WATER RESOURCES ENGINEERING CONSULTANT

MARYGOLD MUTUAL WATER CO.

DOMESTIC WATER AVAILABILITY ASSESSMENT STUDY AND REPORT

FOR

VALLEY CORRIDOR SPECIFIC PLAN BLOOMINGTON

Prepared By:

ENGINEERING

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SECTION 1 - BACKGROUND AND INTRODUCTION

BACKGROUND – WATER DEMAND

A master development called "Valley Corridor" has been proposed along the Interstate 10 Freeway in the vicinity of "Bloomington", which is an area roughly between Fontana and Rialto. The development as presently configured stretches for 1.25 miles along and north of Interstate 10 Freeway from Alder Avenue on the west to Spruce Avenue on the east. The northern limit is Marygold Avenue from Alder to Linden Avenue. At Linden, the northern boundary continues eastward along Grove Place, Bloomington Avenue, and then a staggered boundary slightly north of Valley Boulevard, ending at Spruce Avenue. (refer to Figure A Placeworks)

The proposed zoning will include five major land use categories for development, each with different water demand characteristics. The entire area is approximately 355 acres including 60 acres of "unparcelized" right-of-way. Figure A shows the layout of the proposed land use districts and the different zoning designations:

- Low and Medium Density Residential
- Medium and High Density Residential
- Mixed-Use
- Bloomington Enterprise
- Commercial

For the purpose of this Domestic Water Availability Assessment (DWAS), the only concern is with the area served by the Marygold Mutual Water Company (MMWC) and which is west of Linden Avenue. The boundary of this DWAS is about ¾ of the Project Area of the Valley Corridor Specific Plan. The Project Area to the east of Linden Avenue is served by the West Valley Water District.

The area served by MMWC is quite a bit larger than the study area, and includes land to the north and the west of the study area. In the past MMWC served some area south of Interstate 10 Freeway, but that area is now served by the West Valley Water District (WVWD). In Figure B is shown the service area of the MMWC which extends to Sierra Avenue west of the study area and to San Bernardino Avenue to the north of the study area. MMWC has existing water supply facilities within the study area west of Linden Avenue. These will be discussed in the next section.

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INTRODUCTION TO WATER DEMANDS

In order to evaluate the ability of the local water agencies to serve the development, the County has requested a response from the agencies, in this case MMWC and WVWD, regarding their ability to deliver adequate quantity, and quality, of potable water to the proposed development area. This will allow planners and reviewing agencies to evaluate all the different aspects of service needed to proceed with the development, as proposed. In order to provide meaningful data for assessment, it is proposed to firstly summarize the development plan in terms of conventional development figures. In the case of VCSPB, this will include single-family dwellings (SFR), multi-family dwelling units (MFR), shopping centers or business establishments, commercial space, and mixed-use projects, generally on a "square-footage" basis.

Then, using historical unit usage figures in this area or from adjacent, similar areas, the "unit-use" water demands for each sector of the development can be estimated. This will be done on an "average-day basis", meaning total annual usage divided by 365 days, along with "peaking factors" for maximum month or maximum day demands, since the water supplier must be capable of furnishing water during peak-use periods. In addition, the water distribution or delivery system must be capable of delivering peak hour and fire demands for different types of development. When the pumps and pipelines to meet development demands are finally sized, they must be capable of carrying not only peak day demand but peak day demand plus fire flow. Normally fire demand is not added to peak hour flow estimates, but a rough comparison can also be made between peak-hour demand and peak day plus fire, which are often of a similar magnitude.

This report is intended to be a planning-level document, so that all of the future facilities that might be needed to meet demand will not be described in detail within this document. That will come later during development of a more detailed "Facilities Planning" document. However in a summary fashion the additional facilities required, especially for water resources (water supply, wells, tanks, and major pumping facilities) will be outlined. Specific or detailed water transmission main layout and sizing is beyond the scope of this planning-level document.

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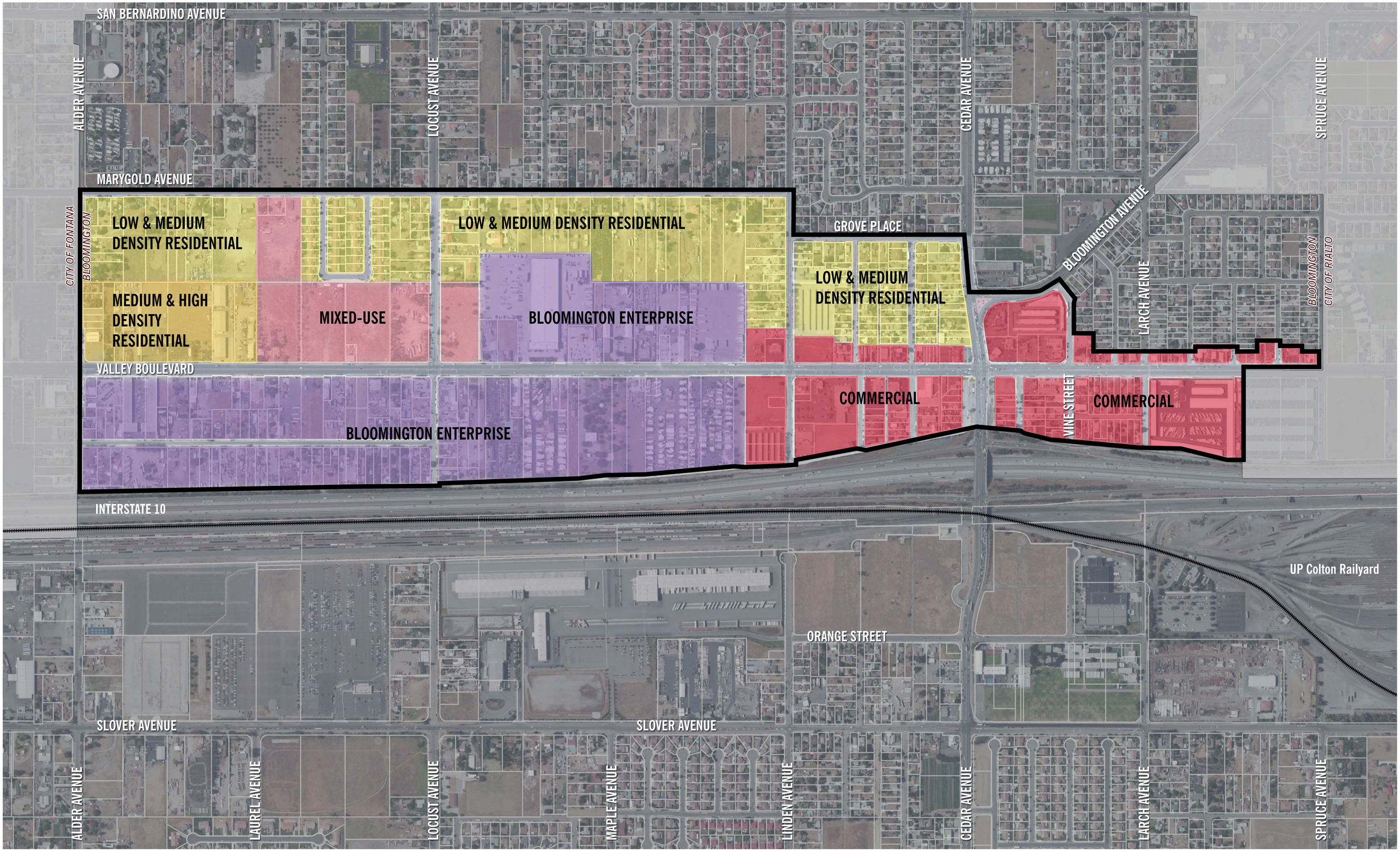


