SECTION 1

EXECUTIVE SUMMARY

1-1 Purpose

The City of Ontario provides domestic water service to a population of approximately 175,000 residents. The City recognizes its responsibility to meet the customers' needs with long range planning efforts. By reviewing its existing water system and future needs, the City can continue to maintain a high service level and reliability in its water system in a cost effective and fiscally responsible manner. This report is intended to update the domestic water analysis of the *2006 Water and Recycled Water Master Plan* and to provide a comprehensive planning guide for improving and upgrading the City's domestic water system through 2035. As a planning document, it is general in nature and is predicated upon the best information available at this time.

1-2 Study Area

The study area coincides with the City of Ontario boundary with the exception of two small areas in the north central and northeastern portion of the City that are served by Cucamonga Valley Water District (CVWD). It is located approximately 35 miles east of downtown Los Angeles and encompasses approximately 50 square miles of residential, commercial, industrial, public and agricultural lands and the Ontario International Airport. It is bordered by the Cities of Chino and Montclair on the west; the Cities of Upland and Rancho Cucamonga on the north; the City of Fontana and Riverside County on the east; and Riverside County, and the City of Chino on the south.

Topographical Description and Geology

The topography of the region generally slopes in a southwesterly direction from 1180 to 633 feet above mean sea level (amsl).

Due to the presence of predominantly dairy industries over a long period of time, prime agricultural soils, high in salts and nitrates, cover approximately 2,999 acres or 36 percent of the total area in the NMC (SOI General Plan Amendment, 1998). Organic materials (manure and feed) are reportedly present in thickness of up to six feet.

The NMC is located within the Chino Groundwater Basin, which has been found to maintain a relatively shallow water table. The SOI General Plan Amendment reported findings of groundwater elevations ranging from 530 to 590 feet in 1991. Water depths observed in 1991 were about 100 feet (SOI General Plan Amendment).

Climate

The climate in the study area is Mediterranean-like with generally moderate temperatures and low humidity year-round. The average median temperature is approximately 83^{o} F. The average annual days of sunshine is 312. The historical average annual rainfall is about 11.3 inches. Most of the rainfall typically occurs between October and April.

Land Use

The existing City is a well planned urban community with a balance of residential, commercial, and industrial land uses. Within the service area (total of 31,345 Ac), the primary land use in the City is residential (8,762 Ac or 28.0%). Industrial use also makes up a significant portion of the total existing land use (4,671 Ac or 14.9%). Approximately 3,290 acres or 10.5 percent of the total is currently undeveloped. The total number of housing units in the City is estimated at 47,795.

The ultimate land uses are based upon the City's latest general plan document entitled *The Ontario Plan (2010).* The residential area increases to 10,915 acres (34.2 percent of total). The employment area, including business parks and industrial uses, is expected to entail about 8,103 acres (25.4 percent of total).

Population

Since its incorporation in 1890, the City of Ontario has grown from a population of 683 to approximately 174,536 in 2010 (*Ref: California Department of Finance, Table E-5, 2010*). . With a population of 174,536 and a 3.67 percent vacancy rate, the average number of persons per household is estimated at 3.766 (Ref: *California Department of Finance, Demographic Research Unit, Table E-5, 2010*).

The ultimate population in New Model Colony is expected to be approximately 162,518 (*Ref: 2010 General Plan Approved Landuse Buildout Estimate Table*). The ultimate population in Old Model Colony is estimated at 195,752. The total ultimate population is estimated at 358,270 which will more than double the existing population. The service area population will be 352,500.

1-3 Water Use

Historical Water Production and Purchase

The City obtains its potable water supply from groundwater wells in Chino Basin and imported water from the Water Facilities Authority (WFA) and the Chino Basin Desalter Authority (CDA). The City currently owns 32 wells. Four wells are either abandoned or destroyed, five (5) of the wells are inactive, while the other 23 wells are operational.

Over the last ten years, the annual production has averaged a total of 43,340 AFY (38.7 mgd). The average production from Chino Basin is 30,605 AFY (27.3 mgd). The average amount of imported water purchased is 12,735 AFY (11.4 mgd).

Water Consumption versus Water Production/Purchase

The City typically purchases/produces more water than the quantity measured by the customer meters. Table 1-1 summarizes the difference between the measured consumption and production from 2000 to 2009. On average, 2.4 percent of the water supply is unaccounted for each year. The discrepancy is partly due to the differences in the accuracies of the few large meters which measure purchases and production, and the thousands of small customer meters which measure sales. Unaccounted for water can also be due to unmeasured uses such as water main flushing and other maintenance related tasks. The remainder may be due to leaks from the system. The average unaccounted for water rate of 2.4 is well within the industry standard.

Table 1-1
Water Consumption versus Water Production/Purchase

Calendar Year	Water Consumption[1] (AFY)	Water Production/ Purchase[1] (AFY)	Percent Unaccounted For Water	Population[2]	Per Capita Production/ Purchase (GPD/Person)	Per Capita Consumption (GPD/Person)
2000	42,998	Data Incomplete	-	152,524	-	252
2001	43,108	43,951	1.9	153,951	255	250
2002	44,193	44,709	1.2	157,752	253	250
2003	41,772	43,447	3.9	160,641	241	232
2004	42,087	42,967	2.0	162,528	236	231
2005	42,097	42,205	0.3	164,308	229	229
2006	42,780	43,901	2.6	164,763	238	232
2007	44,286	44,806	1.2	166,058	241	238
2008	42,072	43,301	2.8	166,760	232	225
2009	37,708	39,538	4.6	167,138	211	201
Average	**42,310**	**43,173[3]**	**2.4[4]**	**161,642**	**237[3]**	**234**

[1] Consumption and Production/Purchase data extracted from annual Department of Water Resources Public Water System Statistics Report. Consumption data for 2005 provided by City staff.

[2] Population data from California Department of Finance, E-5 Population and Housing Estimates for Cities 2000-2010, excluding estimate of population for areas in Ontario served by CVWD.

[3] Water production/purchase and per capita production/purchase averages do not include calendar year 2000 because the data was not available on the DWR report.

[4] Percent unaccounted for water average does not include calendar year 2000 data, because the data was not available.

Water Demand Variations

Demand variations through a year are influenced by seasonal effects such as temperature, humidity, and precipitation. System demand variations throughout a day are influenced by the customer base and the daily lifestyles of the customers. In primarily residential areas, the peak demands within a day typically occur in the morning hours between 6:00 am and 9:00 am, when customers wake to begin their daily routine. In largely commercial and industrial areas, the peaks may occur mid-day or the demand may even remain relatively constant throughout the work day. For this study, the variations are expressed as a ratio to the average demand, with the average demand being equal to one.

Monthly Demand Variations

Typical of most Southern California communities, the City's water consumption exhibits a distinct seasonal pattern. Peak and low monthly consumption occur during the dry summer months and wet winter months, respectively. Peak demands in Ontario typically occur in August and September. Low demands typically occur in February, March, or April. The highest and lowest monthly demand factors between 2000 and 2009 were 1.43 and 0.53, respectively.

Daily Demand Variations

Maximum day demand for this study was based upon a review of daily production/purchase reports for 2007 and 2008. The maximum day production/purchase for both years was approximately 1.5 times the average day demand for the year. A maximum day demand factor of 1.6 was selected for the Master Plan work to account for the limited data currently available.

Hourly Demand Variations

Knowledge of accurate demand variations over a 24-hour period is essential for proper analysis of water systems. For this study, hourly demand variations were represented by the development of a diurnal demand curve for each potable water usage type. The diurnal demand curves are employed in determining the adequacy of the sources of supply, pumping facilities, reservoirs, and the transmission / distribution facilities.

The diurnal curves developed in the City's Water and Recycled Water Master Plan, dated April 2006 were implemented in this study, which did not include diurnal curve development in its scope. The diurnal curves were generally based upon tank level information from the Supervisory Control and Data Acquisition (SCADA) system. Graphs of the diurnal curves can be seen in Section 4-6 of this report.

System Demands and Peaking Factors

It is important to evaluate a water system during various incremental peak demands. Typically, a water system is designed to meet the maximum demands placed on it. The system components must be designed to cope with these demands as they occur. Maximum month and maximum day demands are important factors in sizing a system's supply capability. Maximum day demands usually dictate the design criteria for both system transmission and storage needs. Peak hour criterion is a measure of the system's overall adequacy with respect to its transmission and distribution elements, as well as its operational storage capacity.

The relationships between the peaking factors developed for this study with respect to the average day demand estimate are displayed graphically on Figure 1-1.

Existing Demands

Existing water demands by zone are shown in Table 1-2. These are estimates based upon the distribution of demands used in the hydraulic model. The model utilized water meter records from 2008.

Figure 1-1
Water Demand Peaking Factors

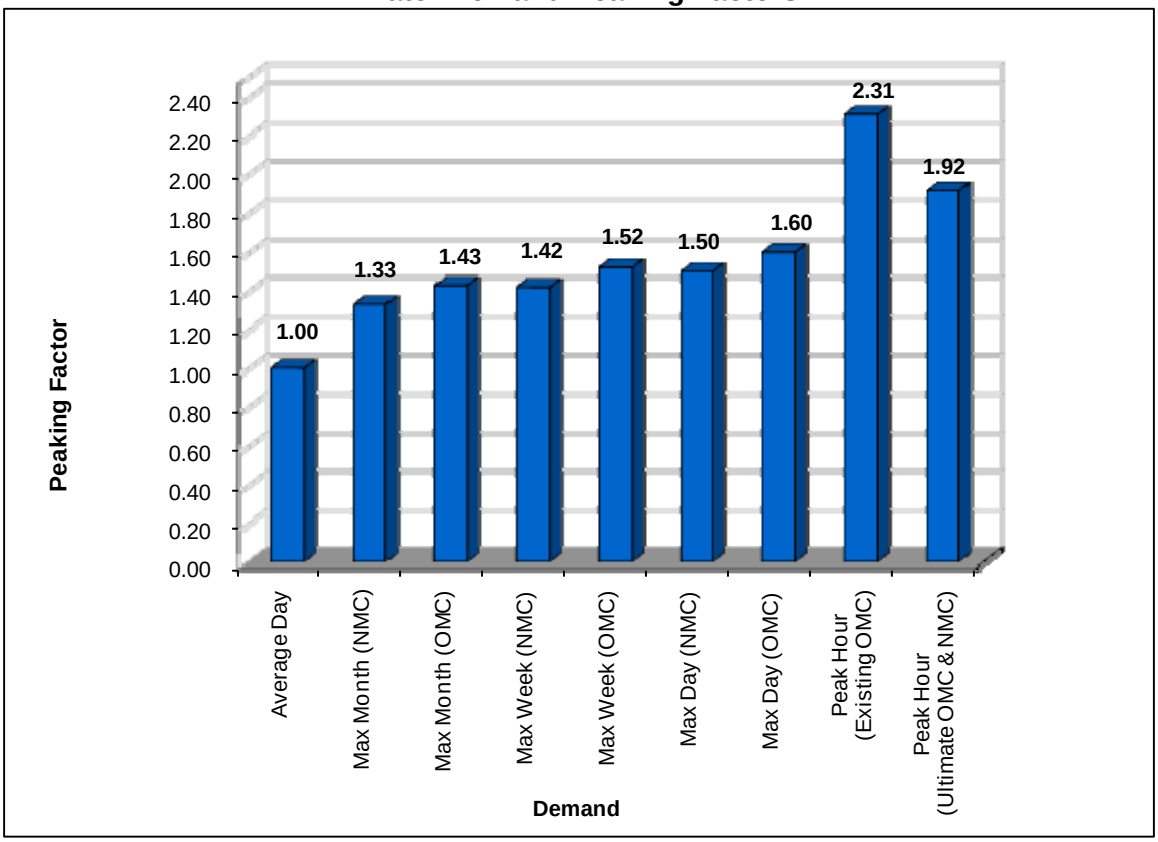


Table 1-2
Existing Water Demands by Zone

Zone	Average			Max Month			Max Week			Max Day[1]			Peak Hour[2]		
	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY
1348	2,671	3.85	4,308	3,819	5.50	6,160	4,060	5.85	6,548	4,273	6.15	6,892	6,173	8.89	9,955
1212	11,059	15.92	17,836	15,814	22.77	25,505	16,810	24.21	27,110	17,694	25.48	28,537	25,557	36.80	41,219
1074	4,977	7.17	8,026	7,117	10.25	11,478	7,565	10.89	12,200	7,963	11.47	12,842	11,501	16.56	18,549
1010	4,674	6.73	7,538	6,684	9.62	10,780	7,104	10.23	11,458	7,478	10.77	12,061	10,801	15.55	17,421
Total	**23,380**	**33.67**	**37,708**	**33,434**	**48.15**	**53,922**	**35,538**	**51.18**	**57,316**	**37,409**	**53.87**	**60,333**	**54,032**	**77.81**	**87,143**

[1] Maximum Day Demand shown is calculated using maximum day factor of 1.60. In the hydraulic model, a maximum day factor of 1.24 is used for Temple Inland.

