Appendix K
2011 SAMP Update

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Planning Areas 30 & 51
Great Park/Great Park Neighborhoods

Sub Area Master Plan Update

PROJECT NUMBER 10787 & 20787

Prepared for:

Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, CA 92619

Prepared by:

RBF Consulting
14725 Alton Parkway
Irvine, CA 92618

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CHAPTER I – EXECUTIVE SUMMARY

1.1 INTRODUCTION

In March 2009, the Irvine Ranch Water District (IRWD, District) completed the Sub-Area Master Plan (SAMP) for Planning Areas 30 and 51 in the City of Irvine. These planning areas were the former Marine Corps Air Station El Toro and include a total area of approximately 3,700 acres. The planning areas are generally bound by the Foothill Transportation Corridor (SR 241) to the north, the Eastern Transportation Corridor (SR 133) to the west, the Santa Ana Freeway (I-5) to the south, and Alton Parkway to the east. Figure 1-1 illustrates the location of the Study Area within the District.

After purchasing the land in 2005, Heritage Fields El Toro, LLC (Heritage Fields) transferred approximately 1,400 acres to public ownership. The portion of the site in public ownership is called the Orange County Great Park (Great Park). It will be developed by the Great Park Corporation. The approved Great Park Master Plan provided by the Great Park Corporation was used as the basis for land use assumptions in the SAMP.

The portion of the land that will be developed by Heritage Fields is referred to as "Great Park Neighborhoods." Heritage Fields provided land use information that was used as a basis for the SAMP. During the Irvine City Council meeting on September 12, 2006, the City and Heritage Fields, LLC discussed studying other land use options in addition to the one noted above, which could allow for approximately 9,500 residential dwelling units. All IRWD facilities' needs were analyzed for the two land use options provided by Heritage Fields.

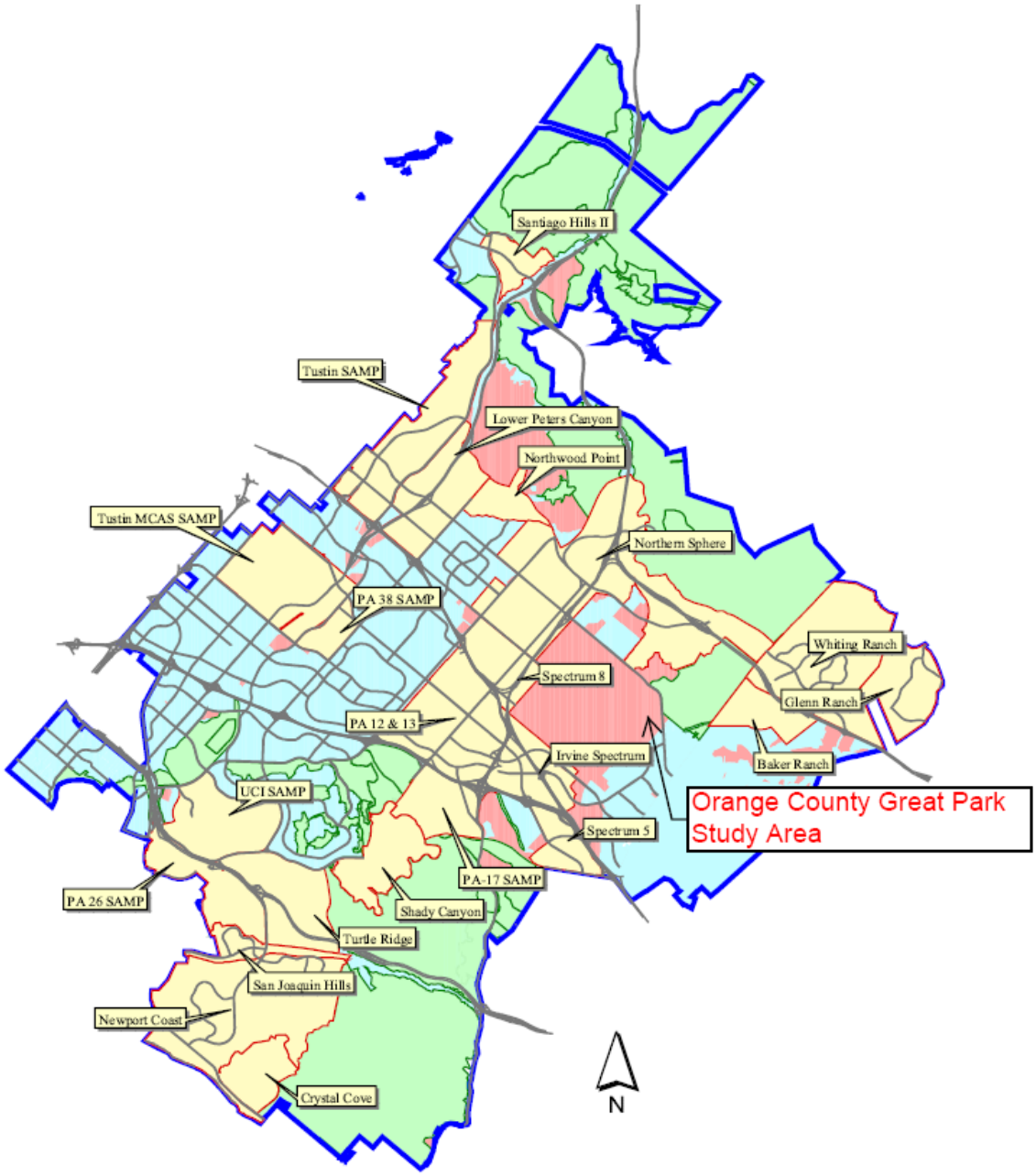
Modifications within Planning Areas 30 and 51 have been proposed since the original SAMP was completed. With the granting of 1,269 Density Bonus Units per state law in conjunction with Heritage Fields Master Affordable Housing Plan, the number of entitled dwelling units has increased to a maximum of 4,894. Table 2-1 includes a comparison of the land use from the March 2009 SAMP to this 2011 update. Along with inclusion of the Density Bonus Units, residential units remained in Districts 1 and 7, and added to Districts 4 and 8. The non-residential uses were retained in Districts 1, 2, 3, and 4, and added to Districts 5 and 6. In addition, development phasing, alignment of infrastructure and site road alignments have been modified.

These modifications affect the proposed on-site and off-site domestic water, wastewater, nonpotable water and natural treatment facilities. Therefore, the SAMP Update for these planning areas was completed such that the IRWD's service criteria will be met after incorporation of the revised planning as described above.

1.2 LAND USE

The Great Park is generally located in the center of the former base. The Great Park Neighborhoods portion of the former base is divided into nine distinct development areas, or districts.

- **Figure 1-1 – Location Map**



For the nine districts, approximately 4,900 residential units are entitled to be developed. Based on IRWD's density land use classifications, this equates to approximately 792 low density dwelling units, 1,820 medium density dwelling units, 1,505 medium-high density dwelling units, and 777 high density dwelling units. In addition to the residential areas, other land uses entitled by Heritage Fields, and their approximate building areas in thousand square feet (ksf), include 1,175 ksf Commercial – Community, 2,690 ksf Commercial - General Office, 1,245 ksf Commercial - Institutional, and 369 ksf Commercial - School. Lastly, approximately 12 acres will be used for agriculture.

For the Great Park, other city of Irvine and county of Orange parcels, the planned land uses, and their approximate building areas in thousand square feet (ksf), include 1,170 ksf Commercial - Institutional, 26 ksf Commercial - Recreational, and 229 ksf Commercial- Community. In addition, the Great Park will include 498 acres of Park – Regional, 165 acres of Park – Community and 215 acres of Habitat Restoration.

During the Irvine City Council meeting on September 12, 2006, the City and Heritage Fields, LLC discussed studying other land use options in addition to the one presented above, which could allow for approximately 9,500 residential dwelling units. Therefore, a sensitivity analysis section is included in each applicable chapter to discuss the changes to each system if the land use plan were to be modified.

The latest land use information for adjacent developments including Planning Areas 6, 9 and 40 have been utilized in analyzing the domestic, wastewater and nonpotable systems.

1.3 DOMESTIC WATER SYSTEM

Planning Areas 30 and 51 will be served by three domestic water pressure zones and one sub-zone. These pressure zones and their corresponding hydraulic grade lines (HGL) are Zone 5 with an HGL of 735 feet, Zone 4 with an HGL of 640 feet, Zone 4R with an HGL of 540 feet, and Zone 3 with an HGL of 470 feet. Pressure Zones 4 and 3 will be gravity fed, while Zones 5 and 4R will be pressure reduced zones.

When IRWD is importing water, the primary sources of supply will be the Allen-McColloch Pipeline (AMP) through the existing OC-72 and OC-73 turnouts. With the recent modifications to the OC-72 turnout, the AMP is discharged directly into both the Zone 4 and 3 water distribution systems. The new Zone 4 Portola Springs transmission main that parallels the Eastern Transportation Corridor (SR-241) supplies the new Portola Springs Zone 4-6 Booster Pump Station.

When IRWD is utilizing their groundwater supplies, the primary source is the Dyer Road Well Field and the Irvine Desalter Project (IDP). The Central Zone 1-3 Booster Pump Station, the two Zone 3-4 booster pump stations, and the Portola Springs Zone 4-6 Booster Pump Station will supply the water to its required HGL.

Based on the development plan land uses, the proposed development within the Study Area will require approximately 2,080 acre-feet per year of domestic water. With the assumed peaking factor, this equates to a maximum day demand of approximately 4.1 MGD. Flow rates are estimated to be 1,300 gpm, 2,860 gpm, and 4,540 gpm for average day, maximum day and peak hour demands, respectively.

The Study Area will require on-site transmission and distribution pipelines and three on-site pressure

reducing stations (PRS's). This study assumes that the two Zone 6-5 PRS's that are proposed for Planning Area 6 (Portola Springs) are installed and operational before the Zone 5 service zone of District 7 is required. If the northern portion of District 7 is developed before the Zone 5 service area of Portola Springs, a temporary hydropneumatic pump station will be required.

If the alternate land use were implemented, the flow rates would be estimated to be 2,020 gpm, 4,450 gpm, and 7,070 gpm for average day, maximum day and peak hour demands, respectively.

1.4 WASTEWATER COLLECTION SYSTEM

Wastewater generated by the Study Area generally flows to the southwest, towards the intersection of the Santa Ana Freeway (I-5) and the Eastern Transportation Corridor (SR-133). All flows will be conveyed to IRWD's off-site wastewater collection system by gravity sewer. No sewage lift stations will be required. Based on the development plan land uses, the average day dry weather flow generated by the Study Area will be approximately 1.3 MGD, or about 2.1 cfs. If the alternate land use were implemented, the average day dry weather flow generated by the Study Area will be approximately 2.1 MGD, or about 3.2 cfs.

In addition to the on-site wastewater generated, it is projected that off-site flows will be routed through the Study Area. The flows from the UC Regents parcel and the eastern portion of PA 40 and a portion of Planning Area 6 are proposed to be routed through the Study Area.

On-site wastewater collection facilities are comprised of 8-inch, 10-inch, 12-inch, 15-inch, 18-inch, 21-inch and 24-inch diameter sewers.

Off-site downstream improvements will include upsizing of portions of the existing 10-inch and 12-inch Reach "A" sewer to 15-inches in diameter. This trunk sewer parallels SR-133 from north of I-5 to the San Diego Creek Interceptor. Portions of the existing Reach "B" sewer, routed from the southern boundary of the Study Area to Technology Drive and then along Technology to Alton Parkway, will require upsizing from 18-inches to 24-inches in diameter. Lastly, the Alton trunk sewer will be relocated from the Serrano Creek to Alton Parkway from the intersection of Alton Parkway and Barranca Parkway to the San Diego Creek Interceptor.

1.5 NONPOTABLE WATER SYSTEM

Great Park/Great Park Neighborhoods nonpotable water demands will be served by three pressure zones, Zone D (HGL 850), Zone C (HGL 640), and Zone B (HGL 460). Zone D demands will be supplied from the Portola Springs Zone D Reservoir and the Zone C- D Booster Pump Station located in the Portola Springs development area. The Zone C demands will be supplied from the Portola Springs Zone C Reservoir, the Zone A-C Booster Pump Station located along Portola Parkway in the Orchard Hills development area, and the LF Zone B Reservoir, through the proposed LF Zone B to IRWD C PRS. Zone B will be gravity fed from the Northwood Zone B reservoir and the Zone B Laguna Tank. The Zone B Rattlesnake 75-1 Booster Pump Station and the LAWRP booster pump stations will also supply the Zone B system. The primary source water to the nonpotable system will be reclaimed water from the LAWRP and Michelson reclamation plant.

Based on the development plan land uses, the proposed development within the Study Area will require approximately 4,520 acre-feet per year of reclaimed water. With the assumed peaking factor, this equates to a maximum day demand of approximately 10.9 MGD. Flow rates were estimated to be 2,800 gpm, 7,600 gpm, and 15,400 gpm for average day, maximum day and peak hour demands, respectively.

In addition to the on-site transmission and distribution pipelines, the lower portion of the ILP will be converted from raw water to Zone C reclaimed. Other off-site improvements include the construction of the Alton Parkway 16-inch Zone C transmission main, the 12-inch LAWD Zone B transmission main along Alton Parkway and Commerce Centre Drive, and the proposed LAWD Zone B – Zone C PRS.

If the alternate land use were implemented, the flow rates would be estimated to be 1,700 gpm, 4,600 gpm, and 9,500 gpm for average day, maximum day and peak hour demands, respectively.

1.6 NATURAL TREATMENT SYSTEM

The Natural Treatment System (NTS) Plan was developed by IRWD to address water quality issues in the San Diego Creek Watershed within IRWD's jurisdiction. The primary purpose and overall goal of the NTS Plan is to cost-effectively improve water quality via the use of regional treatment systems that utilize natural treatment processes.

The NTS Plan identified six local NTS sites that were on or affected by property owned by the U.S. Navy at the time of the reports publication. These NTS sites are Site 18: Marshburn Retarding Basin, Site 22: MCAS El Toro - Agua Chinon Lower, Site 50: MCAS El Toro - Irvine Auto Center, Site 51: MCAS El Toro - Serrano, Site 52: MCAS El Toro - Bee Canyon, and Site 53: Caltrans SR 133/I5 Interchange.

The NTS Plan is intended to be flexible in terms of design, operation, maintenance and configuration of NTS facilities. Heritage Fields is currently working with IRWD on the protocol and procedures necessary to incorporate NTS sites as needed for the recent City of Irvine tentative map applications into the IRWD NTS Master Plan.

The NTS Plan developed water quality models to estimate the performance of the NTS Plan facilities and the effectiveness of the complete NTS Plan. Assessment of the NTS Plan was based on performance measures of pollutant removal and receiving water quality. The proposed NTS facilities should meet or exceed the sediment load removals, nitrogen removals and fecal coliform reductions as proposed in the model presented in the NTS Master Plan.

1.7 EASEMENTS

IRWD will require unlimited access to all of their facilities for routine maintenance, operations, repair, replacements, monitoring and other critical functions. The majority of these facilities will be located in public streets. However, several facilities may be located on private property. These facilities will include sewer pipelines and manholes that are required to provide gravity drainage for some proposed services while minimizing cover over the pipeline, domestic water pipelines that are required to provide critical looping to improve reliability and maintain system pressures, and public facilities in parks. In addition,

the development phasing may create instances in which the IRWD facilities are required to be in service before the street right-of-way is dedicated to the city of Irvine. For all locations in which an IRWD facility will not be located in the public right-of-way, an easement shall be granted to IRWD. Discussions regarding easements for Reach "A" , Reach "B" Sewer, and District 7 domestic and nonpotable pipelines with adjacent landowners are on-going.

If an easement to IRWD is required for construction and/or maintenance of water, sewer or reclaimed water facilities, the minimum easement width shall be ten feet for domestic and reclaimed water facilities and twenty feet for sewers. Deep sewer or water lines will require easements equal to twice the facility depth rounded upward to the nearest five feet. Easements shall be contained in single lettered lots and shall not straddle lot lines. In case of parallel facilities, the easement width shall not overlap.

1.8 TELEMETRY

One of the three domestic water pressure reducing stations will require telemetry. Changes in development plans or phasing could cause the installation of other temporary or permanent facilities requiring telemetry. The primary Zone 4-4R pressure reducing station will be fully telemetered with permanent, metered electrical service to communications to the MWRD Operations Center will be by programmable logic controller (PLC) via wireless radio signals.

The 2009 update to the IRWD Construction Manual W-15 Standard Drawing will be the source for telemetry standards and requirements for all facilities.

1.9 PROJECT PHASING

The Study Area is envisioned to be developed in six phases for this report. Phase 1 will include Great Park Neighborhoods District 8. Phase 2 will include Great Park Neighborhoods District 1 and a portion of the Great Park. Phase 3 will include Great Park Neighborhoods Districts 2 and 4. Phase 4 will include Great Park Neighborhoods District 7 and the portion of District 3 south of Alton Parkway. Phase 5 will include Great Park Neighborhoods Districts 5, 6 and the portion of District 3 north of Alton Parkway. Phase 5 will also include a portion of the Great Park and the parcels between Marine Way and the OCTA/Metrolink railroad. Phase 6 will include Great Park Neighborhoods District 9 and the remaining portion of the Great Park.

The proposed domestic water, wastewater and reclaimed water facilities improvements will be phased to accommodate this development phasing plan.

1.10 PROJECT COSTS

Project costs have been estimated for the proposed facilities to serve the Study Area. The costs have been divided by IRWD Capital and Non-Capital facilities by developer and summarized in Table 1-1.

Table 1-1. Estimated Project Costs (Baseline), dollars

Category	Total Estimated Project Costs[a]	Great Park Neighborhoods Portion[a]	Great Park Portion[a]	UC Regents Portion[a]	PA40 Portion[a]
Domestic Water					
Capital	$8,303,100	$5,445,200	$296,400	$1,543,500	$1,018,000
Non-Capital	$23,336,000	$23,336,000	[b]	[b]	[b]
Subtotal	**$31,639,100**	**$28,781,200**	**$296,400**	**$1,543,500**	**$1,018,000**
Wastewater Collection					
Capital	$11,626,500	$9,186,200	$211,300	$1,453,600	$775,400
Non-Capital	$23,259,000	$23,259,000	[b]	[b]	[b]
Subtotal	**$34,886,500**	**$32,445,200**	**$211,300**	**$1,453,600**	**$775,400**
Nonpotable Water					
Capital	$11,151,800	$6,388,900	$4,304,600	$214,100	$244,200
Non-Capital	$9,396,000	$9,396,000	[b]	[b]	[b]
Subtotal	**$20,547,800**	**$15,784,900**	**$4,304,600**	**$543,500**	**$244,200**
TOTAL	**$87,073,400**	**$77,011,300**	**$4,812,300**	**$3,540,600**	**$2,037,600**

[a] Includes a 35 percent allowance for design, contract administration, inspection, legal fees and construction contingencies.

[b] Non-Capital facilities and their related project costs will be analyzed in an independent SAMP or in an update to this SAMP.

CHAPTER 2 – LAND USE

2.1 HISTORY AND GENERAL DESCRIPTION OF STUDY AREA

The former Marine Corps Air Station El Toro (MCAS El Toro) encompasses 3,724 acres that is generally bounded by the I-5 (Santa Ana Freeway) and the Metrolink right-of-way to the south, portions of Alton and Bake Parkway to the east, Portola Parkway to the north, and State Route 133 (Laguna Canyon Road) to the west. After a history of being farmed, MCAS El Toro was commissioned in 1943 and used as a military airfield. As part of the Federal Base Realignment and Closure practice, MCAS El Toro was officially closed on July 2, 1999. In 2002, the majority of Orange County voters approved Measure W, which amended the Orange County General Plan to create a park and other land uses at the former base. The City of Irvine annexed the property in 2003, and added Planning Areas 30 and 51 to the City of Irvine General Plan.

In early 2005, the former MCAS El Toro was auctioned as four parcels by the Department of the Navy. Through a public, on-line auction, Heritage Fields LLC bought all of the parcels.

As part of the development agreement between the developers and the City of Irvine, Heritage Fields LLC transferred 1,347 acres to public ownership.

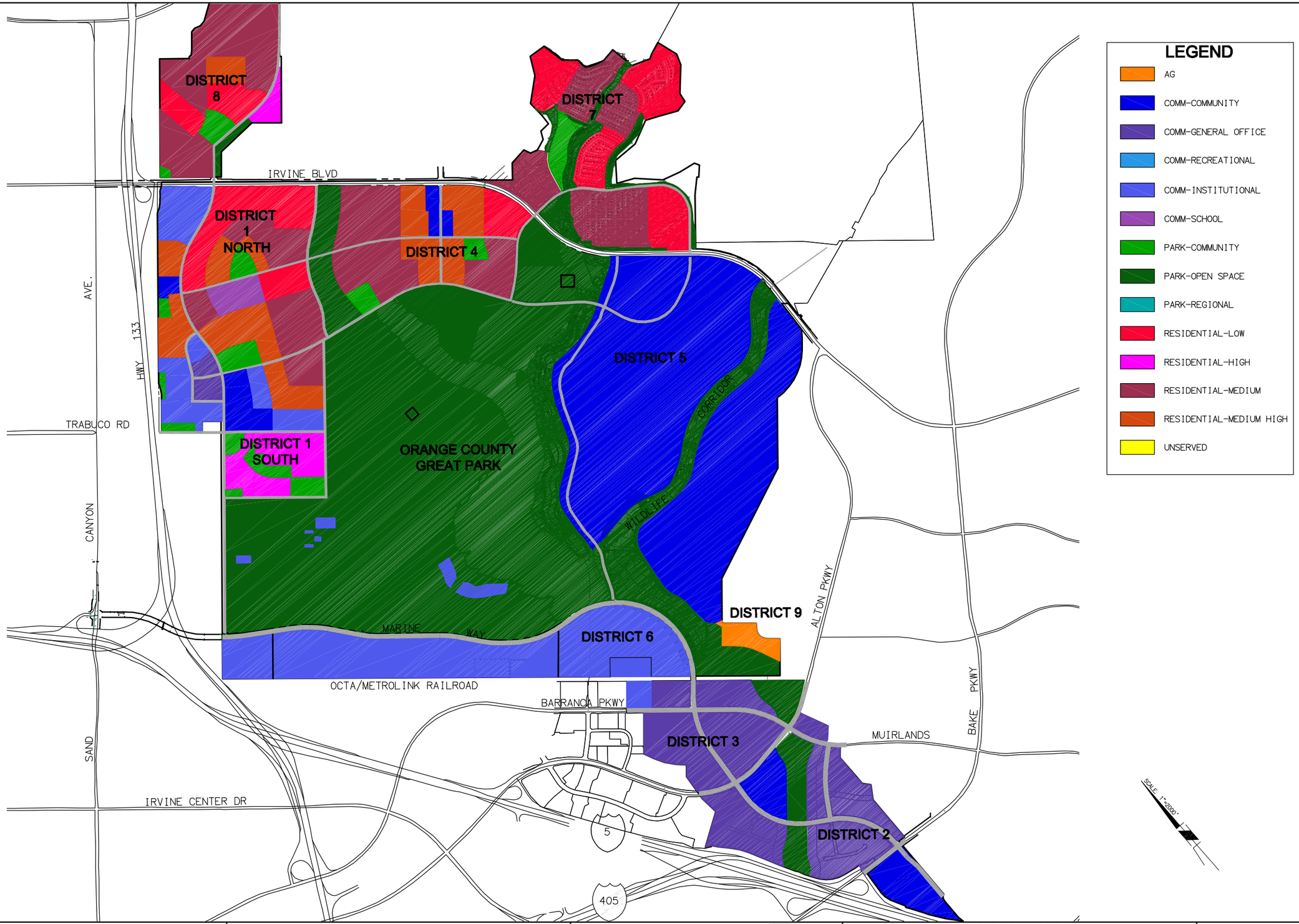
The Planning Areas 30 and 51 Study Area is comprised of parcels with both public and private ownership. The portion of the site that will be in public ownership is called the Great Park/Public Ownership land use. The Great Park will be developed by the Great Park Corporation. Other public ownership parcels will be developed by the County of Orange or City of Irvine. The portion of the land that is not the Great Park/Public Ownership will be called the Great Park Neighborhoods.

The Great Park will generally be located in the center of the former base. The Great Park Neighborhoods portion of the former base will be divided into nine distinct development areas, or Districts.

2.2 PROPOSED LAND USE

The proposed land uses are illustrated in Figure 2-1. A detailed breakdown of the land uses proposed within the Study Area by District is provided in Table 2-1. The land uses are subtotaled for each of the nine Districts, the Great Park, and other City and County owned parcels. The proposed Districts are illustrated in Figure 2-2. Land use and site development planning information for Great Park Neighborhoods was provided by Heritage Fields, LLC. Land use information for the Great Park was provided by The Great Park Corporation. For the nine districts, approximately 4,900 residential units are planned to be developed. Based on IRWD's density land use classifications, this equates to approximately 792 low density dwelling units, 1,820 medium density dwelling units, 1,505 medium-high density dwelling units, and 777 high density dwelling units. In addition to the residential areas, other land uses planned, and their approximate building areas in thousand square feet (ksf), include 1,175 ksf Commercial – Community, 2,690 ksf Commercial - General Office, 1,245 ksf Commercial - Institutional, and 369 ksf Commercial - School. Lastly, approximately 12 acres will be used for agriculture.

The Great Park's, and other City and County owned parcels' planned land uses, and their approximate building areas in thousand square feet (ksf), include 1,170 ksf Commercial - Institutional, 26 ksf Community - Recreational, and 229 ksf Commercial - Community. In addition, the Great Park will include 498 acres of Park – Regional, 165 acres of Park - Community and 215 acres of Habitat Restoration.



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PLANNING ■ DESIGN ■ CONSTRUCTION
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8122 • www.RBF.com

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IRVINE RANCH WATER DISTRICT

IRVINE RANCH WATER DISTRICT
GREAT PARK / GREAT PARK NEIGHBORHOODS
SUB-AREA MASTER PLAN
(2011 UPDATE)
PROPOSED LAND USE PLAN

FIG. 2-1

DISTRICT 8

DISTRICT 7

IRVINE BLVD

DISTRICT 1 NORTH

DISTRICT 4

AVE.

