Appendix G

Water Conservation Plan

FINAL
OTAY RANCH VILLAGE 9
II.8 WATER CONSERVATION PLAN

December 2010

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ABBREVIATIONS

ac -	acre
ac-ft -	acre-foot
cfd -	community facilities district
cfs -	cubic feet per second
gpd -	gallons per day
gpf -	gallons per flush
gpm -	gallons per minute
HOA -	homeowner's association
mgd -	million gallons per day

USEFUL CONVERSIONS

1 acre-foot	=	325,829 gallons
1 mgd	=	1,000,000 gallons/day
1 cfs	=	448.8 gpm
1 cubic foot	=	7.48 gallons
1 mgd	=	694.4 gpm

II-8.1 EXECUTIVE SUMMARY

The City of Chula Vista's Growth Management Ordinance (CVMC 19.09.050C) requires that all development projects with 50 dwelling units or greater prepare a Water Conservation Plan at the time of the Sectional Planning Area plan preparation. This plan presents a review of presently available technologies and practices which result in water conservation in primarily residential development. This report presents water conservation measures that will be incorporated into the planning and design of Otay Ranch Village 9, including the requirements outlined in the Landscape Water Conservation Ordinance. The project includes Otay Ranch Village 9.

Proposed development within the Village 9 project includes 4,000 mixed density residential dwelling units, two schools, commercial, parks, and open space. The residential development proposes 266 single family residential units and 3,734 multi-family units and will be planned as a university oriented urban village.

The Otay Water District is the local water agency that will supply potable water and recycled water to Village 9. The total estimated average potable and recycled water use for the project is 1.35 mgd and 0.12 mgd, respectively.

The State and local government have mandated a number of water conservation measures. The focus of this study is on the implementation of non-mandated water conservation measures. The project will install hot water pipe insulation, pressure reducing valves, and water efficient dishwashers in all single family and multi-family residential units. Additionally, the developer will install evapotranspiration controllers and dual flush toilets in the single family residential units and utilize water efficient irrigation systems and evapotranspiration controllers for the non-residential sites. The project will be designed in compliance with the Water Conservation Ordinance. At buildout of the project, implementation of the above measures along with the use of recycled water would result in an estimated water savings of 220,030 gallons per day for the project.

II-8.2 INTRODUCTION

In recent years, the subject of water conservation has been given increased attention. The growing awareness of the need and value of water conservation has been sparked by local and regional water purveyors concerned about meeting the future water demands of their customers, particularly during drought conditions. Water conservation provides an alternative

approach to the problem of finding new water sources to meet the water demand for a proposed community. The intent of water conservation is to manage water demand so that the customers receive adequate service but use less water.

Much has been done to educate consumers about limitations of water supply, the serious implications of a long-term drought and the need for water conservation, but there is a practical limit to the percentage reduction of water use in established communities. This limit is a result of the types of plumbing fixtures installed in existing homes as well as the difficulty in altering consumers' established patterns of water use. Any water conservation effort, voluntary or mandatory, requires the cooperation of the public. Public information should be utilized to inform and convince the consumer that a change in personal water use habits is in everyone's best interest.

In recent years, the private development sector has become more attuned to the concerns of water availability and has recognized the value of addressing water conservation issues throughout planned development projects. By incorporating low water use plumbing fixtures, promoting drought tolerant landscaping, and providing educational materials to homeowners within the development project, private developments can do much to cultivate an interest in water conservation and establish new patterns of water use. These efforts can have significant impacts with regard to reducing the need for securing and importing larger quantities of water for use in San Diego County. The Landscaping Water Conservation Ordinance went into effect on January 1, 2010 and requires homeowners to be efficient with the landscape systems and plant selection.

In 2006 the State repealed the Water Conservation in Landscaping Act and adopted a new Water Conservation in Landscaping Act, Government Code Sections 65591 et seq. The new Act requires the Department of Water Resources to update the previously adopted model efficient landscape ordinance that provides for greater efforts at water conservation and more efficient use of water in landscaping. Government Code Section 65595 requires that on or before January 1, 2010 a local agency shall adopt a water efficient landscape ordinance that is at least as effective in conserving water as the updated model ordinance or adopt the model ordinance. If a local agency does not adopt a water efficient landscape ordinance by the deadline, the updated model ordinance shall apply within the local agency's jurisdiction and shall be enforced by the local agency.