[2] Peak Hour Demand shown is calculated using peak hour factor of 2.31. In the hydraulic model, some of the large users are assigned specific Peak Hour factors based on the user's hours of operation

Ultimate Demands

A thorough explanation of the development of the ultimate demands is explained in the Ultimate Citywide Water Demand Estimate Technical Memorandum, included as Appendix 1. In summary, the following steps were used to estimate the ultimate demands:

1. Existing meter data was used for existing uses in Old Model Colony (OMC). The demands were reduced by 5 percent to account for future conservation efforts and increased by 5 percent to compensate for unaccounted for water.

2. Developed unit demand factors in gpd/ac were used to estimate demands for the vacant and future densification areas in OMC. Unit demand factors included a 5 percent reduction for future conservation efforts.

3. Developed unit demand factors in gpd/person or gpd/job were used to estimate demands for future mixed use areas. Unit demand factors included a 5 percent reduction for future conservation efforts.

4. Developed unit demand factors in gpd/person or gpd/job were used to estimate demands for future New Model Colony (NMC) residential and commercial areas. Unit demand factors included a 5 percent reduction for future conservation efforts.

5. Developed unit demand factors in gpd/ac were used to estimate demands for future NMC public facilities and schools.

6. Demands for major parks, right-of-ways, and open space areas within NMC were not included because it was assumed to be served by the recycled water system. The remainder of the areas were assumed be served by domestic water and are accounted for in the unit demand factors.

The ultimate average citywide demand estimate included in the Technical Memorandum (Appendix 1) is reported as 69,384 AFY. For this Master Plan, the ultimate average demand is estimated at 74,735 AFY as shown in Table 1-3. The reason for the difference is that the Master Plan did not account for recycled water use for future OMC developments or for recycled water use conversions in the OMC. In the event that future OMC developments do not use recycled water or if current domestic water users are not converted to the recycled water system, the domestic water system is planned to be able to accommodate all the expected ultimate demands.

The following unit demand factors were implemented for all areas where population data was available. These factors account for future water conservation efforts.

Rural Residential = 140 gpd/person

Low Density Residential = 136 gpd/person

Low-Medium Density Residential = 116 gpd/person

Medium Density Residential = 98 gpd/person

High Density Residential = 76 gpd/person

Office Commercial and Business Park = 43 gpd/job

Neighborhood Commercial = 70 gpd/job

General Commercial = 180 gpd/job

Industrial = 95 gpd/job

Mixed use office = 43 gpd/job

Mixed use non-office = 125 gpd/job

The City of Ontario's ultimate water system demands utilized in this study are shown in Table 1-3 by zone.

Table 1-3
Ultimate Water Demands by Zone

Zone	Average			Max Month[1]			Max Week[2]			Max Day[3]			Peak Hour[4]		
	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY
1348	3,552	5.11	5,728	5,079	7.31	8,192	5,399	7.77	8,707	5,683	8.18	9,166	8,208	11.82	13,239
1212	15,874	22.86	25,601	22,700	32.69	36,610	24,128	34.74	38,914	25,398	36.57	40,962	36,685	52.83	59,165
1074	6,045	8.70	9,749	8,644	12.45	13,942	9,188	13.23	14,819	9,672	13.93	15,599	13,970	20.12	22,531
1010	7,878	11.34	12,705	10,737	15.46	17,317	11,446	16.48	18,460	12,076	17.39	19,477	16,162	23.27	26,065
925	12,990	18.71	20,951	17,277	24.88	27,864	18,446	26.56	29,750	19,485	28.06	31,426	24,981	35.97	40,290
Total	**46,339**	**66.73**	**74,734**	**64,438**	**92.79**	**103,925**	**68,608**	**98.80**	**110,651**	**72,315**	**104.13**	**116,630**	**89,113**	**144.01**	**161,290**

** Demands shown do not include potential recycled water use in OMC or potential recycled water conversions*

[1] Maximum Month Demand shown is calculated using maximum month factor of 1.43 for OMC demands and 1.33 for NMC demands.

[2] Maximum Week Demand shown is calculated using maximum week factor of 1.52 for OMC demands and 1.42 for NMC demands.

[3] Maximum Day Demand shown is calculated using maximum day factor of 1.60 for OMC demands and 1.50 for NMC demands. In the hydraulic model, a maximum day factor of 1.24 is used for Temple Inland.

[2] Peak Hour Demand shown for each zone is calculated using the overall system peak hour factor of 1.92. In the hydraulic model, some of the large users are assigned specific Peak Hour factors based on the user's hours of operation. The actual peak hour demands may vary by zone in the model.

Developed unit demand factors in gpd/ac are shown in Table 1-4.

Table 1-4
Domestic Water Unit Demand Factors

Landuse		Density (du/ac)	Density (people/ du)	Unit Demand Factor (gpd/ person or gpd/job)	Unit Demand Factor (gpd/ac)	Unit Demand Factor (gpd/du)
Residential						
Rural Residential	RR	0 - 2	4.0	140	1,120	560
Low Density Residential	LDR	2 - 5	4.0	136	2,450	544
Low Medium Density Residential	LMDR	5 - 11	4.0	116	3,940	464
Medium Density Residential (OMC)	MDR	11 - 25	3.8	98	6,730	372
Medium Density Residential (NMC)	MDR	11 - 25	3.3	98	7,220	323
High Density Residential (OMC)	HDR	25 - 45	3.3	76	8,900	251
High Density Residential (NMC)	HDR	25 - 45	2.0	76	5,320	152
Commercial						
Business Park	BP	-	-	43	2,200	-
General Commercial	GC	-	-	180	2,200	-
Hospitality[1]	HOS	-	-		5,000	-
Neighborhood Commercial	NC	-	-	70	2,200	-
Office Commercial	OC	-	-	43	3,400	-
Industrial						
Industrial	IND	-	-	95	2,000	-
Mixed Use						
Mixed Use[2]	MU	-	-	Factors for residential, see above 43 for office 125 for non-office	N/A	-
Open Space						
Open Space Non-Recreational	OS-NR	-	-	-	1,000	-
Open Space Recreational	OS-R	-	-	-	1,000	-
Public						
Public Facility	PF	-	-	-	2,200	-
Public School[3]	PS	-	-	-	3,500	-

[1] If possible it is recommended to use 150 gpd/room on a case by case basis. It is difficult to estimate the number of rooms or square footage per acre.

[2] Mixed Use demands should be based on the types of landuse that make up the specific area and the unit flow factors provided above. The City's 2010 General Plan (The Ontario Plan) provides detailed information on the landuses that make up each mixed use area (See Table 3-2 of this report).

[3] The unit flow factor 3,500 gpd/ac include an allowance for irrigation. If irrigation will be supplied by recycled water, a factor of 1,800 gpd/ac is recommended. This reduced factor was used in the hydraulic model for NMC schools.

Recycled Water

The City's existing recycled water use in OMC is estimated at 1,547 AFY as of January 2010. The recycled water is supplied by Inland Empire Utilities Agency's (IEUA) recycled water system. There are currently 147 recycled customer meters in the City.

The City's Recycled Water Master Plan is based upon increasing the recycled water use in OMC to 6,898 AFY, including 1,944 AFY in currently vacant areas, and 3,407 AFY in future conversions from potable water to recycled water along the planned recycled water pipeline alignments. The Recycled Water Master Plan determined the need for 11,487 AFY of recycled water in NMC.

Conversions of domestic water use to recycled water use was not incorporated into the domestic water model for this study. This was done to be conservative and assure that the domestic water system could provide the demands if necessary.

1-4 Water Supply

Sources of Supply

The City's existing potable water supply consists of imported water from the Water Facilities Authority (WFA) and Chino Basin Desalter Authority (CDA) and the groundwater from Chino Basin, extracted via the City's wells. The City currently owns 32 wells. Four wells are either abandoned or destroyed, five (5) of the wells are inactive, while the other 23 wells are operational. Over the last ten years, the City has imported an average of 12,735 AFY and pumped 30,605 AFY from the groundwater basin. Therefore, about 29 percent of the City's water supply is imported.

Imported Water Supply

Water is imported into Southern California through two major water supply systems:

1. The Colorado River Aqueduct, constructed and operated by Metropolitan Water District of Southern California (MWD), transports water from the Colorado River to MWD's service area.
2. The State Water Project, owned and operated by the State of California Department of Water Resources (DWR), transports water from the Sacramento-San Joaquin Delta through the California Aqueduct.

The City's imported water supply over the last ten years is shown in Table 1-5.

Table 1-5
Imported Water Supply

Year	WFA Supply		CDA Supply		Total Supply	
	(AFY)	(mgd)	(AFY)	(mgd)	(AFY)	(mgd)
2000	9,258	8.3	-	-	9,258	8.3
2001	8,907	8.0	-	-	8,907	8.0
2002	9,325	8.3	-	-	9,325	8.3
2003	13,207	11.8	-	-	13,207	11.8
2004	15,143	13.5	-	-	15,143	13.5
2005	13,406	12.0	-	-	13,406	12.0
2006	12,256	10.9	2,852	2.5	15,108	13.5
2007	12,826	11.5	5,352	4.8	18,178	16.2
2008	8,747	7.8	7,528	6.7	16,275	14.5
2009	3,494	3.1	5,047	4.5	8,541	7.6
Average	**10,657**	**9.5**	**5,195**	**4.6**	**12,735**	**13.0**

2000-2008 data from City's General Production Reports
2009 data from Ontario System Operations file

Water Facilities Authority

The Water Facilities Authority (WFA) currently owns and operates the Agua de Lejos Water Treatment Plant located at the Benson Avenue and 18th Street, in the City of Upland. It is a conventional surface water treatment facility that treats and disinfects imported water supplies, primarily State Water Project water that is purchased from MWD through IEUA. The current rated capacity of the plant is 81 mgd. The City of Ontario owns 25 mgd or 31.4 percent of the treatment plant capacity.

The water from Agua de Lejos Water Treatment Plant is conveyed to two locations that connect with the City's existing water system. The first turnout (Turnout 1) is located adjacent the 1212-1A and 1212-1B Reservoirs at the northwest corner of Eighth Street and Fern Avenue. It has a 16 mgd capacity. The second turnout (Turnout 2) is located adjacent the 1212-3 Reservoir at the southeast corner of Campus Avenue and A Street. It has a 9 mgd capacity. The maximum volume of water that the City can receive from their WFA connections is therefore 25 mgd.

Chino Basin Desalter Authority

The Chino Basin Desalter Authority (CDA), a joint powers agency, purifies brackish groundwater extracted from the lower Chino Basin with the Chino 1 and Chino 2 Desalter facilities and distributes drinking water to member agencies. Each of the member agencies has "take or pay" contracts to purchase water produced by the CDA. CDA owns and operates the two groundwater treatment desalination systems, Chino Desalter 1 (CDA I) and Chino Desalter 2 (CDA II).

CDA I is located in the City of Chino south of Kimball Avenue, west of Euclid Avenue. There are 14 supply wells feeding the desalter facilities. CDA I produces 14.2 mgd or 15,900 AFY of high-quality drinking water. The City receives about 1,500 AFY of water from the CDA I facility.

CDA II is located at 11202 Harrel Street in Mira Loma, California. There are 8 supply wells feeding the desalter facilities. CDA II produces 9.3 mgd or 10,400 AFY of high quality drinking water. The City receives about 3,500 AFY of water from the CDA II facility.

Groundwater Supply

The City extracts groundwater from the Chino Groundwater Basin (Chino Basin or Basin), which is one of the largest groundwater basins in the Southern California area with storage capacity estimated at five to seven million acre-feet. It collects roughly 140,000 acre-feet of water each year. Chino Basin encompasses about 235 square miles of the upper Santa Ana River watershed and lies within portions of San Bernardino, Riverside, and Los Angeles counties.

Per the Chino Basin Judgement, the City of Ontario has appropriative rights to 16,337.40 AFY and its share of the initial operating safe yield is 11,373.82 AFY or 20.74 percent.

Water Quality

Imported water is generally of good quality with nitrate and total dissolved solid concentrations well below the established maximum contaminant levels. Groundwater quality in Chino Basin is generally good with better quality in the northern portion of the basin where recharge occurs. Salinity (TDS) and nitrate-nitrogen concentrations increase in the southern portion of the basin.

Areas of high nitrate concentrations are shown in Figure 5-2. The City of Ontario has inactivated or abandoned several wells (Well 3, 4, 9, 15, and 50) due to high nitrate and perchlorate concentrations detected above the maximum contaminant levels (MCL).

Future Imported Water Supply

In the future, water supply capacity provided from WFA will remain at 25 mgd. The City's Chino II product water entitlements from CDA will increase by 3,533 AFY following the completion of the Chino II expansion project. The total supply from CDA II will be about 7,033 AFY. The total supply from CDA I will remain at 1,500 AFY. New facilities are being designed so that the CDA II product water can be delivered to the City's 1010 Zone in the vicinity of the intersection of Millliken Avenue and Riverside Drive.