HWY 133

DISTRICT 5

CORRIDOR

WILDLIFE

TRABUCO RD

DISTRICT 1 SOUTH

ORANGE COUNTY GREAT PARK

CANYON

DISTRICT 9

ALTON PKWY

MARINE WAY

DISTRICT 6

COUNTY

OCTA/METROLINK RAILROAD

BARRANCA PKWY

DISTRICT 3

MUIRLANDS

BAKE PKWY

SAND

IRVINE CENTER DR

5

DISTRICT 2

405

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PLANNING ■ DESIGN ■ CONSTRUCTION
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IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8122 • www.RBF.com

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IRVINE RANCH WATER DISTRICT
GREAT PARK / GREAT PARK NEIGHBORHOODS
SUB-AREA MASTER PLAN
(2011 UPDATE)

DISTRICT BOUNDARIES

FIG. 2-2

Table 2-1. Proposed Land Use Summary

Land Use	2009 SAMP			2011 SAMP		
	Area, acres[a]	Dwelling Units	Area (Sq. Feet)	Area, acres[a]	Dwelling Units	Area (Sq. Feet)
District 1[b]						
Residential - Low Density	186.2	704	-	45.8	262	-
Residential - Medium Density	-	-	-	51.1	378	-
Residential - Medium-High Density	17.9	412	-	55.1	809	-
Residential - High Density	3.4	60	-	44.4	611	-
Commercial - Community	3.9	-	126,000	26.6	-	165,000
Commercial - General Office	73.6	-	1,000,001	9.6	-	138,700
Commercial - Institutional	19.9	-	272,720	61.5	-	578,500
Commercial - School	96.0	-	1,169,881	21.4	-	368,500
Park - Community	6.5	-	-	22	-	-
District 1 Subtotal	**407.4**	**1,176**	**2,493,602**	**337.5**	**2,060**	**1,250,700**
District 2[b]						
Commercial - Community	32.0	-	102,000	32	-	102,000
Commercial - General Office	119.0	-	1,600,000	127.6	-	1,600,000
District 2 Subtotal	**151.0**	**0**	**1,702,000**	**159.5**	**0**	**1,702,000**
District 3[b]						
Commercial - General Office	5.6	-	75,000	72.7	-	951,300
Commercial - Institutional	-	-	-	28.6	-	144,400
Residential - Medium Density	39.1	282	-	-	-	-
Residential - Medium-High Density	39.0	493	-	-	-	-
Commercial - Community	5.9	-	75,000	-	-	-
District 3 Subtotal	**89.6**	**775**	**150,000**	**101.3**	**0**	**1,095,700**
District 4[b]						
Residential - Low Density	-	-	-	14.2	66	-
Residential - Medium Density	-	-	-	69.1	428	-
Residential - Medium-High Density	-	-	-	35.4	608	-
Commercial - Community	2.3	-	75,000	7.1	-	70,000
Commercial - School	14.2	-	172,900	-	-	-
Commercial - Recreational	103.0	-	708,000	-	-	-
Park - Community	-	-	-	8.5	-	-
District 4 Subtotal	**119.5**	**0**	**955,900**	**134.3**	**1,102**	**70,000**
District 5[b]						
Commercial - Community	-	-	-	563.6	-	838,000
Commercial - Recreational	3.1	-	25,000	-	-	-
Residential - Low Density	210.0	630	-	-	-	-
Park - Regional	207.9	-	-	-	-	-
District 5 Subtotal	**421.0**	**630**	**25,000**	**563.6**	**0**	**838,000**

Table 2-1. Proposed Land Use Summary (continued)

Land Use	2009 SAMP Area, acres[a]	2009 SAMP Dwelling Units	2009 SAMP Area (Sq. Feet)	2011 SAMP Area, acres[a]	2011 SAMP Dwelling Units	2011 SAMP Area (Sq. Feet)
District 6[b]						
Commercial - Institutional	-	-	-	80.8	-	523,000
Residential - Medium Density	57.3	725	-	-	-	-
Park - Community	4.0	-	-	-	-	-
District 6 Subtotal	**61.3**	**725**	**0**	**80.8**	**0**	**523,000**
District 7[b]						
Residential - Low Density	156.5	470	-	59.6	341	-
Residential - Medium Density	-	-	-	70.5	499	-
Fuel Modification Zone	17.3	-	-	-	-	-
Park - Community	-	-	-	6.4	-	-
District 7 Subtotal	**173.8**	**470**	**0**	**136.5**	**840**	**0**
District 8[b]						
Residential - Low Density	-	-	-	27.8	123	-
Residential - Medium Density	-	-	-	72.1	515	-
Residential - Medium-High Density	-	-	-	8.3	88	-
Residential - High Density	-	-	-	7.5	166	-
Park - Community	-	-	-	6	-	-
Agricultural	168.6	-	-	6	-	-
District 8 Subtotal	**168.6**	**0**	**0**	**121.7**	**892**	**0**
District 9[b]						
Agricultural	12.4	-	-	12.4	-	-
District 9 Subtotal	**12.4**	**0**	**0**	**12.4**	**0**	**0**
Great Park/Public Ownership[c]						
Commercial - Community	19.5	-	53,500	19.5	-	53,500
Commercial - Institutional	210.7	-	1,170,500	308.2	-	1,170,500[d]
Park - Open Space	94.6	-	-	406.7	-	-
Park - Community/Institutional	3.3	-	26,000	165	-	26,000[e]
Habitat - Restoration	215.0	-	-	215	-	-
Park - Regional	854.3	-	75,000	498	-	-
Great Park/Public Subtotal	**1,397.4**	0	**1,325,000**	**1397.4**	**-**	**1,250,000**
TOTAL	**3,002**	**3,776**	**6,661,502**	**3002**	**4,894**	**6,729,400**

a. The subtotals of acreage vary from 2009 to 2011 SAMP, as the previous Planning Subareas are now broken up into a number of distinct development Districts.

b. Land use information was obtained from Heritage Fields, LLC.

c. Land use information was obtained from The Great Park Corporation.

d. The Commercial – Institutional land use includes 468,000 square feet in the Great Park parcel, and 563,000 square feet in the County parcel south of Marine Way and north of the OCTA Metrolink Railroad. It also includes 122,500 square feet for the most southwest parcel that is east of "O" Street, south of Marine Way and north of the OCTA Metrolink Railroad. Lastly it includes 10,000 and 7,000 square feet for the two parcels immediately northeast and east, respectively, of the existing OCTA station within the Transit Oriented Development District.

e. This land use is located within the Great Park.

2.3 RESOURCE AGENCY PERMITS

The developers will be responsible for the preparation, processing, and acquisition of any and all resource agency permits required for the various development areas within the project grading boundaries. These resource agency permits shall include any impacts caused by the construction of recommended IRWD capital projects within the Study Area's boundaries.

However, the preparation, processing, and acquisition of permits for necessary facilities that fall outside the grading boundaries of the projects will be the responsibility of IRWD.

2.4 SENSITIVITY ANALYSIS

During the Irvine City Council meeting on September 12, 2006, the City and Heritage Fields, LLC discussed studying other land use options in addition to the one presented above (Table 2-1), which could allow for approximately 9,500 residential dwelling units.

Since alternate land uses are plausible, the SAMP will include analysis regarding the changes required to serve the highest intensity land use plan contemplated by Heritage Fields, LLC and the City of Irvine at this time. The potential development could allow for approximately 9,500 residential dwelling units. Therefore, a sensitivity analysis section has been included in each applicable chapter to discuss the changes to each system if the land use plan were changed.

CHAPTER 3 – DOMESTIC WATER SYSTEM

3.1 DOMESTIC WATER PRESSURE ZONE SERVICE AREAS

IRWD established criteria in their 1999 Water Resources Master Plan (1999 WRMP) for determining domestic water pressure zone service boundaries. The 1999 WRMP guidelines require, when feasible, to adhere to the criteria as shown in Figure 3-1 and described below:

- The minimum static pressure is equal to 58 pounds per square inch (psi) based on a full reservoir.
- The maximum static pressure is equal to 100 psi, based on a full reservoir.

Therefore, in a standard pressure zone, the highest allowable service elevation is determined by subtracting 134 feet (58 psi) from the full reservoir level. The lowest allowable service level is determined by subtracting 231 feet (100 psi) from the reservoir high water level (HWL).

Pressures falling between 80 and 100 psi, based on the IRWD's established reservoir elevations, will be regulated by individual pressure regulators. Where system pressures exceed 100 psi, system pressure reducing stations (PRS) will be installed to create pressure reduced sub-zones, limiting maximum line pressures to 100 psi. Certain isolated areas were allowed to exceed 100 psi to avoid excessive additional facilities and accommodate development phasing.

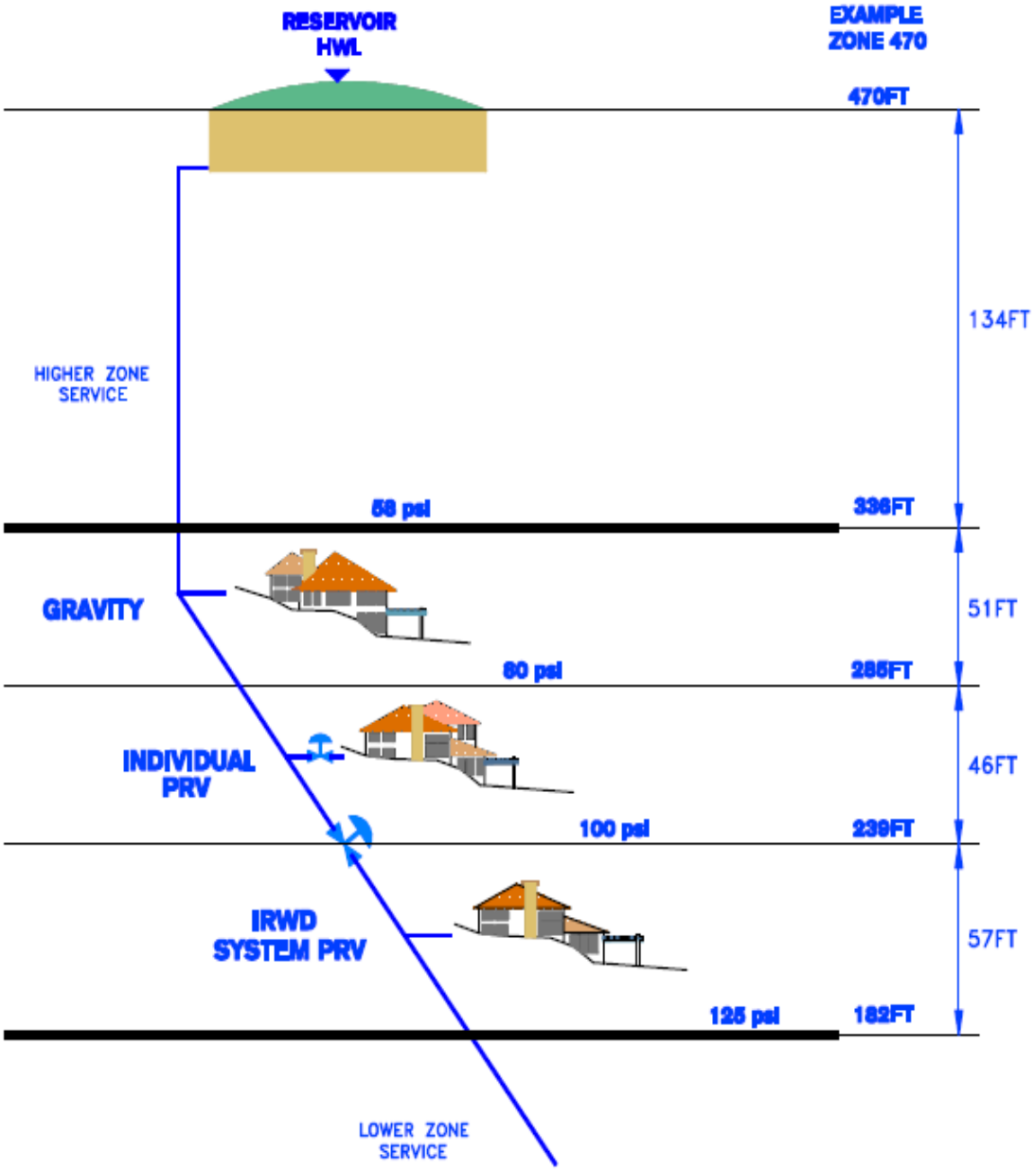
Based on these guidelines, the Study Area will be served by three pressure zones and one sub-zone. These pressure zones and their corresponding hydraulic grade lines (HGL) are Zone 5 with an HGL of 735 feet, Zone 4 with an HGL of 640 feet, Zone 4R with an HGL of 540 feet, and Zone 3 with an HGL of 470 feet. Pressure Zones 4 and 3 will be gravity fed, while Zones 5 and 4R will be pressure reduced zones.

Zone 5 will be a pressure reduced zone supplied from Zone 6. Zone 6 will be supplied by the recently-constructed Portola Zone 4-6 Booster Pump Station and the 2.5 MG Zone 6 Reservoir northeast of Portola Springs. Since Zone 6 is a single source of supply distribution system, the Zone 5 system will be as well. The Zone 5 distribution system will include two proposed pressure reducing stations. Both of these stations will be located within the second phase of Portola Springs, which is northeast of the Study Area. If the development within District 7 of the Study Area occurs before the Irvine Community Development Company (ICDC) develops phase 2 of Portola Springs, a small Zone 4-5 booster pump station may be required to operate in a closed-loop.

Zone 4 will be supplied from the north by the 3.5 MG Zone 4 Reservoir in Portola Springs; the Portola Springs Zone 3-4 Booster Pump Station, along Portola Parkway east of the SR-133; and the OC-72 turnout of the AMP. Zone 4 will be supplied from the east by the existing 2.5 MG East Irvine Zone 4 Reservoir, the existing East Irvine Zone 3–4 Booster Pump Station, and the Lake Forest Zone 5 Reservoir, through the planned Lake Forest Zone 5 – 4 pressure reducing station.

Zone 4R will be a pressure reduced zone supplied from Zone 4. Two existing PRS's located near the northern portion of the Study Area will provide the supply to Zone 4R. One of these stations is located within the Portola Springs Zone 3-4 Booster Pump Station. The second PRS is located along Irvine Boulevard, just west of its intersection with Modjeska.

Figure 3-1 Typical Static Domestic Water System Service Range



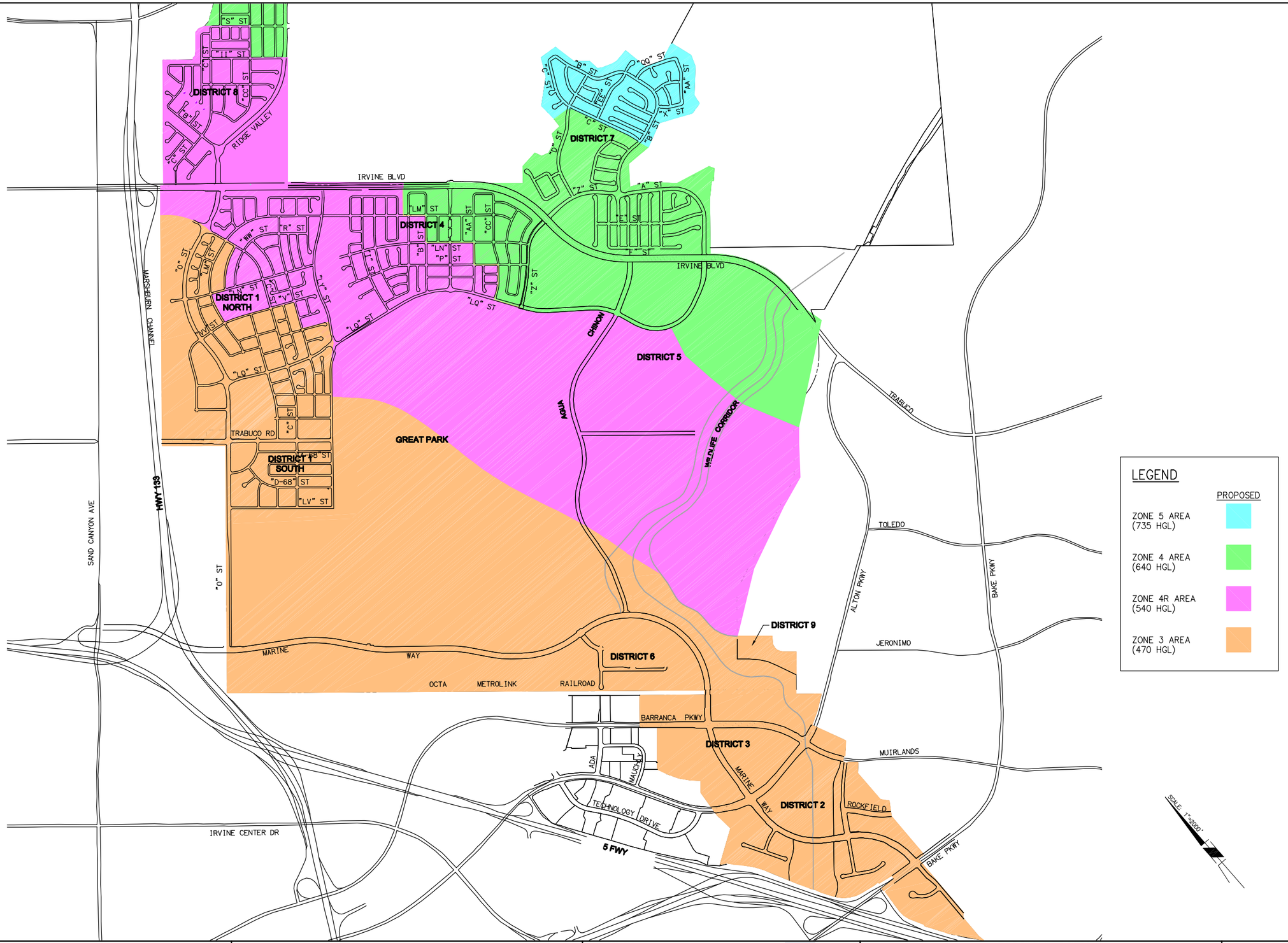
Zone 3 will be supplied from the north and west by the 6.0 MG Zone 3 Lomas Valley Reservoir, the Central Zone 1-3 Booster Pump Station adjacent to Sand Canyon Avenue and OC-72 turnout of the Allen-McCulloch Pipeline (AMP). Zone 3 will be supplied from the east by the existing 5.0 and 7.0 MG East Irvine Zone 3 Reservoirs.

Table 3-1 provides a summary of the proposed pressure zones, including minimum and maximum anticipated static pressures. Figure 3-2 graphically illustrates the pressure zone service areas described above.

Table 3-1. Domestic Water System Pressure Zone Summary

Pressure/Zone Facility Sources	PRS No.	HGL ft.	Pad Elevations Served,[a] ft,		Static Pressure[a]	
			Upper	Lower	Min. psi	Max. psi
Zone 5 Portola Springs Zone 6 Reservoir & Portola Springs Zone 4 - 6 BPS through PRS's in Portola Springs		735 730	536	505	86	100
Zone 4 Portola Springs, East Irvine Zone 4 Reservoirs Portola Springs, East Irvine Zone 3-4 BPS's OC-72 Turn-out Lake Forest Zone 2 West Reservoir		640	505	390	58	108[e]
Zone 4R PRS at Zone 3 to 4 BPS PRS at Irvine/Modjeska PRS in District 8 PRS in District 4 PRS in District 5	 1[d] 2[c] 3[d]	540 535 535 540 535	406	314	58	98
Zone 3 Portola Springs, East Irvine Zone 3 Reservoirs Central Zone 1 -3 BPS OC-72 Turn-out		470	336	256	58	93

[a] Pad elevations noted are tentative based on rough grading, and are within the Study Area only.
[b] Lots with static pressure greater than 80 psi require individual pressure regulating valves.
[c] Primary source feed PRS
[d] Secondary source feed PRS
[e] To reduce dual piping costs, some service connections may have static water pressures above 100 psi. All Zone 4 service connections with elevations below 409 feet should be equipped with individual PRVs.



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PLANNING ■ DESIGN ■ CONSTRUCTION
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IRVINE, CALIFORNIA 92618-2027
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SUB-AREA MASTER PLAN
(2011 UPDATE)

DOMESTIC WATER PRESSURE ZONES

FIG. 3-2

PATH/FILENAME: H:\PDATA\10105001\ADMIN\RWD\RWD SAMP\SAMP 2011 UPDATE\DWG\FIG 3-2 DW PRESSURE ZONES.DWG
LAST UPDATE: Wednesday, August 24, 2011 11:13:58 AM
PLOT DATE: Wednesday, August 24, 2011 11:15:51 AM
ANSI D — 3-8-05

When IRWD is importing water, the primary sources of supply will be the AMP through the existing OC-72 and OC-73 turnouts. The AMP OC-72 turnout discharges directly into both the Zone 4 and 3 water distribution systems. The Zone 4 Portola Springs transmission main that parallels the Eastern Transportation Corridor (SR-241) supplies the new Portola Springs Zone 4-6 Booster Pump Station.

When IRWD is utilizing their groundwater supplies, the primary source is the Dyer Road Well Field and the Irvine Desalter Project (IDP). The Central Zone 1-3 Booster Pump Station, the two Zone 3-4 booster pump stations, and the Portola Springs Zone 4-6 Booster Pump Station will supply the water to its required HGL.

The redundancy in supply options is a beneficial strategic decision as, according to the latest draft of the WRMP, groundwater supply is expected to increase, and be a significant and cost effective potable water supply in the future. IRWD's goal is to achieve a 75-percent basin production percentage (BPP) as defined by the OCWD. Recently completed groundwater supply projects such as the Irvine Desalter Project (IDP) and the Deep Aquifer Treatment System (DATS) will help IRWD achieve this goal. Annual water supply projections to meet future demands, under normal operating conditions in 2025, show that clean groundwater and treated groundwater supplies will increase while treated water from MWD will remain relatively unchanged as the existing conditions.

3.2 DOMESTIC WATER USE FACTORS

Table 3-2 reflects current water use factors from the WRMP. Water use factors from the WRMP were used for calculation of the average day demands.

Table 3-2. Domestic Water Use Factors

Land Use, Units	Average Day Use Factor[a]
Res. Low, gpd/du	405
Res. Medium, gpd/du	335
Res. Medium-High, gpd/du	185
Res. High, gpd/du	160
Res. Very High, gpd/du	170
Comm - Community, gal/ksf/day	185
Comm - General Office, gal/ksf/day	60
Comm - Institutional, gal/ksf/day	45
Comm - Regional, gal/ksf/day	170
Comm - Recreation, gal/ksf/day	60
Comm-School, gal/ksf/day	13
AG, gal/acre/day	0
Park[b] - Regional, gal/acre/day	0
Park[b] – Community, gal/park/day	0

[a] Based on WRMP assumption of domestic supply for interior and exterior.
[b] Assumed local demand for parks. Nonpotable water used for irrigation purposes.

3.3 DOMESTIC WATER PEAKING FACTORS

Peaking factors developed in the 2003 update to the 1999 WRMP, from Figure 3-6, were used in this SAMP to more closely reflect the peak demands for the Study Area. For the analysis, the maximum day factor is 2.2 times the average day demands, and the peak hour factor is 3.5 times the average day demands.

3.4 PROJECTED DOMESTIC WATER DEMANDS

Domestic water demands are estimated based on the assumption that the nonpotable system is implemented to the fullest extent practical to irrigate parks, recreational areas, and common landscape areas. Domestic water will be used to serve all interior and exterior uses, including fire flows, to residential lots and structures. Table 3-3 summarizes the domestic water demands by land use within each District. Table 3-4 summarizes the domestic water demands by pressure zone.

Table 3-3. Estimated Domestic Water Demands by District

Land Use	Units[a]	Demand, gpm		
		Average Day	Max. Day	Peak Hour
District 1				
Residential – Low Density	262	74	162	258
Residential – Medium Density	378	88	193	308
Residential – Medium-High Density	809	104	229	364
Residential – High Density	611	68	149	238
Commercial – Community	165 [b]	21	47	74
Commercial – General Office	139 [b]	6	13	20
Commercial – Institutional	579 [b]	18	40	63
Commercial – School	369 [b]	3	7	12
District 1 Subtotal		**382**	**840**	**1336**
District 2				
Commercial – Community	102 [b]	13	29	46
Commercial – General Office	1600 [b]	67	147	233
District 2 Subtotal		**80**	**175**	**279**
District 3				
Commercial – General Office	951 [b]	40	87	139
Commercial – Institutional	144 [b]	5	10	16
District 3 Subtotal		**44**	**97**	**155**
District 4				
Residential – Low Density	66	19	41	65
Residential – Medium Density	428	100	219	348
Residential – Medium-High Density	608	78	172	273
Commercial – Community	70 [b]	9	20	31
District 4 Subtotal		**205**	**452**	**718**
District 5				
Commercial – Community	838 [b]	108	237	377
District 5 Subtotal		**108**	**237**	**377**

Table 3-3. Estimated Domestic Water Demands by District (continued)

Land Use	Units[a]	Demand, gpm		
		Average Day	Max. Day	Peak Hour
District 6				
Commercial - Institutional	523 [b]	16	36	57
District 6 Subtotal		**16**	**36**	**57**
District 7				
Residential - Low Density	60	96	211	336
Residential - Medium Density	71	116	255	406
District 7 Subtotal		**212**	**466**	**742**
District 8				
Residential - Low Density	123	35	76	121
Residential - Medium Density	515	120	264	419
Residential - Medium-High Density	88	11	25	40
Residential - High Density	166	18	41	65
District 8 Subtotal		**184**	**405**	**645**
District 9				
AG	0	0		
District 9 Subtotal				
Great Park/Public Ownership				
Commercial - Community	229 [b]	29	65	103
Commercial - Institutional	1171 [b]	37	80	128
Park - Open Space	0	0	0	0
Park-Regional/ Commercial-Institutional	26 [b]	1	2	3
Great Park/Public Subtotal		**67**	**147**	**234**
TOTAL		**1298**	**2856**	**4543**

[a] Units for residential land uses are dwelling units. For all non-residential land uses, the total building area in ksf or the total land area in acres is listed for units.
[b] Units are in thousand square feet of building.

