

CAMPUS PARK WEST PROJECT

APPENDIX S

WATER AND SEWER STUDIES

SPA05-001, GPA05-003, REZ05-005,
TM 5424, LOG NO. 05-02-009

for the

DRAFT SUBSEQUENT ENVIRONMENTAL IMPACT REPORT

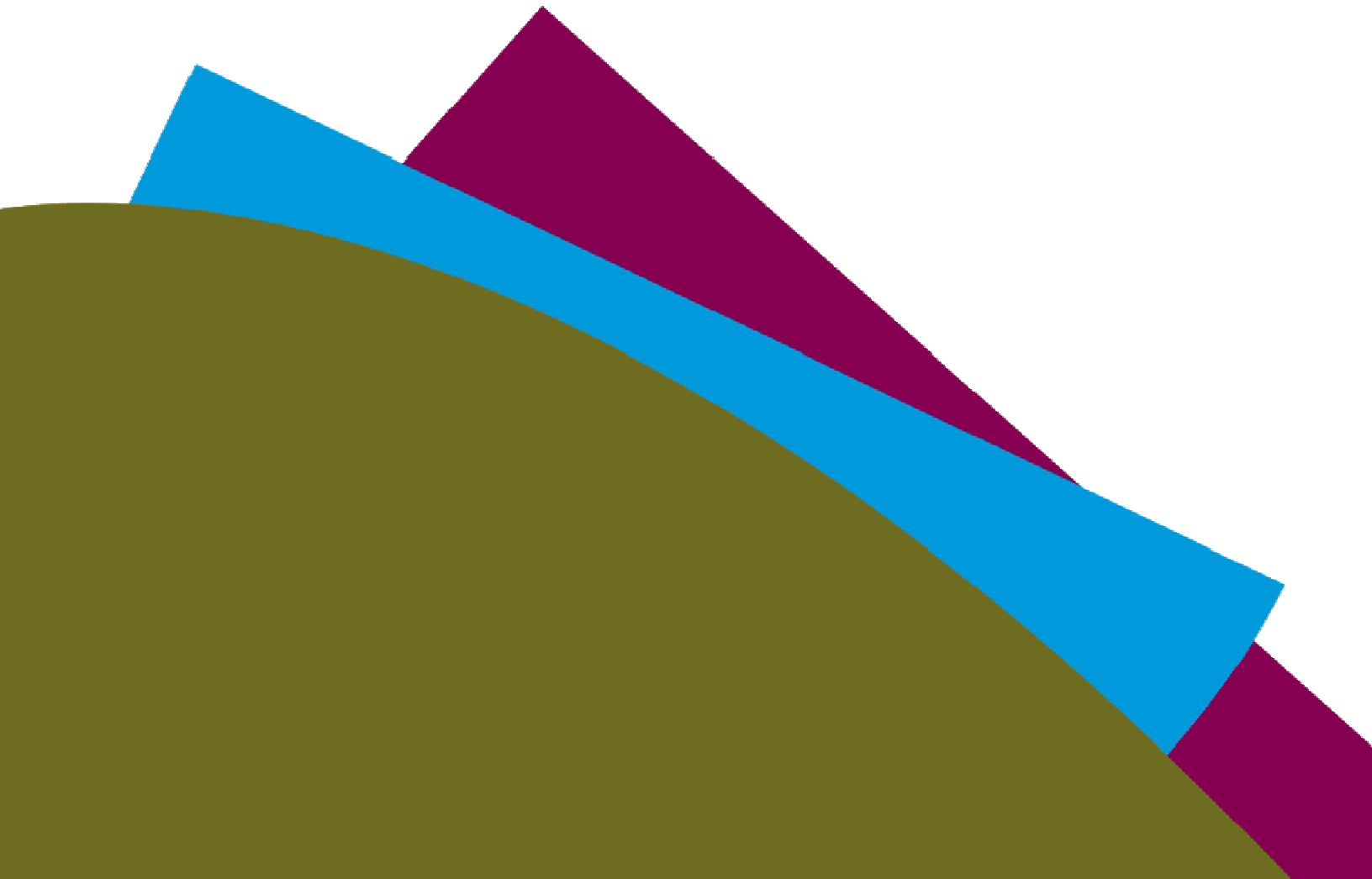
August 2013

Campus Park West Project

Water and Sewer System Studies

**Prepared for:
Pappas Investments**

October 2012



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WATER AND SEWER SYSTEM STUDIES FOR THE CAMPUS PARK WEST PROJECT

October 2012

1. INTRODUCTION

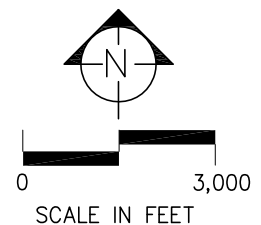
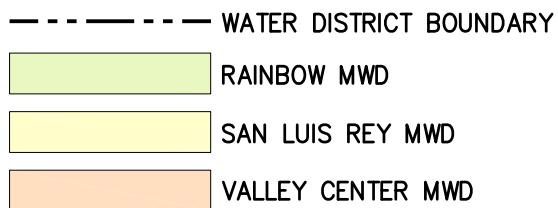
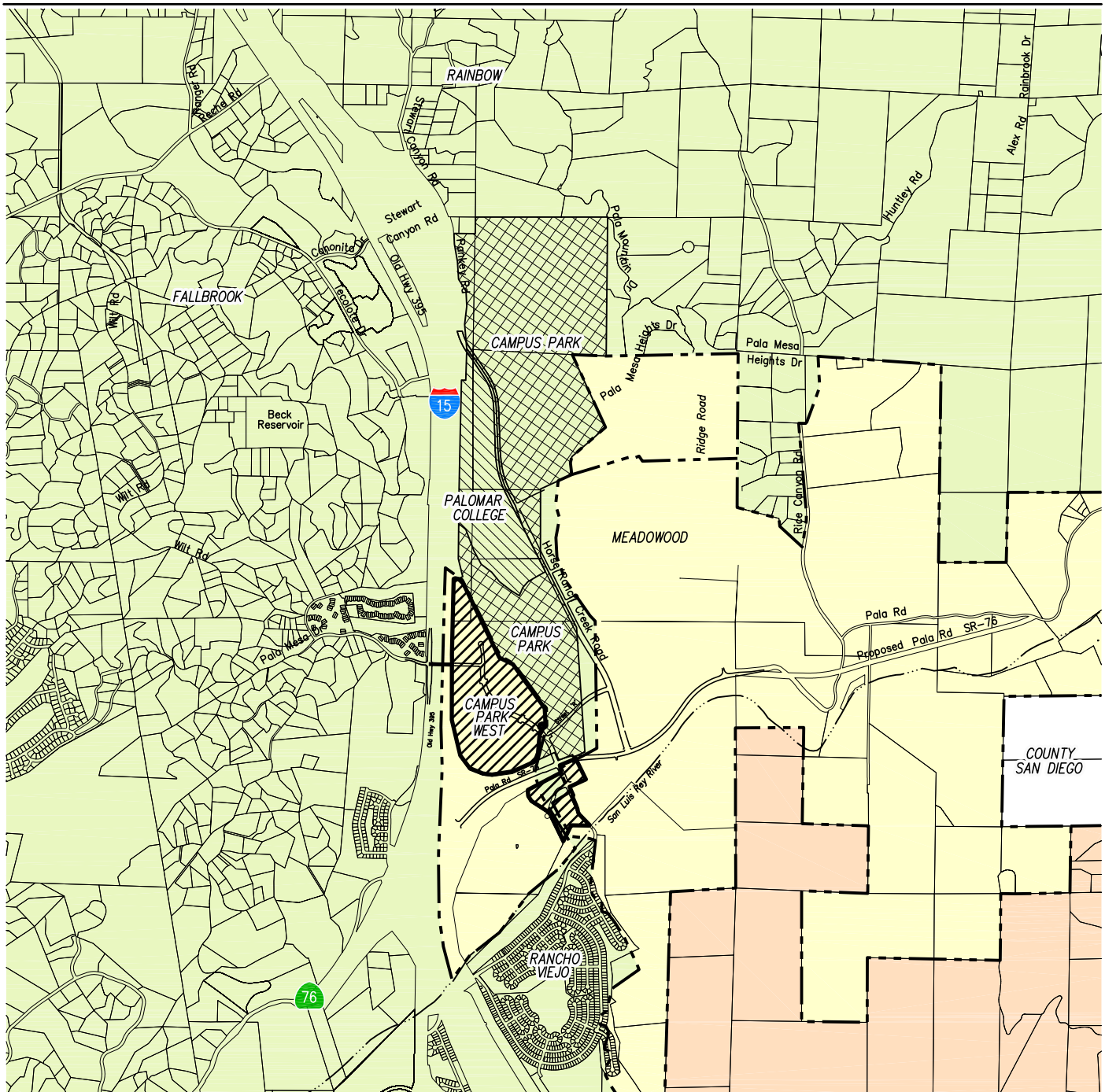
This report identifies the proposed water and sewer facilities to serve the Campus Park West project, which is situated on 116.5 acres that is proposed to be subdivided into 23 lots for a mixed-use land use plan. A detailed description and layout of the project is provided together with water demand and sewer flow projections. Both on-site and off-site facilities are proposed and analyzed based on Rainbow Municipal Water District (District) design and planning criteria.

