POTABLE WATER SYSTEM MASTER PLAN

Final

BEAUMONT CHERRY VALLEY
WATER DISTRICT
Beaumont, California

Adopted January 13, 2016

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SYSTEM MASTER PLAN

Final

Prepared by:

BEAUMONT CHERRY VALLEY WATER DISTRICT
560 N. MAGNOLIA AVENUE
BEAUMONT, CALIFORNIA 92220

Adopted January 13, 2016

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ABBREVIATIONS AND ACRONYMS

Acre-ft	acre-feet (1 acre-ft = 325,800 gallons)
Acre-ft/yr	acre-feet per year
AFY	acre-feet per year
BCVWD	Beaumont Cherry Valley Water District
BIA	Building Industry Association
BMP	Best Management Practices
BSU	Beaumont Storage Unit, Beaumont Basin
Build-out	Development based on City of Beaumont General Plan 2007, Zoning Map, and Riverside County General Plan, Pass Area Land Use Plan, 2003
CaSIL	California Spatial Information Library
ccf	hundred cubic feet (748 gallons)
CDPH	California Department of Public Health, now SWRCB Division of Drinking Water
CEC	Chemicals of Emerging Concern
CEQA	California Environmental Quality Act
CFD	Community Facilities District
cfs	Cubic feet per second
CII	Commercial, Industrial and Institutional
CIMIS	California Irrigation Management Information System
Company	Beaumont Land and Water Company
Cr^{+3}, Cr^{+6}	Trivalent and Hexavalent Chromium, respectively
CUWCC	California Urban Water Conservation Council
CVAN	Cherry Valley Acres and Neighbors
DFW	Department of Fish and Wildlife (formerly Fish and Game (DFG)
District	Beaumont Cherry Valley Water District
DMM	Demand Management Measure (water conservation)
DWR	Department of Water Resources
EBX	East Branch Extension of the State Water Project Phase I also EBX I
EBX II	East Branch Extension of the State Water Project Phase II
EDU	Equivalent Dwelling Unit
EIR	Environmental Impact Report
EMWD	Eastern Municipal Water District
ERP	Emergency Response Plan

ft	feet
ft bgs	feet below ground surface
GIS	Geographic Information System
gpcd or GPCD	Gallons per capita per day
gpd	Gallons per day
gpm	gallons per minute
GWMP	Groundwater Management Plan
HP	Horsepower
ICWMC	Interagency California Watershed Mapping Committee
IEBL	Inland Empire Brine Line (previously Santa Ana River Interceptor [SARI])
IRWMP	Integrated Regional Water Management Program
JPA	Joint Powers Agency
LAFCO	Local Agency Formation Commission
MAX or max	Maximum
MCL	Maximum Contaminant Level
MF	Microfiltration Membrane Process
MG	Million gallons
mgd	millions of gallons per day
mg/L	milligram per liter (approx. 1 part per million)
mi^2	square miles
MIH	miner’s inch hours
MIN or min	Minutes or Minimum
MOU	Memorandum of Understanding
MSL	Mean Sea Level
N/A	Not Available/Not Applicable/Not Analyzed
NDMA	Nitrosodimethylamine
NF	Nanofiltration Membrane Process
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
Pass Agency	San Gorgonio Pass Water Agency
PPCP	Pharmaceuticals and Personal Care Products
RCFCD	Riverside County Flood Control and Water Conservation District
RF/CP	Recharge Facilities/Community Park
RO	Reverse Osmosis Membrane Process

RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SAR	Sodium Adsorption Ratio
SAWPA	Santa Ana Watershed Project Authority
SARI	Santa Ana River Interceptor (Brine line) now IEBL
SBVMWD	San Bernardino Valley Municipal Water District (Valley District)
SCADA	Supervisory Control and Data Acquisition (telemetry system)
SCAG	Southern California Association of Governments
SCPGA	Southern California Professional Golf Association
SGPWA	San Gorgonio Pass Water Agency
SOI	Sphere of Influence
sq mi	Square mile
STWMA	San Timoteo Watershed Management Authority
SWP	State Water Project
TDS	Total Dissolved Solids
THM	Trihalomethane (a disinfection by-product)
TOC	Total Organic Carbon
UF	Ultra-filtration Membrane Process
µg/L	Microgram per Liter, (approx. 1 part per billion)
ULFT	Ultra-Low-Flush Toilet
USGS	U.S. Geological Survey
USWS	National Weather Service
UWMP	Urban Water Management Plan
Valley District	San Bernardino Valley Municipal Water District
WRCOG	Western Riverside Council of Governments
WRWRF	Wochholz Regional Water Recycling Facility (YVWD)
WUCOLS	Water Use Classification of Landscape Species
WWTF	Wastewater Treatment Facility
WRF	Water Reclamation or Recycling Facility
YVWD	Yucaipa Valley Water District
YVRWFF	Yucaipa Valley Regional Water Filtration Facility

Table of Contents

Table of Contents (Cont'd)

Table of Contents (Cont'd)

Table of Contents (Cont'd)

List of Tables

List of Tables (Cont'd)

List of Tables (Cont'd)

List of Tables (Cont'd)

List of Figures

List of Master Plan Facility Maps

Title

Section 1

Background and Service Area Characteristics

Background

The Beaumont Cherry Valley Water District (BCVWD) provides potable and non-potable water service to about 16,799 active accounts, (16,985 connections), as of December 2015[1], in the City of Beaumont and the unincorporated community of Cherry Valley in Riverside and San Bernardino Counties in Southern California. The District's is approximately 75 miles east of Los Angeles along Interstate 10. BCVWD's average day demand in 2014 was 11.3 mgd; maximum day was 17.0 mgd. This was a decrease from 2013 when the average day and maximum day demands were 11.45 mgd and 20.2 mgd respectively -- primarily due to landscape and other outdoor water conservation measures.

The area started to develop in the late 1880s and in 1912 the community of Beaumont incorporated. BCVWD was formed in 1919 as the Beaumont Irrigation District under California Irrigation District Law, Water Code Section §20500 *et seq*. The name was changed to the Beaumont Cherry Valley Water District in 1973.

Beaumont and Cherry Valley remained small until about the mid-1980s. The populations of Beaumont and Cherry Valley in 1980 were 6,818 and 5,012 respectively. The boom of the early 2000s, saw Beaumont's population to skyrocket to 36,837 by 2010; Cherry Valley showed only limited growth to 6,279 during that same time period. Current (2014) population served by the District is approximately 46,600. Meeting the water demands for this rapid growth in Beaumont was challenging.

The population served by the District is expected to nearly double by 2035. The City of Beaumont's General Plan, adopted in 2007, had a projected build-out population of 87,200. The build out population within the District's Sphere of Influence (SOI) is estimated to be about 112,300 based on BCVWD estimates of land use. It is for this reason, that an update to the District's water system master plan is appropriate.

This water master plan addresses the potable water system; a separate master plan is being prepared for the non-potable water system.

Service Area

The District's present service area covers approximately 28 square miles, virtually all of which is in Riverside County, and includes the City of Beaumont and the community of Cherry Valley. The District owns 1,524 acres of watershed land in Edgar Canyon in San Bernardino County located just north of the Riverside-San Bernardino County line where the District operates a number of wells and several reservoirs.

The District's SOI, or ultimate service planning area, encompasses an area of approximately 37.5 square miles (14.3 sq mi are in the City of Beaumont). This SOI, shown in Figure 1-1, was established by the Riverside and San Bernardino County Local Agency Formation Commissions (LAFCOs). SOIs are established as a planning tool and help establish agency boundaries and

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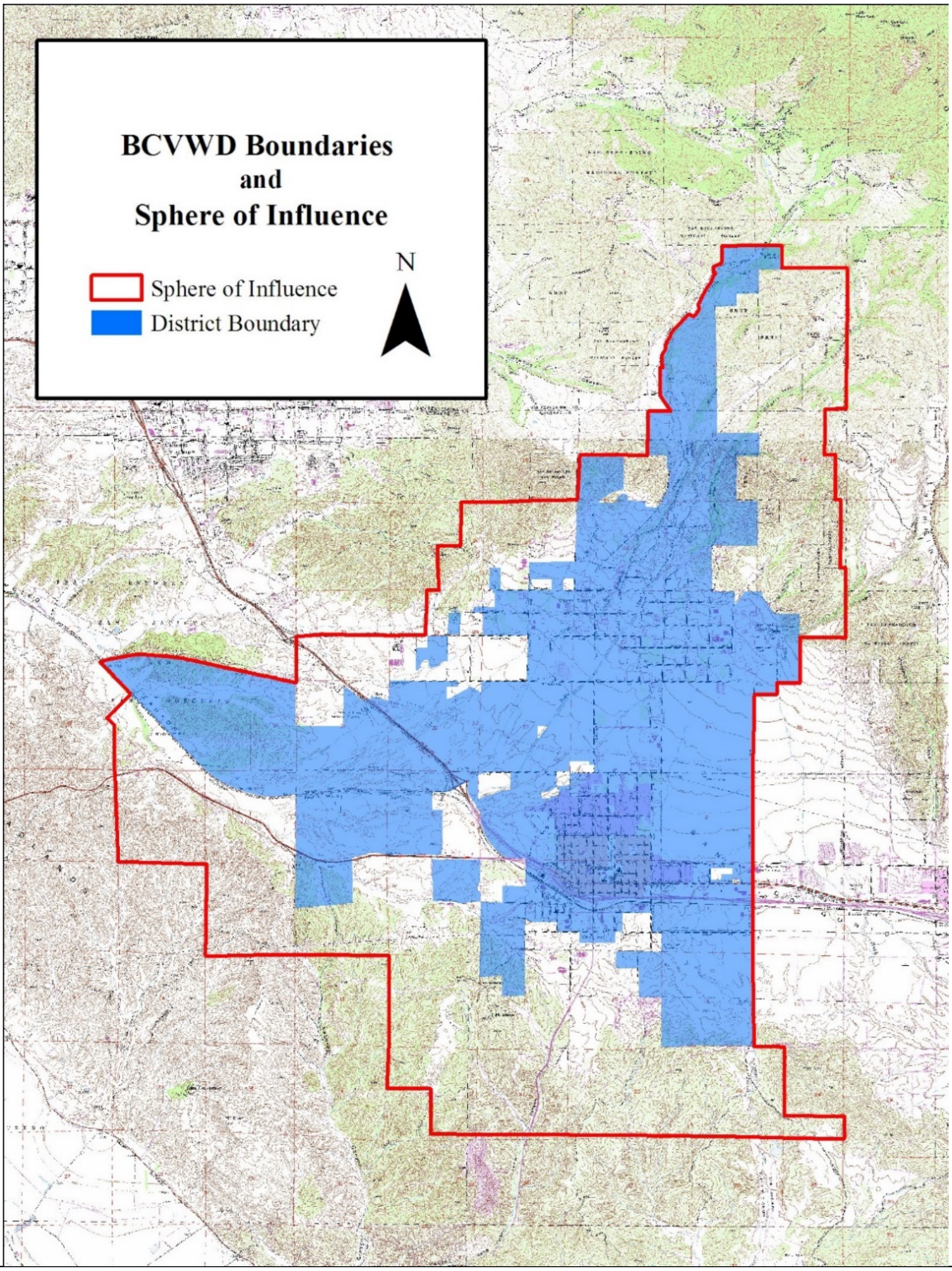
[1] BCWD (2015). Annual Financial Report for Fiscal Year Ended December 31, 2015.

avoid problems in service, unnecessary duplication of costs, and inefficiencies associated with overlapping service.



Source: modified from USGS 1:24 000 topographic maps of Beaumont, Forest Falls, Yucaipa, and El Casco, CA

Figure 1-1
District Boundary and Sphere of Influence

Beaumont Cherry Valley Water District
Beaumont, California

The District's SOI is bounded on the west and north by the Yucaipa Valley Water District (YVWD) and on the east by the City of Banning. The northerly boundary of Eastern Municipal Water District (EMWD) is one-mile south of the District's southerly SOI boundary. The area between EMWD and the District's SOI is not within any SOI and could be annexed to either the District or EMWD. The District's SOI in Little San Gorgonio Canyon follows Oak Glen Road. The area west of Oak Glen Road is within YVWD's SOI; east of Oak Glen Road is within the District's SOI.

In 1999, as part of an agreement to transfer the "Midway Area" to the City of Banning, the easterly limit of the District's SOI was set at Highland Springs Road. Areas east of Highland Springs Road are now served by the City of Banning. (Note, the "Midway Area" was along 6th St. east of Highland Springs Rd.)

West of I-10, between Oak Valley Parkway (formerly San Timoteo Canyon Road) and I-10, the District's SOI matches that of the City of Beaumont and extends northerly and westerly to Southern California Edison Power Line Easement (Towers). This corresponds to the northerly boundary of the Fairway Canyon Project. North of the Power Line Easement there is an open space reserve that would limit any development westerly along Oak Valley Parkway (San Timoteo Canyon Rd.) This portion of the District's SOI boundary abuts the City of Calimesa and Yucaipa Valley Water District (YVWD).

About the year 2007, Riverside County LAFCO revised the District's SOI Boundaries east of I-10 in the vicinity of Calimesa. The area north of Cherry Valley Blvd from I-10 eastward to a point about 1000 ft west of Hannon Rd is now in the City of Calimesa and in YVWD's SOI.

Though not in the District's service area boundary at the present time, a future development (Jack Rabbit Trail Project) southerly of Highway 60 is in the District's service area and ultimately would be served by the District.

The District's service area ranges in elevation from 2300 feet above mean sea level (MSL) in Fairway Canyon area of Beaumont on the western boundary, to 2900 feet in Cherry Valley, and over 4,000 feet in the upper reaches of the SOI. The area serves primarily as a "bedroom" community for the Riverside/San Bernardino Area and the communities east of Los Angeles County along the I-10 corridor.

The District is governed by a 5-member Board of Directors, each representing a division within the existing service area. Members of the Board of Directors are elected at large.

Climate

Table 1-1 presents the monthly temperature, precipitation and evapotranspiration for the BCVWD service area.

Temperature

Table 1-1 presents temperature data for the City of Beaumont obtained from the Western Regional Climate Center. The climate in Cherry Valley is similar, but temperatures are cooler in the upper elevations of the District's SOI. Temperatures below freezing are common in winter in the upper elevations of the service area. Temperatures over 100°F are also common in the summer.

Precipitation

As shown in Table 1-1, virtually all the precipitation occurs during the months of November through April; most of the precipitation is in the form of rain, but snow is common in higher elevations of the service area during the winter. Some rainfall occurs in summer from thunderstorms that are associated with monsoonal moisture. Annual precipitation in Beaumont (2680 MSL) averages approximately 17.8 inches, with increasing amounts of precipitation with increasing elevation. Cherry Valley averaged 20.6 inches for the period 1911-2006; Oak Glen (4600 ft MSL) averaged 25.5 inches for the 61-year period 1946-2006.

Table 1-1
Climate in BCVWD Service Area[1]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	60.5	63.6	66.2	72.5	78.8	88.0	95.6	95.5	90.6	80.7	69.4	62.0	77.0
Average Min. Temperature (F)	38.6	39.1	40.0	42.8	47.7	52.5	58.4	58.6	55.8	49.3	43.1	39.2	47.1
Average Total Precipitation (in.)	3.76	3.44	3.12	1.36	0.63	0.16	0.23	0.22	0.51	0.60	1.65	2.09	17.76
Average Total Snowfall (in.)	1.1	0.4	0.2	0	0	0	0	0	0	0	0.1	0.3	2.0
Standard Monthly Average Evapotranspiration, ETo[2]	2.81	2.76	3.78	5.31	6.10	6.97	7.08	6.83	5.67	4.15	3.31	2.56	57.33

[1] Western Regional Climate Center, Beaumont 1E 7/1/1948 – 12/30/2004
[2] CIMIS website – Winchester, CA

Table 1-2 shows the percentage of occurrence of storms of various total rainfall amounts in Beaumont. Rarely does a total storm rainfall exceed 3 inches. A “storm,” in the Table 1-2 analysis, is defined as a continuous period of measurable daily rainfall interrupted by not more than 3 consecutive days of no measureable rainfall.

Evapotranspiration

Table 1-1 presents the monthly reference average ETo based on the California Irrigation Management Information System (CIMIS), Winchester, CA station. This station is located about 15 miles south of the BCVWD and is representative of the evapotranspiration in the District’s service area. The reference ETo represents the amount of water used and evaporated by a 4-in to 7-in tall stand of grass in an open field. Water use by other crops and landscape materials can be determined using the appropriate crop coefficient in conjunction with the ETo.

The service area is in Reference ETo Zone 9 – South Coast Marine to Desert Transition.[2]

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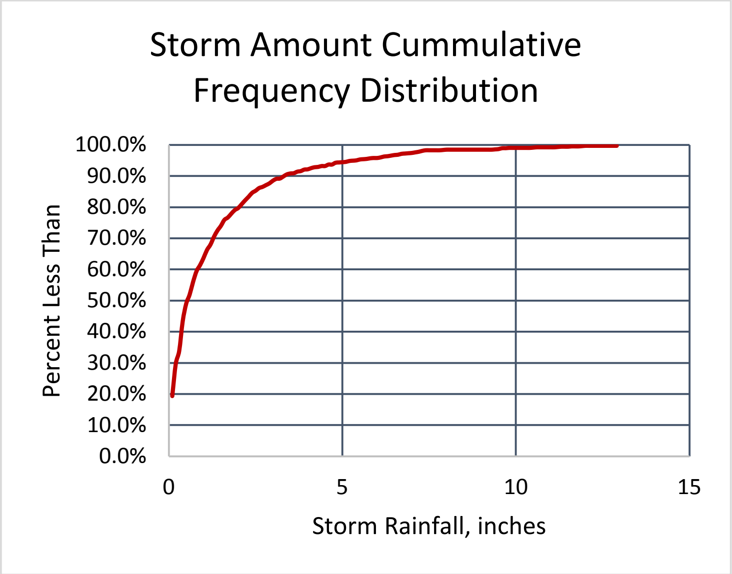
[2] California Department of Water Resources and University of California Cooperative Extension, A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California, The Landscape Coefficient Method and WUCOLS III, August 2000.

Table 1-2
Total Storm Rainfall Frequency Beaumont (1918 – 2006)

Storm Total, in	Percent of Time
0.50 or less	49%
1.0 or less	63.9%
2.0 or less	79.8%
3.0 or less	88.5%
4.0 or less	92.2%
5.0 or less	94.5%
6.0 or less	95.8%
7.0 or less	97.4%
8.0 or less	98.5%
More than 8.0	1.5%



History of the BCVWD

The origin of the Beaumont-Cherry Valley Water District dates back to the latter part of the 1800's when the Southern California Investment Company was the owner of the land that currently is the City of Beaumont and the Community of Cherry Valley. The Company was owned by F.P. Sigler, who intended to build a system of water lines for the purpose of developing subdivisions throughout the Beaumont and Cherry Valley area. In February, 1887, Sigler recorded his first subdivision which later became the City of Beaumont. In 1896, Sigler sold all holdings, including its water rights and the water system, to Murray F. Vandall. Vandall held the property for only two months and sold all interest to the German Savings and Loan Society of San Francisco. The German Savings and Loan Society held the property until 1907 when it was sold to C.B. Eyer and K.R. Smoot.

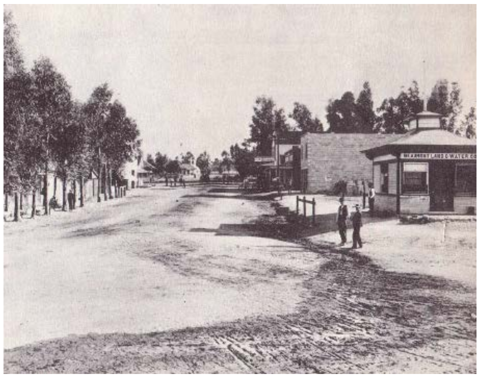
Picture taken in the late 1800's, showing the original Beaumont Land and Water Company in the background.

Eyer and Smoot began work through the Beaumont Land and Water Company to bring irrigation water to the subdivisions in the area. The Beaumont Land and Water Company established its first point of diversion at the confluence of Wallace and Edgar Canyons. (Edgar Canyon is also know as Little San Gorgonio Creek.) A second diversion was established along the north line of sections 10 and 11, T2S1W, which was the northern limit of the 160-acre property Beaumont Land and Water Company had purchased from Thomas Mellon. (This is about ¾ mile north of BCVWD's present-day Well No. 6.) Along with the diversions in Edgar Canyon, a small diversion point in Noble Canyon was developed. These diversions allowed surface water to be taken into the system for irrigation and domestic uses.

C.B. Eyer's home is still standing at the corner of 6th Street and Magnolia adjacent to present day BCVWD headquarters office

As the Company's land began to develop, the need for water grew. To answer the new demands, the Company began the construction of wells on their watershed lands in 1907. With the construction of the new wells, the Company began to divert water for recharge in the canyon areas rather than provide diverted water directly to the customers. The diversions, which actually began as early as 1902, allowed the Company to recharge the underground aquifers during storm events and pump the water when needed.

With the construction of the diversions, two downstream users (Hannon and Roach) entered into litigation against the Company resulting in the Company purchasing riparian water rights from downstream landowners. The water rights purchases often required the Company to deliver a specified amount of water to the seller on a regular basis. Even today, the District continues deliveries of water as required by agreements, some of which date back to the early 1900s[3].



Beaumont Land & Water Company Office
on 5th & Egan, 1907

In March 1919, the Beaumont Irrigation District was formed by a vote of the people under the Wright Act of 1897. In December 1920, the Beaumont Irrigation District purchased the land owned by the Company, as well as that of the San Gorgonio Land and Water Company. Subsequently the Beaumont Irrigation District purchased the Warren and Fick Ranches in Edgar Canyon. The District currently owns approximately 1,524 acres of watershed land north of Cherry Valley in Edgar Canyon and Noble Creek.

The District continued to drill wells in Edgar and Noble Canyons through the 1920s and 1930s as the demand for irrigation water continued. Up to 35 wells were drilled; many were not very productive due to the severe faulting in the canyons. Eventually the amount of water available could not keep up with the demand and the District drilled it first well, (existing Well No. 1) in the Beaumont Groundwater Basin in 1935. By the 1950s the District had three wells in the Beaumont Basin.

In 1958, with the construction of the freeway, the original District Office site was acquired by the Department of Transportation and the office was relocated to its present site at 560 Magnolia Ave.

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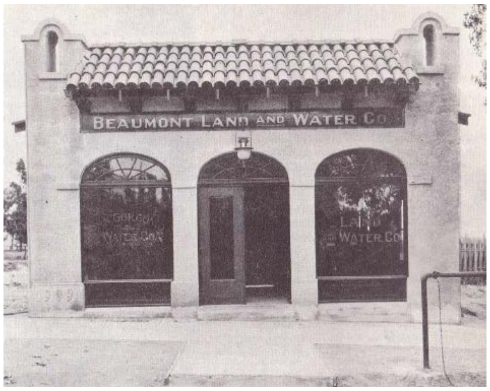
[3] P.J. and Anna Roach and Jeremiah C. Hannon and Elizabeth Hannon Agreements.

In 1961, the San Gorgonio Pass Water Agency (SGPWA) was formed by the California Legislature to import Northern California Water from the State Water Project (SWP) into the area in response to a concern over groundwater overdraft. The SGPWA began imported water deliveries in 2003 recharging it into an area north of the Beaumont Basin's adjudicated boundary in a series of percolation ponds at the mouth of Edgar Canyon leased from BCVWD.

The name of the Beaumont Irrigation District was changed to the Beaumont Cherry Valley Water District in 1973. Even though the name has changed, the District's authority comes from the Irrigation District Law of the State of California, California Water Code §20500 *et seq*.



BCVWD Office at 5th and California Ave
from 1921- 1958

In the middle to late 1990s major developers took an interest in the area surrounding Beaumont. Large subdivisions, such as Oak Valley, were planned with thousands of homes. The Oak Valley Golf Course was developed in anticipation of the new homes. The Southern California PGA constructed a 36-hole golf course between I-10 and San Timoteo Canyon Road. This became the Morongo Tukwet Canyon Golf Course. Other developers soon followed. There was concern of the impact of these and other projects would have on the declining water table in the Beaumont Groundwater Basin. Developers and the District began to focus on imported water and the San Gorgonio Pass Water Agency. The Pass Agency was not without its own issues including environmental challenges to the East Branch Extension of the State Water Project which held up construction of the first phase for many years. It was clear, at the time, the proposed development could not proceed without a firm supply of imported water.

In the late 1990s, BCVWD purchased 29.5 acres of land, west Taylor Dr. and of north of Golden Valley Ln., adjacent to the route of the East Branch Extension, as a site for a possible future potable water treatment facility to treat water from the SWP. The Taylor Tank occupies a portion of this site and could serve as the water treatment plant clearwell.

In 2001, BCWD began investigating its own recharge facility near the intersection of Beaumont and Brookside Avenues, envisioning percolating the imported water rather than treating it for direct deliveries. A detailed hydrologic study was performed, a demonstration scale, multi-year percolation test was conducted and the District eventually purchased the property known as the "Oda Property." Further investigation eventually led to the development of Well 23 reaching 1,500 ft below the ground surface (bgs) – about 500 ft deeper than any previous wells. This led to the conclusion that there may be more water in storage in the Beaumont Basin than previously believed. BCVWD completed the first phase of its recharge facility in 2006 and began to recharge imported water from the SGPWA in September of that year.

In 2001 BCVWD along with the Cities of Beaumont and Banning, South Mesa Water Company, and Yucaipa Valley Water District formed the San Timoteo Watershed Management Authority (STWMA) – a joint powers agency (JPA). One of the first tasks of the JPA was to file a suit in Riverside County Superior Court to adjudicate the Beaumont Basin. After 18 months of discussion and negotiation, a stipulated judgment was filed in February 2004. The Judgment included the appropriators and the overlying pumpers and established the Beaumont Basin Watermaster. The provisions of the Judgment have a major impact on the master planning for BCVWD. The STWMA was disbanded around year 2010.

In April 2008 the District moved into a new, larger office building constructed at the same 560 Magnolia Avenue site

BCVWD Authority Under the Irrigation District Law

California Water Code §20500 *et seq*. defines the "powers" and authority of irrigation districts which is summarized below:

- Furnish water in the district for any beneficial use, including fire protection (§20500, 22077)
- Control, distribute, store, spread, treat, recapture and salvage any water (including but not limited to sewage waters for the beneficial use of the district or its residents (§22078)
- Provide for any and all drainage made necessary by the irrigation provided for by the District. (§22095)
- Acquire lease and operate plants for the generation, transmission, distribution and sale of electric power (§22115)
- Acquire, construct, maintain, and operate facilities for the collection and disposal of sewage subject to approval by a majority of the voters of the district (§22170, 22176)
- Fix and collect charges for any service provided by the district including the sale of water (with standby charges), connections to new pipelines or extensions of existing pipelines, use of water for groundwater recharge, use of water for power purposes and sale of electric power (§22280)
- Impose a special tax pursuant to Article 3.5 (commencing with Section 50075) of Chapter 1 of Part 1 of Division 1 of Title 5 of the Government Code. The special taxes shall be applied uniformly to all taxpayers or all real property within the district, except that unimproved property may be taxed at a lower rate than improved property (§22078.5)

BCVWD Office since 2008

Although these powers are permitted under statute, approval from LAFCO may be required before certain activities are undertaken.

Overview of BCVWD's Water System and Operation

BCVWD has both a potable and a non-potable water distribution system. BCVWD provides potable water, scheduled irrigation water to agricultural users through the potable water system; water for landscape irrigation of parks, playgrounds, school yards, street medians and common

areas is through its non-potable (recycled) water system. The amount of scheduled irrigation water is small as the number of fruit orchards is decreasing. As of December 2014, there were over 16,500 connections; about 45 were for scheduled irrigation water. There were 311 non-potable water service connections.

BCVWD has two active stream diversion locations within Little San Gorgonio Creek that are in the State Water Resources Control Board, Division of Water Rights database (S014351, S014352). The diversions have pre-1914 recorded water rights amounting to 3,000 miner's inch hours (MIH) or approximately 45,000 acre-feet per year (AFY) of right for diversion of water for domestic and irrigation uses. These date back to the early history of the District. However, the District has never had a demand that requires such large quantities of water supply; and the watersheds may not be capable of supplying such quantities during an average year. At the present time the District currently diverts streamflow, recharges it and operates wells in Little San Gorgonio Creek (Edgar Canyon) to extract it for domestic purposes. The District does not operate any wells located in Noble Canyon

Potable Water System

BCVWD's potable water system is supplied by wells in Little San Gorgonio Creek (Edgar Canyon) and the Beaumont Basin (sometimes called the Beaumont Storage Unit or the Beaumont Management Zone). The District has a total of 24 wells (1 well is a standby). One of the wells, Well 26, can pump into either the potable water or the non-potable water system. Currently it is pumping into the non-potable water system. The Beaumont Basin is adjudicated and managed by the Beaumont Basin Watermaster. BCVWD augments its groundwater supply with imported State Project Water from the San Gorgonio Pass Water Agency (SGPWA) which is recharged at BCVWD's recharge facility at the intersection of Brookside Avenue and Beaumont Avenue.

Wells in Edgar Canyon have limited yield, particularly in dry years, and take water from shallow alluvial and bedrock aquifers; wells in the Beaumont Basin are large capacity and pump from deep aquifers – some as deep as 1500 ft below the ground surface. The Edgar Canyon wells are very inexpensive to operate and are the preferred source; however, those wells are not able to meet the current average day demand. The Edgar Canyon wells pump to a gravity transmission main that extends the full length of the District-owned properties in Edgar Canyon. The transmission main connects to the distribution system in Cherry Valley. Water from the Edgar Canyon Wells which is not used in the developed areas adjacent to Edgar Canyon or Cherry Valley is transferred to lower pressure zones serving the City of Beaumont. This happens regularly in the winter time. The Edgar Canyon Wells provided 15 to 20 percent of the total annual supply; the rest is pumped from wells in the Beaumont Basin.

BCVWD's total well capacity (Edgar Canyon and Beaumont Basin) is about 27.5 million gallons per day (mgd) with the largest well out of service, which is much greater than the current 20 mgd maximum day demand.

The District has 11 pressure zones and 14 reservoirs (tanks) ranging in size from 0.5 million gallons (MG) to 5 MG. Total storage is approximately 22 MG – slightly more than two average days or one maximum day. The reservoirs provide gravity supply to their respective pressure zones. The BCVWD's system is constructed such that any higher zone reservoir can supply water on an emergency basis to any lower zone reservoir. There are booster pumps in the system to pump water up from a lower pressure zone to a higher pressure zone also.

The transmission system in the main pressure zones is 24-in diameter. (There are some 30-in diameter pipelines at some reservoirs.) The bulk of the pipe is ductile iron pipe with cement mortar lining and was installed in the last 10 to 15 years. There are a number of small distribution lines (4-in and smaller that are gradually being replaced over time with minimum 8-in diameter ductile iron pipe. All developments since the early 1980s have installed mortar lined, ductile iron pipe. The distribution system is capable of providing over 4,000 gallons per minute (gpm) fire flow in the industrial/commercial areas of the service area.

Imported Water and Recharge Facilities

Around 2001, BCVWD began investigating an 80-acre site on the east side of Beaumont Avenue between Brookside Ave. and Cherry Valley Blvd. as a location for a facility to recharge captured storm flow and imported water. After extensive hydrogeologic investigations including pilot testing, the District eventually purchased the site, (known as the Oda Property), and developed Phase 1 of the recharge facility on the westerly half of the site. The Phase 1 facilities were completed and went on line in late summer 2006. Phase 2 of the recharge facility was completed in 2014. This site has excellent recharge capabilities with long-term percolation rates around 7 to 10 acre-ft/acre/day with proper maintenance.

The District completed construction of a 24-in pipeline from the turnout on East Branch Extension (EBX) of the State Water Project to the groundwater recharge site in 2006. A metering station was installed at the turnout at Noble Creek and Vineland Avenue and BCVWD began taking imported water deliveries from SGPWA for recharge in September 2006. In conjunction with the recharge facility, the District developed a drought-tolerant landscape garden with walking trails and picnic areas for visitors to the site. Since its operation in 2006 through the end of 2014, over 46,300 acre-ft (over 15 billion gallons) of imported water have been recharged.

Non-potable (Recycled) Water System

Currently BCVWD has about 30 miles of non-potable water transmission pipelines in place which is supplemented by an extensive network of smaller distribution lines installed by developers as part of the tract development that has occurred since about 2002. The transmission system forms a loop around the City of Beaumont and comprises of primarily 24-in diameter ductile iron pipe. The system includes a 2 million gallon recycled (non-potable) water reservoir which provides gravity storage and pressurization for the system. The 2 MG non-potable water reservoir is configured to receive potable water or untreated State Project Water (SPW) through air gap connections. The non-potable water system can have a blend of recycled water, imported water and potable water. The 2 MG reservoir is located at the District's groundwater recharge facility at Beaumont Avenue between Brookside Ave. and Cherry Valley Blvd. There are about 300 existing landscape connections to the recycled water system receiving about 1,800 acre-ft of water based on 2014 meter records.

A large part of the non-potable water system is supplied from Well 26, supplemented with potable water which is introduced into the 2 MG non-potable water tank through an air gap connection. The non-potable water system in the Tournament Hills and Fairway Canyon area is currently supplied with potable water through several interconnections between the potable and non-potable water system.

BCVWD was awarded a facilities planning grant from the SWRCB to develop a facilities plan for a recycled water connection with YVWD. This facilities plan was approved by the SWRCB in August 2014 and BCVWD could apply for grant/loan funding for the project. BCVWD is also in discussions with the City of Beaumont for recycled water.

A separate non-potable water master plan is being developed.

Recent Developments

Historically the principal industry in the Beaumont-Cherry Valley area was agriculture and agriculture related services, particularly those associated with fruit production (cherries) and egg ranching. More and more of the agricultural areas and other vacant lands are being converted to housing tracts as new buyers seek more affordable homes, particularly within the City of Beaumont. A major egg ranch, Sunny Cal, is no longer in business and most of the facilities have been removed in anticipation of development. A Specific Plan has been developed for that project.

There have been several major commercial centers constructed, most notably the Wal-Mart and Kohl Center in Southeast Beaumont, the revitalized Stater Brothers-Walgreens center on 14th and Oak Valley Parkway, and others. A number of major distribution centers have been constructed or are in construction including Lowes Distribution Center, the Pro-Logis Developments and the Beaumont Business Center on the Dowling Orchard site.

Several large housing projects were started during the "boom" period around 2005 but many of these have stopped due to the downturn in the economy around 2008. These developments have been approved for construction; some, in fact, have the grading completed and underground utilities installed. These projects include Seneca Springs, K-hov Four Seasons, Tournament Hills, Fairway Canyon, Pardee Sundance, Aspen Creek, and Heartland. Several of these projects have re-started (2014) with more expected to be re-starting in the near future.

A number of projects were approved by the City of Beaumont, but have not yet started construction due to the economy. These projects include Hidden Canyon, Kirkwood Ranch, Potrero Creek Estates, Noble Creek Meadows (formerly Noble Creek Vistas), and Sun Cal. These projects are expected to be into construction in the not-to-distant future.

In addition, there are a number of projects are still in the City of Beaumont review stage e.g. Jack Rabbit Trail, The Preserve/Legacy Highlands. Tournament Hills 3, Hidden Canyon II and others.

The impact of these new or to soon-to-be completed projects on BCVWD's water supply needs will be addressed in Section 4.

Previous Planning Efforts

Master Planning

The last “official” update to the Water System Master Plan was in 1994; however, the District's planning maps were updated on a fairly regular basis, as needed, to meet new development street configurations and water needs through the growth period of the early 2000s. Since the last Master Plan was completed the District has annexed the area formerly served by the Bonita Vista Mutual Water Company and has installed new piping and facilities to serve that mutual water company.

In the early 1990s, BCVWD envisioned a recycled water system which would serve recycled water from the City of Beaumont's Wastewater Treatment Plant to parks, medians, and common areas within Beaumont. Initial planning included a recycled water pipe loop around the City of Beaumont with a recycled water storage tank at the site of what is now the Districts' Groundwater Recharge Site. The plan also required developers to install recycled water pipelines throughout their subdivisions and design landscape irrigation systems to comply with California Department of Public Health (CDPH) recycled water requirements. The Three Rings Ranch Development was the first development to incorporate recycled water transmission and distribution mains. Since then the non-potable water system has been extended to all of the new developments in the City of Beaumont and turnouts have been provided to serve Oak Valley Golf Course and the Morongo Tukwet Canyon Golf Course.

BCVWD received a Facilities Planning Grant from the State Water Resources Control Board (SWRCB) for a recycled water connection to YVWD's non-potable water system. As part of the effort of this facilities plan, significant effort was performed on the planning of BCVWD's non-potable water system. This study forms the basis for the current Non-potable Water Master Plan.

Urban Water Conservation and Management Plans

In October of 1986, the District prepared an Urban Water Conservation Plan in conformance with AB 797, the 1983 Urban Water Management Planning Act. The plan contained a number of recommendations for water conservation which reduced the need for imported water supplies. This plan was updated in May 1991, as required by law. In 1995 the District updated the 1991 Urban Water Conservation Plan to an Urban Water Management Plan (UWMP) in conformance with new legislation. That UWMP was updated in 2000 and 2005. The 2005 update included addressing the requirements of SB 221 (Kuehl) and SB 610 (Costa). UWMPs are required to be updated by law at least every 5 years. The UWMP was last updated in May 2013 and submitted to the State of California. The Department of Water Resources (DWR) stated that the District's UWMP 2013 Update addressed all of the requirements of the California Water Code.

Other Water Resource Studies

Water resource studies prepared by the District and others in the area over the last ten years or so which provide background for this master plan update are identified below:

- Resource Development, Surface Water Capture for Little San Gorgonio Creek and Other Locations, September 12, 2000 which estimated the water yield, on a very conceptual level, from Little San Gorgonio and Noble Creeks. The study included a preliminary biological reconnaissance study and concept plans to modify the existing basins at the mouth of Little San Gorgonio Creek and a pipeline route to a proposed recharge facility at Cherry Valley Blvd and Beaumont Avenue on approximately 80 acres of land known, as the Oda Property. This study was prepared by the District.
- Geohydrologic Investigation Noble Creek Artificial Recharge Study (July 2002) prepared by Geoscience Support Services (Geoscience) which provided the results of the exploratory drilling, pilot testing of a recharge pond, final monitoring and production well design and construction recommendations for a large groundwater recharge and extraction facility. It was this investigation that found that the Beaumont Basin aquifer extended to a depth of at least 1,500 ft, well below the 1,000-ft, previously thought to be the lower limit of useable groundwater. The Phase I recharge facilities, including monitoring wells, extraction Well No. 23, and a maintenance building have been constructed and in operation since 2006; Phase II of the recharge facilities was completed in 2014 and placed into operation.
- Hydrology Study, Resource Development Program on Little San Gorgonio and Noble Creeks (January, 2003) which presented preliminary runoff estimates and peak flow estimates from the two watersheds and a concept plan for the recharge facilities. The project envisioned extending a recycled water line from the recycled water storage tank on the proposed groundwater recharge site to Bogart Park and the construction of artificial wetlands for recycled water quality enhancement. The US Bureau of Reclamation completed a study of the feasibility of using a constructed wetlands to remove nitrate from groundwater and recycled water in 2007. If the concept proved feasible, a demonstration scale facility would be constructed at the mouth of Edgar Canyon. Due to the low removal rates for nitrates in this type of system, land area requirements were substantial and the project was deemed “not feasible.”
- In 2004 the District prepared a report on EDUs, storage and well capacity to meet projected growth in the District. This study identified facility needs and construction timing until 2010. This formed the basis for the construction of Wells 25, 26, the purchase of the Sunny Egg Ranch Well (since renamed Well No. 29) and its outfitting, and construction of additional reservoirs at the Vineland and Cherry Tank sites, and a new 5 MG buried concrete reservoir at Hannon in the new 2650 Pressure Zone to serve Tournament Hills, Fairway Canyon and other developments south of I-10.
- Noble Creek Artificial Recharge Facility, Groundwater Monitoring Report , October 1 to December 20, 2009 (prepared February 9, 2010) prepared by Geoscience Support Services. This was the latest in a series of annual reports on the District's recharge site operation. The report clearly demonstrated that the imported water which is percolated

is reaching the water table as both the shallow and deep monitoring wells showed increases in level in response to recharge. Long-term infiltration rates ranged from 7 to 15 ft/day. Area-weighted average infiltration rate was 10.3 ft/day.

- Water Quality Impacts from Onsite Waste Disposal Systems in the Cherry Valley Community of Interest, (March 2007) prepared by Wildermuth Environmental Inc. for San Timoteo Watershed Management Authority (STWMA) Project Committee No. 1. This study concluded there was an impact from on-site wastewater disposal systems on water quality in the Beaumont Basin. Riverside County Board of Supervisors created a “Blue Ribbon” committee to review the findings of the report in response to questions from the public. In June 2009, the committee issued a report which concluded there was no immediate concern. The study did recommend an independent third party take another look, with better sampling techniques, an expanded sampling program, and with more wells included. In February 2012, University of California Riverside (UCR), under a grant from the SWRCB, performed this third party investigation using chemical and isotope tracers. The study concluded there is a statistically significant difference between groundwater areas with septic systems and ground water in areas where sewer service is available. Pharmaceuticals and Personal Care Products (PPCPs) were found to be significantly higher in areas with septic systems than in areas with sewer service. Total Dissolved Solids (TDS) concentration were similarly higher in the groundwater underlying areas with septic tanks vs. those areas with sewer systems.[4]
- Integrated Regional Water Management Program for the San Timoteo Watershed, Urban Runoff Management Strategy, March 2006, prepared by Wildermuth Environmental, Inc. for the State Water Resources Control Board and STWMA identified opportunities for storm water and urban runoff harvesting and capture.
- In late 2009, BCVWD completed a 5-year capital improvement program (CIP) study to support a water rate study prepared by Wildan and Associates in May 2010. The CIP identified a number of water resource projects including storm water capture, and a pollution control project to pump high nitrate groundwater and convey it to the non-potable water system for reuse.
- Preliminary Assessment of Assimilation Capacity for TDS and Nitrogen in the San Timoteo Management Zone November 2010 by Wildermuth Environmental, Inc. projected changes in TDS and nitrogen concentrations in the groundwater over time using a simplified complete mix model.
- A study on the effects of Blending Various Source Waters in BCVWD’s Non-potable Water System – TDS Implications May 2012 was prepared to determine how much City of Beaumont and other source recycled water could be used and still be in compliance with the RWQCB’s Maximum Benefit TDS limit of 330 mg/L 10-year moving annual average.
- Facilities Plan for a Non-potable Water Connection to YVWD’s Non-potable Water System prepared by BCVWD for submittal to the SWRCB as part of a Facilities Planning Grant, December 2013, identified the most cost effective alternative for connection to

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[4] University of California, Riverside (UCR 2012). Final Report: Water Quality Assessment of the Beaumont Management Zone: Identifying Sources of Groundwater Contamination Using Chemical Isotopic Tracers, SWRCB Agreement No. R8-2010-0022, Department of Environmental Science, February3.

YVWD and provided a framework for the Non-potable Water system master plan. The Facilities Plan was approved by the SWRCB in August 2014.

- In 2014, as required by the Adjudication, a re-evaluation of the Beaumont Basin Safe Yield was initiated. A draft report was issued by Thomas Harder and Company in association with Alda, Inc. which included a method for evaluation of return flow credits. In April 2015 the Beaumont Basin safe yield was reduced from 8,650 AFY in the original adjudication to 6,700 AFY

Significant Events Since the Last Master Plan

In January 2001 the San Timoteo Watershed Management Authority (STWMWA) was formed as a Joint Exercise of Powers Agency (JPA) comprised of the District, the City of Beaumont, Yucaipa Valley WD, and South Mesa Water Company to prepare and implement a water resources management program to enhance the region’s water resources, maximize the utilization of local supplies, improve surface and groundwater quality and quantity, protect and enhance groundwater storage, agriculture and recreational resources, preserve open space, protect wildlife habitat and wetlands all for the benefit of the public. STWMA conducted a number of studies, some of which were grant funded; but most importantly, they were the plaintiff in the Beaumont Basin Adjudication. STWMA ceased to function as a JPA around 2010.

The Beaumont Groundwater Basin was adjudicated in February 2004, in Superior Court, Riverside County, Case RIC 389197, *San Timoteo Watershed Management Authority vs. City of Banning et. al.* The Judgment established the Beaumont Basin Watermaster (Watermaster) to administer the judgment and established the rights of the overlying and appropriator parties. The powers and duties of Watermaster are delineated in the Judgment and include, among others: wellhead protection and recharge, location identification, well abandonment procedures, well construction standards, overdraft mitigation, replenishment, monitoring of water levels and water quality, and development of conjunctive use programs. In summary the Judgment is the functional equivalent of a groundwater management plan.

Phase I of the East Branch Extension of the California Aqueduct (EBX or EBX I) was completed by the California Department of Water Resources (DWR) in 2003 which brought the capability to bring State Project Water into the San Gorgonio Pass Area.

Beginning about the year 2000 or so, BCVWD began construction of non-potable (recycled) water system that would “loop” the City of Beaumont. Many of the backbone transmission pipelines were funded under Mello-Roos Community Facilities District Bonds; the local, smaller diameter pipelines were installed by developers as part of their tract development. As of 2014, about 30 miles of transmission main are constructed. A 2 MG non-potable water storage tank and some “missing link” transmission mains were installed by the District using their own funds. There are about 300 connections to the system as of 2014, receiving about 1,800 acre-ft of water annually.

In September 2006, BCVWD completed construction of its Phase I groundwater recharge site at Beaumont Avenue between Cherry Valley Blvd and Brookside Ave and a 24-in pipeline from the EBX turnout at Orchard Ave and Noble Creek to the recharge site and began taking deliveries of State Project Water (SPW) from the EBX for recharge.

In 2007 BCVWD filed an application with Riverside County LAFCO to activate the District’s latent sewering authority. LAFCO required a vote of the people and on September 25, 2007, the voters defeated Measure B. As a result the District does not currently have authority to provide sewer service. This was in conjunction with a proposal to provide wastewater collection and treatment for the Cherry Valley Community of Interest in response to nitrate spikes in the groundwater.

In 2008 the District approved participation with the U.S. Bureau of Reclamation in a pilot project to evaluate the effectiveness of wetlands treatment to remove nitrogen from nitrate-contaminated groundwater underlying the mouth of Edgar Canyon. The USGS completed the concept phase of the study but concluded the land area which was available for wetlands treatment was insufficient for the amount of groundwater which would be remediated.

About 2009 the District began to implement a Geographical Information System (GIS) for the potable and non-potable water distribution systems. The GIS system integrates all of the District’s facilities, e.g., pipelines, tanks, wells, services, hydrants, etc. into a map based system. This system will help with the management of the District’s assets. The system is functioning and is used by office staff and field staff. It is internet based, so staff can access the data and mapping any place there is a WI-FI signal.

In 2013 the District began to construct Phase II of the Groundwater Recharge Project. This project was operational in late 2014.

In July 2015, the SGPWA Board passed Capacity Fee Resolution 2015-05. This resolution adopted Facilities Capacity Fees for Facilities and Water Rights Purchases. In the resolution the SGPWA will be charging all new development for facilities and purchase of additional Table A water rights to meet all of their member agencies’ imported water needs. The resolution and findings clearly stated SGPWA would be purchasing Article 21 water when available. The money will be collected to purchase 32 cfs additional capacity in EBXII from Valley District bringing Pass Agency’s total capacity to 64 cfs and pay for other facilities deemed necessary by the Pass Agency. The Agency’s decision to purchase the additional Table A needed removes this responsibility from BCVWD. The SGPWA will be negotiating an agreement with BCVWD relative to fee collection. Imported water is discussed in other sections of this master plan.

Significant Interagency Agreements

The District has entered into a number of significant interagency agreements with the City of Banning, South Mesa Water Company, YVWD, SGPWA and others that have an impact on water supply planning.

City of Beaumont

BCVWD and the City of Beaumont worked cooperatively to install potable and non-potable water facilities to serve approved City developments. These were funded extensively through Mello-Roos Community Facilities District (CFD) Bonds. BCVWD and City continue to work toward using treated effluent from the City’s wastewater treatment plant in BCVWD’s non-potable water distribution system.

San Gorgonio Pass Water Agency

In January of 1999, the District, San Gorgonio Pass Water Agency and the Riverside County Flood Control and Water Conservation District (RCFCD) entered into a cooperative agreement for joint use of the existing percolation ponds known as Little San Gorgonio Creek Spreading Grounds. The agreement was formed to ensure that the percolation ponds would be operated in a coordinated manner to allow recharge of both local and imported waters to maximize public benefit while preserving existing rights of the District and RCFCD. This agreement had a 10-year term limit and was extended in 2009.

South Mesa Water Company

The District and South Mesa Water Company entered into an agreement which gives the District the first right of refusal to purchase any unneeded portion of the South Mesa Water Company's temporary surplus in the Beaumont Basin as part of the Adjudication. The initial purchase of this water occurred in 2007 when 1,500 acre-ft were purchased. This continued through 2012; as of December 2012, BCVWD purchased 13,000 AF from South Mesa. This purchase option terminated in 2014 when the Watermaster's "temporary surplus" ended.

City of Banning

In December 2003 the District entered into an agreement with the City of Banning to jointly fund the construction and operation of municipal production wells in the Beaumont Basin for the mutual benefit of both entities and to agree to jointly fund the construction and operation of a potable water treatment plant for imported water at such time in the future that this may be necessary. Connections have been designed to allow water to be easily conveyed to the City of Banning from the District at Highland Springs Road.

Yucaipa Valley Water District

In 2010 the District met with YVWD to discuss a recycled water interconnection and other water supply issues of mutual interest. Yucaipa agreed to amend their State SRF loan to extend their recycled water pipeline to the District and the District would continue the pipeline to connect to the District's existing recycled water system. BCVWD prepared a "Facilities Plan" for SWRCB approval in December 2013. The Plan was approved in August 2014. It was also discussed that the District could provide potable water supply, on an interim basis, to some of the portions of Yucaipa's service area which can be served by BCVWD.

Riverside County Flood Control and Water Conservation District

BCVWD and Riverside County Flood Control and Water Conservation District (RCFCD) had several discussions on the feasibility of capturing storm water in Marshall and Noble Creeks including an interceptor storm drain in Grand Avenue in Cherry Valley. This storm drain will capture storm water ultimately tributary to San Timoteo Creek and divert it to the District's Groundwater Recharge Facilities for percolation. BCVWD and RCFCD applied for funding under Santa Ana Watershed Project Authority's (SAWPA's) 2015 Integrated Watershed Protection Program. It appears the program will equally funded by SAWPA, RCFCD, and BCVWD.

Regional Water Allocation Agreement

The seven major water producers within the SGPWA area developed a draft regional water allocation agreement (March 2012) for water imported by the SGPWA. The "allocation" was based on the proportion of the water producer's SOI area within SGPWA. The agreement describes a methodology to distribute any unused allocation. Although the agreement has not been adopted by SGPWA, it does provide a basis for water supply planning.

The Master Plan Update

The purpose of this Master Plan Update is to update the facility requirements for potable water supply, transmission, booster pumping, and storage between now and build-out for each pressure zone. An estimate of the cost of each of these facility needs is included. The requirements and costs are presented for each 5-year period to assist with capital infrastructure planning. The Master Plan also identifies imported water needs to build-out.

Past Master Plans did not have ready access to water demand data by pressure zone; so facility requirements were determined from rough estimates of where demand would be occurring. This Master Plan takes advantage of the District's new customer billing system which has been updated to include the pressure zone for each customer service. Demands can now be easily aggregated by pressure zone.

The District's SCADA system is helpful in verifying water demand variations over the day and was used to refine the hourly demand curve (diurnal curve) used in past master plans to better identify the storage requirements.

Growth in water demand in this Master Plan Update is based on developer specific plans and tentative tract maps which have been submitted to the City of Beaumont. The City publishes a project status report periodically which shows projects approved and under construction, approved but not constructed, and projects in the review or planned. This project status report provided a rough indication of build-out rates.

The District's past master plans only presented "build-out" or ultimate facilities. This Master Plan Update will provide "snapshots" of facility requirements, including costs, not only at build-out, but also at each five year interval through the year 2045. The costs will form the basis for adjustments to BCVWD's Facilities Fees (New Development Impact Fees) and future water rate studies.

This Master Plan Update is intended to serve as a general guidance document for the Board, management, and staff. Developers can use it to provide preliminary estimates of facility needs to serve their projects; other local agencies can use the plan to coordinate facilities.

As with any master plan, maps, figures, and text descriptions of facility locations show or describe only the general location of facilities to guide the District's Board and staff in establishing requirements for specific projects and developments. It is anticipated that some minor adjustments and modifications to the plan will be made as development in the service area occurs.

Although the last master plan was done some time ago, the demand projections and facility needs at build-out were not appreciably different from those presented in this Master Plan Update. For example, this Master Plan projected a build-out, average daily water demand of 22.96 (23.0) mgd (see Section 4); the 1994 Master Plan estimated the build-out, average daily demand to be 24.83 mgd. This affirms the District's past infrastructure planning activities are consistent with the current master plan.

This Master Plan identifies projects needed to replace existing infrastructure and provide potable water service to accommodate growth in conformance with the City of Beaumont General Plan and the Riverside County General Plan, Pass Area Land Use Plan. The program and facilities identified in this Master Plan Update are intended to be guidelines for the District to serve future developments.

The projects would be installed by the developers, by the District or a combination of the two. These projects would be financed by a wide variety of financial vehicles, e.g., community facility district (CFD) bonds, loans and grants, pay as you go, private development funds, etc. These facilities, if required, will be constructed either as part of other projects or separately. Appropriate environmental documentation will be provided at the time the projects are proposed for implementation either by the District or by the developers who actually construct these facilities.

Acknowledgements

This Master Plan Update was prepared by Mr. Joseph C. Reichenberger, P.E., BCEE, Staff Engineer, under the guidance of Dan Jaggers, P.E., Director of Engineering, and Eric Fraser, P.E., General Manager, with assistance from Tony Lara, Director of Operations, Knute Dahlstrom, Field Operations, Sylvia Molina, Bruce Kincade, and other members of BCVWD's staff.

Adoption

This Master Plan was discussed at the regular meeting held on January 13, 2016 and formally adopted by RESOLUTION NO. 2016-01, RESOLUTION OF THE BOARD OF DIRECTORS OF THE BEAUMONT-CHERRY VALLEY WATER DISTRICT ADOPTING THE 2015 POTABLE WATER SYSTEM MASTER PLAN UPDATE

Section 2

Existing Facilities and Operation

System Overview

BCVWD has both a potable and a non-potable water distribution system. The non-potable system is described and master planned in a separate document entitled "2015 Non-Potable Water System Master Plan." This document will describe only the potable water system.

BCVWD's service area extends from 3500 ft mean sea level (MSL) to 2100 ft MSL.[1] Because of the large variation in service area elevation, the District's potable water system is currently subdivided into 8 major pressure zones to provide reasonable operating pressures for customers.

- 3620 Pressure Zone (Upper Mesa)
- 3330 Pressure Zone (Mesa)
- 3040 Pressure Zone (Noble)
- 2850 Pressure Zone (Intermediate)
- 2750 Pressure Zone (Beaumont)
- 2650 Pressure Zone
- 2520 Pressure Zone
- 2370 Pressure Zone

In addition to these eight zones, there are several smaller pressure zones serving small areas in Cherry Valley, including:

- Highland Springs Hydropneumatic System (3140 Zone)
- 3150 Pressure Zone (Lower Mesa and Bonita Vista)
- 3900 Pressure Zone (Ultimately serves Oak Glen Rd and District Middle Houses)

The general location of these pressure zones is shown in Figure 2-1.

The number, i.e. 3620, associated with the pressure zone designation corresponds approximately to the elevation, mean sea level (msl), of the operational hydraulic grade line (HGL) in the respective pressure zone.

The 3900 Zone is not fully operational at this time. A bolted steel storage tank was constructed in 2007 in anticipation of a development on the west side of Oak Glen Rd., with a secondary benefit of providing fire protection to BCVWD's Middle Houses. (A fire in the 1990s burned through the area; but, fortunately, no damage occurred to the District houses.)

Ground storage reservoirs (tanks) provide system pressurization for the pressure zones. The BCVWD's system is constructed so that any higher zone reservoir can supply water on an emergency basis to any lower zone reservoir. There are booster pumps in the system that allow water to be pumped up from a lower pressure zone to a higher pressure zone also. This provides great flexibility in system operations.

The following subsections describe BCVWD's existing water supply and well system and the facilities and operation within the pressure zones.

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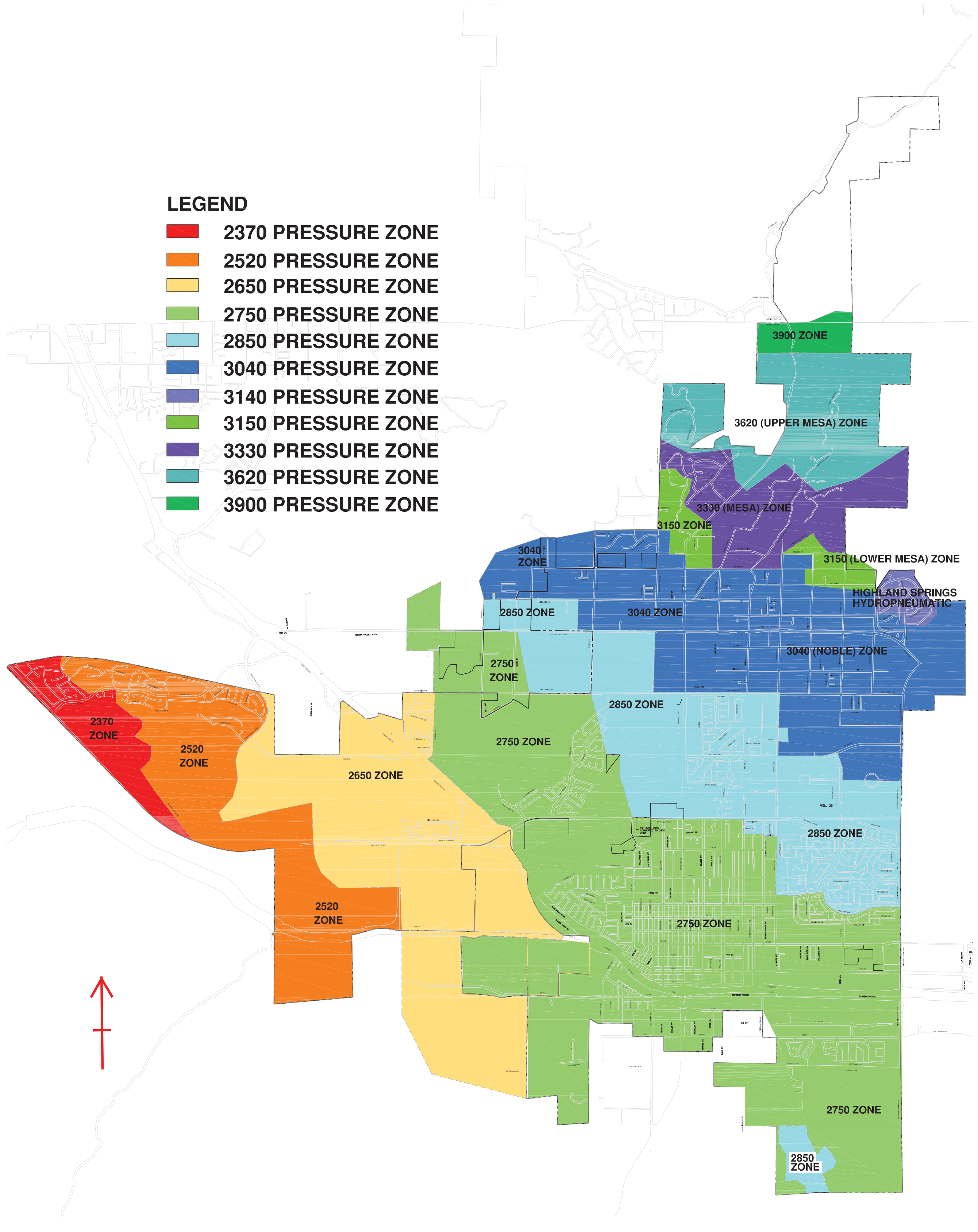
[1] BCVWD property actually extends to 4200 ft MSL, but there are no services between 4200 ft and 3500 ft MSL except for District-owned properties.



WATER MASTER PLAN

BEAUMONT CHERRY VALLEY WATER DISTRICT

FIGURE 2-1 PRESSURE ZONE MAP

SCALE
1"=1200'

SHEET NO.
1 OF 1

FILE NO.

Water Supply

BCVWD relies on groundwater from Edgar Canyon (Little San Gorgonio Creek) and the Beaumont Basin as well as imported State Project Water (SPW) from the San Gorgonio Pass Water Agency (SGPWA or "Pass Agency") which is percolated at the District's groundwater recharge facility for subsequent extraction by the District's wells.

Groundwater

Edgar Canyon Wells

BCVWD has a total of 13 wells in Edgar Canyon; Well No. 13 is a standby for Well No. 12; Well No. 9A has limited use and Well RR-1 is not used due to low water level. Total capacity of the wells, not including RR-1, 9A and 12 is 1510 gallons/minute (gpm) or 2.17 mgd. Individual well capacities range from 50 gpm to 300 gpm. Well capacities in Edgar Canyon vary from year to year, and throughout a given year, depending on hydrologic conditions, i.e., wet year vs dry year.

Table 2-1 presents a summary of District's well supply in Edgar Canyon.

Groundwater in Edgar Canyon primarily occurs in the shallower, younger and older alluvial valleys and within the rock fractures beneath the alluvium. Numerous faults cross the canyon generally in a southeast-northwest direction. These act as barriers to groundwater movement and subdivide the canyon into several sub basins. Over the years BCVWD has drilled numerous wells, pilot holes and test wells in Edgar Canyon; but, because of the faulting, many of these wells have proven to be of limited use or value. Many "dry holes" are noted on some of the old BCVWD system maps.

The groundwater aquifer in Edgar Canyon is limited and storage is small. Groundwater levels vary from just few feet below ground surface to about 200 feet below ground surface. The groundwater levels and groundwater production respond quickly to stream flow. During wet years considerably more water can be pumped than during dry years.

BCVWD prefers to use the wells in Edgar Canyon since they are the least expensive to operate and the water can be conveyed to the District customers by gravity with no additional pumping.

The District has arbitrarily subdivided Edgar Canyon into three production areas:

- **Upper Edgar Canyon** -- in San Bernardino County from the District's northern boundary, where Oak Glen Road crosses over Little San Gorgonio Creek, to a point about the center of Section 2, T1S/R1W approximately 1.5 miles north of the Riverside/San Bernardino County Line. The Upper Canyon wells include all wells on Table 2-1 except Wells 6, 4A, 5 and RR-1.
- **Middle Edgar Canyon** -- in San Bernardino County from the Riverside/San Bernardino County Line to a point about 0.5 mile north of the County line. Well 6 in Table 1 is in the Middle Canyon
- **Lower Edgar Canyon** in Riverside County from the mouth of the Canyon at Orchard St to about 1 mile north (upstream) where Well No. 5, in Table 2-1 is located. Well No. 4A is located about 1/4 mile below Well No. 5. Well RR-1 is about ½ mile north of Orchard St., downstream of Well 4A.

Table 2-1
Edgar Canyon Wells

Well No	Capacity, gpm	Year Const	Total Depth, ft	HP	Standby Power Source (See Note)	Location	Remarks
4A	300	1949	459	50	3	Lower Edgar	Chlorinator
5	160	1929	308	10		Lower Edgar	
6	250	1929	270	40	3	Middle Edgar	Chlorinator
9A	75	2006	113	3		Upper Edgar	Limited Use
10	50	1935	152	5		Upper Edgar	
11	100	1927	170	7.5		Upper Edgar	
12	130	1942	253	20	2	Upper Edgar	Chlorinator
13	Unknown	1927	88	5		Upper Edgar	Standby well,
14	200	1955	711	50	3	Upper Edgar	
18	50	1967	168	5		Upper Edgar	
19	220	1967	200	10		Upper Edgar	
20	50	1969	165	5		Upper Edgar	
RR-1	250	1993	425	40		Lower Edgar	Not used
Total	1,510	Not including Wells 9A, 13 or RR-1					

Stand-by Power Source: 1 = Generator; 2 = Auxiliary Engine Drive; 3 = Portable Generator Connection

Table 2-2 presents a summary of the 8-year production from the wells in Edgar Canyon for the years 2007 - 2014. From 1957 to 2014, a period of 57 years, the average production from the Edgar Canyon Wells was 1,934 AFY. However, prior to 1983, the ability to utilize the water pumped from Edgar Canyon was limited due to a lack of sufficient conveyance capacity to deliver water from Edgar Canyon to Cherry Valley and Beaumont. In 1983, the District installed the 14-in Edgar Canyon Transmission Main which enabled larger quantities of water to be conveyed from Edgar Canyon to Cherry Valley and Beaumont. Since 1983 to 2014, a period of 31 years, the average amount pumped was 2,205 AFY. This is far more indicative of Edgar Canyon's ability to produce water.

Statistical information on the Edgar Canyon production for the period 1983 to 2013 is presented in Table 2-3. As can be seen in Table 2-3, Edgar Canyon Wells produce about 1/6 of the District's annual need.

In Table 2-3, the term "10th Percentile" means that 90 percent of the time the production was greater than the value shown. In other words, there would be only one year in ten that the production would be less than 1,291 ac-ft/yr. It is important to point out in Table 2-3 that annual production (far right column) will not be the total of the Upper, Middle and Lower Canyon values (second and third columns) because the maximums and minimums, etc. may not have occurred simultaneously, i.e., in the same year.

Table 2-2
Groundwater Extractions from Edgar Canyon Wells
(2007 through 2014), Acre-ft/year (AFY)

Year	Upper Canyon	Middle Canyon	Lower Canyon	Total, AFY	Percent of BCVWD Supply
2007	1,094	571	700	2,365	17.3%
2008	833	502	773	2,108	14.7%
2009	707	335	742	1,783	14.0%
2010	755	324	788	1,867	16.9%
2011	1,271	318	568	2,158	18.4%
2012	961	371	658	1,990	16.4%
2013	697	341	694	1,732	13.5%
2014	560	21	744	1,325	10.5%
8-yr Ave	860	348	708	1,916	15.2%

Table 2-3
Groundwater Extraction Statistics from Edgar Canyon Wells
(1983 -2014)

Parameter	Annual Production Upper and Middle Canyon, acre-ft	Annual Production Lower Canyon, Acre-ft	Annual Production Acre-ft
Average	1,443	762	2,205
Maximum	2,720	1,095	3,738
Minimum	516	334	1,117
90th Percentile	2,283	1,017	3,252
10th percentile	774	541	1,291

The San Timoteo Watershed Management Authority (STWMA)[2], estimated the safe yield from Edgar Canyon to be 2,600 ac-ft/yr.[3] The amount appears consistent with the average amount of extractions shown in Table 2-3 from Edgar Canyon for the period 1983 –2013.

A water budget analysis in a report prepared for the SGPWA indicated the yield from Edgar Canyon was between 2,000 and 2,800 ac-ft/yr. The SGPWA report stated that based on the 20-year period 1988-2008, when water levels were reported rising in Edgar Canyon, pumping

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[2] The San Timoteo Watershed Management Authority (STWMA), was dissolved around the year 2011.

[3] Wildermuth Environmental, Inc. (2005). Integrated Regional Water Management Program for the San Timoteo Watershed, Final Draft, prepared for the San Timoteo Watershed Management Authority, , June 2005.

averaged 2,900 ac-ft/yr and suggests that the yield of Edgar Canyon may be in the range of 2,300 to 2,800 ac-ft/yr. This also is consistent with both the District's data and that of STWMA.[4]

The Edgar Canyon wells are very inexpensive to operate and are the preferred source; however, those wells are not able to meet even the average day demand.

Locating water wells in Edgar Canyon has been a challenge due to the faults crossing the canyon. The faults form barriers to groundwater flow and create small, low production, low storage, aquifers. The successful wells are clustered into the 3 areas – Upper, Middle and Lower Edgar Canyon. In between the areas there is no groundwater production.

For example, between the Upper and Middle Canyon areas, a distance of about one mile, there are no producing wells; old District maps show a number of dry wells. The lowest production well in elevation in the Upper Canyon is Well 14. There is a recharge pond just downstream from Well 14. When stream flow is diverted into percolation ponds upstream of Well 14, water is seen in the bottom of the percolation pond downstream of Well 14. It is believed there is a fault barrier immediately downstream of the percolation pond that forces water up through the pond bottom.

In the 1980s, BCVWD activated Well 7, in the Middle Canyon, about 800 – 900 ft north of Well No. 6, a very good producer. Even though Well No. 7 was located downstream of several percolation ponds, production slowed to the point the well was abandoned within a few years. BCVWD also drilled Well No 8, located midway between Well 6 and Well 7 in the 1980s. The well was drilled using cable tool methods and then deepened using air drilling methods. Development of the well was unsuccessful and the well was also abandoned.

It can be concluded that installing additional wells in Edgar Canyon is risky.

Beaumont Basin Wells

The Beaumont Basin, or Beaumont Storage Unit (BSU) as it is also known, is one of the largest groundwater units in the San Gorgonio Pass area covering an area of about 27 sq. mi. with at least 1.1 million acre-feet of water in storage and about 200,000 to 400,000 acre-feet of unused groundwater storage capacity. STMWA estimated the amount of water in the Beaumont Basin could be as much as 2.4 million acre-ft based on usable groundwater extending down to 1500 ft below ground surface.[5] This is 500 ft deeper than previously assumed and is based on several recent wells drilled by BCVWD and others.

The boundaries of the BSU are defined on all sides by postulated faults including the Banning and Cherry Valley Faults to the north and unnamed faults to the south, east, and west. The Cherry Valley Fault is the dividing line between the BSU and the Singleton storage unit. See Figure 2-2.

Groundwater within the BSU primarily occurs in the older alluvium and the San Timoteo Formation. Groundwater elevations in the BSU range from approximately 160 ft below ground surface (bgs) to 600 ft bgs. Underlying the BSU are nearly impermeable granitic/metamorphic basement rocks.

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[4] SGPWA (2010). *Report on the Sustainability of the Beaumont Basin and Beaumont Management Zone*, prepared for the SGPWA by Hahn Water Resources, LLC, Evergreen, CO, November.

[5] "*Integrated Regional Water Management Program for the San Timoteo Watershed*," Final Draft, prepared for the San Timoteo Watershed Management Authority, Wildermuth Environmental, Inc., p 2-15, June 2005.

It should be noted that the BSU has been drawn down from the steady state groundwater elevations computed in the Bloyd (1971) report[6]. The Bloyd report shows that the groundwater elevation is approximately 100 feet below steady-state (pre-development) conditions. According to STWMA, progressive drawdown of water levels in the Beaumont Basin occurred from the 1920s to about 1980. Since then, groundwater levels have stabilized. Current levels in the basin are about 75 to 120 ft below the 1920 levels and about 10 to 40 ft below the 1980 level.[7] Even though water levels have dropped, there has been no known adverse impact, e.g., water quality impacts, subsidence, etc. The only adverse impact is additional pumping cost. With the adjudication, the Basin is now under a long-term safe yield operation. Fluctuations in water levels will occur from wet years to dry years; but there should be no long-term decline.

Since startup of the BCVWD recharge facility and the recharge of SPW, groundwater in the BSU flows from the recharge site, (at Beaumont and Brookside Avenues), in a southeasterly direction toward Banning and a southwesterly direction to San Timoteo Creek.

During the field investigation work performed by BCVWD in anticipation of developing its recharge facility, multiple aquifers systems were identified by Geoscience Support Services Inc. (Geoscience)[8]. They designated the aquifer systems beneath the recharge site as:

- Perched -- 300 to 400 ft bgs
- Shallow -- 478 to 485 ft bgs
- Intermediate – 600 to 1000 ft bgs
- Deep –below 1000 ft bgs

Prior to drilling Well 23 at the recharge site, the base of useable groundwater water in the Beaumont Basin was thought to be 1,000 ft bgs. This was the primary production zone of most of the older municipal wells in the BSU, including the District's. (There are currently seven production wells in the Beaumont Basin having depths of 1,400 ft or more.) As part of the pilot recharge project, a well was drilled to 1,500 ft bgs and test pumped at 3,000 gpm. The water quality from this well is excellent, with total dissolved solids concentrations in the low 200 mg/L range. The finding of this deep aquifer greatly extends the amount of usable groundwater in the BSU.

Table 2-4 presents the BCVWD's groundwater extractions in the BSU. The table shows the amount extracted and sold to Banning. Sale of water to Banning started in 2004. Figure 2-3 shows BCVWD's groundwater production over time. The year 1983 was a very wet year and demand was low, so the production from the Beaumont Basin was low. Since 2000, with the housing boom and the need for construction water and water to establish landscaping, production from the Beaumont Basin increased markedly.

