Appendix L. 2007 Public Utilities and Service Systems

Appendix

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Appendix K: Public Services/Utilities and Service Systems

K.1 - Responses from Chino Valley Fire District, Chino Police Department, and Chino Branch Library

K.2 - Water Supply Assessment Prepared by Dudek - October 26, 2007

K.3 - Water System Master Plan Update Prepared by MWH - October 2007

K.4 - Sewer Master Plan Update Report Prepared by Bureau Veritas, Final Report November 2007

K.5 - Storm Drain Master Plan Update Report Prepared by Bureau Veritas, Draft Final Report November 2007

K.1 - Responses from Chino Valley Fire District, Chino Police Department, and Chino Branch Library

ATTACHMENT A
CHINO VALLEY FIRE DISTRICT QUESTIONNAIRE

Please reply by October 19, 2007. Your prompt reply to our request is appreciated. If you have any questions regarding this information request, please contact Kristen M. Garcia at 714.508.4100 or kgarcia@brandman.com.

Please answer the following questions:

1. **Service Area and Facilities**. Describe the geographic extent of your service area. If possible, provide a map. Describe in your service area (number and type of stations, personnel on hand). Identify the fire stations(s) that would provide protection in the project area. Please indicate the station name and street address.

The Fire District boundaries include 80 square miles primarily located within the boundaries of the City of Chino and the City of Chino Hills. A small area of unincorporated area is also included and located north of the City of Chino.

Six municipal fire stations.
Six Paramedic fire engines with four personnel.
One Paramedic Truck with four personnel.
One Battalion Chief.

Fire Station 3 located at 7550 Kimball Avenue, Chino, will primarily serve the project.

2. **Response Times.** What is the approximate response time for units to emergency calls in the project vicinity? What is your average response time throughout the rest of your service area?

The Fire District response standard is a five minute travel time. Fire and paramedic response times are excessive to this project.

3. **Staffing.** On a 24-hour basis, how many personnel are available at the station(s) to respond to calls within the project vicinity? Throughout your service area?

4 personnel from the nearest fire station.

28 personnel throughout the service area.

4. **Equipment.** Describe the number and types of vehicles, as well as any special equipment available at the station(s) responding to the project area.

Fire Station 3
One municipal fire engine is staffed.
One water tender is not staffed.

5. **Service Levels.** Currently, are the existing facilities, manpower and equipment adequate to maintain a sufficient level of service throughout your service area? If not, what additional facilities, manpower and equipment may be needed?

The response times are excessive to the project.

Additional "facilities, manpower and equipment" to be determined.

The Fire District is requesting a meeting with all necessary parties to discuss this deficiency.

6. **Mutual Assistance.** Please explain any mutual assistance that you engage in with either the County or other agencies.

The Fire District can call on neighboring jurisdictions for assistance in the event of a fire. This assistance is not available for medical emergencies and is subject to the availability of the resources requested.

7. **Impacts and Mitigations.** Do you anticipate any adverse impacts as a result of the proposed project? If so, what mitigation measures would you recommend for reducing potential impacts on fire service?

See attached Fire District letter sent December 27, 2006 in response to the draft EIR.

8. **Other Information**. Are there any other site specific issues you are aware of (e.g. Wildland fire conditions, etc)? Please provide any additional information that you are aware of which would be helpful in evaluating the physical impacts of the proposed project.

The project is in the vicinity of a wildland-interface area.

The Fire Code that will be in effect as of January 1, 2008 will be the 2007 California Fire Code with local amendments.

9. **Contact Information**. Please provide us with a contact name and information (phone, e-mail, etc.) in the event that additional information is needed, or we have any questions regarding your responses.

Greg Turner, Deputy Chief Office (909) 902-5260 gturner@chofire.org

FD Attachment

December 27, 2006

Ms. Candida Neal, EIR Project Manager
CITY OF CHINO
Community Development Department
13220 Central Avenue
Chino, CA 91710

RE: EDGEWATER LAKES COMMUNITIES
Notice of Preparation—Draft EIR

Dear Ms. Neal:

The Chino Valley Fire District (Fire District) appreciates the opportunity to be involved in the entire planning process for this project.

Fire District comments regarding the project are outlined below:

1. Fire Station

   This project presents unique challenges to providing service as it is outside of areas which have been previously intended for development. This area is in a flood plain and has not been part of The Preserve Master Plan. As a result, fire and paramedic response times are excessive for this development.

2. Water-Fire Protection

   Residential fire flow is required to be 1,000 gpm at 20 psi residual pressure for a 2-hour duration. Residential dwellings in excess of 3,600 square feet and commercial occupancies shall have fire flow as specified in Table A-III-A-1 of the Fire Code.

   Recycled water is not to be used for fire protection systems.

3. General

   The development is to comply with all current fire protection requirements, currently the 2001 California Fire Code as amended locally, Fire District standards, and City of Chino regulations.

   A 100 foot fuel modification zone may be required at the perimeter of the development.

4. <u>Emergency Access / Egress</u>

   All Fire District access standards are to be complied with, including roads widths at a minimum of City of Chino standards and for private streets at a minimum of 26 feet (with no parking).

   Multiple points of vehicular <u>access and egress</u> is required to all areas of this development. The access and egress is to be utilized regularly on a daily basis by the residents to ensure familiarity in the event of an emergency.

   Any gated roadways must comply with Fire District requirements, including, but not limited to, emergency response electronic control devices. Gates/entry areas are to be designed as to not slow emergency vehicle response.

   Traffic signals associated with the project to be equipped with emergency response signal control devices per current specifications.

The Fire District contact for this project is:

Tom J. Maxham
Division Chief / Fire Marshal
2005 Grand Avenue
Chino Hills, CA 91710
909/ 902-5260

Please let us know if any further information is needed. Fire District staff is available to assist with this project as you may need.

Sincerely,

Paul L. Benson
Fire Chief

By: Tom J. Maxham
Division Chief/Fire Marshal

Chino Police Department
Support Services Division
MEMORANDUM

Office of the Chief of Police
Stan Stewart

Mike Johnson, Captain
Miles Pruitt, Captain

TO: Kristen M. Garcia, Michael Brandman Associates

FROM: Captain Mike Johnson

DATE: October 11, 2007

SUBJECT: Request for Information Regarding Edgewater Communities Project

The information shown below is in response to the Edgewater Communities Project questionnaire recently forwarded to our agency.

1. ***Service Facilities and Personnel.*** *Please confirm that the nearest police facility to service the project area is the City's main police station at 13250 Central Avenue.*

   The City of Chino Police Facility, located at 13250 Central Avenue is indeed the central location for police services in the entire Chino community. Please note that there is a police substation located in closer proximity to the proposed Edgewater project area; however this substation is not staffed and mainly serves as a venue for staff to complete reports and investigations. The police substation facility is located on the grounds of Chino Airport, 7000 Merrill Avenue.

   How many of the following personnel comprise the Police Department?

Sergeants	14	
Detectives		See Senior Police Officer, Below
Senior Police Officers (Cpl.)	17	9 Detective Corporals, 6 Patrol Corporals, 2 Traffic Cpls.
Police Officers	60	
Police Chief	1	
Assistant Chief of Police	0	
Captains	2	
Lieutenants	6	
Trainees	0	

Sworn Positions (authorized complement of the department)

- 100 sworn positions (full-time)

Non-Sworn personnel (who are administrative aids, maintain records, crime prevention, and enforcement assistance).

- 52 full-time civilian support staff members
- 13 part-time civilian support staff members

2. ***Response Times.*** *What is the approximate response time of patrol units to emergency calls in the project vicinity? Would that amount of time be the average response time for an emergency in your jurisdiction?*

   Priority 1 (Emergency) patrol response times for calendar year 2006 (Min : Sec)

   - Project Area = 7:14
   - Citywide = 5:16

3. ***Staffing.*** *How many beat/patrol areas does the City have? In which beat or patrol area is the project site located? On a 24-hour basis, how many sworn officers are assigned to this beat or patrol area?*

   The City of Chino has five (5) patrol beats. The project site is located within Beat 5.

   One officer is assigned to this beat on a 24-hour basis; however it takes a total of 6 sworn officers to reliably staff this beat with the one officer 24/7/365.

4. ***Equipment.*** *How many police vehicles does the Department maintain within the patrol division?*

   The Chino Police Department's Operations Division has 54 vehicles total, including 39 black & whites, 7 motorcycles, 6 vehicles for operations support staff, and 2 unmarked vehicles.

5. ***Service Levels.*** *Currently, without implementation of the proposed project, are the existing facilities, manpower and equipment adequate to maintain a sufficient level of service throughout your service area? If not, what additional facilities, manpower and equipment may be currently needed? What is the current officer to population ratio?*

   The level of service throughout our service area is minimally adequate. As the community experiences growth in the number of dwelling units, businesses and industry, there will be a need to add sworn and civilian staff – in addition to increased facility, vehicle and equipment needs.

   The current sworn officer to population ratio is 1.23 per 1,000 residents.

   Total Sworn = 100 Population = 81,224

6. ***Mutual Assistance.*** *Please confirm that the City maintains mutual aid agreements with surrounding police and sheriff agencies, as well as with the State Office of Emergency Services.*

   The City maintains mutual aid agreements with surrounding police agencies.

7. ***Impacts and Mitigation.*** *Do you anticipate any adverse impacts as a result of the proposed project? Can the additional personnel that may be needed to serve the project site be accommodated at the existing police station? Does the Department have a projection of new sworn personnel based on growth estimates by the City? If so, what is the projection? If potential adverse impacts may occur, what mitigation measures would you recommend to reduce potential impacts on police services?*

   Development of the proposed project will create an adverse impact of an incremental nature, mostly related to increased staffing, facility, vehicle and equipment needs.

   Using an assumption of 1,074 dwelling units being developed within the project area, and an average of 3.4 residents per dwelling unit = potential residential population increase of 3,651. Extrapolating the existing staffing ratio of 1.23 officers per 1,000 population times the 3.651 thousand additional residents, results in a projected sworn staffing needs increase of 4.49 officers (round down to 4.0). The population increase would also result in the need for fractional increases in civilian support positions. The existing police facility is sized to accommodate such an increase.

   The City of Chino is currently updating its General Plan, which may create an adjustment in the City's projected population at build-out. This issue creates a situation where accurately projecting long-term staffing needs could be adversely impacted, due to the potential for error – at least until such a time that the updated General Plan is finalized.

   In regards to mitigating the impacts of project-related growth on police services, there are several areas for consideration. There would be a need to purchase uniforms / equipment for each of the four (4) additional officers, along with two (2) marked police sedans – as the police vehicle fleet is at usage capacity. Another consideration, given the water features proposed for the project area, may be the need for law enforcement and / or rescue personnel to have access to watercraft for enforcement / rescue purposes.

8. ***Other Information.*** *Are there any other site-specific issues that you are aware of? Please provide any additional information that you are aware of which would be helpful in evaluating the physical impacts of the proposed project.*

   The project site is proposed to contain a variety of recreational uses, inclusive of hiking / walking trails and water features. Access for sworn and civilian support personnel would be an area of concern if the project was designed without vehicle / vessel access needs in mind.

9. ***Contact Information.*** *Please provide us with a contact name and information (phone, e-mail, etc.) in the event that additional information is needed, or we have any questions regarding your responses.*

Michael C. Johnson, Captain
Support Services Division Commander
Chino Police Department
13250 Central Avenue
Chino, CA 91710

Office	(909) 591-9870
E-Mail	mjohnson@chinopd.org

This concludes the responses for the Chino Police Department. Please feel free to contact me if we may be of further assistance.

ATTACHMENT A
CHINO BRANCH LIBRARY QUESTIONNAIRE

Please reply by **October 19, 2007**. Your prompt reply to our request is appreciated. If you have any questions regarding this information request, please contact Kristen M. Garcia at 714.508.4100 or **kgarcia@brandman.com**. Please answer the following questions:

1. Identify the library facilities near the project area. Please indicate the facility name and street address.

   Chino Branch Library
   13180 Central Avenue
   Chino CA 91710

2. Currently, are the existing facilities sufficient to meet the needs of the proposed project? What plans are there for the future expansion of the library facilities?

   Not sufficient for current population
   No plans for expansion

3. Do you anticipate any adverse impacts as a result of the proposed project?

   Library will be more crowded, lack of materials due to demand

4. Currently, are there any improvement or expansion plans for the library serving the project area? What are the projected design capacities and the completion dates?

   No

5. Please provide us with a contact name and address in the event that additional information is required.

   Jennifer Fukunaga
   Branch Manager
   909-465-5236

K.2 - Water Supply Assessment
Prepared by Dudek - October 26, 2007

Water Supply Assessment for the Edgewater Communities

Edgewater Associates I, LLC

Prepared for
The City of Chino
Public Works Department, Water Utility

Prepared by
DUDEK
605 Third Street
Encinitas, CA 92024
(760) 479-4876

October 26, 2007

City of Chino
Water Supply Assessment
Edgewater Communities

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TABLES (cont.)

FIGURES

ATTACHMENTS

ACRONYMS and ABBREVIATIONS

AB	Assembly Bill
ACT	Urban Water Management Planning Act of 1983
AF	Acre Feet
AFY	Acre Feet per Year
AWPF	Advanced Water Purification Facilities
BMP	Best Management Practices
CA	California
CALFED	California and Federal Bay-Delta Program
CALSIM	California Water Allocation and Reservoir Operations Model
CBWCD	Chino Basin Water Conservation District
CCF	Hundred Cubic Feet
CCWRF	Carbon Canyon Water Reclamation Facility
CDA	Chino Basin Desalter Authority
CEQA	California Environmental Quality Act
CII	Commercial, Industrial and Institutional
CIM	California Institution for Men, Chino
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Program
CPTP	Coastal Pumping Transfer Program
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DBP	Disinfection Byproducts
DHS	Department of Health Services
DMM	Demand Management Measure
DWR	Department of Water Resources
DYY	Dry Year Yield
EIR	Environmental Impact Report
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
Eto	Evapotranspiration
gpd	Gallons Per Day
gpf	Gallons Per Flush
gpm	Gallons Per Minute
IAWP	Interim Agricultural Water Program
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resources Plan
IRWM	Integrated Regional Water Management
JCSD	Jurupa Community Services District
JPA	Joint Powers Agreement
LRP	Local Resources Program
MAF	Million Acre Feet
Max	Maximum
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
mg/L	Milligrams Per Liter
Min	Minimum
MOU	Memorandum of Understanding

MWD	Metropolitan Water District of Southern California
MZ	Management Zone
OBMP	Optimum Basin Management Program
OCWD	Orange County Water District
QSA	Quantification Settlement Agreement
RP	Regional Plant
RWIP	Recycled Water Implementation Plan
RWQCB	Regional Water Quality Control Board
SARI	Santa Ana Regional Interceptor
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBCFCD	San Bernardino County Flood Control District
SCADA	Supervisory Control Data Acquisition System
SCIWP	Southern California Integrated Watershed Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TIN	Total Inorganic Nitrogen
TMDL	Total Maximum Daily Load
TVMWD	Three Valleys Municipal Water District
USBR	U.S. Bureau of Reclamation
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WFA	Water Facilities Authority
WMP	Water Master Plan
WSA	Water Supply Assessment
WSDM	Water Surplus and Drought Management
WSMP	Water System Master Plan
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

The City of Chino (City) is responsible for the preparation of the Edgewater Communities (Project) Environmental Impact Report (EIR). The EIR includes an assessment of utilities, including water supply. Recent legislation, Senate Bill 610, requires that a water supply assessment (WSA), based on specific criteria, be prepared to document the sufficiency of available water supply for the City and the Project. The WSA identifies water supply and reliability to the City, now and into the future, including a sufficient water supply for the Project. **The WSA does not, nor it is intended to, identify infrastructure needs related to the provision of water for the proposed Edgewater Communities.**

The WSA is considered at a point in time when known future projects are considered. It is also understood that new and innovative programs and projects in concept are yet to be designed. Therefore, WSAs are a part of the ongoing planning efforts of the City to optimize its water resource program.

The WSA includes a discussion of the relevant legislation requiring the WSA, an overview of the proposed Project, analysis of water demands for the City's existing service area and the Project over a 20-year or more planning period, analysis of reliability of the City's water supplies, including each agency that impacts water supply and water quality to the region, and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years over a 20-year planning period.

Edgewater Communities

The Edgewater Communities (Project) has a total area of 272.93 acres, with 142 acres for residential and 131 acres of open space including major lakes, water features and recreational facilities. The Project is located east of State Route 71, north of State Route 91, west of Interstate 15 and south of State Route 60 and is located in the extreme southwestern corner of San Bernardino County. The current land uses for this area include agricultural, open space and estate residential.

The City-adopted General Plan and Specific Plan for The Preserve both identify the current Project area land uses as open space natural, open space recreational, agricultural and open space natural, and limited estate residential.

Water Supply

The City of Chino relies on four sources for its long-term water supply City-produced local groundwater, imported water, desalted water, and recycled water.

- Groundwater is produced from the Chino Groundwater Basin (Basin). The Basin was adjudicated in 1978, which allocated water production rights to water producers. The City's current groundwater production right as a share of the safe yield of the Basin is 4,034 acre-feet per year (AFY). However, the City has the ability to obtain annual adjustments to its allocated production capability. Management of the Basin is accomplished by the Chino Basin Watermaster through the following three documents: 1) the 1978 Chino Basin Judgment; 2) the Peace Agreement; and 3) the Optimum Basin Management Program (OBMP).

- Imported State Water Project (SWP) water is received from the Metropolitan Water District of Southern California (MWD) through the Inland Empire Utilities Agency (IEUA) and the Water Facilities Authority (WFA). The City's imported water deliveries are treated by the WFA at its Agua de Lejos Treatment Plant located in Upland, California. The City is entitled to 5.9 percent of the treatment plant capacity; current Chino entitlement equals 5,353 AFY.

- Desalted water is received from the Chino Basin Desalter Authority's (CDA) Chino I Desalter. The City's allocation is 5,000 AFY.

- Recycled water is supplied to the City by IEUA through the Regional Recycled Water Distribution System. In 2005, the City provided approximately 3,365 AF of recycled water to industrial, landscape irrigation, and agricultural customers. The City's limited recycled water infrastructure is expected to be expanded with development of The Preserve, College Park, and the Edgewater Communities, as well as conversions of potable water use to recycled water use.

The City's water supply planning considers the programs of local and regional water agencies. The Water Utility manages agreements and contracts with its water suppliers and continually monitors activities, projects and programs to optimize the City's water supply.

Water Demand

The City's current average total demand is approximately 21,000 AFY. The build-out of the Edgewater Communities will increase water demand by approximately 1,094 AFY of water (484 AFY of potable water and 610 AFY of recycled water) yielding a total projected City demand of 31,048 AFY by 2021, as shown in **Table 4.1-2**. Combined with the build-out of The Preserve and College Park, which has been included in the water demand projections, water demand is anticipated to increase to 31,429 AFY by 2030.

Demand and Supply Projections

Edgewater Communities is expected to be built within a 10-year period with an initial water demand in 2009. This development phasing plan allows for water demands to be met from sources that are currently being planned, developed and implemented, including recycled water and conservation programs. Supplies of imported water and CDA water are expected to remain relatively stable throughout the forecast period. Enhanced water conservation, increased local well production, and increased use of recycled water should provide for the balance of needed supplies.

Analysis of water demand and supply projections for the City, including the Edgewater Communities (Section 4.0, City of Chino Water Demand and Supplies), demonstrate that projected supplies exceed demand through the year 2030.

The City has the opportunity to increase supply to meet demand through the following measures: 1) production of groundwater based on safe yield limitations; 2) increasing imported water purchases, if available and if there is available WFA capacity; 3) purchasing additional desalted water if more is produced than needed to satisfy requirements of other purchasers, and 4) purchasing additional recycled water, if available. Collectively, these additional options will enable water supply to exceed water demand for the City of Chino now and into the future.

Additionally, analysis of normal, single-dry, and multiple-dry year scenarios also demonstrate the City's ability to meet or exceed demand during the 20-year planning period in all hydrologic conditions, even under reduced imported water supply conditions and implementation of the Dry Year Yield Program.

Reliability

Reliability of future water supplies to the region will be ensured through continued implementation of the OBMP, implementation of local agency programs, and combined efforts and programs among agencies, including all water retailers, and the Chino Basin Watermaster, IEUA, MWD, WFA, CDA, Santa Ana Regional Water Quality Control Board (RWQCB), Santa Ana Watershed Project Authority (SAWPA), and the Chino Basin Water Conservation District.

Prevailing drought conditions throughout California and the Colorado River Basin, coupled with environmental issues affecting deliveries of SWP water through the Sacramento – San Joaquin Delta, have resulted in diminished imported surface water to Southern California. MWD, the major importer of surface water to Southern California, has developed plans and programs to address drought conditions and its continuing ability to meet the water demands of its service area. MWD continually re-evaluates these plans and programs for effectiveness in consideration of changing conditions. The plans describe a progressive series of actions, including tapping into stored water reserves and, if necessary, reductions in deliveries. This WSA demonstrates that possible reductions in imported water deliveries due to drought conditions do not prevent the City from satisfying its anticipated demands.

Conclusion

The information included in this WSA identifies a sufficient water supply for the City, now and into the future, including a sufficient water supply for the Edgewater Communities.

1.0 INTRODUCTION

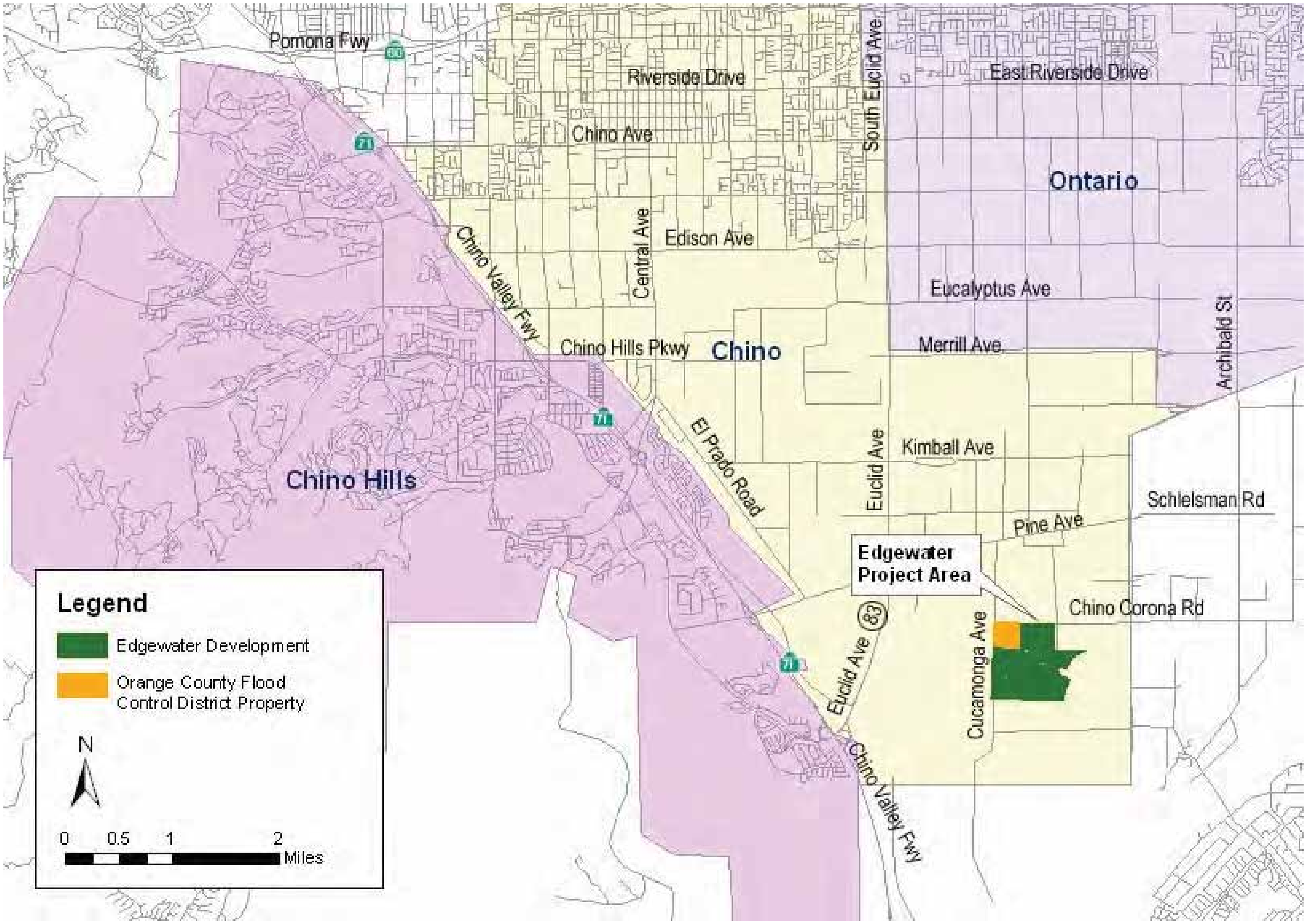
The City of Chino (City) is responsible for the preparation of the Edgewater Communities Environmental Impact Report (EIR). The EIR includes an assessment of utilities, including water supply. Recent legislation, Senate Bill 610, requires that a water supply assessment (WSA), based on specific criteria, be prepared to document the sufficiency of available water supply for the City and the Project. The WSA identifies water supply and reliability to the City, now and into the future, including a sufficient water supply for the Project. **The WSA does not, nor it is intended to, identify infrastructure needs related to the provision of water for the proposed Edgewater Communities.**

The proposed 273-acre Edgewater Communities (Project) is a master-planned, water-oriented, residential community at the southern end of The Preserve. The Project is being proposed by Edgewater Associates I, LLC (Developer) and is located east of State Route 71, north of State Route 91, west of Interstate 15 and south of State Route 60 in the southwestern corner of San Bernardino County (see **Figure 1)**. The City's General plan shows the current land use for this area as open space natural, open space recreational, agricultural and open space natural, and limited estate residential.

The WSA is considered at a point in time when known future projects are considered. It is also understood that new and innovative programs and projects in concept are yet to be designed. Therefore, WSAs are a part of the ongoing planning efforts of the City to optimize its water resource program.

The WSA includes a discussion of the relevant legislation requiring the WSA, an overview of the proposed Project, analysis of water demands for the City's existing service area and the Project over a 20-year or more planning period, analysis of reliability of the City's water supplies, including each agency that impacts water supply and water quality to the region, and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years over a 20-year or more planning period.

Figure 1. Regional Location - Edgewater Communities



2.0 LEGISLATION

Due to the Project's potential impact on current and future water supplies, the State of California, through SB 610, requires that a WSA be completed for the proposed development. The Project proposes 1,074 residential units, exceeding the threshold of 500 units, triggering the requirement for the preparation of a WSA to determine the sufficiency of water supply to the project and the City's water customers now and for a 20-year planning period. The following information outlines the requirements of SB 610.

2.1 SB 610 – Costa – Water Supply Planning

SB 610 was chaptered into law on October 9, 2001. SB 610 requires a city or county that determines a particular project is subject to CEQA to identify any public water system that may supply water for the project and to request those public water systems to prepare a specified WSA. The assessment is to include the following if applicable to the supply conditions:

1. Discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing.
2. Identification of existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project and water received in prior years pursuant to those entitlements, rights, and contracts.
3. Description of the quantities of water received in prior years by the public water system under the existing water supply entitlements, water rights or water service contracts.
4. Water supply entitlements, water rights or water service contracts shall be demonstrated by supporting documentation such as the following:
    a. Written contracts or other proof of entitlement to an identified water supply.
    b. Copies of capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.
    c. Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.
    d. Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.
5. Identification of other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system.
6. If groundwater is included for the supply for a proposed project, the following additional information is required:

a. Review of any information contained in the Urban Water Management Plan (UWMP) relevant to the identified water supply for the proposed project.
b. Description of any groundwater basin(s) from which the proposed project will be supplied. Adjudicated basins must have a copy of the court order or decree adopted and a description of the amount of groundwater the public water system has the legal right to pump. For non-adjudicated basins, information on whether the DWR has identified the basin as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of DWR that characterizes the condition of the basin, and a detailed description of the efforts being undertaken in the basin to eliminate the long-term overdraft condition.
c. Description and analysis of the amount and location of groundwater pumped by the public water system for the past 5 years from any groundwater basin which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
d. Description and analysis of the amount and location of groundwater projected to be pumped by the public water system from any groundwater basin which the proposed project will be supplied. Analysis should be based on information that is reasonably available, including, but not limited to, historic use records.
e. Analysis of sufficiency of the groundwater from the basin(s) from which the proposed project will be supplied.

7. The water supply assessment shall be included in any environmental document prepared for the project.
8. The assessment may include an evaluation of any information included in that environmental document. A determination shall be made whether the projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses.

Additionally, SB 610 requires new information to be included as part of an UWMP if groundwater is identified as a source of water available to the supplier. The City of Chino 2005 UWMP includes a comprehensive discussion of groundwater.

3.0 EDGEWATER COMMUNITIES

3.1 Project Description

The proposed Edgewater Communities (Project) is a master-planned, water-oriented, residential community at the southern end of The Preserve. The Project is being proposed by Edgewater Associates I, LLC (Developer). The Project is located east of State Route 71, north of State Route 91, west of Interstate 15 and south of State Route 60 and is immediately in the extreme southwestern corner of San Bernardino County. The City's General plan shows the current land use for this area as open space natural, open space recreational, agricultural and open space natural, and limited estate residential.

The Project is comprised of six land use categories including 142.09 acres of three residential land use categories containing a total of 1,074 dwelling units at build-out, and 130.84 acres of four open space land use categories: Recreation – Irrigated; Recreation – Unirrigated; Natural; and Water (i.e., Lakes). The total area of the Project consists of 272.93 acres. The Project will include major lakes and water features as well as substantial areas of open space and recreational facilities.

A water demand analysis was prepared by Dudek for the Project, *Edgewater Communities Water Demands Analysis, August 17, 2007,* and is included as a technical memorandum in Appendix A. The technical memorandum provides additional detailed analysis to the summary of information included in Sections 3.1 and 3.2.

The majority of residential land uses projected in the Project area consists of low density residential (537 units). Other residential land uses are medium density residential (287 units) and high density residential (250 units). Open space land use categories consist of 71.39 acres of open space recreation, 39.22 acres of open space water (five planned lakes), and 20.23 acres of open space natural.

The Developer has estimated an absorption rate for residential land uses over a 10-year period, with water services beginning to come online in 2009. **Table 3.1-1** identifies the number of residential units anticipated to begin demanding water within the 5-year increment planning phases.

Table 3.1-1 – Project - Projected Unit Counts by WSA Phase

Land Use	Phase 1 (2007-2011) (units)	Phase 2 (2012-2016) (units)	Phase 3 (2017-2021) (units)	Total Units
Low Density Residential	172	270	95	537
Medium Density Residential	180	107		287
High Density Residential	250			250
Total	**602**	**377**	**95**	**1,074**

All irrigated open space recreational lands are anticipated to be constructed within Phase 1. Lakes 2 and 3 are also anticipated to be constructed and filled within Phase 1, with Lakes 1, 4, and 5 being filled in Phase 2. **Table 3.1-2** summarizes the development of non-residential lands.

Table 3.1-2 – Project - Projected Development of Non-Residential Lands

Land Use	Phase 1 (2007-2011) (acres)	Phase 2 (2012-2016) (acres)
Open Space Recreational – Irrigated	35.70	-
Open Space Recreational – Unirrigated	35.69	
Open Space Natural	20.23	-
Open Space Water	14.56	24.66
Open Space Total	**106.18**	**24.66**

Figure 2 presents a graphical representation of the proposed land use categories broken down by areas and percent acreage.

3.2 Edgewater Communities (Project) Water Demands

The 2005 UWMP does not project future water service for the property. In order to determine water demand requirements for the Project development, a water demand analysis was performed and is presented in a technical memorandum. The Project Technical Memorandum (**Attachment A**) includes important assumptions regarding the water demand the Project will impose on the City's water system. These assumptions provide the rationale for the volume of estimated Project water demand.

The water demand analysis includes all 273 gross acres of the Project by land use designation. For the water demand analysis,[1] the Project is shown complete by 2021, which is within the 20-year planning period. Section 4 of this WSA compares water demand with supply for the City's existing customers and the Project for the entire 20-year planning period.

[1] Technical Memorandum, *Edgewater Communities Water Demands Analysis,* August 17, 2007, Dudek.

EDGEWATER COMMUNITIES

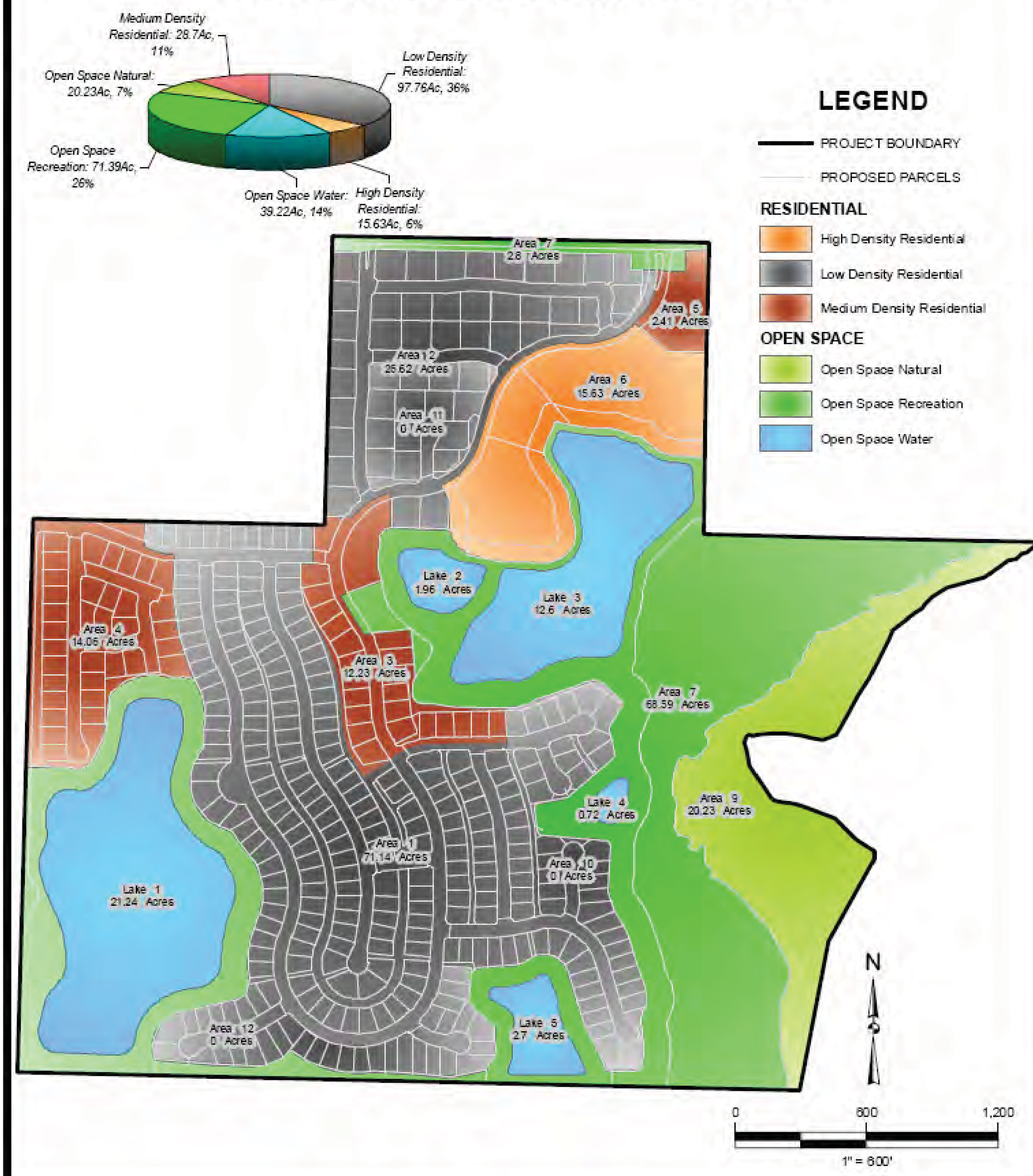


FIGURE 2 - ULTIMATE LAND USE

DUDEK

The Project will generate a build-out need over a 20-year planning horizon of approximately 1,094 AFY of water; of which 484.2 AFY will be potable water demand for residential land use categories and 610.2 AFY will be recycled water demand for irrigation and lake water replenishment. Initial lake filling will occur for the five lakes in Phases 1 and 2 of the Project and will be accomplished with recycled water.

Water demands for the Project are theoretically calculated in 5-year increments; however, build-out of the Project is dependent on market demand, which may fluctuate over the 20-year planning period.

The water demand projections were estimated for both potable water and recycled water. It is assumed that residential demand will be met by potable water, and open space irrigation, residential common area irrigation, and lake demand by recycled water.

The proposed growth phasing was utilized to determine the potable water and recycled water demands for the Project in 5-year increments through build-out. **Tables 3.2-1 and 3.2-2** summarize the projected water demand for potable water and recycled water respectively to build-out of the development. No additional water demands are projected within Phase 4, the final 5-year increment to 20 years, of the WSA.

Table 3.2-1 – Project Potable Water Demand Projections

Land Use	Phase 1 (2007-2011) (AFY)	Phase 2 (2012-2016) (AFY)	Phase 3 (2017-2021) (AFY)	Total Potable Water Demand (AFY)
Low Density Residential	88.43	138.75	48.82	276.0
Medium Density Residential	64.90	38.60	-	103.5
High Density Residential	93.10	-	-	93.1
Open Space Recreational - Irrigated	11.60	-	-	11.6
Open Space Recreational - Unirrigated	-	-	-	0.0
Open Space Natural	-	-	-	0.0
Open Space Water	-	-	-	0.0
Total	**258.03**	**177.35**	**48.82**	**484.2**

Note: Phased projections are anticipated water demands within each 5-year phase and are not cumulative.

Table 3.2-2 – Project Recycled Water Demand Projections

Land Use	Phase 1 (2007-2011) (AFY)	Phase 2 (2012-2016) (AFY)	Phase 3 (2017-2021) (AFY)	Total Recycled Water Demand (AFY)
Low Density Residential	37.91	59.46	20.92	118.3
Medium Density Residential	27.81	16.54	-	44.3
High Density Residential	39.90	-	-	39.9
Open Space Recreational – Irrigated	104.40	-	-	104.4
Open Space Recreational - Unirrigated	-	-	-	0.0
Open Space Natural	-	-	-	0;0
Open Space Water	116.50	186.80	-	303.3
Total AFY by Phase	**326.52**	**262.80**	**20.92**	**610.2**
Open Space Water - Lake Filling (one-time only for each lake)	**181.0**	**289.0**	**-**	**-**

Notes:

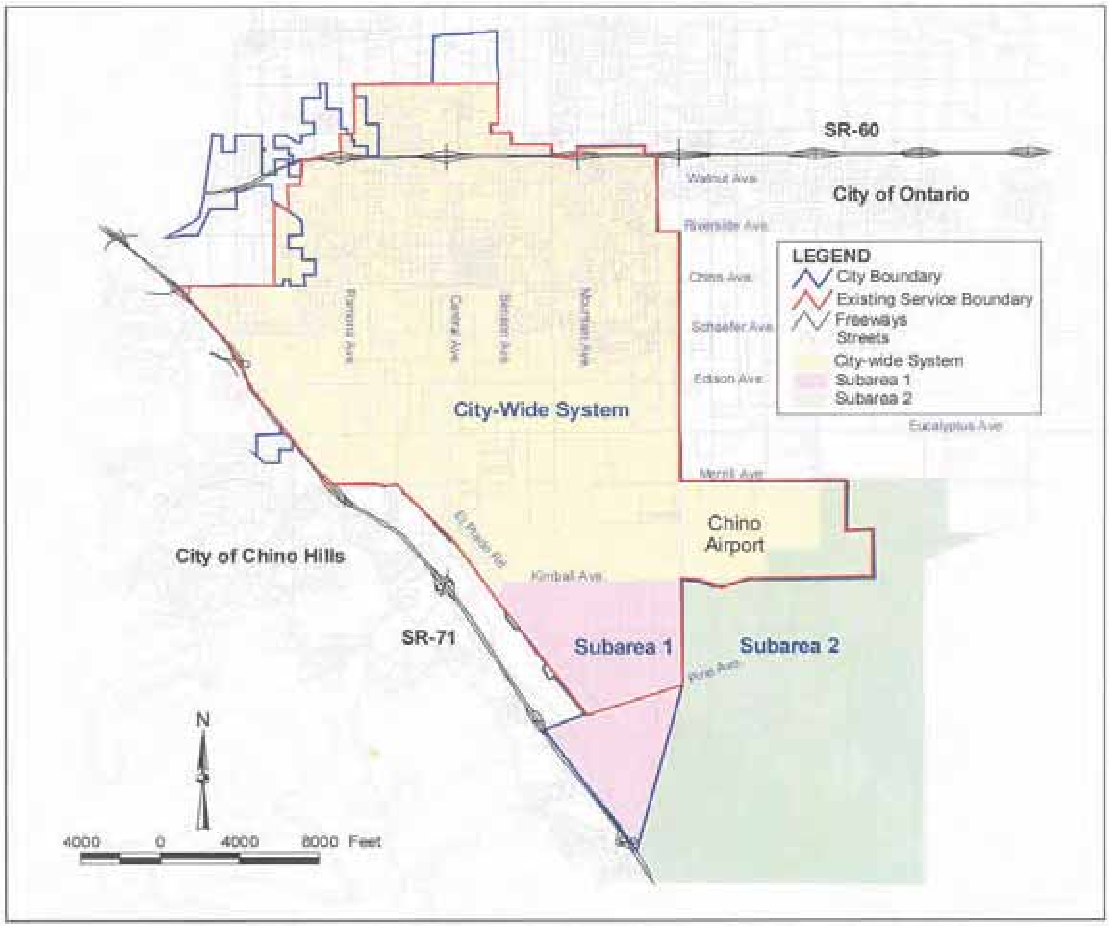
- *Phased projections are anticipated water demands within each 5-year phase and are not cumulative.*
- *Fifty percent of Open Space areas will be irrigated.*

The estimated ultimate water demand for the study area will be approximately 1,094 AFY, which consists of both potable water (484.2 AFY) and recycled water (610.2 AFY). Approximately 62% (675.1 AFY) of ultimate water demand within the study area will come from the residential land use categories, whereas 38% (418.9 AFY) of the ultimate water demand will come from open space land use categories. In addition, 470 AF of recycled water will be used to initially fill the lakes.

4.0 CITY OF CHINO WATER DEMAND AND SUPPLIES

The City of Chino Water Utility currently serves water to an area of approximately 27 square miles. There are small portions of the City that extend beyond the westerly and northwesterly boundary of the City's water service area that are served by other water purveyors, including the Monte Vista Water District. The City's water service area, including the new development areas (i.e., Subareas 1 and 2) is shown in **Figure 3**.

Figure 3. City of Chino Water Service Area, Including Development Areas



Source: City of Chino, 2005 Urban Water Management Plan, December 2005

Note: The City-wide system in Figure 3 above refers to that portion of the City's service area that existed prior to the annexations of Subareas 1 and 2 to the City.

4.1 Overview of Supply and Demand

The City currently receives approximately 42 percent of its water supply from groundwater, 20 percent from imported water, 22 percent from desalted water, and 16 percent from recycled water. Current and planned improvements will increase the efficient and reliable use of each water source. Each of the sources of water for the City is more fully discussed beginning in Section 4.2.

The City currently obtains water from the following primary water sources: 1) groundwater from the Chino Groundwater Basin managed by the Chino Basin Watermaster; 2) imported State Water Project (SWP) water from the MWD through the Inland Empire Utilities Agency (IEUA); 3) desalted water from the Chino Basin Desalter Authority (CDA); and 4) recycled water supplied by IEUA. The City owns five reservoirs with a combined storage capacity of 18.5 million gallons, 11 groundwater wells, one imported water connection to the Water Facilities Authority (WFA) Agua de Lejos Water Treatment Plant, two booster pump stations, two CDA water connections, potable water pipelines, and recycled water pipelines.

Growth Rate

The City's adopted 2005 UWMP included an analysis of the City's anticipated growth rate. The current population is approximately 78,000 and that is expected to increase to over 129,000 by 2030. **Table 4.1-1** shows the projected population for the City. As shown in **Table 4.1-1**, The Preserve area of the City is anticipated to be fully built-out by 2020 and the College Park area is anticipated to be fully developed by 2015. Population projections for the Project are also shown in the table; built-out by 2019.

Table 4.1-1 - City of Chino Population – Current and Projected

Area	2007	2010	2015	2020	2025	2030
City[1]		74,632	77,466	79,903	82,073	84,746
The Preserve[1]		12,102	28,437	35,498	35,498	35,498
College Park[1]		4,356	9,075	9,075	9,075	9,075
Edgewater Communities[2]		895	2,101	2,474	2,474	2,474
Total	**78,000**	**91,985**	**117,079**	**126,950**	**129,120**	**131,793**

[1] Source: City of Chino 2005 Urban Water Management Plan (City of Chino Planning Department)

[2] Source: Edgewater Associates I, LLC, August 13, 2007

Water Demand

Currently, the City's total water demand is approximately 21,000 acre-feet. The Edgewater Communities will increase this demand, generating an additional build-out need of approximately 1,094 AFY or 977,021 gallons per day (gpd) of water. This demand is comprised of both potable and recycled sources based on use; 484.2 AFY (432,272 gpd) of potable water and 610.2 AFY (544,749 gpd) of recycled water. An additional 470 AF of recycled water will be used for the initial filling of the Project lakes.

Demand and Supply Comparison

Table 4.1-2 shows the current and projected water demand and supply for the City of Chino, including additional demand the Project will require through 2030. While SB 610 requires a 20-year planning period, 2030 represents a 25-year planning period from 2005, which is consistent with the City's 2005 UWMP, and satisfies the 20-year planning period for the WSA.

Demand and supply projections consider land use, in addition to water development programs and projects. A supply surplus is indicated demonstrating a sufficient water supply for the City and the Project through the 20-year planning period and beyond.

Table 4.1-2 - Current and Projected Water Demand and Supply[2]
City of Chino and Edgewater Communities

Water Sources		Actual (AF)	Projected (AF)				
		2006	2011	2016	2021	2026	2030
DEMAND							
Potable	City	16,306	17,822	20,144	21,041	21,236	21,422
	Edgewater Communities	0	258	435	484	484	484
	Total Potable Demand	16,306	**18,080**	**20,579**	**21,525**	**21,720**	**21,906**
Recycled	City	2,271	3,599	5,482	7,572	7,572	7,572
	El Prado Golf Course	312	312	312	312	312	312
	Prado Park	1,029	1,029	1,029	1,029	1,029	1,029
	Edgewater Communities	0	327	589	610	610	610
	Edgewater Communities Lake Filling	0	181	289	0	0	0
	Total Recycled Demand	**3,612**	**5,448**	**7,701**	**9,523**	**9,523**	**9,523**
	Total Water Demand	**19,918**	**23,528**	**28,280**	**31,048**	**31,243**	**31,429**
SUPPLY							
	Groundwater – City	7,159	9,578	12,340	13,189	13,189	13,189
	Groundwater/Ag Conversion - Edgewater Communities	0	291	410	445	445	445
	Desalted	5,000	5,000	5,000	5,000	5,000	5,000
	Imported	5,353	5,353	5,353	5,353	5,353	5,353
	Total Potable Supply	**17,512**	**20,222**	**23,103**	**23,987**	**23,987**	**23,987**
	Total Recycled Supply	**3,612**	**5,448**	**7,701**	**9,523**	**9,523**	**9,523**
POTABLE SUPPLY SURPLUS		**1,206**	**2,142**	**2,524**	**2,462**	**2,267**	**2.081**

[2] Demand and Supply projections for the City, El Prado Golf Course and Prado Park are extrapolated from the City of Chino 2005 UWMP, December 2005, Table 4.2-3, pg. 4-22; Edgewater demand projections are from the Technical Memorandum, Edgewater Communities Water Demands Analysis, August 17, 2007, Dudek.

Demand Assumptions:

1. **City Potable Demand:** Year 2006 is actual demand; projections in five-year increments to 2026 and 2030 are extrapolated from the City of Chino 2005 UWMP, **Table 4.2-2**, pg. 4-22.
2. **Edgewater Communities Potable Demand:** Demand projections for the Project are determined in the Edgewater Communities Water Demand Analysis Technical Memorandum, August 17, 2007, included in Appendix A and summarized in Section 3.2 of this WSA. Build-out annual potable water demand of 484.2 AFY is from residential land use and is based on three development phases beginning demand in 2009 and completing in 2020.
3. **City Recycled Demand:** Years 2006 is actual demand; projections in five-year increments to 2026 and 2030 are extrapolated from the City of Chino 2005 Urban Water Management Plan**, Table 4.2-2**, pg. 4-22. These projections are based on completion of the Regional Recycled Water System by 2010 and additional efforts to connect customers.
4. **Edgewater Communities Recycled Demand:** Demand projections for the Project are determined in the Edgewater Communities Water Demand Analysis Technical Memorandum, August 17, 2007, included in Appendix A and summarized in Section 3.2 of this WSA. Build-out annual recycled water demand of 610.2 AFY is from irrigation, lake water replenishment and open space land use and is based on three development phases beginning demand in 2009 and completing in 2020. A one-time initial lake filling is shown on a separate line for Phases 1 and 2 when all five lakes are proposed to be completed and filled.

Supply Assumptions:

1. **Groundwater – City:** Year 2006 is actual groundwater production; projections in five-year increments to 2026 and 2030 are based on projected City entitlement extrapolated from the City of Chino 2005 UWMP, December 2005, **Table 4.2-3,** pg. 4-22. The total City entitlement of 13,189 AFY assumes assigned City rights (4,034 AFY) + early transfer rights (2,413 AFY) + Preserve conversion rights at build-out in 2020 (5,304 AFY) + College Park build-out in 2015 (1,438 AFY); no additional leased rights are included. Additional groundwater can be produced for an additional assessment on each acre-foot overproduced, limited to the safe yield of the basin; groundwater replenishment expands the opportunity to overproduce.
2. **Groundwater – Edgewater Communities:** Groundwater supply available from the Project is based on the Chino Basin Adjudication, which is calculated consistent with projected development phasing over 20 years. Conversion rights for the Project at build-out, anticipated by 2020, totals 444.70 AFY. Total available groundwater rights from the Project area are based on the Land Use Conversion of Water Rights defined in the Adjudication. This allows the amount of water rights converted from agricultural land to urban use up to 2.0 AF per acre as allocated between initial shares of safe yield and the service provider, all of which is allocated upon conversion of the land to the Appropriative Pool member, City of Chino, and based on determination of available water supplies by the Watermaster.

   The total conversion amount of 444.70 is calculated as follows:

   Total Project acreage (272.93 acres) less area outside allowable conversion area (50.58 acres) (272.93 – 50.58 = 222.35 acres x 2.0 AF/acre = 444.70)

   Phase 1 (2007-2011) = 145.25 acres x 2 = 290.50 AF

   Phase 2 (2012-2016) = 59.50 acres x 2 = 119.00 AF

   Phase 3 (2017-2021) = 17.6 acres x 2 = 35.20 AF

   All acreage excluded (50.58 acres) from conversion is within the proposed Project Open Space.
3. **Desalted:** Chino I Desalter existing contract: 3,000 AFY and Chino I Expansion (2004): 2,000 AFY equals 5,000 AFY; more can be purchased if unused capacity is available.
4. **Imported:** Entitlement to WFA production water: 5.9% of plant 81 mgd capacity = 4.78 mgd (5,353 AFY); more can be purchased if unused capacity is available.
5. **Recycled:** Year 2006 is actual use; projections in five-year increments to 2026 and 2030 are extrapolated from the City of Chino Urban Water Management Plan, December 2005, Table 4.2-2, pg. 4-22. These projections are based on completion of the Regional Recycled Water System by 2010, which merges all the recycled water plants together, creating no maximum entitlement to recycled water. Therefore, supply will meet demand.

The analysis shows that as groundwater water and recycled water supplies increase, desalted and imported water supplies will remain stable. Recycled water will be used to supply new development and certain existing uses, such as landscape irrigation and industrial uses, currently supplied with potable water.

The City of Chino has the opportunity to increase supply as needed to meet demand through the following additional measures: 1) production of groundwater based on safe yield limitations; and 2) purchasing additional recycled water when available with completion of the Regional Recycled Water System, which merges all the recycled plants together. Also, the City may purchase additional desalted water if more is produced than needed to satisfy requirements of other purchasers. Collectively, these additional options will further enable water supply to exceed water demand for the City of Chino now and into the future.

Reliability of future water supplies to the region will be ensured through continued implementation of the Optimum Basin Management Program (discussed in Section 4.2 below), implementation of local agency programs, and combined efforts and programs among member and cooperative agencies, including all water retailers, and the Chino Basin Watermaster, IEUA, MWD, Santa Ana Regional Water Quality Control Board, Santa Ana Watershed Project Authority, and the Chino Basin Water Conservation District. The Water Utility manages agreements and contracts with these agencies and continually monitors activities, projects and programs to optimize the City's water supply.

The following sections discuss each of the water sources for the City of Chino. Reliability of each of these sources is discussed in Section 5.

4.2 Groundwater

Chino Groundwater Basin

The City receives groundwater from the Chino Groundwater Basin, one of the largest basins in southern California, which is managed by Chino Basin Watermaster. The Chino Watermaster is guided by the provisions of the Chino Basin adjudication and subsequent agreements between the parties to the Judgment. These agreements provide for groundwater production rights that are not fully utilized by the Basin's agricultural interests to be transferred to municipal water purveyors via two methods; agricultural land use conversion and early transfer.