1-5 Existing System

General

The City's existing domestic water system consists of the following:

- 5 primary pressure zones (Zone 925, 1010, 1074, 1212, and 1348)
- Over 2.8 million feet (546 miles) of transmission and distribution pipe, 2-inches through 42-inches in diameter
- 6,811 fire hydrants
- 36,658 water meters
- 23 active wells and 5 inactive wells
- 12 reservoirs with a total volume of 75 MG
- 4 active booster pump stations, 1 inactive booster pump station
- 16 pressure reducing stations
- 5 inter-agency connections
- 2 Connections to Water Facilities Authority
- 2 Connections to Chino Desalter Authority
- 1 Ion Exchange Treatment Facility
- 2 altitude valves
- 36,658 domestic water services (See Table 1-6)

Table 1-6
Water Meter Type

Meter Type	Number of Meters
Single Family Residential	29,473
Multiple Family Residential	2,069
Commercial	3,285
Industrial	278
Landscape Irrigation	1245
Other	308
Total	**36,658**

The existing water service area includes only a very small portion of New Model Colony- Edenglen by Brookfield Homes (located south of Riverside Drive, east of Mill Creek Avenue), and Colony High School (located south of Riverside Drive and west of Mill Creek Avenue). The majority of the existing residents and businesses of NMC use private groundwater wells for their water supply. The existing domestic water system is shown on Figure 1-2. The hydraulic schematic of the existing water system is shown on Figure 1-3.

WFA
Aqua de Lejos
Water Treatment Plant

RES1348-1A
RES1348-1B
RES1348-1C

RES1212-1A
RES1212-1B

SAW
Conn

BP-3
BP-4

RES1212-3

WFA
Conn

WFA
Conn

City of
Upland

City of
Rancho Cucamonga

City of
Montclair

City of
Chino

City of
Chino

City of
Fontana

Riverside
County

Old Model
Colony

New Model
Colony

BP-9A
BP-9B

RES1074-1A
RES1074-1B

BP-1A
BP-1B
BP-1C
BP-2

RES1010-1

RES1010-2A
RES1010-2B

RES925-2A

Ontario

CDA II
Conn

CDA I
Conn

PRS2
PRS3
PRS4
PRS5
PRS6
PRS7
PRS8
PRS9
PRS10
PRS11
PRS12
PRS13
PRS14
PRS15
PRS17
PRS18

BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
SIXTH ST
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
FOURTH ST
ONTARIO MILLS PKWY
I-10 FWY
AIRPORT DR
JURUPA ST
PHILADELPHIA ST
MISSION BLVD
WINEVILLE AVE
VINTAGE AVE
SR-60
RIVERSIDE DR
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
BENSON AVE
MAGNOLIA AVE
CYPRESS AVE
SR-60
WALNUT ST
RIVERSIDE DR
FERN ST
EUCLID AVE
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
CUCAMONGA CREEK
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
CLEVELAND AVE
EUCLID AVE
SULTANA AVE
CAMPUS AVE
BON VIEW AVE
CUCAMONGA AVE
GROVE AVE
PARCO AVE
WALKER AVE
BAKER AVE
VINEYARD AVE

N

0 2,500 5,000 10,000 Feet

Legend

- Booster Pump Station
- Pressure Reducing Station
- Reservoir
- Active Well
- Inactive Well
- 1010 Zone Pipe
- 1074 Zone Pipe
- 1212 Zone Pipe
- 1348 Zone Pipe
- CDA Pipe
- WFA Pipe
- City Boundary
- New Model Colony
- 1010 Pressure Zone
- 1074 Pressure Zone
- 1212 Pressure Zone
- 1348 Pressure Zone

CITY OF ONTARIO
WATER MASTER PLAN

PROJECT NO: 1000919.00

DATE: October 2011

Existing Water System

Figure 1-2

1500'
1400'
1300'
1200'
1100'
1000'
900'
800'
700'
600'
500'
400'
300'
200'

1348' (1A) 3.00 MG
1348' (1B) 2.00 MG
1348' (1C) 3.75 MG
1348' 8.75 MG (3 RES.)

WFA AGUA DE LEJOS WTP 1618'
1618'
JOINT AGENCY PRS
1474'
30"
NO. 2 TURNOUT/ PRS
1350' 1454'
≈ 9 MGD FROM WFA NO.2
16"
24"
≈ 16 MGD FROM WFA NO. 1

1212' (1A) 20.00 MG
1212' (1B) 2.00 MG
1212' (2) 0.37 MG
1212' (3) 10.00 MG
1212' 32.00 MG (3 RES.)

1180'
1348' ZONE
4,308 AFY (11.4 %)
1020'
BP: "B"
XXXX GPM
1232' 1454'
NO. 1 TURNOUT/ PRS
SAW 850 AF/Y
1095'
150 HP
BP: 3 2979 GPM
100 HP 4 1803 GPM
46 2500 TBD
PRS : 6" 15 52 PSI 6" 47 PSI
200 HP BP: 9A 2137 GPM
200 HP 9B 2159 GPM

1212' ZONE
17,835 AFY (47.3 %)
865'
PRS: 4" 14 45 PSI 8" 40 PSI
FROM CVWD
PRS: 6" 6 65 PSI; 8" 60 PSI; 4" 9 65 PSI; 8" 60 PSI; 4" 10 89 PSI; 10" 85 PSI; 6" 70 PSI; 4" 11 62 PSI; 8" 57 PSI; 4" 12 79 PSI; 6" 73 PSI; 10" 68 PSI
47 1600 TBD
WELLS : 9 1200 GPM; 18 580 GPM; 19 580 GPM; 20 786 GPM; 24 1803 GPM; 25 1280 GPM; 26 865 GPM; 27 1061 GPM; 29 2503 GPM; 30 1810 GPM; 31 2958 GPM; 37 2953 GPM; 38 2424 GPM; 41 2557 GPM
BP: 3686 GPM 1A 250 HP; 3500 GPM 1B 200 HP; 4766 GPM 1C 350 HP; 2200 GPM 2 250 HP
FACILITIES IN PLACE TO BOOST TO 1348' ZONE
PRS: 7 3" 4" 8" 55 PSI; 4" 8" 50 PSI; 8 4" 8" 12" 55 PSI; 8" 50 PSI; 40 PSI; 13 4" 6" 10" 60 PSI; 55 PSI; 50 PSI

1074' (1A) 2.75 MG
1074' (1B) 2.00 MG
1074' 4.75 MG (2 RES.)
ALT. VALVE
GALVIN WTP OUT OF SERVICE
MWD
930'
1074' ZONE
8,026 AFY (21.3 %)
825'
ALT. VALVE
ION-EX
WELLS : 40 3305 TBD; 11 240 GPM; 15 900 GPM; 16 1393 GPM; 17 3020 GPM; 35 1658 GPM; 36 2500 GPM; 45 2500 GPM; 3 1080 GPM; 4 1240 GPM; 44 2500 GPM; 52 2500 GPM
PRS: DEM; DEM; 2 4" 8" 8" 62 PSI; 58 PSI; 52 PSI; 3 4" 8" 8" 65 PSI; 60 PSI; 55 PSI; 4 4" 8" 12" 4" 64 PSI; 57 PSI; 90 PSI RELIEF; 5 4" 6" 8" 65 PSI; 60 PSI; 50 PSI

1010' (1) 5.50 MG
1010' (2A) 9.00 MG
1010' (2B) 9.00 MG
1010' 23.50 MG (3 RES.)
880'
1010' ZONE
7,538 AFY (20.0 %)
735'
WELL : 50 2500 GPM; 34 2074 GPM
CDA I (930 GPM) (1,500 AFY) ARCHIBALD BPS
39 2413 GPM
PRS : 4" 10" 17; 4" 10" 14" 18

PHASE 2: 1212' TO 925'
PRS (PHASE 2)
925' (2A) 6.00 MG
925' 6 MG (1 RES.)
WELLS : 49 2760 GPM
1 1298 GPM; 2 1315 GPM; 3 1282 GPM
CDA II ONTARIO BPS
PRS (LAT. B)
PRS (LAT. A)
1110' CDA II VIA JCSD 3,500 AFY 2,170 GPM

LEGEND :

WELLS : INACTIVE ACTIVE
RES. = RESERVOIR INACTIVE ACTIVE
SAME SITE =
BP = BOOSTER PUMP INACTIVE ACTIVE
CDA = CHINO BASIN DESALTING AUTHORITY
PRS. = PRESSURE REDUCING STATION INACTIVE ACTIVE
SAW = SAN ANTONIO WATER CO. ABANDONED
WFA = WATER FACILITIES AUTHORITY
AFY = ANNUAL CONSUMPTION FOR 08'
(%) = PERCENT OF TOTAL CONSUMPTION
HYDROELECTRIC FACILITY =
ALTITUDE VALVE =
BLENDING STATION =
TURNOUT / PRS
ION EXCHANGE PLANT ION-EX

BOOSTER LINE
PRV LINE
RES. DEDICATED FILL LINE
WFA FACILITY

NITRATE LEVELS (MG/L)
<20 20-30 31-40 41-50 >50

CITY OF ONTARIO
AKM
PROJECT NO. 1000919.00
DATE: March 2011
CITY OF ONTARIO WATER MASTER PLAN
Existing Water System Hydraulic Schematic
Figure 1-3

Pressure Zones

As shown in Figure 1-2, the existing system is divided into the 5 pressure zones entitled: 925 Zone, 1010 Zone, 1074 Zone, 1212 Zone, 1348 Zone. It should be noted that the 925 Zone does not currently have any existing demands. The 925 Zone will serve the future New Model Colony developments. The largest pressure zone in the system is the 1212 Zone, which covers about 38 percent of the existing water service area. Details of each pressure zone are shown in Table 1-7.

Table 1-7
City of Ontario Pressure Zones

Pressure Zone Name[1]	Pressure Zone Name[2]	Area (sq. mi.)	Area (Ac)	Pipe Length (ft)	Hydraulic Grade Line (ft)	Ground Elevation Range (ft)	Static Pressure Range[3] (psi)
1348	13th Street	3.1	1,954	370,591	1,348	1,020 - 1,180	73 - 142
1212	8th Street	18.7	11,957	1,285,311	1,212	865 - 1,095	51 - 150
1074	4th Street	7.5	4,780	596,218	1,074	825 - 930	62 - 108
1010	Phillips Street	9.0	5,783	615,906	1,010	735 - 880	56 - 119
925[4]	Francis Street	10.5	6,733	15,341	925	635 - 800	54 - 126
	Total	**48.8**	**31,206**	**2,883,366**			

[1] Nomenclature used in this report.

[2] Nomenclature used in previous Water Master Plan.

[3] Calculated based on HGL and ground elevation range.

[4] There is no existing demands in the 925 Zone. The water entering Reservoir 925-2A is pumped out to the 1212 Zone. Brookfield Homes and Colony High School are currently connected to the 1010 Zone.

Transmission and Distribution System

The potable water system includes 546 miles of transmission and distribution pipe, ranging in size from 2-inches through 42-inches. Pipe materials are primarily ductile iron, cast iron, and cement motor lined and welded steel. More than half of the system was constructed between 1970 and 2000.

City Wells

There are 32 wells within the City's water system. Twenty three (23) of them are currently active and five (5) are inactive. Four wells have been abandoned. The total well capacity is about 51,100 gpm or 73.6 mgd.

Reservoirs

The City's water system includes twelve (12) reservoirs ranging in capacity from 2 million gallons to 20 million gallons. The City's total reservoir capacity is currently 75 MG of which approximately 32 MG lies within the 1212 Zone. The hydraulic gradient in each pressure zone is controlled by the high water elevation of the reservoirs that feed the zones by gravity.

All the existing reservoirs in the City are less than 60 years old with the exception of Reservoir 1212-3, which was constructed in 1926. The average life expectancy of concrete reservoirs and steel tanks is about 100 years, provided that reservoirs are properly maintained and regularly

repainted or recoated every 15-20 years. Thus, most of the City reservoirs are expected to be in fairly good condition and no improvements based on age are recommended except for Reservoir 1212-3.

Booster Pump Stations

The City's system includes five booster pump stations. One station, housing Booster B (BP-B), is inactive. The Ontario Booster Pump Station was constructed in 2008. It currently takes suction from Reservoir 925-2A. Reservoir 925-2A was constructed to ultimately serve a new 925 Zone, which will serve water to New Model Colony. Currently, there is not much demand in New Model Colony. Therefore, the water is moved from Reservoir 925-2A to the 1212 Zone via three pumps at the Ontario Booster Pump Station.

Pressure Reducing Stations

The City's system includes sixteen (16) pressure reducing stations (PRS). Most of the stations have two or more pressure reducing valves (PRVs), a main valve and a one or more bypass valves. The main valve, the smallest in diameter, typically has the highest pressure setting. Bypass valves are larger in diameter and have a slightly lower pressure setting than the main valve. The bypass valve will open when the system pressure drops below the main valve's pressure setting and the main valve cannot supply enough water. If the downstream pressure continues to fall below the bypass valve pressure setting, the second bypass valve will open to provide additional water. In addition, pressure relief valves are generally present at each PRS. These valves protect the water system from abnormally high pressures should the regulating valves fail to work properly.