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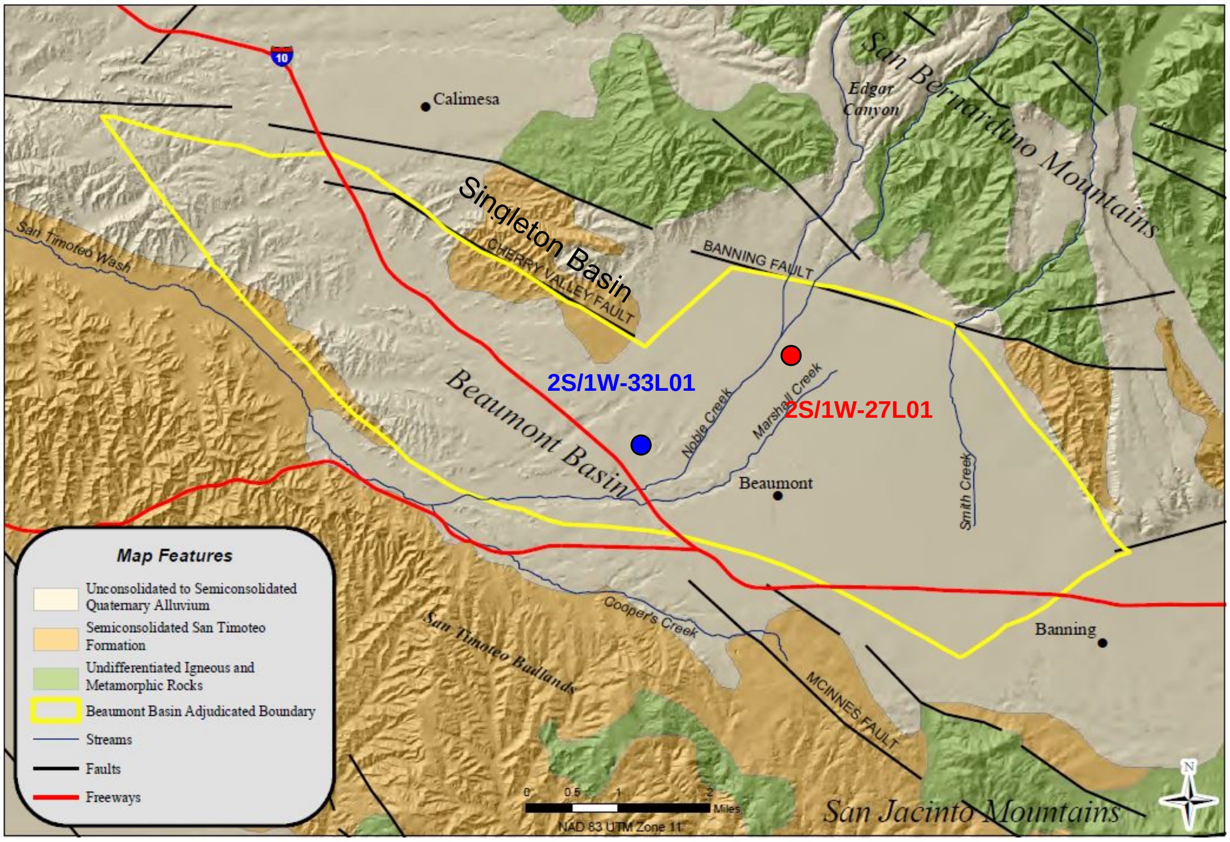
[6] Bloyd, R.M., 1971, Underground storage of imported water in the San Gorgonio Pass area, southern California: U.S. Geological Survey Water-Supply Paper 1999-D.

[7] "*Integrated Regional Water Management Program for the San Timoteo Watershed*," Final Draft, prepared for the San Timoteo Watershed Management Authority, Wildermuth Environmental, Inc., p 2-13, June 2005

[8] Geoscience Support Services, Inc., (2002). *Geohydrologic Investigation Noble Creek Recharge Study*, July 1, 2002



Source: Alda, Inc/Thomas Harder, 2-1 Watermaster Annual Report

Figure 2-2
Beaumont Groundwater Basin and Major Fault Boundaries
(See Figure 2-5 for water level in the two wells shown)
Source: Beaumont Basin Watermaster

Table 2-4
BCVWD's Groundwater Extractions from Beaumont Basin Wells (2007 – 2014)

Year	Total Production Acre-ft	Sold to Banning Acre-ft	Net BCVWD Extractions Acre-ft
2007	11,956	530	11,383
2008	11,461	751	10,710
2009	10,609	495	10,134
2010	9,563	0	9,421
2011	9,431	0	9,431
2012	10,162	0	10,162
2013	11,097	0	11,097
2014	10,806	0	10,806
8-year average			10,393

Source: Beaumont Basin Watermaster Annual Report 2014, Draft, June 2015

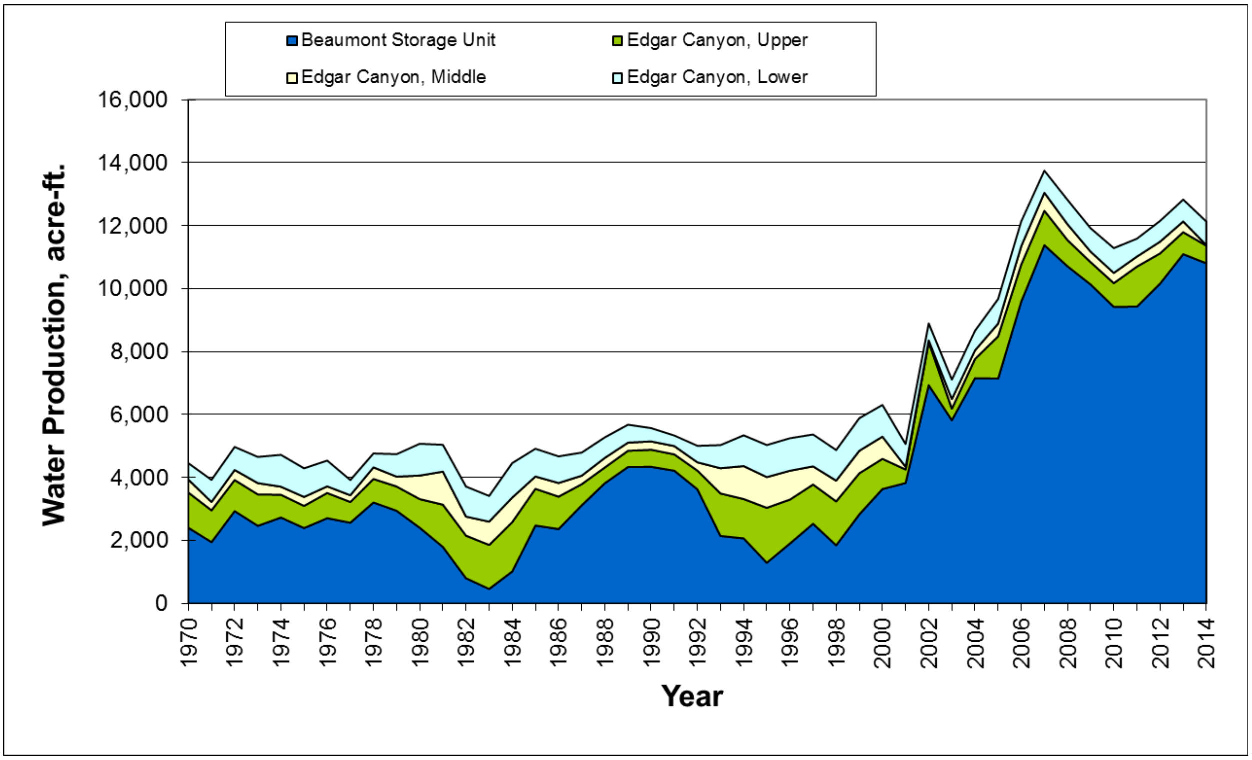


Figure 2-3
BCVWD Water Production History

As of 2014, BCVWD and the other appropriators in the Beaumont Basin have no right to the Basin safe yield. The Basin safe yield has been reserved for the overliers. However, if any overlier receives potable water or recycled water from any of the appropriators, according to the adjudication, the appropriator may pump the amount of water delivered to the overlier. Annually the Watermaster makes an accounting of the unused overlier rights and distributes that amount to the appropriators in accordance to a predetermined share. (BCVWD's share is 42.51%.) In addition the Watermaster makes an accounting of the potable and recycled water supplied by an appropriator to an overlier. These two sources along with any imported water recharged go into the appropriator's storage account. Only stored water can be pumped. If an appropriator has insufficient stored water, Watermaster will assess the producer to pay for the purchase of imported water.

The safe yield of the Basin is subject to review every 10 years. It was reviewed in 2014 and a new safe yield of 6,700 AF was established by Watermaster in 2015.

BCVWD has 11 wells in the Beaumont Basin; they are listed in Table 2-5. The total pumping capacity is 17,425 gpm or 25.1 mgd, assuming the pumps operate 24 hours per day. Because of the large motors, these wells do not operate during the peak power periods. At 18-hr/day pumping, with all wells operating, the total pumping rate is 18.8 mgd. With the largest well out of service and 24 hr/day pumping the capacity is 13,425 gpm or 19.3 mgd; with 18 hours of pumping, the total pumping rate is 14.5 mgd.

Table 2-5
Beaumont Basin Wells

Well No	Capacity, gpm	Year Const	Total Depth, ft	HP	Standby Power Source (See Note)	Pressure Zone	Remarks
1	1,300	1936	946	400		2750	
2		1947	800			2750	Inoperable
3	1,500	1952	812	400		2750	
16	800	1961	788	350	3	2850	Deepened about 1985
21	2,100	1970	980	400	3	2750	
22	1,700	1955	910	400	3	2750	
23	2,700	2002	1500	800	1	2850	
24	1,250		1430	600	1	2750	Total 2500 gpm, 1,250 gpm for Banning
25	1,250	2007	1470	800	1	2850	Total 2,500 gpm, 1,250 gpm for Banning
26*	825		1500	400	1	2750	Total 1,650 gpm, 825 gpm for Banning Total 1800 gpm to non-potable system
29	4,000	1990	1410	800	1	2650	
Total	17,425						

Stand-by Power Source: 1 = Generator; 2 = Auxiliary Engine Drive; 3 = Portable Generator Connection

* Well 26 can also pump into the non-potable water system

Table 2-6 shows the District’s total well pumping capacity, Edgar Canyon plus Beaumont Basin Wells, under various scenarios. To put it in perspective, the current (2014) average and maximum day demands are 11.3 mgd and 17.0 mgd respectively. With all wells operating and assuming 24 hour/day pumping, (22.4 mgd capacity), the District can meet the maximum demand under extended multi-day power outages even under maximum day demand. . The District could withstand an extended multi-day power outage, with the largest well on standby power out of service under all but the highest demand conditions (16.6 mgd capacity *vs*. 17.0 mgd maximum day demand). However as growth occurs in the service area, this ability will be impacted unless provisions are made to increase well capacity and standby power capacity

Groundwater Quality

Overall, the water quality from BCVWD’s wells is excellent. Table 2-7 presents a summary of the quality of water from the District’s 2014 Consumer Confidence Report.

Table 2-6
Summary of BCVWD Beaumont Basin Well Capacity

Operating Condition	Beaumont Basin		Edgar Canyon (not incl. RR-1)		Total Pumped,
	Pumping Capacity, gpm	hours	Pumping Capacity, gpm	hours	mgd
All wells Operating	17,425	24	1,510	24	27.3
All Wells Operating	17,425	18	1,510	24	21.0
Largest Well (#29) Out of Service	13,425	24	1,510	24	21.5
Largest Well (#29) Out of Service	13,425	18	1,510	24	16.7
All Wells on Standby Power Operating	14,625	24	880	24	22.4
Largest Standby Power Well Out of Service (#29)	10,625	24	880	24	16.6

Edgar Canyon

In Edgar Canyon the TDS concentration is below 250 mg/L range; hardness is moderate; nitrate levels are low, except at the mouth of Edgar Canyon. At the mouth of Edgar Canyon, USGS has reported[9] that a monitoring well 2S/1W-22G4 had a nitrate-N concentration of 11.3 mg/L. This exceeds the drinking water MCL of 10 mg/L. Well 2S/1W-22G4 is a shallow monitoring well that is perforated from 138 to 158 below ground surface. USGS states that this well is likely affected by “an anthropogenic source of nitrogen that may include agricultural activity or septic tank seepage.” This well is not used for potable water supply; BCVWD has no production wells in the high nitrate area.

Data from 1998 and 1999, showed the TDS in BCVWD’s RR-1 well, in the floor of Edgar Canyon near the mouth, was 370 mg/L. Nitrate as nitrate was 24-27 mg/L. The TDS near the mouth of the canyon is much higher than farther up the canyon where BCVWD has its production wells.

Bonita Vista Water Company wells, on the ridge to the west of Edgar Canyon, showed high nitrate concentration; the Company has since been annexed into BCVWD and the wells were taken out of active operation. Based on this information, the ridges adjacent to the mouth of Edgar Canyon likely have elevated nitrate concentrations.

Beaumont Basin

In the Beaumont Basin during the period 2002 – 2006, TDS concentrations in the groundwater ranged from 160 to 360 mg/L. Historical ambient TDS based on the period 1954 – 1973 was

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[9] USGS (2006). *Geology, Ground-Water Hydrology, Geochemistry, and Ground-Water Simulation of the Beaumont and Banning Storage Units, San Gorgonio Pass Area, Riverside, California*, U.S. Department of the Interior, U.S. Geologic Report, in cooperation with the San Gorgonio Pass Water Agency, Scientific Investigations Report 2006-5026.

230 mg/L; for the period 1984- 2003 the ambient TDS was 260 mg/L. Although there is a slight upward trend, the TDS is still very low.[10]

Table 2-7
Summary of BCVWD Groundwater Quality[11]

Constituent	Concentration, mg/L unless noted otherwise
	Average
Total Dissolved Solids, TDS	200
Specific Conductance, µmhos/cm	360
pH, pH units	8.1
Sodium	18
Calcium	37
Magnesium	12
Potassium	1.4
Bicarbonate	180
Chloride	5.4
Sulfate	10
Nitrate	7.8
Fluoride	0.5
Total Alkalinity, mg/L as $CaCO_3$	150
Total Hardness, mg/L as $CaCO_3$	140

Average nitrate-N concentrations for the period 2002 – 2006 ranged from 0.26 to 7.9 mg/L with maximum concentrations ranging from 0.26 to 9.03 mg/L. During that same period about 70% of the wells sampled for nitrate-N had an average concentration less than 2.5 mg/L. None of the wells sampled had nitrate-N exceeding the MCL of 10 mg/L[12]. BCVWD's Well No. 16 in Cherry Valley experienced a "spike" in nitrate-N in 2005 reaching 9.0 mg/L; at the same time, Well No. 21 showed a concentration of 6.1 mg/L.[13] These concentrations have since decreased. This was investigated; but no conclusions could be drawn as to the exact cause. It is possible this could occur again.

The University of California Riverside (UCR), under contract with the SWRCB, conducted a water quality assessment of Beaumont Management Zone with the specific objective of looking at nitrate contamination from on-site wastewater disposal systems.[14]

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[10] Wildermuth Environmental Inc. (2007). First Biennial Engineer's Report, July 2003 through June 2006, Beaumont Basin Watermaster for San Timoteo Watershed Management Authority vs. City of Banning et.al, June.

[11] BCVWD 2014 Consumer Confidence Report

[12] Ibid

[13] Wildermuth Environmental, Inc. (2007). Water Quality Impacts from On-site Waste Disposal Systems in the Cherry Valley Community of Interest, Final Report, prepared for San Timoteo Watershed Management Authority, Project Committee No. 1, March.

[14] Univ. of California Riverside (2012). Final Report: Water Quality Assessment of the Beaumont Management Zone: Identifying Sources of Groundwater Contamination Using Chemical and Isotope

Forty wells and eleven surface water sites were sampled and analyzed in the UCR study. In the central part of the BMZ, i.e., generally in Cherry Valley, several wells "showed clear signs of contamination by septic systems. The groundwater within the central part of Cherry Valley appeared to be more strongly affected by septic systems than groundwater on the periphery of Cherry Valley. Several wells had measureable concentrations of pharmaceuticals and personal care products (PPCPs) and major anions and cations [associated with wastewater], suggesting septic waste was entering the groundwater system.[15]"

Figure 2-4 shows historical trends in the nitrate concentrations in the BCVWD's wells; Wells 1, 16 and 21 are in the Beaumont Basin; Wells 4 and 5 are in lower Edgar Canyon.

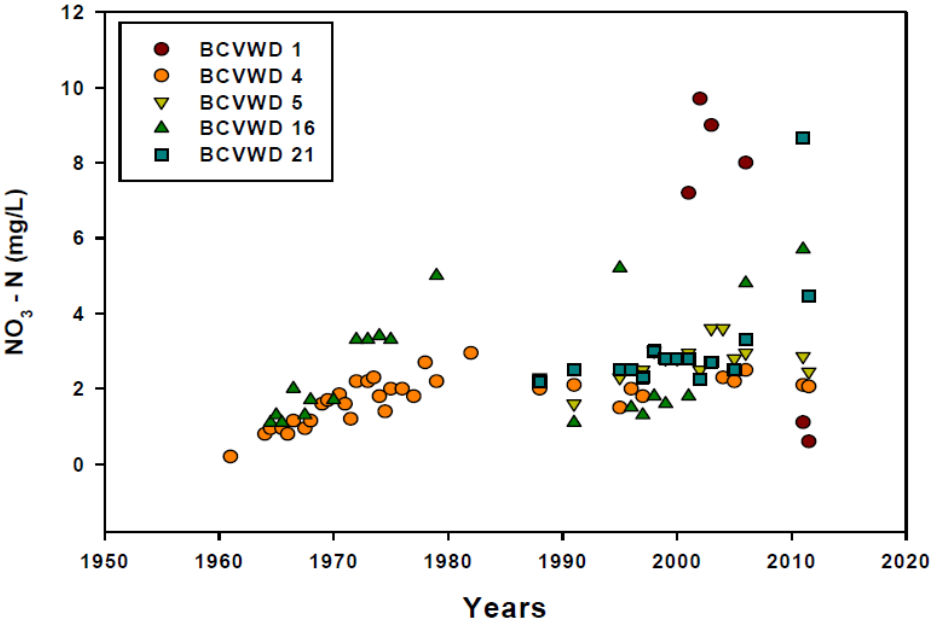

Figure 2-4
Historical Trends in Nitrate-N Concentration in Selected BCVWD Wells[16]
(MCL for NO_3-N = 10 mg/L)

BCVWD has been able to deal with the nitrate concentrations by blending with other lower nitrate source waters when it has become an issue. Riverside County Ordinance 871 requires any new septic tanks within the Cherry Valley Community of Interest be able to remover 50% of the nitrogen. Usually this requires an "add on" process to the conventional septic tank. At some point in time it may be necessary to either install well-head treatment for nitrate removal (ion exchange or reverse osmosis) if blending alone cannot mitigate the problem. If the problem gets worse, sewers may need to be installed in the more densely developed portions of Cherry Valley.

One issue that has emerged is hexavalent chromium (Cr+6). Total chromium is regulated by the state of California, Division of Drinking Water, at an MCL of 50 µg/L (50 parts per billion). There are two forms of chromium that exist in natural waters – trivalent chromium (Cr+3) and hexavalent chromium (Cr+6). Trivalent chromium is a trace metal that the human body needs; hexavalent chromium is considered toxic based on laboratory animal studies. Trace amounts of

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Tracers. SWRCB Agreement No. R*-2010-0022, Department of Environmental Sciences, Riverside, CA 92521, Feb 3.

[15] Ibid, pg. 27

[16] Ibid

hexavalent chromium are natural and found in rock and minerals. In some areas, high concentrations of hexavalent chromium are the result of industrial discharges. On July 1, 2014, a separate, State of California, MCL of 10 µg/L (10 parts per billion) for Cr+6 was established.

BCVWD sampled for hexavalent chromium as required by the State. Well 3, in the Beaumont Basin, had a concentration of 11 µg/L; wells 25 and 26, also in the Beaumont Basin, had concentrations of 11-12 µg/L and 14-15 µg/L respectively. This is all from natural causes; the concentrations are at or slightly above the MCL. Since these wells are above the MCL, quarterly monitoring will be required. Although BCVWD is concerned; there is no reason to be alarmed. The MCL was set low enough that health risk is extremely low. Well 26 is no longer pumping into the potable water distribution system; Well 25 has been modified to reduce the Cr+6.

As part of the preparation of the 2013 UWMP Update, a review of past industrial/commercial operations, particularly their waste disposal practices, was researched to see if there could be any future water quality impact from these discharges.

Lockheed Martin Corporation[17] used two remote sites near Beaumont, CA, to test solid rocket propellant and motors, weapons, and ballistics. Contamination related to these operations has been identified at both sites—Potrero Canyon and Laborde Canyon. Although the sites are owned or managed by entities other than Lockheed Martin today, Lockheed Martin has assumed responsibility for environmental cleanup at both locations.

The Potrero Canyon site is south of Beaumont and does not overlie any of the Beaumont Basin. BCVWD is not extracting any groundwater from this area. Laborde Canyon is located southwest of the City of Beaumont in the San Timoteo Badlands and also does not overly the Beaumont Groundwater Basin. BCVWD has no wells in this area either.

The SWRCB's GeoTracker list was reviewed for potentially contaminated sites in the BCVWD service area. There are sixteen sites in the BCVWD SOI on the list; three are still "open." These include the Beaumont Landfill (inactive) at Fourth St. and Nicholaus St., O'Reilly Auto Parts on Sixth and Maple, and SOCO on Fourth and Beaumont Ave. . The O'Reilly site is in the assessment phase; SOCO is in the remediation phase, and the landfill is in the monitoring phase. These sites have not affected any BCVWD wells; BCVWD's nearest wells to these facilities are about 0.75 mile away.

Surface Diversions

BCVWD has two active surface water diversions in Edgar Canyon. These are on file with the State of California Division of Water Rights.

- Diversion Number S014351 located in the SE1/4 of NE1/4 of Section 2, T2S, R1W, SB&M and first used in 1907. This location is about 1,200 ft downstream of the USGS gauging station in Little San Gorgonio Creek, near the upper end of the District's property.
- Diversion Number S014352 located in the NW1/4 of SE1/4 or Section 22, T2S, R1W, SB&M and first used in 1894. This location is just upstream of the existing percolation ponds at the mouth of Edgar Canyon.

In the early years of the District, the upper diversion was used to provide domestic and irrigation supply. Water was diverted from Little San Gorgonio Creek and conveyed to sand and

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[17] http://www.lockheedmartin.com/us/who-we-are/sustainability/remediation/beaumont.html Accessed 09052012

sediment removal structures and filter boxes in the Canyon and then piped down to consumers and orchards in Cherry Valley and Beaumont.

These diversions are used today to direct surface flows in Little San Gorgonio Creek into a series of percolation ponds in Edgar Canyon which then recharge the shallow aquifers to help supply the existing wells in Upper and Middle Edgar Canyon. BCVWD has been doing this since the late 1800s and has a pre-1914 water right to divert up to 3,000 miner's inch-hours (MIH) or approximately 43,440 acre-feet per year (acre-ft/yr) for domestic and irrigation uses[18]. However, BCVWD has never had a demand that requires such large quantities of water supply; and the watersheds may not be capable of supplying such quantities during an average year.

Imported Water Facilities

The SGPWA is the State Water Contractor responsible for importing State Project Water (SPW) into its service area in the San Gorgonio Pass through the East Branch Extension (EBX) of the State Water Project. The SGPWA has a current Table A contract of 17,300 AFY. However due to delivery reliability issues with the State Water Project (SWP), on the average, the SWP will only be able to deliver about 64% of the Table A amount.[19] The Pass Agency's rate structure provides for purchasing additional water rights to mitigate the lost reliability and bring the Table A amount to 100% reliability.

The EBX was planned to be constructed in two phases. Phase I (EBX I) was completed in March 2003; EBX II is under construction and scheduled to be complete in late 2015 early 2016.

The EBX begins downstream of the State of California, Department of Water Resources' (DWR's) Devil Canyon Power Plant at the Devil Canyon Afterbay, north of the City of San Bernardino (Water Surface Elevation =1,931 ft MSL). From the Afterbay, the SPW flows through the Foothill Pipeline to the Greenspot Pump Station. From the Greenspot Pump Station, the water is pumped through the Greenspot Pipeline to the Crafton Hills Pump Station. The Crafton Hills Pump Station then pumps the SPW through the Crafton Hills Pipeline to Crafton Hills Reservoir. The existing Crafton Hills Reservoir has a capacity of 85 acre-ft with a maximum water surface elevation of 2925 ft MSL. (It is being enlarged to 225 acre-ft as part of EBX II.) From the Crafton Hills Reservoir the water flows by gravity to the inlet of the Cherry Valley Pump Station, located at Taylor St. and Orchard Ave. The Cherry Valley Pump Station then pumps the SPW through the Noble Creek Pipeline to the EBX terminus at Noble Creek in Cherry Valley (HGL Elevation ≈ 3,000 ft MSL). The EBX has a total length of about 33 miles; the water is lifted over 1,000 ft to get it to the Pass Agency. The EBX facilities up to the Garden Air Creek Metering Facilities are shared with San Bernardino Valley MWD (Valley District).

BCVWD takes water from a 20-in diameter turnout and metering station at the current end of the EBX I at Orchard Ave. and Noble Creek in Cherry Valley.

SGPWA Capacity in the East Branch Extension

An analysis based on discussions with SGPWA and SBVMWD was presented in BCVWD's 2013 UWMP Update. The Pass Agency has 64 cfs capacity in the East Branch Extension except for:

- ***Foothill Pipeline*** – Pass Agency has 32 cfs in this pipeline but can use additional capacity if SBVMWD is not using the capacity. The 32 cfs is the maximum capacity

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[18] A miner's inch in Southern California is reported to be 0.02 cubic ft/second (cfs)

[19] State Water Project Final Delivery Reliability Report 2011 (2012). Department of Water Resources, (June)

Pass Agency currently has in the rest of the California Aqueduct. The Pass Agency is in negotiations to purchase an additional 32 cfs to bring their capacity to 64 cfs. In July 2015, Pass Agency Board of Directors passed a capital facilities fee resolution to provide funding for this additional capacity.

- ***Cherry Valley Pump Station*** – Pass Agency has 52 cfs of total pumping capacity and 32 cfs of firm capacity (largest pump out of service). There is no space to add additional pumps in the building without major modifications.
- ***Noble Creek Pipeline*** – The velocity in this pipeline based on the total capacity of the Cherry Valley Pump Station of 52 cfs is 7.4 ft/sec. This is marginally acceptable with the headloss of 35 ft in the 10,000 ft length pipeline.

The 64 cfs capacity in the EBX will convey 35,000 AFY assuming 75% utilization (25% "downtime"). In short, the Pass Agency capacity is sufficient for many years to come. It is all contingent on growth in other areas of their service area. To date most of the growth has been in the Beaumont area, with some in Yucaipa Valley Water District's (YVWD's) service area in Riverside County. BCVWD and YVWD are the only significant purchasers of Pass Agency's imported water to date.

Recharge Facility Capacity

Water from Pass Agency's EBX turnout is metered by DWR and then enters a 3,500-ft long, 24-in diameter pipeline which conveys the water to BCVWD's groundwater recharge site located east of Beaumont Ave. between Brookside Ave and Cherry Valley Blvd. The pipeline, designed for 30 cfs, was constructed by BCVWD in 2006. If operated continuously, the pipeline could convey 21,700 acre-ft per year. The capacity is based on maintaining the pipeline velocity below 10 ft/second. Higher velocities could be tolerated for short periods of time which would result in increased short-term delivery capacity.

Phase I, (West of Noble Creek), of the recharge facility was completed in September 2006 and BCVWD began to take imported water at that time. Phase I consists of approximately 10.2 wetted acres based on the projected horizontal area at the normal water depth. Phase I has 3 "trains," or sets of percolation ponds (2.7 acres, 4.2 acres, and 3.32 acres (wetted area) respectively for "trains" 1, 2, and 3). Phase II was completed in 2014 and is now on-line also. Phase II has an estimated horizontal wetted area of about 17 acres. It, too, is constructed in "trains" to allow wetting and drying.

Recharge of imported water has occurred almost continuously since September 2006. As of December, 2014, 46,365 acre-ft (15.1 billion gallons) of water have been recharged to BCVWD's account. Since 2006, annual recharge has averaged 5,358 AFY with a maximum of nearly 8,000 AFY.

Based on operational studies from 2006 through 2010, Geoscience Support Services, Inc., (Geoscience), determined the weighted average recharge rate for the Phase I facility is 10.3 acre-ft/wetted acre/day. This is a very high rate. Since there are a total of 10.2 wetted acres in Phase I, the existing recharge facility would be able to percolate over 100 acre-ft/day. Theoretically this is would be over 36,000 acre-ft per year (about twice the Pass Agency's Table A amount.) The 36,000 acre-ft per year, however should be reduced because of the need to "rest" and "restore" the basins and perform routine maintenance. If 2 of the 3 Phase I trains were operating at any one time, the theoretical capacity would be about 25,000 acre-ft/yr for Phase I.

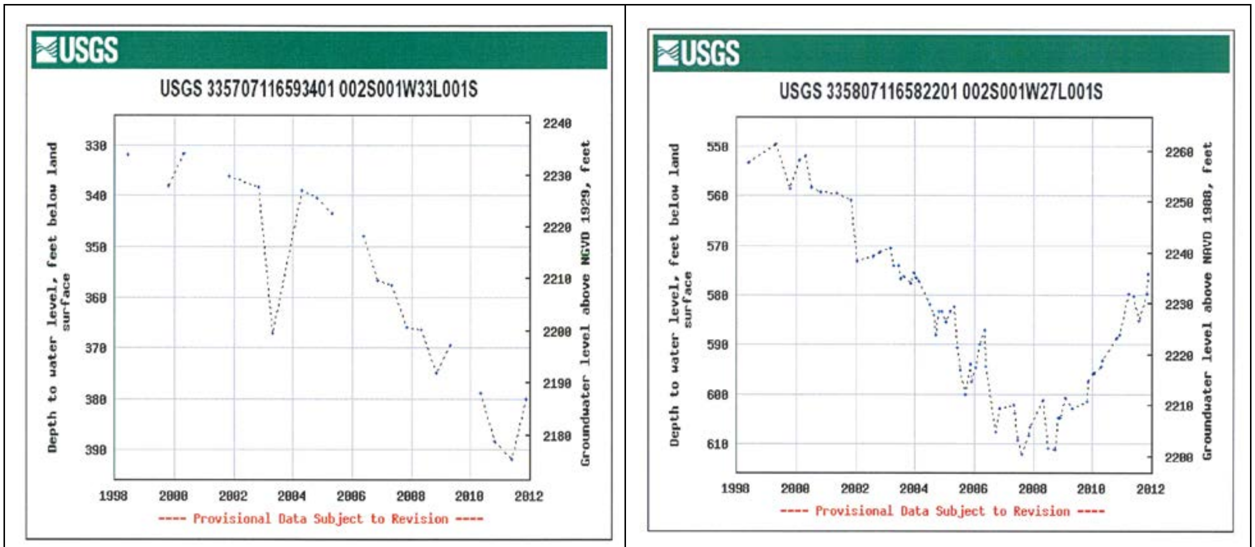
Taking a conservative approach, using a percolation rate of 6 acre-ft/wetted acre/day and considering both Phase I and Phase II facilities, the percolation capacity would be 150 acre-ft/day. Using a 75% utilization factor, the percolation capacity on an annual basis would be over

40,000 acre-ft. However, achieving a capacity of 40,000 AFY would require frequent rest periods along and frequent pond bottom scouring. At this point, BCVWD does not have sufficient long-term operating experience with the Phase II ponds to justify more than a conservative 25,000 to 30,000 AFY total percolation capacity for Phases I and II combined.

Aquifer Response

The recharged SPW is reaching the groundwater table and recharging it. Monitoring wells were installed with the initial construction of the recharge facility to track and “trace” the recharged water. BCVWD recharged over 15,000 acre-ft of imported water from September 2006 to December 20, 2009 and water levels in the three shallow aquifer monitoring wells (perforated from 480 to 550 ft below ground surface) increased by 94.4 ft, 86.1 ft, and 89.5 ft respectively. In the deeper aquifer (perforated 600 to 700 ft below ground surface), water levels increased in the fall and winter when BCVWD Well 23 was used less and decreased in summer when the well was used more. The water level in the two very deep monitoring wells (perforated 600 to 1000 ft below ground surface) increased 11.5 and 13.2 ft respectively since start of recharge in September 2006. In summary, it is clear the water is reaching the intended aquifers.

Figure 2-5 shows two wells, one just west of Little San Gorgonio Creek, the other near the BCVWD recharge site which show a steady decline of water levels. Well 27L01, at the BCVWD recharge site, shows a recovery starting in late 2006 when the District began recharging state project water. Water levels rose 30 to 40 ft. Well 33L01, farther west, shows an increase from 2011. That could be due to stream percolation in the nearby creeks or a time lag for the recharge water to reach the well – approximately 1 mile southwesterly of the recharge area. It is very likely a combination of the two. Figure 2-5 clearly demonstrates the recharged water reaches the main groundwater table.



Well 2S/1W-33L01 Near Little San Gorgonio Creek between Oak Valley Parkway and Brookside Ave.

Well 2S/1W –27L01 Near BCVWD Recharge Site

Figure 2-5
Typical Beaumont Basin Well Levels[20]
(See Figure 2-2 for location)

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[20] SGPWA (2012). Annual Report on Water Conditions, Reporting Period 2011. November

Imported Water Quality

State Project Water experiences some changes in water quality in response to wet and dry cycles in Northern California. Data from the Metropolitan Water District of Southern California, (Metropolitan), shown in Figure 2-6, shows the TDS in their imported water supplies from 1977 to 2007 – a 30-year period. Of particular interest is the Silverwood Reservoir source. The SGPWA also uses the same Silverwood Reservoir source. During the high flow year of 1983, the TDS actually dipped below 100 mg/L; during the drought period of the early 1990s, TDS hovered over 400 mg/L. The last 7 or 8 years the TDS has been in the 200 to 300 mg/L range. The nitrate concentration (as nitrate) in the imported water for 2011-2012 was 2.0 mg/L, (0.45 mg/L as N).

Article 19 of the Department of Water Resources' contract with SGPWA states that it is the objective of the State and the State shall take all reasonable measures to make available project water of such quality that the TDS concentration does not exceed 440 mg/L on a monthly average or 220 mg/L as an average during any 10-year period.[21]

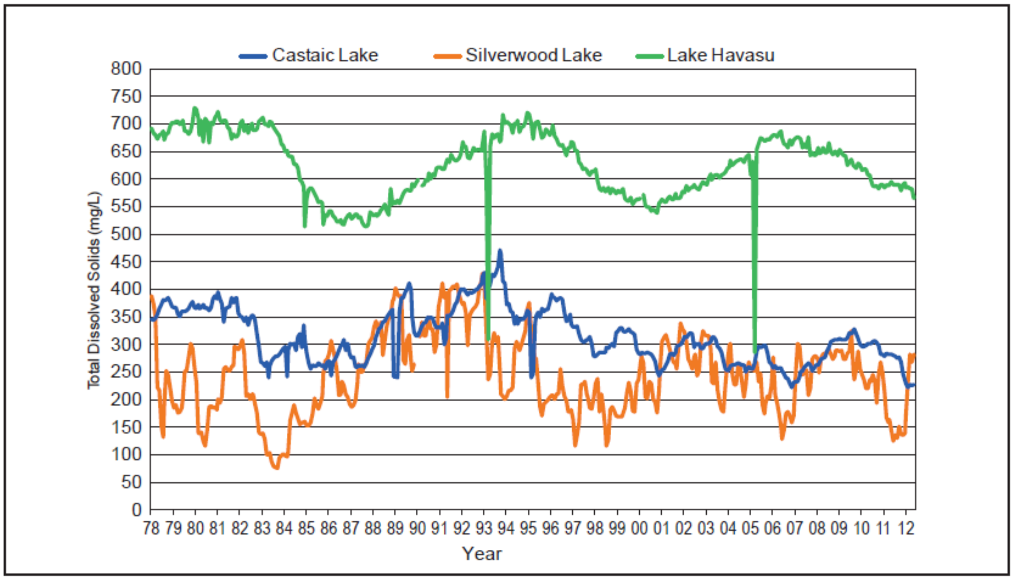

Figure 2-6
Quality of Metropolitan's Imported Water Supplies[22]

The average TDS for the period January 2004 through January 2010 was 249 mg/L. This matches the TDS for the 25-year period from 1972-97[23]. For the 10-year period 1988-97 the TDS averaged 300 mg/L. This indicates that there could be some 10-year periods in the future where the SPW could exceed 250 mg/L and careful salinity management will be necessary. In

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[21] State of California Department of Water Resources (1962), Contract between the State of California, Department of Water Resources and San Gorgonio Pass Water Agency for a Water Supply. November 16.

[22] Metropolitan Water District of Southern California (Metropolitan 2012) Annual Report for the Fiscal Year July 1, 2011 to June 30, 2012. Chapter 4/

[23] California Urban Water Agencies (1999). Recommended Salinity Targets and Program Actions for the CalFed Water Quality Program, December.

their salinity management plan, Metropolitan used an average of 250 mg/L TDS for the East Branch.[24]

Implementation of the Bay Delta Conservation Plan should help maintain or improve the quality of the State Project Water; so a TDS concentration of 250 mg/L as a 10-year average should be is reasonable at this time.

Major BCVWD Water System Facilities

Figure 2-7 is a simplified hydraulic schematic of BCVWD's system. Summaries of the District's reservoirs (tanks), booster pumps and pressure regulating stations are presented in Tables 2-8 through 2-10 respectively.

The storage reservoirs, (tanks), are located at a higher elevation than the area they serve in order to provide system pressurization to a typical minimum of 40 to 50 pounds per square inch (psi). Storage tanks also:

- Simplify pump control and operation.
- Provide water to meet peak demands, which normally exceeds the capacity of the booster pumps and supply systems (sometimes called "operational storage.")
- Provide water for fire protection.
- Provide water for emergency power outages or short-term supply outages. For long term storage, BCVWD relies on groundwater and imported water stored in the Beaumont Basin.
- Provide a pressure break in systems with large variations in terrain.

Table 2-8 shows the storage within each pressure zone; but the way that BCVWD's system is set up, any higher elevation reservoir can supplement the storage in a lower pressure zone through a pressure regulator. Thus for the 2650 Zone, for example, there are up to 22.25 MG of water in storage that could serve that pressure zone. The District currently has slightly more water in gravity storage than needed to meet the maximum water demand for 24 hrs. Considering the number of wells on standby power, as well as the water in gravity storage, the District will be able to withstand extended periods of power outage.

Except for the 12th and Palm Boosters, the booster pumping stations in the system pump water from a lower pressure zone to a pressure zone at higher elevation. The 12th and Palm Boosters pump water collected by Wells 1, 2 (currently non-operational), and 3, and pump it into the distribution system (2750 Zone). Except for the Noble Booster and the Upper Mesa Emergency Booster, the booster pumps are used on a regular basis.

The pressure regulating stations reduce the pressure as water is transferred from a higher elevation zone to a lower elevation zone. These stations are necessary to allow full utilization of all of the District's gravity storage.

Water System Operating Description

The following paragraphs describe the operation of the District's water distribution system.

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[24] Metropolitan Water District of Southern California (2012). Salinity in Metropolitan Supplies, Historical Perspective, Handout #2. Presented at Salinity Management Update Study Workshop, Southern California Salinity Coalition, June 1.

Upper Edgar Canyon Well Field and Pipeline

The Upper Edgar Canyon wells, along with the Middle Canyon wells discussed subsequently, provide the principal water supply to the 3620 and 3330 Pressure Zones as well as the small pressure zone served by the Fisher Regulator (4 lots).

Data on the Upper Edgar Canyon Wells were presented previously in Table 2-1. Although the wells are quite old, there was some work done on them to extend their useful life in the late 1990s.

- Replacement of Well 10 with a submersible pump, insertion of a liner and gravel pack between the existing casing and new liner, 50-ft internal grout sanitary seal, and replacement of the pump house (1998-99).
- Replacement of the pump at Well 11 with a submersible pump. Well 11 was rehabilitated in 1997 and a new liner and gravel pack was inserted in the well including an internal grout sanitary seal.
- Replacement of Well 14 with a submersible pump, insertion of a liner and gravel pack between the existing casing and new liner, 50-ft internal grout sanitary seal, and replacement of the pump house (1998-99).
- Well 20, which was damaged during a flood in the canyon, was replaced with a submersible pump and a new pump house. The well was video logged around 1999 and determined to be in relatively good condition. Well 20 has an existing 40-ft deep sanitary seal.
- Well 9A was drilled to replace Well 9 which was destroyed due to root intrusion in 1999.

As a result of the rehabilitation work, the wells in the Upper Canyon area should provide reliable service for a number of years.

Well No. 12, and adjacent standby Well No. 13, pump into a 10,000 gallon steel tank located near the well site. This tank provides water and system pressure to serve the District's Upper House (called the Warren House, obtained by the District as part of the Warren Ranch purchase.) A transmission pipeline extends from the tank about 10,000 ft to Upper Edgar Reservoir. A tablet chlorinator feeds calcium hypochlorite into the water at Well No. 12 in sufficient quantity to maintain a residual all the way to Upper Edgar Reservoir. The other Upper Edgar Canyon wells discharge into the transmission main. The transmission main, through the Upper Canyon well field, is ductile iron pipe (DIP) ranging in size from 6 in to 12 in diameter constructed in 1985[25].

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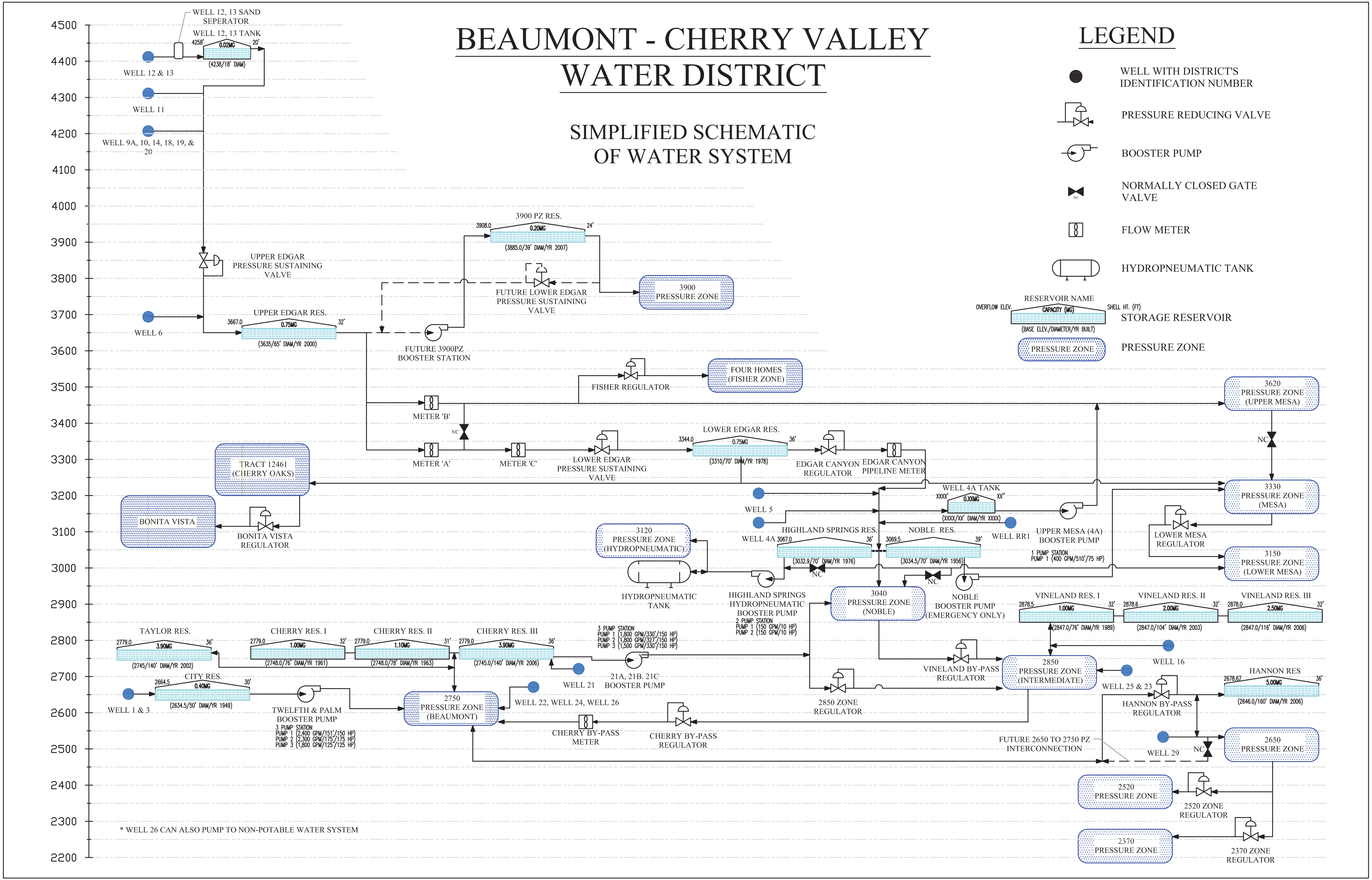
[25] BCVWD (1999). Little San Gorgonio Creek (Edgar Canyon) Water Quality Investigation, prepared by Parsons Engineering Science, July.

BEAUMONT - CHERRY VALLEY WATER DISTRICT

SIMPLIFIED SCHEMATIC OF WATER SYSTEM



* WELL 26 CAN ALSO PUMP TO NON-POTABLE WATER SYSTEM

FIGURE 2-7 HYDRAULIC SCHEMATIC

Table 2-8
Existing Potable Water Storage Reservoirs

Location	Pressure Zone	Capacity, MG	Type	Diameter, ft	Height, ft	Overflow Elevation	Bottom Elevation	Year Const'd	Condition	Zone Storage, MG	Total Gravity Storage to Zone, MG
Upper Edgar	3620	0.75	Steel	65	32	3667.0		2000	Excellent (1)	0.75	0.75
Lower Edgar	3330	1	Steel	70	36	3310.0	3344.0	1978	Needs Recoat (2)	1.0	1.75
Noble	3040	1.0	Steel	70	36	3034.5	3069.5	1956	Very Good	2.0	3.75
Highland Springs		1.0	Steel	70	36	3032.9	3067.0	1976	Needs Recoat (2)		
Vineland I	2850	1	Steel	75	32	2878.0	2847.0	1989	Fair (2)	5.5	9.25
Vineland II		2	Steel	104	32	2878.0	2847.0	2003	Excellent (2)		
Vineland III		2.5	Steel	116	32	2878.0	2847.0	2006	Excellent		
Cherry I	2750	1.0	Steel	76	32	2779.0	2748.0	1961	Good	8.0	17.25
Cherry II		1.1	Steel	78	31	2779.0	2748.0	1963	Good		
Cherry III		2.0	Steel	103	33	2779.0	2748.0	2006	Excellent		
Taylor		3.9	Steel	140	36	2779.0	2745.0	2002	Excellent		
12th & Palm		0.4	Steel	50	30	2664.5	2634.5	1949	Good	--	--
Hannon	2650	5.0	Prestressed Concrete	160	36	2678.7	2646.0	2006	Excellent	5.0	22.25
3900 Zone	3900	0.2	Bolted Steel	39	24	3909.0	3886.0	2007	Excellent	0.2	0.2

(1) Needs inspection and may need cleaning

(2) Inspected in 2013

Table 2-9
Existing Booster Pump Stations

Name/Location	Pump	Capacity, gpm	Capacity, mgd	Head, ft	HP	Remarks
Noble, Noble Reservoir	1	500	0.72	310	60	Pumps from 3040 Zone to 3330 Zone
Upper Mesa Emergency, Well 4A Site	1	400	0.58	510	100	Pumps from Zone to 3330 Zone or Wells 4A and 5 to 3620 Zone
12th & Palm	1 2 3	2,400 2,300 1,800 4,100 Firm	3.46 3.31 2.69 5.90 Firm	151 194 145	100 100 75	Pumps Well 1, 2, & 3 from City Tank (Ground Storage) to 2750 Zone
Cherry Boosters, Cherry Tanks	21A 21B 21C	1400 1600 1500 2,900 Firm	2.01 2.30 2.15 4.16 Firm	346 346 346	150 150 200	Pumps from Cherry Tanks (2750 Zone) to 3040 Zone; Pump 21C has a Waukesha Natural Gas Engine
Highland Springs Hydropneumatic, Highland Springs Reservoir	1 2	150 150 150 Firm	0.22 0.22 0.22 Firm	135 135	10 10	Vertical Turbine Can, lead/lag pump from Highland Springs Reservoir to Highland Springs Village; hydro tank 4,500 gal

Table 2-10
Existing Pressure Regulators

Location	Pressure Zone	Size	Capacity, gpm	Elevation	Inlet, psi	Outlet, psi	Remarks
Fisher, 8981 Ave. Miravilla	3620	2 @ 2”	420	3290	145	45	Reduce from 3620 Zone to 3394 to serve 4 lots
Well 4A Site	3620	1 @ 8” 1@2”	3,100 210	3127	210	88	Reduce from 3620 Zone to 3330 Zone to be able to take Lower Edgar Reservoir out of service
Bonita Vista, 9198 Bonita	3330	2”	210	3059	118	30	Reduce from 3330 Zone to 3150
Cherry Oaks @ Oak Glen Rd	3330	2@ 4”	1,600	3040	125	50	Reduce from 3330 Zone to 3150 Zone (Bonita Vista)
Lower Mesa, Noble Tank Site	3330	1@6” 1@2”	2,010	3040	125	48	Reduce from 3330 Zone to 3150 Zone
Intermediate Zone, Cherry & Brookside	3040	2@6” 1@2	3,810	2757	123	40	Reduce from 3040 Zone to 2850 Zone
Intermediate Zone, Vineland Bypass, Vineland Tanks	3040	2@8”	1,500	2870	70	15	Reduce from 3040 Zone to 2850 Zone
Cherry By-pass, Cherry Booster PS	2850	6“	1,800	2752	125	10	Reduce from 3040 Zone to 2750 Zone
Edgar Canyon Pressure and Flow Control, vic. Well 5	--	10”	4,900	3195	58	10	Controls flow in Edgar Canyon Pipeline
2650 Zone, Hannon and Brookside	2750	2@16”	11,000	2589	70	25	Reduce from 2750 Zone to 2650 Zone
2520 Zone, Cherry Valley Blvd and Champions Drive	2650	1@12” 1@8” 1@6”	7,000 3,100 1,800	2380	115	60	Reduce from 2650 Zone to 2520Zone
2370 Zone, Palmer n/o Morris	2520	2@*8” 1@4”	3,100 800	2223	125	60	Reduce from 2520 Zone to 2370 Zone

Downstream of Well No. 14 in the Upper Canyon, except for a small portion that was replaced with 12-in DIP believed to have occurred in the late 1990s, the transmission main is 10-in diameter steel. That steel pipe is fairly old and probably dates to the 1950s or 1960s. An integrity test was conducted by District staff in 1999 as part of a water quality investigation in Edgar Canyon[26]. The testing was performed in three test reaches as shown in Table 2-11.

There are only a few domestic services along Oak Glen Rd on this pipeline; although functional, the transmission pipeline is a critical supply line to the 3620, 3330 and 3150 Pressure Zones and the old steel portion should be replaced in the near future due to its age and condition..

Table 2-11
Results of the Year 1999 Integrity Testing on 10-in Steel Transmission Main in Edgar Canyon

Reach	Test Duration, minutes	Pressure, psi		Comment
		Lower Location	Upper Location	
Upper	30	40 - 50	15	Held pressure
Middle	30	130	20	Held pressure
Lower	75	145 -160	70	Leak occurred, held pressure for 75 min

Middle Edgar Canyon Wells, Upper Edgar Reservoir and the 3620 Pressure Zone

Well No. 6 is the only operating well in the Middle Canyon; it pumps directly into Upper Edgar Reservoir through a separate pipeline. There is a tablet chlorinator at Well 6 to chlorinate the water pumped by the well and provide a chlorine residual “boost” to the water in Upper Edgar Reservoir. Rehabilitation of Well 6, consisting of a new liner, gravel pack between the existing casing the new liner, a 50-ft deep internal, grout sanitary seal, and a new water-lubricated pump occurred in 1998-99.

Details on Upper Edgar Reservoir were presented in Table 2-7; it replaced a very old (1914) concrete reservoir with a wood roof. The new reservoir is believed to be in excellent condition, but has not been inspected or cleaned since it was constructed (2000).

Well No. 7 was equipped and operated in the early to mid-1980s, but has since been abandoned due to low production. Well No. 8, drilled in the 1980s, proved to be a poor producer and was never completed or equipped. It is abandoned.

From Upper Edgar Reservoir there is a relatively new 24-in DIP main that extends just past the old, abandoned Upper Edgar Concrete Reservoir and connects to two transmission mains: one is a 10-inch steel pipe and the other a 20-in DIP. The 10-in main is generally on the west side of Little San Gorgonio Creek (Edgar Canyon); the 20-in, constructed about the year 2000, is generally on the east side of the Creek. Both convey the water down the canyon to Lower Edgar Reservoir (3330 Pressure Zone). The westerly line (called the 10-in “A” Line) serves the “Orchard Tract” along the east side of Oak Glen Road. The easterly line (called 20-in “B” Line) reduces to 10-in and joins an older steel pipeline about 2,600 ft downstream of Upper Edgar Reservoir. There is a 300-ft section of old 10-in pipe in service on the “B” Line and then the “B” Line increases back to 20- in diameter and remains 20-in diameter to a point about 300 ft upstream of Lower Edgar Reservoir. At that point the “B” Line transitions back to 10-in diameter

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[26] Ibid

and continues southward (downstream) eventually going up the side of the canyon to serve the Upper Mesa area of Cherry Valley (3620 Zone).

Both the “A” Line and “B” Line are metered, (“A” meter and “B” meter respectively), just upstream of Lower Edgar Reservoir. Immediately downstream of the flow meters, the “A” and “B” pipelines are interconnected. This allows both pipelines from Upper Edgar Reservoir to supply Lower Edgar Reservoir and the Upper Mesa (3620) Pressure Zone. See Figure 2-8.

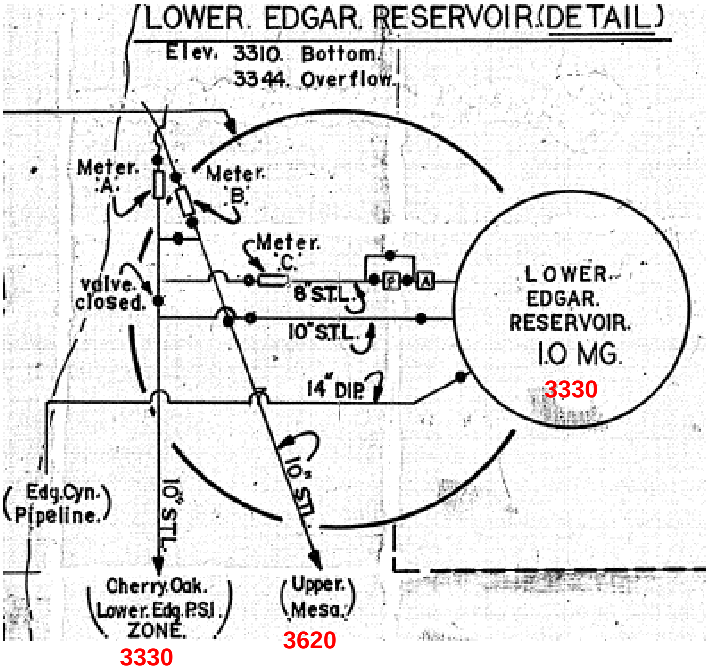

Figure 2-8
Pipeline System in the Vicinity of Lower Edgar Reservoir

There is a normally closed valve on the “A” Line, which separates the Upper Edgar 3620 Pressure Zone from the Lower Edgar 3330 Pressure Zone. See Figure 2-8. As shown in Figure 2-8, an 8-in pipeline with pressure sustaining valve and an altitude valve delivers water into Lower Edgar Reservoir. The “C” meter measures the flow going into Lower Edgar Reservoir. The Edgar Canyon Pipeline, shown in Figure 2-8, provides water to the 3040 Pressure Zone. It is metered too, but farther downstream. This is discussed later in this section.

The 10-in “B” line, continues south past Lower Edgar Reservoir and up on to the Cherry Valley Mesa area to serve the 3620 Pressure Zone. The 10-in pipeline then splits to an 8-in pipeline to serve the west side of the Mesa and a 6-in pipeline to serve the eastern side of the Mesa down to Avenida Cerrovista. This comprises the 3620 Pressure Zone.

At the south end of the 8-in (3620 Zone) pipeline, a 6-in steel pipeline goes west down the side of the Mesa, across Little San Gorgonio Creek, and up to Oak Glen Rd. This pipeline provides 3620 Zone service to parcels on Oak Glen Rd. (This line closely parallels the 12-in, 3330 Zone pipeline, serving Cherry Oaks as discussed below.)

There is a 4-in steel pipeline branch from the westerly 8-in pipeline on the Mesa that leads to the Fisher Regulator at 8981 Avenida Miravilla. The Fisher Regulator reduces the pressure from the 3620 Pressure Zone to a hydraulic grade line of 3394 to serve about 4 lots. Data on the Fisher Regulator was presented in Table 2-10.

A pressure regulating station was installed in 2002 at the vicinity of Upper Mesa Emergency Booster Pump between the 3620 Upper Mesa Pressure Zone and the Lower Mesa 3330 Pressure Zone. This was installed to permit the Lower Edgar Reservoir to be taken out of service if necessary for maintenance and repair. Data on this regulating station can be found in Table 2-10 presented previously.

At the Well 4A site, there is a 7,000 gal tank and a booster pump, called the Upper Mesa Emergency Booster, which can pump water from the 3330 Pressure Zone or Wells 4A and 5 up to the 3620 Upper Edgar Pressure Zone, if needed. This booster pump is strictly for emergency in the event there is insufficient production for the Upper and Middle Edgar Canyon Wells to serve the needs of the Upper Mesa (3620 Pressure Zone) or the Upper Edgar Reservoir needs to be taken out of service. Data on the Upper Mesa Emergency Booster Pump was presented in Table 2-9. It was installed in 1987 and is rarely used.

Lower Edgar Reservoir and the 3330 Pressure Zone

Lower Edgar Reservoir supplies the 3330 Pressure Zone and was constructed originally to serve the Cherry Oaks Tract, an 89 lot subdivision on the west side of Oak Glen Rd. Details of Lower Edgar Reservoir are presented in Table 2-8.

There are two outlets from Lower Edgar Reservoir; see Figure 2-7 presented previously.

- The original 10-in steel pipe, a continuation of the “A” line, but at reduced pressure, (3330 Zone), which follows Edgar Canyon south to the vicinity of Well 4A and then crosses Little San Gorgonio Creek to Oak Glen Rd to serve the Cherry Oaks Tract. This line was extended south in Oak Glen Road and also serves the Bonita Vista Area and the Tokay area through pressure regulators. A branch of this pipeline goes east up the side of the canyon, in the vicinity of Well 4A, to supply water to the 3330 Pressure Zone system on the Mesa.
- The 14-in DIP Edgar Canyon Transmission Main, constructed in 1982-83, conveys water from Lower Edgar Reservoir, through the Edgar Canyon Pressure and Flow Control Station, (described later), to a pipeline leading to the 3040 Pressure Zone. Wells 5 and 4A connect into the Edgar Canyon Transmission Main downstream of the pressure and flow control structure.

The 3330 Pressure Zone includes the following areas:

- Mesa area generally south of the “Wagon Wheel” intersection (Avenida Miravilla, Avenida San Timoteo, Avenida Altura Bella), between Noble Creek (Bogart Park) and Edgar Canyon
- Cherry Oaks Tract west of Oak Glen Rd

The 3330 Pressure Zone can also be supplied by pumping water from the 3040 Pressure Zone into the 3330 Pressure Zone, and ultimately up to Lower Edgar (3330 Zone) Reservoir, by the Noble Booster Pump located at Noble Reservoir. Data on the Noble Booster Pump was shown in Table 2-9

The Noble Booster is normally only used during summer months when the demand on the Mesa is high and the Upper and Lower Canyon wells do not have sufficient production. This is a critical pump station; but currently there is only a single pump with no standby power available.

Edgar Canyon Pressure and Flow Control Station

The Edgar Canyon Pressure and Flow Control Station is telemetry operated through the District’s SCADA system to always maintain a preset amount of water in both the Upper Edgar

Reservoir for the Mesa Area and the Lower Edgar Reservoir for Cherry Oaks, Bonita Vista and other areas served by the Lower Edgar Reservoir. Any “surplus” is “released” down the Edgar Canyon Transmission Main through the pressure and flow control station to the 3040 Pressure Zone for use in the main part of Cherry Valley. During the summer, little, if any, water flows down the transmission main to the 3040 pressure zone since most of water is used on the Mesa and in Cherry Oaks/Bonita Vista. During other times of the year, as much water as possible is released to the 3040 pressure zone to reduce the cost of energy to pump water using the Beaumont Basin wells.

3150 Pressure Zones

Water to supply the 3150 Pressure Zones comes from Lower Edgar Reservoir (3330 Pressure Zone) through pressure regulators. There are two 3150 Pressure Zones generally separated by Little San Gorgonio Creek.

- The easterly 3150 Pressure Zone covers a small area, generally north of Dutton St. between Jonathon Ave. and Bellflower St. This pressure zone is served by the Lower Mesa Regulator, located adjacent to the Noble Reservoir. See Table 2-10 for data.
- The second 3150 Pressure Zone serves the Bonita Vista area west of Oak Glen Rd and the Tokay Area just east of Oak Glen Rd, north of Orchard St. This zone is supplied by a pair of pressure regulators – one at Oak Glen Rd and Cherry Oaks Rd and another at 9198 Bonita, in the Bonita Vista area. See Table 2-10 for data.

3040 Pressure Zone

The 3040 Pressure Zone is supplied from the Lower Edgar Canyon wells and the Cherry Booster Pumps. There are two reservoirs in the 3040 Zone – Noble and Highland Springs; data on these reservoirs was presented in Table 2-8.

Lower Edgar Canyon Wells

Well 5, Well 4A and Well RR-1, in order from the highest in elevation to the lowest, are the Lower Edgar Canyon Wells. Well 5 and 4A pump into the Edgar Canyon Transmission Main downstream of the Edgar Canyon Flow Control and Pressure Regulator. There is a tablet chlorinator at Well 4A to provide a residual disinfectant to both Well 5 and Well 4A water as it enters the 3040 Pressure Zone. The Edgar Canyon Pipeline joins a 12-in steel at Avenida Miravilla; the pipeline then follows Avenida Miravilla to Orchard St. where it connects to the 3040 Pressure Zone system.

It is worth noting that during very wet years, Well 4A experiences artesian conditions and flows with the pump shut off. This has not occurred for a number of years, however.

Recharge-Recovery Well RR-1 downstream of Well 4A and immediately upstream of the existing spreading basins at the mouth of Edgar Canyon was constructed in 1993. However it is currently not used due to low production.

There is a pressure sustaining valve in the 12-in pipeline in Edgar Canyon Rd., just north of the intersection with Avenida Miravilla, to maintain slight pressurization in the 12-in pipeline downstream of Well 4A to ensure water quality.

Cherry Booster Pumps

The three Cherry Booster Pumps, 21A, 21B and 21C, located at the 2750 Zone Cherry Reservoir site, pump water from the 2750 Zone to the 3040 Zone. A significant amount of water for Cherry Valley is pumped by these booster pumps. Data on the Cherry Booster Pumps can be found in Table 2-9 presented previously. The booster pumps are vertical turbine pumps in a “can;” 21A and B are electric motor driven. Booster pump 21C has an angle drive and a natural gas engine. These pumps were probably installed in the late 1960s and early 1970s with the construction of the initial Cherry Reservoirs and Well 21.

The pump stop-start sequence is controlled by the level in Noble Reservoir. If the tank level drops below a preset level, booster 21A starts; if the level in Noble Reservoir continues to drop, the second booster starts and so on.

Highland Springs Hydropneumatic Zone

The developer of Highland Springs Village installed a hydropneumatic system to provide water to the Village, approximately 376 accounts. The hydropneumatic system was constructed with Highland Springs Reservoir about 1976. The hydropneumatic booster pumps are supplied from Highland Springs Reservoir. There is 4,500 gallon hydropneumatic storage tank on the system. The two vertical turbine “can type” boosters operate in a lead-lag mode, controlled by pressure in the hydropneumatic tank.

In the event of an emergency or power outage, a by-pass valve allows water to flow directly from Highland Springs Reservoir into the system. An emergency generator was added in 2001 to provide power during power outages. Fire flow is provided through this emergency by-pass.

2850 Pressure Zone

The 2850 (Intermediate) Pressure Zone includes the following areas:

- East of Cherry Ave. from Snapdragon Way and Starlight Ave. approximately, to future Cougar Way extended, in the Pardee Sundance Development
- North of Oak Valley Parkway to Brookside Ave. between Cherry Ave. and approximately Noble Creek.
- An undeveloped area north of Brookside Ave. and west of Beaumont High School

There is a small isolated 2850 pressure zone located on the far south side of the District’s service area, south of Eagles Nest Dr. between Manzanita Park Rd. and Highland Springs Rd. A separate 2850 zone transmission line runs through the Sundance Tract and under the I-10 freeway and the Southern Pacific railroad tracks to serve this isolated area.

The 2850 Zone is pressurized by the three Vineland Reservoirs. Details of these reservoirs was presented in Table 2-8. The primary source of water for the 2850 Zone, when available, is water from the Edgar Canyon wells delivered through the 3040 (Noble) Zone through pressure regulators or from Wells 16, 23 and 25. Wells 23 and 25 are major Beaumont Basin production wells. Well 16 had experienced some nitrate spikes in the past, but this does not seem to be a concern at the present time.

There are two pressure regulator stations from the 3040 Zone to the 2850 Zone. They are shown in Table 2-10. One is at the Cherry Reservoirs at Brookside Ave. and Cherry Ave.; this is used for emergencies. The main supply regulator is the Vinland Bypass at the Vineland Reservoir Tank Site, just south of Vineland St.

At the present time there is no way of pumping water from the 2750 Zone into the 2850 Zone. The water would have to be boosted by the Cherry Booster Pumps (21A or 21B) into the 3040 Zone and then released through the Vineland Bypass Regulator into the 2850 Zone. This is not energy efficient. Future projects will include a new booster pump station from the 2850 Zone to the 3040 Zone either in the Pardee Sundance Tract or at the Vineland Tank Site, and conversion of the 21A, 21B and 21C boosters to pump from 2750 Zone to the 2850 Zone. This is discussed in subsequent section of this master plan.

2750 Pressure Zone

The 2750 Pressure Zone serves the bulk of Beaumont south of Oak Valley Parkway. West of Noble Creek, the pressure zone extends up to Brookside Ave. and even up to Cherry Valley Blvd in the proposed Sunny Cal Egg Ranch Development. The 2750 Zone is the zone with the greatest current and future demand in the District. The 2750 Pressure Zone is pressurized by the Cherry Reservoirs and Taylor Reservoir. See Table 2-8 for details.

There are a number of large production wells which pump into the 2750 Zone: Well 21, 22, 24, and 26. Well 21 pumps directly into the Cherry Reservoirs. Wells 1 and 3 pump to the “City Reservoir” located at 12th St. and Palm Ave. Well details can be found in Table 2-5. The City Reservoir is a ground storage, collector reservoir. The water from Wells 1 and 3 is then boosted into the 2750 Zone by the Twelfth and Palm Boosters. See Table 2-9. Well 2 had a casing failure about the year 2006. The pumping equipment has been pulled and the well is not used. It is possible to drill another well on the Well 2 site as a replacement well.

The Twelfth and Palm Boosters probably date to 1949 or so when the City Reservoir was constructed. The pumps are operating satisfactorily and are well maintained. All booster pumps are driven by an electric motor and are of the horizontal split-case centrifugal type. The boosters are controlled by the level in the Cherry Reservoirs (located at Cherry Avenue and Brookside Avenue); when the level drops to a preset level, the first booster is started; if the level continues to drop, the second booster comes on, etc. The pump station has been equipped with a transfer switch to accept a portable generator.

These booster pumps have a secondary benefit and that is to provide additional pressurization to the 2750 Zone during exceptionally high-peak hour demands and fire demands. A low pressure switch installed in the distribution system at Oak Valley Parkway and Michigan Avenue actuates the boosters if low system pressure occurs. (This could happen during a fire demand).

Historically the Twelfth and Palm Booster Pumps did not have sufficient capacity to meet the production from Wells 1, 2, and 3 combined. This was due to excessive friction loss in the piping system. With the construction of the Taylor Reservoir and the 30-in and 24-in diameter pipeline to the Twelfth and Palm Booster Pumps, there is more hydraulic capacity in the system and this may no longer be an issue.

Water can be released into the 2750 Zone from the 3040 Zone through the Cherry By-pass Regulator located in the Well 21/Booster 21A/21B building at the Cherry Reservoir Site. This would only be used if there were surplus water available from Edgar Canyon. This is not common any longer.

It is possible to pump Well 29 into the 2750 Zone, but it will require a connection to the 2750 Zone. Plans have been made to install a valved interconnect between the Well 29 discharge pipe and an existing 2750 Zone transmission main in Cherry Valley Blvd. This provides an emergency supply to the 2750 Zone should any of the large 2750 Zone wells be out of service.

2650 Pressure Zone

The 2650 Pressure Zone serves the westerly part of the District’s service area generally south of I-10 and generally west of Cherry Valley Blvd. The 2650 Pressure Zone is supplied by the 5 MG Hannon Reservoir. See Table 2-8 for reservoir details. Supply for the 2650 pressure zone is from Well 29 (formerly the Sunny Cal Egg Ranch Well) or from the 2750 zone through a by-pass regulator at Hannon Ave. and Brookside Ave. or.

The 2650 Pressure Zone also serves the 2520 Zone and 2370 Zone through pressure regulators.

There is a single 24-in pipeline from Hannon Reservoir to Deodar Dr. in the Corman-Leigh "Stetson" Development where it reduces to 18-in diameter and then extends through a bore under I-10 in near the entrance to the Tournament Hills development at Desert Lawn Dr. and Champions Dr. In the future, additional reservoirs are envisioned south of I-10 and CA-60 in the Legacy Highlands Development. A future pressure regulating station will be constructed at the future 2650 tank site to supply water from the 2750 zone to the 2650 Zone Tank.

2520 Pressure Zone

The 2520 Pressure Zone serves an area south of I-10 and west of Cherry Valley Blvd on the north side of San Timoteo Canyon Rd and south of San Timoteo Rd, west of Potrero Blvd. This zone is largely undeveloped at the present time. The portion of the pressure zone, that is developed, is in Fairway Canyon along Palmer Ave. A pressure regulator from the 2650 Pressure Zone located at Cherry Valley Blvd and Champions Drive provides water to the 2520 Zone from the 2650 Zone. See Table 2-9.

In the future there will be reservoirs located south of I-10/CA-60 in the Legacy Highlands Development to serve the pressure zone. A pressure regulating station will be constructed at the future tank site to supply water directly to the 2520 Zone storage tank from the 2650 Zone.

2370 Pressure Zone

The 2370 Pressure Zone serves an area on the north side of Oak Valley Parkway (San Timoteo Canyon Rd.) at Palmer Ave. at the far edge of the District's service area. This small pressure zone will not likely expand since one side is adjacent to a preserve which borders YVWD's SOI. A site has been graded within the Sun-Cal development for a future 2370 Zone reservoir. This reservoir would be fed from the 2520 Pressure Zone through a regulator at the 2370 Zone Tank Site. See Table 2-10.

Flow Metering

All of the District's wells are metered and read daily. The Upper and Middle Edgar Canyon well supply is measured by the "A", "B" and "C" meters described above. Water delivered through the Edgar Canyon Pressure and Flow Control Facility and the Cherry By-pass pressure regulator (3040 Zone to 2750 Zone) are both metered.

All of the District's services are metered, including fire protection services. Construction water is metered through District-provided hydrant flow meters.

SCADA (Supervisory Control and Data Acquisition) System

In 1984 and early 1985 the District installed an extensive telemetry system for the monitoring and control of the District's wells, pump stations, regulators and reservoirs. The original telemetry system has been replaced, upgraded and expanded several times since it was initially installed in order to keep up with new system facilities and improvements in technology. The current SCADA system is centrally located at the Twelfth and Palm Operations Center.

The SCADA system monitors reservoir levels, well pump and booster pump operation on a continuous basis 24 hours/day, 7 days/week. Alarms are indicated and transmitted to the Operator on Call. Operators are able to access the system remotely to make adjustments. The SCADA system ensures that pumps scheduled to be on Time-of-day pumping do not start prematurely.

Section 3

Population and Land Use

Historical Population

Historic and current populations for the District's service area were extracted from the District's 2013 UWMP Update are presented in Table 3-1. There were some minor adjustments to account for the latest census data. The data in Table came from several sources:

- 1980 and 1990 populations and household information – U.S. Census Bureau, 2000 Census of Population and Housing, Population and Housing Unit Counts, PHC-3-6, California, Washington D.C., 2003. This data was used for the City of Beaumont. Data for Cherry Valley for this period was estimated.
- 2000 and 2010 population and household information – U.S. Census Bureau American Fact Finder for Beaumont, CA and Cherry Valley CDP[1], CA.

Table 3-1
Historical Population and Housing

	1980	1990	2000	2010	2013	2014
City of Beaumont						
Population	6,818	9,685	11,384	36,877	39,727	40,853
Households	2,852	3,718	3,881	11,801		
People/Household	2.39	2.60	2.93	3.12		
Housing Units			4,258	12,908		
Occupied Housing Units			3,881	11,801		
Cherry Valley						
Population	5,012	5,945	5,891	6,362	6,500	6,550
Households	2,023	2,530	2,310	2,612		
People/Household	2.48	2.35	2.55	2.43		
Housing Units			2,627	2,874		
Occupied Housing Units			2,434	2,612		
TOTAL						
Population	11,830	15,630	17,275	43,239	45,360	46,710
Households	4,875	6,248	6,191	14,413		
People/Household	2.43	2.50	2.79	3.00		
Housing Units			6,885	15,782		
Occupied Housing Units			6,315	14,413		

- 2013 and 2014 population – Estimated for Cherry Valley based on historic growth. Based on housing completions from City Planning Department for the City of Beaumont, Major Project Status Reports.

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[1] CDP = Census-designated Place

It should be pointed out that the data in Table 3-1 are all of the people living in the District's service area. Except for a relatively few number of people that are on private wells or local water systems, all are served by the District. The District's sphere of influence extends beyond its service area; but the existing population between the service area and the sphere of influence boundary is small at this time.

Figure 3-1 shows the population growth in the City of Beaumont and Cherry Valley from 1980 to 2014. The population after 2010 was estimated from the number of connections.