Table 3-4. Estimated Domestic Water Demands by Pressure Zone

Land Use	Units[a]	Demand, gpm		
		Average Day	Max. Day	Peak Hour
Zone 5				
Residential - Low Density	165	46	102	162
Residential - Medium Density	102	24	52	83
Zone 5 Subtotal		**70**	**154**	**245**
Zone 4				
Residential - Low Density	242	68	150	238
Residential - Medium Density	506	118	259	412
Residential - Medium-High Density	321	41	91	144
Commercial - Community	291[b]	37	82	131
Zone 4 Subtotal		**264**	**582**	**926**
Zone 4R				
Residential - Low Density	385	108	238	379
Residential - Medium Density	1212	282	620	987
Residential - Medium-High Density	988	127	279	444
Residential - High Density	166	18	41	65
Commercial - Community	617[b]	79	174	277
Commercial - Institutional	280[b]	9	19	31
Commercial - School	172[b]	2	3	5
Zone 4R Subtotal		**620**	**1,365**	**2,188**
Zone 3				
Residential - Medium-High Density	196	25	55	88
Residential - High Density	611	68	149	238
Commercial - Community	496[b]	64	140	223
Commercial - General Office	2690[b]	112	247	392
Commercial - Institutional	2136[b]	67	147	234
Commercial - School	197[b]	2	4	6
Park - Regional	26[b]	1	2	3
Zone 3 Subtotal		**338**	**744**	**1,184**
TOTAL		**1,298**	**2,856**	**4,543**

[a] Units for residential land uses are dwelling units. For all non-residential land uses, the total building area in ksf or the total land area in acres is listed for units.
[b] Units are in thousand square feet of building.

3.5 DOMESTIC WATER SYSTEM EVALUATION CRITERIA AND ASSUMPTIONS

The water system analysis for this SAMP was performed using steady-state computer model simulations (peak hour demands day plus and maximum fire flow conditions). An Extended Period Simulations (EPS) runs over a 24-hour period maximum day demand was also performed.

The model analysis for peak hour demands initially sized pipelines to maintain velocities below eight (8) feet per second (fps). Pipe diameters were increased as necessary to maintain a minimum 20 psi residual pressure during fire flow conditions. Dead-end mains in cul-de-sacs having less than 28 lots, less than 600 feet in length, and no more than two fire hydrants are acceptable, pursuant to IRWD design criteria.

Fire flow criteria are based on the 1999 WRMP and other recent IRWD SAMP's. Table 3-5 summarizes the proposed fire flow requirements. The multi-family housing areas are assumed to incorporate fire sprinkler systems, and would thus require a fire flow no greater than 3,000 gpm as required for multi-family uses. The required minimum residual pressure pursuant to IRWD design criteria is 20 psi. Single family homes may also require sprinkler systems to meet City of Irvine Standards. This could impact the meter and service size required. The Orange County Fire Authority and the City of Irvine should be contacted prior to making any adjustments to the criteria in Table 3-5. Actual fire flow requirements are determined upon final tract approval. Detailed information regarding building areas and types of construction is required to provide a more exact estimate of the required fire flows.

Table 3-5. Fire Flow Criteria

Land Use	Fire Flow Criteria[a]	Duration[b], hours
Low Density Residential	1,750 gpm	2
Medium Density Residential	2,500 gpm	2
Medium-High/High Density Residential	3,000 gpm	4
School	3,000 gpm	4
Commercial/Industrial	4,000 gpm	4

[a] Fire flow criteria obtained from ranges given in IRWD's 1999 WRMP.
[b] Estimated fire duration.

3.6 WATER STORAGE REQUIREMENTS ANALYSIS

Domestic water storage requirements for Great Park/Great Park Neighborhoods are determined based on the District's storage criteria and requirements as established in the latest revision of Chapter 5 of the WRMP. The local storage necessary for the operation of the potable water system is divided into three categories: operational storage, fire flow storage, and emergency storage.

Operational storage must be provided in each service zone to balance differences between the rate of supply and hourly demand on a maximum day. Operational storage is equal to the maximum day demand times the appropriate storage factor from Table 5-1 of the WRMP. The operational storage as a percentage of demand is assumed for mid-peak (No pumping from 11 AM to 6 PM). Based on Table 5-1 of the WRMP, this factor is 23 percent for Zone 6. It is 27 percent for Zone 4 and 42 percent for Zone 3.

For the entire storage zone that includes services areas outside the Study Area, fire flow storage is equal to 0.6 MG for residential development and 1.92 MG for commercial and industrial development. Consistent with the requirements in the WRMP for calculating storage requirements, the residential volume shall be calculated by multiplying the required fire flow rate of 2,500 gpm times a duration of four hours. Since areas within the storage zone that are not within the Study Area may not have sprinkler systems, the commercial and industrial volume shall be computed by multiplying the required flow rate of 8,000 gpm times a duration of four hours.

Local emergency storage is equal to one maximum day demand. When computing maximum day demands for storages calculations, the District-wide maximum day peaking factor of 1.8 is used.

For service zones with more than one source of supply, total local storage is equal to the larger of operational and fire storage volumes, or local emergency within each tank service zone. However, the local storage for service zones dependent on a single source of supply is equal to the sum of the three.

3.6.1 ZONE 6 ANALYSIS

Although the Study Area will not be served by pressure Zone 6, the storage for Zone 5 will be in the East AMP Zone 6 Reservoir. The 2.5 MG Zone 6 reservoir is located north of Portola Springs. This reservoir will serve the Portola Springs (PA 6), the Lambert Ranch within Portola Springs, and Great Park/Great Park Neighborhoods. Table 3-6 provides a calculation of the Zone 6 required storage. Due to decreases in both the estimated Portola Springs and Study Area demands, the provided storage will be more than sufficient. Based on the calculations provided in Table 3-6, the existing storage capacity in Zone 6 will be sufficient for the requirements of the Study Area.

3.6.2 ZONE 4 ANALYSIS

The East AMP Zone 4 storage area includes pressure zones 4 and 4R in Portola Springs, Zone 4 in Lambert Ranch, the UC Regents property, Zone 4R in PA 9C, existing PA 35, and Zones 4 and 4R in Great Park/Great Park Neighborhoods. The existing 3.5 MG Portola Springs and the 2.5 MG East Irvine reservoirs provide storage capacity to the East AMP Zone 4 storage area. Based on the calculations provided in Table 3-6, approximately 1.87 MG of additional storage capacity in Zone 4 will be required for the ultimate build-out of the storage zone.

The Lake Forest Zone 2 (LF2) service area is northeast of the Study Area. The LF2 storage zone includes two 7.8 MG reservoirs, called LF2 East and LF2 West, and has an HGL of 883 feet. According to the Lake Forest Area SAMP dated October 2010, the LF2 storage zone is projected to have a future surplus storage capacity of 9.58 MG. Assuming that one-half of the zone's excess storage capacity is contained within each reservoir, the surplus capacity in each reservoir is approximately 4.79 MG. The LF2 West reservoir is located along Rancho Parkway South between Bake Parkway and the extension of Alton Parkway currently under construction. Once the water transmission main in Alton Parkway is completed in late 2011, the LF2 reservoir will be able to feed Zone 4 through a pressure reducing station located near the OC-73 turnout from the AMP. Therefore, LF2 West will provide sufficient operational storage to compensate for the deficit in East AMP Zone 4 and no additional storage will be required. Per the hydraulic analysis, no water should be required from Lake Forest Zone 2 to supply Zone 4 during normal operating conditions. Thus, Lake Forest Zone 2 should only supply water to Zone 4 in the event that the Zone 4 reservoir is at a lower water level or out of service, or under fire flow conditions for Zone 4.

3.6.3 ZONE 3 ANALYSIS

In the 1999 WRMP, IRWD identifies three Zone 3 storage zones. As shown in Table 5-2 of the 1999 WRMP, they are the East Irvine, Northwood and South storage zones. Storage reservoirs for these storage zones include the 5.0 MG Northwood Tank, 6.0 MG Lomas Valley Tank, the 7.0 MG and 5.0 MG East Irvine Tanks, and the 3.5 MG Quail Hill Tank. As the District approaches build out, the boundaries between these storage zones start to disappear. The water distribution system has expanded so that the water stored in one storage zone can be delivered to other storage zones if needed.

A hydraulic study was performed to determine which reservoirs could serve each planning area of the Zone 3 storage service area. The study concluded that the Northwood Tank could provide water to Planning Areas 1, 2, 5A, 5B, 9A, 9B, 40 and 9C. The Lomas Valley Tank could provide water to Planning Areas 5A, 5B, 9A, 9B, 9C, 32, 33, 34, 35, 39, 17 and 22. The East Irvine Tanks could supply water to Planning Areas 12, 13C, 30, 31, 51, 32, 33, 34, 35 and 39. The Quail Hill Tank could provide water to Planning Areas 12, 13C, 31, 17 and 22.

Table 3-6. Domestic Water Zone 6 and 4 Storage Analyses

Storage Tank	Planning Area/ Service Area	Avg Day Demand MGD	Max Day Demand MGD	Oper. Storage MG	Local Emergency Storage MG	Fire Flow MG	Total Storage Required MG	Existing Storage MG	Additional Storage Required MG
East AMP Zone 6	Portola Springs - Zone 6[a]	0.261	0.469	0.108	0.469				
	Portola Springs - Zone 5[a]	0.161	0.290	0.067	0.290				
	Lambert Ranch - Zone 5R[b]	0.023	0.041	0.009	0.041				
	Great Park Neighborhoods - Zone 5	0.101	0.182	0.042	0.182				
	Total East AMP Zone 6	**0.546**	**0.982**	**0.226**	**0.982**	**0.720**	**1.928**	**2.500**	**(0.572)**
East AMP Zone 4	Portola Springs - Zone 4[a]	0.746	1.343	0.363	1.343				
	Portola Springs - Zone 4R	0.144	0.259	0.070	0.259				
	Lambert Ranch[b]	0.034	0.062	0.017	0.062				
	PA 9C - Zone 4R[c]	0.092	0.166	0.045	0.166				
	UC Regents (1,500 Med Density)[d]	0.503	0.905	0.244	0.905				
	PA 35[e]	1.570	2.826	0.763	2.826				
	Great Park Neighborhoods - Zone 4	0.381	0.685	0.185	0.685				
	Great Park/Great Park Neighborhoods - Zone 4R	0.900	1.620	0.437	1.620				
	Total East AMP Zone 4	**4.370**	**7.866**	**2.124**	**7.866**	**1.920**	**7.866**	**6.000**	**1.866[f]**

a) Average Day Demand obtained from PA 6 SAMP Update from Tettemer & Associates dated August 25, 2005.
b) Dwelling unit type and count by pressure zone obtained from Planning Area 6 (Portola Springs) Sub-Area Master Plan Update for Lambert Ranch from Tetra Tech, Inc., dated April 17, 2007.
c) Average Day Demand obtained from Planning Area 9B and 9C Sub-Area Master Plan prepared by Stantec,, dated March 2006.
d) Dwelling Unit type and count obtained from IRWD staff on March 17, 2008 and confirmed by UCI planning staff on December 31, 2008.
e) Average Day Demand obtained from Table 5-2.1 of the 1999 WRMP.
f) According to the Lake Forest Area SAMP dated October 2010, Lake Forest Zone 2 (LF2) has surplus storage capacity of 9.58 MG, with 4.79 MG surplus assumed for the LF2 West Reservoir.

Based on the storage capacity of each reservoir and the planning areas that can be provided water by each reservoir, the maximum day demand for each planning area was allocated to a reservoir. After this process was completed, the five existing reservoirs had sufficient storage capacity to contain all of the Zone 3 maximum day demands, with excess capacity of approximately 2.1 MG. Based on this analysis, no additional Zone 3 storage is required. A summary of the allocation of maximum day demands is shown in Table 3-7. In Table 3-7, the planning areas that cannot supply fire flow demands from a reservoir are hatched in the cell. Empty cells signify that the maximum day demands from a planning area could have been allocated to a reservoir, but that the required storage was allocated to a different reservoir that could also provide service to the planning area.

Table 3-7. Domestic Water Zone 3 Storage Analysis

Service Zones	Reservoir				Total
	Northwood Reservoir	Lomas Valley Reservoir	East Irvine Reservoir	Quail Hill Reservoir	
PA 1& 2[d]	0.809				0.809
Northwood – Zone 2[d]	4.644				4.644
PA-12[e]				0.740	0.740
PA-13C[e]				1.340	1.340
PA-31[e]			1.150	0.220	1.370
PA-5A[f]	1.545				1.545
PA-5B[b]	0.954				0.954
PA-9A[b]	0.900	0.570			1.470
PA-9B[c]		1.304			1.304
Gateway Park[a]		0.189			0.189
PA-40[c]		2.304			2.304
PA-9C[a]		0.353			0.353
PA 30 & 51 (Great Park/Great Park Neighborhoods)			0.487		0.486
PA-32[e]		1.100	0.660		1.760
PA-33[e]			2.370		2.370
PA-34[e]			1.840		1.840
PA-35[e]			2.830		2.830
PA-39[e]			0.920		0.920
PA-17[e]				1.080	1.080
PA-22[e]				0.060	0.060

Table 3-7. Domestic Water Zone 3 Storage Analysis (continued)

Service Zones	Reservoir				Total
	Northwood Reservoir	Lomas Valley Reservoir	East Irvine Reservoir	Quail Hill Reservoir	
Total Required	8.852	5.820	10.257	3.440	28.369
Total Available	9.000	6.000	12.000	3.500	30.500
Excess/(Deficiency)	0.148	0.180	1.743	0.060	2.131

a. Maximum Day Demand obtained from Planning Areas 9B and 9C Sub-Area Master Plan prepared by Stantec, dated March 2006.
b. Maximum Day Demand obtained from Planning Areas 5B, 8A, 9A and Spectrum 8 (PA 40) Sub-Area Master Plan Update prepared by Tettemer & Associates, dated February 2005.
c. Maximum Day Demand obtained from Planning Area 40 Sub-Area Master Plan prepared by Stantec, dated January 2011.
d. Maximum Day Demand obtained from Planning Areas 1 and 2 Sub-Areas Master Plan prepared by Tettemer & Associates, dated February 2005.
e. Maximum Day Demand obtained from Planning Areas 17 Sub-Area Master Plan prepared by The Keith Companies, dated August 2001.
f. Maximum Day Demand obtained from Planning Area 5A, Northwood Point Sub-Area Master Plan.

3.7 PROPOSED DOMESTIC WATER FACILITIES

3.7.1 ONSITE FACILITIES

Onsite facilities within the Study Area consist of 263,000 lineal feet (lf) of distribution pipelines. This will include 53,200 lf of 12-inch diameter pipelines, 30,200 lf of 10-inch diameter pipelines, and 179,600 lf of 8-inch diameter pipelines. Three pressure reducing stations will be needed. The pipeline alignments and diameters needed to serve the project are shown in Figure 3-3.

All three pressure reducing stations will provide water to Zone 4R from Zone 4. Maximum flow rates and average flow rates through each pressure reducing station are estimated in the hydraulic model. The maximum flow rates occur during fire events. With the wide range in potential flow rates through each station, each proposed pressure reducing station should be designed with a larger pressure reducing valve sized for the fire flow demands and a smaller by-pass valve sized to accommodate the average day demand flow rates. Table 3-8 provides the estimated maximum and average flow rates through each proposed pressure reducing station.

Table 3-8. Proposed Pressure Reducing Stations

Valve No.	Zone		HGL (feet)		Maximum Flow Rate (gpm)	Average Flow Rate (gpm)
	Upstream	Downstream	Upstream	Downstream		
PRS-1[b]	4	4R	640	535	3,300	250
PRS-2[a]	4	4R	640	540	3,700	250
PRS-3[b]	4	4R	640	535	3,700	160

a. Primary pressure reducing station.
b. Secondary pressure reducing station.

As described in Sections 3.8 and 3.9, hydraulic network analyses were performed to determine the appropriate onsite pipe sizes. These analyses were performed for both the base and alternative land use domestic water demands and fire flow requirements. The differences in pipe sizes, and costs, were not substantial and the slightly larger distribution system will provide for future shifts or increases in the development. Therefore, the pipe sizes shown in the figure and in the cost tables will support the alternative land use.

The Great Park Corporation is in the process of refining the site plan for the Great Park. To support the proposed land uses, onsite domestic water facilities will be required. After the proposed onsite water facilities have alignments and sizes, the City/Great Park Corporation and IRWD will determine which onsite water facilities will be owned and maintained by IRWD, and which will be owned and maintained by the Great Park. The facilities that will be "public," owned and maintained by IRWD, should be shown in a PA 30 & 51 SAMP Update.

3.7.2 OFFSITE FACILITIES

An offsite facility is considered to be any facility that is required to provide water service to the Study Area that is outside the Study Area boundary. As shown in Figure 3-4, the offsite facilities required to serve the Study Area are the Zone 6 pipelines in Phase 2 of the Portola Springs development, two Zone 6-5 PRSs, the Alton Parkway Zone 4 transmission main, and the Lake Forest Zone 5 (LA Zone 2) – Zone 4 PRS.

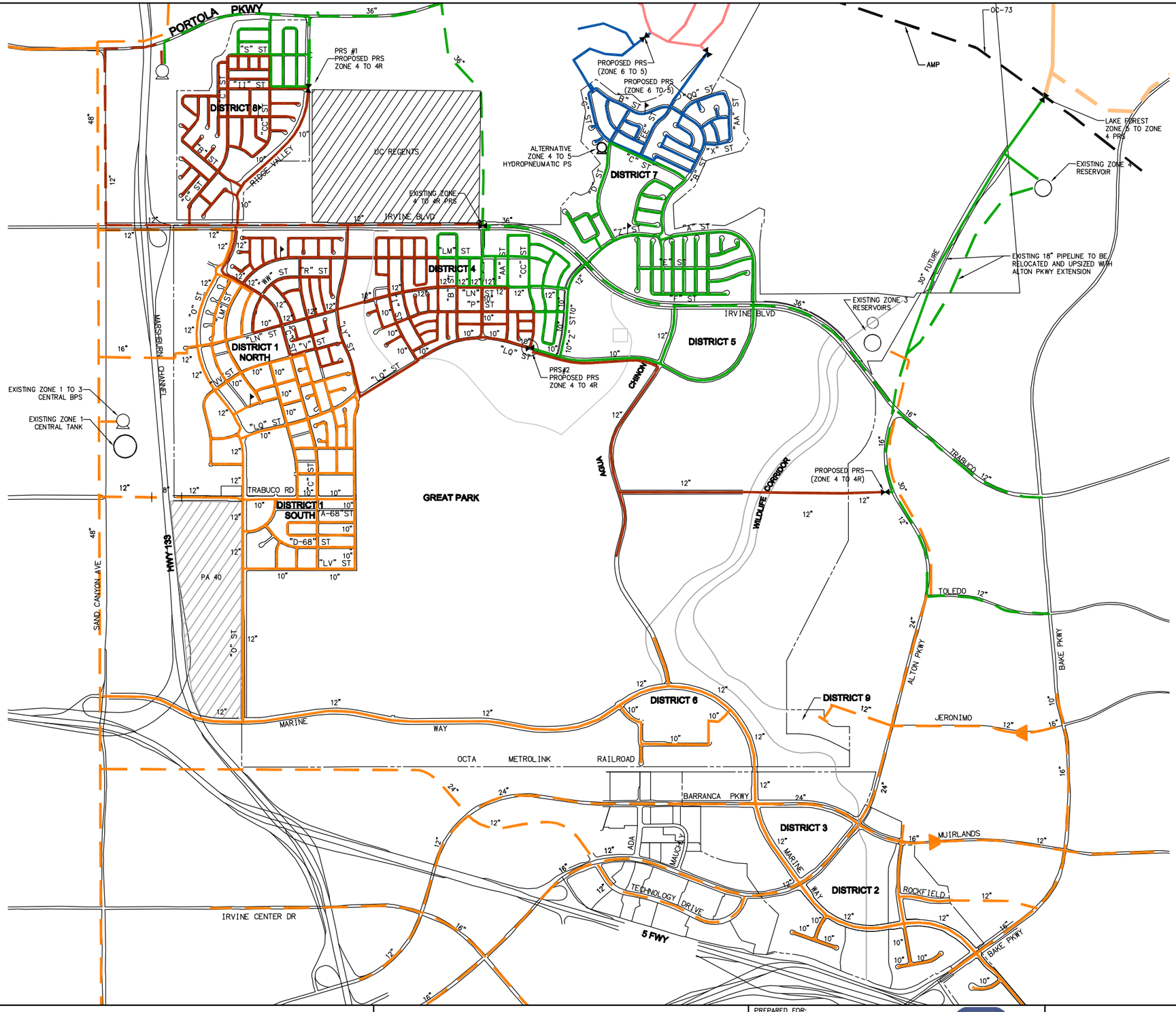
As previously discussed, if the Zone 6 offsite facilities are not constructed before housing developments within District 7 that have proposed pad elevations of 505 feet or higher, a temporary or alternative water supply will be required. This may include a small Zone 4-5 booster pump station within the development or temporary Zone 6 pipelines and Zone 6-5 PRSs.

3.8 DOMESTIC WATER SYSTEM COMPUTER ANALYSIS

The domestic water system computer analysis was performed using MWH Soft's InfoWater modeling software. The model used for the PA 5B, 8A, 9A, and Spectrum 8 SAMP and the subsequent PA 6 SAMP and PA 1 SAMP was used for this analysis. Two steady-state demands conditions were modeled (peak hour demands and maximum day plus fire flow requirements) to verify pipe diameter. Each simulation assumed that the pump stations were off, with supply from the reservoirs only. Insufficient low dynamic pressures were corrected by increasing pipeline diameters or looping pipes to decrease velocities and headlosses. Velocities and node pressures were analyzed to meet the criteria as described in Chapter 6 of the WRMP.

The peak hour demands condition was analyzed with the pipe diameters as shown in Figure 3-3. All proposed pipelines were found to flow within the velocity criteria. Pressures at all demand nodes were above 40 psi.

The maximum day plus fire flow demand condition was analyzed with the fire flows as listed in Table 3-5 for each land use area. All other areas met the requirements with the pipeline alignments and diameters as shown in Figure 3-3.



NOTES:

1. THE DOMESTIC WATER FACILITIES WITHIN THE GREAT PARK ARE NOT SHOWN ON THIS FIGURE. AT THE TIME OF THE SAMP PREPARATION, THE REQUIRED DOMESTIC WATER DISTRIBUTION FACILITIES WERE NOT KNOWN. ONCE THE LAND USE PLAN IS FINALIZED, THE DOMESTIC WATER DISTRIBUTION SYSTEM WILL REQUIRE ANALYSIS AND APPROPRIATE LEVEL OF SAMP UPDATE OR ADDENDUM WILL BE REQUIRED. ADDITIONALLY, AT THE TIME, A DETERMINATION WILL BE MADE AS TO WHICH FACILITIES WILL BE PUBLIC AND WHICH WILL BE PRIVATE.
2. AS PART OF THE AGREEMENT WITH THE DEPARTMENT OF DEFENSE, THE LEAD ENTITY CONSTRUCTING BURIED PIPELINES WITHIN THE FORMER MARINE CORPS AIR STATION, EL TORO MUST SUBMIT A PROJECT ENVIRONMENT REVIEW FORM (PERF) TO THE NAVY AND THE DEPARTMENT OF TOXIC SUBSTANCES CONTROL PRIOR TO COMMENCEMENT OF EXCAVATION ACTIVITIES.
3. ALL PIPELINES ARE 8" UNLESS SHOWN.