The Chino Basin Watermaster prepares an Assessment Package each year to determine the assessments for each groundwater producer based on production from the prior fiscal year.

As shown in **Table 4.2-1**, during fiscal year 2005/06, the City received their assigned Early Transfer[3] share of 2,413 AF and a Land Use Conversion[4] amount of 5,883 AF; however, these amounts are subject to reconciliation between the amount required and amount available. The reconciliation assigned a debit of 314 AF resulting in a Net Ag Pool Reallocation of 7,982 AF.[5] Further, the City received 4,034 AF in Carry-Over from fiscal year 2004/05, a debit of 81 AF for Carryover Storage Loss, a net Water Transaction activity of <5,228> AF, and 883 AF in New Yield. Together with assigned water rights (4,034 AF), the City had a Total Annual Production Right of 11,624 AF for 2005/06.

Table 4.2-1 - City of Chino
2005/06 Total Annual Groundwater Production Right (AF)

	2005/06
Early Transfer	2,413
Land Use Conversion	5,883
Difference of Potential for Reallocation vs. Net	<314>
Agricultural Pool Safe Yield Reallocation	**7,982**
Assigned Water Rights	4,034
Carry Over from 2004-05 Production	4,034
2% Carryover Storage Loss	<81>
Net Ag Pool Reallocation	7,982
Water Transaction Activity[6]	<5,228>
New Yield	883
Total 2005/06 Production Right	**11,624**

Source: Chino Basin Watermaster, Assessment Package, Fiscal Year 2006-2007

Note: All amounts are subject to change annually.

[3] Early Transfer is the reallocation of safe yield not produced by the Agricultural Pool to the Appropriative Pool on an annual basis rather than according to the five-year increment described in the Judgment (refer to page 2-16).
[4] Land Use Conversion is the amount of water rights converted from agricultural land to urban use (refer to Judgment, page 2-17).
[5] Chino Basin Watermaster, Fiscal Year 2006-2007, Assessment Package, February 22, 2007
[6] Water Transaction Activity consists of the sale of water (that the City had available in 2006-07) to another water agency. The amount of water available for water transactions is reviewed annually. The review considers total water demand, available supplies from all sources, and Ag reallocation. Water transaction activities may or may not occur depending on analysis results of the review.

Groundwater Management

The Chino Basin Watermaster was established in 1978 by a judgment entered by the Superior Court of California. The Judgment required that the Watermaster develop a management plan for the Chino Groundwater Basin that meets water quality and water quantity objectives for the region.

As mentioned earlier, the Watermaster is guided by the provisions of the Chino Basin adjudication and subsequent agreements between the parties to the Judgment. These agreements provide for groundwater production rights that are not fully utilized by the Basin's agricultural interests to be transferred to municipal water purveyors via two methods; agricultural land use conversion and early transfer. Three primary documents govern the adjudication and management of the Chino Basin: 1) the 1978 Chino Basin Judgment, 2) the Peace Agreement, and 3) the OBMP. The following discusses each of these documents as they pertain to basin management and the City of Chino water supply from groundwater.

The City's current assigned water production right, based on a share of safe yield, is 4,034 AFY from the Chino Groundwater Basin. Additional production allocations are received from annual entitlements of Early Transfers and Land Use Conversions, although they are subject to availability. Additional groundwater may also be available via a conjunctive use program for the Chino Basin in partnership with the Chino Basin Watermaster, IEUA, and MWD. The program is anticipated to reduce summertime peaking, deliver SWP supplies, control MWD surface water deliveries during future droughts/emergencies, and allow MWD to export stored water for other member agencies.

Adjudication – 1978 Judgment

In 1978, the Superior Court of the State of California entered a judgment that adjudicated the water rights of the Chino Basin, and imposed a physical solution, which is the heart of the Judgment.

According to the Judgment, there are significant imported water supplies available to supplement the native safe yield of the Basin. Therefore, the purpose of the physical solution was to establish a legal and practical means for making the maximum reasonable beneficial use of the waters of the Chino Basin by providing the optimum economic, long-term, conjunctive utilization of surface waters, ground waters and supplemental water, to meet the requirements of water users having rights in or dependence on the Chino Basin. A fundamental premise of the physical solution was that all water users dependent on the Chino Basin would be allowed to pump sufficient waters to meet their needs. To the extent that a water producer's pumping exceeds its share of the Safe Yield, the water producer has the obligation to provide for replenishment of the Basin for the amount of production exceeding its rights.

The Watermaster, as an extension of the court, manages the Basin in accordance with the provisions of the Judgment. An Assessment Package is produced by the Watermaster on an annual basis, which describes the rights and abilities to which appropriators are entitled according to the provisions of the Judgment.

Water Rights – 1978 Judgment

Three operating pools were established by the 1978 Judgment for Watermaster administration: the Overlying Agricultural Pool, the Overlying Non-Agricultural Pool, and the Appropriative Pool. Rights to the safe yield of the Chino Basin were allocated to each operating pool. According to the Judgment, the safe yield of the Chino Basin is 140,000 AFY. Safe Yield is defined as the long-term average annual quantity of groundwater (excluding replenishment water or stored water but including return flow to the Basin from the use of replenishment or storage water), which can be produced from the Basin under cultural conditions of a particular year without causing an undesirable result.

Overlying right is defined as the appurtenant right of an owner of lands overlying the Chino Basin to produce water from the Basin for overlying beneficial use on such lands. Appropriative right is defined as the annual production right of a producer from the Chino Basin other than pursuant to an overlying right.

Aggregate preserved overlying rights in the safe yield for agricultural pool use, including the rights of the State of California, total 82,800 AFY, or 414,000 AF in any five consecutive years. Overlying rights for non-agricultural pool use total 7,366 AFY. In accordance with the provisions of the Chino Basin Watermaster process, when land converts from agricultural use to non-agricultural use, the purveyor that will supply water to the converted land may apply for additional groundwater production credit; i.e., Agricultural Land Use Conversion.

Appropriative rights allocated by the Judgment include rights by prescription and are entitled under the physical solution to share in the remaining safe yield, after satisfaction of overlying rights. Operating Safe Yield is defined as the amount of groundwater that the Watermaster shall determine can be produced from the Chino Basin by the Appropriative Pool parties free of replenishment obligation under the physical solution. Any subsequent change in the safe yield would debit or credit the Appropriative Pool. The City's current share of the Operating Safe Yield is 7.357 percent or 4,034 AFY.

Reallocation of Water Rights

According to the Judgment, in any five years that any portion of the share of safe yield allocated to the Overlying Agricultural Pool is not produced, that water is available for reallocation to the Appropriative Pool. Priority of that water is first to supplement water available from Operating Safe Yield to compensate for any reduction in the safe yield after the tenth year of operation (1988), conversion claims, and then for supplement to the Operating Safe Yield without regard to reductions in safe yield.

Appropriative rights and corresponding shares of Operating Safe Yield may be assigned or may be leased or licensed to another appropriator, as approved by the Watermaster.

Overdraft - 1978 Judgment

In adopting the Operating Safe Yield for any year, the Watermaster is limited to 200,000 acre-feet of accumulated overdraft, and in no event shall the Operating Safe Yield for all pools in any year be less than the Appropriative Pool's share of Safe Yield or exceed the Appropriative Pool's share of Safe Yield by more than 10,000 AF.[7]

Groundwater Replenishment – 1978 Judgment

Overdraft is defined as a condition wherein the total annual production from the Basin exceeds the safe yield. The 1978 Judgment stated that the Chino Basin, since at least 1953, was in a condition of overdraft. The Watermaster reports in its State of the Basin Report, July 2005 that the safe yield of the Basin could be reduced unless certain actions are taken. These actions are to occur through the implementation of the Optimum Basin Management Program (OBMP). The State of the Basin Report also states that the Judgment allows a 5,000 AFY overdraft of Chino Basin through 2017.[8]

The Watermaster levies an annual Replenishment Assessment in an amount sufficient to purchase replenishment water to replace production during the preceding year, which exceeds the safe yield.

Supplemental water may be used to recharge the Basin either directly by spreading and percolating or injecting the water into the Basin, or indirectly by delivering the water for use in lieu of production and use of safe yield or operating safe yield. Supplemental water may be obtained from any available source including recycled water, State water, local import, and Colorado River supplies.

Much of the available natural surface water runoff in the Santa Ana River Watershed is captured and recharged to the groundwater aquifers. A system of flood control channels and percolation basins have been developed to increase the recharge capacity of the Basin. The groundwater recharge program is planned to be expanded in the future.

Groundwater Replenishment – Recycled Water

IEUA has primary responsibility for production and delivery of recycled water to Chino Basin facilities for recharge. Direct use of recycled water has priority over recharge deliveries.

The Chino Basin Recycled Water Groundwater Project, developed by the Chino Basin Water Conservation District (CBWCD), IEUA, San Bernardino County Flood Control District (SBCFCD), and the Chino Basin Watermaster, includes redevelopment and modification of the existing Chino Basin groundwater recharge facilities. Historically, these basins have been used primarily for flood control. However, as part of the OBMP,

[7] 1978 Judgment (Chino Basin), Engineering Appendix, Exhibit I, 2B. Operating Safe Yield, Quantitative Limits, page 80.
[8] State of the Basin Report, July 2005 update, 8.3.1.2.1 Baseline OBMP Scenario, page 8-11.

the recharge basins will help "drought-proof" the Chino Basin as they will be enhanced to capture storm water and provide for the greater ability to store imported water in the Chino Basin.

Recycled recharge water is credited to parties to the Regional Sewer Service Contract, based on relative contributions of wastewater flow delivered to the Regional Reclamation Plants by the respective agencies. This translates into additional groundwater pumping rights calculated annually as stored water credits. In fiscal year 2005-06, the City of Chino received 122.4 AF of additional production capability (included in the <5,228> AF Water Transaction Activity shown in **Table 4.2-1**) as a result of recycled water recharge activity.[9]

Carryover – 1978 Judgment

Any Appropriator who produces less than its assigned share of Operating Safe Yield may carry such unexercised right forward for use in subsequent years. The first water used in any such subsequent year is to be an exercise of that carryover right. If the aggregate carryover of any appropriator exceeds its share of Operating Safe Yield, a storage agreement is executed with the Watermaster as a condition of preserving the surplus carryover. For example, the City of Chino's carryover to 2005-06 was 4,034 AF.[10] This amount was determined based on the amount of carryover from 2004-05, plus the assigned share of safe yield, plus a one-time prior year adjustment, plus water transaction activity, plus Ag Pool safe yield reallocation for a total 2005-06 production right, less 2004-05 actual production and exchanges. This amount equaled 6,862.4 AF, of which 4,034 AF is carried over to 2006-07 production and the excess carryover of 2,828.6 AF is eligible for storage.

Groundwater Storage Capacity – 1978 Judgment

The Judgment states that a substantial amount of available groundwater storage capacity exists in Chino Basin, which is not utilized for storage or regulation of Basin waters. The Basin stores approximately 5 MAF of groundwater and has the capability of storing an additional 1 MAF. Chino Basin reservoir capacity can appropriately be utilized for storage and conjunctive use of supplemental water with Basin waters. Any person or public entity may make reasonable beneficial use of the available groundwater storage capacity for storage of supplemental water, with allocation preference of storage capacity to the needs and requirements of the lands overlying the Basin and the owners of rights in the Basin.

Peace Agreement

Adopted in July 2000 and amended in 2004, the "Peace Agreement" amended the 1978 Chino Basin Judgment for a term of 30 years. The Peace Agreement facilitates the implementation of the OBMP.

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[9] Chino Basin Watermaster, Fiscal Year 2006-2007, Assessment Package, February 22, 2007
[10] Chino Basin Watermaster, Fiscal Year 2006-2007, Assessment Package, February 22, 2007

The Peace Agreement amended the judgment in three areas:

1) Members of the Overlying Non-Agricultural Pool have the right to transfer or lease their quantified production rights within the same pool or to the Watermaster in conformance with specified procedures.
2) Any appropriator who provides water service to overlying agricultural lands may exercise overlying rights to the extent necessary to provide water service to overlying lands.
3) For the term of the Peace Agreement, in any year in which sufficient unallocated safe yield from Overlying Agricultural Pool is available for conversion claims, the Watermaster can allocate each appropriator with a conversion claim, 2.0 AF of unallocated safe yield water for each converted acre approved.

Overdraft – Peace Agreement

Individual producers do not currently have a limit on how much they can over-produce; however, they are assessed an amount to replenish the Basin for all overproduction. Producers generally develop annual demand projections that assist in making arrangements with other appropriators for pre-purchase of replenishment water through transfers and other agreements. This allows the Watermaster to optimize planning within the OBMP.

The Watermaster is responsible to conduct recharge and replenishment of the Basin. As party of its ongoing efforts to manage the basin so that ground water producers may pump groundwater in sufficient quantities to meet their needs, the Watermaster committed per the Peace Agreement to conduct physical recharge of supplemental water of 6,500 AFY in one or more of the areas known as Montclair, Brooks, and Upland spreading facilities (Management Zone 1 – MZ1). If the cumulative total of 32,500 AF of recharge has not been accomplished at the end of the five years, then recharge will continue at the same annual rate until 32,500 AF has been reached. The prescribed recharge of 32,500 AF was accomplished.

Cost and allocation of supplemental water is apportioned pro-rata among members of the Appropriative Pool according to the producer’s share of the Initial Safe Yield.

In-Lieu of Groundwater Production

Recharging the Basin may be accomplished either directly by spreading and percolating or injecting the water into the Basin, or indirectly by delivering the water for use in lieu of groundwater production and use of safe yield or operating safe yield.

In lieu areas are designated by the Watermaster. The Watermaster has designated the entire Chino Basin as an in-lieu area. Any member of the Appropriative Pool, who is willing to abstain for any reason from producing any portion of its share of operating safe yield in any year, may offer the unproduced water to the Watermaster. The Watermaster then may purchase the unproduced groundwater, in place of spreading replenishment water. The price is the lesser of the cost of replenishment water plus the cost of spreading, or the cost of supplemental surface supplies less the appropriator's average cost of groundwater production and the applicable production assessment.

Storage and Recovery – Peace Agreement
Local Storage

Local storage is protected and each party has the right to store its un-produced carry-over water in the Basin. Local storage agreements are approved so long as the total quantity of supplemental water under local storage agreements does not exceed the cumulative total of 50,000 AF. Water held in storage is transferable, but storage capacity is not. In 2005-06, the City of Chino had approximately 3,625.8 AF in local storage.[11]

Parties may continue to produce the actual quantity of carry-over water and supplemental water held in its storage account, subject only to the loss provisions. Rate of loss from local storage was zero percent until 2005, at which time it was recalculated based on the best available scientific information. The current 2% Carryover Storage Loss is deducted annually from each storage account. For fiscal year 2005-06, The City's Carryover Storage Loss was 71.66 AF.

The Watermaster has the general discretion to place reasonable limits on the further accrual of carry-over and supplemental water in local storage. This is necessary to provide priority for the use of storage capacity for Storage and Recovery Programs that provide broad mutual benefits to all parties.

Storage and Recovery Program

The initial target for the cumulative quantity of water held in storage in the Basin is 500,000 AF. This program was recently developed and as of June 2007 there was nearly 88,400 AF of storage based on agreements with MWD.[12]

Appropriative and Non-Agricultural Pool members are entitled to the compensation paid for a Storage and Recovery Program paid in any form, including money, revenues, credits, proceeds, programs, facilities, or other contributions. Compensation may also be used to offset the cost of operations, to reduce assessments on the members, and to defray the costs of capital projects at the request of the members.

The Watermaster is responsible to conduct best efforts to do the following: 1) complete the short-term conjunctive use project conducted by IEUA, Three Valleys Municipal Water District (TVMWD) and MWD; 2) develop a seasonal peaking program for in-Basin use and dry year yield to reduce the Basin's demand on MWD water; 3) develop a dry year export program; and 4) develop a seasonal peaking export program.

[11] Chino Basin Watermaster, Fiscal Year 2006-2007, Assessment Package, February 22. 2007
[12] Chino Basin Watermaster, Optimum Basin Management Program, Status Report 2007-1: January to June 2007, July 2007

The short-term conjunctive use project includes construction of facilities to store water and later withdraw it for conjunctive use. The program goals are to reduce summertime peaking on MWD, deliver SWP supplies to Chino Basin, minimize MWD surface water deliveries during future droughts/emergencies, and to allow MWD to export storage water for other member agencies. The program will create improved reliability by establishing an initial 100,000 AF storage account for MWD and providing a financial incentive for shifting demand on MWD surface deliveries to the winter months. This program is just one example of storage programs that are necessary to optimize Basin storage and supplies, reduce demand on imported water supplies, and make water available that may not have been otherwise.

Transfers – Peace Agreement

Transfers must have the approval of the Watermaster. Transfers include the assignment, lease, or sale of a right to produce water to another producer within the Chino Basin or to another person or entity for use outside the Basin whether the transfer is temporary or permanent. Lease of water rights are also permissible to allow producers to make up for the lessee's over-production.

According to the Watermaster Fiscal Year 2006-07 Assessment Package, the City of Chino had one transfer. Transfers are recorded annually as arrangements are made. For 2005-06, the City transferred 5,350 AF of water rights to the Cucamonga Valley Water District.

Overlying Non-Agricultural Pool members have the right to transfer or lease within the pool, and the right to transfer to the Watermaster for the purpose of replenishment for a desalter or for a storage and recovery program.

Early Transfer

An "early transfer" means the reallocation of safe yield not produced by the Overlying Agricultural Pool to the Appropriative Pool on an annual basis rather than according to the five-year increment described in the Judgment. The Early Transfer of not less than 32,800 AFY was the expected approximate amount of water not produced by the Agricultural Pool. Early transfer is to be the greater of 32,800 AF or 32,800 AF plus the actual quantity of water not produced in a given year after all the land use conversions are satisfied. Early transfer water is allocated among members of the Appropriative Pool in accordance with their pro-rata share of the initial safe yield. The City of Chino's share of the initial safe yield is 7.357 percent, yielding an Early Transfer of 2,413 AFY.

Land Use Conversion of Water Rights

With the effective date of the Peace Agreement (June 2000), the amount of water rights converted from agricultural land to urban use was changed from 2.6 AF per acre with allocation between initial shares of safe yield and service provider to 2.0 AF per acre, all of which is allocated upon conversion of the land to the Appropriative Pool member service provider. Upon conversion of water rights, the purveyor pledges the amount of water needed for the urban land use, and up to 2.0 AFY per acre of land will be made available.

Recently, two major developments in the City that have land use conversions include The Preserve and College Park. The Preserve Specific Plan, which has 2,652 acres of development, represents 5,304 acre-feet of water rights at build-out. College Park, which has 719 acres of development, represents 1,438 AF of water rights at build-out. The water rights that the City will receive through the land use conversion process applied to the two developments, when combined with the City's current share of water rights at 4,034 AFY under the Chino Basin operating safe yield and an Early Transfer share of 2,413 AFY equals a total of 13,189 AF of water rights per year. Additionally, the proposed Edgewater Communities Project has 222.35 acres of development eligible for conversion to urban use, representing an additional 444.7 AF of water rights at build-out, for a total City of Chino water rights per year of 13,634 AF.

An Agricultural Pool member has the right to a voluntary agreement with an appropriator, which has a service area contiguous to or inclusive of the agricultural land, to provide the required water to the overlying land on behalf of the Ag Pool member. The appropriator is then entitled to a credit to off-set production to the extent it is serving the overlying land up to the amount of the historical maximum annual quantity previously used on that property. The credit is debited to the Ag Pool's collective production right.

Total required reallocations from Early Transfers and Land Use Conversions are subject to availability. For example, in FY 2005-06, the City received an Early Transfer share of 2,413 AF and a Land Use Conversion amount of 5,883 AF; however, these amounts are subject to a reconciliation between the amount of acre feet required and the amount of acre feet available based on Agricultural Pool under (over) production. The City was assigned a debit for 2005-06 of 314 AF based on its share of operating safe yield and the amount of under production. Therefore, the total available to the City for Ag Pool Reallocation in 2005-06 was 7,982 AF.[13]

Optimum Basin Management Program for the Chino Basin

In 1998, the Chino Basin Watermaster developed an integrated set of water management goals and actions for the Basin. Known as the Optimum Basin Management Program (OBMP), this document describes nine program elements to meet the water quality and local production objectives in the Basin. The OBMP encourages the increased use of local supplies to help "drought proof" the Basin.

[13] Chino Basin Watermaster, Fiscal Year 2004-2005, Assessment Package, November 2004

The OBMP is intended to formulate and implement a groundwater management program that will preserve and enhance the safe yield and the water quality of the Chino Basin. The Watermaster's goal is to make it possible for all groundwater users to produce water from the basin for beneficial uses at an affordable cost. The OBMP is intended to allow continued reliance on groundwater for beneficial use within the basin while minimizing demand for imported water, and to encourage beneficial use of the large available storage space in the aquifer system. OBMP actions are intended to benefit both local and regional water supply programs.

The effort to complete the OBMP for the Chino Basin was divided into two phases. The first phase culminated in the September 1999 submittal of the draft Phase 1 Report to the Court with continuing jurisdiction over the Basin groundwater resources. The second phase, including a programmatic EIR, was completed and adopted in July 2000, as the Implementation Plan.

Phase 1 of the OBMP defined the state of the Chino Groundwater Basin, established the goals and objectives concerning major issues identified by stakeholders, and affirmed a management plan for the achievement of the stated goals and objectives. Phase 2 of the OBMP is the Implementation Plan for the installation and operation of OBMP facilities. The major OBMP facilities include pipelines, groundwater treatment plants, recharge basins, pump stations, production wells, and monitoring devices.

The four primary OBMP management goals are to enhance basin water supplies, to protect and enhance water quality, to enhance management of the basin, and to equitably finance the OBMP.

The OBMP includes nine program elements that were developed during the Phase 1 OBMP Report that collectively will meet the goals of the OBMP. The scope of implementation of some of the programs have been combined since they overlap and have synergies between them. The program elements include developing and implementing each of the following:

Element 1 – Comprehensive Monitoring Program
Element 2 – Comprehensive Recharge Program
Element 3 – Water Supply Plan for the Impaired Areas of the Basin
Element 4 – Comprehensive Groundwater Management Plan for Management Zone 1
Element 5 – Regional Supplemental Water Program
Element 6 – Cooperative Programs With the Regional Water Quality Control Board, Santa Ana Region, and Other Agencies to Improve Basin Management
Element 7 – Salt Management Program
Element 8 – Groundwater Storage Management Program
Element 9 – Storage and Recovery Programs

City of Chino Wells

The City currently maintains 11 wells, including two inactive wells, two that are off due to high nitrates, and three that are utilized in consideration of blending requirements. **Table 4.2-2** presents the City's existing and anticipated future wells and associated capacities by 2010. The quantity in brackets indicates reduced pumping capacities if water is not available for blending as required.

Table 4.2-2 City of Chino Anticipated Future Groundwater Wells – 2010

Well Number	Operating Well Capacity (gpm)	Current Operational Status
3	0	Inactive
4	725	Active
5	1,349	Active[1]
6	935	Active
7	0	Inactive
9	2,400	Active[1]
10	1,403	Standby[1,2]
11	1,973	Active
12	2,225 {0}[3]	Active
13	1,492 {0}[4]	Active
14	2,297 {960}[3]	Active
16	1,500[5]	Under Construction
17	1,500[5]	Under Construction
18	1,500[5]	Planned[1]
19	1,500[5]	Planned[1]
DR Horton	900[5]	Under Construction[1]
College Park	900[5]	Under Construction[1]
Total	**22,599 {17,545}**	

Source: City of Chino 2005 Urban Water Management Plan, December 2005

1 Requires wellhead treatment.
2 Active after connection to treatment facility to be constructed in 2007/08.
3 Requires blending with imported surface water (WFA). Well production is reduced or discontinued as shown in brackets if imported water is not available for blending.
4 Requires blending with CDA water. Well Production is reduced or discontinued as shown in brackets if CDA water is not available for blending.
5 Estimated well capacity.

The City's Water System Master Plan includes recommendations for well improvements to provide for system reliability and continued groundwater pumping. Improvements are discussed in Section 5.1 of this WSA.

Tables 4.2-3 and **4.2-4** provide the amount and location of groundwater pumped for the last five years prior to 2005 and groundwater projections through the year 2030, respectively.

Table 4.2-3 – City of Chino Historic Amount of Groundwater Pumped from the Chino Basin (AF)

Well Number	2000	2001	2002	2003	2004	2005	2006
4	1,067.32	917.83	712.03	358.56	446.41	356.05	478.66
5	586.40	336.22	193.41	434.11	253.90	549.83	230.78
6	731.58	357.92	620.35	409.78	578.68	272.59	527.95
9	2.35	2.27	0	0	0	75.29	1,677.04
10	0.95	38.16	9.39	0	0	0	0
11	1,827.77	1,703.19	2,218.09	2,288.22	2,294.30	1,982.06	1,961.35
12	1,237.57	821.74	558.72	77.71	295.41	88.60	0
13	1,767.80	603.13	682.98	644,52	759.74	776.24	819.13
14	2,472.10	1,156.50	1,557.05	1,654.14	1,688.35	1,648.89	1,464.16
Total	**9,693.84**	**5,936.96**	**6,552.02**	**5,867.04**	**6,316.79**	**5,749.56**	**7,159.06**

Note: Years are shown in calendar years.

Table 4.2-4 – City of Chino Projected Amount of Groundwater Pumping from the Chino Basin (AF)

25-Year Projections				
2010	**2015**	**2020**	**2025**	**2030**
8,940	**12,128**	**13,189**	**13,189**	**13,189**

Source: City of Chino, 2005 Urban Water Management Plan , Table 2.2.2-5, pg. 2-10

4.3 Imported Water (Surface Water) – Water Facilities Authority

The City receives its imported water through the Water Facilities Authority (WFA). The WFA Agua de Lejos Treatment Plant is located in Upland, and receives surface water from the SWP. The water is purchased from MWD through IEUA.

MWD's Rialto Branch of the Foothill Feeder delivers SWP water to the WFA Agua de Lejos Water Treatment Plant for treatment. The Agua de Lejos Water Treatment Plant is permitted to treat 81 MGD of SWP water. The actual quantity of treated water has ranged from 12 MGD in the winter months to as high as 71 MGD during the summer. WFA water enters the City's potable water distribution system at Benson Avenue and State Street. WFA water is of higher quality than the City's groundwater, the water is stored in the City's Reservoir 5, and it is then blended with water from City wells to maintain water quality levels within State and Federal standards.

The City is entitled to 5.9 percent of the WFA Agua de Lejos Plant capacity (5,353 AFY or 4.78 MGD). However, the City has historically taken up to 7.3 percent of the capacity. **Table 4.3-1** shows historical imported water production from 2000 through 2005.

Table 4.3-1 – City of Chino Historic Annual Imported Water Production (AF)

WFA	2000	2001	2002	2003	2004	2005
Imported Water	5,451	6,172	6,100	6,508	6,607	6,287

The City may take delivery of more than its entitlement when other WFA members are not taking delivery of their full entitlements. Historically, there has always been unused capacity and Chino has always had an opportunity to meet water quality standards and demands through additional WFA imported water. Many of the WFA members desire less dependence on imported water and greater reliability and control on local supplies. As a result, development of local water supply programs has increased and continued opportunity for purchase of unused capacity is possible. However, increasing costs related to groundwater production and treatment and OBMP implementation also factor into determinations regarding resource utilization and it is possible that increasing groundwater costs would encourage full utilization of WFA capacity. For this reason, this analysis assumes the City utilizes only its entitlement, as adjusted by MWD actions related to available imported water supply.

Discussions on the opportunity to maintain and increase the capacity of the WFA treatment plant have occurred; however, analysis would need to be done to determine feasibility and economic benefits considering the climate of imported water reliability. The plant could be increased to 88 MGD through re-rating of the existing plant, and further capacity increases would be accomplished by plant expansion.

4.4 Recycled Water

Water recycling involves the treatment of wastewater to create a high quality, safe source of water for outdoor irrigation, industrial and groundwater recharge uses. Water recycling is a critical component of the water resources management strategy for the region. The City relies on the Regional Recycled Water Distribution System operated by IEUA for its recycled water supply. Development and expansion of the regional system is critical to meeting the City's anticipated demands for recycled water. Development of the local recycled water distribution lines within the City is a partnership between the City, IEUA, and developers.

Reuse of highly treated tertiary water is available to meet the growing water demands of the IEUA service area. Recycled water will provide a dependable local supply of water as well as reduce the likelihood of water rationing during droughts. In addition, the use of recycled water for groundwater recharge is an integral part of the OBMP. Region-wide implementation of recycled water projects are vital to the protection and enhancement of the safe yield and water quality of the Chino Groundwater Basin.

IEUA Regional Wastewater Treatment Plants

IEUA operates four regional wastewater treatment plants: Regional Plant No.1 (RP-1), RP-4, RP-5, and the Carbon Canyon Water Reclamation Facility (CCWRF). Each treatment plant produces tertiary treated recycled water in compliance with California's Title 22 regulations and exceeds the stringent public health standards. The water quality from these plants is characterized by an average level of total dissolved solids (TDS) of 480 mg/L (TDS limit: 550 mg/L) and an average level of total nitrogen (TIN) of 6.2 mg/L (TIN limit: 8 mg/L).[14]

The IEUA Regional Sewerage Service Contract defines the manner for a Contracting Agency to claim its respective share of the recycled water from the treatment plants.
Under the current contract, the City may take delivery of more than its entitlement when other contracting agencies are not taking delivery of their full entitlements. However, on completion of the Regional Recycled Water System, phased through 2010, which merges all of the recycled water plants together, there will be sufficient system flexibility and supply to satisfy all anticipated future demands.

According to the IEUA Regional Recycled Water System Program, local recycled water facilities are those that serve the customers of only one contracting agency. Each local agency is responsible for the planning, design, construction and operation of local laterals within their service area. IEUA staff is working closely with each agency, including the City, to coordinate their recycled water planning efforts.

[14] Inland Empire Utilities Agency, Bonita Fan, October 22, 2007; based on agency-wide 12-month average ending September 2007.

Recycled Water for Regional Direct Use and Groundwater Recharge

Recycled water used for groundwater recharge will be blended with MWD's imported SWP supplies and local storm water, consistent with the water quality requirements of the Chino Basin Watermaster's OBMP, Santa Ana Regional Water Quality Control Board's Basin Plan and the DHS.

Aquifer retention time, the distance to the nearest well, and groundwater migration will be considered in the calculation of the blending ratio necessary to comply with the requirement of the DHS. Current estimates are that 33,800 AFY of recycled water could be recharged at spreading grounds throughout the Chino Basin by 2010. Additional facilities, including the construction of new transmission lines for imported water from the MWD Rialto Pipeline, development of new groundwater recharge basins, and installation of additional pumping capacity, will be needed to achieve the long term water recycling goals for the region.

As the region continues to develop, significant new development such as the proposed Edgewater Communities will be designed to make the maximum beneficial use of recycled water. In addition, future expansion of recycled water facilities through retrofits to additional existing developments will continue. By 2025 direct recycling is planned to supply 80,000 AFY in the IEUA service area. Also, by 2025, recycled water recharge will increase to 70,000 AFY due to increased demand for recharge water and advanced treatment of recycled water for recharge.

Recycled Water Use in the City of Chino

The City recognizes the potential uses of recycled water in its community, such as landscape irrigation, parks, industrial and other uses, and works with IEUA to develop the needed recycled water infrastructure to support use of recycled water.

In 2005, the City provided 3,365 AFY of recycled water from the IEUA Regional Recycled Water System to landscape irrigation, agricultural irrigation, industrial customers, and construction customers, as shown in **Table 4.4-1**. This amount is more than any other IEUA sub-agency utilized in 2005 and is more than originally projected in 2000 (1,000 AF) for use by 2005. Recycled water use has substantially increased since 2000 and is projected to increase by 260 percent from 2006 to 2030. The City's limited recycled water infrastructure is expected to be expanded with development of The Preserve, College Park, Edgewater Communities and conversions of major potable water users in the City's water system.

Table 4.4-1- 2005 City of Chino Recycled Water Users (AF)

2005 Recycled Water Use Sector	2005 Demand
Industrial	599
Landscape Irrigation	1,560
Agricultural Irrigation	951
Construction	255
Total Recycled Water Use	**3,365**

Source: City of Chino Public Works Department Staff

Recycled water use for 2011 is projected at 4,940 AF, increasing to 8,913 AFY by 2030 as shown in **Table 4.4-2**. The recycled water use projections to 2030 have been adjusted from the IEUA projections included in the Regional UWMP Year 2005 Update to reflect City-refined projections.

Table 4.4-2- Current and Projected Recycled Water Use in the City of Chino (AF)

	2006	2011	2016	2021	2026	2030
Chino Users (excluding Edgewater)[1]	3,612	4,940	6,823	8,913	8,913	8,913
Edgewater Communities[2]	0	327	589	610	610	610
Total Recycled Water Use	**3,612**	**5,267**	**7,412**	**9,523**	**9,523**	**9,523**

[1] City of Chino, 2005 Urban Water Management Plan, December 2005, Table 8.4-1, pg. 8-8

[2] Edgewater Communities Water Demand Analysis, Technical Memorandum, Dudek, August 6, 2007

Recycled water availability for the region, as discussed in IEUA's 2005 Regional UWMP, was 86,700 AF for 2005, and projected to increase to 111,400 AF by 2010 and 197,200 by 2030. Ultimate regional recycled water deliveries, including groundwater recharge, are projected to be approximately 94,000 AFY by 2015. This demonstrates that available recycled water supply is projected to meet, and in fact exceed, demand in all hydrologic conditions.

4.5 Desalted Water

The Chino Groundwater Basin is the water source for the Chino Basin Desalter Authority (CDA). Since August 2000, the Chino I Desalter produced approximately 8.4 MGD of potable water until its expansion in 2006 increasing capacity to 13.3 MGD. Facilities consist of approximately 14 groundwater wells located within the southern portion of the Chino Groundwater Basin, a central water treatment plant (WTP), and pipelines to deliver water from the wells to the WTP and from the WTP to the water retailers (cities of Chino, Chino Hills, Ontario, and the Jurupa Community Services District/City of Norco).

The Chino I Desalter managed by the CDA is currently operated under the following: 1) "take-or-pay" agreements with the purchasers of the water; 2) an agreement with MWD to reduce the cost of the water from the Desalter compared to uninterruptible treated imported water; and 3) an agreement with the Watermaster, all groundwater producers, Kaiser Ventures, Inc., and the California Regional Water Quality Control Board, Santa Ana Region, regarding replenishment obligations for operating the Desalter. Since the desalters are supplied from groundwater wells, the amount of water produced by the desalter is subject to replenishment by the Watermaster to prevent overdrafting. The Watermaster has identified a hierarchy of water sources/supplies for replenishment purposes. Replenishment water is provided from the following: 1) the Watermaster Desalter Replenishment account; 2) new yield of the Basin; 3) safe yield of the Basin; and 4) additional replenishment water purchased by the Watermaster.

The City of Chino entered into a contract in 1996 committing to purchase a minimum of 3,000 AFY on a "take or pay" contractual basis. Expansion of the Desalter increased the City's flow allocation and commitment to 5,000 AFY.

The contract allows the City of Chino to obtain additional product water if the Chino Basin Desalter Authority is capable of producing more Product Water than is necessary to satisfy the requirements of the purchasers. The City is entitled to purchase a minimum proportionate share of additional Product Water. Under this contract, Chino is also entitled to unused Product Water if it remains available after offered to all purchasers up to their respective percentages. Chino also has the opportunity to negotiate the purchase of contracted desalted water with purchasers that are constrained by the "take-or-pay" obligation, but have optimized other sources of local water and do not need to take their full entitlement. **Table 4.5-1** shows the City's historic annual amount of desalted water utilized by the City.

Table 4.5-1 – City of Chino Historic Annual Desalted Water Use (AF)

	2001	2002	2003	2004	2005
Desalted Water	2,736	2,922	2,845	2,705	3,608

The CDA originally contracted to provide a combined total of 9,200 AFY of product water from the Chino I Desalter to Jurupa Community Service District (JFSD) and the cites of Chino, Chino Hills, and Norco. The Chino I Desalter Expansion added 5,000 AFY of potable water available for use. The resultant total of 14,200 AFY is allocated between the cities of Chino, Chino Hills, Norco and Ontario, and the JCSD and the Santa Ana River Water Company. **Table 4.5-2** shows the water deliveries under the original contracts and the new integrated project contracts for the Chino I Desalter and its expansion.

Table 4.5-2 - Desalted Water Deliveries from Chino I Desalter (AFY)

Agency	Original Contracts	New Contracts	
	Chino I Existing	Chino I Existing	Chino I Expansion
City of Chino	3,000	3,000	2,000
City of Chino Hills	2,000	2,000	2,200
Jurupa Community Service District	3,200	2,700	
City of Norco	1,000		
City of Ontario		1,500	
Santa Ana River Water Co.			800
Subtotal		9,200	5,000
TOTAL	**9,200**	**14,200**	

Source: Chino I Desalter Expansion and Chino II Desalter Project, Draft Subsequent Environmental Impact Report

The Chino II Desalter includes a 10 million gallons per day (MGD) (10,400 AFY) Treatment Plant, pump stations, pipelines, and wells. The desalted water is provided to the Jurupa Community Services District, the City of Ontario, the City of Norco and the Santa Ana River Water Company. The Chino II Desalter is located in Mira Loma, California. Groundwater from eight wells in the Mira Loma area is treated by reverse osmosis (6 MGD) and ion exchange treatment systems (4 MGD).[15] The CDA has the ability to adjust deliveries of water from Desalters I and II to the City of Ontario and Jurupa Community Service District in order to achieve maximum production and provide contractual deliveries to other member agencies.

[15] Chino I Desalter Expansion & Chino II Desalter Project Update, CDA, April, 7, 2005.

5.0 RELIABILITY OF WATER SUPPLIES

The City of Chino and all of southern California communities and water agencies are facing increasing challenges in their role as stewards of water resources in the region. For example, increased environmental regulations and competition for water from outside the region have resulted in reduced supplies of imported water. Continued population and economic growth increase water demand within the region, putting an even larger burden on local supplies.

The Edgewater Communities proposes eight land use categories including approximately 142 acres for 1,074 dwelling units and five open space land use categories covering 131 acres for a total Project area of 272.93 acres. The Project will include major lakes and water features as well as substantial areas of open space and extensive recreational facilities. Total water demand at build-out for the Project is estimated to be approximately 1,094 AFY; which consists of 484 AFY of potable water and 610 AFY of recycled water. An additional 470 AF of recycled water will be used for the initial filling of the five Project lakes.

The Project presents an opportunity to demonstrate reliability of future water supply for the City of Chino. The City works with the following agencies to ensure water supply reliability to the region: Inland Empire Utilities Agency, Metropolitan Water District of Southern California, Water Facilities Authority, Chino Basin Watermaster, Chino Basin Desalter Authority, Chino Basin Water Conservation District, Santa Ana Regional Water Quality Control Board, and Santa Ana Watershed Project Authority.

The following sections discuss these agencies, and others throughout the region, their roles in water supply reliability, and the near and long-term efforts they are involved with to ensure future reliability of water supplies to the City and the region as a whole.

5.1 City of Chino

The City's water system is expanding as a result of the facilities (e.g. pipelines, wells, storage tanks) that are necessary to supply water to new City areas such as The Preserve and College Park. In addition, the City's water system is expanding as a result of more stringent water quality regulations, which increase the need for wellhead treatment.

As mentioned in Section 1.0, this WSA does not identify specific infrastructure needs related to the provision of water for the Project, nor does the City have a specific capital improvement or outlay program representing this project. For Project infrastructure information, refer to the *City of Chino, Water System Master Plan Update for the Edgewater Development, Draft, September 2007,* as prepared by MWH Global, Inc (MWH). Further, the City and Developer will work to secure local, regional, and federal permits and regulatory approvals for the Project that may be required.

The City's current Capital Improvement Program (CIP) identifies the construction of new wells (Number 16 through 20) located in the City of Ontario. These new wells will be a water supply source for new development such as The Preserve and will facilitate the projected increase in groundwater production.

Moreover, the new wells, along with other projected water facility improvements included in the CIP, will enhance system reliability and redundancy. For example, if a well fails or must be taken out of service and cannot produce water for a period of time, the new wells provide an additional measure of system redundancy to ensure adequate water supply, thereby enhancing system reliability. The City's plans to augment existing infrastructure provides multiple sources of water to the City resulting in more available capacity than demand.

5.2 Chino Basin Watermaster

As required by the Court, the Chino Basin Watermaster prepares semiannual reports that describe implementation of the OBMP. These semiannual reports provide information on each of the nine OBMP program elements (refer to page 4-16) and their implementation status. The following provides an overview of some of the major activities to ensure reliability of the Basin:

Groundwater Level Monitoring

Water level monitoring is important to understand the impacts of pumping, availability of storage, changes in Basin hydrology, and the influence of recharge on groundwater levels. The Watermaster has three active groundwater-level monitoring programs operating in the Basin: 1) A semiannual basin-wide program; 2) A key well monitoring program associated with the Chino I/II Desalter well fields and the Hydraulic Control Monitoring Program; and 3) A peizometric monitoring program associated with land subsidence and ground fissuring in Management Zone 1 (MZ-1).

For the semiannual basin-wide program, the Watermaster staff manually measure water levels in approximately 480 agricultural wells twice per year. In conjunction with the semiannual program, Watermaster staff manually measure water levels at about 107 key wells in the south portion of the Basin and around the Chino I/II Desalter well fields once per month. For the MZ 1 program, groundwater level data is collected manually at 35 wells in the southern portion of MZ 1 once every two months and automatically once every 15 minutes using pressure transducer/data loggers installed at each well.[16]

During calendar year 2006, Watermaster staff expanded the use of pressure transducer/data loggers to include an additional 25 loggers at wells in the key well program and at selected wells in the northern portion of the Basin where highly detailed groundwater level data is scarce.

The Watermaster, IEUA, Orange County Water District, and the Regional Water Quality Control Board (RWQCB) have agreed to construct nine new monitoring wells as part of

[16] Chino Basin Watermaster, Status Report No. 16, October 2005 through December 2005. January 2006.

the piezometric monitoring program. These monitoring wells are necessary because existing well locations and well construction are not sufficient to measure the extent of hydraulic control in the vicinity of the Desalter well fields and because the loss of agricultural wells monitoring devices is a consequence of the conversion of land use from agriculture to urban uses. The objective of these new wells is to document the creation of a regional depression in the peizometric surface, for both the shallow and deep aquifer systems, as a result of Desalter pumping.

The Watermaster and IEUA are constructing a number of monitoring wells at recharge basins to monitor the influence of recharge on the groundwater levels in general, and to monitor water quality resulting from the blend of supplemental and storm waters. At least one monitoring well will be installed downgradient of each recharge facility that receives recycled water.[17]

Dry Year Yield Program

Participants in the Dry Year Yield (DYY) Program, as described in Section 5.4, are required to reduce (shift) their imported water usage by a predetermined amount during a dry year. Each participating agency has a specific shift obligation that, when added together, will provide MWD with 33,000 AF of dry year yield.[18] The eight participating agencies include the cities of Chino, Chino Hills, Ontario, Pomona and Upland, Cucamonga Valley Water District, Jurupa Community Services District, and Monte Vista Water District.[19] The DYY Program is designed to supply local water in a prolonged drought.

As of June 30, 2007, about 88,400 AF had been stored in the Basin in the DYY account. Construction of local facilities as part of the DYY program continues for seven of the eight agencies. These facilities include wellhead treatment facilities and new wells.[20]

Voluntary Forbearance

Land subsidence is a current groundwater issue in the Chino Basin. Land subsidence can occur in areas where underlying fine-grained sediment layers (silt and/or clay) are dewatered over a long period of time allowing these layers to compress. According to the Phase I OBMP Report, subsidence and ground fissuring has been documented in portions of the City. The area underlying the City and the CIM has experienced ground fissuring as early as 1973, and an accelerated occurrence of subsidence ensued after 1991. A common cause of ground fissuring within alluvial basins is the removal of subsurface fluids resulting in compaction of poorly consolidated aquifer materials and land subsidence.

[17] Chino Basin Watermaster, Status Report No. 16, October 2005 through December 2005. January 2006;
[18] Chino Basin Watermaster, Dry Year Yield Project, Memorandum & Attachments, Agreement No. 49960, February 2003.
[19] Chino Basin Watermaster Status Report No. 11, June 2004
[20] Chino Basin Watermaster, Status Report 2007-1: January to June 2007, July 2007

Remote sensing studies of subsidence were conducted for the City in 1999 to further analyze subsidence in MZ 1. These studies confirmed the location and relative magnitude of subsidence in MZ 1. It was concluded that the cause of this subsidence was localized groundwater overdraft and declining groundwater levels, and effects resulting from groundwater production from mostly deep wells in the area.[21]

The Watermaster has developed a groundwater level monitoring program that includes multiple tools to evaluate subsidence. To reduce the risk of subsidence in the western portion of the Chino Basin, the Watermaster has recommended a reduction in groundwater production, from certain wells. However, no wells that have been relied on by the City of Chino to supply its water are affected.

5.3 Water Facilities Authority (WFA)

The WFA is permitted to treat 81 MGD of SWP water through a MWD imported water connection located in the City of Upland. MWD's Rialto Branch of the Foothill Feeder delivers SWP water to the Agua de Lejos Plant for treatment. The actual quantity of treated water has ranged from 12 MGD in the winter months to as high as 71 MGD during the summer.

As discussed in Section 4, WFA-treated water enters the City's potable water distribution system at the upstream end of the City's system. It is stored in the City's Reservoir 5, and is blended with groundwater from wells to maintain water quality levels within State and Federal standards.

The City is entitled to 5.9 percent of the WFA Agua de Lejos Plant capacity, but has utilized up to 7.3 percent of the capacity. Historically, there has always been unused capacity and Chino has always had an opportunity to meet water quality standards and demands through additional WFA imported water. Many of the WFA members desire less dependence on expensive imported water and greater reliability and control of local supplies. As a result, the development of local water supply programs has received increased attention and the continued opportunity for utilization of unused WFA treatment capacity is reasonably anticipated. However, increasing costs related to groundwater production and treatment and OBMP implementation also factor into determinations regarding resource utilization and it is possible that increasing groundwater costs would encourage full utilization of WFA capacity. For this reason, this analysis assumes the City utilizes only its entitlement, as adjusted by MWD actions related to available imported water supply.

Discussions on the opportunity to increase the capacity of the WFA treatment plant have occurred; however, analysis would need to be done to determine feasibility and economic benefits considering the climate of imported water reliability. The plant could be increased to 88 MGD through re-rating of the existing plant, and further capacity increases would need to be accomplished by plant expansion. However, increasing

[21] City of Chino Water System Master Plan Update, May 2003

groundwater expenses and MWD incentive programs for imported water may reduce the opportunity to take additional WFA water.

5.4 Inland Empire Utilities Agency (IEUA)

The City of Chino is a sub agency of the IEUA. Other retail water service agencies located within the IEUA service area include the City of Chino Hills, Cucamonga County Water District, Fontana Water Company, Monte Vista Water District, City of Ontario, and the City of Upland.

Imported Water

As a water wholesaler, MWD supplies imported water to IEUA to meet the water needs of its service area. MWD's diverse resources and aggressive conservation program protect the reliability of the region's water supply, as discussed in Section 5.5. MWD demonstrates that sufficient supplies can be reasonably relied on to meet projected demand. As a result, during a single dry year or multiple dry years, MWD will have the resources to supply IEUA with 100 percent of its imported water demands. However, with the DYY Program in effect, several of IEUA's retail agencies will reduce their imported water demands by their respective DYY Program shift, thus reducing demands on MWD. During a dry year, imported water demands are expected to decrease to approximately 65 percent.[22]

Dry Year Yield Program[23]

In 2002, IEUA, the Watermaster, and MWD executed an agreement for the development of the Chino Basin DYY Program to help reduce demands on imported water during dry years by pumping additional groundwater. Three Valleys Municipal Water District is also a signatory to the Program. The DYY Program is an implementation element of the OBMP Element Nos. 8 and 9, which were to develop and implement a groundwater storage and recovery program.

The DYY Program is the first step in a phased plan to develop and implement a comprehensive conjunctive use program to allow maximum use of imported water available during wet years and stored groundwater in the Chino Basin during dry years. MWD will utilize the Chino Basin for dry year storage up to 100,000 AF of surplus imported water. Imported water deliveries to participants would increase during wet or normal (or "put") years, and purchase of imported water would decrease during dry (or "take") years.

Collectively, the eight DYY participants, six of which are local retail agencies of IEUA, including the City of Chino, would perform to predetermined levels in order to achieve a maximum 25,000 AFY "put" and a maximum 33,000 AFY "take". Each of the local

[22] Inland Empire Utilities Agency, Regional UWMP, Review Draft October 2005
[23] Inland Empire Utilities Agency, Regional UWMP, Review Draft October 2005

retail agencies volunteered to produce excess groundwater during a dry year in-lieu of receiving normal imported water deliveries. In exchange, they received funding for new groundwater treatment and well facilities that would enable additional groundwater production during dry years. IEUA's overall imported water demands during dry years would decrease by 29,000 AFY, which equals the portion of the 33,000 AFY of the DYY shift obligation for IEUA's local retail agencies, as shown in **Table 5.4-1**. During dry years when the DYY Program is active, groundwater production may increase to approximately 116 percent of a normal year. The DYY program is scheduled to become effective in 2008 when facilities needed to support the program are constructed.[24]

Table 5.4-1 – Participating Agencies DYY Shift Obligations

Local Retail Agency	DYY Program Shift Obligation (AFY)
City of Chino	1,159
City of Chino Hills	1,448
Cucamonga Valley Water District	11,353
Jurupa Community Services District[(1)]	2,000
Monte Vista Water District	3,963
City of Ontario	8,076
City of Pomona[(1)]	2,000
City of Upland	3,001
Total	**33,000**

(1) Agencies not within the IEUA service area.

Recycled Water for Direct Use

Recycled water is becoming an increasingly important source of local water for the region. According to IEUA, it has been assumed that recycled water will be 100 percent reliable during a single dry year. During multiple dry years, reliability remains unaffected and use of recycled water continues to help reduce potable water demands as new water users make optimum use of the regional recycled water system. It is projected that during multiple dry years, increased utilization of recycled water will increase to 111% of normal in the 2nd dry year and 115% of normal in the 3rd dry year. Recycled water is a reliable resource not subject to droughts or imported water availability.

[24] Inland Empire Utilities Agency, 2005 Urban Water Management Plan.

Recycled Water Recharge Project

The Chino Basin Recycled Water Recharge Project is part of the comprehensive Water Supply Enhancement Program jointly sponsored by IEUA, Chino Basin Watermaster, Chino Basin Water Conservation District, and the San Bernardino County Flood Control District. The recharge program is regulated by the RWQCB and is consistent with and responds to various plans, agreements, legal decisions, studies, task force objectives, and approvals throughout the region and the state.

The purpose of the Recharge Project is to enhance water supply reliability and improve groundwater quality in local drinking water wells through the Chino Basin by increasing the recharge of storm water, imported water, and recycled water. Recycled water recharge for the year 2005 has been estimated to be approximately 1,000 AF.[25]

The benefits of the Recharge Project include the following: 1) Blends high quality storm water and recycled water which allows for more local and less expensive water supplies to recharge the basin and reduces the need for more expensive imported water; 2) provides reliable "drought-proof" water supplies to meet future growth; 3) enhances the capacity to recharge more imported water in wet years when this water is more plentiful and less expensive; and 4) helps to offset reductions in imported water supplies through conjunctive management of ground and surface water supplies.

To implement the Chino Basin Recharge Master Plan and OBMP, the proposed Phase I Recharge Project consists of the annual recharge of up to 44,000 acre-feet of storm water, recycled water and imported water.

Organics Management

In an effort to continually clean up the Chino Basin, the City of Chino has worked integrally with IEUA to explore various methods of Organics Management with the goal of reducing and remediating salt contamination of the groundwater basin. IEUA seeks to foster sustainable self-reliance in organics and biosolids management by recycling 100 percent of organic solids generated by IEUA facilities

5.5 Metropolitan Water District of Southern California

MWD's primary goal is to provide reliable water supplies to meet the water needs of its service area at the lowest possible cost. Prevailing drought conditions throughout California and the Colorado River Basin, coupled with environmental issues affecting deliveries of SWP water through the Sacramento – San Joaquin Delta, have resulted in diminished imported surface water to Southern California. MWD, the major importer of surface water to Southern California, has developed plans and programs to address drought conditions and its continuing ability to meet the water demands of its service area. One such project is MWD's recently completed Diamond Valley Lake located in

[25] Inland Empire Utilities Agency, 2005 Urban Water Management Plan, Table 5-7.

Hemet, California. Diamond Valley Lake is an 800,000 AF capacity reservoir for regional seasonal and emergency storage of SWP and Colorado River waters. The reservoir began storing water in November 1999 and reached the sustained water level by early 2002.[26] MWD continually re-evaluates its plans and programs for effectiveness in consideration of changing conditions. The plans describe a progressive series of actions, including tapping into stored water reserves and, if necessary, reductions in deliveries. This WSA demonstrates that possible reductions in imported water deliveries due to drought conditions do not prevent the City from satisfying its anticipated demands.