The City of Chula Vista City Council adopted an ordinance that complies with the findings and declaration's of the State's Water Conservation in Landscaping Act and is as effective as the State's updated model water efficient landscape ordinance. This water conservation plan incorporates the requirements of the City ordinance.

The Otay Ranch Village 9 project is within the Otay Ranch General Development Plan (GDP). The Otay Ranch GDP was adopted in 1993 and included objectives for water conservation to be incorporated into the development of Otay Ranch. These objectives included the implementation of water efficient fixtures, increased use of drought tolerant landscaping, and use of recycled water for irrigation. The objective of these measures is to reduct the per capita water use within Otay Ranch by 25 percent as compared to 1989 County wide per capita levels. This report will demonstrate how the City, in partnership with the Otay Water District and the development community are meeting these objectives.

II-8.3 PURPOSE

The State Legislature determined in the Water Conservation in Landscaping Act that the State's water resources are in limited supply. The Legislature also recognized that while landscaping is essential to the quality of life in California, landscape maintenance and design must be water efficient. The City of Chula Vista's Growth Management Ordinance requires that all major development projects (50 dwelling units or greater) prepare a Water Conservation Plan at the time of Sectional Planning Area Plan preparation. The City has adopted guidelines for the preparation and implementation of required water conservation plans.

This report will present water conservation measures which will be incorporated into the planning and design of the project, including an estimate of the anticipated water savings. Approximately half of the water used by residences in California is used outdoors. For this reason, the City's Landscape Water Conservation Ordinance will be an important component of reduce water usage.

Although not covered in detail, there are several secondary benefits to conserving water that should be kept in mind when reviewing material in this report. These benefits include reduced sewage flows, reduced natural gas use, and reduced electricity use. Using less water in the shower, for example, reduces the amount of water input into the sewer system and reduces the amount of energy required to heat the water.

II - 8.4 PROJECT DESCRIPTION

Proposed development within the Village 9 boundary includes 4,000 mixed density residential dwelling units, two schools, commercial, parks, and open space. The residential development proposes 266 single family residential units and 3,734 multi-family units. Figure 1 provides the proposed land use plan for the project and Table 1 provides a land use summary.

TABLE 1
VILLAGE 9 SITE UTILIZATION SUMMARY

Planning Area	Gross Acres	Maximum Residential Units	Maximum Commercial Square Footage
Mixed Use Eastern Urban Center			
A	11.0	515	350,000
B-1	4.6	160	145,000
B-2	3.9	140	115,000
D	7.8	345	290,000
E-1	4.6	180	145,000
E-2	4.2	160	145,000
Subtotal	**36.1**	**1,500**	**1,190,000**
Mixed Use Town Center			
K-1	3.7	148	0
K-2	3.8	152	0
M	3.6	80	29,000
N	3.5	57	52,000
O-1	3.6	80	29,000
O-2	3.6	80	29,000
P	3.6	80	29,000
Q	3.5	57	52,000
R-1	3.6	80	29,000
R-2	3.6	80	29,000
Subtotal	**36.1**	**894**	**278,000**
Mixed Use Residential			
F	6.7	135	0
G	7.9	160	0
S	14.4	285	0
T	3.4	48	32,000
U-1	3.5	70	0
U-2	3.5	70	0

TABLE 1
VILLAGE 9 SITE UTILIZATION SUMMARY

Planning Area	Gross Acres	Maximum Residential Units	Maximum Commercial Square Footage
V	8.4	165	0
Y-1	3.3	65	0
Y-2	3.0	60	0
Z-1	3.7	75	0
Z-2	2.7	55	0
CC	7.7	152	0
Subtotal	**68.2**	**1,340**	**32,000**
Single Family Residential			
AA	6.8	72	0
BB	8.4	89	0
DD	12.2	47	0
EE	7.1	26	0
FF	8.8	32	0
Subtotal	**43.3**	**266**	**0**
Community Purpose Facility			
J	2.3	---	---
X	2.7	---	---
Subtotal	**5.0**	**---**	**---**
Schools			
H-1/H-2	10.3	---	---
W	11.7	---	---
Subtotal	**22.0**	**---**	**---**
Parks			
C	3.6	---	---
I	1.4	---	---
L	12.5	---	---
GG	2.9	---	---
HH	1.3	---	---
II	3.4	---	---
Subtotal	**25.1**	**---**	**---**
Open Space/Other			
OS-1	2.8	---	---
OS-2	3.3	---	---
OS-3	2.8	---	---
OS-4	0.7	---	---

