MEADOWOOD
WATER STUDY

May 5, 2009

Prepared By:

Dexter Wilson Engineering, Inc.
2234 Faraday Avenue
Carlsbad, CA 92008

Job Number 648-006

TABLE OF CONTENTS

PAGE NO.

EXEC. SUM. WATER AGENCY SELECTION OPTIONS/ FACILITY PLANNING ES-1
FACILITY OVERVIEW – POTABLE WATER SYSTEM ES-2
Water Supply Facilities For Service by San Luis Rey MWD, Valley Center MWD, or Rainbow MWD New Supply Facilities ES-2
Water Supply Facilities For Service by Rainbow MWD Using Existing Supply Facilities ES-4
FACILITY OVERVIEW - RECYCLED WATER SYSTEM ES-10
EIR DOCUMENTATION ES-10

CHAPTER 1 INTRODUCTION 1-1
PURPOSE AND OUTLINE 1-1
WATER SERVICE BACKGROUND 1-2
Recycled Water Service 1-4
PROJECT PLANNING AND ENVIRONMENTAL DOCUMENTATION 1-4

CHAPTER 2 WATER DEMAND OVERVIEW 2-1
WATER DEMANDS 2-1
Planned Land Use 2-1
Water Use Projections for the School Site 2-1
Possible Changes to the Land Use Plan 2-2
Water Use Factors 2-3
Interior and Exterior Water Use 2-3
WATER CONSERVATION 2-4
RECYCLED WATER SUPPLY AND DEMAND ANALYSIS 2-5
Recycled Water Demands 2-6
Recycled Water Quality 2-7
Recycled Water Disposal. 2-8
On-Site Recycled Irrigation System Management 2-9
Supplementing the Recycled Water System 2-9
POTABLE WATER DEMAND 2-9

TABLE OF CONTENTS

PAGE NO.

WATER OFFSET PROGRAM 2-11
Offset Amount 2-11
Agency Considerations 2-11
Offset Water Supply 2-11
Conservation. 2-12
Recycled Water. 2-12
Desalinated Water 2-12
Groundwater. 2-12
Other Supplies. 2-12

CHAPTER 3 MEADOWOOD WATER SUPPLY FACILITIES FOR SERVICE BY SAN LUIS REY MWD, VALLEY CENTER MWD, OR RAINBOW MWD NEW SUPPLY FACILITIES 3-1
POTABLE WATER RESERVOIR SIZING AND SITING 3-1
Reservoir Sizing 3-1
Site Alternatives 3-2
Construction and Maintenance Access 3-4
Site Selection 3-8
AQUEDUCT CONNECTION SIZING AND SITING 3-8
Aqueduct Connection Sizing 3-9
Pipeline Sizing 3-9
Aqueduct Connection Site and Alignment Alternatives 3-10
Site Requirements 3-10
First Aqueduct at Huntley Road 3-10
Second Aqueduct at Reche Road 3-11
First Aqueduct at Highway 76/Pala Road 3-14
Second Aqueduct at Pala Mesa Drive and Wilt Road 3-14
Additional Aqueduct Connection Design Considerations 3-18
Additional Alignment Considerations 3-18
Connection and Alignment Evaluation and Selection 3-19
Single Connection Preferred. 3-19

TABLE OF CONTENTS

PAGE NO.

Capacity Availability in Second versus First Aqueduct. 3-19
Alignment Selection Considerations 3-19
HYDRAULIC CONTROL 3-21
ONSITE POTABLE WATER DISTRIBUTION 3-22
WATER FACILITIES PHASING 3-22

CHAPTER 4 MEADOWOOD WATER SUPPLY FACILITIES FOR SERVICE BY RAINBOW MWD EXISTING SUPPLY FACILITIES 4-1
BACKGROUND ON RAINBOW MWD WATER SYSTEM 4-1
North Reservoir and Rice Canyon System 4-1
Canonita System 4-2
Beck System 4-2
POTABLE WATER RESERVOIR SIZING AND SITING 4-2
AQUEDUCT CONNECTION SIZING AND SITING 4-3
WATER TRANSMISSION PIPELINE SIZING AND ALIGNMENT 4-3
Pipeline Sizing 4-3
Pipeline Alignment Alternatives 4-3
Option 1 - Connection to the North Reservoir/Rice Canyon System 4-3
Option 2 - Connection to the Canonita System 4-5
Option 3 - Connection to the Beck System. 4-6
Alternative Selection Considerations 4-6
ONSITE POTABLE WATER DISTRIBUTION 4-7
WATER FACILITIES PHASING 4-7

CHAPTER 5 RECYCLED WATER FACILITIES 5-1
RECYCLED WATER RESERVOIR 5-1
RECYCLED WATER TRANSMISSION MAIN 5-2
RECYCLED WATER DISTRIBUTION SYSTEM 5-2
RECYCLED WATER SYSTEM PHASING 5-4

APPENDIX A MEMO TO KAREN KOSUP- GROUNDWATER USE ON THE MEADOWOOD PROPERTY

LIST OF TABLES

PAGE NO.

TABLE ES-1 POTABLE WATER FACILITIES COMPONENT INVENTORY ES-6

TABLE ES-2 RECYCLED WATER FACILITIES COMPONENT INVENTORY ES-11

TABLE 2-1 MEADOWOOD LAND USER SUMMARY 2-2

TABLE 2-2 MEADOWOOD LAND USE DETAIL 2-2

TABLE 2-3 MEADOWOOD WATER DEMAND 2-3

TABLE 2-4 MEADOWOOD INTERIOR AND EXTERIOR USE 2-4

TABLE 2-5 RECYCLED WATER DEMAND FACTORS 2-6

TABLE 2-6 NON-POTABLE WATER DEMAND MONTHLY ANALYSIS 2-7

TABLE 2-7 MEADOWOOD POTABLE AND NON-POTABLE DEMANDS AND DELIVERIES WITH CONSERVATION 2-10

TABLE 2-8 MEADOWOOD POTABLE AND NON-POTABLE DEMANDS AND DELIVERIES 2-10

TABLE 3-1 MEADOWOOD POTABLE WATER STORAGE SIZING 3-2

TABLE 3-2 COMPARISON OF RESERVOIR SITE ALTERNATIVES 3-8

TABLE 3-3 AQUEDUCT CONNECTION SIZING 3-9

TABLE 3-4 WATER TRANSMISSION PIPELINE SIZING 3-9

TABLE 3-5 COMPARISON OF ALTERNATIVE PIPELINE ALIGNMENTS 3-20

TABLE 3-6 SUMMARY OF ALTERNATIVE AQUEDUCT CONNECTION CONDITIONS 3-21

TABLE 5-1 RECYCLED WATER STORAGE SIZING 5-1

LIST OF FIGURES

PAGE NO.

FIGURE ES-1 WATER FACILITIES OVERVIEW FOR SERVICE BY SAN LUIS REY MWD OR VALLEY CENTER MWD ES-3

FIGURE ES-2 WATER FACILITIES OVERVIEW FOR SERVICE BY RAINBOW MWD ES-5

FIGURE 3-1 NORTH AND SOUTH RESERVOIR SITES 3-3

FIGURE 3-2 SOUTH RESERVOIR SITE PLAN 3-5

FIGURE 3-3 SOUTH RESERVOIR SITE SECTION 3-6

FIGURE 3-4 RESERVOIR ACCESS ROAD 3-7

FIGURE 3-5 AQUEDUCT CONNECTION FIRST AQUEDUCT HUNTLEY ROAD 3-12

FIGURE 3-6 AQUEDUCT CONNECTION SECOND AQUEDUCT RECHE ROAD 3-13

FIGURE 3-7 AQUEDUCT CONNECTION FIRST AQUEDUCT SR-76/PALA ROAD 3-15

FIGURE 3-8 AQUEDUCT CONNECTION SECOND AQUEDUCT PALA MESA ROAD 3-16

FIGURE 3-9 SUPPLY PIPELINES FROM FIRST AND SECOND AQUEDUCTS 3-17

FIGURE 3-10 MEADOWOOD POTABLE WATER DISTRIBUTION SYSTEM 3-24

FIGURE 4-1 WATER FACILITIES OVERVIEW FOR SERVICE BY RAINBOW MWD 4-4

FIGURE 5-1 RECYCLED WATER SUPPLY FACILITIES AND USE AREAS 5-3

EXECUTIVE SUMMARY

This report defines the facilities needed to supply potable and recycled water to the Meadowood development proposed by Pardee Homes. The Meadowood development will be located in the San Luis Rey River Valley area of northern San Diego County, on 389.5 acres of property north of State Route 76 and east of Interstate 15. The development will consist of single-family and multi-family housing, along with a park, an elementary school, common area landscaping, and 49 acres of retained groves.

The purpose of this report is twofold:

1. **Design Definition:** Confirm the size, location, right-of-way requirements, and constructability of the proposed water and recycled water facilities.

2. **EIR Support:** Describe the facilities in sufficient detail to support the Meadowood project Environmental Impact Report (EIR).

WATER AGENCY SELECTION OPTIONS/FACILITY PLANNING

Water service for the Meadowood project will be provided by one of three nearby water agencies. These are:

- San Luis Rey Municipal Water District (San Luis Rey MWD)
- Valley Center Municipal Water District (Valley Center MWD)
- Rainbow Municipal Water District (Rainbow MWD)

The selection of a water service provider for the project will be made by the San Diego Local Agency Formation Commission (LAFCO) as part of a Municipal Services Review-Sphere of Influence (MSR-SOI) process. The selection will also need the concurrent approval of the San Diego County Water Authority (Water Authority) and the Metropolitan Water District of Southern California (Metropolitan) relative to annexation of the Meadowood property into their respective service areas. Furthermore, should the San Luis Rey Municipal Water District be selected, it will need to apply for membership to the Water Authority and Metropolitan. LAFCO will use the Meadowood EIR as environmental documentation for its actions to determine the water service provider for Meadowood. The Meadowood EIR includes an environmental analysis of the water and recycled water facilities described in this report.

FACILITY OVERVIEW – POTABLE WATER SYSTEM

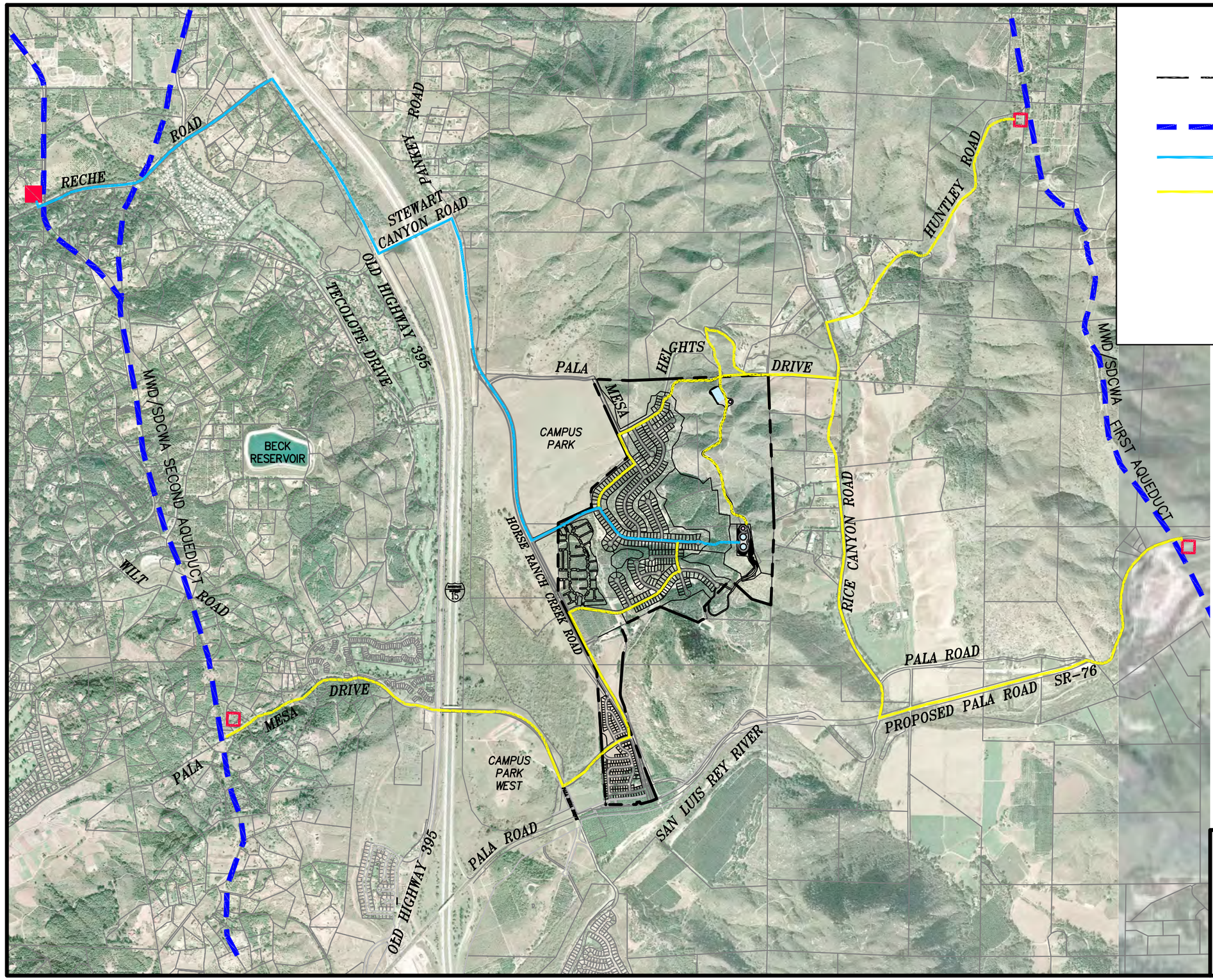
In comparing the possible ways that the Meadowood project could receive water, the water supply facilities required for service by the San Luis Rey MWD are identical to those required for service by the Valley Center MWD and would likely require a new connection to one of the nearby aqueducts. These same new facilities could also be utilized by the Rainbow MWD; however, utilization of existing Rainbow MWD facilities in the area to the extent possible would be preferred. Thus, this report considers the facility requirements for (1) the installation of a new aqueduct connection as supply for service by the San Luis Rey MWD, the Valley Center MWD, or the Rainbow MWD, and (2) the utilization of existing Rainbow MWD facilities as supply.

Water Supply Facilities for Service by San Luis Rey MWD, Valley Center MWD, or Rainbow MWD New Supply Facilities

The water facilities required for service by either the San Luis Rey MWD or Valley Center MWD are identical. These same new facilities could also be utilized by Rainbow MWD; however, utilization of existing Rainbow MWD facilities to the extent possible would be preferred if Rainbow MWD is selected by LAFCO. The facilities consist of a new turnout and flow control facility along the San Diego County Water Authority aqueduct system, transmission pipeline from the aqueduct to the Meadowood site, water storage tanks, and appurtenant facilities. A summary map depicting these facilities is shown in Figure ES-1. The figure depicts alternative aqueduct connection points and pipeline alignments from each of the two aqueducts. The figure also depicts two alternative water storage tank locations within the Meadowood project, one of which will be selected for construction.