Colorado River Aqueduct (CRA)

Pursuant to the 1964 U.S. Supreme Court decree, MWD's dependable supply of Colorado River water was limited to 550,000 acre-feet per year assuming no surplus or unused Arizona and Nevada entitlement was available and California agricultural agencies use all of their contractual entitlement. Historically, MWD has also possessed a priority for an additional 662,000 acre-feet per year depending on availability of surplus water. In addition, MWD maintains agreements for storage, exchanges and transfers within the service area of Imperial Irrigation District that provide hundreds of thousands of acre-feet per year of water to MWD.[27]

Water supplies from the Colorado River have been and continue to be a topic of negotiation and intense debate. The 1964 Court Decree required California to limit its annual use to 4.4 million acre-feet (MAF) basic annual apportionment of Colorado River water plus any available surplus. To keep California at 4.4 MAF, MWD reduces its level of diversions in years when no surplus is available.

In 1999, the Colorado River Board developed "California's Colorado River Water Use Plan," also known as the "California Plan" and the "4.4 Plan," which was endorsed by all seven Colorado River Basin states and the U.S. Department of the Interior. This plan developed the framework that specifies how California will transition and live within its basic apportionment of 4.4 MAF of Colorado River water. The U.S. Bureau of Reclamation (USBR) implemented Interim Surplus Guidelines to assist California's transition to the 4.4 Plan.

In October 2003, the Quantification Settlement Agreement (QSA), a critical component of the California's Colorado River Water Use Plan was authorized defining Colorado River water deliveries, and facilitating the transfer of water from agricultural agencies to urban uses. The QSA is a landmark agreement, signed by the four Colorado River water use agencies and the U.S. Secretary of the Interior, which will guide reasonable and fair use of the Colorado River by California through the year 2037.

[26] The Metropolitan Water District of Southern California, Regional Urban Water Management Plan, 2005.
[27] Metropolitan Water District of Southern California. Integrated Water Resources Plan. 2003 Update. May 2004.

MWD's Integrated Water Resources Plan 2003 Update, recognizes that the QSA supports MWD's development plans for CRA deliveries, and demonstrates the reliability benefits as a result of the QSA and existing supply enhancement programs.

State Water Project (SWP)

The reliability of the SWP impacts MWD's member agencies' abilities to plan for future growth and supply. DWR's Bulletin 132-05, *Management of the California State Water Project*, updates certain reliability information including water supply planning, construction, financing, management, and operation activities of the State Water Project.. Bulletin 132-05 continues the Bulletin 132 annual series initiated in 1963.[28] Bulletin 132-05 discusses significant events and issues that affect SWP management and operations, as well as water supply and delivery, Delta resources and environmental issues, facilities, and financial analysis.

In 2002, the DWR Bay-Delta Office prepared an original report, and later an updated 2005 report, specifically addressing the reliability of the SWP.[29] This report, *The State Water Project Delivery Reliability Report*, provides information on the reliability of the SWP to deliver water to its contractors assuming historical precipitation patterns. The following SWP reliability information is included in these reports.

On an annual basis, each of the 29 SWP contractors including MWD request an amount of SWP water based on their anticipated yearly demand. In most cases, MWD's requested supply is equivalent to its full "Table A Amount"; currently at 1,911,500 AFY. After receiving the requests, DWR assesses the amount of water supply available based on precipitation, snow pack in northern California watersheds, volume of water in storage, projected carry over storage, and Sacramento-San Joaquin Bay Delta regulatory requirements. For example, the SWP annual delivery of water to contractors ranged from 552,600 AFY in 1991 to 3.5 MAF in 2000.

Due to the uncertainty in water supply, contractors are not typically guaranteed their full Table A Amount, but instead a percentage of that amount based on the available supply. Typically, around December of each year, DWR provides the contractors with an initial estimate of allocation for the following year. Due to the variability in water supply for any given year, it is important to understand the reliability of the SWP to supply a specific amount of water each year to the contractors. As hydrologic and water conditions develop throughout the year, DWR revises the allocations. For example, on January 14, 2005, SWP supplies were projected to meet 60 percent of most SWP contractor's Table A Amounts. This allocation was increased to 70 percent on April 1, 2005 and to 80 percent on April 21, 2005. The final adjustment increase occurred on May 27, 2005 and the DWR projected the SWP would meet 90 percent of most contractor's Table A Amounts.

[28] Department of Water Resources, Bulletin 132-05 covers the period of calendar year 2004.
[29] Department of Water Resources, The State Water Project Delivery Reliability Report. 2005, April 2006.

On April 18, 2006, DWR announced[30] that the allocation for water delivery to the SWP Contractors in calendar year 2006 increased from 80 percent to 100 percent of the SWP Contractor's requested amounts. This is the first time since SWP contractors began asking for their full Table A amounts that DWR has been able to deliver 100 percent of the requested amounts.

On November 30, 2006, DWR initially approved 2,465,529 acre-feet of Table A water for long-term SWP contractors in 2007. SWP contractor's Table A for 2007 totaled 4.13 MAF, of which 4.07 MAF was requested. The allocation was made consistent with the long-term water supply contracts, public policy, conservative projection of hydrology, SWP operational constraints, and 2007 contractor demands, including carryover water from 2006. SWP supplies were projected to meet 60 percent of contractor's Table A Amounts in 2007.[31] However, DWR revises allocations as the hydrologic and water supply condition develops throughout the year.

DWR analyzed the SWP's reliability using the California Water Allocation and Reservoir Operations Model (CALSIM II) in their State Water Project Reliability Report 2003. The CALSIM II model was developed by DWR and USBR to simulate operations of the SWP and the Central Valley Project (CVP). The CALSIM II model is used to estimate water deliveries to both SWP and CVP users under various assumptions such as hydrologic conditions, land use, regulations, and facility configurations. Documentation for CALSIM II, including assumptions, can be found on the DWR Web site at http://modeling.water.ca.gov.

One of the key assumptions of the CALSIM II model is that past weather patterns will repeat themselves in the future. The model uses a monthly time step to calculate available water supply based on historical rainfall data from 73 years of records (1922 – 1994). The model scenarios used in the preparation of the Reliability Report also assumed that regulatory requirements and facilities would not change in the future. DWR considered this assumption conservative since additional facilities such as reservoirs may be implemented in the future to specifically increase the SWP's reliability.

The CALSIM II model was used to complete three benchmark studies (Studies 1, 2 and 3) to evaluate supply and demand under different conditions for the 2003 Reliability Report. **Table 5.5-1** shows the results of these studies, which demonstrate that SWP deliveries, on average, can meet between 72 and 76 percent of the maximum Table A Amount.

The Reliability Report recommended using the results of update studies 4 and 5 since they contain the most current information for assumed demands. The results of studies 4 and 5 show average deliveries of 69 percent of full Table A under current conditions (at the time of the studies), and 77 percent under future conditions. These studies also show a minimum delivery of 4 and 5 percent of full Table A amounts for 2005 (Study 4) and

[30] Notice to State Water Project Contractors No. 06-04, April 18, 2006,
[31] Department of Water Resources, Initial 2007 SWP Allocation. November 30, 2006.

2025 (Study 5), respectively. The update studies indicate a lower minimum SWP delivery for current and future conditions in comparison to earlier CALSIM II modeling studies (see **Table 5.5-1**).

Table 5.5-1 - SWP Table A Deliveries from the Delta
Percent of Total Table A Amount of 4.133 maf
(maf)

Study #	Study	Average (% of Max Table A)	Maximum Table A	Minimum (Single Dry Year)
SWP Delivery Reliability Report (2003)				
1	2001 Study	2.962 (72%)	3.845 (93%)	0.804 (19%)
2	2021 Study A[1]	3.083 (75%)	4.133 (100%)	0.830 (20%)
3	2021 Study B[2]	3.130 (76%)	4.133 (100%)	0.830 (20%)
Update Studies				
4	Revised-Demand Today[3] (2005 Study)	2.818 (69%)	3.848 (94%)	0.159 (4%)
5	Revised-Demand Future[4] (2025 Study)	3.178 (77%)	4.133 (100%)	0.187 (5%)

Source: Department of Water Resources, 2005 SWP Delivery Reliability Final Report – April 2006, Chapter 5, Study Results, Table 5-1, pg. 16
[1] Assumes demands depend on weather conditions.
[2] Assumes demands at maximum Table A amount.
[3] Revises demands to current (2005) conditions.
[4] Revises demands at levels of use projected to occur by 2025.

In 1994, DWR and certain SWP contractors agreed to a set of principles known as the Monterey Agreement. The purpose of the Monterey Agreement is to resolve water allocation disputes among certain SWP contractors by amending long-term water supply contracts and to establish a new water management strategy for the SWP.

The Monterey Agreement states that contractors will be allocated part of the total available project supply in proportion to their Table A Amount. The Monterey Agreement changed SWP water allocation rules by specifying that, during drought years, project supplies be allocated proportionately based on the maximum contractual Table A Amount. Water is allocated to urban and agricultural purposes on a proportional basis, deleting a previous initial supply reduction to agricultural contractors. The agreement further defines and permits permanent sales of SWP Table A Amounts and provides for transfer of up to 130,000 AF of annual Table A Amounts from agricultural use to municipal use. The Agreement also allows SWP contractors to store water in another agency's reservoir or groundwater basin, facilitates the implementation of water transfers and provides a mechanism for using SWP facilities to transport non-project water for SWP water contractors. The Agreement provides greater flexibility for SWP contractors to use their share of storage in SWP reservoirs.

Report on MWD Water Supplies, A Blueprint for Water Reliability

MWD released a *Report on Metropolitan's Water Supplies, A Blueprint for Water Reliability* on March 25, 2003, to provide updated information on MWD's projected supply and demand for incorporation into Water Verification and Water Supply Assessments for compliance with SB 221 and SB 610, respectively. The report addresses water supply reliability issues and states MWD's roles and responsibilities, which include the following: (1) implementing water management programs that support the development of cost-effective local resources; (2) securing additional imported supplies as necessary through programs that increase the availability of water delivered through the Colorado River Aqueduct and the SWP; (3) providing the infrastructure needed to integrate imported and local sources; (4) establishing a comprehensive management plan dealing with periodic surplus and shortage conditions; and (5) developing a rate structure that strengthens MWD's financial capabilities to implement water supply programs and make infrastructure improvements.

The report details that MWD's regional water demand projections are 6 percent to 16 percent *higher*, depending on the particular 5-year projection period, and 11 percent *higher* for Year 2025, than the aggregated projections of MWD's member agencies. As stated in the Report, "this difference indicated that MWD's supplies would provide a level of 'margin of safety' or flexibility to accommodate delays in local resources development or adjustments in development plans."[32] Additionally, the report concludes that "current practices allow MWD to bring water supplies on-line at least ten years in advance of demand with a very high degree of reliability." More particularly, MWD documented sufficient currently available supplies to meet 100 percent of member agencies' supplemental water demands for 20 years under Average and Wet Year conditions, for 15 years under Multiple Dry Year conditions (with 8 to 26 percent reserve capacity), and for 15 years under Single Dry Year conditions (with 8 to 25 percent reserve capacity). With the addition of supplies under development, MWD will be able to meet 100 percent of its agencies' supplemental water needs under all supply and demand conditions through 2030 with 20 to 25 percent reserve capacity.[33]

The Report also identifies the ways MWD is managing changes in Southern California's water supplies, including reduced Colorado River deliveries and water quality constraints. In addition, opportunities for additional supplies are currently being implemented in the following ways:

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[32] Metropolitan Water District of Southern California. Report on Metropolitan Water Supplies, A Blueprint for Water Reliability, p. 9. March 25, 2003.
[33] Metropolitan Water District of Southern California. Report on Metropolitan Water Supplies, A Blueprint for Water Reliability, p. 24-25. March 25, 2003.

1) Full Diamond Valley Lake: The Lake is now fully operational with an increased conveyance capacity for refill system storage.
2) Re-Operation of Storage and Transfer Programs: In 2003, MWD developed additional storage and transfer capabilities and completed filling local resources to achieve full storage accounts in operational reservoirs and banking/transfer programs.
3) Enhanced Conservation Programs: A new campaign is designed to encourage more efficient outdoor water use and promote innovative conservation measures.
4) Development of Additional Local Resources: There are promising opportunities identified to develop seawater desalination and expand the Local Resources Program.

In addition to the *Report on Metropolitan's Water Supplies, A Blueprint for Water Reliability,* MWD's 2005 Regional Urban Water Management Plan (RUWMP) demand and supply analysis also projects surpluses (of regional supplies compared with regional demands) ranging from 5 percent to 35 percent in all years and all drought scenarios through 2030.[34]

As demand forecasts are refined, supply goals are also refined. MWD has consistently supplied over 50 percent of water supplies to the southern California region. To continue to accomplish this, MWD continues to approve new and innovative projects and programs to ensure reliability. For example, in August 2001, MWD took action to move forward initiatives to bolster future supplies by supporting seawater desalination projects, increased commercial conservation efforts, improve water quality by decreasing salinity in supplies from the SWP and the Colorado River, increased underground storage and retrieval facilities, adopted principles for establishing cooperative programs, and endorsed legislation that would further water reliability.

Integrated Water Resources Plan (IRP)

To address the SWP reliability challenges, MWD and its member agencies developed an Integrated Water Resources Plan (IRP) in 1996. The overall objective of the IRP process is the selection and implementation of a Preferred Resource Mix (or strategy) consisting of complementary investments in local water resources, imported supplies and demand-side management that meet the region's desired reliability goal in a cost-effective and environmentally sound manner. The 1996 IRP was reviewed as part of MWD's strategic plan and rate refinement to guide the development and implementation of revised MWD water management programs through the year 2005.

The IRP 2003 Update was approved and released July 13, 2004, and includes various projects and programs that contribute to the reliability of MWD's imported water supplies. During the adoption of the IRP 2003 Update, the Board decided that IRP Updates would be done in 5-year cycles to provide input to the 5-year UWMP. In

[34] Metropolitan Water District of Southern California, 2005 Regional Urban Water Management Plan, Tables II-7, 8 and 9.

addition, staff reports to the Board annually on the progress of IRP implementation. The 2003 IRP Update concluded that the resource targets from the 1996 IRP, factored in with changed conditions, will continue to provide for 100 percent reliability through 2025.

While the IRP 2003 Update and the IRP Implementation Reports include goals for a variety of resource targets, they identify the most significant programs as conservation and local supply development among the Preferred Resource Mix. The IRP details the Local Resources Program (LRP) and the Seawater Desalination Program as a means to increase reliability of local supplies.

MWD initiated the LRP in 1982 to promote the development of water recycling projects that reduced demand for imported water and improved regional water supply reliability. In 1991, the Groundwater Recovery Program was implemented to similarly promote the recovery of local degraded groundwater supplies. In 1995, both programs were combined into the LRP. In 2006, MWD contributed $15.2 million to recycled water projects that produced 77,334 AF, and $9.4 million to groundwater recovery projects that produced 50,427 AF, for more than 127.700 AF; a 15 percent increase over 2005. As of 2006, the LRP, including both recycling and groundwater recovery, has provided a total financial incentive amounting to nearly $214 million that has produced more than 282,500 AF. MWD's partnership with its member agencies to develop resource programs has helped to produce nearly 1.2 MAF of recycled and treated groundwater. In all, MWD has funding agreements for 59 member agency projects.[35]

The IRP 2003 Update and the IRP Implementation Report 2006 Update states that MWD's regional production target is 500,000 AF by 2020 for its LRP. MWD's current projection of regional implementation of recycling, groundwater recovery, and seawater desalination resource targets exceeds the 1996 IRP goals. Although in fiscal year 2002, recycling and groundwater recovery programs narrowly missed their target, the region is expected to meet its 2010 and 2020 targets.

In addition to the LRP, MWD also provides financial and technical assistance for implementing water conservation Best Management Practices (BMPs), as well as a significant investment in regional and local water conservation programs. MWD was also responsible for distributing $45 million in funds from Proposition 13 funding for development of conjunctive management programs in Southern California. To date, MWD has utilized Proposition 13 funds to develop eight contractual groundwater storage programs. These agreements will provide a total of 197,000 AF of storage with 64,000 AF of dry-year-yield.[36]

When viewed altogether, MWD has developed programs and identified projects that will meet cumulative IRP targets through 2025. However, when viewed by individual category, some development components may be at higher risk, or previously identified

[35] Metropolitan Water District of Southern California, Annual Progress Report to the California State Legislature, Achievements in Conservation, Recycling and Groundwater Recovery, February 2007.
[36] Metropolitan Water District of Southern California Integrated Water Resources Plan Update – Implementation Report, November 2005.

options simply may not be available for implementation. Since existing water supplies and programs are susceptible to potential changed conditions, MWD continues to identify and pursue additional resource opportunities consistent with the implementation buffer or "planning contingency" adopted as part of the IRP Update. MWD's 2006 IRP Implementation Report demonstrates that while changes occur to all water resources, MWD is able to maintain supply reliability through its diversified water resources portfolio. The IRP is an adaptive planning framework, and with the adopted annual implementation reporting and five-year updating cycle, MWD and its member agencies will continue to refine and revise the resource targets as new information and technologies become available.

5.6 Santa Ana Watershed Project Authority

SAWPA was formed in 1968 as a planning agency and reformed in 1972 as a joint powers agency for the purpose of coordinating regional planning within the Santa Ana River Watershed, including the Santa Ana and San Jacinto Rivers, to address water quality and supply improvements. SAWPA is comprised of five major water supply and wastewater management agencies within the Santa Ana Watershed: Inland Empire Utilities Agency, Eastern Municipal Water District, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District.

Since the early 1970's, SAWPA has held a key role in the development and update of the Regional Basin Plan for the RWQCB. SAWPA conducts water-related investigations and planning studies, and builds facilities needed for regional water supply, wastewater treatment or water quality remediation. Current studies include the Chino Basin Water Resources Management Study, the Colton-Riverside Conjunctive Use Project, an investigation of water quality in Lake Elsinore and studies on the nitrogen and organic carbon levels in the Prado Basin.

SAWPA adopted an IRP in June 1998 to facilitate improvements to the local water supply system. The IRP focuses on the following: [37]

- Planning time horizons for 2010, 2025, and 2050 of water demands and supplies.
- Water resource plans by member districts.
- A breakdown of planned water resource projects into six major project categories.
- Balancing of available resources.
- Identification of regional problems, issues, and description of long-term integrated solutions.

SAWPA conducted a stakeholder process, which resulted in identifying potential IRP projects with a total estimated cost of over $1 billion. Approved in March 2000, Proposition 13 provided $235 million to the Southern California Integrated Watershed

[37] Western Municipal Water District, Urban Water Management Plan, December 2005

Program (SCIWP).[38] The SCIWP was developed by SAWPA as a series of projects that would be required to achieve SAWPA's goal of making the watershed drought-proof; i.e., no imported water during drought years. On July 17, 2000, the SWRCB entered into a memorandum of understanding to set forth general procedures and criteria for selecting projects to rehabilitate and improve the Santa Ana River watershed to be funded by the SCIWP. On August 1, 2000, SAWPA approved an Initial Project Priority List of 44 projects with an estimated cost of $689 million, and adopted a policy to ensure that the Project Priority List is reviewed and updated periodically to ensure timely and cost-effective use of funds.

The Chino Basin received $87 million for the construction of water desalters, groundwater recharge facilities and new wells, of which $48 million has been allocated by SAWPA and the SWRCB for the Chino I Desalter Expansion and construction of the new Chino II Desalter (construction completed). This is part of the $235 million approved for the Santa Ana River Watershed, subject to administration by SAWPA.

The Integrated Regional Water Management Program, jointly managed by the SWRCB and DWR, provides funding for regional projects. Currently, Proposition 50 funds are available and Proposition 84 funds will be available in the near future. In order to access up to $25 million in funding, SAWPA updated their Project Priority List through the update of its Integrated Regional Water Management (IRWM) Plan (previously known as the IRP). In June 2006, SAWPA developed and submitted an IRWM Implementation Grant Step 2 Application requesting a total of $25 million for various water-related projects. On March 20, 2007, the SWRCB approved funding $25 million for SAWPA IRWM projects.

SAWPA is currently updating its IRWM Plan in order to obtain Proposition 84 funding, which can provide up to $114 million to the region. Distribution of these funds is still pending development of a process to allocate funds to regional projects.

5.7 Chino Basin Water Conservation District (CBWCD)

Chino Basin Water Conservation District, incorporated on December 6, 1949, is an independent special district that operates under authority of Division 21 of the California Water Code. Located in the western area of San Bernardino County, California, the District currently has a 112-square mile service area encompassing the entire City of Montclair and portions of the cities of Chino, Chino Hills, Upland, Ontario, Rancho Cucamonga and some of the unincorporated areas of San Bernardino County.

Since its establishment in 1949, the District has actively protected and replenished the Chino Groundwater Basin with natural area rainfall and storm water discharge from the San Gabriel Mountains. Recognizing that even in years of normal rainfall its service area depends heavily on groundwater, the District's network of basins and spreading grounds

[38] The SCIWP was developed by SAWPA as a series of projects that would be required to achieve SAWPA's goal of making the watershed drought-proof; i.e., no imported water during drought years.

allow captured runoff to percolate into the groundwater basin. With the population projected to dramatically increase in the near future, the District believes that conservation will increasingly be necessary as an effective means of coping with the increased demand. The prospect of intermittent regional droughts occurring in the future compels increased use of water conservation as a vital means to protect limited water resources.

The District has adopted the following strategic goals:

1. To continue to provide the highest educational and physical recharge services at the lowest possible cost;
2. To cooperate with others in the economical and cost effective development and operation of new and enhance existing groundwater recharge facilities;
3. To actively promote and expand, as-needed, the District's water conservation educational programs while actively supporting the conservation programs and activities of other agencies; and
4. To assist others in the economical implementation and operation of recycled water recharge projects and those involving groundwater remediation.

The District's commitment to water conservation is multifaceted and includes not only the use of percolation basins to replenish the groundwater basin but also a commitment to provide water conservation education to individuals, school districts, civic organizations, and municipalities within its service area.

The District is one of the first agencies in California to take a pro-active role in region-wide water conservation. It operates and maintains several water conservation recharge basins, which, on an average annual basis, capture and recharge a volume of stormwater in excess of 4,200 AF. Typically, this amount is equivalent to approximately 20 percent or more of all the artificial stormwater recharge that presently occurs in the Chino Groundwater Basin.

The District currently provides water conservation educational services to approximately 400,000 customers within its service area. The District owns and maintains a Water Conservation Demonstration Garden, which is visited annually by thousands of elementary school students from surrounding school districts as part of their curriculum of earth sciences.

5.8 Santa Ana Regional Water Quality Control Board – Region 8

Background

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (Regional Boards) are responsible for the protection and, where possible, the enhancement of the quality of California's waters. The SWRCB sets statewide policy, and together with Regional Boards, implements state and federal laws and regulations. Each of the nine Regional Boards adopts a Water Quality Control Plan or Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's ground and surface waters, and local water quality conditions and problems.[39]

In 1975, the Santa Ana Regional Water Quality Control Board (RWQCB) adopted the original Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin. In 1995, the RWQCB updated the Basin Plan to address issues that had evolved over time due to increasing populations and changing water demands in the region. The scope of the document covers the Santa Ana River Basin, which includes the upper and lower Santa Ana River watersheds including northwestern Orange County. In 2002, a triennial review of the Basin Plan was performed. In July 2002, at a public hearing, the RWQCB adopted Resolution No. R8-2002-0070, approving the Triennial Review Priority List and Work Plan.

The Basin Plan is more than just a collection of water quality goals and policies, descriptions of conditions, and discussions of solutions. It is also the basis for the RWQCB's regulatory programs. The Basin Plan establishes water quality standards for all the ground and surface waters of the region. The RWQCB also regulates water discharges to minimize and control impacts on the quality of the region's ground and surface water.

Water quality problems in the region are listed in the Basin Plan. For water bodies with quality below the levels necessary to allow all the beneficial uses of the water to be met, plans for improving water quality are included. Legal basis and authority for the RWQCB reflects, incorporates, and implements applicable portions of a number of national and statewide water quality plans and policies, including the California Water Code (Porter-Cologne Water Quality Control Act) and the Clean Water Act.[40]

Key Regional Issues

Water quality degradation due to high concentrations of nitrogen and TDS is a significant regional water quality problem in the Santa Ana River Watershed (Watershed).

A Task Force was formed in 1995 to provide oversight, supervision, and approval of a study to evaluate the impact of (total inorganic nitrogen) TIN and (total dissolved solids) TDS on water resources in the Watershed. The study is coordinated by SAWPA, and is investigating questions related to TIN and TDS management in the Watershed, including groundwater sub-basin water quality objectives, sub-basin boundaries, and regulatory approaches to wastewater reclamation and recharge.[41]

Water Resources and Water Quality Management

[39] Santa Ana Regional Water Quality Control Board. Region 8 Water Quality Control Plan (Santa Ana River Basin). January 1995.
[40] Santa Ana Regional Water Quality Control Board. Region 8 Water Quality Control Plan (Santa Ana River Basin). January 1995.
[41] Santa Ana Regional Water Quality Control Board. Watershed Management Initiative. Revised May 2004.

Numerous water resource management studies and projects, focused on water quality and/or water supply, are in progress in the Region under the auspices of a variety of parties. As stated above, the RWQCB has been working with SAWPA concerning water supply and reliability issues. SAWPA has been studying TIN and TDS issues and is a valuable partner in water resource and water quality management. SAWPA, and its member agencies, conduct water related investigations and planning studies, and build physical facilities where needed for water supply, wastewater treatment or water quality remediation.

Some of these activities bear directly on the implementation of the Basin Plan, while others may lead to future Basin Plan amendments to incorporate appropriate changes, such as revised regulatory strategies for various dischargers. These investigations and the implementation of appropriate physical solutions are an essential and integral part of the effort to restore and maintain water quality in the Region.

5.9 Water Quality Effect on Water Management Strategies and Supply Reliability

5.9.1 City of Chino

The City works collaboratively with the Chino Basin Watermaster, WFA, IEUA, and CDA to achieve the highest quality of water and to ensure reliability of water supplies. The identified water quality issues facing the City include TDS, nitrate, VOCs, and perchlorate. A variety of water management strategies are implemented or planned for implementation by the City as discussed below.

Expanded Water Quality Monitoring

To comply with State and Federal Maximum Contaminant Levels (MCLs), the City safeguards its water supply by exceeding the monitoring frequency required by the EPA and DHS. The City's distribution system is also monitored at various locations to ensure good quality water throughout the distribution system. In 2006, the City collected more than 1,700 samples for analysis at a state-certified laboratory for 170 drinking water substances.[42]

Water Source Blending

The City blends its various sources of water to ensure that the quality of drinking water is in compliance with standards. For example, groundwater from wells with higher levels of perchlorate and/or nitrate is blended with other well water or imported water to create a blended supply to comply with state and federal standards.

Water Treatment

To address the concerns of nitrate and perchlorate, a new ion exchange treatment system is operating at the City's Benson Reservoir site. The treatment system removes nitrate

[42] City of Chino, Annual Water Quality Report, 2005

and perchlorate from groundwater produced by City wells, and provides enhanced water quality and reliability. Additionally, other water treatment installations are in various stages of design and construction.

Joint Water Supply Enhancement Project

As part of the Dry Year Yield Project[43], the City has entered into a joint water supply enhancement project with the Monte Vista Water District, which is expected to result in additional high-quality groundwater supplies. The project includes the development of a new well for the injection of WFA treated imported surface water into the Basin, and the recovery of groundwater from the well. High-quality water that is injected is anticipated to blend with lower quality groundwater to produce water that complies with drinking water standards. To safeguard against the possibility of the quality of pumped water being worse than expected, wellhead treatment will be put in place. The well is currently being designed for injection at 1,500 gpm and extraction at 3,000 gpm. The facilities are planned to be constructed by 2008.

Diversified Water Resource Mix

The City is seeking to maximize the use of alternative supplies resulting in a diversified water resource mix. The City's Water System Master Plan identifies the maximum use of recycled water and desalted water, where appropriate and available, as part of the City's plan to ensure a reliable water supply for its service area.

Additionally, groundwater will continue to be a focus of water management for the City to optimize and ensure reliability of this valuable and significant local resource. The following section provides water quality program activities of the Watermaster that seek to ensure a reliable supply of groundwater.

Interconnections

To increase system reliability, the City has established interconnections with neighboring water agencies that may be activated in the event of an isolated interruption of water supply, and would serve to facilitate mutual aid. Interconnections presently exist between the City's system and the systems operated by the City of Ontario and the Monte Vista Water District. Other interconnections with the City of Chino Hills and the Jurupa Community Services District are in various stages of planning/design.

[43] The Watermaster and IEUA entered into an agreement with Metropolitan in 2003 for a groundwater conjunctive use storage program, which would include development of facilities to deliver and store imported water supplies in the Chino Basin.

5.9.2 Chino Basin Watermaster

The Chino Basin Watermaster is conducting water quality management activities in the Chino Groundwater Basin that help to safeguard the groundwater supply. [44]

Groundwater Quality Monitoring

In response to the results of the RWQCB and the Watermaster's groundwater quality monitoring programs (OBMP Program Element 1), the Watermaster has refined its water quality monitoring to focus on the following key areas:

- Identify and characterize water quality anomalies, such as the VOC anomaly south of the Ontario International Airport. Status reports on each of the anomalies were developed.
- Participate in the process of developing TMDLs for Reach 3 of the Santa Ana River and other water bodies in the lower Chino Basin.
- Assist the RWQCB with research, monitoring, and the crafting of investigative and cleanup and abatement orders for potential dischargers involved with the Ontario International Airport.

The Watermaster developed its streamlined, key-well water quality monitoring program in which approximately 107 "key wells" are sampled bi-annually in the southern portion of the Basin. Approximately 53 wells will be sampled on an annual basis including the following water quality analyses:

- All groundwater samples are analyzed for general mineral and general physical parameters.
- Wells within or near the VOC plumes south of Ontario and Chino Airports are being analyzed for VOCs, in addition to the general mineral and general physical parameters.
- All private wells in the key program are being analyzed for perchlorate because of its widespread occurrence from recent sampling, and the concerns expressed by appropriators faced with expensive treatment costs for perchlorate-contaminated wells.

The Watermaster's water quality program also includes the collection of water quality data from other sources, which is routinely checked and maintained in the Watermaster's database. Data sources include appropriators (groundwater pumpers), DHS, Department of Toxic Substance Control for Stringfellow Acid Pits, and the RWQCB for sites under Cleanup and Abatement Orders.

The Watermaster continues to update its understanding of contaminants of concern in various plumes, and the extent of their migration. Analysis of environmental records

[44] Chino Basin Watermaster, Status Report 2006-2, July to December 2006, January 2007

continues, including state and federal databases of known users and dischargers of potentially hazardous chemicals. The Watermaster is also analyzing the relationship of potential sources of perchlorate with downgradient impacted production wells. An analysis was also performed on current and emergent technologies for specific contaminants of concern in the Chino Basin, including nitrates, perchlorate, arsenic, and specific VOCs.

Construction of Monitoring Wells

The Watermaster and IEUA are planning to construct a number of monitoring wells at recharge basins to monitor the influence of recharge on groundwater levels in general, and to monitor the water quality resulting from the recharge of supplemental and storm waters. At least one monitoring well will be installed downgradient from each recharge facility that receives recycled water.

TDS and Nitrogen Objectives for the Chino Basin

The Watermaster has been working with the TDS/Nitrogen Task Force to revise the subbasin boundaries and the TDS and Nitrogen objectives for the Chino Basin to promote maximum beneficial use of water in the Basin. The maximum beneficial use approach[45] will increase water supplies and lower water management costs over time while meeting water quality requirements. In December 2003, the Watermaster proposed specific water-quality management zone boundaries, and the recommendations were incorporated into the TDS/N Basin Plan Amendment in November 2003. The Basin Plan Amendment was approved by the SWRCB in 2004.

Watermaster developed surface water and groundwater monitoring programs that measure the progress of the Watermaster and IEUA in achieving the "maximum benefit" goal in the Basin. One such program is the development of the salt budget tool to estimate the current and future salt loads to the Basin. The tool was used to establish a TDS objective for the northern part of the Basin based on maximum beneficial use of water available to the region. The salt load projections were based on the water supply plan in the OBMP Implementation Plan and include alternative recycled water and SWP water recharge scenarios.

The Watermaster conducts a surface water monitoring program to characterize the water quality of water in the recharge basins and the water levels in some of these basins. The purpose of this program is to estimate the volume and quality of recharge. This information is used for multiple management programs including estimating the safe yield of the Basin. Currently, the Watermaster monitors the water quality in 20 basins. Generally, the water quality samples are taken after storm events; however, monitoring of

[45] The quality of water required for each beneficial use often differs. Drinking water is the beneficial use that usually requires the highest quality water to protect human health. The quality of groundwater is a function of natural influences and human activities. Several beneficial uses exist for the use of groundwater. Groundwater quality standards for the Chino Basin protect water supplies for the beneficial use that requires the highest quality – drinking water. The standards also ensure the propagation and protection of wildlife and flora.

nuisance flows also occurs. Each basin has been sampled three to five times each year, and the frequency of sampling was increased in 2005 for basins that are scheduled to receive recycled water.

VOC Plume at Ontario International Airport

As discussed above, Groundwater Monitoring Programs include the identification and characterization of water quality anomalies, including the VOC anomaly south of the Ontario International Airport. Activities include assisting the RWQCB with research, monitoring and crafting of investigative and cleanup and abatement orders for potential dischargers. The Watermaster reports that data gathering is complete and RWQCB letters of Notification/Cleanup and Abatement Orders have been mailed to potential dischargers.

With regard to the Chino Airport VOC plume, the Watermaster obtained permission from private well owners to release well water quality data to the Watermaster's consultant performing quarterly groundwater monitoring of the VOC plume. The consultant is attempting to determine the source of the VOC plume.

The Watermaster's water level and water quality monitoring program over the last several years has resulted in a robust database that provides key information used by the Watermaster and other stakeholders in the Basin to continue VOC plume abatement and cleanup activities.

5.10 Water Shortage Plans

5.10.1 City of Chino's Water Shortage Contingency Plan

In 1991, the City of Chino adopted the Water Conservation Ordinance ("Ordinance"), Chapter 13.05 of the Municipal Code. The Ordinance implements a Water Shortage Contingency Plan, which includes voluntary consumption reduction measures, required consumption reduction measures, and penalties associated with failure to achieve compliance. The City Council can authorize and direct the implementation of certain restrictions (that are described in the Ordinance) based on prevailing conditions in the City, region, and/or state to protect public health, welfare, and safety or when the demand for water consumption threatens to exceed the City's available supply of quality water. These restrictions, which are more fully detailed in the City's 2005 Urban Water Management Plan, will provide for voluntary and/or mandatory water conservation throughout the City's service area.

As a sub-agency of IEUA, the City will also respond to MWD's Water Surplus and Drought Management (WSDM) Plan. IEUA will also follow the guidance of MWD's WSDM Plan, while considering the needs and water shortage actions of each sub-agency. The City will focus on implementing/enforcing the elements of its own contingency plan in association with IEUA's response to a declared regional water shortage.

5.10.2 MWD's Water Surplus and Drought Management (WSDM) Plan

In 1999, MWD in conjunction with its member agencies developed the WSDM Plan. This plan addresses both surplus and shortage contingencies. IEUA, and the City of Chino as a member agency of IEUA, have adopted and follow the MWD WSDM Plan.

The WSDM Plan will guide management of regional water supplies to achieve the reliability goals of Southern California's IRP. The IRP sought to meet long-term supply and reliability goals for future water supply planning. The WSDM Plan guiding principle is to minimize adverse impacts of water shortage and ensure regional reliability. From this guiding principle come the following supporting principles:

- Encourage efficient water use and economical local resource programs.
- Coordinate operations with member agencies to make as much surplus water as possible available for use in dry years.
- Pursue innovative transfers and banking programs to secure more imported water for use in dry years.
- Increase public awareness about water supply issues.

The WSDM Plan guides the operations of water resources (local resources, Colorado River, State Water Project, and regional storage) to ensure regional reliability. It identifies the expected sequence of resource management actions MWD will take during surpluses and shortages of water to minimize the probability of severe shortages that require curtailment of full-service demands. Mandatory allocations are avoided to the extent practicable; however, in the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

The WSDM Plan describes MWD's ability to meet demand during a Surplus, Shortage, Severe Shortage, and Extreme Shortage. The WSDM Plan also defines seven shortage management stages to guide resource management activities. Each year, MWD will consider the level of supplies available and the existing levels of water in storage to determine the appropriate management stage for that year. Each stage is associated with specific resource management actions designed to: 1) avoid an Extreme Shortage to the maximum extent possible; and 2) minimize adverse impacts to retail customers should an Extreme Shortage occur. The following describes water management actions to be taken under each of the seven shortage stages, with the first shortage stage being the least severe and requiring the least consumption reduction and the seventh stage being the most severe and requiring the most stringent consumption restrictions.

Shortage Stage 1: MWD may make withdrawals from Diamond Valley Lake.

Shortage Stage 2: MWD will continue Shortage Stage 1 actions and may draw from out-of-region groundwater storage.

Shortage Stage 3: MWD will continue Shortage Stage 2 actions and may curtail or temporarily suspend deliveries to Long Term Seasonal and Replenishment Programs in accordance with their discounted rates.

Shortage Stage 4: MWD will continue Shortage Stage 3 actions and may draw from conjunctive use groundwater storage (such as the North Las Posas program) and the SWP terminal reservoirs.

Shortage Stage 5: MWD will continue Shortage Stage 4 actions. MWD's Board of Directors may call for extraordinary conservation through a coordinated outreach effort and may curtail IAWP deliveries in accordance with their discounted rates. In the event of a call for extraordinary conservation, MWD's Drought Program Officer will coordinate public information activities with member agencies and monitor the effectiveness of ongoing conservation programs. The Drought Program Officer will implement monthly reporting on conservation program activities and progress and will provide quarterly estimates of conservation water savings.

Shortage Stage 6: MWD will continue Shortage Stage 5 actions and may exercise any and all water supply option contracts and/or buy water on the open market either for consumptive use or for delivery to regional storage facilities for use during the shortage.

Shortage Stage 7: MWD will discontinue deliveries to regional storage facilities, except on a regulatory or seasonal basis, continue extraordinary conservation efforts, and develop a plan to allocate available supply fairly and efficiently to full-service customers. The allocation plan will be based on the Board-adopted principles for allocation listed previously. MWD intends to enforce these allocations using rate surcharges. Any deliveries exceeding 102 percent of the allotment will be assessed a surcharge equal to three times MWD's full-service rate.

The overriding goal of the WSDM Plan is to never reach Shortage Stage 7, an Extreme Shortage. Given present resources, MWD fully expects to achieve this goal over the next ten years and beyond.

Reliability Modeling of the WSDM Plan

Using a technique known as "sequentially indexed Monte Carlo simulation," MWD undertook an extensive analysis of system reservoirs, forecasted demands, and probable hydrologic conditions to estimate the likelihood of reaching each Shortage Stage through 2010. The results of this analysis demonstrated the benefits of coordinated management of regional supply and storage resources. Expected occurrence of a Severe Shortage is four percent or less in most years and never exceeds six percent; equating to an expected shortage occurring once every 17 to 25 years. An Extreme Shortage was avoided in every simulation run.

MWD also tested the WSDM Plan by analyzing its ability to meet forecasted demands given a repeat of the two most severe California droughts in recent history. Hydrologic conditions for the years 1923–34 and 1980–91 were used in combination with demographic projections to generate two hypothetical supply and demand forecasts for the period 1999–2010. MWD then simulated operation to determine the extent of regional shortage, if any. The results again indicate 100 percent reliability for full-service demands through the forecast period.

5.10.3 Catastrophic Supply Interruption Plans

A water shortage emergency could be the result of a catastrophic event such as the failure of water distribution facilities, a regional power outage, earthquake, flood, supply contamination from a chemical spill, or other adverse conditions. The Chino City Council shall be responsible for authorizing and directing implementation of the water conservation stages described in the Water Shortage Contingency Plan, as appropriate, to address emergencies.

In the event of a water shortage emergency, the City will employ its Emergency Response Plan to minimize the impact of supply interruption. The major objectives to be accomplished include the following:

- Provide essential water services
- Manage repair crews
- Meet city, county, and state established priorities
- Coordinate service from outside water departments
- Provide and maintain an inventory of potable water resources
- Develop priorities

These objectives will be met through careful implementation of response activities, which include the following:

- Preserve water in storage
- Isolate areas for which restoration of service will require the longest period of time to accomplish and arrange for emergency water distribution
- Identify areas that can be served with minimal repairs
- Set priorities for repair work

Throughout this process, the City's Water Utility will coordinate with the City's Emergency Operation Center (EOC).

MWD Catastrophic Loss Planning Measures

To safeguard the region from a catastrophic loss of water supply, MWD and its member agencies have made and are continuing to make substantial investments in emergency storage, distribution system reliability upgrades, and interconnections with adjacent water purveyors. MWD's emergency plan assumes that demands are reduced 25 percent from the 2020 baseline demand forecast through extraordinary conservation, while the local supplies are largely undisrupted. With few exceptions, MWD asserts it can deliver emergency supply from its Diamond Valley Lake Reservoir throughout its service area via gravity, thereby eliminating dependence on power sources that could also be disrupted by a major earthquake. MWD's WSDM Plan will guide management of available supplies and resources during an emergency.

IEUA maintains an emergency response plan for its service area. IEUA expects to meet emergency demands within the region through extraordinary conservation and groundwater pumping measures. Multiple sources of power exist within the service area making any electrical shortages a temporary disruption. In addition, IEUA is pursuing additional mutual aid agreements between local retail agencies.[46]

5.11 Water Conservation as a Reliable Water Source

The City of Chino recognizes water use efficiency as an integral component of current and future water strategy for its service area. The City of Chino has made implementation of Best Management Practices (BMPs) the cornerstone of its conservation programs. As a sub-agency of IEUA, the City has supported regional water conservation, as a water resource management strategy, throughout the region. The major elements of the regional water conservation strategy are:

- Integrate conservation with other water management programs to maximize the overall water supply, water quality, flood control and environmental benefits to the region.
- Encourage all new developments to be more water (and energy) efficient.
- Encourage responsible irrigation and landscaping techniques, including use of recycled water, system audits, and weather-integrated automatically controlled system designs.
- Continue residential appliance/fixture retrofit programs that target the most wasteful in-door water consuming applications.
- Expand public education program and place an emphasis on development of partnerships with school districts to promote wise water use and how this behavior contributes to the quality of life and increased economic sustainability of the region.

The City and IEUA are signatories to the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California with the California Urban Water Conservation Council (CUWCC). The City coordinates with IEUA to implement many of the CUWCC established BMPs, which include the following:

1. Water survey programs for single-family residential and multifamily residential customers

[46] Agreement between City of Fontana and the Cucamonga County Water District was developed in 1999.

2. Residential plumbing retrofit
3. System water audits, leak detection, and repair
4. Metering with commodity rates for all new connections and retrofit of existing connections
5. Large landscape conservation programs and incentives
6. High-efficiency washing machine rebate programs
7. Public information programs
8. School education programs
9. Conservation programs for commercial, industrial, and institutional accounts
10. Wholesale agency programs
11. Conservation pricing
12. Water conservation coordinator
13. Water waste prohibition
14. Residential ultra-low-flush toilet replacement programs

The City is committed to conservation as a means to provide a sustainable supply of water to its service area, and plans to expand its conservation program in conjunction with IEUA into the future.

IEUA establishes conservation goals on a regional level and the City implements measures to help meet the regional goals. In its 2000 UWMP, IEUA established the regional goal for conservation for the succeeding 20 years at about 1,100 AFY of new conservation in each year for a total of 22,000 AFY of conserved water by 2020. Conservation activities during the last few years have been very successful and it is expected that the 22,000 AFY goal may be attained by 2010.[47] Chino's service area will contribute significantly to meeting this goal through various conservation measures detailed in its 2005 UWMP. Water conservation has become an increasingly important element of water management for the region, and as a result, many of the conservation programs established in 2000 have been expanded to meet the region's conservation goal. As the water wholesaler for the region, IEUA also introduced a variety of new and innovative incentive programs to help achieve the conservation goal. The programs directly benefit its sub-agencies, including the City of Chino. These programs will reduce the City's overall demand on imported water sources and ensure drought-proof resources.

[47] Inland Empire Utilities Agency, 2005 Urban Water Management Plan, December 2005

5.12 Dry Year Reliability Analysis

Most of Southern California is on track to have one of the driest precipitation years of record, potentially surpassing the prior record set in 2001-02. In Northern and Central California, forecasts of unimpaired runoff from Sierra Nevada watersheds are well below average. The Colorado River Basin, an important source of water supply for Southern California, continues to experience drought conditions with well below average runoff in six of the last eight years.

Defining when a drought begins is a function of the impacts of dry conditions on water users. One dry year does not constitute a drought for most California water users. Water year 2006 was the fifth wettest year on record for Northern California – and left above-average storage conditions in most major reservoirs and groundwater basins. Past experience with California droughts tells us that impacts of a single dry year are felt primarily by those most dependent on/affected by annual rainfall. California's last major statewide drought occurred from 1987 to 1992. 1977 has the distinction of being the single driest year of California's measured hydrologic record.

In 2007, the convergence of dry weather and environmental issues has created the need for aggressive drought planning and resource management on the part of MWD. On May 1, 2007, MWD implemented Shortage Stage 4 of its WSDM Plan. Shortage Stage 4 actions include withdrawals from Diamond Valley Lake, withdrawal from out-of-region groundwater storage, curtailment or temporary suspension of deliveries to Long Term Seasonal and Replenishment Programs, and may include withdrawal from conjunctive use groundwater storage.

To date, water demands on MWD have been satisfied with drawing on MWD storage water. MWD may need to implement Shortage Stage 5, which includes a call for extraordinary conservation through a coordinated outreach effort lead by MWD and possible curtailment of Interim Agricultural Water Program (IAWP) deliveries by January 2008. In 2005, the City's agricultural water demands were less than four percent of total demand and are projected to reduce to zero toward 2010. Curtailment of IAWP deliveries would have little effect on the City's imported water supply. Conservation activities are already being coordinated region-wide by MWD with other Southern California agencies in preparation for continuing drought conditions. For example, the Chino Basin Recycled Groundwater Project helps to reduce dependence on imported water supplies through the use of recycled water for groundwater replenishment, which is a local drought-proof supply of new water for the Chino Basin.

At this time, MWD's long-term outlook is to focus on the ability to supplement water supplies from various existing programs and develop and adopt a Shortage Allocation Plan, which is not currently included in the WSDM Plan. However, such a plan will likely not be produced quickly or without significant dialog and debate. In the meantime, water reliability planning by local agencies is occurring and MWD's reliability factors that are described in Section 5.5 are considered valid.

City of Chino Dry Year Reliability Analysis

The City's current water demand is approximately 21,000 AF. By the year 2030, the City's water demand is projected to be 31,429 AF, which includes an estimated 1,094 AFY of water associated with the Edgewater Communities.

The City's Water System Master Plan (WSMP) Update 2004 updated water demands to reflect the developments that occurred between 2000 and 2003, developments that were anticipated for 2004, and projected water demands through the year 2030. The City's 2005 UWMP is generally consistent with the WSMP Update 2004 and the current IEUA 2005 Regional UWMP.

Table 5.12-1 presents the dry year demand and supply factors utilized for the dry year analysis presented in **Tables 5.12-2** through **5.12-6**. These tables compare current and projected water supplies and demands in normal, single dry year and multiple dry year scenarios for the City (areas included in the City's 2005 UWMP) and the Project. The basis of the data in these tables is from Section 4.2 of the City's 2005 UWMP and **Table 4.1-2** of this WSA. Supply and demand assumptions for the Project are interpolated on a straight-line basis beginning in 2009 (based on estimated year of first water consumption) through project completion in 2019. Groundwater supplies during multiple dry years 1, 2, and 3 are estimated based on the factors in **Table 5.12-1**.[48] In those instances where the estimated supply exceeds the City's anticipated annual entitlements (i.e. rights) the City would incur a replenishment obligation. Such obligation may be satisfied by securing additional entitlements and/or tapping stored water reserves.

Based on the results presented in **Tables 5.12-2** through **5.12-6**, the City should not experience any deficiency in meeting its demands in normal, single dry and multiple dry year scenarios for the City's existing and future developments, including the Project. The data indicates in many instances the dry year condition water supply is greater than the normal year condition water supply. This is explained by the fact that a number of programs which have been designed specifically to provide water supply during a dry year (e.g. stored water purchase contracts) are "triggered" only during dry year conditions. The net result of the activation of these program activities actually provides for more water supplies during the dry year conditions than if normal conditions were to persist and the dry year programs were not activated.

Dry year analysis also includes activation of the DYY Program. **Table 5.12-1** presents the dry year demand and supply factors utilized for the DYY Program dry year analysis that are presented in **Tables 5.12-7** through **5.12-16**. As of June 30, 2007, about 88,400

[48] The City's current groundwater ability as a share of the Basin operating safe yield (assigned water rights), plus additional groundwater supply ability from reallocations of Early Transfers and Land Use Conversions.

AF has been stored in the Basin in the DYY account.[49] Up to 100,000 AF can be stored if wet years persist and allow additional storage. The analysis considers both the current amount stored in the DYY account and a full account (i.e., 100,000 AF) scenario. Each scenario is applied to any of the 5-year increments during the planning period and assumes the maximum "take" during dry years at the prescribed levels by each participating agency as discussed in Section 5.4. The analysis also assumes each of the DYY agencies have the capability of taking their prescribed amounts. The DYY Program is scheduled to become effective in 2008 when facilities needed to support the DYY Program are constructed[50]; however, to reasonably analyze the effect of multiple dry years, the DYY program will be consistent with the multiple dry years in **Tables 5.12-7** through **5.12-11**.

The first DYY analysis assumes 88,400 AF in storage, which allows for only approximately three years of "take"; the first year at 33,000 AF and the second year at 33,000 AF, and the third year at 22,400 AF. For the City of Chino, the prescribed amount for the first DYY analysis is 1,159 AF for the first two years and 787 AF for the third year.

The second DYY analysis assumes the maximum 100,000 AF in storage, which allows for the maximum amount of "take" for three years (i.e., 33,000 AF each year). The City of Chino's prescribed amount is 1,159 AF for each of the three years. This analysis is shown in **Tables 5.12-12** through **5.12-16**.

[49] Chino Basin Watermaster, Chino Basin OBMP. Status Report to the Court, Status Report 2007-1: January to June 2007, July 2007
[50] Inland Empire Utilities Agency, 2005 Urban Water Management Plan

Table 5.12-1 - City of Chino Dry Year Demand and Supply Factors

	Source	Normal Year Factor	Dry Year Factors			
			Single Dry	Multiple 1	Multiple 2	Multiple 3
Demand[1]	Potable	1.000	1.054	1.085	1.042	0.946
	Recycled	1.000	1.000	1.000	1.107	1.145
Supply	Groundwater	1.000	1.054	1.054	1.070	1.085
	Desalted	1.000	1.000	1.000	1.000	1.000
	Recycled	1.000	1.000	1.000	1.107	1.145
	Imported					
w/MWD Reliability Projections[2]	2005 - 2010	1.000	1.065	0.982	0.982	0.982
	2011 - 2015	1.000	1.167	1.068	1.068	1.068
	2016 - 2020	1.000	1.131	1.033	1.033	1.033
	2021 - 2025	1.000	1.119	1.024	1.024	1.024
	2026 - 2030	1.000	1.119	1.024	1.024	1.024

[1] Source: City of Chino 2005 Urban Water Management Plan. Section 4.2.
[2] Source: City of Chino 2005 Urban Water Management Plan, Section 4.2, Tables 4.2-1 and 4.2-2.

Table 5.12-2
20-Year Water Supply and Demand Comparison
During Multiple Dry Water Years Including the Project - Years 2006-2011
(AFY)

	2006*	2007	2008	2009	2010	2011
	Normal	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	16,306	16,661	17,016	18,847	18,469	17,103
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Total Demand	**19,918**	**20,604**	**21,290**	**23,452**	**24,134**	**23,134**
Supply						
Groundwater - City	7,159	7,643	8,126	9,075	9,730	10,392
Groundwater - Project	0	0	0	102	208	316
Imported - WFA	5,353	5,353	5,353	5,257	5,257	5,717
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Supply Total	**21,124**	**21,939**	**22,753**	**24,039**	**25,859**	**27,455**
Supply Surplus	**1,206**	**1,335**	**1,464**	**587**	**1,725**	**4,321**

* 2006 is actual data.