Proposed Land Use Districts and Zoning Designations

Valley Corridor Specific Plan and EIR | Bloomington, San Bernardino County | Public Review Draft

H-5

Legend

SPECIFIC PLAN LAND USE DISTRICT (Valley Corridor - VC)

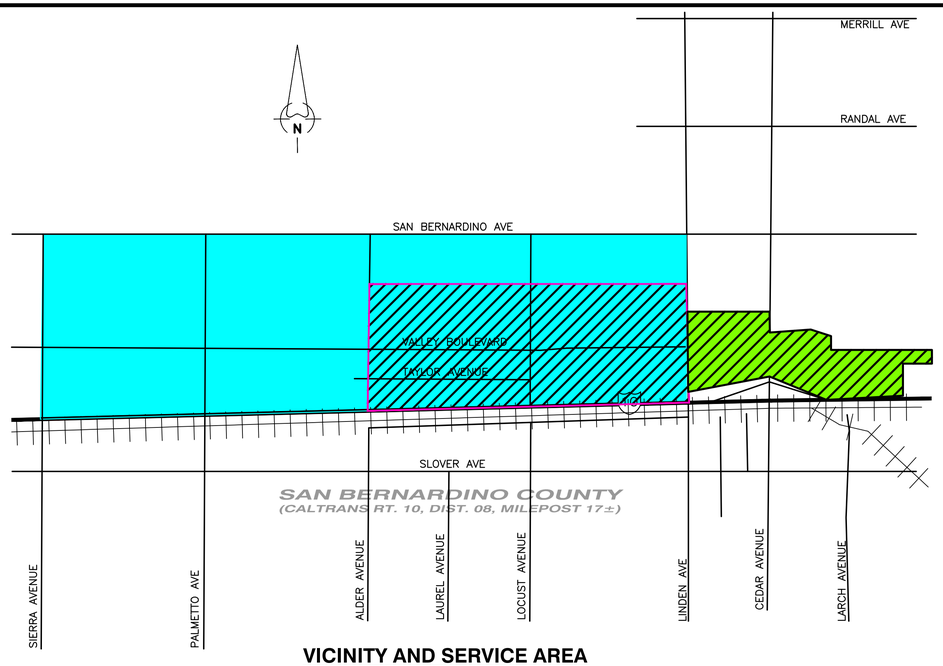
- VC/Mixed-Use
- VC/ Bloomington Enterprise
- VC/ Commercial
- VC/Low & Medium Density Residential
- VC/Medium & High Density Residential
- * Open Space as a floating designation