Based on projected demands and phasing considerations, the recommended water supply facilities include:

- A 2.5-cubic feet per second (cfs) flow control facility
- A 12-inch diameter water transmission pipeline from an aqueduct
- Five million gallons (MG) of potable reservoir storage on the Meadowood project
- On-site pressure reducing stations



LEGEND

- MEADOWOOD PROJECT BOUNDARY
- EXISTING AQUEDUCT
- PREFERRED ALIGNMENT
- ALTERNATIVE ALIGNMENT
- PREFERRED CONNECTION AND FLOW CONTROL FACILITY
- ALTERNATIVE CONNECTION AND FLOW CONTROL FACILITY

N

1" = 1800'

FIGURE ES-1

NEW POTABLE SUPPLY FACILITIES OVERVIEW (SLRMWD, VCMWD, RMWD)

\\PACIFIC\DWG\648006\FIGURE ES-1.DWG 04-20-09 16:10:44 LAYOUT: ES-1

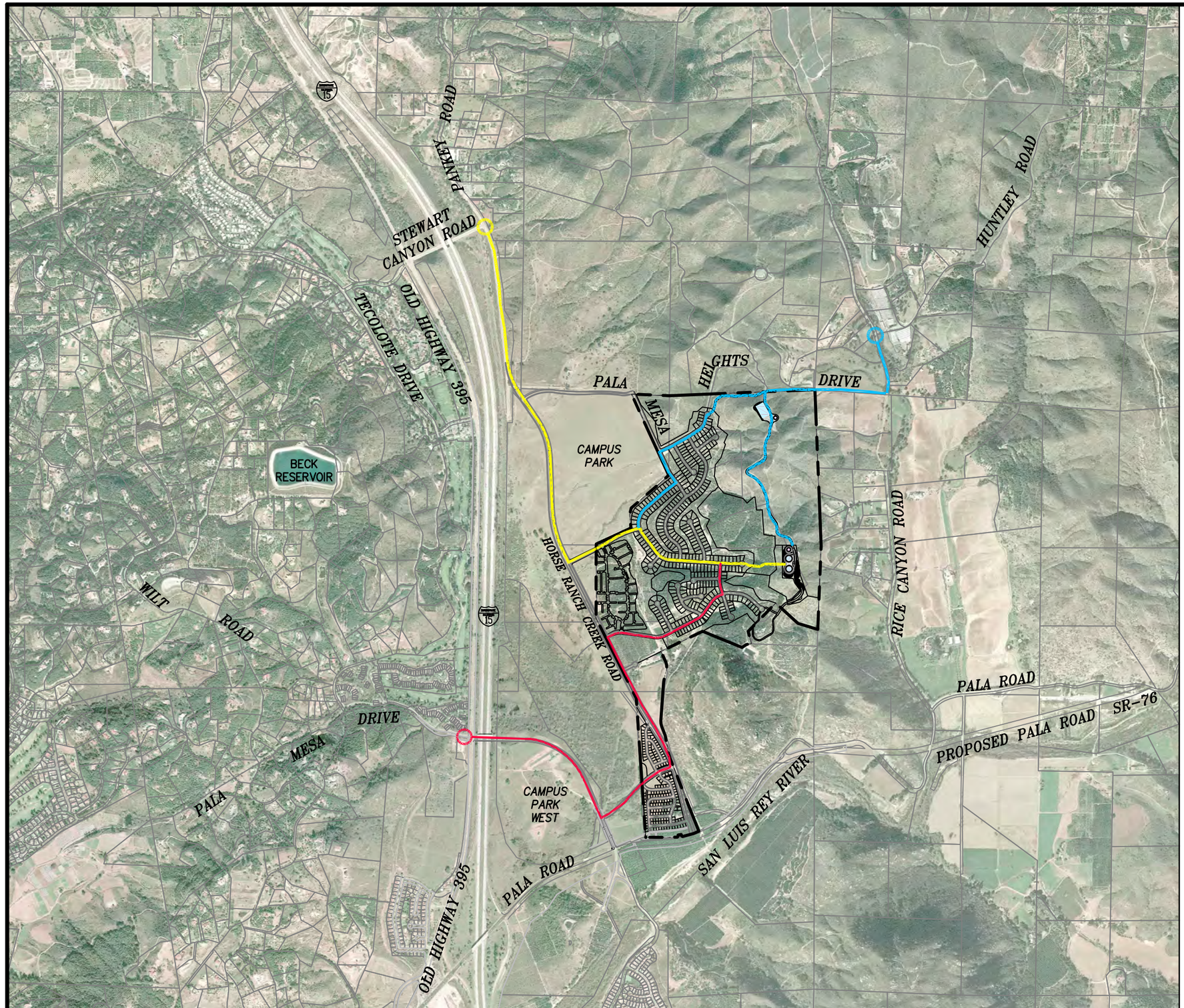
Water Supply Facilities for Service by Rainbow MWD Using Existing Supply Facilities

The water facilities required for service by the Rainbow MWD using existing supply facilities consist of new transmission pipelines connecting to Rainbow's existing transmission pipelines, and may include the same water storage tanks on the project site as for the other two districts. A summary map depicting these facilities is shown in Figure ES-2. The figure depicts three possible points of connection to the Rainbow system, one of which will be selected for construction. The figure also depicts two alternative water storage tank locations, one of which will be selected for construction.

Limited information was available to fully evaluate the design requirements associated with connecting to the Rainbow MWD water system. However, based on the Rainbow MWD 2001 and Draft 2006 Master Plans as well as the demands and phasing considerations summarized above, the recommended water supply facilities include:

- One 12-inch diameter water supply pipeline connected to the existing Rainbow MWD water system
- Five MG of potable reservoir storage
- Off-site pressure reducing station, if necessary
- On-site pressure reducing stations

The preferred water supply facilities required for each of the possible water districts are itemized and further described in Table ES-1 (subsequent pages).



LEGEND

- MEADOWOOD PROJECT BOUNDARY
- OPTION 1 ALIGNMENT
- OPTION 2 ALIGNMENT
- OPTION 3 ALIGNMENT
- OPTION 1 CONNECTION TO EXISTING RMWD FACILITIES
- OPTION 2 CONNECTION TO EXISTING RMWD FACILITIES
- OPTION 3 CONNECTION TO EXISTING RMWD FACILITIES

THIS EXHIBIT SHOWS THE LOCATION OF THE WATER SUPPLY FACILITIES THAT WOULD BE CONSTRUCTED TO SERVE THE MEADOWOOD PROJECT FOR WATER SERVICE FROM THE RAINBOW MWD. THE MAJOR FACILITIES ARE:

1) TANKS: TWO POSSIBLE SITES AS SHOWN, OF WHICH ONE WILL BE SELECTED FOR CONSTRUCTION.

2) PIPELINES: THESE WILL CONNECT THE TANKS TO EXISTING RAINBOW MWD PIPELINES.

N

1" = 1800'

FIGURE ES-2

EXISTING POTABLE SUPPLY FACILITIES OVERVIEW (RMWD)

\\PACIFIC\DWG\648006\FIGURE ES-2.DWG 04-16-09 11:03:09 LAYOUT: ES-2

TABLE ES-1
POTABLE WATER FACILITIES COMPONENT INVENTORY

	For service by new supply facilities of • **San Luis Rey MWD, Valley Center MWD, or Rainbow MWD**	**For service by existing supply facilities of:** • **Rainbow MWD**
Aqueduct Connections & Flow Control Facilities	One to either the First (eastern) or Second (western) aqueduct systems of the San Diego County Water Authority, consistent with the selected water transmission pipeline alignment.	None
Facility Description	• Construct new pipeline connection to existing aqueduct pipelines. • Construct masonry block turnout/meter building approx. 20 ft. x 20 ft., 20 ft, high, and adjacent masonry block flow control valve building approx. 20 ft. x 20 ft., 20 ft, high. Final design may determine that the two buildings can be combined into one structure approx. 20 ft. x 40 ft., 18 ft. high.	
Footprints/land acquisition	Total land area required: approx. 0.25 acre. Land Acquisition: Selected sites would be purchased from existing private property owners.	
Transmission Pipeline	Construct one water transmission pipeline to either the First (eastern) or Second (western) aqueduct systems of the San Diego County Water Authority. The preferred alignment is to the Second Aqueduct via Reche Road, with a total length of approx. 22,000 ft.	Construct one water transmission pipeline to one of three existing RMWD pipelines. Options 1 and 3 are preferred over Option 2. Option: 1. Approx. 12,000 ft. in length to existing RMWD facilities in Rice Canyon Rd. 2. Approx. 11,000 ft. in length to existing RMWD facilities in Stewart Canyon Rd. 3. Approx. 13,000 ft. in length to existing RMWD facilities in Pala Mesa Dr.

TABLE ES-1
POTABLE WATER FACILITIES COMPONENT INVENTORY

Facility Description	Pipeline Material: ductile iron or PVC. Pipeline Diameter: approx. 12 inches, sized for Meadowood only. Construction Method: Pipes will be placed in excavated trenches in existing and planned roadways. Other Facilities: None	Same Other Facilities: Pressure reducing station may be required for Option 1 or Options 2.
	For service by new supply facilities of • **San Luis Rey MWD, Valley Center MWD, or Rainbow MWD**	For service by existing supply facilities of: • **Rainbow MWD**
Footprints/land Acquisition	Trench Dimensions: approx. 5 feet wide and 5 to 6 feet deep. Total Construction Zone Width: approx. 25 feet. Land Acquisition: The pipeline segments in Huntley Road, Pala Mesa Heights Drive and in the western portion of Pala Mesa Drive are within private roads and will require easement acquisitions. The Huntley Road easement acquisition may need to extend 20 to 30 feet to one side of the existing road surface due to possible conflicts with existing utility easements in the road. All of the other pipeline segments off-site of the Meadowood property are in existing public roadways and will not require any land acquisition. The crossing at I-15 will require a Caltrans encroachment permit.	Trench Dimensions: Same. Total construction zone width: Same. Land Acquisition: All of the pipeline segments off-site of the Meadowood property are in existing or proposed public roadways and will not require any land acquisition.
Storage Tanks	Construct 5 million gallons of potable water storage along ridgeline with paved access road to site. Two tanks at 2.5 million gallons each, the South Site is preferred.	Same

TABLE ES-1
POTABLE WATER FACILITIES COMPONENT INVENTORY

Facility Description	Tank Material: Steel. Tank Dimensions: Approx. 118 feet in diameter and 32 feet high (each). Earthwork: Site grading for the tanks will entail approx. 100,000 cubic yards (cy) of excavation, including approx. 70,000 cy of blasting. Excess material will be used as fill for the development. Visual Screening: Foundation excavation will leave a natural earthen berm, which will partially shield view of the tanks from the I-15 corridor. Access Road: Primary construction and maintenance access will be via the existing ridge-top farming road and 20 foot access easement from end of cul-de-sac.	Same
	For service by new supply facilities of • **San Luis Rey MWD, Valley Center MWD, or Rainbow MWD**	For service by existing supply facilities of: • **Rainbow MWD**
Footprints/land Acquisition	Tank Site Footprint: Approximately 2.5 acres, inclusive of a 3 foot construction buffer around the entire perimeter. Access Road Footprint: The existing ridge-top farming road will be improved between the existing paved Pala Mesa Heights Drive and the tank site, a distance of approximately 4,000 ft. The road will be graded within a 30 ft. wide easement and paved to a width of 16 ft. Total road easement is approximately 3 acres. Land Acquisition: The tank site and most of the new sections of access road are within the Meadowood property. The northernmost section of access road just south of the connection to Pala Mesa Heights Drive may require an expansion of the existing Meadowood access easement.	Same

TABLE ES-1
POTABLE WATER FACILITIES COMPONENT INVENTORY

Distribution/Other	Distribution Pipeline: Potable water distribution pipelines will be constructed mostly within the Meadowood development road network along with other underground facilities. The only distribution pipelines not within the road network are an initial pipeline reaches leading from the tank site to the development. Other Facilities: Pressure reducing stations will be located in vaults within or adjacent to the Meadowood road network.	Same

FACILITY OVERVIEW - RECYCLED WATER SYSTEM

The Meadowood project will use recycled water for irrigation uses, reducing its need for imported water. Wastewater from the development will be treated to recycled water quality standards at the project's wastewater treatment plant, and will be used on-site for irrigation of the project's common area landscaping, slopes, park, school fields, and the retained groves. These uses will consume all of the recycled water generated by the project except during several winter months when the majority of the recycled water will be utilized and excess effluent from the wastewater treatment plant will be disposed of by percolation.

Recycled water facilities will consist of a conveyance pump station located at the wastewater treatment plant site (southern edge of the Meadowood property, just north of the realigned Highway 76/Pala Road), a transmission pipeline, a storage tank, and recycled water distribution pipelines. The storage tank will have a capacity of 0.65 million gallons, equal to one day of the projected recycled water use under summertime maximum month conditions. The recycled water facilities will be the same for any of the three water district options.

A summary map depicting the recycled water facilities is included in Chapter 5. The preferred facilities shown are itemized and further described in Table ES-2 (next page).

EIR DOCUMENTATION

Permitting requirements and construction descriptions associated with the construction of the Meadowood water and recycled water facilities are included in this report to support the EIR preparation efforts. The impacts associated with the preferred alternative for water storage (south reservoir site) and the Second Aqueduct connection alternative at Reche Road are analyzed in the EIR. Construction descriptions are based on typical construction methods for the water and recycled water facilities identified in this report. The permits required include a Waste Discharge Permit for recycled water use, Grading Permit, Standard Urban Stormwater Mitigation Plan, and Caltrans Encroachment Permit. Depending on the alternative selected, the required permits may also include a California Department of Fish and Game Stream Alteration Agreement.

TABLE ES-2
RECYCLED WATER FACILITIES COMPONENT INVENTORY

	For service by new supply facilities of • **San Luis Rey MWD, Valley Center MWD, or Rainbow MWD**
Conveyance Pump Station	Pump station to lift recycled water from the wastewater treatment plant site to a recycled water storage tank.
Facility Description	Pump Station: Integrated into wastewater treatment plant site.
Footprints/land Acquisition	Total land area required: Part of wastewater treatment plant site. Land Acquisition: Part of wastewater treatment plant site.
Conveyance Pipeline	One pipeline approximately 8,000 feet in length from the wastewater treatment plant site to the storage tank site.
Facility Description	Pipeline Material: PVC or ductile iron. Pipeline Diameter: approximately 6 inches, sized for Meadowood only. Construction Method: Pipes will be placed in excavated trenches in existing and planned roadways.
Footprints/land Acquisition	Trench Dimensions: approx. 3 to 4 feet wide and 4 to 5 feet deep. Total Construction Zone Width: approx. 25 feet. Land Acquisition: All of the identified pipeline segments off-site of the Meadowood property are within existing public roadways and will not require any land acquisition.
Storage Tank	One tank at approx. 0.65 million gallons, located on the same site as the potable water storage tanks.
Facility Description	Tank Material: Welded Steel Tank Dimensions: Approx. 70 feet in diameter and 24 feet high. Earthwork: Included in site development for potable water storage tanks. Visual Screening: Foundation excavation will leave a natural earthen berm, which will partially shield the view of the tank from the I-15 corridor. Access Road: Same as for the potable water storage tanks.
Footprints/land Acquisition	Tank Site Footprint: Included in the footprint for the potable water tanks. Land Acquisition: None required. The tank site is within Meadowood.
Distribution/Other	Distribution Pipelines: Recycled water distribution pipelines will be constructed mostly within the Meadowood development road network along with other underground facilities. These pipes will be 4 to 6-inch diameter PVC. The only distribution pipelines not within the road network are the initial pipeline reaches leading from the tank site to the development. Other Facilities: Pressure reducing stations will be located in vaults within or adjacent to the Meadowood road network. An irrigation booster pump station may be required to serve retained groves.

CHAPTER 1

INTRODUCTION

Pardee Homes is pursuing development of 389.5 acres of property near the intersection of Interstate 15 and Highway 76/Pala Road in North San Diego County. The development, known as Meadowood, will require water, wastewater, and recycled water infrastructure. Dexter Wilson Engineering, Inc. is providing engineering services to assist Pardee Homes with planning and preliminary design of the water and recycled water facilities.

PURPOSE AND OUTLINE

This report provides preliminary engineering for the Meadowood water and recycled water facilities. The purpose of the report is twofold:

- **Design Definition:** Conduct sufficient research and design to confirm the size, location, right-of-way requirements, and constructability of the proposed water and recycled water facilities.

- **EIR Support:** Describe facilities in sufficient detail to support a project-level EIR, including documentation of an alternative analysis process sufficient to comply with California Environmental Quality Act (CEQA).

The report is organized into 5 chapters as follows:

- Chapter 1 – Introduction (this chapter)
- Chapter 2 – Water Demand Overview
- Chapter 3 – Meadowood Water Supply Facilities for Service by San Luis Rey MWD Valley Center MWD, or Rainbow MWD New Supply Facilities
- Chapter 4 – Meadowood Water Supply Facilities for Service by Rainbow MWD Existing Supply Facilities
- Chapter 5 – Recycled Water Facilities

WATER SERVICE BACKGROUND

The Meadowood project is not within a district that provides potable water service. It is also not within the service area of the San Diego County Water Authority or the Metropolitan Water District of Southern California.

Water service for the Meadowood project will be provided by one of three nearby water agencies:

- San Luis Rey Municipal Water District (San Luis Rey MWD)
- Valley Center Municipal Water District (Valley Center MWD)
- Rainbow Municipal Water District (Rainbow MWD)

The selection of a water service provider for the project will be made by the San Diego Local Agency Formation Commission (LAFCO) as part of a Municipal Services Review – Sphere of Influence (MSR-SOI) process. The selection will also need the concurrent approval of the San Diego County Water Authority (Water Authority) and the Metropolitan Water District of Southern California (Metropolitan) relative to annexation of the Meadowood property into their respective service areas. Furthermore, should the San Luis Rey MWD be selected, it will need to apply for membership to the Water Authority and Metropolitan.

The three water service provider alternatives are summarized below:

- **Alternative A - San Luis Rey MWD.** Most of the Meadowood project area is located within the boundaries of San Luis Rey MWD. San Luis Rey MWD currently operates only as a groundwater management agency, and does not provide retail water service to any customers. San Luis Rey MWD was working with LAFCO to activate its latent powers to provide retail water and wastewater service within its boundaries. San Luis Rey MWD was also working with the Water Authority to discuss the possibility of the district annexing into the Water Authority and obtaining access to the Water Authority's imported water facilities. Both of these efforts have been unsuccessful and it does not appear that San Luis Rey MWD will become a potable water service provider. Currently, San Luis Rey MWD has no facilities to obtain and deliver potable water. In addition to the administrative requirements, San Luis Rey MWD would have to construct facilities to deliver treated water from the Water Authority aqueduct pipelines into its service area, including the Meadowood project. These facilities would include flow control facilities, pipelines, storage tanks, and other ancillary facilities.