LEGEND

	PROPOSED	EXISTING
ZONE 6 (850 HGL)	———	- - -
ZONE 5 (735 HGL)	———	- - -
ZONE 4 (640 HGL)	———	- - -
ZONE 4R (540 HGL)	———	- - -
ZONE 3 (470 HGL)	———	- - -

SECONDARY PRESSURE REDUCING STATION

PRIMARY PRESSURE REDUCING STATION W/ TELEMETRY

WATER QUALITY SAMPLING STATION (TENTATIVE LOCATION)

SCALE 1"=2000'

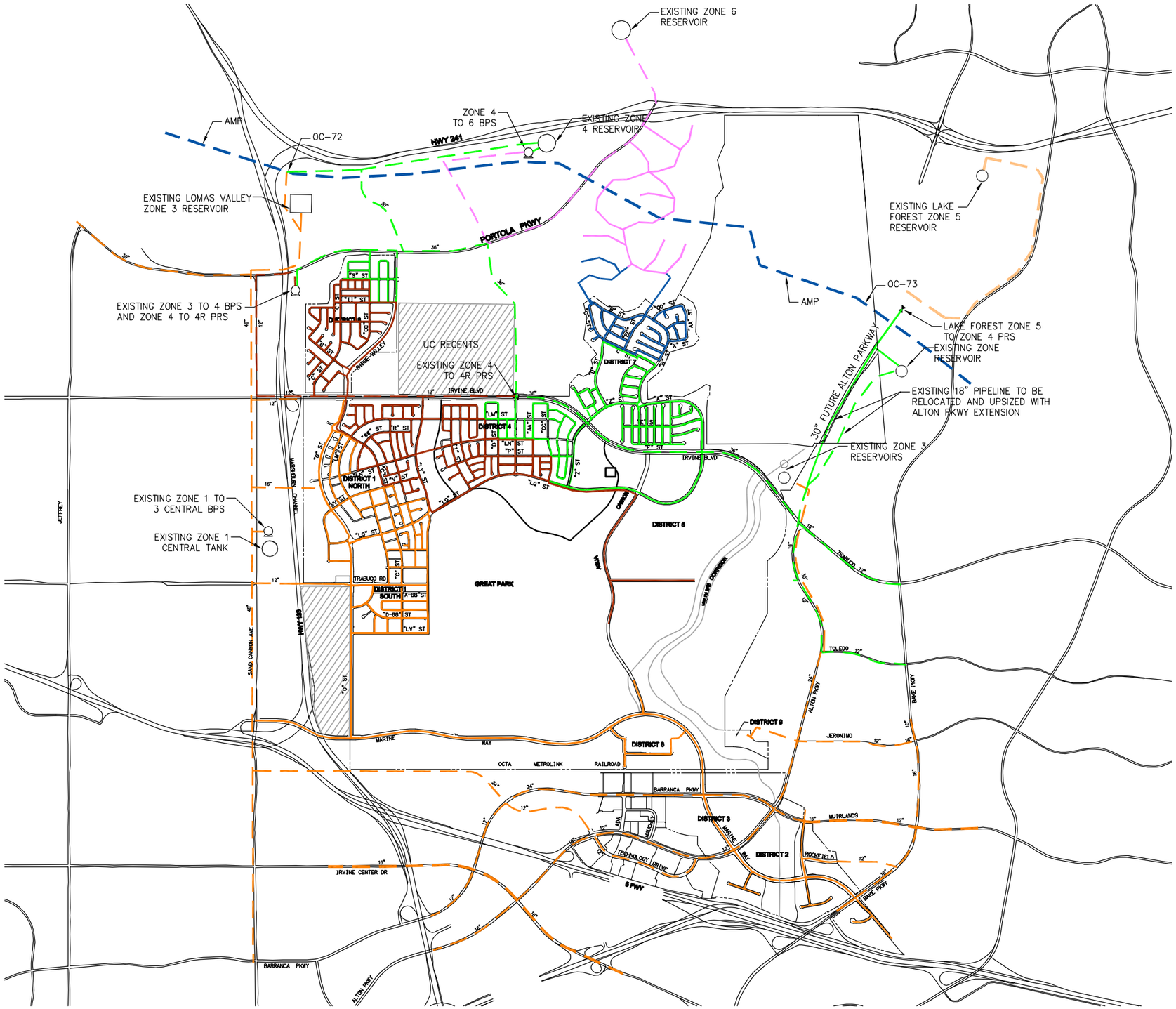
RBF CONSULTING
PLANNING ■ DESIGN ■ CONSTRUCTION
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8122 • www.RBF.com

PREPARED FOR:
IRVINE RANCH WATER DISTRICT

IRVINE RANCH WATER DISTRICT
GREAT PARK / GREAT PARK NEIGHBORHOODS
SUB-AREA MASTER PLAN
(2011 UPDATE)
PROPOSED DOMESTIC WATER FACILITIES

FIG. 3-3

PATH/FILENAME: H:\YDATA\10105001\ADMIN\IRWD\IRWD SAMP\SAMP 2011 UPDATE\DWG\FIG 3-3 PROP DW FACILITIES.DWG
LAST UPDATE: Thursday, September 29, 2011 4:46:06 PM
PLOT DATE: Thursday, September 29, 2011 4:46:25 PM
ANSI D - 3-8-05



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SUB-AREA MASTER PLAN
(2011 UPDATE)

DOMESTIC WATER REGIONAL FACILITIES

FIG. 3-4

PATH/FILENAME: H:\PDATA\10105001\ADMIN\IRWD\IRWD SAMP\SAMP 2011 UPDATE\DW\FIG 3-4 DW REGIONAL FACILITIES.DWG
LAST UPDATE: Thursday, October 06, 2011 2:03:34 PM
PLOT DATE: Thursday, October 06, 2011 2:04:26 PM
ANSI D - 34-8-05

3.8.1 WATER QUALITY ANALYSIS

A brief water quality analysis was performed for this SAMP based on the velocities in the pipelines. For proposed pipelines, the predicted velocity in a pipeline can be a general indicator for potential water quality problems, in particular for large diameter transmission mains. The District's minimum velocity criteria stated in the 1999 WRMP is one fps. This velocity is necessary to properly flush the water through the pipelines and prevent the water from becoming stagnant.

The hydraulic model predicted the velocities in the proposed pipelines during peak hour demands, with all pump stations off. The majority of the pipelines are within the 0 to 1 fps range. These pipelines are sized to provide adequate fire protection, and therefore, oversized for the peak hour demands. Water quality could potentially become an issue throughout the residential areas. To aid in monitoring the water quality, sampling stations per IRWD Standard Drawing W-10 should be provided throughout the system. Sampling stations should be in strategic areas. These stations will provide a means for collecting water quality samples on a regular basis. It is also recommended that fire hydrants be placed at the end of cul-de-sacs to assist IRWD in maintaining water quality in these areas through periodic flushing, or a 4-inch diameter water main be utilized after the last hydrant with blow-offs installed at the end of each street. Routine flushing can alleviate potential problems before they occur.

3.9 DOMESTIC WATER SENSITIVITY ANALYSIS

Based on the alternate land use plan, the average day demand for the Study Area would increase from 1,290 gpm to 2,021 gpm. The maximum day and peak hour demands would increase from 2,838 gpm and 4,446 gpm to 4,446 gpm and 7,073 gpm, respectively. Estimated domestic water demands are shown by district and by pressure zone in Table 3-9 and Table 3-10, respectively.

Table 3-9. Estimated Domestic Water Demands by District (Alternate Land Use)

District	Demand, gpm		
	Average Day	Max. Day	Peak Hour
District 1	406	893	1,421
District 2	80	175	279
District 3	44	97	155
District 4	205	452	718
District 5	609	1,340	2,132
District 6	158	348	554
District 7	212	466	742
District 8	184	405	645
District 9			
Great Park/Public Ownership	122	269	428
TOTAL	**2,021**	**4,446**	**7,073**

Table 3-10. Estimated Domestic Water Demands by Pressure Zone (Alternate Land Use)

Pressure Zone	Demand, gpm		
	Average Day	Max. Day	Peak Hour
Zone 5	70	154	245
Zone 4	349	767	1,220
Zone 4R	1,120	2,465	3,921
Zone 3	482	1,059	1,685
TOTAL	**2,021**	**4,445**	**7,072**

With revised water demands, the water storage analysis must be revised. The revised calculations for the Zone 6 and Zone 4 storage analyses are shown in Table 3-11. Since the land use within the Zone 6 storage area do not change, the storage requirements do not either. The revised land use does increase the additional required storage volume for Zone 4 to 2.4 MG. This total is less than the excess storage capacity available in LF Zone 2. Therefore, no additional Zone 4 storage is required.

Table 3-11. Domestic Water Zone 6 and 4 Storage Analyses (Alternate Land Use)

Storage Tank	Planning Area/ Service Area	Avg Day Demand MGD	Max Day Demand MGD	Oper. Storage MG	Local Emergency Storage MG	Fire Flow MG	Total Storage Required MG	Existing Storage MG	Additional Storage Required MG
East AMP Zone 6	Portola Springs - Zone 6[a]	0.261	0.469	0.108	0.469				
	Portola Springs - Zone 5[a]	0.161	0.290	0.067	0.290				
	Lambert Ranch - Zone 5R[b]	0.023	0.041	0.009	0.041				
	Great Park Neighborhoods - Zone 5	0.101	0.182	0.042	0.182				
	Total East AMP Zone 6	**0.546**	**0.982**	**0.226**	**0.982**	**0.720**	**1.928**	**2.500**	**(0.572)**
East AMP Zone 4	Portola Springs - Zone 4[a]	0.746	1.343	0.363	1.343				
	Portola Springs - Zone 4R	0.144	0.259	0.070	0.259				
	Lambert Ranch[b]	0.034	0.062	0.017	0.062				
	PA 9C - Zone 4R[c]	0.092	0.166	0.045	0.166				
	UC Regents (1,500 Med Density)[d]	0.503	0.905	0.244	0.905				
	PA 35[e]	1.570	2.826	0.763	2.826				
	Great Park Neighborhoods - Zone 4	0.502	0.904	0.244	0.904				
	Great Park/Great Park Neighborhoods - Zone 4R	1.613	2.904	0.784	2.904				
	Total East AMP Zone 4	**5.204**	**9.367**	**2.529**	**9.367**	**1.920**	**9.367**	**6.000**	**3.367[f]**

a. Average Day Demand obtained from PA 6 SAMP Update from Tettemer & Associates dated August 25, 2005.
b. Dwelling unit type and count by pressure zone obtained from Planning Area 6 (Portola Springs) Sub-Area Master Plan Update for Lambert Ranch from Tetra Tech, Inc., dated April 17, 2007.
c. Average Day Demand obtained from Planning Area 9B and 9C Sub-Area Master Plan prepared by Stantec,, dated March 2006.
d. Dwelling Unit type and count obtained from IRWD staff on March 17, 2008 and confirmed by UCI planning staff on December 31, 2008.
e. Average Day Demand obtained from Table 5-2.1 of the 1999 WRMP.
f. According to the Lake Forest Area SAMP dated October 2010, Lake Forest Zone 2 (LF2) has surplus storage capacity of 9.58 MG, with 4.79 MG surplus assumed for the LF2 West Reservoir.

The revised calculations for the Zone 3 storage analysis is shown in Table 3-12. The storage required for the Great Park/Great Park Neighborhoods increases from 0.5 MG to 0.7 MG. Even with this increase, sufficient existing storage is available in the Zone 3 storage area.

Table 3-12. Domestic Water Zone 3 Storage Analysis (Alternate Land Use)

Service Zones	Reservoir				Total
	Northwood Reservoir	Lomas Valley Reservoir	East Irvine Reservoir	Quail Hill Reservoir	
PA 1& 2[d]	0.809				0.809
Northwood - Zone 2[d]	4.644				4.644
PA-12[e]				0.740	0.740
PA-13C[e]				1.340	1.340
PA-31[e]			1.150	0.220	1.370
PA-5A[f]	1.545				1.545
PA-5B[b]	0.954				0.954
PA-9A[b]	0.900	0.570			1.470
PA-9B[c]		1.304			1.304
Gateway Park[a]		0.189			0.189
PA-40[c]		2.304			2.304
PA-9C[a]		0.353			0.353
PA 30 & 51 (Great Park/Great Park Neighborhoods)			0.693		0.693
PA-32[e]		1.100	0.660		1.760
PA-33[e]			2.370		2.370
PA-34[e]			1.840		1.840
PA-35[e]			2.830		2.830
PA-39[e]			0.920		0.920
PA-17[e]				1.080	1.080
PA-22[e]				0.060	0.060
Total Required	8.852	5.820	10.463	3.440	28.576
Total Available	9.000	6.000	12.000	3.500	30.500
Excess/(Deficiency)	0.148	0.180	1.537	0.060	1.924

a. Maximum Day Demand obtained from Planning Areas 9B and 9C Sub-Area Master Plan prepared by Stantec, dated March 2006.
b. Maximum Day Demand obtained from Planning Areas 5B, 8A, 9A and Spectrum 8 (PA 40) Sub-Area Master Plan Update prepared by Tettemer & Associates, dated February 2005.
c. Maximum Day Demand obtained from Planning Area 40 Sub-Area Master Plan prepared by Stantec, dated January 2011.
d. Maximum Day Demand obtained from Planning Areas 1 and 2 Sub-Areas Master Plan prepared by Tettemer & Associates, dated February 2005.
e. Maximum Day Demand obtained from Planning Areas 17 Sub-Area Master Plan prepared by The Keith Companies, dated August 2001.
f. Maximum Day Demand obtained from Planning Area 5A, Northwood Point Sub-Area Master Plan.

CHAPTER 4 – WASTEWATER COLLECTION SYSTEM

4.1 WASTEWATER FLOW GENERATION FACTORS

Flow generation factors for wastewater, listed in Table 4-1 are based on the latest IRWD's interior potable water demand factors.

Table 4-1. Wastewater Flow Generation Factors

Land Use, Units	Average Daily Flow Generation Factor
Res. Low, gpd/du	225
Res. Medium, gpd/du	220
Res. Medium-High, gpd/du	150
Res. High, gpd/du	145
Res. Very High, gpd/du	135
Comm - Community, gal/ksf/day	150
Comm - General Office, gal/ksf/day	52
Comm - Institutional, gal/ksf/day	30
Comm - Regional, gal/ksf/day	135
Comm - Recreation, gal/ksf/day	41
Comm-School, gal/ksf/day	12
AG, gal/acre/day	0
Park - Regional, gal/acre/day	0
Park – Community, gal/park/day	0

4.2 PROPOSED ONSITE WASTEWATER FLOWS

The wastewater duty factors listed in Table 4-1 and the land uses detailed in Chapter 2 were used to develop projected onsite wastewater flows for the districts. Table 4-2 presents the projected wastewater flow by district. Based on the WRMP for interior water use, the total projected average dry weather flow from the Study Area is estimated to be 1,347,000 gallons per day. This is equivalent to an average day flow of about 2.08 cubic feet per second (cfs).

The Sewer Collection System Master Plan (SCSMP) dated June 2006 provides one diurnal curve for residential hourly flow patterns and one curve for non-residential flow variation. Figure 3-1 in the SCSMP develops peaking factors for residential flows, and Figure 3-3 develops the hourly peaking factors for non-residential flows. Based on the development mix between residential and non-residential flows, the peak hour flow will occur at hour 7 for Great Park Neighborhood Districts 1, 4, 7 and 8, and at hour 11 for Great Park Neighborhood Districts 2, 3, 5 and 6 and the Great Park. At hour 7, the residential peaking factor is 2.2, and the non-residential peaking factor is 0.92. At hour 11, the residential peaking factor is 1.06 and the non-residential peaking factor is 1.75.

Based on a recent study performed by IRWD, the maximum day peaking factor is estimated to be 1.298 times the average day flow. To obtain the peak hour flow rates, this maximum day peaking factor is applied to the diurnal curves peaking factors.

Based on the proposed product mix for each District, Districts 2, 3, 5 and 6 and the Great Park have effective peak hour factors of 2.27, since each includes only non-residential development. With all residential development, District 7 has an effective peaking rate of 2.85. With their mixed-use developments, Districts 1, 4 and 8 have peak hour factors of 2.63, 2.75 and 2.35, respectively. The entire Study Area peak hour factor is 2.31. These peaking factors were applied to the average daily flows to determine sewer pipe sizes.

Table 4-2. Wastewater Collection Projections by District

Land Use	Units[a]	Duty Factor (gpd/unit)	Average Dry Weather Flow		Peak Dry Weather Flow[b] (cfs)
			gpd	cfs	
District 1					
Residential - Low Density	262	225	58,950	0.091	
Residential - Medium Density	378	220	83,160	0.129	
Residential - Medium-High Density	809	150	121,350	0.188	
Residential - High Density	611	145	88,595	0.137	
Commercial - Community	180	150	27,000	0.042	
Commercial - General Office	124	52	6,432	0.010	
Commercial - Institutional	579	30	17,355	0.027	
Commercial - School	369	12	4,422	0.007	
District 1 Subtotal			**407,264**	**0.630**	**2.111**
District 2					
Commercial - Community	102	150	15,300	0.024	
Commercial - General Office	1600	52	83,200	0.129	
District 2 Subtotal			**98,500**	**0.152**	**0.594**
District 3					
Commercial - General Office	951	52	49,468	0.077	
Commercial - Institutional	144	30	4,332	0.007	
District 3 Subtotal			**53,800**	**0.083**	**0.341**
District 4					
Residential - Low Density	66	225	14,850	0.023	
Residential - Medium Density	428	220	94,160	0.146	
Residential - Medium-High Density	608	150	91,200	0.141	
Commercial - Community	70	150	10,500	0.016	
District 4 Subtotal			**210,710**	**0.326**	**1.174**
District 5					
Commercial - Community	838	150	125,700	0.194	
District 5 Subtotal			**125,700**	**0.194**	**0.729**

Table 4-2. Wastewater Collection Projections by District (continued)

Land Use	Units[a]	Duty Factor (gpd/unit)	Average Dry Weather Flow		Peak Dry Weather Flow[b] (cfs)
			gpd	cfs	
District 6					
Commercial - Institutional	523	30	15,690	0.024	
District 6 Subtotal			**15,690**	**0.024**	**0.107**
District 7					
Residential - Low Density	341	225	76,725	0.119	
Residential - Medium Density	499	220	109,780	0.170	
District 7 Subtotal			**186,505**	**0.289**	**1.068**
District 8					
Residential - Low Density	123	225	27,675	0.043	
Residential - Medium Density	515	220	113,300	0.175	
Residential - Medium-High Density	88	150	13,200	0.020	
Residential - High Density	166	145	24,070	0.037	
District 8 Subtotal			**178,245**	**0.276**	**1.020**
District 9					
Agricultural	0		-		
District 9 Subtotal					
Great Park/Public Ownership					
Commercial - Community	229	150	34,395	0.053	
Commercial - Institutional	1,171	30	35,115	0.054	
Commercial - Recreation	26	41	1,053	0.002	
Great Park/Public Subtotal			**70,563**	**0.109**	**0.437**
TOTAL			**1,346,977**	**2.084**	**5.940**

[a] Units for residential are dwelling units, all other units are thousand square feet.

[b]. Peaking factor is based on Figure 3-5 of the 2006 Sewer Collection System Master Plan.

4.3 OFFSITE TRIBUTARY FLOWS

All or portions of the wastewater generated by three offsite developments will be routed through the Great Park/Great Park Neighborhoods sewage collection system. The areas are known as Portola Springs (Planning Area 6), the UC Regents property and PA 40. These developments and their estimated flows through the Study Area are described below.

4.3.1 PORTOLA SPRINGS (PA 6)

The Irvine Community Development Company (ICDC) is currently developing Portola Springs, also called Planning Area 6. This area is generally bounded by the Eastern Transportation Corridor (State Route 133) to the west, the Foothill Transportation Corridor (State Route 241) to the north, the El Toro National Wildlife Refuge to the east and the Great Park/Great Park Neighborhoods to the south. ICDC will develop their property in six villages called Lomas Valley, Park Village, Center Village, Tomato Springs, Agua Chinon Knolls and Bordiers. They have home occupancies in Lomas Valley and Center Village.

Besides the ICDC property, Planning Area 6 also includes the Lambert Sisters and Lambert Ranch properties. This proposed development is currently in the planning and engineering stage.

Based on the Planning Area 6 SAMP, the wastewater from four of ICDC's proposed villages and a portion of the Lambert properties will be routed along either Modjeska Road or Lambert Road to the existing gravity sewer along Irvine Boulevard. This sewer flows west along Irvine Boulevard to a crossing of the Eastern Transportation Corridor.

4.3.2 UC REGENTS

The University of California owns a property that is bound by Irvine Boulevard to the south, Modjeska Road to the east, the Center Village portion of Portola Springs to the north and proposed Ridge Valley Road to the west. The 192 acre site currently is used for agricultural research by the universities. Based upon potential entitlement, it has been projected that the land may be developed into 1,500 medium-density dwelling units. The total wastewater flows for this future development will be 0.330 mgd, or 0.511 cfs for the average dry weather flow.

4.3.3 PLANNING AREA 40

ICDC also owns an undeveloped area, called Planning Area 40, which adjoins the Great Park/Great Park Neighborhoods to the southwest. PA 40 is bounded by Jeffrey Road to the west, Trabuco Road to the north, the Santa Ana Freeway (I-5) to the south, and the Great Park/Great Park Neighborhoods to the east. The portion of the planning area bounded by Trabuco Road, future "O" Street, the Eastern Transportation Corridor (State Route 133) and the Santa Ana Freeway will sewer to the proposed Reach "A" wastewater collection system within Planning Area 51. The total wastewater flow for portion of this planning area that will be routed through the Reach "A" wastewater collection system is estimated to be 0.251 mgd, or 0.388 cfs for the average dry weather flow.

Table 4-3. Offsite Wastewater Collection Projections

Planning Area/Land Use Description	Unit	Duty Factor, gdp/unit	Average Dry Weather Flow	
			gpd	cfs
Portola Springs				
Agua Chinon Knolls				
Residential - Low Density	346	225	77,850	0.120
Residential - Medium Density	293	220	64,460	0.100
Residential - Medium-High Density	499	150	74,850	0.116
Park - Community	27.2	36.76	1,000	0.002
Agua Chinon Knolls Subtotal			218,160	0.338
Tomato Springs				
Residential - Low Density	96	225	21,600	0.033
Residential - Medium Density	59	220	12,980	0.020
Residential - Medium-High Density	270	150	40,500	0.063
Residential - High Density	450	145	65,250	0.101
Comm - School	125	12	1,500	0.002
Park - Community	27.2	36.76	1,000	0.002
Tomato Springs Subtotal			142,830	0.221
Park Village				
Residential - Medium Density	237	220	52,140	0.081
Residential - Medium-High Density	347	150	52,050	0.081
Residential - High Density	525	145	76,125	0.118
Comm - School	125	12	1,500	0.002
Park - Community	10.8	46.3	500	0.001
Park Village Subtotal			182,315	0.282
Center Village				
Residential - Medium Density	180	220	39,600	0.061
Residential - Medium-High Density	345	150	51,750	0.080
Residential - High Density	367	145	53,215	0.082
Comm - Commercial	166.12	135	22,426	0.035
Comm - Institutional	8.88	30	266	0.000
Park - Community	8.7	57.47	500	0.001
Center Village Subtotal			167,758	0.260
Lambert Village				
Residential - Medium Density	240	220	52,800	0.082
Residential - High Density	548	145	79,460	0.123
Lambert Village Subtotal			132,260	0.205
Lambert Property				
Residential - Medium Density	106.00	220	23,320	0.036
Lambert Property Subtotal			23,320	0.036
Portola Springs Total			**866,642**	**1.342**
UC Regents				
Residential - Medium Density	1,500	220	330,000	0.510
UC Regents Subtotal			**330,000**	**0.510**

Table 4-3. Offsite Wastewater Collection Projections (continued)

Planning Area/Land Use Description	Unit	Duty Factor, gdp/unit	Average Dry Weather Flow	
			gpd	cfs
PA 40 (Tributary Area Only)				
Residential - High Density	1,309	145	189,805	0.294
Existing Fire Station	50	52	2,600	0.004
Commercial / Industrial	1,121	52	58,280	0.090
PA 40 Subtotal			**250,685**	**0.388**
Total Off-Site			**1,447,327**	**2.240**

[a] For Residential land uses, unit are number of dwelling units. For all Commercial and Park – Community uses, units are thousand square feet of building area. For Neighborhood and Community Park, units are acres of land.

4.4 WASTEWATER SYSTEM EVALUATION CRITERIA AND ASSUMPTIONS

Proposed layouts for the onsite wastewater system were performed using IRWD criteria presented in the 2006 Sewer Collection System Master Plan. Manning's equation was used for this analysis, with a roughness coefficient of 0.013 in all cases. Table 4-4 lists criteria for pipe sizes, minimum slopes, and maximum depth of flow to diameter ratios.

Table 4-4 Sewer Design Criteria

Pipe Size Inches	Min. Slope ft/ft	Max. Depth/Dia. Ratio
8	0.0040	50 percent
10	0.0028	50 percent
12	0.0022	50 percent
15	0.0015	67 percent
18	0.0012	75 percent
21	0.0010	75 percent

4.5 PROPOSED WASTEWATER COLLECTION SYSTEM

4.5.1 ONSITE WASTEWATER COLLECTION SYSTEM FACILITIES

MWH Soft's InfoSewer GIS Suite, Version 4.0, Update #8 was used to perform hydraulic analyses based on the design criteria, flows generated and peaking factor. These analyses were performed for both the base and alternative land use plans. The differences in pipe sizes, and costs, were not substantial and the slightly larger onsite collection system will provide for future shifts or increases in the development. Therefore, the onsite pipe sizes shown in the figure and in the cost tables will support the alternative land use.

Figure 4-1 graphically shows the proposed wastewater collection system. The onsite wastewater collection system is comprised of 4,200 lf of 21-inch diameter sewers, 8,800 lf of 18-inch diameter sewers, 6,700 lf of 15-inch diameter sewers, 21,400 lf of 12-inch diameter sewers, 9,400 lf of 10-inch diameter sewers, and 133,000 lf of 8-inch diameter sewers.

Due to proximity and topography, wastewater flows for developments north of Irvine Boulevard, including Great Park Neighborhoods District 8, Planning Area 6, and UC Regents will be conveyed though an existing 15- and 18-inch sewer system in Irvine Boulevard. This system crosses under the Eastern Transportation Corridor (State Route 133 or SR 133) north of Irvine Boulevard as an 18-inch pipeline to convey flow to trunk sewer systems within Sand Canyon Avenue and Jeffrey Road, en route to the San Diego Creek Interceptor system.

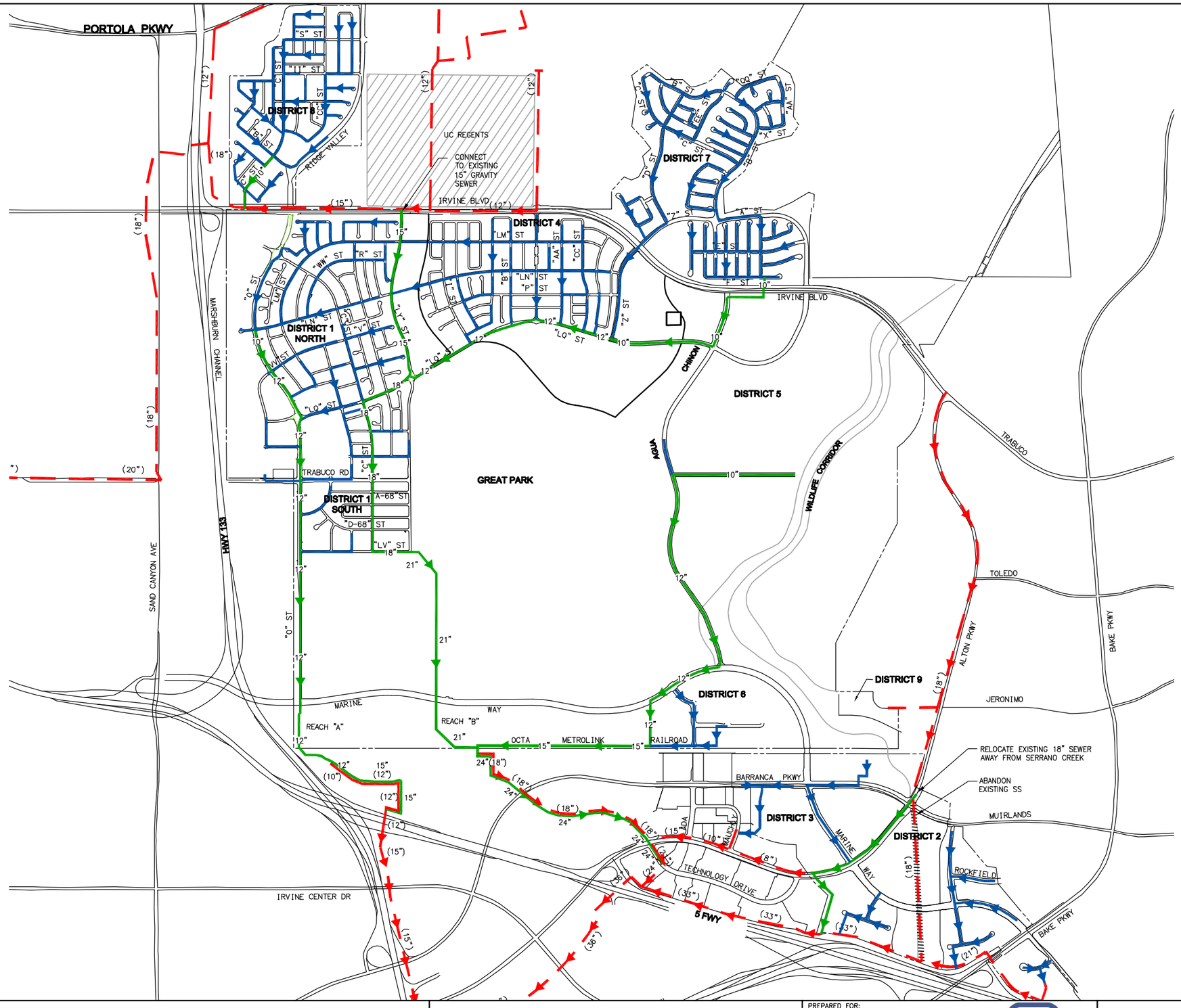
The 18-inch pipeline crossing under SR 133 does not have sufficient capacity to serve all of Planning Area 6, District 8 and UC Regents. Thus, the Reach "B" sewer must ultimately convey a portion of the flow from the Irvine Boulevard system by means of a sewer diversion manhole in Irvine Boulevard. Upon the issuance of building permits for 75% of the development areas (equating to 4,250 EDU based on average day sewer flows converted to EDU) north of Irvine Blvd, flow monitoring upstream of the existing 18-inch sewer crossing of the SR-133 must be started. When flow monitoring results indicate a depth to diameter ratio of 65% the selection of the method to divert flow away from the 18-inch sewer must be selected. The Reach "B" sewer should be completed from Irvine Boulevard to the Study Area southern boundary as the primary means to prevent the design capacity of the 18-inch gravity sewer pipeline under SR-133 from being exceeded.