FIGURE A

JUNE 2015

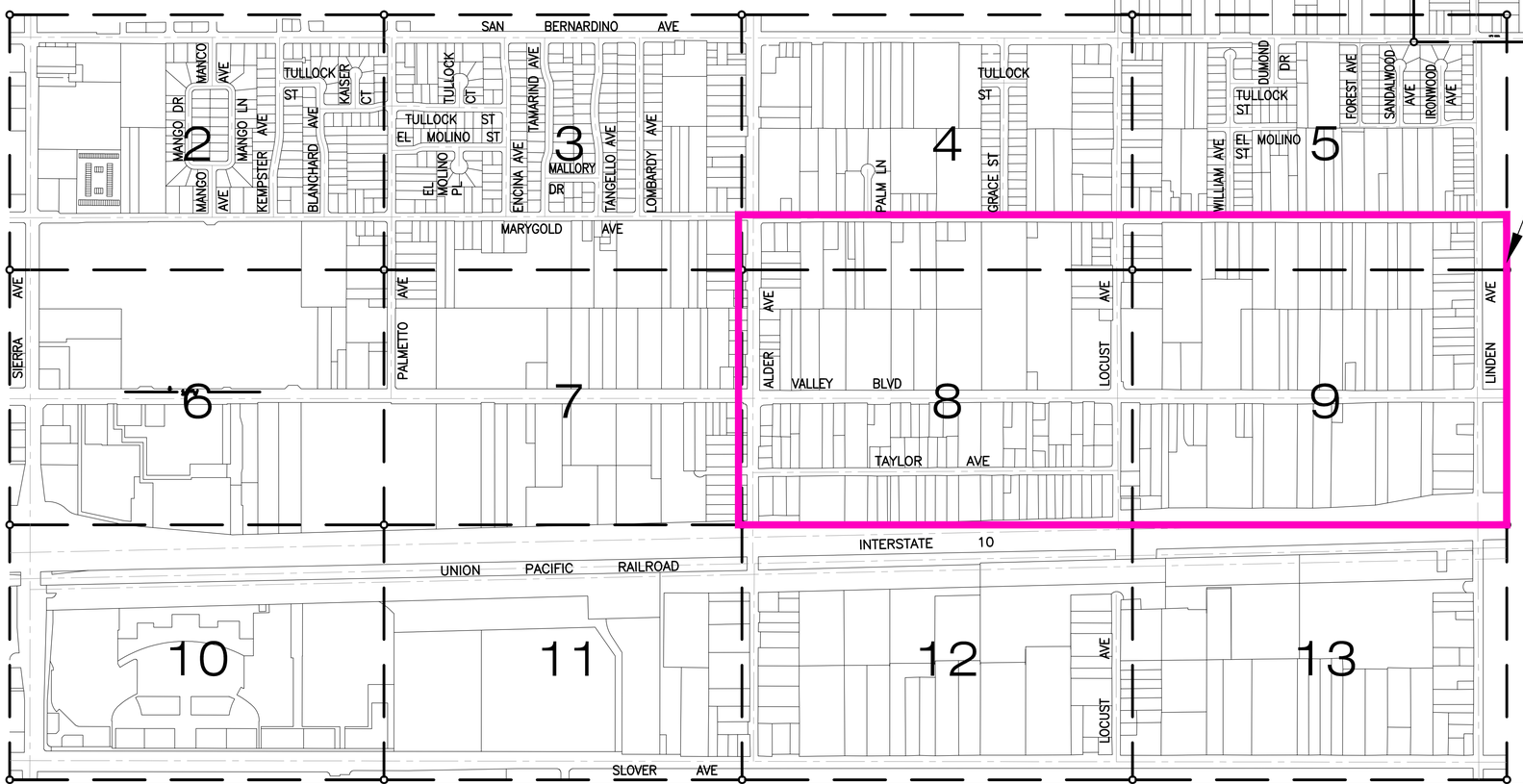
PLACEWORKS

BPC MEDIAWORKS
WEBB & ASSOCIATES
CBRE
COGSTONE



VICINITY AND SERVICE AREA

NOT TO SCALE



BLOW UP OF CROSS HATCHED AREA ABOVE

LEGEND

- MARYGOLD MUTUAL WATER COMPANY
- VALLEY CORRIDOR
- WEST VALLEY WATER DISTRICT

N

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.

MARYGOLD MUTUAL WATER COMPANY

9715 ALDER AVENUE, BLOOMINGTON, CALIFORNIA

NO	DESCRIPTION	BY	DATE	APPROVED	DATE

DESIGNED BY:	DRAWN BY: STAFF
CHECKED BY: S. ANDREWS	DATE: AUGUST 2015

VICINITY & INDEX MAP

FIGURE B

SECTION 2 - VALLEY CORRIDOR SPECIFIC PLAN BLOOMINGTON (VCSPB)

LAND USE AT BUILDOUT

The Valley Corridor Specific Plan Development is described in detail in other portions of the applicant documents. In this section of the document is described the background for the anticipated water demands associated with the development plan. Therefore, the different development categories will be presented with an eye to developing water demands associated with the proposed planning areas. The different types of development have associated unit water demand characteristics, based on a sampling of many similar communities.

The entire VCSPB is to be developed along 355 acres of unincorporated community along the Interstate 10 corridor located east of the City of Fontana and west of the City of Rialto. Refer to Figure A. In the 2010 census, this entire area was within a census district called "Bloomington." In 1888 an actual townsite was surveyed, centered around the intersection of what is now Cedar Avenue and Interstate 10 Freeway. The area has retained this loose designation up to today, with the census designated area of "Bloomington" encompassing 19,318 population in the 2000 census and 23,851 in the 2010 census on a land area of about 6 square miles. In 2007 a committee of local citizens attempted to incorporate but they missed a deposit requirement of $100,000 for feasibility and financial studies so that the focus group lost some momentum towards their ultimate goal of cityhood.

As detailed in other portions of the proposed development summary, the VCSPB will consist of the following land use breakdown:

TABLE A – LAND USE DISTRICTS, & BUILDOUT PROJECTIONS VALLEY CORRIDOR SPECIFIC PLAN

Valley Corridor Plan		Residential		Non-Residential	
Land Use Districts	Acres	Units	Population	Square Feet	Jobs
Mixed Use	26.1	404	1,252	79,756	134
Bloomington Enterprises	114.2	-	-	1,244,067	995
Commercial (3)	51.6	-	-	492,138	754
Low & Med Residential (4)	84.7	436	1,931	66,466	7
Med & High Residential	17.4	254	889	-	-
Right-of-Way	60.5	-	-	-	-
TOTAL	**355**	**1,093**	**4,073**	**1,882,428**	**1,890**
Existing Land Use	-	525	2,216	975,109	477
Diff Compared to Exist.	-	568	1,857	907,319	1,413

Notes:

1. Includes a 30-room hotel in Bloomington Enterprise District, MMWC service area.
2. Existing commercial self-storage businesses will remain in new residential and non-residential districts.
3. The Commercial split is 10% MMWC, and 90% WVWD
4. The Low/Medium Density Residential split is 77% MMWC, and 23% WVWD

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PORTION WITHIN MARYGOLD MUTUAL WATER COMPANY SERVICE AREA

As mentioned previously, the proposed development area falls within the existing water service area of two agencies. Marygold Mutual Water Company presently serves the area west of Linden Avenue and within the VCSPB. Refer to Figure A for the Specific Plan layout and land use or zoning designations within the VCSPB. Note that there is a small portion (only 10%) of the proposed commercial area west of Linden Avenue which is within the MMWC water service area, which is called out in Table A. The low and medium residential areas are also split, with 77% in the MMWC water service area.

PORTION WITHIN WEST VALLEY WATER SERVICE AREA

Most of the land within the VCSPB which is to be zoned for Commercial Use is along Interstate 10 Freeway, and just north of the freeway. It encompasses about 46.5 acres, leaving about 5.1 acres of commercial zoning west of Linden Avenue in the MMWC water service area. Likewise, only 23% or about 17 acres of the proposed low and medium density residential area will be located within the West Valley water service area.

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SECTION 3 – MARYGOLD MUTUAL WATER COMPANY – AN OVERVIEW

SERVICE AREA

The Marygold Mutual Water Company (MMWC) is a private company and water supplier that serves potable water to residents and businesses within its service area, which is primarily from Linden Avenue on the east, to Sierra Avenue on the west, and primarily from San Bernardino Avenue on the north to Interstate 10 Freeway to the South (Figure B). MMWC in the past served some areas south of the 10 Freeway but that area is now served by the West Valley Water District, which is contiguous to the south. Figure B also shows that the Valley Corridor land that is east of Linden Avenue is presently served by the West Valley Water District.

EXISTING WATER SUPPLY FACILITIES

Marygold Mutual Water Company presently has water supply and distribution facilities located throughout its service area. These include wells, storage facilities to manage peaking demands and fire protection, and pumping facilities to pressurize the entire water distribution network to domestic service requirements, typically in the range of 35 psi minimum to 100 psi maximum.