Altitude Valves

The existing system has two altitude valves that regulate reservoir operations. The altitude valves are operated based on levels in Reservoirs 1010-2 and 1010-1.

Imported Water Connections

The City has two Water Facilities Authority (WFA) turnouts, two points of connection with the Chino Basin Desalter Authority (CDA), and one point of connection to the San Antonio Water Company (SAWC).

Inter-Agency Connections

The City's water system has five inter-agency connections with neighboring cities or water utilities. These inter-agency connections allow the City to obtain water from or provide water to adjacent water systems. One connection is capable of allowing water from Cucamonga Valley Water District to the City's 1212 Zone. One connection is capable of providing water from the City's 1212 Zone to the City of Chino. Three connections are capable of providing water from the City's 1348 Zone to the City of Upland and Cucamonga Valley Water District.

Water Treatment

Operated by the City for over thirty years to treat raw Colorado River water from the MWD Upper Feeder, the John Galvin Water Treatment Plant was deactivated in 1993 because the treatment process did not meet the requirements of the Surface Water Treatment Rule.

As a part of participating in the DYY program, the John Galvin Water Treatment Plant site (southeast corner of Cucamonga Avenue and Fourth Street) was chosen for the location of a new ion-exchange facility. The ion-exchange plant was completed in 2008 and treats water extracted from Well 44 and Well 52. The groundwater is treated for nitrates and perchlorates and is then fed into Reservoir 1074-1A and 1074-1B. The facility includes a bypass blending system where groundwater can be blended with Zone 1212 water prior to entering Reservoir 1074-1A and 1074-1B. The treated and bypass blending capacities depend on the groundwater quality being treated at the time. The maximum well water concentrations are 70 mg/L nitrate and 8 micrograms/L perchlorate. The treated well water has concentrations of less than 35 mg/L nitrate and less than 4.6 micrograms/L perchlorate.

1-6 Service Criteria

Performance criteria are established to evaluate the adequacy of various water system components through a systematic analysis. Necessary improvements are identified and recommended for inclusion in a Capital Improvement Program (CIP). Some criteria are based upon experience and their application is at the discretion of the water purveyor. This includes service pressures, storage capacity, and sources of supply. Other criteria, such as water quality and fire protection, are based on federal, state and local jurisdictional requirements.

A summary of the service criteria is listed in Table 1-8.

Water Quality

The quality of water served by the City has to be in accordance with the Federal standards as well as the State of California Department of Public Health (CDPH) standards as set forth in Title 22 of the California Code of Regulations.

The basic water quality standards are established by the Safe Drinking Water Act (SDWA), which was passed by the Congress in 1974. Amendments to the SDWA were enacted in 1986 and 1996. The SDWA mandated the U.S. Environmental Protection Agency (EPA) to develop primary drinking water standards or maximum contaminant levels (MCL'S) in public water supplies.

The CDPH has responsibility for the State's drinking water program. It is accountable to the EPA for enforcement of the SDWA and for adoption of standards that are at least as stringent as that of the EPA. Since California conducts independent risk assessments, some of its standards are more stringent than the standards of the Federal Government.

See Section 7-2.11 for additional information regarding the water quality requirements.

Table 1-8
Service Criteria

Description	Criteria	Existing Requirement	Ultimate Requirement
1. Source of Supply			
a. Total	Maximum Day Demand (except for closed zones which shall be Maximum Day Demand plus Fire Flow Demand or Peak Hour, whichever is greater)	37,409 gpm	72,315 gpm
b. Local Supply	Average Day Demand	23,380 gpm	46,339 gpm
2. Reservoir Capacity			
a. Operational Storage	30% of Maximum Day Demand	16.2 mg	27.4 mg
b. Emergency Storage	100% of Average Day Demand	33.7 mg	66.7 mg
c. Fire Suppression	Highest Fire Flow Requirement		
Residential			
Rural	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Low-Medium Density	1,500 gpm for 2 hours	0.18 mg	0.18 mg
Medium Density	2,000 gpm for 2 hours	0.24 mg	0.24 mg
High Density	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Retail / Service			
Neighborhood Commercial	2,500 gpm for 3 hours	0.45 mg	0.45 mg
General Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Office Commercial	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Hospitality	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Employment			
Business Park	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Industrial	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Other			
Airport	4,000 gpm for 4 hours	0.96 mg	0.96 mg
Mixed Use	3,500 gpm for 4 hours	0.84 mg	0.84 mg
Open Space	1,500 gpm for 2 hours		
Public Facility	3,000 gpm for 3 hours	0.54 mg	0.54 mg
Public School	2,500 gpm for 3 hours	0.45 mg	0.45 mg
3. Booster Pump Stations	➢ Capable of delivering Maximum Day Demand plus Fire Flow or Peak Hour Demand of service area, whichever is greater ➢ Stand-by pump equal in size to the largest duty pump ➢ Flow meters, suction and discharge pressure gauges, and telemetry equipment for alarm and status notification at each station ➢ Provisions for emergency power at all stations		
4. Minimum Pipe Size	12-inch in commercial and industrial areas 8-inch in all other areas		

Table 1-8
Service Criteria (continued)

Description	Criteria
5. Maximum Velocities	➢ 5 ft/s at Average Day Demand ➢ 7 ft/s at Maximum Day Demand (5 ft/s for PVC pipe) ➢ 7 ft/s at Fire Flow Demand (5 ft/s for PVC pipe)
6. Static Pressures	➢ Minimum 40 psi ➢ Desired 60 - 80 psi ➢ With pressure regulation over 80 psi
7. Dynamic Pressures	Minimum 40 psi during Peak Hour Demand
8. Fire Flows and Pressures	
Residential	
Rural	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant
Low Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant
Low-Medium Density	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant
Medium Density	2,000 gpm for 2 hours with 20 psi residual pressure at fire hydrant
High Density	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant
Retail / Service	
Neighborhood Commercial	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant
General Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant
Office Commercial	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant
Hospitality	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant
Employment	
Business Park	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant
Industrial	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant
Other	
Airport	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant
Mixed Use	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant
Open Space	1,500 gpm for 2 hours with 20 psi residual pressure at fire hydrant
Public Facility	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant
Public School	2,500 gpm for 3 hours with 20 psi residual pressure at fire hydrant

1-7 Hydraulic Model

A computer model of the City's water system was utilized to aid in the evaluation of the adequacy of the existing facilities under present and future demand conditions.

Hydraulic analyses were performed using the Innovyze (formerly MWHSoft) InfoWater program, which is a commercially available hydraulic software package that is designed to simulate steady state and extended period operations of water systems.

The City's existing hydraulic model, developed for the 2006 Water and Recycled Water Master Plan, was used as the basis for the model. For this study, pipelines and facilities that had been constructed since mid-2004 and not included in the original model were added per the City's Water GIS and as-built construction plans.

The model primarily includes the domestic water pipelines that are owned by the City. Water service laterals are not included. Modeling information associated with each pipe includes size, length, and roughness. Other information included in the model database are pipe diameter, year of installation, zone, and pipe material. Modeling information associated with each node includes elevation, water demand, and diurnal pattern of demand. Node and facility elevations were obtained from the City's 2-foot contour information, provided in GIS shapefile format. The elevations are based on the National American Vertical Datum (NAVD) of 1988.

See Section 8 for additional details on the development of the hydraulic model.

1-8 System Analysis

The established system criteria and the computer model were utilized in analyzing the system, and evaluating its adequacy. The system was analyzed under average day, maximum day, peak hour, and maximum day plus fire flow conditions. Survey of the City's source of supply, storage, and pumping facilities were also conducted.

Existing system deficiencies were identified and mitigation projects were formulated based upon the results of the model runs, the survey, and input from City staff. Proposed projects were added in the hydraulic model to test the operation of the system after implementation.

Source of Supply

The criterion established requires a source of supply equal to one maximum day demand, with one average day demand from local sources.

Per the criterion, the City's existing source of supply should be greater or equal to 37,409 gpm with 23,380 gpm from local sources. The total existing supply sources is equivalent to 71,554 gpm which exceeds the criteria of one maximum day demand of 37,409 gpm. The total source of supply from wells or local sources is 51,093 gpm which exceeds the criteria of one average day demand of 23,380 gpm.

Per the criterion, the City's ultimate source of supply would need to be greater or equal to 72,315 gpm (maximum day demand) with 46,339 gpm (average day demand) from local sources. The City already has an additional well drilled (Well 43) and sites identified for three more (Well 42, 48, and 51). Altogether, the ultimate system will include 9 additional wells, with 7 wells serving the 925 zone. The total capacity of the existing wells meets the criteria of one average day demand under ultimate conditions. However, additional wells are needed to be able to supply the maximum day demand efficiently when water from one or more of the imported supply sources may not be available, and to operate the wells during the off-peak periods.

The estimated useful life of well casings is 60 years. The oldest active well is Well 17, which was constructed in 1963. Well 24 was constructed in 1969, and Wells 25, 26, and 27 were constructed in 1971. Depending upon the condition of the casings, these wells may be lost in the next 15 to 20 years. Because nine new wells are planned, additional replacement wells have not been included in the CIP for these wells.

Storage

For the City of Ontario's system, operational storage criterion is based on 30 percent of the maximum day demand for NMC, and 25 percent of maximum day demand for OMC due to the diversity of demands in OMC. The City's emergency storage criteria is set to one average day demand. Fire suppression storage is the volume required to supply the service area with the required fire flows, which range from 1,500 to 4,000 gpm for a duration of two (2) to four (4) hours. The fire flow suppression storage and operational storage is increased by 15 percent so that a portion of the reservoir volume is available for variations in elevation, and to provide submergence over the reservoir outlet pipe. The emergency storage volume is not increased by 15 percent in order to keep the required storage volumes at reasonable amounts. In a real emergency, the emergency storage volume plus the operational storage volume plus the fire suppression storage volume would all be available for use.

Due to age and condition, it is assumed in the ultimate storage analysis that the 10 MG Reservoir 1212-3 will be abandoned. Two additional 8 MG reservoirs are recommended for the 1212 Zone. One additional 6 MG reservoir and two 9 MG reservoirs are recommended for the 925 Zone which will ultimately provide service to most of New Model Colony. The recommended reservoirs were considered in the ultimate storage analysis.

For the existing system, a storage deficit of 6.68 mgd was calculated in the 1074 Zone. For the ultimate system, the storage deficit of the 1074 Zone is increased to 8.92 mgd. The available surplus in the 1212 Zone (3.52 mgd, following the construction of two new 8 MG reservoirs) could be transferred to the 1074 Zone via PRSs. Ultimately, the 1010 Zone surplus is calculated to be 9.19 mgd. The construction of a new booster pump station is recommended to pump this surplus water from the 1010 Zone to the 1074 Zone.

Reservoir condition assessment led to the following recommendations:

- Structural retrofits for 1348 Zone Reservoirs
- Inlet and outlet piping seismic retrofits for Reservoir 1010-1A
- Repair of Reservoir 1212-3 (to extend its useful life possibly 10 to 15 years), including thorough roof inspection and repair

Model Runs and System Pressures

Existing System Analysis - The existing system was modeled with existing demands in order to confirm the system geometry and controls. Results were compared with SCADA information provided by the City.

Ultimate Maximum Day, Peak Hour Analysis - Upon confirmation that the existing system model was simulating existing field conditions, the remaining hydraulic analyses for this study was primarily based upon the ultimate demands expected for the City's domestic water system. Initially, the ultimate demands were applied to the existing system plus planned facilities for the expanded 1010 Zone and the 925 Zone (see Section 10 for further descriptions). The model was run to determine areas of low pressures under maximum day peak hour conditions. Improvements formulated to increase pressures in these areas to meet the criteria of a minimum of 40 psi during peak hour conditions include 3 PRSs and 28,390 feet of new pipe.

Ultimate Maximum Day plus Fire Flows - System analysis was conducted with ultimate facilities and demands under maximum day plus fire flow conditions. If the fire node was located near multiple land use types, the highest fire flow demand was utilized. Improvement recommendations for additional or upsized pipe to address the fire flow deficiencies include 136,909 feet of pipe.

Additional Analysis / Improvement Recommendations

Additional improvement recommendations based upon previous studies, interviews with City staff and additional analysis include the following:

- Pipeline replacement program for small diameter pipelines (6-inch or less) and aging pipelines (50 years or older)
- Permanent back-up power at Well 39
- Portable generator connections and manual transfer switches at all twenty existing wells
- Purchase of eight 750 KW portable generators
- One future inter-agency connection
- Four future emergency connections
- Completion of water meter replacements
- Security upgrades at Reservoirs 1212-1A & 1212-1B, Reservoir 1212-3, Well 9, Well 26, Well 35, and Reservoir 1010-1
- Airport metering and backflow prevention

See Section 9 for additional information on the aforementioned improvement recommendations.