TABLE 1
VILLAGE 9 SITE UTILIZATION SUMMARY

Planning Area	Gross Acres	Maximum Residential Units	Maximum Commercial Square Footage
JJ	50.0	---	---
Arterials	17.7	---	---
SR-125	10.0	---	---
Subtotal	**87.3**	**---**	**---**
TOTAL	**323.1**	**4,000**	**1,500,000**

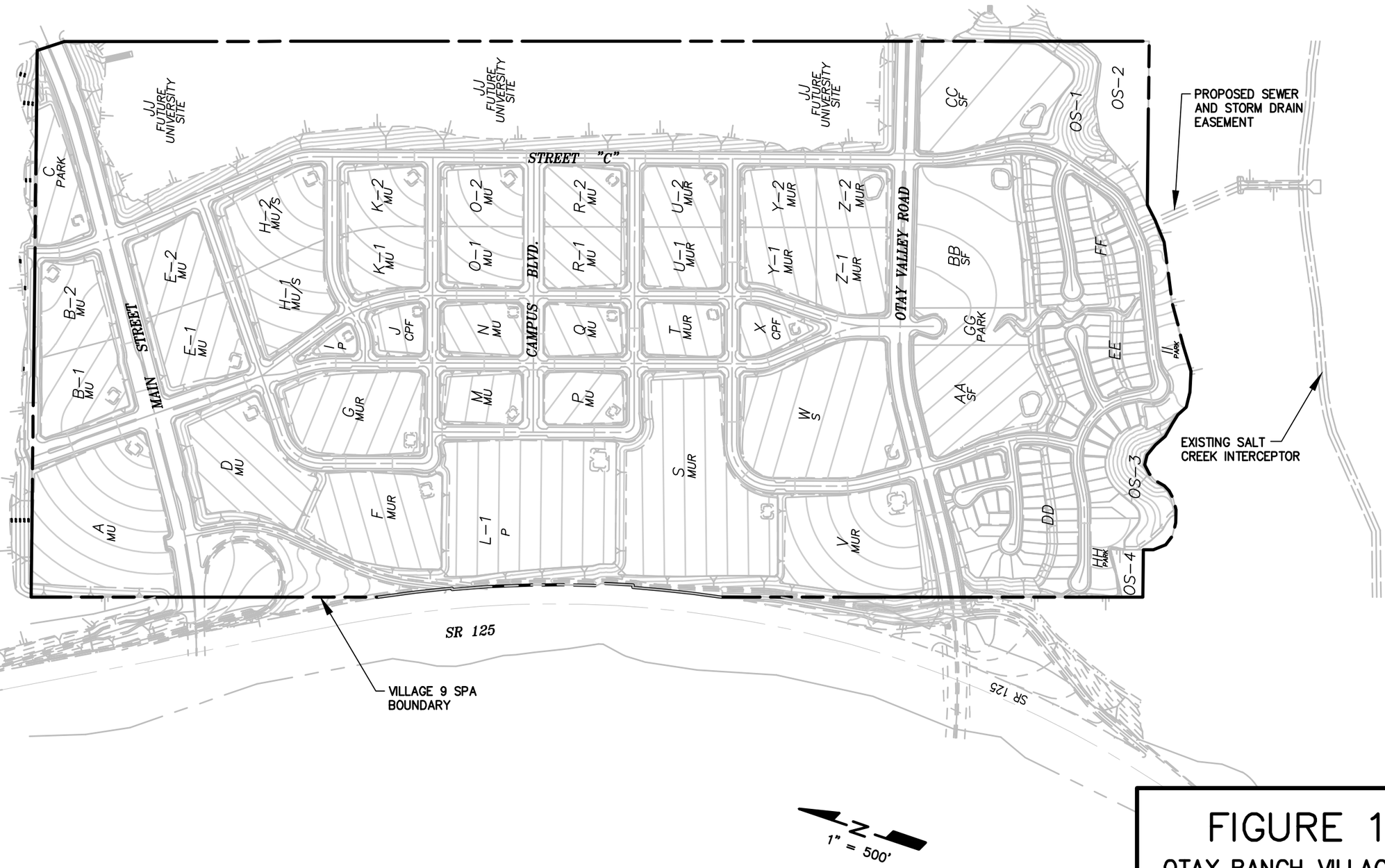


FIGURE 1

OTAY RANCH VILLAGE 9 PROPOSED DEVELOPMENT PLAN

\\PACIFIC\DWG\646371\WC PLAN\FIGURE 1.DWG 12-06-10 15:01:40 LAYOUT: 1

II-8.5 WATER SERVICE AND SUPPLY

The Otay Water District is the local water agency that will supply potable water and recycled water to Village 9. The Otay Water District relies solely on the San Diego County Water Authority (SDCWA) for its potable water supply. The SDCWA is the largest of 27 member agencies of the Metropolitan Water District of Southern California (MWD), which is the primary importer of domestic water in Southern California.

II-8.6 PROJECTED WATER USE

II-8.6a Potable Water Demand

Water use is affected by, among other things, climate and the type of development. In California, recent trends towards the construction of more multi-unit housing, the general reduction in residential lot size, and a number of local agency water conservation programs in effect are all tending to reduce per capita water consumption.

Potable water demands were projected by taking the total development for each land use and multiplying by water use factors. Table 2 provides the projected potable water demand for Village 9. The total estimated potable water use is 1.35 mgd. The potable water usage will be reduced by the use of recycled water within common landscaped areas of the project and implementation of water conservation measures (see Table 7). Potable water use factors were taken from the October 2008 Otay Water District Water Resources Master Plan.

TABLE 2
PROJECTED POTABLE WATER DEMANDS
FOR OTAY RANCH VILLAGE 9

Land Use	Quantity	Unit Demand	Average Day Demands, gpd
Single-Family Residential	266 units	500 gpd/unit	133,000
Multiple-Family Residential	3,734 units	255 gpd/unit	952,170
Commercial/Retail	1,500,000 SF	0.14 gpd/SF	210,000
School	22.0 ac	1,428 gpd/ac	31,420
CPF	5.0 ac	714 gpd/ac	3,570
Parks	25.1 ac	---[1]	14,910
Total			**1,345,070**

[1]Parks to be irrigated with recycled water, but include some potable demand per project water study.