MMWC primary water production facilities are located on the site that includes the office and headquarters of the agency which is located on the southeast corner of San Bernardino Avenue and Alder Avenue, about the middle of the agency. There are production wells, chlorine feed facilities, storage tanks, and booster pumping facilities at this location.

Wells – An Overview. The MMWC relies primarily on groundwater for service to its customers. In the past it has used connections from neighboring agencies for supply, but now these represent only "emergency supplies", which is a common practice for many water agencies. The MMWC has drilled a number of wells in the past, but some of them over time have exhibited high nitrates and been abandoned or simply worn out. In recent years, however, the District has drilled and placed into service Well Nos. 6 (2007) and Well No. 7 (2008).

The MMWC is located in the eastern portion of the greater Chino Ground Water Basin. Wells in this vicinity are generally drilled to a depth of about 700 feet with the lower portion of 50-200 feet with a screened interval reflecting the presence of alluvial material through which groundwater travels. The total depth is generally "unconsolidated alluvial materials" consisting of boulders, gravel, silt and clay overlying the bedrock. The alluvial aquifer is unconfined to semi-confined with a transmissivity in the range of 127,000 to 190,000 gallons per day per foot. The depth to groundwater is generally about 350 feet below ground surface. Wells in the region can generally produce in the range of 1,000 to 2,000 gpm with an acceptable drawdown.

Regarding water quality, most wells exhibit TDS concentration between 200 and 375 parts per million. The drinking water standard, "maximum contaminant level" or MCL, is less than 500 parts per million (ppm). As a result of historical agricultural activity in the area, nitrate (as NO3) contamination is fairly widespread within the shallow groundwater layer (usually less than 300 feet below ground surface. Nitrate concentrations in wells nearby the MMWC well sites are below 40 ppm. The MCL for nitrate is 45 ppm. PCE and TCE (trichloroethylene) have not been detected in

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any wells near the MMWC well sites. Perchlorate has been detected at some wells in the West Valley Water District, located downgradient of MMWC, but so far no detection of PCE in MMWC wells. The MMWC regularly monitors for PCE to insure that this contaminant is not present in any of its wells.

Well No. 6. This well was drilled in December 2004 using the reverse circulating rotary method. It has a total depth of 702 feet below ground surface, with a perforated interval from 562 feet to 702 feet, and is gravel packed across an interval of 217 feet. The static water level was 344 feet below ground surface when it was drilled. A pump test of 2,500 gpm was used with a pump set at 540 feet below ground level. Based on the pump test the well was equipped in May of 2009 with a 450 HP pump capable of delivering up to 2,500 gpm. Furthermore, the motor is equipped with a variable speed drive, so that the motor speed and pump output is variable in response to actual usage within the water distribution system, and responds to water level in the adjacent storage tanks, two each 2 million gallons operating in parallel. That is, when customers begin to use more water, the water level in the tank begins to drop, and the pump motor automatically speeds up, to deliver more flow and and replenish the storage tank to "full". When demand begins to decrease, and the tank is beginning to reach a "high water level" setpoint, then the motor speed and pump output begins to decrease, until the pump output once again modulates to more closely reflect the actual demand from the distribution system booster pumps.

Well No. 7. This well was drilled in 2008. It has a total depth of 650 feet below ground surface, with a perforated interval from 570 feet to 640 feet, and is gravel packed across an interval of 105 feet. The static water level was 356 feet below ground surface when measured in 2008. The estimated yield was 1,050 gpm, based on an 8 hour constant rate drawdown test. The well was equipped with a 150 HP pump, and normally serves as a backup to Well No. 6. It operates on-off to keep the water level in the storage tanks in a "full" mode.

Potable Water Storage Facilities. The two wells deliver water through pipelines directly into two storage tanks at MMWC headquarters, each 2.0 MG in size. The tanks are above ground and operated in parallel, with each serving as standby for the other tank. The tanks are steel and coated with potable water safe epoxy paint. The water is disinfected with chlorine on the way to the reservoirs.

Booster Pump Station. A finished water booster pumping station is located adjacent to the storage tanks, capable of delivering water into the distribution system to customers. The booster station has four pumps. Three end suction pumps are each 25 HP with a capacity of 400 gpm each. The fourth pump is a vertical turbine with a capacity of 800 gpm. These are used to "elevate" the water to a pressure head in the distribution system such that every customer receives water with at least 40 psi pressure. Since the system is "closed" the pumps are capable of varying their speed which varies the output to meet the required demand. Pumps come on and off seamlessly as demand increases and decreases throughout the day, so that pressures are stable throughout the distribution system at the customer end use point.

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Water Distribution System. The booster pumping station is located at about the middle of the MMWC service area on the northern boundary so that water flows in three directions away from the facility. The distribution system is "looped" extensively, meaning that water can get to most customers from two directions which provides service reliability, and improves fire flow capability.

In general, the system is almost entirely "looped" with pipelines 10-inch and larger, and up to 16-inch diameter in a few locations. There are a few locations within the existing system where 6-inch pipe may be replaced and upsized to provide for the slight expected demand increase, but these could be addressed on an individual basis as determined necessary.

At a later date a simple computer model can be prepared of the distribution system to review the ability of the existing pipeline network to deliver the peak hour and maximum daily plus fire demand. A detailed distribution system analysis is beyond the scope of this evaluation.

WATER RELIABILITY

The reliability of water delivery really falls into two categories that can be evaluated: (1) supply reliability and (2) system reliability. Water (distribution) system reliability will be briefly discussed in a later section once the proposed development is described and water demand associated with the additional development. Supply reliability refers to the water source, in the case of MMWC it is groundwater reliability, and the source of supply facilities. MMWC is a participant in a large regional groundwater basin, and two regional water supply agencies are responsible for the water supplies that are available to member agencies. One agency is the San Bernardino Valley Municipal Water District. This agency has responsibility for obtaining and distributing imported water supply, mostly surface water from the Metropolitan Water District. In addition they are involved with the purchase of imported water for replenishment of the groundwater basins, depending on the monitored water levels and groundwater storage volumes as managed by the other regional agency, the Chino Basin Groundwater Master. The Chino Basin Groundwater Master has the overall responsibility for managing the overall "health" of the very large Chino Groundwater Basin. They carefully monitor water levels from year to year, address water quality issues in the basin, seek out imported water supplies for replenishment of the basin when necessary, and monitor the withdrawals of all participating agencies.