Table 5.12-3
20-Year Water Supply and Demand Comparison During
Single and Multiple Dry Water Years Including the Project - Years 2012-2016
(AFY)

	2012	2012	2013	2014	2015	2016
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	19,649	18,642	19,204	21,447	21,182	19,468
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Total Demand	**25,308**	**24,301**	**25,256**	**28,180**	**28,751**	**27,954**
Supply						
Groundwater - City	10,767	10,215	10,853	12,111	12,977	13,389
Groundwater - Project	332	315	339	382	413	445
Imported - WFA	5,701	5,353	5,353	5,717	5,717	5,530
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Supply Total	**27,459**	**26,542**	**27,596**	**29,943**	**31,675**	**32,850**
Supply Surplus	**2,151**	**2,241**	**2,340**	**1,763**	**2,925**	**4,896**

Table 5.12-4
20-Year Water Supply and Demand Comparison During
Single and Multiple Dry Water Years Including the Project - Years 2017-2021
(AFY)

	2017	2017	2018	2019	2020	2021
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	21,934	20,810	21,042	23,081	22,390	20,363
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Total Demand	**29,875**	**28,752**	**29,512**	**32,082**	**32,932**	**31,266**
Supply						
Groundwater - City	13,230	12,552	12,765	13,678	14,112	14,310
Groundwater - Project	444	422	433	469	476	483
Imported - WFA	6,247	5,353	5,353	5,530	5,530	5,481
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Supply Total	**32,863**	**31,268**	**32,022**	**33,677**	**35,660**	**36,178**
Supply Surplus	**2,988**	**2,517**	**2,509**	**1,595**	**2,728**	**4,912**

Table 5.12-5
20-Year Water Supply and Demand Comparison During
Single and Multiple Dry Water Years Including the Project - Years 2022-2026
(AFY)

	2022	2022	2023	2024	2025	2026
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,726	21,562	21,599	23,475	22,583	20,547
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,249**	**31,085**	**31,122**	**32,998**	**33,125**	**31,451**
Supply						
Groundwater - City	13,901	13,189	13,189	13,901	14,112	14,310
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	6,054	5,353	5,353	5,481	5,481	5,481
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,947**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,698**	**2,425**	**2,388**	**1,377**	**2,487**	**4,728**

Table 5.12-6
20-Year Water Supply and Demand Comparison During
Single and Multiple Dry Water Years Including the Project - Years 2027-2031
(AFY)

	2027	2027	2028	2029	2030	2031
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,942	21,766	21,813	23,717	22,826	20,767
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,465**	**31,289**	**31,336**	**33,240**	**33,368**	**31,671**
Supply						
Groundwater - City	13,901	13,189	13,189	13,901	14,112	14,310
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	5,990	5,353	5,353	5,481	5,481	5,481
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,883**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,419**	**2,221**	**2,174**	**1,134**	**2,244**	**4,507**

DYY PROGRAM AT 88,400 AF OF STORAGE

Table 5.12-7 – DYY Program at 88,400 AF of Storage
20-Year Water Supply and Demand Comparison
During Multiple Dry Water Years Including the Project - Years 2006-2011
(AFY)

	2006*	2007	2008	2009	2010	2011
	Normal	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	16,306	16,661	17,016	18,847	18,469	17,103
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Total Demand	**19,918**	**20,604**	**21,290**	**23,452**	**24,134**	**23,134**
Supply						
Groundwater - City	7,159	7,643	8,126	10,234	10,889	11,179
Groundwater - Project	0	0	0	102	208	316
Imported - WFA	5,353	5,353	5,353	4,098	4,098	4,930
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Supply Total	**21,124**	**21,939**	**22,753**	**24,039**	**25,859**	**27,455**
Supply Surplus	**1,206**	**1,335**	**1,464**	**587**	**1,725**	**4,321**

* 2006 is actual data.

Table 5.12-8 – DYY Program at 88,400 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2012-2016
(AFY)

	2012	2012	2013	2014	2015	2016
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	19,649	18,642	19,204	21,447	21,182	19,468
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Total Demand	**25,308**	**24,301**	**25,256**	**28,180**	**28,751**	**27,954**
Supply						
Groundwater - City	10,767	10,215	10,853	13,270	14,136	14,176
Groundwater - Project	332	315	339	382	413	445
Imported - WFA	5,701	5,353	5,353	4,558	4,558	4,743
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Supply Total	**27,459**	**26,542**	**27,596**	**29,943**	**31,675**	**32,850**
Supply Surplus	**2,151**	**2,241**	**2,340**	**1,763**	**2,925**	**4,896**

**Table 5.12-9 – DYY Program at 88,400 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2017-2021
(AFY)**

	2017	2017	2018	2019	2020	2021
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	21,934	20,810	21,042	23,081	22,408	20,363
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Total Demand	**29,875**	**28,752**	**29,512**	**32,082**	**32,949**	**31,266**
Supply						
Groundwater - City	13,230	12,552	12,765	14,837	15,271	15,097
Groundwater - Project	444	422	433	469	476	483
Imported - WFA	6,247	5,353	5,353	4,371	4,371	4,694
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Supply Total	**32,863**	**31,268**	**32,022**	**33,677**	**35,660**	**36,178**
Supply Surplus	**2,988**	**2,517**	**2,509**	**1,595**	**2,711**	**4,912**

**Table 5.12-10 – DYY Program at 88,400 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2022-2026
(AFY)**

	2022	2022	2023	2024	2025	2026
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,726	21,562	21,599	23,475	22,583	20,547
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,249**	**31,085**	**31,122**	**32,998**	**33,125**	**31,451**
Supply						
Groundwater - City	13,901	13,189	13,189	15,060	15,271	15,097
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	6,054	5,353	5,353	4,322	4,322	4,694
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,947**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,698**	**2,425**	**2,388**	**1,377**	**2,487**	**4,728**

Table 5.12-11 – DYY Program at 88,400 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2027-2031
(AFY)

	2027	2027	2028	2029	2030	2031
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,942	21,766	21,813	23,717	22,826	20,767
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,465**	**31,289**	**31,336**	**33,240**	**33,368**	**31,671**
Supply						
Groundwater - City	13,901	13,189	13,189	15,060	15,271	15,097
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	5,990	5,353	5,353	4,322	4,322	4,694
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,883**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,419**	**2,221**	**2,174**	**1,134**	**2,244**	**4,507**

DYY PROGRAM AT 100,000 AF OF STORAGE

Table 5.12-12 – DYY Program at 100,000 AF of Storage
20-Year Water Supply and Demand Comparison
During Multiple Dry Water Years Including the Project - Years 2006-2011
(AFY)

	2006*	2007	2008	2009	2010	2011
	Normal	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	16,306	16,661	17,016	18,847	18,469	17,103
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Total Demand	**19,918**	**20,604**	**21,290**	**23,452**	**24,134**	**23,134**
Supply						
Groundwater - City	7,159	7,643	8,126	10,234	10,889	11,551
Groundwater - Project	0	0	0	102	208	316
Imported - WFA	5,353	5,353	5,353	4,098	4,098	4,558
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	3,612	3,943	4,274	4,605	5,665	6,031
Supply Total	**21,124**	**21,939**	**22,753**	**24,039**	**25,859**	**27,455**
Supply Surplus	**1,206**	**1,335**	**1,464**	**587**	**1,725**	**4,321**

* 2006 is actual data.

**Table 5.12-13 – DYY Program at 100,000 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2012-2016
(AFY)**

	2012	2012	2013	2014	2015	2016
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	19,649	18,642	19,204	21,447	21,182	19,468
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Total Demand	**25,308**	**24,301**	**25,256**	**28,180**	**28,751**	**27,954**
Supply						
Groundwater - City	10,767	10,215	10,853	13,270	14,136	14,548
Groundwater - Project	332	315	339	382	413	445
Imported - WFA	5,701	5,353	5,353	4,558	4,558	4,371
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	5,659	5,659	6,052	6,733	7,568	8,486
Supply Total	**27,459**	**26,542**	**27,596**	**29,943**	**31,675**	**32,850**
Supply Surplus	**2,151**	**2,241**	**2,340**	**1,763**	**2,925**	**4,896**

**Table 5.12-14 – DYY Program at 100,000 AF of Storage
20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2017-2021
(AFY)**

	2017	2017	2018	2019	2020	2021
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	21,934	20,810	21,042	23,081	22,390	20,363
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Total Demand	**29,875**	**28,752**	**29,512**	**32,082**	**32,932**	**31,266**
Supply						
Groundwater - City	13,230	12,552	12,765	14,837	15,271	15,469
Groundwater - Project	444	422	433	469	476	483
Imported - WFA	6,247	5,353	5,353	4,371	4,371	4,322
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	7,941	7,941	8,471	9,000	10,542	10,904
Supply Total	**32,863**	**31,268**	**32,022**	**33,677**	**35,660**	**36,178**
Supply Surplus	**2,988**	**2,517**	**2,509**	**1,595**	**2,728**	**4,912**

Table 5.12-15 – DYY Program at 100,000 AF of Storage 20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2022-2026 (AFY)

	2022	2022	2023	2024	2025	2026
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,726	21,562	21,599	23,475	22,583	20,547
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,249**	**31,085**	**31,122**	**32,998**	**33,125**	**31,451**
Supply						
Groundwater - City	13,901	13,189	13,189	15,060	15,271	15,469
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	6,054	5,353	5,353	4,322	4,322	4,322
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,947**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,698**	**2,425**	**2,388**	**1,377**	**2,487**	**4,728**

Table 5.12-16 – DYY Program at 100,000 AF of Storage 20-Year Water Supply and Demand Comparison During Single and Multiple Dry Water Years Including the Project - Years 2027-2031 (AFY)

	2027	2027	2028	2029	2030	2031
	Single Dry	Normal	Normal	Multiple 1	Multiple 2	Multiple 3
Demand						
Potable	22,942	21,766	21,813	23,717	22,826	20,767
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Total Demand	**32,465**	**31,289**	**31,336**	**33,240**	**33,368**	**31,671**
Supply						
Groundwater - City	13,901	13,189	13,189	15,060	15,271	15,469
Groundwater - Project	469	445	445	469	476	483
Imported - WFA	5,990	5,353	5,353	4,322	4,322	4,322
Desalter - CDA	5,000	5,000	5,000	5,000	5,000	5,000
Recycled	9,523	9,523	9,523	9,523	10,542	10,904
Supply Total	**34,883**	**33,510**	**33,510**	**34,375**	**35,612**	**36,178**
Supply Surplus	**2,419**	**2,221**	**2,174**	**1,134**	**2,244**	**4,507**

6.0 CONCLUSION

The City of Chino optimizes its water resource supply through an integrated resource approach, utilizing available water programs and projects. The City receives its water supplies from groundwater, desalted water, imported water, and recycled water. Complexities and continuing refinement in groundwater management and rights, evolving development of the regional recycled water system and supplies, desalter expansion and optimization projects, and challenges of imported water reliability make analysis of water demand and supply complicated.

The City is preparing an EIR for the Edgewater Communities (Project), which includes an assessment of utility services, including water supply. Recent legislation, SB 610, requires that a water supply assessment be prepared to document the sufficiency of an available water supply for the City and the proposed Project.

This water supply assessment (WSA) is considered at a point in time when known future projects are considered. It is also understood that new and innovative programs and projects in concept are yet to be designed. Therefore, WSAs are a part of the ongoing planning efforts of the City to optimize its water resource program.

This WSA includes a discussion of the relevant legislation requiring the WSA, an overview of the proposed Project, analysis of water demands for the City's existing supply sources and the Project over a 20-year or more planning period, a discussion of reliability of the City's water supplies, including each agency that impacts water supply and water quality to the region, and concludes with a sufficiency analysis of water supply during normal, single-dry, and multiple dry years over a 20-year planning period. **The WSA does not evaluate the adequacy of the City's infrastructure to handle the available water supplies or make any recommendations with respect to capital improvements that may be necessary in order to provide an adequate level of service to the Edgewater Communities.**

This WSA identifies a sufficient water supply for the Project over a 20-year planning period. Edgewater Associates I, LLC (Developer) has estimated an absorption rate for residential land uses over a 10-year period, with water services beginning to come online in 2009. It is anticipated that the phasing will allow for water demands to be met entirely from sources that are currently being planned, developed and implemented, including desalter water, recycled water, and conservation programs.

The Project has a total area of 272.93 acres, with 142 acres for residential and 131 acres of open space including major lakes, water features and recreational facilities. The Project is located east of State Route 71, north of State Route 91, west of Interstate 15 and south of State Route 60 and is situated in the southwestern corner of San Bernardino County. The City's General plan shows the current land use for this area as open space natural, open space recreational, agricultural and open space natural, and limited estate residential.

Source of Water

The City obtains water from the following primary water sources: groundwater produced via City wells, imported water, desalted water, and recycled water. The City currently receives approximately 42 percent of its water supply from groundwater, 20 percent from imported water, 22 percent from desalted water, and 16 percent from recycled water.

Water Demand and Supply Projections

The build-out of the Project will increase the City's water demand by the year 2019 by approximately 1,094 AFY of water (484 AFY of potable; 610 AFY of recycled water) yielding a total projected City demand of 31,048 AFY by 2021, as shown in **Table 4.1-2**. Demand projections are carried out to the year 2030 when total demand is estimated at 31,429 AFY.

Analysis of water supply projections for the City, including the Project, demonstrates that projected supplies exceed demand through the year 2030. These projections consider land use, water development programs and projects, and water conservation. The analysis shows that groundwater and recycled water supplies increase and desalted and imported water supplies remain stable. Recycled water will be used to supply new development and certain existing uses, such as landscape irrigation and industrial uses, currently supplied with potable water.

The City has the opportunity to increase supply to meet demand through the following measures: 1) production of groundwater based on safe yield limitations; 2) increasing imported water purchases, if available and if there is available WFA capacity; 3) purchasing additional desalted water if more is produced than needed to satisfy requirements of other purchasers; and 4) purchasing additional recycled water, if available. Collectively, these additional options will enable water supply to exceed water demand for the City of Chino now and into the future.

Analyses of normal, single-dry, and multiple-dry year scenarios also demonstrate the City's ability to satisfy demand during the 20-year planning period in all hydrologic conditions, even under reduced imported water supply conditions and implementation of the DYY Program.

Collectively, the information included in this Water Supply Assessment identifies a sufficient and reliable water supply for the City, now and into the future, including a sufficient water supply for the Edgewater Communities.

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The following documents were used, in conjunction with discussions with the City of Chino and Edgewater Associates I, LLC in preparing this water supply assessment:

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City of Chino
Water Supply Assessment
Technical Memorandum

Date:	August 17, 2007
Subject:	**Edgewater Communities Water Demand Analysis**
Prepared By:	Saurabh Thapar
Reviewed By:	Russ Bergholz, P.E. and Denise Landstedt

Introduction

In support of our overall Water Supply Assessment effort, Dudek has developed water demand projections for the proposed Edgewater Communities (Project) within the City of Chino (City). Water demand projections were determined in five-year increments through build-out. The proposed Project is a master-planned, water-oriented, residential community at the southern end of the Preserve. This Water Supply Assessment is prepared for Edgewater Associates I, LLC (Developer) on behalf of the City to be included in the Environmental Impact Report (EIR) for the Project. The purpose of this technical memorandum is to develop the additional water demands that need to be served by the City as a result of creation of the proposed residential community, also known as the Edgewater Communities.

This technical memorandum will address the following:

- Unit water demand factors.
- Existing land use and water demand projection.
- Proposed land use and phasing.
- Proposed potable and recycled water demand projections.

Background

The City is the water supplier for the Project and also the lead agency for development of the EIR. The City currently serves approximately 21,000 acre-ft per year (afy) or 19.3 million gallons per day (MGD) of potable water and recycled water annually to an area of approximately 27 square miles and 15,830 customers. The build-out of The Preserve and the College Park developments will increase the water demand by approximately 13,693 afy of which 8,074 afy will by potable water and 5,619 afy will by recycled water. The City's current population is anticipated to increase from 76,000 to 129,000 by 2030. Contributing to this increase is The Preserve and the College Park development areas of the City, which are projected to be built out in 2020 and 2015 respectively. The increase in population is estimated at a growth rate of five percent per five years or about one percent annually.

The City currently obtains water from the following primary water sources: 1) groundwater from the Chino Groundwater Basin, 2) imported State Water Project (SWP) water (surface water), 3) desalted water, and most recently 4) recycled water. The City currently receives approximately 42 percent of its water supply from groundwater, 20 percent from imported water, 22 percent from desalted water from Chino I Desalter, and 16 percent from recycled water. Current and planned improvements will increase the use of recycled and desalted water. The City receives its imported water from the Metropolitan Water District of Southern California (MWD) through the Inland Empire Utility Agency (IEUA), who wholesales the water to the City through the Water Facilities Authority (WFA). The WFA, a joint powers authority, built and manages the Agua de Lejos Water Treatment Plant to treat and distribute water to it members, including the City. IEUA also produces recycled water at its water reclamation facilities and wholesales to the City.

As per the information provided by Huitt-Zollars, Edgewater Associates I, LLC's civil engineer, the proposed Project is comprised of six land use categories including 142.09 acres (1,074 units) of three residential land use categories and 130.84 acres of three open space land use categories. The total area of the Project is 272.93 acres. The project will include major lakes and water features as well as substantial areas of open space and extensive recreational facilities. The project includes five planned lakes totaling 39.22 acres, along with stream, waterfalls, and decorative rock work.

Unit Water Demand Factors

In order to determine potential water demand from a future designated land use or potential building square footage, an assumption of the unit water demand by area use must be prepared. The term "*unit water demand factor*" refers to the average water demand per unit area or dwelling units for a particular land use category.

Dudek investigated the unit water demand factors prepared for the 2003 and 2004 Water Master Plan Updates by MWH for the City. Table 1 summarizes the unit water demand factors and source of water supply for all the land use categories used in this study. The unit water demand factors were used to generate the existing and proposed demand projections. Source water percentages were used to determine relative potable and recycled water demands.

Table 1 – Unit Water Demand Factors and Water Sources

Land Use Category	Unit Water Demand Factor (gpd/acre)	Percent Indoor Water (Potable)**	Percent Outdoor Water (Recycled)**
Residential			
Low Density Residential	3,600	70%	30%
Medium Density Residential	4,600	70%	30%
High Density Residential	7,600***	70%	30%
Open Space			
Agriculture	2,900	0%	100%
Open Space Recreational – Irrigated	2,900	10%	90%
Open Space Recreational – Unirrigated	0	0%	0%
Open Space Natural	0	0%	0%
Open Space Water (Lakes)*	N/A	0%	100%

** Water Usage for the Lakes was provided by Huitt-Zollars*

*** Indoor and Outdoor water usage percentages per 2004 Master Plan table 4-6.*

****The developer proposed 15.63 acres of "High Density Residential" land use in the project. However, the actual density for this area falls within the "Medium Density Residential" range. Despite this, a demand factor of 7,600 gpd/acre is utilized to be conservative. This 7,600 gpd/acre demand factor corresponds to the "High Density Residential" land use category in the 2004 Water Master Plan Update.*

Existing Land Use and Water Demand Projection

The existing land uses of the subject property are open space natural, open space recreational, agricultural and open space natural, and estate residential, per the City of Chino General Plan.

There is no current water service to the property. According to the process typically utilized for urban water management planning for future water demands, the future increase in water demand is generally estimated relative to projected population growth within the service area. Because the property currently has no potable water service, there was no future water service projected for the property, as calculated within the 2005 UWMP.

Proposed Land Use and Phasing

The relative growth and development of the Project was evaluated by Huitt-Zollars, on behalf of the Developer. A detailed ultimate land use evaluation was provided itemizing the development potential of the Project, broken down by either residential or open space land use categories. The data contained future build-out land use information including the area and the dwelling units.

The majority of residential land uses projected in the study area consists of low density residential, with an average density factor of 5.5 dwelling units per acre (DU/acre) and a total of 537 units. Other residential land uses are medium density residential with an average of 10 DU/acre comprising 287 units and high density residential with an average of 16 DU/acre comprising 250 units. Open space land use categories consist of 71.39 acres of open space recreation, 39.22 acres of open space water (Lakes), and 20.23 acres of open space natural.

Table 2 presents the ultimate build-out acreage and dwelling units per acre of each land use category in the Project.

Table 2 – Ultimate Land Use

Land Use	*Area (acres)*	*Percent Land Use*	*Average DU/acre*	*Total Units*
Low Density Residential	97.76	36%	5.50	537
Medium Density Residential	28.70	11%	10.00	287
High Density Residential	15.63	6%	16.00	250
Residential Sub Total	***142.09***	***52%***	**-**	***1,074***
Open Space Recreation – Irrigated	35.70	13%	-	-
Open Space Recreation - Unirrigated	35.69	13%	-	-
Open Space Natural	20.23	7%	-	-
Open Space Water	39.22	14%	-	-
Open Space Sub Total	***130.84***	***48%***	-	-
Grand Total	***272.93***	***100%***	**-**	***1,074***

A graphical representation of the ultimate land use categories broken down by areas and percent acreage can be seen in Figure 1.

The Developer has estimated an absorption rate for residential land uses over a 10 year period, with water services beginning to come online in 2009. Based on the absorption rate, Table 3 identifies the number of residential units anticipated to begin demanding water within the 5-year increment planning phases of the Water Supply Assessment.

Table 3 – Projected Unit Counts by WSA Phase

Land Use	*Phase 1 (2007-2011) (units)*	*Phase 2 (2012-2016) (units)*	*Phase 3 (2017-2021) (units)*	*Total Units*
Low Density Residential	172	270	95	537
Medium Density Residential	180	107		287
High Density Residential	250			250
Total	***602***	***377***	***95***	***1074***

Utilizing the total acreage for each residential land use type, a percentage of residential land use developed in each Phase is presented in Table 4.

Table 4 – Percent Completion by WSA Phase

Land Use	Phase 1 (2007-2011) (% of Total)	Phase 2 (2012-2016) (% of Total)	Phase 3 (2017-2021) (% of Total)	Total Units
Low Density Residential	32%	50%	18%	100%
Medium Density Residential	63%	37%		100%
High Density Residential	100%			100%

All irrigated open space recreational lands are anticipated to be constructed within Phase 1. Lakes 2 and 3 are also anticipated to be constructed and filled within Phase 1, with Lake 1, 4 and 5 being filled in Phase 2. Table 5 summarizes the development of non-residential lands utilizing recycled water. The Developer has indicated that no more than 50% of land designated as Open Space Recreational will be irrigated as part of the project.

Table 5 – Projected Development of Non-Residential Lands

Land Use	Phase 1 (2007-2011) (acres)	Phase 2 (2012-2016) (acres)
Open Space Recreation – Irrigated	35.70	-
Open Space Recreation - Unirrigated	35.69	-
Open Space Natural	20.23	-
Open Space Water	14.56	24.66
Open Space Sub Total	***106.18***	***24.66***

Proposed Water Demand Projection

Projected water demands for each of the future land use categories, with the exception of open space water, which is comprised of five lakes, were determined by multiplying the water demand factors with the corresponding area. Below is the equation used to calculate the future water demands:

Future Water Demands = Unit Water Demand Factor (gpd/acre)*Area (acres)

The water demand projections were estimated for both potable water and recycled water using the above equation and the source water percentages listed on Table 1.

The water demand for the lakes was also provided by Huitt-Zollars. The methodology used to calculate the water demand for the lakes states that the water demand is derived from the loss due to seasonal evaporation. The water demand for all the lakes will be met by the recycled water. A summary of projected water demands for the lakes as provided by Huitt-Zollars is presented in Table 6.

Table 6 – Recycled Water Demand for Lakes

Lake	*Area (acres)*	*Evaporation during Winter (gal/90 days)*	*Evaporation during Spring (gal/90 days)*	*Evaporation during Summer (gal/90 days)*	*Evaporation during Autumn (gal/90 days)*	*Total Evaporation (gal/year)*	*Total Evaporation (afy)*
1	21.24	6,229,793	12,978,735	20,246,827	12,978,735	52,434,090	160.92
2	1.96	574,240	1,196,333	1,866,279	1,196,333	4,833,185	14.83
3	12.6	3,936,200	8,200,418	12,792,651	8,200,418	33,129,687	101.68
4	0.72	211,385	440,385	687,001	440,385	1,779,156	5.46
5	2.70	790,337	1,646,535	2,568,595	1,646,535	6,652,002	20.41
Total	***39.22***	***11,741,955***	***24,462,406***	***38,161,353***	***24,462,406***	***98,828,120***	***303.30***
Total (gpd)		***130,467***	***271,805***	***424,015***	***271,805***	***270,762***	

As per the information provided in the table above, the peak recycled water demand of 474.98 afy or 424,015 gpd will occur during summer. An average annual recycled water demand of 303.30 afy or 270,762 gpd is required to compensate for the loss due to evaporation for all five lakes. Table 7 provides a summary of the initial fill volume and the 24-hour replenishment rate required to maintain the lakes full during the summer months. Note that any subsequent draining and refilling have not been included in average annual water demand calculations.

Table 7 – Recycled Water Required for Lakes

Lake	*Area (acres)*	*Initial Fill Volume (acre-feet)*	*Summer Replenishment 24 hr Fill Rate (gpm)*
1	21.24	255	156
2	1.96	18	14
3	12.60	163	99
4	0.72	6	5
5	2.70	28	20
Total	***39.22***	***470***	***294***

Dudek utilized the proposed growth phasing to determine the potable water and recycled water demands for the Project in five year increments through build-out. The existing demands established the starting point for the evaluation. Table 8 summarizes the total water demand by all land use categories whereas Tables 9 and 10 divide each average water demand according to the percentage of potable versus recycled water usage in Table 1. No additional water demands are projected within Phase 4 (the final five-year increment to 20-years) of the WSA because the Project is expected to reach build-out by 2019.

Table 8 – Total Water Demand Projection

Land Use	*Phase 1 (2007-2011) (gpd)*	*Phase 2 (2012-2016) (gpd)*	*Phase 3 (2017-2021) (gpd)*	*Total (gpd)*	*Total (afy)*
Low Density Residential	112,724	176,951	62,261	351,936	394.2
Medium Density Residential	82,800	49,220		132,020	147.9
High Density Residential	118,788			118,788	133.1
Open Space Recreational – Irrigated	103,515	-	-	103,515	116.0
Open Space Recreational - Unirrigated	-	-	-	0	0.0
Open Space Natural	-	-	-	0	0.0
Open Space Water (Lake Water Replenishment)	104,008	166,754	-	270,762	303.3
Total GPD	***521,835***	***392,925***	***62,261***	**977,021**	**-**
Total AFY by Phase	***584.6***	***440.2***	***69.7***		**1094.5**
Open Space Water (Lake Filling – One Time)	181	289	**-**	**-**	**-**

Note: Phased projections are anticipated water demands within each 5-year phase and are not cumulative

Table 9 – Potable Water Demand Projection

Land Use	*Phase 1 (2007-2011) (gpd)*	*Phase 2 (2012-2016) (gpd)*	*Phase 3 (2017-2021) (gpd)*	*Total (gpd)*	*Total (afy)*
Low Density Residential	78,907	123,866	43,583	246,355	276.0
Medium Density Residential	57,960	34,454		92,414	103.5
High Density Residential	83,152			83,152	93.1
Recreational Irrigation*	10,352	-	-	10,352	11.6
Natural Open Space	-	-	-	0	0.0
Lake Water Replenishment	-	-	-	0	0.0
Total GPD	***230,370***	***158,320***	***43,583***	**432,272**	**-**
Total AFY	***258***	***177***	***49***	**-**	**484.2**

Note: Phased projections are anticipated water demands within each 5-year phase and are not cumulative.

Table 10 – Recycled Water Demand Projection

Land Use	*Phase 1 (2007-2011) (gpd)*	*Phase 2 (2012-2016) (gpd)*	*Phase 3 (2017-2021) (gpd)*	*Total (gpd)*	*Total (afy)*
Low Density Residential	33,817	53,085	18,678	105,581	118.3
Medium Density Residential	24,840	14,766	-	39,606	44.4
High Density Residential	35,636	-	-	35,636	39.9
Recreational Irrigation	93,164	-	-	93,164	104.4
Natural Open Space	-	-	-	0	0.0
Lake Water Replenishment	104,008	166,754	-	270,762	303.3
Total GPD	***291,465***	***234,605***	***18,678***	**544,749**	**-**
Total AFY by Phase	**327**	**262**	**21**	**-**	**610.2**
Open Space Water (Lake Filling – One Time)	181	289	-	-	**n/a**

Note: Phased projections are anticipated water demands within each 5-year phase and are not cumulative

Conclusion

Based on the projected development and growth of the Project, approximately 62% of ultimate water demands within the study area will come from the residential land use categories. Open space land use categories will account for 38% of the ultimate water demands. Overall, an average ultimate annual water demand of 1,094 afy or 977,021 gpd is estimated out of which 432,272 gpd or 484.2 afy will be potable water demand for residential land use categories and 544,749 gpd or 610.2 afy will be recycled water demand for irrigation, lake water replenishment and open space land use categories. An additional 470 AF of recycled water will be used for initial lake filling. Therefore, the Project's annual demand for recycled water will be greater during the years when the lakes are initially filled.

K.3 - Water System Master Plan Update
Prepared by MWH - October 2007

CITY OF CHINO

Water System Master Plan Update
for the Edgewater Development

October 2007

MWH

Water System Master Plan Update for the Edgewater Development

October 2007

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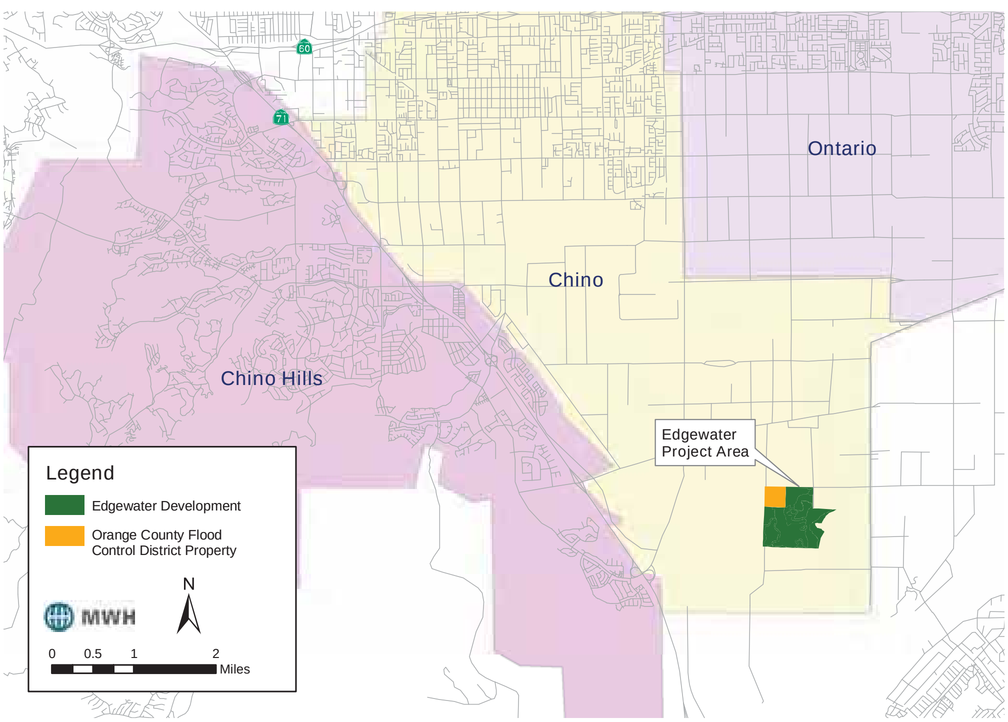
Water System Master Plan Update for the Edgewater Development

INTRODUCTION

The Edgewater Communities (Edgewater Development) is a 272-acre proposed development located in the southern region of the City of Chino (City). The Edgewater Development was originally designated as open space natural, open space recreational, agricultural and open space natural, and limited estate residential in the City's General Plan and Preserve Specific Plan. The development is located south of Chino-Corona Road and east of Cucamonga Avenue. This Water System Master Plan Update (study) assumes that the adjacent property to the northwest, owned by the Orange County Flood Control District, will also develop. A project location map displaying the Edgewater Development in relation to its surrounding regions is shown on **Figure 1**. The purpose of this study is to recommend a standalone water distribution system to provide potable water for the Edgewater Development. In addition, this study includes recommendations on the recycled water facilities that would be required to distribute recycled water purchased from the Inland Empire Utilities Agency (IEUA) for lake replenishment and irrigation purposes within the Edgewater Development.

Figure 1
Project Location



PROJECT DESCRIPTION

In previous studies, the Edgewater Development area was mostly designated as Agricultural and Natural Open Space due to its location within the Prado Flood Control Basin. Since then, the United States Army Corps of Engineers (ACOE) has reviewed and approved the proposed grading and reservoir volume calculations which are the basis of Tentative Tract Map (TTM) 17458 for the Edgewater Development. The proposed Edgewater Development consists of approximately 1,074 dwelling units of varying densities. Approximately 98 acres are designated as low density residential, 29 acres as medium density residential, and 16 acres as high density residential. The development also contains five proposed lakes and approximately 36 acres of recreational open space that would be served with recycled water. In addition, the development reserves approximately 20 acres of land for natural open space. The Orange County Flood Control District property is assumed to be entirely low density residential. Proposed Edgewater Development land use is depicted on **Figure 2**.

Absorption of the development is anticipated to begin in year 2009 and will be spread over three development phases: Phase 1 will occur from 2009-2011, Phase 2 from 2012-2014, and Phase 3 from 2015-2018. See **Appendix B** for the proposed preliminary phasing map. The absorption of the Orange County Flood Control District property is assumed to occur linearly from 2012-2018 (Phase 2 and Phase 3). In this study, development absorption is distinguished from construction phasing. Development absorption refers to when actual demands come online, whereas construction phasing refers to when facilities are built, the latter of which necessarily precedes development absorption.

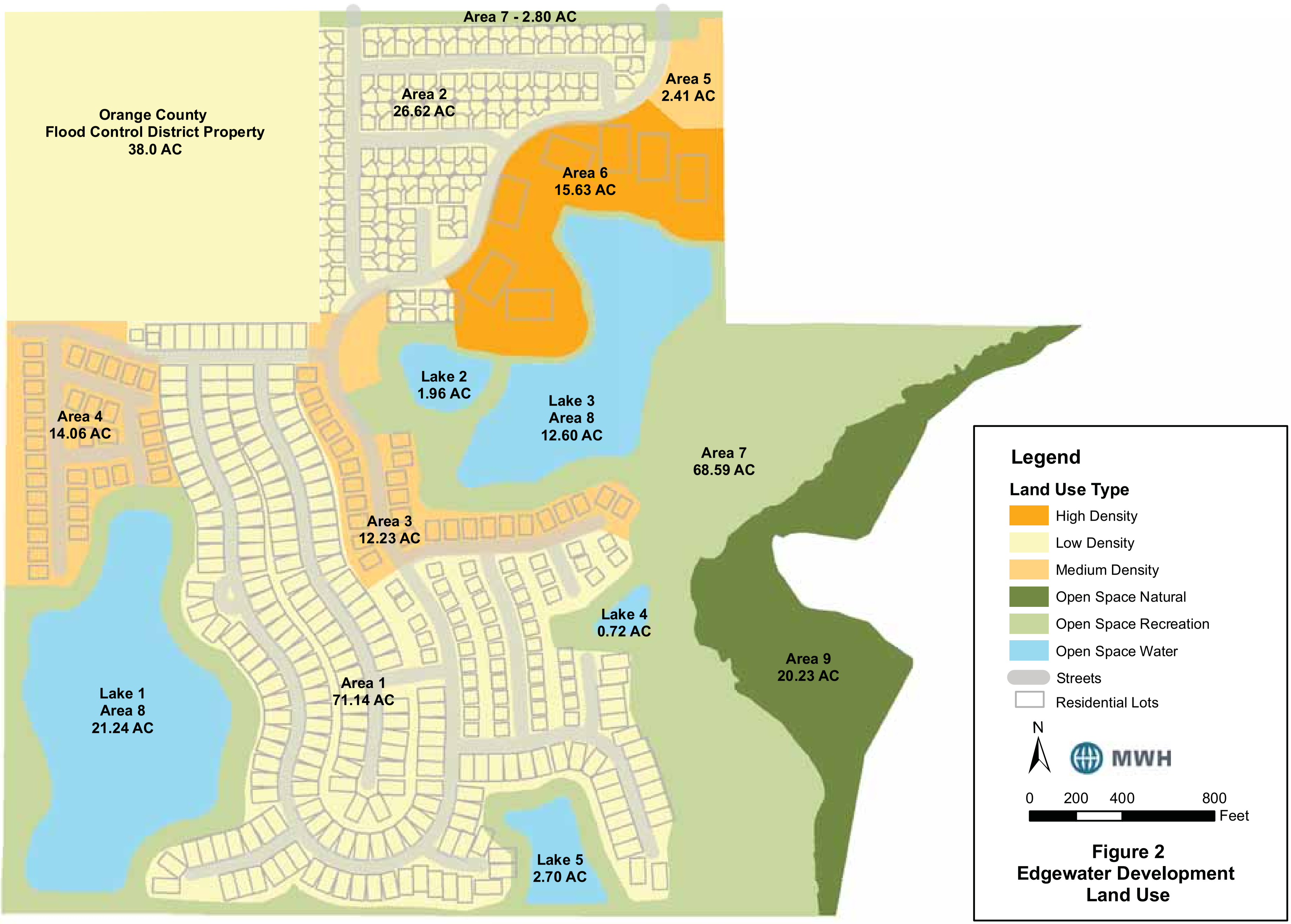


Figure 2
Edgewater Development
Land Use

WATER DEMANDS

The Edgewater Development is anticipated to have both potable and recycled water demands. Recycled water will be used to supply initial lake filling, lake replenishment, open space irrigation, and public space irrigation demands. The two different types of demands are evaluated separately.

Potable Water Demands

Calculation of potable water demands for the Edgewater Development is based on proposed densities and corresponding water duties from the City's Water System Master Plan Update (2003 WMP) (MWH, 2003). The water duties for residential development are presented in **Table 1**.

Table 1
Residential Water Duties

Land Use Category	Water Duty (gpd/acre)
Estate Residential (0-2 du/acre)	1,300
Low Density Residential (2-8 du/acre)	3,600
Medium Density Residential (8-20 du/acre)	4,600
High Density Residential (>20 du/acre)	7,600

As part of the 2003 WMP, it was estimated that 70 percent of residential usage is for indoor purposes, while the remaining 30 percent is for outdoor. To maintain consistency with the City's previous master planning efforts, it is assumed that 70 percent of residential demand will be served with potable water, while the remaining percentage may be served with recycled water.

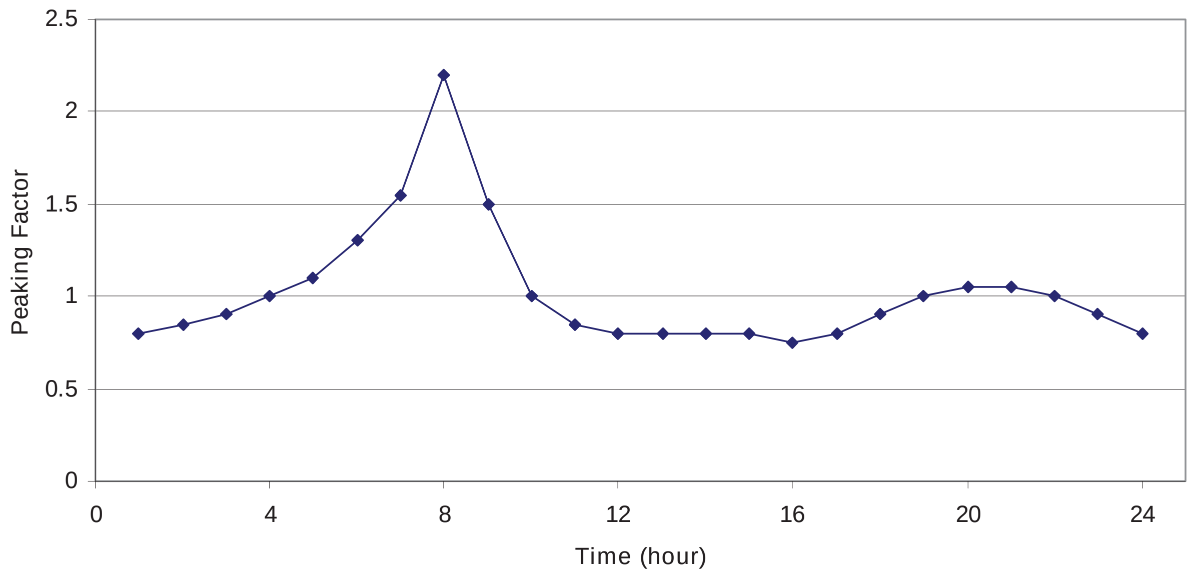
For sizing of the pipeline network, this 70 percent potable water demand assumption is used in the hydraulic model analysis since fireflow requirements drive the sizing of the pipelines rather than residential demands under normal conditions. However, to remain conservative on the sizing of supply source facilities (i.e. sizing of the production well, well pump, treatment processes, storage reservoir, and booster station), it is assumed that 100 percent of the residential demand is served with potable water in the case that the 70 to 30 percent split between potable and recycled water is not achieved in actuality. Therefore, if the recycled water demands amount to less than 30 percent of the total residential demand once the development comes online, the supply source facilities are still conservatively sized to account for the difference.

Historically, a maximum day demand to average day demand (MDD/ADD) peaking factor of 1.7 has been used for the City system excluding Subarea 1 and 2 (MWH, 2003). As part of the 2003 WMP, an adjusted potable water MDD/ADD peaking factor of 1.4 was calculated for Subareas 1 and 2 to reflect the use of recycled water for residential irrigation. Since it is assumed that roadway medians and common areas will be irrigated using recycled water, the MDD/ADD peaking factor of 1.4 used for Subareas 1 and 2 is maintained for the Edgewater Development.

As part of the 2003 WMP, a diurnal curve was developed for Subarea 2. Based on the curve, the Subarea 2 system experiences a peak hour demand to maximum day demand (PHD/MDD) peaking factor of approximately 2.2. This diurnal curve, depicted on **Figure 3**, is also applied to the Edgewater Development.

Based on land use information, water duties, and peaking factors, the potable water demand is calculated for the Edgewater Development. The projected potable demand at buildout (year 2019) by land use type is described in **Table 2**. The open space recreation area is assumed to have no potable demands (i.e., no potable water demands for restrooms, water fountains, etc. are accounted for in these areas).

Figure 3
Diurnal Curve



Absorption rates were provided by the developer. The absorption of the Orange County Flood Control District property is assumed to occur linearly from 2012 to 2018. The potable water demands separated by phase are shown on **Table 3**.

Table 2
Potable Water Demand Projection at Buildout

Land Use Category	Acres	Dwelling Units[4]	Density (du/acre)	Water Duty[1] (gpd/acre)	Indoor Water Usage	Average Day Demand (gpd)	Average Day Demand (acre-ft/yr)	Maximum Day Demand[3] (MGD)
Low Density	97.8	537	5.5	3,600	70%	246,400	276	0.34
Medium Density	28.7	287	10.0	4,600	70%	92,400	103	0.13
High Density[5]	15.6	250	16.0	4,600	70%	50,300	56	0.07
Low Density (County of Orange)[2]	38.0	-	-	3,600	70%	95,800	107	0.13
Total	180.1	1,074	-	-		484,900	543	0.68

1. As set forth in the 2003 WMP (MWH, 2003)
2. Assumed low density based upon discussions with the City
3. Based on peaking factor of 1.4 times the average demand.
4. See Appendix B for developer' s land use map.
5. The actual density for this area falls within the Medium Density range therefore the Water Duty is maintained at 4,600 gpd/acre.

Table 3
Potable Water Demand Projection by Phase

Description	Year 2009-2011	Year 2012-2014	Year 2015-2018
Average Day Demand (acre-ft/yr)	210	168	166
Maximum Day Demand (mgd)	0.26	0.21	0.21

Note: Demands presented on table are by phase and are not cumulative

The average annual potable water demand for the Edgewater Development, including the Orange County Flood Control District property, is estimated at 543 acre-ft/yr and the MDD at approximately 0.7 MGD.

Recycled Water Demands

It is anticipated that the Edgewater Development will use recycled water to satisfy initial lake filling, lake replenishment, open space irrigation, and public space irrigation demands. The lakes and open space irrigation areas (areas 7 and 8) are shown on **Figure 2**. Locations for public spaces have not been finalized by the developer and are therefore estimated based on the tentative tract map for the purposes of estimating recycled water demands.

Preliminary lake replenishment demands for the Edgewater Development have been estimated by the developer's landscape engineer based on seasonal evaporation rates in the project area (see **Appendix B** for table). The annual evaporation rate for the study area is estimated at 90 in/yr. The daily seasonal evaporation rates are estimated at 0.12 in/day for the winter, 0.25 in/day for autumn and spring, and 0.39 in/day for summer. The seasonal demand requirements for lake replenishment (shown in **Table 4)** are based on these evaporation rates and the planned lake surface areas.

The actual timing of the lake replenishment must be coordinated with IEUA, but for the purposes of this study, the lake replenishment demands are conservatively assumed to occur at night, when the rest of the Edgewater Development irrigation demands are also occuring. Based on discussion with the City, it is assumed that the lakes will be replenished for approximately 8 hours during the night (9:00 PM to 5:00 AM). The required flows to the lakes during these peak hours are described in **Table 5**. Approximately 900 gpm of total flow is required to replenish all five lakes over an 8-hour period during a typical summer day.

In addition to the lakes, there is an area designated as open space recreation comprising approximately 71 acres (designated as area 7 on **Figure 2**). Based on discussions with the developer, it is anticipated that approximately half of this open space recreation area (36 acres) will be irrigated. The recycled water demand for this area is calculated using water duties from the 2003 WMP. In addition to the open space recreation area, the developer also plans to serve public spaces (shared open areas, slopes, medians, etc.) with recycled water. The recycled water demand for these areas is calculated assuming that 30% of the gross residential demand is used for these irrigation purposes. The 2003 WMP estimated an MDD/ADD factor of 2.6 and a PHD/MDD factor of 3.0 (based on 8-hour daily usage) for irrigation demands, which are also applied to irrigation demands in the Edgewater Development.

The recycled water demands for open space irrigation in the Edgewater Development are described in **Table 6** and the recycled water demands for public space irrigation are described in **Table 7**.

Table 4
Seasonal Lake Replenishment Demand

Lake Number	Area (square feet)	Winter Usage (in/day)	Avg Daily Winter Usage (gpd)	Spring Usage (in/day)	Avg Daily Spring Usage (gpd)	Summer Usage (in/day)	Avg Daily Summer Usage (gpd)	Autumn Usage (in/day)	Avg Daily Autumn Usage (gpd)	Average Annual Demand (acre-ft/year)
1	925,400	0.12	69,225	0.25	144,218	0.39	224,980	0.25	144,218	163
2	85,300	0.12	6,381	0.25	13,293	0.39	20,738	0.25	13,293	15
3	584,700	0.12	43,738	0.25	91,122	0.39	142,150	0.25	91,122	103
4	31,400	0.12	2,349	0.25	4,893	0.39	7,634	0.25	4,893	6
5	117,400	0.12	8,782	0.25	18,296	0.39	28,542	0.25	18,296	21
Total	1,744,200	-	130,475	-	271,823	-	424,043	-	271,823	307

1. Table based on developer' s assumptions and calculations. See Appendix B for developer' s table.

Table 5
Peak Lake Replenishment Demand

Lake Number	Average Summer Demand (MGD)	Fill in 8 hrs Rate (gpm)
1	0.22	469
2	0.02	43
3	0.14	296
4	0.01	16
5	0.03	59
Total	0.42	883

Table 6
Open Space Recreation Irrigation Demand

Irrigated Area (acres)	Water Duty (gpd/acre)	Average Annual Demand (acre-ft/yr)	Maximum Day Demand (MGD)	Peak Hour Demand (gpm)
36	2,900	116	0.27	560.7

Table 7
Public Space Irrigation Demand

Land Use Category	Acres	Dwelling Units[4]	Density (du/acre)	Water Duty[1] (gpd/acre)	Outdoor Water Usage	Average Day Demand (gpd)	Average Day Demand (acre-ft/yr)	Maximum Day Demand[3] (MGD)
Low Density	97.8	537	5.5	3,600	30%	105,600	118	0.27
Medium Density	28.7	287	10.0	4,600	30%	39,600	44	0.10
High Density[5]	15.6	250	16.0	4,600	30%	21,600	24	0.06
Low Density (County of Orange)[2]	38.0	-	-	3,600	30%	41,000	46	0.11
Total	180.1	1,074	-	-		207,800	233	0.54

1. As set forth in the 2003 WMP (MWH, 2003)
2. Assumed low density based upon discussions with the City
3. Based on peaking factor of 2.6 times the average demand.
4. See Appendix B for developer' s land use map.
5. The actual density for this area falls within the Medium Density range therefore the Water Duty is maintained at 4,600 gpd/acre.

MODEL ANALYSIS

Planning Criteria

As part of the 2003 WMP, a set of planning criteria was developed for the evaluation of both existing and future system hydraulic model results. The same set of planning criteria is used for this analysis. The criteria for the potable system is shown in **Table 8**, and the criteria for the recycled system is shown in **Table 9**.

Table 8
Planning and Evaluation Criteria – Potable Water System

Description	Value	Units
Maximum Pressure (Evaluation)		
Peak Hour	90	psi
Minimum Pressure (Evaluation)		
Peak Hour	40	psi
Maximum day + Adjacent to a Fire	20	psi
Maximum Pressure (Planning)		
Peak Hour	90	psi
Minimum Pressure (Planning)		
Peak Hour	45	psi
Maximum day + Adjacent to a Fire	20	psi
Maximum Pipeline Velocity		
Transmission Pipelines (12-inch and greater)	3	fps
Distribution Pipelines (<12-inch)	5	fps
Fire Fighting Capabilities		
Agricultural, Green Space, Open Space	0	gpm
Medium Density Residential (4.5-14 DU/acre)	1,500	gpm for 2 hours
High Density Residential (more than 14 DU/acre)	3,000	gpm for 3 hours
Storage Volume		
Operational	30% MDD	MG
Fire Fighting	4,000 gpm	4 hours
Emergency	50% MDD	MG

Table 9
Planning and Evaluation Criteria – City Recycled Water System

Parameter	Description	Design Criteria
Pressure	Minimum Pressure with PHD	40 psi
	Maximum Pressure with PHD	150 psi
Velocity and Headloss	Maximum Gradient with MDD	2 ft headloss/1,000 ft
	Maximum Velocity with MDD	2 ft/sec
	Maximum Velocity with PHD	5 ft/sec
Storage	Operational Storage	N/A

Potable Water Model Creation

The potable water hydraulic model is constructed in H_2ONET Version 6.0. For the purposes of this analysis, the Edgewater Development potable water system is modeled as a stand alone system. The potable water model is constructed as an extended period simulation over a 24-hour period. The diurnal curve is input to the model at each hour as depicted on **Figure 3**. The supply for the Edgewater Development is modeled as a fixed head reservoir at an HGL of 790 feet, located near the intersection of Schaefer and Campus. An HGL of 790 feet is selected for the supply assuming that the development may ultimately be integrated into the City's 790 zone.

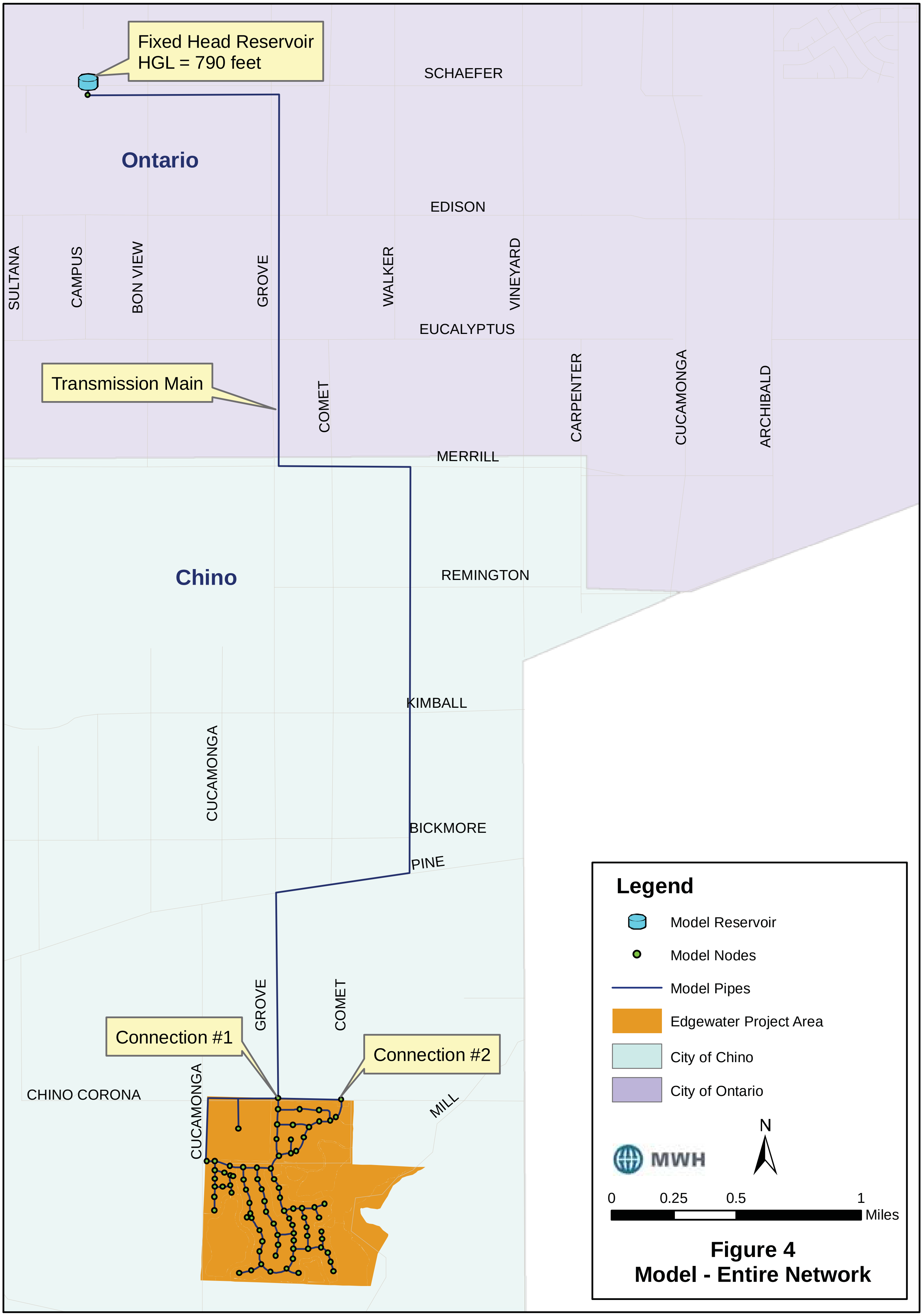
A transmission main from the supply/treatment/storage complex to the northern boundary of the Edgewater Development is input to the model. For this planning level analysis, the transmission main from the supply/treatment/storage complex follows the alignment depicted on **Figure 4**. The transmission main is assumed to connect to the Edgewater Development distribution pipes at two locations along the northern boundary of the development, one at the intersection of Chino-Corona Road and Grove Avenue and another at the intersection of Chino-Corona and Comet Avenue. In addition, a pipeline heading west along Chino-Corona Road from Comet Avenue then heading south along Cucamonga Avenue to connect to the Edgewater Development from the west, creates a looped system for supply to the southern portion of the Edgewater Development. All pipelines are assumed to have a Hazen-Williams roughness coefficient of 130.