Project Location

The Campus Park West project site is located in an unincorporated area of San Diego County (County) in the Fallbrook Community Planning Area, approximately 6 miles southeast of downtown Fallbrook and 45 miles north of downtown San Diego. The project is comprised of approximately 116.5 acres (APN numbers 108-121-14, 125-061-01, 125-063-07, and 125-063-08) along the east side of Interstate 15 (I-15) and straddling Pala Road/State Route 76 (SR-76). The majority of the site, approximately 100 acres, is located north of Pala Road/SR-76 and approximately 17 acres are located south of Pala Road/SR-76. Pankey Road extends through the project site, and the Pala Mesa Drive I-15 overpass terminates at the project's western boundary. A vicinity map is provided on Figure 1-1.

Development to the west of the project includes the Pala Mesa Golf Resort and the surrounding residential development on the east side of I-15. A gas station and California Department of Transportation Park and Ride facilities are located southwest of the project site. A proposed mixed-use development project called Campus Park is located to the north and east, and the open space portion of Campus Park borders the eastern length of Campus Park West north of Pala Road/SR-76. Also, to the north is a proposed campus of Palomar Junior College and to the east is a planned master planned development known as Meadowood.

The main access to the project site will be from Pankey Road, which will be improved to extend north from SR-76 and connect with the Pala Mesa Drive overpass, providing access to the west side of Interstate 15. Pankey Road will serve as the main backbone road for the project.



CAMPUS PARK WEST VICINITY MAP

Figure 1-1

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Campus Park West
Water, Recycled Water, and Sewer Study
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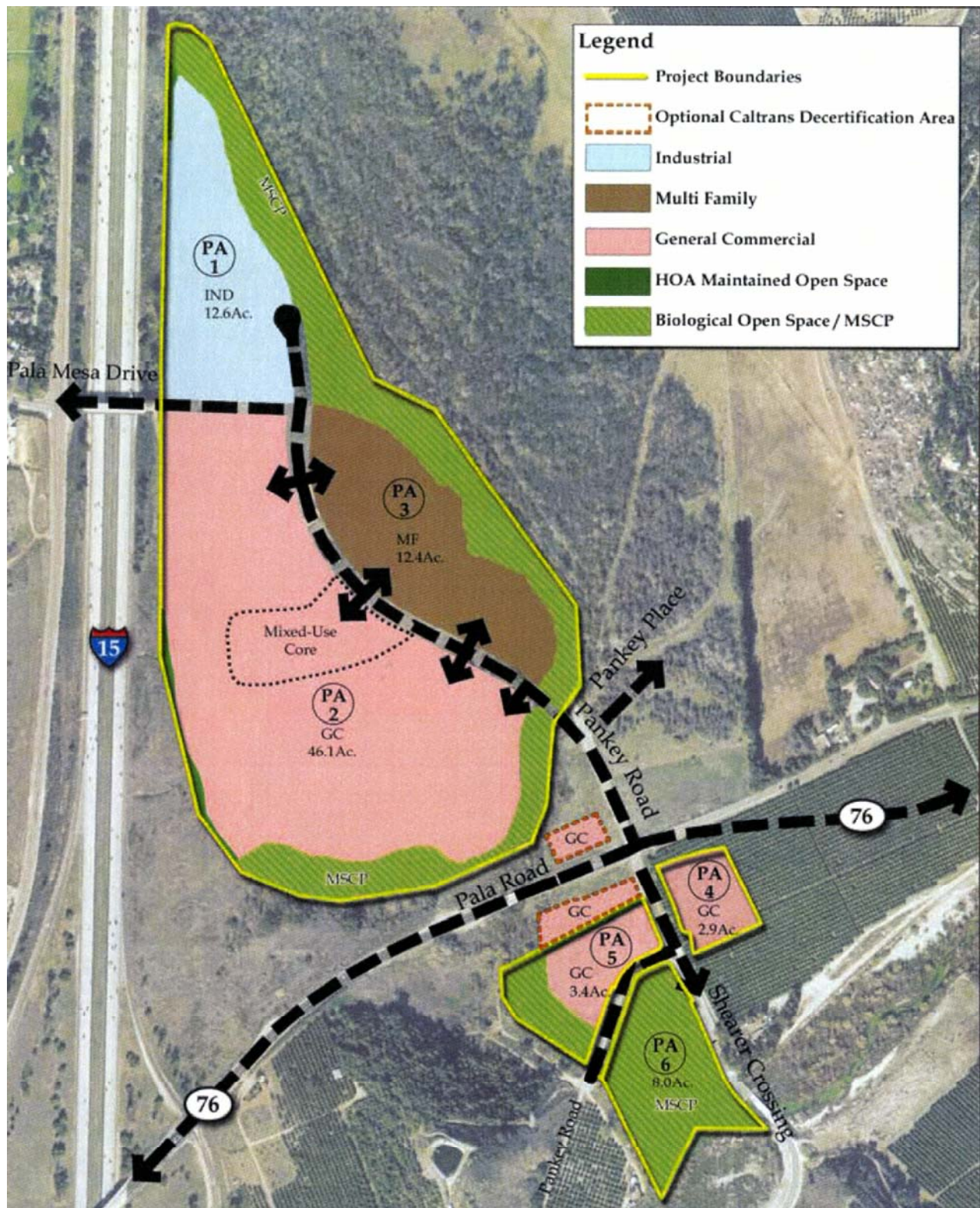
Projection Description