In addition to two wells that MMWC pumps groundwater from, located in about the middle of the service area along the northern boundary, the agency has a connection to the City of Rialto, which is located in the northeast corner of the service area. At one time this used to be the delivery point for all of the water to MMWC, so the connection is fairly large diameter 16-inch pipe, with significant "one-way" capacity.

MMWC also has an interconnection to the West Valley Water District which is an emergency connection that can be opened if necessary. The MMWC has an agreement to use this supply in the event of an emergency. This is a connection that comes from the WVWD distribution system located to the south of MMWC and Interstate 10 Freeway, between Locust and Linden Avenue. The WVWD also has pipelines within Linden Avenue that could possibly be considered for additional system reliability interconnections, for the benefit of both agencies.

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MMWC has also discussed an interconnection to the Fontana Water Company (FWC) which is the agency located west of Sierra Avenue. The FWC has pipelines that extend to Sierra Avenue in both San Bernardino Avenue and Valley Boulevard which could possibly be tapped for an emergency supply connection and water delivery if necessary.

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SECTION 4 – WATER DEMANDS FOR VCSPB

WATER DEMAND REQUIREMENTS – AN OVERVIEW

In Section Two the entire Valley Corridor Bloomington development was described in terms of land use districts and buildout projections. It was also noted that the water service for the development will come from two existing service providers based on the location east, or west, of Linden Avenue. That is, MMWC now serves, and can continue to serve, all of the proposed development west of Linden Avenue. The development areas east of Linden Avenue are now served by, and can continue to be served by, the West Valley Water District. That agency also serves all of the existing areas south of the 10 Freeway. Interconnections between the two agencies are considered to be available, and fortuitous, to provide additional water system reliability.

Table A in Section Two provided a development summary and can be used to provide a basis for estimating water demands. Water demands for any given development may be stated a number of different ways, but the most meaningful data is concerned with annual average demand, maximum daily demand, and peak hour demand. The annual average demand times 365 days provides the total amount of water in a given year, usually stated in acre-feet per year (AF/yr), that is required to meet all domestic needs, including irrigation. The maximum daily demand (MDD) is associated with having sufficient supply available during the peak 24-hour demand period, usually on a hot summer day. Peak hour demand is higher than the maximum day demand, because it represents the peak 60 minute demand on the system that often will occur on the peak day. Supply sources are often sized to meet the total annual, and maximum daily, requirement. The storage and delivery system must be able to meet the peak hour requirement. Finally, fire flow requirements are also an important consideration to be certain that the water supply facilities and distribution system can meet the peak fire flow demand requirements.

For purposes of this water service analysis, the annual average demand, or supply availability, is the most important consideration. That is because pumping and distribution facilities may be added or increased in size as needed to meet peak day, peak hour, or fire flow requirements, but the annual supply availability comes from the legal availability of sufficient water to meet all of the needs. Since all of the supply for VCSPB is likely to come from groundwater, it is most important that the Chino Basin will make available sufficient supply to meet the annual demand. Then MMWC must install sufficient wells, or interconnections, to meet maximum day and diurnal demand, and storage, transmission and distribution pipelines to distribute the water to adequately meet peaking demands (maximum day, peak hour, and fire flow requirements).

UNIT WATER USE DEMAND FACTORS

In order to determine annual water supply requirements, it is necessary to make projections using unit use demand assumptions. These unit use figures can come from historical records of the MMWC, or similar use areas, based on a long history of water use. In recent years there has been an increasing focus on cutting unit water use, particularly at the residential level. This has resulted in fewer residential lawn (turfgrass) areas, which are often replaced with artificial turf, xeriscape low-water-using plants, gravel, or a combination of these items. In addition, indoor water use reduction has occurred due to low-flush toilets, low-water use dishwashers and clothes washers,

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low-flow shower heads and sink faucets, etc. All of these have combined to reduce residential water use in newer neighborhoods. However, about half of the VCBSPB residential development is actually in existing areas, so the impact may be somewhat mitigated.

Based on a review of historical records, and unit use figures obtained from similar use areas, the following unit use figures are assumed to determine annual water use:

Low and Medium Density Residential 1.85 gpm/acre
Medium and High Density Residential 3.00 gpm/acre
Bloomington Enterprise 1 gpm/acre
Commercial 1.0 gpm/acre
Mixed Use 2 gpm/acre
Right-of-Way Zero see footnote (a) below

The basis for these assumptions comes from the following data which has been determined at other similar locations:

Low Density Residential 1.2 gpm/acre
Medium Density Residential 2.5 gpm/acre
High Density Residential 3.5 gpm/acre
Industrial 1.3 gpm/acre
Commercial 1.0 gpm/acre

(a) Assume mostly along I-10 corridor and will be handled by a combination of recycled water, xeriscape, gravel, hardscape, or a combination of these but no "potable water" use for highway ROW.

WATER DEMANDS FOR VCSPB

Based on the identification of different land use districts and the buildout projections for the Valley Corridor Specific Plan Bloomington presented in Section 2, the ultimate annual water demands for the development plan were estimated. They are shown in the Table B following, noting that this is only for the portion west of Linden Avenue, within the MMWC service area.

TABLE B – ANNUAL WATER USE ESTIMATE FOR THE VALLEY CORRIDOR SPECIFIC PLAN BLOOMINGTON AT BUILDOUT (Linden Avenue to Alder Avenue)

LAND USE	ACRES	AVE ANNUAL DEMAND (gpm)	Acre-Feet per Year
Low and Medium Density Residential	65.2	120.6	195
Medium and High Density Residential	17.4	52.2	84
Bloomington Enterprise	114.2	114.2	184
Commercial	5.2	5.2	8
Mixed-Use	26.1	52.2	84
TOTAL	228.1	344.4(1)	555

(1) Note this includes the demand of existing developed areas

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The average annual water use is important to determine the groundwater supply needs for the development area. To determine MMWC total annual demand, this figure must be added to the demands for the other portions of their service area, located south of San Bernardino Avenue and west of Alder Avenue to Sierra Avenue as shown on Figure B.

WATER DEMANDS FOR ALDER TO SIERRA AVENUE, AND I-10 TO SAN BERNARDINO AVE.

The west half of MMWC service area extends from Alder Avenue to Sierra Avenue, and from I-10 on the south to San Bernardino Avenue to the north. It is assumed that this area will remain basically with existing zoning, as it is mostly developed. Water demands can be estimated using similar figures as presented in the prior section, along with an additional zoning category of a "Public Facility" Hospital, with an estimated average demand of 1.0 gpm/acre, based on an examination of past water use.