- **Alternative B - Valley Center MWD:** The Meadowood project is approximately one-half mile north of the existing northern boundary of the Valley Center MWD. Valley Center is a member agency of the Water Authority, and obtains 100 percent of its supply from the Water Authority aqueduct system. Valley Center MWD is a participant in the LAFCO MSR-SOI studies, so it is possible LAFCO could determine that Valley Center MWD is the preferred water service provider for the Meadowood project. Under this alternative, Valley Center MWD would construct essentially the same facilities as those for the San Luis Rey MWD alternative, and would operate these as a satellite to its existing system. It is also possible that existing Valley Center MWD facilities, which are south of the Meadowood development, would be utilized; however, it is not likely that this approach would be economically feasible.

- **Alternative C - Rainbow MWD:** The Meadowood project area is outside but adjacent to the existing boundaries of the Rainbow MWD. Rainbow MWD is a member agency of the Water Authority, and obtains 100 percent of its supply from the Water Authority aqueduct system. Rainbow MWD has discussed with Meadowood the possibility of annexing the property into the Rainbow MWD service area and providing water service to the property. Under this alternative, Rainbow could extend its existing water distribution system to serve the project, and may possibly need to make improvements to one of its existing storage reservoirs. These facilities would include pipelines and other ancillary facilities, and possibly a reservoir cover or water filtration system.

In comparing the possible ways that the Meadowood project could receive water, the water supply facilities required for the San Luis Rey MWD option are identical to those required for the Valley Center MWD option and would likely require a new connection to one of the surrounding aqueducts. These same new facilities could also be utilized by Rainbow MWD; however, utilization of existing Rainbow MWD facilities to the extent possible would be preferred. Thus, this report considers the facility requirements for (1) the installation of a new aqueduct connection for service by the San Luis Rey MWD, the Valley Center MWD, or the Rainbow MWD, and (2) the utilization of existing Rainbow MWD facilities.

Recycled Water Service

Pardee Homes plans to develop recycled water production and distribution facilities as part of the Meadowood project. Recycled water will be produced at the wastewater treatment plant (to be constructed at the southern edge of the Meadowood property, just north of the realigned Highway 76 / Pala Road), pumped to a storage tank located on the Meadowood property, and distributed for irrigation uses within the development.

The recycled water will be treated to Title 22 standards for unrestricted water reuse. Recycled water uses will include irrigation of parks, school grounds, retained groves, and common area landscapes.

PROJECT PLANNING AND ENVIRONMENTAL DOCUMENTATION

The water and recycled water facilities described in this report will be evaluated in a Project EIR for the Meadowood development. The impacts associated with the preferred alternative for water storage (south reservoir site) and the Second Aqueduct connection alternative at Reche Road are analyzed in the EIR. A companion report to this one describes the wastewater facilities required to serve the development. Both reports serve as technical references for the Project EIR.

The Meadowood Project EIR will be used by the County of San Diego for its review of the Meadowood project. The EIR will also be used by the San Diego Local Agency Formation Commission (LAFCO) as part its Municipal Services Review – Sphere of Influence (MSR-SOI) process to determine the appropriate water, recycled water, and wastewater service provider for the Meadowood area.

CHAPTER 2

WATER DEMAND OVERVIEW

This chapter describes the Meadowood project's potable and non-potable demands and includes the following sections:

- Water Demands
- Water Conservation
- Recycled Water Supply and Demand Analysis
- Project Water Demands
- Water Offset Program

WATER DEMANDS

This report has estimated water demands directly from the planned land uses, using water use factors specific to each land use. Land use and water use factors are described below.

Planned Land Use

The Meadowood land use plan proposes a variety of different housing types and uses. The plan maintains much of the existing agricultural uses and preserves sensitive biological habitat. The plan also provides parks, multi-use trails (hiking and horseback riding), and a site for an elementary school. The project's seven Planning Areas are summarized in Table 2-1. Table 2-2 then provides further detail on the gross acreages in Table 2-1 by providing the lot area, HOA area, and road area acreages.

Water Use Projections for the School Site. The land use plan notes that in the event the school district elects not to construct the school on the Meadowood property, the site would instead be developed as multi-family detached residential, with a unit count as shown in Table 2-1. For planning purposes, this report estimates the water demands based on whichever of the land use options produces the larger demand. The highest demand estimate results from use of the school site as a school. This approach assures the planned water facilities are adequate for either land use option.

TABLE 2-1
MEADOWOOD LAND USE SUMMARY

Planning Area	Land Use	Proposed Zoning	Gross Acreage	Dwelling Units	Actual Density *
1	Multi-Family Detached	RV10	26.1	164	6.3
2	Elementary School Site	RV10	12.7	42 **	3.3
3	Neighborhood Park	S80	10.1	--	--
4	Multi-Family Attached	RU20	24	325	13.5
5	Single-Family Detached	RS3	132.5	355	2.7
6	Agricultural Open Space	S80	47.6	--	--
7	Open Space	S80	128.5	--	--
	Roads, etc.	--	8	--	--
TOTAL			**389.5**	**886**	**2.3**

* Dwelling Units per acre
** Note: The actual proposed dwelling unit number is 886 – 42 = 844, because the elementary school is the intended use for Planning Area 2.

TABLE 2-2
MEADOWOOD LAND USE DETAIL

Land Use	Gross Acreage	Area Acreage	HOA Area Acreage	Road Area Acreage
Single-Family	130.8	57.6	49.6	23.6
Multi-Family	50.1	29.5	7.9	12.7
Elementary School	12.7	11.1	1.4	0.2
Neighborhood Park	10.1	8.5	0.0	1.6
Retained Groves *	49.3	49.3	0.0	0.0
Open Space	128.5	128.5	0.0	0.0
Roads, etc.	8.0	0.0	0.0	8.0
Totals	**389.5**	**284.5**	**58.9**	**46.1**

* Includes Planning Area 6 (47.6 acres) and 1.7 acres of HOA Area within Planning Area 5

Possible Changes to the Land Use Plan. Changes to the land use plan may occur as the project proceeds through the approval process, or during final design. The final land use plan could contain fewer uses than shown above. Consequently, the actual water demand of the project as developed could be lower than presented in this technical study, but is unlikely to be higher. Likewise, the actual facilities built to serve the water demands could be smaller than presented in this technical study. The facility plan presented in this report is therefore a reasonable basis for project planning, environmental documentation, and permitting.

Water Use Factors

The report has assigned water use factors to each of the different land use categories. For the residential categories, the water use factors are in gallons per day per dwelling unit (gpd/du). For the other land use categories, the water use factors are in gpd per acre (gpd/ad). In all cases, the water use factors represent average annual use rates; actual use will be higher in the summer months and lower in the winter months. The water use factors were based on an analysis of water use factors typically utilized by those water districts which may potentially serve the Meadowood project. The water use factors assigned are shown in Table 2-3.

TABLE 2-3
MEADOWOOD WATER DEMAND

Land Use	Dwellings Units or Acres	Water Use Factor	Demand		
			gpd	mgd	ac-ft/yr
Single-family	355	500 gpd/DU	177,500	0.178	199
Multi-family	489	400 gpd/DU	195,600	0.196	219
Elementary School [1]	11.1	2,000 gpd/ac	22,200	0.022	25
Neighborhood Park [1]	8.5	2,000 gpd/ac	17,000	0.017	19
HOA Areas [2]	58.9	2,000 gpd/ac	117,800	0.118	132
R.O.W. Irrigation [3]	9.22	2,000 gpd/ac	18,440	0.018	21
Retained Groves [1]	49.3	3,570 gpd/ac	176,001	0.176	197
Natural Open Space [1]	128.5	--	--	--	--
TOTAL			**724,541**	**0.725**	**812**

[1] Water Demand acreage based on Area Acreage, Table 2-2
[2] Water Demand acreage based on total HOA Area Acreage within each planning area, Table 2-2
[3] Water Demand acreage based on 20% of total Road Area Acreage in each planning area, Table 2-2

Interior and Exterior Water Use

Of the water required for the Meadowood project, a portion of the water demand will be met using recycled water generated by treating the wastewater produced within the project. Table 2-4 presents the approximate breakdown of interior and exterior use among land use types to assist in the development of the following sections regarding the availability of recycled water and non-potable water demands. Table 2-4 also provides the percentage of exterior demands which could be met with non-potable water.

TABLE 2-4 MEADOWOOD INTERIOR AND EXTERIOR USE			
Land Use	**% of Demand for Interior Use**	**% of Demand for Exterior Use**	**% of Exterior Use met with Non-potable water**
Single-family	60	40	0
Multi-family	80	20	0
Elementary School	50	50	100
Neighborhood Park	10	90	100
HOA Areas	5	95	100
R.O.W. Irrigation	0	100	100
Retained Groves	0	100	100
Natural Open Space	-	-	-

WATER CONSERVATION

The Meadowood project may utilize a variety of conservation measures to reduce the total water demand. It is anticipated that the conservation measures will reduce the total water demand by greater than 25 percent. In the following analysis of demands, it was assumed that the water conservation measures will reduce all water demands by 25 percent. This may include a combination of interior water saving fixtures and exterior water saving measures.

Interior water conservation features could include:

- High efficiency clothes washers
- High efficiency dishwashers
- Low flush toilets
- Low flow water faucets and showerheads
- Tankless water heaters

Exterior water conservation features could include:

- Weather-based irrigation controllers
- Low water use landscaping (xeriscape)
- Restrictions limiting turf use and encouraging artificial turf

Additional conservation features could include:

- Installation of “smart” meters with leak detection capability
- Individually metered multi-family units

RECYCLED WATER SUPPLY AND DEMAND ANALYSIS

The Meadowood development will include a wastewater treatment plant for treatment and recycling of the project's wastewater flows. The plant will treat all of the project's wastewater flows to Title 22 recycled water standards (disinfected tertiary effluent) producing recycled water suitable for all irrigation uses including food crops. The development will use this recycled water to irrigate its common-area landscaping, including the school site, park site, slopes and other common landscaped areas, and approximately 49 acres of retained groves.

The capacity of the wastewater treatment plant is based on the interior potable water demands of the project. Without accounting for potable conservation measures, the plant should have the capacity to treat 315.5 acre-feet per year (0.281 mgd), as shown later in this chapter in Table 2-7. In accounting for the 25 percent decrease in interior potable demand due to the project's utilization of conservation measures, the required capacity of the wastewater treatment plant is reduced to 236.6 acre-feet per year (0.211 mgd), as shown later in the chapter in Table 2-8. The recycled water then available from the plant is estimated at 90 percent of the interior demand. The following sections discuss the actual deliveries of recycled water. As detailed in this report, the Meadowood recycled water irrigation demands will consume almost all of the plant's capacity during the months from March to October, and lesser amounts during the cooler months. This recycled water use will reduce the project's potable water demands by more than 25 percent.

Recycled Water Demands

The recycled water demands for the project are based on the demand factors shown in Table 2-5. The use factors, other than the retained groves, are based on evapotranspiration rates for the area and water requirements of warm and cool season turf grass, a conservative estimate for the landscaping. The retained grove use factor is based on the calculation of present irrigation rates on the existing groves as determined by Dexter Wilson Engineering, Inc. in the attached Appendix A memo. The calculated use factor is in line with typical evapotranspiration rates and crop coefficients for grove irrigation.

TABLE 2-5
RECYCLED WATER DEMAND FACTORS

Land Use	Acreage	Percent Irrigated	Use Factor *, gpd/acre
Elementary School	11.1	50	1,500
Neighborhood Park	8.5	90	1,500
HOA Areas	58.9	95	1,500
R.O.W. Irrigation	9.2	100	1,500
Retained Groves	49.3	100	2,678

* Includes 25 percent reduction for conservation measures

The annual demand for recycled water within the Meadowood development will be approximately 91.1 MG (see Table 2-6). Demands in the summer months will be well above average and will exceed the available supply of recycled water. During these months, other sources of water will be used to supplement the recycled water system to meet demands on the recycled water distribution system.

Conversely, demands in the winter months will be below average and below the production rate of the wastewater treatment plant. During these months, surplus recycled water from the plant will be delivered to wet weather ponds for disposal.

Typical seasonal variations in recycled water demands are shown in Table 2-6. The table also shows the need to supplement the recycled water system of meet expected demands and shows the excess effluent disposal requirements during periods when not all the recycled water generated can be used. Note that although annual demands on the recycled water system are approximately 91.1 MG, annual deliveries of recycled water to irrigation uses are approximately 61.5 MG. The 29.6 MG difference will be provided by supplementing the recycled water system which is discussed later in this chapter in the section entitled *Supplementing the Recycled Water System*.

TABLE 2-6
NON-POTABLE WATER DEMAND MONTHLY ANALYSIS

Month	Days	% of Average	Demand, MG	Recycled Water Available, MG	Recycled Water Delivered, MG	Recycled Water Excess, MG	Makeup Needed, MG
January	31	21.6	1.6	5.9	1.6	4.3	0.0
February	28	69.5	5.3	5.3	5.3	0.0	0.0
March	31	77.9	5.9	5.9	5.9	0.0	0.0
April	30	61.2	4.6	5.7	4.6	1.1	0.0
May	31	90.0	6.8	5.9	5.9	0.0	0.9
June	30	122.4	9.3	5.7	5.7	0.0	3.6
July	31	169.3	12.8	5.9	5.9	0.0	7.0
August	31	187.3	14.2	5.9	5.9	0.0	8.3
September	30	139.1	10.6	5.7	5.7	0.0	4.9
October	31	142.9	10.8	5.9	5.9	0.0	5.0
November	30	66.0	5.0	5.7	5.0	0.7	0.0
December	31	52.8	4.0	5.9	4.0	1.9	0.0
TOTAL, MG			**91.1**	**69.4**	**61.5**	**7.9**	**29.6**
TOTAL, acre-feet			**279.6**	**213.0**	**188.6**	**24.4**	**90.9**

Recycled Water Quality

The California Department of Health Services (DHS) has established quality, treatment, reliability and operational standards for the use of recycled water. These regulations are contained in Title 22, Division 4 of the California Administrative Code to ensure that the recycled water facilities can reliably produce treated wastewater of adequate quality for the intended use. For landscape irrigation of parks and schools with unrestricted access, disinfected tertiary treated water is required. Tertiary refers to the addition of filtration as a third stage of treatment, in addition to conventional primary and secondary wastewater treatment processes. The recycled water produced by the Meadowood wastewater treatment plant will meet all applicable standards for water quality, health, and public safety for its intended use.

In planning a new development that will incorporate recycled water in its irrigation system, plant material selection should avoid species with high sensitivities to certain dissolved solids present in recycled water such as total dissolved solids (TDS), boron, and chloride. Most common plant species and grasses are tolerant of medium salinity levels and allow full use of recycled water.

Avocado groves are sensitive to TDS levels above 800 milligrams per liter (mg/L), boron concentrations above 0.5 mg/L, and chloride concentrations above 100 mg/L. Boron and chloride toxicity can lead to leaf damage. Salinity levels between 800 and 1,100 mg/L can lead to a decrease in yield potential. Periodic application of potable water or blending of recycled water with potable water to leach the soils are typical management practices to limit damage to sensitive crops.

The existing avocado groves are currently irrigated with groundwater that has a TDS of approximately 1,300 mg/L. Recycled water produced at the Meadowood wastewater treatment plant is anticipated to have a TDS between 900 and 1,050 mg/L, well below the current groundwater supply. Nevertheless, maintenance of the groves may require occasional over-irrigation to help prevent salts from accumulating in the soil.

State policy requires users of recycled water to minimize over-spray and runoff of recycled water. Incidental runoff does not require a waste discharge permit from the Regional Water Quality Control Board (RWQCB). Any over-irrigation required for maintenance of the groves will need to be managed to prevent surface runoff from the site.

Recycled Water Disposal. In winter months, when the demand for recycled water is less than that available, surplus recycled water from the plant will be delivered to wet weather ponds adjacent to the plant for disposal. When permitting the facility, if the state looks at the project as a "Reuse" project with unlined storage basins (which percolate), Title 22 requires a setback of 50 feet from wells for irrigation areas and 100 feet from impoundments using tertiary recycled water. (Reference: California Title 22, Div 4, Chapter 3, Article 4 - Use Area Requirements)

Alternatively, if the state looks at the project as a "groundwater recharge" project, then the new Draft Groundwater Recharge Rules would apply in which the water remains in the ground for a minimum of 6 months prior to exiting through a well. There are no numeric setback values for recharge projects as the retention time would be site specific.

On-Site Recycled Irrigation System Management

The recycled water supply and distribution facilities will be owned and managed by whichever of the three water districts LAFCO designates as the area service provider. The irrigation systems themselves will be owned and managed by the Meadowood Homeowners Association (HOA). Typically, the recycled water purveyor (water district) will require each recycled water customer to obtain a Recycled Water User permit and will require each customer to designate a Recycled Water Site Supervisor to operate and maintain the safe and efficient use of the onsite system. The Site Supervisor must be familiar with recycled water use regulations, maintain permits, coordinate annual inspections and testing, as well as maintain and operate the system. Appropriate provisions will be included in the Meadowood CC&Rs. Training is available through the Water Authority. Recycled water regulations are summarized in the California DHS "Purple Book" publication, which can be found online at: http://www.dhs.ca.gov/ps/ddwem/publications/waterrecycling/purplebookupdate6-0l.PDF.