1-9 Ultimate System

The ultimate domestic water system will consist of five pressure zones as shown on Figure 1-4. As New Model Colony is developed, the 1010 Zone will be expanded further south to Chino Avenue and a fifth pressure zone called the 925 Zone will be added, covering the rest of New Model Colony. A hydraulic schematic of the ultimate system is shown on Figure 1-5. Ultimate facility recommendation locations are shown on Figure 1-6.

WFA
Aqua de Lejos
Water Treatment Plant

RES1348-1A
RES1348-1B
RES1348-1C

RES1212-4A
RES1212-4B

City of Upland

RES1212-1A
RES1212-1B

SAW Conn

WFA Conn

BP-3
BP-4

WFA Conn

City of Rancho Cucamonga

City of Montclair

BP-9A
BP-9B

PRS15

RES1074-1A
RES1074-1B

BP-1A
BP-1B
BP-1C
BP-2

PRS14

RES1010-1

RES1010-2A
RES1010-2B

Old Model Colony

PRS9
PRS11
PRS21
PRS22
PRS6
PRS12
PRS13
PRS10
PRS7
PRS8

AV3

RES925-1A
RES925-1B

RES925-2A
RES925-2B

Ontario

PRS19

CDA II Conn

PRS4
PRS5
PRS2
PRS23
PRS3

City of Chino

Riverside County

PRS18

CDA II Conn

PRS16

PRS17

CDA I Conn

New Model Colony

City of Fontana

BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
EIGHTH ST
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
FERN ST
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
CUCAMONGA CREEK
CLEVELAND AVE
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
MAGNOLIA AVE
CYPRESS AVE
WINEVILLE AVE
VINTAGE AVE

N

0 2,500 5,000 10,000
Feet

Legend

- Altitude Valve
- Pressure Reducing Station
- Booster Pump Station
- Reservoir
- Active Well
- Inactive Well
- Zone 925 Pipe
- Zone 1010 Pipe
- Zone 1074 Pipe
- Zone 1212 Pipe
- Zone 1348 Pipe
- CDA Pipe
- WFA Pipe
- 925 Pressure Zone
- 1010 Pressure Zone
- 1074 Pressure Zone
- 1212 Pressure Zone
- 1348 Pressure Zone
- City Boundary

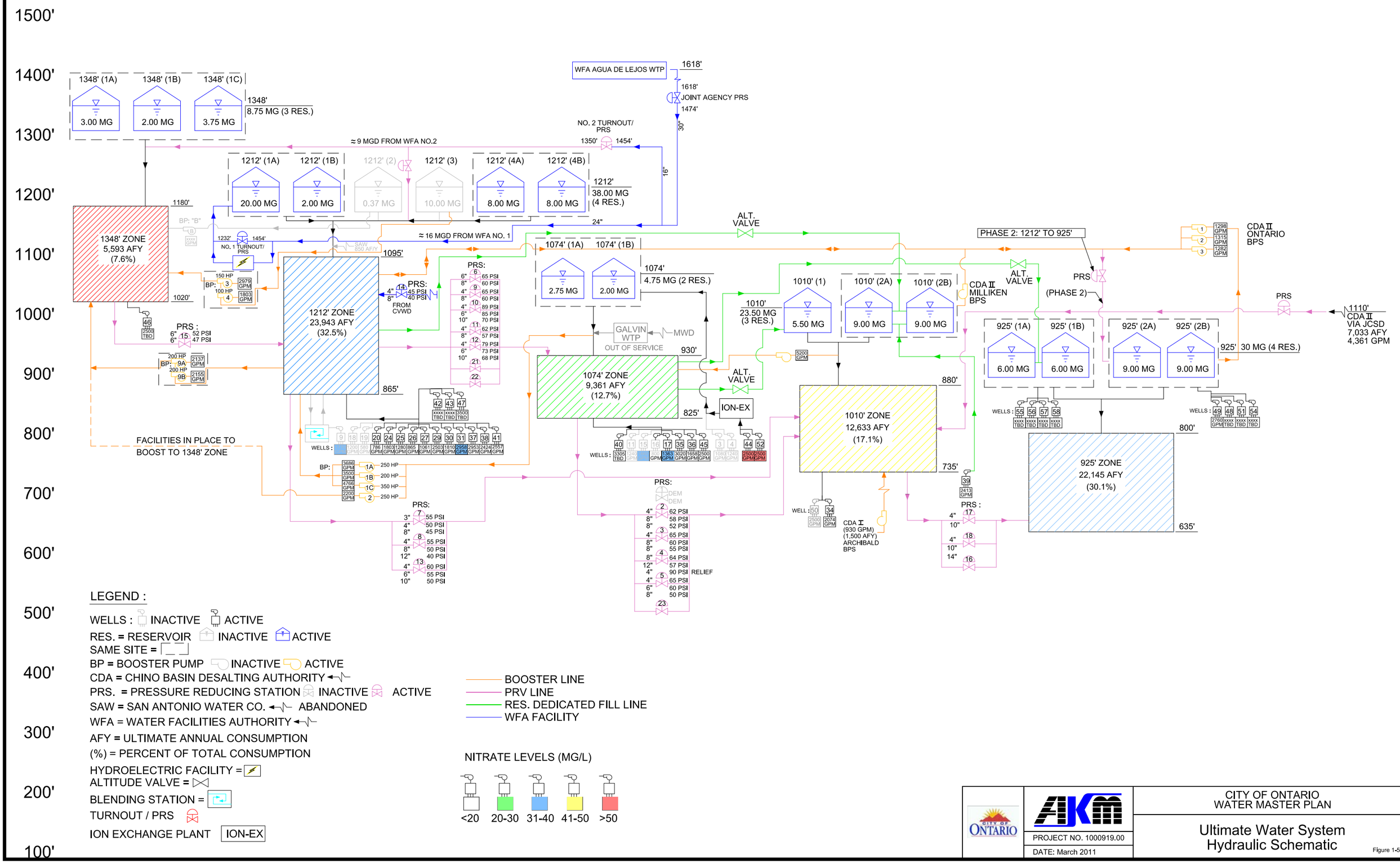
CITY OF ONTARIO
WATER MASTER PLAN

PROJECT NO: 1000919.00

DATE: October 2011

Ultimate Water System

Figure 1-4



CITY OF ONTARIO
WATER MASTER PLAN

Ultimate Water System
Hydraulic Schematic

PROJECT NO. 1000919.00
DATE: March 2011

Figure 1-5

WFA
Aqua de Lejos
Water Treatment Plant

RES1348-1A
RES1348-1B
RES1348-1C

RES1212-4A
RES1212-4B

City of Upland

City of Rancho Cucamonga

City of Montclair

City of Fontana

City of Chino

Riverside County

Old Model Colony

New Model Colony

SAW Conn

WFA Conn

RES1212-1A
RES1212-1B

BP-3
BP-4

BP-9A
BP-9B

PRS15

RES1074-1A
RES1074-1B

BP-1A
BP-1B
BP-1
BP-C
BP-2

RES1010-1

RES1010-2A
RES1010-2B

PRS14

PRS21

PRS22

PRS9

PRS11

PRS6

PRS10

PRS12

PRS13

PRS7

PRS8

RES925-2A
RES925-2B

PRS19

Ontario

RES925-1A
RES925-1B

AV3

PRS4

PRS5

PRS2

PRS23

PRS3

CDA II Conn

PRS18

PRS16

PRS17

CDA I Conn

BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
CUCAMONGA CREEK
WINEVILLE AVE
VINTAGE AVE
FERN ST
SULTANA AVE
BON VIEW AVE
CUCAMONGA AVE
PARCO AVE
WALKER AVE
CLEVELAND AVE
CYPRESS AVE
MAGNOLIA AVE

I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
EIGHTH ST
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST

N

0 2,500 5,000 10,000 Feet

Legend

- Recommended Altitude Valve/PRS
- Altitude Valve/PRS
- Booster Pump Station
- Recommended Well
- Well
- Recommended Reservoir
- Reservoir
- Pipe
- Recommended Pipe
- Recommended Pipe for 1010 Zone Expansion
- Recommended Pipe for 925 Zone
- 925 Pressure Zone
- 1010 Pressure Zone
- 1074 Pressure Zone
- 1212 Pressure Zone
- 1348 Pressure Zone
- City Boundary

CITY OF ONTARIO
WATER MASTER PLAN

PROJECT NO: 1000919.00

DATE: October 2011

Ultimate System Improvements

Figure 1-6

925 Zone Facilities

The future 925 Zone will provide water service to the majority of New Model Colony. This zone is generally bounded by Chino Avenue to the north, Euclid Avenue to the west, the City boundary to the south, and Milliken Avenue to the east. Some of the facilities that will ultimately serve the 925 Zone have already been constructed.

1010 Zone Facilities

The southerly boundary of the existing 1010 Zone will ultimately be expanded south to Chino Avenue from Euclid Avenue to Milliken Avenue. Currently, mainline pipes are planned in major streets. The future pipes will tie into existing 1010 Zone pipes in Riverside Drive. The expanded 1010 Zone will require approximately 58,650 feet of mainline pipes. Recommended sizes range from 12-inches to 18-inches. Pipe sizes recommended in the 2006 WMP and existing agreements with developers were maintained for this study. A new booster pump station from 1010 Zone to 1074 Zone is recommended to provide water to 1010 Zone in emergencies or when storage reserves are low. The location of this future pump station should be determined during a preliminary design study..

1212 Zone Facilities

It is recommended that the future 1212 Zone include two additional 8 MG reservoirs (1212-4A and 1212-4B) to meet the storage criteria. The City has obtained a site located north of Foothill Boulevard and west of Rochester Avenue in the City of Rancho Cucamonga. Piping has already been installed through the adjacent shopping center located on the property east of the reservoir site. The total length of 30-inch pipe required to connect the future Reservoir 1212-4A and 1212-4B to the existing system is approximately 13,600 feet (will depend on final alignment). The new pipe is proposed to tie into an existing 24- inch waterline in Fourth Street. See Figure 1-4 for approximate locations of the recommended 1212 Zone facilities. It is assumed that Reservoir 1212-3 will be abandoned following the construction of Reservoir 1212-4A and 1212-4B.

Under ultimate conditions, the City may take up to 25 mgd supply water from WFA connections in the 1212 Zone. Some of this water needs to be conveyed south through pressure reducing stations to serve other zones. Pressure reducing stations between the 1212 Zone and 1074 Zone are currently located on the east and west end of the 1074 Zone. Two additional pressure reducing stations are recommended at Euclid Avenue and Vineyard Avenue to assist in increasing pressures in the north central portion of the 1074 Zone. Another pressure reducing station is recommended between the 1074 Zone and 1010 Zone at Grove Avenue and SR-60, to increase the pressures in the northern portion of the 1010 Zone.

1-10 Capital Improvement Program

The Capital Improvement Program (CIP) consists of projects that will enhance the system to meet the established criteria, properly maintain the system's assets, and replace the facilities that have reached the end of their useful lives. The goal of the CIP is to provide the City with a long-range planning tool that will allow construction of the recommended projects in an orderly manner to improve the existing system and provide for future growth. In order to accomplish this goal, it is

necessary to determine the estimated cost of the needed water system improvements identified in this report, establish a basis and prioritize each of the projects.

The recommended CIP is shown in Table 1-9. Project locations are shown on Figure 1-7.

Cost Estimates

Cost estimates have been prepared for each recommended project, based upon information from recent similar projects. The pipeline replacement costs are based upon $15 per diameter inch per foot for the OMC and $12 per diameter inch per foot for the NMC. The City of Ontario's Old Model Colony is largely developed, and future pipelines will be constructed along alignments with many existing utilities. Therefore, the costs of constructing new or replacement facilities will be generally higher in this area than one that is undeveloped. New well costs include providing permanent back-up power. Construction costs can be expected to fluctuate as changes occur in the economy. These costs should therefore be reevaluated and updated annually based upon Engineering News Record (ENR) Index for the Los Angeles area (ENRLA), with the base ENRLA Index of 10,285 for April 2012.

It should be noted that some of the improvements recommended herein are conceptual in nature based on existing planning information available. Therefore, they should not be considered as absolute for final design. Further analysis and refinement will be necessary prior to commencing work on the final plans, specifications and estimates package for each project. Detailed preliminary design studies should be prepared to select the final design projects.

The cost estimates that follow were generated by estimating the quantities of required items for each improvement, and applying typical unit prices to obtain the total estimated construction costs. Contingencies are estimated at 10 percent of the construction cost. Engineering and administration costs are estimated at 15 percent of the construction plus contingency costs. The resultant sum is the total estimated project cost.

Projects are identified in Table 1-9 as a part of the OMC or the NMC (column "OMC/NMC") and as needed due to existing conditions or ultimate conditions (column "Ex/Ult"). All fire flow deficiencies found in the OMC are assigned to the existing OMC cost. Fire flow deficiencies were all found under existing conditions, but projects were developed so that the fire flows could be met under ultimate conditions as well. A summary of the total costs are as follows:

Existing OMC cost: $ 157,788,220

Ultimate OMC cost: $ 35,077,180

Ultimate NMC cost: $ 153,097,660

Total CIP cost: $ 345,963,060 (not including annual OMC improvement project costs)

Annual OMC improvement project cost: $675,000

Project Priorities

The primary consideration in establishing project priorities for the capital improvement program list must always be given to the health, safety and welfare of the public and the customers. In general, the projects necessary to improve the existing system are scheduled earlier in the order of supply, pumping and storage. Fire protection rates as a high priority, but is usually dependent on the supply and storage, as well as the distribution system.

