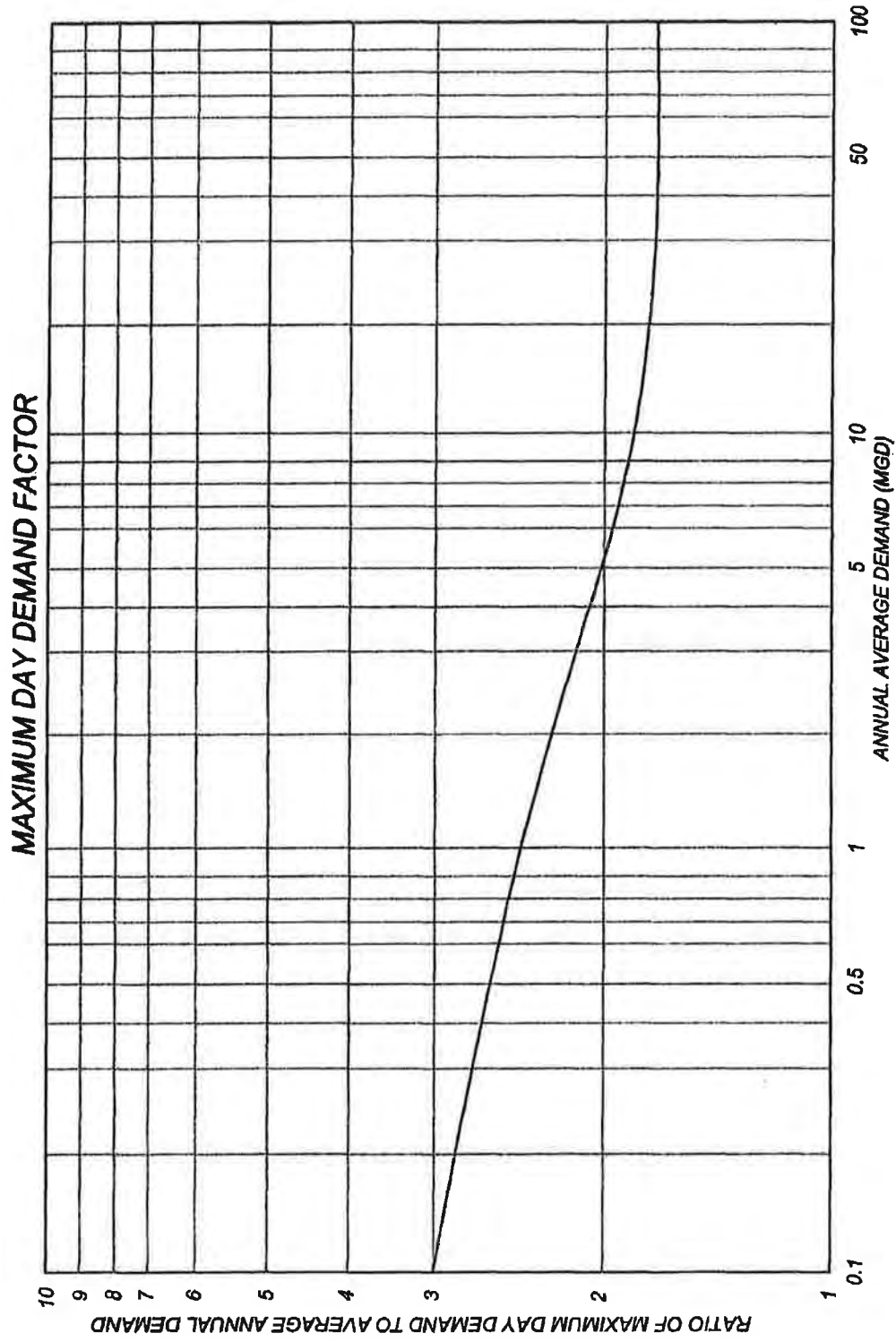


Figure 4-3. Peak Hour Peaking Curve