The Campus Park West Specific Plan Amendment identifies six Planning Areas (PA-1 through PA-6) which are shown on Figure 1-2. Proposed development includes residential, general commercial with a mixed-use core, and limited impact industrial land uses. The limited impact industrial and commercial uses are located adjacent to I-15 and SR-76 and the mixed use core is centrally located within the general commercial land use, allowing for a potential pedestrian-oriented linear marketplace. In addition to the developed areas there are open space areas, most of which are designated as Multiple Species Conservation Program (MSCP) open space. The proposed project has been included as a Hard-Lined Development Project in the final version of the North County MSCP Program.

Approximately 12.4 acres (4 lots) east of Pankey Road in PA-3 are designated for multi-family residential uses at a density of 20 dwelling units per acre (248 dwelling units). The general commercial area consists of 6 lots located west of the multi-family residential area in PA-2 and two lots in PA-4 and PA-5, which are located south of Pala Road/SR-76. The general commercial area totals approximately 52.4 acres and will contain approximately 503,500 square feet of commercial space. The mixed-use core is integrated into the general commercial land area in PA-2 and may contain a maximum of 35 dwelling units in addition to commercial and office space. PA-1 is located to the north of Pala Mesa Drive, west of Pankey Road and east of I-15 and is the limited impact industrial area. This area consists of 4 lots totaling approximately 12.6 acres which may contain approximately 120,000 square feet of light industrial/office space. PA-6 is at the very south end of the project and includes only MSCP open space. Campus Park West includes three Home Owners Association (HOA) lots totaling 1.42 acres which are comprised of manufactured slopes, HOA maintained landscaped areas, and drainage facilities. There are four biological open space lots, including PA-6, which total approximately 31.0 acres. The proposed development per the Campus Park West Specific Plan Amendment is summarized in Table 1-1.

Table 1-1 Campus Park West Proposed Land Use Summary

Land Use	Gross Acreage (acres)	Density (DU/ac)	Dwelling Units (DU)	Building Area (sq ft)
Multi-Family Residential (PA-3)	12.4	20	248	
Commercial/Mixed Use (PA-2, -4 & -5)	52.4			503,000
Mixed Use residential (PA-2)	--	20	35	
Light Industrial/Office (PA-1)	12.6			120,000
HOA - irrigation	1.42			
Biological Open Space (includes PA-6)	31.0			
Right-of-Way	6.7			
Totals	116.5		283	



SOURCE: Project Design Consultants

CAMPUS PARK WEST LAND USE

Figure 1-2

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October 2012

Topography

The existing elevation within the project site ranges from approximately 290 feet in the northern portion to 261 feet along the southern boundary. The proposed project includes grading of approximately 91.2 acres of a 116.5 acre site. The finished grade will range from 294 feet on the northern portion of the site to 274 feet near Pala Road/SR-76. The project area south of SR-76 has existing elevations between 266 and 261 feet, and proposed elevations on the graded portions are between 272 and 268 feet.

Water and Sewer Service

The majority of Campus Park West is located within the San Luis Rey Municipal Water District sphere of influence and a small percentage is within the Rainbow Municipal Water District (RMWD), as shown previously on Figure 1-1. The RMWD is a member agency of the San Diego County Water Authority and provides both water and sewer services, whereas the San Luis Rey Municipal Water District manages groundwater resources of the San Luis Rey River, its sole source of water. Water and sewer service will therefore be provided to Campus Park West by the RMWD, and specific provisions for service have been outlined in a pre-annexation agreement dated May 22, 2012. The Campus Park West project will initiate annexation into the RMWD and an amendment to the District's Sphere of Influence once the project is approved by the County.

The RMWD has existing water facilities in the vicinity of the Campus Park West project that have sufficient capacity to serve the project. Additionally, the supply capacity of the San Diego County Water Authority and Metropolitan Water District aqueduct connections are projected to be adequate for ultimate demands. Water supply facilities for Campus Park West will be integrated with proposed facilities for the Campus Park project to the north.

RMWD has existing wastewater treatment capacity and conveyance capacity for Campus Park West flows in offsite trunk sewers and in an existing force main that was installed by the Hewlett-Packard Campus Park project in 1988. Wastewater flows from Campus Park West will be collected in on-site gravity sewers and pumped from a new regional lift station called the Campus Park Lift Station. The Campus Park Lift Station will be located at the northeast corner of Pankey Road and Pala Road/SR-76 and will collect flows from Campus Park West, the planned Campus Park project, the planned Palomar College site, and existing RMWD customers who discharge flows to a gravity pipeline that currently extends through the Campus Park West project site. Flows from the Campus Park Lift Station will be conveyed to the City of Oceanside's San Luis Rey Wastewater Treatment Plant, where RMWD has existing capacity ownership.

It is noted that RMWD currently does not generate nor distribute recycled water. Furthermore, due to the financial impacts of acquiring or producing recycled water and installing and maintaining a parallel recycled water transmission and distribution system, a recycled water system is not planned at this time. One option for recycled water in the future is the proposed Meadowood project to the east, which includes a wastewater treatment and reuse option for disposal. Should the development proposal be realized, RMWD could obtain recycled water

from a Valley Center MWD owned and operated facility. In this scenario, a recycled water pipeline in Pankey Road could serve irrigation use within the project. Other options include recycled water from Fallbrook Public Utilities District or Valley Center Municipal Water District's Moosa Canyon plant with a recycled water pipeline extension to the District's Beck reservoir. It is recommended that RMWD review the status and likelihood of a reclamation facility in the area at the time of improvement plan processing and determine if a recycled pipeline should be required within Campus Park West.

2. WATER AND SEWER DESIGN CRITERIA

Criteria for the planning and design of the Campus Park West water system are established by the RMWD. The master planning criteria summarized in this report were obtained from the RMWD Domestic Water and Sanitary Sewer Construction Standards Manual, dated December 2011, and is consistent with the planning criteria used for the proposed Campus Park project.

Water Demands

Water demand projections for the proposed development are based on the number of residential dwelling units, land area or building size and corresponding unit demand factors for specific land use types. The water use factors applicable to Campus Park West are provided in Table 2-1.