Supplementing the Recycled Water System

As Table 2-6 in the previous section illustrated, there will be several months during which the recycled water system will need a supplemental water source in order to meet the project's irrigation demands. This supplement could be provided by groundwater which has been utilized to irrigate the existing onsite avocado and citrus groves for over 40 years. The Appendix A memo estimates that the historical groundwater use for the 45 acres of avocado groves and 135 acres of citrus groves is approximately 618 acre-feet per year.

PROJECT WATER DEMANDS

In utilizing recycled water with groundwater as a supplement, the balance of the Meadowood project's water demands will be supplied by potable water which will be obtained from the Water Authority via the selected local water purveyor. As shown in Table 2-7, the potable water demand for the Meadowood project is 329.2 ac-ft/yr. Table 2-7 breaks down the potable demand between interior and exterior uses and also calculates the demand deliveries of the project's non-potable water supply. The table shows that on average the project's recycled water use will reduce its demand for potable water by over 25 percent.

TABLE 2-7
MEADOWOOD POTABLE AND NON-POTABLE DEMANDS AND DELIVERIES, WITH CONSERVATION

Project Information		Potable Water, gpd			Non-potable Water, gpd		
Land Use	**Project Water Demands, gpd**	**Total Demand**	**Interior Demand**	**Exterior Demand**	**Total Demand**	**Recycled Water Deliveries**	**Makeup Water (Ground-water) Deliveries**
Single-family	133,125	133,125	79,875	53,250	0	0	0
Multi-family	146,700	146,700	117,360	29,340	0	0	0
Elementary School	16,650	8,325	8,325	0	8,325	8,325	0
Neighborhood Park	12,750	1,275	1,275	0	11,475	11,475	0
HOA Areas	88,350	4,418	4,418	0	83,933	83,933	0
R.O.W. Irrigation	13,830	0	0	0	13,830	13,830	0
Retained Groves	132,001	0	0	0	132,001	50,823	81,178
Natural Open Space	-	-	-	-	-	-	-
TOTAL, gpd	**543,406**	**293,843**	211,253	82,590	**249,563**	168,386	81,178
TOTAL, ac-ft/yr	**608.7**	**329.2**	236.6	92.5	**279.6**	188.6	90.9

For comparison purposes, Table 2-8 provides the project's water demands without conservation measures.

TABLE 2-8
MEADOWOOD POTABLE AND NON-POTABLE DEMANDS AND DELIVERIES

Project Information		Potable Water, gpd			Non-potable Water, gpd		
Land Use	**Project Water Demands, gpd**	**Total Demand**	**Interior Demand**	**Exterior Demand**	**Total Demand**	**Recycled Water Deliveries**	**Makeup Water (Ground-water) Deliveries**
Single-family	177,500	177,500	106,500	71,000	0	0	0
Multi-family	195,600	195,600	156,480	39,120	0	0	0
Elementary School	22,200	11,100	11,100	0	11,100	11,100	0
Neighborhood Park	17,000	1,700	1,700	0	15,300	15,300	0
HOA Areas	117,800	5,890	5,890	0	111,910	111,910	0
R.O.W. Irrigation	18,440	0	0	0	18,440	18,440	0
Retained Groves	176,001	0	0	0	176,001	67,764	108,237
Natural Open Space	-	-	-	-	-	-	-
TOTAL, gpd	**724,541**	**391,790**	281,670	110,120	**332,751**	224,514	108,237
TOTAL, ac-ft/yr	**811.6**	**438.9**	315.5	123.4	**372.8**	251.5	121.2

WATER OFFSET PROGRAM

The Meadowood project plans to fully offset their potable water use by developing new sources of water supply. These sources may be recycled water (other than that generated by the project itself), desalinated water, groundwater or other supplies as approved by the water supply agencies. Meadowood may be required to build facilities or pay fees but it is anticipated that the new water supply will be required to be in place prior to occupancy permits being issued for the Meadowood project.

Offset Amount

Based on Table 2-8 the amount of potable water use in the project, with conservation, is estimated to be 329.2 ac-ft/yr and supplied by the Water Authority via the selected local water purveyor. This will be the minimum amount of water needed for the offset program. It is anticipated that groundwater or other sources will provide the source of supplemental water to the recycled water system. If potable water is required for the supplement, the total amount of offset water will be increased by 90.9 ac-ft/yr to a total of 420.1 ac-ft/yr.

Agency Considerations

Since Meadowood must annex into a local water agency as well as the Water Authority and Metropolitan, all three of the agencies will have input on the water offset for Meadowood. It is likely that the offset project will need to be identified and proven to be an implementable project prior to final annexation into the Water Authority, Metropolitan and the local water agency. The actual construction of the offset water supply will need to be completed prior to development of need for potable water on the Meadowood project.

Offset Water Supply

The Meadowood project will consider all available types of offset projects. The agencies will determine the actual projects to be implemented. A brief description of possible projects follows.

Conservation. In addition to the conservation measures implemented on the project, Meadowood could pay to fund conservation outside of the project and receive offset credits for the conserved water. This type of project could be implemented at the Metropolitan, Water Authority or local agency level. Implementing this type of project would be easiest at the local level but most efficient at the Metropolitan or Water Authority level. This is due to the fact that most opportunities for conservation are in developed residential areas and the Meadowood project is in a predominantly rural area.

If conservation programs are available through Water Authority or Metropolitan they will be considered by Meadowood.

Recycled Water. Meadowood is planning to use recycled water to the maximum extent possible from the onsite recycling system. Meadowood could fund recycling projects in other areas of Metropolitan, the Water Authority, or the local water agency to obtain water offsets. Projects outside of the local water agency could be more difficult to implement as it would require that offset credits obtained outside of a local agency be credited to that local agency.

Desalinated Water. Meadowood could fund a portion of a desalination project to provide a water offset. The Poseidon desalination project in Carlsbad may provide opportunities for such an offset.

Groundwater. Historical groundwater use on the Meadowood property has been estimated at 618 ac-ft/yr. This water is not being considered for potable supply for the project but when a local water purveyor has been identified this groundwater may be used by the water purveyor as all of or a portion of the water offset requirement.

Other Supplies. Meadowood could participate in funding of water supply projects such as conjunctive use projects, water banking projects, or other new sources of supply as identified by Metropolitan, the Water Authority, or the local agency.

CHAPTER 3

MEADOWOOD WATER SUPPLY FACILITIES FOR SERVICE BY SAN LUIS REY MWD, VALLEY CENTER MWD, OR RAINBOW MWD NEW SUPPLY FACILITIES

In this chapter we will discuss the storage, piping, and aqueduct connection needed for water supply from San Luis Rey MWD or Valley Center MWD. If Rainbow MWD is determined to be the appropriate water purveyor by LAFCO, the facilities in this chapter present additional supply options to the existing Rainbow MWD facilities surrounding the Meadowood development. Utilization of Rainbow MWD's existing facilities to serve the Meadowood project is discussed in Chapter 4.

POTABLE WATER RESERVOIR SIZING AND SITING

The Meadowood development must provide potable water storage for the project. Two possible locations on the Meadowood property where this storage could be sited have been identified.

Reservoir Sizing

Potable water reservoirs must provide water for operational needs, including equalization storage for hourly and daily demand variations and reserve storage for fire fighting needs. In addition, water systems as a whole must provide or have access to storage for water supply interruptions, such as the loss of supply due to either planned or unplanned events.

The Water Authority and Metropolitan at times take their facilities out of service in order to conduct repairs, improvements, and inspections. These shutdown periods can last for up to 10 days, and are normally scheduled for winter months when water demands are below average. Consistent with this, the Water Authority advises all of its member agencies to be prepared to supply their own needs independent of the aqueduct pipelines for up to 10 days. Many agencies have less than this amount in treated water storage, but make up the difference by having access to their own raw water storage and treatment facilities, interconnections with other member agencies, connections to more than one aqueduct pipeline, or a combination of the above.

This report sizes Meadowood storage at 10 average days of demand. The provision of the full 10 days of treated water storage recognizes that the water supply system will be reliant on a single aqueduct connection, and that it does not benefit from access to any raw water storage and treatment, or to an interconnection with a neighboring agency having surplus supplies or storage. The provision of 10 average days of demand allows for a scheduled wintertime shut-down of the aqueduct system, while still providing adequate reserve for fire flows and operational storage. Although it is anticipated that the recycled water system supplemental water will be the onsite groundwater, the potable water reservoir is conservatively sized to store this supplemental water as potable water, if necessary. Meadowood potable water storage sizing is summarized in Table 3-1.

TABLE 3-1
MEADOWOOD POTABLE WATER STORAGE SIZING

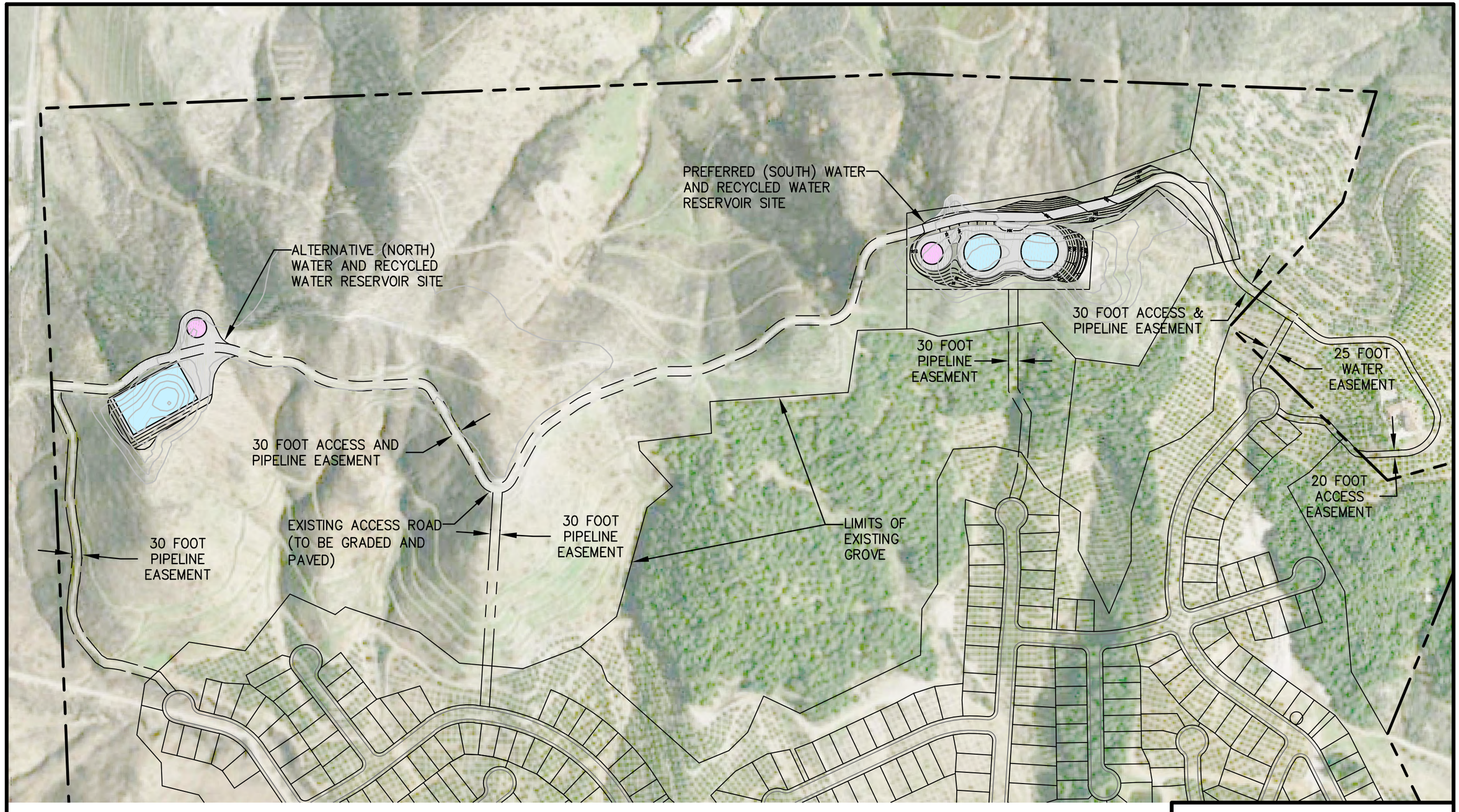
Average Day Demands	Criteria	Calculated Volume	Design Volume
0.5 MGD [1]	10 days	5.0 MG	5.0 MG

[1] Sum of potable demand and recycled water supplement

The total storage volume will be split into two reservoirs of equal size. This will provide operational flexibility and redundancy, allowing one reservoir to be taken out of service for maintenance for short periods of time during low demand months. This also allows for phasing construction of the reservoirs.

Site Alternatives

Treated water storage is usually sited at sufficient elevation to allow gravity service from the storage reservoir to the zones served, without need for pumping. The topography of the Meadowood development generally slopes upward from west to east, cresting in a north-south trending ridgeline along the eastern edge of the property at an elevation of approximately 760 feet. This elevation allows for gravity service (at adequate pressure) to the highest planned lots in the development which are at an elevation of 605.5 feet. The Meadowood ridgeline provides two suitable siting alternatives for storage reservoirs. These are shown in Figure 3-1.



LEGEND

MEADOWOOD BOUNDARY

N

1" = 300'

FIGURE 3–1

NORTH AND SOUTH RESERVOIR SITES

\\PACIFIC\DWG\648006\FIGURE 3–1.DWG 04–20–09 10:07:33 LAYOUT: 3–1

- North Site: The North reservoir site consists of a saddle between two steep knolls on the Meadowood ridgeline, approximately even in latitude with the development's northernmost cul-de-sac. The knoll to the south of the saddle is disturbed and graded for farming operations. The northern knoll remains undisturbed with low-lying natural vegetation. Reservoir construction would require large cuts of these knolls to develop suitable pad area. The topography of the site may be better suited for construction of a rectangular reservoir; however, circular tanks could be utilized. The use of steel tanks would require either additional excavation at the site to keep the tanks' visual profile low, or accepting that steel tanks on grade will have a greater visual impact. If the visual impact is not acceptable, buried circular concrete tanks could be placed at the North Site with phased construction to minimize the fiscal impact to the project. The rectangular shape allows the pad to fit between the knolls while minimizing to the extent possible the cuts into the knolls. Even so, the cuts are significant.

- South Site: The South reservoir site consists of the gently sloping knoll on the Meadowood ridgeline, approximately even in latitude with the Meadowood park and school site. The knoll is disturbed by the existing farming operations. This knoll would be graded down to provide suitable pads for reservoir construction. The topography of the site allows for development of enough pad area for construction of circular steel reservoirs, which are preferred because of their economy in this size range. The South site reservoir layout is shown in plan and profile (section) views in Figures 3-2 and 3-3. This location also provides a more favorable opportunity for phasing the installation of the two reservoirs.