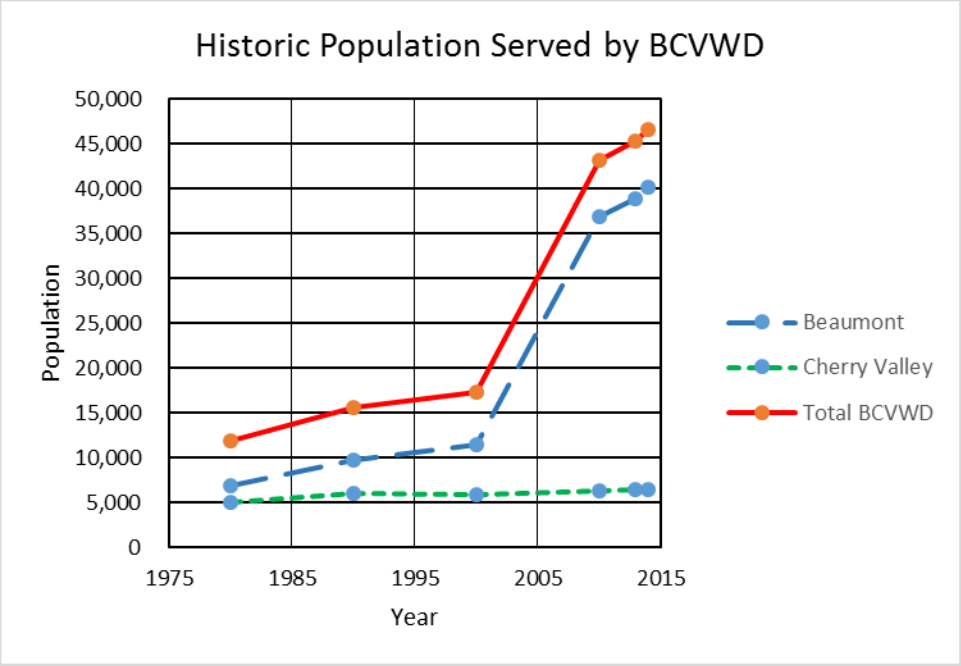

Figure 3-1
Historical Population Growth in District

The data in Table 3-1 and Figure 3-1 show very rapid growth for the City of Beaumont from the year 2000 to 2010. About 2/3 of this growth occurred between 2000 and 2007 based on building permits issued by the City of Beaumont. The high rate of growth continued until mid-2008 when development slowed markedly following the economic turndown in the US and California. The population in Cherry Valley remained relatively constant since 1990. A few homes were constructed, but not many. During the period from 2000 to 2008, the community of Cherry Valley did not experience the same growth spurt that occurred in the City of Beaumont and other areas in Western Riverside County.

The U.S. Census Bureau, American Fact Finder provided some information about the housing units in Beaumont and Cherry Valley. This information is presented in Table 3-2.

Table 3-2
Housing Characteristics

Housing Type	Percent of Total Housing Units (2013 data)	
	Beaumont	Cherry Valley
Single Family	89.2%	73.1%
Multi-family	7.7%	0.3%
Mobile Home	3.1%	26.6%
Age of Housing	61.5% since 2000 68.4% since 1990	6.8% since 2000 86.4% since 1960

Figure 3-2 shows the number of single family home building permits issued in the City of Beaumont for the years 2002 through 2015. Although not shown in the Figure, the permits started picking up in 1999-2000 and reached their peak in 2005 with 2,300 new home permits issued for that year. The number of permits for new homes declined to a low of 169 in 2011. Over the last 8 years, permits averaged 346 per year; over the last 3 years, permits averaged 449 per year. The 14-year average was 772 per year. **Future growth will likely be in the range of 400 to 600 permits per year, although some developers have projected slightly higher amounts in their build-out forecasts**.

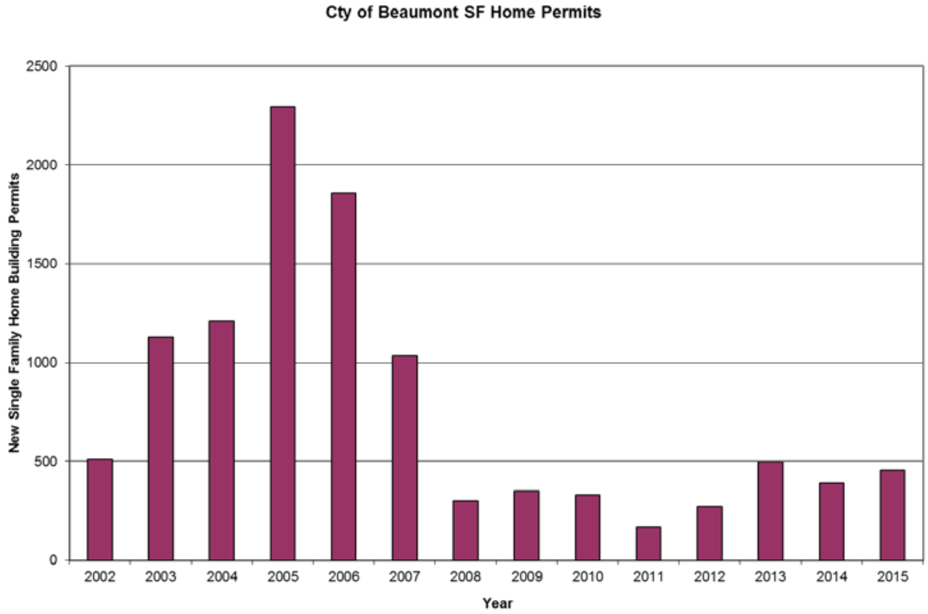

Figure 3-2
Growth in Beaumont as Shown by Single Family Home Building Permits

BCVWD Historic Connection Growth

Figure 3-3 shows the growth in total connections (services) within BCVWD's service area. Virtually all of these occurred in the City of Beaumont. Total connections at the end of 2015 was 16,985 as stated in the 2016 BCVWD Operating Budget. Total metered connections at the end of 2014 was 16,577 as stated in the 2015 BCVWD Annual Budget. Prior to the year 2000, the District had about 5,600 total connections. The number of connections increased steadily until about 2008 when the annual increase began to slow down and level off.

The peak year was 2005 when 2,433 connections were added. For 2009 and 2015 the increase was just under 350 connections per year. The average for the period 2001 through 2015 was 762 new connections per year. For 2014 and 2015, the District added 440 and 408 connections respectively. The number of connections dropped in 2011. This is more a function of the data collection which is taken from the total active accounts. The drop is likely due to the high number of foreclosures in the service area. Many of these accounts were "closed." Based on an analysis of the total number of connections and the population in the service area, there are about 2.80 people per connection.

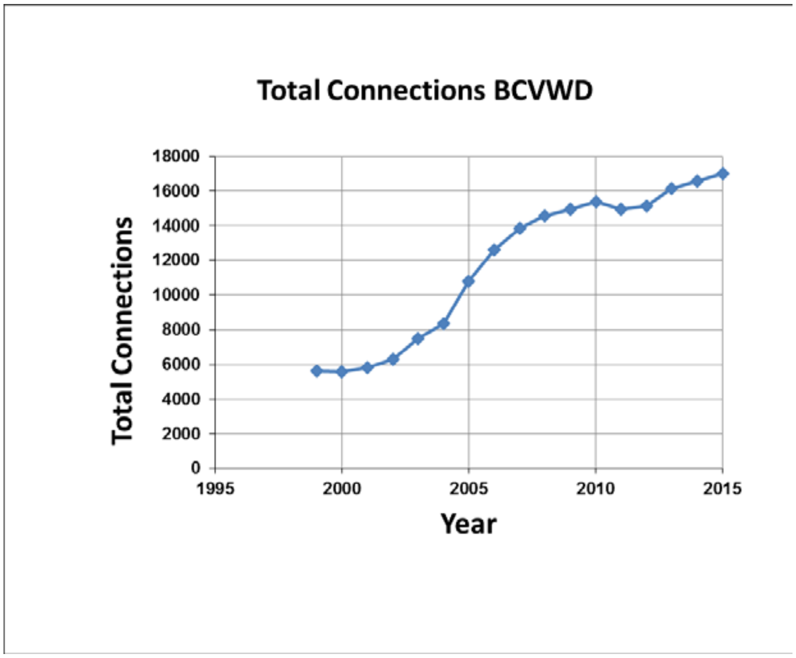

Figure 3-3
Connection Growth in BCVWD Since 1999

Projected Service Area Growth

In August 2012, BCVWD contacted the City of Beaumont[2] to determine the status of construction projects and developments. BCVWD was particularly interested in the number of units that were approved that still needed to be completed. Seven major developments were identified that are under construction. These are identified in Table 3-3 along with the number of dwelling units yet to be constructed as of August 2012.

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[2] Personal Communication, Dan Jaggers (BCVWD) with K. Warsinski (City of Beaumont), 8/1/2012

Table 3-3
Projects within BCVWD Service Area Under Construction (2012)

Development Name	Total Housing Units Approved	Housing Units Yet to be Constructed	Estimated Build-out Year
Seneca Springs	955	9	2012
Tournament Hills	1,094	387	2020
Sundance	4,716	2,788	2021[3]
Fairway Canyon SCPGA	3,566	2,351	2025
Aspen Creek	106	77	2014
Heartland	922	922	2035
Four Seasons	2,041	1,097	2025
Family Dollar Store	Commercial	---	2013
Totals	13,400	7,631	

Source: City of Beaumont Project Status 9/1/2012 and Personal Communication, D. Jaggers, BCVWD with City of Beaumont Aug, 2012)

Table 3-4 presents a list of projects that have be approved by the City of Beaumont but have not yet started construction.

Table 3-4
Projects Approved for Construction by City of Beaumont (2012)
but Have Not Started Construction

Development Name	Total Housing Units Approved	Estimated Build-out Year
Kirkwood Ranch	403	2030
Potrero Creek Estates	700	2040
Tract 32850	95	2025
Nobel Creek Meadows	648	2030
Hidden Canyon (see text)	411	2020
Sunny Cal Specific Plan	560	2025
Totals	2,817	

Source: City of Beaumont Project Status 9/1/2012 and Personal Communication, D. Jaggers, BCVWD with City of Beaumont Aug, 2012)

In Table 3-4, Hidden Canyon development may be changed to large distribution warehousing which would reduce the size from 411 EDUs to about 200 EDUs – a significant reduction in water demand.

Considering the housing units yet to be constructed plus the units which have been approved but not yet into construction (total of 10,448 units [7,631 + 2,817]), there will be an increase in population of about 29,300 people in the City of Beaumont based on a future estimate of 2.8

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[3] Miyashiro to Jaggers (2014). Sundance Future Phasing., Personal Communication, email July 8.

people/EDU. (Currently there are about 2.4 people per EDU District-wide.) This will bring the total population in the City of Beaumont to about 68,800.

There are several projects that are still under City of Beaumont review; these are presented in Table 3-5. These projects have a total of 6,725 units with would add another 18,800 people bringing the total population in the City of Beaumont to about 87,600 assuming 2.8 people/EDU. This population estimate close to the build out population presented previously. BCVWD estimated the City of Beaumont's build-out population would be 90,600 was based on average densities within the various land use categories. The 87,600 estimate is very close to the City of Beaumont's General Plan build out population of 87,200.[4]

Not included in Tables 3-3 and 3-4 are a number of industrial/commercial developments. These include Dowling Orchard Business Park (26.3 ac), Farmer Boys (0.62 ac), Ramona Tire (0.44 ac) and Mountain Bridge (38 ac). (The Dowling Orchard Business Park, Farmer Boys, and Ramona Tire have been completed as of end of 2015.) The water demand for these facilities is estimated to be the equivalent of 225 EDUs on the basis of 2,000 gallons/day/acre. These projects would bring the total EDUs to 17,398, i.e. (10,448+6,725+225) but the population in the City of Beaumont would remain at 87,600.

Table 3-5
Projects Under Review by City of Beaumont (2012)

Development Name	Total Housing Units Approved	Estimated Build-out Year
Taurek (Potrero/Viele, TR-31162)	244	Unknown
Jack Rabbit Trail	2,000	Unknown
The Preserve/Legacy Highlands Specific Plan	3,412	Unknown
American Villas (693 American Ave)	36	Unknown
Eighth St. Condos (1343 Eighth St.)	16	Unknown
Pennsylvania Ave Apts (850 Penn Ave)	8	Unknown
Beaumont Commons Affordable Housing (Xenia, 6th -8th St)	120	Unknown
Tuscany Townhomes (8th Xenia)	188	Unknown
Tournament Hills 3 (TM 36307)	233	Unknown
Oak Valley Senior Center (Oak Valley Pkwy/Oak View)	372	Unknown
Hidden Canyon II	82	Unknown
Beaumont Distribution Center	14 (EDUs)	Unknown
Totals	6,725	

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[4] City of Beaumont General Plan, March 2007, page 25.

Cherry Valley Population Growth and BCVWD Served Population

As presented previously, the ultimate build-out population served by BCVWD for Cherry Valley based on the Pass Area Land Use Plan[5] densities is 21,700 people or about 7,750 EDUs. This is based on an increase to 2.8 persons per EDU projected at build-out.

There are 2,874 housing units in Cherry Valley in 2010 per the census data, but 26.6% of those are mobile homes. The 2,874 housing units are equivalent to about 2,485 EDUs. So build-out will result in about another 5,265 new EDUs. The Sunny Cal Egg Ranch Development (560 EDUs), included in the City of Beaumont, is actually within the Cherry Valley area and would have been included among the 5,265 EDU increase for Cherry Valley. So to avoid "double counting," the Sunny Cal Egg Ranch EDUs were deducted resulting in a net projected 4,655 EDU increase for Cherry Valley.

Except for the Sunny Cal Egg Ranch project, BCVWD believes the bulk of the 4,655 Cherry Valley EDUs will not be constructed until after 2030.

Build-out Population

The BCVWD service area build-out or "saturation" population was determined using the City of Beaumont's Zoning Map from the City's General Plan[6] and the District's Geographic Information System (GIS) to determine the total areas of the various zoning categories in the District's SOI. Actual GIS data was obtained from the City and integrated into the District's GIS system to determine the land use within the District's SOI. The zoning designation included a range of dwelling units/acre. An average value was used in the build-out analysis. The District's estimate of the City of Beaumont's build-out population is 90,600. (The City's General Plan, page 25, states the build-out population is 87,200; so the District's estimate is reasonable.)

The same approach was used for Cherry Valley, only this time data from Riverside County General Plan, Pass Area Land Use Plan was used[7]. Again the GIS data set was obtained from the County and integrated into the District's GIS system to determine the land use category areas within the District's SOI. Build-out population for Cherry Valley, within the BCVWD's SOI is 21,700 people.

Total estimated build-out population within the BCVWD's SOI is 112,300 or about 2.6 times the current population. BCVWD believes this population would not be reached until well beyond 2050 or 2060, if ever.

The build-out population is a function of the local zoning; this could change at any time resulting in an increase or reduction in the build-out population. Changes in the SOI boundary by LAFCO would also affect the ultimate population served.

Combining the City of Beaumont population from the developments, (87,600 presented previously), and the Cherry Valley build-out population, (21,700 presented above), the total population served by BCVWD is projected to be 109,300. This matches closely to the GIS land use based estimate of 112,300 presented previously. The 112,300 estimate will be used as the District's build-out, served, population for planning purposes.

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[5] Pass Area Land Use Plan, October 7, 2003, Part of Riverside County General Plan.

[6] City of Beaumont General Plan, Adopted March 2007.

[7] The Pass Area Land Use Plan, October 7, 2003. (Part of Riverside County General Plan)

Existing EDUs and EDU Growth to Build-out

BCVWD uses Equivalent Dwelling Units (EDUs) to calculate and project potable water demand. BCVWD Rules and Regulation, Section 5, defines the water use as 580 gal/EDU/day. This is equivalent to 0.65 AFY/EDU. An analysis is presented in Section 4, Table 4-5, which supports this demand. During 2014, 12,657 AF of water was pumped by the District to meet demands. This would imply there are **19,470 EDUs currently (2014) served by the District**. Based on a population of 46,710, (Table 3-1), there are about 2.4 people per EDU at the present time. The District expects this to increase to about 2.8 people per EDU over time as rural areas become more urbanized.

Based on the developments listed in Tables 3-3 through 3-5 presented previously, tentative tract maps, specific plans, and other planning maps were reviewed to identify the growth in the number of EDUs within the District's pressure zones over time. One of the developers, Sundance, provided BCVWD with a projected development schedule[8]; this was factored into the anticipated growth of EDUs within the District's service area. A build-out year for the projects was established based on the developers' estimate and the area's past history for absorbing new housing units.

Based on the past history of building permits in the City of Beaumont, presented previously in Figure 3-2, a constraint of about 600 to 700 or so EDUs per year is believed to be a reasonable market assimilation rate for the area. This is somewhat below the "boom" years, but similar "boom" years are not expected to occur in the future. Table 3-6 is a summary of the additional EDUs over time by pressure zone. The 927 EDUs per year average from 2015 to 2020 is greater than the 600 to 700 EDUs mentioned above; but this higher construction rate is due to the number of tracts that were approved and started construction before the economic turndown brought a "halt" to these developments. A number of these tracts were fully graded with utilities already installed. As a result they are "ready to go" and developers want to get these projects finished as soon as possible.

The growth in EDUs will be the basis for projecting the water demand for the master plan.

Figure 3-4 shows the historic population served by BCVWD and the projected population served on the basis of an estimated future 2.8 people/EDU. The projected growth rate to the year 2045 is slightly lower than the "boom" years 2000 to 2010. BCVWD believes this growth rate is conservative for planning purposes. It is doubtful the growth rate for the next 30 years will exceed the rates shown in Figure 3-4.

This potable water master plan should be reviewed and updated every 5 to 7 years; during each review, the development potential and timing will be reviewed. Adjustments to the facility needs schedule can be made at that time. In the interim, if facilities are constructed to meet the growth projected in this master plan, adequate facilities will be in place, but they may be temporarily larger in size than needed at the time.

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[8] Miyashiro to Jaggers (2014). Sundance Future Phasing., Personal Communication, email July 8

Table 3-6
Summary of New EDUs by Pressure Zone

Pressure Zone	**Cumulative New EDUs**							
	2015	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**Build-out**
3620	1	1	4	13	28	83	112	233
3330	1	1	4	13	28	83	112	233
3150	1	1	4	13	28	83	112	233
Highland Springs	No change in EDUs							
3040	92	1064	1097	1190	1355	1966	2280	3612
2850	276	1795	1804	1830	1875	2041	2127	2490
2750	200	996	2107	3445	4532	5048	5284	6019
2650	193	795	1592	2389	3136	3660	3975	5142
2520	153	898	1770	2742	3715	4549	4549	4549
2370	No change in EDUs							
Totals	918	5553	8383	11633	14696	17513	18550	22,511
Average New EDUs/year		927	566	650	612	563	207	

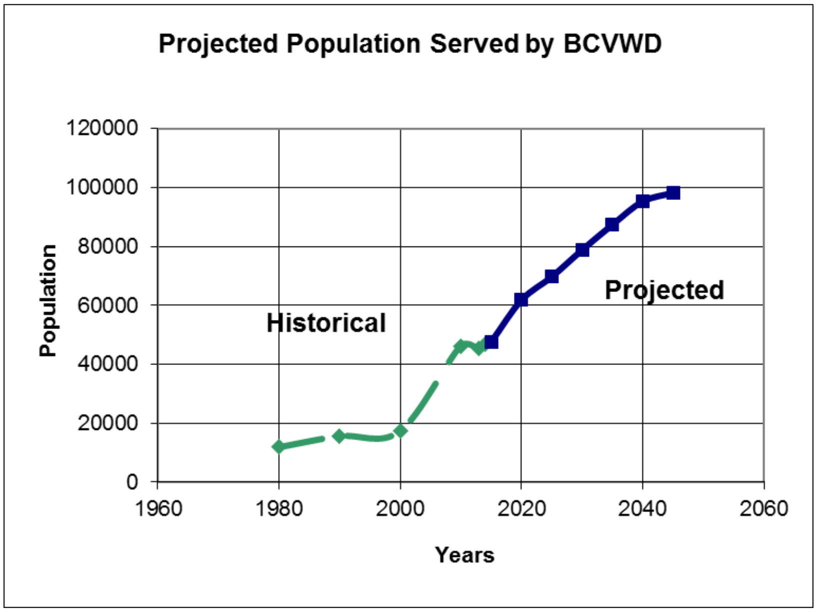

Figure 3-4
Historic and Projected Population Served by BCVWD
(based on EDU growth rate)

Land Use

Figure 3-5 shows the distribution of land use within the District's SOI based on the City of Beaumont and Riverside County Zoning as presented in the latest General Plans. This does not necessarily represent the current land use distribution. Almost 50% of the land use is residential; 39% is open space, conservation or rural mountainous.

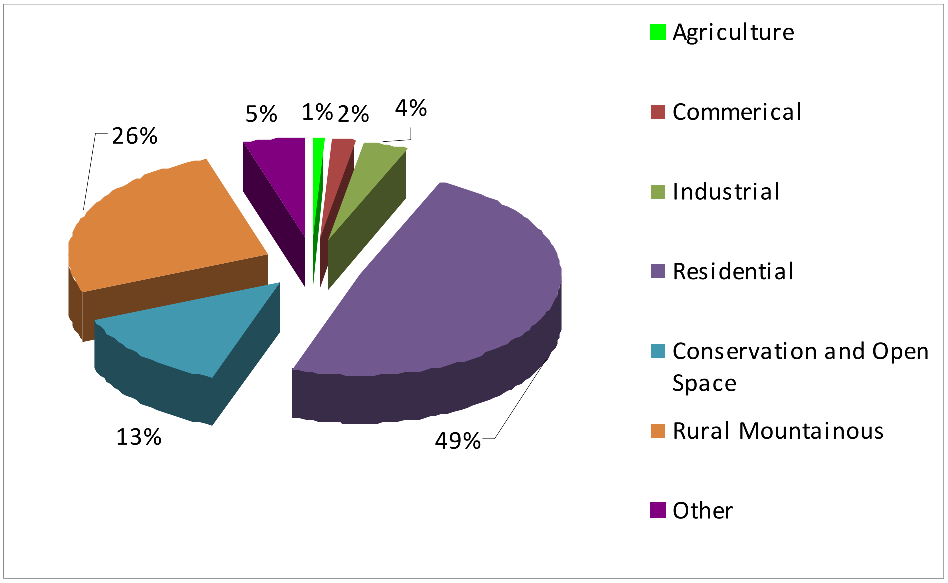

Figure 3-5
Land Use Distribution within BCVWD SOI based on Current Zoning

It should be pointed out during the last few years, the City of Beaumont has been promoting rezoning of residential zoning areas to commercial and industrial zoning in areas currently being considered for development. Those areas include projects listed in Tables 3-3, 3-4 and 3-5, such as the Heartland Development, the Hidden Canyon Development and possibly the Jack Rabbit Trail Development. This would result in a significant reduction in the water demand.

Impact of Potential Growth Limitation Initiative

In late 2015 there was discussion of a resident sponsored initiative that would limit the number of new housing units in the City of Beaumont to 350 units per year, 300 if in a planned community. There was discussion to try to get this on the November 2016 ballot. The impact this potential initiative would have on the District's EDU projections in this Master Plan is best illustrated by Figure 3-6. First it is not likely the initiative will affect those projects which have some form of entitlement so the impacts will likely not be manifested for some time. But if implemented it would likely cause the projects identified in this Master Plan to be deferred by as much as 10 years or so.

Based on Figure 3-6, if the initiative were implemented, BCVWD's year 2045 potable demand would be reduced by about 20 percent.

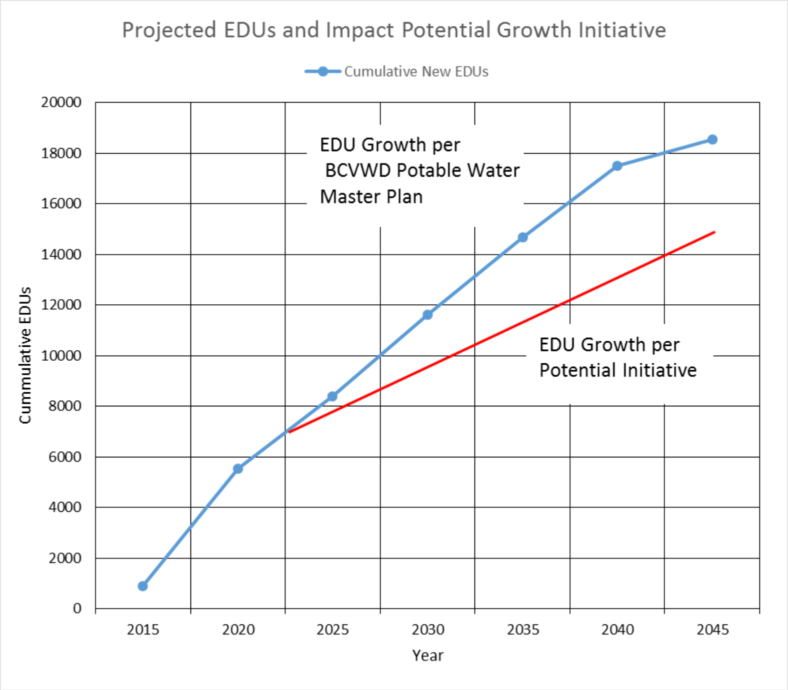

Figure 3-6
Possible Impact of Growth Initiative on BCVWD Planning

Section 4

Potable Water Demands

Historic and Present Water Demands

Data from the District's well production records for the period 2005 through 2014 is summarized in Table 4-1. This represents the total amount of water "into the system," since the District does not take any direct potable or non-potable deliveries at this time.

Table 4-1
BCVWD's Historical Well Production (2005 -2014)

Year	Average Annual		Average Day on Maximum Month	Maximum Day	
	AFY	mgd	mgd	mgd	Date
2005	9306	8.31	13.49	17.0	July 16
2006	11,503	10.27	16.53	20.7	July 16
2007	13,165	11.75	17.68	23.8	July 15
2008	13,548	12.09	16.75	20.6	Aug 16
2009	12,764	11.39	19.87	22.1	July 19
2010	11,034	9.85	16.34	19.7	Aug 10
2011	11,729	10.47	16.48	19.8	June 29
2012	12,152	10.85	16.66	19.8	Aug 10
2013	12,830	11.45	16.35	20.2	Aug 25
2014	12,657	11.30	16.78	17.05	July 9

The maximum day demand reached an historic high of 23.8 mgd in 2007; this was just before much of the housing construction almost stopped. This high demand was undoubtedly due to the demand for construction water, (which the District meters), and the relatively large amounts of water used to establish landscaping in the new subdivisions and common areas. From 2010 through 2013, the maximum day demand has held steady at about 20 mgd or slightly more, even though the average annual pumping increased slightly. The maximum day was appreciably lower in 2014, probably due to the reduction in outdoor water use brought on by the State of California water conservation directive (Gov. Brown's Executive Order B-29-15) associated with the drought.

It is interesting to note that in 2010 the average annual demand dropped significantly from the previous years. It is believed this was due to a number of vacant houses due to foreclosures, "belt-tightening," and water conservation in the occupied houses. A small reduction also occurred in 2014, but this was due to the drought and the resulting mandate to reduce residential water consumption which occurred in mid-2014.

In 2014, the District's water sales total for 2014 was 11,991 acre-ft based on individual meter records. The amount pumped was 12,657 acre-ft, which would indicate about 5.3 percent "loss" or non-revenue water, which is good. However, this may not be accurate due to a number of factors all related to the timing between when the water is pumped and when it is actually billed. Residential customers are billed bi-monthly, but not all of the residential customers are billed on the same month. Landscape irrigation accounts and large commercial users are billed monthly.

The District meters all fire services with “tattle tale” meters to detect low water use and leaks, meters all hydrant construction water, is vigilant about quickly repairing water leaks, and uses SCADA to prevent reservoir overflows. As a result it is believed the District’s non-revenue or “unaccounted for” water may be less than the 5.2% indicated above.

Variations in Demand

BCVWD exhibits seasonal and daily variations in demand typical of the Inland Empire. Cool, generally wet winters reduce outdoor consumption to a minimum, but wind and increasing temperatures in late spring and summer cause outdoor water demands to increase dramatically. Table 4-2 shows the historic ratios of maximum month and maximum day to average annual demand from 2005 to present.

Table 4-2
Historical Ratios of Maximum Month and Maximum Day to Annual Average

Year	Average day on Max Month/Average Annual	Maximum Day/Average Annual
2005	1.62	2.05
2006	1.61	2.02
2007	1.50	2.03
2008	1.39	1.70
2009	1.74	1.94
2010	1.66	2.00
2011	1.57	1.89
2012	1.54	1.83
2013	1.43	1.77
2014	1.48	1.51
Average	1.55	1.87
Use for Planning Purposes	1.6	2.0

Review of previous water system master plans completed by the District and its consultants show that the ratio of the maximum day demand to the average annual demand has declined from that experienced and used in previous master plans. For example in the 1986 master plan, which was based on data from the early 1980s, the ratio of the maximum day/ average annual demand was 2.25; the 1994 master plan data indicated the ratio was even higher at 2.32. For comparison Eastern Municipal Water District uses a maximum to average day ratio of 2.0 to 2.5 depending on the size of the pressure zone; YVWD uses a ratio of 2.0. So the District’s experience is similar to adjacent agencies.

Previous master plans had used a peak hour to average day ratio of 3.20 or a peak hour demand of 1.4 times the average demand on the maximum day. A typical diurnal demand curve[1] was used in previous master plans.

Using BCVWD's SCADA system it was possible to develop the hourly demand variations over a typical 24-hr period using a simple mass balance approach. Both the 2650 and 3040 pressures zones were analyzed. For the 2650 Zone, one day in winter, summer and early fall were analyzed. Figure 4-1 shows the results. The diurnal curve used in previous master plans is shown for reference.

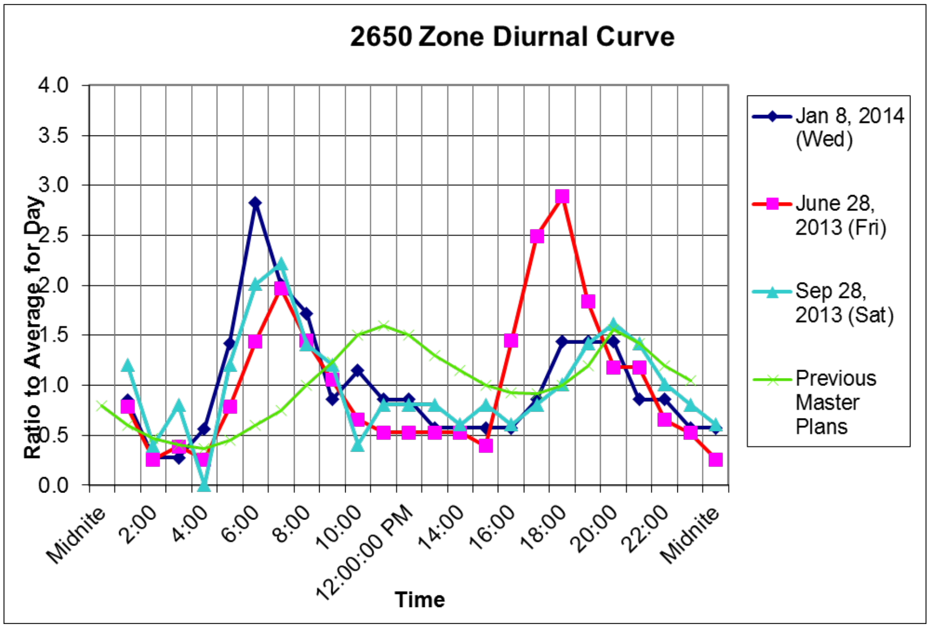

Figure 4-1
2650 Pressure Zone Diurnal Curve

Some conclusions:

- Morning peaks tend to occur very early, probably because many residents in the area are getting ready for a relatively long commute to work. Fridays and Saturdays have a lower peak and it occurs later in the morning as residents "sleep in."
- Winter evening peaks are lower than the morning peak. But summer evening peaks are higher as more lawn watering occurs later at night. The day analyzed, June 28, 2013, had consumption very nearly equal to the maximum day for the year.
- The morning peak is substantially greater than that used in previous master plans and is significantly earlier in time. The summer irrigation peak in the evening is much greater than the peak used in previous master plans.

For modeling and analysis purposes, the summer curve will control since the demands during the summer are so much greater than during the winter. Figure 4-2 presents the "smoothed"

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[1] Diurnal curve is a plot of the variations in water demand over a 24-hr period. Districts' typically experience two peaks during the period – hence the term "diurnal."

diurnal curve for the 2650 Zone which will be used for the 2850 Zone and all pressure zones below 2850.

For the 3040 Zone, June 28, 2013, was analyzed; Figure 4-3 shows the typical early morning peak and a late evening peak – again reflective of the near maximum day irrigation condition. The data used to develop the 3040 Zone diurnal curve is not as reliable as the data used for the 2650 Zone, so the 3040 Zone curve can be considered "approximate" at best due to estimates of well production and booster pump output and pressure regulator status. The "approximation" is due to uncertainty in the output of the Cherry Avenue Boosters (21A and B) and the amount of water, if any, which is released through unmetered pressure regulators from higher pressure zones. A "smoothed curve" was developed, and shown in Figure 4-3, to represent a more typical summer day. The smoothed 3040 Zone curve will be used for the planning and analysis of all pressure zone 3040 and above. These zones currently represent the more-rural development in Cherry Valley.

Table 4-3 shows the diurnal curve hourly ratios used in the modeling and storage analysis.

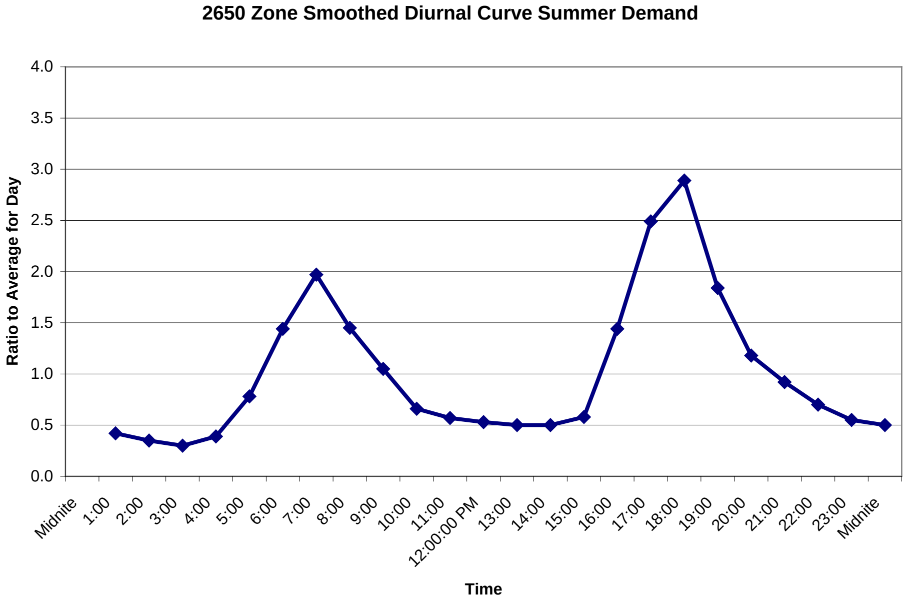

Figure 4-2
Smoothed Diurnal Curve for
Pressure Zones 2850 and Lower

For the 2850 Pressure Zone and below, the peak hour demand on the maximum day is 2.89 times the average for the day. Considering the maximum day demand is 2.0 times the average annual demand, the peak hour would be 5.8 times the average annual demand. For comparison, for a pressure zone similar to the 2650 Zone analyzed, Eastern Municipal Water District would use a peak hour to average daily demand ratio of 5.0 for a pressure zone similar to the current 2850 Zone. Yucaipa Valley Water District uses a peak hour to average daily demand ratio of 4.0. Based on this, the District's criteria is not much different.

Current Demands by Pressure Zone

Table 4-4 shows the current (2013) annual demands by pressure zone based on the District's meter records. The irrigation water is scheduled irrigation water delivered to agricultural customers through the potable water system The non-potable water system demands are also shown. This system is separate from the potable water system, but is currently pressurized with potable water. Eventually this system will be converted over to recycled and other non-potable water.

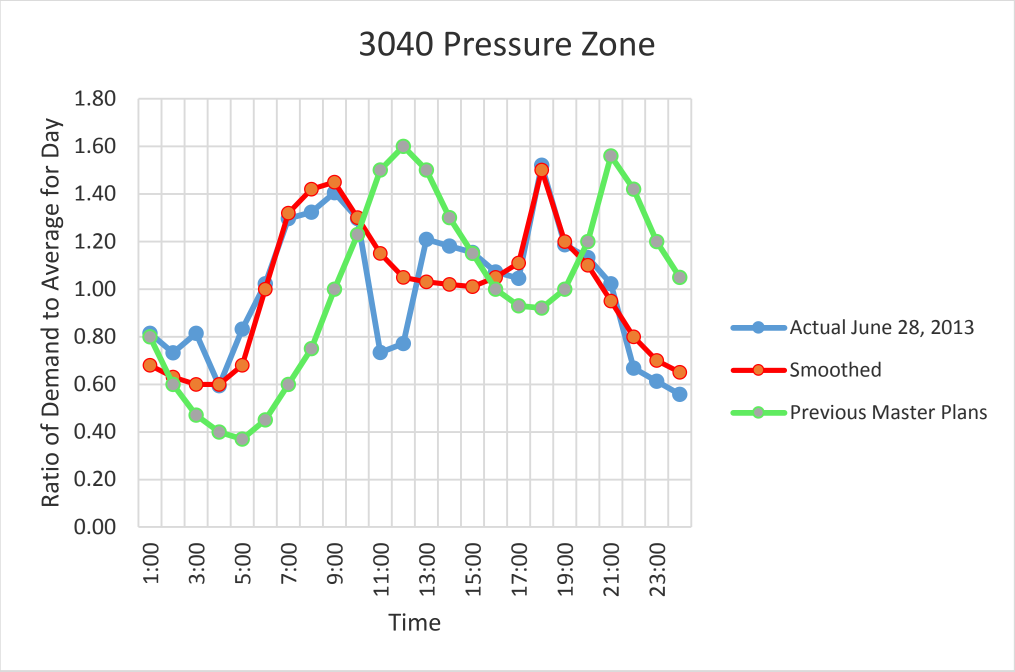

Figure 4-3
3040 Pressure Zone Diurnal Curve
(Use for Pressure Zones 3040 and Above)

Projected Water Demands

Section 3 presented the number of new EDUs within each pressure zone by 5-year period to 2045 plus build-out. This section will use those EDUs as a basis for projecting the water demands for these same periods.

Unit Demand Factors

In previous master plans and water supply studies, BCVWD used 0.61 to 0.65 AFY/EDU as the basis for planning and determining Facilities Fees for non-residential construction. There have been a number of developments that were constructed since the year 2000 which provide data on water consumption per residence. These developments have separate, metered services for non-potable water, so determining the potable water demand is simple and direct.

Table 4-5 presents a summary of the water use for the year 2013 in various developments based on individual meter records. Unoccupied, or very low individual water use, residents were excluded. The vast majority of the homes were constructed during the housing boom in the early to mid-2000s and the lawns and landscaping is well established by year 2013 when the water use analysis was completed.

Table 4-3
Smoothed Summer Diurnal Curves

Time	2850 Pressure Zone and Below	3040 Pressure Zone and Above		Time	2850 Pressure Zone and Below	3040 Pressure Zone and Above
1 am	0.42	0.68		1 pm	0.5	1.03
2	0.35	0.63		2	0.5	1.02
3	0.3	0.6		3	0.58	1.01
4	0.39	0.6		4	1.44	1.05
5	0.78	0.68		5	2.49	1.11
6	1.44	1		6	2.89	1.5
7	1.97	1.32		7	1.84	1.2
8	1.45	1.42		8	1.18	1.1
9	1.05	1.45		9	0.92	0.95
10	0.66	1.3		10	0.7	0.8
11	0.57	1.15		11	0.55	0.7
Noon	0.53	1.05		Midnight	0.5	0.65

Table 4-4
Current (2013) Annual Demands by Pressure Zone

Pressure Zone	Potable		Irrigation (currently from Potable)		Non-Potable Book 45 (currently from Potable)		Total For Pressure Zone	
	Acre-ft	Accts	Acre-ft	Accts	Acre-ft	Accts	Acre-ft	Accts
2370	211	365	0.0	0	24	14	235	379
2520	621	852	0.0	0	109	19	729	871
2650	905	1,430	0.0	0	0.0	0	905	1,430
2750	5,155	7,721	28	6	1,647	265	6,830	7,992
2850	1,976	3,046	4	7	0.0	0	1,981	3,053
3040	1,419	1,626	39	59	0.0	0	1,458	1,685
Bridges 3150	51	39	1	1	0.0	0	51	40
Highland Springs 3180	136	376	0.0	0	0.0	0	136	376
3330	432	298	18	14	0.0	0	449	312
3620	159	97	11	5	0.0	0	171	102
Totals	11,064	15,850	101	92	1,780	298	12,946	16,240

Table 4-5
Development Potable Water Use in 2013

Subdivision	BCVWD Meter Book(s)	Occupied Services	Total AFY	AFY/service (AFY/EDU_
Sundance	47, 48	1,083	685	0.63
Pulte Fairway Drive (Active Adult)	73, 74, 75	961	502	0.52
Khov Four Seasons (Active Adult, dual plumbed subdivision)	21	1,108	355	0.32
Three Rings Ranch	29	504	355	0.70
Tournament Hills	80	900	568	0.63
Fairway Canyon	85, 86	1,202	834	0.69
Miranda (E/o Beaumont Ave, N/o Oak Valley Pkwy)	46, 69, 70	987	616	0.62
Oak Valley Greens, Oak View Drive	71	335	279	0.83
Solera (Snowberry Rd.)	78	347	218	0.63
Corman Leigh (Monte Verde Dr.)	79	189	134	0.71
Ryland (Oak Valley Pkwy)	81	231	163	0.71
Seneca Springs/Empire Homes	24, 25, 26, 27	1,052	670	0.64
All Developments		8,899	5,379	0.60
“Conventional” Developments Only		6,830	4,522	0.66
Use for Planning Purposes				**0.65**

In Table 4-5, the “per EDU” water use in Khov Four Seasons development is only 0.32 AFY/EDU. This is due to the fact that there is very little yard space and the common areas and the front lawns are all on the non-potable water system. This area is classified as a “dual plumbed subdivision.”

Pulte’s Active Adult community along Fairway Drive also has a lower water use per EDU than some of the other areas. Again this is likely due to common areas on the non-potable water system and smaller yards.

The other more-conventional developments have a range of water consumption from 0.62 to 0.83 AFY/EDU. The average water use for the “conventional” developments is 0.66 AFY/EDU. Considering all of the developments in Table 4-5, the average is 0.60 AFY/EDU.

BCVWD Rules and Regulations, Section 5, defines an EDU as 580 gal/EDU/day. This is **equivalent to 0.65 AFY/EDU which is consistent with the data in Table 4-5** and which will be **used in this master plan** for water demand projections. This may be adjusted in future master plans.

Impact of Water Efficient Landscaping Ordinances

The City of Beaumont and Riverside County adopted new water efficient landscaping ordinances in compliance with AB 1881 before January 2010. This affects new projects. The goal of the ordinances is to make sure landscaping water use does not exceed 70% of the reference evapotranspiration, ETo. Outdoor water use is about half of the water use in a conventional home. It is likely that implementation of these ordinances will result in some water use reductions perhaps 10% or more of total EDU water use. The impact of that reduction can be verified in future master plan updates.

A revised model landscape water efficiency ordinance was issued in draft form July 15, 2015, in response to the Governor's Executive Order B-29-15, which reduced landscape water use to 55% of ETo for residential projects and 45% of ETo for other types of projects. It also reduced the landscape project size covered by the revised ordinance down to 500 sq ft or larger. DWR estimates that residential landscape water use will be reduced by 12,000 gal/year or about 20% below that of the September 2009 ordinance.

With increased interest in energy and water efficient homes, developers are constructing homes which have almost exclusively low water using landscaping and little or no turf areas; some even have installed artificial turf. These homes use substantially less water than the conventionally landscaped home. This will have the net effect of reducing the District's water demand in future years as more of these types of home are constructed.

BCVWD believes that impact of the new landscape water efficiency ordinances could result in as much as a 20% reduction in current residential water use over time.

Projected Demands by Pressure Zone

Table 4-6 presents the current and projected average annual potable water demands, in AFY, within each pressure zone out to ultimate build-out based on 0.65 AFY/EDU for each new EDU. The table reflects an accelerated development schedule presented for the Sundance Project.

Table 4-6
Projected Average Annual Potable Water Demand by Pressure Zone, AFY

Pressure Zone	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
3620	170	171	171	173	179	188	224	243	322
3330	449	450	449	449	454	462	497	514	593
3180 Highland Springs Hydro	136	136	136	136	136	136	136	136	136
3150 Bridges	51	51	52	54	59	69	105	124	202
3040	1,458	1,514	2,146	2,160	2,215	2,318	2,709	2,906	3,767
2850	1,981	2,159	3,145	3,149	3,166	3,195	3,303	3,359	3,595
2750	6,830	6,959	5,816	6,532	7,394	8,100	8,436	8,589	9,067
2650	905	1,031	1,422	1,940	2,458	2,944	3,284	3,489	4,248
2520	729	829	1,204	1,771	2,403	3,035	3,577	3,577	3,577
2370	235	235	211	211	211	211	211	211	211
Totals	**12,946**	**13,535**	**14,753**	**16,576**	**18,674**	**20,658**	**22,483**	**23,148**	**25,718**

The 2750, 2520 and 2370 Pressure Zones include the potable water in the non-potable water system for the years 2013 and 2015. It is assumed the non-potable water system will be fully operational by 2020. Table 4-7 and 4-8 present the average day and maximum day potable water demands by pressure zone based on a maximum day/average day ratio of 2.0.

Table 4-7
Projected **Average Day** Potable Water Demand by Pressure Zone, mgd

Pressure Zone	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
3620	0.15	0.15	0.15	0.15	0.16	0.17	0.20	0.22	0.29
3330	0.40	0.40	0.40	0.40	0.40	0.41	0.44	0.46	0.53
3180 Highland Springs Hydro	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
3150 Bridges	0.05	0.05	0.05	0.05	0.05	0.06	0.09	0.11	0.18
3040	1.30	1.35	1.92	1.93	1.98	2.07	2.42	2.59	3.36
2850	1.77	1.93	2.81	2.81	2.83	2.85	2.95	3.00	3.21
2750	6.10	6.21	5.19	5.83	6.60	7.23	7.53	7.67	8.09
2650	0.81	0.92	1.27	1.73	2.19	2.63	2.93	3.11	3.79
2520	0.65	0.74	1.07	1.58	2.14	2.71	3.19	3.19	3.19
2370	0.21	0.21	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Totals	**11.56**	**12.08**	**13.17**	**14.80**	**16.67**	**18.44**	**20.07**	**20.66**	**22.96**

Table 4-8
Projected **Maximum Day** Potable Water Demand by Pressure Zone, mgd

Pressure Zone	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
3620	0.30	0.31	0.31	0.31	0.32	0.34	0.40	0.43	0.57
3330	0.80	0.80	0.80	0.80	0.81	0.82	0.89	0.92	1.06
3180 Highland Springs Hydro	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
3150 Bridges	0.09	0.09	0.09	0.10	0.11	0.12	0.19	0.22	0.36
3040	2.60	2.70	3.83	3.86	3.95	4.14	4.84	5.19	6.72
2850	3.54	3.85	5.62	5.62	5.65	5.70	5.90	6.00	6.42
2750	12.19	12.42	10.38	11.66	13.20	14.46	15.06	15.33	16.19
2650	1.62	1.84	2.54	3.46	4.39	5.26	5.86	6.23	7.58
2520	1.30	1.48	2.15	3.16	4.29	5.42	6.39	6.39	6.39
2370	0.42	0.42	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Totals	**23.11**	**24.16**	**26.34**	**29.59**	**33.34**	**36.88**	**40.14**	**41.32**	**45.91**

Figure 4-4 shows the District's total average potable water demand over time to build-out with and without conservation. For the conservation alternative, 20% conservation is assumed from 2020 through build-out. Also for comparison, the potable water demand from the District's 2013 UWMP Update is included. As can be seen, the current projections, with conservation, closely match the 2013 UWMP projections. The current projections, without conservation, show an acceleration in the demand of about ten years

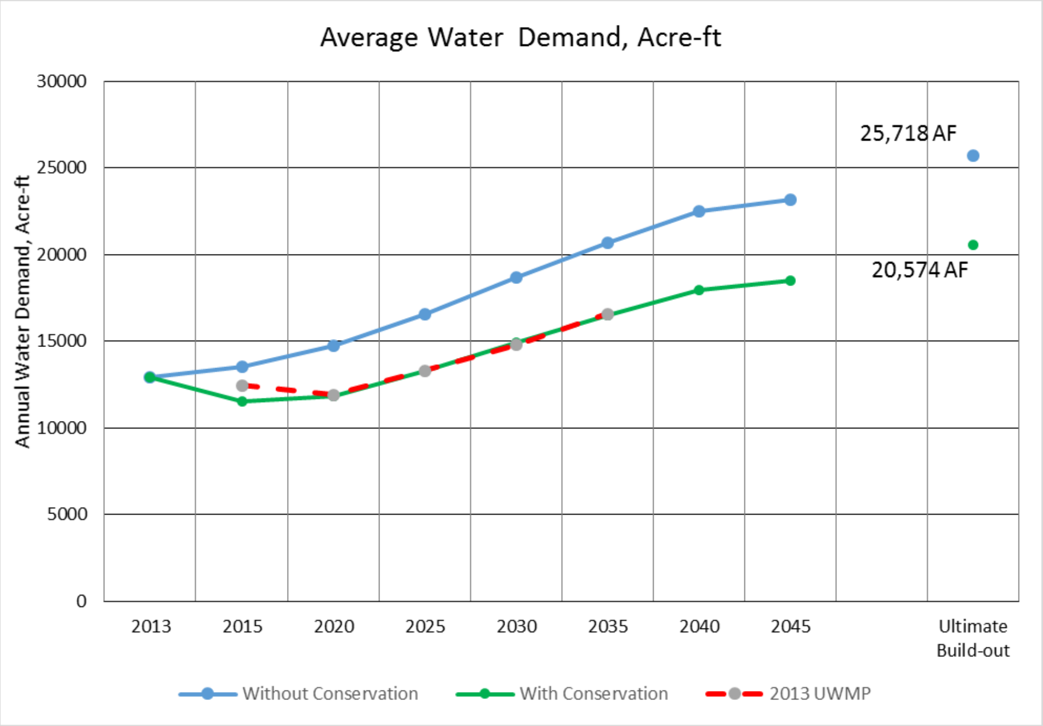

Figure 4-4
BCVWD Average Annual Water Demand

Figure 4-5 graphically shows the increase in maximum day demand in the BCVWD system over time with and without conservation. Without conservation, the current demand for potable water will double at build-out.

Fire Flow Requirements

Water requirements to fight fires are mandated by the City of Beaumont or Riverside County Fire Marshall depending on the location within the District. The requirements vary depending on height and size, type of structure, type of adjacent structures, and other factors. These demands must be met from the distribution system within the land use area with a residual pressure of at least 20 psi for a specified duration. The fire flow requirement is added to the average demand on the maximum day for water distribution system analysis.

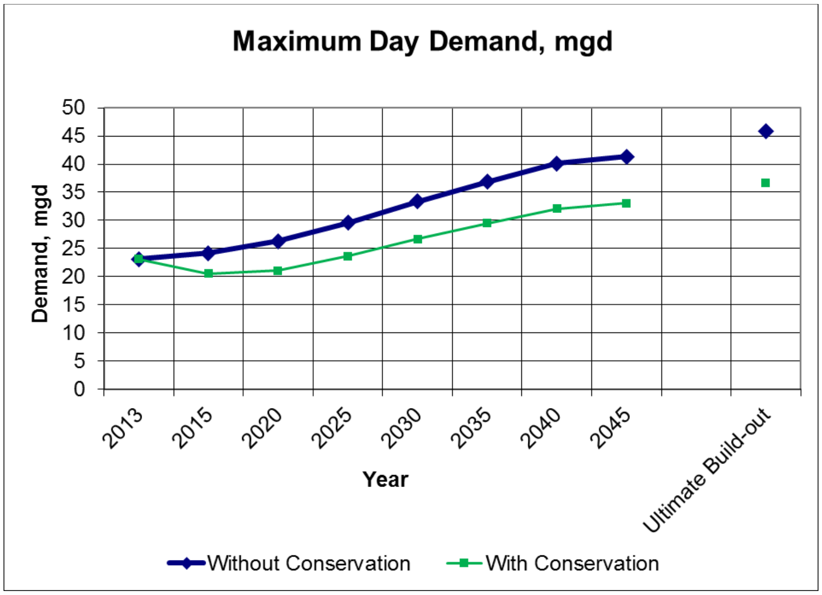

Figure 4-5
BCVWD Maximum Day Water Demand

Table 4-9
Fire Flow Requirements for Master Planning Purposes

Pressure Zone	Current		Future (2020 and beyond)	
	Flow, gpm	Duration, hr	Flow, gpm	Duration, hr
3620, 3350, 3150	1,000	2	1,000	2
Highland Springs Hydropneumatic	1,000	2	1,000	2
3040	1,500	2	1,500	2
2850	2,000	3	2,000	3
2750	4,000	4	4,000	4
2650	2,000	3	4,000	4
2520	1,500	2	4,000	4
2370	1,500	2	1,500	2

The reason for the large fire flow requirement in the future for the 2650 and 2520 Pressure Zones is the potential for large warehousing. The 4,000 gpm fire flow requirement is typically only required in the major commercial and warehousing areas in the 2750, 2650, and 2520 Pressure Zones. In the residential areas in these pressure zones, 1,500 gpm would be adequate for single family areas and 2,000 gpm for multi-family residential.

Section 5

Potable Water Supply to Meet Demands

This section describes the District's plan for meeting the water demands presented in Section 4. The non-potable water demands are addressed with the potable demands because the non-potable water system may have to be supplemented with potable water, imported water or other water at times.

The water sources available to BCVWD are listed in Table 5-1

Table 5-1
Current and Potential Sources of Water for BCVWD to Meet Demands

Water Source	Current	Future
Edgar Canyon Groundwater	X	X
Beaumont Basin Groundwater[1]	X	X
Imported Water through SGPWA	X	X
Recycled Water from City of Beaumont and YVWD		
For Landscape Irrigation		X
For Groundwater Recharge with Advanced Treatment		Potential
Captured Storm water incl. Urban Runoff		X
Captured shallow groundwater from non-adjudicated basins containing nitrates to supplement non-potable water system		Potential
Joint Projects with Other Agencies with Exchanges		Potential

[1] Limited to stored water, unused overlier production rights, and non-potable and potable water service exchange per Adjudication.

The District's water supply plan is based on the following set of principles:

- The Plan must be sustainable in terms of water quality and quantity
- Energy must be a major consideration in the evaluation of alternative water supply strategies
- Local water resources such as poor quality groundwater and recycled water should be maximized in the non-potable water system and used for irrigation
- Surplus non-potable water should be supplied to golf courses whenever it is not needed to meet other landscape non-potable water demands
- Recycled Water not needed for landscaping or golf courses shall be advance treated and percolated
- Urban runoff and storm runoff in Little San Gorgonio Creek, Marshall Creek, Noble Creek and others should be captured and percolated to the extent practical to minimize the amount leaving the "basin"
- The Beaumont Basin Adjudication will be followed and return flow credits will be given for imported and recycled water.
- The SGPWA will provide the needed imported water supply to meet BCVWD's needs through build-out

There are constraints on the use of some of these sources, e.g. recycled water to ensure the water quality of the groundwater is maintained over time. These constraints are established by the RWQCB and are described later in this section. The RWQCB and the CDPH have constraints on the use recycled water for irrigation and groundwater recharge.

The water supply plan which is developed must be flexible. Conditions will change over time, regulations will change, more information and experience will be gained with the existing facilities, and other things will occur requiring adjustments to the water supply plan.

Groundwater

Edgar Canyon Groundwater

Based on production records for the 31-year period, 1983 – 2014, average and minimum production from Edgar Canyon was 2,205 and 1,117 AFY respectively. Minimum yield is about 50% of the average. **For planning purposes 2,200 and 1,110 AFY will be used for the average and minimum year respectively**.

Beaumont Basin Groundwater

The Beaumont Groundwater Basin was adjudicated in 2004 as described in Section 2. All of the Basin's 2004 "safe yield" of 8,650 AFY was assigned to the overliers. The provisions in the Adjudication state the safe yield must be evaluated every 10 years. In April 2015 the Basin Watermaster approved a revised safe yield of 6,700 AFY.

Between 2004 and 2014, BCVWD and the other appropriators in the Beaumont Basin were able to annually extract a fixed percentage of a "temporary surplus" created by the adjudication to provide storage volume in the Beaumont Basin for conjunctive use. The 10-year period created a window of opportunity for the Pass Agency/DWR to complete the East Branch Extension Phase 1 of the State Water Project and for the appropriators to purchase and store imported water, thereby building up their individual storage accounts. BCVWD took advantage of this period to construct a non-potable water system, construct their groundwater recharge facility and pipeline connection to the East Branch Extension and purchase and recharge imported water. From September 2006 through the end of 2014, BCVWD recharged over 46,300 AF of water. This was significant considering the District's total annual demand is around 11,000 to 12,000 AFY.

During this time (2004-14), BCVWD also purchased water from South Mesa Water Company. This water was transferred from South Mesa's Beaumont Basin storage account to BCVWD's storage account.

After 2014, BCVWD and the other appropriators are not able to pump the "temporary surplus" water and will have to rely solely on:

- Reallocation of unused overlier pumping rights from the 17 current overlying parties
- Credit for providing potable water or non-potable water delivered to an overlying party or an overlying party's land (termed "Forbearance Water")
- Imported water recharged
- Captured Stormwater and Urban Runoff if deemed "new water" by Watermaster
- Return flow credits

The Beaumont Basin Watermaster Rules and Regulations §7.8, requires Watermaster to allocate the unused overlying party pumping rights to the Appropriators. BCVWD's share of the unused rights is 42.51%. This reallocation was done every year beginning in Fiscal Year 2008-09 based on the previous 5 years of the Overlying Party's pumping amount.

In addition, when an overlying party develops his/her property and receives potable or non-potable (recycled) water from an Appropriator, like BCVWD, the overlying party shall forbear pumping the equivalent amount of groundwater. Watermaster will reassign this forbearance pumping to the appropriator supplying water to the overlier's developed property. This is done every year.

Individual parties can have storage accounts in the Beaumont Basin; BCVWD has an 80,000 acre-ft storage account which can be used to store imported water, captured stormwater and recycled water (if approved by the Regional Board and CDPH).

Allocation of Unused Overlier Water Right to BCVWD

The Overlying Parties and their rights along with their average groundwater production from the Beaumont Basin from 2004 through 2012 are presented in Table 5-2. This is based on the original Adjudication safe yield of 8,650 AFY. The Safe Yield was re-evaluated and Watermaster adopted a lower safe yield of 6,700 AFY in April 2015.

Table 5-3 presents a summary of the unused overlier pumping rights allocated to BCVWD by Watermaster for the period 2008 through 2017.

The amount in Table 5-3 which is transferred will not remain constant in the future. Although a few of the overliers are fully developed or nearly so, and probably will not change their water use appreciably over the years, most of the overliers will be developing their properties and their current pumping or water use on those developed parcels will change with development.

A detailed analysis of each of the overlying parties was performed taking into account the current water used, size of the particular parcel(s), and development potential. Some of the assumptions are:

- The Oak Valley Partners' has an overlier right of 1,806 AFY and lies within both the BCVWD and YVWD sphere of influence or service area. The amount of water used by the fully developed property will most likely exceed the Oak Valley Partners' overlying right and there will be no unused rights returned to the "pool" for reallocation. This will occur sometime in the future.
- Sunny Cal Egg Ranch and Poultry Company and associated landowners have prepared a Specific Plan #41 for the City of Beaumont which envisions 571 dwelling units on 324 total acres. This project will require about 371 AFY of potable water and 120 AFY of non-potable water based on BCVWD's estimated water demand of 0.65 AFY/EDU. Their total overlying right is 1439.5 AFY which means, even after development, there will be unused pumping rights to be reallocated to appropriator parties. This project is expected to start development sometime after 2015.
- Portions of the original Sunny Cal Egg Ranch North, Manheim, Manheim and Berman were transferred to a number of parties who retained water rights. These included Albor Properties, Nikodinov, McAmis, Aldama, Gutierrez *et al*, and Darmont. Together they have 344.5 AFY of pumping rights. According to Watermaster, the total parcel land area is 136.8 ac. At 2 DU/acre, the water demand would be 178 AFY at 0.65 AFY/EDU. Even with full development there will be unused pumping rights to be reallocated to appropriator parties.

Table 5-2
Overlying Parties, Pumping Rights and Average 2004 – 2012 Production[1]

Overlying Party	Average Production 2004 - 2012, AFY	Overlying Water Right, acre-ft	Unused Overlying Allocation, acre-ft	Category (see below)
Beckman	13.2	75	61.8	1
Oak Valley Golf and Resort, LLC	687.8	950	262.2	2
Merlin Properties	1.6	550	548.4	3
Oak Valley Partners, LP	329.7	1,806	1476.3	1
Plantation on the Lake, LLC	342.0	581	239.0	4
Rancho Calimesa Mobile Home Park	69.0	150	81.0	4
Roman Catholic Bishop of San Bernardino	19.5	154	134.5	3
Sharondale Mesa Owners Association	157.4	200	42.6	4
Morongo Tukwet Canyon Golf Club	1230.4	2,200	969.6	2
Stearns	1.0	200	199.0	3
Sunny-Cal Egg and Poultry Company	90.6	1,439.5	1348.9	1
Albor Properties III, LP	3.8	300	296.2	1
Nikodinov	0.8	20	19.2	1
McAmis	0.6	5	4.4	1
Aldama	0.8	7	6.2	1
Gutierrez and Monroy	1.4	10	8.6	1
Darmont	0.4	2.5	2.1	1
Total	2950	8,650	5700	

Category:

1. Overlying Parties Likely to Develop and Receive Potable or Non Potable Water from BCVWD
2. Overlying Parties Likely to Receive Non-potable Water from BCVWD
3. Overlying Parties Likely to Develop and Receive Potable or Non Potable Water from Others, e.g., YVWD
4. Overlying Parties Likely to Remain Unchanged within the foreseeable future

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[1] Alda, Inc. in Assoc. with Thomas Harder & Co. (2013). Beaumont Basin Watermaster, 2012 Annual Report, Draft, Redlined Version, October.

Table 5-3
Unused Overlier Right Allocated to BCVWD[2]

Year	Allocated Right AF		Year	Allocated Right AF
2008	801.0		2013	2,421.0
2009	2,103.3		2014	2,470.6
2010	2,277.4		2015	2,705.8
2011	2,148.2		2016	2,716.5
2012	2,271.5		2017	2,673.5
Average Last 9 Years			2,421 AF	

- Beckman has 38 acres of land which if developed at a density of 2 EDU/acre will require about 50 AFY of potable water. Development is not anticipated to start before 2020. The Beckman pumping right is 75 AFY, so even after development there will be some pumping right allocated back to the appropriator parties.
- Merlin Properties, the Roman Catholic Bishop of San Bernardino, and Leonard Stearns properties total about 174 acres – all within the boundaries or sphere of YVWD. At 2 EDU/acre, about 350 EDU could be constructed on these properties which would have a water demand of about 230 AFY. These properties have an aggregate pumping right of 904 AFY, so, even after development, there will be unused pumping rights reallocated to the appropriator parties.
- The Plantation on the Lake, Rancho Calimesa Mobile Home Park and Sharondale Mesa Owner's Association properties will likely not change significantly in the foreseeable future. These overliers will essentially maintain the status quo. They have an aggregate 931 AFY of pumping right and are using a little over 600 AFY; so there will be unused pumping rights reallocated to the appropriator parties.
- California Oak Valley Golf Course and Morongo Tukwet Golf Club have an aggregate 3,150 AFY of pumping right; their annual water use collectively (pumping) is about 2,000AFY, so unused pumping rights will be allocated back to the appropriator parties.

Table 5-4 presents a summary of the total unused pumping rights returned to the "pool" as well as the amount which would be allocated to BCVWD (42.51% of the "pool" total) based on the revised safe yield of 6,700 AFY. Although the Adjudication is "silent" on issue of reallocation of 'the safe yield, it is assumed that the overlying parties' pumping rights would be adjusted downward proportionately from the original 8,650 AFY safe yield. This is a conservative assumption for this master plan and still undecided. If this does not occur, this can be adjusted in future master plan updates.

Supplying Potable and/or Non-potable Water to Overlier Parties' Land (Forbearance)

The Adjudication provides that if an appropriator, such as BCVWD, provides potable and/or non-potable water to an overlier's property, the overlier shall forbear pumping that amount of groundwater and the appropriator shall have the right to pump an equal amount of groundwater up to an amount equal to the overlier's pumping right.

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[2] Ibid

Table 5-4
Projection of Allocation of Unused Overlier Pumping Rights to BCVWD Based on Adjusted Safe Yield of 6,700 AFY

	Year							
Overlier	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**Build out**
Beckman								
Overlier Pumping Right, AFY	58	58	58	58	58	58	58	58
Water Pumped by Overlier for its use, AFY estimated decrease over time	13	6	0	0	0	0	0	0
Future Water Demand supplied by BCVWD (Forbearance of Pumping) , AFY	0	25	50	50	50	50	50	50
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	45	27	8	8	8	8	8	8
Sunny Cal Egg Ranch								
Overlier Pumping Right, AFY	1115	1115	1115	1115	1115	1115	1115	1115
Water Pumped by Overlier for its use, AFY estimated decrease over time	4	0	0	0	0	0	0	0
Future Potable Water Demand supplied by BCVWD (Forbearance of Pumping), AFY	0	100	200	300	371	371	371	371
Future Non-potable Water Demand supplied by BCVWD (Forbearance of Pumping), AFY	0	30	60	90	120	120	120	120
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	1111	985	855	725	624	624	624	624
Oak Valley Partners								
Overlier Pumping Right, AFY	1399	1399	1399	1399	1399	1399	1399	1399
Water Pumped by Overlier for its use, AFY estimated decrease over time	310	250	200	150	100	0	0	0
Potable and non-potable water demand supplied by BCVWD (Forbearance of Pumping) based on a maximum of 25% of Pumping Right, AFY	272	287	300	312	325	350	350	350
Potable and non-potable water demand supplied by YVWD (Forbearance of Pumping) based on a maximum of 75% of Pumping Right, AFY	0	862	899	937	974	1049	1049	1049
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	817	0	0	0	0	0	0	0
Albor Properties, Nikodinov, McAmis, Aldama, Gutierrez, Darmont								
Overlier Pumping Right, AFY	267	267	267	267	267	267	267	267
Water Pumped by Overlier for its use, AFY estimated decrease over time	7	5	3	0	0	0	0	0
Future water demand supplied by BCVWD (Forbearance of Pumping), AFY	0	30	100	178	178	178	178	178
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	260	232	164	89	89	89	89	89
Outside BCVWD Overliers, Merlin Properties, Stearns, Roman Catholic Bishop of San								
Overlier Pumping Right, AFY	700	700	700	700	700	700	700	700
Water Pumped by Overlier for its use, AFY estimated decrease over time	2	0	0	0	0	0	0	0
Future water demand supplied by other Appropriator (Forbearance of Pumping), AFY	0	65	130	195	230	230	230	230
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	698	635	570	505	470	470	470	470
Overliers not expected to change production or develop: Plantation on the Lake, Sharondale								
Overlier Pumping Right, AFY	721	721	721	721	721	721	721	721
Water Pumped by Overlier for its use, AFY	600	600	600	600	600	600	600	600
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	121	121	121	121	121	121	121	121
California Oak Valley Golf and Resort LLC								
Overlier Pumping Right, AFY	736	736	736	736	736	736	736	736
Water Pumped by Overlier for its use, AFY	750	750	750	750	750	750	750	750
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	0	0	0	0	0	0	0	0
Morongo Tukwet Canyon Golf Course								
Overlier Pumping Right, AFY	1704	1704	1704	1704	1704	1704	1704	1704
Water Pumped by Overlier for its use, AFY	1250	1250	1250	1250	1250	1250	1250	1250
Overlier Pumping Right Returned to Pool for Reallocation to Appropriators, AFY	454	454	454	454	454	454	454	454
Total Overlier Pumping Rights Returned to Pool for Reallocation to Appropriators, AFY	3506	2454	2172	1902	1766	1766	1766	1766
BCVWD Share of Reallocated Unused Overlier Rights, AFY	1490	1043	923	809	751	751	751	751
BCVWD Share of Reallocated Unused Overlier Rights For Planning Purposes based on 8,650 AF Safe Yield, AFY	1490	1040	920	800	750	750	750	750

Table 5-5 presents a projection of BCVWD's forbearance water for which Watermaster would allow BCVWD to pump an equivalent amount of groundwater. Data for Table 5-5 was taken from Table 5-4.

Table 5-5
Projected Forbearance Water for BCVWD, AFY

Overlier/Developer	2015	2020	2025	2030	2035	2040	2045	Build-out
Beckman	0	25	50	50	50	50	50	50
Sunny-Cal Egg Ranch								
Potable Water	0	100	200	300	371	371	371	371
Non-Potable Water	0	30	60	90	120	120	120	120
Oak Valley Partners	272	287	300	312	325	350	350	350
Albor Properties, Nikodinov, et al	0	30	100	178	178	178	178	178
Subtotal Potable Water Forbearance	272	472	710	930	1,044	1,044	1,044	1,044
Subtotal Non-Potable Water Forbearance	0	30	60	90	120	120	120	120
Total Forbearance	272	502	770	1,020	1,164	1,164	1,164	1,164

The demand for the Oak Valley Golf and Resort and the Morongo Tukwet Golf Club averaged 688 AFY and 1,230 AFY respectively for the period 2004 through 2012. Total use by both clubs is 1,915 AFY – round to 2,000 AFY.

BCVWD has pipeline facilities to deliver non-potable or recycled water to Oak Valley Golf Club and the Morongo Tukwet Canyon Golf Club. Any non-potable water supplied by BCVWD to the golf courses would be "forbearance water" and add to the totals in Table 5-6. This is analyzed in detail later in this Section.

Return Flow Credits

Return flow is defined as the portion of water which is applied to the land which is not evaporated or evapo-transpired and which ultimately percolates (returns) to the groundwater table and which can be re-extracted for use. Return flows originate from irrigation of agricultural land and lawns and landscaped areas in rural and urban settings and from deep percolation of septic tank effluent in unsewered areas, e.g., Cherry Valley. In most adjudicated groundwater basins, credit is given to the supplier of water which is used on land overlying the groundwater basin and which percolates back or "returns" to the groundwater.

At BCVWD's request, Watermaster investigated return flows as part of Watermaster's Safe Yield evaluation in 2014-15. Safe yield is the amount of water which can be extracted annually on a long-term basis which will not cause an adverse effect on the groundwater basin or aquifer. Adverse effects can include water quality deterioration from poor quality groundwater entering the aquifer due to reduced water level in the aquifer, subsidence, or excessive lowering of the water level in the aquifer to the point where it becomes uneconomical to pump. Lowering of the water table has occurred over time, but it has not dropped to a level where it is not economical to pump. In fact it is still the least expensive source of water for BCVWD. None of the other conditions are occurring in the Beaumont Basin.

The safe yield is not "static" amount; it changes over time. As the land develops, lawns, parks, and common areas are created which require watering. A portion of the applied water percolates back (returns) to the groundwater and is available for re-extraction. This is "return flow;" the amount will increase over time.

Watermaster provided annual return flow estimates from various land uses in Table 3 of the Safe Yield Report[3] considering high density (typically Beaumont), commercial, urban landscaping, and low density (typically Cherry Valley) land uses based on land use maps dated 1974, 1989, 2002, and 2010. The return flow factors were: 0.29 ft/yr for high density development, 0.02 ft/yr for commercial development, 1.13 ft/yr for urban landscaping, 0.58 ft/yr for low density development, and 0.40 ft/yr for irrigated trees.

It is important to identify the time when the return flow reaches the groundwater table and becomes part of the safe yield. Watermaster investigated the time it takes for rainfall and applied irrigation water to travel from the ground surface to the groundwater table. Watermaster reported that there appears to be a 25-year lag between the time when water is applied to the land surface until the time it reaches the aquifer based on analysis of BCVWD's Well No. 1 and No.2.[4] (Note this is not to be confused with the time it takes for recharge in BCVWD's recharge pond to reach the groundwater. This imported water recharge is saturated flow and, based on monitoring data, takes about 60 days to travel from the ground surface to the groundwater table. The "return flow" is "unsaturated" flow.)

When the Beaumont Basin was first adjudicated in 2004, it was based on preliminary safe yield calculations based on land use conditions that existed around 2002 or so. Based on the 25-year lag time, the safe yield calculation of 2002 or so, would have included return flows typical of 1977 development. Watermaster did not provide an estimate of return flows that would have occurred in 1977, so BCVWD projected the return flow data from Watermaster back from 1983 to 1977 to estimate 1977 conditions – the land use conditions for the 2002 safe yield calculations and the basis for the adjudication. BCVWD estimates the return flow in 1977 was 645 AFY. Return flow over and above this "baseline" amount should be considered as "new water" available for extraction by BCVWD.

Watermaster only projected return flows based on 2013 land use which will reach the water table in 2038. This master plan extends to 2040, 2045, and build out.

To provide a basis for forecasting return flows beyond year 2038, the changes in Watermaster's annual return flow for the period 2002 to 2010 were compared to the growth in population and EDUs within BCVWD for that same period. Table 5-6 shows the results of the analysis and the estimated return flow at build-out of the service area. The two methods resulted in roughly the same amount of return flow at build out; but to be conservative the lower value of 2,850 AFY based on 0.0595 AFY/EDU was used. It is also a better fit to use the EDU approach to projecting water demands used in this master plan.