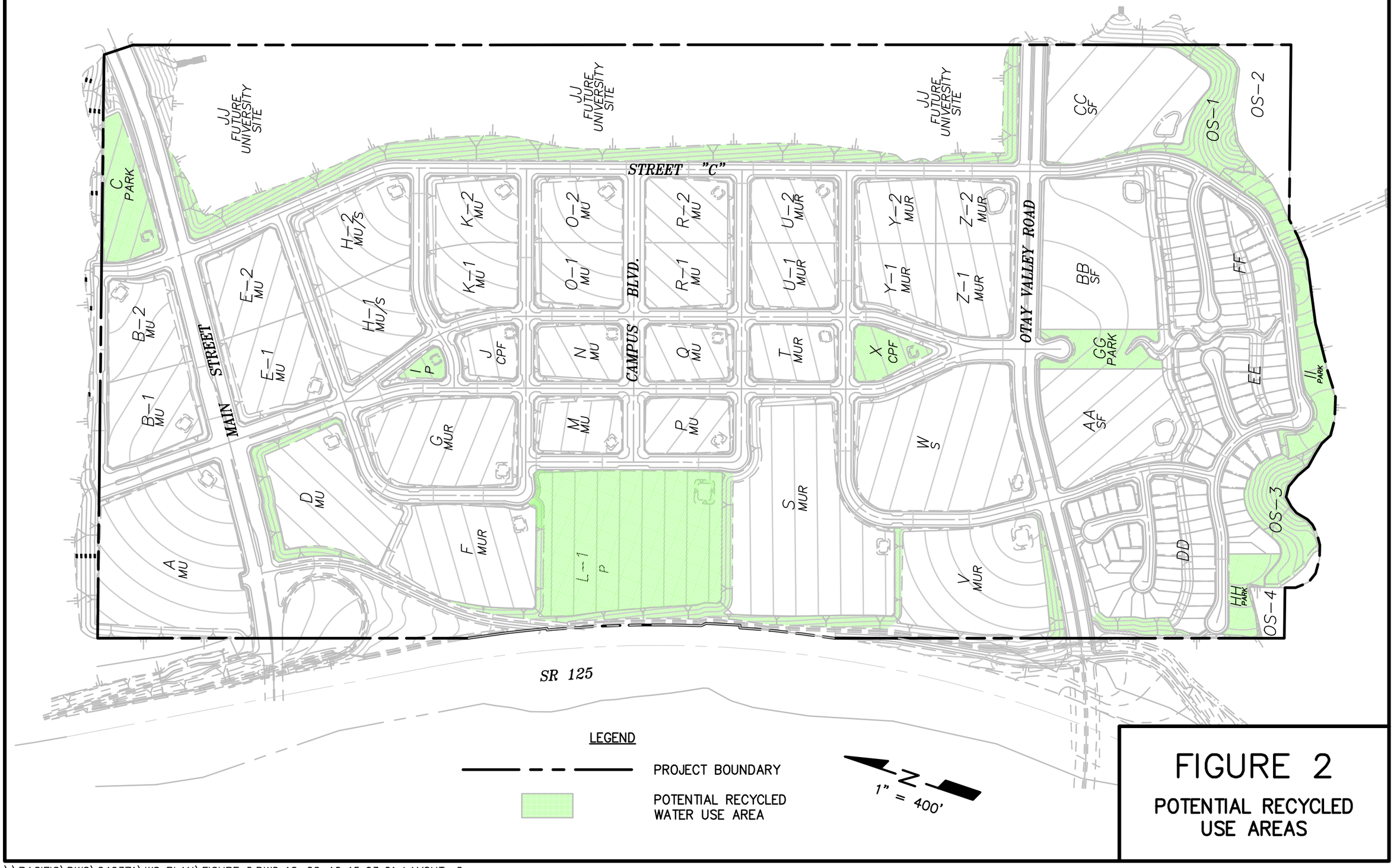
II-8.6b Recycled Water Demand

In accordance with Section 26 of the Otay Water District Code of Ordinances, Village 9 will utilize recycled water for the irrigation of open space slopes, parks, parkway and median landscaping, and the common areas of schools, commercial, and multi-family residential sites. Figure 2 identifies the potential recycled water use areas and Table 3 provides the estimated recycled water demand. The total estimated recycled water demand is 0.12 mgd.

TABLE 3
PROJECTED RECYCLED WATER DEMANDS FOR
OTAY RANCH VILLAGE 9

Land Use	Area, Acres	Percentage to be Irrigated	Irrigated Acreage	Recycled Water Irrigation Factor, gpd/ac	Average Recycled Water Demand, gpd
Open Space Slopes, Parkways	10[1]	100	10.0	2,155	21,550
Parks	25.1	100	25.1	2,155	54,090
Mixed Use	140.4	10	14.0	2,155	30,170
Schools	22.0	20	4.4	2,155	9,490
CPF	5.0	10	0.5	2,155	1,080
TOTAL					**116,380**

[1] Preliminary Estimate



LEGEND

PROJECT BOUNDARY

POTENTIAL RECYCLED WATER USE AREA

N

1" = 400'

FIGURE 2

POTENTIAL RECYCLED USE AREAS

II-8.7 MANDATED WATER CONSERVATION MEASURES