Table 2-1 Water Use Factors

Land Use	Average Day Demand
Multi-Family Residential	300 gpd/DU
General Commercial/Mixed Use	3,000 gpd/acre
Light Industrial/Office	100 gpd/1,000 sqft
Developed Parks	4,000 gpd/acre

Water Peaking Factors

Average day demands are multiplied by peaking factors to project maximum day and peak hour demand conditions. The peaking factors for Campus Park West are based on RMWD factors established in the Domestic Water and Sanitary Sewer Construction Standards Manual and are 2.0 for the maximum day demands 4.5 for peak hour demands.

Fire Flows

The fire flow requirements vary by the type of land use and are established by the local fire protection agency. Fire services for Campus Park West will be provided by the North County Fire Protection District. Residential development requires a minimum fire flow of 1,500 gpm with a 20 psi residual pressure at all fire hydrants. For commercial development, fire flows are specific to individual buildings and are dependent on the building size and type of construction,

and proximity to wilderness areas. Furthermore, fire flow requirements may be reduced for buildings that have approved fire sprinkler systems. The maximum proposed building size is 175,000 square feet, which would require a fire flow of 4,500 gpm if not sprinklered. Since most non-residential buildings today are normally sprinklered, a maximum fire flow requirement of 3,500 gpm with a 20 psi residual pressure has been assumed for commercial and industrial land uses.

Water System Pressures

The RMWD potable water distribution system is generally designed to maintain static pressures between 60 psi and 150 psi. The minimum pressure with peak hour demands is 40 psi and the minimum pressure with maximum day demands plus a fire flow is 20 psi. To limit pressure drops and pressure swings due to high velocities, water mains are sized for a maximum velocity of 10 feet per second under the maximum day plus fire flow condition and a maximum velocity of 5 feet per second under the peak hour flow condition.

Sewage Flows

Wastewater flow projections for the proposed development are based on the number of equivalent dwelling units (EDUs) for specific land use types. The wastewater generation factors applicable to Campus Park West are provided in Table 2-2. These factors are in accordance with the Domestic Water and Sanitary Sewer Construction Standards Manual, December 2011, Section 2.03.A, with the exception that one EDU is equivalent to 250 gpd of sewage flow. This is consistent with the planning criteria used for the proposed Campus Park project.

Table 2-2 Sewage Generation Factors

Land Use	EDU Factor
Multi-Family Residential	1.0 per living unit 2.58 bedrooms per EDU
General Commercial/Mixed Use	1.0 for less than 5,000 sq ft 3.4 for first 5,000 sqft 0.4 per 1,000 sqft for balance
Light Industrial/Office	1.0 for less than 5,000 sq ft 3.4 for first 5,000 sqft 0.4 per 1,000 sqft for balance

Sewage Peaking Factor

The sewer design peak flow for Campus Park West are based on RMWD factors established in the Domestic Water and Sanitary Sewer Construction Standards Manual and three (3) times average flow.

Gravity Sewers

All gravity sewers are designed to convey the peak flow. For pipes with a diameter of 12 inches or less, the sewers have designed to convey the peak flow when flowing half full by depth. For pipes with a diameter greater than 12 inches, the sewers are designed to convey the peak flow when flowing two-thirds full. Manning's equation is used to size all gravity sewers with a roughness coefficient $n = 0.013$. All new sewers are designed to maintain a minimum velocity of two feet per second (fps) at design capacity to prevent the deposition of solids but not more than 10 fps maximum velocity.

Sewer Lift Stations

Sewer lift stations are designed based on the projected peak wet weather influent flow and a 1.3 peak pumping safety factor. At a minimum, a lift station will have one duty and one standby pump of the same size. The lift station wet well is sized for a minimum storage volume equal to six hours of average daily flow. All lift stations will be equipped with District approved instrumentation and telemetry that is compatible with the Supervisory Control and Data Acquisition (SCADA) system.

Sewer Force Mains

Sewer force mains are sized to provide flow rates between three and eight feet per second. In addition, every attempt should be made to limit the maximum retention time in force mains to six hours.

3. WATER FACILITIES

Projected Water Demands

Projected water demands based on the water use factors and proposed development plan for Campus Park West presented in earlier report sections are provided in Table 3-1. The total average day water is projected for be 0.261 MGD (296 acre-feet per year)

The projected water demand for Campus Park West is equivalent to 529.5 equivalent dwelling units (EDUs) of water demand based on one EDU equaling one single family residence with a demand of 500 gpd.

Table 3-1 Campus Park West Water Demand Projections

Land Use	Gross Acreage	Max Square Footage/ Units	Unit Use Factor	Average Annual Demand	
				gpd	gpm
Multi-Family Residential	12.4	248	300 gpd/DU	74,400	51.7
Commercial/Mixed Use	52.4	503,500	3,000 gpd/acre	157,200	109.2
Mixed Use residential	--	35	300 gpd/DU	10,500	7.3
Light Industrial/Office	12.6	120,000	100 gpd/1,000 SF	12,000	8.3
HOA - irrigation	1.42	--	4,000 gpd/acre	5,680	3.9
Biological Open Space	31.0	--	0 gpd/acre	-	0.0
Right-of-Way*	6.7	--	4,000 gpd/net acre	1,340	0.9
Total	116.5			261,120	181

* Mostly pavement, with 5% of the area assumed irrigated (net acres)

Using the peaking factors discussed in the previous chapter, projected demands for other demand conditions are as follows:

Maximum Day Demand (x 2.0) = 0.522 MGD (363 gpm)

Peak Hour Demand (x 4.5) = 1.18 MGD (816 gpm)

Existing and Planned Pressure Zones

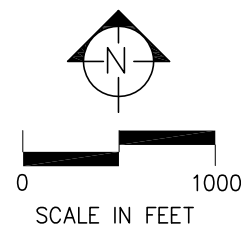
RMWD has two water pressure zones in the vicinity of Campus Park West: the 1019 Canonita Zone and 897 Beck Zone. The hydraulic grade of both of these zones is too high to serve Campus Park West directly. A new reduced pressure zone is planned to supply the proposed Campus Park development located to the north and east of Campus Park West. Facilities for the planned 660 Campus Park Zone were recommended in the Water System Analysis for the Campus Park Project in the County of San Diego, dated November 5, 2010. Water service and fire protection for Campus Park West are recommended from the planned 660 Campus Park Zone, as described below and illustrated on Figure 3-1.

1019 Canonita Zone - The Canonita Zone is located north of the Campus Park West project site. The closest transmission main is a 16-inch diameter main in Stewart Canyon Road, approximately 1.4 miles north of the northern project boundary. The 16-inch diameter main extends north and connects with the 6.0 million gallon (MG) Canonita Tank.

897 Beck Zone – The Beck Zone serves residential development to the west of I-15, along the western Campus Park West boundary. An 18-inch water main is located in the Pala Mesa Drive I-15 overpass and terminates at the proposed project boundary. The Beck Zone includes the 203.7 MG Beck Reservoir.