The various land uses, approximate acres, and associated water demands are identified in the Table C below:

TABLE C – ANNUAL WATER USE ESTIMATE FOR THE MMWC SERVICE WEST OF VCSPB
(between Alder and Sierra east/west, and San Bernardino Ave and I-10 north/south)

LAND USE	ACRES	AVE ANNUAL DEMAND (gpm)	Acre-Feet per Year
Low Density Residential R-1	138.5	166.2	268
Medium Density Residential R-2	18.1	45.2	73
High Density Residential R-3	10.0	39	63
General Commercial C-2	139.6	139.6	225
Hospital	66	66	106
		456	735

WATER DEMANDS FOR MARYGOLD TO SAN BERNARDINO AVENUE, NORTH OF VCSPB

There is one additional development area to account for in the MMWC service area, which is the area north of the study area, VCSPB, and between Linden Avenue on the east and Alder Avenue to the west. This area is presently in a mix of low density residential and open space, primarily. It is outside any city boundary in an unincorporated area of the county. It is assumed that it will develop with a mix of R-1 and R-2 zoning, that is Low and Medium Density Residential. There is a total of about 152.7 acres in this area, and with a unit use figure of 1.85 gpm/acre it would exhibit an ultimate annual demand of about 282 gpm or 454 AFY.

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PEAKING FACTORS

MMWC has, in the past, studied their system "peaking factors." For example, they examined the years of 1996 through 1999 and determined that the maximum day to average day peaking factor ranged from 1.55 to 1.77 with an average of 1.64. In order to develop a basis for estimating peaking factor, to get a maximum day demand estimate, historical data was summarized for two use periods with data. The years for which data was available are 1996 to 1998, 2001 to 2003 (limited data) and 2010 to 2015. It should be noted in advance that there has been a lot of focus in the past 10-15 years on conserving water and reducing peaking use. This has been accomplished by increasing use of low water using household fixtures such as shower heads, dishwashers, toilets, and clothes washers. In addition, irrigation usage has been reduced by incentives to replace lawn areas, convert to xeriscape landscaping etc. It will be seen in Table D below that overall usage and peaking factors have actually been coming down in the study area, a result that is not entirely unexpected.

TABLE D – HISTORICAL PEAKING FACTORS – MMWC

YEAR	ADF (gpm)	MDF (gpm)(1)	Max Mo. ADF	Max Day ADF	AF/YR
1996	838	1302	1.36	1.55	1,378
1997	848	1504	1.38	1.77	1,395
1998	799	1269	1.44	1.59	1,314
2001-2003	910				1,467
2010	701	907	1.29		1,132
2011	596	871	1.46		961
2012	740	988	1.33		1,194
2013	762	999	1.31		1,229
2014	790	981	1.24		1,275
2015(2)	721	804	1.11		1,162 est.

Notes:

(1) Actually "max month" for 2010-2014
(2) Data for 8 months through August, 2015

In 2004 discussions with the Watermaster, it was noted that water demands were running in the vicinity of 1,500 AF/yr. On that basis, discussions with the Chino Basin Watermaster predicted that the future water demand in the MMWC service area would be about 1,700 AFY. That was the figure used for long-range planning purposes set 11 years ago. Future projections are reviewed annually. By examination of the trend in Table D, it is fairly obvious that water usage in MMWC has followed the general trend in Southern California of decreasing water use in response to more limited supplies.

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MAXIMUM DAILY AND PEAK HOUR DEMAND

Furthermore, water supply (source) facilities must be capable of meeting the maximum daily demand, since diurnal peaking throughout peak days can be met via storage and pumping facilities. That is, as long as storage, pumping, and pipeline facilities are adequately sized to meet peak hour, or fire, demand requirements, then water supply facilities may be sized to meet the peak day demand. Based on this limited data set, it is recommended that the peak day factor should be about 1.70 for the new service area. That is, if the average day demand for the VCSPB from table B above is 344 gpm, then the "peak" or maximum daily demand is estimated to be in the vicinity of 585 gpm, assuming that the new use areas have a peaking demand similar to the use areas that were evaluated in 1996-1998. Combining all three of the use areas described above, VCSPB (Tables B, C, and area north of VCSPB), the average day demand would be 1,082 gpm, and making the peak day estimate about 1,840 gpm for the service area. Generally this implies that water "source" such as peak ability for pumping from wells, should have a firm supply of about 2,000 gpm (rounded up). Peak hour and/or fire flow requirements would be in addition to these demands, and would be necessary when sizing ultimate treated storage, pumping, and distribution (pipeline network) facilities. Determination of the size required for peaking and fire flows is beyond the scope of this report, and is normally determined at a specific location by consideration of occupancy, materials of construction, building presence or lack of sprinklering, type of use, and overall area (square footage). Then a distribution system hydraulic model can be prepared to see if there are any weaknesses or if improvements need to be made in storage, booster pumping, or distribution pipeline sizing in the vicinity of the project, layout of hydrants, etc.

SUMMARY ANNUAL WATER SUPPLY REQUIREMENTS

By summarizing the annual water supply requirements determined in the paragraphs above, it results in an ultimate annual requirement of about 1,744 acre-feet annually. As mentioned, in past discussions with Watermaster for the Chino Basin, the MMWC has, in the past, been planning for an ultimate demand up to 1,700 acre-feet, which includes their baseline allocation and supplemental projected allocation. Therefore the projected ultimate water source/supply for long-range planning purposes will need to be increased by about 50 AFY based strictly on the projections made herein. Note that present demand is on the order of 1,160 AFY (average from years 2010-2014) so there is a good amount of growth still expected to occur in the MMWC service area. Even if the VCSPB were to "buildout" say in the next ten years, there still might be some further growth needed to "fill-in" the remaining development areas west of Alder Avenue and/or immediately to the north of Marygold Avenue. In the following table the water demand growth in the VCSPB was distributed evenly over the following 10 years, 2015 to 2025, and the water demand growth in the remaining areas of MMWC service area was distributed evenly over the next 20 years to 2035. In the absence of more detail on specific development plans for VCSPB, and the rest of MMWC, it is thought this to be a reasonable approach to overall demand projections for MMWC. After further analysis and discussion with developers, and refinements as necessary, this water use growth projection can be presented to the Chino Basin Watermaster for his long-range strategy of developing and delivering additional water supply for the agencies in the Chino Basin, and more specifically the MMWC service area. As mentioned previously, the overall water supply comes from development of the

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existing Chino Basin groundwater resources, with supplementation by bringing in additional imported water for replenishment and growth, as determined necessary.