A total of 83 nodes are input at various locations throughout the pipeline network in order to model the Edgewater Development demands. Based on a map provided by the developer showing the layout of the separate lots, a demand per dwelling unit is calculated for each residential area (see **Figure 2**) assuming that each dwelling unit within a residential area of designated density has equal demand. The demand for each of the dwelling units is then assigned to its nearest model node. Elevations are also input at each model node according to the developer's preliminary grading plan (see **Appendix B**).

Because the potential development layout of the Orange County Flood Control District property is unknown, it is modeled as a single pipeline to a single node in the center of the property. Demands for this property are calculated using water duties on a gross area basis. It should be noted that if a 0 gpm water demand were assigned to the Orange County Flood Control District property, the resulting estimates of pipeline sizes needed to satisfactorily serve the Edgewater Development remain unchanged. The entire model network is depicted on **Figure 4**. The model network of only the Edgewater Development distribution area is shown on **Figure 6** and **7**.

The potable water model includes one standard scenario that emulates PHD conditions and a fireflow model excercise to emulate MDD plus fireflow conditions. The standard scenario that emulates PHD conditions (PHD/MDD factor = 2.2) consists of a 24-hour model run that follows the diurnal curve depicted in **Figure 3**. A fireflow model exercise includes using the fireflow run option in H_2ONET. This H_2ONET run option involves selection of an hour at which to run the model (in this case, an hour with a diurnal factor of 1.0 to equal MDD). The model then performs a series of steady state runs. Each run includes a defined fireflow at a specified model node and each run determines residual pressures throughout the system. From this series of steady state fireflow runs, the worst-case fireflow location is identified and a standard model run is subsequently performed with the individual fireflow demand manually input into the model at that location and the system response evaluated. Facilities are then modified in order to meet pressure criteria during the worst-case fireflow condition.

These are the basic scenarios and methodologies that are used in evaluating the potable water system. Variations of these scenarios to evaluate specific conditions are further described below in the Potable Water Model Results section.



Fixed Head Reservoir
HGL = 790 feet
SCHAEFER
Ontario
EDISON
SULTANA
CAMPUS
BON VIEW
GROVE
WALKER
VINEYARD
EUCALYPTUS
Transmission Main
COMET
CARPENTER
CUCAMONGA
ARCHIBALD
MERRILL
Chino
REMINGTON
KIMBALL
CUCAMONGA
BICKMORE
PINE
GROVE
COMET
Connection #1
Connection #2
CHINO CORONA
CUCAMONGA
MILL
Legend
Model Reservoir
Model Nodes
Model Pipes
Edgewater Project Area
City of Chino
City of Ontario
MWH
N
0
0.25
0.5
1
Miles
Figure 4
Model - Entire Network

Potable Water Model Results

The model is run for a 24-hour period and evaluated under PHD and MDD plus fireflow conditions. Under the worst case condition, a fireflow of 3,000 gpm is required in the high density residential area in the northeastern portion of the development (Area 6 on **Figure 2**). Model results show there is approximately 110 feet of headloss over the total length of the 18-inch diameter transmission pipeline and the minimum pressure in the system is 37 psi during the worst-case fireflow scenario. The results from the model run with a 3,000 gpm fireflow in the high density residential area are shown on. **Figure 5**. Full results from this model run are included as "Potable Model Run #1" in **Appendix C**.

In order to identify the worst case fireflow condition (described in the preceding paragraph), the fireflow model exercise includes a series of steady state model runs for fireflows at every demand node (one at a time) in the system under MDD conditions. This exercise demonstrates that pressure requirements can be met when there is a fire at any individual demand node throughout the system. Model results showing residual pressures from this part of the fireflow exercise are included as "Potable Model Run #2" in **Appendix C**. In addition to the steady-state fireflow model runs, a transient 4-hr model run under MDD conditions is also performed to evaluate the prolonged effects of a 3,000 gpm fireflow demand on the system at the worst-case location. Over the 4-hr fireflow, the system's storage reservoir decreases approximately 33% in stored water volume (assuming a total volume of 1.94 MG, see **Table 14** for sizing calculations), resulting in a minimum system pressure at the end of the 4-hr fireflow of 33 psi, which still meets the required minimum pressure criteria during a fireflow. Model results from this run are included as "Potable Model Run #3" in **Appendix C**.

Based on the MDD plus fireflow model runs, it is determined that an 18-inch diameter transmission pipeline conveying water from the new supply complex to the development is required. During non-fireflow conditions (both ADD and MDD), the model shows pressures exceeding 90 psi throughout the majority of the network. To address maximum pressure criteria of 90 psi during non-fireflow conditions, a pressure reducing valve with a setting of 70 psi is added at the connection to the development along Grove Avenue. The recommended facilities sizing and resulting pressures during ADD are shown on **Figure 6**. Full results from the ADD model run with the pressure reducing valve are included as "Potable Model Run #4" in **Appendix C**. The recommended facilities sizing and resulting pressures during PHD conditions are shown on **Figure 7**. Full results from the PHD model run with modified pipeline sizing and pressure reducing valve are included as "Potable Model Run #5" in **Appendix C**. The maximum pressure in the model during ADD analysis is 72 psi. The minimum pressure during PHD is 60 psi.

The addition of a PRV to the Edgewater distribution network does not significantly influence the results from the previous fireflow model runs. During a fireflow condition, the pressure at the location of the PRV is substantially below the setting of 70 psi, therefore the PRV remains fully open and there is no significant pressure reduction besides minor losses through the station. Based upon standard k values for pressure reducing valves and the bends and tees required for the station, these minor losses are estimated at less than 3 psi during MDD with a fireflow at the worst-case location, which would result in a minimum residual pressure of approximately 30 psi for this scenario (see the above description of “Potable Model Run #3).

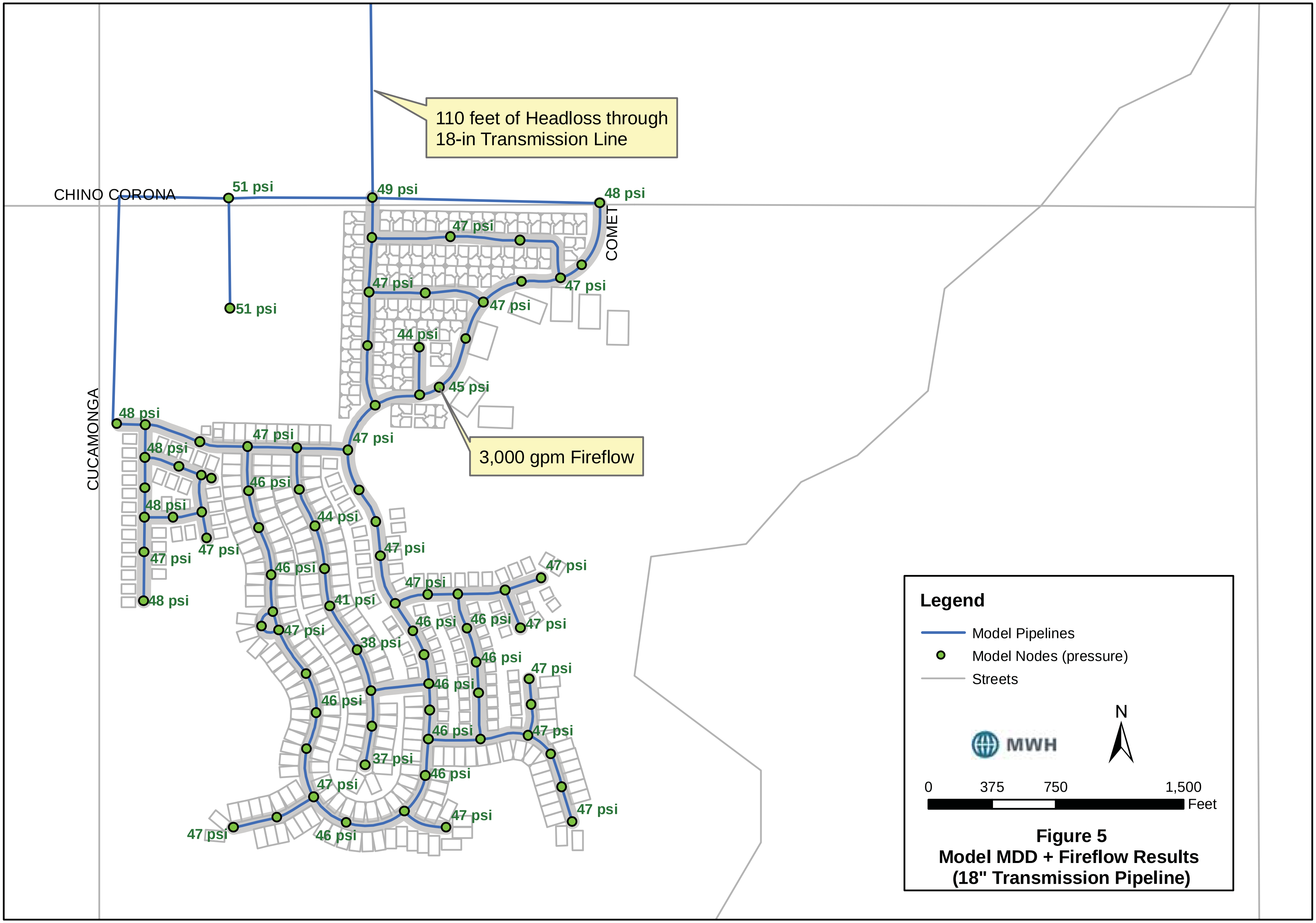


Figure 5
Model MDD + Fireflow Results
(18" Transmission Pipeline)

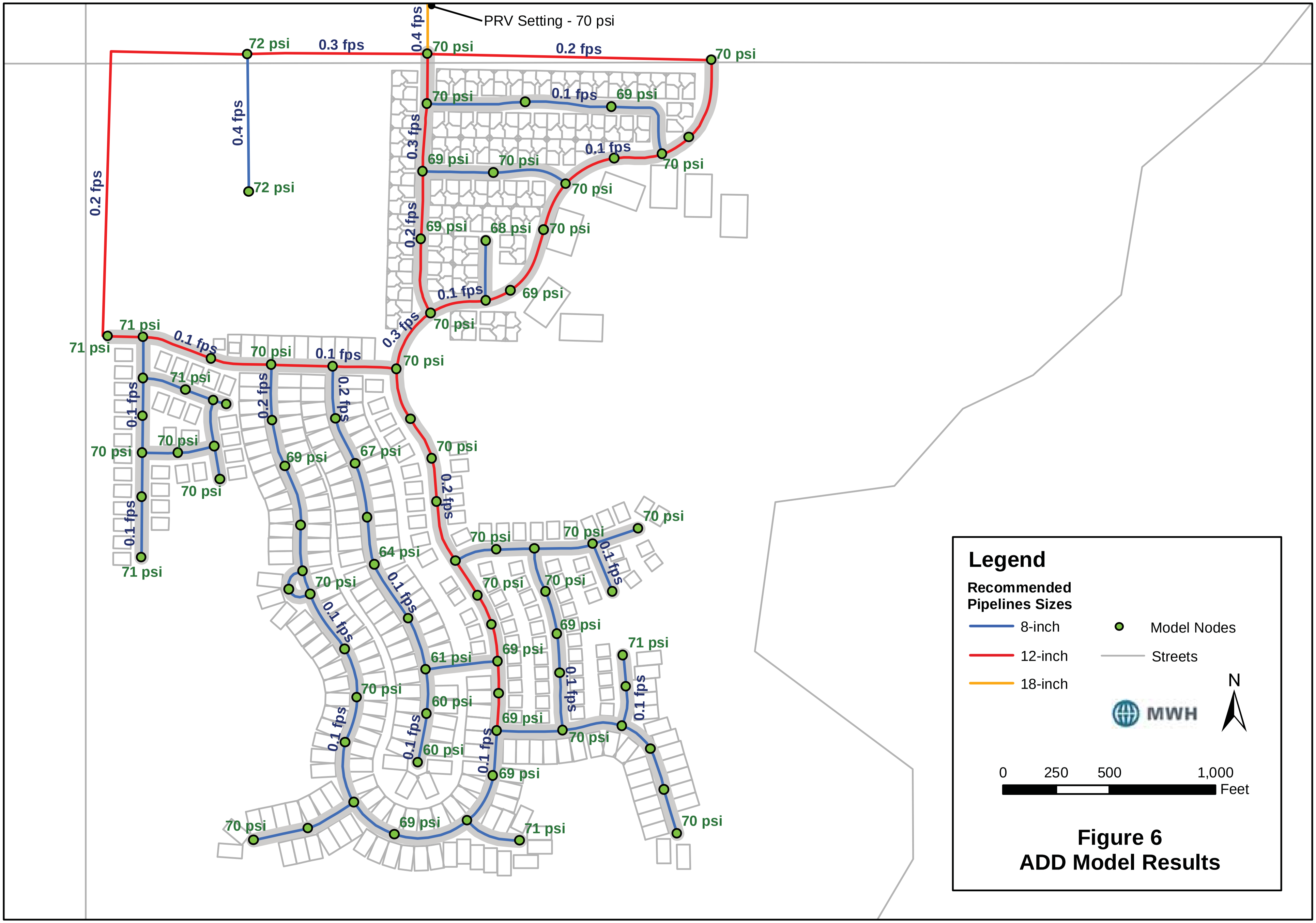


Figure 6
ADD Model Results

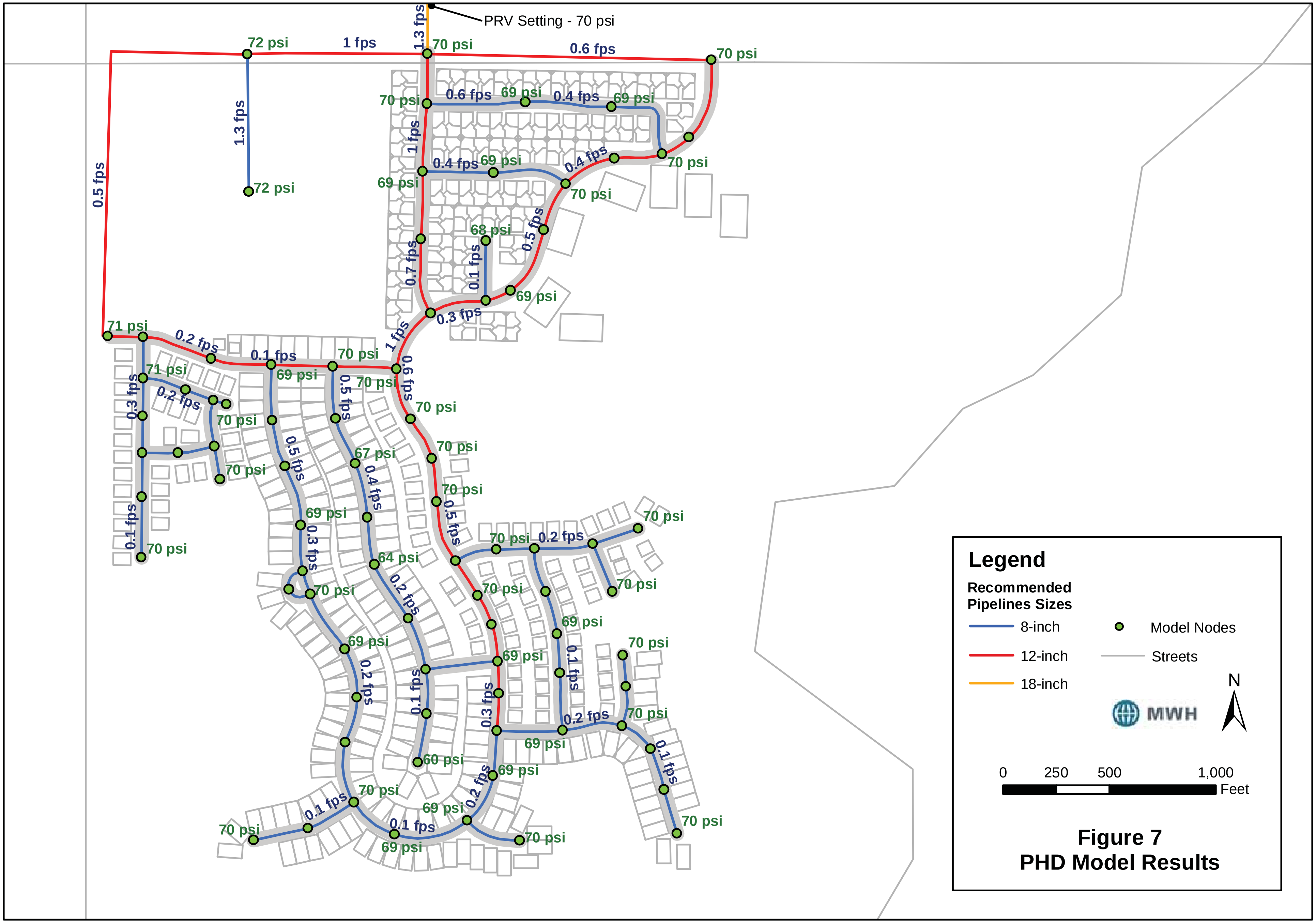


Figure 7
PHD Model Results

Recycled Water Model Creation

As part of the 2003 WMP and the 2004 Hydraulic Analysis for City Subarea 2 (2004 Subarea 2 Report), a recycled water model was created and updated for the City. This model was created and updated using the best information then available regarding the planning of IEUA's recycled water facilities. Since then, IEUA has developed its Recycled Water Implementation Plan (RWIP) (MWH, 2005). For the current analysis of supplying recycled water to the Edgewater Development, the previous model used for the 2004 Subarea 2 Report has been updated with the appropriate recommendations from the RWIP to more accurately reflect the direction of IEUA's facilities planning on a regional level.

For this analysis, updates are made to IEUA's facilities in the 800 and 930 zones, since these are the zones that most directly impact the hydraulics of the Edgewater Development, (located in the 800 zone). The water reclamation facilities that are planned to provide water to the 800 and 930 zones are modeled as fixed head reservoirs at their respective grades. These plants include the Carbon Canyon Water Reclamation Facility (CCWRF), Regional Plant 1 (RP-1), and Regional Plant 5 (RP-5). The model is further updated to reflect the correct sizing and locations of IEUA's existing and planned transmission mains in the 800 and 930 zones. These include the existing RP-1 Outfall and Bickmore pipelines, and the future RP-1 Outfall Parallel, Edison, Bickmore West, 800 West Reservoir, and 930 West Reservoir pipelines. In addition, the 930 West and 800 West proposed reservoirs are added to the model. Most of these IEUA facilities should be online by absorption of Phase 1 of the Edgewater Development, and all are expected to be online by the absorption of Phase 3. The major IEUA facilities included in the model along with planned City of Chino recycled water facilities are shown on **Figure 8**. Significant IEUA recycled water demands in the 800 zone, most notably the Prado Regional Park, are also updated in the model.

Recycled pipelines in the Edgewater Development are input to the model. This includes pipelines with connections to each of the five lakes and also to four irrigation connections. The locations of the irrigation connections are based on preliminary indications from the developer, and may not reflect ultimate locations. A 12-inch diameter pipeline is included on the northern and western boundaries of the Edgewater Development along Chino-Corona Road and Cucamonga Avenue to create a looped system of supply. The pipeline along Chino-Corona Road is also interconnected at two locations with the planned City pipelines in Subarea 2. These additional facilities are included to provide reliability to the Edgewater recycled water system. Since the developer's preliminary layout shows pipelines only to lakes and the open space irrigation connections it is assumed that public space demands occur along the pipelines shown in the layout. If these public space irrigation demands are located in other roadways or areas, then additional pipelines will need to be installed resulting in corresponding adjusted capital costs for the Edgewater recycled water system.

The Edgewater Development is connected to IEUA's system at the nearest large IEUA pipeline, which is the existing 30-inch diameter discharge line to Mill Creek near the intersection of Chino-Corona Road and Comet Avenue. The initial pipeline sizing is also input into the model as proposed in the developer's preliminary layout, and all pipelines are assigned a Hazen-Williams roughness coefficient of 130. The ability to meet planning criteria with the proposed sizing is verified through the model runs. Demands for lake replenishment and irrigation are input to the model at the appropriate nodes (with elevations allocated using the same methodology as the potable system model). Peak hour for both the lake and irrigation demands is assumed to occur during the night. The model of the recycled water facilities in the Edgewater Development is depicted on **Figure 9**.

All of the above updates are made to the year 2015 scenario in the previously created model for the 2004 Subarea 2 Report. This scenario is chosen because it most closely approximates the City's recycled water demands and facilities that will be online during and by the time the Edgewater Development is completed.

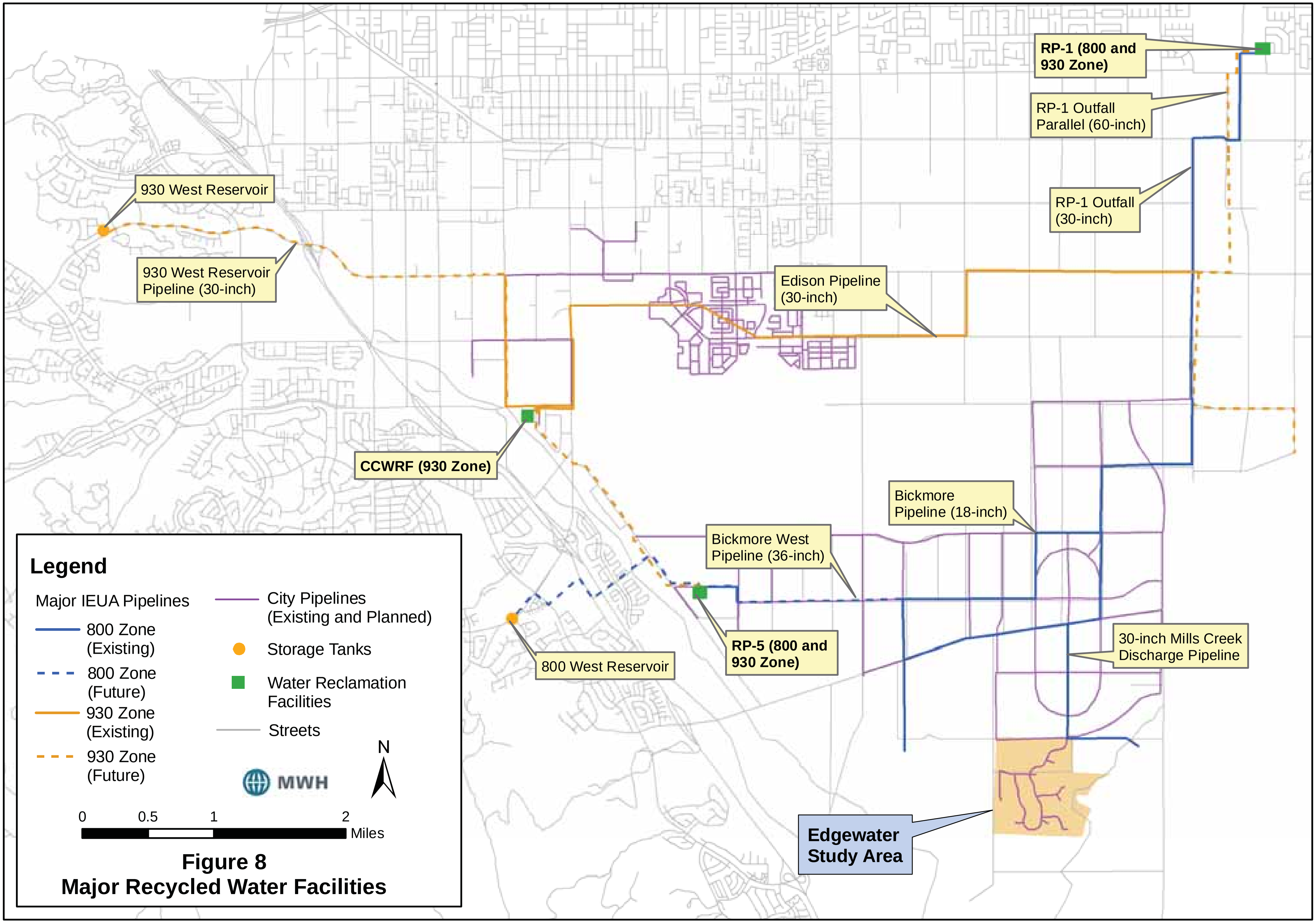


Figure 8
Major Recycled Water Facilities

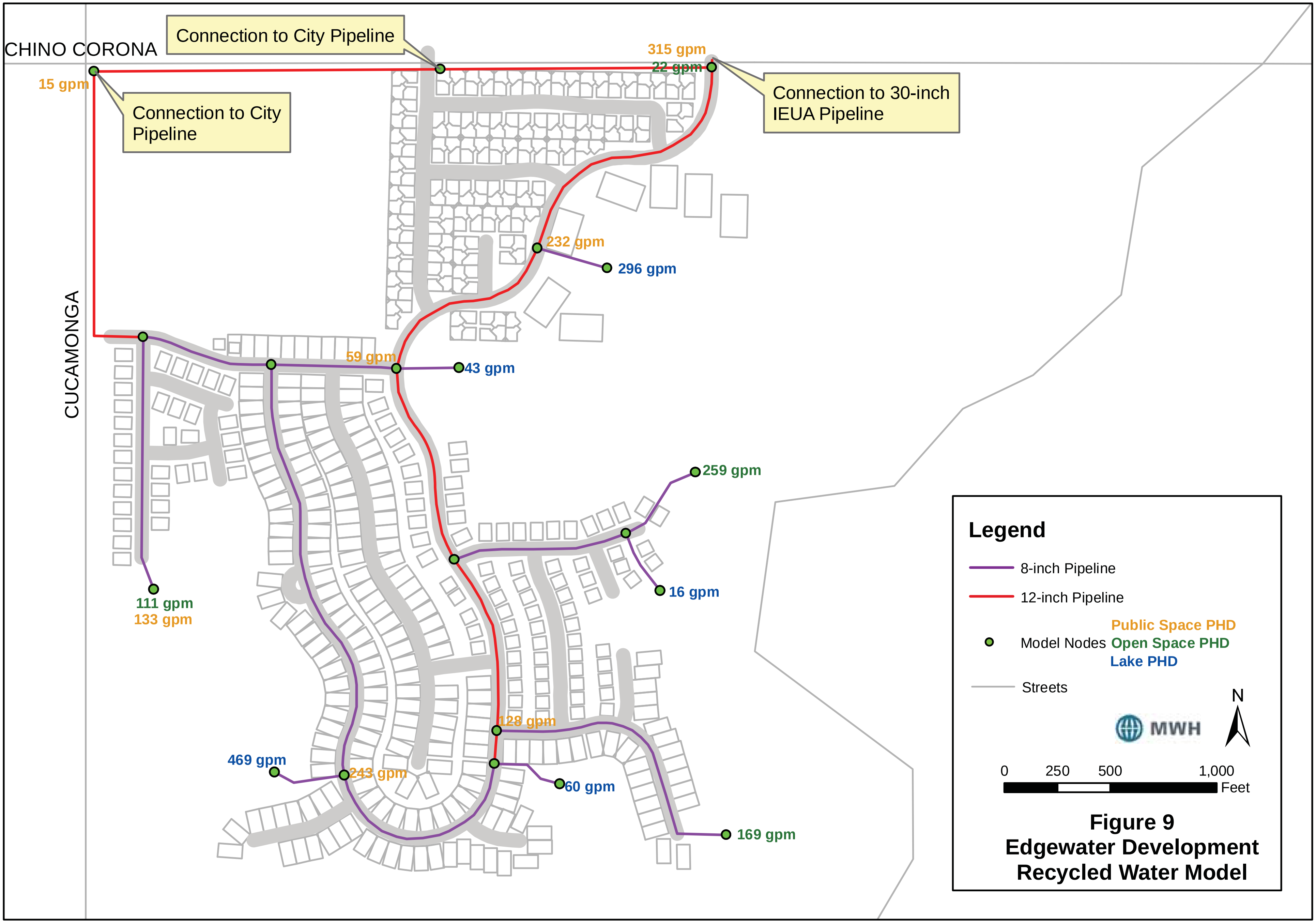


Figure 9
Edgewater Development Recycled Water Model

Recycled Water Model Results

The model is run under steady-state PHD conditions for two scenarios: with and without the Edgewater Development. The results from the run with the Edgewater Development are shown in **Table 10** and on **Figure 10**. The evaluation does not consider an MDD scenario because the recycled water demands throughout the system are all assumed to be occurring at the same time, so the demand over the course of a maximum day is either the peak demand or zero.

Table 10
Recycled Water Model Results (PHD)

Description	Value	Unit
Head at Connection to IEUA pipeline	713	feet
Pressure at Connection to IEUA pipeline	62	psi
Maximum Edgewater Development System Pressure	77	psi
Minimum Edgewater Development System Pressure	55	psi
Maximum Edgewater Development Pipeline Velocity	4.3	ft/sec
Maximum Edgewater Development Pipeline Headloss	7.6	ft/1000 ft

The model run shows that sufficient pressure is delivered to the Edgewater Development, with a minimum pressure of 55 psi experienced during PHD. The maximum pipeline velocity experienced is 4.3 ft/sec, which is less than the maximum velocity criteria of 5 ft/sec for PHD conditions. The recommended pipeline sizing assumes that the lakes are refilled and that irrigation occurs during an 8-hour night period. Should either of these assumptions change, pipeline sizing to the connections would need to be reevaluated. The recommended pipeline sizing and results for the final model run under these conditions are shown on **Figure 10**. Full results for the model run are included as "Recylced Model Run" in **Appendix C**.

The model is also run without the Edgewater Development to evaluate the impacts represented by Edgewater on IEUA's recycled water system. Without the demands of the Edgewater Development, the pressure at the connection location is approximately 70 psi (i.e., the additional demands of the Edgewater Development result in a pressure drop of approximately 8 psi at the connection location). Therefore, the effects of the Edgewater Development are relatively minor on IEUA's transmission facilities and do not adversely impact the conveyance of water to the rest of the 800 zone.

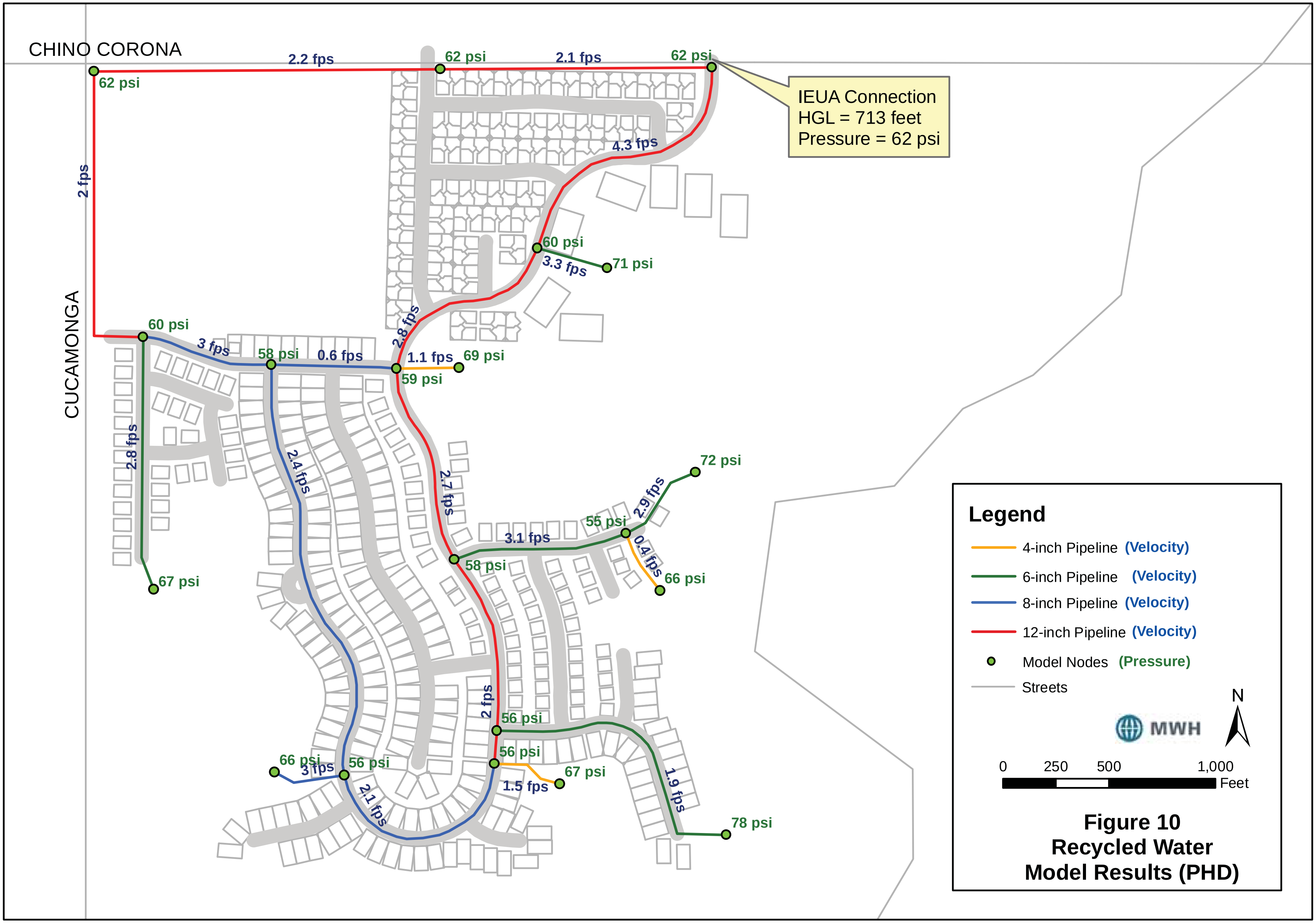


Figure 10
Recycled Water
Model Results (PHD)

WATER SUPPLY AND STORAGE

Potable Water Supply

Based on discussions with the City, it is assumed that the water supply for the Edgewater Development will be provided from one or more wells (concept well) that will convey water to the intersection of Campus Avenue and Schaefer Avenue, the location of a City planned potable water treatment and storage complex. As discussed earlier, all potable water supply source facilities (i.e. the supply well, well pump, treatment processes, storage reservoir, and booster station) are sized to deliver 100% of the residential demand assuming limited actual use of recycled water in residential development areas. The potable water supply source facilities are therefore sized conservatively in case recycled water demands do not account for as much as 30% of the total residential water demand. The concept well is sized to meet the MDD of the Edgewater Development, also taking into account an expected loss of 15 percent due to recommended treatment processes. The 15 percent loss corresponds to the brine waste stream resulting from the various treatment processes to lower TDS and nitrate from the source groundwater to target levels of 350 mg/L and 25 mg/L, respectively. Detailed calculations of the treatment process sizing and associated losses are included in **Appendix D**. For the purposes of analyzing the Edgewater Development as a stand alone system, a share in the City's firm capacity is not included in the concept well sizing. Based upon these assumptions, the required supply capacity of the new concept well is shown in **Table 11**.

The new supply well facilities are anticipated to be integrated into the City's distribution system in the future. It is assumed that supply redundancy for the Edgewater Development will be provided when this integration occurs. When integrated, the new concept well would also need to be sized to include a share in the City's firm capacity (i.e., the new concept well would need to provide a portion of the City's largest well capacity in addition to meeting the Edgewater Development MDD).

Table 11
New Supply Well Capacity

Edgewater Development MDD (MGD)	Expected Water Recovery after Treatment[1] (%)	Required Well Capacity (MGD)
1.22	85%	1.43

1. See **Appendix D** for detailed water recovery calculation

To estimate groundwater levels in the vicinity of the new supply well, the Chino Basin Watermaster's plan to achieve hydraulic control is considered. As part of the Chino Basin Optimum Basin Management Program, the Chino Basin Watermaster is attempting to achieve "hydraulic control" of the basin, a condition in which groundwater is intercepted before discharge to the Santa Ana River. As part of the *Analysis of Future Replenishment and Desalter Plans Pursuant to the Peace Agreement and the Peace II Process*, two alternatives were investigated to achieve hydraulic control in the basin (Wildermuth, 2006). Out of these alternatives, the lowest groundwater elevation contour in the vicinity of the concept well field is approximately 545 feet by year 2030. The lowest groundwater elevation contour from the two alternatives is used to provide a conservative estimate of the required pump power for the new Edgewater supply well(s). At a groundwater elevation of 545 feet, 175 feet of head would be required to pump the water to the storage tank high water elevation. From this information and the required well capacity, the well pump power is calculated and shown in **Table 12**.

Table 12
Well Pump Power

Pump Capacity (gpm)	Groundwater Elevation (ft MSL)	Storage High Water Elevation (ft MSL)	Head (ft)	Pump Power (hp)
1,000	545	720	175	60

Note: Pump efficiency is assumed to be 65%

Based on analysis performed in the 2003 WMP and discussion with the City, it is assumed that groundwater in this area will need to be treated by ion exchange and reverse osmosis for high nitrate and TDS concentrations before being pumped into the distribution system. The 2004 Subarea 2 Report provides more detailed information on the methodology behind sizing of the reverse osmosis, ion exchange, and bypass units, which is also applied to this analysis. The 2004 Subarea 2 Report used water quality data from several existing wells in the vicinity of Subarea 2 to estimate a source water quality for new wells. This analysis uses selected wells from the Subarea 2 Report to estimate average nitrate and TDS concentrations in the new supply well(s) for Edgewater. From these calculations, the nitrate and TDS concentrations in the concept well(s) are expected to be 374 and 1,027 mg/L, respectively, and are to be treated to 25 and 350 mg/L, respectively. From these water quality values and the well flow capacity, a treatment capacity is determined as presented in **Table 13**. The detailed calculations behind the sizing of the treatment processes are included in **Appendix D**. Approximately half of the flow would require reverse osmosis treatment, while approximately a quarter would require ion exchange treatment to reach the target water quality objectives for nitrogen and TDS. The process produces a treated effluent of 1.22 MGD and a brine discharge of 0.21 MGD.

Table 13
Treatment Capacity

Description	Capacity (MGD)
Raw Well Production	1.43
Reverse Osmosis Effluent	0.82
Ion Exchange Effluent	0.33
Bypass Effluent	0.07
Combined Effluent	1.22
Brine	0.21

Based on discussions with IEUA, the brine discharge of 0.21 MGD would be conveyed by gravity flow to the Santa Ana Regional Interceptor (SARI) located along Pine Avenue through a new 22,400-foot, 8-inch diameter pipeline aligned along Euclid Avenue. This intersection (i.e. Pine/Euclid) represents the most probable location of the future connection to the SARI line. With a flow of 0.21 MGD, a Manning's n of .013, and a slope of approximately 0.006 ft/ft from the treatment plant to the SARI pipeline, the pipeline would be approximately 41 percent full and experience a velocity of 2.4 ft/sec (a minimum velocity criteria of 2 ft/sec is typically used for gravity flow pipelines).

After treatment, the water would be conveyed to a new storage reservoir on or near the treatment plant site (ground elevation of approximately 690 feet and high water level of 720 feet). This reservoir is sized to meet operational, fire fighting, and storage requirements for the Edgewater Development (per criteria in **Table 8**). Based on the storage requirements, a 1.94 MG tank would be required. The storage volume calculation is shown in **Table 14**.

Table 14
Storage Volume Calculation

Storage Volume Type	Planning Criteria	Required Volume (MG)
Operational	30% MDD	0.37
Fire Fighting	4,000 gpm x 4 hrs	0.96
Emergency	50% MDD	0.61
Total		1.94

From the storage reservoir, the water would need to be pumped into the 790 zone from an HGL of 720 feet. For reliability purposes, the pump station would include two electrical pumps sized with a combined capacity to meet PHD for the Edgewater Development and one backup diesel pump sized to provide 3,000 gpm of fireflow. The required power calculation for this booster station is shown in **Table 15**.

Table 15
790 Zone Booster Station

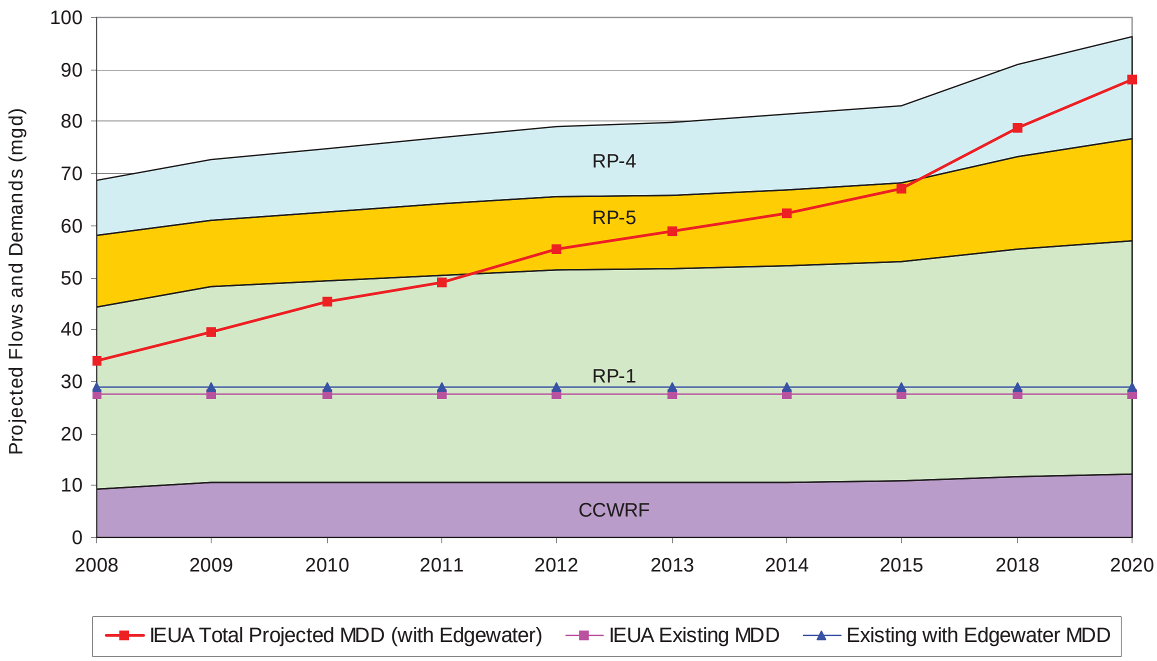
Description	Zone	Flow (gpm)	TDH (ft)	Pump Capacity (HP)
Pump #1	790	1,081	70	30
Pump #2	790	1,081	70	30
Fireflow Pump	790	3,000	70	80

Note: The pump efficiency is assumed to be 65%

Recycled Water Supply and Storage

As mentioned in the 2003 WMP and the 2004 Subarea 2 Report, the recycled water demand in the IEUA service area is projected to increase significantly over the next 20 years. However, no recycled water supply shortfall is anticipated due to an ample recycled water supply through year 2020. This supply sufficiency is further illustrated in a graph from the RWIP projecting IEUA's recycled water demand versus wastewater flows (see **Figure 11)** (MWH, 2005). In addition to IEUA's total supply and demand projections, the figure illustrates IEUA's existing MDD both with and without the projected buildout Edgewater MDD.

Figure 11
IEUA Projected Recycled Water Demand and Wastewater Flows



The Edgewater Development recycled water system does not require any storage reservoirs or booster stations, since these will be provided through IEUA's system. As mentioned in the 2003 WMP and the 2004 Subarea 2 Report, IEUA has sufficient production and storage capacity to buffer the daily variations between recycled water production and demand.

CAPITAL IMPROVEMENT PROGRAM

The Capital Improvement Program (CIP) identifies the facilities that are required to supply the Edgewater Development with potable and recycled water through the development's buildout. In accordance with CIP phasing periods established for the 2003 WMP, the projects are phased into the following two periods:

- Year 2007-2010
- Year 2011-2020

The phasing does not extend beyond year 2020 because it is anticipated that the development will reach buildout by that time. All facilities required to convey water to the development (i.e., the supply well(s), treatment system, reservoir, pumps, transmission pipeline, and pressure reducing valve) are phased for construction between year 2007-2010, while the pipelines within the development are phased for construction between year 2007-2010 or year 2011-2020 based on preliminary phasing of the residential units provided by the developer. As noted earlier, the CIP phasing should be distinguished from the development absorption phasing. The CIP is phased so that facilities are constructed and online prior to absorption of demand for any particular area. To provide a conservative CIP phasing, all of those facilities required to serve demands for the absorption phase 1 (Year 2009-2011) and phase 2 (2012-2014) of the Edgewater development are categorized into CIP phase 2007-2010, while facilities required to serve absorption phase 3 (2015-2018) are categorized into the CIP phase 2011-2020. The potable water pipeline phasing is shown on **Figure 12**, and the recycled water pipeline phasing is shown on **Figure 13**. The recycled water system includes only pipelines along streets as suggested on the developer's preliminary pipeline layout. Should recycled water pipelines in additional streets be required to meet demands at various locations, the capital cost of the recycled water system will be different.

Unit costs for treatment, storage, and pipelines are based upon recent MWH experience on projects for similar regions. Additional unit costs are taken from the City's 2003 WMP. All unit costs are scaled to a March 2007 ENR construction cost index for Los Angeles of 8873.09. The transmission pipeline from the concept well to the Edgewater Development is assumed to require excavation of existing roads, while all pipes within the Edgewater Development are assumed to be constructed in the dirt prior to or along with road construction. The list of projects in the CIP for the Edgewater Development are shown in **Table 16**. The location of the capital improvement projects, labeled by the Map ID listed in **Table 16,** are shown on **Figure 14**.

The CIP does not include any O&M costs, including energy costs and monthly or annual capacity costs. The latter specifically relates to discharge of brine into the SARI line, which includes capacity, volumetric, and strength charges. The monthly capacity charge is set at $171.24 per 15 gpm, the monthly volumetric charge at $1,500 per million gallons of discharge, and the strength charge at $346 per 1000 pounds (dry weight) for TSS and $233 per 1000 pounds (dry weight) for BOD. These O&M costs are not included in the CIP.

The total CIP for the Edgewater Development is estimated at approximately $33,000,000. The potable water component is estimated at $30,600,000, while the recycled water component is estimated at $2,400,000.

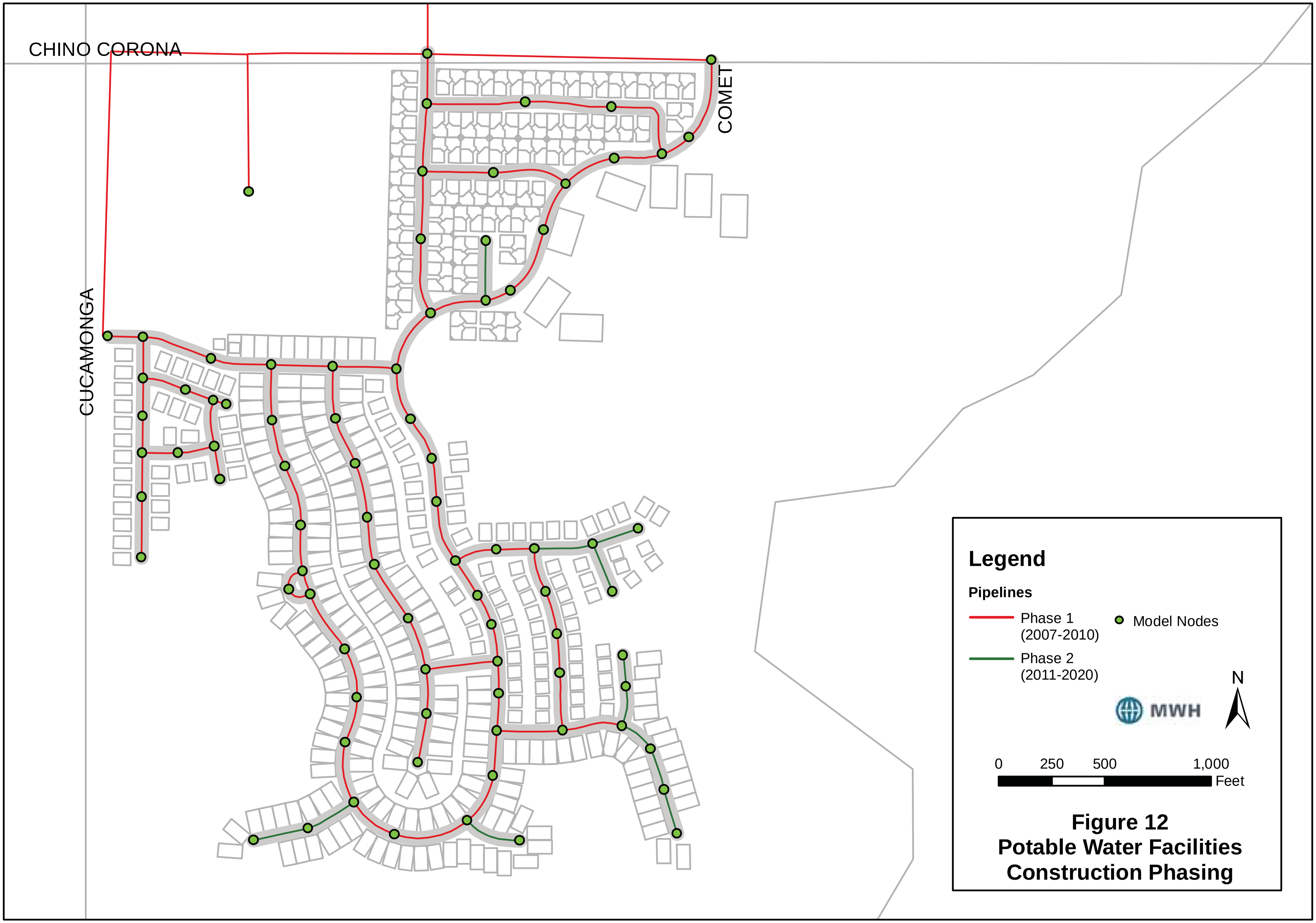


Figure 12
Potable Water Facilities
Construction Phasing

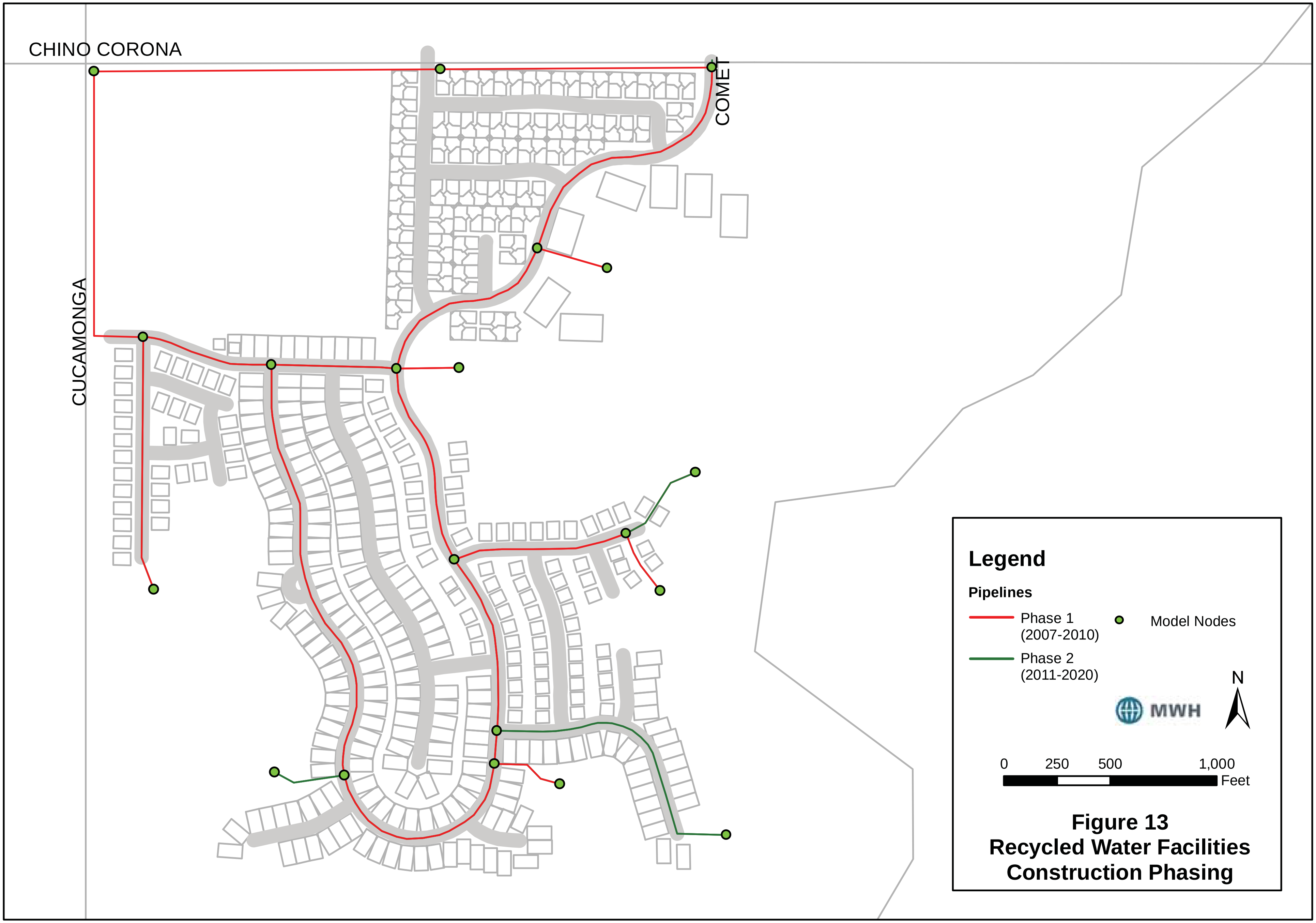


Figure 13
Recycled Water Facilities
Construction Phasing

Table 16
Capital Improvement Program

Map ID	Phasing	Description	Size	Unit	Unit Cost	Unit	Construction Cost	Contingency (20%)	Engineering & Admin (12.5%)	Construction Mgmt (10%)	Total Cost (rounded)
Potable System											
1	2007-2010	Supply Well (Drilled and Equipped)[1]	1.43	mgd	$1,500,000	$/well	$1,500,000	$300,000	$188,000	$150,000	$2,138,000
2	2007-2010	Reverse Osmosis Plant 1.03 mgd	1.03	mgd	$4,300,000	$/mgd	$4,429,000	$886,000	$554,000	$443,000	$6,312,000
2	2007-2010	Ion Exchange Plant 0.35 mgd	0.35	mgd	$1,500,000	$/mgd	$525,000	$105,000	$66,000	$53,000	$749,000
2	2007-2010	Bypass (Disinfection) 0.07 mgd	0.07	mgd	$500,000	$/mgd	$35,000	$7,000	$5,000	$4,000	$51,000
2	2007-2010	Land Acquistion for Well and Treatment	1	acre	$500,000	$/acre	$500,000	$100,000	$63,000	$50,000	$713,000
3	2007-2010	8-inch Brine Discharge Line to SARI connection	22,400	feet	$87	$/ft	$1,946,692	$390,000	$244,000	$195,000	$2,776,000
4	2007-2010	Brine Disposal Capacity in SARI Line	0.21	mgd	$150,000	$/15 gpm	n/a (LS)	n/a (LS)	n/a (LS)	n/a (LS)	$1,458,000
5	2007-2010	1.94 MG Storage Reservoir	1.94	MG	$1.25	$/gal	$2,425,000	$485,000	$304,000	$243,000	$3,457,000
5	2007-2010	Land Acquistion for Storage Reservoir	1	acre	$500,000	$/acre	$500,000	$100,000	$63,000	$50,000	$713,000
6	2007-2010	790 Zone 140 HP Booster Station	140	hp	$4,200	$/hp	$588,000	$118,000	$74,000	$59,000	$839,000
7	2007-2010	18-inch Transmission Pipeline to Edgewater	30,400	feet	$176	$/ft	$5,349,926	$1,070,000	$669,000	$535,000	$7,624,000
8	2007-2010	PRV Station (4" Valve for Normal Flow, 14" for Fireflow)	1	station	$150,000	$/station	$150,000	$30,000	$19,000	$15,000	$214,000
9	2007-2010	12-inch Diameter Pipeline in Edgewater	11,000	feet	$104	$/ft	$1,147,158	$230,000	$144,000	$115,000	$1,636,000
9	2007-2010	8-inch Diameter Pipeline in Edgewater	12,500	feet	$87	$/ft	$1,086,323	$218,000	$136,000	$109,000	$1,549,000
9	2011-2020	8-inch Diameter Pipeline in Edgewater	2,800	feet	$87	$/ft	$243,336	$49,000	$31,000	$25,000	$348,000
Subtotal (rounded)											***$30,600,000***
Recycled System[2]											
9	2007-2010	12-inch Diameter Pipeline in Edgewater	8,700	feet	$104	$/ft	$907,297	$182,000	$114,000	$91,000	$1,294,000
9	2007-2010	8-inch Diameter Pipeline in Edgewater	4,300	feet	$87	$/ft	$373,695	$75,000	$47,000	$38,000	$534,000
9	2007-2010	6-inch Diameter Pipeline in Edgewater	2,400	feet	$73	$/ft	$175,202	$36,000	$22,000	$18,000	$251,000
9	2007-2010	4-inch Diameter Pipeline in Edgewater	1,000	feet	$56	$/ft	$55,620	$12,000	$7,000	$6,000	$81,000
9	2011-2020	8-inch Diameter Pipeline in Edgewater	400	feet	$87	$/ft	$34,762	$7,000	$5,000	$4,000	$51,000
9	2011-2020	6-inch Diameter Pipeline in Edgewater	1,900	feet	$73	$/ft	$138,702	$28,000	$18,000	$14,000	$199,000
Subtotal (rounded)											***$2,400,000***
TOTAL (rounded)											$33,000,000

1. Potable Water System assumes only one concept well is needed to satisfy the water supply and does not consider location of the well or the corresponding length of pipeline required to plumb the well to the water treatment and storage complex.
2. Recycled Water System assumes pipelines only in streets as shown on the developer's preliminary layout (in addition to pipeline to create loop along the northwest boundary of the development).

