SECTION 9

SYSTEM ANALYSIS

9-1 Introduction

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.

A capital improvement program was developed as a result of these analyses. Recommended projects and cost estimates are discussed in Section 11 of this Master Plan Report.

9-2 Source of Supply

Any water system must be capable of meeting all demands imposed upon the system. This can be achieved through multiple supply sources, storage, or a combination of both. Generally, the determination is based upon water availability, existing storage capacity, and economics. It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available.

California Code of Regulations Related to Drinking Water requires a minimum source of supply of one maximum day demand of the service area. Under this criterion, reservoirs are typically needed to regulate hourly fluctuations in demand, provide fire flow and supplement supply during an outage of a source for an extended duration.

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

9-2.1 Existing Source of Supply

Per the criterion, the City's existing source of supply should be greater or equal to 37,409 gpm (maximum day demand) with 23,380 gpm (average day demand), from local sources.

The City's existing source of supply is shown in Table 9-1. The total existing supply sources is equivalent to 71,554 gpm which exceeds the criteria of one

Table 9-1

Existing Source of Supply

Source	Capacity		
	AFY	mgd	gpm
Existing Wells	82,403	73.57	51,093
WFA at Aqua de Lejos WTP	28,000	25.00	17,361
CDA from CDA I	1,500	1.34	930
CDA from CDA II	3,500	3.13	2,170
Total	**115,403**	**103.04**	**71,554**

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.

The existing source of supply by zone is detailed in Table 9-2.

Table 9-2
Existing Supply by Zone

Zone	MDD (mgd)	Well Capacity (mgd)	WFA Supply Capacity (mgd)	CDA Supply Capacity (mgd)	Total Supply (mgd)	Surplus/ Deficit (mgd)
925		3.97			3.97	3.97
1010	10.77	6.46		4.46	10.92	0.15
1074	11.47	24.26			24.26	12.79
1212	25.48	35.28	20.10		55.38	29.90
1348	6.15	3.6	4.90		8.50	2.35
Total	**53.87**	**73.57**	**25.00**	**4.46**	**103.03**	**49.16**

9-2.2 Ultimate Source of Supply

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 ultimate source of supply is detailed in Table 9-3 and Table 9-4. Altogether, the ultimate system will include 9 additional wells with 7 of the wells serving the 925 zone.

The City already has an additional well drilled (Well 43) and sites identified for three more (Well 42, 48, and 51).

Table 9-3
Ultimate Source of Supply

Source	Capacity		
	AFY	mgd	gpm
Existing Wells	82,403	73.57	51,093
Future Wells[1]	36,288	32.40	22,500
WFA at Aqua de Lejos WTP	28,000	25.00	17,361
CDA from CDA I	1,500	1.34	930
CDA from CDA II	7,033	6.28	4,361
Total	**155,224**	**138.59**	**96,245**

[1] *Future well capacities assumed to be 2,500 gpm each. 9 wells planned.*

[2] *Facilities are being designed so CDA/Ontario has the ability to deliver 7,033 AFY through new facitilities to the City's 1010 Zone at Milliken Avenue and Riverside Drive*

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.

Table 9-4
Ultimate Supply by Zone

Zone	MDD (mgd)	Existing Well Capacity (mgd)	Added Well Capacity (mgd)	WFA Supply Capacity (mgd)	CDA Supply Capacity (mgd)	Total Supply (mgd)	Surplus/ Deficit (mgd)
925	28.06	3.97	25.20			29.17	1.11
1010	17.39	6.46			7.62	14.08	-3.31
1074	13.93	24.26				24.26	10.33
1212	36.57	35.28	7.20	20.10		62.58	26.01
1348	8.18	3.60		4.90		8.50	0.32
Total	**104.13**	**73.57**	**32.40**	**25.00**	**7.62**	**138.59**	**34.46**

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.

9-3 Storage

9-3.1 Capacity Evaluation Criteria

Operational 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.

Emergency Storage

The City's emergency storage criterion is set at one average day demand. For a system that depends mostly on groundwater supplies, this amount of emergency storage is adequate and is primarily for response in operations due to a loss of a major source of supply.

Fire Suppression Storage

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 an emergency, the emergency storage volume, as well as the operational storage volume and the fire suppression storage volume would all be available for use.

9-3.2 Existing Storage Analysis

Table 9-5 shows the existing storage capacity in each zone, and the reservoir capacity needed.

A deficit of 6.68 MG is calculated in the 1074 Zone. The storage surplus in the 1212 Zone could be transferred through PRS 6, 9, 10, 11, and 12 to the 1074 Zone to make up for this deficit. Plans to construct two additional reservoirs in the 1212 Zone at 8 MG each would address the storage deficit in the 1074 Zone (see Ultimate Storage Analysis). Water could also be pumped from the 1010 Zone to the 1074 Zone. This would require the construction of a new booster pump station.