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[3] Ibid

[4] Thomas Harder and Company in Association with Alda, Inc. (2014). Beaumont Basin Watermaster, Draft 2013 Re-evaluation of the Beaumont Basin Safe Yield, April 2

Table 5-6
Return Flow Projection Methods and Summary of Results

Population Basis		EDU Basis	
Change in Population 2002-10	25,200	Change in EDUs 2002-10	9,500
Change in Return Flow 2002-10, AFY	565	Change in Return Flow 2002-10, AFY	565
Return Flow Increment, AFY/person	0.0225	Return Flow Increment, AFY/EDU	0.0595
Population at Build out	112,300	New EDUs from 2010 to Build out	22,511
Population Change 2010 – Build out	69,200		
Return Flow Increase 2010 – Build out	1,557	Return Flow Increase 2010 – Build out	1339
Return Flow at 2010, AFY	1,513	Return Flow at 2010, AFY	1,513
Return Flow at Build out	3,070	Return Flow at Build out	2,850
Use Return Flow at Build out = 2,850 AFY and 0.0595 AFY/EDU			

Table 5-7 presents the Return Flows for the period 2015 through Build out and includes the 25-year time lag. The return flow credits could be less than the amount estimated due to reduced outdoor water use from water conservation mandates.

Table 5-7
Return Flow Projections

Year of Return Flow Arrival	Total Return Flow Based on Watermaster, AFY[a]	Estimated Baseline Return Flow in 2002 Safe Yield Determination, AFY	Additional Extractable Groundwater by BCVWD from Return Flow, AFY
2015	810	645	165
2020	868	645	223
2025	925	645	280
2030	1,159	645	514
2035	1,513	645	868
2040	1,568[b]	645	922
2045	1,843[b]	645	1,198
Build out	2,850[b]	645	2,205

[a] From Watermaster Excel Spreadsheet provided to BCVWD dated 1/16/2015
[b] Projected, based on 0.0595 AFY/EDU

Imported Water Supply

Imported Water is provided to BCVWD through the San Gorgonio Pass Water Agency (SGPWA), one of the 29 State Water Contractors that import water from Northern California through the State Water Project. The Agency has a service area of 225 sq. mi., exclusively in Riverside County. In addition to BCVWD, the major water retailers in the SGPWA service area include the City of Banning, YVWD, Banning Heights Mutual Water Company, High Valley Water District, South Mesa Mutual Water Company, and Cabazon Water District.

SGPWA Table A Imported Water Supply

The SGPWA or “Pass Agency” has a Table A amount of **17,300 acre-ft/year** based on their contract with the Department of Water Resources (DWR). Table A amounts are used in allocating the total State Water Project (SWP) water supply that is determined by DWR to be available for delivery each year among the State Water Contractors. The Table A amount is the maximum amount a contractor may request in any year from DWR. It is also the maximum amount that DWR agrees to deliver to a contractor, like the Pass Agency, during a year. The sum total of all of the Table A amounts for all of the 29 State Water Contractors under the Monterey Agreement (1994) shall not exceed 4.185 million acre-ft. (The DWR 2011 State Water Project Delivery Reliability Report[5] states 4.172 million acre-ft as the total combined maximum Table A amount – not significantly different.) The Pass Agency’s Table A is shared with other agencies in the Pass’ service area.

Under certain hydrologic and water supply conditions, DWR is not always able to deliver all of the water requested by the contractors. In these cases a smaller amount (“allocation”) is set by DWR by prorating the total amount available in proportion to the contractor’s Table A amount. Thus the Pass Agency’s Table A amount of 17,300 acre-ft/year is subject to the reliability of State Water Project.

The State Water Project has been, and continues to be, subject to delivery reduction caused by the operational restrictions of several biological opinions issued in December 2008 and June 2009 by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). These federal court decisions have been remanded (returned back) to the agencies for further study. In March 2014, the US Circuit Court of Appeals, 9th District, reversed a lower court decision by US District Court Judge Oliver Wanger and upheld the US Fish and Wildlife Service’s protection of the Delta Smelt. In December 2014, the protection was extended to salmon and steelhead.

The DWR 2011 delivery reliability report[6] uses the assumptions in the 2008/2009 biological opinions and there is essentially no change to the delivery reliability with the recent (2014) decisions.

The delivery reliability was calculated by DWR using the Cal-Sim-II computer model which simulates current and future operations of the SWP. The analyses are based on 82 years (1922-2003) of rainfall and runoff adjusted to reflect current and future levels of development. The impact of climate change is factored into the calculations. Figure 5-1 presents a cumulative probability curve of deliveries as a percent of a Contractor’s Table A amount.

The results are summarized in Table 5-8. In reading Table 5-8, 90 percent of the time the SWP will be able to deliver 28 percent of a Contractor’s Table A; 50 percent of the time, the SWP will be able to deliver 64 percent of Table A.

Relating this to the Pass Agency, it means **on the average** (50% of the time), the SWP should be able to **deliver 11,100 acre-ft/yr to the Pass Agency**.

On July 27, 2015 the Pass Agency Board of Directors adopted a Facility Capacity Fee. The Capacity Fee is to be charged to new development on a “per EDU” basis for “new” water and for

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[5] State Water Project Final Delivery Reliability Report 2011 (2012). Department of Water Resources, (June)

[6] Ibid

facility capacity increase to improve reliability and to be able to accommodate the larger volumes of water available during wet years.

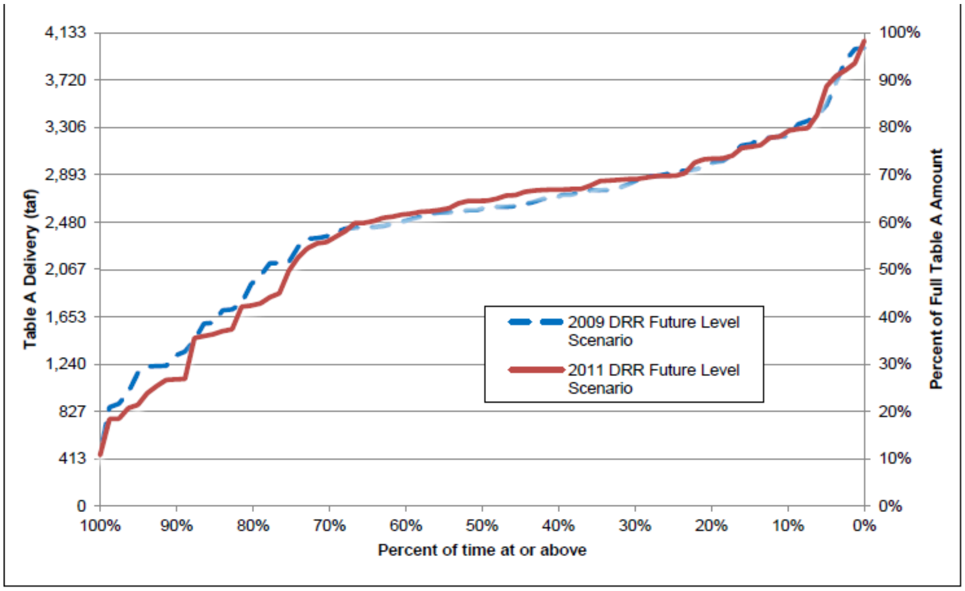

Figure 5-1
SWP Delivery Reliability (Future Conditions)

Source: 2011 Final Delivery Reliability Report, Technical Addendum

Table 5-8
Percent Probability of Receiving Full Table A Amount

Probability Expressed as a % of Time	Percent of Table A
90	28
80	42
70	56
60	61
50	64
40	66
30	69
20	73
10	78

Source: Extracted from 2011 Final Delivery Reliability Report Technical Addendum

It is assumed the Pass Agency will consider the SWP reliability factor (64%) in the purchase of any additional Table A water from other State Water Contractors to ensure 100% reliability of Table A water.

Figure 5-2 presents recent historical delivery percentages from 1992 – 2015. The average for the period is 66.2% or slightly above the 64% stated in the 2011 Delivery Reliability Report.

This is not surprising since the Reliability Report percentages were based on future conditions. But the figure does lend credibility to the Reliability Report projections. This 64% reliability factor has been considered in the amount of water available on a consistent basis from the SWP.

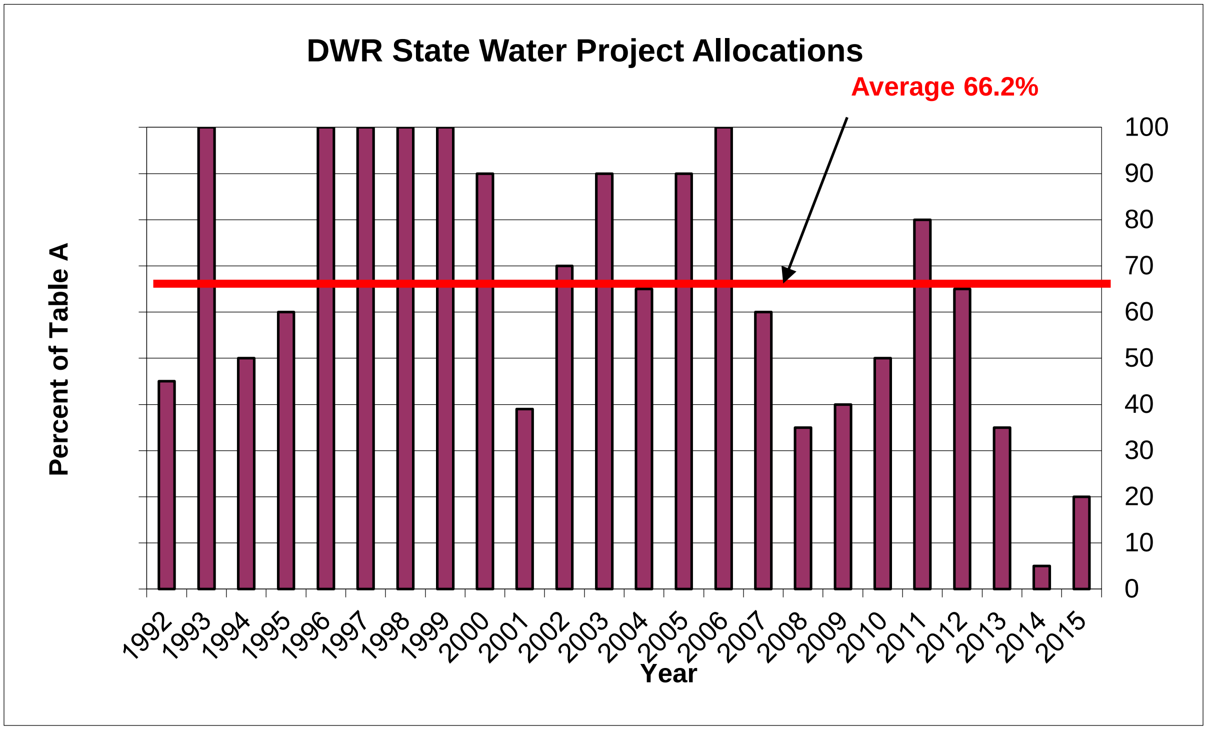

Figure 5-2
Historical SWP Delivery Percentages (1992 – 2015)

In addition to the maximum annual Table A amount, there is a contractual limit of **32 cfs** on the instantaneous rate of delivery through the Aqueduct. (If operated continuously for the entire year, this would be 23,360 acre-ft. Since this exceeds the annual Table A amount, the maximum amount which could be delivered on an annual basis is still 17,300 acre-ft.) So California aqueduct conveyance is not a current limitation.

The seven major water producers within the Pass Agency developed a draft regional water allocation agreement[7] for water imported by the Agency based on the proportion of the water producer's sphere of influence area within the Agency. When the Agency purchases additional Table A water, it will be added to the baseline 17,300 acre-ft, current Table A. The draft agreement describes the methodology to distribute any unused allocation. This draft agreement has not been adopted by the Pass Agency; however, it does provide a basis for water supply planning for this Master Plan Update.

According to the "allocation agreement" described above, BCVWD would be able to receive **27.4% of the 17,300 AFY Table A, or 4,740 AFY on a long term average annual basis**. **This assumes the Pass Agency will "firm up" its current Table A to 100% reliability. (Only 3040 AFY if 64% reliable.)**

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[7] Draft Regional Water Allocation Agreement for Water Imported by the San Gorgonio Pass Water Agency, March 14, 2012.

Near-term Imported Water Supply

The 4,740 AFY long term average for the availability of SPW assumes Pass Agency members will be taking their respective “full share” of the available water. At the present time only BCVWD, YVWD and the City of Banning have taken imported water. The City of Banning and YVWD have only taken small amounts, so BCVWD has been able to purchase essentially all of the remaining available water, which in most years is well above the 4,740 AFY. Table 5-9 shows the amount of imported water purchased by BCVWD and recharged by BCVWD since 2006, along with the DWR allocation percentages. The table shows BCVWD has been averaging about 5,360 AFY and in some years has approached 8,000 AFY.

Table 5-9
Imported Water Recharged for BCVWD’s Account

FY	Imported SPW Recharged, acre-ft	DWR Allocation Percentage
2006[1]	3,501	100
2007	4,501	60
2008	2,399	35
2009	2,741	40
2010	5,727	50
2011	7,979	80
2012	7,783	65
2013	7,434	35
2014	4,300[2]	5
Total	46,365	
Average (2007 -2014)	5,358	

[1] From September through December, 2006,
[2] Includes an estimate of 430 acre-ft for December 2014, based on November 2014 metered quantity.

BCVWD expects to be able to recharge at least 6,000 to 8,000 AFY under “normal” hydrologic conditions, perhaps to 2020 - 2025, since the other agencies in Pass Agency service area will most likely not need the imported water during this period of time. This provides time for the Pass Agency to develop other water sources. Drought periods, such as 2013-2015 severely limit the availability of imported water. During 2014, Pass Agency had some “carry over” water which increased the delivery amount as shown in Table 5-9.

BCVWD will need additional imported water to meet its long term needs, even when maximizing local water resources. As stated above, with the adoption of the Capacity Fee, the Pass Agency will provide adequate water supply to meet BCVWD’s projected needs to at least year 2035. BCVWD can reduce its need for supplemental water from the Pass Agency through:

- Water conservation
- Increased storm water capture and recharge
- Use of local groundwater containing high nitrate and TDS in the non-potable water system

- Advanced wastewater treatment of YVWD and/or City of Beaumont recycled water for groundwater recharge

Recycled Water

Although a separate non-potable water master plan has been developed, recycled and non-potable water supply and demand affect the amount of imported water needed and are discussed herein.

BCVWD has an extensive network of about 30 miles of non-potable transmission pipelines already constructed that can convey untreated SPW, groundwater, and recycled water. An extensive network of smaller distribution mains have be constructed by Tract developers to serve parks, medians, schools and common areas in their respective developments. The system includes a 2 million gallon non-potable water reservoir and is described in detail in the Non-potable Water Master Plan. There are about 300 existing landscape connections to the recycled water system receiving 1,650 acre-ft of water (2013 total). The existing recycled water system is currently pressurized with groundwater from Well 26 which has chromium levels above the CDPH levels. This is supplemented with potable water introduced into the non-potable water system through an air gap connection at the non-potable water storage tank (2800 Zone Non-potable Water Tank).

The Tournament Hills and Sun-Cal Fairway Canyon projects, south of I-10, have non-potable water distribution systems installed. This portion of the non-potable water system is isolated from and operates at a lower hydraulic grade line from the 2800 Non-potable Water Zone. This portion of non-potable water distribution system is currently supplied from the District's potable water system through interconnections having backflow prevention devices between the potable and non-potable water system. The non-potable water system was constructed from 2002 to the present using City of Beaumont Community Facilities District (CFD) bond funds, BCVWD funds derived from facilities (impact) fees collected from developers, BCVWD funding, and developer funding for the smaller distribution lines.

There are three existing wastewater reclamation plants in the San Gorgonio Pass Area:

- City of Beaumont Treatment Plant No. 1
- YVWD Henry Wochholz Water Reclamation Plant
- City of Banning Wastewater Treatment Facility.

The City of Beaumont's Treatment Plant No. 1 (to the right) has a current capacity of 4 million gallons/day (mgd). The treatment facility provides tertiary filtration and ultraviolet disinfection. Per a 2007 letter from CDPH, the facility, as it currently stands, needs some upgrades and validation testing to provide effluent meeting CDPH Title 22 requirements for unrestricted use. Current wastewater flow is about 3.0 mgd. A portion of the effluent is currently discharged to Cooper's Creek, (DP-001), a tributary of San Timoteo Creek which is a tributary of the Santa Ana River; a portion of the effluent is discharged into an unnamed creek at DP-007 located approximately 1,300 ft northwesterly along the

railroad tracks from Veile Ave.. As part of the environmental permitting[8] for the recycled water system, the US Fish and Wildlife Service required that 1.8 mgd of effluent continue to be discharged to Cooper's Creek for maintenance of habitat[9]. BCVWD continues to work with the City relative to recycled water. The City of Beaumont's effluent has a TDS concentration of about 400 mg/L which is in excess of the Regional Board's Maximum Benefit Water Quality Objectives for the Beaumont Basin.

On July 24, 2015, the Regional Board adopted Order No. R8-2015-0026, NPDES Permit CA 0105376. This order established two surface water discharge points (DP-001 and DP-007 described above) and three recycled water use areas: Tukwet Canyon Golf Course, Oak Valley Golf Course and BCVWD. The discharge limits in terms of Total Dissolved Solids (TDS) and Total Inorganic Nitrogen (TIN) are shown below.

Parameter	DP-001		DP-007	Recycled Water
	Discharge up to 1.8 mgd	Discharge over 1.8 mgd	All Discharges	All Discharges
TDS	400 mg/L	300 mg/L	230 mg/L	330 mg/L
TIN	6 mg/L	3.6 mg/L	2 mg/L	No Limit

As stated above the TDS of the City's effluent discharge is 400 mg/L. This is actually good quality recycled water; however, it does not meet the water quality requirements in the permit for specific discharge locations. As a result the City will need to provide desalination to at least a portion of the flow, (reverse osmosis treatment), to meet these requirements.

The City must start construction of the desalination facilities by September 1, 2018 and be in compliance with the TDS and TIN limits by March 1, 2020; any discharges of TDS or TIN in excess of the limits above shall be completely offset by January 1, 2025. This is a very aggressive schedule.

The YVWD Wochholz Facility (to the right) is a tertiary facility with a current flow of 4.5 mgd and a capacity of 6.7 mgd. It was recently expanded and upgraded and provides tertiary treatment using microfiltration membranes and ultraviolet disinfection. A 2.5 mgd reverse osmosis treatment process started operation in 2014. YVWD constructed a 15-mile long brine line from the Wochholz Treatment Facility to the terminus of the Inland Empire Brine Line (IEBL) near the I-215/I-10 Interchange in San Bernardino. The IEBL joins the Santa Ana River Interceptor (SARI) at the Orange County line below Prado Dam. YVWD will be discharging effluent with a TDS of 330 mg/L or less, which meets the Regional Board's Maximum Benefit Water Quality Objectives for the Beaumont Basin.

BCVWD is in discussions with YVWD for recycled (non-potable) water. YVWD would have to construct about 5 miles of pipeline from their system to near the intersection of I-10 and Cherry

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[8] Initial Study/Mitigated Negative Declaration Beaumont Cherry Valley Water District Recycled Water System Project, SCH 2007081127, June 2007.

[9] Letter dated February 29, 2008, Karen Goebel USFWS to Michelle Jones SWRCB, Informal Consultation for Beaumont Cherry Valley Water District Recycled Water System, SRF Loan C-06-5157-110.

Valley Blvd where it would connect into BCVWD's master planned 2600 Zone non-potable water pressure system. A new booster pump station would be constructed to boost the water into BCVWD's 2800 non-potable water pressure zone. A facilities plan has been prepared by BCVWD for the connection. The plan has been approved by the State Water Resources Control Board and the District could apply for funding under the Water Reclamation Bond Program/State Revolving Fund program.

The City of Banning has a secondary treatment facility that percolates effluent into the alluvium along Smith Creek southeast of the City under a permit from the Colorado River Regional Water Quality Control Board. The City has begun construction of a recycled (non-potable) water line from Sun Lakes Golf Course east to the wastewater treatment plant. The City may pump percolated wastewater, (groundwater), using a retrofitted well at the wastewater treatment plant, into the pipeline to serve the golf course in the future. The City has plans to upgrade the wastewater treatment plant to a modern membrane bioreactor facility to provide recycled water for the future. It is possible that some surplus recycled water from the City of Banning could be introduced into the BCVWD recycled water system at some point in the distant future. It is not under consideration in this Master Plan, but could be part of future master plans, however.

Recycled Water Supply

Table 5-10 presents a summary of the amount of recycled water available from the City of Beaumont. The estimated amount which can be recycled has a 6% reduction factor to account for recycled water used at the treatment plant site for wash down and irrigation and water contained in the biosolids which are hauled off-site. To meet the TDS limit of 330 mg/L for recycled water used for irrigation, 20 percent of the volume will have to be membrane treated with reverse osmosis. The remaining 80 percent can be blended with the reverse osmosis product water to meet the TDS limit. Assuming 80% recovery in the reverse osmosis process (20 percent brine), the amount of brine is 4 percent of the recycled water, i.e. 20% of 20%. The total water loss, then, is 10 percent (6% + 4%).

Table 5-10
Recycled Water Available from City of Beaumont's WWTP

Year	2015	2020	2025	2030	2035	2040	2045	Build-out
City of Beaumont Population	40,900	43,762	49,014	54,895	61,483	68,000	74,000	90,600
Wastewater Generation Flow Rate, gpcd	75	75	75	75	75	75	75	75
Wastewater Flow, mgd	3.0	3.28	3.68	4.12	4.61	5.10	5.55	6.8
Environmental Mitigation Flow, mgd	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Wastewater Available for Recycling, mgd	1.2	1.48	1.88	2.32	2.81	3.3	3.75	5.0
Estimated amount which can be recycled, mgd	1.07	1.33	1.69	2.09	2.53	3.0	3.38	4.5
Estimated amount which can be recycled, AFY	1,194	1,494	1,892	2,336	2,835	3,360	3,785	5,040
Estimated amount which can be recycled, AF/month	100	125	158	195	235	280	315	420

In addition to the City of Beaumont's recycled water, recycled water is also available from YVWD:

Years	Recycled Water Amount
2015 to 2030	2,000 AFY or 167 AF/month
After 2030	3,000 AFY or 250 AF/month

Constraints on the Use of Recycled Water

There are a number of constraints on the use of recycled water which relate to the quality of recycled water, the groundwater basin water quality objectives, CDPH regulations, and the seasonal demands for water.

1. The City of Beaumont's recycled water currently has a TDS concentration of about 400 mg/L and as such will need to be desalted to 330 mg/L TDS. About 20 percent of the flow will need desalination to meet this TDS limit. This will result in some water loss as discussed above. YVWD indicated they could provide recycled (non-potable) water with a TDS concentration = 330 mg/L, so additional desalination is not required for YVWD recycled water.
2. According to CDPH, the City of Beaumont will need to complete some validation testing and upgrades to their tertiary treatment facility to ensure full compliance with Title 22 before the effluent is suitable for reuse as irrigation water. This can be accomplished fairly quickly. However, the City will need to mitigate the excess TDS once the desalination system is operational.
3. Use of recycled water for groundwater recharge as part of a Groundwater Replenishment Reuse Project will need to meet the requirements in California Code of Regulations, Title 22. This includes residence time in the groundwater, monitoring, testing and modeling. To protect the high quality of the Beaumont Basin groundwater, BCVWD believes that separate advanced treatment consisting of reverse osmosis membrane treatment followed by advanced oxidation using hydrogen peroxide and high dose ultraviolet irradiation similar that used at other similar indirect reuse facilities will be necessary to remove CECs and PPCPs.
4. The landscape irrigation demand varies throughout the year with maximum demand in summer and minimal demand in winter. This limits the amount of recycled water which can be used on an annual basis since seasonal storage is not available.
5. Environmental mitigation flow to Cooper's Creek from the City of Beaumont's WWTP is 1.8 mgd based on the City's agreement with U. S. Fish and Wildlife. (This could be decreased in the future if studies show and the regulators agree that the habitat can be maintained with less flow.) A portion of this flow could be recovered through a series of extraction wells and introduced into the non-potable water system.

Non-potable Water Demand

BCVWD prepared a Facilities Planning Report[10] for a recycled water connection with YVWD which contains information on non-potable water demands and available non-potable water from YVWD and the City of Beaumont. Table 5-11 is taken from the Facilities Plan; the year 2045 demand was estimated.

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[10] BCVWD (2014). Recycled Water Facilities Planning Report for Recycled Water Supply Pipeline and Pump Station, WRFP Project No. 3844-010, August 5.

Table 5-11
Projected Non-potable Water Demands for All Pressure Zones
No Golf Courses

	2015	2020	2025	2030	2035	2040	2045	Build-out
Annual Average, AFY	1,752	1,906	2,374	2,931	3,228	3,449	3,670	3,710
Annual Average, mgd	1.56	1.70	2.12	2.62	2.88	3.08	3.28	3.31

There are three golf courses in the BCVWD service area which have estimated annual and maximum month demands as follows:

	Annual	Max Month
Oak Valley Golf Club and Resort	750 AFY	119 AF
Morongo Tukwet Canyon	1250 AFY	198 AF
Highland Springs Village	200 AFY	32 AF

Oak Valley and Morongo Tukwet were estimated from Watermaster pumping records since they each have their own well water supply. Highland Springs Village was estimated based on irrigated area and evapotranspiration estimates. This was confirmed with water consumption records for 2013. Because Oak Valley and Morongo Tukwet Canyon have their own wells, they do not need to be 100 percent reliant on non-potable water from BCVWD. They could be supplied only when non-potable water is actually available after BCVWD meets its other demands.

The projections in Table 5-11 could decrease over time particularly if street medians and common areas are converted to more drought tolerant landscaping to conserve recycled water for advanced treatment and groundwater recharge.

Non-potable Water Supply Scenarios

Five non-potable water supply scenarios were developed for consideration in this master plan:

1. Use YVWD recycled water only and irrigate only landscaping, no golf courses.
2. Use YVWD recycled water only and irrigate the landscaping as a first priority. During the winter and early spring months, when landscape irrigation demands are low, supply the Oak Valley and Morongo Tukwet Canyon Golf Courses. This has the effect of taking the golf course private wells off-line during this time and provides “Forbearance” water to BCVWD.
3. Use YVWD recycled water only and irrigate only landscaping, no golf courses. During the winter and spring time when landscape demands are low, provide advanced treatment of the surplus recycled water and recharge the advance treated water for indirect reuse. Assume the advanced treatment facility will be located near the recharge facility and eighty percent of the surplus recycled water will actually result in product water, i.e., 80% recovery. The remaining 20% will be discharged as brine. It is possible to increase the recovery to as much as 85% (15% brine) by additional pre and post treatment.
4. Supplement YVWD recycled water with recycled water from the City of Beaumont and supply the irrigation landscaping and golf course demands. This maximizes the use of recycled water for landscape and golf course irrigation, reduces the demand on the golf courses’ private wells significantly, and provides “Forbearance” water to BCVWD.

5. Supplement YVWD recycled water with recycled water from the City of Beaumont and supply the irrigation landscaping and golf course demands. This will reduce the demand on the golf courses' private wells significantly and provide "Forbearance" water to BCVWD. During the winter months there will be surplus recycled water available since demands are low. During this time provide advanced treatment of the surplus recycled water and recharge the advance treated water for indirect reuse. Assume the advanced treatment facility will be located near the recharge facility and eighty percent of the surplus recycled water will actually result in product water, i.e., 80% recovery. This scenario maximizes the use of recycled water. The remaining 20% will be discharged as brine. It is possible to increase the recovery to as much as 85% (15% brine) by additional pre and post treatment. The brine may need to be trucked to a suitable point of disposal or the IEBL extended from YVWD to Beaumont. This is discussed in the Non-potable Water Master Plan.

Scenario 1 (YVWD Recycled Water Only for Landscaping)

A month-by-month analysis of the non-potable water demands was made vis-à-vis the projected recycled water supply from YVWD to determine the amount of recycled water which can be used and the amount of supplemental SPW needed to meet peak demands during the summer months. The analysis was based on a maximum YVWD amount of 167 AF/Month (2,000 AFY) up to the year 2030 and 250 AF/Month (3,000 AFY) thereafter. This is believed to be a conservative assumption. If there is more recycled water available in summer, the need for supplemental SPW would be reduced.

Table 5-12 shows the sources and amounts without any of the golf courses. The table clearly illustrates that supplemental water is needed to meet the minimal non-potable water landscape demands not considering the golf courses. Table 5-12 shows that as demands increase, the amount from YVWD that is actually usable increases, but also the amount of supplemental SPW increases.

Table 5-12
Scenario 1 – YVWD RW Only, No Golf Course Irrigation

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Annual Landscape Demand, AFY	1,752	1,906	2,374	2,931	3,228	3,449	3,670	3,710
Supplied by YVWD, AFY	1,425	1,469	1,582	2,220	2,294	2,348	2,392	2,400
SPW Supplemental, AFY	327	437	792	711	934	1,101	1,278	1,310
Maximum Month Supplemental Supply, AF	111	135	209	214	261	296	331	337
Percent of YVWD Available RW Used	71.2	73.4	79.1	74.0	76.5	78.3	79.7	80.0

Due to the seasonal variations in landscape demand, not all of the water that YVWD can supply can actually be used – assuming the monthly delivery amount is limited to 167 and 250 AF/month as discussed above. Only between 70 and 80 percent of the available supply is actually used.

Scenario 2 (Supply Golf Courses when YVWD Recycled Water Available)

Review of the analysis of the monthly non-potable water demands vs. supply used to develop Table 5-12, indicates there is enough recycled water available from YVWD to meet or partially meet the golf course demands during December through April. The golf courses will be "off their wells" at this time and BCVWD will benefit from the additional forbearance water by supplying non-potable water to the golf courses. Table 5-13 shows the result of a month-by-month analysis assuming BCVWD is able to supply the golf courses with recycled water during the winter and spring months.

This scenario has increased the amount of available YVWD that can be recycled and resulted in an annual volume of forbearance water ranging from 267 AFY to 346 AFY. Forbearance water is water that can be pumped from the Beaumont Basin for potable water supply.

Table 5-13
Scenario 2 – YVWD RW Only
Supply Golf Courses when YVWD Recycled Water Available

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Annual Landscape Demand, AFY	1,752	1,906	2,374	2,931	3,228	3,449	3,670	3,710
Supplied by YVWD, AFY	1,425	1,469	1,582	2,220	2,294	2,348	2,392	2,400
SPW Supplemental, AFY	327	437	792	711	934	1,101	1,278	1,310
Maximum Month Supplemental Supply, AF	111	135	209	214	261	296	331	337
Oak Valley GC Demand, AFY	750	750	750	750	750	750	750	750
Morongo Tukwet Demand, AFY	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250
G C Supplied by YVWD, AFY	346	320	230	355	316	288	269	267
Forbearance, AFY	346	320	230	355	316	288	269	267
Total Supplied by YVWD, AFY	1,771	1,789	1,812	2,575	2,610	2,636	2,662	2,666
Percent of YVWD Available RW Used	88.6	89.5	90.6	85.8	87.0	87.9	88.7	88.9

Scenario 3 (Advance Treat and Recharge Surplus YVWD Recycled Water)

In Scenario 3 YVWD recycled water is used to irrigate landscaping through the non-potable water system. No golf course irrigation is anticipated. During winter and spring there is surplus recycled water available since the landscape demands are low. This surplus recycled water would be treated in an advanced treatment process consisting of the current state of the art microfiltration or ultrafiltration membrane treatment followed by reverse osmosis and advanced oxidation with high dose ultraviolet light aided with hydrogen peroxide to remove as much of the unknown organics, pharmaceuticals, and other chemicals of concern. The process has a recovery of about 80%, i.e., 20% of the water treated is reject water containing all of the impurities which were removed. As discussed above, it may be possible to increase the recovery through more expensive pre and post treatment. The reject water needs to be discharged to a brine line, i.e., the IEBL. This advanced treatment process has been demonstrated for a number of years now at Orange County's Groundwater Replenishment Project, at West Basin Municipal Water District and elsewhere. The drawback is the process is expensive to construct and operate.

The advanced treatment facility would require access to the IEBL which has been extended to the Wochholz Water Reclamation Plant in Yucaipa. It is not known if there is capacity available in the extension constructed by YVWD, the IEBL or the SARI line. There would also be costs for treatment of the brine/reject water at Orange County Sanitation District paid through the Santa Ana Watershed Project Authority (SAWPA).

Table 5-14 presents a summary of the month-by-month analysis of Scenario 3. Scenario 3 allows recycling of over 94% to 96% of the available YVWD recycled water. In the development of Table 5-14, it is assumed the advanced treatment process has an 80% recovery, i.e., 20% reject brine which would be discharged to the SARI line.

Typical costs experienced at Orange County are $6/gallon/day for construction and $1,370/million gallons, ($450/acre-ft), to treat. Considering amortization of capital cost and the operation and maintenance, the total cost for the treated water could be close to $1,000/acre-ft. This could still be quite cost effective considering the cost for additional imported water rights and the uncertainty associated with those rights.

The best location would be near the recharge facilities. The treatment plant would be constructed in two phases: 1.75 mgd initial phase followed by 0.50 mgd second phase between 2025 and 2030. About 0.5 mgd of brine capacity in the IEBL and SARI would be needed.

Table 5-14

Scenario 3 – YVWD RW Only, No Golf Course Irrigation, Advance Treat and Recharge Surplus

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Annual Landscape Demand, AFY	1,752	1,906	2,374	2,931	3,228	3,449	3,670	3,710
Supplied by YVWD, AFY	1,425	1,469	1,582	2,220	2,294	2,348	2,392	2,400
SPW Supplemental, AFY	327	437	792	711	934	1,101	1,278	1,310
Maximum Month Supplemental Supply, AF	111	135	209	214	261	296	331	337
Surplus Recycled Water Not Used in Irrigation System, AFY	575	531	418	779	706	652	608	601
Maximum Month Surplus Recycled Water Not Used, AF	145	143	137	213	210	207	204	204
Maximum Month Surplus Recycled Water Not Used, mgd	1.6	1.6	1.5	2.3	2.3	2.2	2.2	2.2
Advance Treated Recycled Product Water Available for Recharge (80% recovery), AFY	460	425	334	624	565	522	486	481
Percent of YVWD Available RW Used	94.3	94.7	95.8	94.8	95.3	95.7	95.9	96.0

Scenario 4 (Supplement YVWD RW with Beaumont RW to meet Landscape and GC Demands)

During the summer time there is not enough recycled water from YVWD to meet landscape and golf course demands. More forbearance water can be made available by using City of Beaumont recycled water to supplement the YVWD recycled water. Table 5-15 presents a summary of the month-by-month analysis of the recycled water use. This scenario maximizes the recycled water for irrigation reuse.

Scenario 5 (Advanced Treatment and Recharge of Surplus Recycled Water from Scenario 4)

During winter and spring, with Scenario 4, there is a significant amount of recycled water which cannot be used for landscape irrigation. In Scenario 5, the surplus recycled water, not needed for irrigation in Scenario 4, is treated in an advanced treatment process similar to Scenario 3 above. The advanced treatment facility would require access to the IEBL and SARI as described above for Scenario 3.

Table 5-16 presents the results of a month-by-month analysis of the amount of surplus recycled water, not needed in Scenario 4, which can be advanced treated and recharged. In the development of Table 5-16, it is assumed the advanced treatment process has an 80% recovery, i.e., 20% reject brine which would be discharged to the IEBL and SARI. As stated previously, it may be possible to increase the recovery and reduce the brine discharge by more expensive pre and post treatment.

The best location would be near the recharge facilities so that only surplus recycled water is treated. The treatment plant would be constructed in two phases: 3.25 mgd initial followed by 3.25 mgd second phase between 2025 and 2030.

Table 5-15

Scenario 4 – Maximize Use of RW for Irrigation incl. YVWD and City of Beaumont RW

	2015	2020	2025	2030	2035	2040	2045	Build-out
Landscape Irrigation								
Total Annual Landscape Demand, AFY	1,752	1,906	2,374	2,931	3,228	3,449	3,670	3,710
Supplied by YVWD RW, AFY	1,425	1,469	1,582	2,221	2,294	2,348	2,392	2,399
Supplied by City of Beaumont RW, AFY	316	427	719	691	910	1085	1262	1310
SPW Supplemental for Make-up for Landscaping, AFY	11	11	74	19	25	16	16	0
Golf Courses								
Oak Valley GC Demand, AFY	750	750	750	750	750	750	750	750
Morongo Tukwet Demand, AFY	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Total GC Demand, AFY	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
GC Supplied by YVWD RW, AFY	346	320	230	355	316	288	269	267
GC Supplied by City of Beaumont RW, AFY	432	491	490	614	676	768	817	1,202
Total Non-potable Water Supplied to GCs, AFY	778	812	721	968	992	1,056	1,086	1,469
Golf Course Private Well Supply, AFY	1,222	1,188	1,279	1,032	1,008	944	914	531
Summary								
Total YVWD RW Used, AFY	1,771	1,789	1,812	2,575	2,610	2,636	2,662	2,666
Total City of Beaumont RW Used, AFY	748	918	1,209	1,305	1,586	1,853	2,079	2,512
Total RW Used, AFY	2,519	2,707	3,021	3,880	4,196	4,489	4,741	5,178
% of Total RW Available Used	78.9	77.5	77.6	72.7	71.9	70.6	69.9	64.4
Total SPW for Make-up, AFY	11	11	74	19	25	16	16	0
Maximum Month Supplemental Supply, AF	11	11	52	19	25	16	16	0
GC Forbearance to BCVWD, AFY	778	812	721	968	992	1,056	1,086	1,469

Table 5-16

Scenario 5—Provide Advanced Treatment and Recharge of Surplus RW Not Needed for Irrigation in Scenario 4

	2015	2020	2025	2030	2035	2040	2045	Build-out
Surplus Recycled Water Not Used in Irrigation System, AFY	675	787	871	1,456	1,639	1,871	2,044	2,862
Maximum Month Surplus Recycled Water Not Used, AF	219	242	270	383	421	462	495	599
Maximum Month Surplus Recycled Water Not Used, mgd	2.4	2.6	2.9	4.2	4.6	5.0	5.4	6.5
Advance Treated Recycled Product Water Available for Recharge (80% recovery), AFY	540	629	697	1,165	1,311	1,497	1,635	2,290

Note Year 2015 and 2020 shown as potential. Unlikely to be implemented until after 2020.

Table 5-16 would indicate a brine capacity in the IEBL and SARI of about 1.3 mgd.

Other Sources of Make-up Supply to the Non-potable Water System

Scenarios 1, 2 and 3 were based on the supplementing the recycled with untreated SPW.

Supplementing the non-potable system with the sources listed below would reduce the amount of SPW needed, “saving” the SPW for a higher and better use, i.e., potable water supply.

- High nitrate groundwater from the mouth of Edgar Canyon. The high nitrate groundwater is otherwise not useable without costly treatment. Blending it into the non-potable water system would provide beneficial nitrogen (fertilizer) to the plant and landscape materials. BCVWD believes there could be 300 to 500 AFY or more of water available from this source. But hydrologic studies would need to be done to confirm this as well as the technical and economic feasibility of the project.
- A well was drilled for construction water by a developer and used in the grading operation of the Heartland project between Highway 60 and San Timoteo Creek. A detailed mineral analysis has not been provided to BCVWD, but it reportedly has a TDS concentration in the 400 mg/L range. It is also uncertain what the impact of the City of Beaumont’s historic wastewater discharge has had on the groundwater in the area. The effluent is known to percolate in Cooper’s Creek, a tributary of San Timoteo Creek. Groundwater is shallow in this area, about 50 ft below ground surface or so. For planning purposes this water should not be considered for potable use, but could be considered to supplement the non-potable water system and is described in more detail in the Non-potable Water Master Plan. BCVWD believes there could be 800 to 1,000 AFY or more available from this source, but hydrologic studies would need to be completed to arrive at a better estimate.

Other Potential Sources of Potable Groundwater

Singleton Basin, Edgar Canyon and Noble Canyon

BCVWD has explored groundwater sources outside of the Beaumont Basin. Over the years BCVWD has explored Edgar Canyon and Noble Canyons for potential well sites. A number of test holes were drilled in Noble Canyon in the late 1980s and early 1990’s, but none were determined to be worth pursuing as production wells. BCVWD also studied the potential for wells in the Singleton Basin. The Hannon Tank Site (2650 Zone) was laid out to add a future well which would be in the Singleton Basin. Well yields are believed to be around 200 gpm. Not much is known about the natural recharge of the Singleton Basin, so long term production capacity is uncertain. Groundwater is reported to about 50 feet below ground surface, but could be deeper in some areas of the basin[11].

There is some groundwater at the mouth of Edgar Canyon, north of Orchard St., but this water contains significant nitrates and is not useable for potable water supply without treatment for nitrates, which is expensive. This water would best be used to supplement the non potable water system as described above.

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[11] USGS National Water Information System nwis.waterdata.usgs.gov/usa/nwis/gwlevelsaccessed 09/17/2014

Potential Storm Water Capture Projects

There were a number of projects identified in BCVWD's 2013 UWMP Update which were explored in more detail in this Potable Water Master Plan. These projects are listed in Table 5-17.

Table 5-17
Potential Storm Water Capture Projects

Project	Brief Description
Stormwater Capture, Little San Gorgonio Creek (Edgar Canyon)	Utilize the existing percolation ponds in Upper and Middle Canyon to the maximum. Surplus water which cannot be captured should be desilted in existing basins near the mouth of the canyon and percolated there. Large flows would flow on downstream. Provide "soft plug" in lined portion of channel and divert flows into BCVWD's recharge facility. (Note that only extreme flows actually make it out of the canyon). Estimated Yield – 500 AFY.
Stormwater Capture Noble Creek	Noble Creek flows could be desilted on property owned by BCVWD (15.7 acres) along Noble Creek upstream of Noble St and west of Cherry Ave. Unfortunately this area is not over the Beaumont Basin, but the property could be used for desilting basins with the desilted water released back into Noble Cr. and recaptured at a soft plug in the lined channel and diverted into the District's recharge site. Estimated Yield = 400 AFY.
Marshall Creek s/o Elm to I-10	There is a significant amount of urban runoff from the developed are east of Beaumont Ave, between Oak Valley Parkway and Brookside Ave. which could be captured in the soft bottom of Marshall Creek using training dikes to prevent the water from going under the I-10 bridge. There is about 300 ac of urban drainage. Estimated Yield = 150 AFY.
Grand Avenue Storm Drain	Approximately 505 acres of area could be intercepted by a storm drain along Grand Ave. and conveyed to the District's Recharge facility. This water is relatively free of sediments and runoff is generated with even the slightest amount of rainfall
Sundance Urban Runoff	Eighth St., Cherry Ave., and Starlight Ave. Basins capture runoff from the Sundance development. These basins capture runoff effectively, but percolation needs to be improved.

The Sundance Basins and the Grand Avenue Stormwater Capture System are shown in Figures 5-3 and 5-4 respectively.

Figure 5-3
General Location of the Sundance Water Quality and Urban Runoff Capture Basins

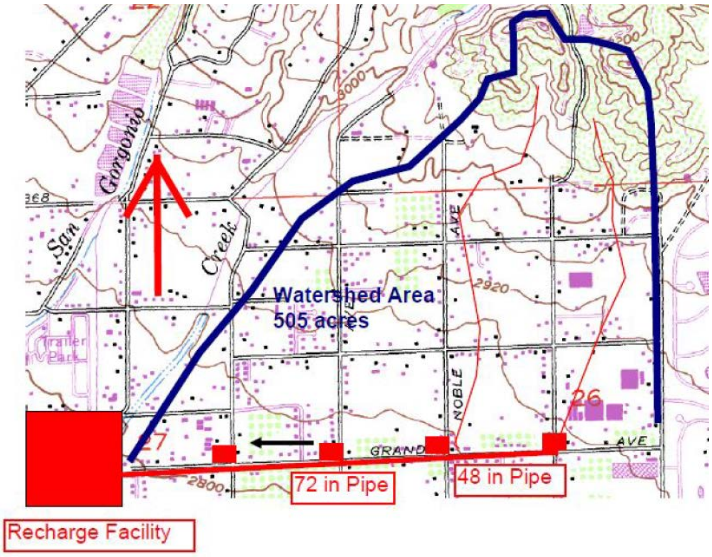


Figure 5-4
Grand Avenue Stormwater Interceptor Watershed Area

Edgar Canyon, Noble Creek and Marshall Creek

In BCVWD's 2013 UWMP Update, an estimate of the yield from the Edgar Canyon, Noble Creek and Marshall Creek Capture Projects was presented. No further work has been performed on these conceptual projects, so at this time the yield from the projects remains at 1,050 AFY.

Grand Avenue and Sundance Urban Runoff Capture

Daily rainfall totals for the period January 1, 1929 through December 31, 2006 were used in the runoff analysis for these drainage areas. This provides 77 years of record. The Beaumont rainfall was used for all of the runoff calculations. This is conservative since there is slightly higher rainfall in Cherry Valley than in Beaumont.

For purpose of this analysis a "storm" is defined as a period of consecutive rain days not interrupted by more than 3 consecutive "non-rain" days. If there were four days or more on "no rain" between rainfall events, the next rainfall period was considered a new "storm."

During the period January 1, 1929 through December 31, 2006 there were 1046 "storms" averaging 5.2 days in duration each.

A histogram of the total storm rainfall was developed in Excel, placing the data in "bins" of 0.1 inch from 0 to 13 inches. There were three storms that had total rainfall exceeding 13 inches – 20.1, 13.47, and 13.37 inches. These were added to the end of the frequency distribution as individual items.

The Natural Resources Conservation Service (NRCS) Curve Number method was used to estimate the runoff from each storm identified meeting the criteria defined above.

The Runoff Curve Number (CN) was determined for two conditions: undeveloped and developed; hydrologic soil type (A, B, C, or D) was based on the Riverside County Flood Control Hydrology Manual Soil Maps. The undeveloped, or natural ground surface, was determined to be “pasture” in good condition. For single family development a sampling of the impervious percentage at three parcels in the Sundance tract was analyzed. The impervious percentages ranged from 51.4% to 62.3% and averaged 56%. A 56% impervious estimate was used for the Sundance Runoff Analysis. For the Grand Avenue Interceptor, the impervious percentage was reduced to take into account a more-rural development in that area. The curve number for impervious surfaces is set at 98. Table 5-18 shows the composite curve number used in the analyses.

Table 5-18
NRCS Runoff Curve Numbers

Location	Condition	Composite Curve Number
Grand Ave. Interceptor	Undeveloped	65
	Developed	73
Sundance Basins	Undeveloped	61
	Developed	82

The rainfall histogram described above was used to determine the undeveloped and developed storm runoff in acre-ft for each storm rainfall “bin” value based on the drainage area tributary to each facility as shown below. The individual storm runoff was multiplied by the number of storm events (frequency) within that “bin” to get the total volume of runoff for the period of record (77 years). Table 5-19 shows the drainage area for each of the drainage areas and the retention basin volume. The basin volume for the Grand Ave Interceptor is BCVWD’s Recharge Facility Phase II only and includes the impact of recharge occurring during the storm water capture event. No infiltration/recharge is assumed to occur at the Sundance Basins

Table 5-19
Summary of the Urban Runoff Drainage Areas and Retention Basin Volumes

Facility	Drainage Area, acres	Basin Volume, acre-ft
Grand Ave Interceptor	505	90[1]
Cherry Ave Basin	426	240
Eighth St. Basin	475	128
Starlight Basin	250	32

[1] Recharge during a multi-day storm even would add another 100 to 125 acre-ft

Not all of the storm water which occurred during the period of record could be captured. The limit on the amount which could be captured was set equal to the volume of the retention basin. All runoff up to the volume of the retention basin was assumed to be captured; any runoff above that was assumed to be lost. Except for the small Starlight Basin, the basins capture the total runoff from about 95% of all of the storms. Table 5-20 shows the amount of storm runoff that can actually be captured – close to 800 acre-ft annual average.

From a water resources perspective, the Beaumont Basin Watermaster would likely not consider all of the captured storm water as “new water.” “New water” is water which is developed over and above what would have occurred naturally, in an undeveloped condition.

Table 5-20
Urban Runoff Capture Summary

Facility	Estimated Captured Runoff, AFY	Percent of Storms Totally Captured	Total Average Annual Runoff, AFY, Based on 77 years of Record	Percent of All Possible Storm Water Captured
Grand Ave Interceptor	200	98.5%	232	90.0%
Cherry Ave Basin	258	95.8%	276	93.4%
Eighth St Basin	237	94.6%	308	76.9%
Starlight Basin	89	89.2%	171	52%
Total	784			

One approach to determine the “new water” is to use the same approach as described above but instead of using the developed composite curve number, use the natural, undeveloped curve number. The “new water” could be quantified as the difference in the volume of water between developed and undeveloped conditions. This could be a valid approach 1) if it were possible to capture and recharge all of the developed flow for all storms, and 2), under natural conditions all of the runoff percolates in the Basin. The problem is that neither of these occurs and historically there was some portion of runoff that left the Basin as surface outflow.

An alternative approach would be to estimate that for a storm rainfall total above some value, surface outflow from the basin would occur under undeveloped conditions. For purposes of this analysis, storm rainfall total greater than 3 inches or 4 inches under natural conditions is assumed to initiate surface outflow from the basin. New water then is defined as the difference between the captured runoff volume and the total runoff which occurs on undeveloped land for storms 3 in or less (or 4-in or less) in total rainfall. Using this approach, an estimate of the “new water” is about 730 AFY as shown in Table 5-21.

Table 5-21
An Estimate of “New Water” from Storm Water Capture

Facility	Estimated Captured Runoff, AFY	Runoff from Undeveloped Land		Estimated Amount of New Water, AFY
		3-in Total Storm Rainfall, AFY	4-in Total Storm Rainfall, AFY	
Grand Ave Interceptor	200	41	75	172 to 192 (Use185)
Cherry Ave Basin	258	9	19	249 to 239 (Use 245
Eighth St Basin	237	10	21	226 to 216 (Use 220)
Starlight Basin	89	5	11	84 to 78 (use 80)
Total				730

This has a current value of over $230,000 per year at the Pass Agency Imported Water Rate of $317 per acre-ft.

The BCVWD 2013 UWMP estimated the yield from the projects in Table 5-21 at 740 AFY; so the master plan studies appeared to confirm some of the earlier work.

Water Source Summaries

Tables 5-22 through 5-24 are summaries of the water demand, local water sources, and supplemental imported water to meet BCVWD's demands between 2015 and build out. Tables 5-22 through 5-24 **assume no conservation effect**. There are a myriad of options which BCVWD could implement over time; but to develop a strategy to provide the technical support for funding and provide an "envelope of imported water requirements," three scenarios are presented. They represent the range of options from minimal development of local resources to fairly extensive development of local water resources and water recycling.

- A "**Minimal Additional Local Water Resources Scenario**," **(Table 5-22),** assumes Beaumont Basin Watermaster's return flow credits based on Table 5-7 presented previously. A "baseline" return flow of 645 AFY was subtracted from Watermaster's return flow credits to account for return flows that were reaching the groundwater table in 2002, the year the original adjudication safe yield was determined. Unused overlier pumping rights would be allocated back to BCVWD and the other appropriators on the basis of an adjusted safe yield of 6,700 AFY. No local storm water capture or imported groundwater projects to supplement the non-potable water system are proposed. No recycled water will be used. Only untreated SPW will be used in the non-potable water system. The Oak Valley Greens and Morongo Tukwet Golf Courses will not be irrigated with recycled water provided by BCVWD. This scenario results in the **largest amount of imported water** required.
- A **"Middle Ground Scenario," (Table 5-23),** assumes Beaumont Basin Watermaster's return flow credits based on Table 5-7 presented previously. A "baseline" return flow of 645 AFY was subtracted from Watermaster's return flow credits to account for return flows that were reaching the groundwater table in 2002, the year the original adjudication safe yield was determined. Unused overlier pumping rights would be allocated back to BCVWD and the other appropriators on the basis of an adjusted safe yield of 6,700 AFY. Local storm water capture and imported groundwater projects to supplement the non-potable water system will be implemented. It also assumes that YVWD recycled water will be used to irrigate landscaping through the BCVWD non-potable water system and any surplus recycled water will be given advanced wastewater treatment and recharged (after 2020). This scenario does not envision irrigation of the Oak Valley Greens and Morongo Tukwet Golf Courses with recycled water supplied by BCVWD, nor does it envision using City of Beaumont recycled water. (The use of City of Beaumont recycled water would reduce the need for imported water under this scenario.)
- A **"Maximizing Local Water Resources Scenario," (Table 5-24),** assumes Beaumont Basin Watermaster's return flow credits based on Table 5-7 presented previously. A "baseline" return flow of 645 AFY was subtracted from Watermaster's return flow credits to account for return flows that were reaching the groundwater table in 2002, the year the original adjudication safe yield was determined. Local storm water capture and imported groundwater projects to supplement the non-potable water system will be implemented. It also assumes that both YVWD and City of Beaumont recycled water will be used to irrigate landscaping and the Oak Valley Greens and Morongo Tukwet Golf Courses will be irrigated with recycled water to the extent it is available. The golf courses may need to supplement their demands with their own well supply during peak demand times. Any surplus recycled water will be given advanced wastewater treatment

and recharged (after 2020). This scenario results in the **least amount of imported water**.

Table 5-22
Water Resource Summary
Maximum Imported Water

Maximum Imported Water Scenario

No Local Stormwater Projects, No Imported Groundwater, No Recycled Water, No Golf Courses

	Source		2015	2020	2025	2030	2035	2040	2045	Build-out
Potable Water Demand, AFY	Table 4-6		13535	14753	16576	18674	20658	22483	23148	25718
Non-Potable Water System Demand, AFY	Table 5-11		1752	1906	2374	2931	3228	3449	3670	3710
Non-Potable Water Supplied to GCs, (equal to GC Forebearance Water), AFY			0	0	0	0	0	0	0	0
Total Non-Potable Water Supplied including GCs, AFY			1752	1906	2374	2931	3228	3449	3670	3710
Recycled Water in Non-potable Water System based on month-by-month analysis										
From YVWD, AFY			0	0	0	0	0	0	0	0
From City of Beaumont, AFY			0	0	0	0	0	0	0	0
Recycled Water Supplied to Oak Valley and Morongo Tukwet GCs										
From YVWD, AFY			0	0	0	0	0	0	0	0
From City of Beaumont			0	0	0	0	0	0	0	0
Imported Groundwater into Non-potable Water System										
High nitrate Mesa Water, AFY			0	0	0	0	0	0	0	0
San Timoteo Basin, AFY			0	0	0	0	0	0	0	0
Supplemental Potable/Imported Water into Non-potable System based on month-by-month analysis			1752	1906	2374	2931	3228	3449	3670	3710
Groundwater Sources AFY										
Edgar Canyon Groundwater	Section 5		2200	2200	2200	2200	2200	2200	2200	2200
Beaumont Basin Groundwater	Section 5		0	0	0	0	0	0	0	0
BCVWD Share of Unused Overlier Rights based on Safe Yield = 6700 AFY	Table 5-4		1490	1040	920	800	750	750	750	750
Overlier Forebearance of Pumping for Potable Water Supply	Table 5-5		452	544	752	942	1026	1051	1051	1051
Overlier Forebearance of Pumping for Recycled or Non-potable Water Supply	Table 5-5		0	30	60	90	120	120	120	120
Overlier Forbearance of Pumping for Recycled or Non-potable Water Supply to GCs	Table 5-15		0	0	0	0	0	0	0	0
Grand Avenue Storm Capture and Recharge Project (185 AFY)	Table 5-21		0	0	0	0	0	0	0	0
Miscellaneous Urban Runoff Capture and Percolation in UWMP (545 AFY)	Table 5-21		0	0	0	0	0	0	0	0
Return Flow Credit (above Baseline)	Table 5-7		165	223	280	514	868	922	1198	2205
Advanced Treated Recyled Water Recharged to Beaumont Basin, AFY			0	0	0	0	0	0	0	0
Subtotal Groundwater Extractable Without Replacement			4307	4037	4212	4546	4964	5043	5319	6326
Total Supplemental Water Required			10980	12623	14738	17060	18923	20890	21499	23102

Table 5-23
Water Resource Summary
Middle Ground Scenario

Middle Ground Imported Water Requirement

Local Stormwater Projects, Imported Groundwater, AWT Groundwater Recharge, YWWD Recycled but No Beaumont Recycled Water, No Golf Courses

	Source		2015	2020	2025	2030	2035	2040	2045	Build-out
Potable Water Demand, AFY	Table 4-6		13535	14753	16576	18674	20658	22483	23148	25718
Non-Potable Water System Demand, AFY	Table 5-11		1752	1906	2374	2931	3228	3449	3670	3710
Non-Potable Water Supplied to GCs, (equal to GC Forebearance Water), AFY	Table 5-15		0	0	0	0	0	0	0	0
Total Non-Potable Water Supplied including GCs, AFY			1752	1906	2374	2931	3228	3449	3670	3710
Recycled Water in Non-potable Water System based on month-by-month analysis										
From YVWD, AFY	Table 5-12		1425	1469	1582	2220	2294	2348	2392	2400
From City of Beaumont, AFY			0	0	0	0	0	0	0	0
Recycled Water Supplied to Oak Valley and Morongo Tukwet GCs										
From YVWD, AFY			0	0	0	0	0	0	0	0
From City of Beaumont			0	0	0	0	0	0	0	0
Imported Groundwater into Non-potable Water System										
High nitrate Mesa Water, AFY			0	0	0	300	300	300	300	300
San Timoteo Basin, AFY			0	0	0	400	600	750	800	800
Supplemental Potable/Imported Water into Non-potable System based on month-by-month analysis			327	437	792	11	34	51	178	210
Groundwater Sources AFY										
Edgar Canyon Groundwater	Section 5		2200	2200	2200	2200	2200	2200	2200	2200
Beaumont Basin Groundwater	Section 5		0	0	0	0	0	0	0	0
BCVWD Share of Unused Overlier Rights based on Safe Yield = 6700 AFY	Table 5-4		1490	1040	920	800	750	750	750	750
Overlier Forebearance of Pumping for Potable Water Supply	Table 5-5		452	544	752	942	1026	1051	1051	1051
Overlier Forebearance of Pumping for Recycled or Non-potable Water Supply	Table 5-5		0	30	60	90	120	120	120	120
Overlier Forbearance of Pumping for Recycled or Non-potable Water Supply to GCs	Table 5-15		0	0	0	0	0	0	0	0
Grand Avenue Storm Capture and Recharge Project (185 AFY)	Table 5-21		0	185	185	185	185	185	185	185
Miscellaneous Urban Runoff Capture and Percolation in UWMP (545 AFY)	Table 5-21		0	200	300	350	400	500	545	545
Return Flow Credit (above Baseline)	Table 5-7		165	223	280	514	868	922	1198	2205
YVWD Advanced Treated Recyled Water Recharged to Beaumont Basin, AFY	Table 5-14		0	0	334	624	565	522	486	481
Subtotal Groundwater Extractable Without Replacement			4307	4422	5031	5705	6114	6250	6535	7537
Total Supplemental Water Required			9555	10769	12337	12981	14579	16285	16791	18391

Table 5-24
Water Resource Summary
Minimum Imported Water

Minimum Imported Water Scenario Maximizing Local Water Resources

Return Flow Credits plus Local Stormwater Projects, Imported Groundwater, AWT Groundwater Recharge, YWWD and Beaumont Recycled Water, Golf Courses

	Source		2015	2020	2025	2030	2035	2040	2045	Build-out
Potable Water Demand, AFY	Table 4-6		13535	14753	16576	18674	20658	22483	23148	25718
Non-Potable Water System Landscape Demand,	Table 5-11		1752	1906	2374	2931	3228	3449	3670	3710
Golf Course Demand, AFY	Table 5-15		2000	2000	2000	2000	2000	2000	2000	2000
Total Landscape and GC Demand, AFY			3752	3906	4374	4931	5228	5449	5670	5710
Recycled Water in Non-potable Water System for Landscaping based on month-by-month analysis										
From YVWD, AFY	Table 5-15		1425	1469	1582	2221	2294	2348	2392	2399
From City of Beaumont, AFY	Table 5-15		0	427	719	691	910	1085	1262	1310
Supplemental Potable/Imported Water into Non-potable System for Landscaping based on month-by-month analysis, AFY			327	11	74	19	25	16	16	0
				1907	2375	2931	3229	3449	3670	3709
Recycled Water Supplied to Oak Valley and Morongo Tukwet GCs, based on month-by-month analysis, AFY										
From YVWD, AFY	Table 5-15		0	320	230	355	316	288	269	267
From City of Beaumont , AFY	Table 5-15		0	491	490	614	675	768	817	1202
Imported Groundwater into Non-potable Water System for GCs										
High nitrate Mesa Water, AFY			0	0	0	300	300	300	300	300
San Timoteo Basin, AFY			0	0	0	650	650	600	600	200
GC Private Well Supply, AFY			2000	1189	1280	81	59	44	14	31
Non-Potable Water Supplied to GCs, (equal to GC Forebearance Water), AFY			0	811	720	1919	1941	1956	1986	1969
Groundwater Sources AFY										
Edgar Canyon Groundwater	Section 5		2200	2200	2200	2200	2200	2200	2200	2200
Beaumont Basin Groundwater	Section 5		0	0	0	0	0	0	0	0
BCVWD Share of Unused Overlier Rights based on Safe Yield = 6700 AFY	Table 5-4		1200	840	700	600	550	550	550	550
Overlier Forebearance of Pumping for Potable Water Supply	Table 5-5		452	544	752	942	1026	1051	1051	1051
Overlier Forebearance of Pumping for Recycled or Non-potable Water Supply	Table 5-5		0	30	60	90	120	120	120	120
Overlier Forbearance of Pumping for Recycled or Non-potable Water Supply to GCs	Table 5-15		0	811	720	1919	1941	1956	1986	1969
Grand Avenue Storm Capture and Recharge Project (185 AFY)	Table 5-21		0	185	185	185	185	185	185	185
Miscellaneous Urban Runoff Capture and Percolation in UWMP (545 AFY)	Table 5-21		0	200	300	350	400	500	545	545
Return Flow Credit (above Baseline)	Table 5-7		165	223	280	514	868	922	1198	2205
YVWD and City of Beaumont Advanced Treated Recyled Water Recharged to Beaumont Basin, AFY	Table 5-16		0	629	697	1165	1311	1497	1635	2290
Subtotal Groundwater Extractable Without Replacement			4017	5662	5894	7965	8601	8981	9470	11115
Total Supplemental Water Required			9845	9102	10756	10728	12082	13518	13694	14603

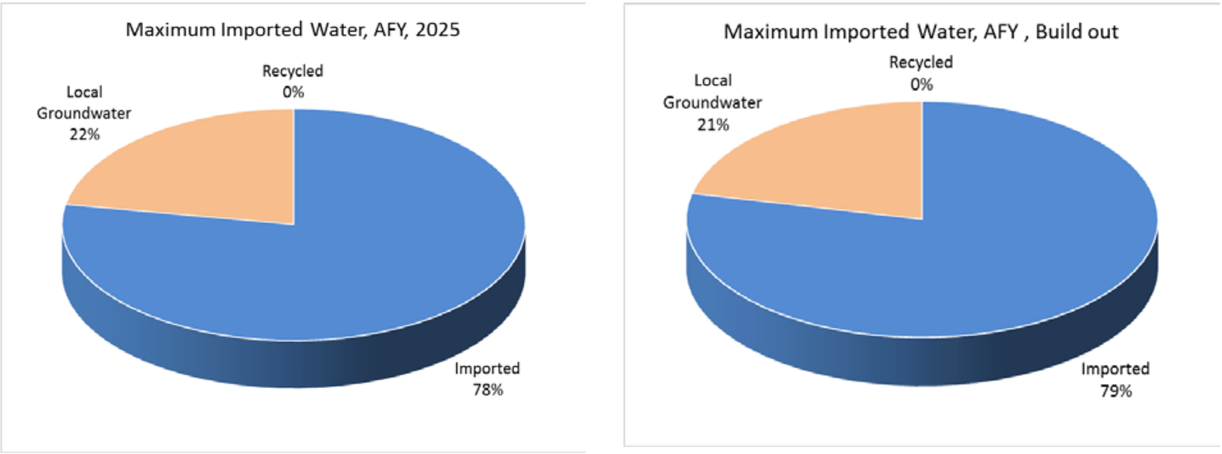
Figure 5-5 shows the range of the water sources for these scenarios graphically for the years 2025 and build out. The local groundwater includes Edgar Canyon, forbearance water, return flows above baseline, reallocated unused overlier rights, and high nitrate and other non-potable groundwater used in the non-potable water system. Figure 5-5 shows the imported water will approach 80% of the District's supply if there is little or no storm water capture and no recycled water use. This is probably not a likely scenario, but does clearly indicate the value of storm water capture and recycled water.

In the scenario where local water resources are maximized, the amount of imported water needed decreases to below 50% at build-out and recycled water approaches 25% of the future supply. This scenario probably represents a "best case" scenario.

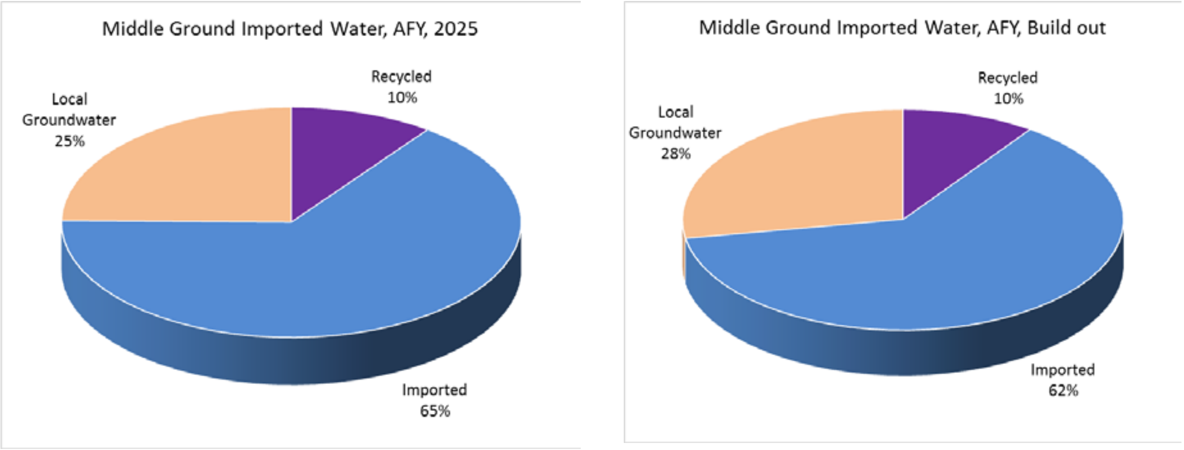
The likely scenario is probably somewhere between these two.

For each of the scenarios above**, four imported water supply conditions** were analyzed. All are based on the Pass Area Member Agencies' Draft Allocation Agreement from 2015 through build-out. This represents a "worst case" condition since it is believed more imported water will be available to BCVWD from 2015 through 2025 or so.

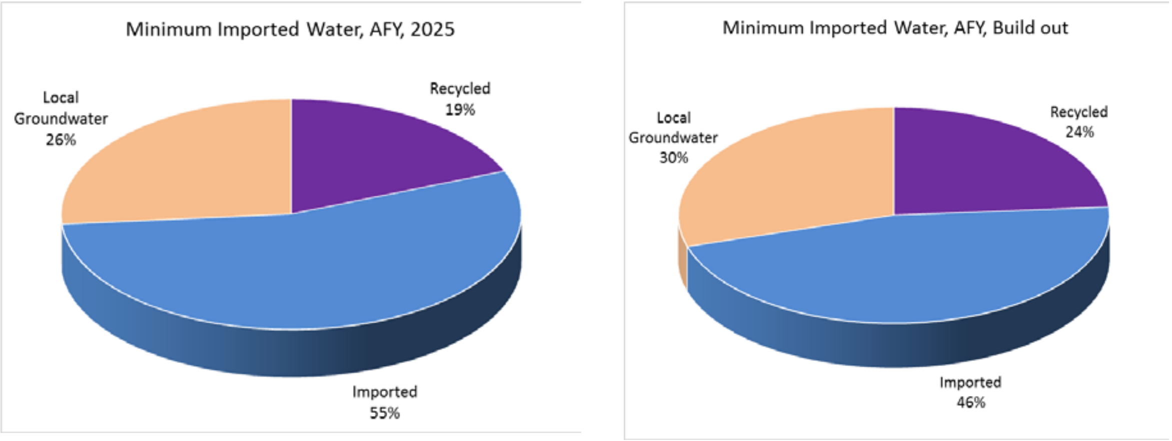
1. The SGPWA does not purchase any more Table A and the Agency's Table A remains at 17,300 AFY. The SWP has a 64% reliability factor which provides BCVWD with an allocation of 3,040 AFY based on the draft Allocation Agreement. BCVWD or SGPWA will need to purchase additional imported water rights (Table A) to meet future BCVWD requirements assuming a similar SWP 64% reliability factor.
2. The SGPWA purchases sufficient quantities of additional water to provide 100% reliability of their current Table A amount of 17,300 AFY. By doing this BCVWD's allocation per the draft Allocation Agreement increases to 4,740 AFY. This is the amount BCVWD can count on year in–year out. BCVWD or SGPWA will purchase additional imported water rights (Table A) to meet future BCVWD requirements taking into account the SWP reliability factor of 64%.
3. The SGPWA purchases sufficient quantities of additional water to provide 100% reliability of their current Table A amount of 17,300 AFY. By doing this BCVWD's allocation per the draft Allocation Agreement increases to 4,740 AFY. This is the amount BCVWD can count on year in–year out. It is assumed that improvements are made to the SWP to improve the delivery reliability to 80%, e.g., Delta improvements, more storage, etc., and BCVWD or SGPWA will purchase additional imported water rights (Table A) to meet future BCVWD requirements taking into account the SWP reliability factor of 80%.
4. The SGPWA purchases sufficient quantities of additional water to provide 100% reliability of their current Table A amount of 17,300 AFY. By doing this BCVWD's allocation per the draft Allocation Agreement increases to 4,740 AFY. This is the amount BCVWD can count on year in–year out. It is assumed that improvements are made to the SWP to improve the delivery reliability to 100%, e.g., Delta improvements, more storage, etc., and BCVWD or SGPWA will purchase additional imported water rights (Table A) to meet future BCVWD requirements taking into account the SWP reliability factor of 100%. This represents an extremely optimistic condition and provides a lower limit on the amount of imported water rights that need to be purchased.



Minimal Local Resources – Maximize Imported Water Scenario



Middle Ground Scenario



Minimize Imported Water – Maximize Local Resources

Figure 5-5
Water Sources for Various Water Resource Scenarios (2025 and Build-out)

Tables 5-25 through 5-27 show the amount of additional imported water required by BCVWD under the three conditions and four water supply conditions described above. Build out assumes 22,511 new EDUs. The amount of imported supplemental water needed at build out ranges from 18,400 - 20,100 AFY under a worst case condition of limited local water resource use to 9,900 - 11,600 AFY under a condition of maximum utilization of local resources and recycled water. With significant recycled water use, the amount of supplemental water needed is 13,600 – 15,400 AFY. It is clear that development of local water resources is important.

For the years 2015 through 2025 or so, Tables 5-25 through 5-27 represent a worst case condition since more imported water should be available to BCVWD because the other water agencies in the area will not be needing their full allocation. Also no consideration is given for the reduction in demand which may occur due to the continuing “conservation ethic,” more water efficient appliances and plumbing in new construction, replacement of plumbing in older buildings and new landscape ordinances.

Table 5-25
Additional Imported Water Required by BCVWD, AFY
Minimize Local Resources and Maximize Imported Water

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	10,980	12,623	14,738	17,060	18,923	20,890	21,499	23,102
SGPWA Purchases No Additional Table A; Table A Remains at 17,300 AFY @64% Reliability								
BCVWD Imported Water Avail. based on Allocation Agreement and 64% SWP Reliability	3,040	3,040	3,040	3,040	3,040	3,040	3,040	3,040
Net Supplemental Water Required	7,940	9,583	11,698	14,020	15,883	17,850	18,459	20,062
Additional SPW to Purchase @ 64% Reliability	12,406	14,973	18,279	21,906	24,817	27,890	28,842	31,346
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY								
BCVWD Imported Water Avail. based on Allocation Agreement and 100 % Reliability	4,740	4,740	4,740	4,740	4,740	4,740	4,740	4,740
Net Supplemental Water Required	6,240	7,883	9,998	12,320	14,183	16,150	16,759	18,362
Additional SPW to Purchase @ 64% Reliability	9,750	12,316	15,622	19,249	22,160	25,234	26,186	28,690
Additional SPW to Purchase @ 80% Reliability	7,800	9,853	12,498	15,399	17,728	20,187	20,949	22,952
Additional SPW to Purchase @ 100% Reliability	6,240	7,883	9,998	12,320	14,183	16,150	16,759	18,362

Table 5-26
Additional Imported Water Required by BCVWD, AFY
“Middle Ground” Condition

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	9,555	10,769	12,337	12,981	14,579	16,285	16,791	18,391
SGPWA Purchases No Additional Table A; Table A Remains at 17,300 AFY @64% Reliability								
BCVWD Imported Water Avail. based on Allocation Agreement and 64% SWP Reliability	3,040	3,040	3,040	3,040	3,040	3,040	3,040	3,040
Net Supplemental Water Required	6,515	7,729	9,297	9,941	11,539	13,245	13,751	15,351
Additional SPW to Purchase @ 64% Reliability	10,180	12,076	14,527	15,532	18,029	20,695	21,486	23,985
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY								
BCVWD Imported Water Avail. based on Allocation Agreement and 100 % Reliability	4,740	4,740	4,740	4,740	4,740	4,740	4,740	4,740
Net Supplemental Water Required	4,815	6,029	7,597	8,241	9,839	11,545	12,051	13,651
Additional SPW to Purchase @ 64% Reliability	7,524	9,420	11,871	12,876	15,373	18,039	18,829	21,329
Additional SPW to Purchase @ 80% Reliability	6,019	7,536	9,497	10,301	12,298	14,431	15,064	17,063
Additional SPW to Purchase @ 100% Reliability	4,815	6,029	7,597	82,41	9,839	11,545	12,051	13,651

Table 5-27
Additional Imported Water Required by BCVWD, AFY
Maximizing Local Water Resources and Minimizing Imported Water

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	9,845	9,102	10,756	10,728	12,082	13,518	13,694	14,603
SGPWA Purchases No Additional Table A; Table A Remains at 17,700 AFY @64% Reliability								
BCVWD Imported Water Avail. based on Allocation Agreement and 64% SWP Reliability	3,040	3,040	3,040	3,040	3,040	3,040	3,040	3,040
Net Supplemental Water Required	6,805	6,062	7,716	7,688	9,042	10,478	10,654	11,563
Additional SPW to Purchase @ 64% Reliability	10,633	9,472	12,056	12,013	14,129	16,372	16,647	18,067
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY								
BCVWD Imported Water Avail. based on Allocation Agreement and 100 % Reliability	4,740	4,740	4,740	4,740	4,740	4,740	4,740	4,740
Net Supplemental Water Required	5,105	4,362	6,016	5,988	7,342	8,778	8,954	9,863
Additional SPW to Purchase @ 64% Reliability	7,977	6,816	9,400	9,357	11,472	13,716	13,990	15,410
Additional SPW to Purchase @ 80% Reliability	6,381	5,453	7,520	7,485	9,178	10,973	11,192	12,328
Additional SPW to Purchase @ 100% Reliability	5,105	4,362	6,016	5,988	7,342	8,778	8,954	9,863

Table 5-22 through 5-27 did not consider:

- The effects of state mandates for water conservation, conversion of older plumbing to more water efficient equipment, installation of more water efficient appliances over time and the impact of new, water efficient landscaping ordinances for new developments.