Construction and Maintenance Access. The access road to the preferred tank begins at the easternmost Meadowood cul-de-sac, and continues up to the ridge and tank site. The access road to the alternative tank site uses Pala Mesa Heights Drive, off Rice Canyon Road, and continues along the existing paved Rainbow MWD tank road to the ridge, and then south to the tank site. Road portions not on Meadowood property may require easements or right-of-entry permits. Both access routes are shown in Figure 3-4. To assure reliable access to the tanks for maintenance and for emergency vehicles, the access roads will conform with the following design standards:

- Minimum paved (AC) width: 16 ft.
- Paving material: AC for slopes less than 15%; otherwise concrete
- Minimum total easement width: 20 ft. for road only; 30 ft. for road with pipeline
- Maximum cross-slope on easement: 5%

30 FOOT ACCESS EASEMENT

LIMITS OF EXISTING AVOCADO GROVE

A
3-3

B
3-3

.65 MG
REC WTR
RESERVOIR
HWL=786.0
BOT=762.5
DIA=70'
HT=24'

2.5 MG
STEEL
WATER RESERVOIR
HWL=796.0
BOT=764.5
DIA=118'
HT=32'

2.5 MG
STEEL
WATER RESERVOIR
HWL=796.0
BOT=764.5
DIA=118'
HT=32'

AC PAVEMENT

30 FOOT
PIPELINE
EASEMENT

MEADOWOOD
BOUNDARY

N

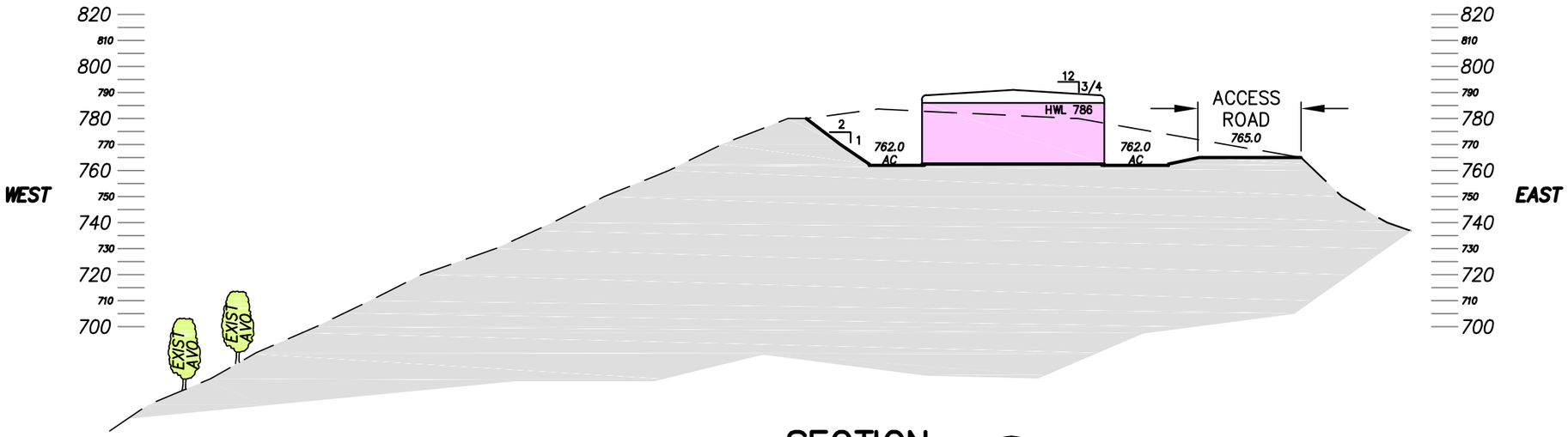
1" = 80'

NOTE:
SEE FIGURE 3-3 FOR SECTIONS

FIGURE 3-2

SOUTH RESERVOIR SITE PLAN

\\PACIFIC\DWG\648006\FIGURE 3-2.DWG 04-20-09 15:17:11 LAYOUT: 3-2

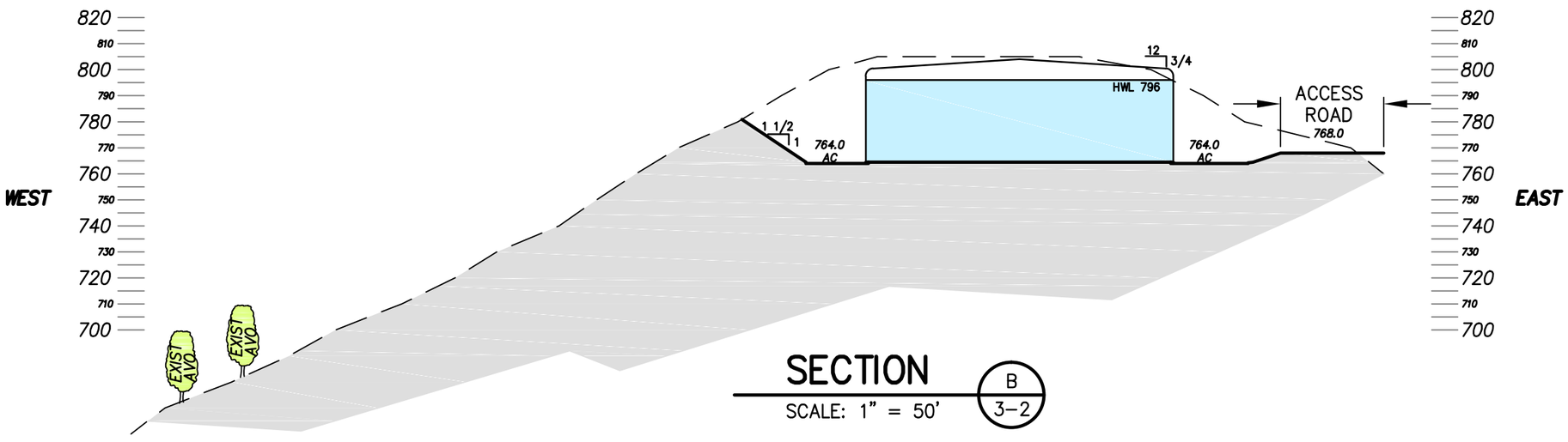


SECTION

SCALE: 1" = 50'

A

3-2



SECTION

SCALE: 1" = 50'

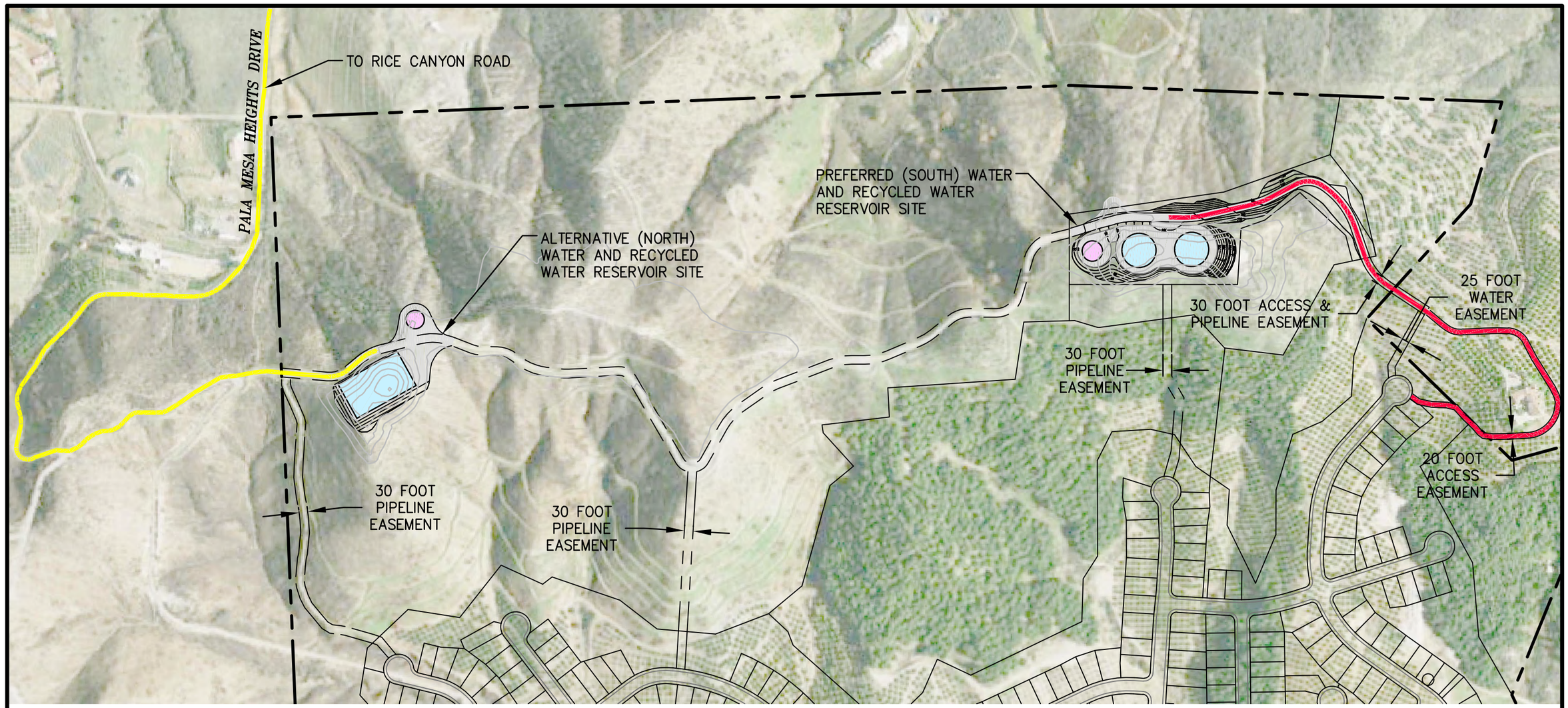
B

3-2

50 0 50 FEET

FIGURE 3-3

SOUTH RESERVOIR SITE SECTIONS



NOTES:

1. THE ACCESS ROAD TO THE PREFERRED TANK SITE BEGINS AT THE NORTHERNMOST MEADOWOOD CUL-DE-SAC, AND CONTINUES AS SHOWN UP ONTO THE RIDGE AND HENCE TO THE TANK SITE.

2. THE ACCESS ROAD TO THE ALTERNATIVE TANK SITE USES PALA MESA HEIGHTS DRIVE, OFF RICE CANYON ROAD, AND CONTINUES ALONG THE EXISTING PAVED RAINBOW MWD TANK ROAD TO THE RIDGE ROAD, AND THEN SOUTH TO THE TANK SITE AS SHOWN.

3. ACCESS ROADS WILL CONFORM TO THE FOLLOWING DESIGN STANDARDS: MIN. PAVED WIDTH = 16 FEET. PAVING MATERIAL: AC FOR SLOPES <15%, OTHERWISE CONCRETE. MIN. TOTAL EASEMENT WIDTH = 20 FEET FOR ROAD ONLY, 30 FEET FOR ROAD WITH PIPELINE. MAXIMUM CROSS-SLOPE ON EASEMENT = 5%.

4. ROAD PORTIONS NOT ON MEADOWOOD PROPERTY WILL REQUIRE EASEMENTS OR RIGHT-OF-ENTRY PERMITS

LEGEND

- MEADOWOOD BOUNDARY
- ACCESS ROAD – PREFERRED TANK SITE
- ACCESS ROAD – ALTERNATIVE SITE

N

1" = 350'

FIGURE 3-4

RESERVOIR ACCESS ROAD

\\PACIFIC\DWG\648006\FIGURE 3-4.DWG 04-20-09 15:25:28 LAYOUT: 3-4

Site Selection

Table 3-2 below compares the features of the two reservoir sites. Both sites are feasible, but the South site is preferred based on its cost, visual aesthetics, and constructability advantages.

TABLE 3-2
COMPARISON OF RESERVOIR SITE ALTERNATIVES

Comparison Factor	North Site	South Site
Elevation	Suitable for gravity service to all of Meadowood.	Same
Constructability/ Tank Material	Rugged terrain requires large cuts and reduces working room. Site constraints prefer a rectangular, reinforced concrete reservoir; however, circular steel or concrete could be used.	Terrain allows ample room for construction. Site allows for use of circular steel reservoirs.
Access	From north along ridge road; adequate.	Through southernmost Meadowood cul-de-sac.
Visual Aesthetics	Large cuts required will alter the visual character of the ridgeline as viewed from the west.	The knoll will be reduced in elevation but the effect on the general character of the ridgeline will be less than for the more rugged terrain of the north site.

AQUEDUCT CONNECTION SIZING AND SITING

The Meadowood water supply will consist of imported water purchased from the Water Authority via the First or Second San Diego Aqueducts. The northern reaches of the San Diego Aqueducts are owned by Metropolitan up to a point approximately seven miles south of the Riverside-San Diego County line. South of this point they are owned by the Water Authority.

The Water Authority and Metropolitan provided preliminary design requirements for a new aqueduct connection and associated flow control facility. The following sections describe the sizing and siting of the facility, as well as the process required to obtain approval by the Water Authority and Metropolitan for design and construction.

Aqueduct Connection Sizing

The aqueduct connection facilities are sized to accommodate peak day demands, or 3.2 times the average daily demand rate. Although it is anticipated that the recycled water system supplemental water will be the onsite groundwater, the potable water aqueduct connection is conservatively sized to accommodate this supplemental water as potable water, if necessary. This is summarized in Table 3-3.

TABLE 3-3
AQUEDUCT CONNECTION SIZING

Average Day Demands	Peak Day Factor	Peak Day Demand, MGD	Peak Day Demand, cfs	Design Flow Rate, cfs
0.5 MGD [1]	3.2	1.6	2.5	2.5

[1] Sum of potable demand and recycled water supplement

Pipeline Sizing

The water transmission pipeline is sized at 12 inches, which is comfortably adequate to accommodate the design flow rate of 2.5 cubic feet per second calculated in Table 3-3. This is summarized in Table 3-4.

TABLE 3-4
WATER TRANSMISSION PIPELINE SIZING

Design Flow Rate, cfs	Pipeline Diameter, inches	Velocity	Energy Slope*
2.5	12	3.2 ft/s	3.7 ft/1000 ft

*Using C = 120

Aqueduct Connection Site and Alignment Alternatives

The design definition work has identified four alternative alignments for the water transmission main, two to the First Aqueduct to the east, and two to the Second Aqueduct to the west based on the identified aqueduct connection sites. The alignments were developed based on consideration of flow control facility locations, existing roadways, land use and right-of-way acquisition, environmental constraints, existing underground utilities, freeway crossings, and proximity to the aqueducts and Meadowood development.

Site Requirements

There are two main components to an aqueduct connection, a turnout/isolation valve and a meter/flow control mechanism. Two separate structures may be required to house each of these main components or final design review could determine that a single structure is acceptable. The expected facility footprint of a turnout structure is approximately 100 feet by 40 feet and would include a 20-foot by 20-foot by 20-foot structure, vehicle access, and adequate space for construction staging. This facility is preferred to be located within the Water Authority or Metropolitan easement.

A typical facility footprint for a flow control facility would be approximately 100 feet by 40 feet and include a 20-foot by 20-foot by 20-foot structure, vehicle access, and adequate space for construction staging. The selected site encompassing both component facilities and having an area of approximately 11,000 square feet (0.25 acre) will have to be purchased from existing private property owners along the aqueduct easement.

Because the transmission pipeline alignment alternatives and the aqueduct connection alternatives are interrelated, the discussion of these alternatives is combined and provided in the following sections. The four alternative transmission pipeline alignments are shown in Figure 3-9 and are described individually below.

First Aqueduct at Huntley Road. The site is shown in Figure 3-5 and is located just south of where Huntley Road crosses the First Aqueduct and west of the aqueduct pipeline. The existing Rainbow #10 flow control facility is just to the north. It is preferable to locate the flow control facility west of the aqueduct pipeline so that the pipeline to the Meadowood development does not need to cross the aqueduct. (In this section of the aqueduct, Pipelines 1 and 2 are a single pipeline.) Metropolitan does not allow structures within their pipeline easements, so the flow control facility is shown to be located outside of the MWD pipeline easement.

The site is on private property and would require acquisition from the owner. The exact location could be adjusted in any direction if necessary to accommodate the interests of the property owner.

The Yuima MWD is planning for a new aqueduct connection in this same general vicinity. This could provide an opportunity for cost savings through use of a shared facility. However, the Yuima site is located well north of the Huntley Road site, and well to the east of the aqueduct pipeline. Thus, the Yuima site would require additional pipeline length and a crossing of the aqueduct to reach the Meadowood project. These constraints could negate any cost savings on a shared connection and flow control facility.

The transmission piping alignment from this site will convey water from the proposed flow control facility to Meadowood via Huntley Road, a portion of Rice Canyon Road, and Pala Mesa Heights Drive (see Figure 3-9). The pipeline alignment borders the northeast Meadowood property boundary until it reaches Ridge Road then turns southerly to either the northern or southern tank sites. This alignment is about 13,500 feet long, assuming the southern storage tank site is used.

Second Aqueduct at Reche Road. The site is shown in Figure 3-6 and is located just north of Reche Road and west of the Second Aqueduct pipelines. Metropolitan does not allow structures within their pipeline easements, so the flow control facility is located outside of those easements.

The site is on private property and would require acquisition from the owner. The exact location could be adjusted if necessary to accommodate the interests of the owner.

The transmission piping alignment from this site will convey water from the proposed flow control facility to Meadowood via Reche Road, Old Highway 395, Stewart Canyon Road, Pankey Road, and the proposed Horse Ranch Creek Road as shown in Figure 3-9. The alignment travels through the Campus Park development and then turns east through the central portion of the Meadowood projejct until it reaches either the northern or southern tank sites. This alignment is approximately 22,000 feet long, assuming the southern storage tank site is used.