Table 9-5
Existing Storage Analysis

Zone	1348	1212	1074	1010	925	Total System
Average Day Demand (mgd)	3.85	15.92	7.17	6.73	-	33.67
Maximum Day Demand (mgd)	6.15	25.48	11.47	10.77	-	53.87
[1]Fire Flow Demand (gpm)	3,500	4,000	3,500	3,500	-	-
Fire Flow Duration (hrs)	4	4	4	4	-	-
[2]Fire Suppression Storage (MG)	0.84	0.96	0.84	0.84	-	-
[3]Operational Storage (MG)	1.54	6.37	2.87	2.69	-	13.47
[4]Emergency Storage (MG)	3.85	15.92	7.17	6.73	-	33.67
Fire + Operational + Emergency Storage (MG)	6.22	23.25	10.87	10.26	-	50.62
[5]Total Storage Required (MG)	6.58	24.35	11.43	10.79	-	53.16
[6]Existing Available Storage (MG)	8.75	32.00	4.75	26.50	6.00	78.00
Zone Surplus / Deficit (MG)	2.17	7.65	-6.68	15.71	6.00	24.84

[1] Highest fire flow required in zone

[2] Fire flow multiplied by duration

[3] 30% of maximum day demand for NMC, 25% of maximum day demand for OMC

[4] One average day demand

[5] (1.15 (fire suppression+operational storage))+emergency storage

[6] Includes Ontario's puchased rights of 3 MG in the JCSD 1110 reservoir - storage accounted for in 1010 Zone

9-3.3 Ultimate Storage Analysis

Table 9-6 shows the ultimate storage capacity in each zone and the reservoir capacity needed.

1212 Zone

Due to age and condition, it is assumed in the ultimate storage analysis that the 10 MG Reservoir 1212-3 will be abandoned (see Section 9-3.4 for condition assessment).

Two additional 8 MG reservoirs are recommended for the 1212 Zone. The City has acquired a site for these reservoirs near the intersection of Foothill Boulevard and Rochester Avenue in the City of Rancho Cucamonga. The reservoir site has an approximate ground elevation of 1,196 feet amsl. The City had the alignment and size of the transmission main that will connect the new 1212 Zone reservoirs to the existing system in Fourth Street between Milliken Avenue and the I-15 Freeway studied in 2005 and after the completion of the 2006 WMP (*TM*: *Hydraulic Analysis for Transmission Mains to Reservoir 1212'-4 by MWH, March 2005 and TM: Updated Hydraulic Analysis for Transmission Mains to Reservoir 1212-4A by MWH)*. Ultimately, a 30-inch diameter pipe was recommended. Three potential alignments were analyzed, with the longest alignment being about 13,600 feet. This pipe size and footage was used in this study for purposes of cost estimates in the Capital Improvement Program (see Section 11).

Table 9-6
Ultimate Storage Analysis

Zone	1348	1212	1074	1010	925	Total System
Average Day Demand (mgd)	5.11	22.86	8.70	11.34	18.71	66.72
Maximum Day Demand (mgd)	8.18	36.57	13.93	17.39	28.06	104.13
[1]Fire Flow Demand (gpm)	3,500	4,000	3,500	3,500	3,500	-
Fire Flow Duration (hrs)	4	4	4	4	4	-
[2]Fire Suppression Storage (MG)	0.84	0.96	0.84	0.84	0.84	-
[3]Operational Storage (MG)	2.05	9.14	3.48	4.35	8.42	27.44
[4]Emergency Storage (MG)	5.11	22.86	8.70	11.34	18.71	66.72
Fire + Operational + Emergency Storage (MG)	8.00	32.96	13.02	16.53	27.97	98.48
[5]Total Storage Required (MG)	8.43	34.48	13.67	17.31	29.36	103.24
[6]Existing Available Storage (MG)	8.75	22.00	4.75	26.50	6.00	68.00
Recommended Additional Storage (MG)		16.00			24.00	40.00
Total Future Available Storage (MG)	8.75	38.00	4.75	26.50	30.00	108.00
Zone Surplus / Deficit (MG)	0.32	3.52	-8.92	9.19	0.64	4.76

[1] Highest fire flow required in zone

[2] Fire flow multiplied by duration

[3] 30% of maximum day demand for NMC, 25% of maximum day demand for OMC

[4] One average day demand

[5] (1.15 (fire suppression+operational storage))+emergency storage

[6] Includes Ontario's puchased rights of 3 MG in the JCSD 1110 reservoir - storage accounted for in 1010 Zone

[6] Assumes Reservoir 1212-3 will be abandoned due to age/condition

1074 Zone

The construction of a new booster pump station is recommended to pump surplus water (9.19 mgd) from the 1010 Zone to the 1074 Zone. The storage surplus from the 1212 Zone (3.52 mgd, following the construction of two new 8 MG reservoirs) could also be transferred through PRS 6, 9, 10, 11, and 12 to the 1074 Zone in an emergency.

In lieu of constructing a new booster pump station, the City could consider constructing one additional 10 MG reservoir in the 1074 Zone. It may be possible for the City to construct the new reservoir adjacent the existing Reservoir 1074-1A and 1074-1B, which are buried reservoirs beneath John Galvin Park. This alternative is much more costly and is therefore not included in the Capital Improvement Program (see Section 11).

925 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 proposed 6 MG reservoir will be located adjacent the existing 6 MG reservoir (Dupont Ave and Jurupa St). The two 9 MG reservoirs are planned to be located between Bon View Avenue and Cucamoga Avenue, west of Francis Street.