- CAMPUS PARK WEST (CPW) PROJECT BOUNDARY
- EXISTING WATER MAIN
- PROPOSED WATER MAIN (BY CPW)
- PROPOSED CONNECTION
- ▲ PROPOSED PRESSURE REDUCING STATION (BY CPW)
- ⋈ PROPOSED HYDRANT
- PLANNED OFFSITE TRANSMISSION MAIN (BY OTHERS)
- ▲ PLANNED OFFSITE PRESSURE REDUCING STATION
- . - . - . PROPOSED OFFSITE TRANSMISSION MAIN (BY DISTRICT WITH CALTRANS)



CAMPUS PARK WEST PROPOSED WATER SYSTEM

Figure 3-1

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Planned 660 Campus Park Zone – A reduced pressure 660 Zone is planned to supply the proposed Campus Park Project, which is located to the north and east of Campus Park West. The 660 Campus Park Zone will be supplied from two pressure reducing stations (PRSs). The primary supply to the 660 Zone will be from an existing Beck Zone watermain in Old Highway 395 on the west side of I-15. Caltrans will be making improvements at the SR-76/I-15 interchange, which will include construction of a new RMWD 12-inch diameter pipeline in Pala Road/SR-76 that will connect with the watermain in Old Highway 395 and extend to the eastern boundary of the Caltrans right-of-way. Campus Park off-site supply facilities will include an eastward extension of this pipeline in Pala Road/SR-76, a pressure reducing station near the intersection of Pala Road/SR-76 and Pankey Road, and a 16-inch diameter 660 Zone pipeline in Pala Road/SR-76 and Horse Creek Road. The second PRS for the 660 Zone is planned at the intersection of Pala Mesa Heights Drive and Horse Ranch Creek Road, which will provide a redundant supply from the Canonita Zone through an extension of the existing 16-inch diameter pipeline in Stewart Canyon Road.

Offsite Water System

Campus Park West is proposed to be supplied from a new onsite 660 Zone PRS and a connection to the planned 660 Zone pipeline in Pala Road/SR-76 at Pankey Road. Offsite improvements will consist of a 660 Zone pipeline connection and a short section of 12-inch diameter pipeline in Pankey Road. Supply to Campus Park West will utilize the pipeline that will be constructed with the new Caltrans interchange and off-site improvements planned for the Campus Park and Palomar Junior College projects. However, only one of these facilities is necessary for Campus Park West development. It is acknowledged that Campus Park West will be responsible for a portion of the costs for these planned off-site improvements, to be determined by the RMWD.

Onsite Water System

The proposed onsite water system for the Campus Park West project will consist of an 897 Beck Zone to 660 Campus Park Zone PRS, a 12-inch diameter transmission main in Pankey Road, and smaller distribution pipelines that will be determined as site development plans are prepared. The PRS will be located at the terminus of the existing 18-inch diameter water main in the Pala Mesa Drive I-15 overpass. A redundant supply to Campus Park West will be provided from the 16-inch diameter transmission main in Pala Road/SR-76 and the two 660 Zone PRSs planned for Campus Park and Campus Park West.

Distribution pipelines within Campus Park West will be looped and designed to deliver maximum day demands plus a fire flow, which exceed the peak hour demands.

Hydraulic Analysis

Service pressures based on the hydraulic grade of the planned 660 Zone and graded pad elevations will range between 158 psi and 169 psi. Peak hour pressures will be slightly lower

due to pipeline friction losses. Results of the hydraulic analysis indicate that the projected maximum day demand plus fire flow (363 gpm + 3,500 gpm fire flow = 3,863 gpm) can be supplied from the proposed 12-inch diameter transmission main at a minimum pressure of 20 psi from any of the three planned 660 Zone PRSs (see Appendix A for headloss calculations). The maximum pipeline velocity in the transmission main under the maximum day plus fire flow condition with supply from a single PRS will be 11 fps. However, with both PRSs in service, the velocities will be within the District velocity criteria of less than 10 fps.

4. SEWER FACILITIES

Projected Sewage Flows

The projected wastewater flows for Campus Park West based on the sewage generation factors presented in Table 2-2 are summarized in Table 4-1. Since only the total building area for the general commercial category is defined, building areas for the three commercial planning areas (PA-2, -4 and -5) are apportioned based on the relative size of the planning areas (acres). The total average wastewater flow is projected to be 0.134 MGD or 93 gpm.

Table 4-1 Campus Park West Sewer Flow Projections

Land Use	Quantity	EDUS			Projected Sewer Flow*	
		1 st 5,000 ft ²	>5,000 ft ²	Total	Average (gpd)	Peak (gpm)
PA-1						
Industrial	120,000 sqft	3.4	46.0	49.4	12,350	
PA-2						
General Commercial	442,525 sqft	3.4	175.0	178.4	44,602	
Mixed Use Residential	35 units	--	--	35.0	8,750	
PA-3						
Multi-Family Residential	248 units	--	--	248.0	62,000	
Subtotal PA-1 thru PA-3				510.8	127,702	310
PA-4						
General Commercial	27,838 sqft	3.4	9.1	12.5	3,134	
PA-5						
General Commercial	32,637 sqft	3.4	11.1	14.5	3,614	
Subtotal PA-4 and PA-5				27.0	6,748	14
Totals				538 EDUs	134,450 gpd	280 gpm

* Based on 250 gpd per EDU and RMWD sewer peaking factor equation

Peak wastewater flows from Campus Park West are calculated based on the peaking factor of 3.0 and average flows of 93 gpm, for a peak wastewater flow of 280 gpm.

Existing Sewer Facilities

The existing sewer facilities in the vicinity of Campus Park West consist of gravity sewer pipelines and a force main. Additionally, a gravity trunk sewer and lift station are planned to convey flows from the proposed Campus Park development. The existing and proposed sewer facilities in the vicinity of Campus Park West are shown on Figure 4-1.