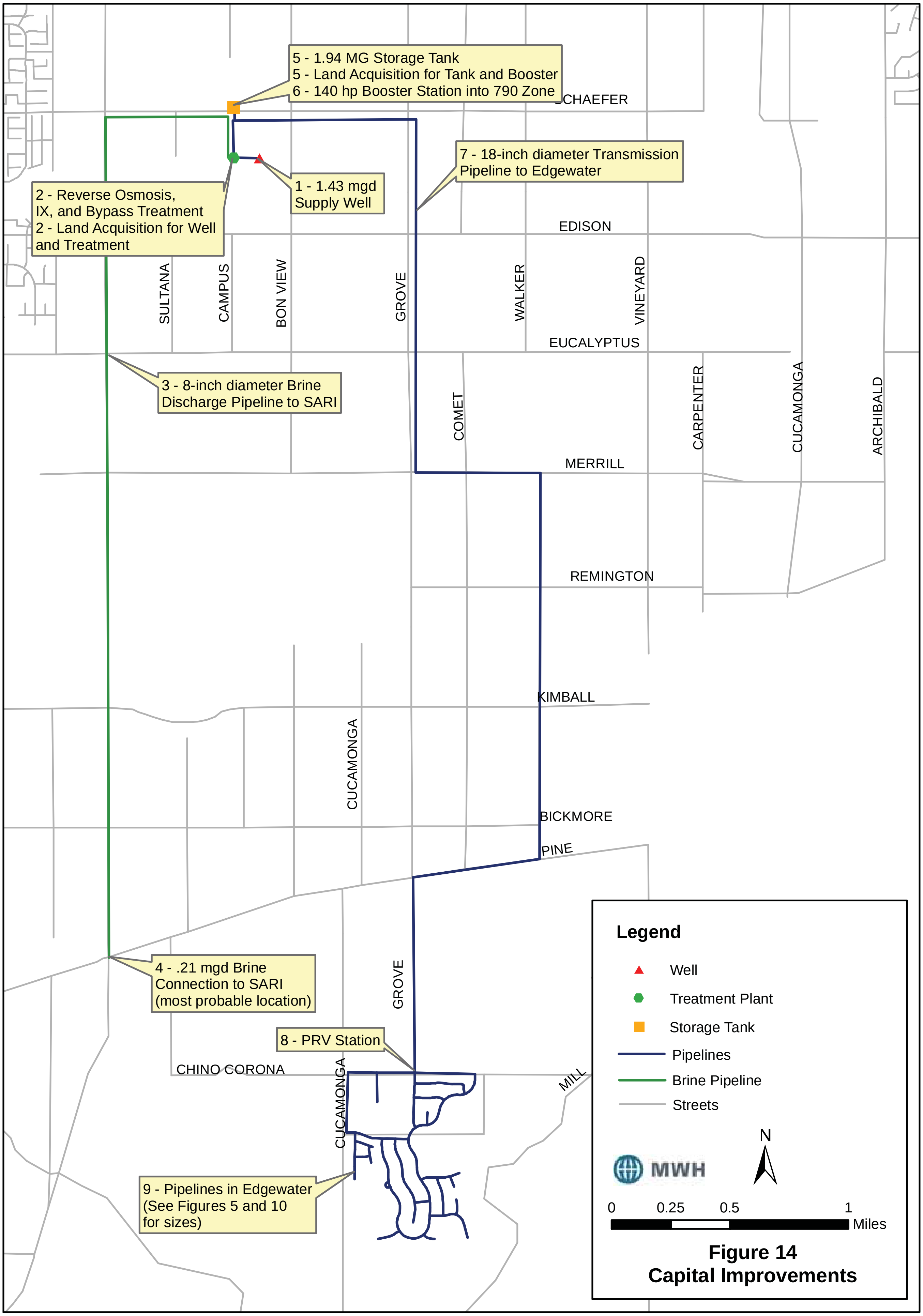


Figure 14
Capital Improvements

CONCLUSION

Based on the findings of this report, potable and recycled water can be supplied to meet the demands of the Edgewater Development with the facility recommendations listed in the CIP. The total cost of the CIP is estimated at $33 million. All of the analyses performed to arrive at this cost estimate assumes that the Edgewater Development's potable water distribution system will be isolated from the rest of the City's distribution system, while recycled water supply will be provided by IEUA. Therefore, this analysis represents a "worst-case" scenario to provide potable water to the development.

Appendix A
References

CDA, 2001. Chino I Desalter Expansion and Chino II Desalter Subsequent Environmental Impact Report, November 2001.

MWH, 2003. Water Master Plan Update, prepared for the City of Chino, May 2003.

MWH, 2004. Hydraulic Analysis for City of Chino Subarea 2, prepared for the Lewis Operating Corporation, May 2004.

MWH, 2005. Recycled Water Implementation Plan, prepared for the Inland Empire Utilities Agency, November 2005.

Wildermuth, 2006. Addendum to the Draft April 2006 Report Analysis of Future Replenishment and Desalter Plans Pursuant to the Peace Agreement and the Peace II Process, prepared for the Chino Basin Watermaster, December 2006.

Appendix B
Developer's References

Chino Corona Rd
Cucamonga Ave
Parcel 2
Low Density
26.62 Ac
Parcel 5
Medium
Density
2.41 Ac
Parcel 6
High Density
15.63 Ac
Legend
Phase
Phase 1
Phase 2
Phase 3
Native Open Space
Parcel 4
Medium Density
14.06 Ac
Lake 2
1.96 Ac
Lake 3
12.60 Ac
Recreation
Fields
Mill Creek
Parcel 3
Medium Density
12.23 Ac
Lake 4
0.72 Ac
Parcel 1
Low Density
71.14 Ac
Lake 1
21.24 Ac
Mill Creek
Prado
Regional
Park
Lake 5
2.70 Ac
Prado Regional Park
Scale: 1" = 900'

EDGEWATER, Chino, California

LAKE WATER USAGE CALCULATIONS (Evaporation)

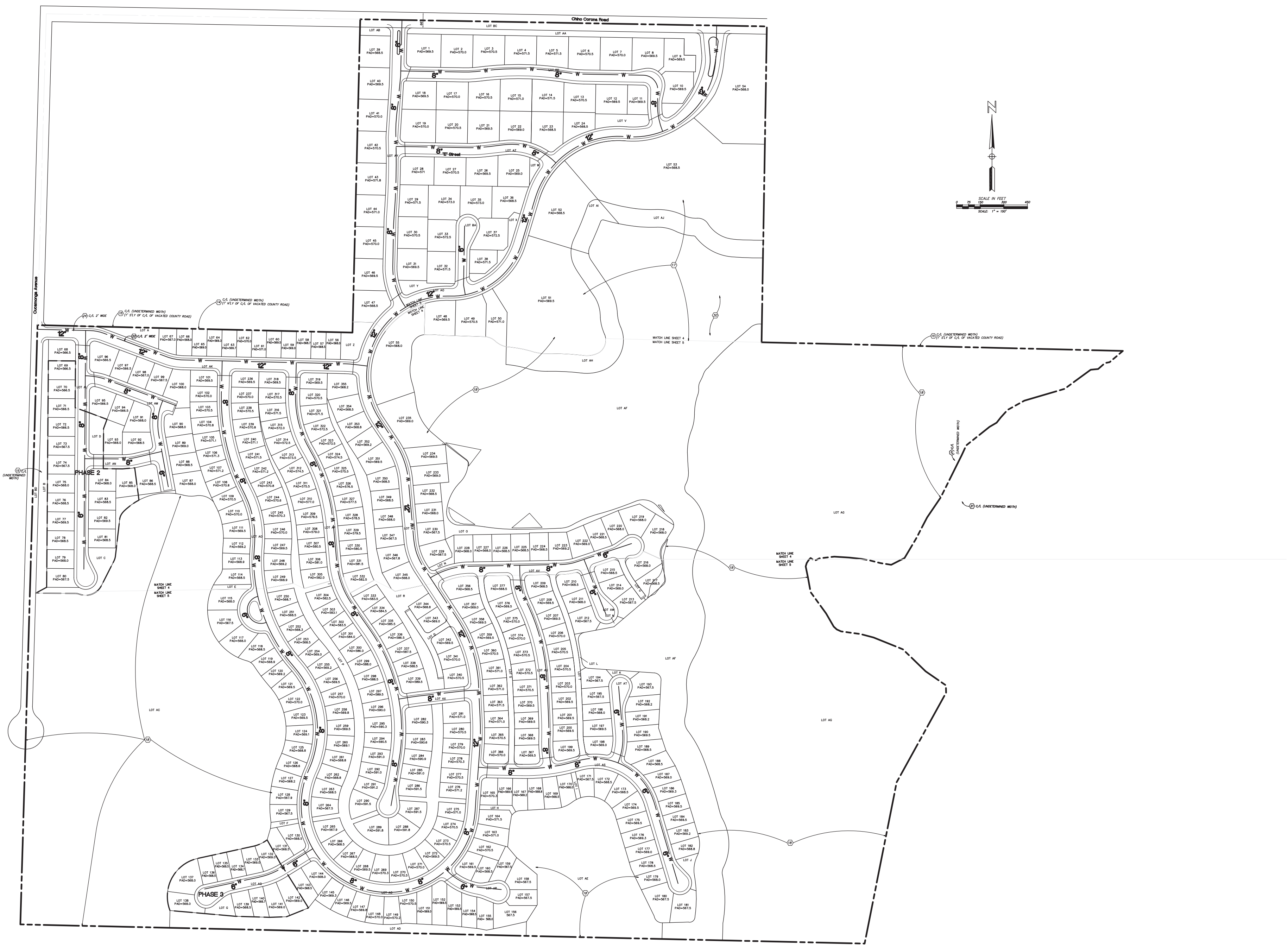
23-Oct-2006 Richard A. McGUIRE, P.E. WATERSCAPERS

Important!! Change **ONLY** the variables in **RED**

Evap. Rate: 90.0 inches / year

(Note: Evaporation rate based on information provided in "The Water Encyclopedia" by Lewis Publishers, 2nd Edition, pages 94 thru 96)

Lake Number	Water Surface Area ft2	Winter Usage Dec Jan Feb in / day	Winter Usage gallons	Avg daily Usage gallons	Spring Usage Mar Apr May in / day	Spring Usage gallons	Avg Daily Usage gallons	Summer Usage Jun Jul Aug in / day	Summer Usage gallons	Avg Daily Usage gallons	Autumn Usage Sep Oct Nov in / day	Autumn Usage gallons	Avg Daily Usage gallons	Total Usage Per Year gals / acre-ft	Lake Fill Rate (based on summer usage) Fill in 1 hr gal/min	Fill in 2 hrs gal/min	Fill in 4 hrs gal/min
1	925,400	0.12	6,229,793	69,220	0.25	12,978,735	144,208	0.39	20,246,827	224,965	0.25	12,978,735	144,208	52,434,090	3749	1875	937
2	85,300		574,240	6,380		1,196,333	13,293		1,866,279	20,736		1,196,333	13,293	4,833,185	346	173	86
3	584,700		3,936,200	43,736		8,200,418	91,116		12,792,651	142,141		8,200,418	91,116	33,129,687	2369	1185	592
4	31,400		211,385	2,349		440,385	4,893		687,001	7,633		440,385	4,893	1,779,156	127	64	32
5	117,400		790,337	8,782		1,646,535	18,295		2,568,595	28,540		1,646,535	18,295	6,652,002	476	238	119
-	0		-	-		-	-		-	-		-	-	0	0	0	0
-	0		-	-		-	-		-	-		-	-	0	0	0	0
-	0		-	-		-	-		-	-		-	-	0	0	0	0
-	0		-	-		-	-		-	-		-	-	0	0	0	0
-	0		-	-		-	-		-	-		-	-	0	0	0	0
-	0		-	-		-	-		-	-		-	-	0	0	0	0
		Winter Usage (gals)	11,741,955		Spring Usage (gals)	24,462,406		Summer Usage (gals)	38,161,353		Autumn Usage (gals)	24,462,406		98,828,120	7,067	3,535	1,766
		(acre-feet)	36.04		(acre-feet)	75.08		(acre-feet)	117.12		(acre-feet)	75.08		303.32	gpm	gpm	gpm
Total Area (sf):	1,744,200																
(acres):	40.04	Avg Daily Usage (gals)		130,467	Avg Daily Usage (gals)		271,805	Avg Daily Usage (gals)		424,015	Avg Daily Usage (gals)		271,805				



NO.	DATE	REVISIONS	APPROVED

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1315
Phone (714) 734-5100 Fax (714) 734-5155

PREPARED UNDER THE SUPERVISION OF ______ R.C.E. ______ EXPIRES ______ DATE ______

DESIGNED BY JRF/MTB/RP
DRAWN BY JRF
CHECKED BY MTB/RP
FIELD BOOK

PRELIMINARY PLANS FOR

EDGEWATER CHINO

PRELIMINARY WATER LAYOUT

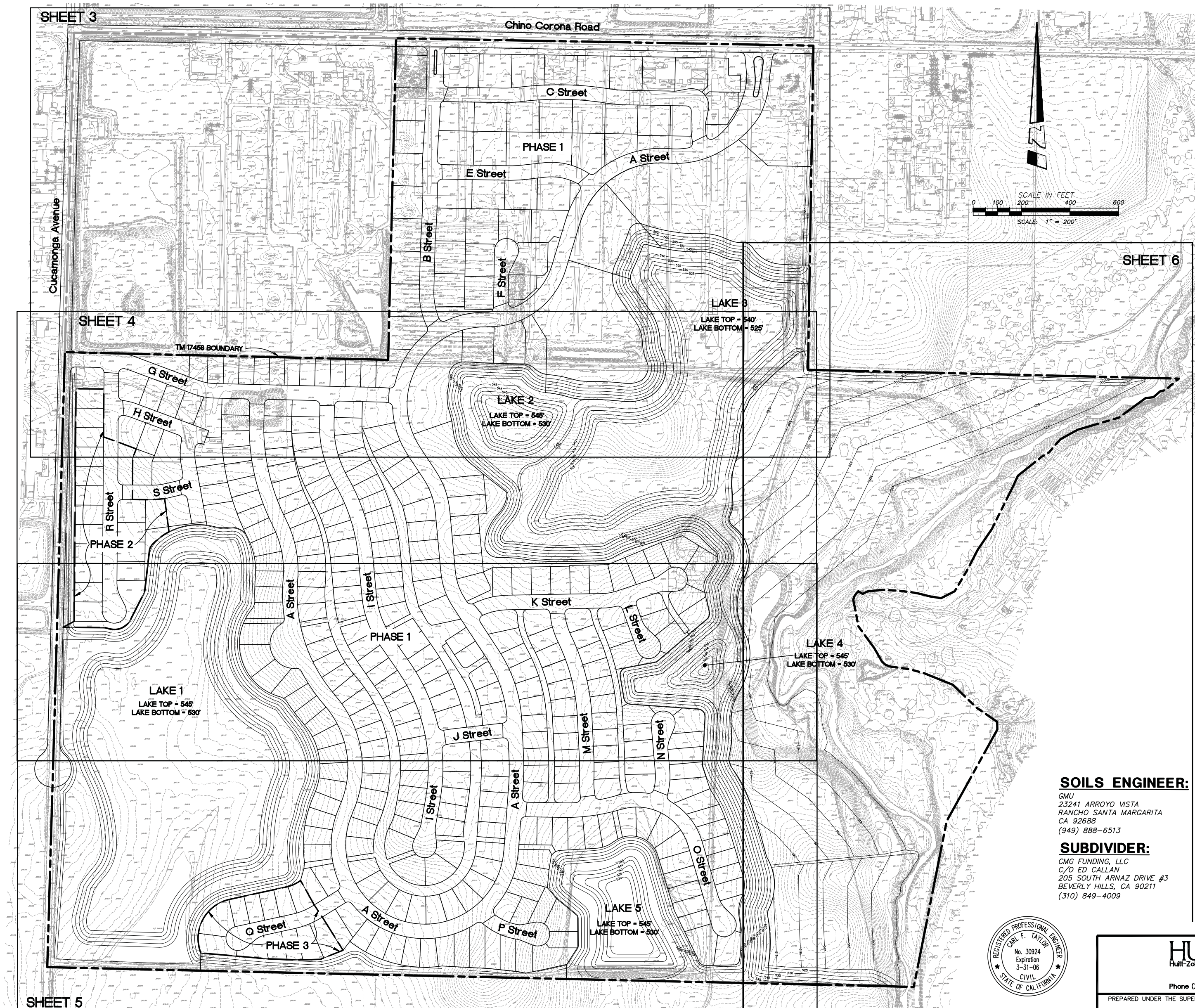
TRACT NO. -

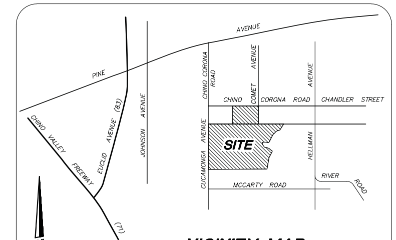
SHEET 2 OF 4 SHEETS

JOB NO. 1073-02

TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
377 NUMBERED LOTS AND 56 LETTERED LOTS





VICINITY MAP
NOT TO SCALE

NOTES

1) EXISTING LAND USE: AGRICULTURE.
2) PROPOSED LAND USE: RESIDENTIAL, PARK, LANDSCAPING AND STREETS.
3) EXISTING ZONING: CITY OF CHINO 'SPECIFIC PLAN'
4) ADJACENT LAND: NORTH: RESIDENTIAL. SOUTH: PRADO BASIN RESERVOIR. EAST: AGRICULTURE. WEST: AGRICULTURE.
5) ACCESS TO SITE IS PROPOSED VIA: CHINO CORONA ROAD & CUCAMONGA AVENUE.
6) ASSESSOR'S PARCEL NUMBER: 132-002-037, -038, 039
7) NUMBERED LOTS – 377
LETTERED LOTS – 51
8) NUMBER OF PHASES – 3
9) PROPOSED EASEMENT FOR SLOPE & FLOOD INUNDATION FOR LOTS AH, AI & AJ

UTILITY

SEWER: CITY OF CHINO PUBLIC WORKS DEPT.
13220, CENTRAL AVENUE
CHINO, CALIFORNIA 91710
(909) 627-7577

WATER: CITY OF CHINO PUBLIC WORKS DEPT.
13220, CENTRAL AVENUE
CHINO, CALIFORNIA 91710
(909) 627-7577

ELECTRICITY: SOUTHERN CALIFORNIA EDISON CO.
1351 E. FRANCIS STREET
ONTARIO, CALIFORNIA 91761-5796
(909) 930-8468 (800) 422-4133

GAS: SOUTHERN CALIFORNIA GAS COMPANY
1981 W. LUGONIA AVENUE
REDLANDS, CALIFORNIA 92374-9720
(909) 335-7572 (800) 422-4133

TELEPHONE: GENERAL TELEPHONE
1400 PHILLIPS BLVD.
POMONA, CALIFORNIA 91766
(909) 469-6334 (800) 422-4133

FIRE PROTECTION: CHINO VALLEY INDEPENDENT FIRE DISTRICT
15091 LA PALMA DR
CHINO, CALIFORNIA 91710
(909) 393-3888

CABLE TELEVISION: ADELPHIA CABLEVISION
1260 DUPONT ST.
ONTARIO, CALIFORNIA 91761
(909) 481-1115 (800) 538-4770

SOILS ENGINEER:

GMU
23241 ARROYO VISTA
RANCHO SANTA MARGARITA
CA 92688
(949) 888-6513

SUBDIVIDER:

CMG FUNDING, LLC
C/O ED CALLAN
205 SOUTH ARNAZ DRIVE #3
BEVERLY HILLS, CA 90211
(310) 849-4009

STATEMENT OF OWNERSHIP

WE, STUEVE BROS FARMS, LLP, DO HEREBY STATE THAT WE ARE THE OWNER'S OF THE PROPERTIES COMPRISING THIS TENTATIVE TRACT MAP (APN'S 132-002-037, -038 AND -039) AND THAT WE HAVE CONSENTED TO THE SUBMISSION OF SAID MAP.

DATED THIS ______________ DAY OF ______________

BY: ______________

PRINTED NAME: ______________

TITLE: ______________

REGISTERED PROFESSIONAL ENGINEER
CARL F. TAYLOR
No. 30924
Expiration 3-31-06
CIVIL
STATE OF CALIFORNIA

DATE : APRIL 11, 2005

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1309
Phone (714) 734-5100 Fax (714) 734-5155

PREPARED UNDER THE SUPERVISION OF	R.C.E.	EXPIRES	DATE
	30924	3-31-06	

DESIGNED BY	DRAWN BY	CHECKED BY
RH/TB	PMP	RS

TENTATIVE TRACT
NO. 17458

SHEET 1 OF 7 SHEETS

JOB NO. 10-1073-02

R:\10107302\Civil\10730202\dwg_TTM\10730201TT01.dwg 7/13/2005 9:55:52 AM PST

TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
377 NUMBERED LOTS AND 56 LETTERED LOTS

LEGAL DESCRIPTION

THE LAND AS DESCRIBED BELOW IS IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

PARCEL 1:

ALL OF THE FOLLOWING DESCRIBED PROPERTY LYING WESTERLY OF THE CENTER LINE OF FUQUA DITCH, AS SHOWN ON MAP OF SURVEY, RECORDED IN BOOK 8, PAGE 97 OF RECORDS OF SURVEY.

THAT PORTION OF RANCHO EL RINCON, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 9, RECORDS OF SAID COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT A POST MARKED "SW" AND RUNNING EAST WITH THE NORTH LINE OF THE O. SIMS SURVEY 80 CHAINS TO A STAKE IN THE EAST BOUNDARY LINE OF SAID RANCHO EL RINCON; THENCE NORTH 38.36 CHAINS TO A POST MARKED " ER NO. X " ; THENCE WEST WITH WITH THE OLD LINE OF SAID RANCHO EL RINCON, 80 CHAINS TO A POST MARKED " ER NO. X I " ; THENCE SOUTH 38.36 CHAINS TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM ANY PORTION INCLUDED WITHIN THE FOLLOWING PARCEL OF LAND:

COMMENCING AT A POST MARKED "ER NO. X" AND RUNNING SOUTH 941 FEET ALONG THE EAST BOUNDARY OF RANCHO EL RINCON FOR A POINT OF BEGINNING; THENCE SOUTH 45° 33' WEST 662.2 FEET; THENCE SOUTH 89° 7' WEST 1047.8 FEET; THENCE SOUTH 28° 17' WEST 463.8 FEET; THENCE SOUTH 10° 30' WEST 697 FEET; THENCE SOUTH 89° 10' EAST 1867.33 FEET TO A STAKE IN THE EAST BOUNDARY LINE OF SAID RANCHO EL RINCON; THENCE NORTH 1600.75 FEET TO THE POINT OF BEGINNING.

ALSO EXCEPTING THEREFROM ANY PORTION INCLUDED WITHIN THE FOLLOWING PARCEL OF LAND:

THAT PORTION OF THE RANCHO EL RINCON, AS PER PLAT RECORDED IN BOOK 7 OF MAPS, PAGE 9, RECORDS OF SAID COUNTY, CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY DEED RECORDED MARCH 7, 1972 IN BOOK 7881, PAGE 848, OFFICIAL RECORDS, LYING WITHIN A STRIP OF LAND 330 FEET WIDE, THE SIDELINES THEREOF BEING 100 FEET NORTHWESTERLY AND 230 FEET SOUTHEASTERLY MEASURED AT RIGHT ANGLES, RESPECTIVELY, FROM THE SURVEYED REFERENCE LINE WHICH IS DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972, SAID WESTERLY LINE BEING ALSO THE CENTER LINE OF CUCAMONGA AVENUE (AS SAME NOW EXISTS 50 FEET WIDE) AS SAID CENTER LINE IS SHOWN IN BOOK 17, PAGE 49, RECORDS OF SURVEY, SAID POINT BEING SOUTH 1° 37' 44" WEST 3182.09 FEET, MEASURED ALONG SAID CENTER LINE OF CUCAMONGA AVENUE FROM A FOUND 3/4-INCH IRON PIPE AT THE NORTHWEST CORNER OF GOVERNMENT LOT 1, SECTION 5, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO BASE AND MERIDIAN; SAID POINT ALSO BEING NORTH 1° 37' 44" EAST, 678.90 FEET, MEASURED ALONG SAID CENTER LINE OF CUCAMONGA AVENUE FROM A FOUND 3/4-INCH IRON ROD SET AT THE SOUTHWEST CORNER OF SAID REAL PROPERTY CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , BY SAID DEED RECORDED MARCH 7, 1972; THENCE NORTH 57° 38' 21" EAST, 5150.20 FEET TO A POINT, SAID POINT BEING SOUTH 0° 59' 51" WEST, 349.46 FEET FROM A POINT IN THE NORTH LINE OF FRACTIONAL SECTION 4, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO MERIDIAN, SAID NORTH LINE BEING ALSO THE CENTER LINE OF CHINO CORONA ROAD, 50 FEET WIDE, AS SHOWN IN BOOK 17, PAGE 49, RECORDS OF SURVEY, SAID LAST MENTIONED POINT BEING SOUTH 89° 00' 09" EAST, 284.01 FEET, MEASURED ALONG SAID NORTH LINE FROM A FOUND 1-1/2 INCH IRON PIPE WITH SAN BERNARDINO COUNTY SURVEYORS BRASS CAP MONUMENT AT THE NORTH 1/4 CORNER OF SAID SECTION 4, SAID POINT ALSO BEING NORTH 89° 00' 09" WEST, 2446.88 FEET, MEASURED ALONG SAID NORTH LINE FROM A FOUND NAIL AND TIN AT THE NORTHEAST CORNER OF SAID SECTION 4.

THE SIDELINES OF SAID STRIP OF LAND, 330 FEET WIDE, SHALL BE PROLONGED OR SHORTENED SO AS TO TERMINATE SOUTHWESTERLY IN SAID WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972 IN BOOK 7881, PAGE 848, OFFICIAL RECORDS.

PARCEL 2:

THAT PORTION OF THE RANCHO EL RINCON, AS PER MAP RECORDED IN BOOK 7, PAGE 9 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY DEED RECORDED MARCH 7, 1972, IN BOOK 7881, PAGE 848 OF OFFICIAL RECORDS IN THE OFFICE OF SAID COUNTY RECORDER, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972, SAID WESTERLY LINE BEING ALSO THE CENTER LINE OF CUCAMONGA AVENUE (AS SAME NOW EXISTS 50 FEET WIDE) AS SAID CENTER LINE IS SHOWN ON RECORD OF SURVEY MAP FILED IN BOOK 17, PAGE 49 OF RECORDS OF SURVEYS IN THE OFFICE OF SAID COUNTY RECORDER, SAID POINT BEING SOUTH 00° 00' 11" WEST, 3182.25 FEET, MEASURED ALONG SAID CENTER LINE OF CUCAMONGA AVENUE FROM A FOUND THREE-QUARTER (3/4) INCH IRON PIPE AT THE NORTHWEST CORNER OF GOVERNMENT LOT 1, IN SECTION 5, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO BASE AND MERIDIAN; THENCE NORTH 56° 00' 45" EAST, 1283.39 FEET ALONG THE SURVEYED REFERENCE LINE DESCRIBED IN THAT CERTAIN STRIP OF LAND 330 FEET WIDE CONVEYED TO SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, BY DEED RECORDED OCTOBER 31, 1972 AS INSTRUMENT NO. 603 IN BOOK 8051, PAGE 941 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE NORTH 29° 06' 00" WEST, 100.36 FEET TO A POINT IN THE NORTHWESTERLY LINE OF SAID STRIP OF LAND 330 FEET WIDE HEREINBEFORE REFERRED TO, SAID POINT ALSO BEING THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION; THENCE NORTH 56° 00' 45" EAST, 60.22 FEET TO A POINT HEREINAFTER (REFERED) TO AS POINT A; THENCE, SOUTH 29° 06' 00" EAST, 331.20 FEET, MORE OR LESS, TO THE SOUTHEASTERLY LINE OF SAID STRIP OF LAND 330 FEET WIDE HEREINBEFORE REFERRED TO; THENCE SOUTH 56° 00" 45 " WEST, 60.22 FEET ; THENCE, NORTH 29° 06' 00" WEST, 331.20 FEET, TO SAID TRUE POINT OF BEGINNING.

EXCEPTING ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, ALL OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERALS AND MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE HEREIN SPECIFIED OR NOT, WITHIN OR UNDERLYING, OR WHICH MAY BE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, TOGETHER WITH THE RIGHT TO USE THAT PORTION ONLY OF SAID LAND WHICH UNDERLIES A PLANE PARALLEL TO AND FIVE HUNDRED (500) FEET BELOW THE PRESENT SURFACE OF SAID LAND, FOR THE PURPOSE OF PROSPECTING FOR, DEVELOPING AND/OR EXTRACTING SAID URANIUM, THORIUM, AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER MINERAL OR HYDROCARBON SUBSTANCES FROM SAID LAND, IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT SAID MONO POWER COMPANY, ITS SUCCESSORS AND ASSIGNS, SHALL HAVE NO RIGHT TO ENTER UPON THE SURFACE OF SAID LAND, OR TO USE SAID LAND OR ANY PORTION THEREOF TO SAID DEPTH OF FIVE HUNDRED (500) FEET, FOR ANY PURPOSE WHATSOEVER, AS EXCEPTED AND RESERVED IN THAT CERTAIN DEED FROM MONO POWER COMPANY, A CORPORATION, TO SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, DATED OCTOBER 16, 1972 AND RECORDED IN BOOK 8051, PAGE 941 OF OFFICIAL RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 3:

THAT PORTION OF THE RANCHO EL RINCON, AS PER MAP RECORDED IN BOOK 7, PAGE 9 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, CONVEYED TO McCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY DEED RECORDED MARCH 7, 1972, IN BOOK 7881, PAGE 848 OF OFFICIAL RECORDS IN THE OFFICE OF SAID COUNTY RECORDER, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT IN THE WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO MCCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972, SAID WESTERLY LINE BEING ALSO THE CENTER LINE OF CUCAMONGA AVENUE (AS SAME NOW EXISTS 50 FEET WIDE) AS SAID CENTER LINE IS SHOWN ON RECORD OF SURVEY MAP FILED IN BOOK 17, PAGE 49 OF RECORDS OF SURVEYS, IN THE OFFICE OF SAID COUNTY RECORDER, SAID POINT BEING SOUTH 00° 00' 11" WEST, 3182.25 FEET, MEASURED ALONG SAID CENTER LINE OF CUCAMONGA AVENUE FROM A FOUND 3/4 INCH IRON PIPE AT THE NORTHWEST CORNER OF GOVERNMENT LOT 1, IN SECTION 5, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO BASE AND MERIDIAN; THENCE NORTH 56° 00' 45" EAST, 1283.39 FEET ALONG THE SURVEYED REFERENCE LINE DESCRIBED IN THAT CERTAIN STRIP OF LAND, 330 FEET WIDE, CONVEYED TO SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, BY DEED RECORDED OCTOBER 31, 1972 AS INSTRUMENT NO. 603, IN BOOK 8051, PAGE 941 OF OFFICIAL RECORDS OF SAID COUNTY; THENCE NORTH 29° 06' 00" WEST, 100.36 FEET TO A POINT IN THE NORTHWESTERLY LINE OF SAID STRIP OF LAND 330 FEET WIDE HEREINBEFORE REFERRED TO; THENCE NORTH 56° 00' 45" EAST, 60.22 FEET TO A POINT HEREINAFTER REFERRED TO AS POINT " A " ; THENCE, NORTH 56°00' 45" EAST, 475.78 FEET ALONG THE NORTHWESTERLY LINE OF THAT CERTAIN STRIP OF LAND 330.00 FEET WIDE, AS CONVEYED TO SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, BY DEED RECORDED OCTOBER 31, 1972, AS INSTRUMENT NO. 603 IN BOOK 8051, PAGE 941 OF OFFICIAL RECORDS OF SAID COUNTY TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION; THENCE, NORTH 56° 00' 45" EAST, 60.22 FEET; THENCE, SOUTH 29° 06' 00" EAST, 74.98 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE TO THE NORTHEAST, HAVING A RADIUS OF 770.00 FEET; THENCE, SOUTHEASTERLY ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 19° 08' 57", AN ARC DISTANCE OF 257.35 FEET, MORE OR LESS, TO THE SOUTHEASTERLY LINE OF SAID STRIP OF LAND 330.00 FEET WIDE HEREINBEFORE REFERRED TO; THENCE, SOUTH 56° 00' 45" WEST, 61.76 FEET TO A POINT IN A NON TANGENT CURVE CONCAVE TO THE NORTHEAST HAVING A RADIUS OF 830.00 FEET, A RADIAL LINE OF SAID CURVE THROUGH SAID POINT BEARS SOUTH 42° 48' 05" WEST; THENCE, NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18° 05' 55" AN ARC DISTANCE OF 262.18 FEET; THENCE, TANGENT TO SAID LAST MENTIONED CURVE NORTH 29° 06' 00" EAST, 69.85 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

EXCEPTING ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, ALL OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERALS AND MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE HEREIN SPECIFIED OR NOT, WITHIN OR UNDERLYING, OR WHICH MAY BE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, TOGETHER WITH THE RIGHT TO USE THAT PORTION ONLY OF SAID LAND WHICH UNDERLIES A PLANE PARALLEL TO AND FIVE HUNDRED (500) FEET BELOW THE PRESENT SURFACE OF SAID LAND, FOR THE PURPOSE OF PROSPECTING FOR, DEVELOPING AND/OR EXTRACTING SAID URANIUM, THORIUM, AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER MINERAL OR HYDROCARBON SUBSTANCES FROM SAID LAND, IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT SAID MONO POWER COMPANY, ITS SUCCESSORS AND ASSIGNS, SHALL HAVE NO RIGHT TO ENTER UPON THE SURFACE OF SAID LAND, OR TO USE SAID LAND OR ANY PORTION THEREOF TO SAID DEPTH OF FIVE HUNDRED (500) FEET FOR ANY PURPOSE WHATSOEVER, AS EXCEPTED AND RESERVED IN THAT CERTAIN DEED FROM MONO POWER COMPANY, A CORPORATION, TO SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION, DATED OCTOBER 16, 1972 AND RECORDED IN BOOK 8051, PAGE 941 OF OFFICIAL RECORDS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 4:

THAT PORTION OF THE RANCHO EL RINCON, AS PER MAP RECORDED IN BOOK 7, PAGE 9, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, CONVEYED TO MCCLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY DEED RECORDED MARCH 7, 1972, IN BOOK 7881, PAGE 848, OF OFFICIAL RECORDS, IN THE OFFICE OF SAID COUNTY RECORDER, LYING WITHIN A STRIP OF LAND THREE HUNDRED THIRTY (330) FEET WIDE, THE SIDELINES THEREOF BEING ONE HUNDRED (100) FEET NORTHWESTERLY AND TWO HUNDRED THIRTY (230) FEET SOUTHEASTERLY, MEASURED AT RIGHT ANGLES, RESPECTIVELY, FROM THE SURVEYED REFERENCE LINE, DESCRIBED IN THAT CERTAIN GRANT DEED TO SOUTHERN CALIFORNIA EDISON COMPANY, RECORDED OCTOBER 31, 1972 IN BOOK 8051, PAGE 941, OF SAID OFFICIAL RECORDS, WHICH IS DESCRIBED AS FOLLOWS:

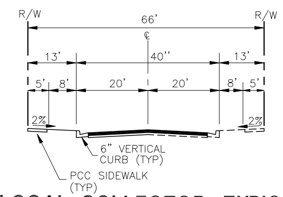
BEGINNING AT A POINT IN THE WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO MC CLEAN RANCH PROPERTIES INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972, AND WESTERLY LINE BEING ALSO THE CENTERLINE OF CUCAMONGA AVENUE (AS SAME NOW EXISTS, 50 FEET WIDE) AS SAID CENTERLINE IS SHOWN ON RECORD OF SURVEY MAP FILED IN BOOK 17, PAGE 49, RECORDS OF SURVEY, IN THE OFFICE OF SAID COUNTY RECORDER, SAID POINT BEING SOUTH 1° 37' 44" WEST, 3182.09 FEET, MEASURED ALONG SAID CENTERLINE OF CUCAMONGA AVENUE FROM A FOUND THREE QUARTER (3/4) INCH IRON PIPE AT THE NORTHWEST CORNER OF GOVERNMENT LOT 1, IN SECTION 5, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO BASE AND MERIDIAN, SAID POINT ALSO BEING NORTH 1° 37' 44" EAST, 678.90 FEET, MEASURED ALONG SAID CENTERLINE OF CUCAMONGA AVENUE FROM A FOUND THREE-QUARTER (3/4) INCH IRON ROD, SET AT THE SOUTHWEST CORNER OF SAID REAL PROPERTY CONVEYED TO MC CLEAN RANCH PROPERTIES, INC. , BY SAID DEED RECORDED MARCH 7, 1972; THENCE NORTH 57° 38' 21" EAST 5150.20 FEET TO A POINT, SAID POINT BEING SOUTH 00° 59' 51" WEST, 349.46 FEET FROM A POINT IN THE NORTH LINE OF FRACTIONAL SECTION 4, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO MERIDIAN, SAID NORTH LINE BEING ALSO THE CENTERLINE OF CHINO CORONA ROAD, 50 FEET WIDE, AS SHOWN ON SAID RECORD OF SURVEY MAP, FILED IN BOOK 17, PAGE 49, OF RECORD OF SURVEYS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, SAID LAST MENTIONED POINT BEING SOUTH 89° 00' 09" EAST, 284.01 FEET, MEASURED ALONG SAID NORTH LINE FROM A FOUND ONE AND ONE-HALF (1 1/2) INCH IRON PIPE, WITH SAN BERNARDINO COUNTY SURVEYORS BRASS CAP MONUMENT, AT THE NORTH QUARTER CORNER OF SAID SECTION 4, SAID POINT ALSO BEING NORTH 89° 00' 09" WEST, 2446.88 FEET, MEASURED ALONG SAID NORTH LINE FROM A FOUND NAIL AND TIN AT THE NORTHEAST CORNER OF SAID SECTION 4.

THE SIDELINES OF SAID STRIP OF LAND, THREE HUNDRED THIRTY (330) FEET WIDE, SHALL BE PROLONGED OR SHORTENED SO AS TO TERMINATE SOUTHWESTERLY IN SAID WESTERLY LINE OF THE REAL PROPERTY CONVEYED TO MC CLEAN RANCH PROPERTIES, INC. , A CORPORATION, BY SAID DEED RECORDED MARCH 7, 1972. TOGETHER WITH THAT PORTION OF THE SOUTH 1/2 OF THE "COUNTY ROAD" , VACATED, LYING NORTHERLY OF AND ADJACENT TO SAID LAND AND BEING SHOWN ON MAP NO. 1318 ON FILE IN THE OFFICE OF THE COUNTY SURVEYOR OF SAN BERNARDINO COUNTY, THE NORTHERLY LINE OF SAID SOUTH 1/2 OF SAID VACATED ROAD, AS ABANDONED BY BOARD OF SUPERVISORS RESOLUTION, DATED JUNE 11, 1973 AND RECORDED JUNE 12, 1973, IN BOOK 8202, PAGE 644, OFFICIAL RECORDS.

EXCEPTING THEREFROM THOSE PORTIONS AS CONVEYED TO MC CLEAN RANCH PROPERTIES, INC., A CORPORATION, DESCRIBED AS PARCELS 1 AND 2, IN THAT CERTAIN GRANT DEED, RECORDED MARCH 24, 1975 IN BOOK 8641, PAGE 975, OF OFFICIAL RECORDS, IN THE OFFICE OF SAID COUNTY RECORDER.

EXCEPTING AND RESERVING UNTO MONO POWER COMPANY, ITS SUCCESSORS AND ASSIGNS, ALL URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, ALL OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER HYDROCARBON SUBSTANCES AND OTHER MINERAL ORES OF EVERY KIND AND CHARACTER, WHETHER SIMILAR TO THESE HEREIN SPECIFIED OR NOT, WITHIN OR UNDERLYING, OR WHICH MAY BE PRODUCED FROM THE HEREINBEFORE DESCRIBED LAND, TOGETHER WITH THE RIGHT TO USE THAT PORTION ONLY OF SAID LAND WHICH UNDERLIES A PLANE PARALLEL TO AND FIVE HUNDRED (500) FEET BELOW THE PRESENT SURFACE OF SAID LAND, FOR THE PURPOSE OF PROSPECTING FOR, DEVELOPING AND/OR EXTRACTING SAID URANIUM, THORIUM AND OTHER FISSIONABLE MATERIALS, OIL, GAS, PETROLEUM, ASPHALTUM, AND OTHER MINERAL OR HYDROCARBON SUBSTANCES FROM SAID LAND, IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT SAID MONO POWER COMPANY, ITS SUCCESSORS AND ASSIGNS, SHALL HAVE NO RIGHT TO ENTER UPON THE SURFACE OF SAID LAND, OR TO USE SAID LAND OR ANY PORTION THEREOF TO SAID DEPTH OF FIVE HUNDRED (500) FEET, FOR ANY PURPOSE WHATSOEVER, AS SET FORTH IN THE DEED RECORDED JANUARY 31, 1996 AS INSTRUMENT NO. 35070, (OFFICIAL RECORDS)

EXISTING STREET SECTIONS

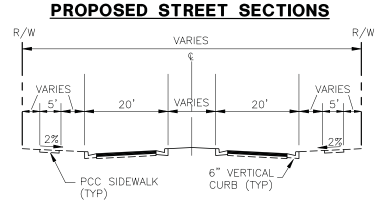


LOCAL COLLECTOR, TYPICAL

(WITH PARKING)

NOT TO SCALE

PROPOSED STREET SECTIONS

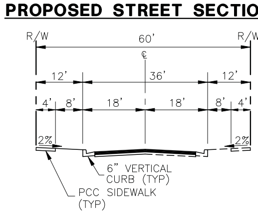


"A" AND "B" STREET BOULEVARD SECTION

(NO PARKING)

NOT TO SCALE

PROPOSED STREET SECTIONS



ON-SITE STREETS

NOT TO SCALE

EARTHWORK SUMMARY

	CUT	FILL
RAW CUT	2,050,201 CY	
RAW FILL		2,130,073 CY
TOTAL	IMPORT 79,872 CY	

PARCEL 5:

GOVERNMENT LOTS 1 AND 2, SECTION 4, TOWNSHIP 3 SOUTH, RANGE 7 WEST, SAN BERNARDINO MERIDIAN IN THE COUNTY OF SAN BERNARDINO. STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL MAP THEREOF.

ALSO EXCEPT AN UNDIVIDED 1/2 INTEREST IN AND TO ALL OIL, GAS, PETROLEUM, NAPTHA, OTHER HYDROCARBON SUBSTANCES AND MINERALS OF WHATSOEVER KIND AND NATURE IN, UPON OR BENEATH THE PROPERTY HEREINABOVE DESCRIBED, TOGETHER WITH THE RIGHT OF ENTRY AND ALL OTHER RIGHTS , INCLUDING ALL RIGHTS OF WAY AND EASEMENTS, WHICH MAY BE NECESSARY FOR THE DEVELOPMENT, PRODUCTION AND REMOVAL OF ALL SUCH SUBSTANCES AND MINERALS AND THE FULL ENJOYMENT OF THE GRANTOR'S INTEREST HEREIN RESERVED, AS RESERVED BY THE FEDERAL FARM MORTGAGE CORPORATION IN DEED RECORDED JANUARY 26, 1942 IN BOOK 1514, PAGE 260, OFFICIAL RECORDS.

ALSO EXCEPT THEREFROM ANY PORTION LYING WITHIN COUNTY ROADS, AS EXCEPTED IN DEED FROM LORNA L. DEANE, A WIDOW, RECORDED FEBRUARY 8, 1955 IN BOOK 3563, PAGE 23, OFFICIAL RECORDS.

TITLE REPORT INFORMATION

ITEM NUMBERS HEREON CORRESPOND TO CHICAGO TITLE COMPANY PRELIMINARY TITLE REPORT NO.32025600-K54, DATED MARCH 17, 2004

NO RESPONSIBILITY FOR COMPLETENESS, ACCURACY OR CONTENT OF SAID REPORT IS ASSUMED BY THIS MAP.

ITEM NUMBERS INDICATED WITH A HEXAGON ( ) REFLECT ITEMS WHICH ARE PLOTTED HEREON:

1-10 TAXES.

11. RIGHTS OF THE PUBLIC IN AND TO THAT PORTION LYING WITHIN CUCAMONGA AVENUE AND UNNAMED COUNTY ROAD.

12. RESERVATIONS FOR WATER RIGHTS AND MINING AS RESERVED IN THE DEED RECORDED APRIL 19, 1888 IN BOOK "C," PAGE 231 OF PATENTS.

13. AN EASEMENT TO COUNTY OF SAN BERNARDINO FOR HIGHWAY PURPOSES RECORDED JANUARY 14, 1907 IN BOOK 387, PAGE 190 OF DEEDS. (40' WIDE)

14. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN SIERRA POWER COMPANY RECORDED APRIL 9, 1928 IN BOOK 353, PAGE 225, O.R.

15. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN SIERRAS POWER COMPANY RECORDED MAY 25, 1928 IN BOOK 370, PAGE 350, O.R. (UNDETERMINED WIDTH)

16. RESERVATION FOR RIGHT OF ENTRY AND OTHER RIGHTD RECORDED JANUARY 26, 1942 IN BOOK 1514, PAGE 260, O.R. (BLANKET OVER PARCEL 5).

17. AN EASEMENT CONSISTING OF FLOWAGE RIGHTS, THE RIGHT TO PROHIBIT HUMAN HABITATION AND PERMANENT EASEMENT VESTED IN THE UNITED STATES OF AMERICA, TO FLOOD AND INUNDATE THE PROPERTY DESCRIBED THEREIN WHENEVER AND WHEREVER THE CONTROL OF STORM WATER RUNOFF IN THE PRADO FLOOD CONTROL BASIN REQUIRES SUCH FLOODING AND INUNDATION, SUBJECT HOWEVER, TO THE RIGHTS AS SET OUT IN THE DECREE OF CONDEMNATION OUT OF THE DISTRICT COURT OF THE UNITED STATES, IN AND FOR THE SOUTHERN DISTRICT OF CALIFORNIA, CENTRAL DIVISION, CASE NO. 1050-C CIVIL, A CERTIFIED COPY OF SAID DECREE IS RECORDED APRIL 21, 1942 IN BOOK 1527, PAGE 469, OFFICIAL RECORDS.

18. AN EASEMENT CONSISTING OF FLOWAGE RIGHTS, THE RIGHT TO PROHIBIT HUMAN HABITATION AND PERMANENT EASEMENT VESTED IN THE UNITED STATES OF AMERICA, TO FLOOD AND INUNDATE THE PROPERTY DESCRIBED THEREIN WHENEVER AND WHEREVER THE CONTROL OF STORM WATER RUNOFF IN THE PRADO FLOOD CONTROL BASIN REQUIRES SUCH FLOODING AND INUNDATION, SUBJECT HOWEVER, TO THE RIGHTS AS SET OUT IN THE DECREE OF CONDEMNATION OUT OF THE DISTRICT COURT OF THE UNITED STATES, IN AND FOR THE SOUTHERN DISTRICT OF CALIFORNIA, CENTRAL DIVISION, CASE NO. 1051-C CIVIL, A CERTIFIED COPY OF SAID DECREE IS RECORDED MAY 22, 1942 IN BOOK 1533, PAGE 363, OFFICIAL RECORDS, FINAL JUDGMENT ON SAID EASEMENT RECORDED MAY 16, 1945 IN BOOK 1783, PAGE 84, OFFICIAL RECORDS AND AMENDMENT TO SAID JUDGMENT RECORDED MAY 16, 1945 IN BOOK 1791, PAGE 6, O.R.

19. AN EASEMENT FOR FLOOD CONTROL AND WATER CONSERVATION IN FAVOR OF SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT RECORDED OCTOBER 31, 1947 IN BOOK 2096, PAGE 150, O.R. (EASEMENT IS NOT LOCATABLE FROM RECORD, EASEMENT IS BASED ON CENTERLINE OF MILL CREEK WHICH IS NOT DEFINED IN DOCUMENT).