TABLE E PROJECTED WATER DEMAND BUILDUP – MMWC WITH VCSPB
(in acre-feet)

Year	Approx. Exist. Demand Areas	Increase Due to VCSPB	Increase From All Other Areas	Cumulative Total Supply Need
2016	1,160	30	14.2	1,204
2017	1,160	30	14.2	1,248
2018	1,160	30	14.2	1,293
2019	1,160	30	14.2	1,337
2020	1,160	30	14.2	1,381
2012	1,160	30	14.2	1,425
2022	1,160	30	14.2	1,470
2023	1,160	30	14.2	1,514
2024	1,160	30	14.2	1,1558
2025	1,160	30	14.2	1,602
2026	1, 160		14.2	1,616
2027	1,160		14.2	1,630
2028	1,160		14.2	1,645
2029	1,160		14.2	1,659
2030	1,160		14.2	1,673
2031	1,160		14.2	1,687
2032	1,160		14.2	1,701
2033	1,160		14.2	1,716
2034	1,160		14.2	1,730
2035	1,160		14.2	1,744

WATER SUPPLY AND SYSTEM RELIABILITY AND EMERGENCY CONNECTIONS

It is worth mentioning that Marygold has both supply and system reliability built-in to its water system. Supply reliability refers to water source, in this case groundwater and/or surface water. Marygold Mutual Water Company owns and operates two wells on its main District property. Well Nos. 6 and 7 provide backup for one another, as normally only one well is operated at a given time. In addition, in the past, Marygold has received water (supply) from other agencies outside their boundary. For example, all of the water supply at one time came from the City of Rialto in an 18-inch steel main that is routed south on Cedar Avenue and then west on San Bernardino Avenue into the service area at Linden Avenue. This main is presently inactive but there are ongoing discussions about potentially reactivating it so that it is immediately "ready" and available in the event of an emergency. West Valley Water District is located to the east of Linden Avenue and will be serving the eastern portion of the VCSPB. System interconnections in Linden Avenue are existing, and potentially available to provide additional supply, and system, reliability. The Fontana Water

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Company serves the areas west of Sierra Avenue and north of San Bernardino Avenue and is potentially available to provide additional supply reliability.

Marygold also has system reliability in the following manner. The entire water distribution system is "looped" so that water is available from two directions almost everywhere in the service area. Larger main lines are located along the main streets throughout the service area, with connecting mains in the smaller streets. This means that in the event of a break, the location could be isolated with valves for repair, while maintaining service to all other customers outside the break area. Obviously the potential connections and availability of water from Rialto as well as West Valley Water District also provides "system" reliability, by providing alternate pathways for water to be delivered to customers.

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SECTION 5 – OVERVIEW OF THE MMWC WATER SERVICE PLAN

WATER SUPPLY – CHINO BASIN WATER MASTER

The Marygold Mutual Water Company is located within the Chino Basin, a defined "hydrologic study area" located mostly in San Bernardino County, but not limited to the surficial county boundary. The "basin" is a defined hydrologic area, centered around the Santa Ana River, and consisting of 235 square miles of the upper Santa Ana River watershed. The River has a separate hydrologic region above, or upstream, in the mountainous regions, and a separate hydrologic region downstream, that encompasses a good portion of Orange County. The Chino Basin has been defined as a hydrologic study area, and the Basin contains about 5,000,000 acre-feet of water and has an "unused" storage capacity of about 1,000,000 acre-feet. The boundary of the basin was defined in a Judgement issued in 1978. Municipal and industrial use is increasing in the basin. Agricultural use is decreasing in the basin, and is expected to be almost gone by 2020.

In 1998 the Court officially accepted a scope of work to develop a Chino Basin "Optimum Basin Management Plan" (OBMP) to improve the operation, and yield, of the Basin. The OBMP is managed by the Water Master, with help from staff and consultants. Wildermuth Environmental has been the Engineer for the Watermaster for many years and has completed a number of reports and recommended activities to enhance the storage and use of water within the basin. The goals and action items for the OBMP have been developed through nine Program Elements, briefly described below:

1. Comprehensive Monitoring. An initial survey followed by annual monitoring efforts.
2. Comprehensive Recharge. Planning, design, construction and operation of groundwater recharge facilities to enhance the capture of storm, imported, and recycled water.
3. Water Supply Plan for Impaired Areas, and 5. Regional Supplemental Water Program. There are a number of locations with degraded quality due primarily to past agriculture activities. This item includes the planning and construction of major groundwater desalters, to remove, treat, and utilize impaired groundwater, such as the Chino I and Chino II Desalters and their associated wellfields to produce potable supply, maintain groundwater production in areas rapidly transforming from agriculture to urban use, and remediate legacy contaminant plumes. Brine is discharged to an outfall that travels to coastal treatment plants near the ocean.
4. Groundwater Management Plan for MZ-1. This is to develop a long-term management plan to minimize subsidence and fissuring in MZ-1 area.
5. (Element 6) Cooperative Program to Improve Basin Management, and 7. A Salt Management Program. This has become a cooperative effort with the Regional Water Quality Control Board to investigate and/or remediate the legacy contaminant plumes found in the Chino Basin, and there are at least 8 known plumes.
6. (Element 8) Groundwater Storage Management Plan and 9. A Storage and Recovery Program. MWDSC has an "account" in the basin which is allowed to store up to 100,000 acre-feet of storage. Watermaster is negotiating to increase storage capacity up to 150,000 acre-feet. The concept is that MWDSC will purchase raw (surface) water and "bank it" (store it) in underground aquifers such as Chino Basin when it is plentiful and less

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expensive, then call upon the groundwater pumpers to "use" that stored water in lieu of direct imported water during dry years. MWSCS has, in prior years, been conducting successful groundwater "banking" programs with many regional groundwater basin managers including Chino Basin Water Master.

The Chino Basin covers over 220 square miles and provides water for over 700,000 residents. The Basin storage capacity is between 5 million and 7 million acre-feet, and the safe yield from over 800 active wells is more than 140,000 acre-feet. The recharge element of the OBMP is to increase the recharge capacity of the Basin and accumulate greater quantities of water made accessible to producer and consumers. The recharge can be from excess imported water in wet years, high quality stormwater, or recycled water.