Plant B Collector Sewer

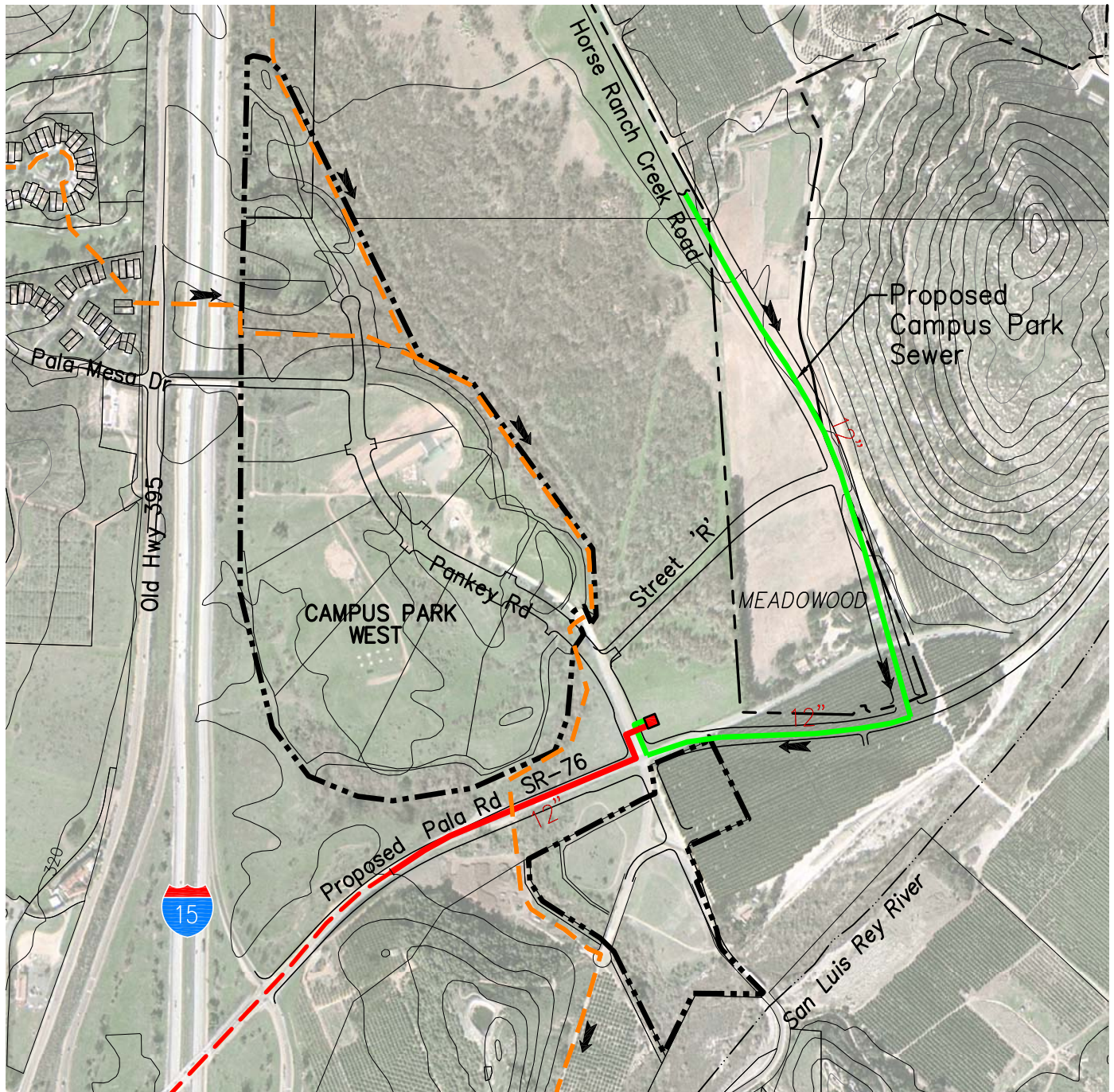
A 12-inch diameter gravity sewer line called the Plant B Collector sewer extends along the eastern boundary of Campus Park West north of Pala Road/SR-76. This line heads south past SR-76 and then turns west, crosses under I-15 and connects to the Plant B Pump Station, which is located on Old Highway 395 near the RMWD office. An additional gravity sewer collects flows from a residential area just west of I-15, crosses under I-15 approximately 400 feet north of the Pala Mesa Drive overpass, and extends approximately 1,000 feet east through the Campus Park West project site to connect with the Plant B Collector sewer. RMWD has been investigating options to relocate the Plant B Collector sewer north of Pala Road/SR-76, since it is aligned in an environmentally sensitive area with difficult access. Furthermore, the RMWD Wastewater Master Plan Update has identified a capacity deficiency in both the Plant B Interceptor and Plant B Sewer Lift Station, which is also in need of rehabilitation. The Plant B Sewer Lift Station will be replaced by future Campus Park facilities.

Pala Road/SR-76 Force Main

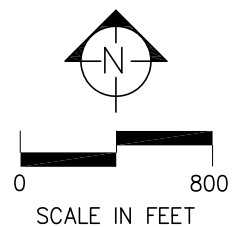
Sewer facilities constructed as part of the Hewlett-Packard Campus Park improvements in 1988 extend up to the western boundary of Campus Park West. A lift station, which was never built, was planned near the southwest corner of the Pankey Road and Pala Road intersection, which is adjacent to Campus Park West PA-5. A portion of the force main for this lift station was constructed in Pala Road/SR-76, but never put into use. The 12-inch diameter force main extends west to the Pala Road bridge over I-15, where it reduces to a 10-inch diameter section through the bridge. The force main discharges to an existing 21-inch diameter gravity sewer in Pala Road/SR-76 on the west side of the bridge.

Planned Campus Park Gravity Sewers

The Sewer Service Analysis for the Campus Park Project was prepared for RMWD in November 2010. Based on recommendations from this report, all sewer flows from Campus Park will be collected in onsite gravity sewers and conveyed south in a trunk sewer aligned in Horse Ranch Creek Road. The trunk sewer will turn west in Pala Road/SR-76 and discharge to the proposed Campus Park Lift Station, which will be located within the Campus Park project at the northeast corner of Pankey Road and Pala Road/SR-76. The trunk sewer in Horse Creek Road will be sized for ultimate Campus Park projected flows plus Plant B interceptor flows (peak wet weather flow = 560 gpm) and future flows from the Palomar College site (peak flow = 72 gpm).



- CAMPUS PARK WEST PROJECT BOUNDARY
- - - EXISTING RAINBOW GRAVITY SEWER
- - - EXISTING FORCE MAIN
- PROPOSED CAMPUS PARK SEWER
- PROPOSED FORCE MAIN
- PROPOSED CAMPUS PARK LIFT STATION



EXISTING ONSITE AND PLANNED OFFSITE SEWER FACILITIES

Figure 4-1

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An additional 15-inch diameter gravity sewer is planned in Pankey Road to connect with the existing Plant B Interceptor and convey flows to the Campus Park Lift Station, which is discussed further in the Plant B Interceptor Abandonment section. Flows from the northern portion of Campus Park West will also discharge to this 15-inch diameter pipeline

Planned Campus Park Lift Station

The Ten Percent Preliminary Design Report (PDR) for the Campus Park Sewer Lift Station was prepared in November 2010 for the RMWD. The Campus Park Sewer Lift Station is part of the infrastructure needed for sewer service to Campus Park and will be constructed on the project site, but it will be a public facility owned and operated by the RMWD. In the ten percent design report, the capacity of the lift station is based on peak sewer flows from the entire Campus Park project, the Palomar Community College project, and ultimate projected flows in the Plant B Interceptor. The Campus Park Lift Station will also pump all flows from the Campus Park West project and the District has requested the inclusion of potential future development from Warner Ranch. The required pumping capacity with projected Campus Park West flows is provided in Table 4-2.