20. RELEASE AND AGREEMENT EXECUTED BY AND BETWEEN SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT, FIRST PARTY, AND ARTHUR J. CLARK AND VIRGINIA S. CLARK, HUSBAND AND WIFE, SECOND PARTY, ON NOVEMBER 5, 1947 IN BOOK 2099, PAGE 220, OFFICIAL RECORDS, AND THAT SAID AGREEMENTS CONTAINED HEREIN SHALL CONSTITUTE A COVENANT RUNNING WITH THE LAND.

21. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED DECEMBER 22, 1947 IN BOOK 2179, PAGE 73, O.R. APPROXIMATE LOCATION ONLY (UNDETERMINED WIDTH)

22. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED JUNE 2, 1950 IN BOOK 2584, PAGE 505, O.R.

23. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED JULY 21, 1953 IN BOOK 3209, PAGE 480, O.R. (NOT LOCATABLE FROM RECORD)

24. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF THE GENERAL TELEPHONE COMPANY OF CALIFORNIA RECORDED APRIL 21, 1955 IN BOOK 3626, PAGE 215, O.R.

25. COVENANT AND RESTRICTIONS RECORDED FEBRUARY 17, 1971 IN BOOK 7616, PAGE 649, O.R.

26. AN EASEMENT RESERVED FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN THE COUNTY ROAD VACATED BY RESOLUTION RECORDED JUNE 12, 1973 IN BOOK 8202, PAGE 644, O.R. (CHICAGO TITLE COMPANY STATES, "NO REPRESENTATION IS MADE AS TO THE PRESENT OWNERSHIP OF SAID EASEMENT")

27. INTENTIONALLY DELETED.

28. AN EASEMENT RESERVED FOR PUBLIC UTILITY AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY IN THE GRANT DEED RECORDED MARCH 24, 1975 IN BOOK 8641, PAGE 975, O.R.

29. A DEED OF TRUST.

30. AN EASEMENT FOR PUBLIC UTILITIES AND INCIDENTAL PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED DECEMBER 20, 1976 IN BOOK 9076, PAGE 71, O.R.

31-36 DEEDS OF TRUST.

37. COVENANTS, CONDITIONS AND RESTRICTIONS RECORDED OCTOBER 29, 1999 AS INSTRUMENT NO. 99-454314, O.R.

38. UNRECORDED LEASE.

39. "MEMORANDUM OF PURCHASE AGREEMENT" RECORDED MARCH 11, 2004 AS INSTRUMENT NO. 20040171081, O.R.

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1309
Phone (714) 734-5100 Fax (714) 734-5155

DESIGNED BY RH/TB	TENTATIVE TRACT NO. 17458	SHEET 2 OF 7 SHEETS	
DRAWN BY PMP			
CHECKED BY RS		JOB NO. 10-1073-02	

R:\1010730\2\Civil\1073\02\dwg_TTM\1073\02JTT01.dwg 7/13/2005 9:55:52 AM PST

TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
377 NUMBERED LOTS AND 56 LETTERED LOTS

Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres	Lot	Land Use	Area (sf)	Acres
1	RESIDENTIAL	20,283	0.47	71	RESIDENTIAL	9,200	0.21	141	RESIDENTIAL	10,412	0.24	212	RESIDENTIAL	10,612	0.24	281	RESIDENTIAL	10,307	0.24	351	RESIDENTIAL	12,682	0.29	AR	STREET	18,489	0.42
2	RESIDENTIAL	18,880	0.43	72	RESIDENTIAL	9,200	0.21	142	RESIDENTIAL	11,230	0.26	213	RESIDENTIAL	9,295	0.21	282	RESIDENTIAL	13,366	0.31	352	RESIDENTIAL	10,225	0.23	AS	STREET	76,945	1.77
3	RESIDENTIAL	17,652	0.41	73	RESIDENTIAL	9,200	0.21	143	RESIDENTIAL	9,455	0.22	214	RESIDENTIAL	8,848	0.20	283	RESIDENTIAL	7,928	0.18	353	RESIDENTIAL	10,425	0.24	AT	STREET	23,220	0.53
4	RESIDENTIAL	16,515	0.38	74	RESIDENTIAL	9,200	0.21	144	RESIDENTIAL	9,497	0.22	215	RESIDENTIAL	8,022	0.18	284	RESIDENTIAL	7,739	0.18	354	RESIDENTIAL	11,386	0.26	AU	STREET	46,311	1.06
5	RESIDENTIAL	17,262	0.40	75	RESIDENTIAL	9,200	0.21	145	RESIDENTIAL	8,108	0.19	216	RESIDENTIAL	10,728	0.25	285	RESIDENTIAL	7,245	0.17	355	RESIDENTIAL	12,638	0.29	AV	STREET	58,404	1.34
6	RESIDENTIAL	18,794	0.43	76	RESIDENTIAL	9,200	0.21	146	RESIDENTIAL	8,126	0.19	217	RESIDENTIAL	9,956	0.23	286	RESIDENTIAL	8,052	0.18	356	RESIDENTIAL	12,054	0.28	AW	STREET	16,810	0.39
7	RESIDENTIAL	18,900	0.43	77	RESIDENTIAL	9,200	0.21	147	RESIDENTIAL	8,149	0.19	218	RESIDENTIAL	14,550	0.33	287	RESIDENTIAL	9,849	0.23	357	RESIDENTIAL	9,198	0.21	AX	STREET	14,467	0.33
8	RESIDENTIAL	17,946	0.41	78	RESIDENTIAL	9,200	0.21	148	RESIDENTIAL	8,131	0.19	219	RESIDENTIAL	13,595	0.31	288	RESIDENTIAL	11,665	0.27	358	RESIDENTIAL	7,158	0.16	AY	STREET	73,178	1.68
9	RESIDENTIAL	15,855	0.36	79	RESIDENTIAL	9,200	0.21	149	RESIDENTIAL	8,128	0.19	220	RESIDENTIAL	9,569	0.22	289	RESIDENTIAL	13,027	0.30	359	RESIDENTIAL	7,642	0.18	AZ	STREET	35,554	0.82
10	RESIDENTIAL	15,513	0.36	80	RESIDENTIAL	9,492	0.22	150	RESIDENTIAL	8,894	0.20	221	RESIDENTIAL	9,894	0.23	290	RESIDENTIAL	10,360	0.24	360	RESIDENTIAL	7,650	0.18	BA	STREET	19,605	0.45
11	RESIDENTIAL	10,712	0.25	81	RESIDENTIAL	9,200	0.21	151	RESIDENTIAL	9,577	0.22	222	RESIDENTIAL	10,236	0.23	291	RESIDENTIAL	7,758	0.18	361	RESIDENTIAL	7,629	0.18	BB	STREET	74,128	1.70
12	RESIDENTIAL	16,875	0.39	82	RESIDENTIAL	9,200	0.21	152	RESIDENTIAL	11,386	0.26	223	RESIDENTIAL	10,530	0.24	292	RESIDENTIAL	7,849	0.18	362	RESIDENTIAL	7,202	0.17	BC	STREET	56,882	1.31
13	RESIDENTIAL	16,380	0.38	83	RESIDENTIAL	9,200	0.21	153	RESIDENTIAL	10,010	0.23	224	RESIDENTIAL	9,488	0.22	293	RESIDENTIAL	7,522	0.17	363	RESIDENTIAL	7,004	0.16	BD	STREET	50097	1.15
14	RESIDENTIAL	17,999	0.41	84	RESIDENTIAL	10,862	0.25	154	RESIDENTIAL	8,810	0.20	225	RESIDENTIAL	9,200	0.21	294	RESIDENTIAL	7,754	0.18	364	RESIDENTIAL	7,200	0.17				
15	RESIDENTIAL	18,541	0.43	85	RESIDENTIAL	10,443	0.24	155	RESIDENTIAL	8,868	0.20	226	RESIDENTIAL	9,200	0.21	295	RESIDENTIAL	7,737	0.18	365	RESIDENTIAL	7,337	0.17				
16	RESIDENTIAL	17,169	0.39	86	RESIDENTIAL	11,392	0.26	156	RESIDENTIAL	13,907	0.32	227	RESIDENTIAL	9,200	0.21	296	RESIDENTIAL	7,761	0.18	366	RESIDENTIAL	8,561	0.20				
17	RESIDENTIAL	16,232	0.37	87	RESIDENTIAL	13,475	0.31	157	RESIDENTIAL	8,174	0.19	228	RESIDENTIAL	9,317	0.21	297	RESIDENTIAL	7,784	0.18	367	RESIDENTIAL	8,446	0.19				
18	RESIDENTIAL	17,026	0.39	88	RESIDENTIAL	9,487	0.22	158	RESIDENTIAL	12,474	0.29	229	RESIDENTIAL	10,550	0.24	298	RESIDENTIAL	7,755	0.18	368	RESIDENTIAL	7,239	0.17				
19	RESIDENTIAL	20,633	0.47	89	RESIDENTIAL	9,183	0.21	159	RESIDENTIAL	8,750	0.20	230	RESIDENTIAL	10,298	0.24	299	RESIDENTIAL	7,749	0.18	369	RESIDENTIAL	7,098	0.16				
20	RESIDENTIAL	18,900	0.43	90	RESIDENTIAL	12,062	0.28	160	RESIDENTIAL	7,818	0.18	231	RESIDENTIAL	9,200	0.21	300	RESIDENTIAL	7,824	0.18	370	RESIDENTIAL	7,004	0.16				
21	RESIDENTIAL	18,295	0.42	91	RESIDENTIAL	11,620	0.27	161	RESIDENTIAL	8,554	0.20	232	RESIDENTIAL	9,200	0.21	301	RESIDENTIAL	7,245	0.17	371	RESIDENTIAL	7,226	0.17				
22	RESIDENTIAL	16,944	0.39	92	RESIDENTIAL	10,789	0.25	162	RESIDENTIAL	8,914	0.20	233	RESIDENTIAL	12,257	0.28	302	RESIDENTIAL	7,171	0.16	372	RESIDENTIAL	7,556	0.17				
23	RESIDENTIAL	20,557	0.47	93	RESIDENTIAL	11,013	0.25	163	RESIDENTIAL	9,612	0.22	234	RESIDENTIAL	13,288	0.31	303	RESIDENTIAL	7,899	0.18	373	RESIDENTIAL	7,593	0.17				
24	RESIDENTIAL	13,206	0.30	94	RESIDENTIAL	9,200	0.21	164	RESIDENTIAL	9,559	0.22	235	RESIDENTIAL	33,566	0.77	304	RESIDENTIAL	8,171	0.19	374	RESIDENTIAL	7,797	0.18				
25	RESIDENTIAL	18,078	0.42	95	RESIDENTIAL	11,346	0.26	165	RESIDENTIAL	8,069	0.19	236	RESIDENTIAL	7,733	0.18	305	RESIDENTIAL	8,115	0.19	375	RESIDENTIAL	7,466	0.17				
26	RESIDENTIAL	16,718	0.38	96	RESIDENTIAL	13,478	0.31	166	RESIDENTIAL	7,245	0.17	237	RESIDENTIAL	7,525	0.17	306	RESIDENTIAL	7,397	0.17	376	RESIDENTIAL	7,451	0.17				
27	RESIDENTIAL	16,200	0.37	97	RESIDENTIAL	9,600	0.22	167	RESIDENTIAL	8,688	0.20	238	RESIDENTIAL	7,632	0.18	307	RESIDENTIAL	7,245	0.17	377	RESIDENTIAL	10,420	0.24				
28	RESIDENTIAL	17,054	0.39	98	RESIDENTIAL	9,600	0.22	169	RESIDENTIAL	9,033	0.21	239	RESIDENTIAL	7,630	0.18	308	RESIDENTIAL	7,311	0.17	A	LANDSCAPE	11,719	0.27				
29	RESIDENTIAL	16,512	0.38	99	RESIDENTIAL	9,649	0.22	170	RESIDENTIAL	8,213	0.19	240	RESIDENTIAL	7,643	0.18	309	RESIDENTIAL	7,717	0.18	B	LANDSCAPE	36,813	0.85				
30	RESIDENTIAL	17,004	0.39	100	RESIDENTIAL	14,318	0.33	171	RESIDENTIAL	7,973	0.18	241	RESIDENTIAL	7,615	0.17	310	RESIDENTIAL	7,721	0.18	C	LANDSCAPE	26,280	0.60				
31	RESIDENTIAL	17,028	0.39	101	RESIDENTIAL	7,736	0.18	172	RESIDENTIAL	9,701	0.22	242	RESIDENTIAL	7,486	0.17	311	RESIDENTIAL	7,696	0.18	D	LANDSCAPE	10,353	0.24				
32	RESIDENTIAL	16,195	0.37	102	RESIDENTIAL	7,487	0.17	173	RESIDENTIAL	10,087	0.23	243	RESIDENTIAL	7,476	0.17	312	RESIDENTIAL	7,717	0.18	E	LANDSCAPE	3,282	0.08				
33	RESIDENTIAL	16,230	0.37	103	RESIDENTIAL	7,564	0.17	174	RESIDENTIAL	9,537	0.22	244	RESIDENTIAL	7,831	0.18	313	RESIDENTIAL	7,465	0.17	F	LANDSCAPE	2,619	0.06				
34	RESIDENTIAL	19,551	0.45	104	RESIDENTIAL	7,569	0.17	175	RESIDENTIAL	8,278	0.19	245	RESIDENTIAL	7,798	0.18	314	RESIDENTIAL	7,809	0.18	G	LANDSCAPE	7,067	0.16				
35	RESIDENTIAL	17,534	0.40	105	RESIDENTIAL	7,587	0.17	176	RESIDENTIAL	8,267	0.19	246	RESIDENTIAL	7,769	0.18	315	RESIDENTIAL	7,832	0.18	H	LANDSCAPE	3,165	0.07				
36	RESIDENTIAL	17,238	0.40	106	RESIDENTIAL	7,587	0.17	177	RESIDENTIAL	8,256	0.19	247	RESIDENTIAL	7,398	0.17	316	RESIDENTIAL	7,822	0.18	I	LANDSCAPE	2,264	0.05				
37	RESIDENTIAL	18,130	0.42	107	RESIDENTIAL	7,583	0.17	178	RESIDENTIAL	8,155	0.19	248	RESIDENTIAL	7,745	0.18	317	RESIDENTIAL	7,623	0.17	J	LANDSCAPE	5,890	0.14				
38	RESIDENTIAL	10,531	0.24	108	RESIDENTIAL	7,567	0.17	179	RESIDENTIAL	7,564	0.17	249	RESIDENTIAL	7,884	0.18	318	RESIDENTIAL	7,736	0.18	K	LANDSCAPE	2,701	0.06				
39	RESIDENTIAL	17,550	0.40	109	RESIDENTIAL	7,432	0.17	180	RESIDENTIAL	15,106	0.35	250	RESIDENTIAL	7,989	0.18	319	RESIDENTIAL	7,734	0.18	L	LANDSCAPE	1,865	0.04				
40	RESIDENTIAL	17,473	0.40	110	RESIDENTIAL	8,116	0.19	181	RESIDENTIAL	12,839	0.29	251	RESIDENTIAL	7,760	0.18	320	RESIDENTIAL	7,789	0.18	M	LANDSCAPE	2,333	0.05				
41	RESIDENTIAL	16,862	0.39	111	RESIDENTIAL	8,153	0.19	182	RESIDENTIAL	7,813	0.18	252	RESIDENTIAL	7,767	0.18	321	RESIDENTIAL	8,036	0.18	N	LANDSCAPE	4,308	0.10				
42	RESIDENTIAL	16,661	0.38	112	RESIDENTIAL	7,414	0.17	183	RESIDENTIAL	7,691	0.18	253	RESIDENTIAL	7,768	0.18	322	RESIDENTIAL	8,025	0.18	O	LANDSCAPE	40,425	0.93				
43	RESIDENTIAL	17,021	0.39	113	RESIDENTIAL	7,435	0.17	184	RESIDENTIAL	7,689	0.18	254	RESIDENTIAL	7,572	0.17	323	RESIDENTIAL	7,407	0.17	P	LANDSCAPE	119,092	2.73				
44	RESIDENTIAL	16,650	0.38	114	RESIDENTIAL	9,042	0.21	185	RESIDENTIAL	7,654	0.18	255	RESIDENTIAL	7,865	0.18	324	RESIDENTIAL	7,593	0.17	Q	STREET	10,491	0.24				
45	RESIDENTIAL	16,457	0.38	115	RESIDENTIAL	11,870	0.27	186	RESIDENTIAL	7,682	0.18	256	RESIDENTIAL	7,865	0.18	325	RESIDENTIAL	7,590	0.17	R	LANDSCAPE	61,275	1.41				
46	RESIDENTIAL	17,068	0.39	116	RESIDENTIAL	13,317	0.31	187	RESIDENTIAL	8,332	0.19	257	RESIDENTIAL	7,866	0.18	326	RESIDENTIAL	7,600	0.17	S	STREET	20,011	0.46				
47	RESIDENTIAL	18,325	0.42	117	RESIDENTIAL	11,570	0.27	188	RESIDENTIAL	10,019	0.23	258	RESIDENTIAL	7,859	0.18	327	RESIDENTIAL	7,603	0.17	T	STREET	19,079	0.44				
48	RESIDENTIAL	18,746	0.43	118	RESIDENTIAL	9,928	0.23	189	RESIDENTIAL	12,579	0.29	259	RESIDENTIAL	7,865	0.18	328	RESIDENTIAL	7,777	0.18	U	STREET	4,902	0.11				
49	RESIDENTIAL	21,062	0.48	119	RESIDENTIAL	7,749	0.18	190	RESIDENTIAL	8,837	0.20	260	RESIDENTIAL	7,919	0.18	329	RESIDENTIAL	7,508	0.17	V	LANDSCAPE	12,163	0.28				
50	RESIDENTIAL	17,012	0.39	120	RESIDENTIAL	7,354	0.17	191	RESIDENTIAL	8,940	0.21	261	RESIDENTIAL	7,929	0.18	330	RESIDENTIAL	7,245	0.17	W	LANDSCAPE	2,757	0.06				
51	RESIDENTIAL	162,709	3.74	121	RESIDENTIAL	8,144	0.19	192	RESIDENTIAL	9,011	0.21	262	RESIDENTIAL	7,677	0.18	331	RESIDENTIAL	7,901	0.18	X	LANDSCAPE	8,660	0.20				
52	RESIDENTIAL	59,793	1.37	122	RESIDENTIAL	8,133	0.19	193	RESIDENTIAL	11,679	0.27	263	RESIDENTIAL	8,109	0.19	332	RESIDENTIAL	8,260	0.19	Y	LANDSCAPE	7,172	0.16				
53	RESIDENTIAL	263,010	6.04	123	RESIDENTIAL	8,131	0.19	194	RESIDENTIAL	9,611	0.22	264	RESIDENTIAL	8,292	0.19	333	RESIDENTIAL	8,107	0.19	Z	LANDSCAPE	13,930	0.32				
54	CHURCH	98,977	2.27	124	RESIDENTIAL	8,139	0.19	195	RESIDENTIAL	7,959	0.18	265	RESIDENTIAL	8,750	0.20	334	RESIDENTIAL	7,343	0.17	AA	LANDSCAPE	43,072	0.99				
55	RESIDENTIAL	58,866	1.35	125	RESIDENTIAL	8,130	0.19	196	RESIDENTIAL	8,140	0.19	266	RESIDENTIAL	8,374	0.19	335	RESIDENTIAL	7,493	0.17	AB	LANDSCAPE	4,523	0.10				
56	RESIDENTIAL	7,245	0.17	126	RESIDENTIAL	7,622	0.17	197	RESIDENTIAL	8,778	0.20	267	RESIDENTIAL	8,353	0.19	336	RESIDENTIAL	7,649	0.18	AC	LANDSCAPE	1,440,919	33.08				
57	RESIDENTIAL	7,245	0.17	127	RESIDENTIAL	7,897	0.18	198	RESIDENTIAL	8,992	0.21	268	RESIDENTIAL	8,309	0.19	337	RESIDENTIAL	7,653	0.18	AD	LANDSCAPE	81,850	1.88				
58	RESIDENTIAL	7,245	0.17	128	RESIDENTIAL	7,900	0.18	199	RESIDENTIAL	8,406	0.19	268	RESIDENTIAL	8,924	0.20	338	RESIDENTIAL	7,656	0.18	AE	LANDSCAPE	266,348	6.11				
59	RESIDENTIAL	7,245	0.17	129	RESIDENTIAL	7,855	0.18	200	RESIDENTIAL	7,081	0.16	269	RESIDENTIAL	8,298	0.19	339	RESIDENTIAL	9,931	0.23	AF	LANDSCAPE	1,400,776	32.16				
60	RESIDENTIAL	7,245	0.17	130	RESIDENTIAL	9,279	0.21	201	RESIDENTIAL	7,002	0.16	270	RESIDENTIAL	8,311	0.19	340	RESIDENTIAL	8,813	0.20	AG	LANDSCAPE	2,324,230	53.36				
61	RESIDENTIAL	7,245	0.17	131	RESIDENTIAL	8,870	0.20	202	RESIDENTIAL	7,004	0.16	271	RESIDENTIAL	8,358	0.19	341	RESIDENTIAL	7,899	0.18	AH	LANDSCAPE	69,853	1.60				
62	RESIDENTIAL	7,245	0.17	132	RESIDENTIAL	7,923	0.18	203	RESIDENTIAL	7,004	0.16	272	RESIDENTIAL	8,318	0.19	342	RESIDENTIAL	8,492	0.19	AI	LANDSCAPE	18,584	0.43				
63	RESIDENTIAL	7,245	0.17	133	RESIDENTIAL	7,675	0.18	204	RESIDENTIAL	7,508	0.17	273	RESIDENTIAL	8,297	0.19	343	RESIDENTIAL	7,475	0.17	AJ	LANDSCAPE	51,953	1.19				
64	RESIDENTIAL	7,245	0.17	134	RESIDENTIAL	7,245	0.17	205	RESIDENTIAL	7,456	0.17	274	RESIDENTIAL	8,325	0.19	344	RESIDENTIAL	7,004	0.16	AK	STREET	84,493	1.94	**TOTAL LAND USE**			
65	RESIDENTIAL	7,245	0.17	135	RESIDENTIAL	7,245	0.17	206	RESIDENTIAL	7,377	0.17	275	RESIDENTIAL	7,798	0.18	345	RESIDENTIAL	12,740	0.29	AL	STREET	67,759	1.56	TOTAL STREET		33.57	Acres
66	RESIDENTIAL	7,566	0.17	136	RESIDENTIAL	7,246	0.17	207	RESIDENTIAL	7,410	0.17	276	RESIDENTIAL	7,245	0.17	346	RESIDENTIAL	10,801	0.25	AM	STREET	44,406	1.02	TOTAL LANDSCAPE		139.77	Acres
67	RESIDENTIAL	7,728	0.18	137	RESIDENTIAL	14,901	0.34	208	RESIDENTIAL	7,439	0.17	277	RESIDENTIAL	7,245	0.17	347	RESIDENTIAL	9,717	0.22	AN	STREET	14,473	0.33	TOTAL RESIDENTIAL		97.32	Acres
68	RESIDENTIAL	10,160	0.23	138	RESIDENTIAL	10,193	0.23	209	RESIDENTIAL	9,076	0.21	278	RESIDENTIAL	7,245	0.17	348	RESIDENTIAL	9,639	0.22	AO	STREET	476,960	10.95	CHURCH		2.27	Acres
69	RESIDENTIAL	9,200	0.21	139	RESIDENTIAL	8,140	0.19	210	RESIDENTIAL	8,768	0.20	279	RESIDENTIAL	7,390	0.17	349	RESIDENTIAL	9,722	0.22	AP	STREET	121,778	2.80	'TOTAL		272.93	Acres
70	RESIDENTIAL	9,200	0.21	140	RESIDENTIAL	7,934	0.18	211	RESIDENTIAL	8,131	0.19	280	RESIDENTIAL	7,510	0.17	350	RESIDENTIAL	10,677	0.25	AQ	STREET	33,838	0.78				

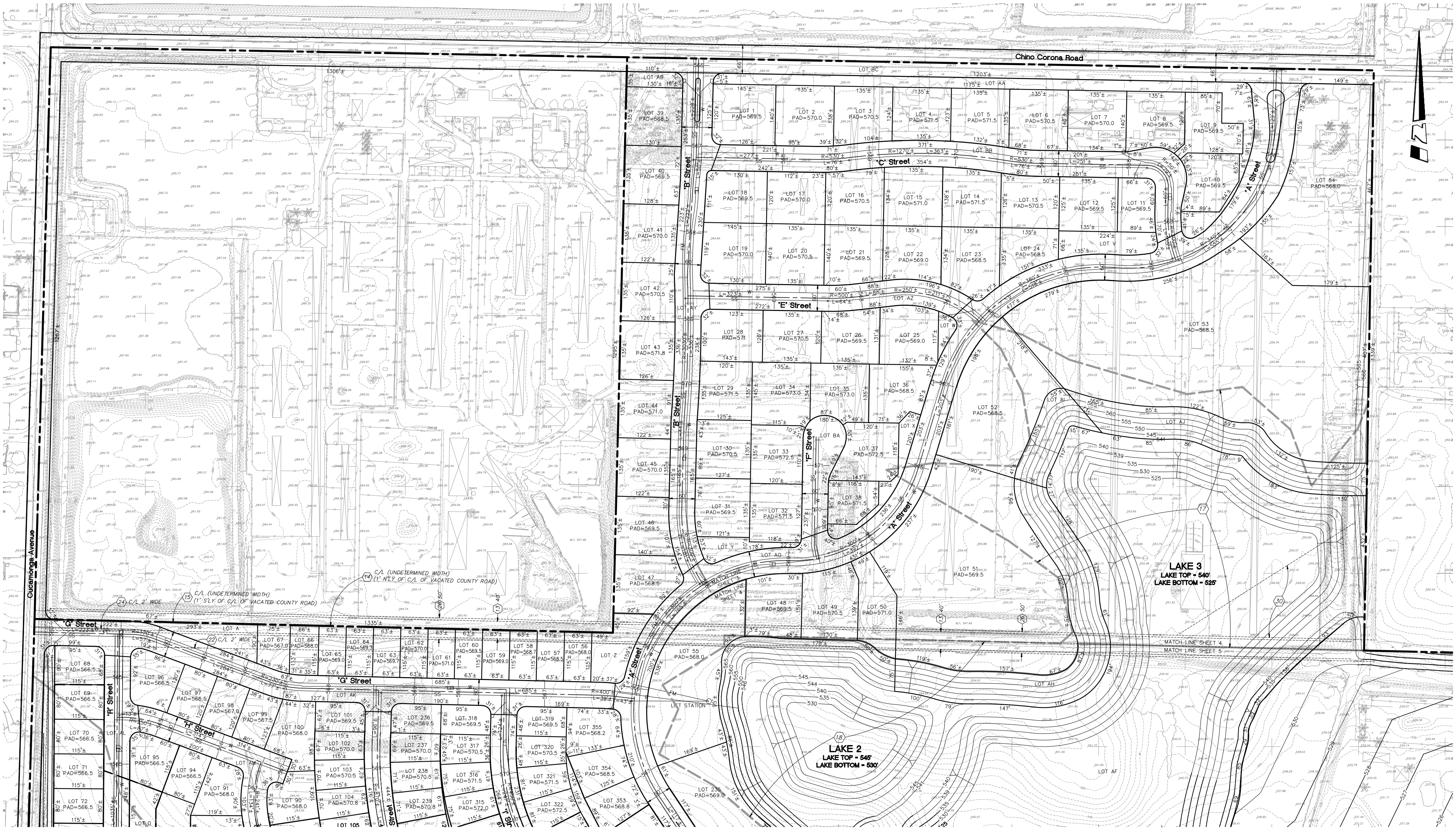
HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1309
Phone (714) 734-5100 Fax (714) 734-5155

DESIGNED BY	DRAWN BY	CHECKED BY		SHEET	JOB NO.
RH/TB	PMP	RS	TENTATIVE TRACT NO. 17458	3 of 7 SHEETS	10-1073-02

TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

377 NUMBERED LOTS AND 56 LETTERED LOTS



HUITT-ZOLLARS	Hutt-Zollars, Inc. Irvine 430 Exchange, Suite 200 Irvine, California 92602-1309 Phone (714) 734-5100 Fax (714) 734-5155
DESIGNED BY	RH/TB
DRAWN BY	PMP
CHECKED BY	RS
TENTATIVE TRACT NO. 17458	
SHEET	4 of 7 SHEETS
JOB NO.	10-1073-02

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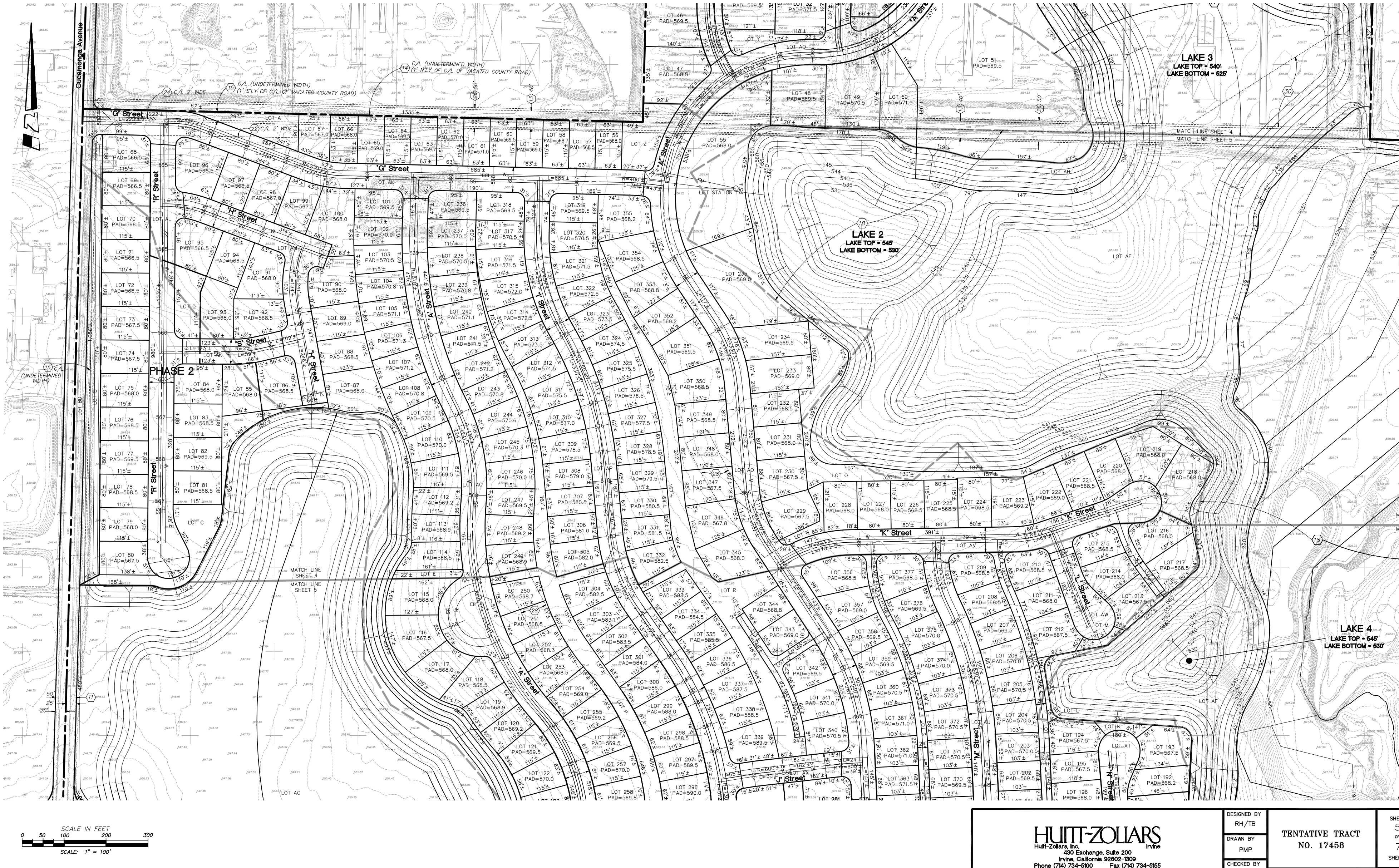
TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

377 NUMBERED LOTS AND 56 LETTERED LOTS



HUITT-ZOLLARS
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430 Exchange, Suite 200
Irvine, California 92602-1309
Phone (714) 734-5100 Fax (714) 734-5155

DESIGNED BY RH/TB	TENTATIVE TRACT NO. 17458	SHEET 5 of 7 SHEETS	
DRAWN BY PMP			
CHECKED BY RS		JOB NO. 10-1073-02	

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TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

377 NUMBERED LOTS AND 56 LETTERED LOTS

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1309
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DESIGNED BY RH/TB	TENTATIVE TRACT NO. 17458	SHEET 6 of 7 SHEETS	
DRAWN BY PMP			
CHECKED BY RS		JOB NO. 10-1073-02	

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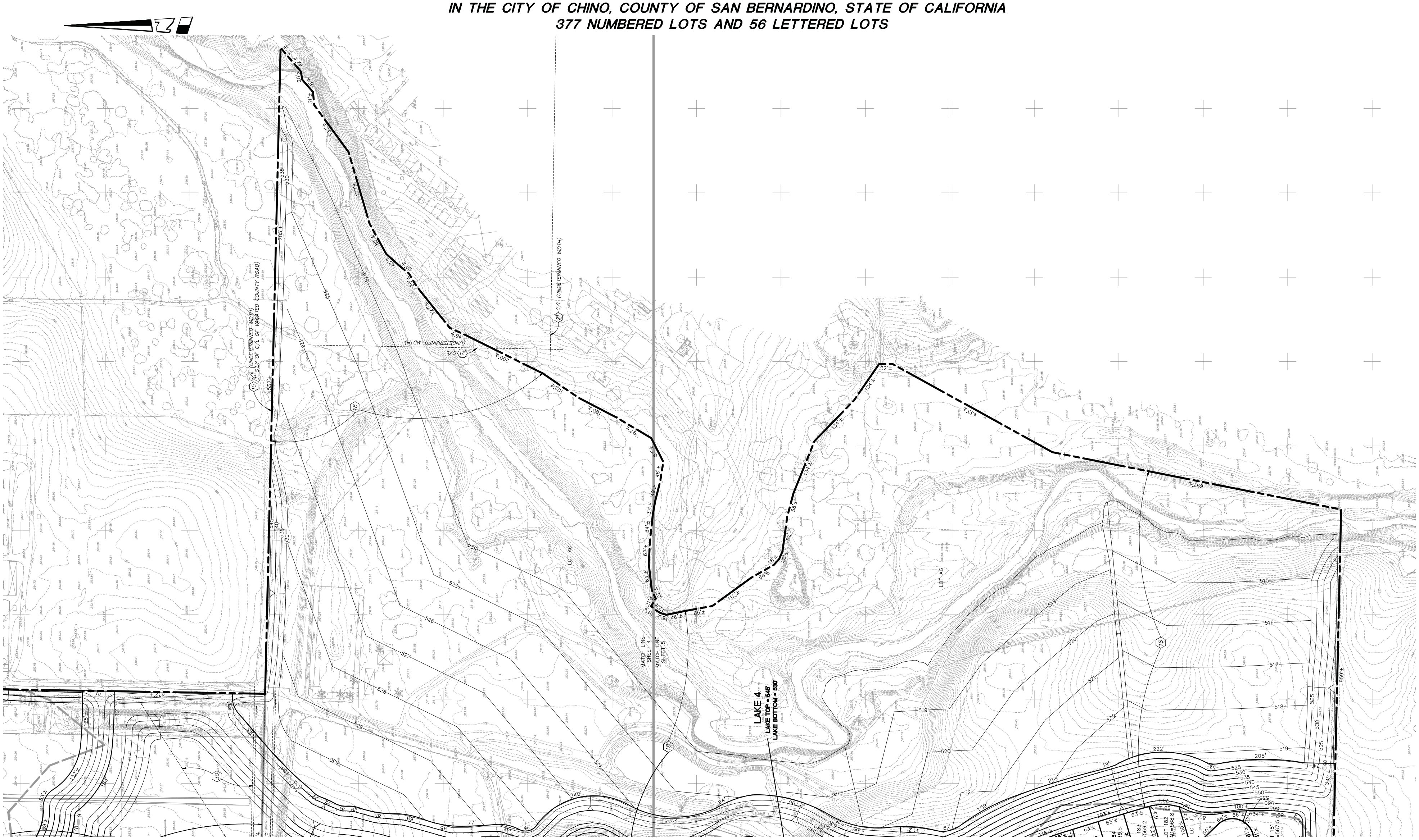
TENTATIVE TRACT NO. 17458

IN THE CITY OF CHINO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

377 NUMBERED LOTS AND 56 LETTERED LOTS



SCALE IN FEET
0 50 100 200 300
SCALE: 1" = 100'

HUITT-ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1309
Phone (714) 734-5100 Fax (714) 734-5155

DESIGNED BY	RH/TB	TENTATIVE TRACT NO. 17458	SHEET 7 of 7 SHEETS
DRAWN BY	PMP		
CHECKED BY	RS		JOB NO. 10-1073-02

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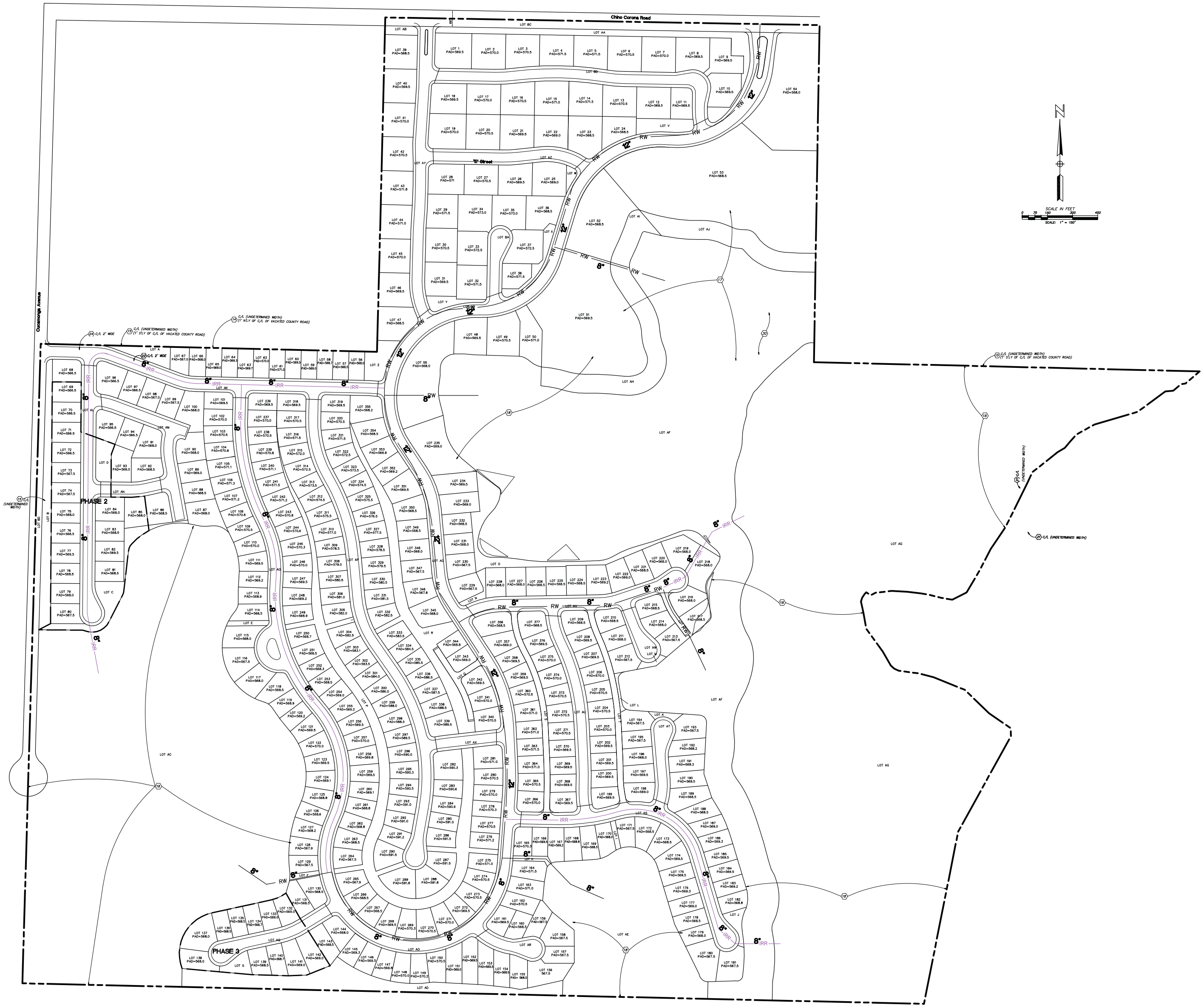

NO.	DATE	REVISIONS	APPROVED

HUITT~ZOLLARS
Huitt-Zollars, Inc. Irvine
430 Exchange, Suite 200
Irvine, California 92602-1315
Phone (714) 734-5100 Fax (714) 734-5155

PREPARED UNDER THE SUPERVISION OF ____ R.C.E. ____ EXPIRES ____ DATE ____

DESIGNED BY JRF/MTB/RP
DRAWN BY JRF
CHECKED BY MTB/RP
FIELD BOOK

PRELIMINARY PLANS FOR
EDGEWATER CHINO
PRELIMINARY RECLAIMED WATER LAYOUT
TRACT NO. -

SHEET 4 OF 4 SHEETS
JOB NO. 1073-02

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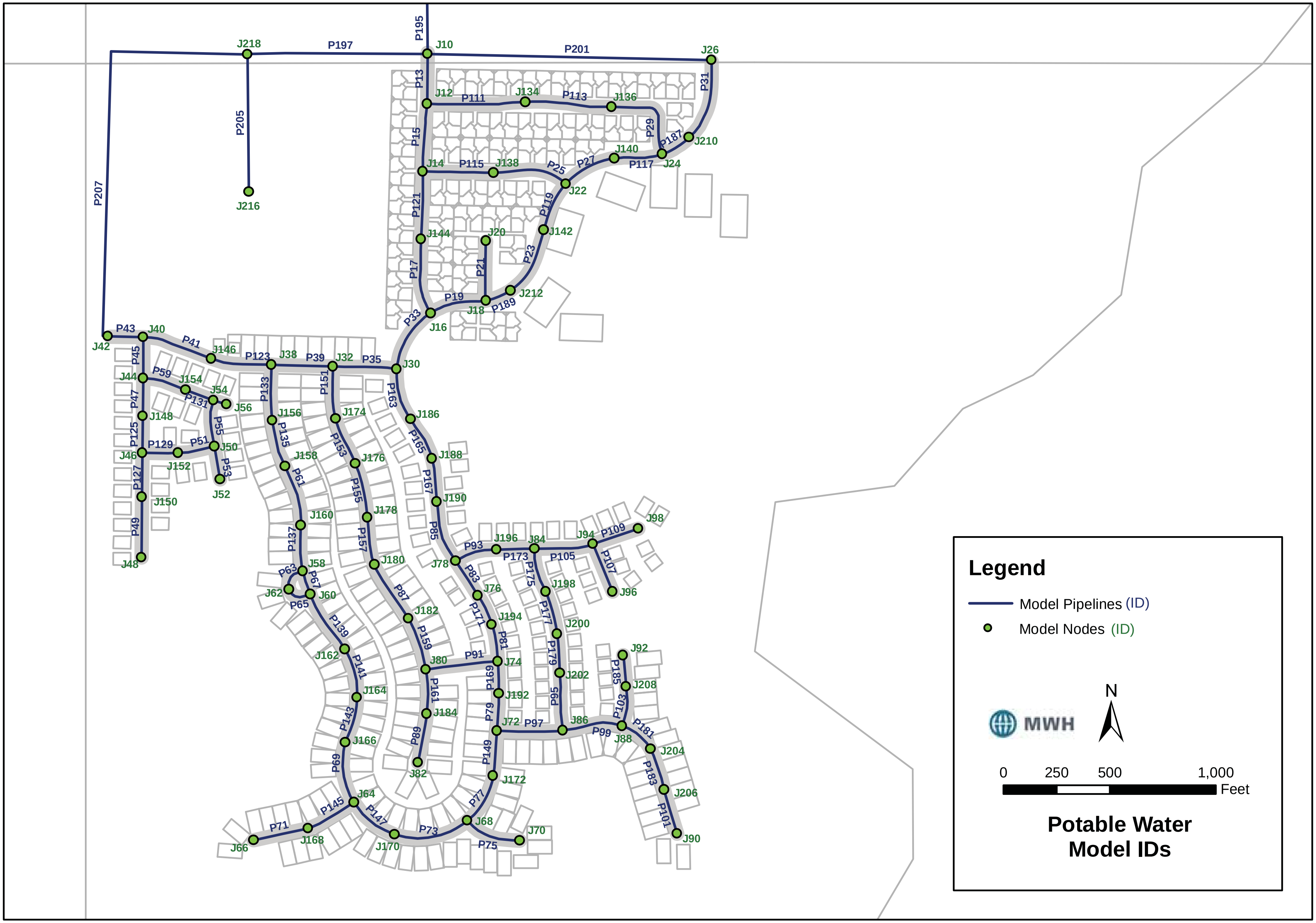
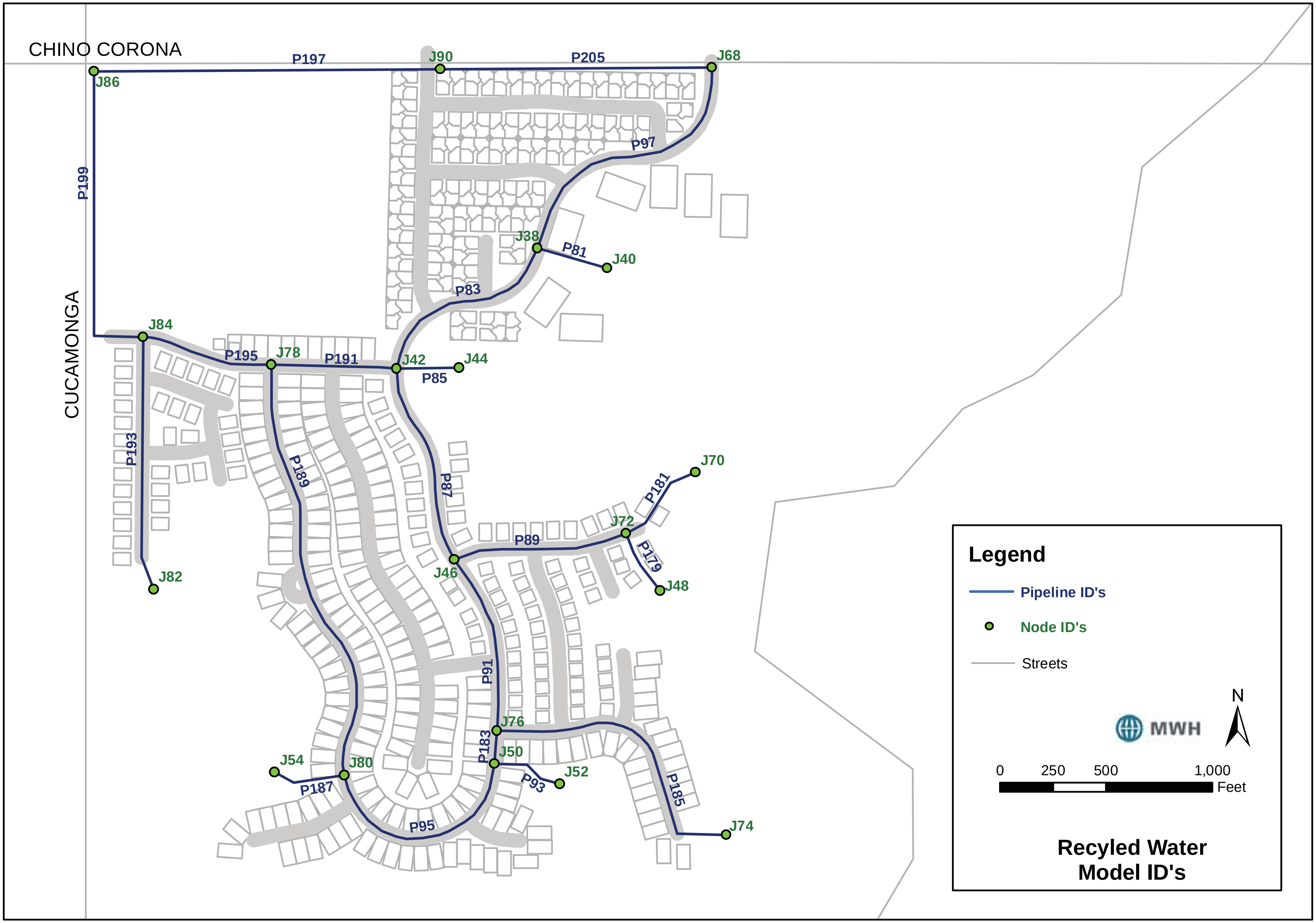
Appendix C
Hydraulic Model Results


Legend
Model Pipelines (ID)
Model Nodes (ID)
MWH
N
0
250
500
1,000
Feet
Potable Water
Model IDs



CHINO CORONA
CUCAMONGA
P197
P205
P199
P97
P81
P83
P85
P87
P89
P91
P93
P95
P179
P181
P183
P185
P187
P189
P191
P193
P195
J86
J90
J68
J38
J40
J84
J78
J42
J44
J70
J72
J46
J48
J82
J76
J50
J52
J54
J80
J74
Legend
Pipeline ID's
Node ID's
Streets
MWH
N
0
250
500
1,000
Feet
Recyled Water
Model ID's

Model Results
Potable Model Run #1 - Pipelines
MDD + Fireflow (at worst case location), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)	Velocity Results (feet/sec)	Headloss Results (feet)
P101	214.6	8	2.9	0.0	0.0
P103	187.3	8	5.7	0.0	0.0
P105	278.8	8	11.1	0.1	0.0
P107	241.2	8	3.4	0.0	0.0
P109	224.6	8	4.4	0.0	0.0
P111	462.3	8	278.4	1.8	0.8
P113	408.5	8	264.2	1.7	0.6
P115	332.4	8	352.1	2.3	0.9
P117	229.0	12	1,107.7	3.1	0.7
P119	241.9	12	1,431.7	4.1	1.2
P121	316.8	12	1,144.9	3.3	1.0
P123	286.8	12	659.5	1.9	0.3
P125	172.1	8	17.4	0.1	0.0
P127	206.8	8	10.6	0.1	0.0
P129	169.8	8	1.6	0.0	0.0
P13	233.5	12	1,791.5	5.1	1.7
P131	141.0	8	12.9	0.1	0.0
P133	262.0	8	98.6	0.6	0.1
P135	225.1	8	92.9	0.6	0.1
P137	217.3	8	83.8	0.5	0.0
P139	305.9	8	77.5	0.5	0.1
P141	238.2	8	73.5	0.5	0.0
P143	221.3	8	69.5	0.4	0.0
P145	248.5	8	8.6	0.1	0.0
P147	249.3	8	55.8	0.4	0.0
P149	213.1	8	39.3	0.3	0.0
P15	320.6	12	1,505.9	4.3	1.7
P151	248.1	8	76.0	0.5	0.0
P153	231.3	8	69.8	0.5	0.0
P155	260.5	8	66.4	0.4	0.0
P157	224.4	8	61.8	0.4	0.0
P159	256.3	8	52.7	0.3	0.0
P161	208.5	8	6.8	0.0	0.0
P163	250.6	12	1.9	0.0	0.0
P165	210.9	12	7.3	0.0	0.0
P167	205.3	12	11.6	0.0	0.0
P169	152.3	12	5.1	0.0	0.0
P17	359.7	12	1,137.7	3.2	1.2
P171	153.2	12	44.1	0.1	0.0
P173	177.3	8	17.2	0.1	0.0
P175	211.7	8	2.9	0.0	0.0
P177	206.6	8	1.1	0.0	0.0
P179	183.6	8	5.1	0.0	0.0
P181	177.3	8	8.6	0.1	0.0
P183	201.1	8	5.1	0.0	0.0
P185	149.7	8	1.7	0.0	0.0
P187	149.2	12	871.6	2.5	0.3
P189	125.8	12	1,590.8	4.5	0.8
P19	272.2	12	1,606.9	4.6	1.7
P195	30,335.8	18	3,471.3	4.4	106.9
P197	846.8	12	796.2	2.3	1.4
P201	1,337.4	12	883.7	2.5	2.7
P205	648.0	8	92.1	0.6	0.1
P207	2,007.4	12	704.1	2.0	2.7
P21	281.7	8	7.1	0.1	0.0
P23	333.4	12	1,423.0	4.0	1.6
P25	357.3	8	345.0	2.2	0.9
P27	262.6	12	1,092.1	3.1	0.8
P29	420.5	8	255.2	1.6	0.6
P31	392.4	12	883.7	2.5	0.8
P33	318.4	12	474.5	1.4	0.2
P35	299.7	12	479.2	1.4	0.2
P39	290.2	12	558.6	1.6	0.3
P41	337.2	12	660.6	1.9	0.4
P43	167.8	12	704.1	2.0	0.2
P45	192.8	8	43.5	0.3	0.0
P47	178.9	8	20.1	0.1	0.0
P49	286.9	8	5.3	0.0	0.0
P51	172.9	8	2.4	0.0	0.0
P53	156.7	8	2.6	0.0	0.0
P55	220.0	8	9.0	0.1	0.0
P57	63.6	8	1.3	0.0	0.0
P59	208.7	8	19.5	0.1	0.0
P61	290.6	8	87.8	0.6	0.1
P63	126.8	8	33.2	0.2	0.0
P65	118.3	8	31.5	0.2	0.0
P67	114.3	8	48.9	0.3	0.0
P69	292.3	8	65.5	0.4	0.0
P71	263.0	8	2.3	0.0	0.0
P73	364.6	8	50.1	0.3	0.0
P75	273.9	8	4.0	0.0	0.0
P77	248.0	8	42.1	0.3	0.0
P79	173.4	12	7.9	0.0	0.0
P81	176.4	12	45.8	0.1	0.0
P83	193.3	12	41.8	0.1	0.0
P85	298.0	12	19.2	0.1	0.0