9-3.4 Storage Reservoir Condition Assessment

A Reservoir Seismic Vulnerability Evaluation was conducted in 2000 by Boyle Engineering Corporation, and again in 2008 by Tetra Tech. The analyses conducted revealed that all the reservoirs had deficiencies that could potentially lead to roof damages and render them totally or partially inoperable after a seismic event. Reservoir 1212-1B and 1212-3 were determined to be under the greatest risk. Reservoir 1348-1A, 1348-1B, 1348-1C, 1212-1A, and 1074-1B were under the next greatest risk.

Recommendations from both evaluations were used as the basis of improvement projects conducted at the reservoirs over the last ten years. The remaining projects in the City's 5-year CIP include structural retrofits for the 1348 Zone Reservoirs and inlet and outlet piping seismic retrofits for Reservoir 1010-1A. These projects are included in the CIP presented in this report.

Based on review of the 2008 seismic study executive summary, the most recent tank inspection (completed September 10, 2010), and discussions with City staff, it is recommended that Reservoir 1212-3 be repaired to extend its useful life possibly for 10 to 15 years. A thorough roof inspection and repair project is recommended. Due to its age (currently 84 years old), Reservoir 1212-3 is expected to be taken out of service in the next 15 years, after the completion of Reservoir 1212-4A and 1212-4B.

Per the established criteria for concrete reservoirs, six of the City's existing reservoirs have outlived their useful life. These are Reservoir 1074-1B (1957), 1212-1A (1959), 1212-1B (1958), 1212-3 (1926), 1348-1B (1955) and 1348-1C (1958). Due to repairs completed following the latest tank inspections, the condition of these reservoirs is acceptable, with the exception of the roof of Reservoir 1212-3. Each tank should be re-inspected and its condition assessed in no more than three years following the repair work.

9-4 Model Runs and System Pressures

Existing System

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 Demands

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. These low pressure areas are shown on Figure 9-1.

Improvements were then formulated by trial and error to increase the pressures in these areas to meet the criteria of a minimum of 40 psi during peak hour conditions. These improvements are listed in Table 9-7.

Table 9-7
Peak Hour Pressures Facility Improvement Recommendations

Facility Type	Zone	Facility Description	Pipe Size (in)	Length[1] (ft)
Pressure Reducing Stations	1212 to 1074	PRS 21 - Euclid Ave and Phillips St	-	-
	1212 to 1074	PRS 22 - Vineyard Ave and Mission Blvd	-	-
	1074 to 1010	PRS 23 - Grove Ave and SR-60	-	-
Pipes	1212	Eighth St from Reservoir 1212-1A and 1B to San Antonio Ave	30	1,500
	1212	San Antonio Ave from Eighth St to Fourth St	30	5,300
	1212	Fourth St from Elderberry Ave to San Antonio Ave	18	4,300
	1212	Fourth St from San Antonio Ave to Vine Ave	18	1,450
	1212	Vine Ave from Fourth St to J St	18	700
	1212	J St from Vine Ave to Euclid Ave	18	1,600
	1212	J St east side of Euclid Ave	24	110
	1212	Campus Ave from Eighth St to Fourth St	20	5,400
	1074	Grove Ave from Phillips St to Francis St	12	4,400
	1010	Euclid Ave from PRS 2 at SR-60 to Walnut St	12	1,750
	1010	Grove Ave from PRS 3 at SR-60 to Walnut St	16	1,800
	1010	Banyan St, west of Parco Ave	6	30
	1010	Walnut St, west of Parco Ave	10	10
	1010	Maidstone St, west of Parco Ave	6	30
	1010	St. Andrews St, west of Parco Ave	8	10
			Total	**28,390**