- Additional water will be available from the Pass Agency to BCVWD for a number of years since other member agencies of SGPWA are not "growing" and will not need their full "share" of imported water for a number of years yet.

Tables 5-28 through 5-30 present a "realistic" amount of imported water considering BCVWD will be getting more water from the Pass Agency during the period 2015 through 2030 than the Draft Allocation limit. The amount is based on historical amounts delivered to BCVWD, tapering off over time. The tables also show the impact of conservation. In Table 5-30, for year 2020, the conservation actually results in "banking water," i.e., available water exceeds the need for imported water.

Table 5-28
Realistic Additional Imported Water Required by BCVWD, AFY
Minimize Local Resources and Maximize Imported Water
(Considering Imported Water Availability and Conservation)

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	10,980	12,623	14,738	17,060	18,923	20,890	21,499	23,102
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (No Conservation)								
Conservation	0%	0%	0%	0%	0%	0%	0%	0%
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	8,980	4,623	8,238	12,060	14,183	16,150	16,759	18,362
Additional SPW to Purchase @ 64% Reliability	14,031	7,223	12,872	18,843	22,160	25,234	26,186	28,690
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (With Conservation)								
Conservation	20%	15%	15%	15%	15%	15%	15%	15%
Total Supplemental Water Required	8,784	10,729	12,528	14,501	16,084	17,756	18,274	19,636
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	6,784	2,729	6,028	9,501	11,344	13,016	13,534	14,896
Additional SPW to Purchase @ 64% Reliability	10,600	4,264	9,418	14,845	17,725	20,338	21,147	23,276

Figure 5-6 shows the growth of imported water requirements over time using a realistic amount of water available from the SGPWA till 2035 under their current Table A amount. See Tables 5-26 through 5-28. It is assumed that the Pass Agency will secure additional water to provide 100 percent reliability in their Table A amount. In 2035 it is assumed that the other agencies in the Pass Agency service area will require their full allocation per the Draft Allocation Agreement.

In Figure 5-6, the drop in water requirements between 2015 and 2020 is an anomaly. The imported water requirement in 2015 is based on the 20% allocation from DWR as a result of the drought. A value of 2,000 AFY was used in the year 2015 analysis. If it were not for the drought and the low allocation, the value would likely be closer to 8,000 AFY.

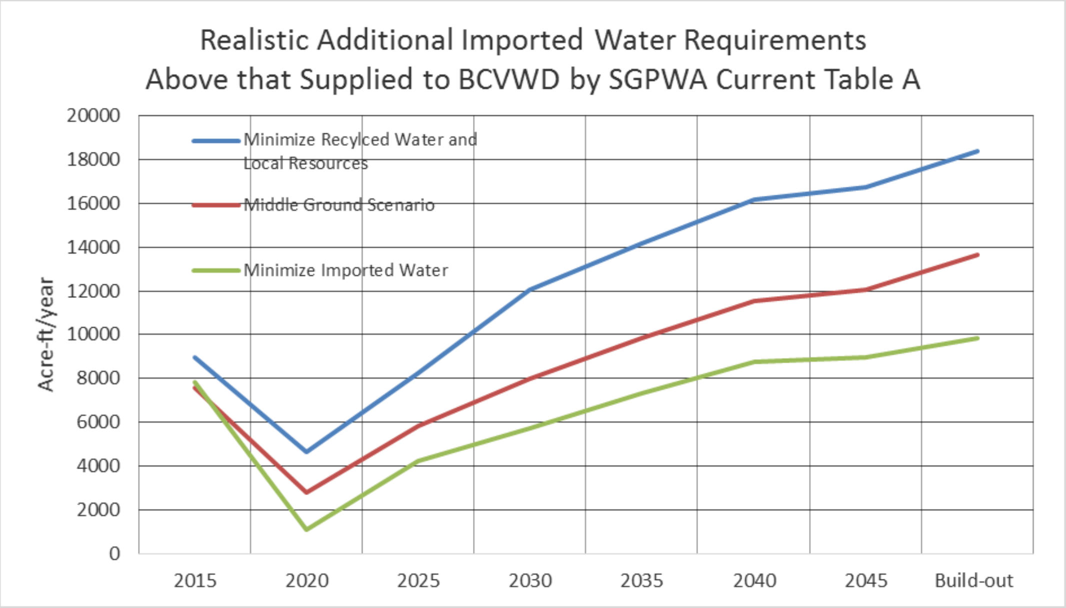
Table 5-30 summarizes the supplemental imported water requirements needed at build-out and the amount needed to be purchased by BCVWD under the three scenarios. The amount to be purchased assumes the Draft Allocation Agreement is "in place" and the SGPWA brings their initial 17,300 AFY Table A up to 100% reliability. The amount BCVWD and/or SGPWA needs to purchase depends on the reliability of the supply purchased. Two options are shown in Table 5-28 – 64% and 80%. The latter assumes future improvements to increase the reliability of the SWP.

Table 5-29
Realistic Additional Imported Water Required by BCVWD, AFY
"Middle Ground" Condition
(Considering Imported Water Availability and Conservation)

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	9,555	10,769	12,337	12,981	14,579	16,285	16,791	18,391
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (No Conservation)								
Conservation	0%	0%	0%	0%	0%	0%	0%	0%
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	7,555	2,769	5,837	7,981	9,839	11,545	12,051	13,651
Additional SPW to Purchase @ 64% Reliability	11,805	4,326	9,121	12,470	15,373	18,039	18,829	21,329
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (With Conservation)								
Conservation	20%	15%	15%	15%	15%	15%	15%	15%
Total Supplemental Water Required	7,644	9,153	10,487	11,033	12,392	13,842	14,272	15,632
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	5,644	1,153	3,987	6,033	7,652	9,102	9,532	10,892
Additional SPW to Purchase @ 64% Reliability	8,819	1,802	6,229	9,427	11,956	14,222	14,894	17,019

Table 5-30
Realistic Additional Imported Water Required by BCVWD, AFY
Maximizing Local Water Resources and Minimizing Imported Water

	2015	2020	2025	2030	2035	2040	2045	Build-out
Total Supplemental Water Required	9,845	9,102	10,756	10,728	12,082	13,518	13,694	14,603
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (No Conservation)								
Conservation	0%	0%	0%	0%	0%	0%	0%	0%
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	7,845	1,102	4,256	5,728	7,342	8,778	8,954	9,863
Additional SPW to Purchase @ 64% Reliability	12,258	1,722	6,650	8,950	11,472	13,716	13,990	15,410
SGPWA Purchases Additional Table A to Provide 100% Reliability for 17,300 AFY (With Conservation)								
Conservation	20%	15%	15%	15%	15%	15%	15%	15%
Total Supplemental Water Required	7,876	7,737	9,143	9,119	10,270	11,491	11,640	12,412
BCVWD Imported Water Avail.	2,000	8,000	6,500	5,000	4,740	4,740	4,740	4,740
Net Supplemental Water Required	5,876	0	2,643	4,119	5,530	6,751	6,900	7,672
Additional SPW to Purchase @ 64% Reliability	9,181	0	4,129	6,436	8,641	10,548	10,781	11,988



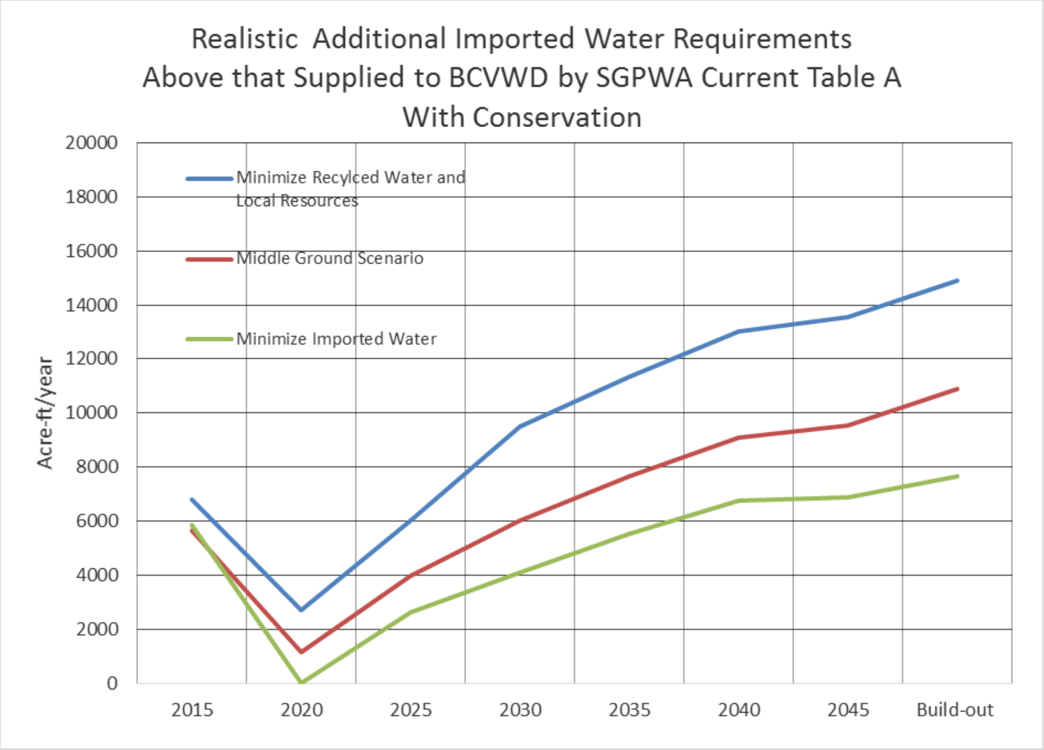


Figure 5-6
Realistic Growth of Imported Water Requirements Over Time
With and Without Conservation

Table 5-31
Additional Imported Water Required by BCVWD at Build-out, AFY

Scenario	Assumes 4,740 AFY Supplied by SGPWA through Current Table A		
	Total Additional Imported Water Needed, AFY	Additional Rights to Purchase @ 64% SWP Reliability, AFY (SGPWA @ 100% Reliability for 17,300 AFY)	Additional Rights to Purchase @ 80% SWP Reliability, AFY (SGPWA @ 100% Reliability for 17,300 AFY)
Minimize Local Resources and Maximize Imported Water	18,400	28,700	23,000
"Middle Ground" Condition	13,700	21,400	17,100
Maximizing Local Water Resources and Minimizing Imported Water	9,900	15,400	12,400
If Water Conservation Per Tables 5-28 through 5-30 Considered			
Minimize Local Resources and Maximize Imported Water	14,900	23,300	18,600
"Middle Ground" Condition	10,900	17,000	13,600
Maximizing Local Water Resources and Minimizing Imported Water	7,700	12,000	9,600

For planning purposes, at this time BCVWD should plan on needing about **13,700 AFY of additional imported water at build out** ("Middle Ground" Condition in Table 5-31). This does not include any "water conservation" effect nor include any adjustment for SWP reliability. If **local resources are maximized**, that amount could be **reduced to perhaps 10,900 AFY with water conservation**. It is important to emphasize that these **amounts are over and above the 4,740 AFY which will be supplied to BCVWD by SGPWA through their current Table A** amount of 17,300 AFY which **also assumes that SGPWA will bring their current Table A to 100% reliability**. Furthermore, to ensure 100% reliability, BCVWD or SGPWA will need to purchase additional SPW rights as shown in Table 5-31, based on a reliability factor of 64% or 80%as shown in Table 5-31.

To achieve 100% reliability for 13,700 AFY, 21,400 AFY and 17,100 AFY of "rights" would need to be purchased by BCVWD or SGPWA at SWP reliability factors of 64% and 80% respectively.

Section 6

Facility Requirements

Planning Criteria

Before the master plan facility requirements can be identified, the planning criteria to determine the adequacy of the various system components, such as wells, reservoirs, transmission mains, etc., and the size of future need facilities must be established. The criteria will also serve to guide developers as they plan their facilities to meet the master plan requirements and the District's ultimate needs.

Water Demands

The water demands were presented in Section 4:

- Average and maximum day demands by pressure zone (Tables 4-6 through 4-8) based on a Maximum Day: Average Day Demand ratio of 2.0:1
- Fire flow requirements by pressure zone (Table 4-9)
- Peak Hour to Maximum Day Ratio (Table 4-3):
    - 1.45 x Maximum day demand for 3040 Pressure Zone and above
    - 2.89 x Maximum day demand for 2850 Pressure Zone and below

Water Supply

Currently BCVWD's only water supply source is groundwater produced from wells. There is no imported water treatment facility at the present time or regional treated water supply connections and none are anticipated for the next 20 to 25 years. Wellhead treatment for nitrate and perhaps hexavalent chromium or other regulated contaminants may be necessary at some wells in the future.

Wells

There must be sufficient well capacity to supply the maximum day demand for the system with the largest well out of service as a minimum. A conservative approach is used in this master plan and this criteria will be applied on a pressure zone by pressure zone basis, to the extent this is possible. Several of the pressure zones are not anticipated to have wells, e.g., the 2520 and 2370 Pressure Zones. The 2650 Pressure Zone will need to have well capacity for those zones in addition to the 2650 Zone.

The ability to transfer water to a lower pressure zone or pump water to a higher pressure zone provides additional reliability. This is considered a "back-up." To provide water supply during extended power outages, i.e., more than a half-day, a sufficient number of wells must be equipped with a fixed or portable generator or auxiliary driver to be able to supply water to meet the maximum day demand, ideally, or, as a minimum, the average day demand.

Imported Water and Recharge Facilities

BCVWD's imported water supply must be capable of meeting the annual water requirements for the District at all times. On a daily basis this represents the average day demand. The difference between the average day demand and the maximum day demand is supplied from imported water stored in the groundwater basin.

The recharge facilities must have sufficient capacity to percolate the maximum amount of imported water needed by BCVWD on an annual basis with some "reserve" or "spare" capacity to be able to take and percolate Article 21 water from the SWP whenever it is available and to be able to perform maintenance on and rest some of the basins, i.e., at utilization factor. A reasonable utilization factor is 75%. This means that 25% of the time the basins are not in operation. This is equivalent to 3 weeks "on" and 1 week "off".

Water Treatment

BCVWD owns about 25 acres of land north of Golden Valley Rd which was purchased in the early to mid-1990s for a future water treatment plant. The site is adjacent to the EBX and the DWR Cherry Valley Pump Station and at an elevation to serve BCVWD's 2750 Pressure Zone. The plan was to take raw water, by gravity, from the EBX, treat it, and allow it to gravity flow into the 2750 Pressure Zone. From there the water could be released to lower pressure zones or pumped to higher pressure zones. The 3.9 MG Taylor Tank (2750 Pressure Zone) is presently on the site.

Although there are no immediate plans for a water treatment plant, these plans could change if the ability to recharge imported water is limited or becomes limited over time. When considering the construction of a water treatment plant for imported water, consideration must be given to the irregular operation and reliability of the SWP and the EBX. If no water is delivered, no water can be treated and the water treatment plant would sit idle.

Water Storage

Water storage has three components:

- Operational Storage (sometimes called "diurnal" storage) needed to meet the peak demands and provide water when the wells and booster pumps are not operating
- Fire Flow Storage to meet the fire flow demands for a given duration
- Emergency Storage to provide water to the consumers under unexpected conditions such as transmission pipeline outage, booster and well pump outage and other unforeseen conditions.

Operational Storage

Table 4-3, presented previously, showed the hourly demand variations for a typical summer day in BCVWD's system. This data is used to develop the hourly demands in the various pressure zones. Wells in Upper, Middle and Lower Edgar Canyon are assumed to be operating all day since they are all low horsepower pumps. Wells in the Beaumont Basin, however, are high horsepower and are on SCE's Time of Use-8 (TOU-8) rate schedule. Booster pumps are assumed to on the same rate schedule. Table 6-1 shows the summer and winter hours for SCE's TOU-8 rate schedule. Note there is no "on peak" time in the winter.

An analysis of the cost effectiveness of time of day pumping was performed for water produced from the Beaumont Basin based on year 2013 data for three pumping durations, 24, 18, and 9 hours per day, to determine the electrical energy and demand costs for the summer months. The summer months are critical from an energy cost standpoint as that is the time of year that demands are the highest. The summer rates for SCE extend from June 1 through September 30.

Table 6-1
SCE TOU-8 Electrical Rate Periods

Rate Period	Time	Duration, hr
Summer June 1 to September 30		
On-peak	Noon to 6 pm	6
Mid-peak	8 am to Noon 6 pm to 11 pm	4 5
Off-peak	11 pm to 8 am	9
Winter October 1 to May 31		
Mid-peak	8 am to 9 pm	13
Off-peak	9 pm to 8 am	11

The required storage, as a percent of the daily demand, for the 24-hr, 18-hr and 9-hr pumping durations based on the hourly variation in Table 4-3 for the 2800 Pressure Zone and below, presented previously, is 20.2%, 33.8% and 72.1% respectively. The additional cost for storage to reduce the pumping from 24 hr/day to 18 hr/day was $2.4 million based on the year 2013 Beaumont Basin summer pumping (14.2 mgd average) and a unit storage cost of $1.25/gallon. In order to provide the reduced pumping duration, the well capacity would need to be correspondingly increased by a factor of 24/18 or 1.33 times. This means another 4.7 mgd of well capacity. This is equivalent to two wells at $3.55 million each. So the total additional construction cost, including the storage, is $10 million.

The present worth of the annual electrical power cost savings from going to 18 hr/day from 24 hr/day pumping over a 20-year period at 3% interest was $3.9 million assuming no escalation in power costs over the 20-year period. If the cost of electrical power increased 3% per year above the cost of money, the present worth of the annual electrical power cost savings would be $6.9 million – still less than the $10 million increased construction cost.

As can be seen, the cost savings considering the escalation of power, even with no “on peak pumping,” is less than the “breakeven” point. (The “breakeven” point is about 30 years.) Note that the analysis does not include the slight increase in the energy cost from increased friction losses due to the increased flow rate in the distribution system. This additional energy is estimated to be small in comparison to the static discharge head which is around 700 ft.

Continuing the analysis to 9 hours of pumping, i.e., off-peak only, it was demonstrated that this was not economically feasible.

Based on this analysis, considering the uncertainty with energy prices in the future, it seems prudent to limit pumping to 18 hours per day for this master plan and provide storage on that basis.

Fire Flow Storage

Table 4-9, presented previously showed the fire flow and duration requirements for the various pressure zones. These flows and durations were used to determine the pressure zone fire storage requirements.

Emergency Storage

BCVWD has 20 regularly operating production wells at the present time and more will be scheduled to be drilled in the future to accommodate the projected growth. Twelve of the existing wells either have an auxiliary engine drive, standby generator, or connection for a portable generator set. (See Tables 2-1 and 2-5 presented previously.) The District relies on subsurface groundwater storage and well capacity to meet emergency demands. The District is not reliant on any surface water delivery system for day to day water supply. As a result, there is no need to provide large amounts of potable water surface storage to accommodate aqueduct or imported water outages. However, some storage is required to meet demands during extended power outages, transmission main outages, tank and reservoir maintenance, major brush fires, and other emergencies.

For planning purposes, BCVWD will provide about 50% of the maximum day demand in system storage for emergencies. This is equivalent to 12 hours on the maximum day (24 hours on an average day) and will provide time to take corrective action should anything be necessary.

Total Storage

The total storage for each pressure zone will be the sum of the operational storage, fire flow storage and emergency storage. There is some latitude in this criteria with the storage “rounded upward” to account for the unexpected. This is similar to other agencies in the area; for example, Eastern MWD has a policy of having a storage volume equal to the maximum day demand plus fire flow storage. They consider operational storage to be 50% of the maximum day demand and emergency storage equal to be 50% of the maximum day demand for a total of 100% of the maximum day demand for operational and emergency storage. This is slightly more conservative than BCVWD.

Transmission and Distribution Mains

Master planning criteria for transmission and distribution mains are presented in Table 6-2. Distribution system pressures shall be as shown in Table 6-3.

Booster Pumping

Booster pumping stations shall be designed to provide the maximum day demand in the pressure zone directly served by the booster pump plus any supplemental water needs in higher elevation pressure zones. Booster pumps shall operate only during mid-peak and off peak hours only (maximum of 18 hours per day) similar to the wells. Pump stations will have a minimum of two pumps, one duty/one standby, and will be constant speed. Pumps will be started and stopped on the basis of water level in the pressure zone reservoir and controlled through the District’s Supervisory Control and Data Acquisition (SCADA) System. Standby power will be provided to operate the duty pump(s) continuously.

Pressure Regulating Stations

Pressure regulating stations, serving pressure zones with tanks, shall be designed to meet the maximum day demand plus the fire flow requirements of the lower pressure zone and any lower pressure zones served through the pressure regulator.

Table 6-2
Transmission and Distribution Piping Planning Criteria

Distribution Mains	
Diameter	8 in (minimum) and 12 in new mains
Material	Cement mortar lined ductile iron
Maximum Velocity	10 ft/sec during maximum day demand plus fire flow 7 ft/sec during peak hour demand
Hazen-Williams C	120 (to account for fittings etc.) 60 to 130 for existing mains depending on material and age
Corrosion Protection	Polyethylene bagging south of I-10 where recommended by soil resistivity surveys
Transmission Mains	
Diameter	16, 18, 20, 24, 30, 36 inches for new mains
Material	Cement mortar lined ductile iron
Maximum Velocity	10 ft/sec
Design Velocity	5 ft/sec
Hazen-Williams C	130 100 -140 for existing mains depending on material and age
Corrosion Protection	Polyethylene bagging south of I-10 where recommended by soil resistivity surveys

Table 6-3
Distribution System Operating Pressure Planning Criteria

Operating Condition	Pressure
Maximum	150 psi
Design Maximum	80 psi
Operating Minimum at Peak Hour	50 psi at pad elevation
Minimum at Maximum Day plus Fire Flow	40 psi in system, 20 psi at flowing fire hydrant

For those pressure zones which do not have tank storage, the pressure regulating stations shall be capable of meeting the peak hour demand or the maximum day demand plus the fire flow requirement whichever is greater. One pressure regulator shall be sized to meet the minimum demand. There shall be at least two regulators in each station; some may need three or more depending on the flow rates. The regulators shall be set to open at successively lower downstream pressures with small regulators opening first.

Pressure regulating stations will typically be constructed in below grade concrete vaults within public rights-of-way.

Master Plan Facility Needs

Imported Water and Recharge Capacity

BCVWD Imported Water Needs

Tables 5-25 through 5-27 presented the amount of supplemental imported water needed by BCVWD from 2015 to build-out under three water resource scenarios. There were a number of imported water supply alternatives evaluated in those tables which were all based on the Draft Allocation Agreement proposed by the Pass Agency's members. However, since it is very unlikely that all of the Agency's members will be needing their full "draft" allocation initially, more imported water should be available to BCVWD for some time into the future – probably to year 2030 or so.

Based on that premise, Tables 5-28 through 5-30 were developed on the basis of a "realistic" estimate of the amount of imported water BCVWD can obtain. Those tables also include an estimate of the impact of conservation, conversion of plumbing in older buildings, more water efficient appliances being purchased and installed, and new, water efficient landscape ordinances proposed by the State on the demand. Table 5-31 presented a summary of the scenarios and the total amount of imported water needed at build-out.

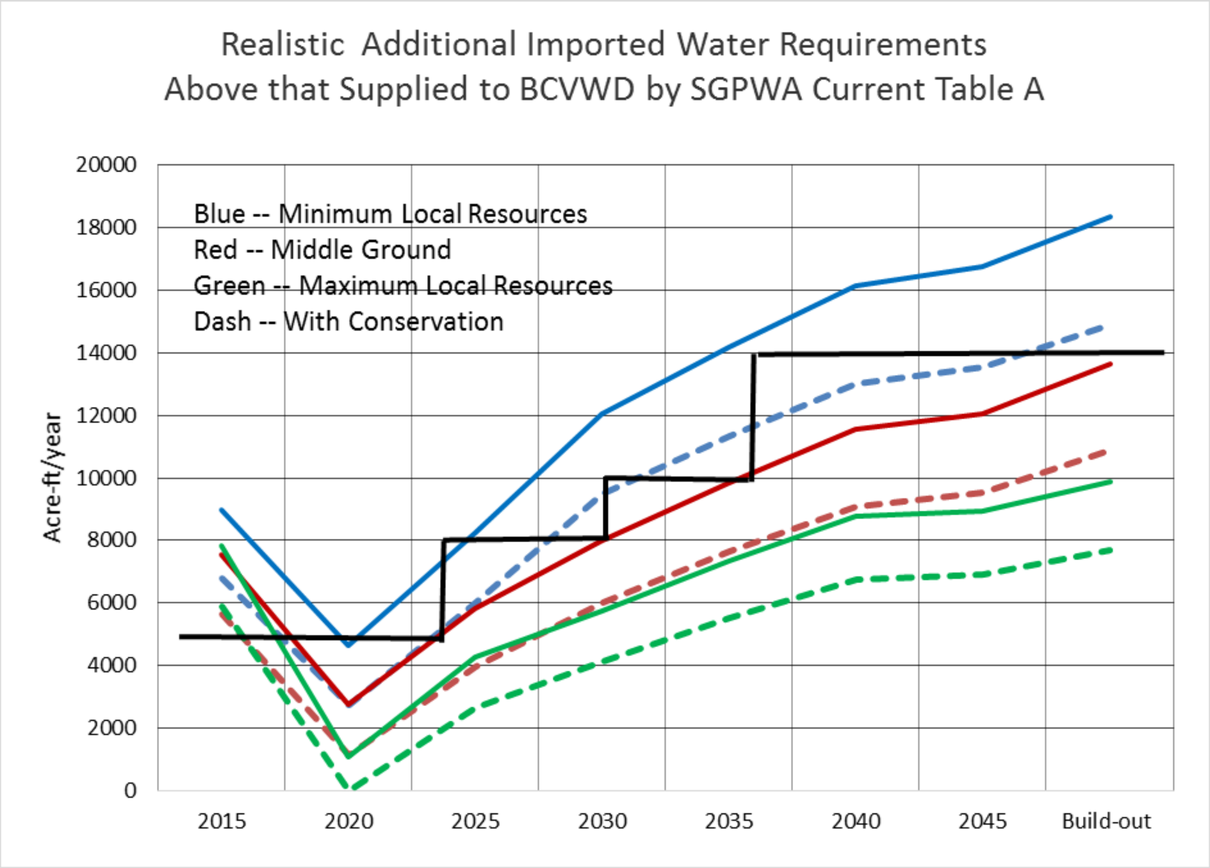
In Table 5-31, under a worst case condition, the maximum amount of imported water that needs to be percolated is **23,140 AFY at build-out, (18,300 + 4,740).** (See Table 5-31). It will **probably be more nearly 18,400 AFY, (13,700 + 4,740),** assuming some implementation of local water resource projects by BCVWD, i.e. "middle ground condition." BCVWD's Turnout from EBX and the District's recharge facility will need to have this capacity as an absolute minimum.

The DWR and others have investigated the impact of climate change on the SWP. It can be concluded that if the changes that have occurred over the last few decades are indicative of long term changes, a larger and larger portion of the precipitation in the SWP watersheds will be in the form of rain and the snowpack will be reduced. With a reduced snowpack, the timing of the peak spring runoff will be earlier than currently experienced. Higher runoff volumes, greater peaks and potentially more water will be lost to the ocean unless storage and conveyance facilities are improved. There is also belief the precipitation events will be more intense, but less frequent and with longer time intervals between events. This means BCVWD and others should be ready to take and percolate these higher flows since our traditional Sierra and SWP reservoirs will fill quickly and there will be a need to move water to places where it can be stored locally. This means more capacity will be needed in the District's turn-out, conveyance pipeline, and recharge site than the 23,140 AFY.

Figure 6-1 shows the increase in BCVWD's need for imported water over time. This amount is **over and above the realistic amount that the Pass Agency can supply out of their current Table A** amount of 17,300 AFY. The dashed lines show the impact of water conservation. Figure 6-1 shows the full range of imported water needs for the three scenarios described in Section 5. The most likely scenario is somewhere in the "middle" – the "red" line.

A staged purchase program for additional Table A is presented in Figure 6-1 for planning and budgeting purposes and is based on the "Middle Ground Scenario" presented in Section 5 and Tables 5-25 through 5-30 and shown in "red" in Figure 6-1. The values shown assume 100 percent reliability, so the **actual amount purchased by BCVWD will need to be larger to take into account the reliability** --- currently 64% reliability for the SWP. The program is recommended to be staged to recognize the uncertainties in the demand growth rate over time.

Figure 6-1



As can be seen from Figure 6-1, BCVWD will need to purchase between 8,000 AFY and 18,400 AFY of additional imported water rights depending on the water resource development strategy and conservation. BCVWD should budget purchasing about 14,000 AFY additional imported water rights. It is possible this could change over time, and with conservation could drop to 11,000 AFY.

It is important to recognize that the **water supply reliability factor**, currently 0.64, **must be included** to determine the actual quantity purchased. Table 6-4 presents the suggested staged purchase program.

SGPWA Imported Water Needs

The SGPWA has a Table A contract amount of 17,300 AFY with DWR for imported water through the California Aqueduct. The Agency's 2010 UWMP indicated 26,920 AFY of imported water would be needed by the year 2035 assuming 5,900 AFY of best management water conservation practices are implemented. If this does not occur, it is possible the SGPWA's imported water demand could exceed 32,000 AFY by the year 2035 on a worst case condition.[1]

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[1] SGPWA (2010). "2010 Urban Water Management Plan for the San Gorgonio Pass Water Agency" prepared by CDM, Table 2-3.

A previous supplementary water supply study prepared by SGPWA in 2009[2] projected the Agency's ultimate, build-out, imported water requirement to be about 39,000 AFY which appears consistent with their 2010 UWMP. This amount is believed to be conservative.

Table 6-4
Suggested BCVWD Staged Purchase Program for Additional Table A

Year	Incremental Amount to Purchase @ 100% Reliability	Total Cumulative Amount @ 100% Reliability	Incremental Amount to Purchase @ 64% Reliability
2020	5,000	5,000	7,800
2025	3,000	8,000	4,700
2030	2,000	10,000	3,100
2035	500 – 4,000*	10,500 – 14,000*	800 – 6,300*

* Depending on impact of conservation and demand growth

The 32,000 AFY by 2035 and the 39,000 AFY at build-out represent flow rates of 58 cfs and 72 cfs respectively assuming a 75% availability or utilization factor in the delivery system.

The Pass Agency currently has 32 cfs of capacity in the SWP California Aqueduct per their contract with DWR. They have 64 cfs capacity in the EBX once EBXII is completed except for:

- Foothill Pipeline – SGPWA has a capacity of 32 cfs at present but can use any excess capacity if Valley District is not using the capacity. Once EBXII is completed, Pass Agency can purchase 16 cfs of additional capacity resulting in a total of 48 cfs. We understand Valley District and the Pass Agency are working on a separate agreement to purchase another 16 cfs which would bring the Pass Agency capacity to 64 cfs.[3]
- Cherry Valley Pump Station – This pump station, located at the end of the Singleton Pipeline, serves only the Pass Agency and is used to boost water to the Noble Creek Turnout and the spreading grounds at the mouth of Edgar Canyon. It has a total capacity of 52 cfs, (firm capacity of 32 cfs with the largest pump out of service), with completion of EBXII. It would be difficult and expensive to add another pump at the Cherry Valley Pump Station, so the capacity may be limited to its current capacity. (Pumping through the Cherry Valley Pump Station would only be necessary if BCVWD desires to take all of its imported water through the Noble Creek Turnout.)
- Noble Creek Pipeline (36-in diameter) – With a discharge of 52 cfs from the Cherry Valley Pump Station, the pipeline velocity is 7.3 ft/sec which is acceptable. It would increase to 9 ft/sec at 64 cfs. This is tolerable. The additional headloss due to the higher flow rate is 16 ft. The pumps should be able to accommodate this and it should be investigated.

Up to 64 cfs can be delivered to the Pass Area through the 54-in diameter Singleton Pipeline upstream of the Cherry Valley Pump Station. This would allow the Pass Agency to meet its projected imported water demands beyond the year 2035 assuming the capacity purchases described above are implemented. The 64 cfs capacity may still be short of the Pass Agency's

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[2] SGPWA (2009). "Supplemental Water Supply Planning Study" prepared by Webb and Associates, October.

[3] SGPWA (2015). "Capacity Fee Study for San Gorgonio Pass Water Agency" prepared by David Taussig and Associates, July 21.

ultimate requirements. It all depends on local water resource development and water conservation efforts.

It may be possible to deliver more water through the Singleton Pipeline, perhaps as much as 72 cfs since the velocity would only be 4.5 ft/sec in the pipeline at that flow rate. This would require a separate hydraulic study.

To provide a reference point, BCVWD's current projection for total amount of imported water for the year 2035 ranges from 10,270 AFY to 18,920 AFY and 12,400 AFY to 23,100 AFY at build-out depending on local water supply development and conservation. (See Tables 5-28 through 5-30). Based on this, BCVWD represents 31% to 59% of SGPWA's total projected imported water demand, again depending on local water resource development and conservation. Overall, it appears the Pass Agency has the needed delivery capacity to meet BCVWD's and the other water suppliers' demands at least until well beyond 2035. To meet ultimate build-out needs in the Pass Area, some modifications and perhaps additional turnouts on the EBX will be required. These are issues which the Pass Agency will have to address.

Turnout Capacity

SGPWA's turnout at Noble Creek on the EBX is currently limited to 20 cfs according to SGPWA. BCVWD's 24-in diameter raw water pipeline from the turnout metering station to the recharge facility has a capacity of 30 cfs. The flow limit in the raw water pipeline is based on maintaining a velocity below 10 ft/sec. Additional flow, which would exceed the velocity limit, could be conveyed through the pipeline for short periods of time if necessary. Table 6-5 shows the imported water capacity for the pipeline and turn-out.

Table 6-5
Noble Creek Turnout and Raw Water Pipeline Capacity

Parameter	SGPWA Noble Creek Turnout	BCVWD Raw Water Pipeline
Diameter, in	20	24
Hydraulic Capacity, cfs	20 (per SGPWA)	30
AFY Continuous Operation	14,500	21,700
AFY at 75% Operation or Utilization	11,000	16,000
Middle ground Imported Water Requirement (Table 5-31)	15,600 – 18,400 AFY	
Flow Rate at 75% Operation or Utilization	28 - 34 cfs	
Maximum Imported Water Requirement	23,140 AFY	
Flow Rate at 75% Operation or Utilization	43 cfs	

The forecasted amount of imported water is 15,600 AFY to 23,140 AFY at build-out depending on local water supply development and conservation. (See Table 5-31 and Table 6-5). The SGPWA turnout and metering station at Noble Creek may need to be enlarged or use the SGPWA's recently installed pipeline – most likely by 2025 or possibly sooner depending on growth of demand, water conservation, etc. BCVWD's raw water pipeline should be adequate to the year 2035 or beyond, again depending on demand and water resource development.

At the appropriate time, and if required, BCVWD may need to request the Pass Agency to increase the Noble Creek Turnout capacity from 20 cfs to 35 cfs. BCVWD would operate its raw water pipeline at 11.5 ft/sec under this condition. This would be acceptable and would allow

BCVWD to meet its imported water requirement to build-out for the “middle ground” water development scenario even without conservation.

Under the scenario of minimum local water supply development, (very unlikely), a second turnout, in addition to the enlarged Noble Creek turnout, would be needed, probably at 15 to 20 cfs capacity. The enlarged Noble Creek turnout would be operated at 30 cfs, (16,000 AFY at 75% utilization), and the new turnout at 20 cfs, (11,000 AFY at 75% utilization), for a total of 27,000 AFY – more than needed even under worst case conditions.

Groundwater Recharge Facilities

In Section 2 an analysis was presented on the capacity of BCVWD’s imported water recharge facilities, (Phases 1 and 2), was estimated to be about 25,000 to 30,000 AFY based on operating experience to date. This should be adequate for the imported needs under even the most conservative assumptions of imported water demands. There is a safety factor of 1.6 on the reasonable estimate of imported water requirement and 1.3 on the most conservative assumption, (greatest demand), of imported water requirement. This should also be adequate to take available Article 21 water.

3900 Pressure Zone

The 3900 Pressure Zone currently has a 200,000 gallon, bolted steel water tank constructed in 2007. The tank was constructed to serve a proposed housing tract along Oak Glen Road just south of the Riverside/San Bernardino County Line. It was also envisioned to provide water supply and fire protection to the three District houses located on the mesa, just south of Upper Edgar Tank. A fire in the late 1990s burned the area surrounding the houses, but the houses themselves were spared. The houses are currently supplied with potable water through a small hydropneumatic system located just south of Upper Edgar Tank, but fire protection is very limited. A 12-in diameter pipeline extends from the from the bridge crossing Little San Gorgonio Creek at the Upper Edgar Tank site (3640 Zone) up to the 3900 Zone tank. There are two laterals that lead to two fire hydrants to provide fire protection to the houses. The small hydropneumatic booster at the Upper Edgar Tank currently provides water to this system.

The 12-in line was to extend down Oak Glen Road to a proposed subdivision. The proposed subdivision was never constructed due to the downturn in the economy and other factors, but will probably be constructed at some point. The existing small hydropneumatic booster is to be replaced with a new 3640/3900 Zone Booster with sufficient capacity for fire protection. There is to be a pressure regulator at the booster pump station to periodically release water from the 3900 Zone into the pipelines leading down to Lower Edgar Tank to minimize stagnation in the 3900 Zone Tank and ensure water quality in the Zone.

3620, 3330 and 3150 Pressure Zones Facilities

Except for the very small 3900 Zone, the 3620, 3330, and 3150 Pressure Zones are the highest elevation zones in the District with significant water demands. They are considered together since they are linked together, supplied principally from the Upper and Middle Edgar Canyon wells. Tables 4-7 and 4-8, in Section 4, showed the average annual and maximum day potable water demands for these pressure zones. Data from those tables is summarized below in Table 6-6. Also included is the peak hour demand on the maximum day.

Except for one or two houses constructed each year or so, most of the growth in these pressure zones will be after 2035 as shown by the accumulated new EDUs.

Water Supply

Water supply for the three pressure zones is derived from the Upper and Middle Canyon wells in Edgar Canyon and from two booster pumps:

- Upper Mesa (Well 4A) Emergency Booster which can boost Well 4A and Well 5 production to Upper Edgar Tank (3620 Pressure Zone). This booster can also pump water from the 3330 (Lower Edgar) Pressure Zone to Upper Edgar Tank (3620 Pressure Zone). Capacity is 400 gpm at 510 ft head. This pump is rarely used.
- Noble Booster, located at Noble Tank, boosts water from 3040 Pressure Zone into the 3330 Pressure Zone (Lower Edgar Tank). Capacity is 500 gpm at 310 ft head. This pump is used on a regular basis during the summer months, particularly when the production from the Upper and Middle Canyon Wells is reduced due to drought.

Table 6-6
Projected Potable Water Demand by Pressure Zone, mgd

Pressure Zone	**2013**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**Ultimate Build-out**
Average Day									
3620	0.15	0.15	0.15	0.15	0.16	0.17	0.20	0.22	0.29
3330	0.40	0.40	0.40	0.40	0.40	0.41	0.44	0.46	0.53
3150	0.05	0.05	0.05	0.05	0.05	0.06	0.09	0.11	0.18
Totals	0.60	0.60	0.60	0.60	0.61	0.64	0.73	0.79	1.00
Maximum Day 2.00 X Average Day									
3620	0.31	0.31	0.31	0.31	0.32	0.34	0.40	0.43	0.57
3330	0.80	0.80	0.80	0.80	0.81	0.82	0.89	0.92	1.06
3150	0.09	0.09	0.09	0.10	0.11	0.12	0.19	0.22	0.36
Totals	1.19	1.19	1.19	1.19	1.24	1.28	1.48	1.57	1.92
Peak Hour 1.45 x Maximum Day									
3620	0.45	0.45	0.45	0.45	0.46	0.49	0.58	0.62	0.83
3330	1.16	1.16	1.16	1.16	1.17	1.19	1.29	1.33	1.54
3150	0.13	0.13	0.13	0.14	0.16	0.17	0.27	0.32	0.52
Totals	1.74	1.74	1.74	1.75	1.79	1.85	2.14	2.32	2.89
Accumulated New EDUs		4	3	12	38	83	249	335	698

Using these two pumps it is possible to pump water from the 3040 Pressure Zone to 3620 Pressure Zone in emergencies.

For purposes of planning, it will be assumed that any additional water needed for these pressure zones will be provided by boosting from lower pressure zones. No significant increase in production capacity from the Upper and Middle Canyon wells is anticipated.

Table 2-1, in Section 2, presented data on the Edgar Canyon wells. The wells in the Upper and Middle Canyon are old. Table 6-7 indicates the year drilled.

Well 7 was an old well, located about 750 ft north of Well 6, which was test pumped and equipped around 1985. It is not known when it was drilled. The well pumped about 200 gpm for several years then "went dry." Well 8 was drilled between Well 6 and the old, concrete Upper Edgar Canyon Reservoir, around the year 1983. It was drilled using the cable tool method; it yielded less than 100 gpm and was drilled deeper using an air drilling technique to see if production could be increased to be more like Well 6. Numerous methods of development were used, but the well never produced much water. It has since been abandoned.

Table 6-7
Upper and Middle Canyon Wells Year Drilled

Well No	Year Drilled		Well No.	Year Drilled
6	1929		12	1942
7	Unknown (abandoned)		13	1927
8	1983 (abandoned)		14	1955
9A	2002 (est)		18	1967
10	1935		19	1967
11	1927		20	1969

Over the years the wells in the Upper Canyon have had their pumps replaced; a number of wells were relined in the 1995 – 2000 time period.

Several of the Upper and Middle Canyon wells will be approaching 100 years old within the next 10 to 20 years and should be replaced. Well 6 and 11 should be replaced within the 2020-2030 time frame; Well 10 by 2030; Well 12 within the 2035 – 2045 time frame. Well 12 is critical to maintaining supply to the District's upper house and several downstream customers. When Well 12 is replaced, consideration should be given to abandoning standby Well 13 and making the old Well 12 the standby well. Because of the highly variable geology in the Upper and Middle Canyon, replacement wells should be in close proximity to the existing wells to minimize the potential for a "dry hole.

The Upper and Middle Canyon well production varies with the watershed precipitation; production following a series of wet years is significantly greater than during dry periods. The aquifers in Edgar Canyon are shallow and do not have much storage capacity but they are rapidly recharged by the flowing creek. Figure 6-2 shows the cumulative probability of annual Edgar Canyon extractions based on records dating back to 1983. (Although production records do back to 1957, the period from 1983 is more representative of the production capability of the Edgar Canyon wells. It was in 1983 the Edgar Canyon Transmission Main was completed which allowed the full production capacity of the wells to be utilized. Prior to that year, the ability to convey water into the 3040 and 2750 Pressure Zones was limited by the pipeline capacity in the Mesa water distribution network.)

For the period from 1983 to 2013, the Upper and Middle Canyon wells averaged 1471 AFY with a minimum production of 516 AFY. The minimum 3-year moving average was 788 AFY. For planning purposes, the minimum Upper and Middle Canyon supply will be 500 AFY and 1450 AFY for average supply.

Storage Requirements

The 0.75 MG Upper Edgar Tank, constructed in the year 2000 serves the 3620 Pressure Zone. The 3150 Pressure Zone is served from the 3330 Pressure Zone through a pressure reducing station which is actually located at the 3040 Zone Noble Tank. The 1 MG Lower Edgar Tank, which was constructed in 1978, serves the 3330 Pressure Zone. It has been inspected, cleaned and repaired several times and is structurally sound.

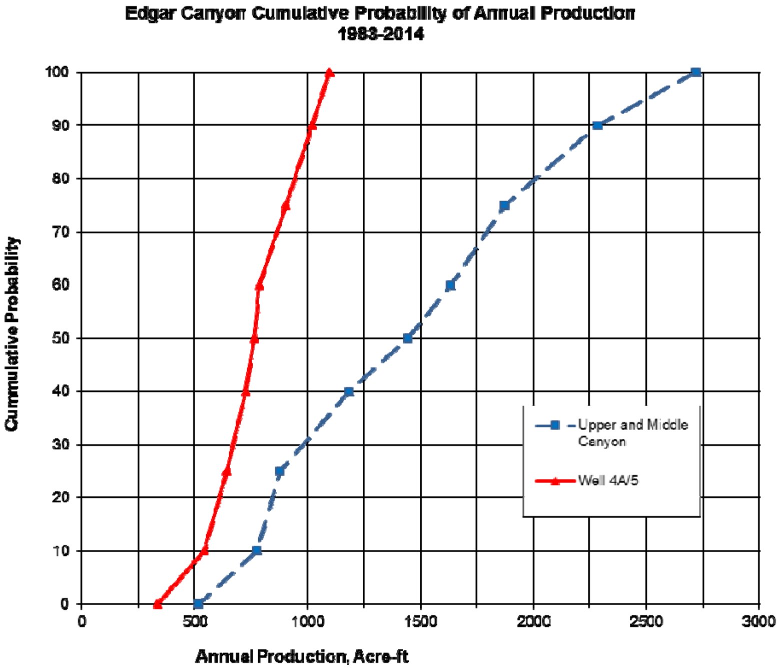

Figure 6-2
Cumulative Probability of Annual Well Production From Edgar Canyon

Storage requirements for these three pressure zones was based on:

Emergency Storage –50% of Maximum Day Demand
Fire Storage – 1,000 gpm for 2 hours
Hourly demand variations for the Upper Pressure Zones shown previously in Table 4-3.

Figure 6-3 shows a schematic of the 3620/3330/3150 Pressure Zone System.

In the analysis of storage requirements for these zones, the following conditions were evaluated:

- All three pressure zones together with average water production from the Upper and Middle Edgar Canyon Wells (1,450 AFY). This will determine the average amount of potable water, if any, to be boosted from the 3040 Pressure Zone to the 3330 Pressure Zone.
- All three pressure zones together with minimum water production from the Upper and Middle Edgar Canyon Wells (500 AFY). This will determine the maximum amount of potable water, if any, to be boosted from the 3040 Pressure Zone to the 3330 Pressure Zone

- 3620 Pressure Zone with minimum water production from the Upper and Middle Canyon Wells (500 AFY). This will determine the maximum amount of potable water, if any, to be boosted from the 3330 Pressure Zone to the 3620 Pressure Zone.

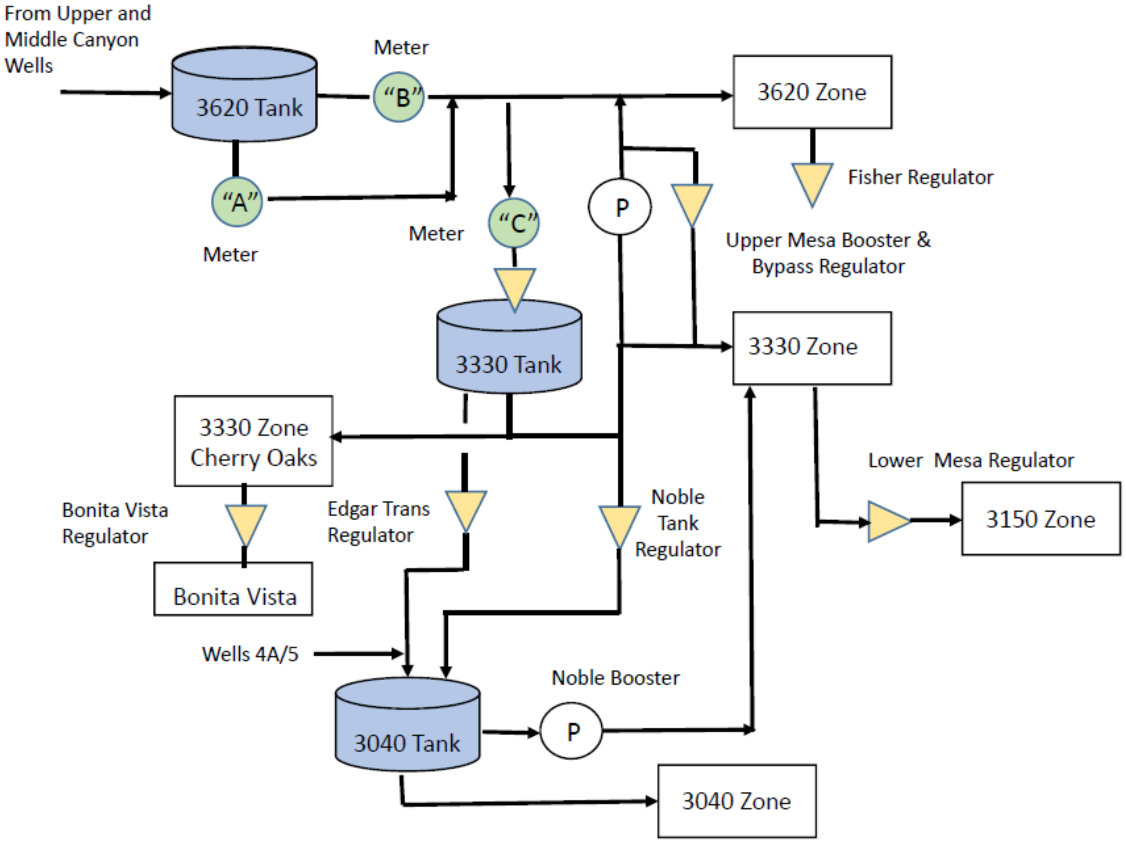

Figure 6-3
3620/3330/3150 Pressure Zone System Simplified Schematic

A spreadsheet model was developed using the hourly demand ratios in Table 4-3. The table below presents the storage requirements under a worst case condition of minimum Edgar Canyon supply. The wells in the Upper and Middle Canyons were assumed to be operational 24 hours per day. Booster pumps, if required, operate only 18 hours per day. Tables 6-8 and 6-9 show the storage requirements for the 3620 Pressure Zone alone and all three pressure zones together, respectively. The maximum storage volumes occurred during minimum supply conditions with booster pumping required.

The results of the analysis, as summarized in Tables 6-8 and 6-9, indicate there is adequate storage through build-out.

Booster Pumping

Table 6-10 shows the booster pumping requirements for the 3620/3330/3150 Pressure Zones based on the demand and storage analysis for average supply from the Upper and Middle Edgar Canyons and under minimum supply conditions.

Table 6-8
Storage Requirements for 3620 Pressure Zone, MG

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build-out
Operational	0.034	0.034	0.034	0.035	0.036	0.038	0.045	.049	0.08
Fire	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Emergency	0.15	0.15	0.15	0.15	0.16	0.17	0.20	0.22	0.29
Total Storage Req'd, MG	0.31	0.31	0.31	0.31	0.32	0.33	0.37	0.39	0.49
Available Storage, MG	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Total Additional, Storage, MG	No Additional Storage Required								

Table 6-9
Storage Requirements for 3620, 3330, and 3150 Pressure Zones Combined, MG

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build-out
Operational	0.24	0.25	0.25	0.25	0.25	0.27	0.32	0.35	0.46
Fire	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Emergency	0.60	0.60	0.60	0.60	0.62	0.64	0.74	0.79	1.00
Total Storage, MG	0.96	0.97	0.97	0.97	0.99	1.03	1.19	1.26	1.58
Available Storage, MG	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Total Additional, Storage, MG	No Additional Storage Required								

3320 Zone to 3620 Zone Booster Pump Station (Upper Mesa Booster)

There is an existing emergency booster at Well 4A Site (Upper Mesa Booster), which pumps to Upper Edgar Tank (3620 Pressure Zone); the booster pump and small tank were installed in the mid-1980s. The water source is the Edgar Canyon Transmission Main as well as the 3330 Pressure Zone. The booster pump has rarely been used. Data on the booster pump was presented previously in Table 2-9.

Table 6-10
Booster Pumping Requirements for 3620, 3330, and 3150 Pressure Zones, gpm

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build-out
3330 to 3620 @ Min Supply	--	--	--	--	--	--	--	--	119
2045	Maintain existing 400 gpm @ 510 TDH, 75 HP; replace in 2045 with 2@ 150 gpm, 330 ft, 25 HP								
3040 to 3330 @ Min Supply	694	698	698	704	731	775	952	1,043	1,433
3040 to 3330 @ Ave Supply	--	--	--	--	--	--	167	258	648
2015	Maintain existing 500 gpm, 310 ft TDH, 60 HP; install 2 @ 500 gpm, 320 ft TDH, 60 HP pump, firm capacity = 1,000 gpm								
2035	Replace original 500 gpm, 310 ft TDH, 60 HP with 1 @ 500 gpm, 320 ft TDH, 60 HP pump, firm capacity = 1,000 gpm								
2045	Add 4th pump, 500 gpm, 320 ft TDH, 60 HP pump, firm capacity = 1,500 gpm to meet requirement for minimum Edgar Canyon Supply Conditions (3 duty/1 standby)								

Table 6-10 shows that no supplemental water will need to be boosted from the 3330 Pressure Zone to the 3620 Pressure Zone on the maximum day when there is minimal well supply from Edgar Canyon until ultimate build out. Up until then, boosting is not needed.

Table 6-10 also shows that the single, existing 400 gpm, 510 TDH, 75 HP booster should be adequate even at build-out. The pump is sized to pump from a 7,000 gallon tank at El 3128, located at the Well 4A site, and boost water from Wells 4A and 5 or the 3330 Pressure Zone into the 3620 Pressure Zone.

After the booster pump was installed in the mid-1980s, there were some changes made to the distribution system. In the event the Edgar Canyon Pipeline to the 3620 Pressure Zone Tank ever be out of service for any reason or there is minimum supply from Edgar Canyon wells at build-out, supplemental water to the 3620 Pressure Zone can best be obtained by boosting from the 3330 Pressure Zone since the 3330 Zone can be supplied from the 3040 Pressure Zone.

There are two alternatives for booster pumping from the 3330 Pressure Zone to the 3620 Pressure Zone:

- Alternative 1: Retain the existing 75 HP booster pump for emergency purposes and install a parallel, new, smaller booster pump with a capacity of 150 gpm, 330 ft TDH, 25 HP around the year 2045. Use the existing 75 HP booster as a standby. It may be necessary to install a pressure sustaining valve on the 75 HP pump discharge to maintain the pump within proper operating range.

- Alternative 2: Retain the existing 75 HP booster pump for emergency purposes until the year 2045; remove it and install two pumps (duty/standby) each rated at 150 gpm, 330 ft TDH and 25 HP.

Some things to consider are that by the year 2045, the 75 HP existing pump will be at least 60 years old. Although not used much, it has been outdoors, exposed to the elements for all that time. It is reasonable for planning purposes to replace the pump (Alternative 2). Pump capacity is based on 18 hours of operation.

There is a by-pass pressure regulator installed at the 4A Well Site to drop the pressure from the 3620 Pressure Zone to the 3330 Pressure Zone. This can be used when the Lower Edgar Tank (3330 Zone) is taken out of service.

3040 Zone to 3330 Zone Booster Pump Station

The existing Noble Booster, located at Noble Tank, boosts water from the 3040 Pressure Zone to the Upper Mesa (3330) Pressure Zone and is the primary means of supplying additional water to the Mesa. There is only one Noble Booster Pump and it is critical in the summer months when production from the Edgar Canyon wells is reduced. The pump was installed sometime in the mid-1980s. Table 6-10 summarizes the booster pumping requirements on the maximum day for both minimum and average Edgar Canyon supply conditions. Under average supply conditions the existing Edgar Canyon wells alone are adequate until sometime after 2035. However, under minimum supply conditions, supplemental boosting is currently required on the maximum day. This is supported by the occasional boosting required the last year or so when supplies, though not minimum, have been reduced.

The current Noble Booster pump (capacity 500 gpm) is not adequate for the minimum supply condition. Furthermore, there is no stand-by. Two duty, 500 gpm, 320 ft head, 60 HP pumps should be installed in parallel with the existing pump to provide the needed firm capacity. The existing pump can function as a standby. The pump station would be constructed at the Noble Tank site.

About the year 2035, when the original 500 gpm pump has reached it useful life, the original pump should be retired and replaced with a new 500 gpm pump. This will result in no additional firm capacity, but will improve reliability. In the year 2040, a fourth, 500 gpm pump should be added to meet build out demands.

Pressure Regulating Stations

There are several regulators within the 3620/3330/3315 Pressure Zones, e.g., Bonita Vista (two regulators), Edgar Canyon Transmission Main Flow Control and Pressure Reducing Station, the 3330 Tank altitude valve/pressure sustaining valve (Meter C), Fisher regulator, and the Lower Mesa (3330 to 3150 Zone) regulator at the Noble Tank site. There are no capacity increases anticipated for these regulating stations except for the Lower Mesa regulator located at the Noble Tank site and shown in Table 6-11. However, they all will require periodic maintenance which should be budgeted in the annual operation and maintenance budgets.

3040 and Highland Springs Pressure Zones

The 3040 Pressure Zone is currently served by the Noble and Highland Springs Tanks, each with a capacity of 1 MG. A portion of the Highland Springs Village is supplied through a hydropneumatic pump system using the Highland Springs Tank as the water source. The hydraulic grade line for this hydropneumatic zone is approximately 3140. Tables 4-7 and 4-8, in Section 4, showed the average annual and maximum day potable water demands for the 3040 and the hydropneumatic pressure zones. Data from those tables is summarized below in Table 6-12. Also included is the peak hour demand on the maximum day.

No additional development is expected to occur in the Highland Springs Hydropneumatic Zone so demands will remain the same through build-out.

Table 6-11
Lower Mesa Regulator 3330 to 3150 Zone (at Noble Tank)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build-out
Peak Demand, mgd	0.13	0.13	0.13	0.14	0.16	0.17	0.27	0.32	0.52
Peak Demand gpm	90	90	90	97	111	118	188	222	361
Current Capacity, gpm									
Capacity Needed Incl. Fire Flow gpm	1,090	1,090	1,090	1,097	1,111	1,118	1,188	1,222	1,361
2015	Add 4-in for fire flow								

Table 6-12
Potable Water Demand in 3040 and Highland Springs Pressure Zones, mgd

Pressure Zone	**2013**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**Ultimate Build-out**
Average Day									
3040	1.30	1.36	1.92	1.93	1.98	2.07	2.42	2.59	3.36
Highland Springs Hydropneumatic	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Totals	1.42	1.48	2.04	2.05	2.10	2.19	2.54	2.71	4.48
Maximum Day 2.00 X Average Day									
3040	2.60	2.71	3.83	3.86	3.95	4.14	4.84	5.19	6.72
Highland Springs Hydropneumatic	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Totals	2.85	2.95	4.07	4.10	4.20	4.38	5.08	5.43	6.96
Peak Hour 1.45 x Maximum Day									
3040	3.77	3.93	5.56	5.59	5.73	6.00	7.01	7.52	9.75
Highland Springs Hydropneumatic	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Totals	4.13	4.28	5.91	5.94	6.09	6.35	7.36	7.87	10.10
Accumulated New EDUs		92	1064	1097	1190	1355	1966	2280	3612

In addition to the water demands shown in Table 6-12, the 3040 Pressure Zone supplies water to the 3620/3330/3150 Pressure Zones when there is inadequate supply from the Upper and Middle Canyon Edgar Canyon wells. This happens during dry years and frequently during the summer. Table 6-13 presents a summary of the water supply (booster pumping) requirements from the 3040 Pressure Zone to the 3620/3320/3150 Pressure Zones on the maximum day under two supply conditions:

- Average supply from the Upper and Middle Edgar Canyon Wells
- Minimum supply from the Upper and Middle Edgar Canyon Wells

The booster pumping capacity is based on 18 hours of pumping. The data is identical to that presented previously in Table 6-8.

Table 6-13
Booster Pumping Requirements from 3040 Zone to 3330 Zone on the Maximum Day
via Noble Booster

Scenario	**2013**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**Ultimate Build-out**
Minimum Upper and Middle Edgar Canyon Well Supply									
Maximum Day, mgd	0.75	0.75	0.75	0.76	0.79	0.84	1.03	1.13	1.55
Booster Pumping Rate to 3330 Zone (18-hrs), gpm	694	698	698	704	731	775	852	1,043	1,433
Average Upper and Middle Edgar Canyon Well Supply									
Maximum Day, mgd	--	--	--	--	--	--	0.18	0.28	070
Booster Pumping Rate to 3330 Zone (18-hrs), gpm	--	--	--	--	--	--	167	258	648

Water Supply

The 3040 Pressure Zone is currently supplied with water from the following sources:

- Water from the Upper and Middle Edgar Canyon wells through the Edgar Canyon Transmission Main Pressure Regulating Station. Note this only occurs when there is excess water available from the wells and that water is not needed in the 3620, 3330 or 3150 Pressure Zones. Generally, if water is available, it is only available in the winter months.
- Wells 4A and 5 in the District's Lower Edgar Canyon system. (In the past, during very wet years, Well 4A would experience "artesian" flow conditions when the well pump was off.)
- Water boosted from the 2750 Pressure Zones via Boosters 21A, 21B and 21C located adjacent to the Cherry Tanks at the intersection of Brookside and Cherry Avenues.

The 3040 Pressure Zone can supply water to the 2850 Pressure Zone through several pressure regulating stations. The main regulator is located off Vineland Ave. at the Vineland Tank Site. Taking water from the 3040 Zone is no longer a normal method of operation because the 2850 Pressure Zone now has direct well supply (Wells 23, 25, and 16). Future booster pumps will be installed to boost from the 2750 Pressure Zone to the 2850 Pressure Zone. The pressure regulators would only be used in an emergency.

Figure 6-2, presented previously, showed the cumulative probability of annual production from Wells 4A and 5. Records since 1983 show a minimum production of 334 AFY with an average of 762 AFY. For master planning purposes 330 and 760 AFY, respectively, will be used for minimum and average supply.

Well 4A was drilled in 1949; Well 5 in 1929. Both of these wells are reaching the end of their normal service life and should be replaced. Well 5 should be replaced in the 2025-2030 time period and Well 4A about the year 2045 or sooner. As with the other wells in Edgar Canyon, the replacement wells should be drilled in close proximity to the existing wells and the existing wells should be abandoned.

Storage Requirements

Storage requirements based on:

Emergency Storage –50% of Maximum Day Demand

Fire Storage – 1,500 gpm for 2 hours

Hourly demand variations for the 3040 and Highland Springs Hydropneumatic Pressure Zones shown previously in Table 4-3.

Table 6-14 shows the storage requirements over time to build-out of 3040 Pressure Zone. Storage is currently supplied by two tanks: Noble and Highland Springs at 1 million gallons each.

Table 6-14
Storage Requirements in 3040 Pressure Zone, MG
(Minimum Edgar Canyon Supply – Worst Case)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational	0.71	0.74	1.03	1.04	1.07	1.12	1.30	1.40	1.80
Fire	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Emergency	1.42	1.48	2.04	2.05	2.10	2.19	2.54	2.72	3.48
Total Storage Required, MG	2.31	2.39	3.25	3.27	3.35	3.49	4.02	4.30	5.47
Additional, Storage Needed, MG			2				2		
Available Storage, MG	2	2	4	4	4	4	6	6	6

Current storage for the 3040 Pressure Zone is inadequate under minimum Edgar Canyon Well Supply as shown in Table 6-14. A separate analysis, not shown, indicates the storage is inadequate even under average Edgar Canyon well supply conditions based on providing emergency storage equal to 50% of the maximum day demand. This much emergency storage is conservative, but nevertheless, additional storage should be provided within the next 5 years or so. The Sundance Development will be expanding into the 3040 Pressure Zone, and an additional 2 MG of storage should be provided with that project at that time. This will bring the total storage up to 4 MG, which should be adequate until year 2040. At that point another 2 MG should be added which will be adequate through build out.

There is no space available on the Highland Springs Tank site. The site is adjacent to and surrounded by land shown on the Assessor's Parcel Map as belonging to Riverside County. It may be possible to secure land from the County for a second tank at that location. The 1994 District Master Plan identified a site on the extension of Mountain View Ave.; but that site is well developed and does not appear suitable any longer. An alternative site off of Cherrystone, west of Byham Ln., is currently vacant and could easily accommodate a 2 MG tank. There is space available at the Noble Tank site which can accommodate two additional 2 MG tanks. BCVWD owns substantial land in the area and this appears to be the least costly and least disruptive site for the new tanks.

Booster Pumping

Table 6-15 presents a summary of the booster pumping capacity needs to supply the 3040 Pressure Zone based on a worst case condition of minimum Edgar Canyon Well Supply. Pumping capacity is based on 18 hours of pumping per day.

Table 6-15
Booster Pumping Capacity Needs to Supply 3040 Pressure Zone
from the 2750 and 2850 Zones[1]

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Source	2750 Zone		2850 Zone						
Booster Pumping Capacity Needed 18 hours pumping, gpm	2,374	2,473	3,511	3,534	3,626	3,797	4,445	4,773	6,203
Booster Pumping Capacity Needed 18 hours pumping, mgd	3.42	3.56	5.06	5.09	5.22	5.47	6.40	6.87	8.43
Existing Boosters 21A, B, and C, Pumping Capacity from 2750 Zone to 3040 Zone, gpm	2900	2900	Decommissioned						
2015	Maintain existing Cherry Boosters until Sundance Development expands into the 3040 Pressure Zone, then decommission Cherry Boosters. Convert pump station to pump from 2750 to 2850 Pressure Zones.								
New 2850 Zone to 3040 Zone Booster at Pardee Site or Vineland Reservoir Site									
2020	3 @ 2100 gpm, 220 ft TDH, 200 HP ea								
2040	Add 4th pump, 2100 gpm, 220 ft TDH, 200 HP								

[1] Assumes minimum supply conditions (critical dry year) in Edgar Canyon

Table 2-9, presented previously, shows the existing capacity of the Cherry Boosters (Boosters 21A, B, and C) is 2,900 gpm firm capacity (largest pump out of service). Table 6-14 shows there is adequate firm capacity in the existing Cherry Boosters for current conditions. However, as the Sundance Project develops into the 3040 Pressure Zone, it will be necessary to have additional capacity.

A new booster pumping station should be constructed in the Pardee Sundance Tract or at the existing Vineland Reservoir Site to boost from the 2850 Zone to the 3040 zone as shown in Table 6-15. A 4-pump station should be constructed, (3 duty/1 standby). Each pump should be 2,100 gpm, 220 ft head, 200 HP (approximate). The new pump station should have 3-pumps initially (2 duty/1 standby), expandable to 4 pumps, with an engine generator and should be installed with the initial Pardee Sundance development in the 3040 Pressure Zone. The fourth pump would not need to be added until around year 2040.

Upon completion of the 2850 Zone to 3040 Zone Booster (around 2020), vertical turbine boosters 21A, B, and C, at the Cherry Tank site will be removed, de-staged, refurbished or replaced in the existing “cans” and designed to pump from the 2750 Zone to the 2850 Pressure Zone Booster Pump Station. This is discussed in the section on the 2750 Pressure Zone to follow.

Highland Springs Hydropneumatic Booster

The peak hour demand in the hydropneumatic service area is shown in Table 6-12 is 0.35 mgd or 250 gpm. There are 376 accounts in the service area. The current firm capacity of the hydropneumatic station is 150 gpm. There is a 4,500 gallon hydropneumatic tank on the system.

During 2013, 136 acre-ft were used (121,400 gal/day average or 84 gpm). Summer, maximum day, demands are typically twice the annual average, so the maximum day demand is close to 170 gpm. The peak hour is estimated to be 250 gpm, which is far greater than the firm capacity of the booster pumps.

The pump station should be upgraded to meet the peak hour demand of 250 gpm by adding a third 150 gpm, 120 ft TDH, 10 HP. This pump could be added in a “can”, outside the station. Or the two existing pumps could be replaced with two new pumps at 275 to 300 gpm,120 ft TDH, 15 HP.

The hydropneumatic pump capacity is inadequate for the 1,000 gpm fire flow. The developer has relied on gravity flow from the Highland Springs Tank to provide fire protection. However, there are several fire hydrants near the tank that are not able to meet the 20 psi residual due to their elevation. Some consideration should be given to installing a high flow pump in the future.

2850 Pressure Zone

The average day and maximum day water demands in the 2850 Pressure Zone were presented in Section 4, Tables 4-7 and 4-8; Table 6-16 shows those demands for convenience and also includes the peak hour demand.

In addition to these demands, the water boosted into the 3040 Pressure Zone from the 2850 Pressure Zone must be included. Currently no water is boosted from the 2850 Pressure Zone to the 3040 Pressure Zone because there are no facilities to do this. In the future, with the expansion of the Pardee Sundance development into the 3040 Pressure Zone, booster pumping facilities will be constructed to boost water from the 2850 Pressure Zone to the 3040 Pressure Zone. For planning purposes, this will occur after 2015 but before 2020.

Table 6-16
Potable Water Demand for 2850 Pressure Zone, mgd

Pressure Zone	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
Average Day	1.77	1.93	2.81	2.81	2.83	2.85	2.95	3.00	3.21
Maximum Day	3.54	3.86	5.62	5.62	5.65	5.70	5.90	6.00	6.42
Peak Hour	10.22	11.14	16.23	16.25	16.33	16.48	17.04	17.33	18.55
Accumulated New EDUs		276	1795	1804	1830	1875	2041	2127	2490

Table 6-17 summarizes the amount of water that needs to be boosted from the 2850 Zone under worst case conditions of **minimal** water supply from Edgar Canyon. For comparison, under **average** Edgar Canyon supply conditions, the amount that must be pumped to the 3040 Pressure Zone from the 2850 Pressure Zone is 0.4 mgd less than the values shown in Table 6-17. Note that for the years 2013 and 2015, water for the 3040 Pressure Zone will be pumped from the 2750 Pressure Zone.

Table 6-17
Booster Pumping Requirements from 2850 Pressure Zone
to 3040 Pressure Zone on the Maximum Day[1]

	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
Maximum Day Demand in 2850 Zone, mgd	3.54	3.86	5.62	5.62	5.65	5.70	5.90	6.00	6.42
Maximum Day Boosted from 2850 Zone to 3040 Zone, mgd (Table 6-15)	--	--	3.79	3.82	3.92	4.10	4.80	5.15	6.70
Total Maximum Day Demand in 2850 Pressure Zone	3.54	3.86	9.41	9.44	9.57	9.80	10.70	11.15	13.12

[1] Based on a worst case condition of minimum water supply from the Edgar Canyon Wells

Water Supply

Historically, in winter, when demands were low, there was greater supply from Edgar Canyon than needed in the upper pressure zones (3040 Pressure Zone and above) and that excess supply was released into the 2750 and 2850 Pressure Zones through pressure regulators. Over time, the demands increased and this is no longer possible except in very wet years and low demand times. However the pressure regulators should be maintained to allow water to move from higher pressure zones to lower pressure zones in emergencies.

The 2850 Pressure Zone is currently supplied by 3 wells as shown in Table 6-18. These wells have adequate capacity to meet the maximum day demands with all wells operating until 2020. However, the firm capacity is only 2.43 mgd assuming an 18-hour pumping schedule and sharing the capacity of Well 25 with the City of Banning. This is insufficient for the current maximum day demand.

To meet the current maximum day demand with the largest well out of service, there are three options:

- Option 1 -- Water could be pumped from 2750 Zone to the 3040 Pressure Zone and released through the existing Vineland Regulating Station into the 2850 Zone.
- Option 2 – Operate the 2850 Zone wells 24 hours per day and supplement with water boosted from 2750 Zone. The boosted water would have to be released through the existing Vineland Regulating Station into the 2850 Zone
- Option 3 --BCVWD could use Banning's share of the capacity in Well 25 (1450 gpm).

Table 6-18
2850 Zone Current Well Capacity

Well	Capacity		Comment
	Gal/min	mgd, 18-hr of pumping	
16	800	0.86	Old Well, deepened in the 1980s
23	2,700	2.92	Constructed about 2003, has a history of motor problems May consider downsizing capacity to 2,000 gpm or so.
25	1,450	1.57	Constructed about 2007, total capacity is 2900 gpm; Banning has half share
Total Capacity	4,950	5.35	All wells operational
Firm Capacity	2,250	2.43	with largest well (Well 23) out of service

Option 1 - Pumping from 2750 Pressure Zone to 3040 Pressure Zone and Use Vineland Regulation Station

This option relies on the Cherry Boosters (Booster 21A, 21B, and 21C) which have a firm capacity of 2,900 gpm (3.1 mgd when operating 18 hours per day). Table 6-15 indicated the current demand in the 3040 Pressure Zone is 2,374 gpm (2,473 gpm year 2015). This leaves about 500 gpm excess capacity which could be used to serve the 2850 Pressure Zone. This is 0.54 mgd over 18 hours which when combined with the firm well capacity in Table 6-18 would only be about 3.0 mgd – still inadequate.

Option 2 – Operate 2850 Zone Wells 24 hours per day and Supplement with Water Boosted from 2750 Zone to 3040 Zone and Released Through the Vineland Regulation Station

The firm capacity of the wells serving the 2850 Pressure Zone, when operated over a 24-hour period would be 3.24 mgd. When combined with the spare capacity in the Cherry Boosters identified above would bring the firm capacity to 3.78 mgd (3.24 mgd + 0.54 mgd). Again this would have to be boosted to the 3040 Zone and released down through a pressure regulating station. This is not energy efficient and is still slightly less than the year 2015 needs.