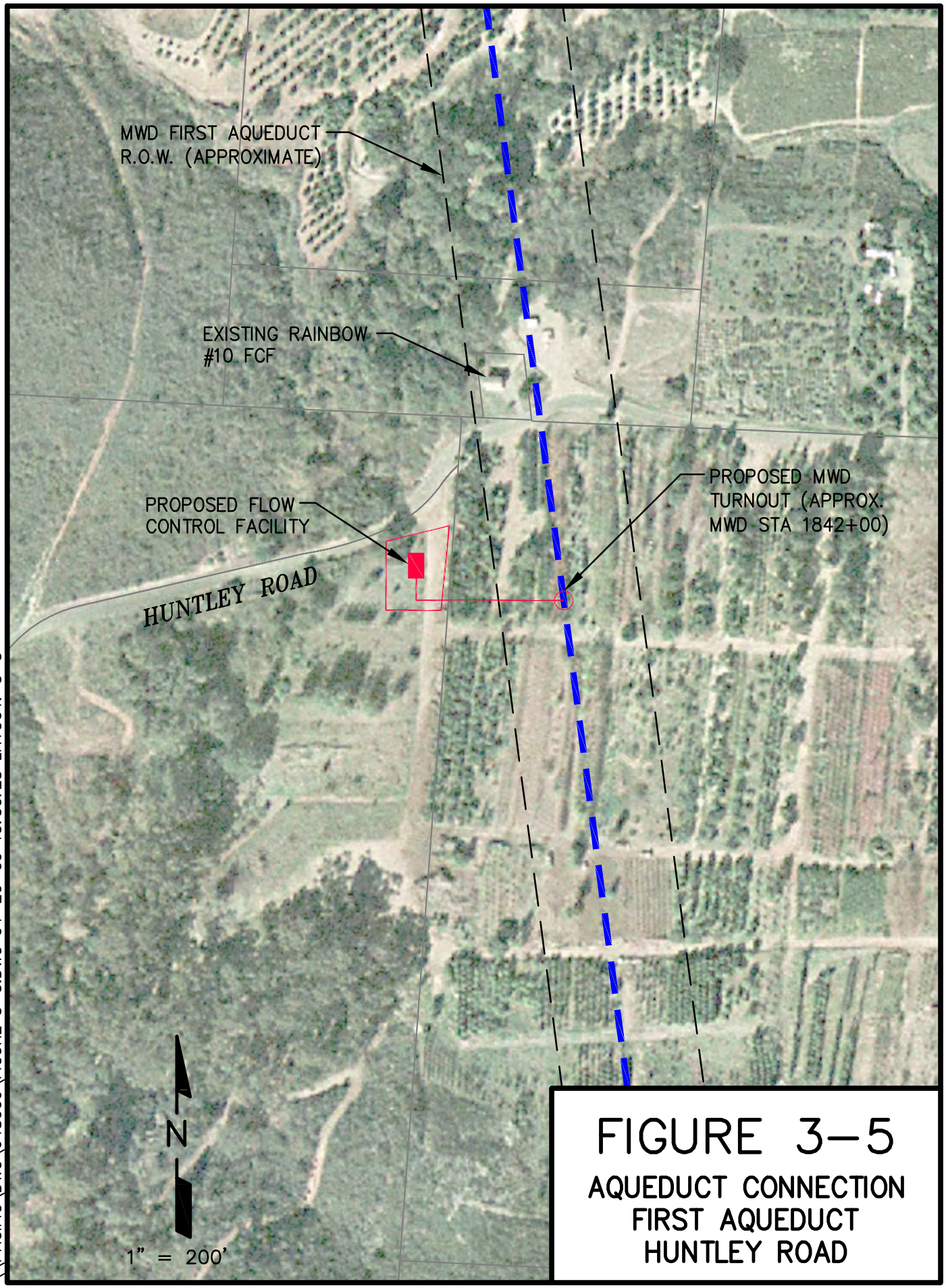


FIGURE 3-5

AQUEDUCT CONNECTION
FIRST AQUEDUCT
HUNTLEY ROAD

\\PACIFIC\DWG\648006\FIGURE 3-5.DWG 04-20-09 15:30:23 LAYOUT: 3-5

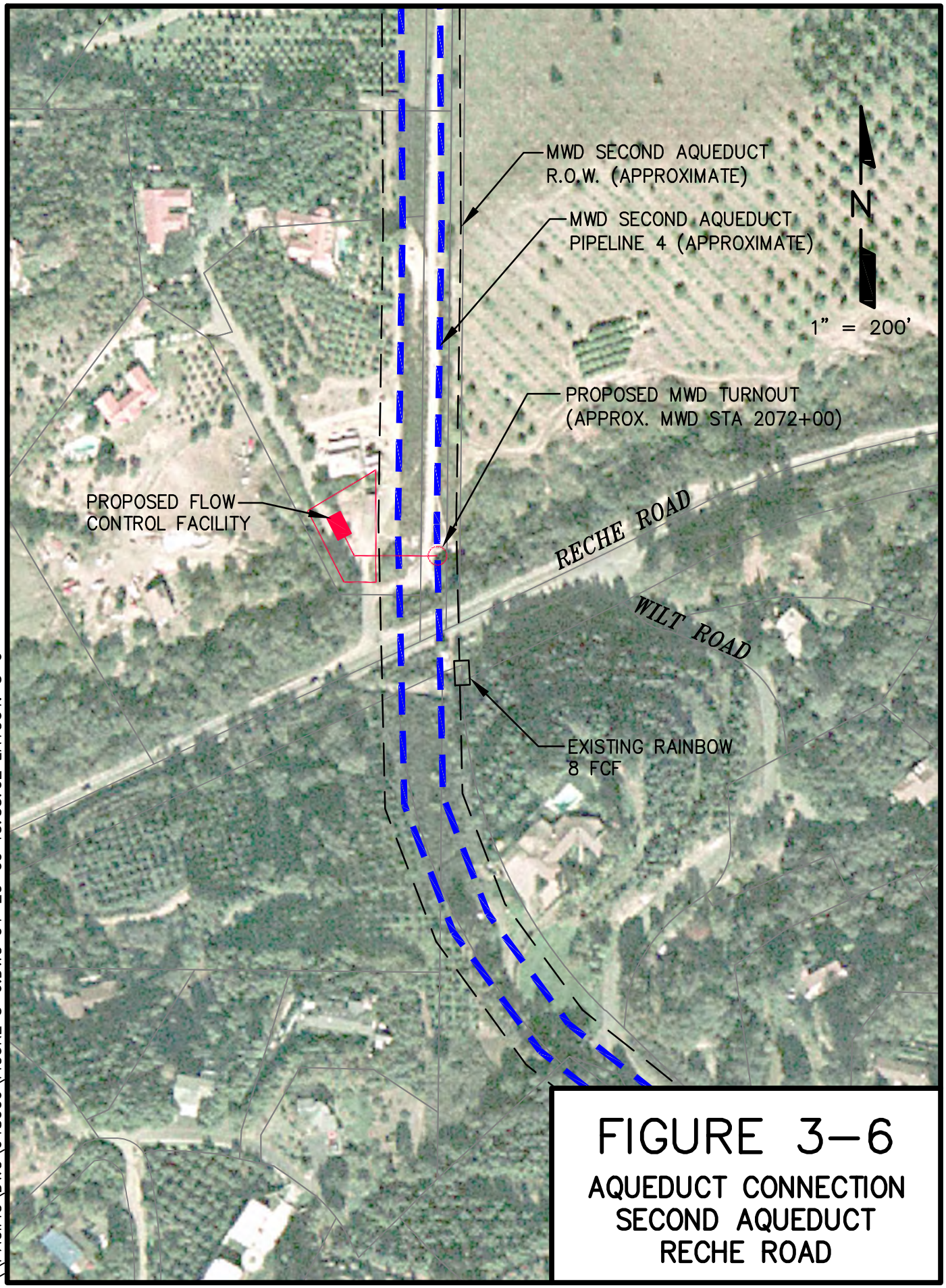


FIGURE 3-6

AQUEDUCT CONNECTION
SECOND AQUEDUCT
RECHE ROAD

\\PACIFIC\DWG\648006\FIGURE 3-6.DWG 04-20-09 15:35:02 LAYOUT: 3-6

First Aqueduct at Highway 76/Pala Road. This site is shown in Figure 3-7. The site is located just south of Pala Road/Highway 76 and east of the aqueduct pipelines. The location east of the aqueduct pipelines requires the Meadowood transmission pipeline to cross the aqueduct pipelines; however, this may be necessary considering the development on the west side of the aqueduct easement. The site would also require the flow control facility to be designed to handle unusually high pressures (approximately 400 psi). This is possible, but the Water Authority would prefer to avoid such a facility.

The site is on private property and would require acquisition from the owner. The exact location could be adjusted in any direction if necessary to accommodate the interests of the owner.

The transmission piping alignment from this site will convey water from the proposed flow control facility to Meadowood within the proposed realignment corridor of State Route 76, Rice Canyon Road, and Pala Mesa Heights Drive (see Figure 3-9 for reference). The alignment borders the northeast property boundary of Meadowood until it reaches Ridge Road then turns southerly to either the northern or southern tank sites. This alignment is about 19,800 feet long, assuming the southern storage tank site is used.

Second Aqueduct at Pala Mesa Drive and Wilt Road. This site is shown in Figure 3-8. The site is located just north of Pala Mesa Drive and east of the three Second Aqueduct pipelines. It is preferable to locate the flow control facility east of the aqueduct pipelines so that the pipeline to the Meadowood development does not need to cross the aqueduct. The Water Authority does not allow structures within their pipeline easements, so the flow control facility is located outside of the easement.

The site is proposed on private property and would require acquisition from the owner. The exact location could be adjusted in any direction if necessary to accommodate the interests of the owner. Additionally, the portion of Pala Mesa Drive west of Daisy Lane is a private road and may require an easement for the pipeline.

The transmission piping alignment from this site will convey water from the proposed flow control facility to Meadowood via Pala Mesa Drive, Pankey Road/Pankey Place, and Horse Ranch Creek Road as shown in Figure 3-9. The alignment skirts the north side of the Campus Park West development within the planned extension of Pala Mesa Drive, goes through the Campus Park development, then follows Meadowood streets to reservoir sites. This alignment is about 17,400 feet long, assuming the southern storage tank site is used.