If the Reach 'B' sewer is not available at the time needed to divert flow away from existing 18-inch sewer pipeline under SR-133, then an alternative sewer conveyance method must be implemented to convey sewer flows to the Sand Canyon Avenue sewer system. Feasible alternatives are provided in the Sewer Contingency Study (See Appendix A).

The Great Park Master Plan was the basis for the land use assumption for the Great Park. To support the proposed land uses, onsite wastewater collection facilities will be required. After the proposed onsite wastewater collection facilities have alignments and sizes, the City/Great Park Corporation and IRWD will determine which onsite wastewater facilities will be owned and maintained by IRWD, and which will be owned and maintained by the Great Park. The facilities that will be "public," owned and maintained by IRWD, should be shown in a separate PA 30 & 51 SAMP Update.

Wastewater flows from the Great Park/Great Park Neighborhoods primarily drain to the southwest towards the intersection of Interstate 5 and State Route 133. Three connection points to the existing sewer collection system are proposed as shown in Figure 4-1. The most westerly connection point will be to the existing 10-inch diameter gravity sewer near the new terminus of Technology Drive. This sewer is known as Reach "A." The second connection point will be near Technology Drive and Barranca Parkway. This sewer is known as Reach "B." The third connection point will be directly to the San Diego Creek Interceptor sewer near Bake Parkway and Interstate 5.

Additionally, there are large diameter storm drains throughout the Study Area. Final design of the wastewater collection system will require evaluation of these and any other existing systems.



NOTES:

1. THE WASTEWATER FACILITIES WITHIN THE GREAT PARK ARE NOT SHOWN ON THIS FIGURE. AT THE TIME OF THE SAMP PREPARATION, THE REQUIRED WASTEWATER COLLECTION FACILITIES WERE NOT KNOWN. ONCE THE LAND USE PLAN IS FINALIZED, THE WASTEWATER SYSTEM WILL REQUIRE ANALYSIS AND APPROPRIATE LEVEL OF SAMP UPDATE OR ADDENDUM WILL BE REQUIRED. ADDITIONALLY, AT THE TIME, A DETERMINATION WILL BE MADE AS TO WHICH FACILITIES WILL BE PUBLIC AND WHICH WILL BE PRIVATE.
2. AS PART OF THE AGREEMENT WITH THE DEPARTMENT OF DEFENSE, THE LEAD ENTITY CONSTRUCTING BURIED PIPELINES WITHIN THE FORMER MARINE CORPS AIR STATION, EL TORO MUST SUBMIT A PROJECT ENVIRONMENT REVIEW FORM (PERF) TO THE NAVY AND THE DEPARTMENT OF TOXIC SUBSTANCES CONTROL PRIOR TO COMMENCEMENT OF EXCAVATION ACTIVITIES.
3. ALL PIPELINES ARE 8" UNLESS SHOWN.

LEGEND

- EXISTING SANITARY SEWER — (12")
- PROPOSED SANITARY SEWER (LARGER THAN 8 INCH)
- 8" PROPOSED SANITARY SEWER (SIZE NOT LABELED)

PATH/FILENAME: H:\PDATA\10100001\ADMIN\RWD\RWD SAMP\SAMP 2011 UPDATE\SS\FIG 4-1 PROP SS COLLECTION FACILITIES.DWG
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PROPOSED SEWER COLLECTION FACILITIES

FIG. 4-1

4.5.2 OFFSITE WASTEWATER COLLECTION SYSTEM FACILITIES

A new 12-inch gravity sewer is required from the southern boundary of the Study Area, under the OCTA railway right-of-way and to Technology Drive. In Technology Drive exists a 10-inch and 12-inch pipeline that needs to be upsized to 12-inch and 15- inch. From Technology Drive to the I-5, the12-inch must be upsized to 15-inch. In addition, the existing 12-inch sewer under Interstate 5 appears to be encased below only the older freeway right-of-way and not under the SR-133 interchange expansion. The hydraulic modeling predicts that this segment will have a d/D ratio of 73 percent at the peak hour. Since the replacement of this segment would be so difficult, it is not proposed at this time.

The Reach "B" sewer has a diameter of 18-inches and terminates near the southern boundary of the Study Area, and east of the Reach "A" sewer. To meet IRWD's design criteria, approximately 3,500 lf of this sewer is required to be replaced with 21-inch diameter gravity sewer. These upgrades are along Technology Drive between the Study Area and Alton Parkway.

Throughout the past several years, IRWD has experienced challenges in maintaining the integrity of the Alton trunk sewer where it parallels the more natural section of the Serrano Creek. To alleviate this issue, the Alton trunk sewer will be relocated from the intersection of Alton Parkway and Barranca Parkway to the San Diego Creek Interceptor.

The capital improvements to the offsite wastewater collection system facilities are also shown in Figure 4-1. As the actual land uses, average flows generated and peaking factors may vary from the peak design flows, it is highly recommended that flow testing be performed before collection system upgrades are constructed.

4.6 WASTEWATER SENSITIVITY ANALYSIS

Based on the alternate land use plan, the average day flows generated by the Great Park/Great Park Neighborhoods would increase from approximately 1.34 mgd to 2.08 mgd. The peak dry weather flow would increase from 5.94 cfs to 8.51 cfs. The average and peak flows generated by each district are presented in Table 4-5. The peak hour factors vary from 3.2 to 4.1, with the entire Study Area's peak hour factor being 2.65.

Table 4-5. Wastewater Collection Projections by District (Alternate Land Use)

District	Average Dry Weather Flow		Peak Dry Weather Flow[a] (cfs)
	gpd	cfs	
District 1	431,144	0.667	2.218
District 2	98,500	0.152	0.594
District 3	53,800	0.083	0.341
District 4	210,710	0.326	1.174
District 5	575,960	0.891	2.852
District 6	206,625	0.320	1.167
District 7	186,505	0.289	1.068
District 8	178,245	0.276	1.020
District 9			
Great Park/Public	134,913	0.209	0.835
TOTAL	**2,076,402**	**3.213**	**8.514**

a. Peaking factor is based on Figure 3-5 of the 2006 Sewer Collection System Master Plan.

CHAPTER 5 – NONPOTABLE WATER SYSTEM

5.1 NONPOTABLE SUPPLY AND WATER SERVICE AREAS

IRWD established criteria in their 1999 WRMP for determining nonpotable water pressure zone service boundaries. These guidelines call for service zones to meet the criteria as shown on Figure 5-1 and as follows:

- Minimum Static Pressure: 60 psi, based on a full reservoir.
- Maximum Static Pressure: 150 psi, based on a full reservoir.

Therefore, in a standard pressure zone, the highest allowable nonpotable service elevation is determined by subtracting 139 feet (60 psi) from the full reservoir level, or in the case of a sub zone, from the pressure reducing station HGL setting. The lowest allowable service level is determined by subtracting 346 feet (150 psi) from the reservoir HWL, or in the case of a subzone, the pressure reducing station HGL setting. Table 5-1 summarizes the proposed nonpotable water pressure zone service ranges.

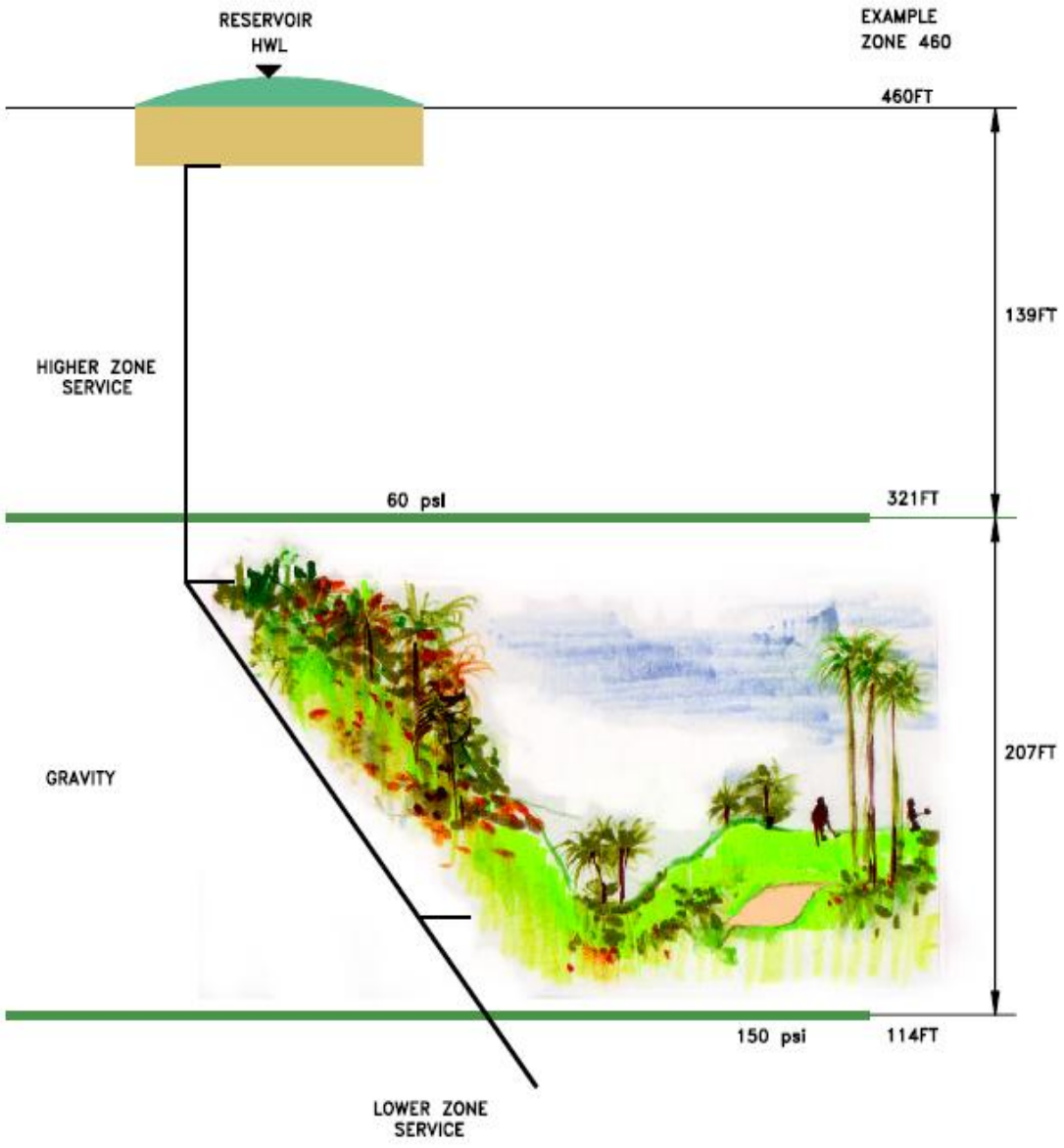
Great Park/Great Park Neighborhoods nonpotable water demands will be served by three pressure zones, Zone D (HGL 850), Zone C (HGL 640), and Zone B (HGL 460). The service area for each pressure zone is illustrated in Figure 5-2. Zone D demands will be supplied from the Portola Springs Zone D Reservoir and the Zone C-D Booster Pump Station located in the Portola Springs development area. The Zone C demands will be supplied from the Portola Springs Zone C Reservoir, the Zone A - C Booster Pump Station located along Portola Parkway in the Orchard Hills development area, and the LF Zone B Reservoir, through the proposed LF Zone B - Zone C PRS. Zone B will be gravity fed from the Northwood Zone B reservoir and the Zone B Laguna Tank. The Zone B Rattlesnake 75-1 Booster Pump Station and the LAWRP booster pump stations will also supply the Zone B system. The primary source water to the nonpotable system will be reclaimed water from the Michelson and LAWRP reclamation plants.

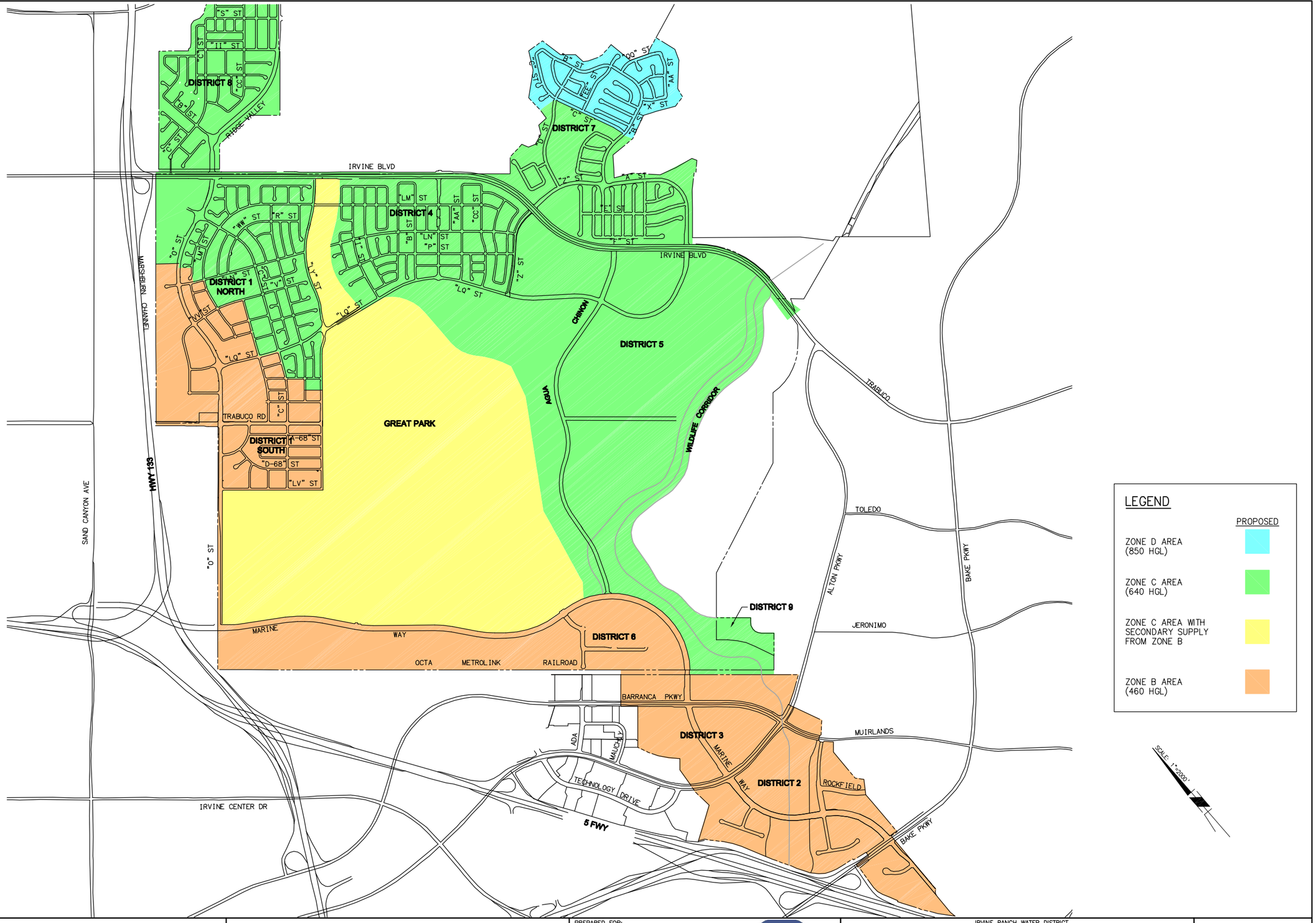
Table 5-1. Nonpotable Water System Pressure Zone Summary

Pressure/Zone Facility Sources	HGL ft.	Pad Elevations Served[a] ft,		Static Pressure[a]	
		Upper	Lower	Min. psi	Max. psi
Zone D Portola Springs Zone D Reservoir & Portola Springs Zone C-D BPS	850	536	504	136	150
Zone C Portola Springs Zone C Reservoir Orchard Hills Zone A-C BPS Proposed Zone B-C BPS	640	501	296	60	149
Zone B Zone B Laguna Tank Zone B Rattlesnake 75-1 BPS Irvine Center Dr. A -B BPS LAWRP Zone B BPS	460	320	233	61	98

a. Service elevations noted are based on preliminary grading plans provided by Heritage Fields and are for areas within the Study Area only.

Figure 5-1 Typical Static Nonpotable Water System Service Range





PATH/FILENAME: H:\YDATA\10105001\ADMIN\IRWD\IRWD SAMP\SAMP 2011 UPDATE\PW\FIG 5-2 NONPOTABLE WATER PRESSURE ZONES.DWG
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SUB-AREA MASTER PLAN
(2011 UPDATE)
NONPOTABLE WATER PRESSURE ZONES

FIG. 5-2

5.2 NONPOTABLE WATER USES

Common area landscape irrigation accounts for the vast majority of nonpotable water use within the IRWD nonpotable water distribution system. Nonpotable water is also provided for irrigation of "estate" size residential lots, and is used for toilet and urinal flushing in a small number of "high rise" (nonresidential) buildings. In addition, IRWD has initiated cooling tower applications of nonpotable water. The District is aggressively investigating expanding these and other non-irrigation uses for nonpotable water. This includes a potential significant reduction in the threshold building size for dual plumbing, requirements for the use of nonpotable water for cooling, and other appropriate commercial and industrial applications. At this time, the nonpotable water facilities proposed in this SAMP assume only parks and typical common area landscape irrigation demands.

5.3 NONPOTABLE WATER USE FACTORS

A summary of the nonpotable water use factors is presented in Table 5-2 below. The factors from the 2003 update to the 1999 WRMP were used in this SAMP.

Table 5-2. Nonpotable Water Use Factors

Land Use	Percent Irrigable	Duty Factor Gal/day/acre
Low Density Residential	15	2,500
Medium Density Residential	15	2,800
Medium-High Density Residential	15	3,000
High Density Residential	20	2,800
Very High Density Residential	20	2,800
Comm - Community	20	3,500
Comm - General Office	20	3,000
Comm - Institutional	30	2,750
Comm - Regional	20	3,500
Comm - Recreation	30	3,000
Comm-School	50	2,500
AG - High-Irrigated	100	3,100
Park - Regional	80	2,100
Park - Community	90	3,500
Fuel Modification Zone	100	1,000
Native Habitat Restoration	100	1,000

5.4 NONPOTABLE WATER PEAKING FACTORS

Peaking factors from the 2003 update to the 1999 WRMP are summarized in Table 5-3. The peaking factors were based on the relationships to the average day demands as shown in Fig 3-6 of the 1999 WRMP.

Table 5-3. Nonpotable Peaking Factor Comparison

Location	Peaking Factor	
	Maximum Day	Peak Hour
Study Area	2.7	5.5
District Wide	2.5	5.0

5.5 PROJECTED NONPOTABLE WATER DEMANDS

Within the Study Area, common area irrigation demands for the several multi-family residential areas are anticipated to be met with nonpotable water. Landscaping associated with the medium-high and high density residential areas, as well as the park areas will be irrigated using the nonpotable water distribution system.

Tables 5-4 and 5-5 summarize the nonpotable water demand calculated from the duty and peaking factors previously discussed. Table 5-4 presents the demands sub-totaled for each of the districts. Table 5-5 shows the demands as sub-totaled for each pressure zone. The total average annual demand is 4.03 mgd, or approximately 2,800 gpm. Maximum day demand and peak hour demands are estimated to be approximately 7,600 gpm and 15,400 gpm, respectively.

Table 5-4. Estimated Nonpotable Water Demand by District

Land Use	Acres	Demand, gpm		
		Average Day	Max. Day	Peak Hour
District 1				
Residential - Low Density	45.8	12	32	66
Residential - Medium Density	51.1	15	40	82
Residential - Medium-High Density	55.1	17	46	95
Residential - High Density	44.4	17	47	95
Commercial - Community	30.4	15	40	81
Commercial - General Office	9.9	4	11	23
Commercial - Institutional	57.4	33	89	181
Commercial - School	21.4	19	50	102
District 1 Subtotal	**315.4**	**132**	**355**	**724**
District 2				
Commercial - Community	32.0	16	42	85
Commercial - General Office	127.6	53	144	292
District 2 Subtotal	**159.5**	**69**	**185**	**378**
District 3				
Commercial - General Office	72.7	30	82	167
Commercial - Institutional	28.6	16	44	90
District 3 Subtotal	**101.3**	**47**	**126**	**257**

Table 5-4. Estimated Nonpotable Water Demand by District (continued)

Land Use	Acres	Demand, gpm		
		Average Day	Max. Day	Peak Hour
District 4				
Residential - Low Density	14.2	4	10	20
Residential - Medium Density	69.1	20	54	111
Residential - Medium-High Density	35.4	11	30	61
Commercial - Community	7.1	3	9	19
District 4 Subtotal	**125.8**	**38**	**104**	**211**
District 5				
Park - Community	569.3	1245	3363	6850
District 5 Subtotal	**569.3**	**1245**	**3363**	**6850**
District 6				
Commercial - Institutional	80.8	46	125	255
District 6 Subtotal	**80.8**	**46**	**125**	**255**
District 7				
Residential - Low Density	59.6	16	42	85
Residential - Medium Density	70.5	21	56	113
District 7 Subtotal	**130.1**	**36**	**97**	**198**
District 8				
Residential - Low Density	27.8	7	20	40
Residential - Medium Density	72.1	21	57	116
Residential - Medium-High Density	8.3	3	7	14
Residential - High Density	7.5	3	8	16
District 8 Subtotal	**115.6**	**34**	**91**	**186**
District 9				
AG	12.4	27	72	147
District 9 Subtotal	**12.4**	**27**	**72**	**147**
Great Park/Public Ownership				
Commercial - Community	19.5	9	26	52
Commercial - Institutional	308.2	177	477	971
Park - Open Space	406.7	0	0	0
Park - Community	165.0	361	975	1985
Park - Regional	498.0	581	1569	3196
Great Park Subtotal	**1397.4**	**1128**	**3046**	**6204**
TOTAL	**3,007.7**	**2,802**	**7,565**	**15,409**

Table 5-5. Estimated Nonpotable Water Demand by Pressure Zone

Land Use	Acres	Demand, gpm		
		Average Day	Max. Day	Peak Hour
Zone D				
Residential - Low Density	35.2	9	25	50
Residential - Medium Density	13.8	4	11	22
Zone D Subtotal	**49.0**	**13**	**36**	**73**
Zone C				
Residential - Low Density	112.2	29	79	161
Residential - Medium Density	249.0	73	196	399
Residential - Medium-High Density	98.8	31	83	170
Residential - High Density	7.5	3	8	16
Commercial - Community	29.9	15	39	80
Commercial - Institutional	26.7	15	41	84
Commercial - School	21.4	19	50	102
Community Park	569.3	1,245	3,363	6,850
Zone C Subtotal	**1114.7**	**1,429**	**3,859**	**7,862**
Zone B				
Residential - High Density	44.4	17	47	95
Commercial - Community	59.1	29	78	158
Commercial - General Office	210.2	88	236	482
Commercial - Institutional	448.3	257	693	1,413
Agricultural	12.4	27	72	147
Community Park	165.0	361	975	1,985
Park - Regional	498.0	581	1,569	3,196
Park - Open Space	406.7	-	-	-
Zone B Subtotal	**1844.0**	**1,359**	**3,669**	**7,475**
TOTAL	**3007.7**	**2,802**	**7,565**	**15,409**

5.6 NONPOTABLE WATER SYSTEM EVALUATION CRITERIA AND ASSUMPTIONS

All nonpotable pipelines are sized to provide velocities less than five (5) fps and headlosses less than ten (10) feet per 1,000 feet during peak hour conditions.

5.7 WATER STORAGE REQUIREMENTS ANALYSIS

Nonpotable water storage requirements for Great Park/Great Park Neighborhoods are determined based on the District's storage criteria and requirements as established in the latest revision of Chapter 5 of the WRMP. In accordance with the WRMP, the Study Area's storage requirements are based on the calculated operational storage for the particular zone. The operational storage is equal to the maximum day demand times a storage factor as obtained from Table 5-1 of the WRMP. For storage calculations, the maximum day demands are calculated to be 2.5 times the average day demands. The operational storage as a percentage of demand is assumed for mid-peak (No pumping from 11 AM to 6 PM.). For Zone D, this factor is 23 percent, and it is 19 percent for Zone C.

5.7.1 ZONE D ANALYSIS

The 0.66 MG Zone D Reservoir serves the Portola Springs (PA 6), the Lambert Ranch within Portola Springs, and Great Park/Great Park Neighborhoods. Table 5-6 provides a calculation of the Zone D required storage. Due to decreases in both the estimated Portola Springs and Study Area demands, the provided storage will be more than sufficient.