Option 3 – Use Banning's Capacity in Well 25 for a Short Period of Time

Assuming the City of Banning does not need their share of the capacity of Well 25 (1,450 gpm), this capacity could be used on a short time basis until well capacity can be restored. This would provide a firm capacity of 4 mgd which would be adequate.

Summary

Until additional well capacity can be brought on line in the 2850 Pressure Zone, the best option of meeting the demand on the maximum day in the 2850 Pressure Zone is to request short-term use of the City of Banning's share of Well 25.

Future Water Supply Needs for the 2850 Pressure Zone

The plan for the 2850 Pressure Zone is to provide wells to supply the maximum day demand in the 2850 Pressure Zone with the largest well out of service and supplement with boosted water from the 2750 Zone where necessary.

Table 6-18 identifies the total 2850 Pressure Zone Demands including the amount of water that needs to be boosted to the 3040 Pressure Zone. The table also includes the firm well capacity. The demands and firm well capacity came from Tables 6-17 and 6-18 respectively.

Table 6-19
Well Capacity Needs for 2850 Pressure Zone (based on largest well out of service)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Total maximum day demand, mgd	3.54	3.86	9.41	9.44	9.57	9.80	10.70	11.15	13.12
Existing Firm Well Supply, mgd	2.43	2.43	2.43	2.43	2.43	2.43	2.43	1.6[1]	1.6
Well capacity needed, mgd	See Text		6.98	7.01	7.14	7.37	8.27	9.55	11.52
New Wells @ 2.2 mgd	--	--	3	--	--	--	1	1[1]	1
Total Firm Well Supply, mgd			9.0	9.0	9.0	9.0	11.2	11.2	13.4
Boosted from 2750 Pressure Zone, mgd (gpm for 18 hr)	--	--	0.40 (370)	0.44 (407)	0.57 (528)	0.80 (740)	--	--	--

[1] Well 16 will be replaced with new well of identical capacity on Well 16 site (0.9 mgd); firm capacity remains at 2.43 mgd.

Well 16 will likely need to be replaced since it is aging. Well 16 was originally constructed in 1961, but was rehabilitated, deepened and relined in the mid-80s. The replacement has been suggested about year 2045, but could occur sooner.

New wells into the Beaumont Basin will be based on limiting the horsepower to 500 HP maximum. Water level in the Beaumont Basin underlying the 2850 Pressure Zone is around 2240 MSL[4]. Specific capacity of the wells in the area are around 60 gpm/ft drawdown, based on data from District Well 29 report by Geoscience Support Services, Inc[5]. Drawdown is estimated to be 35 ft at 2,000 gpm. Based on this the total lift to the 2850 Pressure Zone is 645 ft.

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[4] Beaumont Basin Watermaster (2013). 2012 Annual Report (Draft), prepared by Alda, Inc. in association with Thomas Harder & Co., October.

[5] Geoscience (2006). Results of Inspection and Performance Testing of Sunny Cal Egg Ranch Well No. 4 (BCVWD #29), Beaumont, California, Letter Report to C. Butcher, July 25.

Using a conservative lift and system losses totaling 700 ft with 2,000 gpm well production, 500 horsepower is required based on an efficiency of 0.75. Wells in the Beaumont Basin can produce 2,000 gpm and more as demonstrated by Wells 23, 24, 25, and 29. For planning purposes, new wells in the Beaumont Basin will be limited to 2,000 gpm (2.2 mgd with 18 hours of pumping).

Table 6-19 shows a total of five new wells and a Well 16 replacement will be needed to meet the build-out demands in the 2850 Pressure Zone and satisfying the boosting requirements to the 3040 Pressure Zone. Table 6-19 envisions use of the 2750 to 2850 Pressure Zone Rehabilitated Cherry Boosters to meet a portion of the demands on the maximum day.

The optimum well locations are along Noble Creek channel south of Brookside Ave and north of Noble Creek Park. An additional well site(s) could be in the northern part of Pardee Sundance. The Well 16 replacement would be on the Well 16 site. There is ample room to maintain the CDPH's recommended 50 ft separation between a new and an old well.

Storage Requirements

All of the current storage for the 2850 Zone is located at the Vineland Tank site located south of Vineland St, between Live Oak Ave. and Noble St. There are three steel tanks on the site providing a total of 5.5 MG: 1 MG constructed in 1989; a 2 MG tank constructed in 2003 and a 2.5 MG tank constructed in 2006. The tanks are relatively new and are in very good condition.

Storage requirements based on:

Emergency Storage –50% of Maximum Day Demand

Booster and Well Pumping for 18 hours/day; no pumping Noon to 6 pm

Fire Storage – 3,000 gpm for 3 hours

Operational Storage – based on hourly demand curve in Table 4-3

Table 6-20 shows the storage requirements for the 2850 Pressure Zone.

The increase in storage between 2015 and 2020 is due to the large increase in water demand during that period as well as the need to supply the 3040 Pressure Zone.

The storage required at build-out is 9.7 MG. A 2 MG tank is required in 2020 and another 2.5 MG to be added in 2040 to total 10 MG.

The previous master plan envisioned a 1 MG tank along Kehl Canyon Rd, north of Orchard St. This appears to be a good location and this Kehl Canyon Tank should remain a part of the master plan. However, a larger tank, say 2.5 MG could be put on the Kehl Canyon site if necessary.

It would be most advantageous to have a tank on the easterly side of the pressure zone, possibly on the Pardee Butterfield project near Brookside Ave and Highland Springs Rd. The Butterfield Specific Plan, November 2011, shows an open space/recycled water storage basin on a 30 acre site just east of Smith Creek located at an ideal elevation. A 2 MG tank could easily be constructed on the site.

Table 6-20
Storage Requirements in 2850 Pressure Zone, MG

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational	1.19	1.30	3.37	3.39	3.48	3.66	4.31	4.64	6.08
Fire	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Emergency	1.77	1.93	2.81	2.81	2.83	2.85	2.95	3.00	3.21
Total Storage Required, MG	3.32	3.59	6.53	6.56	6.67	6.87	7.62	8.00	9.65
Available Storage, MG	5.5	5.5	7.5	7.5	7.5	7.5	10.0	10.0	10.0
Total Additional, Storage, MG			2				2.5		

Booster Pumping

Cherry Tank Site Booster

Table 6-19 presented previously indicated some booster pumping from the 2750 Pressure Zone to the 2850 Pressure Zone will be required. Currently there is no booster pumping station to serve the 2850 Pressure Zone. If water needed to be boosted from the 2750 Zone, it would have to be pumped into the 3040 Pressure Zone then released through a pressure regulator – very energy inefficient. This existing 2750 to 3040 booster pump station is located at the District’s Cherry Tank Site at Brookside and Cherry Ave.

There are three existing vertical turbine “can” boosters with capacities from 1,400 to 1,600 gpm as shown in Table 2-9 in Section 2. Firm capacity is 2,900 gpm. They were constructed during the late 1960’s/early 1970s. Two of the pumps, 21A and 21B are electric motor driven. Pump 21C has an old Waukesha natural gas engine drive. The electrically-driven pumping units are in relatively good condition.

Table 6-19 indicates a capacity of about 740 gpm is needed to meet the year 2035 booster pumping demands – the maximum projected need assuming the largest production well is out of service. The maximum day demand for the 2850 Pressure Zone, including the boosting requirements to the 3040 Zone at build-out is 13.1 mgd (9,100 gpm on a 24-hour basis or 12,130 gpm on an 18-hour basis. The average day demand would be one half of the maximum day demand.) Consideration should be given to provide some emergency pumping capability in the event the 2850 Zone and 3040 Zone tanks or some of the wells were damaged during an earthquake. It would seem reasonable to meet an average day demand during an emergency. Based on this, a total booster station capacity of around 4,500 gpm would be reasonable. Since this booster station is only for emergency purposes, some latitude in firm pumping capacity can be taken. To accommodate the more common, lower, demand conditions, a smaller pump should be installed also, say 750 gpm. The station should be in place when the new 2850 to 3040 Pressure Zone Booster Station is completed – probably around 2020.

The existing pumps 21A, 21B and 21C would be removed and replaced with new pumps in the existing “cans” providing the new pumps “fit.” The existing electrical equipment should be replaced. The characteristics of the proposed 2750 to 2850 Zone Booster Pump Station is shown in Table 6-21 and would serve the District through build-out.

Table 6-21
Proposed 2750 to 2850 Pressure Zone
Booster Pump Station at Cherry Tank Site

Year	Description
2020	Remove existing booster pumps 21A, B, and C; retain existing "cans"; install 3 electric-driven pumps: 1 @ 750 gpm @ 130 ft TDH, 40 HP 2 @ 2,250 gpm, 130 ft TDH, 100 HP

Legacy Highlands (Preserve) Emergency Booster

A portion of the 2850 Pressure Zone extends south of I-10 into the southerly portions of the K-hov Development and into the Legacy Highlands (Preserve) Development. These areas are supplied by a single 16-in diameter main extending under I-10 and the railroad at Xenia St on the east side of the BCVWD service area. There is no place for a storage tank south of I-10 that is high enough in elevation to serve the 2850 Pressure Zone, and as a result, the 2850 Zone south of I-10 has no back-up supply should that 16-in pipeline be out of service for any reason. To provide back-up, an emergency booster pump station should be constructed at the 2750 Tank site in Legacy Highlands that would pump from the 2750 Zone to 2850 Zone.

Based on a "pad count" in September 2015, there are about 375 EDUs in the 2850 Zone south of I-10 in the K-hov development. The Legacy Highlands, (The Preserve), tentative tract map 31570 shows about 90 to 95 pads within the 2850 Pressure Zone. Development has not yet started on this project. Examination of the topography south of I-10, between Highway 79 and the K-hov development show there are about 100 to 110 acres of land which is currently undeveloped or sparsely developed. Based on 3.8 EDUs per gross acre, another 380 EDUs could potentially be in the 2850 Pressure Zone south of I-10, bringing the total number of EDUs to about 850 EDUs at build-out.

The total maximum day demand for these 850 potential EDUs will be about 0.98 mgd (680 gpm over 24 hours); peak hour is 2.83 mgd (1,965 gpm). Table 6-22 shows the characteristics of the Legacy Highlands 2750 Zone to 2850 Zone Emergency Booster. Since this is to be used only for emergencies, some relaxation of the firm pumping capacity is proposed. The station can meet the maximum day demand, south of I-10 with the largest pump out of service, but to meet peak hour on the maximum day at build-out, both pumps need to operate.

Table 6-22
Proposed 2750 to 2850 Pressure Zone Emergency
Booster Pump Station at Legacy Highlands 2750 Zone Tank Site

Year	Description
2020 or when Legacy Highlands 2850 Zone Created	2 @ 1000 gpm, 130 ft TDH, 50 HP

2750 Pressure Zone

The average day and maximum day water demands in the 2750 Pressure Zone were presented in Section 4, Tables 4-7 and 4-8; Table 6-23 shows those demands for convenience and also includes the peak hour demand.

Table 6-23
Potable Water Demand for 2750 Pressure Zone, mgd

Pressure Zone	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
Average Day	6.10	6.21	5.19	5.83	6.60	7.23	7.53	7.67	8.09
Maximum Day	12.19	12.43	10.38	11.66	13.20	14.46	15.06	15.33	16.19
Peak Hour	35.24	35.91	30.01	33.70	38.15	41.79	43.52	44.31	46.78
Accumulated New EDUs		200	996	2,107	3,445	4,532	5,048	5,284	6,019

In addition to these demands, the water boosted into the 3040 Pressure Zone from the 2750 Pressure Zone must be included. Currently no water is boosted from the 2750 Pressure Zone to the 2850 Pressure Zone because there are no facilities to do this. In the future, with the expansion of the Pardee Sundance development into the 3040 Pressure Zone, booster pumping facilities will be constructed for pumping from 2850 Pressure Zone to the 3040 Pressure Zone. For planning purposes, this will occur after 2015 but before 2020. When this occurs, the existing Cherry Boosters 21A, 21B and 21C will be refurbished and redesigned to pump to the 2850 Pressure Zone as described above and shown in Table 6-21.

Table 6-24 summarizes the amount of water that needs to be boosted from the 2750 Zone under worst case conditions of **minimal** water supply from Edgar Canyon. Note that for the years 2013 and 2015, water will be pumped from the 2750 Pressure Zone to the 3040 Pressure Zone; after 2020, the water will be pumped to the 2850 Pressure Zone and then from that zone to the 3040 Zone in a separate, new pumping station. Note that from year 2040 and beyond, regular boosting to meet maximum day demand in the 2850 Pressure Zone is not required. But the pumps are able to provide emergency supply in the event of a well outage. An alternative would be to defer construction of one or more of the 2850 Zone wells indicated needed after year 2040 and move them to the 2750 Zone and continue boosting from 2750 to 2850 Zone after year 2040. This option should be reviewed in future master plans.

In Table 6-24 the demand for potable water dropped significantly in the year 2020 as a result of securing recycled (non-potable) water from YVWD in conjunction with the addition of three new wells in the 2850 Pressure Zone. The latter reduces the booster pumping needs from the 2750 Pressure Zone. The conversion of the existing non-potable water system to recycled water is expected to occur sometime after 2015, but before 2020.

Water Supply

The 2750 Pressure Zone is currently supplied by six wells as shown in Table 6-25. Well 26 has been temporarily piped to pump into the non-potable water system until hexavalent chromium treatment or blending can be provided at Well 26.

The firm yield of the wells (largest well out of service) operating 18 hours/day is 7.0 mgd assuming Well 26 is connected to the potable water system. The firm yield with Well 26 pumping to the non-potable water system is 6.2 mgd. Both conditions are less than the current maximum day demand. To meet the maximum day year 2015 demand in the 2750 Pressure Zone, all wells need to be operating 24 hours per day and Well 26 needs to be pumping to the potable water system. This condition will also require BCVWD using the City of Banning's share of the capacity in the joint wells.

The discharge piping system from Well 29, which currently pumps to the 2650 Pressure Zone, is currently being modified to allow the well to pump to either the 2650 Pressure Zone or the 2750 Pressure Zone. Current demand in the 2650 Pressure Zone is far less than the production capacity of Well 29 and so, this spare capacity can be used to supplement the 2750 Pressure Zone supply in the interim if needed. This spare capacity will not be available much beyond 2015. Well 29 has a capacity of 4,000 gpm (4.3 mgd over 18 hours or 5.8 mgd over 24 hours).

Table 6-24
Booster Pumping Requirements from 2750 Pressure Zone to 3040 and 2850 Pressure Zones on the Maximum Day[1]

	2013	2015	2020	2025	2030	2035	2040	2045	Ultimate Build-out
Maximum Day Demand in 2750 Zone, mgd	12.19	12.43[2]	10.38	11.66	13.20	14.46	15.06	15.33	16.19
Maximum Day Boosted from 2750 Zone to 3040 Zone, mgd (Table 6-15)	2.56	2.67	--	--	--	--	--	--	--
Maximum Day Boosted from 2750 Zone to 2850 Zone, mgd (Table 6-19)	--	--	0.40	0.44	0.57	0.80	--	--	--
Total Maximum Day Demand in 2750 Pressure Zone	14.75	15.1[2]	10.78	12.10	13.77	15.26	15.06	15.33	16.19

[1] Based on a worst case condition of minimum water supply from the Edgar Canyon Wells and largest well out of service in 2850 Pressure Zone

[2] Year 2015 demand includes non-potable water demand since it is supplied by potable water

The total maximum day capacity in Table 6-25 for 2013 and 2015 includes potable water supplied to the non-potable water system. From year 2020 on, the demands shown in the table are only the potable water demands. (The non-potable water demand currently is approximately 1,650 AFY on the average which represents 2.94 mgd on the maximum day.)

In 2015 Well 26, (capacity of 1.6 mgd with 18 hours operation), was piped into the non-potable system until hexavalent chromium treatment or blending can be installed to allow the well to be switched back to the potable water system. This has the effect of reducing the potable water demand for years 2013 and 2015 to 13.15 mgd and 13.5 mgd respectively.

The total capacity with Well 26 pumping to the non-potable water system is 13.1 mgd, assuming the wells operate 24 hours per day and BCVWD uses the City of Banning's shared capacity. (See Table 6-25.) This should be adequate to meet the potable water demands until 2020 when recycled water will be introduced into the non-potable water system.

To provide capacity beyond 2015, Well 2 should be replaced with a new well and pump. Well 2 pump was pulled about year 2008 due to an improperly installed casing liner and gravel pack and has remained inoperative since then. There is sufficient room on the site to drill another well of similar capacity (2,000 gpm). A new well at this site may require hexavalent chromium treatment facilities.

Table 6-25
2750 Zone Current Well Capacity

Well	Capacity, gpm	mgd, 18-hr of pumping	mgd, 24-hr of pumping	Comment
1	1,300	1.40		The oldest well in Beaumont Basin (drilled in 1936)
2	--	--	--	Casing Failed, No Equipment
3	1,500	1.62		Drilled in 1952
21	2,100	2.27		Drilled in 1971
22	1,700	1.84		Drilled in 1955
24	1,250	1.35		Total capacity = 2,500 gpm, shared with Banning
26	750	0.81		Total capacity = 1,500 gpm, shared with Banning, can pump to non-potable water system
Total Capacity BCVWD Share	8,600	9.3	12.4	All wells operational
Firm Capacity BCVWD Share	6,500	7.0	9.3	With largest well out of service
Total Capacity incl, Banning Share	10,600	11.4	15.2	All wells, incl. Banning's Share
Firm Capacity BCVWD Share	10,500	11.3	15.1	With largest 2750 Zone well out of service but with Well 29
Well 26 Pumping to Non-potable Water System				
Total Capacity BCVWD Share	7,850	8.5	11.3	All other wells operational
Firm Capacity BCVWD Share	5,750	6.2	8.3	With largest well out of service
Total Capacity incl, Banning Share	9,100	9.8	13.1	All other wells, incl. Banning's Share
Firm Capacity BCVWD Share	9,750	10.5	14.0	With largest 2750 Zone well out of service but with Well 29

Over time, Wells 1, 3 and 22 will need replacement as shown in Table 6-26. Well 1 is located at the City Reservoir site (12th and Palm Yard) and there should be adequate space for a replacement well there. The existing well sites for Wells 3 and 22 should be adequate for replacement wells.

Three new wells, on new sites, will be needed to be constructed in addition to the replacement wells (Wells 1, 2, 3, and 22) identified above. Reviewing data from the Beaumont Basin Watermaster[6], the ideal locations for the new wells will be along Noble Creek, south of Oak Valley Parkway. The Beaumont Basin is deep in this area and the sediments deposited by Noble Creek are believed to be very permeable.

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[6] Harder and Alda (2014). Draft 2013 Reevaluation of the Beaumont Basin Safe Yield, Beaumont Basin Watermaster, Thomas Harder & Co. in association with Alda, Inc., April 2.

Future well needs are shown in Table 6-26 above based on limiting the capacity to about 2,000 gpm (2.2 mgd over 18 hours of pumping) for planning purposes. The basis for the 2,000 gpm well capacity was discussed previously.

Table 6-26
Well Capacity Needs for 2750 Pressure Zone
(based on largest well out of service, 18 hours of pumping,
and Well 26 into Non-potable water system unless noted)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Total maximum day demand, mgd	14.75	15.1[d]	10.78	12.10	13.77	15.26	15.06	15.33	16.19
Existing Firm Well Supply, mgd	6.2	6.2	4.8[a]	3.2[b]	3.2	1.4[c]	1.4	1.4	1.4
Existing Firm Well Supply, incl. Well 29, mgd	10.5	10.5	Well 29 Spare Capacity Not Available						
All Wells Operating 24 hr, incl. Well 29, mgd	14.0	14.0	Well 29 Spare Capacity Not Available						
Replacement Wells @ 2.2 mgd			2[e]	1[b]		1[c]			
New Wells @ 2.2 mgd			1	1		1			
Total Firm Well Supply, mgd		See Note d	11.4	14.2	14.2	16.8	16.8	16.8	16.8

[a] Decommission Well 1 and replace on same site
[b] Decommission Well 3 and replace on same site
[c] Decommission Well 22 and replace on same site
[d] includes 1.6 mgd supplied to non-potable system by Well 26; actual potable demand = 13.5 mgd
[e] Includes replacement for Well 2 on same site

Storage

Storage requirements based on:

Emergency Storage – 25% of Maximum Day Demand including any water pumped to other pressure zones

Well Pumping for 18 hours/day; no pumping Noon to 6 pm

Fire Storage –4,000 gpm for 4 hours

The storage requirements for the 2750 Pressure Zone are shown in Table 6-27. Currently there are 8 MG of storage available: 3.9 MG at the Taylor Tank Site and 4.1 MG in three tanks at the Cherry Tank Site at Brookside and Cherry Aves. The original Cherry Tanks were constructed in the early 1960s, but have been maintained are in in good condition. The third Cherry Tank was constructed in 2006 and is in excellent condition. Similarly the Taylor Tank, constructed at Taylor Ave. and Golden Valley Ln. in 2002, is in excellent condition.

Table 6-27
Storage Requirements in 2750 Pressure Zone

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational	3.83	3.66	3.51	3.94	4.46	4.88	5.08	5.178	5.47
Fire	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Emergency	6.10	5.41	5.19	5.83	6.60	7.23	7.53	7.67	8.09
Total Storage, MG	10.89	10.03	9.66	10.73	12.02	13.07	13.57	13.80	14.52
Total Storage in Place, MG	8.0	8.0	8.0	11.0	13.0	13.0	15.0	15.0	15.0
Total Additional, Storage, MG			3.0		2.0		2.0		

Current storage is inadequate according to Table 6-27; however, this is based on having 50% of the maximum day demand as emergency storage. The existing 8 MG of storage provides 3.2 MG of emergency storage, which is satisfactory for now. In 2020, another 3 MG of storage is recommended to be constructed, another 2 MG in 2030 and a 2 MG tank in 2040. This will provide a total of 15 MG of storage, adequate for build-out.

In considering storage for the 2750 Pressure Zone, it is important to realize the 2750 Zone currently and at build-out has the largest demand in the system. At build-out, the maximum day demand is over 16 mgd. Current storage is concentrated at Brookside and Cherry Aves. (4.1 MG) at the northeast corner of the Zone and Taylor Tank (3.9 MG) at the northwest corner of the Zone. A substantial portion of this demand, estimated to be about 30 to 35%, will be south of I-10. There is no storage south of I-10 at the present time. There are four major transmission mains crossing under I-10 to serve the 2750 Zone south of I-10, (at Veile St., California Ave., Pennsylvania Ave., and Allegheny St.), which provide system reliability. But to better balance system pressures, provide better fire protection, and system reliability, gravity storage south of I-10 is necessary.

There are several sites to meet future storage requirements:

1. A tank site near Mt. Davis at the southwest corner of the Zone adjacent to the Legacy Highlands Development. The site could accommodate 4 MG of storage, perhaps a little more. This site will likely not be easily accessible until the adjacent portion of Legacy Highlands is completed. This should be the first choice and should be constructed with Legacy Highlands. If necessary a temporary access road could be constructed from Legacy Highlands to the tank site. To meet the storage requirements at least 3 MG should be constructed. If Legacy Highlands is not in construction at the time the next tank is needed (about 2020), then site 2 below should be site for the next stage, i.e. a 2 MG tank adjacent to Taylor Tank and the Legacy Highlands tanks should be postponed until 2030.
2. On district-owned land adjacent to the Taylor Tank site. The District owns approximately 29.5 ac, adjacent to the Taylor Tank site. This site was purchased with the intent of constructing a potable water treatment plant to treat imported SPW at some point in future. The land is adjacent to EBX and DWR's Cherry Valley Pump Station. This site

would be large enough for the treatment plant and almost any sized water storage tank (2 MG is recommended). Although treatment plant is not envisioned to be needed at this time, it could be needed in the future if operating experience shows that the projected amount of imported water and advanced treated recycled water could not effectively be recharged and extracted at the District's groundwater recharge site along Beaumont Ave.

3. A tank site south of I-10 along Highland Springs Ave., in the hills, south of Sun Lakes at the southeast corner of the Zone. The site can accommodate a 2 MG tank, possibly as much as 3 MG tank. The development of this site will be expensive. There is nearly one mile of 6 to 11 percent grade access road required to be graded to reach the site. Construction of this tank could wait until 2040 at the earliest, unless that area south of K-hov, (Potrero Creek Estates), begins to develop. If Potrero Creek develops before 2040, consideration should be given to installing a 2 MG at this site. If the costs for this site become prohibitive, at last 1 MG, preferably 2 MG should be constructed at the Mt. Davis Site (Site 1). If the needed storage cannot be constructed at the Mt. Davis tank site, any needed additional storage should be at Site 2 adjacent to Taylor Tank.

For planning and budgeting purposes the following program is assumed:

- 3 MG at Legacy Highlands (2020)
- 2 MG at District-owned site adjacent to Taylor Tank (2030)
- 2 MG at site along Highland Springs Ave., south of I-10 (2040)

Booster Pumping

The 2750 Pressure Zone is self-sufficient and booster pumping from the 2650 Zone is not anticipated to be needed.

Pressure Regulating Stations

2850 Zone to 2750 Zone

A pressure regulating station should be constructed adjacent to the proposed 3 MG, 2750 Zone Tank at the Legacy Highlands Development to reduce pressure from the 2850 Zone to the 2750 Zone. The primary purpose of this station is to ensure water circulation in the 2850 Pressure Zone south of I-10. The 2850 Zone, south of I-10 is on a single pipeline extending under I-10 at Xenia St. to the K-hov development and then over to Legacy Highlands. There may not be sufficient development in the initial tract development to have sufficient water movement.

A 3-in regulator with a capacity of 460 gpm should be adequate for circulation.

2750 Zone to 2650 Zone

The 2650 Zone will have wells and is master planned to be self-sufficient. In addition there is a by-pass regulator near the 2650 Zone Hannon Tank that can supply water from the 2750 Zone to the 2650 Zone and the lower zones if necessary during an emergency. A second pressure reducing station for emergency purposes should be installed in close proximity to the 2650 Zone tank site in Legacy Highlands. In the event that some of the 2650 Zone pipelines under I-10 or the 2650 Zone Tank at Legacy Highlands need to be taken out of service, the regulator can supply water to the south side of the system.

A pair of 4-in regulators with a total capacity of 1,600 gpm should be adequate.

2650, 2520 and 2370 Pressure Zones

These are the three lowest pressure zones in the BCVWD potable water distribution system. Growth in the 2650 and 2520 Pressure Zones will be significant between now and build-out. A large portion of the growth is anticipated to occur between 2015 and 2035. There is little growth anticipated in the 2370 Pressure Zone; it abuts the SOI boundary with YVWD and the City of Calimesa boundary. There is land between Oak Valley Parkway and State Route 60 that could be served by the 2370 Pressure Zone, but that land is designated as Riverside County Regional Park and Open Space and is not anticipated to be developed. The Jack Rabbit Trail Project, listed in Section 3, is south of State Route 60, but this area would be in the 2520 Pressure Zone.

In terms of sources of supply, the 2520 and 2370 Pressure Zones will likely always be supplied from the 2650 Pressure Zone as there is not believed to be significant sources of potable water underlying either the 2520 or 2370 Pressure Zones. During the grading work for the Heartland Development in the mid-2000s, a well was drilled for construction water; the well yielded water that was reportedly more mineralized than the groundwater typically found in the Beaumont Basin. Groundwater in the San Timoteo Creek alluvium is believed to have been intruded with more mineralized wastewater discharged from the City of Beaumont's wastewater treatment plant over time and is not deemed to be a suitable source of potable water at this time. As more data is collected, this source may prove viable for either portable or non-potable water.

Projected potable water demands in the 2650, 2520 and 2370 pressure zones are presented in the Table 6-28. Note that in Table 6-28, the water demand in the 2370 zone decreases between 2015 and 2020. This is due to introduction of recycled water into the non-potable water distribution system which is currently served by potable water. This same situation occurs in the 2750 and 2650 pressure zones, however, the growth in the 2013 to 2020 period masks the decrease.

Water Supply

The 2650 Pressure Zone as well as the 2520 and 2370 Zones are currently supplied by the 2650 Zone Hannon Tank (5 MG) and Well 29. There is a by-pass regulator near the Hannon Tank, in Cherry Valley Blvd that can release water from the 2750 Pressure Zone to the 2650 Pressure Zone. This regulator has not been used since Well 29 went into service. Other than Well 29, there are no other wells serving these pressure zones at the present time. As stated above, it is also unlikely that there will be wells in the 2520 and 2370 Pressure Zones in the future due to the limited supply of high quality water in those pressure zones.

Well 29 is a relatively new well, drilled in 1990 to a depth of 1,410 ft. See Table 6-29. It was originally drilled for the Sunny Cal Egg Ranch; but was purchased by BCVWD around 2005 or so as the Egg Ranch was planning on developing the property. Well 29 is the District's largest producer. Well 29 would meet the needs of the three pressure zones on the maximum day until almost 2020; however there is no standby.

The pressure reducing station from the 2750 Pressure Zone to the 2650 Pressure Zone can be used in the event Well 29 is out of service; however, investigations have shown that under maximum day demand, there is not enough well capacity currently available in the 2750 Pressure Zone to meet the needs of the 2750, 3040 and 2650, 2520 and 2370 Pressure Zones. This has been discussed in the previous sections. So it is clear that stand-by well capacity is immediately needed in the 2650 Pressure Zone. Well requirements are shown in Table 6-30.

Table 6-28
Potable Water Demands in the 2650, 2520 and 2370 Pressure Zones, mgd

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
2650 Pressure Zone									
Average Day	0.81	0.92	1.27	1.73	2.19	2.63	2.93	3.11	3.79
Maximum Day	1.62	1.84	2.54	3.46	4.39	5.26	5.86	6.23	7.58
Peak Hour	4.67	5.32	7.34	10.01	12.68	15.19	16.94	18.00	21.91
Total Accumulated New EDUs		193	795	1,592	2,389	3,136	3,660	3,975	5,142
2520 Pressure Zone									
Average Day	0.65	0.74	1.07	1.58	2.14	2.71	3.19	3.19	3.19
Maximum Day	1.30	1.48	2.15	3.16	4.29	5.42	6.39	6.39	6.39
Peak Hour	3.76	4.28	6.21	9.14	12.40	15.66	18.46	18.46	18.46
Total Accumulated New EDUs		153	898	1,770	2,742	3,715	4,549	4,549	4,549
2370 Pressure Zone									
Average Day	0.21	0.21	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Maximum Day	0.42	0.42	0.38	0.38	0.38	0.38	0.38	0.38	0.38
Peak Hour	1.21	1.21	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Total Accumulated New EDUs		Negl.	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Total Average Day Demand 2650, 2520 and 2370 Zones mgd	1.67	1.87	2.53	3.50	4.53	5.53	6.31	6.50	7.17
Total Max Day Demand 2650, 2520 and 2370 Zones mgd	3.34	3.74	5.07	7.00	9.06	11.05	12.63	12.99	14.35
Total Accumulated New EDUs in 2650, 2520 and 2370 Zones		692	1,693	3,362	5,131	6,851	8,209	8,524	9,691

Table 6-29
2650 Zone Current Well Capacity

Well	Capacity, gpm	mgd, 18-hr of pumping	Comment
29	4,000	4.32	Sometimes called Egg Ranch Well, drilled in 1990 5.8 mgd (24-hr operation)

Table 6-30
Well Requirements for the 2650 Pressure Zone[1]

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Maximum day demand in 2650, 2520 and 2370 Zones, mgd	3.34	3.74	5.07	7.00	9.06	11.05	12.63	12.99	14.35
Existing Firm Well Supply, mgd	None. Only well is well 29								
New Wells @ 2.2 mgd each		2	1	1	1	1			1
Total Firm Well Supply, mgd		4.4	6.6	8.8	11.0	13.2	13.2	13.2	15.4

[1]. Includes the 2520 and 2370 Pressure Zone Demands

Well 29 will likely need a major rehabilitation sometime after the year 2045 due to its age. A total of seven new wells will be needed to meet ultimate build-out, maximum day demands of the 2650, 2520 and 2370 Pressure Zones. At this point, the District does not believe there are adequate potable groundwater resources in the 2520 or 2370 Pressure Zone, so no potable wells are planned in those pressure zones. The water demands for the 2520 and 2370 Pressure Zones will be supplied from the 2650 Pressure Zone through a series of pressure regulators.

Review of maps and figures in the Beaumont Basin Watermaster's Draft Reevaluation of Safe Yield[7], shows that the area with the greatest specific yield is generally parallel to I-10, trending northwesterly from the intersection of I-10 and Oak Valley Parkway to 3,500 ft northwest of Singleton Rd. The area extends to the base of the mountains north of Cherry Valley Blvd. This area includes the existing Well 29. This area has high horizontal and vertical hydraulic conductivity, and the depth is about 1,000 ft to the bottom of the upper aquifer. This area should be a good location for the new wells.

Storage

Storage requirements based on:

Emergency Storage –50% of Maximum Day Demand including any water pumped to other pressure zones

Well Pumping for 18 hours/day; no pumping Noon to 6 pm

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[7] Harder and Alda (2014). Draft 2013 Reevaluation of the Beaumont Basin Safe Yield, Beaumont Basin Watermaster, Thomas Harder & Co. in association with Alda, Inc., April 2.

Fire Storage –

Zone	Current	Future
2650	2,000 gpm, 3 hrs	4,000 gpm, 4hrs (2020)
2520	1,500 gpm, 2 hrs	4,000 gpm, 4hrs (2020)
2370	1,500 gpm, 2 hrs	

The fire storage in the 2650 and 2520 Pressure Zones increases in the future due to the potential for large warehouse development which could occur in those areas. The Heartland Commercial, in the 2520 Pressure Zone, will likely be under construction by the year 2020 and require the large fire flow.

2650 Pressure Zone

The storage requirements for the 2650 Pressure Zone are shown in Table 6-31. The storage requirements assume that no storage is provided in the 2520 or 2370 Pressure Zones and these pressure zones are supplied through a series of pressure regulators. The existing 5 MG 2650 Zone Hannon Tank will be sufficient until the year 2020 under this mode of operation. At that point in time a decision will have to be made:

- Provide all the storage in the 2650 Pressure Zone
- Provide some of the storage in the 2520 Pressure Zone for both the 2650 Zone and 2370 Zone.

Table 6-32 shows the storage required in the 2650 Pressure Zone assuming a rate of flow controller is placed on the pressure regulating station between the 2650 Pressure Zone and the 2520 Pressure Zone to limit the flow to the average demand on the maximum day. This transfers the operational storage requirements to the 2520 Pressure Zone Tank and reduces the overall storage required in the 2650 Pressure Zone. The storage at build-out is reduced from 13 MG to just under 9 MG. The 4 MG of storage is then moved to the 2520 Pressure Zone Tank, so there is no savings in tank capacity. In fact the tank capacity requirements are actually increased since fire storage is provided in both the 2520 and 2650 Pressure Zones and some emergency storage is duplicated. But in the interests of flexibility and reliability it is better to have storage tanks in both the 2650 and 2520 Pressure Zones.

The best location for the additional 2650 Pressure Zone storage is south of I-10 since this would provide two sources of supply – one from the north (Hannon Tank) and one from the south. Having the two sources improves overall system reliability substantially and maintains more constant pressures. Table 6-32 shows that 4 MG of additional storage is required for the 2650 Zone to build-out. Two 2 MG tanks are planned. There is a suitable site at the proper elevation in the Legacy Highlands (Preserve) development that can accommodate the two tanks.

2520 Pressure Zone

As shown in Table 6-31, presented previously, the 2520 Pressure Zone can be served from the 2650 Zone until the year 2020, when either more storage needs to be constructed in the 2650 Pressure Zone or storage should be provided in the 2520 Pressure Zone. Considering the demands in the 2520 Pressure Zone are approximately the same as the 2650 Pressure Zone and further considering the fire flow for the 2520 Pressure Zone is 4,000 gpm for 4 hours, providing separate storage in the 2520 Pressure Zone is warranted. Table 6-33 shows the storage requirements for the 2520 Pressure Zone. It is assumed that the 2520 Pressure Zone will rely on storage in the Hannon Tank (2650 Zone) until the year 2020. At that point 4 MG of storage would be constructed followed by another 2 MG of storage on the same site ten years later. There is a suitable location in the Legacy Highlands (Preserve) development.

Table 6-31
Storage Requirements in 2650 Pressure Zone
(No Storage in 2520 or 2370 Pressure Zones)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational	1.12	1.26	1.71	2.33	3.05	3.73	4.26	4.39	4.84
Fire	0.36	0.36	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Emergency	1.67	1.87	2.53	3.45	4.52	5.53	6.31	6.49	7.17
Total Storage Required, MG	3.15	3.49	5.20	6.74	8.54	10.22	11.53	11.84	12.97
Total Existing Storage in Place, MG	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Additional, Storage, MG			4.0			4.0			
Total Storage MG	5.0	5.0	9.0	9.0	9.0	13.0	13.0	13.0	13.0

Table 6-32
Storage Requirements in 2650 Pressure Zone
(Assumes Storage in 2520 Pressure Zones)

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational	1.12	1.26	1.42	1.93	2.52	3.06	3.48	3.61	4.06
Fire	0.36	0.36	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Emergency	1.67	1.87	1.27	1.73	2.19	2.63	2.93	3.11	3.79
Total Storage Required, MG	3.15	3.49	3.65	4.63	5.67	6.65	7.37	7.68	8.81
Total Existing Storage in Place, MG	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total Additional, Storage, MG					2.0		2.0		
Total Storage MG	5.0	5.0	5.0	5.0	7.0	7.0	9.0	9.0	9.0

Table 6-33
Storage Requirements in 2520 Pressure Zone

	Year								
	2013	2015	2020	2025	2030	2035	2040	2045	Build out
Operational			0.51	0.71	0.94	1.17	1.36	1.36	1.36
Fire			0.96	0.96	0.96	0.96	0.96	0.96	0.96
Emergency			1.26	1.77	2.33	2.90	3.38	3.38	3.38
Total Storage Required, MG			2.73	3.45	4.24	5.03	5.71	5.71	5.71
Total Existing Storage in Place, MG	No storage in zone; rely on 2650 Zone until 2020								
Total Additional, Storage, MG			4.0		2.0				
Total Storage MG			4.0	4.0	6.0	6.0	6.0	6.0	6.0

There is a 2520 Zone tank site north of Cherry Valley Blvd, east of I-10 which would be a preferred alternative to the second 2 MG tank at the Legacy Highlands (Preserve) development since it would give a second source from the north to the 2520 Zone for improved reliability and better balance the pressures in the system. The pipeline from this northerly tank would have to cross I-10 in the new Caltrans bridge across I-10 at Cherry Valley Blvd. Due to the large difference in elevation across I-10 at this location, typical bore and jack installation is probably not feasible. BCVWD should request Caltrans to install the pipeline in the bridge deck. (Note there would be two pipelines in the bridge deck, a 2650 Zone and a 2520 Zone pipeline, both 24-in. It is also possible there may be a large diameter non-potable water pipeline in the same deck.) These pipes should be installed in the bridge at the time the bridge is constructed and capped off until the actual connection to the system is required.

2370 Pressure Zone

The theoretical storage requirement for the 2370 Zone is 0.44 MG. The maximum day demand is 0.38 mgd at build-out. There was a site set aside and rough graded for the 2370 Zone Tank during the Pardee-Sun Cal Development. A pressure regulating station is planned to be constructed at the tank site to be able to control the flow from the 2520 Zone into the 2370 Zone. If a tank is installed to serve the 2370 zone, 0.5 MG should be adequate. If it is made too large, there could be water quality problems due to water residing in the tank for long periods of time. It may be prudent to reserve a portion of the tank site for a non-potable water tank to store water pumped from San Timoteo Canyon alluvium should this ever become a future source of non-potable water.

Pressure Regulating Stations

Water will be supplied to the 2520 and 2370 Pressure Zones through pressure regulators. Valve selection for the 2650 to 2520 Zone pressure regulator should allow adding a flow control (set to maximum day flow rate) at some point in the future when storage is provided in the 2520 pressure zone. This will prevent the lower pressure zones from peaking off of the 2650 Pressure Zone. Table 6-34 presents data on the 2650 to 2520 Zone pressure regulating stations.

Table 6-34
2650 Zone to 2520 Zone Pressure Regulating Stations

Year	Demands, gpm			Regulator			Notes
	Average	Maximum	Fire Flow	Dia, in	Capacity, gpm	Number	
Linksman Dr. and Balata St.							
Existing	Serves a limited number of lots, ample capacity, no plans to expand			2 6	210 800	2 1	
Champions Dr. & Cherry Valley Blvd							
Existing	450	2,600	1,500	6 8 12	1,800 3,100 7,000	1 1 1	
2020	450	900	4,000	2 4 6	210 800 1,800	1 1 2	Replace valves, provide fire flow from new 2520 tank, but have valve capacity if tank down
2040	1200	2,400	4,000	4 6	800 1,800	2 2	Replace valves, provide fire flow from new 2520 tank, but have valve capacity if tank down
New at 2520 Tank Site in Legacy Highlands Development							
2020	450	900	4,000	2 4 6	210 800 1,800	1 1 2	Fire flow from new 2520 tank but have valve capacity if tank down
2040	1,200	2,400	4,000	4 6	800 1,800	2 2	Fire flow from new 2520 tank, but have valve capacity if tank down
New at 2520 Tank Site North of Cherry Valley Blvd							
2030	1,200	2,400	4,000	4 6	800 1,800	2 2	Fire flow from new 2520 tank, but have valve capacity if tank down

The existing pressure regulating station at Linksman Dr. and Balata St. is new and serves about 200 single family homes, along Straightaway Dr., Gallery Dr., and Stableford Ct. The regulator will not need to be expanded as the service area is not expected to grow.

There is an existing regulator near Champions Dr. and Cherry Valley Blvd that was constructed as part of the Sun-Cal Tract. This regulator will be the principal source of supply to the 2520 Pressure Zone until the Heartland Project develops on the south side of San Timoteo Creek. At that time a second, temporary, regulator station will be installed with the Heartland Project to provide a supply from the 2650 Pressure Zone originating on the south side of San Timoteo Creek.

When the Legacy Highlands (Preserve) project develops, a 4 MG 2520 Pressure Zone tank should be installed on the Legacy Highlands (Preserve) project at the designated site. Then a permanent regulating station should be installed at the Legacy Highlands (Preserve) Tank site and the temporary regulating station can be decommissioned. Both the Champions Dr/Cherry Valley Blvd station and the permanent Legacy Highlands (Preserve) 2650 to 2520 Zone Regulator will need to be expanded by replacing and upsizing the valves to meet the build-out demand as shown in Table 6-34.

If the 2520 Zone tank is constructed north of Cherry Valley Blvd and east of I-10 in lieu of the equivalent 2 MG tank at Legacy Highlands (Preserve), a regulator should be installed adjacent to the tank to supply water from the 2650 Zone to the 2520 Zone. This regulator is shown in Table 6-34.

The 2370 Pressure Zone is served by an existing regulator in Palmer Ave about 500 ft east of Morris St. This station will be adequate for the ultimate build out. A second station should be installed at the proposed 2370 tank site when the tract adjacent to the tank site builds out. This station will provide some redundancy and enhance reliability. See Table 6-35. Both of the stations must be designed to meet the maximum day demand plus the fire flow.

Table 6-35
2520 Zone to 2370 Zone Pressure Regulating Stations

Year	Demands, gpm			Regulator			Notes
	Average	Maximum	Fire Flow	Dia, in	Capacity, gpm	Number	
Palmer Ave., 500 e/o Morris St							
Existing	145	840	1,500	4 8	800 3,100	1 2	
At proposed 2370 Tank Site							
2020	130	760	1,500	3 6	460 1,800	2 1	

Pipelines

The master planned pipelines consist of new transmission mains to accommodate growth in demand, i.e., those 16-in in diameter and larger; replacement of some older transmission mains, and replacement of aging, undersized, distribution mains in the 2750 and higher pressure zones.

The transmission mains to accommodate growth are to be funded from facilities fees (sometimes called “impact fees”) paid by developers. The aging, undersized transmission or distribution mains are typically funded from depreciation funds, but a portion of the cost could be funded from facilities fees if the existing pipelines are replaced with a pipeline 16-in in diameter and larger. The size difference could be funded from facilities fees with the replacement of the original size from depreciation funds. There are several new 12-in diameter pipes which would either be installed by developers as part of their tract work. These projects would be funded by the developers or funded through front footage fees.

BCVWD similar to many other water agencies in the U.S. has aging infrastructure. The major facility upgrades are identified in this Master Plan. There are also a number of a number of old, leaky pipelines within the District that were identified in the 2011 Capital Improvement Program (CIP) that need replacement. Due to budget constraints, much work remains to be done on these pipelines. Because of their high probability of leaks, replacement is a high priority.

These pipelines have been included in this Master Plan, along with a project number, and are listed in Table 6-36 for reference so the reader can see how the pipelines in the CIP are integrated into this Master Plan. For the most part these pipelines are 4-in and 6-in diameter and will be replaced with 8-in diameter since this is the District's standard minimum size. This will increase the fire flow available to the area where the pipelines are installed, stabilize the operating pressures during peak demand periods, reduce call-outs and cost for leak repair, reduce water wastage. The work will include individual service line replacement from the new main to the meter. In some cases "alley and easement" lines will be taken out of service and new services will need to be installed on-site to tie in the old point of connection to the new meter location. These high priority pipelines should be replaced within the next 10 years or sooner.

Table 6-36
High Priority Distribution Pipeline Replacement (Leaks) Identified in BCVWD's 2011 CIP

Master Plan Project Number	Location	Approx. Length, ft
P-2750-0064	Antonell Ct, Pennsylvania to Cherry	580
P-3330-006	Bogart Fire Service	1,000
P-3040-0013	Bellflower W. side, Dutton to Brookside	4,610
Completed	Oak View Dr to School District on Brookside (Project Complete)	2,820
P-3040-0011	Winesap Ave, Brookside. to Lincoln.	900
P-3040-0026	Utica Way, Vineland to View Dr.	900
P-3040-0022	Friendship Dr., Vineland to end of cul de sac	900
P-3620-0009	Avenida Miravilla, Quail Rd. to Blowoff (part of P-3620-0009)	360
P-3040-0026	Tom Mayder, Utica Way	900
P-3040-0019	Grand W/o Noble to Martin	1,280
P-2750-0069	Alley Between California and Egan, 5th to 7th	730
P-2750-0068	Elm St, 6th to valve in school play ground	680
P-3040-0021	Lincoln w/o Noble, to 39363 Lincoln	530
P-3040-0023	Bing Pl	270
P-3040-0024	Lambert Pl	270
P-3040-0025	Star, Sky and View Dr	1,200
P-3620- 0014	Lilac Lane	1,500
P-3620- 0014	Apple Tree Lane	1,740
P-3620- 0002	Oak Glen Rd,	500
P-3620- 0001	"B" Line in Edgar Canyon	2,770

Note that the pipeline lengths in the actual Master Plan Projects may be different since these may be parts of a larger project.

There is a second group of existing pipelines, mainly in the 2750 Zone in the older sections of Beaumont, that should be replaced because the pipelines are grossly undersized, many 2-in in diameter, in alleys and easements which make access maintenance difficult, and provide poor service. However, they are not critical to be replaced immediately.

There are a number of older pipelines in the 3620 and 3330 Pressure Zones on the Mesa that are in easements through private property. Ideally these pipelines should be replaced with pipelines in streets. These have been identified in this Master Plan; these will be expensive and difficult to install due to the narrow winding streets on the Mesa. But having newer, 8-in diameter pipelines and more strategically located fire hydrants, will provide better fire protection for the Mesa area.

As with any existing pipeline replacement the associated water service connections will need to be replaced and possibly reconfigured.

Project Numbering System

To facilitate the planning and budgeting for the facilities identified in this section and subsequent sections, a project identification and numbering system has been developed. For the potable water system, the following system is used:

XX – YYYY- ZZZZ

Wherein:

XX = Facility Type,
YYYY = Pressure Zone Location,
ZZZZ = Sequential Number beginning with 0001

Facility Types:

P = Pipeline
T = Tank
BP = Booster Pump Station
PR = Pressure Regulating Station
W = Well
M = Miscellaneous

Section 7 contains a summary of the Facility Needs, including Project Numbers and costs, to meet the ultimate build-out demands within BCVWD.

Section 7

Facility Costs

Facility Cost Criteria

The following paragraphs describe the basis for the master plan facility costs. All costs used in the development of master plan facility costs are current to Fourth Quarter 2014, Engineering News Record 20-city Average Construction Cost Index of 9845. Note the costs presented in Tables 7-2 through 7-9 do not include contingencies, engineering, administration and inspection.

Land

Land costs are estimated at $80,000 per acre for readily developable land. This will vary depending on location, but at this time is a reasonable estimate of land. This is based on the land purchase for the Groundwater Recharge Site at $6.305 million for approximately 80 acres in 2006 ($78,800 per acre). This was prime developable land. BCVWD purchased the Hannon Tank Site (2650 Zone Tank) about the same time. The purchase price was about $ 1.9 million for approximately 21.4 acres ($88,900 per acre). It, too, is prime, developable land. Table 7-1 shows the land cost, based on $80,000 per acre and minimum land requirements for master planned facilities.

Table 7-1
Land Area Requirements and Cost for Master Plan Facilities

Facility	Minimum Land Requirement, acre	Land Cost @ $80,000 per acre
Well Site	0.75	$60,000
Booster Pump Station	0.5	$40,000
1 MG Reservoir	0.5	$40,000
2 MG Reservoir	0.75	$60,000
3 MG Reservoir	1	$80,000
4 MG Reservoir	1.5	$120,000

For reservoir sites requiring extensive grading or long access roads, the area is adjusted.

Water Supply

Wells – Drilling and Outfitting

Well costs for drilling and outfitting are presented in Table 7-2. The costs include all costs except for land costs. The costs include drilling, developing, test pumping, water quality sampling and outfitting with line-shaft type vertical turbine pumps. Pumping units will be installed in a masonry building, architecturally designed with split face or fluted/scored block to be consistent with the surrounding neighborhood. The building will include electrical switchgear, disinfectant chemical storage and feeding equipment, and telemetry. A generator will be provided on a pad outside of the building. The site will be enclosed by a decorative, block wall fence; security cameras and intrusion alarms are included.

Table 7-2
Well Drilling and Outfitting Costs

Drilling		
Location	Description	Unit Cost
Edgar Canyon	10-in diameter casing, < 300 ft depth, drilling, development, and test pumping	$400,000
Edgar Canyon	12-in diameter casing, > 300 ft depth, drilling, development, and test pumping	$500,000
Beaumont Basin	20-in diameter casing, 1,500 ft depth, drilling development, and test pumping	$1,300,000
Outfitting incl. Pump House, Generator & Chlorinator		
Edgar Canyon	<200 gpm, 150 ft TDH, 15 HP	$200,000
Edgar Canyon	>200 gpm, 150 ft TDH, 20 HP	$250,000
Beaumont Basin	2,000 gpm,700 ft TDH, 500 HP	$2,250,000
Beaumont Basin	Major deep well rehabilitation, incl redevelopment, motor rewind, bowl and bearing replacement	$1,687,000

No contingencies or engineering, administration etc.

Imported Water Transfers

Water transactions in California generally fall into one of three categories: permanent sales of water rights or entitlements, long-term transfers, or short-term transfers (spot market). Transfers are distinguished as north of the Delta or south of the Delta. South-of-Delta (export service area) includes areas served by the Central Valley Project (CVP) and SWP Delta pumping facilities[1]. Although BCVWD should take advantage of long-term lease transfers and spot purchases, including Article 21 water, when available, to build up their Beaumont Basin storage account, the focus of this section of the master plan is to implement permanent transfers through the SGPWA. The purchase price is difficult to determine and project. It depends on the market and essentially how much the market will bear. BCVWD would have to go on the market to determine a purchase price. However, historical transfers provide a general indication of market price.

USBR (2006)[2] presented a list of nine CVP and SWP permanent transfers for the period 2002 to 2004. The costs ranged from $1,000 to $2,150 per acre-ft with an average of $1,477 per acre-ft (round to $1,500 per acre-ft). The report also stated that increases in costs were exceeding inflation rates. The year 2003, ENRCCI as 6580; current ENRCCI is 9845. The $1,500 per acre-ft price paid in the past would be about $2,250 per acre-ft currently.

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[1] USBR (2006). Initial Economic Evaluation for Plan Formulation, Los Vaqueros Expansion Investigation, California, Chapter4, US Department of the Interior, Bureau of Reclamation, Mid-Pacific Division, Sacramento, CA. July

[2] Ibid

In 2006, Berrenda Mesa Water District offered Coachella Valley Water District and Desert Water Agency 16,000 acre-ft at $3,000 per acre-ft.[3] The ENRCCI in mid-2006 was 7700; the last quarter 2014 index was 9845 so the cost would be about $3,850 per acre-ft currently.

The 2007 Update of Facilities Fees prepared for BCVWD[4] stated a cost of $3,500 per acre-ft. That price would be $4,400 per acre-ft fourth quarter 2014.

The Pass Agency's Draft Capacity Fee Study (SGPWA, 2015) used $6,200 per acre-ft for new purchased water capacity.[5]

Based on the above, and assuming it will be several years yet before an actual water purchase is made, **a cost of $6,500 per acre-ft will be used for the cost of Table A purchase**. In determining the quantity of permanent transfer water required, the 64% reliability of the SWP must be considered. For example, if 1,000 acre-ft are needed to meet demand, 1,000/0.64 = 1,563 acre-ft would have to be purchased.

Water Storage

Recent bids taken by BCVWD for water storage tanks from the period 2005 – 2009 were reviewed and updated to fourth quarter 2014. The steel tanks ranged from 2 MG to 2.8 MG; a 5 MG buried pre-stressed concrete tank was included in the data set. Table 7-3 show the unit costs for steel and pre-stressed concrete reservoirs. All above ground tanks in the master plan are assumed to be steel tanks, anchored to a ring foundation, with flexible piping connections to withstand seismic action, conforming to AWWA standards.

Table 7-3
Water Storage Tank Costs

Tank Material	Condition	Unit Cost, $/gal. capacity
Steel	Above ground, graded site, minimal piping and site work	$1.00
Steel	Above ground, average site work and piping, easy access	$1.25
Pre-stressed Concrete	Buried, average site work and piping, easy access	$2.00

Tanks will be equipped with chain link security fencing, telemetry, intrusion alarms and security cameras.

Booster Pumping

Booster pump stations are assumed to be constructed of concrete block, (split face, or fluted/scored units), color to match surroundings, flat or sloping roof to match surroundings, 3

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[3] Coachella Valley Water District (2007). Final Subsequent Environmental Impact Report Transfer of State Water Project Table A Amounts from Berrenda Mesa Water District to Coachella Valley Water District and Desert Water Agency SCH# 2005121006, prepared by MWH, letter, page 58 of 66, March

[4] Raftelis Financial Consultants, Inc. (2007). 2007 Update of System Development Fees Report, prepared for BCVWD, June 29.

[5] SGPWA (2015). Draft Update Capacity Fee Study for San Gorgonio Pass Water Agency, David Taussig and Associates, Newport Beach, CA, March 15.

fixed speed, vertical pumps minimum, (2 duty, 1 standby), with diesel generator, surge control, and by-pass pressure reducing valves. The site will be enclosed by a decorative, block wall fence; security cameras and intrusion alarms are included.

Two sources were used to estimate the cost for booster pump construction:

- "Memorandum, Updated Project Cost Estimates for CIP" prepared for a client in Washington state, October, 1999, ENRCCI = 6928, updated to fourth quarter, 2014, ENRCCI = 9845. 3-pumps (2 duty/1 standby), no generator, 175 ft TDH. Cost of generator added as a separate item ranging from $550/kW for an 80 kW generator to 325/kW for an 800 kW generator.
- "Appendix G, Cost Estimating Assumptions," West Yost and Associates, for City of Tracy (CA) Citywide Water System Master Plan, July, 2012, ENRCCI approximately 9300. Costs are based on firm pumping capacity and stated to include hypochlorite chemical feed and standby power.

The costs from these sources was adjusted to fourth quarter 2014 and curve fit with the following equation:

$$\text{Cost, \$,} = -4489.4 * (\text{FPC})^2 + 224235 * (\text{FPC}) + 816392$$

FPC = Firm Pumping Capacity, mgd

The costs from this curve fit equation are presented in Table 7-4.

Table 7-4
Booster Pump Station Cost

Firm Pumping Capacity @ 175 ft TDH, mgd	Cost
0.25	$873,000
0.5	$928,000
1	$1,037,000
2	$1,247,000
3	$1,449,000
5	$1,826,000
7.5	$2,246,000
10	$2,610,000
15	$3,170,000
20	$3,506,000

For those instances where pumping units are only for emergency purposes and units would not be enclosed in a building, an appropriate reduction in cost was made on a case-by-case basis.

Pressure Regulating Stations

Pressure regulation stations are installed in vaults, typically located in street medians or street parkways so land purchase is usually not required. In the typical installation, the stations have a pair of small diameter regulators to meet the typical day to day water requirements supplemented by a larger regulator used to provide flow for fighting fires. The regulators are set to open at different pressures. The multiple regulator system minimizes maintenance and improves pressure control. Pressure regulating stations are proposed to be equipped with flow meters to indicate and totalize flow. This is useful to monitor flow from one pressure zone to another. Ultimately the flow meter will be connected to the District's SCADA system. Table 7-5. shows the estimated cost for pressure regulating stations for planning purposes. Although the size of the regulators vary from location to location, the overall cost differences associated with regulator size are not significant to affect the planning level cost estimates in this Master Plan. Furthermore, since they are planned to be installed in public rights-of-way, land costs are not included.

Table 7-5
Pressure Regulating Station Cost

Condition	Cost
New pressure regulating station	$100,000
Upgrade or expansion of existing regulating station	$50,000

Cost adjustments are made for small regulating stations used for emergency service only.

Transmission Piping

The costs for transmission piping are based on the District's standard cement mortar lined, ductile iron pipe installed in conformance with District standards. Polyethylene encasement is not normally needed in the service area except in the area south of I-10 and east of Pennsylvania Ave. where past soil surveys have indicated the soil is potentially corrosive to metal. The surveys indicated that there was little of no corrosive impact to concrete structures[6]. The pipes shall be suitable for 150 psi minimum. Several approaches were used to estimate the cost of the piping:

1. Units costs from developer estimates currently under plan review
2. Unit costs for materials from a recent quote from a pipeline supplier supplemented with trenching and pipe installation costs developed from R. S. Means Cost Guides. The pipeline costs were increased by twenty percent to account for fittings, air and vacuum release valves, blow-offs and isolation valves. Fire hydrants and water service connections were not included as they are part of the developers' tract installation requirement.
3. Review of master plan reports prepared by engineering consultants for other water agencies.

The methods generally yielded similar results, although the second method was selected for estimating the costs for this Master Plan. Two types of estimates were prepared: one for in-tract developments, where streets are not paved and traffic control is not required and one in existing urban streets with pavement removal and replacement, traffic control etc. Table 7-6 shows the unit costs for the transmission mains for the two construction conditions.

For pipelines constructed on the "Mesa" in the 3330 and 3620 Pressure Zones a "difficulty factor" was included to account for the narrow streets, difficult working conditions, traffic control etc. A "difficulty factor was also included for work in Oak Glen Rd and Edgar Canyon.

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[6] Converse Consultants (2004). Soil Corrosivity Evaluation, prepared for Beaumont Cherry Valley Water District, November 18.

Table 7-6
Transmission Main Unit Costs

Diameter, in	In-tract, no pavement removal or replacement, $/ft	In existing urban streets with pavement removal and replacement, traffic control, $/ft
16	$123	$197
18	$142	$229
20	$160	$250
24	$198	$298
30	$288	$401
36	$446	$580

Distribution Piping

The Master Plan includes upgrades and replacement of existing, undersized and aging water distribution piping, sizes less than 16-in diameter. The District has standardized on 8-in and 12-in diameter distribution mains. Although there are some 10-in mains, the District will replace these with minimum 12-in diameter mains. Table 7-7 shows the costs for 8-in and 12-in distribution mains in existing urban streets with pavement removal and replacement and traffic control. All in-Tract distribution mains are the responsibility of the individual developers.

Table 7-7
Distribution Main Unit Costs

Diameter, in	In existing urban streets with pavement removal and replacement, traffic control, $/ft
6	$90
8	$115
12	$152

Water Treatment

There are several areas where water treatment facilities may be needed to meet future water demands:

- Hexavalent chromium removal on Beaumont Basin wells
- Nitrate removal on Edgar Canyon and Beaumont Basin wells
- Treatment and direct use of imported water

Hexavalent Chromium Removal

The CDPH has established a very low MCL of 10 µg/L for hexavalent chromium. BCVWD has tested its wells as required by CDPH and hexavalent chromium was detected in a few of the Beaumont Basin wells. The hexavalent chromium is naturally occurring; it is not due to any pollution source, but that does not matter; compliance is still required. Finding hexavalent chromium has caused BCVWD to modify some of its wells and take others off of the potable water system. It is possible that other wells could be affected in the future.

There are several treatment technologies that have been tested for hexavalent chromium removal:

- Strong Base Anion Exchange (SBA)
- Weak Base Anion Exchange (WBA)
- Chromium reduction with ferrous sulfate, coagulation, filtration (RCF)
- Reverse Osmosis (RO)

SBA uses an ion exchange resin in a pressure vessel and is regenerated on site. The brine from the regeneration process is treated to remove the chromium that was removed from the water. The liquid from the brine handling must be trucked or discharged to a brine line; the precipitated chromium solids must be hauled to a landfill. Although the process can also remove nitrate and perchlorate, the brine handling can make its use problematic. The Indio Water Authority is using this technology and indicates, at their loading rates, this is a favorable technology for their groundwater chemistry. The capital cost for a 3,000 gpm well is $2.3 million. The O&M Cost is about $145/AF. The resin is regenerated with salt and operates in the chloride cycle. It is trucked away to disposal.

WBA uses a different type of resin and it is not regenerated on site. Once it becomes exhausted it is hauled offsite for regeneration or disposal. WBA technology has the lowest capital cost of the various technologies with a 500 gpm facility costing about $1.0 million and 1,000 gpm system about $1.65 million; O&M costs run about $350/AF. These were 2011 costs with an average ENRCCI = 9070.

In the RCF technology, the hexavalent chromium is transformed (reduced) to trivalent chromium using ferrous sulfate. Trivalent chromium is not hazardous, in fact, it is an essential trace element for the human body. The trivalent chromium will form a precipitate and can be removed by filtration – either sand media or microfiltration. It does have a higher capital cost than WBA due to the need for more process vessels and filtration $3.4 million to $5.7 million for the 500 gpm and 1,000 gpm systems respectively. Again these were 2011 costs. The O&M cost is about $250/AF (2011 cost) significantly less than the WBA technology.

The costs for WBA and RCF are based on a workshop at the Water Replenishment District of Southern California[7].

Reverse osmosis could be used, but unless there is a need to remove salinity, it is too expensive to use and offers no real advantages.

A 1,000 gpm WBA system might be satisfactory for a 2,000 gpm well since the product water, which is typically less than 5 µg/L, can be blended with by-pass water from the well, assuming the hexavalent chromium concentration is under 12 µg/L, a 50/50 blend would still be under the 10 µg/L MCL. However, for planning and budgeting purposes, it is assumed a 2,000 gpm unit is required. Scaling up the cost where $C_B = C_A*(QB/QA)^{0.72}$, the cost for a 500 gpm, 1,000 gpm and 2,000 gpm WBA are $1.1, $1.8 and $2.9 million respectively current Master Plan cost . The O&M cost will be $380/AF. See Table 7-8

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[7] Blute N. (2011). Treatment Options for Hexavalent Chromium, Perchlorate, and Nitrate," Groundwater Quality Workshop, Water Replenishment District of Southern California, Malcolm Pirnie/Arcadis June 29.

Nitrate Treatment

The treatment technologies for nitrate removal include:

- Strong Base Anion Exchange (SBA)
- Biological Denitrification and Post-treatment
- Reverse Osmosis

The SBA is the most commonly used process. The ion exchange resin is "charged" with chloride ions and exchanges chloride ions for nitrate ions. The resin can be regenerated using a salt brine, similar to a water softener. The brine, however, must be trucked or piped to a brine line for disposal. The cost of operation depends on the sulfate concentration in the water since sulfate competes with nitrate for removal. Fortunately, the sulfate concentration in the Beaumont Basin wells is low (10 mg/L), so performance of SBA should be excellent.

Biological denitrification of nitrate-containing groundwater is a proven technology, but CDPH is reluctant to approve of the process due to the fact that anoxic/anaerobic bacteria are cultured and grown in the process. A source of organic carbon is also required and if this is not completely removed, will result in disinfection by-product formation when the water is disinfected. It is possible that more of these types of plants may be approved in the future. The capital cost, per a study by Malcolm Pirnie/Arcadis is more than SBW, and operating costs are about the same.

Reverse osmosis is a proven technology, but again, unless there is a need to removal salinity, the process is too expensive.

Work by Malcolm Pirnie/Arcadis indicated the cost for SBA nitrate treatment for 500 gpm capacity was $800,000 (year 2007 dollars). At the Master Plan ENRCCI, this would be $1 million. O&M cost were estimated to $250/AF (year 2007 dollars) or $310/AF current cost. A 1000 gpm and 2000 gpm capacity system would be $1.5 million and $2.3 million respectively. Table 7-8 also contains the cost for nitrate treatment.

Table 7-8
Cost for Wellhead Treatment

Item	Hexavalent Chromium Treatment		Nitrate Treatment	
Capacity, gpm	1,000	2,000	1,000	2,000
Construction Cost (000s)	$1,800	$2,900	$1,500	$2,300
Contingency, 30%	$540	$870	$450	$690
Subtotal	$2,340	$3,770	$1,950	$2,990
Engineering & Permitting, 25%	$585	$940	$490	$750
Total	$2,925	$4,710	$2,440	$3,740
O&M Cost, $/AF	$150 to $380		$310	

Treatment and Direct Use of Imported Water

BCVWD has land adjacent to the EBX Cherry Valley Pump Station which was purchased in the 1990s to construct a potable water treatment plant should the ability to recharge large quantities of imported water not be practical. If a treatment plant is needed, it could be constructed on the District's land and the treated water introduced, by gravity, into the 2750 Pressure Zone. The existing Taylor Tank is at the proper elevation to provide gravity delivery. A turnout, just upstream of the Cherry Valley Pump Station, would be needed. For planning purposes, a treatment plant with a capacity of 12.5 mgd (20 cfs or 40 AF/day) is considered. This facility could treat 7,200 AF in 6 months.

The treatment plant would likely be a membrane type, using ultrafiltration membranes. It is not known what the future requirements will be relative to giardia, cryptosporidium, viruses, disinfection by-products, cyanotoxins, and other constituents. A conservative approach is used to estimate the cost of the treatment plant

San Diego County Water Authority constructed the Twin Oaks Water Treatment Plant in the 2005 to 2008 time frame. It is a submerged membrane, surface water treatment plant with a capacity of 100 mgd. The cost for design and construction was $159 million. Escalating the ENRCCI cost from mid-construction, (8100), to 9845 results in the plant costing $192 million. Using a scale factor (Capacity 1/Capacity 2)$^{0.6}$, the cost for a 12.5 mgd plant would be $55 million. The “unit cost” is $4.40/gal/day capacity. It is possible there may have been some supply and product water piping included.

Several other sources for membrane filtration plant cost were reviewed[8,9] and costs were adjusted to the current Master Plan cost. The cost for a 12.5 mgd plant ranged from $1.63/gal/day to $1.91/gal/day. A value of $2.00/gal/day capacity was selected as a planning estimate. Thus the 12.5 mgd plant would have a construction cost, without contingencies, of $25 million. Table 7-9 presents a summary of the membrane filtration plant cost.

Table 7-9
Cost of Membrane Filtration Facilities for SPW

Item	Cost ($000s)
Capacity, mgd	12.5
Construction Cost	$25,000
Contingency, 30%	$7,500
Subtotal	$32,500
Engineering & Permitting, 25%	$8,100
Total	$40,600

Other Facilities

Other master planned facilities such as SCADA upgrades, warehousing and operation and maintenance facilities, storm water capture facilities, recharge facilities etc. are estimated on a case-by-case basis.

Contingencies, Engineering, Inspection and Other Costs

Considering this is a planning level cost estimate a contingency of 30% of the estimated project construction cost is recommended. Note that land costs are not included in the construction cost. Contingencies cover the unknowns which could include site geology, rock excavation or

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[8] AWWA (2005). “Microfiltration and Ultrafiltration”

[9] AWWA (2006). “ Optimization of Membrane Treatment for Direct and Clarified Water Filtration,” AWWA Research Foundation

blasting, unknown substructures and utilities, pavement removal and replacement requirements over and above what is normally expected for pipeline trench installation, need for boring and jacking, and other unforeseen conditions. The contingency allowance will be based on the total construction cost for the project.

Each project will have design engineering and permitting (CEQA etc.); legal services for contract review, land acquisition, etc.; inspection and materials testing; construction contract administration (shop drawings and submittals, RFIs, etc.); and project close-out costs. Table 7-10 summarizes these costs.

Table 7-10
Engineering and Other Allowances for Major Facilities and Pipelines

Item	Major Facilities Percentage	Pipelines and Transmission Mains Percentage
Design Engineering	7.5%	3.5%
Survey and Geotechnical including project staking and materials testing	5%	3%
Permitting and Environmental Documentation	3%	1.5%
Construction Contract Administration, Shop Drawing Review, RFIs and Inspection	7.5%	4%
Legal and General Administrative	2%	1%
Total Engineering and Other Costs Applied to the Total of Construction Cost plus Contingency	25%	13%

For pipeline work, engineering and other allowances will be less since the design engineering and geotechnical work is less complex, environmental permitting costs are reduced along with construction contract administration, shop drawing review, and legal and administrative. These are also reflected in Table 7-8.

These costs, sometimes called “soft costs,” are included as a percent of the total construction cost with contingencies included. Land costs are then added to develop the total project cost.

Master Plan Facility Requirements

The Master Plan Facilities are subdivided into four categories:

- Imported Water Rights
- Wellhead and SPW treatment
- Major Facilities such as tanks, booster pumps, wells, etc.
- Pipelines including transmission mains and upgraded distribution mains

These facilities are needed to reliably supply water to BCVWD’s existing customers plus meet the demands of the estimated 22,511 new EDUs projected to be added to reach build-out. In Section 3, (Table 3-5), the growth in new EDUs was presented.

Imported Water Rights

Section 5, Tables 5-28 through 5-30 presented realistic estimates of the additional imported water needed to meet the projected demands of the 22,511 new EDUs under three scenarios which “bracket” the likely requirements. Figure 5-6 showed the increase in imported water requirements over time, with and without conservation. Table 5-31 presented a summary of the additional imported water needed to “build-out,” over and above the estimated 4,740 AFY that can be supplied, (relied on), out of SGPWA’s current Table A.

A staged, step-wise purchase program was presented previously in Figure 6-1. This step-wise approach avoids over-purchase and allows BCVWD to match imported water purchases with growth. Considering the “middle ground” scenario as a reasonable approach, Table 7-11 presents a program for purchase of imported water rights on the basis that the Pass Agency will bring their current Table A (17,300 AFY) to 100 percent reliability.

Table 7-11
Program for Purchase of Imported Water Rights to Build-out

Year	Additional Imported Water Needed at 100% Reliability, AF		Additional Imported Water to be Purchased at 64% Reliability, AF	Cost to Purchase @ $6,500/AF, ($000s)
	Cumulative	Increment Needed		
2020	5,000	5,000	7,800	$50,700
2025	8,000	3,000	4,700	$30,550
2030	10,000	2,000	3,100	$20,150
2035	14,000	4,000	6,300	$40,950
Total		14,000	21,900	$142,350

BCVWD or SGPWA will need to purchase 14,000 AF of “firm” Table A entitlement under the “middle ground” scenario; this requires the purchase of 21,900 AFY of rights based on 64% reliability. By purchasing in smaller increments, the District can better match their water supply requirements to funds on hand, make adjustments to match the growth in EDUs, and avoid over-purchase. The disadvantage is the water will cost more purchasing in these increments.

However, with water conservation and more local water resource development, the required amount could be reduced to a total 10,000 AFY (15,600 AFY considering 64% reliability); this would save nearly $41 million.

Water Treatment

BCVWD may need water treatment in the future for:

- Wellhead treatment for hexavalent chromium removal or nitrate removal
- Filtration treatment for SPW in the event that more imported will be needed than can be percolated at the Phase I and II recharge site.

Based on BCVWD water analysis, it is known that existing Wells 3, 25 and 26 have elevated hexavalent chromium levels. It is possible the new Sundance Well will also have elevated hexavalent chromium levels. The Master Plan envisions a total of 20 new or replacement wells in the Beaumont Basin for the 2650, 2750 and 2850 Pressure Zones. For estimating purposes it will be assumed that 3 of these new wells (including the new Sundance Well) will require treatment for hexavalent chromium. It is further assumed that existing Well 3, 25 and 26 will require hexavalent chromium treatment at some point. Based on this 3 of 5 wells or 60% of the hexavalent chromium treatment cost will be funded from depreciation (rates) and the remaining 40% from Facilities Fees paid by new development.

Nitrate removal will likely be required at some point in the future; Well 21 and Well 16 are the likely candidates. Since these are existing wells, the treatment would be funded from depreciation (rates).

For the imported water membrane filtration plant, it is assumed that a 12.5 mgd capacity plant will be needed based on the discussion previously in this Section. Table 7-12 presents a summary of the water treatment costs. When membrane treatment is required, the funding should be proportionately paid from depreciation funds and Facilities Fees based on the amount of SPW BCVWD has “rights to” and the amount needed to meet future needs. Using the amount allocated to BCVWD on the basis of the draft allocation agreement developed by the Pass area water users as the existing amount of SPW, (4,740 AFY), and the SPW required at build-out, (18,391 AFY), 25.8% of the treatment cost would be paid from depreciation with the remaining 74.2% from Facilities Fees. This is shown in Table 7-12.