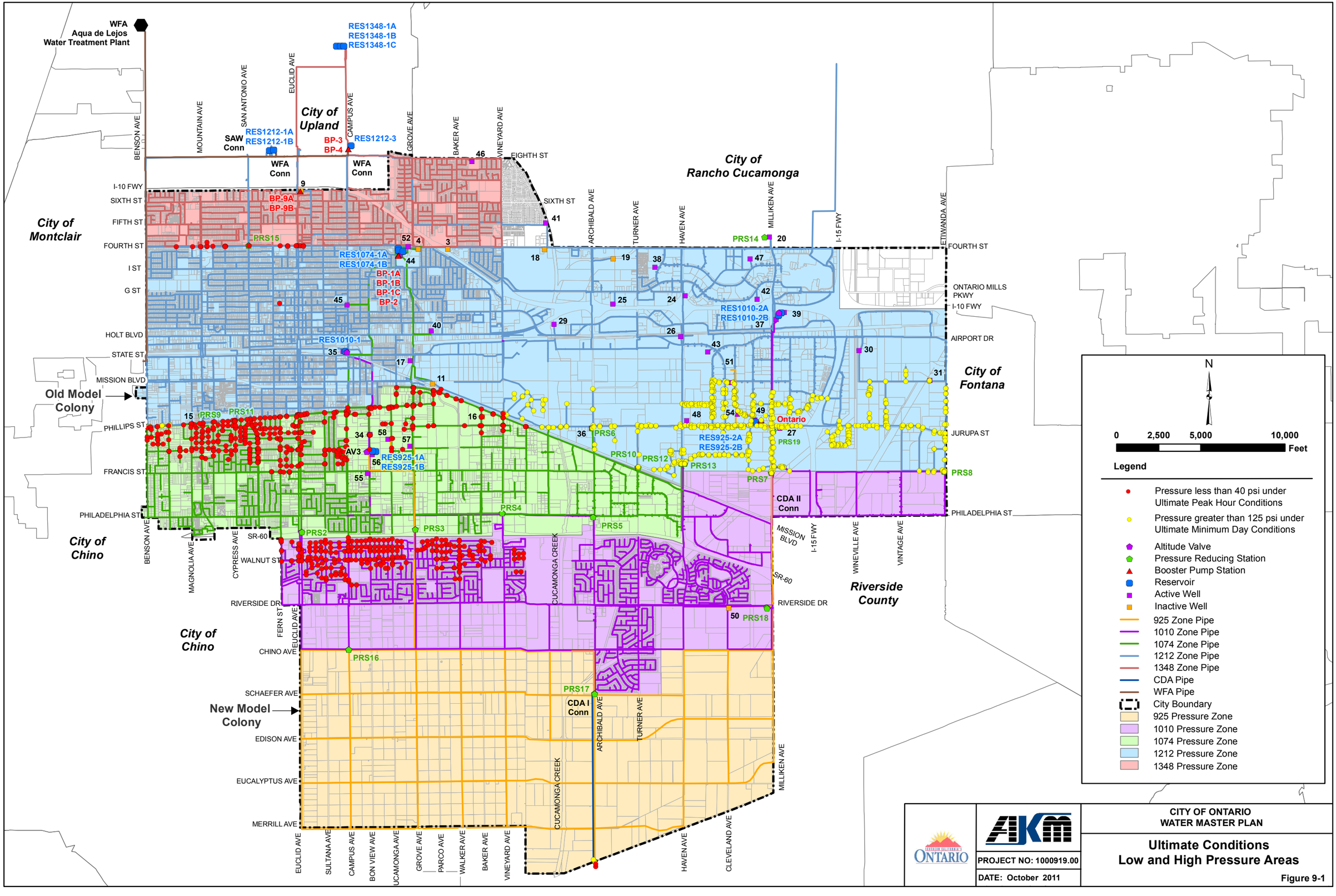
[1] *Lengths based of GIS and hydraulic model. Lengths should be verified prior to design and construction of new facilities.*

The parallel pipes listed in Table 9-7 are recommended to boost pressures in the northerly portions of the 1212 Zone, 1074 Zone and 1010 Zone. In addition, four short connections are recommended for the 1010 Zone to complete system looping and increase pressures. Each of these connections is located just west of Parco Avenue. Improvement locations are detailed on Figures 9-2 and 9-3.

Insert Figure 9-1 Ultimate Conditions, Low and High Pressure Areas

Insert Figure 9-2 Peak Hour Pressure Facility Improvement Recommendations – north

Insert Figure 9-3 Peak Hour Pressure Facility Improvement Recommendations - south



CITY OF ONTARIO
WATER MASTER PLAN

Ultimate Conditions
Low and High Pressure Areas

PROJECT NO: 1000919.00

DATE: October 2011

Figure 9-1

City of Upland

SAW Conn

RES1212-1A
RES1212-1B

BP-3
BP-4

RES1212-3

WFA Conn

WFA Conn

30"

30"

20"

20"

30"

18"

18"

18"

24"

18"

PRS15

9

46

52

4

44

45

RES1074-1A
RES1074-1B
BP-1A,
BP-1B
BP-1C
BP- 2

BP-9A
BP-9B

BENSON AVE

MOUNTAIN AVE

SAN ANTONIO AVE

EUCLID AVE

CAMPUS AVE

GROVE AVE

BAKER AVE

I-10 FWY

SIXTH ST

FIFTH ST

FOURTH ST

I ST

G ST

HOLT BLVD

ELDERBERRY AVE

VINE AVE

J ST

N

0 700 1,400 2,800 Feet

Legend

- Existing PRS or Altitude Valve
- Existing Pump Station
- Exisitng Well
- Existing Reservoir
- Existing Pipe
- Recommended Pipe
- 1212 Pressure Zone
- 1348 Pressure Zone
- City Boundary