Supply improvements rate in the order of benefit to the overall system, and reliability during emergencies such as multiple sources.

Pumping improvements rate in the order of ability to augment fire flows, capacity to maintain adequate storage levels in the reservoirs, and redundancy of power and pumps to provide adequate service during emergencies.

Storage improvements rank in the order of fire protection, operational capability to meet average and peak flows, and emergencies.

With these guidelines, the projects recommended in this report and their estimated costs were examined and sorted. Each project is shown with its total estimated project cost. The City should review this schedule and adjust it annually to respond to changed conditions and to take advantage of concurrent construction such as street paving projects or adjacent infrastructure work.

Projects in New Model Colony or related to service to New Model Colony will be dependent upon the progression of development, which is relatively unknown at this time. Therefore, the New Model Colony projects are not prioritized in Table 1-9.

Table 1-9
Capital Improvement Program

Row No.	WMP Project No.	City's CIP Project No.	OMC/ NMC	Ex/ Ult	Facility Type	Ex Pipe Size (in)	Description	Size/ Number	Unit	Unit Cost ($)	Unit	Construction Cost ($)	Contingency ($)	Engineering & Admin. ($)	Construction Mgmt. ($)	Total Cost ($)
Old Model Colony Improvement Projects																
1	O-1	WAXXXX	OMC	Ex	Other		1348 Zone Reservoirs Structural Retrofits	3	Reservoir	5,000,000	$/project	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	5,000,000
2	O-2	WA0901	OMC	Ex	Other		Reservoir 1010-1A Piping Seismic Retrofits	1	Reservoir	102,000	$/project	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	102,000
3	S-1	WA9910	OMC	Ex	Supply		CIP Well #43 in the 1212 Zone Equipping of Well drilled in 2008	1	Well	1,600,000	$/Well	1,600,000	160,000	35,000	150,000	1,945,000
4	S-2		OMC	Ex	Supply		CIP Well #42 in the 1212 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
5	S-3		OMC	Ex	Supply		Treatment for OMC Wells			Lump Sum		8,890,000	889,000	977,900	488,950	11,245,850
6	S-4	Skipped														
7	S-5	Skipped														
8	S-6	Skipped														
9	S-7		OMC	Ex	Supply		Well #11 Abandon due to continuing sanding problem (1074 Zone)	1	Well	100,000	$/Well	100,000	10,000	11,000	5,500	126,500
10	R-1		OMC	Ex	Reliability		Backup Power for Well 39 (500 KW) - 1010 Zone	500	KW	500,000	$/Well	500,000	50,000	55,000	27,500	632,500
11	ST-1		OMC	Ex	Storage		Replace Roof on Reservoir 1212-3	73,100	sq ft	10	$/sq ft	731,000	73,100	80,410	40,205	924,715
12	ST-2		OMC	Ex	Storage		Booster Pump Station from 1010 Zone to 1074 Zone - Location to be determined	300	HP	5,000	$/HP	1,500,000	150,000	165,000	82,500	1,897,500
13	O-3	WA0301	OMC	Ex	Other		Airport Metering and Backflow Prevention - Planning	8	meters	120,000	$/study	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	120,000
14	O-4	WA0301	OMC	Ex	Other		Airport Metering and Backflow Prevention - Construction	8	meters	300,000	$/project	300,000	30,000	33,000	16,500	379,500
15	R-2		OMC	Ex	Reliability		Portable Generator Connection and Manual Transfer Switch	2	Well	250,000	$/Well	500,000	50,000	55,000	27,500	632,500
16	R-3		OMC	Ex	Reliability		Portable Generators-750 KW	2	EA	500,000	$/Genset	1,000,000	100,000	110,000	55,000	1,265,000
17	S-8		OMC	Ex	Supply		Abandon Existing OMC Well #9	1	Well	100,000	$/Well	100,000	10,000	11,000	5,500	126,500
18	S-9		OMC	Ex	Supply		Abandon Existing OMC Well #15	1	Well	100,000	$/Well	100,000	10,000	11,000	5,500	126,500
19	S-10		OMC	Ex	Supply		Abandon Existing OMC Well #16	1	Well	100,000	$/Well	100,000	10,000	11,000	5,500	126,500
20	S-11	Skipped														
21	S-12		OMC	Ex	Supply		Abandon John Galvin Facility	1	LS	400,000	LS	400,000	40,000	44,000	22,000	506,000
22	P-1		OMC	Ex	Pressure		20-inch pipeline in Campus Ave from Eighth St to Fourth St (1212 Zone)	5,400	ft	300	$/ft	1,620,000	162,000	178,200	89,100	2,049,300
23	P-2		OMC	Ex	Pressure		30-inch pipeline in Eighth St from Reservoir 1212-1A and 1212-1B to San Antonio Ave (1212 Zone)	1,500	ft	450	$/ft	675,000	67,500	74,250	37,125	853,875
24	P-3		OMC	Ex	Pressure		30-inch pipeline in San Antonio Ave from Eighth St to Fourth St (1212 Zone)	5,300	ft	450	$/ft	2,385,000	238,500	262,350	131,175	3,017,025
25	P-4		OMC	Ex	Pressure		18-inch pipeline in Fourth St from Elderberry Ave to San Antonio Ave (1212 Zone)	4,300	ft	270	$/ft	1,161,000	116,100	127,710	63,855	1,468,665
26	P-5		OMC	Ex	Pressure		18-inch pipeline in Fourth St from San Antonio Ave to Vine Ave (1212 Zone)	1,450	ft	270	$/ft	391,500	39,150	43,065	21,533	495,248
27	P-6		OMC	Ex	Pressure		18-inch pipeline in Vine Ave from Fouth St to J St (1212 Zone)	700	ft	270	$/ft	189,000	18,900	20,790	10,395	239,085
28	P-7		OMC	Ex	Pressure		18-inch pipeline in J St from Vine Ave to Euclid Ave (1212 Zone)	1,600	ft	270	$/ft	432,000	43,200	47,520	23,760	546,480
29	P-8		OMC	Ex	Pressure		24-inch pipeline in J St east side of Euclid Ave (1212 Zone)	110	ft	360	$/ft	39,600	3,960	4,356	2,178	50,094
30	P-9		OMC	Ult	Pressure		PRS 21 at Euclid Ave and Phillips St (from 1212 Zone to 1074 Zone)	4 and 8	inch	250,000	$/station	250,000	25,000	27,500	13,750	316,250
31	P-10		OMC	Ult	Pressure		PRS 22 at Vineyard Ave and Mission Blvd (from 1212 Zone to 1074 Zone)	4 and 8	inch	250,000	$/station	250,000	25,000	27,500	13,750	316,250
32	P-11		OMC	Ult	Pressure		12-inch pipeline in Grove Ave from Philips St to Francis St (1074 Zone)	4,400	ft	180	$/ft	792,000	79,200	87,120	43,560	1,001,880
33	P-12		OMC	Ult	Pressure		12-inch pipeline in Euclid Ave from PRS 2 at SR-60 to Walnut St (1010 Zone)	1,750	ft	180	$/ft	315,000	31,500	34,650	17,325	398,475
34	P-13		OMC	Ult	Pressure		16-inch pipeline in Grove Ave from PRS 3 at SR-60 to Walnut St (1010 Zone)	1,800	ft	240	$/ft	432,000	43,200	47,520	23,760	546,480
35	P-14		OMC	Ult	Pressure		PRS 23 at SR-60 and Campus Ave (from 1074 Zone to 1010 Zone)	4 and 8	inch	250,000	$/station	250,000	25,000	27,500	13,750	316,250
36	P-15		OMC	Ult	Pressure		6-inch pipeline in Banyan St, west of Parco Ave (1010 Zone)	30	ft	30,000	$/project	30,000	3,000	3,300	1,650	37,950
37	P-16		OMC	Ult	Pressure		10-inch pipeline in Walnut St, west of Parco Ave (1010 Zone)	10	ft	30,000	$/project	30,000	3,000	3,300	1,650	37,950
38	P-17		OMC	Ult	Pressure		6-inch pipeline in Maidstone St, west of Parco Ave (1010 Zone)	30	ft	30,000	$/project	30,000	3,000	3,300	1,650	37,950
39	P-18		OMC	Ult	Pressure		8-inch pipeline in St. Andrews St, west of Parco Ave (1010 Zone)	10	ft	30,000	$/project	30,000	3,000	3,300	1,650	37,950
40	ST-3		OMC	Ult	Storage		Reservoir 1212-4A	8.0	MG	1.20	$/gallon	9,600,000	960,000	1,056,000	528,000	12,144,000
41	ST-4		OMC	Ult	Storage		Reservoir 1212-4B	8.0	MG	1.20	$/gallon	9,600,000	960,000	1,056,000	528,000	12,144,000
42	ST-5		OMC	Ult	Storage		30-inch transmission line from Reservoir 1212-4A and 1212-4B	13,600	ft	450	$/ft	6,120,000	612,000	673,200	336,600	7,741,800
43	ST-6		OMC	Ex	Storage		Abandon Reservoir 1212-3 (condition/age)	10.0	MG	30	$/CY	1,485,000	148,500	163,350	81,675	1,878,525
44	R-11		OMC	Ex	Reliability		Future Emergency Connection (MVWD-1)	1	Connection	250,000	$/connection	250,000	25,000	27,500	13,750	316,250
45	R-12		OMC	Ex	Reliability		Future Emergency Connection (Chino-2)	1	Connection	250,000	$/connection	250,000	25,000	27,500	13,750	316,250
46	R-13		OMC	Ex	Reliability		Future Emergency Connection (FWC-1)	1	Connection	250,000	$/connection	250,000	25,000	27,500	13,750	316,250
47	R-14		OMC	Ex	Reliability		Future Emergency Connection (Upland-2)	1	Connection	250,000	$/connection	250,000	25,000	27,500	13,750	316,250
											Subtotal	**55,728,100**	**5,572,810**	**5,989,091**	**3,127,046**	**75,639,047**