5.7.2 ZONE C ANALYSIS

The 2.2 MG Portola Springs Zone C Reservoir will provide storage capacity for Portola Springs, Lambert Ranch, the UC Regents property, Stonegate (PA 9B), PA 9C, existing PA 35, and the Great Park/Great Park Neighborhoods. Zone C will provide storage for both the Zone C and Zone B nonpotable water demands in Great Park/Great Park Neighborhoods. Based on the calculations provided in Table 5-6, approximately 0.777 MG of additional storage capacity in Zone C will be required for the ultimate build-out of the storage zone.

The Lake Forest Zone B (LF-B) service area is northeast of the Study Area. The LF-B storage zone includes two reservoirs, called LF-B East and LF-B West, which have capacities of 3.3 MG and 7.8 MG, respectively. Both reservoirs have an HGL of 860 feet. According to the Lake Forest Area SAMP dated October 2010, the LF-B storage zone is projected to have a future surplus storage capacity of 9.44 MG. Even if all of the required storage volume were contained in LF-B West, this reservoir would provide excess storage capacity of 6.18 MG. The LF-B West reservoir is located along Rancho Parkway South between Bake Parkway and the extension of Alton Parkway currently under construction. Once the reclaimed water transmission main in Alton Parkway is completed in late 2011, the LF-B reservoir will be able to feed Zone C through a pressure reducing station located along Alton Parkway. Therefore, LF-B West will provide sufficient operational storage to compensate for the deficit in Zone C East Irvine and no additional storage will be required.

Table 5-6. Nonpotable Water Storage Analysis

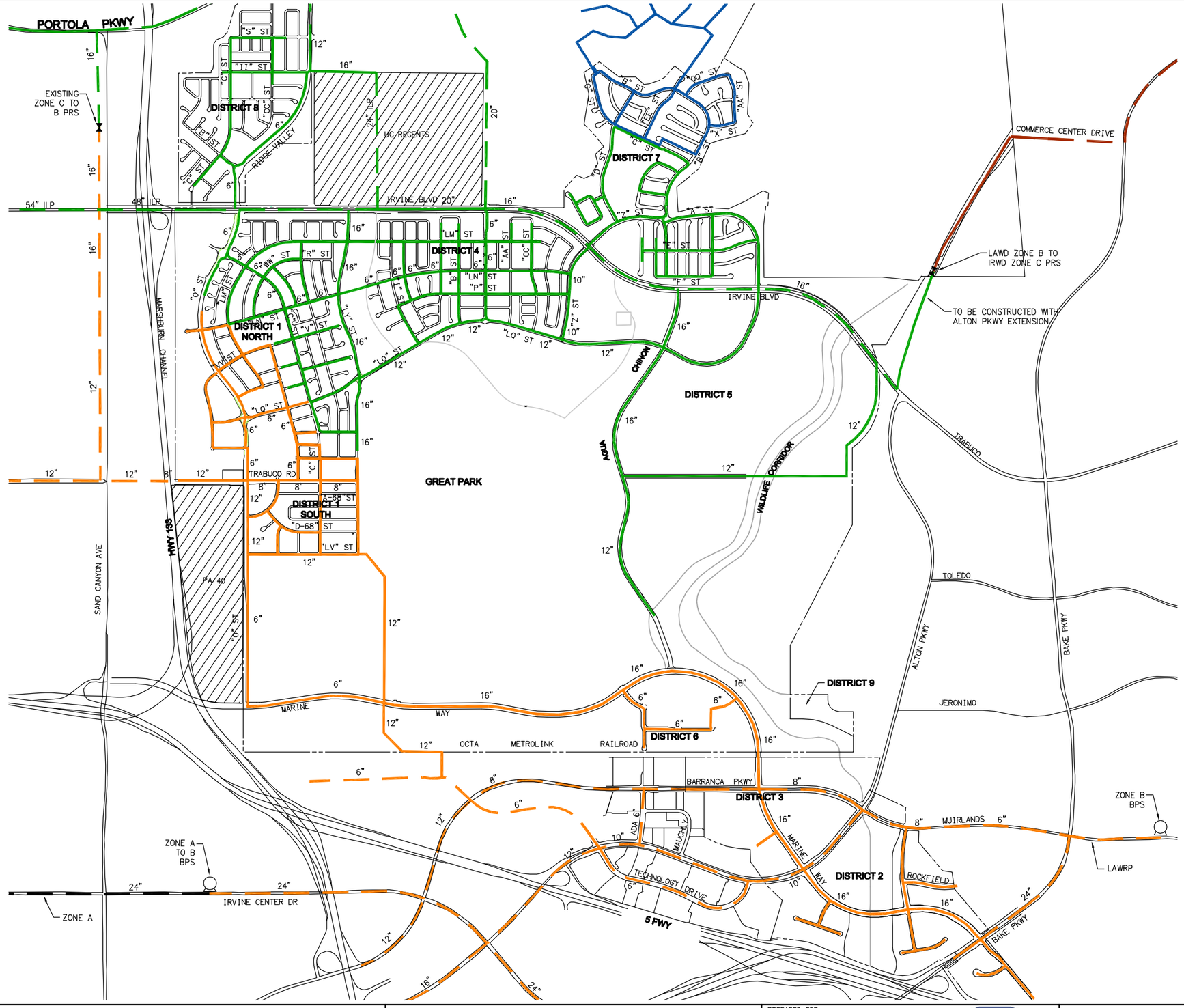
Storage Tank	Planning Area/ Service Area	Avg Day Demand MGD	Max Day Demand MGD	Oper. Storage MG	Existing Storage MG	Additional Storage Required MG
Zone D East AMP	Portola Springs	0.854	2.135	0.491		
	Lambert Ranch	0.029	0.073	0.017		
	Great Park Neighborhoods	0.019	0.047	0.011		
	Total Zone D East AMP	**0.902**	**2.255**	**0.519**	**0.660**	**(0.141)**
Zone C East Irvine	Portola Springs[a]	0.593	1.483	0.282		
	Lambert Ranch[b]	0.048	0.120	0.023		
	PA 9B	0.284	0.710	0.135		
	PA 9C	0.095	0.238	0.045		
	UC Regents (1,500 Med Density)[d]	0.084	0.210	0.040		
	PA 35[e]	0.450	1.125	0.214		
	Great Park Neighborhoods - Zone C	2.058	5.146	0.978		
	Great Park/Great Park Neighborhoods - Zone B	2.655	6.639	1.261		
	Total Zone C East Irvine	**6.268**	**15.669**	**2.977**	**2.200**	**0.777[f]**

a. Average Day Demand obtained from PA 6 SAMP Update from Tettemer & Associates dated August 25, 2005.
b. Dwelling unit type and count by pressure zone obtained from Planning Area 6 (Portola Springs) Sub-Area Master Plan Update for Lambert Ranch from Tetra Tech, Inc., dated April 17, 2007.
c. Average Day Demand obtained from Planning Area 9B and 9C Sub-Area Master Plan prepared by Stantec,, dated March 2006.
d. Dwelling Unit type and count obtained from IRWD staff on March 17, 2008 and confirmed by UCI planning staff on December 31, 2008.
e. Average Day Demand obtained from Table 5-4.1 of the 1999 WRMP.
f. According to the Lake Forest Area SAMP dated October 2010, Lake Forest Zone B (LF-B) has surplus storage capacity of 9.44 MG. Since 7.8 of the 11.1 of existing LF-B storage is contained in LF-B West Reservoir, LF-B West Reservoir will provide sufficient storage for Zone C East Irvine.

5.8 PROPOSED NONPOTABLE WATER FACILITIES

5.8.1 ONSITE FACILITIES

Proposed onsite nonpotable water facilities and pipelines are shown on Figure 5-3. The onsite facilities consist of 4-inch to 16-inch diameter pipelines as shown.



NOTES:

1. THE RECLAIMED WATER FACILITIES WITHIN THE GREAT PARK ARE NOT SHOWN ON THIS FIGURE. AT THE TIME OF THE SAMP PREPARATION, THE REQUIRED RECLAIMED WATER DISTRIBUTION FACILITIES WERE NOT KNOWN. ONCE THE LAND USE PLAN IS FINALIZED, THE RECLAIMED WATER DISTRIBUTION SYSTEM WILL REQUIRE ANALYSIS AND APPROPRIATE LEVEL OF SAMP UPDATE OR ADDENDUM WILL BE REQUIRED. ADDITIONALLY, AT THE TIME, A DETERMINATION WILL BE MADE AS TO WHICH FACILITIES WILL BE PUBLIC AND WHICH WILL BE PRIVATE.
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3. ALL PIPELINES ARE 4" UNLESS SHOWN.

LEGEND

	PROPOSED	EXISTING
ZONE D (850 HGL)		
ZONE C (640 HGL)		
ZONE B (460 HGL)		
LAWD ZONE B		

SCALE 1" = 2000'

PATH/FILENAME: H:\PDATA\10105001\ADMIN\IRWD\IRWD SAMP\SAMP 2011 UPDATE\IRWD\FIG 5-3 PROP NONPOTABLE WATER FACILITIES.DWG
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PROPOSED NON-POTABLE WATER FACILITIES

FIG. 5-3

5.8.2 OFFSITE FACILITIES

An offsite facility is considered to be any facility that is required to provide nonpotable water service to the Study Area that is outside the Study Area boundary. Figure 5-4 shows all of the proposed offsite facilities required to serve the Study Area.

Irvine Lake Pipeline Conversion

To the northwest, the Irvine Lake Pipeline (ILP) has recently been modified. The portion of the ILP from the Zone A-C Booster Pump Station to the northerly end of Lambert Road has been converted from a raw water facility to a Zone C reclaimed water transmission pipeline. The ILP is routed from the pump station, north of Portola Parkway near the Rattlesnake Reservoir, southerly along Citrusglen and Yale Avenue to Irvine Boulevard. From this intersection the pipeline is easterly routed along Irvine Boulevard to Lambert Road. A 24-inch diameter lateral is routed north along Lambert Road. The pipeline will be connected to the existing 16-inch by 20-inch diameter bend at the intersection of Irvine Boulevard and Modjeska with a proposed 20-inch diameter transmission main.

With the conversion of the ILP, a portion of the agricultural irrigation demands for PA 40 will be required to be transferred from the ILP to the existing 30-inch diameter Zone A transmission main along Jeffrey Road.

Alton Parkway PRS and Transmission Main Construction

The County of Orange is currently constructing the 16-inch diameter Zone C and 12-inch diameter LF Zone B pipeline and the LF Zone B – Zone C PRS along Alton Parkway from Irvine Boulevard to Commerce Center Drive. The pipelines are scheduled to be operational by December 2011.

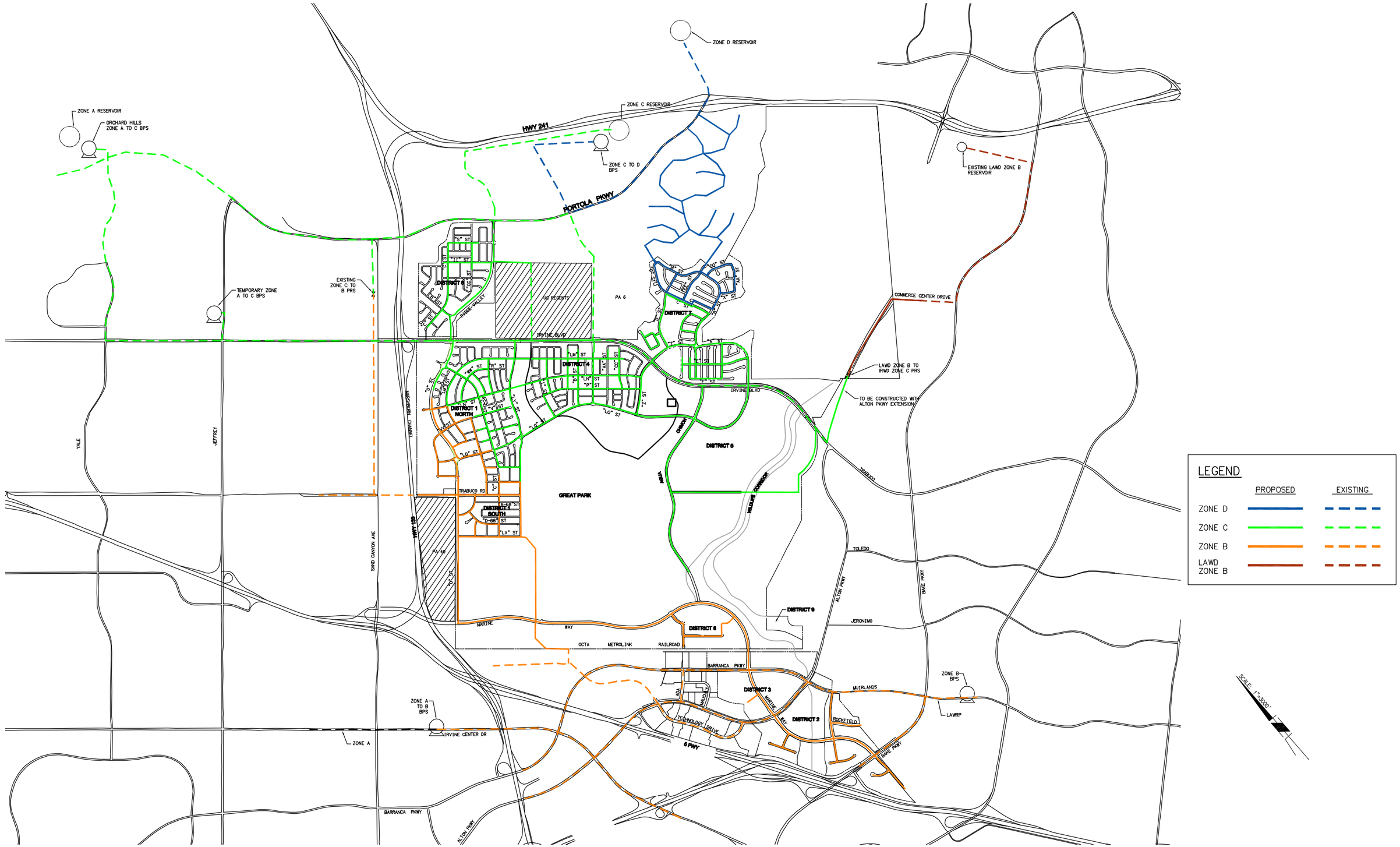
5.9 NONPOTABLE WATER SYSTEM COMPUTER ANALYSIS

The nonpotable water system computer analysis was performed using MWH Soft's InfoWater modeling software. The model created for the PA 9A, 8A, 5B, and Spectrum 8 SAMP, as well as the PA 6 SAMP, was used.

Based on information provided by the Great Park's consultants, the irrigation demands for the Great Park will be supplied by three proposed points of connection. Two of the three points of connection will be temporary. These services will provide irrigation water to the Agua Chinon Channel and the Wildlife Corridor. It is assumed that these water demands will be required for approximately three to five years in order for the native habitat to be re-established. Both of these points of connection will be along Irvine Boulevard.

The third point of connection will also be along Irvine Boulevard. This service will provide irrigation water to the remainder of the Great Park. Nonpotable water will be routed through a 16-inch transmission main to a storage facility in the Great Park over a 12-hour duration.

Nonpotable water analysis showed that supply from the Lake Forest Zone B to Zone C is required under normal and peak conditions. Flow are anticipated to range from 1,000 to 2,000 gpm between average day and maximum day conditions. These flows may vary in the future based on the ultimate land use in District 5 and pressure set point of the pressure reducing station. It is recommended that means to reduce these flows be investigated further.



PATH/FILENAME: H:\PDATA\1010501\ADMIN\RWD\RWD SNMP\SNMP 2011 UPDATE\VW\FIG 5-4 NONPOTABLE REGIONAL WATER FACILITIES.DWG
LAST UPDATE: Thursday, September 29, 2011 11:23:32 AM
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NONPOTABLE REGIONAL WATER FACILITIES

FIG. 5-4

The water storage facility will be used to supply irrigation water to the Great Park. Although this storage facility will not be an IRWD facility, similar to a golf course irrigation pond, it will greatly reduce peak demands in the IRWD nonpotable water infrastructure. The storage facility will allow nonpotable water infrastructure to be sized to meet the maximum day demands for the Great Park rather than the peak hour demands. As shown in Table 5-4, the peak hour demand is more the twice the maximum day demand. Without the storage facility, the required flow rate would increase by about 3,000 gpm. To construct the infrastructure to accommodate this increased demand would require upgrades to several existing booster pump stations and new transmission mains within existing streets.

The Great Park will be supplied with a secondary source. This source of supply will only be utilized when the Zone C supply along Irvine Boulevard is inoperable due to maintenance or operational issues. This secondary supply will be along Great Park Boulevard, near the southwest portion of the Great Park. This supply will be from Zone B. Since it is only for very infrequent usage, this supply source will require 24-hours to replenish the irrigation water to the storage facility.

As discussed in Section 5.8, a portion of the ILP has been converted from a raw water conveyance pipeline supplied by Irvine Lake to a Zone C reclaimed water pipeline supplied by the Orchard Hills Zone A-C Booster Pump Station. Since IRWD is currently providing irrigation water to several agricultural users from the ILP, these users will need to be supplied from the Zone C distribution system. Recent billing data and discussions with the agricultural representatives were used to determine irrigation water demands so that they could be input into the computer model.

The large nonpotable water demands are presented in Table 5-7. These provided demands were compared to the demands estimated using IRWD's nonpotable water use factors and peaking factors as described in Sections 5.3 and 5.4. The calculated peak hour demands were found to materially agree to the peak flows provided.

Table 5-7. Concentrated Nonpotable Water Demands

Irrigation Area	Duration of Demand	Peak Hour Demand (GPM)
Great Park Storage Fac. (Zone C)	Permanent	4,600
Aqua Chinon Channel	3 – 5 Years to establish	490
Wildlife Corridor	3 – 5 Years to establish	750
District 5 Golf Course	Permanent	1,200
UC Regents	Indefinite	710
Great Park Storage Fac. (Zone B)	Back-up Only	2,300

Based on the peak hour demand analysis, all nonpotable service pressures were predicted to be between 50 psi and 135 psi, with the exception of short portions of two streets in the northern portion of District 7 that are predicted to have peak hour water pressures as low as 38 psi. This isolated area is at the boundary between Zones C and D. The headlosses are minimal and the static pressures would be greater than 150 psi if the service area were changed to Zone D. Therefore, no revisions are recommended to the proposed distribution system. If reclaimed water meters are to be installed along these short portions of the streets, private irrigation pumps may be required.

5.10 NONPOTABLE WATER SENSITIVITY ANALYSIS

With the alternative land use plan, the nonpotable water demands would decrease almost forty percent. The average day demands would decrease from 2,800 gpm to 1,720 gpm. The peak hour demand would decrease from 15,400 gpm to 9,500 gpm. Estimated reclaimed water demands are shown by district and by pressure zone in Table 5-8 and Table 5-9, respectively.

Table 5-8. Estimated Nonpotable Water Demand by District (Alternate Land Use)

District	Acres	Demand, gpm		
		Average Day	Max. Day	Peak Hour
District 1	315.4	132	355	724
District 2	159.5	69	185	378
District 3	101.3	47	126	257
District 4	125.8	38	104	211
District 5	569.3	166	448	913
District 6	80.8	31	85	173
District 7	130.1	36	97	198
District 8	115.6	34	91	186
District 9	12.4	27	72	147
Great Park / Public	1397.4	1140	3079	6273
TOTAL	**3,007.7**	**1,720**	**4,644**	**9,460**

Table 5-9. Estimated Nonpotable Water Demand by Pressure Zone (Alternate Land Use)

Land Use	Acres	Demand, gpm		
		Average Day	Max. Day	Peak Hour
Zone D	49.0	13	36	73
Zone C	1154.7	363	979	1,994
Zone B	1804.0	1,344	3,629	7,393
TOTAL	**3007.7**	**1,720**	**4,644**	**9,460**

As discussed above, the overall nonpotable water demands would be reduced by almost forty percent if the alternate land use plan were implemented. Comparing Table 5-5 to Table 5-9, the Zone B demands would increase while the Zone C demands would decrease. The operational storage for both Zones B and C will both be contained in the Zone C reservoir. The sum of the Zone B and Zone C demands with the alternate land use plan is less than the current development plan. Since the Zone C storage is adequate with the current development plan, it will also be adequate if the alternate land use were implemented. The Zone D demands would be the same under either development plan scenario. Therefore, the Zone D storage would also be adequate under the alternate land use plan.

CHAPTER 6 – NATURAL TREATMENT SYSTEM

6.1 INTRODUCTION

An overall Conceptual Project Water Quality Management Plan was approved by the City of Irvine in April 2009. The use of the IRWD "Natural Treatment System" (NTS) has been anticipated. Once final engineering is available to determine the feasibility, final location and the size of each treatment system, each potential site will be evaluated.

The Natural Treatment System (NTS) Plan was developed by IRWD to address water quality issues in the San Diego Creek Watershed within IRWD's jurisdiction. This plan was documented in the "Irvine Ranch Water District San Diego Creek Watershed Natural Treatment System Master Plan," dated June 2005 and prepared by Geosyntec Consultants (NTS Plan). According to the report, the primary purpose and overall goal of the NTS Plan is to cost-effectively improve water quality via the use of regional treatment systems that utilize natural treatment processes. The facilities envisioned are constructed water quality treatment wetlands similar to the existing IRWD facilities at the San Joaquin Marsh.

Stated objectives of the NTS Plan include:

1. Assist County and Cities and others in meeting Total Maximum Daily Loads (TMDLs) and NPDES permit requirements.

2. Provide a comprehensive, regional, watershed-based approach to clean up runoff from a) existing land uses and b) future land uses.

3. Improve water quality in San Diego Creek, Upper Newport Bay Ecological Reserve, and Newport Bay.

4. Where feasible, enhance habitat.

6.2 DESCRIPTION OF NTS FACILITIES PROPOSED IN THE NTS MASTER PLAN

The NTS Plan consists of an ecosystem-based network of constructed water quality treatment (WQT) wetlands for improving water quality in San Diego Creek. It includes WQT wetlands at 31 sites distributed throughout the watershed. The wetlands are categorized into three general configurations:

I. Wetlands that are adjacent to existing stream channels (Off-Line facilities)

II. Wetlands established within existing stream channels (In-Line facilities)

III. Wetlands that are incorporated within existing and planned flood control basins

Eight of the 31 NTS sites and the four existing NTS facilities were designated as "regional retrofit" facilities because they provide regional level treatment of runoff from existing urban communities. The remaining sites are designated as "local" facilities and would be constructed in accordance with planned development activities to primarily serve these newly developed communities.

The NTS Plan identified six local NTS sites that were on or affected by property owned by the U.S. Navy at the time of the reports publication. The NTS Plan described the facilities as follows:

Site 18: Marshburn Retarding Basin (Construction Completed). This existing retarding basin is located at the head of Marshburn Channel on the Great Park/Great Park Neighborhoods property and is operated and maintained by Orange County Flood Control District (OCFCD). High flows from Bee Canyon are diverted from Bee Channel into this basin. Proposed Type III WQT wetlands would be integrated into the basin without impacting the flood control functions of the retarding basin. The bottom of the retarding basin would be excavated to accommodate WQT wetlands for the treatment of low flows and runoff from small storms. This facility takes advantage of an existing flood peak-retarding basin to achieve water quality improvements.

Site 22: MCAS El Toro – Aqua Chinon Lower: Located on the Great Park/Great Park Neighborhoods property, the Agua Chinon site is located adjacent to Agua Chinon Channel just south of the north-south runways and near the Irvine Multimodal Transportation Center. Type I Off-Line WQT wetlands are proposed to treat low flows and small storm flows diverted from the Agua Chinon Channel, as well as runoff from the Great Park/Great Park Neighborhoods property. Water quality benefits from this site would result from treatment of dry and wet weather flows from a drainage area that may include pollutants associated with past activities on the base.

Site 50: MCAS El Toro – Irvine Auto Center: This site is located along San Diego Creek upstream of the I-405 freeway on property owned by the Great Park/Great Park Neighborhoods. Type I Off-Line WQT wetlands are proposed to treat low flows and small storm flows, diverted from San Diego Creek. The benefits of this site are the treatment of dry and wet weather flows from a drainage area that contains commercial uses.

Site 51: MCAS El Toro – Serrano: This site is on the Great Park/Great Park Neighborhoods property adjacent to Serrano Creek downstream of the intersection of Alton Parkway with Barranca Parkway. Type I Off-Line WQT wetlands are proposed to treat low flows and small storm flows, diverted from Serrano Creek. The advantage of this site is that it provides treatment of dry and wet weather flows from current and future urban development upstream of the site, while providing additional aquatic and riparian habitat.

Site 52: MCAS El Toro – Bee Canyon: This site is located on Bee Canyon Wash upstream of the I-5 freeway. The Great Park/Great Park Neighborhoods owns the property. Type I Off-Line WQT wetlands are proposed to treat low flows and small storm flows, diverted from the Bee Canyon Channel, as well as runoff from the Great Park/Great Park Neighborhoods property. The benefits of this site are the treatment of dry and wet weather flows from current and future urban development upstream of the site, while providing additional aquatic and riparian habitat

Site 53: Caltrans SR 133/I5 Interchange: This site is located on Caltrans property, adjacent to the Marshburn Channel, near the intersection of I-5 and State Route 133. Type I Off-Line WQT wetlands are proposed to treat low flows diverted from the Marshburn Channel and small storm runoff from the freeway interchange. Operating an NTS facility at this site would enhance an existing Caltrans detention basin to include treatment of dry-weather low flows.

Table 6-1 provides a summary of the NTS facilities proposed in the NTS Plan.