Table 7-12
Cost for Water Treatment (All Costs 000s)

Item	Hexavalent Chromium Treatment		Nitrate Treatment		Membrane Filtration
Capacity	1,000 gpm	2,000 gpm	1000 gpm	2000 gpm	12.5 mgd
Construction Cost	$1,800	$2,900	$1,500	$2,300	$25,000
Contingency, 30%	$540	$870	$450	$690	$7,500
Subtotal	$2,340	$3,770	$1,950	$2,990	$32,500
Engineering & Permitting, 25%	$585	$940	$490	$750	$8,100
Total	$2,925	$4,710	$2,440	$3,740	$40,600
Number of Facilities	2	3	1	1	1
Subtotal Cost,	$5,850	$14,130	$2,440	$3,740	$40,600
Total	$19,980		$6,180		$40,600
Depreciation (rates) Funded	$8,000		$6,180		$10.5
Facilities Fee Funded	$11,980		--		$30.1

Major Facilities

The list of major facilities, e.g., tanks, wells, booster pumps, pressure regulators etc., are shown in Table 7-13 along with the funding source(s). **Table 7-13 is at the end of this section**.

Pipelines (Transmission and Distribution)

Section 6 identified the high priority distribution system pipelines from the 2011 BCVWD Capital Improvement Program (CIP) that needed replacement due to age and excessive leaks. These projects have been incorporated into this Master Plan Pipeline Replacement Tables and assigned a project number; see Table 6-36. Several other high priority pipelines were added as a result of this master planning effort. **Table 7-14, at the end of this section**, presents a list of the high priority pipelines which include the aforementioned pipelines from the 2011 BCVWD CIP shown previously in Table 6-36. Pipelines denoted “high priority” should be in place by 2025.

In Table 7-14, there are five projects in Edgar Canyon. These projects include replacement of portions of the old 10-in steel pipeline from the Upper Canyon Well Field to Upper Edgar Tank (3620 Zone Tank) and replacement of portions of the old steel “A” and “B” lines from Upper Edgar Tank to Lower Edgar Tank (3330 Zone Tank). The CDPH performed a sanitary survey of the District’s water supply facilities in June 2013 and issued a report of findings on July 13, 2013 and requested the replacement of the steel transmission mains and a timeline for replacement. The District has long recognized this need and started replacement in 2004. These five projects have a total cost of about $11.9 million and should be completed by 2025. This is just over $1 million annually

Tables 7-15 through 7-25, at the end of this section, list all of the Master Plan pipelines by pressure zone and priority. These tables also include their respective cost and funding sources.

Table 7-26 summarizes the pipeline cost by pressure zone.

Table 7-26
Summary of Master Plan Pipeline Cost by Pressure Zone ($000s)

Pressure Zone	Total Pipeline Cost	Funding Source		
		Facilities Fees	Depreciation	Developer
2370	$488	$488	$-	$-
2520	$15,658	$13,908	$-	$1,750
2650	$25,928	$23,962	$-	$1,966
2750	$45,610	$31,466	$11,660	$2,484
2850	$20,034	$14,239	$-	$5,795
3040	$12,551	$4,897	$6,671	$984
3150	$1,134		$1,134	$-
3330	$2,928		$2,928	$-
3620	$8,698		$8,698	$-
3900	$621		$-	$621
Upper Edgar Canyon	$2,402		$2,402	$-
Total	$136,051	$88,959	$33,493	$13,599

Table 7-27 shows the pipeline expenditures by time period to build-out. The schedule of expenditures is based on the BCVWD’s estimate of tract development and construction. This can easily change; but BCVWD believes the schedule is conservative, i.e., the schedule is aggressive.

Table 7-27
Summary of Master Plan Pipeline Cost by Year to Build-out ($000s)

Year	Total Pipeline Cost	Funding Source		
		Facilities Fees	Depreciation	Developer
High Priority (before 2020)	$43,864	$26,619	$13,549	$3,696
2025	$19,913	$13,783	$4,274	$1,856
2030	$31,042	$13,858	$13,345	$3,839
2035	$5,074	$4,529	$468	$77
2040	$13,334	$10,174	$1,134	$2,025
2045	$2,750	$2,248	$-	$502
Build-out	$20,075	$17,748	$722	$1,604
Total	$136,051	$88,959	$33,493	$13,599

Table 7-28 shows the breakdown of transmission and distribution pipelines where transmission pipelines are determined to be 16-in in diameter and larger. Table 7-27 shows some distribution size mains funded by facilities fees. The reason for this is there are some smaller diameter pipes that connect new wells to the distribution system (well discharge pipelines). Since the wells are funded from facilities fees, it is logical the well discharge pipeline be funded from the same source.

Table 7-28
Summary of Distribution and Transmission Pipeline Cost to Build-out ($000s)

Type	Total Pipeline Cost	Funding Source		
		Facilities Fees	Depreciation	Developer
Distribution Pipelines less than 16-in diameter	$42,184	$704	$28,444	$13,036
Transmission Pipelines 16-in and larger in diameter	$93,868	$88,255	$5,049	$563
Total	$136,051	$88,959	$33,493	$13,599

Major Facility and Water Rights Requirements

Table 7-29 shows a breakdown of the master plan major facilities by type; Figure 7-1 shows breakdown graphically. The cost per EDU is also presented in Table 7-28 is based on 22,511 EDUs to build-out. The total cost of the master plan facilities to build-out is over $572 million. This include facilities to support projected growth in the service area plus replacement of aging existing facilities. Of the $572 million almost $490 million are needed for growth and would be funded by the developments through Facilities Fees (Impact Fees). About $69 million would be funded from depreciation; about $14 million of distribution mains would be funded by developers through front footage fees or other method. (These are distribution mains less than 16-in diameter.)

On a “per EDU” basis, the total Facilities Fee to meet the growth in the District’s service area to Build-out is **$21,772**. Figure 7-1 shows the breakdown of the Facility Fee components graphically. Figure 7-1 shows that about 30 percent of the expenditures is for imported water rights.

In Table 7-29, build-out water rights purchases could be reduced by as much as $41 million with additional local water resource projects and conservation. If this were to occur, this would reduce the water rights component of the Facility Fee to $4,502 and the total Facilities Fee to $19,924. It is anticipated implementing these local water resources projects and conservation incentives would result in a similar $41 million expenditure however.

Table 7-29
Total Cost, Funding Sources and Facilities Fees for
Facilities by Type to Build-out

Major Facility Type	Total Cost (000s)	Funding Source			Facilities Fee, $/EDU
		Facilities Fees (000s)	Depreciation (Rates) (000s)	Developer (Front Footage, etc.) (000s)	
Tanks	$62,424	$62,624			$2,773
Booster Pumps	$13,498	$10,487	$3,010		$466
Regulators	$1,138	$1,138			$51
Wells	$122,715	$114,956	$7,759		$5,107
Water Resource Projects	$27,734	$27,734			$1,232
Wellhead Treatment for Hexavalent Chromium Treatment	$19,980	$11,980	$8,000		$532
Wellhead Treatment for Nitrate Treatment	$6,180		$6,180		--
SPW Treatment	$40,600	$30,100	$10,500		$1,337
Transmission Pipelines	$93,868	$88,255	$5,049	$563	$3,920
Distribution Pipelines	$42,184	$704	$28,444	$13,036	$31
Subtotal	$430,320	$347,777	$68,942	$13,599	$15,449
Water Rights	$142,350	$142,350			$6,324
Total	$572,670	$490,127	$68,942	$13,599	$21,772

Table 7-30 shows the project expenditures over time through build-out. Figure 7-2 shows it graphically. Table 7-30 and Figure 2 show a substantial expenditure before year 2020. This was in response to an aggressive development schedule posed by the developers and they tried to finish up their previously started projects. This may not occur. For the most part these facilities are funded through Facilities Fees. The large well expenditures projected for this period can be partially deferred or at least spread out if recycled water can be obtained from YVWD and or the City of Beaumont.

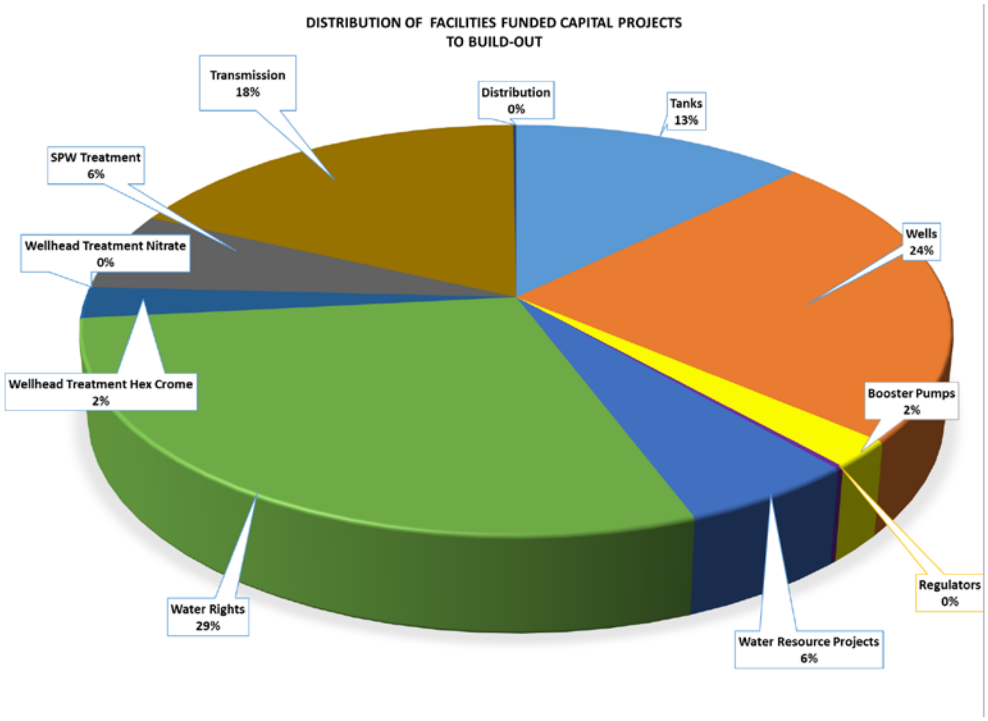

Figure 7-1
Breakdown of Facility Fee Funded Project Expenditures to Build-out

Table 7-30
Major Facility Expenditures Over Time ($000s)

Year	Tanks	Wells	Booster Pump Stations	Pressure Regulators	Water Resource Projects	SPW and Wellhead Treatment	Total
2020 and before	$16,149	$53,964	$10,243	$561	$7,399		$88,314
2025	$7,392	$18,645	$536	$211	$406	$8,000	$35,191
2030	$10,722	$5,829		$162	$19,929	$11,090	$47,733
2035	-	$17,366	$406			$7,070	$24,842
2040	$28,161	$5,829	$894	$203		$40,600	$75,686
2045		$9,425	$1,419				$10,844
Build-out		$11,658					$11,658
Total	$62,424	$122,715	$13,498	$1,138	$27,734	$66,760	$264,268

Table 7-31 presents a summary of all of the projects, i.e., Major Facilities, Pipelines and Imported Water Rights, expenditures over time and the source of funding.

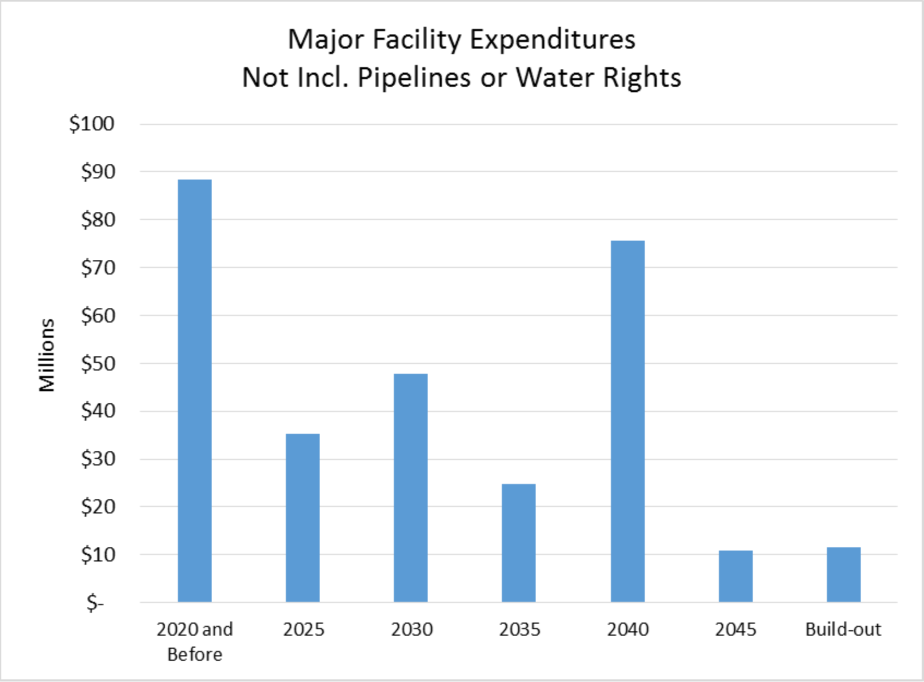

Figure 7-2
Major Facility Expenditures Over Time
(Not Including Pipelines or Imported Water Rights)

Table 7-31
Summary of Master Planned Potable Water Facility Cost Requirements Over Time ($000s)

Year	Major Facilities	Pipelines	Imported Water Rights[1]	Total	Funding Sources	
					Facilities Fees	Other
2020 and before	$88,314	$43,864	$50,700	$182,878	$164,502	$18,377
2025	$35,191	$19,913	$30,550	$85,654	$75,052	$10,602
2030	$47,733	$31,042	$20,150	$98,925	$75,451	$23,474
2035	$24,842	$5,074	$40,950[2]	$70,866	$65,225	$5,641
2040	$75,686	$13,334		$89,020	$75,360	$13,660
2045	$10,844	$2,750		$13,594	$5,132,	$8,462
Build-out	$11,658	$20,075		$31,732	$29,406	$2,327
Total	$294,268	$136,051	$142,350	$572,669	$490,128	$82,542

[1] Assumes the SGPWA purchases additional Table A to bring their total Table A to 100% reliability. These purchases are over and above SGPWA purchases for additional Table A. These expenditures could partially be deferred in time if substantial quantities of imported water can be obtained from the SGPWA and banked into the Beaumont Basin.

[2] Depending on demands, conservation and local water resource development, the additional purchase of $40,950,000 of water rights may not be necessary. This would reduce the "per EDU" cost to $4,505 for water rights. However, this would be offset by the cost to construct local water resource projects and conservation incentives.`

Summary of Potable Water Facility Costs

A summary of the master plan facilities costs was presented in Table 7-31. The total program facilities cost is over $570 million to build-out. About $490 million, (85% of the total), is paid for by the development to accommodate the growth in demand and facilities through impact fees. About $82 million is funded through a combination of depreciation funds and other sources. Some of these other sources could include front footage fees for pipelines less than 16-in diameter put in by developers as part of a main extension agreement or installed as part of the tract development.

It is important to realize that the non-potable water component needs to be added to the amounts for the Potable Water System. Significant expenditures related to the non-potable water system will be needed to ensure maximum utilization of local water resources and minimize the purchase of imported water rights, i.e., a “trade off on the $41 million discussed previously.

Reconciliation with Past Facilities Fee Study

BCVWD retained a consultant, Raftelis Financial Consultants, Inc., to prepare an update to a 2004 “nexus study” prepared by Black and Veatch Consultants. Raftelis produced a report dated June 29, 2007, which formed the basis for BCVWD’s current Facilities Fee structure. A summary of the 2007 study is presented in Table 7-32.

To provide a comparison with the capital program in this Master Plan, the following will be considered:

- About 3,400 EDUs have been added to the BCVWD system since 2007 per the data from the City of Beaumont presented in Section 3, Figure 3-2.
- The ENRCCI average for 2007 was 7937; Master Plan ENRCCI = 9845 or a 1.24 x increase in cost
- Water rights are currently estimated to be $6,500 per AFY vs. $3,500per AFY in the previous study.

Table 7-33 presents a reconciliation.

In summary, the adjusted difference between the 2007 Facilities “nexus” Study prepared by Raftelis and the basis of the District’s current facilities fees matches within ten percent, i.e., $445.8 million vs. $490.0 million.

Impact of Shorter Time Periods on Facilities Fees

Table 7-29, presented previously, showed the Facilities Fees for the various components. It was based on cost of facilities needed to accommodate full build-out of the BCVWD service area as it is known today. In the development of impact fee studies, the literature cautions the agency to not use too long a time period. Separate cost studies were developed extending out to year 2035 and year 2045 for comparison with going to full build-out. The results are summarized in Table 7-34.

As can be seen in Table 7-34, a longer period of time, results in a lower impact fee.

Table 7-32
Summary of Raftelis 2007 Updated Facilities Fee Study

Item	Cost, millions	Unit Cost based on 38,000 EDUs
Supply		
Wells	$73.6	$1,936
Water Rights	$46.6	$1,225
Water Treatment Plant	$35.0	$9,21
Local Water Source	$18.4	$485
Recycled Water	$53.3	$1,402
Subtotal	$226.8	$5,969
Transmission	$55.0	$1,568
Storage	$70.4	$2,008
Booster Pumping	$4.9	$139
Pressure Regulating Stations	$2.5	$71
Miscellaneous	$2.2	$62
Subtotal	$361.7	$9,818
Financing	$11.2	$304
Total	$372.9	$10,122
Subtotal (Potable Only)	$308.5	$8,415
Financing (Potable Only)	$9.6	$260
Total (Potable Only)	$318.1	$8,675
Subtotal (Potable Only), not incl. Water Rights	$261.9	$7,190
Financing (Potable Only), not incl. Water Rights	$8.1	$221
Total (Potable Only), not incl. Water Rights	$270.0	$7,411

Table 7-33
Reconciliation of 2015 Master Plan Capital Program with 2007 Facilities Fee Study

Item	Cost, millions
Potable Water Costs in 2007 Study without Financing or Water Rights, 2007 dollars	$261.9
Escalation from 2007 to Master Plan ENRCCI = (9845-7937)/7937= 0.24	$62.9
Subtotal Potable Water Costs in 2007 Study, without Financing or Water Rights, updated to current cost	$324.8
Water Rights, from Table 7-9 based on 64% reliability	$142.4[a]
Well head treatment, not anticipated in 2007	$12.0
Subtotal Potable Water Costs, without Financing, current cost	$479.2
Less 3,400 EDUs constructed since 2007 at $9,818 per EDU for Potable Water	-$33.4
Adjusted Potable Water Project Cost, without Financing	$445.8
Master Planned Potable Water Facilities, without Financing, Funded Through Facilities Fees See Table 7-13	$490.0

[a] With conservation, this amount could be reduced by $41 million. However it is anticipated an equivalent amount would be used to develop local water resources and indirect potable water recycling and recharge projects.

Table 7-34
Impact of Shorter Time Periods on Facilities Fees

Major Facility Type	Current to 2035 (14,969 EDUs)			Current to 2045 (18,550 EDUs		
	Total Cost (000s)	Facilities Fees (000s)	Facilities Fee, $/EDU	Total Cost (000s)	Facilities Fees (000s)	Facilities Fee, $/EDU
Tanks	$34,264	$34,264	$2,332	$62,424	$62,424	$3,365
Booster Pumps	$11,185	$9,594	$653	$13,498	$9,594	$517
Regulators	$934	$934	$64	$1,138	$1,138	$61
Wells	$95,804	$94,585	$6,436	$111,058	$103,298	$5,569
Water Resource Projects	$27,734	$27,734	$1,887	$27,734	$27,734	$1,495
Wellhead Treatment for Hexavalent Chromium Treatment	$19,980	$11,980	$815	$19,980	$11,980	$646
Wellhead Treatment for Nitrate Treatment	$6,180			$6,180		$-
SPW Treatment				$40,600	$30,100	$1,623
Transmission Pipelines	$63,737	$58,125	$3,955	$76,159	$70,547	$3,803
Distribution Pipelines	$36,155	$664	$45	$39,817	$664	$36
Subtotal	$295,973	$237,879	$16,187	$398,587	$317,478	$17,115
Water Rights	$142,350	$142,350	$9,686	$142,350	$142,350	$7,674
Total	$438,323	$380,229	$25,873	$540,937	$459,828	$24,789

Master Plan Facility Needs Summary (ENR CCI 9845)

					Cost		Funding Source %					Funding $	
Project No.	Pressure Zone	Year Needed	Title	Description	Construction	Total Project Cost, incl Land	Facilities Fee	Depreciation	Rates & General Fund	Developer Reimbursed	Grants & Loans	Facilties Fees	Other
T-2370-0001	2370	2025	0.5 MG 2370 Zone Tank in Sun Cal Development	Construct 0.5 MG 2370 Zone Tank on graded pad in Sun Cal Development	$ 650,000	$ 812,500	100%	0%	0%	0%	0%	$ 812,500	$ -
PR-2520-0001	2520	2025	New 2520 to 2370 Zone Pressure Regulator at 2370 Tank Site	Construct new 2520 to 2370 Zone Pressure Regulating Station at site of 2370 tank. 2 @ 3-in diameter and 1 @ 6-in diameter.	$ 130,000	$ 162,500	100%	0%	0%	0%	0%	$ 162,500	$ -
T-2520-0001	2520	2025	4 MG 2520 Zone Tank in Legacy Highlands	Construct 4 MG 2520 Zone Tank in Legacy Highlands Development	$ 5,200,000	$ 6,580,000	100%	0%	0%	0%	0%	$ 6,580,000	$ -
T-2520-0002	2520	2030	2 MG 2520 Zone Tank North of Cherry Valley Blvd	Construct 2 MG 2520 Zone Tank north of Cherry Valley Blvd	$ 2,600,000	$ 3,330,000	100%	0%	0%	0%	0%	$ 3,330,000	$ -
PR-2650-0001	2650	2020	2650 to 2520 Zone Pressure Regulator on Champions Dr.	Replace valves in existing 2650 to 2520 Zone pressure regulation station in Champions Dr. and Cherry Valley Blvd. Install 2 @2-in diameter and 1 @ 4-in diameter	$ 65,000	$ 81,250	100%	0%	0%	0%	0%	$ 81,250	$ -
PR-2650-0002	2650	2020	2650 to 2520 Zone Pressure Regulator (Legacy Highlands)	Legacy Highlands Development adjacent to 2520 Zone Tank, 2 @ 2 in 1 @ 4 in, oversize to replace 4-in with 6 in in future	$ 130,000	$ 162,500	100%	0%	0%	0%	0%	$ 162,500	$ -
PR-2650-0003	2650	2040	2650 to 2520 Zone Pressure Regulator on Champions Dr.	Replace valves in existing 2650 to 2520 Zone pressure regulation station in Champions Dr. and Cherry Valley Blvd. Install 2 @4-in diameter and 1 @ 6-in diameter	$ 65,000	$ 81,250	100%	0%	0%	0%	0%	$ 81,250	$ -
PR-2650-0004	2650	2040	Upgrade 2650 to 2520 Zone Pressure Regulator in Legacy Highlands	Zone Tank in Legacy Highlands. Replace 4 in regulator with 6-in regulator	$ 97,500	$ 121,875	100%	0%	0%	0%	0%	$ 121,875	$ -
PR-2650-0005	2650	2030	New 2650 to 2520 Regulator at New 2520 Zone Tank N/o Cherry Valley Blvd.	Contruct new 2650 to 2520 regulator at new 2520 zone tank, N/o Cherry Valley Blvd	$ 130,000	$ 162,500	100%	0%	0%	0%	0%	$ 162,500	$ -
T-2650-0001	2650	2030	2 MG 2650 Zone Tank in Legacy Highlands	Legacy Highlands development has a designated pad designed for a 2650 Zone Tank.	$ 2,600,000	$ 3,330,000	100%	0%	0%	0%	0%	$ 3,330,000	$ -
T-2650-0002	2650	2040	Second 2 MG 2650 Zone Tank in Legacy Highlands	Legacy Highlands development has a designated pad designed for a 2650 Zone Tank.	$ 2,600,000	$ 3,330,000	100%	0%	0%	0%	0%	$ 3,330,000	$ -
W-2650-0001	2650	2020	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well in the Ryland Commercial Area at intersection of Oak Valley Pkwy and I-10 , 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0002	2650	2020	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well in the Sunny Cal Egg Ranch Development in a designated open space, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0003	2650	2020	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well in the Sunny Cal Egg Ranch Development adjacent to a proposed water quality basin, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0004	2650	2025	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well in the Sunny Cal Egg Ranch Development in a designated open space, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0005	2650	2030	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well in Riverside County Maintenance Yard Site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0006	2650	2035	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well along Cherry Valley Blvd w/o Sunny Cal Egg Ranch, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2650-0007	2650	BO	New 2650 Zone Well	Drill and outfit new Beaumont Basin deep well along Cherry Valley Blvd at I-10, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -

Table 7-13
Major Facilities
by Pressure Zone
and
Year Needed

Master Plan Facility Needs Summary (ENR CCI 9845)

Project No.	Pressure Zone	Year Needed	Title	Description	Cost		Funding Source %					Funding $	
					Construction	Total Project Cost, incl Land	Facilities Fee	Depreciation	Rates & General Fund	Developer Reimbursed	Grants & Loans	Facilties Fees	Other
W-2650-0008	2650	2045	Rehabilitate Well 29	Major rehabilitation of Well 29 due to age	$ 1,950,000	$ 2,437,500	0%	100%	0%	0%	0%	$ -	$ 2,437,500
BP-2750-0001	2750	2020	2750 Zone to 2850 Zone Booster Pump Station	Remove existing 2750 to 3040 Zone "can" booster pumps 21A, 21B and engine driven pump 21C. Retain existing "cans." Install 3 new pumps: 1 @ 750 gpm, 130 ft TDH, 40 HP and 2 @ 2250 gpm, 130 ft	$ 2,394,600	$ 3,033,250	100%	0%	0%	0%	0%	$ 3,033,250	$ -
BP-2750-0002	2750	2020	2750 Zone to 2850 Zone Legacy Highlands Booster Pump Station	Emergency Booster Pump at 2750 Zone Tank S/o I-10 near Legacy Highlands to provide supply to 2850 Zone S/o I-10	$ 1,485,900	$ 1,857,375	100%	0%	0%	0%	0%	$ 1,857,375	$ -
PR-2750-0001	2750	2020	2750 to 2260 Zone Pressure Regulator at 2650 Tank Legacy High	2750 Zone to 2650 Zone Pressure Regulator near 2650 Tank Size in Legacy Highlands for Emergency	$ 97,500	$ 121,875	100%	0%	0%	0%	0%	$ 121,875	$ -
T-2750-0001	2750	2020	3 MG 2750 Zone Tank South of I-10	Construct a 2750 Zone steeltank south of I-10 near Mt. Davis adjacent to Legacy Highlands Project. May need to have 4 MG if the Highland Springs South Tank Site not feasible	$ 4,875,000	$ 6,318,750	100%	0%	0%	0%	0%	$ 6,318,750	$ -
T-2750-0002	2750	2030	2 MG 2750 Zone Tank at Taylor Tank Site	Construct a second 2750 Zone steel tank on BCVWD land adjacent to Taylor Tank	$ 3,250,000	$ 4,062,500	100%	0%	0%	0%	0%	$ 4,062,500	$ -
T-2750-0003	2750	2040	2 MG 2750 Zone Tank S/o I-10 Highland Springs Ave	Construct a 2750 Zone steel tank off Highland Springs Ave. S/o I-10 near Potrero Creek Estates	$ 11,960,000	$ 15,450,000	100%	0%	0%	0%	0%	$ 15,450,000	$ -
W-2750-0001	2750	2020	Replacement for Well 2	Well 2 site at corner of 12th and Michigan St., 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,768,750	100%	0%	0%	0%	0%	$ 5,768,750	$ -
W-2750-0002	2750	2020	2750 Zone Well in Noble Creek Regional Park	Drill and outfit new Beaumont Basin deep well in southwest corner of Noble Creek Regional Park., 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2750-0003	2750	2025	2750 Zone Well in Kirkwood Ranch	Ranch. There are two alternative sites, both are on the Developer's property: 1) south east of Kirkwood Ranch on Kirkwood Ranch Developer property 2) on north side adjacent to Oak Valley Parkway,	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2750-0004	2750	2035	2750 Zone Well in Kirkwood Ranch/Three Rings Ranch	Drill and outfit new Beaumont Basin deep well on City of Beaumont property between Kirkwood Ranch Development and Three Rings	$ 4,615,000	$ 5,768,750	100%	0%	0%	0%	0%	$ 5,768,750	$ -
W-2750-0005	2750	2020	Replace 2750 Zone Well 1	Drill and outfit new Beaumont Basin deep well to replace Well 1 on Well 1 site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,768,750	100%	0%	0%	0%	0%	$ 5,768,750	$ -
W-2750-0006	2750	2025	Replace 2750 Zone Well 3	Drill and outfit new Beaumont Basin deep well to replace Well 3 on Well 3 site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,768,750	100%	0%	0%	0%	0%	$ 5,768,750	$ -
W-2750-0007	2750	2035	Replace 2750 Zone Well 22	Drill and outfit new Beaumont Basin deep well to replace Well 22 on Well 22 site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,768,750	100%	0%	0%	0%	0%	$ 5,768,750	$ -

Table 7-13
Major Facilities
by Pressure Zone
and
Year Needed

Master Plan Facility Needs Summary (ENR CCI 9845)

Project No.	Pressure Zone	Year Needed	Title	Description	Cost		Funding Source %					Funding $	
					Construction	Total Project Cost, incl Land	Facilities Fee	Depreciation	Rates & General Fund	Developer Reimbursed	Grants & Loans	Facilties Fees	Other
BP-2850-0001	2850	2020	2850 Zone to 3040 Zone Booster Pump Station	Construct new 2850 to 3040 Booster Pumping Station at Pardee Sundance. Design for 4 pumps ultimate, install 3 initially @ 2100	$ 2,601,300	$ 3,291,625	100%	0%	0%	0%	0%	$ 3,291,625	$ -
BP-2850-0002	2850	2040	2850 Zone to 3040 Zone Booster Pump Station	Add 4th pump 2100 gpm, 220 ft TDH, 200 HP	$ 260,000	$ 325,000	100%	0%	0%	0%	0%	$ 325,000	$ -
PR-2850-0001	2850	2020	2850 to 2750 Regulator at Legacy Highlands 2750 Tank Site	Emergency Regulator to provide water from 2850 Zone to 2750 Zone South of I-10 in event of a pipeline outage and water circulation in long 2850 Zone pipeline.	$ 52,000	$ 65,000	100%	0%	0%	0%	0%	$ 65,000	$ -
T-2850-0001	2850	2020	2 MG 2850 Zone Tank Pardee Butterfield Banning	New 2850 Zone partially buried prestressed concrete tank in Pardee Butterfield in Banning east of Highland Springs Rd.	$ 5,200,000	$ 6,580,000	100%	0%	0%	0%	0%	$ 6,580,000	$ -
T-2850-0002	2850	2040	2.5 MG 2850 Zone Tank in Kehl Canyon	New 2850 Zone steel tank in Kehl Canyon	$ 4,062,500	$ 5,158,125	100%	0%	0%	0%	0%	$ 5,158,125	$ -
W-2850-0001	2850	2020	New Beaumont Basin Well on Pardee Sundance Site	Drill and outfit new Beaumont Basin deep well on Pardee Sundance Site, 2000 gpm, 700 ft TDH, 500 HP, Note that this well could pump to 3040 Zone also.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2850-0002	2850	2020	New Beaumont Basin Well Near Brookside Elementary School	Drill and outfit new Beaumont Basin deep well near Brookside Elementary School, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2850-0003	2850	2020	New Beaumont Basin Well Noble Creek Meadows	Drill and outfit new Beaumont Basin deep well in Noble Creek Regional Park, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2850-0004	2850	BO	New Beaumont Basin Well Noble Creek Meadows	Drill and outfit new Beaumont Basin deep well in Noble Creek Meadows, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -
W-2850-0005	2850	2045	Replacement for Well 16	Drill and outfit new Beaumont Basin deep well to replace Well 16 on Well 16 site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,768,750	50%	50%	0%	0%	0%	$ 2,884,375	$ 2,884,375
W-2850-0006	2850	2020	Reduce Capacity of Well 23	Well 23 is currently producing about 3000 gpm but has been the subject of frequent maintenance and repair. Recommend	$ 1,300,000	$ 1,625,000	100%	0%	0%	0%	0%	$ 1,625,000	$ -
W-2850-0007	2850	2040	New Beaumont Basin Well near Beaumont High School	Drill and outfit new Beaumont Basin deep well on South Side of Beaumont High School Site, 2000 gpm, 700 ft TDH, 500 HP.	$ 4,615,000	$ 5,828,750	100%	0%	0%	0%	0%	$ 5,828,750	$ -

Master Plan Facility Needs Summary (ENR CCI 9845)

					Cost		Funding Source %					Funding $	
Project No.	Pressure Zone	Year Needed	Title	Description	Construction	Total Project Cost, incl Land	Facilities Fee	Depreciation	Rates & General Fund	Developer Reimbursed	Grants & Loans	Facilties Fees	Other
BP-3040-0001	3040	2020	3330 to 3620 Booster Pump Station at Well 4A	Install 2 pumps , 500 gpm @ 320 ft TDH, 60HP, construct permanent pumping station for existing Noble Booster. Provide space for 4	$ 1,485,900	$ 1,857,375	50%	50%	0%	0%	0%	$ 928,688	$ 928,688
BP-3040-0002	3040	2035	3040 to 3330 Booster Pump Station at Noble Tank	Replace original 500 gpm @ 310 ft TDH, 60 HP, with new pump, 500 gpm @320 ft TDH, 60 HP	$ 325,000	$ 406,250	0%	100%				$ -	$ 406,250
BP-3040-0003	3040	2040	3040 to 3330 Booster Pump Station at Noble Tank	Add 4th pump, 500 gpm @ 320 ft TDH, 60 HP	$ 455,000	$ 568,750	100%	0%	0%	0%	0%	$ 568,750	$ -
T-3040-0001	3040	2020	2 MG 3040 Zone Tank	Construct additional 2 MG steel tank adjacent to existing 1 MG Noble (3040) Zone Tank on District Property	$ 2,600,000	$ 3,250,000	100%	0%	0%	0%	0%	$ 3,250,000	$ -
T-3040-0002	3040	2040	2 MG 3040 Zone Tank	existing 1 MG Noble (3040) Zone Tank on District Property 2) Cherrystone west of Byham Ln.	$ 3,250,000	$ 4,222,500	100%	0%	0%	0%	0%	$ 4,222,500	$ -
W-3040-0001	3040	2025	Replace Well 5	Replace Well 5 drilled in 1929 with similar designed well in close proximity to existing Well 5, 310 ft depth	$ 975,000	$ 1,218,750	0%	100%	0%	0%	0%	$ -	$ 1,218,750
W-3040-0002	3040	2045	Replace Well 4A	Replace Well 4A drilled in 1949 with similar designed well in close proximity to existing Well 4A, 500 gpm, 460 ft depth	$ 975,000	$ 1,218,750	0%	100%	0%	0%	0%	$ -	$ 1,218,750
BP-3330-0001	3330	2045	3330 to 3620 Booster Pump Station at Well 4A	Replace existing 400 gpm @ 550 ft TDH 4A Emergency Booster with new booster pump station with 2@150 gpm, 330 ft TDH, 25 HP.	$ 1,134,900	$ 1,418,625	0%	100%	0%	0%	0%	$ -	$ 1,418,625
PR-3330-0001	3330	2020	3330 to 3150 Lower Mesa, Noble Regulator	Add 4-in regulator for fire protection	$ 52,000	$ 65,000	100%	0%	0%	0%	0%	$ 65,000	$ -
BP-3620-0001	3620	2025	3620 Zone to 3900 Zone Booster Pump Station	Construct new 3620 to 3900 Zone Booster Pumping Station near Upper Edgar Reservoir, 2 @ 500 gpm, 300 ft TDH, 60 HP each	$ 429,000	$ 536,250	90%	10%	0%	0%	0%	$ 482,625	$ 53,625
PR-3620-0001	3620	2020	3620 to 3330 Fisher Pressure Regulator	protection	$ 52,000	$ 65,000	100%	0%	0%	0%	0%	$ 65,000	$ -
PR-3620-0002	3620	2025	3620 to 3330 Fisher Pressure Regulator	Replace both existing 2-in regulator valve with two new 2-1/2 in regulator to increase capacity	$ 39,000	$ 48,750	100%	0%	0%	0%	0%	$ 48,750	$ -
BP-HS-0001	HS	2020	Add 3rd Booster Pump and Fire Pump at HS Hydropneumatic	Add 3rd can booster, 150 gpm, 120 ft TDH, 10 HP, at Highland Springs Hydropneumatic Booster Pump Station in new "can" outside of the existing pump station to provide capacity for peak demands. Add 1000 gpm diesel driven fire pump.	$ 162,500	$ 203,125	0%	0%	100%	0%	0%	$ -	$ 203,125

Master Plan Facility Needs Summary (ENR CCI 9845)

Project No.	Pressure Zone	Year Needed	Title	Description	Cost		Funding Source %					Funding $	
					Construction	Total Project Cost, incl Land	Facilities Fee	Depreciation	Rates & General Fund	Developer Reimbursed	Grants & Loans	Facilties Fees	Other
WR		2020	Improvements to Eighth St., Cherry and Starlight Basins	Construct metering facilties for stormwater into the Eighth St. Starlight, and Cherry Basins that capture runoff from Sundance. Install meter to measure flow leaving basins. Reconfigure to improve percolation. In lieu, install pumping station and pipeline to Marshall Creek for release and percolation. (540 AFY)	$ 793,000	$ 991,250	100%	0%	0%	0%	0%	$ 991,250	$ -
WR		2020	Marshall Creek Stormwater Capture	Construct training dikes in lower Marshall Creek to improve percolation. These will need to be rebuilt annually. Constructing inlet metering flume and outlet metering facility in the box culvert	$ 104,000	$ 130,000	100%	0%	0%	0%	0%	$ 130,000	$ -
WR		2020	Beaumont Ave and Brookside Ave Stormwater Metering	Improvements along Beaumont Ave to divert and meter excess storm flows into Phase I recharge facilties. Drainage Areas 34 ac; relatively impervious. (20 AF of runoff from 16 in of rain estimated in 2007-08). Metering of diverted stormwater on Brookside Ave. 150 ac tributary after Grand Ave SD. Est 50 AFY) Total 70 AFY.	$ 104,000	$ 130,000	100%	0%	0%	0%	0%	$ 130,000	$ -
WR		2020	Edgar Canyon Stormwater Capture Enhancements	Contruct facilities to enchance stormwater capture in upper and middle Edgar Canyon. Work includes diversion works with soft plugs, measuring flumes, percolation pond inlet and over flow improvements. Install diversion and measuring flume in lower Edgar Canyon to measure captured storm water (500 AFY)	$ 1,384,500	$ 1,730,625	100%	0%	0%	0%	0%	$ 1,730,625	$ -
WR		2020	Grand Avenue Storm Drain	Construct interceptor storm drain in Grand Ave from Bellflower Ave. to Phase 2 of the Groundwater Recharge Facility to intercept relatively clean urban runoff. Watershed area = 505 acres. Q10year approx. 380 cfs.	$ 3,533,400	$ 4,416,750	100%	0%	0%	0%	0%	$ 4,416,750	$ -
WR		2025	EXB Turnout 2 at Orchard St and Noble Cr.	Construct parallel 2nd 20-in turnout to EBX at Orchard St and Noble Creek similar to existing to increase capacity to 40 cfs	$ 325,000	$ 406,250	100%	0%	0%	0%	0%	$ 406,250	$ -
WR		2030	Sundance WQ Basin PumpOut to Marshall Cr.	Due to uncentainty of being able to rehab the Sundance WQ basins. Install a pump and piping system to pump the water to Marshall Creek for percolation. Starlight Basin can gravity flow to Marshall	$ 9,703,135	$ 12,128,919	100%	0%	0%	0%	0%	$ 12,128,919	$ -
WR		2030	Beaumont Ave and Brookside Ave Stormwater Metering	storm flows into Phase I recharge facilties. Drainage Areas 34 ac; relatively impervious. (20 AF of runoff from 16 in of rain estimated	$ 3,120,000	$ 3,900,000	100%	0%	0%	0%	0%	$ 3,900,000	$ -
WR		2030	Noble Creek Desilting Basins and Capture	Noble Creek to desilt flows and return them to the creek. Construct diversion works (soft plug) and metering flume at Phase II spreading	$ 3,120,000	$ 3,900,000	100%	0%	0%	0%	0%	$ 3,900,000	$ -
				Totals	$ 180,178,635	$ 227,508,294						$ 216,738,606	$ 10,769,688

Table 7-13
Major Facilities
by Pressure Zone
and
Year Needed

High Priority Pipelines

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingney	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2750-0064	Antonell Court, Pensylvania Ave. to Cherry Ave.	8	575	9		115	$ 66,125	$ 24,300	$ 90,425	$ 27,128	$ 117,553	$ 15,282	$ 132,900	0%	$ -	100%	$ 132,900	0%	$ -	High Priority
P-3330-0006	Bogart Fire Service	8	1000	0		115	$ 115,000	$ -	$ 115,000	$ 34,500	$ 149,500	$ 19,435	$ 169,000	0%	$ -	100%	$ 169,000	0%	$ -	High Priority
P-3040-0013	Bellflower Ave., Brookside St. to High St	12	3210	22		152	$ 487,920	$ 59,400	$ 547,320	$ 164,196	$ 711,516	$ 92,497	$ 804,100	0%	$ -	100%	$ 804,100	0%	$ -	2020 w/ Pardee BP
P-3040-0011	Winesap Ave, Brookside Ave. to High St	16	3320	37		197	$ 654,040	$ 99,900	$ 753,940	$ 226,182	$ 980,122	$ 127,416	$ 1,107,600	50%	$ 553,800	50%	$ 553,800	0%	$ -	2020 w/ Pardee BP
P-3040-0026	Utica Way, Vineland St to View Dr.	8	800	4		115	$ 92,000	$ 10,800	$ 102,800	$ 30,840	$ 133,640	$ 17,373	$ 151,100	0%	$ -	100%	$ 151,100	0%	$ -	High Priority
P-3040-0022	Friendship Dr., Vineland St. to End	8	480	6		115	$ 55,200	$ 16,200	$ 71,400	$ 21,420	$ 92,820	$ 12,067	$ 104,900	0%	$ -	100%	$ 104,900	0%	$ -	High Priority
P-3620-0009	Ave. Miravilla,End of 12-in to Whispering Pines	8	1105	6		173	$ 190,613	$ 16,200	$ 206,813	$ 62,044	$ 268,856	$ 34,951	$ 303,900	0%	$ -	100%	$ 303,900	0%	$ -	High Priority
P-3040-0019	Grand Ave., Noble St. to Martin st	8	1200	11		115	$ 138,000	$ 29,700	$ 167,700	$ 50,310	$ 218,010	$ 28,341	$ 246,400	0%	$ -	100%	$ 246,400	0%	$ -	High Priority
P-2750-0069	Egan Ave-California Ave. Alley, 5th to 7th	8	810	16		115	$ 93,150	$ 43,200	$ 136,350	$ 40,905	$ 177,255	$ 23,043	$ 200,300	0%	$ -	100%	$ 86,300	0%	$ -	High Priority
P-2750-0068	Elm Ave., 6th to 7th	8	440	3		115	$ 50,600	$ 8,100	$ 58,700	$ 17,610	$ 76,310	$ 9,920	$ 86,300	0%	$ -	100%	$ 86,300	0%	$ -	High Priority
P-3040-0021	Lincoln St., Noble St to West end	8	1330	15		115	$ 152,950	$ 40,500	$ 193,450	$ 58,035	$ 251,485	$ 32,693	$ 284,200	0%	$ -	100%	$ 284,200	0%	$ -	High Priority
P-3040-0023	Bing Pl	8	270	10		115	$ 31,050	$ 27,000	$ 58,050	$ 17,415	$ 75,465	$ 9,810	$ 85,300	0%	$ -	100%	$ 85,300	0%	$ -	High Priority
P-3040-0024	Lambert Pl	8	270	10		115	$ 31,050	$ 27,000	$ 58,050	$ 17,415	$ 75,465	$ 9,810	$ 85,300	0%	$ -	100%	$ 85,300	0%	$ -	High Priority
P-3040-0025	Star Ln, Sky Ln, and View Dr	8	1250	29		115	$ 143,750	$ 78,300	$ 222,050	$ 66,615	$ 288,665	$ 37,526	$ 326,200	0%	$ -	100%	$ 326,200	0%	$ -	High Priority
P-3620-0014	Llilac Lane, Ave. Miravilla to end of cul-de-sac	8	980	3		173	$ 169,050	$ 8,100	$ 177,150	$ 53,145	$ 230,295	$ 29,938	$ 260,300	0%	$ -	100%	$ 260,300	0%	$ -	High Priority
P-3620-0015	Appletree Ln, B line to Oak Glen Rd	8	2170	19		173	$ 374,325	$ 51,300	$ 425,625	$ 127,688	$ 553,313	$ 71,931	$ 625,300	0%	$ -	100%	$ 625,300	0%	$ -	High Priority
	Subtotal High Priority Transmission Mains 16-in and larger before 2020		3320	37			$ 654,040	$ 99,900	$ 753,940	$ 226,182	$ 980,122	$ 127,416	$ 1,107,600		$ 553,800		$ 553,800		$ -	
	Subtotal High Priority Distribution Mains < 16-in before 2020		15890	163			$ 2,190,783	$ 440,100	$ 2,630,883	$ 789,265	$ 3,420,147	$ 444,619	$ 3,865,500		$ -		$ 3,751,500		$ -	
P-3620-0002	"A" Line Upper Edgar to split at Apple Tree Lane Tract	20	3000	0		375	$ 1,222,500	$ -	$ 1,222,500	$ 366,750	$ 1,589,250	$ 206,603	$ 1,795,900	0%	$ -	100%	$ 1,795,900	0%	$ -	High Priority
P-3620-0001	"B" Line Upper Edgar to upper end of 20" DIP and from lower end 20" DIP to Balance line and Balance Line in Edgar Canyon	20	3000	0		375	$ 1,125,000	$ -	$ 1,125,000	$ 337,500	$ 1,462,500	$ 190,125	$ 1,652,700	0%	$ -	100%	$ 1,652,700	0%	$ -	High Prioity
P-3620-0003	"A" Line split at Apple Tree Lane Tract to Meter "A" Lower Edgar Tank	20	1900	0		375	$ 712,500	$ -	$ 712,500	$ 213,750	$ 926,250	$ 120,413	$ 1,046,700		$ -		$ 1,046,700		$ -	High Prioity
P-UEC-0001	Edgar Canyon Pipeline Well 14 to Wedding Chapel	12	2350	0		228	$ 535,800	$ -	$ 535,800	$ 160,740	$ 696,540	$ 90,550	$ 787,100	0%	$ -	100%	$ 787,100	0%	$ -	High Priority
P-UEC-0002	Edgar Canyon Pipeline Wedding Chapel to Upper Edgar	12	4820	0		228	$ 1,098,960	$ -	$ 1,098,960	$ 329,688	$ 1,428,648	$ 185,724	$ 1,614,400	0%	$ -	100%	$ 1,614,400	0%	$ -	High Priority
						#N/A	#N/A	$ -	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A		#N/A		#N/A	
	Subtotal High Priority Transmission Mains 16-in and larger before 2025		7900	0			$ 3,060,000	$ -	$ 3,060,000	$ 918,000	$ 3,978,000	$ 517,140	$ 4,495,300		$ -		$ 4,495,300		$ -	
	Subtotal High Priority Distribution Mains < 16-in before 2025		7170	0			$ 1,634,760	$ -	$ 1,634,760	$ 490,428	$ 2,125,188	$ 276,274	$ 2,401,500		$ -		$ 2,401,500		$ -	
	Total High Priority Transmission Mains 16-in and larger		11220	37			$ 3,714,040	$ 99,900	$ 3,813,940	$ 1,144,182	$ 4,958,122	$ 644,556	$ 5,602,900		$ 553,800		$ 5,049,100		$ -	
	Total High Priority Distribution Mains < 16-in		23060	163			$ 3,825,543	$ 440,100	$ 4,265,643	$ 1,279,693	$ 5,545,335	$ 720,894	$ 6,267,000		$ -		$ 6,153,000		$ -	
	Total All High Priority Pipelines		34280	200			$ 7,539,583	$ 540,000	$ 8,079,583	$ 2,423,875	$ 10,503,457	$ 1,365,449	$ 11,869,900		$ 553,800		$ 11,202,100		$ -	

Master Plan Upper Edgar Canyon

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-UEC-0001	Edgar Canyon Pipeline Well 14 to Wedding Chapel	12	2350	0		228	$ 535,800	$ -	$ 535,800	$ 160,740	$ 696,540	$ 90,550	$ 787,100		$ -	100%	$ 787,100		$ -	High Priority
P-UEC-0002	Edgar Canyon Pipeline Wedding Chapel to Upper Edgar	12	4820	0		228	$ 1,098,960	$ -	$ 1,098,960	$ 329,688	$ 1,428,648	$ 185,724	$ 1,614,400		$ -	100%	$ 1,614,400		$ -	High Priority
	Totals		7170	0		456	$ 1,634,760	$ -	$ 1,634,760	$ 490,428	$ 2,125,188	$ 276,274	$ 2,401,500		$ -		$ 2,401,500	$ -	$ -	

100%

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 2,401,500		$ -		$ 2,401,500		$ -
2025								
2030								
2035								
2040								
2045								
Buildout								
Total Distribution		$ 2,401,500		$ -		$ 2,401,500		$ -

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020								
2025		$ -		$ -		$ -		$ -
2030								
2035								
2040								
2045								
Buildout								
Total Transmission		$ -		$ -		$ -		$ -

Table 7-15
Master Plan Pipelines
Upper Edgar Canyon

Master Plan 3900 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingney	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3900-0001	Edgar Canyon Bridge at 3620 Tank to Oak Glen Rd	12	1245	0		182.4	$ 227,088	$ -	$ 227,088	$ 68,126	$ 295,214	$ 38,378	$ 333,600		$ -		$ -	100%	$ 333,600	Build Out
P-3900-0002	Oak Glen Rd County Line to Proposed Development	12	1285	0		152	$ 195,320	$ -	$ 195,320	$ 58,596	$ 253,916	$ 33,009	$ 287,000		$ -		$ -	100%	$ 287,000	Build Out
	Totals		2530	0			$ 422,408	$ -	$ 422,408	$ 126,722	$ 549,130	$ 71,387	$ 620,600		$ -		$ -		$ 620,600	

Pipeline Schedule Dsitribution < 16-in

High Priority & 2020			100%					
2025								
2030								
2035								
2040								
2045								
Buildout		$ 620,600		$ -		$ -		$ 620,600
Total Distribution		$ 620,600		$ -		$ -		$ 620,600

Pipeline Schedule Transmission 16-in and larger

High Priority & 2020								
2025		$ -		$ -		$ -		$ -
2030								
2040								
2045								
Buildout								
Total Transmission		$ -		$ -		$ -		$ -
		$ -		$ -		$ -		$ -

Table 7-16
Master Plan Pipelines
3900 Pressure Zone

Master Plan 3620 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3620-0001	"B" Line Upper Edgar to upper end of 20" DIP and from lower end 20" DIP to Balance line and Balance Line in Edgar Canyon	20	3000	0		375	$ 1,125,000	$ -	$ 1,125,000	$ 337,500	$ 1,462,500	$ 190,125	$ 1,652,700		$ -	100%	$ 1,652,700		$ -	High Priority
P-3620-0002	"A" Line Upper Edgar to split at Apple Tree Lane Tract	20	3260	0		375	$ 1,222,500	$ -	$ 1,222,500	$ 366,750	$ 1,589,250	$ 206,603	$ 1,795,900		$ -	100%	$ 1,795,900		$ -	High Priority
P-3620-0003	"A" Line split at Apple Tree Lane Tract to Meter "A" Lower Edgar Tank	20	1900	0		375	$ 712,500	$ -	$ 712,500	$ 213,750	$ 926,250	$ 120,413	$ 1,046,700		$ -	100%	$ 1,046,700		$ -	2030
P-3620-0004	Oak Glen Rd., Appletree Lane to end of 6-in pipe	8	1750	2		173	$ 301,875	$ 5,400	$ 307,275	$ 92,183	$ 399,458	$ 51,929	$ 451,400		$ -	100%	$ 451,400		$ -	High Priority
P-3620-0005	Crossing of Little San Gorgonio Cr at Cherry Oaks (3620 Zone) to Oak Glen Rd.	8	1040	0		345	$ 358,800	$ -	$ 358,800	$ 107,640	$ 466,440	$ 60,637	$ 527,100		$ -	100%	$ 527,100		$ -	2030
P-3620-0006	Lower Edgar Tank to Ave. Miravilla	12	650	0		228	$ 148,200	$ -	$ 148,200	$ 44,460	$ 192,660	$ 25,046	$ 217,800		$ -	100%	$ 217,800		$ -	2030
P-3620-0007	Ave. Miravilla from 12-in to northerly end of Ave. Miravilla	8	2310	12		173	$ 398,475	$ 32,400	$ 430,875	$ 129,263	$ 560,138	$ 72,818	$ 633,000		$ -	100%	$ 633,000		$ -	2030
P-3620-0008	Ave. Miravilla at Lower Edgar Tank to ex. 6-in	12	935	0		228	$ 213,180	$ -	$ 213,180	$ 63,954	$ 277,134	$ 36,027	$ 313,200		$ -	100%	$ 313,200		$ -	2030
P-3620-0009	Ave. Miravilla,End of 12-in to Whispering Pines	8	1105	6		173	$ 190,613	$ 16,200	$ 206,813	$ 62,044	$ 268,856	$ 34,951	$ 303,900		$ -	100%	$ 303,900		$ -	High Priority
P-3620-0010	Whispering Pines, Ave. Miravilla to end	8	980	10		173	$ 169,050	$ 27,000	$ 196,050	$ 58,815	$ 254,865	$ 33,132	$ 288,000		$ -	100%	$ 288,000		$ -	2030
P-3620-0011	Ave. Miravilla, Whispering Pines to Altura Bella	8	530	2		173	$ 91,425	$ 5,400	$ 96,825	$ 29,048	$ 125,873	$ 16,363	$ 142,300		$ -	100%	$ 142,300		$ -	2030
P-3620-0012	Ave Altejo Bella, Ave Miravilla to end of cul-de-sac	8	970	3		173	$ 167,325	$ 8,100	$ 175,425	$ 52,628	$ 228,053	$ 29,647	$ 257,700		$ -	100%	$ 257,700		$ -	2030
P-3620-0013	Ave. Miravilla, Ave. San Timoteo to Lilac Lane	8	690	2		173	$ 119,025	$ 5,400	$ 124,425	$ 37,328	$ 161,753	$ 21,028	$ 182,800		$ -	100%	$ 182,800		$ -	2030
P-3620-0014	Llilac Lane, Ave. Miravilla to end of cul-de-sac	8	980	3		173	$ 169,050	$ 8,100	$ 177,150	$ 53,145	$ 230,295	$ 29,938	$ 260,300		$ -	100%	$ 260,300		$ -	High Priority
P-3620-0015	Appletree Ln, B line to Oak Glen Rd	8	2170	19		173	$ 374,325	$ 51,300	$ 425,625	$ 127,688	$ 553,313	$ 71,931	$ 625,300		$ -	100%	$ 625,300		$ -	High Priority
	Subtotal Other Than High Priority, Should be completed 2030		10005	29			$ 2,377,980	$ 78,300	$ 2,456,280	$ 736,884	$ 3,193,164	$ 415,111	$ 3,608,600		$ -		$ 3,608,600		$ -	
	Totals		22270	59			$ 5,761,343	$ 159,300	$ 5,920,643	$ 1,776,193	$ 7,696,835	$ 1,000,589	$ 8,698,100		$ -		$ 8,698,100		$ -	

100%

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 1,640,900	100%	$ -		$ 1,640,900		$ -
2025								
2030		$ 2,561,900		$ -		$ 2,561,900		$ -
2035								
2040								
2045								
Buildout								
Total Distribution		$ 4,202,800		$ -		$ 4,202,800		$ -

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020		$ 3,448,600		$ -		$ 3,448,600		$ -
2025								
2030		$ 1,046,700		$ -		$ 1,046,700		$ -
2035								
2040								
2045								
Buildout								
Total Transmission		$ 4,495,300		$ -		$ 4,495,300		$ -

Table 7-17
Master Plan Pipelines
3620 Pressure Zone

Master Plan 3330 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3330-0001	From 3620/3330 Regulator to "Wagon Wheel" at Ave. San Timoteo and Ave. Miravilla	12	1930	10		228	$ 440,040	$ 27,000	$ 467,040	$ 140,112	$ 607,152	$ 78,930	$ 686,100		$ -	100%	$ 686,100		$ -	2030
P-3330-0002	Ave San Timoteo, end of 12-in to Ave. Sonrisa	8	2430	15		173	$ 419,175	$ 40,500	$ 459,675	$ 137,903	$ 597,578	$ 77,685	$ 675,300		$ -	100%	$ 675,300		$ -	2030
P-3330-0003	Ave. Sonrisa, Ave San Timoteo to Ave. Miravilla	8	1620	15		173	$ 279,450	$ 40,500	$ 319,950	$ 95,985	$ 415,935	$ 54,072	$ 470,100		$ -	100%	$ 470,100		$ -	2030
P-3330-0004	Ave. Miravilla, Ave, Sonrisa to end of 6 in pipe	8	2200	8		173	$ 379,500	$ 21,600	$ 401,100	$ 120,330	$ 521,430	$ 67,786	$ 589,300		$ -	100%	$ 589,300		$ -	2030
P-3330-0005	Ave. Miravilla, End of 6-in pipe to 12-in from 3620/3330 regulator	8	1130	13		173	$ 194,925	$ 35,100	$ 230,025	$ 69,008	$ 299,033	$ 38,874	$ 338,000		$ -	100%	$ 338,000		$ -	2030
P-3330-0006	Bogart Fire Service	8	1,000	0		115	$ 115,000	$ -	$ 115,000	$ 34,500	$ 149,500	$ 19,435	$ 169,000		$ -	100%	$ 169,000		$ -	High Priority
	Totals		10,310	61			$ 1,828,090	$ 164,700	$ 1,992,790	$ 597,837	$ 2,590,627	$ 336,782	$ 2,927,800		$ -		$ 2,927,800		$ -	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 169,000		$ -		$ 169,000		$ -
2025								
2030		$ 2,758,800		$ -		$ 2,758,800		$ -
2035								
2040								
2045								
Buildout								
Total Distribution		$ 2,927,800		$ -		$ 2,927,800		$ -

Pipeline Schedule Transmission 16-in and larger							
High Priority & 2020							
2025							
2030							
2031							
2035							
2040							
2045							
Buildout							
Total Transmission	$ -		$ -		$ -		$ -

Table 7-18
Master Plan Pipelines
3330 Pressure Zone

Master Plan 3150 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3150-0001	Jonathan Ave., Dutton St. to Bridges St.	8	1105	20		115	$ 127,075	$ 54,000	$ 181,075	$ 54,323	$ 235,398	$ 30,602	$ 266,000		$ -	100%	$ 266,000		$ -	2040
P-3150-0002	Easement Line, between Winesap Ave. and Jonathon Ave, Dutton to Bridges	8	420	0		115	$ 48,300	$ -	$ 48,300	$ 14,490	$ 62,790	$ 8,163	$ 71,000		$ -	100%	$ 71,000		$ -	2040
P-3150-0003	Winesap Ave., Dutton to International Rd.	8	415	5		115	$ 47,725	$ 13,500	$ 61,225	$ 18,368	$ 79,593	$ 10,347	$ 90,000		$ -	100%	$ 90,000		$ -	2040
P-3150-0004	Easement Line, W/o Winesap Ave. N/o Dutton St.	8	785	7		115	$ 90,275	$ 18,900	$ 109,175	$ 32,753	$ 141,928	$ 18,451	$ 160,400		$ -	100%	$ 160,400		$ -	2040
P-3150-0005	Dutton St., Johnathon Ave. to Bellflower Ave.	8	2495	14		115	$ 286,925	$ 37,800	$ 324,725	$ 97,418	$ 422,143	$ 54,879	$ 477,100		$ -	100%	$ 477,100		$ -	2040
P-3150-0006	Dutton Easement Rd, S/o Dutton	8	320	4		115	$ 36,800	$ 10,800	$ 47,600	$ 14,280	$ 61,880	$ 8,044	$ 70,000		$ -	100%	$ 70,000		$ -	2040
	Totals		5540	50		690	$ 637,100	$ 135,000	$ 772,100	$ 231,630	$ 1,003,730	$ 130,485	$ 1,134,500		$ -		$ 1,134,500		$ -	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020								
2025		$ -		$ -		$ -		$ -
2030		$ -		$ -		$ -		$ -
2035								
2040		$ 1,134,500				$ 1,134,500		$ -
2045								
Buildout								
Total Distribution		$ 1,134,500		$ -		$ 1,134,500		$ -

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020								
2025								
2030								
2035								
2040								
2045								
Buildout								
Total Transmission		$ -		$ -		$ -		$ -

Table 7-19
Master Plan Pipelines
3150 Pressure Zone
Page 1 of 1

Master Plan 3040 Zone

							Funding Sources						
							Faclities Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3040-0001	Taylor Dr, Vineland St. to Orchard St.; Orchard St, Taylor Dr. to End of pipe	12	$ 75,438	$ 326,898	$ 42,497	$ 369,400		$ -	100%	$ 369,400		$ -	Build Out
P-3040-0002	Nancy Ave. 3040 Reservoir to Orchard St.	20	$ 234,000	$ 1,014,000	$ 131,820	$ 1,145,900	100%	$ 1,145,900		$ -		$ -	2040
P-3040-0003	Pass View Dr-Cherry Estates Ct, Nancy St. to Mountain View Ave	12	$ 140,448	$ 608,608	$ 79,119	$ 687,800		$ -		$ -	100%	$ 687,800	Build Out
P-3040-0004	Ralph Rd., Cherry Valley Blvd to Vineland St	12	$ 59,964	$ 259,844	$ 33,780	$ 293,700		$ -	50%	$ 146,850	50%	$ 146,850	Build Out
P-3040-0005	Ralph Rd., Vineland St to Orchard St.	12	$ 60,876	$ 263,796	$ 34,293	$ 298,100		$ -	50%	$ 149,050	50%	$ 149,050	Build Out
P-3040-0006	Lincoln St. Noble St. to Cherry Ave	8	$ 57,518	$ 249,243	$ 32,402	$ 281,700		$ -	100%	$ 281,700		$ -	2030
P-3040-0007	Lincoln St. Cherry Ave to Jonathan Ave	12	$ 69,408	$ 300,768	$ 39,100	$ 339,900		$ -	100%	$ 339,900		$ -	2030
P-3040-0008	Lincoln St. Jonathan Ave to Winesap Ave	6	$ 47,115	$ 204,165	$ 26,541	$ 230,800		$ -	100%	$ 230,800		$ -	2025
P-3040-0009	Cherry Ave. Noble Tank to Dutton St	20	$ 214,950	$ 931,450	$ 121,089	$ 1,052,600	100%	$ 1,052,600		$ -		$ -	2020 W/2nd Noble Tank
P-3040-0010	Jonathan Ave., Brookside Ave. to Dutton St.	12	$ 223,128	$ 966,888	$ 125,695	$ 1,092,600		$ -	100%	$ 1,092,600		$ -	2020 w/ Pardee BP
P-3040-0011	Winesap Ave, Brookside Ave. to High St	16	$ 226,182	$ 980,122	$ 127,416	$ 1,107,600	50%	$ 553,800	50%	$ 553,800		$ -	2020 w/ Pardee BP
P-3040-0012	Winesap Ave., High St. to Dutton St.	12	$ 70,722	$ 306,462	$ 39,840	$ 346,400		$ -	100%	$ 346,400		$ -	2030
P-3040-0013	Bellflower Ave., Brookside St. to High St	12	$ 164,196	$ 711,516	$ 92,497	$ 804,100		$ -	100%	$ 804,100		$ -	2020 w/ Pardee BP
P-3040-0014	Overland Trail, End of pipe N/o Cherry Valley Blvd to Bel Air Dr	12	$ 11,628	$ 50,388	$ 6,550	$ 57,000		$ -	100%	$ 57,000		$ -	Build Out
P-3040-0015	Cherry Ave., S/o Brookside Ave. to Cougar Way	16	$ 136,521	$ 591,591	$ 76,907	$ 668,500	100%	$ 668,500		$ -		$ -	Build Out
P-3040-0016	Cougar Way, Cherry Ave. to Highland Springs Ave.	16	$ 201,843	$ 874,653	$ 113,705	$ 988,400	100%	$ 988,400		$ -		$ -	w/Sundance 2020
P-3040-0017	2850 Sundance Booster to 3040 Zone	24	$ 22,572	$ 97,812	$ 12,716	$ 110,600	100%	$ 110,600		$ -		$ -	w/Sundance 2020
P-3040-0018	Highland Springs Ave., Cougar Way to Brookside Ave	16	$ 76,937	$ 333,392	$ 43,341	$ 376,800	100%	$ 376,800		$ -		$ -	w/Sundance 2020

Table 7-20
Master Plan Pipelines
3040 Pressure Zone

Master Plan 3040 Zone

							Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-3040-0019	Grand Ave., Noble St. to Martin st	8	$ 50,310	$ 218,010	$ 28,341	$ 246,400		$ -	100%	$ 246,400		$ -	High Priority
P-3040-0020	Martin St., Lincoln St. to Grand Ave.	8	$ 40,875	$ 177,125	$ 23,026	$ 200,200		$ -	100%	$ 200,200		$ -	2030
P-3040-0021	Lincoln St., Noble St to West end	8	$ 58,035	$ 251,485	$ 32,693	$ 284,200		$ -	100%	$ 284,200		$ -	High Priority
P-3040-0022	Friendship Dr., Vineland St. to End	8	$ 21,420	$ 92,820	$ 12,067	$ 104,900		$ -	100%	$ 104,900		$ -	High Priority
P-3040-0023	Bing Pl	8	$ 17,415	$ 75,465	$ 9,810	$ 85,300		$ -	100%	$ 85,300		$ -	High Priority
P-3040-0024	Lambert Pl	8	$ 17,415	$ 75,465	$ 9,810	$ 85,300		$ -	100%	$ 85,300		$ -	High Priority
P-3040-0025	Star Ln, Sky Ln, and View Dr	8	$ 66,615	$ 288,665	$ 37,526	$ 326,200		$ -	100%	$ 326,200		$ -	High Priority
P-3040-0026	Utica Way, Vineland St to View Dr.	8	$ 30,840	$ 133,640	$ 17,373	$ 151,100		$ -	100%	$ 151,100		$ -	High Priority
P-3040-0027	Grand Ave., Jonathon Ave. to Bellflower; Cherry Valley Blvd. Bellflower to HS Village 12 in	12	$ 166,602	$ 721,942	$ 93,852	$ 815,800		$ -	100%	$ 815,800		$ -	2020 w/ Pardee BP
			$ -	$ -	$ -	$ -		$ -		$ -		$ -	
			$ -	$ -	$ -	$ -		$ -		$ -		$ -	
	Totals		$ 2,562,972	$ 11,106,212	$ 1,443,808	$ 12,551,300		$ 4,896,600		$ 6,671,000		$ 983,700	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 3,995,900		$ -		$ 3,995,900		$ -
2025		$ 230,800		$ -		$ 230,800		$ -
2030		$ 1,168,200		$ -		$ 1,168,200		$ -
2035								
2040								
2045								
Build out		$ 1,706,000		$ -		$ 722,300		$ 983,700
Total Distribution		$ 7,100,900		$ -		$ 6,117,200		$ 983,700

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020		$ 3,636,000		$ 3,082,200		$ 553,800		$ -
2025								
2030								
2035								
2040		$ 1,145,900		$ 1,145,900		$ -		$ -
2045								
Buildout		$ 668,500		$ 668,500		$ -		$ -
Total Transmission		$ 5,450,400		$ 4,896,600		$ 553,800		$ -

Table 7-20
Master Plan Pipelines
3040 Pressure Zone

Master Plan 2850 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2850-0001	Kehl Canyon Rd, 2850 Zone Tank to Orchard St; Orchard St, Kehl Can. to Nancy Ave; Nancy Ave., Orchard St to	24	5450	0		298	$ 1,624,100	$ -	$ 1,624,100	$ 487,230	$ 2,111,330	$ 274,473	$ 2,385,900	100%	$ 2,385,900		$ -		$ -	With 2850 Tank in Kehl Can 2040
P-2850-0002	Vineland Ave., Union St. to Nancy Ave.	12	3240	0		152	$ 492,480	$ -	$ 492,480	$ 147,744	$ 640,224	$ 83,229	$ 723,500		$ -		$ -	100%	$ 723,500	2030
P-2850-0003	Union St., Vineland Ave. to Cherry Valley Blvd	12	1340	0		152	$ 203,680	$ -	$ 203,680	$ 61,104	$ 264,784	$ 34,422	$ 299,300		$ -		$ -	100%	$ 299,300	2030
P-2850-0004	Cherry Valley Blvd, Union St. to Nancy Ave.	12	3290	0		152	$ 500,080	$ -	$ 500,080	$ 150,024	$ 650,104	$ 84,514	$ 734,700		$ -		$ -	100%	$ 734,700	2030
P-2850-0005	Nancy Ave., Vineland Ave. to Cherry Valley Blvd	20	1350	0		250	$ 337,500	$ -	$ 337,500	$ 101,250	$ 438,750	$ 57,038	$ 495,800	100%	$ 495,800		$ -		$ -	With 2850 Tank in Kehl Can 2040
P-2850-0006	Union St., Cherry Valley Blvd. to Brookside Ave.	12	2690	0		152	$ 408,880	$ -	$ 408,880	$ 122,664	$ 531,544	$ 69,101	$ 600,700		$ -		$ -	100%	$ 600,700	2030
P-2850-0007	Brookside Ave., Union St. to Nancy Ave.	12	3290	0		152	$ 500,080	$ -	$ 500,080	$ 150,024	$ 650,104	$ 84,514	$ 734,700		$ -		$ -	100%	$ 734,700	2030
P-2850-0008	Nancy Ave., Cherry Valley Blvd to Brookside Ave.	16	2650	3		197	$ 522,050	$ 8,100	$ 530,150	$ 159,045	$ 689,195	$ 89,595	$ 778,800	100%	$ 778,800		$ -		$ -	2030
P-2850-0009	Brookside Ave., Nancy Ave. to end 16-in	18	760	4		229	$ 174,040	$ 10,800	$ 184,840	$ 55,452	$ 240,292	$ 31,238	$ 271,600	100%	$ 271,600		$ -		$ -	2030
P-2850-0010	Oak View Dr., New Well to Brookside Ave.	12	940	0		152	$ 142,880	$ -	$ 142,880	$ 42,864	$ 185,744	$ 24,147	$ 209,900	100%	$ 209,900		$ -		$ -	With W-2850-0003 2020
P-2850-0011	Noble Creek Meadows, Cougar Way to Brookside Ave.	12	3100	0	Tract	87	$ 269,700	$ -	$ 269,700	$ 80,910	$ 350,610	$ 45,579	$ 396,200		$ -		$ -	100%	$ 396,200	With Noble Meadow 2020
P-2850-0012	Cougar Way, End of 12-in to Noble Creek Meadows	12	1600	0	Tract	87	$ 139,200	$ -	$ 139,200	$ 41,760	$ 180,960	$ 23,525	$ 204,500		$ -		$ -	100%	$ 204,500	With Noble Meadow 2020
P-2850-0013	Cherry Valley Blvd., Nancy Ave. to Mountain View Ave.	18	2700	0		229	$ 618,300	$ -	$ 618,300	$ 185,490	$ 803,790	$ 104,493	$ 908,300	100%	$ 908,300		$ -		$ -	With 2850 Tank in Kehl Can 2040
P-2850-0014	Cherry Valley Blvd., Mountain View Ave. to Live Oak Ave.	18	2640	0		229	$ 604,560	$ -	$ 604,560	$ 181,368	$ 785,928	$ 102,171	$ 888,100	100%	$ 888,100		$ -		$ -	With 2850 Tank in Kehl Can 2040
P-2850-0015	Cherry Valley Blvd., Live Oak Ave. to Noble St.	18	1270	0		229	$ 290,830	$ -	$ 290,830	$ 87,249	$ 378,079	$ 49,150	$ 427,300	100%	$ 427,300		$ -		$ -	With 2850 Tank in Kehl Can 2040
P-2850-0016	Cougar Way, Cherry Ave. to Starlight Ave.	12	2460	0	Tract	87	$ 214,020	$ -	$ 214,020	$ 64,206	$ 278,226	$ 36,169	$ 314,400		$ -		$ -	100%	$ 314,400	With 2850/3040 Booster 2020
P-2850-0017	Sundance Drive, Sundance Circle to Highland Springs Rd.	16	2915	0	Tract	197	$ 574,255	$ -	$ 574,255	$ 172,277	$ 746,532	$ 97,049	$ 843,600	100%	$ 843,600		$ -	$ -	$ -	2020
P-2850-0018	2850 to 3040 Zone Booster Pump Suction and Discharage Pipes	24	600	0	Tract	198	$ 118,800	$ -	$ 118,800	$ 35,640	$ 154,440	$ 20,077	$ 174,600	100%	$ 174,600		$ -		$ -	With 2850/3040 Booster 2020
P-2850-0019	Highland Springs Ave., Proposed Buried Tank to Cougar Way	20	4050	0		250	$ 1,012,500	$ -	$ 1,012,500	$ 303,750	$ 1,316,250	$ 171,113	$ 1,487,400	100%	$ 1,487,400		$ -		$ -	With 2850 Tank E/o Highland Springs 2020
P-2850-0020	Noble Creek Meadows, Cougar Way to Oak Valley Pkwy; connect to end of converted 2750 Zone 10 in ACP	12	2600	0	Tract	87	$ 226,200	$ -	$ 226,200	$ 67,860	$ 294,060	$ 38,228	$ 332,300		$ -		$ -	100%	$ 332,300	2020
P-2850-0021	Potrero Blvd., Seneca Springs Pkwy to Manzanita Ave	16	2600	0		197	$ 512,200	$ -	$ 512,200	$ 153,660	$ 665,860	$ 86,562	$ 752,500	100%	$ 752,500		$ -		$ -	w/ Legacy Highlands 2040
P-2850-0022	Potrero Blvd., Manzanita Ave to Beaumont Ave	16	2700	0	Tract	123	$ 332,100	$ -	$ 332,100	$ 99,630	$ 431,730	$ 56,125	$ 487,900	100%	$ 487,900		$ -		$ -	w/ Legacy Highlands 2040
P-2850-0023	Potrero Blvd., Beaumont Ave. to 12-in in Legacy Highlands (The Preserve)	16	6540	0	Tract	123	$ 804,420	$ -	$ 804,420	$ 241,326	$ 1,045,746	$ 135,947	$ 1,181,700	100%	$ 1,181,700		$ -		$ -	w/ Legacy Highlands 2045