ONTARIO

AKM

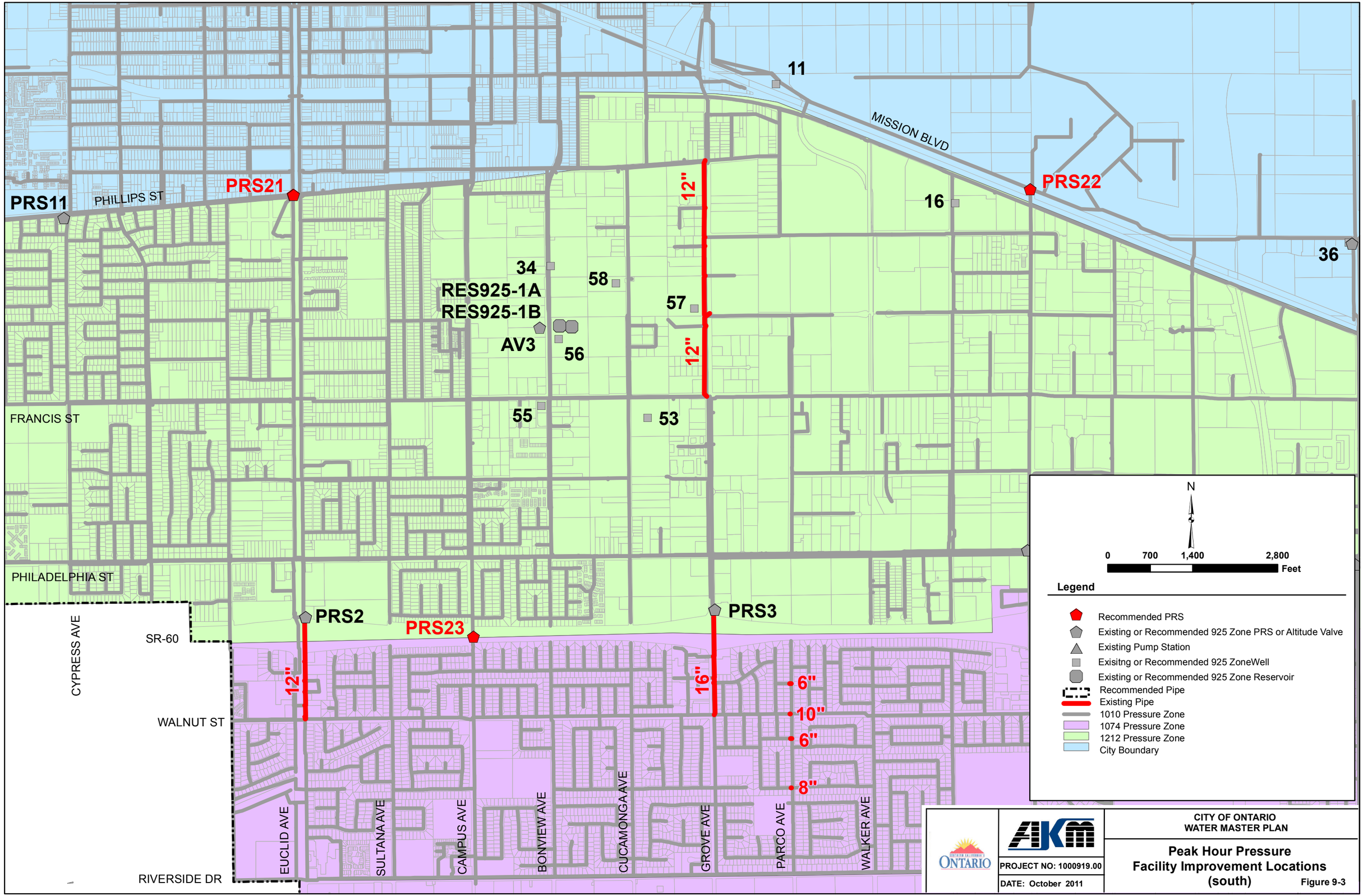
PROJECT NO: 1000919.00

DATE: October 2011

CITY OF ONTARIO
WATER MASTER PLAN

Peak Hour Pressure Facility Improvement Locations (north)

Figure 9-2


PRS11
PHILLIPS ST
PRS21
11
MISSION BLVD
PRS22
16
36
34
RES925-1A
RES925-1B
AV3
56
58
57
55
53
12"
12"
FRANCIS ST
PHILADELPHIA ST
PRS2
PRS23
PRS3
16"
12"
6"
10"
6"
8"
CYPRESS AVE
SR-60
WALNUT ST
RIVERSIDE DR
EUCLID AVE
SULTANA AVE
CAMPUS AVE
BONVIEW AVE
CUCAMONGA AVE
GROVE AVE
PARCO AVE
WALKER AVE
N
0
700
1,400
2,800
Feet
Legend
Recommended PRS
Existing or Recommended 925 Zone PRS or Altitude Valve
Existing Pump Station
Exisitng or Recommended 925 ZoneWell
Existing or Recommended 925 Zone Reservoir
Recommended Pipe
Existing Pipe
1010 Pressure Zone
1074 Pressure Zone
1212 Pressure Zone
City Boundary
ONTARIO
AKM
PROJECT NO: 1000919.00
DATE: October 2011
CITY OF ONTARIO
WATER MASTER PLAN
Peak Hour Pressure
Facility Improvement Locations
(south)
Figure 9-3

Ultimate Maximum Day plus Fire Flows

System analysis was conducted with ultimate facilities and demands under maximum day plus fire flow conditions. Fire flow demands, as listed in Table 7-1 were applied at all fire nodes (nodes in close proximity to fire hydrant locations). If the fire node was located near multiple land use types, the highest fire flow demand was utilized.