Table 1-9 (Continued)
Capital Improvement Program

Row No.	WMP Project No.	City's CIP Project No.	OMC/ NMC		Facility Type	Ex Pipe Size (in)	Description	Size/ Number	Unit	Unit Cost ($)	Unit	Construction Cost ($)	Contingency ($)	Engineering & Admin. ($)	Construction Mgmt. ($)	Total Cost ($)
Old Model Colony Annual Improvement Projects																
48	ST-7	WA0206	OMC	Ex	Storage		Reservoir recoating/repainting/repair			150,000	$/year	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	150,000
49	O-5	WA0205	OMC	Ex	Other		Facility Security Improvements			200,000	$/year	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	200,000
50	O-6	WA0605	OMC	Ex	Other		New Meter Installations			75,000	$/year	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	75,000
51	O-7	WA0602	OMC	Ex	Other		Water Meter Replacements			250,000	$/year	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	250,000
											Subtotal					**675,000**
Old Model Colony Old and Small Pipe Replacement Projects																
52	O-8		OMC	Ex	Condition/Age	8" & Less	Improvements Due to Pipe Age (pipes constructed in or before 1960)- Replace with 8"	357,343	ft	120	$/ft	42,881,161	4,288,116	4,716,928	2,358,464	54,244,669
53	O-8		OMC	Ex	Condition/Age	10" & 12"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 12"	43,580	ft	180	$/ft	7,844,368	784,437	862,880	431,440	9,923,125
54	O-8		OMC	Ex	Condition/Age	14" & 16"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 16"	13,588	ft	240	$/ft	3,261,204	326,120	358,732	179,366	4,125,424
55	O-8		OMC	Ex	Condition/Age	16" to 18"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 18"	38,380	ft	270	$/ft	10,362,720	1,036,272	1,139,899	569,950	13,108,840
56	O-8		OMC	Ex	Condition/Age	18" to 20"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 20"	4,582	ft	300	$/ft	1,374,520	137,452	151,197	75,599	1,738,768
57	O-8		OMC	Ex	Condition/Age	20" to 24"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 24"	5,569	ft	360	$/ft	2,005,002	200,500	220,550	110,275	2,536,328
58	O-8		OMC	Ex	Condition/Age	24" to 36"	Improvements Due to Pipe Age (pipes constructed in or before 1960) - Replace with 36"	616	ft	540	$/ft	332,640	33,264	36,590	18,295	420,789
59	O-9		OMC	Ex	Size	4" & Less	Replace Small Diameter Pipes with 8-inch Pipe (pipes 4-inch and smaller)	49,631	ft	120	$/ft	5,955,720	595,572	655,129	327,565	7,533,986
											Subtotal	**74,017,336**	**7,401,734**	**8,141,907**	**4,070,953**	**93,631,930**
New Model Colony Improvement Projects																
60	ST-8		NMC	Ult	Storage		Reservoir 925-1A	9.0	MG	1.20	$/gallon	10,800,000	1,080,000	1,188,000	594,000	13,662,000
61	ST-9		NMC	Ult	Storage		Reservoir 925-1B	9.0	MG	1.20	$/gallon	10,800,000	1,080,000	1,188,000	594,000	13,662,000
62	ST-10		NMC	Ult	Storage		Reservoir 925-2B	6.0	MG	1.20	$/gallon	7,200,000	720,000	792,000	396,000	9,108,000
63	S-13		NMC	Ult	Supply		Altitude Valve from 1074 Zone to 925 Zone at Reservoir 925-1A and 925-1B	12	inch	250,000	$/valve	250,000	25,000	27,500	13,750	316,250
64	S-14		NMC	Ult	Supply		Land Acquisition for Well #48 in 925 Zone	1	Well	0	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	0
65	S-15		NMC	Ult	Supply		NMC Well #48 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
66	S-16		NMC	Ult	Supply		18-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	3,000	ft	216	$/ft	648,000	64,800	71,280	35,640	819,720
67	S-17		NMC	Ult	Supply		24-inch well collecting line for Well 48 and 54 to Reservoir 925-2A	900	ft	288	$/ft	259,200	25,920	28,512	14,256	327,888
68	S-18		NMC	Ult	Supply		30-inch well collecting line for Well 48 to Reservoir 925-2A	400	ft	360	$/ft	144,000	14,400	15,840	7,920	182,160
69	S-19		NMC	Ult	Supply		Land Acquisition for Well #51 in 925 Zone	1	Well	0	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	0
70	S-20		NMC	Ult	Supply		NMC Well #51 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
71	S-21		NMC	Ult	Supply		18-inch well collecting line for Well 51 to Reservoir 925-2A	4,000	ft	216	$/ft	864,000	86,400	95,040	47,520	1,092,960
72	S-22		NMC	Ult	Supply		Land Acquisition for Well #54 in 925 Zone	1	Well	0	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	0
73	S-23		NMC	Ult	Supply		NMC Well #54 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
74	S-24		NMC	Ult	Supply		18-inch well collecting line for Well 54 to Reservoir 925-2A	500	ft	216	$/ft	108,000	10,800	11,880	5,940	136,620
75	S-25		NMC	Ult	Supply		Land Acquisition for Well #55 in 925 Zone	1	Well	300,000	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	300,000
76	S-26		NMC	Ult	Supply		NMC Well #55 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
77	S-27						Skipped									
78	S-28		NMC	Ult	Supply		Land Acquisition for Well #56 in 925 Zone	1	Well	300,000	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	300,000
79	S-29		NMC	Ult	Supply		NMC Well #56 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
80	S-30		NMC	Ult	Supply		30-inch line from Well 56 to intersection of Bonview Ave and Francis St	1,400	ft	480	$/ft	672,000	67,200	73,920	36,960	850,080
81	S-31						Skipped									
82	S-32		NMC	Ult	Supply		30-inch line in Francis St from Bonview Ave to Grove Ave	2,700	ft	360	$/ft	972,000	97,200	106,920	53,460	1,229,580
83	S-33		NMC	Ult	Supply		Land Acquisition for Well #57 in 925 Zone	1	Well	300,000	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	300,000
84	S-34		NMC	Ult	Supply		NMC Well #57 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
85	S-35		NMC	Ult	Supply		18-inch well collecting line from Well 57 to intersection of Francis St and Grove Ave	1,500	ft	216	$/ft	324,000	32,400	35,640	17,820	409,860
86	S-36		NMC	Ult	Supply		Land Acquisition for Well #58 in 925 Zone	1	Well	300,000	$/site	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	300,000
87	S-37		NMC	Ult	Supply		NMC Well #58 in the 925 Zone	1	Well	2,800,000	$/Well	2,800,000	280,000	308,000	154,000	3,542,000
88	S-38		NMC	Ult	Supply		18-inch well collecting line from Well 58 to intersection of Francis St and Cucamonga Ave	2,000	ft	216	$/ft	432,000	43,200	47,520	23,760	546,480
89	S-39		NMC	Ult	Supply		PRS 16 at Campus Ave and Chino Ave (from 1010 Zone to 925 Zone)	8 and 12	inch	250,000	$/station	250,000	25,000	27,500	13,750	316,250
90	S-40		NMC	Ult	Supply		Treatment at Bon View and Jurupa Reservoir Sites	1	Site	10,000,000	$/well	10,000,000	1,000,000	1,100,000	550,000	12,650,000
91	T-1		NMC	Ult	Transmission		12-inch distribution lines (925 Zone)	173,150	ft	144	$/ft	24,933,600	2,493,360	2,742,696	1,371,348	31,541,004
92	T-2		NMC	Ult	Transmission		18-inch distribution lines (925 Zone), Chino Ave	5,300	ft	216	$/ft	1,144,800	114,480	125,928	62,964	1,448,172
93	T-3		NMC	Ult	Transmission		18-inch distribution lines (925 Zone), Chino Ave	6,600	ft	216	$/ft	1,425,600	142,560	156,816	78,408	1,803,384

Table 1-9 (Continued)
Capital Improvement Program

Row No.	WMP Project No.	City's CIP Project No.	OMC/ NMC		Facility Type	Ex Pipe Size (in)	Description	Size/ Number	Unit	Unit Cost ($)	Unit	Construction Cost ($)	Contingency ($)	Engineering & Admin. ($)	Construction Mgmt. ($)	Total Cost ($)
New Model Colony Improvement Projects continued																
94	T-4		NMC	Ult	Transmission		24-inch distribution lines (925 Zone), Milliken Ave, Eucalyptus Ave, Archibald Ave, Edison Ave	29,200	ft	288	$/ft	8,409,600	840,960	925,056	462,528	10,638,144
95	T-5		NMC	Ult	Transmission		30-inch distribution lines (925 Zone), Grove Ave, Milliken Ave	11,900	ft	360	$/ft	4,284,000	428,400	471,240	235,620	5,419,260
96	T-6		NMC	Ult	Transmission		42-inch distribution lines (925 Zone), Grove Ave btw Reservoir 925-1A and Chino Ave	10,700	ft	504	$/ft	5,392,800	539,280	593,208	296,604	6,821,892
97	T-7		NMC	Ult	Transmission		12-inch distribution lines (1010 Zone)	20,900	ft	144	$/ft	3,009,600	300,960	331,056	165,528	3,807,144
98	T-8		NMC	Ult	Transmission		18-inch distribution lines (1010 Zone), Cleveland Ave north of Chino Ave.	950	ft	216	$/ft	205,200	20,520	22,572	11,286	259,578
99	T-9		NMC	Ult	Transmission		18-inch distribution lines (1010 Zone), Chino Ave,Riverside Dr, Campus Ave	36,800	ft	216	$/ft	7,948,800	794,880	874,368	437,184	10,055,232
												120,077,200	**12,007,720**	**13,208,492**	**6,604,246**	**153,097,658**
Old Model Colony Fire Flow Improvement Projects																
100	FF-1	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Deodar St, Fuchsia Ct, Oaks Ct, Iris Ct, Jasmine Ct, Fuchsia Ave, Helen Ct, Gardenia Ct	3,852	ft	120	$/ft	462,240	46,224	50,846	25,423	584,734
101	FF-2	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Elderberry Ave, Gardenia Ave, Alley between Sixth St and Fifth St, Alley between Helen Ave and Elderberry Ave, Alley between Gardenia Ave and Elderberry Ave	3,614	ft	120	$/ft	433,680	43,368	47,705	23,852	548,605
102	FF-3	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Fifth St, Helen Ave, College Wy. Two new connections are recommended; 1 - Euclid Ave and Harvard St connect the fire hydrant to 12-inch pipe in Euclid Ave, 2 - Harvard St and Alley east of Euclid Ave connect the fire hydrant to 8-inch pipe in Harvard St	10,770	ft	120	$/ft	1,292,400	129,240	142,164	71,082	1,634,886
103	FF-4	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Rosewood Ct, Elderberry Ave	964	ft	120	$/ft	115,680	11,568	12,725	6,362	146,335
104	FF-5	1212	OMC	Ex	Fire Flow	2&4	8-inch distribution line - State St, Oaks Ave, Mission Blvd, Magnolia Ave	5,018	ft	120	$/ft	602,160	60,216	66,238	33,119	761,732
105	FF-6	1074	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Helen Ave, Benson Ave, Philadelphia St	4,090	ft	120	$/ft	490,800	49,080	53,988	26,994	620,862
106	FF-7	1074	OMC	Ex	Fire Flow	4	8-inch distribution line - Oaks Ave	2,621	ft	120	$/ft	314,520	31,452	34,597	17,299	397,868
107	FF-8	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Boulder Ave, Granite Ave	1,281	ft	120	$/ft	153,720	15,372	16,909	8,455	194,456
108	FF-9	1348	OMC	Ex	Fire Flow	4	8-inch distribution line - San Antonio Ave, Cypress Ave	1,232	ft	120	$/ft	147,840	14,784	16,262	8,131	187,018
109	FF-10	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - La Deney Dr, Cypress Dr, Hawthorne St, San Antonio Ave	6,379	ft	120	$/ft	765,480	76,548	84,203	42,101	968,332
110	FF-11	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Cypress Dr	925	ft	120	$/ft	111,000	11,100	12,210	6,105	140,415
111	FF-12	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Rosewood St, Rosewood Ct	1,194	ft	120	$/ft	143,280	14,328	15,761	7,880	181,249
112	FF-13	1212	OMC	Ex	Fire Flow	2&4	8-inch distribution line - Fourth St, Rosewood Dr	1,821	ft	120	$/ft	218,520	21,852	24,037	12,019	276,428
113	FF-14	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Palmetto Ave	1,041	ft	120	$/ft	124,920	12,492	13,741	6,871	158,024
114	FF-15	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Pinyon Dr, Pinyon Ct, Vesta St, Alpine Ct, Cone Flower Dr	2,972	ft	120	$/ft	356,640	35,664	39,230	19,615	451,150
115	FF-16	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Brooks St, Mountain Ave	1,423	ft	120	$/ft	170,760	17,076	18,784	9,392	216,011
116	FF-17	1074	OMC	Ex	Fire Flow	6	8-inch distribution line - Ladora Ct	565	ft	120	$/ft	67,800	6,780	7,458	3,729	85,767
117	FF-18	1074	OMC	Ex	Fire Flow	6	8-inch distribution line - Redwood Ave, Cedar St	1,688	ft	120	$/ft	202,560	20,256	22,282	11,141	256,238
118	FF-19	1074	OMC	Ex	Fire Flow	4	8-inch distribution line - Francis St. New connection is recommended between proposed 8-inch and existing 8-inch pipe lines in Francis St east of Fern St.	1,927	ft	120	$/ft	231,240	23,124	25,436	12,718	292,519
119	FF-20	1212	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Sunkist St	1,383	ft	120	$/ft	165,960	16,596	18,256	9,128	209,939
120	FF-21	1212	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Laurel Ave, Transit St, Emporia St	1,678	ft	120	$/ft	201,360	20,136	22,150	11,075	254,720
121	FF-22	1212	OMC	Ex	Fire Flow	4&6	8-inch distribution line - B St, Laurel Ave	1,382	ft	120	$/ft	165,840	16,584	18,242	9,121	209,788
122	FF-23	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Alley between Vine Ave and Fern Ave, and between Fern Ave and Palm Ave	714	ft	120	$/ft	85,680	8,568	9,425	4,712	108,385
123	FF-24	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - E St, Fern Ave	535	ft	120	$/ft	64,200	6,420	7,062	3,531	81,213
124	FF-25	1212	OMC	Ex	Fire Flow	4&6	8-inch distribution line - E St	784	ft	120	$/ft	94,080	9,408	10,349	5,174	119,011
125	FF-26	1212	OMC	Ex	Fire Flow	4	8-inch distribution line -F St	1,114	ft	120	$/ft	133,680	13,368	14,705	7,352	169,105
126	FF-27	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Alley between Granada St and Plaza Serena St	83	ft	120	$/ft	30,000	3,000	3,300	1,650	37,950
127	FF-28	1348	OMC	Ex	Fire Flow	2&4&6	8-inch distribution line - Alley between San Antonio Ave and Vine Ave, Armsley Sq, Bonita Ct	2,461	ft	120	$/ft	295,320	29,532	32,485	16,243	373,580
128	FF-29	1348	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Kenmore Ct, Caroline Ct, Kenmore Ave	2,699	ft	120	$/ft	323,880	32,388	35,627	17,813	409,708
129	FF-30	1348	OMC	Ex	Fire Flow	2&4	8-inch distribution line - Alvarado St, Deodar St, Sultana Ave, Columbia Ave. Pipe in Columbia Ave must connect to pipe in Deodora St at the intersection of Deodar St and Columbia Ave.	3,144	ft	120	$/ft	377,280	37,728	41,501	20,750	477,259
130	FF-31	1212	OMC	Ex	Fire Flow	2&4&6	8-inch distribution line - D St and Alleys between Euclid Ave and Lemon Ave	1,734	ft	120	$/ft	208,080	20,808	22,889	11,444	263,221
131	FF-32	1212	OMC	Ex	Fire Flow	-	8-inch distribution line - Plum Ave	180	ft	120	$/ft	21,600	2,160	2,376	1,188	27,324