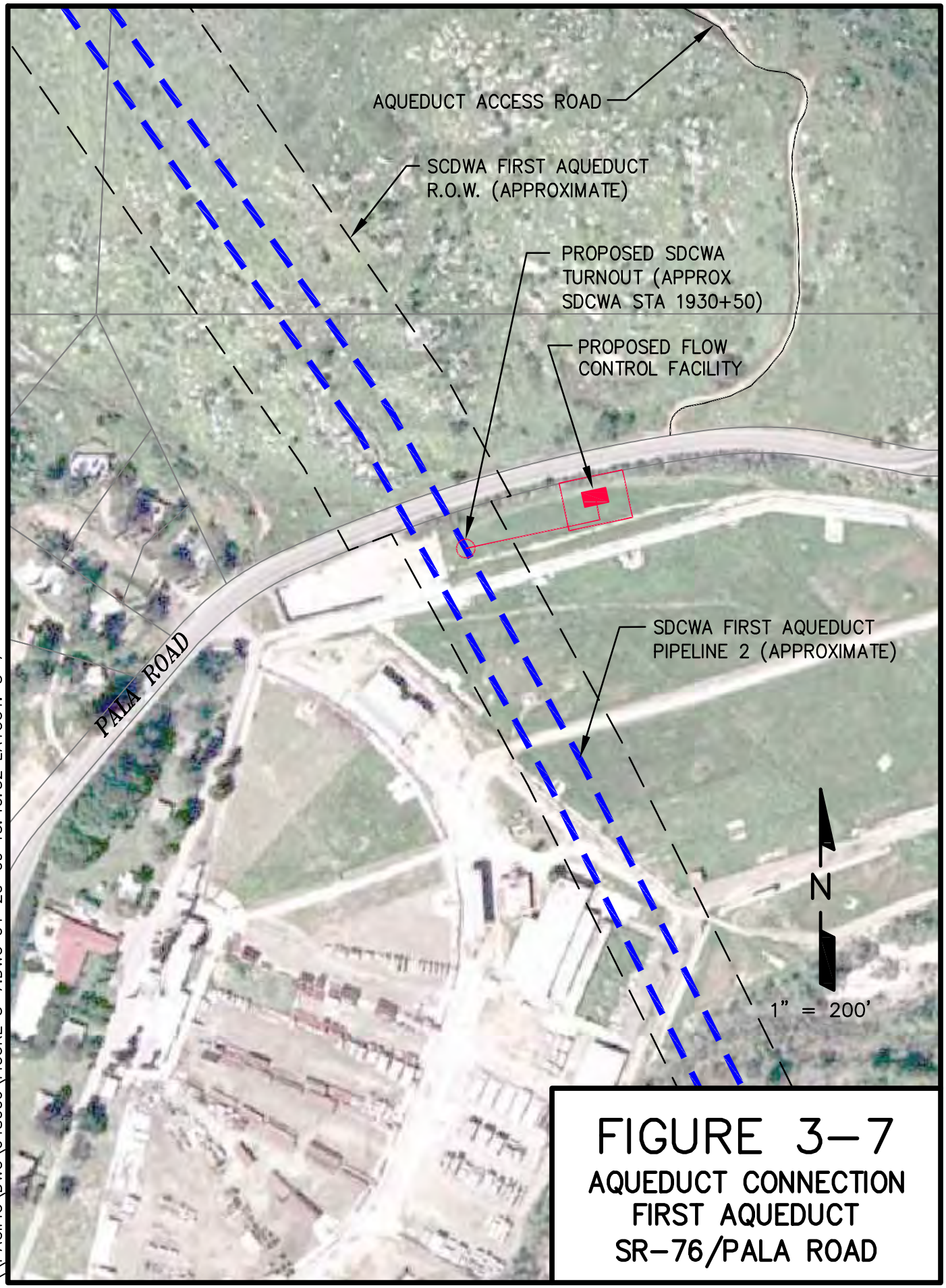


FIGURE 3-7

AQUEDUCT CONNECTION
FIRST AQUEDUCT
SR-76/PALA ROAD

\\PACIFIC\DWG\648006\FIGURE 3-7.DWG 04-20-09 15:40:32 LAYOUT: 3-7

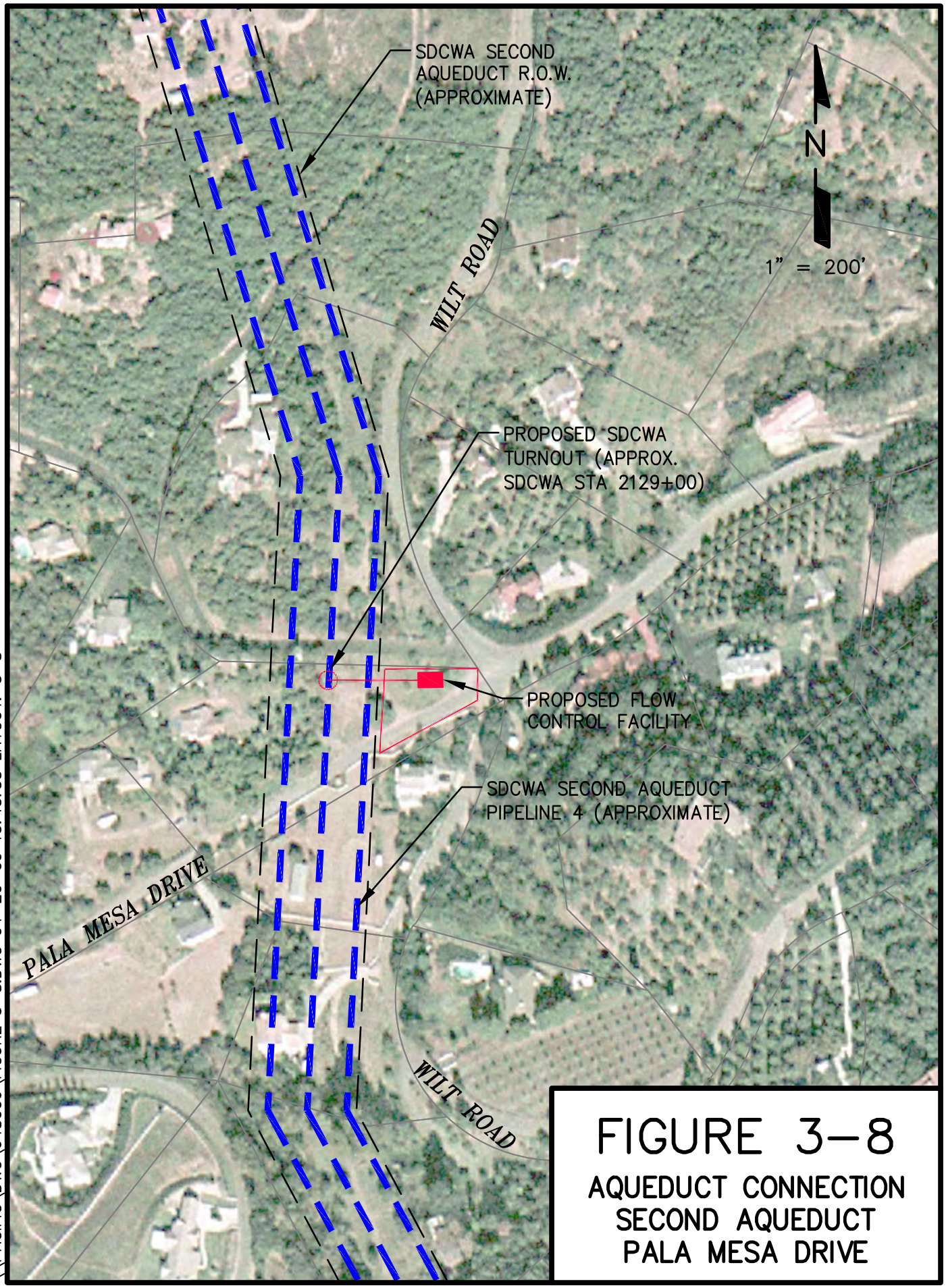


FIGURE 3-8

AQUEDUCT CONNECTION SECOND AQUEDUCT PALA MESA DRIVE

\\PACIFIC\DWG\648006\FIGURE 3-8.DWG 04-20-09 15:45:35 LAYOUT: 3-8

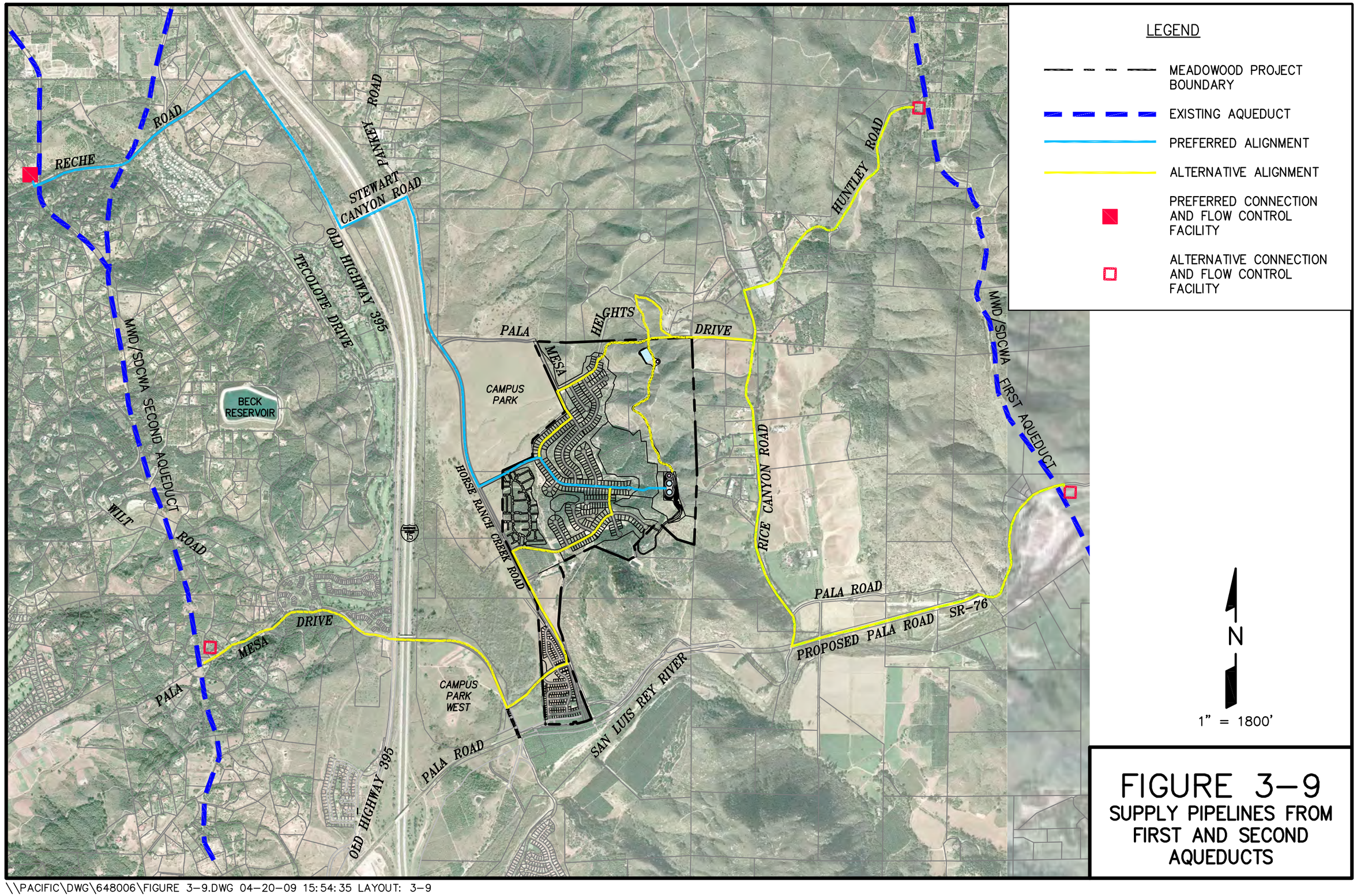


FIGURE 3-9
SUPPLY PIPELINES FROM FIRST AND SECOND AQUEDUCTS

Additional Aqueduct Connection Design Considerations

Based on discussions with the Water Authority, the process for obtaining approval for a new flow control facility begins with a letter from the water purveyor (to be determined by LAFCO) requesting a flow control facility in a particular location. The Water Authority then begins a design review process and coordinates with Metropolitan to review the flow control facility design. The local water agency will be responsible for obtaining the right-of-way for each facility. The Water Authority estimates this process will require one year.

Depending on the pipeline ownership, Metropolitan or the Water Authority will own and maintain the turnout and the meter structure, which will house the upstream isolation valve and the Venturi (flow) meter. The Water Authority will maintain a separate flow control structure, which will house the pressure reducing valve and the downstream isolation valve. Only the turnout structure is required to conform to Metropolitan's design standards when connected to their pipeline. Likely, both agencies will review the design of all the aqueduct connection components.

Regardless of whether the aqueducts are owned by the Water Authority or Metropolitan, flow control facilities will be operated and maintained by the Water Authority since they will be located within the Water Authority's service area.

Additional Alignment Considerations

Among the alignment options considered, slopes range from zero percent to twenty percent and range from narrow roads serving only local traffic to heavily trafficked roads such as Reche Road and Old Highway 395. Additional right-of-way appears to be necessary for the Huntley Road alignment, encroaching into existing habitat. Additionally, the alignments for the aqueduct connections to the west of Meadowood will require either an undercrossing of I-15 at Stewart Canyon Road (requiring a Caltrans encroachment permit and steel casing) or an I-15 bridge crossing at Pala Mesa Drive. The I-15 bridge crossing has an existing Rainbow MWD 18-inch (diameter to be confirmed) pipeline within one of the bridge cells. The pipe is capped and is not in use. The Meadowood transmission pipeline alignment would need to fit a new pipe within one of the other bridge cells.

In all alignment alternatives, there are existing utilities in the roadways including, but not limited to, water, storm drain, and high pressure gas. Easement acquisition and right-of-entry permits will be required to install the transmission main and negotiations with Rainbow MWD may be necessary for installing a line within existing Rainbow MWD easements.

Connection and Alignment Evaluation and Selection

The Meadowood Water Study has evaluated four possible pipeline connection sites and alignments for connecting to the Water Authority aqueduct system. Two routes connect to the Water Authority's First Aqueduct to the east of the Meadowood site, and two routes connect to the Second Aqueduct to the west of the Meadowood site. Table 3-5 provides a summary of key comparison factors related to each alignment.

The following paragraphs summarize additional general considerations for the project's aqueduct connections.

Single Connection Preferred. For service to the Meadowood development, only one aqueduct connection is required. Although two connections provide a possible economical means of providing supply reliability in lieu of a portion of the 10-days of treated water storage, it is not anticipated that a second connection would add significantly to supply reliability. Additionally, constructing 10 days of treated water storage provides the most economical and efficient system design.

Capacity Availability in Second versus First Aqueduct. The Water Authority currently operates the treated water pipelines in both aqueducts at or near their capacity during the summer months. During the past few summers the Water Authority has issued calls for voluntary conservation to prevent demands from exceeding the treated water system capacity. This treated water capacity shortfall is expected to be alleviated with the Water Authority completion of its Twin Oaks Water Treatment Plant. However, the First (eastern) Aqueduct system may still run at capacity in the summer months. Also, the Yuima MWD and the San Luis Rey Indian Water Authority both have plans for new connections to the First Aqueduct. These capacity-availability factors may favor a connection to the Second Aqueduct over a connection to the First Aqueduct.

Alignment Selection Considerations

In comparing the alignment alternatives, as summarized in Table 3-5, the Second Aqueduct connection at Reche Road presents the preferred option. This alignment is constructible within existing public rights-of-way, does not pose any significant environmental concerns, avoids possible capacity availability concerns by connecting to the Second Aqueduct rather than the First Aqueduct, and has a reasonable cost in comparison to the other alternatives. As an incidental benefit, the alignment alternative connects to the aqueduct north of the Metropolitan delivery point to the Water Authority, qualifying deliveries at this location for a lower water purchase cost per acre-foot.

TABLE 3-5
COMPARISON OF ALTERNATIVE PIPELINE ALIGNMENTS

Comparison Factor	First Aqueduct via Huntley Road	Second Aqueduct via Reche Road	First Aqueduct via Highway 76/Pala Road	Second Aqueduct via Pala Mesa Drive
Length (linear feet)	13,500	22,000	19,800	17,400
Flow Control Facility Siting	Good	Good	Low elevation would require 400 psi design	Good
Aqueduct Capacity Availability	Uncertain	Good	Uncertain	Good
Land Use / Right-of-Way Acquisition Requirements	Requires easement in Huntley Road and Pala Mesa Heights Drive, plus additional parallel ROW	None	Requires easement in Pala Mesa Heights Drive	Requires easement in western portion of Pala Mesa Drive
Environmental Constraints	Parallel ROW along Huntley Road will encroach into existing habitat	None significant	None significant	None significant
Utility conflicts / Road crossings	Existing Rainbow MWD pipeline in Huntley Road does not leave space in road for new pipeline	Crosses 1-15 at Stewart Canyon under-crossing	None significant	Crosses 1-15 in Pala Mesa Drive overpass. Availability of bridge cell uncertain -presently occupied by unused Rainbow MWD line
Conclusions:	Not preferred, due to uncertainty of First Aqueduct capacity and lack of space in Huntley Road for pipeline	**Preferred**	Not preferred due to undesirability of high-pressure FCF	Not preferred due to bridge crossing unknowns

HYDRAULIC CONTROL

The Meadowood development will obtain its water supply from the Water Authority from a connection to either the First Aqueduct to the east or the Second Aqueduct to the west of the project. Water supply from the aqueducts will be piped to storage reservoirs to be located on the eastern Meadowood ridgeline, enabling gravity flow to the development to the west. Aqueduct hydraulic conditions at the possible connections are summarized in Table 3-6.

TABLE 3-6
SUMMARY OF ALTERNATIVE
AQUEDUCT CONNECTION CONDITIONS

Aqueduct Connection Location	Pipeline Station, approx	Ground Surface Elevation, ft	Centerline Pipeline Elevation, ft	HGL, ft
First Aqueduct (Pipelines 1 and 2) at Huntley Road (a single pipeline in this reach)	MWD 1842+00	1020	1010 (76-inch precast concrete)	Min:1242 Max: 1260
Second Aqueduct (Pipeline 4) at Reche Road	MWD 2072+00	647	633 (89-inch WSP)	Min: 1077 Max: 1254
First Aqueduct (Pipeline 2) at Highway 76/Pala Road	SDCWA 1930+50	515	500 (48-inch WSP)	Min: 1180 Max: 1250
Second Aqueduct (Pipeline 4) at Pala Mesa Drive and Wilt Road	SDCWA 2129+00	540	560 (90-inch prestressed concrete)	Min: 1077 Max: 1222

For the Huntley Road alternative, the fact that the connection point is physically higher than the Meadowood reservoirs creates a hydraulic condition that would have to be mitigated. Since the reservoirs are open to the atmosphere, the hydraulic grade line (HGL) above each upstream pipeline is 800 feet plus head losses in the pipeline backing upstream from the reservoirs. Therefore, the portion of each pipeline above that HGL will not be under pressure. This is an unacceptable condition for a potable water system. Essentially water will cascade down the pipeline from the flow control facility at the aqueduct connection until it reaches the HGL of the reservoirs.

This condition can be addressed by installing a pressure sustaining valve between the flow control facility and the reservoir. According to Water Authority, the flow control facility

should be designed so that there is a 20 to 30 psi pressure drop (maximum 50 psi) across the control valves. The set point of the pressure sustaining valve should cause the pressure to back up into that 20 to 30 psi band, thereby providing a fully pressurized pipe but not causing backpressure in the aqueduct pipeline itself.

ONSITE POTABLE WATER DISTRIBUTION

The Meadowood project pad elevations are anticipated to range from approximately 270 feet to 605.5 feet. With the potable reservoir water levels ranging from 764.5 feet to 796 feet, the maximum static pressures would range from 68.6 psi to 227.9 psi. To extend the service life of the piping and minimize leaks, pressure reducing stations would be utilized to provide a minimum to maximum static pressure range of 60 psi to 120 psi throughout the project. The pressure reducing stations would reduce the pressure from the reservoirs to serve Planning Areas 1, 2, 3, and 4 which include the multi-family developments, school, and park sites.

Figure 3-10 illustrates the areas anticipated to be served by each pressure zone and schematically shows the proposed potable water distribution piping.

WATER FACILITIES PHASING

Regardless of the chosen water purveyor, it is possible for the project to consider two general paths in phasing the installation of potable water facilities. The first path would be to construct the aqueduct connection prior to the first occupancy. In this case, since it is not acceptable to peak off the aqueduct, storage facilities would be required. To delay the expense of developing the reservoir site along the ridge, a temporary reservoir in Planning Area 5 along Street "A" (Orchard Ridge Lane) could be installed. At the end of the cul-de-sac, the elevations are in the 600 feet range. With a reservoir at this location, a static pressure of 60 psi could be provided to building pads with an elevation less than 467 feet. This would allow service to Planning Areas 1, 2, 3, and 4 which have elevations ranging from 270 feet to 330 feet. The temporary reservoir location could continue to be used until the project demand storage requirements exceed what the temporary storage can provide. Then, the permanent reservoir(s) on the ridge could be developed.

A second possible phasing path, regardless of the chosen purveyor, is for the initial development phases to be served by an interim intertie with Rainbow MWD. A pressure reducing station could be installed in the vicinity of the proposed Campus Park West development to reduce the available system pressure down to acceptable levels to provide service to the Meadowood project. The timing of construction of the aqueduct connection, transmission pipeline, and onsite reservoir storage would be a matter negotiated between Rainbow MWD and the local water purveyor.

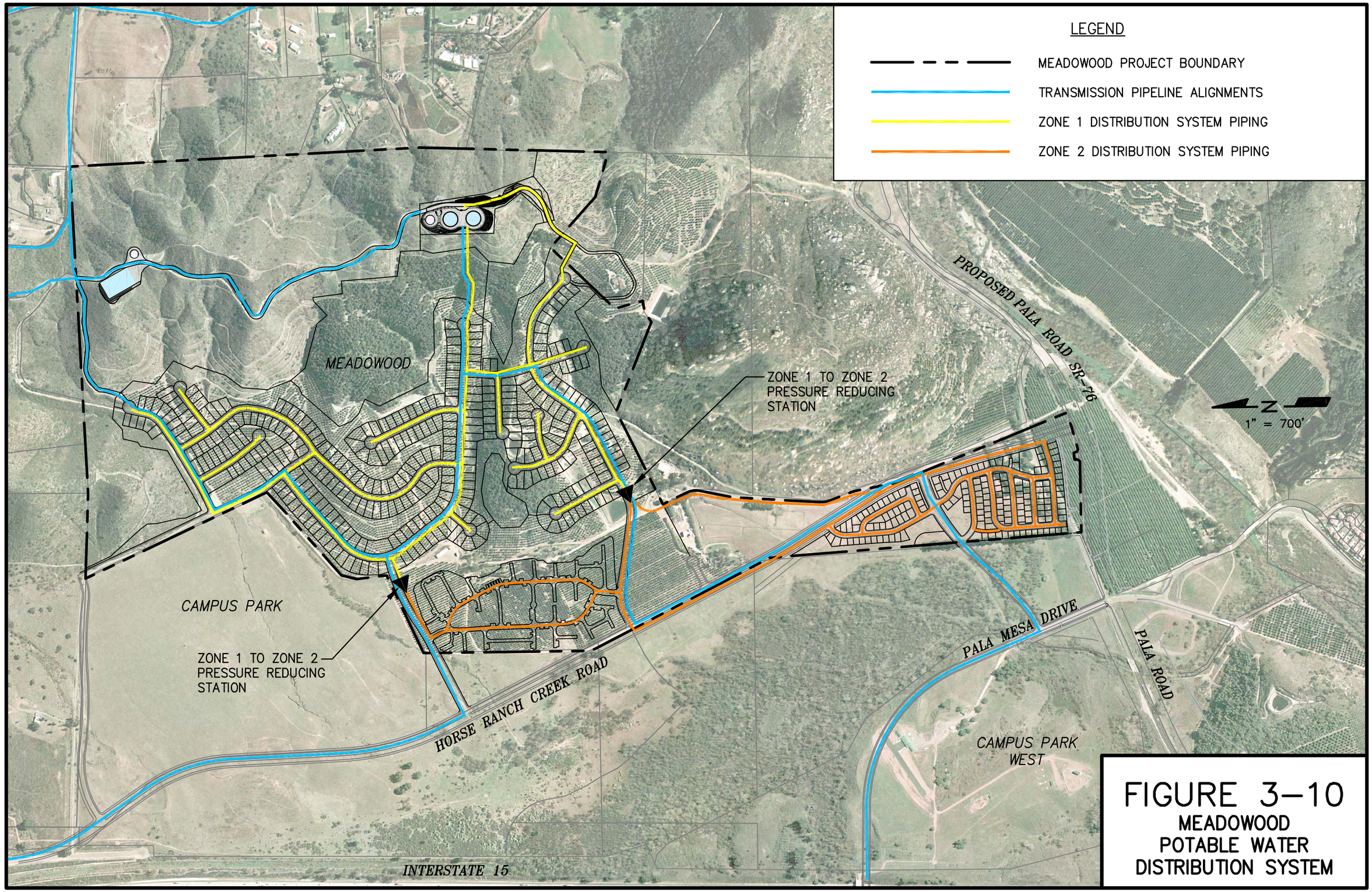


FIGURE 3–10
MEADOWOOD POTABLE WATER DISTRIBUTION SYSTEM

CHAPTER 4

MEADOWOOD WATER SUPPLY FACILITIES FOR SERVICE BY RAINBOW MWD EXISTING SUPPLY FACILITIES

The required facilities discussed in Chapter 3 assumed that Rainbow MWD's existing facilities would not be utilized. This chapter presents the facilities required for water service to the Meadowood project based on connecting Rainbow MWD existing supply facilities.