Table 6-1. Proposed NTS Facilities from the NTS Plan

Site Number	Facility Name	Facility Type	Location/ Drainage Area
18	Marshburn Retarding Basin	III	Bee and Round Canyon
22	MCAS El Toro – Agua Chinon Lower	I	Aqua Chinon Wash
50	MCAS El Toro – Irvine Center Dr.	I	Upper San Diego Creek
51	MCAS El Toro – Serrano	I	Serrano Creek
52	MCAS El Toro – Bee Canyon	I	Bee Canyon Channel
53	Caltrans SR 133/I5 Interchange	I	Marshburn Channel

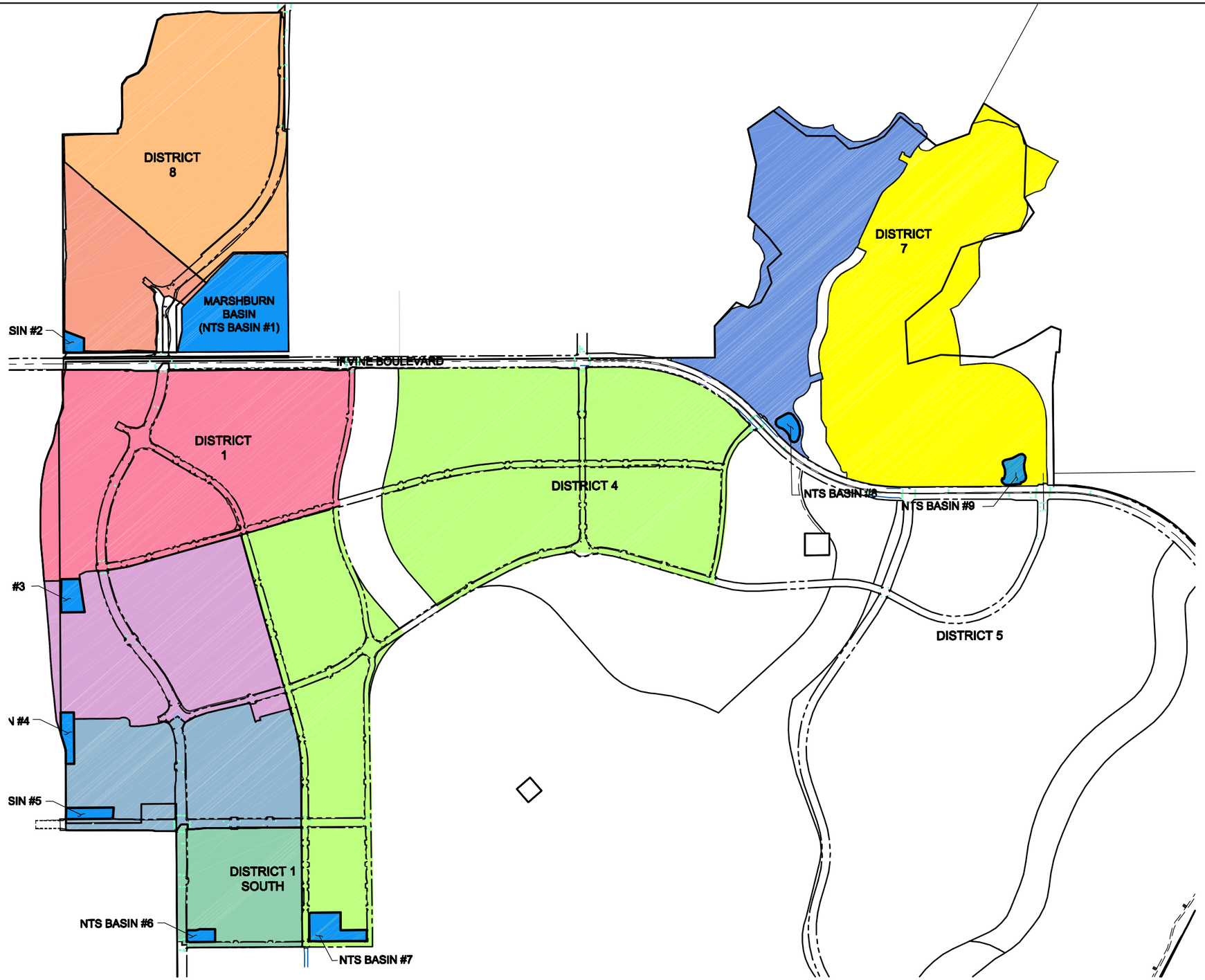
The NTS Plan is intended to be flexible in terms of design, operation, maintenance and configuration of NTS facilities.

The NTS Plan developed water quality models to estimate the performance of the NTS Plan facilities and the effectiveness of the complete NTS Plan. Assessment of the NTS Plan was based on performance measures of pollutant removal and receiving water quality. Although detailed site information was not available when the model was run, the planning level water quality models was believed to have provided estimates of treatment performance at a level that is consistent with the preliminary/conceptual design stage of the NTS facilities. Based on estimated facilities sizes and ultimate land uses, the model predicted sediment and nutrient removals from each facility in order for the entire NTS system of facilities to achieve its water quality goals. The facilities' assumed sizes and performance is provided in Table 6-2.

Table 6-2. Estimated Modeled Areas, Sediment Loads and Removal from Proposed NTS Plan

Site Number	Modeled Areas			Sediment Load Removal (ton/yr)	Nitrogen Removal		Fecal Coliform	
	Marsh Area (Ac)	Open Water Area (Ac)	Total Area (Ac)		Dry Season (lbs/yr)	Wet Season (lbs/yr)	Upstream (MPN/100mL)	Downstream (MPN/100mL)
18	4.9	1.2	6.1	145	295	1,149	12,000	6,900
22	3.25	0.82	4.07	70	675	3,806	9,000	6,300
50	0.68	0.17	0.85	68	100	189	14,000	12,000
51	2.66	0.67	3.30	43	237	746	15,000	8,900
52	0.66	0.17	0.83	20	190	354	13,000	9,500

Heritage Fields is currently working with IRWD to develop the sizing and placing of the specific water quality facilities for the proposed vesting tentative tract maps for District 1 North, Distruct 1 South, District 4, District 7, and District 8. The latest proposed facilities are shown in Figure 6-1. Appendix B summarizes the current understanding of the collaboration.



LEGEND

NTS BASIN #	TRIBUTARY AREA
BASIN #1 (Existing)	
BASIN #2	
BASIN #3	
BASIN #4	
BASIN #5	
BASIN #6	
BASIN #7	
BASIN #8	
BASIN #9	

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NTS / WATER QUALITY BASINS

FIG. 6-1

CHAPTER 7 – EASEMENTS

7.1 INTRODUCTION

IRWD will require unlimited access to all of their facilities for routine maintenance, operations, repair, replacements, monitoring and other critical functions. The majority of these facilities will be located in public streets. However, several facilities may be located on private property. These facilities will include sewer pipelines and manholes that are required to provide gravity drainage for some proposed services while minimizing cover over the pipeline, and domestic water pipelines that are required to provide critical looping to improve reliability and maintain system pressures. In addition, the development phasing may create instances in which the IRWD facilities are required to be in service before the street right-of-way is dedicated to the city of Irvine. For all locations in which an IRWD facility will not be located in the public right-of-way, an easement shall be granted to IRWD. This chapter describes the easement requirements and some of the locations where easements will be required.

7.2 EASEMENT REQUIREMENTS

If an easement to IRWD is required for construction and/or maintenance of water, sewer or nonpotable water facilities, the minimum easement width shall be ten feet for domestic and nonpotable water facilities and twenty feet for sewers. Deep sewer or water lines will require easements equal to twice the facility depth rounded upward to the nearest five feet. Easements shall be contained in single lettered lots and shall not straddle lot lines. In case of parallel facilities, the easement width shall not overlap.

7.3 PROPOSED EASEMENTS

Figure 7-1 shows the locations of proposed IRWD facilities that will be located outside of public right of way. Easements would be required for these facilities which connect domestic and recycled water systems, or convey wastewater offsite. Coordination with off-site adjacent landowners for mutually beneficial easements is on-going. Regarding required on-site easements, the development agreement between Heritage Fields and the City of Irvine requires the parties to provide easements as necessary for backbone infrastructure to serve the site. Such easements are depicted on the approved AVTTM 17008.

Reach “A” Sewer

There is an existing easement for a portion of Reach “A” sewer that is south of the “O” street and Marine Way intersection that is within an easement across the County Parcel to the railway right of way. The alignment for Reach “A” along with the easement is depicted on the 2nd Amended Vesting Tentative Map No. 17008 approved by the City Irvine. Future easements required south of the railway, that are outside of public right of way and existing IRWD easements have been identified for Reach “A” on Figure 7-1.

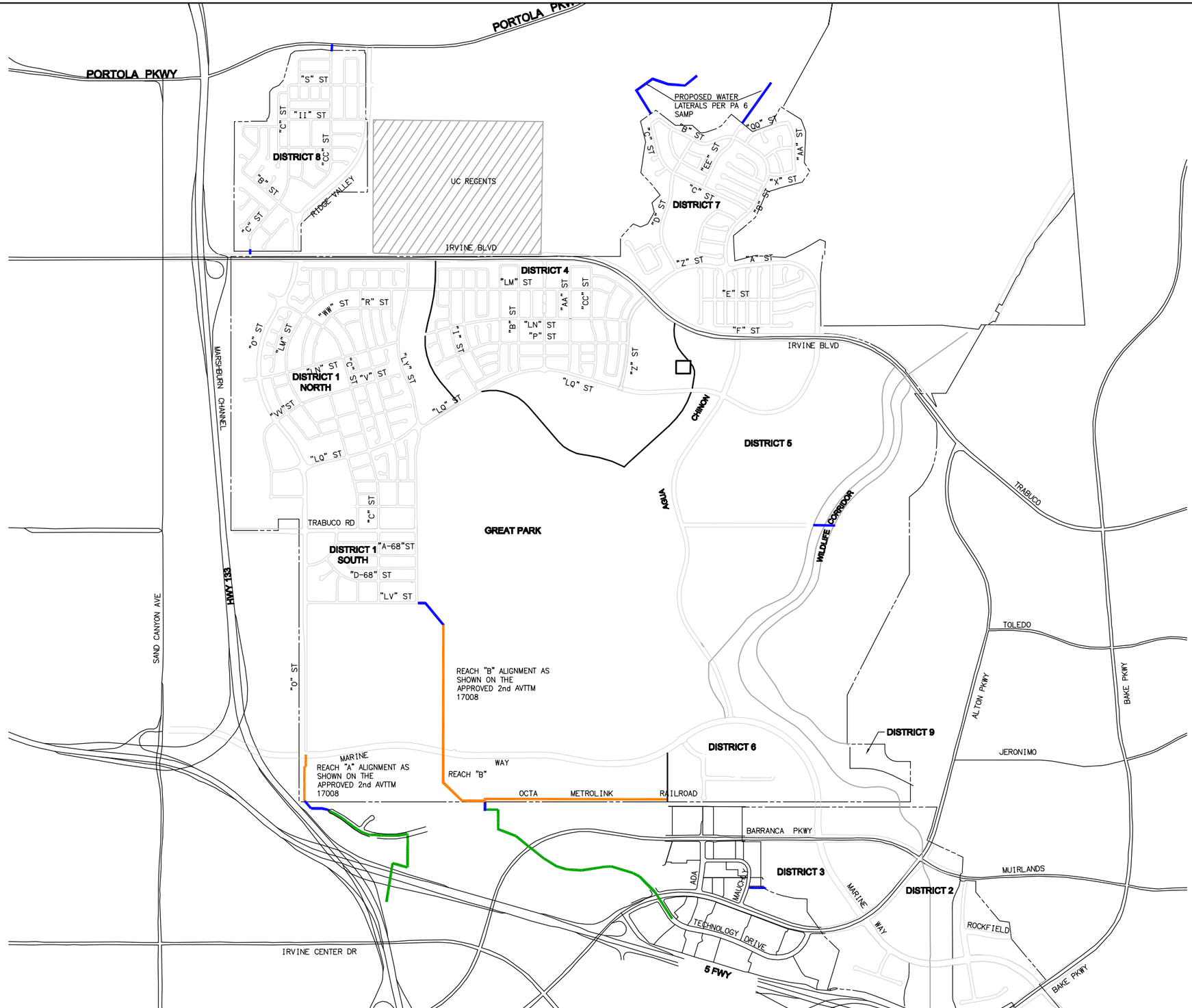
Reach “B” Sewer

There is an existing easement that has been depicted for the alignment of the Reach ‘B’ sewer south of “LV” street, through the OCGP and County Parcel to the railway. The alignment for Reach “B” along with the easement is depicted on the 2nd Amended Vesting Tentative Map No. 17008 approved by the City of Irvine. The connection of Reach “B” south of railway right of way will tie into an existing IRWD sewer line that currently serves the property.

District 7 Domestic and Recycled Water

The future domestic water and recycled water connections for Zone 5 within District 7 will ultimately require connections to pipelines to be built per Planning Area 6. Easements for these ultimate facilities were depicted in the PA 6 SAMP, and will be coordinated with the adjacent landowner. In case the pipelines from PA 6 are not constructed before District 7, the alternative plan is to construct a hydropneumatic pump station.

The current Great Park Master Plan does not differentiate between between private utilities and IRWD maintained facilities. To support the proposed land uses, onsite domestic water and sewer facilities will be required. After the proposed onsite water and sewer facilities have alignments and sizes, the developer and IRWD will determine which onsite water and sewer facilities will be owned and maintained by IRWD, and which will be owned and maintained by the Great Park. The facilities that will be "public," owned and maintained by IRWD, will require easements for IRWD prior to IRWD acceptance of the facility.



LEGEND

OFF PROPERTY IRWD FACILITY (EXISTING EASEMENT OR EXISTING PUBLIC RIGHT OF WAY)

PROPOSED IRWD EASEMENT

UTILITY EASEMENT PROVIDED. AS SHOWN ON THE APROVED 2nd AVTTM 17008

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PRELIMINARY OFF-PROPERTY IRWD EASEMENTS

FIG. 7-1

CHAPTER 8 – TELEMETRY SYSTEM

8.1 TELEMETRY REQUIREMENTS

One of the three proposed domestic water pressure reducing station will require telemetry. Changes in development plans or phasing could cause the installation of other temporary or permanent facilities requiring telemetry. The active IRWD maintained facilities will be fully telemetered with permanent, metered electrical service to communications to the MWRD Operations Center will be by programmable logic controller (PLC) via wireless radio signals.

Prior to construction, the Design Engineer will be required to apply to the City of Irvine for electrical utility service addresses for the telemetry panel at the pressure reducing station.

8.1.1 TELEMETRY SOURCES

The 2009 update to the IRWD Construction Manual W-15 Standard Drawing will be the source for telemetry standards and requirements for all facilities.

8.1.2 TELEMETRY SYSTEM DESCRIPTION

Storage reservoirs, pump stations and pressure reducing stations are primary signal collection sites for data from the IRWD facilities. From the collection sites, data is typically transferred to the MRWP Operations Center via a licensed microwave band radio system. Signals between the area facilities are typically sent to the telemetry signal collection site via telemetry cable.

Data is transferred from the data collection sites using spread spectrum unlicensed data radios. The radios work well when there is good line-of-sight between the two antenna sites. Where a facility's antenna is within sight of the data collection site's antenna, wireless communications has proven to be very reliable for IRWD.

Where direct lines-of-sight are not available for wireless radio signals or cabling is more efficient, direct buried cables should be used for data collection. Direct buried telemetry cables should consist of heavy-duty telephone cables. These cables shall be installed in the protection zone at the base of the associated pipeline. Where the telemetry cable leaves the protection zone of the pipeline, it should be installed in a rigid steel conduit. The bend of the conduit should be strapped to the pipeline at the divergence point to eliminate shifting that might sheer the cable. The conduit should extend to the back of the sidewalk or parkway where it would enter a telemetry pullbox or telemetry pedestal, prior to entering the facility.

8.2 EXISTING TELEMETRY FACILITIES

The existing data collection sites that are able to receive the communications for the Study Area facilities via radio signals are the Quail Hill Storage Tank, the Central Zone 1 Storage Tank radio communications tower, and the Portola Springs Zone 4 Reservoir and Zone 4-6 Booster Pump Station site.

8.3 TELEMETRY SYSTEM LAYOUT

Geographically, the Study Area is relatively evenly sloped. Therefore, the proposed onsite telemetry facilities will be able to send telemetry signals to the data collection site via a licensed microwave band radio system. The data will then be relayed to the MWRP Operations Center via existing radio communications.

PRS-2: Zone 4 to 4R, main feed – Data collection should be sent to the existing Quail Hill Storage Tank via licensed microwave band radio. The pressure reducing station should be equipped with an antenna in order to transfer the signals. The height of the antenna cannot be determined until the rough grading is completed and a radio survey is performed at the pressure reducing station site.

CHAPTER 9 - PROJECT PHASING

9.1 PROPOSED DEVELOPMENT

The Study Area is envisioned to be developed in six phases for this report. Phase 1 will include Great Park Neighborhoods District 8. Phase 2 will include Great Park Neighborhoods District 1 and a portion of the Great Park. Phase 3 will include Great Park Neighborhoods Districts 2 and 4. Phase 4 will include Great Park Neighborhoods District 7 and the portion of District 3 south of Alton Parkway. Phase 5 will include Great Park Neighborhoods Districts 5, 6 and the portion of District 3 north of Alton Parkway. Phase 5 will also include a portion of the Great Park and the parcels between Marine Way and the OCTA/Metrolink railroad. Phase 6 will include Great Park Neighborhoods District 9 and the remaining portion of the Great Park.

As agreed between the City of Irvine and Heritage Fields LLC, sewer (Reach "A" and Reach "B") and nonpotable water systems, from the railway up to the southern edge of District 1 South will be initiated as part of the site first five year master phasing plan. Mass grading for District 8 is anticipated to begin in fall of 2011. Vertical construction is anticipated 12 to 14 months following grading.

As shown in Chapter 2 Land Use, several City or County owned parcels besides the Great Park are in the Study Area. The public ownership parcels between Marine Way and the OCTA/Metrolink railroad are assumed to be part of Phase 5. The remaining public ownership parcels are assumed to be developed concurrently with the developer owned parcels surrounding them.

In addition to the onsite development, several parcels of land outside of the Study Area will impact the phasing of the IRWD facilities. For this analysis, it is assumed that the portion of PA 40 that is east of SR-133 will be developed at the same time as onsite Study Area Phase 5. It is assumed that the UC Regents property will be developed concurrently with Study Area Phase 6. See Figure 9-1 for a graphic representation of the proposed Study Area phasing.

9.2 DOMESTIC WATER SYSTEM PHASING

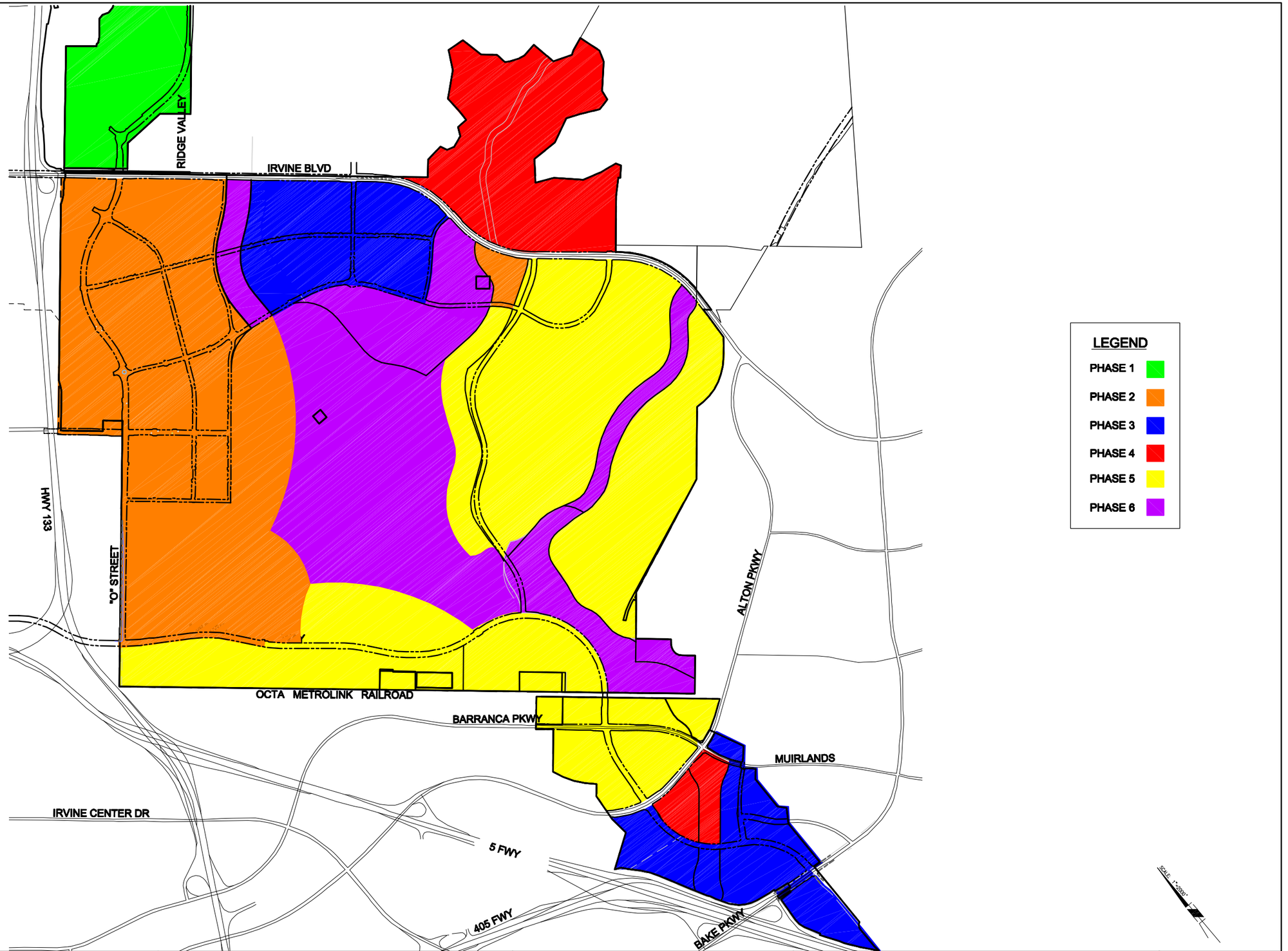
All onsite domestic water pipelines should be constructed concurrently with the onsite street improvements. A minimum of two connection points to the distribution systems should be required to provide adequate looping when more than 28 dwelling units are occupied or more than two fire hydrants are placed in service. The domestic water distribution system phasing is depicted on Figure 9-2.
\

9.2.1 STUDY AREA PHASE 1

The Phase 1 development will be served by Zones 4 and 4R. Since existing Zones 4 and 4R pipelines are located in Portola Parkway and Irvine Boulevard, the proposed improvements will include the construction of one Zone 4-4R pressure reducing station and on-site pipelines. Two connections will be required to the existing Zone 4R pipeline along Irvine Boulevard. Lastly, two connections will be required to the existing Zone 4 pipeline along Portola Parkway.

9.2.2 STUDY AREA PHASE 2

The Phase 2 development will be served by Zones 4R and 3. Proposed improvements will include the



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PROPOSED PROJECT
PHASING PLAN

FIG. 9-1

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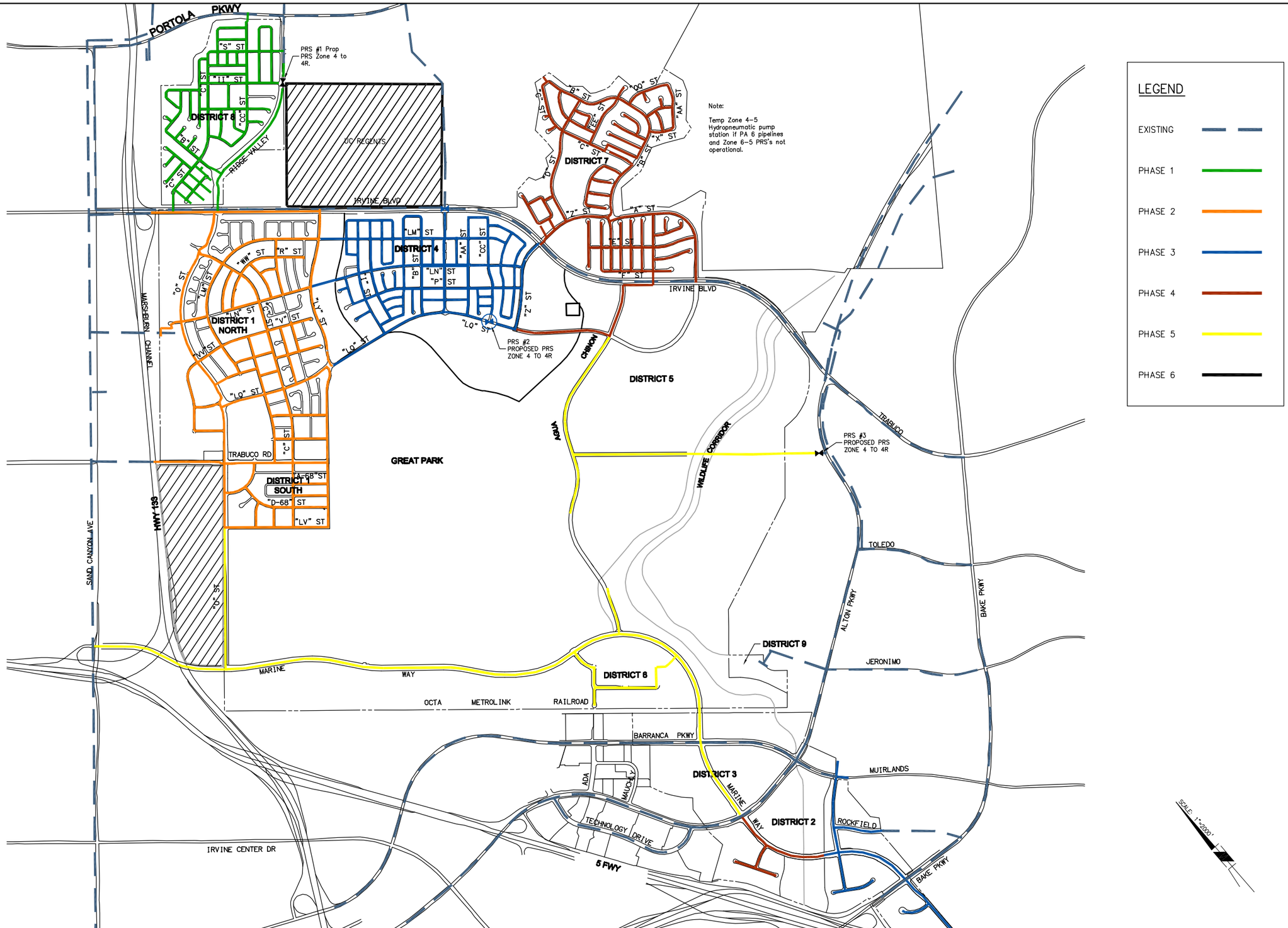

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PROPOSED DOMESTIC WATER FACILITIES PHASING

FIG. 9-2

Zone 3 transmission main along Trabuco Road from east of SR-133 to proposed "O" Street, the continuation of the Zone 3 pipeline under SR-133 that is midway between Trabuco Road and Irvine Boulevard, the Zone 3 transmission main along Irvine Boulevard between SR-133 and proposed "O" Street, and on-site piping. Two connections will be required to the existing Zone 4R pipeline along Irvine Boulevard. The existing 8-inch Zone 3 transmission main in the Trabuco Road bridge over the SR-133 is adequately sized for interim and ultimate conditions and will be connected to the existing 16-inch pipeline that crosses under the SR-133, or new Zone 3 transmission main from Irvine Boulevard.