Table 7-21
Master Plan Pipelines
2850 Pressure Zone
Page 1 of 2

Master Plan 2850 Zone

P-2850-0024	Legacy Highlands (Preserve), to Pressure Regulating Station 2850 to 2750 and 2750/2850 Eergency Booster	16	5900	0	Tract	123	$ 725,700	$ -	$ 725,700	$ 217,710	$ 943,410	$ 122,643	$ 1,066,100	100%	$ 1,066,100		$ -		$ -	w/ Legacy Highlands 2045
P-2850-0025	Legacy Highlands (Preserve), East Side	12	3930	0	Tract	87	$ 341,910	$ -	$ 341,910	$ 102,573	$ 444,483	$ 57,783	$ 502,300		$ -		$ -	100%	$ 502,300	w/ Legacy Highlands 2045
P-2850-0026	Manzanita Ave., Potrero to Seneca Springs Pkwy	12	1840	0		152	$ 279,680	$ -	$ 279,680	$ 83,904	$ 363,584	$ 47,266	$ 410,900		$ -		$ -	100%	$ 410,900	2040
P-2850-0027	Development S/o Potrero Blvd, between Manzanita Ave and Beaumont Ave.	12	4240	0	Tract	87	$ 368,880	$ -	$ 368,880	$ 110,664	$ 479,544	$ 62,341	$ 541,900		$ -		$ -	100%	$ 541,900	2040
P-2850-0028	Starlight Ave., Cougar Way to Well 25	24	1220	0	Tract	198	$ 241,560	$ -	$ 241,560	$ 72,468	$ 314,028	$ 40,824	$ 354,900	100%	$ 354,900				$ -	Constructed, to be funded
P-2850-0029	Moutain View, Cherry Valley Blvd to Brookside Avenue	16	2673	0		197	$ 526,581	$ -	$ 526,581	$ 157,974	$ 684,555	$ 88,992	$ 773,600	100%	$ 773,600					2035
P-2850-0030	Starlight Ave., Cougar Way to Brookside Ave	24	2582	0	Tract	198	$ 511,236	$ -	$ 511,236	$ 153,371	$ 664,607	$ 86,399	$ 751,100	100%	$ 751,100		$ -		$ -	Constructed, to be funded
	Totals		83160			5051	$ 13,618,402	$ 18,900	$ 13,637,302	$ 4,091,191	$ 17,728,493	$ 2,304,704	$ 20,034,500		$ 14,239,100		$ -		$ 5,795,400	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 1,457,300		$ 209,900		$ -		$ 1,247,400
2025								
2030		$ 3,092,900		$ -		$ -		$ 3,092,900
2035								
2040		$ 952,800		$ -		$ -		$ 952,800
2045		$ 502,300		$ -		$ -		$ 502,300
Buildout								
Total Distribution		$ 6,005,300		$ 209,900		$ -		$ 5,795,400

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020		$ 3,611,600		$ 3,611,600		$ -		$ -
2025								
2030		$ 1,050,400		$ 1,050,400		$ -		$ -
2035		$ 773,600		$ 773,600				
2040		$ 6,345,800		$ 6,345,800		$ -		$ -
2045		$ 2,247,800		$ 2,247,800		$ -		$ -
Buildout								
Total Transmission		$ 14,029,200		$ 14,029,200		$ -		$ -

Table 7-21
Master Plan Pipelines
2850 Pressure Zone
Page 2 of 2

Master Plan 2750 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2750-0001	North of 4th St, west of Nickolas	12	2800	0	Tract	87	$ 243,600	$ -	$ 243,600	$ 73,080	$ 316,680	$ 41,168	$ 357,900		$ -		$ -	100%	$ 357,900	2020
P-2750-0002	North of 4th St, west of Nickolas	18	2700	0	Tract	142	$ 383,400	$ -	$ 383,400	$ 115,020	$ 498,420	$ 64,795	$ 563,300		$ -		$ -	100%	$ 563,300	2020
P-2750-0003	4th St, west from end of 24-in to proposed 2750/2650 PRv	24	3570	0	Tract	198	$ 706,860	$ -	$ 706,860	$ 212,058	$ 918,918	$ 119,459	$ 1,038,400	100%	$ 1,038,400		$ -		$ -	with Legacy Highlands 2030
P-2750-0004	From 2750/2650 PRV to Potrero Blvd	24	2055	0	Tract	198	$ 406,890	$ -	$ 406,890	$ 122,067	$ 528,957	$ 68,764	$ 597,800	100%	$ 597,800		$ -		$ -	with Legacy Highlands 2030
P-2750-0005	In Potrero Blvd, easterly to road into Legacy Highlands	24	2800	0	Tract	198	$ 554,400	$ -	$ 554,400	$ 166,320	$ 720,720	$ 93,694	$ 814,500	100%	$ 814,500		$ -		$ -	with Legacy Highlands 2030
P-2750-0006	In Potrero Blvd, easterly from road into Legacy Highlands to Viele St.	24	4600	0	Tract	198	$ 910,800	$ -	$ 910,800	$ 273,240	$ 1,184,040	$ 153,925	$ 1,338,000	100%	$ 1,338,000		$ -		$ -	with Legacy Highlands 2030
P-2750-0007	In Potrero Blvd., Viele St. to California Ave	24	2080	0	Tract	198	$ 411,840	$ -	$ 411,840	$ 123,552	$ 535,392	$ 69,601	$ 605,000	100%	$ 605,000		$ -		$ -	with Legacy Highlands 2750 Tank 2030
P-2750-0008	In Potrero Blvd., Viele St. to California Ave to end of pipe west of Manzanita Rd	24	3380	0	Tract	198	$ 669,240	$ -	$ 669,240	$ 200,772	$ 870,012	$ 113,102	$ 983,200	100%	$ 983,200		$ -		$ -	with Legacy Highlands 2750 Tank 2030
P-2750-0009	In Legacy Highlands, Potrero Blvd. to 2750/2650 PRV at 2650 Tank Site in Legacy Highlands	30	2400	0	Tract	288	$ 691,200	$ -	$ 691,200	$ 207,360	$ 898,560	$ 116,813	$ 1,015,400	100%	$ 1,015,400		$ -		$ -	With Legacy Highlands 2650 Zone 2030
P-2750-0010	In Legacy Highlands, to serve 2750 Zone	12	600	0	Tract	87	$ 52,200	$ -	$ 52,200	$ 15,660	$ 67,860	$ 8,822	$ 76,700		$ -		$ -	100%	$ 76,700	2035
P-2750-0011	In Legacy Highlands from 2750/2650 Regulator to 2750 Tank Site	30	1900	0	Tract	288	$ 547,200	$ -	$ 547,200	$ 164,160	$ 711,360	$ 92,477	$ 803,900	100%	$ 803,900		$ -		$ -	with Legacy Highlands 2750 Tank 2030
P-2750-0012	2750 Tank Outlet Pipe in Legacy Highlands	36	400	0	Tract	446	$ 178,400	$ -	$ 178,400	$ 53,520	$ 231,920	$ 30,150	$ 262,100	100%	$ 262,100		$ -		$ -	with Legacy Highlands 2750 Tank 2030
P-2750-0013	2750 Legacy Highlands Tank Site to Potrero Blvd/Hwy 79 Connector Rd	30	1000	0	Tract	288	$ 288,000	$ -	$ 288,000	$ 86,400	$ 374,400	$ 48,672	$ 423,100	100%	$ 423,100		$ -		$ -	with Legacy Highlands 2750 Tank 2030
P-2750-0014	In Potrero Blvd/Hwy 79 Connector Rd to Legacy Highlands road to 2750 Tank Site	24	3100	0	Tract	198	$ 613,800	$ -	$ 613,800	$ 184,140	$ 797,940	$ 103,732	$ 901,700	100%	$ 901,700		$ -		$ -	2035
P-2750-0015	Legacy Highlands 2750 Zone Loop	12	8390	0	Tract	87	$ 729,930	$ -	$ 729,930	$ 218,979	$ 948,909	$ 123,358	$ 1,072,300		$ -		$ -	100%	$ 1,072,300	2040
P-2750-0016	In Potrero Blvd/Hwy 79 Connector Rd to Legacy Highlands road to Hwy 79	24	3990	0	Tract	198	$ 790,020	$ -	$ 790,020	$ 237,006	$ 1,027,026	$ 133,513	$ 1,160,600	100%	$ 1,160,600		$ -		$ -	Not needed until far southern area develops B.Out
P-2750-0017	In California Ave, Potrero Blvd South, parallel Hwy 79	24	5030	0		298	$ 1,498,940	$ -	$ 1,498,940	$ 449,682	$ 1,948,622	$ 253,321	$ 2,202,000	100%	$ 2,202,000		$ -		$ -	Not needed until far southern area develops B.Out
P-2750-0018	Southerly Loop, east of Hwy 79	24	4960	0	Tract	198	$ 982,080	$ -	$ 982,080	$ 294,624	$ 1,276,704	$ 165,972	$ 1,442,700	100%	$ 1,442,700		$ -		$ -	Not needed until far southern area develops B.Out
P-2750-0019	Manzanita Rd, south to southerly loop	24	5020	0	Tract	198	$ 993,960	$ -	$ 993,960	$ 298,188	$ 1,292,148	$ 167,979	$ 1,460,200	100%	$ 1,460,200		$ -		$ -	Not needed until far southern area develops B.Out
P-2750-0020	Southerly Loop, Manzanita Rd Extension to Highland Springs Rd.	24	7430	0	Tract	198	$ 1,471,140	$ -	$ 1,471,140	$ 441,342	$ 1,912,482	$ 248,623	$ 2,161,200	100%	$ 2,161,200		$ -		$ -	Not needed until far southern area develops B.Out

Table 7-22
Master Plan Pipelines
2750 Pressure Zone

Master Plan 2750 Zone

P-2750-0021	Highland Springs Rd, end of existing 30-in to Southerly Loop	30	2800	0	Tract	288	$ 806,400	$ -	$ 806,400	$ 241,920	$ 1,048,320	$ 136,282	$ 1,184,700	100%	$ 1,184,700		$ -		$ -	Not needed until far southern area develops B.Out
P-2750-0022	Highland Springs Rd. Southerly Loop to 2750 Zone Tank off Highland Springs Rd.	30	6340	0	Tract	288	$ 1,825,920	$ -	$ 1,825,920	$ 547,776	$ 2,373,696	$ 308,580	$ 2,682,300	100%	$ 2,682,300		$ -		$ -	With 2750 Zone Tank off Highland Springs Rd. 2040
P-2750-0023	Viele Ave., 4th St. to Potrero Blvd	24	1640	0	Tract	198	$ 324,720	$ -	$ 324,720	$ 97,416	$ 422,136	$ 54,878	$ 477,100	100%	$ 477,100		$ -		$ -	With Legacy Highlands 2035
P-2750-0024	Olive, 4th to s/o 3rd	8	1010	12		115	$ 116,150	$ 32,400	$ 148,550	$ 44,565	$ 193,115	$ 25,105	$ 218,300		$ -	100%	$ 218,300		$ -	2030
P-2750-0025	Maple Ave., 1st St to 3rd St	8	1100	15		115	$ 126,500	$ 40,500	$ 167,000	$ 50,100	$ 217,100	$ 28,223	$ 245,400		$ -	100%	$ 245,400		$ -	2025
P-2750-0026	Palm Ave., Potrero Blvd. to 1st St	12	1000			152	$ 152,000	$ -	$ 152,000	$ 45,600	$ 197,600	$ 25,688	$ 223,300		$ -		$ -	100%	$ 223,300	2025
P-2750-0027	2nd St, Pennsylvania Ave to	12	3570	0	Tract	87	$ 310,590	$ -	$ 310,590	$ 93,177	$ 403,767	$ 52,490	$ 456,300		$ -	100%	$ 456,300		$ -	2020
P-2750-0028	Pennsylvania Ave., 5th St. to 3rd St	24	980	0		298	$ 292,040	$ -	$ 292,040	$ 87,612	$ 379,652	$ 49,355	$ 429,100	100%	$ 429,100		$ -		$ -	2025
P-2750-0029	Maple Ave. 5th to 4th St. Under 1-10 in bore	12	530	0		456	$ 241,680	$ -	$ 241,680	$ 72,504	$ 314,184	$ 40,844	$ 355,100		$ -	100%	$ 355,100		$ -	Constructed, to be funded
P-2750-0030	4th St., Maple Ave. to Beaumont Ave.	12	940	6		152	$ 142,880	$ 16,200	$ 159,080	$ 47,724	$ 206,804	$ 26,885	$ 233,700		$ -	100%	$ 233,700		$ -	2025
P-2750-0031	4th St., Beaumont Ave. to California Ave.	12	1170	1		152	$ 177,840	$ 2,700	$ 180,540	$ 54,162	$ 234,702	$ 30,511	$ 265,300		$ -	100%	$ 265,300		$ -	2025
P-2750-0032	Egan, B St to 5th Pl, Bore I-10, Bore RR	8	1050	5		460	$ 483,000	$ 13,500	$ 496,500	$ 148,950	$ 645,450	$ 83,909	$ 729,400		$ -	100%	$ 729,400		$ -	2025
P-2750-0033	Viele Ave., 7th St. to B St.	16	1710	6		394	$ 673,740	$ 16,200	$ 689,940	$ 206,982	$ 896,922	$ 116,600	$ 1,013,600	100%	$ 1,013,600		$ -		$ -	With Legacy Highlands 2035
P-2750-0034	Minnesota Ave., B St to 4th St	16	840	0		197	$ 165,480	$ -	$ 165,480	$ 49,644	$ 215,124	$ 27,966	$ 243,100	100%	$ 243,100		$ -		$ -	With Legacy Highlands 2035
P-2750-0035	Allegheny St., 6th to 8th	8	900	7		115	$ 103,500	$ 18,900	$ 122,400	$ 36,720	$ 159,120	$ 20,686	$ 179,900		$ -	100%	$ 179,900		$ -	2025
P-2750-0036	Michigan St., 6th to 8th	8	1120	45		115	$ 128,800	$ 121,500	$ 250,300	$ 75,090	$ 325,390	$ 42,301	$ 367,700		$ -	100%	$ 367,700		$ -	2025
P-2750-0037	Maple Ave., 6th to 7th; 7th, Maple Ave. to Palm Ave.	8	970	16		115	$ 111,550	$ 43,200	$ 154,750	$ 46,425	$ 201,175	$ 26,153	$ 227,400		$ -	100%	$ 227,400		$ -	2030
P-2750-0038	Maple Ave., 5th to 6th	8	580	11		115	$ 66,700	$ 29,700	$ 96,400	$ 28,920	$ 125,320	$ 16,292	$ 141,700		$ -	100%	$ 141,700		$ -	2030
P-2750-0039	5th St., Michigan Ave. to Massachusetts Ave.	8	430	2		115	$ 49,450	$ 5,400	$ 54,850	$ 16,455	$ 71,305	$ 9,270	$ 80,600		$ -	100%	$ 80,600		$ -	2030
P-2750-0040	Orange Ave., 5th to 6th , Alley s/o 6th St, Orange Ave. to Magnolia Ave.	8	805	9		115	$ 92,575	$ 24,300	$ 116,875	$ 35,063	$ 151,938	$ 19,752	$ 171,700		$ -	100%	$ 171,700		$ -	2030
P-2750-0041	Euclid Ave., 6th to 8th	8	940	12		115	$ 108,100	$ 32,400	$ 140,500	$ 42,150	$ 182,650	$ 23,745	$ 206,400		$ -	100%	$ 206,400		$ -	2030
P-2750-0042	Edgar Ave., 5th to 6th	8	575	10		115	$ 66,125	$ 27,000	$ 93,125	$ 27,938	$ 121,063	$ 15,738	$ 136,900		$ -	100%	$ 136,900		$ -	2030
P-2750-0043	Edgar Ave., 6th to 8th	8	1160	36		115	$ 133,400	$ 97,200	$ 230,600	$ 69,180	$ 299,780	$ 38,971	$ 338,800		$ -	100%	$ 338,800		$ -	2030
P-2750-0044	6th St., (Alley n/o), California Ave. to Alley w/o Beaumont Ave.	12	1060	17		152	$ 161,120	$ 45,900	$ 207,020	$ 62,106	$ 269,126	$ 34,986	$ 304,200		$ -	100%	$ 304,200		$ -	2025
P-2750-0045	7th St., California Ave. to Beaumont Ave.	12	1700	1		152	$ 258,400	$ 2,700	$ 261,100	$ 78,330	$ 339,430	$ 44,126	$ 383,600		$ -	100%	$ 383,600		$ -	2025
P-2750-0046	9th St, Elm Ave. to Euclid Ave.	8	1690	1		115	$ 194,350	$ 2,700	$ 197,050	$ 59,115	$ 256,165	$ 33,301	$ 289,500		$ -	100%	$ 289,500		$ -	2030
P-2750-0047	9th St., Beaumont Ave. to Palm Ave.	8	1680	0		115	$ 193,200	$ -	$ 193,200	$ 57,960	$ 251,160	$ 32,651	$ 283,900		$ -	100%	$ 283,900		$ -	2030
P-2750-0048	9th St., Palm Ave. to Michigan Ave, and Massachusetts Ave. to Pennsylvania Ave.	8	1260	0		115	$ 144,900	$ -	$ 144,900	$ 43,470	$ 188,370	$ 24,488	$ 212,900		$ -	100%	$ 212,900		$ -	2030
P-2750-0049	10th St., Palm Ave. to Michigan Ave.	12	855	0		152	$ 129,960	$ -	$ 129,960	$ 38,988	$ 168,948	$ 21,963	$ 191,000		$ -	100%	$ 191,000		$ -	2025
P-2750-0050	Orange Ave., 8th St to 10th st	8	1150	68		115	$ 132,250	$ 183,600	$ 315,850	$ 94,755	$ 410,605	$ 53,379	$ 464,000		$ -	100%	$ 464,000		$ -	2030
P-2750-0051	Orange Ave., 10th St. to 11th St.	8	535	4		115	$ 61,525	$ 10,800	$ 72,325	$ 21,698	$ 94,023	$ 12,223	$ 106,300		$ -	100%	$ 106,300		$ -	2030
P-2750-0052	Magnolia Ave., 10th St. to 11th St.	8	535	18		115	$ 61,525	$ 48,600	$ 110,125	$ 33,038	$ 143,163	$ 18,611	$ 161,800		$ -	100%	$ 161,800		$ -	2030
P-2750-0053	Euclid Ave., 10th St. to 11th St.	8	570	16		115	$ 65,550	$ 43,200	$ 108,750	$ 32,625	$ 141,375	$ 18,379	$ 159,800		$ -	100%	$ 159,800		$ -	2030
P-2750-0054	Edgar Ave., 8th St. to 10th St.	8	1150	31		115	$ 132,250	$ 83,700	$ 215,950	$ 64,785	$ 280,735	$ 36,496	$ 317,300		$ -	100%	$ 317,300		$ -	2030
P-2750-0055	Edgar Ave, 10th St. to 11th St.	8	570	15		115	$ 65,550	$ 40,500	$ 106,050	$ 31,815	$ 137,865	$ 17,922	$ 155,800		$ -	100%	$ 155,800		$ -	2030
P-2750-0056	Eleventh St., Elm Ave. to Beaumont Ave.	8	2090	29		115	$ 240,350	$ 78,300	$ 318,650	$ 95,595	$ 414,245	$ 53,852	$ 468,100		$ -	100%	$ 468,100		$ -	2035
P-2750-0057	Magnolia Ave., 7th to 8th	8	360	20		115	$ 41,400	$ 54,000	$ 95,400	$ 28,620	$ 124,020	$ 16,123	$ 140,200		$ -	100%	$ 140,200		$ -	2025
P-2750-0058	Wellwood Ave., B St north to end	8	180	2		115	$ 20,700	$ 5,400	$ 26,100	$ 7,830	$ 33,930	$ 4,411	$ 38,400		$ -	100%	$ 38,400		$ -	2025
P-2750-0059	Wellwood Ave., 11th to 12th	8	1010	20		115	$ 116,150	$ 54,000	$ 170,150	$ 51,045	$ 221,195	$ 28,755	$ 250,000		$ -	100%	$ 250,000		$ -	2030
P-2750-0060	Edgar Ave, 11th to 12th, Merry Ln, Edgar to end of cul-de-sac	8	1530	31		115	$ 175,950	$ 83,700	$ 259,650	$ 77,895	$ 337,545	$ 43,881	$ 381,500		$ -	100%	$ 381,500		$ -	2030

Table 7-22
Master Plan Pipelines
2750 Pressure Zone

Master Plan 2750 Zone

P-2750-0061	Orange Ave., 11th to Oak Valley Pkway	8	3600	67		115	$ 414,000	$ 180,900	$ 594,900	$ 178,470	$ 773,370	$ 100,538	$ 874,000		$ -	100%	$ 874,000		$ -	2030
P-2750-0062	Maple Ave., 12th St. north to ex. 6 in	8	720	18		115	$ 82,800	$ 48,600	$ 131,400	$ 39,420	$ 170,820	$ 22,207	$ 193,100		$ -	100%	$ 193,100		$ -	2030
P-2750-0063	Thirteenth St., Palm Ave. to Pennsylvania Ave.	8	1640	12		115	$ 188,600	$ 32,400	$ 221,000	$ 66,300	$ 287,300	$ 37,349	$ 324,700		$ -	100%	$ 324,700		$ -	2030
P-2750-0064	Antonell Court, Pensylvania Ave. to Cherry Ave.	8	575	9		115	$ 66,125	$ 24,300	$ 90,425	$ 27,128	$ 117,553	$ 15,282	$ 132,900		$ -	100%	$ 132,900		$ -	High Priority
P-2750-0065	Edgar Ave., South of Oak Valley Pkwy	8	550	1		115	$ 63,250	$ 2,700	$ 65,950	$ 19,785	$ 85,735	$ 11,146	$ 96,900		$ -	100%	$ 96,900		$ -	2030
P-2750-0066	Egan Ave.-Wellwood Ave. Alley, 5th to 8th St	8	1180	32		115	$ 135,700	$ 86,400	$ 222,100	$ 66,630	$ 288,730	$ 37,535	$ 326,300		$ -	100%	$ 326,300		$ -	High Priority
P-2750-0067	Elm Ave.-Wellwood Ave. Alley, 7th St. to 5th St.	8	600	9		115	$ 69,000	$ 24,300	$ 93,300	$ 27,990	$ 121,290	$ 15,768	$ 137,100		$ -	100%	$ 137,100		$ -	High Priority
P-2750-0068	Elm Ave., 6th to 7th	8	440	3		115	$ 50,600	$ 8,100	$ 58,700	$ 17,610	$ 76,310	$ 9,920	$ 86,300		$ -	100%	$ 86,300		$ -	High Priority
P-2750-0069	Egan Ave-California Ave. Alley, 5th to 7th	8	810	16		115	$ 93,150	$ 43,200	$ 136,350	$ 40,905	$ 177,255	$ 23,043	$ 200,300		$ -	100%	$ 200,300		$ -	High Priority
P-2750-0070	Twelfth St., Michigan Ave. to Pennsylvania Ave.	12	810	16		152	$ 123,120	$ 43,200	$ 166,320	$ 49,896	$ 216,216	$ 28,108	$ 244,400		$ -	100%	$ 244,400		$ -	2025
P-2750-0071	Oak Valley Pkwy, Elm Ave. to Michigan Ave	16	4720	0		197	$ 929,840	$ -	$ 929,840	$ 278,952	$ 1,208,792	$ 157,143	$ 1,366,000	100%	$ 1,366,000		$ -		$ -	2025
P-2750-0072	Ring Ranch Rd extension, across Noble Cr. to Kirkwood Ranch Project	16	1290	0	Tract	369	$ 476,010	$ -	$ 476,010	$ 142,803	$ 618,813	$ 80,446	$ 699,300	100%	$ 699,300		$ -		$ -	With Kirkwood Ranch 2020
P-2750-0073	Ring Ranch/Kirkwood Ranch Well Discharge Pipeline	12	125	0	Tract	87	$ 10,875	$ -	$ 10,875	$ 3,263	$ 14,138	$ 1,838	$ 16,000	100%	$ 16,000		$ -		$ -	With Well 2035
P-2750-0074	Kirkowood Ranch, Oak Valley Pkwy to I-10 (existing pipe)	16	4480	0	Tract	123	$ 551,040	$ -	$ 551,040	$ 165,312	$ 716,352	$ 93,126	$ 809,500	100%	$ 809,500		$ -		$ -	With Kirkwood Ranch 2020
P-2750-0075	Kirkwood Ranch Well Discharge Pipeline	12	300	0	Tract	87	$ 26,100	$ -	$ 26,100	$ 7,830	$ 33,930	$ 4,411	$ 38,400	100%	$ 38,400		$ -		$ -	With Well 2025
P-2750-0076	Sunny Cal Egg Ranch, mainline	8	2230	0	Tract	58	$ 129,340	$ -	$ 129,340	$ 38,802	$ 168,142	$ 21,858	$ 190,100		$ -		$ -	100%	$ 190,100	2020
P-2750-0077	Brookside Ave., Oak View Dr. to Mountain View Channel	24	1900	0		298	$ 566,200	$ -	$ 566,200	$ 169,860	$ 736,060	$ 95,688	$ 831,800	100%	$ 831,800		$ -		$ -	Build Out
P-2750-0078	Parallel Mtn View Channel, Brookside to Cougar Way	24	2600	0		298	$ 774,800	$ -	$ 774,800	$ 232,440	$ 1,007,240	$ 130,941	$ 1,138,200	100%	$ 1,138,200		$ -		$ -	Build Out
P-2750-0079	Cougar Way, Mountain View Channel to Cherry Ave.	24	5000	0		298	$ 1,490,000	$ -	$ 1,490,000	$ 447,000	$ 1,937,000	$ 251,810	$ 2,188,900	100%	$ 2,188,900		$ -		$ -	Build Out
P-2750-0080	Palm Ave., Cougar Way to Oak Valley Pkwy	24	2600	0		298	$ 774,800	$ -	$ 774,800	$ 232,440	$ 1,007,240	$ 130,941	$ 1,138,200	100%	$ 1,138,200		$ -		$ -	Build Out
																			$ -	
																			$ -	
																			$ -	
																			$ -	
																			$ -	
																			$ -	
Subtotals			154460	649			$ 29,033,520	$ 1,752,300	$ 30,785,820	$ 9,235,746	$ 40,021,566	$ 5,202,804	$ 45,228,500		$ 31,466,000		$ 11,278,900		$ 2,483,600	

	Magnolia Ave. & Orange Ave., 11th to 12th (Abandon Pipelines)	8	0	1		115	$ -	$ 2,700	$ 2,700	$ 810	$ 3,510	$ 456	$ 4,000		$ -	100%	$ 4,000		$ -	With -0061, 2030
	Wellwood Ave., 9th to 10th (Abandon Pipeline)	8	0	24		115	$ -	$ 64,800	$ 64,800	$ 19,440	$ 84,240	$ 10,951	$ 95,200		$ -	100%	$ 95,200		$ -	2025
	Chestnut Michigan 8th to 11th Easement (Abandon pipeline)	8	0	0		115	$ -	$ -	$ -	$ -	$ -	$ -	$ -		$ -	100%	$ -		$ -	2025
	Elm Wellwood Alley 8th to 10th (Abandon Pipe)	8	0	30		115	$ -	$ 81,000	$ 81,000	$ 24,300	$ 105,300	$ 13,689	$ 119,000		$ -	100%	$ 119,000		$ -	2025
	Wellwood California Alley 8th to 10th (Abandon pipe)	8	0	15		115	$ -	$ 40,500	$ 40,500	$ 12,150	$ 52,650	$ 6,845	$ 59,500		$ -	100%	$ 59,500		$ -	2025
	Chestnut Michigan 5th to 6th (Abandon Pipeline)	8	0	5		115	$ -	$ 13,500	$ 13,500	$ 4,050	$ 17,550	$ 2,282	$ 19,900		$ -	100%	$ 19,900		$ -	2025
	Beaumont 5th to 6th (Abandon pipeline)	8	0	8		115	$ -	$ 21,600	$ 21,600	$ 6,480	$ 28,080	$ 3,650	$ 31,800		$ -	100%	$ 31,800		$ -	2025
	Euclid Beaumont Alley, 8th to 10th (Abandon pipe)	8	0	3		115	$ -	$ 8,100	$ 8,100	$ 2,430	$ 10,530	$ 1,369	$ 11,900		$ -	100%	$ 11,900		$ -	with -0054, 2030
	Fourth St, Grace to Walnut (Abandon Pipeline)	8	0	10		115	$ -	$ 27,000	$ 27,000	$ 8,100	$ 35,100	$ 4,563	$ 39,700		$ -	100%	$ 39,700		$ -	2025

Total Incl Serivice Relocations for abandoned lines		154460	745			$ 29,033,520	$ 2,011,500	$ 31,045,020	$ 9,313,506	$ 40,358,526	$ 5,246,608	$ 45,609,500		$ 31,466,000		$ 11,659,900		$ 2,483,600	

Pipeline Schedule Dsitribution < 16-in

High Priority & 2020		$ 1,887,200		$ -		$ 1,339,200		$ 548,000
2025		$ 4,305,100		$ 38,400		$ 4,043,400		$ 223,300
2030		$ 5,809,200		$ -		$ 5,809,200		$ -
2035		$ 560,800		$ 16,000		$ 468,100		$ 76,700
2040		$ 1,072,300		$ -		$ -		$ 1,072,300
2045								
Buildout								
Total Distribution		$ 13,634,600		$ 54,400		$ 11,659,900		$ 1,920,300

Pipeline Schedule Transmission 16-in and larger

High Priority & 2020		$ 2,072,100		$ 1,508,800		$ -		$ 563,300
2025		$ 1,795,100		$ 1,795,100		$ -		$ -
2030		$ 7,881,400		$ 7,881,400		$ -		$ -
2035		$ 2,635,500		$ 2,635,500		$ -		$ -
2040		$ 2,682,300		$ 2,682,300		$ -		$ -
2045								
Buildout		$ 14,908,500		$ 14,908,500		$ -		$ -
Total Transmission		$ 31,974,900		$ 31,411,600		$ -		$ 563,300

Master Plan 2650 Zone

								Funding Sources						
								Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2650-0001	Cherry Valley Blvd north to 2650/2520 Pressure Regulator	16	600	$ 22,140	$ 95,940	$ 12,472	$ 108,500	100%	$ 108,500		$ -		$ -	With 2520 Zone tank Build Out
P-2650-0002	Cherry Valley Blvd, Well 29 to new well 1640 ft west	24	1640	$ 146,616	$ 635,336	$ 82,594	$ 718,000	100%	$ 718,000		$ -		$ -	With new well -0006, 2035
P-2650-0003	New Well Discharge Pipe	12	190	$ 8,664	$ 37,544	$ 4,881	$ 42,500	100%	$ 42,500		$ -		$ -	With new well -0006, 2035
P-2650-0004	Cherry Valley Blvd., new well to new well at I-10	24	1850	$ 165,390	$ 716,690	$ 93,170	$ 809,900	100%	$ 809,900		$ -		$ -	With new well -0007, Build out
P-2650-0005	New Well Discharge Pipe	12	180	$ 8,208	$ 35,568	$ 4,624	$ 40,200	100%	$ 40,200		$ -		$ -	With new well -0007, Build out
P-2650-0006	Cherry Valley Blvd I-10 Bridge Crossing	24	1220	$ 218,136	$ 945,256	$ 122,883	$ 1,068,200	100%	$ 1,068,200		$ -		$ -	Trans Bridge Work 2025
P-2650-0007	Desert Lawn Dr., Cherry Valley Blvd to Champions	18	8430	$ 579,141	$ 2,509,611	$ 326,249	$ 2,835,900	100%	$ 2,835,900		$ -		$ -	2030
P-2650-0008	Sunny Cal Egg Ranch, Cherry Valley Blvd South	18	630	$ 26,838	$ 116,298	$ 15,119	$ 131,500	100%	$ 131,500		$ -		$ -	2020
P-2650-0009	Sunny Cal Egg Ranch	12	1440	$ 37,584	$ 162,864	$ 21,172	$ 184,100		$ -		$ -	100%	$ 184,100	2020
P-2650-0010	Sunny Call Egg Ranch, Brookside Ave. north	18	900	$ 38,340	$ 166,140	$ 21,598	$ 187,800	100%	$ 187,800		$ -		$ -	2020
P-2650-0011	Brookside Ave., Sunny Cal Entrance to Deodar St.	16	2250	$ 132,975	$ 576,225	$ 74,909	$ 651,200	100%	$ 651,200		$ -		$ -	With Sunny Cal project 2020
P-2650-0012	Brookside Ave.,New Well Discharge Pipe to Sunny Cal Entrance Rd.	12	680	$ 17,748	$ 76,908	$ 9,998	$ 87,000	100%	$ 87,000		$ -		$ -	With new well -0004, 2025
P-2650-0013	New Sunny Cal Egg Ranch Well, east, discharge pipe to Brookside Ave.	12	800	$ 20,880	$ 90,480	$ 11,762	$ 102,300	100%	$ 102,300		$ -		$ -	With new well -0002, 2020
P-2650-0014	Well discharge pipe, north of Brookside Ave. at Deodar St.	12	190	$ 8,664	$ 37,544	$ 4,881	$ 42,500	100%	$ 42,500		$ -		$ -	With new well -0003, 2020
P-2650-0015	Well discharge pipe, north of Brookside Ave. at Riverside Co. Property	12	200	$ 9,120	$ 39,520	$ 5,138	$ 44,700	100%	$ 44,700		$ -		$ -	With new well -0005, 2030

Table 7-23
Master Plan Pipelines
2650 Pressure Zone

P-2650-0016	Ryland Well discharge pipe	12	360	$ 16,416	$ 71,136	$ 9,248	$ 80,400	100%	$ 80,400		$ -		$ -	With Ryland Well -0001, 2020
P-2650-0017	Cherry Valley Blvd, Champions Dr., to Oak Valley Pkwy	18	5400	$ 230,040	$ 996,840	$ 129,589	$ 1,126,500	100%	$ 1,126,500		$ -		$ -	2020
P-2650-0018	Oak Valley Pkwy, Cherry Valley Blvd. to San Timoteo Stream Crossing	18	5320	$ 365,484	$ 1,583,764	$ 205,889	$ 1,789,700	100%	$ 1,789,700		$ -		$ -	2020
P-2650-0019	San Timoteo Stream Crossing	24	1430	$ 383,526	$ 1,661,946	$ 216,053	$ 1,878,000	100%	$ 1,878,000		$ -		$ -	With San Timoteo -0001, 2020
P-2650-0020	Oak Valley Pkwy., San Timoteo Stream Crossing to end of pipe at Pardee Sun Cal	24	1480	$ 132,312	$ 573,352	$ 74,536	$ 647,900	100%	$ 647,900		$ -		$ -	With Oak Valley Pkwy San Timoteo Stream Crossing to end of pipe at Pardee -0001, 2020
P-2650-0021	Through Heartland, San Timoteo Crossing to Potrero Blvd	24	6160	$ 365,904	$ 1,585,584	$ 206,126	$ 1,791,800	100%	$ 1,791,800		$ -		$ -	2025
P-2650-0022	Heartland, Albany Lane	12	2160	$ 56,376	$ 244,296	$ 31,758	$ 276,100		$ -		$ -	100%	$ 276,100	2020
P-2650-0023	Heartland, Denver Court	12	270	$ 7,047	$ 30,537	$ 3,970	$ 34,600		$ -		$ -	100%	$ 34,600	2020
P-2650-0024	In Heartland 2650 Zone, south and west loop	12	5840	$ 152,424	$ 660,504	$ 85,866	$ 746,400		$ -		$ -	100%	$ 746,400	With 2650 west in Legacy Highlands 2030
P-2650-0025	In Potrero, Heartland to Fourth St	30	4130	$ 356,832	$ 1,546,272	$ 201,015	$ 1,747,300	100%	$ 1,747,300		$ -		$ -	2025
P-2650-0026	In Potrero, Fourth St. to 2650/2520 PRV at 2520 Tank Site in Legacy Highlands	30	2300	$ 198,720	$ 861,120	$ 111,946	$ 973,100	100%	$ 973,100		$ -		$ -	With In Potrero Fourth St to PRV at Tank Site in -0001, 2025
P-2650-0027	At 2520 Tank Site, Main Line to 2650/2520 PRV	24	300	$ 17,820	$ 77,220	$ 10,039	$ 87,300	100%	$ 87,300		$ -		$ -	2025
P-2850-0028	Starlight Ave., Cougar Way to Well 25	24	1220	$ 109,068	$ 472,628	$ 61,442	$ 534,100	100%	$ 534,100				$ -	Constructed, to be funded
P-2650-0028	In Potrero Blvd south toward to 2650 Tank Site	30	3060	$ 264,384	$ 1,145,664	$ 148,936	$ 1,294,700	100%	$ 1,294,700		$ -		$ -	With 2650 Tank in Legacy Highlands 2030
P-2850-0030	Starlight Ave., Cougar Way to Brookside Ave	24	2582	$ 153,371	$ 664,607	$ 86,399	$ 751,100	100%	$ 751,100		$ -		$ -	Constructed, to be funded

P-2650-0030	In Fourth St, 2750/2650 PRV to Potrero Blvd	18	3700	$ 157,620	$ 683,020	$ 88,793	$ 771,900	100%	$ 771,900		$ -		$ -	2025
P-2650-0031	In Fourth St, Potrero Blvd to Hidden Canyon	18	3890	$ 165,714	$ 718,094	$ 93,352	$ 811,500	100%	$ 811,500		$ -		$ -	2025
P-2650-0032	In Potrero Blvd, Heartland to San Timoteo Creek (serves Heartland e/o Potrero)	16	1620	$ 59,778	$ 259,038	$ 33,675	$ 292,800	100%	$ 292,800		$ -		$ -	2020
P-2650-0033	In Heartland 2650 Zone north side, e/o Potrero, from Potrero to RR crossing at Aim-All Storage	16	5070	$ 187,083	$ 810,693	$ 105,390	$ 916,100	100%	$ 916,100		$ -		$ -	2025
P-2650-0034	In Heartland 2650 Zone south side, e/o Potrero, from Potrero to RR crossing at Aim-All Storage	16	6940	$ 256,086	$ 1,109,706	$ 144,262	$ 1,254,000	100%	$ 1,254,000		$ -		$ -	2025
P-2650-0035	In Heartland 2650 Zone e/o Potrero	12	5670	$ 147,987	$ 641,277	$ 83,366	$ 724,700		$ -		$ -	100%	$ 724,700	2025
P-2650-0036	Railroad Crossing at Aim All Storage	18	340	$ 70,074	$ 303,654	$ 39,475	$ 343,200	100%	$ 343,200		$ -		$ -	2035
	Totals		90442	$ 5,294,510	$ 22,942,876	$ 2,982,574	$ 25,927,500		$ 23,961,600	$ -	$ -		$ 1,965,900	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 720,000		$ 225,200		$ -		$ 494,800
2025		$ 811,700		$ 87,000		$ -		$ 724,700
2030		$ 791,100		$ 44,700		$ -		$ 746,400
2035		$ 42,500		$ 42,500		$ -		$ -
2040								
2045								
Buildout		$ 40,200		$ 40,200		$ -		$ -
Total Distribution		$ 2,405,500		$ 439,600		$ -		$ 1,965,900

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020		$ 6,705,400		$ 6,705,400		$ -		$ -
2025		$ 9,955,300		$ 9,955,300		$ -		$ -
2030		$ 4,881,700		$ 4,881,700		$ -		$ -
2035		$ 1,061,200		$ 1,061,200		$ -		$ -
2040								
2045								
Buildout		$ 918,400		$ 918,400		$ -		$ -
Total Transmission		$ 23,522,000		$ 23,522,000		$ -		$ -

Master Plan 2520 Zone

													Funding Sources						
													Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2520-0001	Cherry Valley Blvd., 2520 Tank to I-10	24	2770	0		298	$ 825,460	$ -	$ 825,460	$ 247,638	$ 1,073,098	$ 139,503	$ 1,212,700	100%	$ 1,212,700		$ -		$ -	With 2520 Tank N/o I-10 Build out
P-2520-0002	I-10 Bridge Crossing	24	980	0		596	$ 584,080	$ -	$ 584,080	$ 175,224	$ 759,304	$ 98,710	$ 858,100	100%	$ 858,100		$ -		$ -	2025
P-2520-0003	Cherry Valley Blvd., End Ex. 24-in to Suncal PA 17	24	560	0	Tract	198	$ 110,880	$ -	$ 110,880	$ 33,264	$ 144,144	$ 18,739	$ 162,900	100%	$ 162,900		$ -		$ -	2020
P-2520-0004	Cherry Valley Blvd.,Suncal PA 17 to PA 22/26	24	2770	0	Tract	198	$ 548,460	$ -	$ 548,460	$ 164,538	$ 712,998	$ 92,690	$ 805,700	100%	$ 805,700		$ -		$ -	2020
P-2520-0005	Cherry Valley Blvd.,Suncal PA 22/27 to Oak Valley Pkwy	24	1990	0	Tract	198	$ 394,020	$ -	$ 394,020	$ 118,206	$ 512,226	$ 66,589	$ 578,900	100%	$ 578,900		$ -		$ -	2020
P-2520-0006	Oak Valley Pkwy., Cherry Valley Blvd to San Tim Crossing at Hidden Can	24	5370	0		298	$ 1,600,260	$ -	$ 1,600,260	$ 480,078	$ 2,080,338	$ 270,444	$ 2,350,800	100%	$ 2,350,800		$ -		$ -	2020
P-2520-0007	San Timoteo Stream Crossing	24	1430	0		894	$ 1,278,420	$ -	$ 1,278,420	$ 383,526	$ 1,661,946	$ 216,053	$ 1,878,000	100%	$ 1,878,000		$ -		$ -	2020
P-2520-0008	In Heartland 2520 Tract, stream crossing to Clifton Way	24	4100	0	Tract	198	$ 811,800	$ -	$ 811,800	$ 243,540	$ 1,055,340	$ 137,194	$ 1,192,600	100%	$ 1,192,600		$ -		$ -	2020
P-2520-0009	In Hearland 2520 Tract, Clifton Way to Potrero	30	3900	0	Tract	288	$ 1,123,200	$ -	$ 1,123,200	$ 336,960	$ 1,460,160	$ 189,821	$ 1,650,000	100%	$ 1,650,000		$ -		$ -	2020
P-2520-0010	In Potrero from Heartland to 2520 Tank in Legacy Highlands (Preserve)	30	6280	0	Tract	288	$ 1,808,640	$ -	$ 1,808,640	$ 542,592	$ 2,351,232	$ 305,660	$ 2,656,900	100%	$ 2,656,900		$ -		$ -	with 2520 Tank in Legacy Highlands (Preserve) 2020
P-2520-0011	In Heartland Tract 2520 Zone	12	290	0	Tract	87	$ 25,230	$ -	$ 25,230	$ 7,569	$ 32,799	$ 4,264	$ 37,100		$ -		$ -	100%	$ 37,100	2020
P-2520-0012	In Heartland Tract 2520 Zone	12	450	0	Tract	87	$ 39,150	$ -	$ 39,150	$ 11,745	$ 50,895	$ 6,616	$ 57,600		$ -		$ -	100%	$ 57,600	2020
P-2520-0013	Tournament Hills n/o Oak Valley Pkwy, PA 15	12	1960	0	Tract	87	$ 170,520	$ -	$ 170,520	$ 51,156	$ 221,676	$ 28,818	$ 250,500		$ -		$ -	100%	$ 250,500	2025
P-2520-0014	Sun Cal n/o Oak Valley, e/o Cherry Valley Blvd	12	5140	0	Tract	87	$ 447,180	$ -	$ 447,180	$ 134,154	$ 581,334	$ 75,573	$ 657,000		$ -		$ -	100%	$ 657,000	2025
P-2520-0015	Sun Cal n/o Oak Valley, w/o Cherry Valley Blvd, PA 20 thru 22	12	5500	0	Tract	87	$ 478,500	$ -	$ 478,500	$ 143,550	$ 622,050	$ 80,867	$ 703,000		$ -		$ -	100%	$ 703,000	2020
P-2520-0016	Sun Cal n/o Oak Valley, w/o Cherry Valley Blvd, PA17 and 18	12	350	0	Tract	87	$ 30,450	$ -	$ 30,450	$ 9,135	$ 39,585	$ 5,146	$ 44,800		$ -		$ -	100%	$ 44,800	2020
P-2520-0017	Sun Cal 2520/2370 Regulator at 2370 Tank Site to Nicklaus Nook easement casing	18	2690	0	Tract	142	$ 381,980	$ -	$ 381,980	$ 114,594	$ 496,574	$ 64,555	$ 561,200	100%	$ 561,200		$ -		$ -	with Sun Cal PA 19 & 20 2025
	Totals		46530	0		4118	$ 10,658,230	$ -	$ 10,658,230	$ 3,197,469	$ 13,855,699	$ 1,801,241	$ 15,657,800		$ 13,907,800		$ -		$ 1,750,000	

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020		$ 842,500		$ -		$ -		$ 842,500
2025		$ 907,500		$ -		$ -		$ 907,500
2030								
2035								
2040								
2045								
Buildout								
Total Distribution		$ 1,750,000		$ -		$ -		$ 1,750,000

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020		$ 11,275,800		$ 11,275,800		$ -		$ -
2025		$ 1,419,300		$ 1,419,300		$ -		$ -
2030								
2035								
2040								
2045								
Buildout		$ 1,212,700		$ 1,212,700		$ -		$ -
Total Transmission		$ 13,907,800		$ 13,907,800		$ -		$ -

Table 7- 24
Master Plan Pipelines
2520 Pressure Zone

Master Plan 2370 Zone

														Funding Sources						
														Facilties Fee		Depreciation		Developer		Priority
Project No.	Title/Description	Dia, in	Length, ft	Services Affected	Installation Condition, Blank if "Special" or not Tract	Unit Cost, $/ft	Pipeline Cost	Service Line Replacements and Tie ins	Subtotal	Contingnecy	Subtotal Construction Cost	Engineering, and Othr Costs	Total Project Cost	%	Amount	%	Amount	%	Amount	
P-2370-0001	From 2370 Tank to end of ex 16-in on Miller Pl.	16	2700	0	Tract	123	$ 332,100	$ -	$ 332,100	$ 99,630	$ 431,730	$ 56,125	$ 487,900	100%	$ 487,900		$ -		$ -	With 2370 Zone Tank or Sun Cal PA 19 & 20 which ever first 2025
	Totals		2700	0			$ 332,100	$ -	$ 332,100	$ 99,630	$ 431,730	$ 56,125	$ 487,900		$ 487,900		$ -		$ -	

100%

Pipeline Schedule Dsitribution < 16-in								
High Priority & 2020			100%					
2025								
2030								
2035								
2040								
2045								
Buildout								
Total Distribution		$ -		$ -		$ -		$ -

Pipeline Schedule Transmission 16-in and larger								
High Priority & 2020								
2025		$ 487,900		$ 487,900		$ -		$ -
2030								
2035								
2040								
2045								
Buildout								
Total Transmission		$ 487,900		$ 487,900		$ -		$ -

$ -

Table 7-25
Master Plan Pipelines
2370 Pressure Zone
Page 1 of 1

Section 8

Priorities, Funding and Implementation

Water Resource Priorities

Immediate Priorities

The water resources element of this master plan is based on specific assumptions. To ensure adequate water supply, the following actions should be undertaken immediately.

- Implement a recycled water connection and supply from YVWD as soon as possible. Continue discussions with the City of Beaumont for use of the City's recycled water whenever it is available. Any recycled water brought in and used will immediately reduce the demand on the potable water system and reduce BCVWD's extractions from the Beaumont Basin.
- The current state-wide drought has limited water availability from the SWP to the SGPWA, but at some point in the future it is expected that normal or "wet" condition will occur. Regardless, BCVWD should continue purchasing of as much imported SPW as is made available by the SGPWA. With the completion of EBXII, more of the Agency's SPW Table A should be available during the next decade and BCVWD needs to take advantage of this. As time goes on, other agencies, such as the City of Banning and others will be needing more SPW which will decrease the amount available to BCVWD.
- Direct SGPWA to purchase as much Article 21 water as is available. This is surplus water, available during wet years and does not "count against" the Agency's Table A amount. This water is available on short notice, but that does not matter, since BCVWD has more than ample recharge capacity with the completion of construction of the second phase of the recharge facilities. Again the completion of EBXII will facilitate the conveyance of Article 21 water.
- SGPWA or BCVWS should consider short or long term lease of State Water Project Table A from other State Water Contractors who currently have a surplus of Table A such as San Bernardino Valley MWD (Valley District). This would provide water in BCVWD's storage account to allow BCVWD to "weather the next drought."
- Maximize the capture and recharge of local storm water. Implement the Grand Ave. Storm Water Project. Consider construction of temporary dikes and levees in Noble Creek, between Beaumont Ave. and the I-10 Freeway crossing, to capture and percolate runoff. Develop a method for accounting for this percolated water with Watermaster.
- Work with the City of Beaumont to change out turf and high water using plants in medians and street common areas with drought tolerant landscaping and drip irrigation. Require the use of smart irrigation controllers on all recycled water connections to save as much recycled water for advanced treatment and indirect potable reuse.
- Work with the City of Beaumont and the County of Riverside to strengthen their existing landscape ordinances to conform to the SWRCB 2015 Model Water Efficient Landscape Ordinance to reduce outdoor water use even more.

These actions should occur simultaneously; implementation of some of these will likely require CEQA action.

Long Term Actions

- SGPWA or BCVWD should look for additional imported water supplies which could take the form of short- or long-term leases of water from other State Water Contractors that have surplus of Table A at the present time. Work with SGPWA to bring this water in through the EBX.
- SGPWA or BCVWD to purchase additional Table A water needed to meet build-out demands.
- Carefully consider participation in other regional water resource projects as a partner. These projects could involve brackish groundwater or sea water desalination or advanced water recycling facilities. As a partner, BCVWD could exchange their capacity with other partners for imported SWP delivered through EBX. This would have to be coordinated with and worked out with SGPWA.
- Implement advanced water recycling treatment to permit recharge of recycled water which is not needed to meet demands.
- Continue to look for additional storm water capture programs.

Facility Priorities

Facilities Needed for Build-out

The proposed facilities needed to accommodate projected development to build-out of BCVWD's service area are identified and summarized in Section 7 by pressure zone, the year needed, funding source, etc.. The major transmission and distribution facilities needed for each pressure zone are also summarized in Section 7 by pressure zone along with estimated year needed, funding source,.etc. Note the costs are all 2014 costs, Engineering News Record Construction Cost Index (ENRCCI) of 9,845. These facilities will serve an additional 22,511 EDUs.

Immediate Priority

There are several projects that should be implemented as quickly as possible to ensure adequate reliability of supply.

- Upgrade of the Noble Booster located at the 1 MG Noble Tank. These booster pumps move water from the 3040 Pressure Zone to the 3330 Pressure Zone. With reduced production from Edgar Canyon during the current drought, the Noble Booster has been required to pump more water than in years past. Under a worst case, minimum supply condition in Edgar Canyon, 694 gpm are needed to be boosted from the 3040 Pressure Zone to the 3330 Pressure Zone on the maximum day. This is the current need (2013). There is only one pump rated at 500 gpm. Pump capacity has been satisfactory thus far because the District has not yet experienced a worst case condition in Edgar Canyon and the District's customers have been consciously conserving water. But if the single pump should ever be inoperable, the ability to supply water to the 3330 Pressure Zone would be severely hampered. A temporary emergency "Rain-for-Rent" or equivalent pump could be obtained and installed, but even that would take a number of days. In summary, the Noble Booster Pump Station should be upgraded as described in Section 6 as soon as possible.

- Data from 2013 indicates the demand in the Highland Springs Hydropneumatic Zone exceeds the capacity of a single pump at the peak hours. Review the impacts of recent water conservation on water use to determine if this is still occurring. Add a third booster pump, 150 gpm, 120 ft, 10 HP at Highland Springs Hydropneumatic Booster Pump Station to have firm capacity to meet peak hour demands on the maximum day if needed to meet peak demands.
- Add a high flow pump, 1,000 gpm, 120 ft, 50 HP, at Highland Springs Hydropneumatic Booster Pump Station to meet minimum 1,000 gpm fire flow requirements.
- The firm well capacity in the 2850 Pressure Zone is currently not adequate. Meeting demands during outage of one of the wells is described in Section 6. Additional well capacity, (three wells to meet firm capacity needs), will be needed by year 2020. In the interim, running pumps during peak power demand times may be cost effective in the short term due to the cyclic nature of the cost of well drilling. The other two wells can be added between 2015 and 2020.
- Wells 1 and 2 in the 2750 Pressure Zone should be replaced as soon as possible to meet firm capacity requirements for wells in the 2750 Pressure Zone.
- Well 29 is the only well in the 2650 Pressure Zone. When it is out of service, water must be released from the 2750 Zone through a pressure regulator. The firm well capacity in the 2750 Pressure Zone is currently not able to meet maximum day demands in the 2750 Pressure Zone. Requiring the 2750 Pressure Zone Wells to “cover for an inoperative Well 29” will stress the well capacity in the 2750 Pressure Zone. The 2650 Pressure Zone also supplies the 2520 and 2370 Pressure Zones. To meet firm capacity three new 2650 Pressure Zone wells are needed by 2020. In the interim, running pumps during peak power demand times may be cost effective in the short term due to the cyclic nature of the cost of well drilling.
- Begin replacing high priority, high leak potential water distribution pipelines.
- Replace undersized mains (6-in diameter and below) particularly in the 2750, 2850 and 3040 pressure zones.
- In the “Mesa Area” (3330 and 3620 Pressure Zones) replace older mains and relocate to streets. This should be done by 2030 if possible.
- Replace the old steel Edgar Canyon main above Upper Edgar Reservoir and the “A” and “B” lines below Upper Edgar Reservoir as requested by the Division of Drinking Water.

Funding Sources

There are a number of funding sources for master plan projects; these are described briefly in the subsections that follow:

Federal and State Grants and Loans

There are a number of State and federal grant and loan programs available for drinking water, groundwater protection, stormwater capture and recycled water. As projects are being considered for implementation, the availability of grants and low interest loans should be investigated.

US Department of Agriculture, Rural Development (USDA RD).

To qualify, applicants must be unable to obtain the financing from other sources at rates and terms they can afford and/or their own resources. Funds can be used for construction, land acquisition, legal fees, engineering fees, capitalized interest, equipment, initial operation and maintenance costs, project contingencies, and any other cost that is determined by the Rural Development to be necessary for the completion of the project. Projects must be primarily for the benefit of rural users.

It is doubtful BCVWD would qualify for this type of financial assistance.

State Revolving Fund

The State Water Resources Control Board (SWRCB), Division of Finance, now administers the Safe Drinking Water State Revolving Fund (DWSRF) to assist public water systems in financing the cost of drinking water infrastructure projects needed to achieve or maintain compliance with SDWA requirements and to further the public health objectives of the Safe Drinking Water Act (SDWA). The projects which are typically funded under the DWSRF program are those projects that: 1) address the most serious risk to human health, 2) are necessary to ensure compliance with the requirements of the SDWA, and 3) assist systems most in need on a per household basis. Projects are ranked by the categories; those that will solve public health issues are given the highest priority followed by source capacity and reliability issues, secondary risks and other projects. Extra consideration is given to disadvantaged communities[1] and severely disadvantaged communities[2]. Grants are available, but they are generally limited to very small, generally underfunded, water districts and non-profit water companies. The loans are typically 20-year payoff with very low interest rate – around 2% or so. As a rule the DWSRF, like other SRFs, do not provide funding for growth. Since most of the projects identified in the master plan are for growth, there is very little likelihood any of the District's master plan projects would be given a high enough ranking to be funded.

It is possible that replacement of the old transmission mains in Edgar Canyon could be fundable under the DWSRF program since these mains are needed to supply the 3620 and 3330 Pressure Zones. Replacing the mains would improve reliability. Because of the low interest rate, BCVWD should consider applying for DWSRF funding for projects that could potentially qualify. Providing treatment for hexavalent chromium or nitrates, if it becomes a problem in the future, may be fundable under the SRF program, also.

There are also grants and low interest loans available from the Water Recycling Funding Program (WRFP) for water recycling projects. The program is described in the Non-potable Water Master Plan and is a very viable source of funding for the District.

Proposition 1, the Water Quality, Supply and Infrastructure Improvement Act of 2014 (Prop1) has funding for drinking water, storm water, groundwater and recycled water projects. The Prop 1 funding is administered by the SWRCB

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[1] The entire water service area median household income is less than 80% of the statewide median annual household income.

[2] The entire water service area median household income is less than 60% of the statewide median annual household income.

Riverside County Flood and Water Conservation District (RCFWCD)

RCFWCD has expressed an interest in funding storm water capture and water conservation facilities such as the Grand Avenue Storm Drain Project described in Table 5-12. (The Grand Avenue Storm Drain Project is currently funded through SAWPA and RCFWCD and is moving forward.) It is possible there may be other similar projects which would reduce flood potential and improve storm water conservation.

Other Direct Loans

BCVWD could take out a conventional loan for specific projects or project oversizing that are not funded from other sources. The District had such a loan to help pay for the construction of the last phase of the non-potable water system. That loan has since been repaid.

The concern with these types of loans is the interest rate is considerably higher than DWSRF and similar revolving fund loans. This could be a source of short term funding should an emergency arise.

Bonds

There are several types of bond funding available to the District:

- General Obligation Bonds
- Revenue Bonds

Bonds could be issued by the District; with the bond issue including the construction and project engineering and administration costs, construction and permitting costs, plus interest.

General Obligation Bonds

General Obligation Bonds are repaid with taxes, particularly property tax, and require a two-thirds voter approval which is generally difficult to obtain. As a result, this type of funding is probably not viable.

Revenue Bonds

Revenue bonds are repaid from the revenue obtained from water sales. Revenue bonds only require a simple majority voter approval. Since revenue bonds are backed by water revenues, the procedures in Proposition 218 are likely required to be followed. BCVWD could issue revenue bonds to cover facility replacements and rehabilitation.

Facilities Fees (Impact Fees)

Facilities fees or impact fees are paid by industrial, commercial and residential developers to fund the cost of the impacts of their developments on the District's water system. The District has collected facilities fees since the early 1980's. Facilities fees pay for oversizing of pipelines, new well, tanks, transmission mains etc. needed to serve new developments.

Any existing facility which is replaced and oversized, the oversizing portion of the cost could be funded from facilities fees.

The facility fee charges must be supported by studies documenting the needed facilities to accommodate growth and the costs for the facilities. This master plan provides such documentation.

Facility Depreciation

BCVWD sets aside funds to refurbish, rehabilitate and replace aging facilities as part of its water rate structure. This fund can be used for replacing aging pipelines up to their existing size, (any oversizing could be funded from facilities fees); rehabilitating, reconditioning, redevelopment of water wells; painting and refurbishment of tanks; and replacing and rehabilitating pumps, etc., i.e., anything that extends the useful life of a capital asset.

Front Footage Fees

BCVWD collects front footage fees for parcels connecting to existing pipelines based on the property length along the property's street frontage. For corner parcels, front footage fees are collected for both street frontages. The front footage fee rates are established by BCVWD's Board of Directors and published in BCVWD's Rules and Regulations for Water Service.

Implementation

- The first step in implementation of this Master Plan is to formally adopt the master plan, recognizing that the master plan will need to be reviewed and updated periodically – perhaps every 7 to 10 years or so. The adopted master plan should then be placed on the District's website for access by the public and developers.
- Prior to construction of any of the facilities identified in the Master Plan. CEQA documentation must be completed.
- The master plan facilities should be incorporated into the District's Geographical Information System (GIS).
- A facilities fee study should be initiated to update the District's existing facilities fee structure based on the facilities identified in this master plan as needed to accommodate growth to ultimate development. This is best accomplished by an independent consultant experienced in rate and facilities fee studies. Prior to the adoption of the revised facilities fees the Board should conduct one or two workshops with the public and developers to seek their input. The updated facilities fees should be adopted by the Board as soon as possible. The facilities fees should be reviewed the next time this master plan is updated.
- Based on the facility replacement and refurbishment requirements, BCVWD should update their 5-year capital improvement program.
- The current water rate structure, published in the District's Rules and Regulations, only extends to January 1, 2015. A water rate study should be initiated in 2016 by an independent consultant. If the rates need to be revised, the procedures required by Proposition 218 will need to be followed.

NOBEL SYSTEMS

436 E. VANDERBILT WAY, SAN BERNARDINO, CALIFORNIA 92408
Phone 1-909-890-5611

WATER MASTER PLAN

BEAUMONT CHERRY VALLEY WATER DISTRICT

3620 (NOBLE) & 3330 (MESA) ZONES

SCALE 1"=500'

SHEET NO. 1 OF 1

FILE NO.

NOBEL SYSTEMS

436 E. VANDERBILT WAY, SAN BERNARDINO, CALIFORNIA 92408
Phone 1-909-890-5611

WATER MASTER PLAN

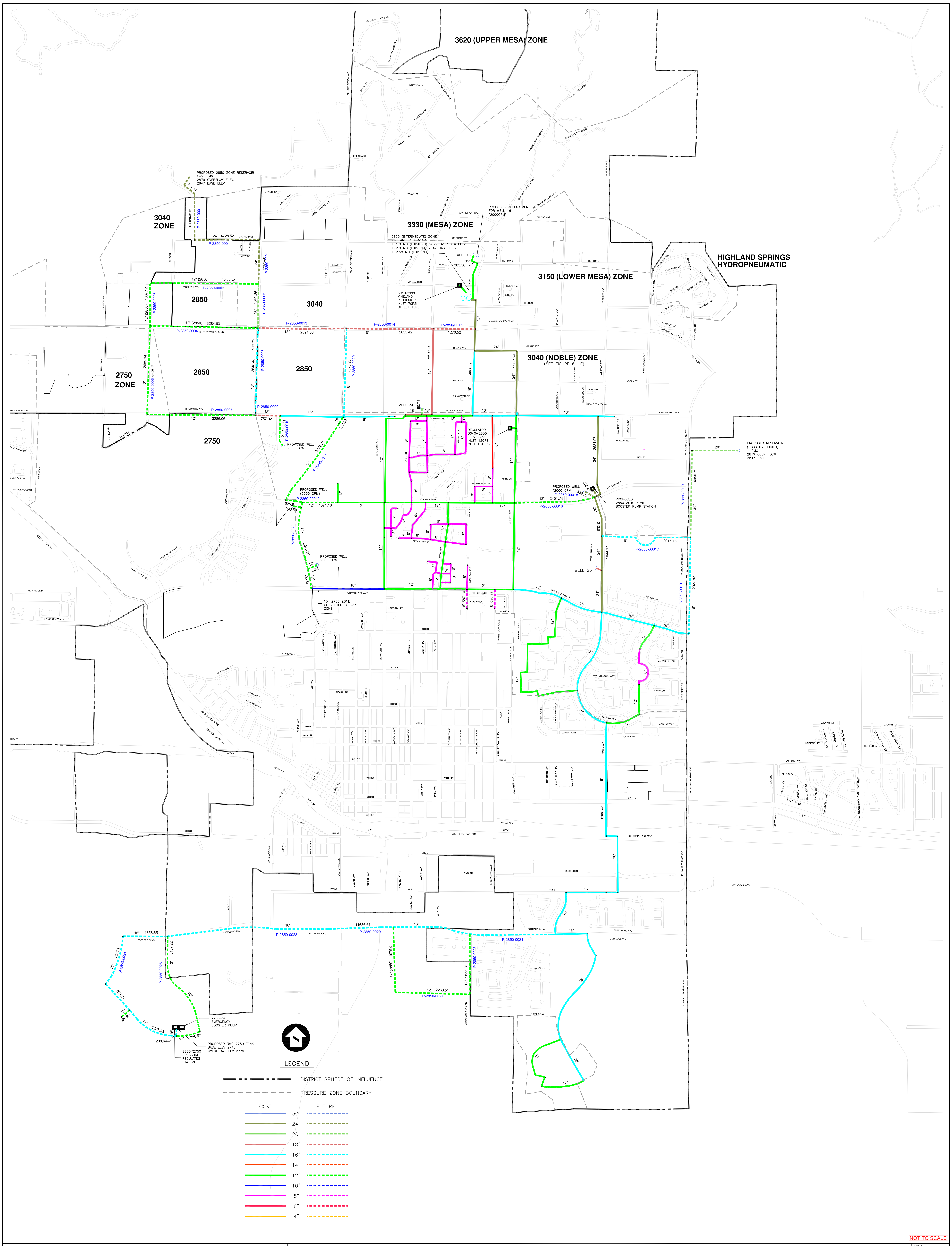
BEAUMONT CHERRY VALLEY WATER DISTRICT

3040 (NOBLE) ZONE

SCALE
1"=1000'

SHEET NO.
1 OF 1

FILE NO.



NOBEL SYSTEMS

436 E. VANDERBILT WAY, SAN BERNARDINO, CALIFORNIA 92408
Phone 1-909-890-5611

WATER MASTER PLAN

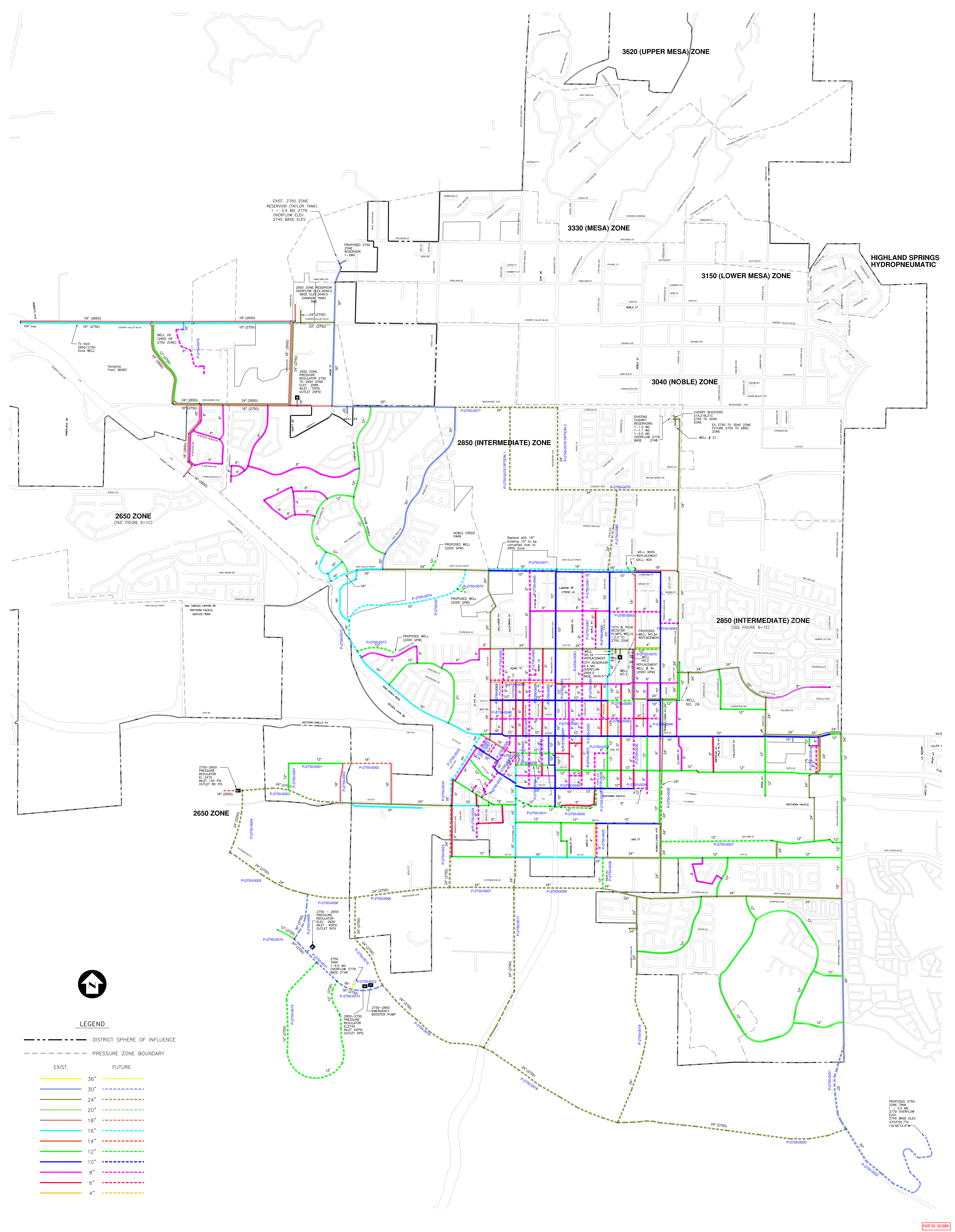
BEAUMONT CHERRY VALLEY WATER DISTRICT

2850 (BEAUMONT) ZONE

SCALE
1"=1000'

SHEET NO.
1 OF 1

FILE NO.



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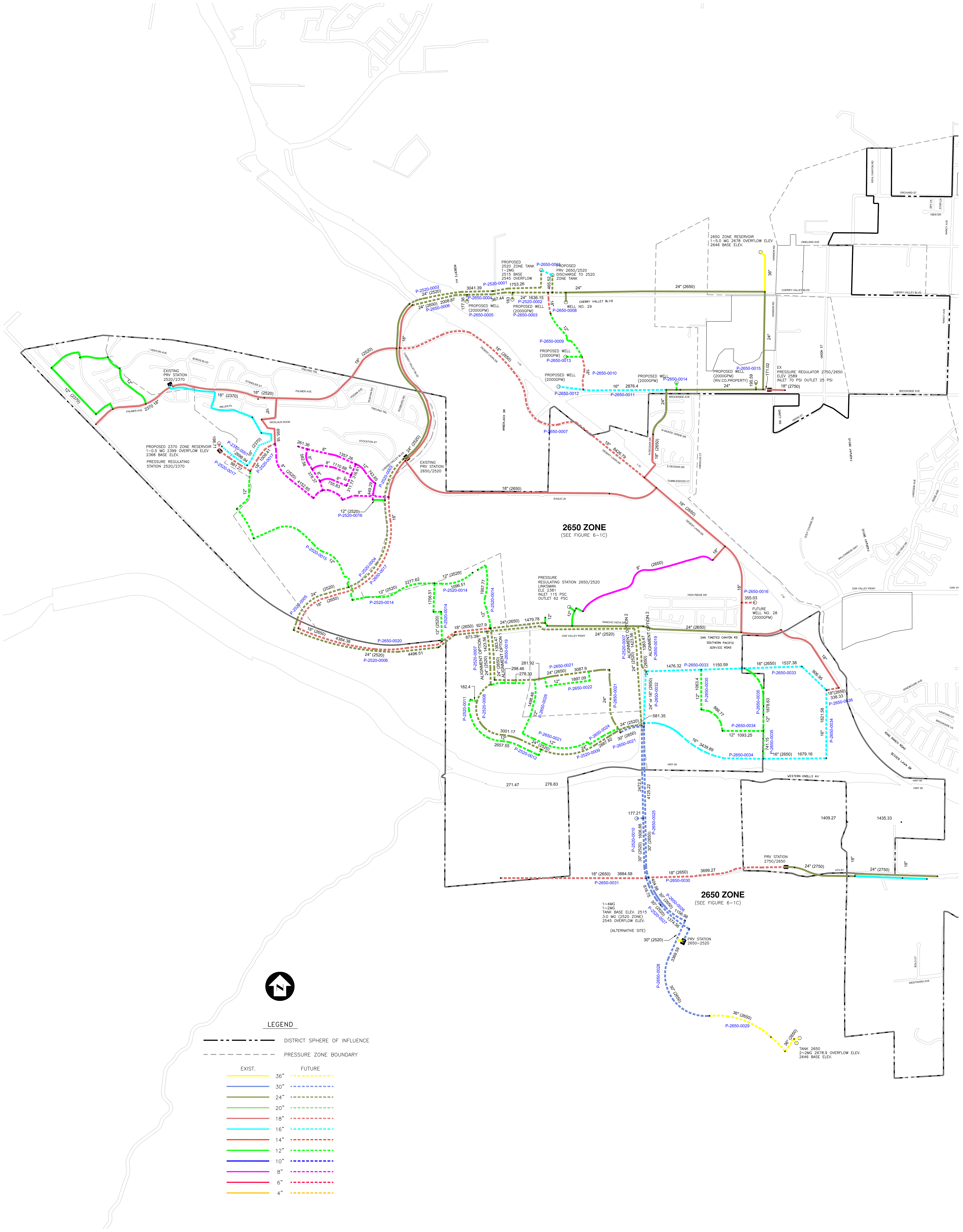
436 E. VANDERBILT WAY, SAN BERNARDINO, CALIFORNIA 92408
Phone 1-909-890-5611

WATER MASTER PLAN

BEAUMONT CHERRY VALLEY WATER DISTRICT

2750 (BEAUMONT) ZONE

SCALE 1"=1000'
SHEET NO. 1 OF 1
FILE NO.



NOT TO SCALE

NOBEL SYSTEMS

436 E. VANDERBILT WAY, SAN BERNARDINO, CALIFORNIA 92408
Phone 1-909-890-5611

WATER MASTER PLAN

BEAUMONT CHERRY VALLEY WATER DISTRICT

2650/2520/2370 ZONE

SCALE
1"=1000'

SHEET NO.
1 OF 1

FILE NO.