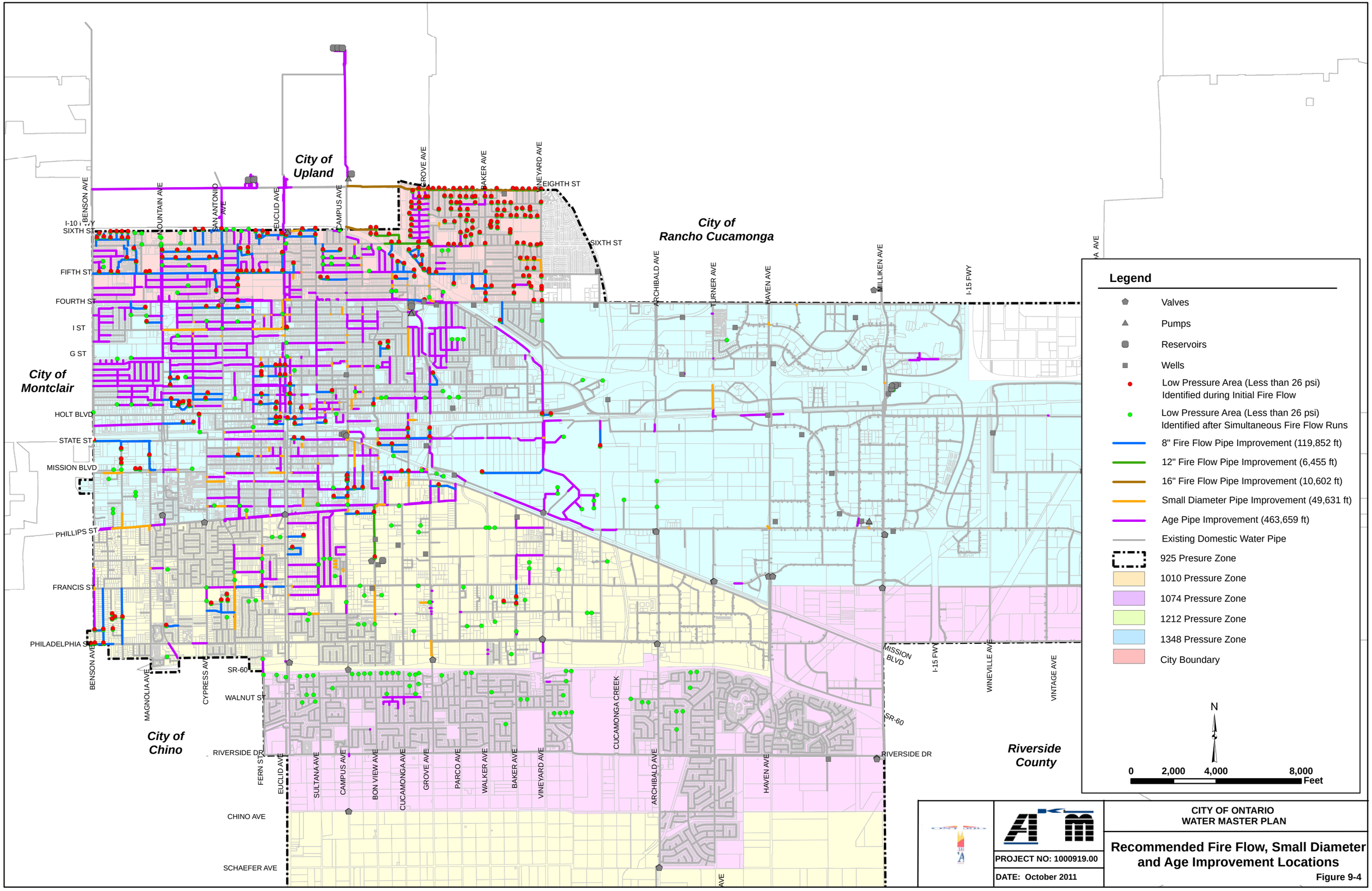
The fire flow criterion requires a residual pressure of 20 psi at the fire hydrant outlet. The hydraulic model does not include laterals from the mainline to the hydrants. It is estimated that there can be a loss of up to 6 psi through a lateral and hydrant at 1,000 to 1,500 gpm. The system evaluation is therefore based on providing 26 psi at the nearest mainline junction in the model. The analysis revealed deficiencies in the system where the required residual pressure could not be met (residual pressure < 26 psi).

Initially, the model simulation attempts to supply the entire fire flow from one location. This resulted in low residual pressures at many locations, as shown on Figure 9-4. In reality, fire fighting often takes place by using multiple fire hydrants. Therefore, the areas identified with low residual pressures were reanalyzed using a feature in the hydraulic model software called “simultaneous fire flow” analysis. Fire flows were split between multiple hydrants (typically 2 or 3) and the analysis was rerun to determine residual pressures. Often times, the system was then able to meet fire flow demands.

Finally, there were areas within the system that continued to show low residual pressures even when the simultaneous fire flow analysis was utilized. These low pressures were typically a result of small pipe sizes (4-inch and 6-inch). Improvement recommendations for additional or upsized pipes were formulated to address the fire flow deficiencies. These recommendations are shown on Figure 9-4 and a summary of the replacement pipe sizes and lengths are listed in Table 9-8. Further details of each project location are provided in Appendix 2 of this report.