The State and many local Governments have mandated a number of water conservation measures. Table 4 summarizes the conservation measures that are currently mandated by the State of California and also provides the requirements if the Draft 2010 California Green Building Standards Code is implemented.

TABLE 4
MANDATED WATER CONSERVATION DEVICES

Device	Baseline Requirement	2010 Green Building Code Requirement
Showerheads	2.5 gpm	2.0 gpm
Lavatory Faucets	2.2 gpm	1.5 gpm
Sink Faucets	2.2 gpm	1.8 gpm
Metering Faucets in Public Restrooms	0.25-0.75 gal/cycle	0.25 gal/cycle
Residential Water Closets	1.6 gpf	1.28 gpf
Flushometer Valves	1.6 gpf	1.28 gpf
Commercial Water Closets	1.6 gpf	1.28 gpf
Urinals	1.0 gpf	0.5 gpf

II-8.8 LOCAL WATER CONSERVATION REQUIREMENTS

There are a number of water conserving measures required by the Otay Water District and City of Chula Vista Landscape Manual. These include the use of recycled water for the irrigation of parks, median landscaping, open space slopes, and common landscaped areas where feasible. The Landscape Manual also requires some drought tolerant plant selection in the landscaping plan and the use of evapotranspiration controllers for parks and common landscaped areas. Additionally, the Landscape Water Conservation Ordinance that went into effect January 1, 2010 is expected to reduce outdoor water usage, particularly in single family residential lots.