Table 4-2 Campus Park Lift Station Pumping Capacity

Service Area	Average Sewage Flow (gpm)	EDUs ¹	Population ²
Campus Park West	93.4	537.8	1,345
Campus Park Project	148.0	850.1	2,125
Warner Ranch ³	135.4	780.0	1,950
Palomar College Project	17.4	100	251
Plant B Interceptor	160	921.6	2,304
Totals	554.2	3189.7	7,974
Sewer Peaking Factor		3.00	
Lift Station Safety Factor		1.30	
Total Firm Pumping Capacity		2,161 gpm	

1) Based on 250 gpd/EDU

2) Based on 2.5 people/EDU

3) Assumes 780 dwelling units for Warner Ranch

A new section of force main will be constructed between the Campus Park Lift Station and the existing 12-inch diameter force main in Pala Road/SR-76, which discharges to a 21-inch diameter gravity interceptor west of I-15. Based on the firm pumping capacity, velocities in the Campus Park Lift Station force main will be 4.9 fps in the 12-inch diameter sections and 7.0 fps in the existing 10-inch diameter section through the bridge over I-15.

The elevation of the Campus Park Lift Station wet well will be determined by the planned 15-inch diameter sewer that will connect with the Plant B Interceptor. The planned pipeline must

cross a creek with a low elevation of approximately 258 feet above mean sea level just prior to the connection point. The pipeline invert of the Plant B Interceptor at the connection point was field verified and determined to be 253 feet above mean sea level. The Ten Percent PDR assumes a wet well flow invert at 250 feet and wet well bottom of 243 feet, which should be deep enough to meet flow criteria in the planned 15-inch gravity sewer.

Should the Campus Park Lift Station be delayed by the developer of Campus Park, the District would permit on an interim basis the discharge of Campus Park West flows to the Plant B Interceptor. Once the Campus Park Lift Station is operational, Campus Park West flows would be diverted from the Plant B Interceptor.

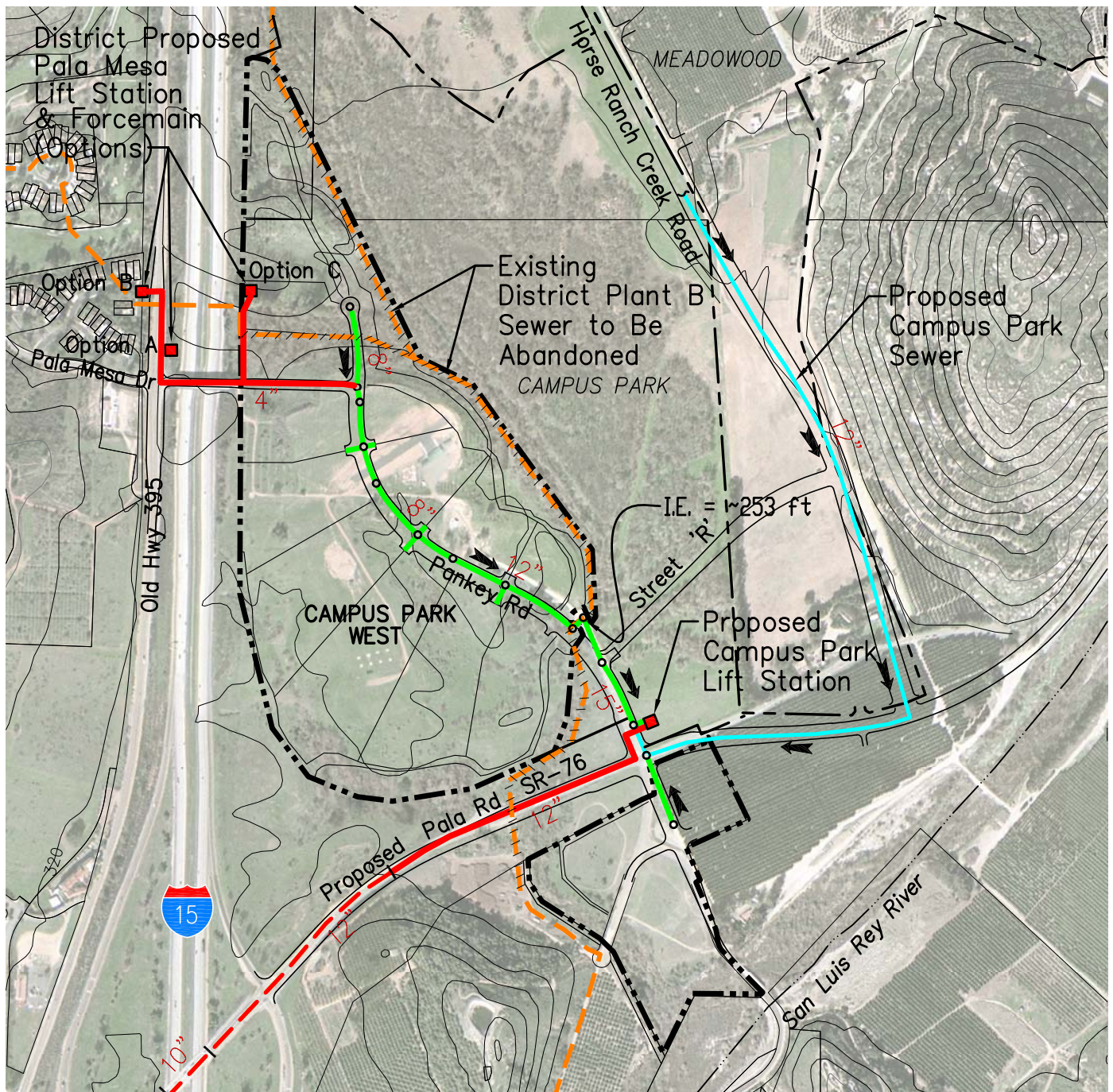
Plant B Interceptor Abandonment and New Pala Mesa Lift Station

RMWD plans to abandon the Plant B Interceptor north of Pala Road/SR-76 with development of Campus Park West and the proposed Campus Park development. Flows in the gravity sewers that enter the Campus Park West project site from the north and the west will be re-routed separately.

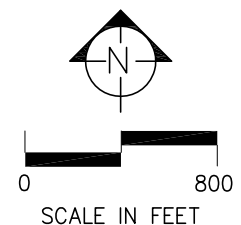
Flows in the gravity sewer entering Campus Park West from the north will be diverted upstream of the Campus Park West project site to flow east and then south through the proposed Campus Park project. Future flows from the Palomar College site will also be conveyed through Campus Park.

Flows in the existing branch gravity sewer that crosses I-15 and enters the Campus Park West project site from the west are proposed to be pumped from a new RMWD lift station. The lift station will discharge to the proposed Campus Park West collection system for conveyance south. Three potential locations have been identified near Pala Mesa Drive for the proposed lift station, which has been named the Pala Mesa Lift Station. These locations are shown on the proposed system map on Figure 4-2.