Table 9-8
Summary of Facility Improvements
Needed to Meet Maximum Day
plus Fire Flow Demands

Pipe Size Replacement (in)	Length (ft)
8	119,852
12	6,455
16	10,602
Total	**136,909**



CITY OF ONTARIO
WATER MASTER PLAN

Recommended Fire Flow, Small Diameter and Age Improvement Locations

Figure 9-4

PROJECT NO: 1000919.00

DATE: October 2011

9-5 Pipeline Replacement Program

The existing distribution system pipes were installed between 1914 and 2009. Figure 6-5 showed the system pipe length by decade of construction. The majority of the distribution system was constructed after 1960. The year of installation is unknown for about 36 miles or 35.8 percent of the existing pipes. For this study, it is assumed that the pipes with unknown year of installation predate 1960 and are therefore more than 50 years old. It is recommended that a detailed investigation be performed to determine the year of installation for all pipes in its system before replacing them.

Pipe replacements due to age are planned for all pipes constructed in or before 1960. This excludes the areas where improvements are recommended to increase peak hour pressures or fire flow pressures.

Small diameter pipe improvements are recommended for all pipes 4-inches in diameter and less. These improvement recommendations exclude the areas where improvements are recommended to increase peak hour pressures or fire flow pressures, as well as the areas where improvements are recommended due to pipe age.

The total length of pipe replacements due to age is estimated at 87.8 miles. A summary of the recommended existing water system pipeline improvements is shown in Table 9-9. Locations of fire flow, small diameter, and age improvements are shown on Figure 9-4.

Table 9-9
Summary of Existing Water System Improvements

Improvement Type	Length (feet)	Length (miles)
Pressure Improvements	28,390	5.4
Fire Flow Improvements	136,909	25.9
Age Improvements of all remaining pipes installed in or before 1960	463,659	87.8
Small Diameter Pipe Improvements (less than or equal to 4")	49,631	9.4
Total	**678,589**	**128.5**

Previously, the City conducted a pipeline replacement program where small diameter pipelines (4-inch and less) as well as pipelines identified in fire flow deficient areas were replaced. This program was not implemented in the past two years, but the City will begin the program again in FY 2011-2012. Subject to considerations such as frequent occurrence of failures in an area, street improvement projects, or other utility improvement projects, fire flow improvement projects should have higher priority over the others, with pressure improvement projects having the second highest priority. Pipe length over 50 years old will continue to increase every year. Therefore, the pipeline replacement program should be accelerated as much as possible to ascertain proper service in the future.

9-6 1010 Zone Boundary

The northeastern portion of the 1010 Zone, shown on Figure 9-5, located northeast of SR-60, is approximately 70 feet higher in average elevation than the rest of the 1010 Zone. Static pressures are therefore lower by about 30 psi than the rest of the zone. It was stated in the 2006 WMP that this area contains a number of customers with fire sprinkler systems that are designed for higher system pressures than the actual system pressures. And based on various past studies, it was recommended to rezone this area to the 1074 Zone.

The hydraulic model developed during this study did not indicate pressure problems in this area per the criteria discussed in Section 7. All maximum day, peak hour pressures exceeded the criteria of 40 psi and all fire flow demands were met with a minimum 26 psi residual pressure under maximum day conditions.

During this study, for each of the customers previously identified as receiving lower system pressures than what their sprinkler system was designed for, City staff provided the minimum criteria. The minimum criteria included a fire flow and residual pressure that the City's water system is required to supply to the customer. These fire flow demands were input into the maximum day scenario of the hydraulic model to determine the residual pressures at each location (See Appendix 5 for detailed results). Only one location, 5151 E. Philadelphia Street, resulted in a lower residual pressure than the criteria. It was therefore determined that the area in question did not need to be rezoned. The customer located at 5151 E. Philadelphia Street will have to be contacted to determine if its sprinkler system can work properly under the lower system pressure conditions or if improvements at the site are necessary.

9-7 Facility Back-up Power

Currently, the wells with standby power are Well 40 (1074 Zone), 41 (1212 Zone), 46 (1348 Zone), 47 (1212 Zone), and 49 (925 Zone).

The system has to be able to provide service during commercial power outages. All future pump stations and wells should be constructed with standby power so that at least one average day demand can be conveyed to each zone from the wells. If well capacity is not sufficient, water can be transferred via pressure reducing stations and/or booster pump stations with backup power.

Permanent back-up power should be added to Well 39. All twenty existing wells should be provided with portable generator connections and manual transfer switches. The City should purchase eight 750 KW portable generators to operate sufficient facilities to deliver one average day demand.

WFA
Aqua de Lejos
Water Treatment Plant

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

City of Upland

RES1212-1A
RES1212-1B

SAW Conn

BP-3
BP-4

RES1212-3

WFA Conn

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

RES1010-1

PRS14

RES1010-2A
RES1010-2B

BP-Ontario

RES925-2A

PRS6

PRS12

PRS13

PRS10

PRS8

PRS7

CDA II Conn

Proposed PRS20

PRS18

CDA II Conn

PRS17

CDA I Conn

PRS9

PRS11

PRS2

PRS3

PRS4

PRS5

Old Model Colony

New Model Colony

City of Chino

City of Chino

City of Fontana

Riverside County

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
ONTARIO MILLS PKWY
AIRPORT DR
JURUPA ST
SR-60
WALNUT ST
RIVERSIDE DR
CHINO AVE
SCHAEFER AVE
EDISON AVE
EUCALYPTUS AVE
MERRILL AVE
MAGNOLIA AVE
CYPRESS AVE
FERN ST
CUCAMONGA CREEK
SULTANA AVE
BON VIEW AVE
CAMONGA AVE
PARCO AVE
WALKER AVE
CLEVELAND AVE
WINEVILLE AVE
VINTAGE 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
- 925 Pressure Zone
- 1010 Pressure Zone
- 1074 Pressure Zone
- 1212 Pressure Zone
- 1348 Pressure Zone
- Possible Rezone Area