The City of Chula Vista Water Conservation Plan Guidelines requires the following three indoor water conservation measures for residential units and non-residential units. These measures are mandatory.

Residential Measures - Mandatory

1. Hot Water Pipe Insulation. This measure involves the insulation of hot water pipes with 1-inch walled pipe insulation and separation of hot and cold water piping. This measure is estimated to cost an additional $50 during initial construction and result in annual savings of 2,400 gallons per residential unit.

2. Pressure Reducing Valves. Setting the maximum service pressure to 60 psi reduces any leakage present and prevents excessive flow of water from all appliances and fixtures. This measure is estimated to cost $100 during initial construction and result in annual water savings of 1,800 gallons per residential unit.

3. Water Efficient Dishwashers. There are a number of water efficient dishwashers available that carry the Energy Star label. These units cost an additional $500 on average and result in an estimated yearly water savings of 650 gallons per residential unit.

Non-Residential Measures - Mandatory

1. Hot water pipe insulation with 1-inch walled pipe insulation.

2. Compliance with Division 5.3 of the California Green Building Standards Code in effect at the time of plan submittal.

3. Pressure reducing valves.

Non-Mandatory Measures

In addition, to comply with the City's current water conservation requirements, the developer must select at least one outdoor measure and one additional indoor or outdoor water conservation measure for residential development and non-residential development. Water conservation measures not included in the City's Residential Water Conservation Measures list may be proposed by the developer. The developer will implement, from the City's list of approved measures, the following two additional non-mandatory measures in single family residential units, multi-family residential units, and non-residential units.

1. Dual Flush Toilets. The developer will install dual flush toilets within the project. This measure is estimated to cost $200 per household and result in annual water savings of 4,000 gallons per year per residential unit.

2. Water Efficient Landscaping. The developer will comply with the City's Landscape Water Conservation Ordinance to reduce outdoor water use. This will include a more drought tolerant plant selection including less turf area as well as installation of water efficient irrigation systems. While the estimated savings from this measure is difficult to quantify at this stage of planning, it is estimated that outdoor water usage at single family residences will be reduced by a minimum of 10 percent, or approximately 25 gpd per home.

II-8.9 WATER CONSERVATION ESTIMATED SAVINGS

The estimated water savings for water conservation measures are based on the estimates provided in Section II-8.8 of this report. The potential water savings varies widely based on land use types. Multi-family residential units, for example, have much less opportunity to implement additional water saving measures than low density single family residential units. This is primarily because the common landscaped areas of multi-family units are required to be irrigated with recycled water and, thus, there are no outdoor water conservation measures that can directly offset potable water usage in these areas.

Tables 5 and 6 summarize the total estimated water savings for Village 9 based on the proposed required measures and non-mandatory measures described above.

TABLE 5
VILLAGE 9 MULTI-FAMILY
PROPOSED WATER CONSERVATION MEASURES

Measure	Location	Yearly Water Savings, gal/unit	Daily Water Savings, gpd/unit	Percentage of Total Usage[1]	Project Total Water Savings[2], gpd
Hot Water Pipe Insulation	Indoor	2,400	6.58	2.2	24,570
Pressure Reducing Valves	Indoor	1,800	4.93	1.6	18,410
Water Efficient Dishwashers	Indoor	650	1.78	0.6	6,650
Dual Flush Toilets	Indoor	4,000	10.96	3.6	40,920
Water Efficient Landscaping	Outdoor	---[3]	---	---	—[3]
TOTAL			**24.25**	**8.1**	**90,550**

[1] Based on 300 gpd/unit average usage.
[2]Based on 3,734 Multi-Family Residential Units.
[3] This measure will reduce the amount of recycled water used for irrigation and has, therefore, not been included in the total potable water savings.