9.2.3 STUDY AREA PHASE 3

The Phase 3 development will be served by Zones 4, 4R and 3. In District 4, the two pipelines connections will be required to the Zone 4 transmission main along Irvine Boulevard. Also, one Zone 4-4R pressure reducing station and on-site piping will be required. In District 2, the proposed improvements will include the Zone 3 transmission main along Muirlands Boulevard and on-site piping. Connections will be required to Zone 3 pipelines along Rockfield Boulevard and Bake Parkway.

9.2.4 STUDY AREA PHASE 4

The Phase 4 development will be served by Zones 5, 4 and 3. The Zone 5 distribution pipelines will connect to the Portola Springs Zone 5 pipelines. The Zone 4 pipelines will connect to the Zone 4 transmission main along Irvine Boulevard at two locations. The proposed Marine Way pipeline will connect to the existing Alton Parkway and to the Marine Way pipeline installed to support Phase 3.

As described in Chapter 3, the Zone 5 service area within District 7 will be supplied by the facilities to be constructed as part of Portola Springs Phase 2. These facilities include Zone 6 pipelines, two Zone 6-5 pressure reducing stations and Zone 5 pipelines. If all of these facilities are not operational when required for District 7, temporary water facilities will be required. These could include temporary pipelines and pressure reducing stations from Portola Springs. As an alternative, the temporary system could include a hydro-pneumatic pump station to boost from Zone 4 to Zone 5.

9.2.5 STUDY AREA PHASE 5

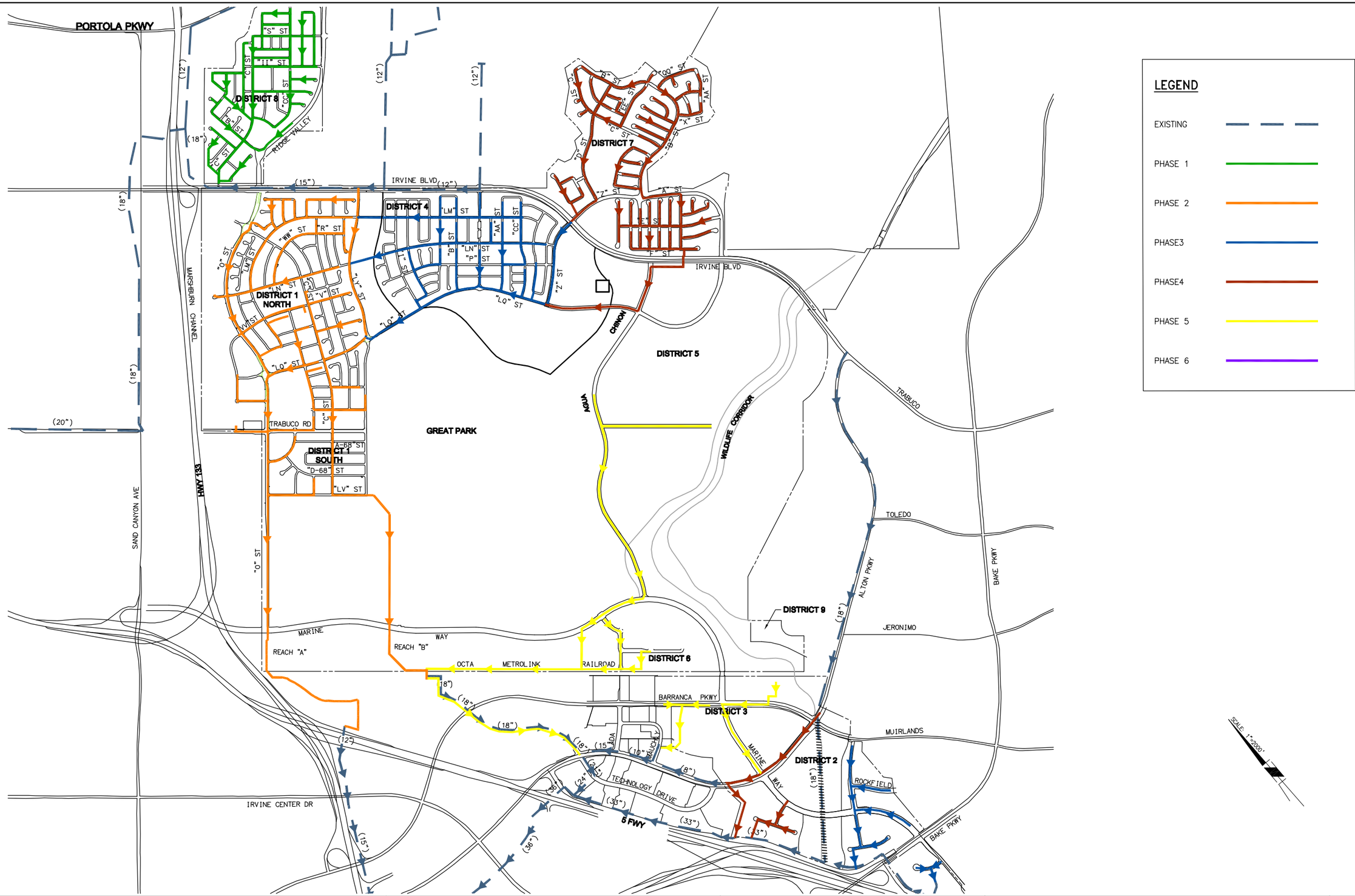
The Phase 5 development will be served from Zone 4, 4R and 3. Two Zone 4-4R pressure reducing stations will be required. In addition to the on-site pipeline, pipeline connections will be required to existing pipelines along Irvine Boulevard, Alton Parkway and Barranca Parkway.

9.2.6 STUDY AREA PHASE 6

The Phase 6 development will be served from Zone 3. One connection will be required to the existing Zone 3 pipeline along Jeronimo Road.

9.3 WASTEWATER COLLECTION SYSTEM PHASING

All onsite gravity sewer pipelines should be constructed concurrently with the onsite street improvements. The wastewater collection system phasing is graphically depicted on Figure 9-3.



PATH/FILENAME: H:\PDATA\10105001\ADMIN\RWD\SWMP 2011 UPDATE\SS\FIG 9-3 PROP SS COLLECTION FACILITIES PHASING.DWG
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PLANNING ■ DESIGN ■ CONSTRUCTION
14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8122 • www.RBF.com

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PROPOSED SEWER COLLECTION FACILITIES PHASING

FIG. 9-3

9.3.1 STUDY AREA PHASE 1

The Phase 1 development will be conveyed to the existing 15-inch sewer system in Irvine Boulevard. This system crosses under the Eastern Transportation Corridor (State Route 133 or SR 133) north of Irvine Boulevard in order to convey flow to trunk sewer systems within Sand Canyon Avenue and Jeffrey Road, en route to the San Diego Creek Interceptor system.

The 18-inch pipeline crossing under SR 133 does not have sufficient capacity to serve all of Planning Area 6, District 8 and UC Regents. Thus, the Reach "B" sewer must ultimately convey a portion of the flow from the Irvine Boulevard system by means of a sewer diversion manhole in Irvine Boulevard. Upon the issuance of building permits for 75% of the development areas (equating to 4,250 EDU based on average day sewer flows converted to EDU) north of Irvine Blvd, flow monitoring upstream of the existing 18-inch sewer crossing of the SR-133 must be started. When flow monitoring results indicate a depth to diameter ratio of 65% the selection of the method to divert flow away from the 18-inch sewer must be selected. The Reach "B" sewer should be completed from Irvine Boulevard to the Study Area southern boundary as the primary means to prevent the design capacity of the 18-inch gravity sewer pipeline under SR-133 from being exceeded.

If the Reach "B" sewer cannot be constructed to divert flow away from existing 18-inch sewer pipeline under SR-133, then an alternative sewer conveyance method must be implemented to convey sewer flows to the Sand Canyon Avenue sewer system. Feasible alternatives are provided in the Sewer Contingency Study (See Appendix A).

9.3.2 STUDY AREA PHASE 2

The Phase 2 development will drain into the Reach "A" and Reach "B" points of connection. The existing 10-inch and 12-inch Reach "A" gravity sewers downstream of the Study Area will be replaced with a 15-inch gravity sewer.

9.3.3 STUDY AREA PHASE 3

A portion of the Phase 3 development will drain directly to the San Diego Interceptor. The remaining portion of Phase 3 will drain through the Phase 2 facilities to Reach "B."

9.3.4 STUDY AREA PHASE 4

As part of Phase 4, the 18-inch Serrano Creek trunk sewer will be relocated to Alton Parkway. The portion of Phase 4 in District 2 will drain directly to the San Diego Interceptor. The portion of Phase 4 in District 7 will drain through the Phase 2 and 3 facilities to Reach "B."

9.3.5 STUDY AREA PHASE 5

The District 5 and 6 developments will drain to Reach "B." The District 3 development will drain through Alton Parkway to the San Diego Interceptor. The Public Ownership portions of Phase 5 will drain to Reach "A."

As part of Phase 5, the existing 18-inch Reach "B" gravity sewer along Technology Drive will replaced with a 24-inch gravity sewer.

9.3.6 STUDY AREA PHASE 6

The Phase 6 development will drain to Jeronimo Road.

9.4 NONPOTABLE WATER SYSTEM PHASING

All onsite nonpotable water pipelines should be constructed concurrently with the onsite street improvements.

9.4.1 STUDY AREA PHASE 1

The Phase 1 development will be served with nonpotable water from Zone C. Pipeline connections will be required to the 48-inch pipeline in Irvine Boulevard and to the 16-inch pipeline in Portola Parkway.

9.4.2 STUDY AREA PHASE 2

The Phase 2 development will be served with nonpotable water from Zones C and B. Two pipeline connections will be required to the 48-inch pipeline in Irvine Boulevard and a connection to the nonpotable pipeline in Trabuco Road. The existing 10-inch Zone B pipeline transmission main in the Trabuco Road bridge over the SR-133 is adequately sized for interim and ultimate conditions.

9.4.3 STUDY AREA PHASE 3

The Phase 3 development will be served with nonpotable water from Zones C and B. The Zone C distribution piping will connect to the existing Zone C transmission main along Irvine Boulevard in two locations. In addition, the 16-inch Zone C transmission main along Irvine Boulevard from Lambert Road to Modjeska will be constructed.

The Zone B distribution system will connect to the existing Zone B pipeline in Bake Parkway. The Zone B pipeline along Muirlands Boulevard will be constructed.

9.4.4 STUDY AREA PHASE 4

The Phase 4 development will be served by Zone D, C and B. The Zone D service area will connect to the existing Portola Springs Zone D pipelines. The Zone C distribution pipelines will connect to the existing Zone C transmission main along Irvine Boulevard in two locations. The Zone B distribution system will connect to the existing Alton Parkway Zone B pipeline and the Marine Way pipeline that was installed to support Phase 3 development.

As described in Chapter 5, the Zone D service area within District 7 will be supplied by the facilities to be constructed as part of Portola Springs Phase 2. These facilities include Zone D pipelines. If these pipelines are not operational to the Study Area boundary when required for District 7, temporary domestic water facilities will be required. The facilities will include connections to the domestic water system with approved backflow preventers.

9.4.5 STUDY AREA PHASE 5

The Phase 5 development will be served by Zones C and B. The Zone C distribution pipelines will connect to the existing Zone C transmission main along Irvine Boulevard in two locations. The portion of Phase 5 south of the OCTA/Metrolink railroad will connect to the existing Alton Parkway and Barranca Parkway Zone B pipelines.

9.4.6 STUDY AREA PHASE 6

The Phase 6 development will be served from Zone B. One connection will be required to the existing Zone B pipeline along Jeronimo Road.

TEMPORARY FACILITIES FOR THE GREAT PARK

If additional flow above the 1,000 gpm is required for the Great Park irrigation system, two alternatives have been identified: 1) a temporary irrigation pond and 2) temporary piping as described below. Temporary systems are considered developer convenience and are funded by the benefiting developer.

Based on the assumed schedules and demands for the off-site agricultural irrigation, the Zone C nonpotable distribution system can deliver approximately 400 gpm over a 24-hour period to the Great Park irrigation system along Irvine Boulevard. Since the proposed Great Park irrigation meters will be approximately 7,500 lf south of Irvine Boulevard, a temporary pipeline would be required from Irvine Boulevard to the proposed meter location. If the temporary pipeline is sized to deliver all of the irrigation water demands over the standard nine hour watering window through Phase 5, the temporary pipeline should have a diameter of 16-inches. This pipeline could be routed along “O” Street. If preferable to the Great Park Corporation, the temporary pipeline could also be constructed along the edge of the Great Park’s future canyon. For either solution, a pressure reducing valve at the irrigation water meter would be required to reduce the water pressure from the Zone C HGL.

The nonpotable water distribution system phasing is graphically depicted on Figure 9-4.

9.5 TELEMETRY SYSTEM PHASING

As the telemetry signals will be transferred via radio communication to existing offsite facilities, the telemetry equipment needed for primary pressure reducing station should be provided with Phase 3 improvements.

PATH/FILENAME: H:\PDATA\10105001\ADMIN\IRWD\IRWD SAMP 2011 UPDATE\FWG FIG 9-4 PROP NONPOTABLE WATER FACILITIES PHASING.DWG
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IRVINE, CALIFORNIA 92618-2027
949.472.3505 • FAX 949.472.8122 • www.RBF.com

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PROPOSED NONPOTABLE WATER FACILITIES PHASING

FIG. 9-4

CHAPTER 10 - PROJECT COSTS

10.1 BREAKPOINT FOR CAPITAL VERSUS DEVELOPER FUNDING

IRWD policy is to fund and construct "backbone" facilities only. Smaller facilities are generally the developer's responsibility. IRWD uses the criteria shown in Table 10-1 to determine IRWD funded and developer funded facilities.

Table 10-1. Funding Criteria

System	IRWD Funded Facilities	Developer Funded Facilities
Domestic Water	Mains 12-inches and larger	Mains 10-inches and smaller
Wastewater	Sewers 12-inches and larger	Sewers 10-inches and smaller
Nonpotable Water	Mains 6-inches and larger	Mains 4-inches

Permanent reservoirs, pumping stations and turnouts are also generally funded by IRWD. Active pressure reducing stations, or those that are the primary source with telemetry, are funded by IRWD. Non-active pressure reducing stations, or secondary sources without telemetry, are funded according to interconnected main size. Special consideration is given to IRWD funding of smaller facilities that help accomplish regional objective.

The engineering cost opinions in this chapter are for both IRWD and developer funded facilities. The costs have been categorized using the size and function criteria presented above.

10.2 UNIT COST FACTORS

Unit prices used in this SAMP, which includes contractor's overhead and profit, were taken from recent construction costs tabulated for similar projects. Unit pipe cost factors presented in Tables 10-2, 10-3, and 10-4 reflect estimated 2009 costs. No allowances have been made in the estimates for escalations of costs in future years. Pipeline costs do not include easement acquisition costs. The unit pipe cost for PVC pipe was used for pipe diameters 12-inches and less. Cement mortar line and coated (CML&C) steel pipe costs have been used for diameters greater than 12-inches to develop the proposed domestic and nonpotable water facilities cost opinion. VCP costs have been used for gravity sewers with diameters greater than 12-inches and for pipes downstream of commercial and industrial development.

10.3 PROJECT COSTS

Total project costs are summarized in Table 10-8. Total construction cost opinions include an additional 35 percent for design, contract administration, inspection, legal fees, and construction contingencies. Detailed cost opinions for domestic water, wastewater and nonpotable water are provided in Table 10-5, Table 10-6, and Table 10-7, respectively. Costs for pipeline facilities to be constructed in existing streets are estimated using a higher unit price to account for pavement removal and replacement, traffic control measures, and potentially shorter working hours imposed by the City of Irvine.

Table 10-2. Domestic Water Pipe Unit Costs

Diameter, inches	Construction Cost, $/LF
8	80.00
10	90.00
12	110.00
16	160.00

Table 10-3. Sewer Unit Costs

Diameter, inches	Construction Cost, $/LF
8	120.00
10	135.00
12	150.00
15	170.00
18	195.00
21	225.00

Table 10-4. Nonpotable Water Unit Pipe Costs

Diameter, inches	Construction Cost, $/LF
4	60.00
6	70.00
8	80.00
10	90.00
12	110.00
16	160.00
18	180.00
20	230.00

Table 10-5. Proposed Domestic Water Facilities Cost Opinion

Item	Quantity	Unit	Unit Cost	Total Cost	IRWD Portion	Developer Portion
ONSITE						
Pipelines						
12-inch Pipeline	53,200	LF	$110	$5,852,000	$5,852,000	
10-inch Pipeline	30,200	LF	$90	$2,718,000		$2,718,000
8-inch Pipeline	179,600	LF	$80	$14,368,000		$14,368,000
Pipeline Subtotal	263,000			$22,938,000	$5,852,000	$17,086,000
Pressure Reducing Stations						
Primary PRS w/ Telemetry	1	EA	$150,000	$150,000	$ 150,000	
Secondary PRS w/o Telemetry	2	EA	$100,000	$200,000		$200,000
Pressure Reducing Stations Subtotal				$ 350,000	$ 150,000	$200,000
Onsite Construction Cost Subtotal				**$ 23,288,000**	**$ 6,002,000**	**$ 17,286,000**
OFFSITE						
30-inch Alton Parkway Pipeline	5,000	LF	$ 260[a]	$1,300,000	$1,300,000	
18-inch Alton Parkway Pipeline	110	LF	$ 310 [a]	$34,000	$34,000	
12-inch Alton Parkway Pipeline	1,400	LF	$ 210 [a]	$294,000	$294,000	
Primary PRS w/ Telemetry	1	EA	$ 150,000	$150,000	$150,000	
Total Offsite Construction Cost Subtotal				$1,778,000	$1,778,000	
Study Area Share of Offsite Construction Cost[b]				**$148,100**	**$148,100**	**$ -**
Total Onsite and Offsite Construction Costs				$23,436,100	$6,150,100	$17,286,000
Contingency, Engineering, Admin.			35%	$8,203,000	$2,775,000	$6,050,000
TOTAL PROJECT COST				**$31,639,100**	**$8,303,100**	**$23,336,000**

a. The construction costs for the IRWD facilities to be constructed with the Alton Parkway extension will be shared between the County of Orange and IRWD. The unit costs shown are the IRWD portion of the facility.
b. The IRWD facilities to be constructed with the Alton Parkway extension will serve several service areas of IRWD. From an analysis performed by IRWD, the Study Area will be responsible for 1/12th of the total IRWD costs, or 8.33%.

Table 10-6. Proposed Wastewater Water Facilities Cost Opinion

Item	Quantity	Unit	Unit Cost	Total Cost	IRWD Portion	Developer Portion
ONSITE						
Pipelines						
21-inch Pipeline	4,600	LF	$225	$1,035,000	$1,035,000	
18-inch Pipeline	4,000	LF	$195	$780,000	$780,000	
15-inch Pipeline	6,700	LF	$170	$1,139,000	$1,139,000	
12-inch Pipeline	21,400	LF	$150	$3,210,000	$3,210,000	
10-inch Pipeline	9,400	LF	$135	$1,269,000		$1,269,000
8-inch Pipeline	133,000	LF	$120	$15,960,000		$15,960,000
Pipeline Subtotal	188,850			$23,393,000	$6,164,000	$17,229,000
Onsite Construction Cost Subtotal				**$23,393,000**	**$6,164,000**	**$17,229,000**
OFFSITE						
Reach "A"						
Install 12-inch Pipeline	1,500	LF	$150	$225,000	$225,000	
Install 15-inch Pipeline, Remove 10-inch Pipeline	400	LF	$185	$74,000	$74,000	
Install 15-inch Pipeline, Remove 12-inch Pipeline	1,300	LF	$190	$247,000	$247,000	
Replace Manholes	8	EA	$20,000	$160,000	$160,000	
Reach "B"						
Install 24-inch Pipeline, Remove 18-inch Pipeline	4,500	LF	$325	$1,462,500	$1,462,500	
Replace Manholes	14	EA	$20,000	$280,000	$280,000	
Offsite Construction Cost Subtotal				**$2,448,500**	**$2,448,500**	**$0**
Total Onsite and Offsite Construction Costs				$25,841,500	$8,612,500	$17,229,000
Contingency, Engineering, Admin.			35%	$9,045,000	$3,014,000	$6,030,000
TOTAL PROJECT COST				**$34,886,500**	**$11,626,500**	**$23,259,000**

Table 10-7. Proposed Nonpotable Water Facilities Cost Opinion

Item	Quantity	Unit	Unit Cost	Total Cost	IRWD Portion	Developer Portion
ONSITE						
Pipelines						
20-inch Pipeline	1,600	LF	$ 230	$368,000	$368,000	
16-inch Pipeline	23,000	LF	$ 160	$3,680,000	$3,680,000	
12-inch Pipeline	21,300	LF	$ 110	$2,343,000	$2,343,000	
10-inch Pipeline	1,900	LF	$ 90	$171,000	$171,000	
8-inch Pipeline	5,500	LF	$ 80	$440,000	$440,000	
6-inch Pipeline	17,100	LF	$ 70	$1,197,000	$1,197,000	
4-inch Pipeline	116,000	LF	$ 60	$6,960,000		$6,960,00
Pipeline Subtotal	186,400			$15,159,000	$8,199,000	$6,960,000
Onsite Construction Cost Subtotal				**$15,159,000**	**$8,199,000**	**$6,960,000**
OFFSITE						
Alton Parkway Extension						
16-inch Alton Parkway Pipeline	5,700	LF	$ 130[a]	$741,000	$741,000	
Study Area Share of Offsite Construction Cost[b]				**$61,800**	**$61,800**	
Total Onsite and Offsite Construction Costs				$15,220,800	$8,260,800	$6,960,000
Contingency, Engineering, Admin.			35%	$5,327,000	$2,891,000	$2,436,000
TOTAL PROJECT COST				**$20,547,800**	**$11,151,800**	**$9,396,000**

a. The construction costs for the IRWD facilities to be constructed with the Alton Parkway extension will be shared between the County of Orange and IRWD. The unit costs shown are the IRWD portion of the facility.
b. The IRWD facilities to be constructed with the Alton Parkway extension will serve several service areas of IRWD. From an analysis performed by IRWD, the Study Area will be responsible for 1/12th of the total IRWD costs, or 8.33%.

Table 10-8. Estimated Total Project Cost Opinion

Category	Total Estimated Construction Costs[a]	IRWD Portion[a]	Developer Portion[a]
Domestic Water	$31,639,100	$8,303,100	$23,336,000
Wastewater Collection	$34,886,500	$11,626,500	$23,259,000
Nonpotable Water	$20,547,800	$11,151,800	$9,396,000
TOTAL	**$87,073,400**	**$31,081,400**	**$55,991,000**

[a] Includes a 35 percent contingency for design, contract administration, inspection, legal fees and construction contingencies

10.4 PROJECT CAPITAL COSTS BY DEVELOPMENT

The proposed domestic water, wastewater and nonpotable water infrastructure required for the Study Area will be impacted by the development of four future properties with four different owners. These owners are Heritage Fields, LLC, the Great Park Corporation, the Irvine Community Development Company and the Regents of the University of California. In this report, their four developments are called the Great Park Neighborhoods, the Great Park, PA 40 and the UC Regents Property. Since all four future developments will benefit from the infrastructure proposed in this SAMP, the associated costs for the infrastructure will be allocated among the four developments.

By design, the domestic water distribution system is looped and interrelated. Also many of the pipelines are sized to provide fire flow to the various areas, and cannot be allocated to just one development. Therefore, the capital costs for the domestic water capital facilities have been allocated based on average day demands for each future development.

The proposed infrastructure required for the wastewater collection system can be more easily allocated to the individual developments. Significantly more offsite improvements are required for some reaches of sewer than others. Therefore, the wastewater collection system infrastructure capital costs will be allocated based on percent of the flow through each gravity sewer reach. For the Reach "A" improvements, the capital costs were allocated to the Great Park Neighborhoods and PA 40 - East. For Reach "B" improvements, costs were allocated to the UC Regents property, the Great Park Neighborhoods and the Great Park.

The proposed capital improvement costs for the nonpotable water distribution system were allocated using the same methodology as the domestic water system. The allocation of capital improvement costs by development is shown in Table 10-9.

Table 10-9. Estimated Total Project Capital Cost Opinion by Development

Category	Total Estimated Capital Costs[a]	Great Park Neighborhoods Portion[a]	Great Park Portion[a]	UC Regents Portion[a]	PA 40 Portion[a]
Domestic Water	$8,303,100	$5,445,200	$296,400	$1,543,500	$1,018,000
Wastewater Collection	$11,626,500	$9,186,200	$211,300	$1,453,600	$775,400
Nonpotable Water	$11,151,800	$6,388,900	$4,304,600	$214,100	$244,200
TOTAL (Baseline)	**$31,081,400**	**$21,020,300**	**$4,812,300**	**$3,211,200**	**$2,037,600**
Domestic Water	$8,303,100	$6,064,600	$389,400	$1,114,300	$734,800
Wastewater Collection	$11,626,500	$9,250,100	$207,200	$1,418,100	$751,100
Nonpotable Water	$11,151,800	$3,515,000	$6,909,700	$339,000	$388,100
TOTAL (Sensitivity Analysis)	**$31,081,400**	**$18,829,700**	**$7,506,300**	**$2,871,400**	**$1,874,000**

[a] Includes a 35 percent contingency for design, contract administration, inspection, legal fees and construction contingencies