ONTARIO

AKM

PROJECT NO: 1000919.00

DATE: October 2011

CITY OF ONTARIO
WATER MASTER PLAN

Portion of 1010 Zone Considered to be Rezoned to 1074 Zone

Figure 9-5

9-8 Inter-Agency and Emergency Connections

The City's existing water system is connected with neighboring cities and water agencies through ten inter-agency connections. Currently, the City receives water from WFA and CDA on a regular basis. There are two existing CDA connections: one at Archibald Avenue and Schaefer Avenue (CDA-1) and one at Milliken Avenue and Philadelphia Street (JCSD-1/CDA2-1). In the future, when new facilities are constructed, the City will have the option to take all the CDA water from a new connection at Milliken Avenue and Riverside Drive into its 1010 Zone (JCSD-2/CDA2-2). This is the most likely future operation as it is expected to provide a significant energy savings. The existing and future inter-agency connections are listed in Table 9-10.

Table 9-10
Existing and Proposed Inter-Agency Connections

ID	Location	From		To	
Existing Inter-Agency Connections					
WFA-1	Eighth St & Fern Ave	WFA	1618'	Ontario	1212'
WFA-2	Campus Ave & A St	WFA	1618'	Ontario	1348'
CVWD-1	Sixth St & Corona Ave	Ontario	1348'	CVWD	1190' or 1310'
CVWD-2	Sixth St & Vineyard Ave	Ontario	1348'	CVWD	1190' or 1310'
CVWD-3	Milliken Ave & Sixth St	CVWD	1310'	Ontario	1212'
Chino-1	Benson Ave & State St	Ontario	1212'	Chino	980'
Upland-1	Campus Ave & Richland St	Ontario	1348'	Upland	Unknown
CDA-1	Archibald Ave & Schaefer Ave	CDA-1	Unknown	Ontario	1010'
JCSD-1/ CDA2-1	Milliken Ave & Philadelphia St	JCSD/CDA-2	1110'	Ontario	1010' or 925'
SAW - Inactive	Eighth St & San Antonio Ave	SAW	Unknown	Ontario	1212'
Future Inter-Agency Connections					
JCSD-2/ CDA2-2	Milliken Ave & Riverside Dr	JCSD/CDA-2	1110'	Ontario	1010'
Future Emergency Connections					
Chino-2	Euclid Ave & Chino Ave	Chino	980'	Ontario	925'
MVWD-1	Benson Ave & Fourth St	Ontario	1212'	MVWD	1207'
		MVWD	1355'	Ontario	1348'
Upland-2	Reservoir 1348'	Upland	Unknown	Ontario	1348'
FWC-1	Etiwanda Ave & Airport Dr	Fontana	1280'	Ontario	1212'

9-9 Water Meter Replacements

The existing system has approximately 36,658 water meters. The City had an aggressive meter replacement program in place. In 2006, 41 percent (15,000) of the water meters were reported to have been recently replaced. Since then, nearly all of the other water meters were also replaced. There are only 16 large meters remaining to be replaced.

9-10 Water System Security Upgrades

Security upgrade recommendations for the facility sites (reservoirs, wells, and booster stations) resulted from the City of Ontario's 2002 Water System Security Vulnerability Assessment. The remaining project descriptions and status are listed in Table 9-11.

Table 9-11
Water System Security Vulnerability Projects

Site	Project Description	Status as of November 2010
Reservoirs 1212-1A and 1212-1B	Retrofit vents of Reservoir 1212-1B with additional cover that is a solid sheet metal on one suface and expanded steel on the second surface	
	Repair exisitng chain link fence	Years 4 and 5 of current 5-year plan
Reservoir 1212-3	Replace perimeter fence with close mesh fence	Year 3 of current 5-year plan
	Install a fence alarm system	
Well 9	Repair or replace chain link fence on north side of site	
Well 26	Fix lighting system. Install photo-electric lights if necessary.	
Well 35 and Reservoir 1010-1	Perimeter wall should be made 8' tall	Year 2 of current 5-year plan
	Replace fence on south side of property with close mesh chain link fence	

9-11 PRS Rehabilitation

Since 2006, the City rehabilitated all of its existing pressure reducing stations. Each station was connected to the City's SCADA system with measurements of upstream pressure, downstream pressure, and flow rate.

9-12 Airport Metering and Backflow Prevention

The City has identified the metering and backflow prevention project for the Ontario International Airport to protect the City's water supply by isolating the airport's on-site water system from the public water supply. The on-site water system is outside of the public right-of-way, within secured areas, and increases maintenance time and presents difficulties in monitoring system modifications. This project consists of installation of approximately 8 meters, backflow prevention devices and related piping to isolate the on-site water system at the airport and dedicate the facilities within the airport to the Los Angeles World Airports (LAWA). (*Ref: Water and Recycled Water Master Plan, April 2006*)