TABLE 6
VILLAGE 9 SINGLE-FAMILY RESIDENTIAL
WATER CONSERVATION MEASURES

Measure	Location	Yearly Water Savings, gal/unit	Daily Water Savings, gpd/unit	Percentage of Total Usage[1]	Project Total Water Savings[2], gpd
Hot Water Pipe Insulation	Indoor	2,400	6.58	1.3	1,750
Pressure Reducing Valves	Indoor0	1,800	4.93	1.0	1,310
Water Efficient Dishwashers	Indoor	650	1.78	0.4	470
Dual Flush Toilets	Indoor	4,000	10.96	2.2	2,920
Water Efficient Landscaping	Outdoor	9,125	25.0	5.0	6,650
TOTAL		**17,975**	**49.25**	**9.9**	**13,100**

[1] Based on 500 gpd/unit total average usage with 250 gpd used outdoors..
[2] Based on 266 Single Family Residential Units.

Water Conservation Summary

As detailed in this report, the Village 9 project is committed to being water efficient through the use of recycled water for irrigation and utilizing other water conservation devices and measures. Table 7 summarizes the baseline potable water use if recycled water and water conservation measures were not utilized and provides the anticipated water savings outlined in this report. As shown, the use of recycled water and other water conservation measures is expected to reduce potable water usage by 220,030 gpd, or 15.1 percent.

As evidenced by the information contained in this study, the objectives of the Otay Ranch GPD to incorporate water saving fixtures, drought tolerant landscaping, and recycled water usage into the development are being met. Based on information contained in the 1989 San Diego County Water Authority Annual Report, average water use within the Otay Water District was 220 gallons per day per capita (20,469.7 AF for a population of 83,000). Based on 2007 data from the OWD 2008 Master Plan, per capita water usage has dropped to approximately 189 gpd (33.26 mgd for a population of 186,000). These per capita numbers include non-residential demands, but clearly indicate the effectiveness that the above measures are having and this trend is expected to continue as adopted guidelines are increasingly focused on reducing per capita water use.

TABLE 7
VILLAGE 9 WATER CONSERVATION SUMMARY

Description	Average Use, gpd
Total Water Use	
Potable Water Use (Table 2)	1,345,070
Recycled Water Use (Table 3)	116,380
TOTAL BASELINE WATER USE	**1,461,450**
Water Conservation Savings	
Recycled Water (Table 3)	116,380
Multi Family Measures (table 5)	90,550
Single Family Measures (Table 6)	13,100
TOTAL CONSERVATION SAVINGS	**220,030**
Net Potable Water Usage[1]	1,241,420
Reduction from Baseline Usage	**15.1**

[1]Potable water use (Table 2) minus water conservation savings (Tables 5 and 6).

II-8.10 IMPLEMENTATION MEASURES

The non-mandated water conservation measures to be included in the residential component of the Village 9 project are listed in Tables 5 and 6. The non-residential development within the project will utilize hot water pipe insulation, pressure reducing valves, water efficient landscape systems, and evapotranspiration controllers as well as meeting all requirements of Division 5.3 of the California Green Building Standards Code in effect at the time of plan submittal.

II-8.11 MONITORING

For the water conservation measures proposed to be incorporated into the Village 9 project, Table 8 summarizes the implementation timing for each measure, as well as the responsibility for monitoring the implementation of the measures.

TABLE 8
VILLAGE 9 IMPLEMENTATION AND MONITORING PROGRAM

Water Conservation Measure	Responsibility for Implementation	Timing	Monitoring of the Implementation
Hot Water Pipe Insulation	Developer	Prior to Issuance of Building Permit	City Building Department
Pressure Reducing Valves	Developer	Prior to Issuance of Building Permit	City Building Department/Otay Water District
Water Efficient Dishwashers	Developer	Prior to Issuance of Building Permit	City Building Department
Dual Flush Toilets	Developer	Prior to Issuance of Building Permit	City Building Department
Water Efficient Landscape System	Developer	Prior to Issuance of Building Permit	City Building Department

REFERENCES

1. Bahman Sheikh, Water Use Efficiency, Strategies for Proposed Residential Developments, September 2001.

2. City of Chula Vista Water Conservation Plan Guidelines, adopted May 27, 2003.

3. Chapter 20.12 Chula Vista Landscape Water Conservation Ordinance (Ord. 3146) December 8, 2009

4. Overview of Water Service for Otay Ranch Village 9, November 2010, Dexter Wilson Engineering, Inc.

5. Otay Water District Water Resources Master Plan, October 2008, PBS&J.

6. San Diego County Water Authority Annual Report, 1989.

7. California Green Building Standards Code, Draft 2010.