BACKGROUND ON RAINBOW MWD WATER SYSTEM

Information about the Rainbow MWD water system presented in this section is based on the *Rainbow Municipal Water District's 2001 and Draft 2006 Water Master Plans.* The Rainbow MWD water system serves the unincorporated communities of Rainbow and Bonsall, as well as a portion of Fallbrook. Water supply is withdrawn from the Water Authority's aqueducts and stored in 16 water storage tanks and reservoirs prior to distribution. In the vicinity of the Meadowood development, there are three different pressure zones and water systems within the Rainbow MWD water system: North Reservoir/Rice Canyon System, Canonita System, and Beck System.

North Reservoir and Rice Canyon System

Distributions lines in the North Reservoir and Rice Canyon System are located northeast of the Meadowood development, including Huntley Road and portions of Rice Canyon Road. North Reservoir operates at a high water level (HWL) of 1,212 feet and has a capacity of 7.8 MG. The Rice Canyon Tank operates at a HWL of 1,206 feet and has a capacity of 4.0 MG. Water from this zone is supplied primarily from Connections 1 and 10 to the Water Authority's First Aqueduct and Connection 9 to the Water Authority's Second Aqueduct (Pipeline 4). Based on the *Rainbow MWD Draft 2006 Water Master Plan,* this zone currently has about 6.2 MG of surplus storage capacity available. The surplus storage volume is, expected to decrease to 5.6 MG when ultimate build-out demands are reached.

Canonita System

Distribution lines in the Canonita System are located northwest and west of the Meadowood development, including Stewart Canyon Road. The Canonita Zone operates at a HWL of 1,019 feet. The Canonita Water Storage Tank provides about 6 MG of storage in this zone. Water for this zone is supplied primarily from Connection 7 to the Water Authority's Second Aqueduct (Pipeline 4) and may be supplemented from the Beck Pressure Zone via emergency pumps. Based on the *Rainbow MWD Draft 2006 Water Master Plan,* the Canonita Zone currently has a storage deficit of about 0.7 MG.

Beck System

Distribution lines in the Beck System are located west of the Meadowood development, including Pala Mesa Drive. The Beck Zone operates at an HWL of 897 feet, and has a storage capacity of 204 MG. Water for this zone comes primarily from Connection 7 to the Water Authority's Second Aqueduct (Pipeline 4), the Canonita PSV Station, and may be supplemented from the Canonita Pressure Zone. Based on the *Rainbow MWD Draft 2006 Water Master Plan,* Beck Reservoir currently has 197.5 MG of surplus storage capacity available. This is expected to decrease to 192.2 MG when ultimate build-out demands are reached.

POTABLE WATER RESERVOIR SIZING AND SITING

Potable water storage for the Rainbow MWD Existing Supply Facilities service option is identical to that described in Chapter 3 for the San Luis Rey MWD, Valley Center MWD, and Rainbow MWD New Supply Facilities service options. Even though Rainbow MWD has existing storage, the *(Rainbow MWD Draft 2006 Water Master Plan)* indicates that the Meadowood area will require additional storage of its own. Depending on which pressure zone system is extended to the Meadowood project, sufficient emergency storage may already exist within the Rainbow MWD system so that the Meadowood onsite reservoirs could be reduced in capacity.

AQUEDUCT CONNECTION SIZING AND SITING

The Rainbow MWD Existing Supply Facilities service option does not require new connections to the aqueducts. Instead, water would be supplied to the development from existing Rainbow facilities, including existing Rainbow aqueduct connections.

WATER TRANSMISSION PIPELINE SIZING AND ALIGNMENT

Pipeline Sizing

Pipeline sizing for the Rainbow MWD Existing Supply Facilities service option is identical to that described in Chapter 3 for the San Luis Rey MWD, Valley Center MWD, and Rainbow MWD New Supply Facilities service options. The underlying premise is that the Meadowood project will construct reservoir storage onsite which means that the offsite water line connections only have to provide average day capacity. Maximum day demands, fire flow requirements, and peak hour demands will be supplied by the onsite potable water storage reservoirs.

Pipeline Alignment Alternatives

For the Rainbow MWD Existing Supply Facilities service option, the Meadowood development would be supplied by connecting to an existing Rainbow MWD pipeline. New pipelines would be constructed from these points of connection to the onsite Meadowood potable water storage reservoir site.

Based on the *Rainbow Municipal Water District's 2001 and Draft 2006 Water Master Plans,* there are three distinct nearby pressure zone systems where the Meadowood project could connect to existing and adequately sized Rainbow MWD pipelines. The three connection points and pipeline alignments are shown in Figure 4-1 and are described below.

Option 1 - Connection to the North Reservoir/Rice Canyon System. This alternative would connect to the North Reservoir/Rice Canyon System at the intersection of Rice Canyon Road and Huntley Road. At this location there is a Rice Canyon Road distribution main 12-inches in diameter. The HGL in this zone is a maximum of 1,212 feet. The proposed connection would provide a minimum 2.5 cfs (1,122 gpm) capacity, delivered to the Meadowood project onsite reservoirs for distribution.

LEGEND

- MEADOWOOD PROJECT BOUNDARY
- OPTION 1 ALIGNMENT
- OPTION 2 ALIGNMENT
- OPTION 3 ALIGNMENT
- OPTION 1 CONNECTION TO EXISTING RMWD FACILITIES
- OPTION 2 CONNECTION TO EXISTING RMWD FACILITIES
- OPTION 3 CONNECTION TO EXISTING RMWD FACILITIES

THIS EXHIBIT SHOWS THE LOCATION OF THE WATER SUPPLY FACILITIES THAT WOULD BE CONSTRUCTED TO SERVE THE MEADOWOOD PROJECT FOR WATER SERVICE FROM THE RAINBOW MWD. THE MAJOR FACILITIES ARE:

1) TANKS: TWO POSSIBLE SITES AS SHOWN, OF WHICH ONE WILL BE SELECTED FOR CONSTRUCTION.

2) PIPELINES: THESE WILL CONNECT THE TANKS TO EXISTING RAINBOW MWD PIPELINES.

N

1" = 1800'

FIGURE 4-1
WATER FACILITIES OVERVIEW-FOR SERVICE BY RAINBOW MWD

\\PACIFIC\DWG\648006\FIGURE 4-1.DWG 04-20-09 16:05:06 LAYOUT: 4-1

The proposed transmission main length would be approximately 12,000 feet, assuming connection to the south reservoir site on the Meadowood project and an onsite transmission line through the project development, not along the ridgeline. The alignment considerations are similar to those discussed in Chapter 3 regarding the aqueduct connection at Huntley Road, with the exception of any considerations in Huntley Road.

A hydraulic analysis has not been done on the effects this connection may have on the North Reservoir/Rice Canyon System. In the Rainbow MWD master plan, this system is noted to have excess reservoir storage capacity at buildout. However, adding the Meadowood service connection will alter the operation of the system and an analysis of the required reservoir storage will have to be done. In addition, a piping analysis will have to be done to verify that the existing piping distribution system has sufficient capacity to deliver average daily flows to the Meadowood project without significant impact to the existing system.

A pressure regulating system would be necessary for this option to reduce system pressures so that they are more compatible with the Meadowood project's operating hydraulic grade line. It is anticipated that pressure reducing valves would be located at or near the connection point of the proposed transmission pipeline. The valves would be installed in a pressure reducing station above grade on a concrete slab within the right-of-way.

Option 2 - Connection to the Canonita System. This option would connect to the Canonita System at the intersection of Stewart Canyon Road and Pankey Road. At this location there is a 16-inch distribution main in Stewart Canyon Road. The HGL in this zone is 1,019 ft. This connection would be used to convey average daily flows to the Meadowood project and connect to the proposed onsite potable water storage reservoirs.

The transmission main length would be approximately 11,000 feet, assuming connection to the south reservoir site. The alignment considerations are identical to those identified in Chapter 3 regarding the aqueduct connection at Reche Road, with the exception of the I-15 underpass which is not needed for this alternative.

Reservoir storage in the Canonita System is currently deficient. Thus, adding a connection to this pressure zone for the Meadowood project would require constructing new storage within this zone. This storage will be in addition to the onsite storage being proposed for the Meadowood project.

A pressure regulating system would be necessary for this option to reduce system pressures so that they are more compatible with the Meadowood project's operating hydraulic grade line. It is anticipated that pressure reducing valves would be located at or near the connection point of the proposed transmission pipeline. The valves would be installed in a pressure reducing station above grade on a concrete slab within the right-of-way.

Option 3 - Connection to the Beck System. This alternative would connect to the Beck System at the Pala Mesa Drive Bridge. The Rainbow MWD *2001 Water Master Plan* shows a 10 to 12-inch diameter pipeline crossing the bridge at Pala Mesa Drive. The Caltrans as-builts of this bridge show a 24-inch outer diameter steel casing for Rainbow MWD in one of the cells, extended 5 feet beyond the bridge in both directions and capped. The pipeline through the bridge is 18-inches in diameter. The HGL in this zone is 897 ft. Connection to this existing pipeline would allow transmission of average day flows for the Meadowood project to the onsite potable water storage reservoirs.

The length of transmission piping for this option is approximately 13,000 feet, assuming connection to the south reservoir site. The Option 3 alignment would include a single pipeline connection to the Beck System and would connect to the existing Rainbow MWD in Pala Mesa Drive. The alignment considerations for this option are identical to those identified in Chapter 3 regarding the aqueduct connection at Pala Mesa Drive.

There is a large surplus of reservoir storage in the Beck System. Therefore, connecting to this system would not entail addition of any offsite reservoir storage. The adequacy of the existing Beck System distribution piping will have to be analyzed to ensure that adding the average day project demand will not adversely impact the existing operation of the system.

Pressure regulation of the Beck System for water delivery to the Meadowood project is not anticipated to be necessary because the existing Beck System pressures would not exceed 160 psi at the lowest point in the transmission pipeline.

Alternative Selection Considerations

Of the three alternative options for service from the Rainbow MWD Existing Supply Facilities, Option 2 is not preferred because of the possibility of having to construct offsite reservoir storage in the Canonita System. The other two options do not have offsite storage issues.

Between Options 1 and 3, there are several advantages and disadvantages. The main advantage to Option 1 is that the transmission main alignment is generally within existing access corridors. This is not the case with Option 3. Option 3 has the transmission piping located in new streets which are planned as part of the Campus Park and Campus Park West developments. In the event that these developments are delayed in their project construction, the Meadowood project may have to construct a portion of these streets in order to install the necessary transmission piping.

Option 3 has the advantage of providing a source of water service directly to the first phases of the Meadowood project. The proposed transmission piping alignment is through the southern end of the Meadowood development which has been considered to be the first phase of project development. The Option 3 transmission main could provide service to the first phases of the project prior to the onsite potable water reservoir being constructed.

A disadvantage to Option 3 is the potential for having to construct a new water main across Interstate 15 in the existing Pala Mesa Drive Bridge.

With regard to right-of-way issues, Option 1 may entail some right-of-way acquisition due to constructing a new pipeline in existing roadways. Option 3 does not have this problem as all the piping will be constructed in new roads to be dedicated as part of development.

In general, both Options 1 and 3 are viable means of providing service to the Meadowood project and both should be evaluated in greater depth in the event that LAFCO selects the Rainbow MWD to become the local water purveyor for the Meadowood project.

ONSITE POTABLE WATER DISTRIBUTION

The onsite potable water distribution system requirements for service by the Rainbow MWD Existing Supply Facilities are the same as those discussed in Chapter 3. Water service to the Meadowood site is distributed from the onsite potable water storage reservoirs.

WATER FACILITIES PHASING

If any of the Rainbow MWD Existing Supply Facilities options are pursued, the same phasing opportunities for reservoir construction exist as discussed in Chapter 3.

CHAPTER 5

RECYCLED WATER FACILITIES

Background and discussion about recycled water demands and recycled water quality are provided in Chapter 2. The following sections of this chapter provide additional discussion regarding the sizing and siting of the recycled water facilities.

RECYCLED WATER RESERVOIR

Because recycled water is produced at a relatively constant rate over a 24-hour period, but is delivered to the irrigation system on a variable basis, operational storage for recycled water is required. To serve the Meadowood development, on-site recycled water storage is sized equal to one day of irrigation demand based on maximum summertime month conditions. This calculation is shown in Table 5-1.

TABLE 5-1
RECYCLED WATER STORAGE SIZING

Average Day Recycled Demand	Max. Month Factor	Max. Month Demand	Storage Criteria	Calculated Storage Volume	Design Storage Volume
0.25 MGD	2.9	0.65 MGD	1 day	0.65 MG	0.65 MG

The location alternatives considered for recycled water storage were the same as those considered for potable water storage, as described in Chapter 3. Generally, the approach is to construct recycled water storage at the same site as the potable water storage to minimize grading impacts and allow the two water systems to operate at similar pressures. As discussed in Chapter 3, the southern reservoir site is the preferred location for the potable and recycled water reservoirs. The reservoir site alternatives, including the recycled water storage reservoirs, are shown in Figure 3-1.

RECYCLED WATER TRANSMISSION MAIN

The recycled water transmission pipeline will convey recycled water from the effluent side of the wastewater treatment plant to the recycled water storage tank. It is anticipated that the pumping rate will be close to the average day flow for the wastewater treatment plant so that minimal effluent storage will need to be provided at the wastewater treatment plant.

The recycled water transmission pipeline is proposed to provide direct service to irrigation connections along its alignment. Peak irrigation demands will be met with withdrawals from the recycled water storage reservoir. The pipeline will be sized to handle peak hour demands equal to approximately 1.2 MGD, and will be sized at approximately 6 inches in diameter to serve the Meadowood project only.

The location of recycled water facilities is shown on Figure 5-1. The total length of the main supply pipeline is approximately 8,000 feet for the preferred South tank site. Distribution lines will branch out from the main line to serve the irrigated areas. Pressure reducing stations will be located to separate pressure zones where working pressures exceed 120 psi. An irrigation booster pump station may be required at the reservoir site to serve the groves along the eastern edge of the development.

All offsite and onsite recycled water facilities will conform to the requirements of the *Guidelines for Distribution of Non-potable Water* developed by the American Water Works Association (AWWA) California-Nevada Section, and the California DHS *Guidelines for Use of Reclaimed Water.*

RECYCLED WATER DISTRIBUTION SYSTEM

Water levels in the recycled water reservoir are anticipated to range from 762.5 feet to 786 feet. As with the potable water system, pressure reducing stations will be utilized to limit delivery pressures to 120 psi. Booster pumps may also be necessary to irrigate portions of the retained groves which are too high for gravity fed service.

LEGEND

MEADOWOOD PROJECT BOUNDARY

PREFERRED RECYCLED WATER TRANSMISSION LINE

ALTERNATIVE RECYCLED WATER TRANSMISSION LINE

RECYCLED WATER RESERVOIR

PREFERRED (SOUTH) RESERVOIR SITE

OPEN SPACE

ALTERNATIVE (NORTH) RESERVOIR SITE

GROVE

GROVE

MEADOWOOD

GROVE

SCHOOL

PARK

MULTI FAMILY

CAMPUS PARK

PROPOSED WWTP

PROPOSED PALA ROAD SR-76

PALA ROAD

HORSE RANCH CREEK ROAD

CAMPUS PARK WEST

INTERSTATE 15

N

1" = 700'

FIGURE 5-1

RECYCLED WATER SUPPLY FACILITIES

\\PACIFIC\DWG\648006\FIGURE 5-1.DWG 04-20-09 16:07:54 LAYOUT: 5-1

RECYCLED WATER SYSTEM PHASING

Anticipating that recycled water will be produced in initial project phases by an interim wastewater treatment system, recycled water storage would be located at the wastewater treatment site and would be pumped when needed to recycled water uses. The temporary booster pumps would be located near the wet weather ponds, part of which would be modified to provide temporary storage for the recycled water. The pumps would operate on an as-needed basis and be controlled by irrigation controllers.

Depending on the phasing and recycled water demands, the pumps would be replaced as the pumping requirements increase. This scenario would continue until either the quantity of recycled water produced exceeds the temporary storage capacity at the wastewater treatment plant site or the potable water phasing triggers the final reservoir site along the ridge to be developed.

The permanent recycled water pumping station would be constructed at the wastewater treatment plant site at the same time as the permanent treatment plant construction occurs. Prior to having the permanent pumping station, we envision the recycled water pumping equipment to be similar to a skid-mounted package irrigation booster system.