APPROPRIATIVE RIGHTS (ORIGINAL PER JUDGMENT)

The original judgement in 1978 established the appropriation of the basin water supplies to the various agencies within the basin. An abbreviated summary is listed herein, rounded to nearest acre-foot (as of June 30, 2012 timeframe):

City of Chino	5,794
City of Chino Hills	3,033
City of Ontario	16,337
City of Pomona	16,110
City of Upland	4,097
Cucamonga Valley Water District	5,199
Jurupa Community Services District	2,960
Monte Vista Water District	6,929
West Valley Water District	926
Fontana Union Water Company	9,181
Marygold Mutual Water Company	**941**
Monte Vista Irrigation Company	972
San Antonio Water Company	2,165
Santa Ana River Water Company	1,869
West End Consolidated Water Company	1,361
Eight Other Smaller Entities, summary	888
TOTAL	78,764 acre-feet

ACTUAL WATER USE SUMMARY 1975 TO 2012

As a point of information, the total water consumption for the agencies within the Chino Basin has ranged from a low of 113,667 acre-feet, to a high of 181,727 acre-feet in 2013-2004. Other, significant, water sources for basin agencies may come from direct imported (surface water) supplies, or recycled water use.

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PROJECTED GROUNDWATER CONSUMPTION IN FUTURE YEARS

Watermaster has also made some preliminary projections of groundwater consumption in future years. In "2015" for example he projects a total usage of about 160,000 acre-feet of groundwater production. Additional production in recent years has come from the completion of a number of groundwater desalters, which provides potable water from formerly unusable groundwater supply. The projected ground water production, including desalter production, in future years, is:

2020 - 160,000 AFY
2025 - 170,000 AFY
2030 - 185,000 AFY
2035 - 195,000 AFY

In unusually wet years, the production can be expected to decrease, as agencies take advantage of possibly less expensive, more available surface water. Conversely, in dry years, the use of groundwater may be expected to peak as envisioned. When some agencies avail themselves of more available, less expensive surface supplies, then they can offer their groundwater to other agencies, or put them into a "storage account", to be called upon in future (dry) years. The entire system of "banking" water for future years is too extensive to go into detail at this time, but it is worth noting, for example, that Marygold had a total of 1,680 acre-feet of water in their "Pool 3 Local Supplemental Storage Account" at the end of 2012 production year, and 867 acre-feet in their "Pool 3 Excess Carry Over Storage Account" at the end of 2012 production year. These two accounts are handled slightly differently for accessing in future years.

In summary, MMWC presently pumps all of their water from the Chino Basin and will plan to do so in the future. They have multiple supply sources (two groundwater wells) and emergency connections to adjacent agencies with groundwater and surface supplies in the event of a loss of their primary groundwater sources. As demand increases, they will request more supply from the Watermaster above their baseload allocation of 941 acre-feet per year. In addition, they can call upon water "banked" or not used in previous years. For example, their storage account at the end of 2012 was holding 1,680 acre-feet in supplemental storage.

IMPORTED WATER SUPPLY

The San Bernardino Municipal Water District is the agency with responsibility for surface water supply management in this region, including the Chino Basin. They are a member agency of the Metropolitan Water District of Southern California (MWDSC) which is the agency that manages the Colorado River and Northern California imported water supplies, focusing primarily on surface water supply. For example MWDSC owns and manages several large storage reservoirs (locally most notable is one at Domenighoni Valley) which are used to store surface supply when it is plentiful, and draw from them during dry periods. Consequently, Chino Basin Watermaster works closely with SBMWD in order to take advantage of possibly lower cost imported water when it is plentiful in order to not only fill reservoirs but to replenish groundwater basins. Chino Basin Watermaster has "spreading facilities" where they can enhance the replenishment of the groundwater basin. They make every effort to have these basins empty when approaching wet seasons, to allow for replenishment, and so they can drawdown the stored water during dry seasons.

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ULTIMATE FACILITIES REQUIRED AND PHASING

At the present time, MMWC easily meets their demand from customers with the availability of two wells. Well No. 6 can meet the entire demand for a year and so can Well No. 7. Well No. 6 has sufficient capacity to meet the maximum day demand throughout the study period to 2035. If Well No. 6 were to go down, then Well No. 7 can meet all of the maximum daily demand now and for several years into the future. When maximum daily demand begins to reach the capacity of Well No. 7, the MMWC can drill another well to provide a small amount of additional supply, or consider using their connection with an adjacent agency to fulfill that peak period need. The storage, booster pumping, and distribution network will simply be expanded as necessary to meet the projected, as monitored and measured, peak hour demands and fire flow requirements. Detail and sizing for these distribution facilities is beyond the scope of this study, which is primarily concerned with water source/supply availability.

The additional water supply will come from groundwater and must therefore be requested By MMWC from the management agency, the Chino Basin Watermaster, in the future as demand begins to buildup. This aspect of obtaining additional supply, or giving "excess" water back to the pool for use by others, is a relatively common occurrence for managed groundwater basins. That is because all of the 25 or so agencies are, each year, making their individual and unique review of past and anticipated water use. New supplies may come from a number of places, including: conservation, recycled water, imported water (especially when it is plentiful in wet years and groundwater can be "left" in the basin), impaired water supplies that are developed (such as Chino Basin desalters), and outright transfers from agencies with excess supply.

SUMMARY

In previous sections of this brief report, the new water demands that will occur over time with the VCSPB and with the passing of years for existing development were described. The analysis showed that the demand expected from existing use areas is about 1,200 AFY. The VCSPB defined service area was described to build up over a ten-year period with additional demands on top of existing, at a rate estimated at about 30 acre-feet per year (AFY). In addition, the "buildout" of existing use areas outside the VCSPB was anticipated to build up at about 14 AFY over a twenty-year time period. This resulted in an ultimate water demand on the order of 1,744 acre-feet per year by the year 2035.

The Chino Basin Watermaster has the responsibility for developing the groundwater supplies for the 25 or so member agencies within the basin. They work hand-in-hand with San Bernardino Valley Municipal Water District, which agency is responsible to bring in imported water supplies as needed for direct use and replenishment. Together, these regional agencies determine the total water needs of the member agencies, using data provided by each agency, and then proceed with plans and facilities to meet those needs. SBVMWD makes available imported water for direct use, and surface water for groundwater replenishment, when it is available. Chino Basin Watermaster manages the groundwater basin so that the anticipated demands of its member agencies, including

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Marygold, are met. Each year total water use is reviewed, and projections made for future years, in order to ensure that long-range water supply planning, and acquisition or development of future supply, is adequate to meet future projected needs.

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