Option A and B locate the Pala Mesa Lift Station on the west side of Interstate 15 and/or Old Highway 395 near the existing gravity sewer and construct a new force main extending south and then west across I-15 in a bridge cell of the Pala Mesa Drive overpass. Option C utilizes the existing gravity sewer crossing I-15 and locates the Pala Mesa Lift Station in Campus Park West. A new force main would be constructed to convey flows south and then west in Pala Mesa Drive, discharging to the proposed Campus Park West gravity sewer in Pankey Road. All options require a new section of force main from the east side of the bridge to the proposed gravity sewer in Pankey Road. Options A and B also require sections of new force main on the west side of I-15 and in the Pala Mesa I-15 overpass, and Option C requires an additional section of force main along the east side of I-15.



- CAMPUS PARK WEST PROJECT BOUNDARY
- - - EXISTING RAINBOW SEWER
- PROPOSED ONSITE SEWER
- MANHOLE
- - - EXISTING FORCE MAIN
- PROPOSED FORCE MAIN
- PROPOSED LIFT STATION
- PROPOSED CAMPUS PARK SEWER



CAMPUS PARK WEST PROPOSED SEWER SYSTEM

Figure 4-2

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ATKINS

Campus Park West
Water, Recycled Water, and Sewer Study
(revised 11/1/12) October 2012

Based on information provided by RMWD staff, the peak flow in the existing gravity sewer that crosses I-15 just north of Pala Mesa Road is 53 gpm. This RMWD flow will be incorporated into the Campus Park West onsite sewer system sizing. The proposed Pala Mesa Lift Station will therefore have a minimum required design capacity of 70 gpm (peak flow times the 1.3 peak pumping safety factor). At this flow rate, a 4-inch diameter force main will be required to provide the minimum force main velocity of 3 feet per second. Due to the small force main diameter, it is recommended that the lift station be equipped with a separate grinder pump.

It is noted that, once the Campus Park Lift Station is constructed, flows from the Plant B Interceptor will be diverted to the planned 15-inch gravity sewer in Pankey Road. This will allow RMWD to abandon the Plant B Lift Station and the interceptor south of the diversion point. Once the Campus Park West sewer facilities and the new Pala Mesa Lift Station are constructed, the upper section of the Plant B Interceptor that extends through the Campus Park West project site can be abandoned. It is also noted that the 15-inch diameter gravity sewer in Pankey Road is part of the Campus Park sewer facilities and has been sized for peak Plant B Interceptor flows. The pipeline can be reduced to a 12-inch diameter pipeline if only flows from Campus Park West and the portion of Plant B interceptor flows originating west of the I-15 (pumped flows from the future Pala Mesa Lift station) are conveyed.

Onsite Gravity Sewers

The onsite gravity sewer system for Campus Park West will convey flows generated north of Pala Road/SR-76 (from PA-1 through PA-3) south in a sewer main in Pankey Road, and flows generated south of Pala Road/SR-76 (from PA-4 and PA-5) in a pipeline flowing north in Pankey Road. Both pipelines will connect to the planned 15-inch and 12-inch diameter trunk sewers in Pankey Road that will discharge to the Campus Park Lift Station, which will be located at the northeast corner of Pankey Road and Pala Road/SR-76. On-site collection sewers will be 8-inch or 12-inch diameter pipelines, as shown on Figure 4-2. It is noted that the location and elevations of building pads have not been determined; therefore the transition location between the 8-inch and 12-inch diameter sewer pipelines is only approximate.

A new bridge in Pankey Road is planned to cross the creek that is north of Pala Road/SR-76. The proposed 12-inch gravity sewer will leave the roadway just north of the creek and turn east to connect with the Plant B Interceptor. The north side of the bridge is at an elevation of 278 feet above msl and the ground drops down about 6 feet to the east. A steeply sloped sewer will be to connect with the Plant B Interceptor, which has an invert of 253 feet above msl. The low point of the creek is approximately 258 feet above msl, and it is recommended that scour analysis be conducted to verify the required sewer depth at this location.

Wastewater Treatment and Disposal

Flows from Campus Park West will be discharged from the planned Campus Park Lift Station into the existing Pala Road gravity sewer, which is part of the backbone sewer system for the RMWD. The Pala Road gravity sewer extends west and south and includes Lift Station No. 1

and Lift Station No. 2, with ultimate conveyance to the City of Oceanside sewer system in North River Road at Stallion Drive and the City of Oceanside's San Luis Rey Wastewater Treatment Plant. RMWD has a 1.5 MGD capacity ownership in the San Luis Rey Wastewater Treatment Plant.

APPENDIX A: Hydraulic Calculations

PROJECT: **Campus Park West**
 DESCRIPTION: **Water and Sewer Study**

DATE: **9/7/2012**
 BY: **SVET**

This is a spreadsheet to calculate head losses in pipes and fittings. The following codes apply to the "FITTING TYPE" in the first column:

Large pipe
K Values

1 - LENGTH OF PIPE	6 - INCREASER	11 - ENTRANCE TO A PIPE	LENGTH OF PIPE	
2 - 90 DEG. ELBOW	7 - REDUCER	12 - EXIT FROM A PIPE	90 DEG. ELBOW	0.4
3 - 45 DEG. ELBOW	8 - BUTTERFLY VALVE	13 - A NEW FLOW	45 DEG. ELBOW	0.3
4 - BEND THRU TEE	9 - SWING CHECK VALV	14 - ANY DELTA P	BEND THRU TEE	1.8
5 - STRAIGHT THRU TEE	10 - PLUG VALVE	15 - ANY K VALUE	STRAIGHT THRU TEE	0.6

FITTING TYPE	DESCRIPTION	Flow (GPM)	Diam (IN.)	Length (FT.)	K	C	Velocity (FPS)	Delta P (FT.)	Total P (FT.)	HGL (ft)
13	MDD + fire	3863	16		-	120	6.2	0.00	0.00	660
1	LENGTH OF PIPE	3863	16	10800	-	120	6.2	96.12	96.12	564
1	LENGTH OF PIPE	3863	12	3200	-	120	11.0	115.46	211.57	352
										25 psi

Worksheet for Circular Pipe - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00350	ft/ft
Diameter	1.00	ft
Discharge	400.00	gpm

Results

Normal Depth	0.45	ft
Flow Area	0.35	ft ²
Wetted Perimeter	1.48	ft
Hydraulic Radius	0.23	ft
Top Width	1.00	ft
Critical Depth	0.40	ft
Percent Full	45.4	%
Critical Slope	0.00574	ft/ft
Velocity	2.57	ft/s
Velocity Head	0.10	ft
Specific Energy	0.56	ft
Froude Number	0.77	
Maximum Discharge	2.27	ft ³ /s
Discharge Full	2.11	ft ³ /s
Slope Full	0.00063	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	45.36	%
Downstream Velocity	Infinity	ft/s

Worksheet for Circular Pipe - 1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.40	ft
Channel Slope	0.00350	ft/ft
Critical Slope	0.00574	ft/ft