Table 1-9 (Continued)
Capital Improvement Program

Row No.	WMP Project No.	Zone	OMC/ NMC		Facility Type	Ex Pipe Size (in)	Description	Size/ Number	Unit	Unit Cost ($)	Unit	Construction Cost ($)	Contingency ($)	Engineering & Admin. ($)	Construction Mgmt. ($)	Total Cost ($)
Old Model Colony Fire Flow Improvement Projects (continued)																
132	FF-33	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Emporia St, Transit St, Lemon Ave	1,301	ft	120	$/ft	156,120	15,612	17,173	8,587	197,492
133	FF-34	1212	OMC	Ex	Fire Flow	3&4	8-inch distribution line - State St	561	ft	120	$/ft	67,320	6,732	7,405	3,703	85,160
134	FF-35	1074	OMC	Ex	Fire Flow	4	8-inch distribution line - Budd St	721	ft	120	$/ft	86,520	8,652	9,517	4,759	109,448
135	FF-36	1074	OMC	Ex	Fire Flow	2&6	8-inch distribution line - Deanza Dr	1,447	ft	120	$/ft	173,640	17,364	19,100	9,550	219,655
136	FF-37	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Berkeley Ct. Connect existing 6-inch and 10-inch pipe lines at the intersection of Mountain Ave and J St.	737	ft	120	$/ft	88,440	8,844	9,728	4,864	111,877
137	FF-38	1074	OMC	Ex	Fire Flow	4	8-inch distribution line - Woodlawn St	1,342	ft	120	$/ft	161,040	16,104	17,714	8,857	203,716
138	FF-39	1074	OMC	Ex	Fire Flow	6	12-inchdistribution line - Bon View Ave	2,495	ft	360	$/ft	898,200	89,820	98,802	49,401	1,136,223
139	FF-40	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Greenwood Ave and Mission Blvd	640	ft	120	$/ft	76,800	7,680	8,448	4,224	97,152
140	FF-41	1212	OMC	Ex	Fire Flow	4&6	8-inch distribution line -California St, Cucamonga St	356	ft	120	$/ft	42,720	4,272	4,699	2,350	54,041
141	FF-42	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Washington St, Jefferson Ave	2,359	ft	120	$/ft	283,080	28,308	31,139	15,569	358,096
142	FF-43	1212	OMC	Ex	Fire Flow	2&4	8-inch distribution line - State St, Cucamonga Ave, Grove Ave. Connect existing 12-inch pipe line to proposed 8-inch pipeline.	2,066	ft	120	$/ft	247,920	24,792	27,271	13,636	313,619
143	FF-44	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Lynn Haven St	721	ft	120	$/ft	86,520	8,652	9,517	4,759	109,448
144	FF-45	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Yale St	1,203	ft	120	$/ft	144,360	14,436	15,880	7,940	182,615
145	FF-46	1348	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Pleasant Ave, La Deney Dr	1,132	ft	120	$/ft	135,840	13,584	14,942	7,471	171,838
146	FF-47	1348	OMC	Ex	Fire Flow	6	16-inch distribution line - Richland St	1,431	ft	240	$/ft	343,440	34,344	37,778	18,889	434,452
147	FF-48	1348	OMC	Ex	Fire Flow	6&8	12-inch distribution line - Sixth St, Deodar St, Eleventh Ave, Grove Ave	3,900	ft	180	$/ft	702,000	70,200	77,220	38,610	888,030
148	FF-49	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Virginia Ave, Fifth St, La Deney Ct, Parkside Ave	3,531	ft	120	$/ft	423,720	42,372	46,609	23,305	536,006
149	FF-50	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Fifth St, Grove Ave	1,798	ft	120	$/ft	215,760	21,576	23,734	11,867	272,936
150	FF-51	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - El Dorado Ave	542	ft	120	$/ft	65,040	6,504	7,154	3,577	82,276
151	FF-52	1348	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Fifth St, Baker Ave, Princeton St	3,568	ft	120	$/ft	428,160	42,816	47,098	23,549	541,622
152	FF-53	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Mariposa Ave, Granada St	1,102	ft	120	$/ft	132,240	13,224	14,546	7,273	167,284
153	FF-54	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Greenwood Ave, El Morado Ct, Florence Ct	1,187	ft	120	$/ft	142,440	14,244	15,668	7,834	180,187
154	FF-55	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Fourth St	820	ft	120	$/ft	98,400	9,840	10,824	5,412	124,476
155	FF-56	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Yale St	554	ft	120	$/ft	66,480	6,648	7,313	3,656	84,097
156	FF-57	1348	OMC	Ex	Fire Flow	4&6	8-inch distribution line - Fifth St, Holmes Ct, La Paloma Ct, I-10 Fwy E.B.	2,630	ft	120	$/ft	315,600	31,560	34,716	17,358	399,234
157	FF-58	1348	OMC	Ex	Fire Flow	4	8-inch distribution line - Easement south of Sixth St to Council Ave	791	ft	120	$/ft	94,920	9,492	10,441	5,221	120,074
158	FF-59	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - D St	927	ft	120	$/ft	111,240	11,124	12,236	6,118	140,719
159	FF-60	1074	OMC	Ex	Fire Flow	4	8-inch distribution line - Kern St	1,237	ft	120	$/ft	148,440	14,844	16,328	8,164	187,777
160	FF-61	1074	OMC	Ex	Fire Flow	6	8-inch distribution line - Baker Ave	922	ft	120	$/ft	110,640	11,064	12,170	6,085	139,960
161	FF-62	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Easement between Vineyard Ave and Grove Ave and south of Airport Dr	2,945	ft	120	$/ft	353,400	35,340	38,874	19,437	447,051
162	FF-63	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Easement between Airport Dr and Holt Blvd and East of Vineyard Ave	498	ft	120	$/ft	59,760	5,976	6,574	3,287	75,596
163	FF-64	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Easement at south of Airport Dr and east of Moore Wy	763	ft	120	$/ft	91,560	9,156	10,072	5,036	115,823
164	FF-65	1348	OMC	Ex	Fire Flow	8&10	16-inch distribution line - Eight St, Grove Ave	9,171	ft	240	$/ft	2,201,040	220,104	242,114	121,057	2,784,316
165	FF-66	Skipped											0	0	0	0
166	FF-67	1348	OMC	Ex	Fire Flow	2&4	8-inch distribution line - Euclid Ave, Armsley St	1,330	ft	120	$/ft	159,600	15,960	17,556	8,778	201,894
167	FF-68	1348	OMC	Ex	Fire Flow	4	8-inch distribution line - Easement east of San Antonio and west of Euclid Ave between Fifth St and Princeton St	668	ft	120	$/ft	80,160	8,016	8,818	4,409	101,402
168	FF-69	1348	OMC	Ex	Fire Flow	6	8-inch distribution line - Seventh St	10	ft	120	$/ft	30,000	3,000	3,300	1,650	37,950
169	FF-70	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Boulder Ave, Vesta St, Hollowell St	3,351	ft	120	$/ft	402,120	40,212	44,233	22,117	508,682
170	FF-71	1212	OMC	Ex	Fire Flow	6	8-inch distribution line - Empora St, Pleasant Ave	641	ft	120	$/ft	76,920	7,692	8,461	4,231	97,304
171	FF-72	1212	OMC	Ex	Fire Flow	2&4	8-inch distribution line - California Ct, Mission Blvd, Campus Ave, Campus St	1,138	ft	120	$/ft	136,560	13,656	15,022	7,511	172,748
172	FF-73	1212	OMC	Ex	Fire Flow	2&4	8-inch distribution line - Raltson St, Maitland St, Campus Ave, Taylor Ave	2,558	ft	120	$/ft	306,960	30,696	33,766	16,883	388,304
173	FF-74	1212	OMC	Ex	Fire Flow	4	8-inch distribution line -Nocta St, Allyin Ave, Willow St	370	ft	120	$/ft	44,400	4,440	4,884	2,442	56,166
174	FF-75	1212	OMC	Ex	Fire Flow	4	8-inch distribution line - Ontario Blvd	103	ft	120	$/ft	30,000	3,000	3,300	1,650	37,950
175	FF-76	1348	OMC	Ex	Fire Flow	4	8-inch distribution line - Harvard St	24	ft	120	$/ft	30,000	3,000	3,300	1,650	37,950
176	FF-77	1348	OMC	Ex	Fire Flow	6	12-inch distribution line - Eighth St at Virginia Ave	50	ft	180	$/ft	30,000	3,000	3,300	1,650	37,950
							Subtotal	**136,909**			**Subtotal**	**18,651,720**	**1,865,172**	**2,051,689**	**1,025,845**	**23,594,426**
							Grand Total (excluding annual OMC improvement project costs)					**268,474,356**	**26,847,436**	**29,391,179**	**14,828,090**	**345,963,060**

WFA
Agua de Lejos
Water Treatment Plant

O-1
RES1348-1A
RES1348-1B
RES1348-1C
R-14

ST-3
RES1212-4A

ST-4
RES1212-4B

ST-5
30"

City of
Upland

City of
Rancho
Cucamonga

City of
Montclair

City of
Fonatana

Ontario International
Airport

Landfill

Old
Model Colony

New Model Colony

City of
Chino

Riverside
County

SAW
Conn

RES1212-1A
RES1212-1B

WFA
Conn

ST-1
ST-6
RES1212-3

BP-3
BP-4

BENSON AVE
MOUNTAIN AVE
SAN ANTONIO AVE
EUCLID AVE
CAMPUS AVE
GROVE AVE
BAKER AVE
VINEYARD AVE
ARCHIBALD AVE
TURNER AVE
HAVEN AVE
MILLIKEN AVE
I-15 FWY
ETIWANDA AVE
WINEVILLE AVE
VINTAGE AVE
CUCAMONGA CREEK

I-10 FWY
SIXTH ST
FIFTH ST
FOURTH ST
I ST
G ST
HOLT BLVD
STATE ST
MISSION BLVD
PHILLIPS ST
FRANCIS ST
PHILADELPHIA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
EIGHTH ST
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST

SULTANA AVE
BON VIEW AVE
PARCO AVE
WALKER AVE
CLEVELAND AVE

P-1 30"
P-2 30"
P-3 30"
P-4 18"
P-5 18"
P-6 24"
P-7 18"
P-9 PRS21
P-10 PRS22
P-11 12"
P-12 12"
P-13 18"
P-14 PRS23
P-15 6"
P-16 10"
P-17 6"
P-18 6"

PRS1 PRS2 PRS3 PRS4 PRS5 PRS6 PRS7 PRS8 PRS9 PRS10 PRS11 PRS12 PRS13 PRS14 PRS15 PRS17 PRS18 PRS19

CDA I Conn
CDA II Conn
BP-ONTARIO

RES1074-1A
RES1074-1B
BP-1
BP-2

RES1010-1
RES1010-2A
RES1010-2B
AV1
AV2
AV3

RES925-2A
RES925-2B
ST-10
S-40

ST-8
RES
925-1A
925-1B
S-40

ST-9
RES
925-1B
S-40

S-1 43
S-2 42
S-7 11
S-8 9
S-9 15
S-10 16
S-12 44
S-13 AV3
S-14 S-15 48
S-16 18"
S-17 24"
S-18 30"
S-19 S-20 51
S-21 16"
S-22 S-23 54
S-24 18"
S-25 S-26 55
S-27 30"
S-28 S-29 56
S-30 30"
S-31 30"
S-32 30"
S-33 S-34 57
S-36 S-37 58
S-39 PRS16

R-1
R-11
R-12
R-13

N

0 1,500 3,000 6,000 Feet

1"=1500'

Legend

- Recommended Emergency Connection
- Recommended Altitude Valve/PRS
- Altitude Vavle/PRS
- Booster Pump Station
- Recommended Well
- Well
- Recommended Reservoir
- Reservoir
- 8" Fire Flow Pipe Improvement
- 12" Fire Flow Pipe Improvement
- 16" Fire Flow Pipe Improvement
- Small Diameter Pipe Improvement (O-9)
- Pipe Improvement due to Age (O-8)
- Recommended Improvement Pipe
- Recommended Pipe for 1010 Zone Expansion
- Recommended Pipe for 925 Zone
- Existing Pipe
- Other Agency Pipe
- City Boundary
- 925 Pressure Zone
- 1010 Pressure Zone
- 1074 Pressure Zone
- 1212 Pressure Zone
- 1348 Pressure Zone

CITY OF ONTARIO
WATER MASTER PLAN

Capital Improvement Project Locations

Figure 1-7

PROJECT NO: 1000919.00

DATE: April 2012