Model Results
Potable Model Run #1 - Pipelines
MDD + Fireflow (at worst case location), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)	Velocity Results (feet/sec)	Headloss Results (feet)
P87	301.3	8	57.2	0.4	0.0
P89	232.4	8	3.4	0.0	0.0
P91	340.4	8	43.0	0.3	0.0
P93	204.4	8	19.3	0.1	0.0
P95	271.2	8	8.5	0.1	0.0
P97	310.1	8	27.9	0.2	0.0
P99	284.9	8	15.4	0.1	0.0

Model Results

Potable Model Run #1 - Junctions

MDD + Fireflow (at worst case location), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)
J10	0.0	569.0	49.1
J12	7.1	569.5	48.1
J134	14.3	571.5	46.9
J136	8.9	570.5	47.0
J138	7.1	570.0	46.7
J14	8.9	570.5	46.9
J140	15.6	568.5	47.3
J142	8.7	568.5	46.5
J144	7.1	571.0	46.2
J146	1.1	567.5	47.7
J148	2.6	566.5	48.3
J150	5.3	569.5	47.0
J152	4.0	568.5	47.4
J154	6.6	567.0	48.1
J156	5.7	571.1	46.0
J158	5.1	571.2	45.9
J16	5.4	569.0	46.6
J160	4.0	570.0	46.4
J162	4.0	570.0	46.3
J164	4.0	569.8	46.4
J166	4.0	568.8	46.8
J168	6.3	569.0	46.7
J170	5.7	570.3	46.2
J172	2.9	571.5	45.6
J174	6.3	572.5	45.3
J176	3.4	575.5	43.9
J178	4.6	580.5	41.8
J18	8.9	571.0	45.0
J180	4.6	582.5	40.9
J182	4.6	588.0	38.5
J184	3.4	591.0	37.2
J186	5.4	569.2	46.6
J188	4.3	569.5	46.5
J190	7.6	568.0	47.1
J192	2.9	571.0	45.8
J194	1.7	570.5	46.1
J196	2.2	568.5	46.9
J198	4.0	570.0	46.3
J20	7.1	573.0	44.2
J200	4.0	570.5	46.0
J202	3.4	569.5	46.5
J204	3.4	569.5	46.5
J206	2.3	569.5	46.5
J208	4.0	569.5	46.5
J210	12.0	568.0	48.0
J212	3,013.8	569.5	45.4
J214	92.1	564.0	50.6
J216	0.0	564.0	50.6
J218	5.4	568.5	47.0
J22	19.2	569.0	47.4
J24	0.0	569.0	47.9

Model Results

Potable Model Run #1 - Junctions

MDD + Fireflow (at worst case location), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)
J26	6.5	568.1	47.1
J30	3.4	569.3	46.7
J32	2.3	569.7	46.6
J38	0.0	566.5	48.3
J40	0.0	566.5	48.4
J42	4.0	566.5	48.3
J44	5.3	568.0	47.6
J46	5.3	567.5	47.9
J48	4.0	569.0	47.2
J50	2.6	568.5	47.4
J52	2.6	568.0	47.6
J54	1.3	568.0	47.6
J56	1.7	568.9	46.8
J58	2.9	568.7	46.9
J60	1.7	568.0	47.2
J62	1.1	568.5	47.0
J64	2.3	568.5	46.9
J66	4.0	569.5	46.5
J68	4.0	567.5	47.4
J70	3.4	570.5	46.1
J72	2.3	571.0	45.8
J74	2.3	569.5	46.5
J76	3.3	568.8	46.8
J78	2.9	590.3	37.5
J80	3.4	591.8	36.8
J82	3.3	568.5	46.9
J84	4.0	569.5	46.5
J86	1.1	569.0	46.7
J88	2.9	568.8	46.8
J90	1.7	567.5	47.3
J92	3.3	569.2	46.6
J94	3.4	567.5	47.3
J96	4.4	568.0	47.1

Model Results
Potable Model Run #2 - Mimium Residual Pressures During Fireflow at Each Demand Node
MDD + Fireflow, 18-in Transmission Pipeline, Modified Pipeline Sizing

Fireflow Node ID	Total Demand (gpm)	Minimum Pressure Node ID	Minimum Pressure (psi)	Minimum Head (ft)
J12	1,507.14	J82	69.18	751.45
J134	1,514.28	J82	69.15	751.38
J136	1,508.92	J82	69.12	751.31
J138	1,507.14	J82	68.93	750.89
J14	1,508.92	J82	68.95	750.92
J140	3,015.61	J82	37.66	678.71
J142	3,008.68	J82	37.18	677.6
J144	1,507.14	J82	68.77	750.5
J146	1,501.14	J82	68.3	749.44
J148	1,502.64	J82	68.41	749.68
J150	1,505.28	J150	67.85	726.09
J152	1,503.95	J82	68.41	749.68
J154	1,506.59	J82	68.41	749.68
J156	1,505.70	J82	68.08	748.92
J158	1,505.13	J82	68	748.74
J16	1,505.36	J82	68.59	750.09
J160	1,503.99	J82	67.91	748.53
J162	1,503.99	J82	67.75	748.15
J164	1,503.99	J82	67.68	747.99
J166	1,503.99	J82	67.61	747.84
J168	1,506.27	J168	66.2	721.77
J170	1,505.70	J82	67.43	747.41
J172	1,502.85	J82	67.11	746.68
J174	1,506.27	J82	67.43	747.42
J176	1,503.42	J82	66.92	746.24
J178	1,504.56	J82	66.38	744.99
J18	1,508.92	J82	68.69	750.33
J180	1,504.56	J82	65.9	743.88
J182	1,504.56	J82	65.18	742.22
J184	1,503.42	J82	60.88	732.31
J186	1,505.40	J82	67.83	748.35
J188	1,504.33	J82	67.6	747.81
J190	1,507.57	J82	67.4	747.34
J192	1,502.85	J82	66.86	746.1
J194	1,501.72	J82	66.92	746.25
J196	1,502.16	J82	67.09	746.64
J198	1,503.99	J82	67.08	746.6
J20	1,507.14	J82	68.69	750.33
J200	1,503.99	J82	67.06	746.56
J202	1,503.42	J82	67.04	746.52
J204	1,503.42	J206	65.8	721.35
J206	1,502.28	J206	62.4	713.52
J208	1,503.99	J208	65.64	720.99
J210	1,512.02	J82	69.07	751.21
J212	3,013.83	J82	36.83	676.79
J22	1,505.36	J82	68.91	750.85
J24	3,019.18	J82	37.84	679.14
J30	1,506.49	J82	68.19	749.18
J32	1,503.42	J82	68.13	749.04

Model Results

Potable Model Run #2 - Mimium Residual Pressures During Fireflow at Each Demand Node

MDD + Fireflow, 18-in Transmission Pipeline, Modified Pipeline Sizing

J38	1,502.28	J82	68.2	749.2
J44	1,503.95	J82	68.41	749.68
J46	1,505.28	J82	68.41	749.68
J48	1,505.28	J48	63.87	714.91
J50	1,503.95	J82	68.41	749.68
J52	1,502.64	J82	68.41	749.68
J54	1,502.64	J82	68.41	749.68
J56	1,501.32	J82	68.41	749.68
J58	1,501.72	J82	67.85	748.38
J60	1,502.85	J82	67.83	748.35
J62	1,501.72	J82	67.84	748.37
J64	1,501.14	J82	67.52	747.62
J66	1,502.28	J66	61.99	711.56
J68	1,503.99	J82	67.27	747.04
J70	1,503.99	J82	67.27	747.04
J72	1,503.42	J82	66.9	746.2
J74	1,502.28	J82	66.81	746
J76	1,502.28	J82	67.01	746.46
J78	1,503.31	J82	67.13	746.73
J80	1,502.85	J82	64.41	740.45
J82	1,503.42	J82	56.97	723.28
J84	1,503.25	J82	67.09	746.63
J86	1,503.99	J82	67	746.43
J88	1,501.14	J82	67	746.43
J90	1,502.85	J90	59.1	705.18
J92	1,501.72	J92	63.99	715.18
J94	1,503.25	J82	67.09	746.63
J96	1,503.42	J96	65.62	718.93
J98	1,504.39	J98	65.67	719.57

Model Results
Potable Model Run #3 - Pipelines
MDD + 4-hr Fireflow (worst-case), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P101	214.6	8	2.9	0:00	2.9	0:00	2.9	0.0	0:00	0.0	0:00	0.0	0.0	3:00	0.0	0:00	0.0
P103	187.3	8	5.7	0:00	5.7	0:00	5.7	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	4:00	0.0
P105	278.8	8	11.1	0:00	11.1	0:00	11.1	0.1	0:00	0.1	0:00	0.1	0.0	0:00	0.0	0:00	0.0
P107	241.2	8	3.4	0:00	3.4	0:00	3.4	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P109	224.6	8	4.4	0:00	4.4	0:00	4.4	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P111	462.3	8	278.4	0:00	278.4	0:00	278.4	1.8	0:00	1.8	0:00	1.8	0.8	0:00	0.8	2:00	0.8
P113	408.5	8	264.2	3:00	264.2	0:00	264.2	1.7	3:00	1.7	0:00	1.7	0.6	2:00	0.6	0:00	0.6
P115	332.4	8	352.1	3:00	352.1	2:00	352.1	2.3	3:00	2.3	2:00	2.3	0.9	0:00	0.9	0:00	0.9
P117	229.0	12	1,107.7	0:00	1,107.7	0:00	1,107.7	3.1	0:00	3.1	0:00	3.1	0.7	0:00	0.7	0:00	0.7
P119	241.9	12	1,431.7	0:00	1,431.7	0:00	1,431.7	4.1	0:00	4.1	0:00	4.1	1.2	3:00	1.2	0:00	1.2
P121	316.8	12	1,144.9	1:00	1,144.9	0:00	1,144.9	3.3	1:00	3.3	0:00	3.3	1.0	1:00	1.0	0:00	1.0
P123	286.8	12	659.5	1:00	659.5	0:00	659.5	1.9	1:00	1.9	0:00	1.9	0.3	0:00	0.3	0:00	0.3
P125	172.1	8	17.4	1:00	17.4	0:00	17.4	0.1	1:00	0.1	0:00	0.1	0.0	3:00	0.0	0:00	0.0
P127	206.8	8	10.6	0:00	10.6	0:00	10.6	0.1	0:00	0.1	0:00	0.1	0.0	0:00	0.0	3:00	0.0
P129	169.8	8	1.6	2:00	1.6	0:00	1.6	0.0	2:00	0.0	0:00	0.0	0.0	4:00	0.0	0:00	0.0
P13	233.5	12	1,791.5	0:00	1,791.5	0:00	1,791.5	5.1	0:00	5.1	0:00	5.1	1.7	0:00	1.7	0:00	1.7
P131	141.0	8	12.9	0:00	12.9	1:00	12.9	0.1	0:00	0.1	1:00	0.1	0.0	3:00	0.0	0:00	0.0
P133	262.0	8	98.6	0:00	98.6	1:00	98.6	0.6	0:00	0.6	1:00	0.6	0.1	0:00	0.1	0:00	0.1
P135	225.1	8	92.9	0:00	92.9	2:00	92.9	0.6	0:00	0.6	2:00	0.6	0.1	0:00	0.1	0:00	0.1
P137	217.3	8	83.8	0:00	83.8	1:00	83.8	0.5	0:00	0.5	0:00	0.5	0.0	0:00	0.0	3:00	0.0
P139	305.9	8	77.5	0:00	77.5	2:00	77.5	0.5	0:00	0.5	2:00	0.5	0.1	0:00	0.1	0:00	0.1
P141	238.2	8	73.5	0:00	73.5	1:00	73.5	0.5	0:00	0.5	1:00	0.5	0.0	1:00	0.0	0:00	0.0
P143	221.3	8	69.5	0:00	69.5	1:00	69.5	0.4	0:00	0.4	1:00	0.4	0.0	0:00	0.0	1:00	0.0
P145	248.5	8	8.6	0:00	8.6	0:00	8.6	0.1	0:00	0.1	0:00	0.1	0.0	0:00	0.0	0:00	0.0
P147	249.3	8	55.8	0:00	55.8	2:00	55.8	0.4	0:00	0.4	2:00	0.4	0.0	0:00	0.0	0:00	0.0
P149	213.1	8	39.3	0:00	39.3	2:00	39.3	0.3	0:00	0.3	2:00	0.3	0.0	0:00	0.0	0:00	0.0
P15	320.6	12	1,505.9	1:00	1,505.9	0:00	1,505.9	4.3	0:00	4.3	0:00	4.3	1.7	0:00	1.7	0:00	1.7
P151	248.1	8	76.0	0:00	76.0	1:00	76.0	0.5	0:00	0.5	1:00	0.5	0.0	2:00	0.0	0:00	0.0
P153	231.3	8	69.8	0:00	69.8	1:00	69.8	0.5	0:00	0.5	1:00	0.5	0.0	0:00	0.0	0:00	0.0
P155	260.5	8	66.4	0:00	66.4	1:00	66.4	0.4	0:00	0.4	1:00	0.4	0.0	0:00	0.0	2:00	0.0
P157	224.4	8	61.8	0:00	61.8	1:00	61.8	0.4	0:00	0.4	1:00	0.4	0.0	2:00	0.0	0:00	0.0
P159	256.3	8	52.7	0:00	52.7	2:00	52.7	0.3	0:00	0.3	1:00	0.3	0.0	3:00	0.0	0:00	0.0
P161	208.5	8	6.8	0:00	6.8	0:00	6.8	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	2:00	0.0
P163	250.6	12	1.9	0:00	1.9	4:00	1.9	0.0	0:00	0.0	4:00	0.0	0.0	0:00	0.0	0:00	0.0
P165	210.9	12	7.3	0:00	7.3	4:00	7.3	0.0	0:00	0.0	4:00	0.0	0.0	0:00	0.0	0:00	0.0
P167	205.3	12	11.6	0:00	11.6	4:00	11.6	0.0	0:00	0.0	4:00	0.0	0.0	0:00	0.0	0:00	0.0
P169	152.3	12	5.1	1:00	5.1	0:00	5.1	0.0	1:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P17	359.7	12	1,137.7	3:00	1,137.7	0:00	1,137.7	3.2	3:00	3.2	0:00	3.2	1.2	0:00	1.2	1:00	1.2
P171	153.2	12	44.1	1:00	44.1	0:00	44.1	0.1	1:00	0.1	0:00	0.1	0.0	2:00	0.0	0:00	0.0
P173	177.3	8	17.2	4:00	17.2	0:00	17.2	0.1	4:00	0.1	0:00	0.1	0.0	2:00	0.0	0:00	0.0
P175	211.7	8	2.9	4:00	2.9	0:00	2.9	0.0	4:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P177	206.6	8	1.1	0:00	1.1	4:00	1.1	0.0	0:00	0.0	4:00	0.0	0.0	0:00	0.0	0:00	0.0
P179	183.6	8	5.1	0:00	5.1	4:00	5.1	0.0	0:00	0.0	2:00	0.0	0.0	0:00	0.0	0:00	0.0
P181	177.3	8	8.6	0:00	8.6	0:00	8.6	0.1	0:00	0.1	0:00	0.1	0.0	0:00	0.0	4:00	0.0
P183	201.1	8	5.1	1:00	5.1	0:00	5.1	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	3:00	0.0
P185	149.7	8	1.7	0:00	1.7	0:00	1.7	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	3:00	0.0
P187	149.2	12	871.6	1:00	871.6	0:00	871.6	2.5	0:00	2.5	0:00	2.5	0.3	3:00	0.3	0:00	0.3
P189	125.8	12	1,590.8	0:00	1,590.8	1:00	1,590.8	4.5	0:00	4.5	1:00	4.5	0.8	2:00	0.8	0:00	0.8
P19	272.2	12	1,606.9	0:00	1,606.9	0:00	1,606.9	4.6	0:00	4.6	0:00	4.6	1.7	0:00	1.7	2:00	1.7
P195	30,335.8	18	3,471.3	0:00	3,471.3	3:00	3,471.3	4.4	0:00	4.4	0:00	4.4	106.7	0:00	106.7	0:00	106.7

Model Results
Potable Model Run #3 - Pipelines
MDD + 4-hr Fireflow (worst-case), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P197	846.8	12	796.2	0:00	796.2	0:00	796.2	2.3	0:00	2.3	0:00	2.3	1.4	0:00	1.4	0:00	1.4
P201	1,337.4	12	883.7	0:00	883.7	2:00	883.7	2.5	0:00	2.5	2:00	2.5	2.7	0:00	2.7	2:00	2.7
P205	648.0	8	92.1	0:00	92.1	0:00	92.1	0.6	0:00	0.6	0:00	0.6	0.1	0:00	0.1	0:00	0.1
P207	2,007.4	12	704.1	0:00	704.1	0:00	704.1	2.0	0:00	2.0	0:00	2.0	2.7	0:00	2.7	0:00	2.7
P21	281.7	8	7.1	0:00	7.1	0:00	7.1	0.1	0:00	0.1	0:00	0.1	0.0	2:00	0.0	0:00	0.0
P23	333.4	12	1,423.0	1:00	1,423.0	0:00	1,423.0	4.0	1:00	4.0	0:00	4.0	1.6	0:00	1.6	0:00	1.6
P25	357.3	8	345.0	1:00	345.0	0:00	345.0	2.2	1:00	2.2	0:00	2.2	0.9	0:00	0.9	3:00	0.9
P27	262.6	12	1,092.1	0:00	1,092.1	0:00	1,092.1	3.1	0:00	3.1	0:00	3.1	0.8	0:00	0.8	3:00	0.8
P29	420.5	8	255.2	0:00	255.2	0:00	255.2	1.6	0:00	1.6	0:00	1.6	0.6	0:00	0.6	0:00	0.6
P31	392.4	12	883.7	0:00	883.7	2:00	883.7	2.5	0:00	2.5	2:00	2.5	0.8	2:00	0.8	0:00	0.8
P33	318.4	12	474.5	0:00	474.5	1:00	474.5	1.4	0:00	1.4	1:00	1.4	0.2	0:00	0.2	0:00	0.2
P35	299.7	12	479.2	0:00	479.2	0:00	479.2	1.4	0:00	1.4	0:00	1.4	0.2	2:00	0.2	0:00	0.2
P39	290.2	12	558.6	0:00	558.6	0:00	558.6	1.6	0:00	1.6	0:00	1.6	0.3	0:00	0.3	2:00	0.3
P41	337.2	12	660.6	0:00	660.6	0:00	660.6	1.9	0:00	1.9	0:00	1.9	0.4	0:00	0.4	0:00	0.4
P43	167.8	12	704.1	0:00	704.1	0:00	704.1	2.0	0:00	2.0	0:00	2.0	0.2	0:00	0.2	0:00	0.2
P45	192.8	8	43.5	0:00	43.5	0:00	43.5	0.3	0:00	0.3	0:00	0.3	0.0	0:00	0.0	0:00	0.0
P47	178.9	8	20.1	1:00	20.1	0:00	20.1	0.1	1:00	0.1	0:00	0.1	0.0	0:00	0.0	3:00	0.0
P49	286.9	8	5.3	0:00	5.3	0:00	5.3	0.0	0:00	0.0	0:00	0.0	0.0	3:00	0.0	0:00	0.0
P51	172.9	8	2.4	0:00	2.4	1:00	2.4	0.0	0:00	0.0	1:00	0.0	0.0	3:00	0.0	0:00	0.0
P53	156.7	8	2.6	0:00	2.6	0:00	2.6	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	2:00	0.0
P55	220.0	8	9.0	0:00	9.0	1:00	9.0	0.1	0:00	0.1	1:00	0.1	0.0	0:00	0.0	3:00	0.0
P57	63.6	8	1.3	0:00	1.3	0:00	1.3	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P59	208.7	8	19.5	0:00	19.5	1:00	19.5	0.1	0:00	0.1	1:00	0.1	0.0	0:00	0.0	3:00	0.0
P61	290.6	8	87.8	0:00	87.8	1:00	87.8	0.6	0:00	0.6	1:00	0.6	0.1	0:00	0.1	0:00	0.1
P63	126.8	8	33.2	0:00	33.2	2:00	33.2	0.2	0:00	0.2	2:00	0.2	0.0	3:00	0.0	0:00	0.0
P65	118.3	8	31.5	0:00	31.5	0:00	31.5	0.2	0:00	0.2	0:00	0.2	0.0	0:00	0.0	0:00	0.0
P67	114.3	8	48.9	0:00	48.9	2:00	48.9	0.3	0:00	0.3	2:00	0.3	0.0	3:00	0.0	0:00	0.0
P69	292.3	8	65.5	0:00	65.5	1:00	65.5	0.4	0:00	0.4	1:00	0.4	0.0	0:00	0.0	0:00	0.0
P71	263.0	8	2.3	0:00	2.3	0:00	2.3	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P73	364.6	8	50.1	0:00	50.1	2:00	50.1	0.3	0:00	0.3	1:00	0.3	0.0	0:00	0.0	0:00	0.0
P75	273.9	8	4.0	0:00	4.0	0:00	4.0	0.0	0:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P77	248.0	8	42.1	0:00	42.1	1:00	42.1	0.3	0:00	0.3	1:00	0.3	0.0	0:00	0.0	0:00	0.0
P79	173.4	12	7.9	1:00	7.9	0:00	7.9	0.0	1:00	0.0	0:00	0.0	0.0	0:00	0.0	0:00	0.0
P81	176.4	12	45.8	1:00	45.8	0:00	45.8	0.1	1:00	0.1	0:00	0.1	0.0	0:00	0.0	2:00	0.0
P83	193.3	12	41.8	1:00	41.8	0:00	41.8	0.1	1:00	0.1	0:00	0.1	0.0	0:00	0.0	2:00	0.0
P85	298.0	12	19.2	0:00	19.2	4:00	19.2	0.1	0:00	0.1	4:00	0.1	0.0	2:00	0.0	0:00	0.0
P87	301.3	8	57.2	0:00	57.2	1:00	57.2	0.4	0:00	0.4	1:00	0.4	0.0	0:00	0.0	0:00	0.0
P89	232.4	8	3.4	0:00	3.4	0:00	3.4	0.0	0:00	0.0	0:00	0.0	0.0	2:00	0.0	0:00	0.0
P91	340.4	8	43.0	0:00	43.0	2:00	43.0	0.3	0:00	0.3	2:00	0.3	0.0	0:00	0.0	4:00	0.0
P93	204.4	8	19.3	1:00	19.3	0:00	19.3	0.1	1:00	0.1	0:00	0.1	0.0	0:00	0.0	0:00	0.0
P95	271.2	8	8.5	0:00	8.5	2:00	8.5	0.1	0:00	0.1	2:00	0.1	0.0	0:00	0.0	0:00	0.0
P97	310.1	8	27.9	0:00	27.9	2:00	27.9	0.2	0:00	0.2	1:00	0.2	0.0	0:00	0.0	0:00	0.0
P99	284.9	8	15.4	0:00	15.4	0:00	15.4	0.1	0:00	0.1	0:00	0.1	0.0	4:00	0.0	0:00	0.0

Model Results
Potable Model Run #3 - Junctions
MDD + 4-hr Fireflow (worst-case), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J10	0.0	569.0	49.1	0:00	44.8	4:00	46.9
J12	7.1	569.5	48.1	0:00	43.8	4:00	46.0
J134	14.3	571.5	46.9	0:00	42.6	4:00	44.8
J136	8.9	570.5	47.0	0:00	42.8	4:00	44.9
J138	7.1	570.0	46.7	0:00	42.5	4:00	44.6
J14	8.9	570.5	46.9	0:00	42.7	4:00	44.8
J140	15.6	568.5	47.3	0:00	43.1	4:00	45.2
J142	8.7	568.5	46.5	0:00	42.2	4:00	44.4
J144	7.1	571.0	46.2	0:00	42.0	4:00	44.1
J146	1.1	567.5	47.7	0:00	43.4	4:00	45.6
J148	2.6	566.5	48.3	0:00	44.0	4:00	46.2
J150	5.3	569.5	47.0	0:00	42.7	4:00	44.9
J152	4.0	568.5	47.4	0:00	43.2	4:00	45.3
J154	6.6	567.0	48.1	0:00	43.8	4:00	45.9
J156	5.7	571.1	46.0	0:00	41.7	4:00	43.8
J158	5.1	571.2	45.9	0:00	41.6	4:00	43.8
J16	5.4	569.0	46.6	0:00	42.4	4:00	44.5
J160	4.0	570.0	46.4	0:00	42.1	4:00	44.3
J162	4.0	570.0	46.3	0:00	42.1	4:00	44.2
J164	4.0	569.8	46.4	0:00	42.2	4:00	44.3
J166	4.0	568.8	46.8	0:00	42.6	4:00	44.7
J168	6.3	569.0	46.7	0:00	42.5	4:00	44.6
J170	5.7	570.3	46.2	0:00	41.9	4:00	44.0
J172	2.9	571.5	45.6	0:00	41.4	4:00	43.5
J174	6.3	572.5	45.2	0:00	41.0	4:00	43.1
J176	3.4	575.5	43.9	0:00	39.7	4:00	41.8
J178	4.6	580.5	41.8	0:00	37.5	4:00	39.6
J18	8.9	571.0	45.0	0:00	40.8	4:00	42.9
J180	4.6	582.5	40.9	0:00	36.6	4:00	38.7
J182	4.6	588.0	38.5	0:00	34.2	4:00	36.4
J184	3.4	591.0	37.2	0:00	32.9	4:00	35.0
J186	5.4	569.2	46.6	0:00	42.4	4:00	44.5
J188	4.3	569.5	46.5	0:00	42.2	4:00	44.4
J190	7.6	568.0	47.1	0:00	42.9	4:00	45.0
J192	2.9	571.0	45.8	0:00	41.6	4:00	43.7
J194	1.7	570.5	46.0	0:00	41.8	4:00	43.9
J196	2.2	568.5	46.9	0:00	42.7	4:00	44.8
J198	4.0	570.0	46.3	0:00	42.0	4:00	44.1
J20	7.1	573.0	44.2	0:00	39.9	4:00	42.0
J200	4.0	570.5	46.0	0:00	41.8	4:00	43.9
J202	3.4	569.5	46.5	0:00	42.2	4:00	44.4
J204	3.4	569.5	46.5	0:00	42.2	4:00	44.3
J206	2.3	569.5	46.5	0:00	42.2	4:00	44.3
J208	4.0	569.5	46.5	0:00	42.2	4:00	44.4
J210	12.0	568.0	48.0	0:00	43.7	4:00	45.9
J212	3,013.8	569.5	45.3	0:00	41.1	4:00	43.2
J216	92.1	564.0	50.6	0:00	46.3	4:00	48.4
J218	0.0	568.5	50.6	0:00	46.4	4:00	48.5
J22	5.4	569.0	47.0	0:00	42.7	4:00	44.9
J24	19.2	569.0	47.4	0:00	43.2	4:00	45.3

Model Results
Potable Model Run #3 - Junctions
MDD + 4-hr Fireflow (worst-case), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J26	0.0	568.1	47.9	0:00	43.6	4:00	45.8
J30	6.5	569.3	47.1	0:00	42.8	4:00	45.0
J32	3.4	569.7	46.7	0:00	42.4	4:00	44.5
J38	2.3	566.5	46.6	0:00	42.3	4:00	44.5
J40	0.0	566.5	48.3	0:00	44.0	4:00	46.2
J42	0.0	566.5	48.4	0:00	44.1	4:00	46.3
J44	4.0	568.0	48.3	0:00	44.0	4:00	46.2
J46	5.3	567.5	47.6	0:00	43.4	4:00	45.5
J48	5.3	569.0	47.9	0:00	43.6	4:00	45.7
J50	4.0	568.5	47.2	0:00	42.9	4:00	45.1
J52	2.6	568.0	47.4	0:00	43.2	4:00	45.3
J54	2.6	568.0	47.6	0:00	43.4	4:00	45.5
J56	1.3	568.9	47.6	0:00	43.4	4:00	45.5
J58	1.7	568.7	46.8	0:00	42.6	4:00	44.7
J60	2.9	568.0	46.9	0:00	42.7	4:00	44.8
J62	1.7	568.5	47.2	0:00	43.0	4:00	45.1
J64	1.1	568.5	46.9	0:00	42.7	4:00	44.8
J66	2.3	569.5	46.9	0:00	42.7	4:00	44.8
J68	4.0	567.5	46.5	0:00	42.2	4:00	44.4
J70	4.0	570.5	47.4	0:00	43.1	4:00	45.2
J72	3.4	571.0	46.0	0:00	41.8	4:00	43.9
J74	2.3	569.5	45.8	0:00	41.6	4:00	43.7
J76	2.3	568.8	46.5	0:00	42.2	4:00	44.4
J78	3.3	590.3	46.8	0:00	42.5	4:00	44.7
J80	2.9	591.8	37.5	0:00	33.2	4:00	35.3
J82	3.4	568.5	36.8	0:00	32.6	4:00	34.7
J84	3.3	569.5	46.9	0:00	42.7	4:00	44.8
J86	4.0	569.0	46.5	0:00	42.2	4:00	44.4
J88	1.1	568.8	46.7	0:00	42.4	4:00	44.6
J90	2.9	567.5	46.8	0:00	42.5	4:00	44.7
J92	1.7	569.2	47.3	0:00	43.1	4:00	45.2
J94	3.3	567.5	46.6	0:00	42.4	4:00	44.5
J96	3.4	568.0	47.3	0:00	43.1	4:00	45.2
J98	4.4	568.0	47.1	0:00	42.9	4:00	45.0

Model Results
Potable Model Run #4 - Pipelines
ADD, 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P101	214.6	8	4.5	7:00	1.5	15:00	2.1	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	1:00	0.0
P103	187.3	8	9.0	7:00	3.1	15:00	4.1	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P105	278.8	8	17.4	7:00	5.9	15:00	8.0	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P107	241.2	8	5.4	7:00	1.8	15:00	2.5	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P109	224.6	8	6.9	7:00	2.4	15:00	3.2	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P111	462.3	8	61.4	7:00	20.9	15:00	28.2	0.4	7:00	0.1	15:00	0.2	0.1	7:00	0.0	15:00	0.0
P113	408.5	8	38.9	7:00	13.3	15:00	17.9	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P115	332.4	8	47.0	7:00	16.0	15:00	21.6	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P117	229.0	12	131.2	7:00	44.7	15:00	60.3	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P119	241.9	12	134.0	7:00	45.7	15:00	61.7	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P121	316.8	12	192.1	7:00	65.5	15:00	88.4	0.5	7:00	0.2	15:00	0.3	0.0	7:00	0.0	15:00	0.0
P123	286.8	12	44.8	7:00	15.3	15:00	20.6	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P125	172.1	8	27.4	7:00	9.3	15:00	12.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P127	206.8	8	16.6	7:00	5.7	15:00	7.6	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P129	169.8	8	2.5	7:00	0.9	15:00	1.2	0.0	7:00	0.0	15:00	0.0	0.0	1:00	0.0	0:00	0.0
P13	233.5	12	325.8	7:00	111.1	15:00	149.9	0.9	7:00	0.3	15:00	0.4	0.1	7:00	0.0	15:00	0.0
P131	141.0	8	20.3	7:00	6.9	15:00	9.3	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P133	262.0	8	61.7	7:00	21.0	15:00	28.4	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P135	225.1	8	52.8	7:00	18.0	15:00	24.3	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P137	217.3	8	38.4	7:00	13.1	15:00	17.7	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P139	305.9	8	28.6	7:00	9.7	15:00	13.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P141	238.2	8	22.3	7:00	7.6	15:00	10.3	0.1	7:00	0.1	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P143	221.3	8	16.0	7:00	5.5	15:00	7.4	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P145	248.5	8	13.4	7:00	4.6	15:00	6.2	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P147	249.3	8	5.5	7:00	1.9	15:00	2.5	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P149	213.1	8	31.5	7:00	10.7	15:00	14.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P15	320.6	12	253.2	7:00	86.3	15:00	116.5	0.7	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P151	248.1	8	56.4	7:00	19.2	15:00	25.9	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P153	231.3	8	46.5	7:00	15.9	15:00	21.4	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P155	260.5	8	41.1	7:00	14.0	15:00	18.9	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P157	224.4	8	34.0	7:00	11.6	15:00	15.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P159	256.3	8	19.6	7:00	6.7	15:00	9.0	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P161	208.5	8	10.8	7:00	3.7	15:00	4.9	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P163	250.6	12	153.4	7:00	52.3	15:00	70.6	0.4	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P165	210.9	12	144.9	7:00	49.4	15:00	66.7	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P167	205.3	12	138.1	7:00	47.1	15:00	63.5	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P169	152.3	12	70.9	7:00	24.2	15:00	32.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P17	359.7	12	180.9	7:00	61.7	15:00	83.2	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P171	153.2	12	72.8	7:00	24.8	15:00	33.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P173	177.3	8	41.3	7:00	14.1	15:00	19.0	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P175	211.7	8	18.8	7:00	6.4	15:00	8.7	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P177	206.6	8	12.6	7:00	4.3	15:00	5.8	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P179	183.6	8	6.3	7:00	2.1	15:00	2.9	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	1:00	0.0
P181	177.3	8	13.4	7:00	4.6	15:00	6.2	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P183	201.1	8	8.1	7:00	2.8	15:00	3.7	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P185	149.7	8	2.7	7:00	0.9	15:00	1.2	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P187	149.2	12	136.4	7:00	46.5	15:00	62.8	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P189	125.8	12	98.6	7:00	33.6	15:00	45.4	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P19	272.2	12	73.4	7:00	25.0	15:00	33.8	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P195	30,335.8	18	740.7	7:00	252.5	15:00	340.7	0.9	7:00	0.3	15:00	0.4	6.1	7:00	0.8	15:00	1.6

Model Results
Potable Model Run #4 - Pipelines
ADD, 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P197	846.8	12	259.6	7:00	88.5	15:00	119.4	0.7	7:00	0.3	15:00	0.3	0.2	7:00	0.0	15:00	0.1
P201	1,337.4	12	155.3	7:00	52.9	15:00	71.4	0.4	7:00	0.2	15:00	0.2	0.1	7:00	0.0	15:00	0.0
P205	648.0	8	144.7	7:00	49.3	15:00	66.5	0.9	7:00	0.3	15:00	0.4	0.3	7:00	0.0	15:00	0.1
P207	2,007.4	12	115.0	7:00	39.2	15:00	52.9	0.3	7:00	0.1	15:00	0.2	0.1	7:00	0.0	15:00	0.0
P21	281.7	8	11.2	7:00	3.8	15:00	5.2	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P23	333.4	12	120.4	7:00	41.0	15:00	55.4	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P25	357.3	8	35.8	7:00	12.2	15:00	16.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P27	262.6	12	106.7	7:00	36.4	15:00	49.1	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P29	420.5	8	24.9	7:00	8.5	15:00	11.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P31	392.4	12	155.3	7:00	52.9	15:00	71.4	0.4	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P33	318.4	12	245.9	7:00	83.8	15:00	113.1	0.7	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P35	299.7	12	82.2	7:00	28.0	15:00	37.8	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P39	290.2	12	20.5	7:00	7.0	15:00	9.4	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	2:00	0.0
P41	337.2	12	46.6	7:00	15.9	15:00	21.4	0.1	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P43	167.8	12	115.0	7:00	39.2	15:00	52.9	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P45	192.8	8	68.4	7:00	23.3	15:00	31.5	0.4	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P47	178.9	8	31.5	7:00	10.8	15:00	14.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P49	286.9	8	8.3	7:00	2.8	15:00	3.8	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P51	172.9	8	3.7	7:00	1.3	15:00	1.7	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P53	156.7	8	4.2	7:00	1.4	15:00	1.9	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P55	220.0	8	14.1	7:00	4.8	15:00	6.5	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P57	63.6	8	2.1	7:00	0.7	15:00	1.0	0.0	7:00	0.0	15:00	0.0	0.0	0:00	0.0	0:00	0.0
P59	208.7	8	30.7	7:00	10.5	15:00	14.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P61	290.6	8	44.7	7:00	15.2	15:00	20.6	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P63	126.8	8	15.0	7:00	5.1	15:00	6.9	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P65	118.3	8	12.3	7:00	4.2	15:00	5.7	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P67	114.3	8	20.8	7:00	7.1	15:00	9.5	0.1	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P69	292.3	8	9.7	7:00	3.3	15:00	4.5	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P71	263.0	8	3.6	7:00	1.2	15:00	1.7	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P73	364.6	8	14.4	7:00	4.9	15:00	6.6	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P75	273.9	8	6.3	7:00	2.1	15:00	2.9	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	1:00	0.0
P77	248.0	8	27.0	7:00	9.2	15:00	12.4	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P79	173.4	12	66.4	7:00	22.6	15:00	30.5	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P81	176.4	12	70.1	7:00	23.9	15:00	32.2	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P83	193.3	12	76.3	7:00	26.0	15:00	35.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P85	298.0	12	126.2	7:00	43.0	15:00	58.1	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P87	301.3	8	26.8	7:00	9.1	15:00	12.3	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P89	232.4	8	5.4	7:00	1.8	15:00	2.5	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P91	340.4	8	4.4	7:00	1.5	15:00	2.0	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	2:00	0.0
P93	204.4	8	44.7	7:00	15.2	15:00	20.6	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P95	271.2	8	0.9	7:00	0.3	15:00	0.4	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P97	310.1	8	29.6	7:00	10.1	15:00	13.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P99	284.9	8	24.2	7:00	8.3	15:00	11.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0

Model Results
Potable Model Run #4 - Junctions
ADD, 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J10	0.0	569.0	70.0	15:00	70.0	7:00	70.0
J12	5.2	569.5	69.8	15:00	69.8	7:00	69.8
J134	10.3	571.5	68.9	15:00	68.9	7:00	68.9
J136	6.5	570.5	69.3	15:00	69.3	7:00	69.3
J138	5.2	570.0	69.6	15:00	69.5	7:00	69.6
J14	6.5	570.5	69.3	15:00	69.3	7:00	69.3
J140	11.3	568.5	70.2	15:00	70.1	7:00	70.2
J142	6.3	568.5	70.2	15:00	70.1	7:00	70.2
J144	5.2	571.0	69.1	15:00	69.1	7:00	69.1
J146	0.8	567.5	70.6	15:00	70.5	7:00	70.6
J148	1.9	566.5	71.1	15:00	70.9	7:00	71.1
J150	3.8	569.5	69.8	15:00	69.6	7:00	69.8
J152	2.9	568.5	70.2	15:00	70.1	7:00	70.2
J154	4.8	567.0	70.9	15:00	70.7	7:00	70.8
J156	4.1	571.1	69.1	15:00	69.0	7:00	69.1
J158	3.7	571.2	69.0	15:00	68.9	7:00	69.0
J16	3.9	569.0	70.0	15:00	69.9	7:00	70.0
J160	2.9	570.0	69.6	15:00	69.4	7:00	69.5
J162	2.9	570.0	69.5	15:00	69.4	7:00	69.5
J164	2.9	569.8	69.6	15:00	69.5	7:00	69.6
J166	2.9	568.8	70.1	15:00	69.9	7:00	70.0
J168	4.5	569.0	70.0	15:00	69.8	7:00	70.0
J170	4.1	570.3	69.4	15:00	69.3	7:00	69.4
J172	2.1	571.5	68.9	15:00	68.8	7:00	68.9
J174	4.5	572.5	68.5	15:00	68.4	7:00	68.5
J176	2.5	575.5	67.2	15:00	67.0	7:00	67.2
J178	3.3	580.5	65.0	15:00	64.9	7:00	65.0
J18	6.5	571.0	69.1	15:00	69.0	7:00	69.1
J180	3.3	582.5	64.1	15:00	64.0	7:00	64.1
J182	3.3	588.0	61.8	15:00	61.6	7:00	61.7
J184	2.5	591.0	60.5	15:00	60.3	7:00	60.4
J186	3.9	569.2	69.9	15:00	69.8	7:00	69.9
J188	3.1	569.5	69.8	15:00	69.6	7:00	69.8
J190	5.5	568.0	70.4	15:00	70.3	7:00	70.4
J192	2.1	571.0	69.1	15:00	69.0	7:00	69.1
J194	1.2	570.5	69.3	15:00	69.2	7:00	69.3
J196	1.6	568.5	70.2	15:00	70.1	7:00	70.2
J198	2.9	570.0	69.5	15:00	69.4	7:00	69.5
J20	5.2	573.0	68.3	15:00	68.2	7:00	68.2
J200	2.9	570.5	69.3	15:00	69.2	7:00	69.3
J202	2.5	569.5	69.8	15:00	69.6	7:00	69.7
J204	2.5	569.5	69.8	15:00	69.6	7:00	69.7
J206	1.7	569.5	69.8	15:00	69.6	7:00	69.7
J208	2.9	569.5	69.8	15:00	69.6	7:00	69.7
J210	8.7	568.0	70.4	15:00	70.4	7:00	70.4
J212	10.0	569.5	69.8	15:00	69.7	7:00	69.8
J216	66.5	564.0	72.1	15:00	71.9	7:00	72.1
J218	0.0	568.5	72.2	15:00	72.1	7:00	72.2
J22	3.9	569.0	70.2	15:00	70.1	7:00	70.2
J24	13.9	569.0	70.0	15:00	69.9	7:00	70.0

Model Results
Potable Model Run #4 - Junctions
ADD, 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J26	0.0	568.1	70.0	15:00	70.0	7:00	70.0
J30	4.7	569.3	70.4	15:00	70.3	7:00	70.4
J32	2.5	569.7	69.9	15:00	69.7	7:00	69.8
J38	1.7	566.5	69.7	15:00	69.6	7:00	69.7
J40	0.0	566.5	71.1	15:00	71.0	7:00	71.1
J42	0.0	566.5	71.1	15:00	71.0	7:00	71.1
J44	2.9	568.0	71.1	15:00	71.0	7:00	71.1
J46	3.8	567.5	70.4	15:00	70.3	7:00	70.4
J48	3.8	569.0	70.6	15:00	70.5	7:00	70.6
J50	2.9	568.5	70.0	15:00	69.9	7:00	70.0
J52	1.9	568.0	70.2	15:00	70.1	7:00	70.2
J54	1.9	568.0	70.4	15:00	70.3	7:00	70.4
J56	1.0	568.9	70.4	15:00	70.3	7:00	70.4
J58	1.2	568.7	70.0	15:00	69.9	7:00	70.0
J60	2.1	568.0	70.1	15:00	70.0	7:00	70.1
J62	1.2	568.5	70.4	15:00	70.3	7:00	70.4
J64	0.8	568.5	70.2	15:00	70.1	7:00	70.2
J66	1.7	569.5	70.2	15:00	70.1	7:00	70.2
J68	2.9	567.5	69.8	15:00	69.6	7:00	69.7
J70	2.9	570.5	70.6	15:00	70.5	7:00	70.6
J72	2.5	571.0	69.3	15:00	69.2	7:00	69.3
J74	1.7	569.5	69.1	15:00	69.0	7:00	69.1
J76	1.7	568.8	69.8	15:00	69.6	7:00	69.7
J78	2.4	590.3	70.1	15:00	69.9	7:00	70.1
J80	2.1	591.8	60.8	15:00	60.6	7:00	60.7
J82	2.5	568.5	60.1	15:00	60.0	7:00	60.1
J84	2.4	569.5	70.2	15:00	70.1	7:00	70.2
J86	2.9	569.0	69.8	15:00	69.6	7:00	69.7
J88	0.8	568.8	70.0	15:00	69.8	7:00	70.0
J90	2.1	567.5	70.1	15:00	69.9	7:00	70.0
J92	1.2	569.2	70.6	15:00	70.5	7:00	70.6
J94	2.4	567.5	69.9	15:00	69.8	7:00	69.9
J96	2.5	568.0	70.6	15:00	70.5	7:00	70.6
J98	3.2	568.0	70.4	15:00	70.3	7:00	70.4

Model Results
Potable Model Run #5 - Pipelines
MDD (PHD @ Time 7:00), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P101	214.6	8	6.3	7:00	2.1	15:00	2.9	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P103	187.3	8	12.6	7:00	4.3	15:00	5.8	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	10:00	0.0
P105	278.8	8	24.3	7:00	8.3	15:00	11.2	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P107	241.2	8	7.5	7:00	2.6	15:00	3.5	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P109	224.6	8	9.7	7:00	3.3	15:00	4.4	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P111	462.3	8	85.9	7:00	29.3	15:00	39.5	0.6	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P113	408.5	8	54.5	7:00	18.6	15:00	25.1	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P115	332.4	8	65.8	7:00	22.5	15:00	30.3	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P117	229.0	12	183.6	7:00	62.6	15:00	84.5	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P119	241.9	12	187.7	7:00	64.0	15:00	86.3	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P121	316.8	12	268.9	7:00	91.7	15:00	123.7	0.8	7:00	0.3	15:00	0.4	0.1	7:00	0.0	15:00	0.0
P123	286.8	12	62.7	7:00	21.4	15:00	28.8	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P125	172.1	8	38.3	7:00	13.1	15:00	17.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P127	206.8	8	23.2	7:00	7.9	15:00	10.7	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P129	169.8	8	3.5	7:00	1.2	15:00	1.6	0.0	7:00	0.0	15:00	0.0	0.0	6:00	0.0	0:00	0.0
P13	233.5	12	456.1	7:00	155.5	15:00	209.8	1.3	7:00	0.4	15:00	0.6	0.1	7:00	0.0	15:00	0.0
P131	141.0	8	28.4	7:00	9.7	15:00	13.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P133	262.0	8	86.4	7:00	29.5	15:00	39.7	0.6	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P135	225.1	8	73.9	7:00	25.2	15:00	34.0	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P137	217.3	8	53.8	7:00	18.3	15:00	24.8	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P139	305.9	8	40.0	7:00	13.6	15:00	18.4	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P141	238.2	8	31.2	7:00	10.6	15:00	14.4	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P143	221.3	8	22.4	7:00	7.6	15:00	10.3	0.1	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P145	248.5	8	18.8	7:00	6.4	15:00	8.7	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P147	249.3	8	7.7	7:00	2.6	15:00	3.5	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P149	213.1	8	44.0	7:00	15.0	15:00	20.3	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P15	320.6	12	354.4	7:00	120.8	15:00	163.0	1.0	7:00	0.3	15:00	0.5	0.1	7:00	0.0	15:00	0.0
P151	248.1	8	78.9	7:00	26.9	15:00	36.3	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P153	231.3	8	65.1	7:00	22.2	15:00	30.0	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P155	260.5	8	57.6	7:00	19.6	15:00	26.5	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P157	224.4	8	47.5	7:00	16.2	15:00	21.9	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P159	256.3	8	27.5	7:00	9.4	15:00	12.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P161	208.5	8	15.1	7:00	5.1	15:00	6.9	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P163	250.6	12	214.8	7:00	73.2	15:00	98.8	0.6	7:00	0.2	15:00	0.3	0.0	7:00	0.0	15:00	0.0
P165	210.9	12	202.9	7:00	69.2	15:00	93.3	0.6	7:00	0.2	15:00	0.3	0.0	7:00	0.0	15:00	0.0
P167	205.3	12	193.4	7:00	65.9	15:00	89.0	0.6	7:00	0.2	15:00	0.3	0.0	7:00	0.0	15:00	0.0
P169	152.3	12	99.2	7:00	33.8	15:00	45.6	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P17	359.7	12	253.2	7:00	86.3	15:00	116.5	0.7	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P171	153.2	12	101.9	7:00	34.7	15:00	46.9	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P173	177.3	8	57.8	7:00	19.7	15:00	26.6	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P175	211.7	8	26.4	7:00	9.0	15:00	12.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P177	206.6	8	17.6	7:00	6.0	15:00	8.1	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P179	183.6	8	8.8	7:00	3.0	15:00	4.0	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P181	177.3	8	18.8	7:00	6.4	15:00	8.7	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P183	201.1	8	11.3	7:00	3.8	15:00	5.2	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P185	149.7	8	3.8	7:00	1.3	15:00	1.7	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P187	149.2	12	191.0	7:00	65.1	15:00	87.9	0.5	7:00	0.2	15:00	0.3	0.0	7:00	0.0	15:00	0.0
P189	125.8	12	138.1	7:00	47.1	15:00	63.5	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P19	272.2	12	102.8	7:00	35.0	15:00	47.3	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P195	30,335.8	18	1,037.0	7:00	353.5	15:00	477.0	1.3	7:00	0.5	15:00	0.6	11.4	7:00	1.6	15:00	2.9

Model Results
Potable Model Run #5 - Pipelines
MDD (PHD @ Time 7:00), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)					Velocity Results (feet/sec)					Headloss Results (feet)				
			Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average	Max.Value	Max.Time	Min.Value	Min.Time	Average
P197	846.8	12	363.5	7:00	123.9	15:00	167.2	1.0	7:00	0.4	15:00	0.5	0.3	7:00	0.0	15:00	0.1
P201	1,337.4	12	217.4	7:00	74.1	15:00	100.0	0.6	7:00	0.2	15:00	0.3	0.2	7:00	0.0	15:00	0.1
P205	648.0	8	202.5	7:00	69.0	15:00	93.2	1.3	7:00	0.4	15:00	0.6	0.6	7:00	0.1	15:00	0.2
P207	2,007.4	12	161.0	7:00	54.9	15:00	74.0	0.5	7:00	0.2	15:00	0.2	0.2	7:00	0.0	15:00	0.0
P21	281.7	8	15.7	7:00	5.4	15:00	7.2	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P23	333.4	12	168.5	7:00	57.5	15:00	77.5	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P25	357.3	8	50.1	7:00	17.1	15:00	23.1	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P27	262.6	12	149.3	7:00	50.9	15:00	68.7	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P29	420.5	8	34.9	7:00	11.9	15:00	16.1	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P31	392.4	12	217.4	7:00	74.1	15:00	100.0	0.6	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P33	318.4	12	344.2	7:00	117.3	15:00	158.3	1.0	7:00	0.3	15:00	0.5	0.1	7:00	0.0	15:00	0.0
P35	299.7	12	115.1	7:00	39.3	15:00	53.0	0.3	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P39	290.2	12	28.7	7:00	9.8	15:00	13.2	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P41	337.2	12	65.2	7:00	22.2	15:00	30.0	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	11:00	0.0
P43	167.8	12	161.0	7:00	54.9	15:00	74.0	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P45	192.8	8	95.7	7:00	32.6	15:00	44.0	0.6	7:00	0.2	15:00	0.3	0.1	7:00	0.0	15:00	0.0
P47	178.9	8	44.1	7:00	15.1	15:00	20.3	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P49	286.9	8	11.6	7:00	4.0	15:00	5.3	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P51	172.9	8	5.2	7:00	1.8	15:00	2.4	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P53	156.7	8	5.8	7:00	2.0	15:00	2.7	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P55	220.0	8	19.7	7:00	6.7	15:00	9.1	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P57	63.6	8	2.9	7:00	1.0	15:00	1.3	0.0	7:00	0.0	15:00	0.0	0.0	4:00	0.0	0:00	0.0
P59	208.7	8	42.9	7:00	14.6	15:00	19.7	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P61	290.6	8	62.6	7:00	21.3	15:00	28.8	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P63	126.8	8	21.0	7:00	7.2	15:00	9.7	0.1	7:00	0.1	15:00	0.1	0.0	7:00	0.0	11:00	0.0
P65	118.3	8	17.2	7:00	5.9	15:00	7.9	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P67	114.3	8	29.1	7:00	9.9	15:00	13.4	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	0:00	0.0
P69	292.3	8	13.6	7:00	4.7	15:00	6.3	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P71	263.0	8	5.0	7:00	1.7	15:00	2.3	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	10:00	0.0
P73	364.6	8	20.2	7:00	6.9	15:00	9.3	0.1	7:00	0.0	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P75	273.9	8	8.8	7:00	3.0	15:00	4.0	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	15:00	0.0
P77	248.0	8	37.8	7:00	12.9	15:00	17.4	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P79	173.4	12	93.0	7:00	31.7	15:00	42.8	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P81	176.4	12	98.1	7:00	33.4	15:00	45.1	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P83	193.3	12	106.9	7:00	36.4	15:00	49.2	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P85	298.0	12	176.7	7:00	60.3	15:00	81.3	0.5	7:00	0.2	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P87	301.3	8	37.5	7:00	12.8	15:00	17.3	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P89	232.4	8	7.5	7:00	2.6	15:00	3.5	0.1	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P91	340.4	8	6.2	7:00	2.1	15:00	2.8	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P93	204.4	8	62.6	7:00	21.3	15:00	28.8	0.4	7:00	0.1	15:00	0.2	0.0	7:00	0.0	15:00	0.0
P95	271.2	8	1.3	7:00	0.4	15:00	0.6	0.0	7:00	0.0	15:00	0.0	0.0	7:00	0.0	0:00	0.0
P97	310.1	8	41.4	7:00	14.1	15:00	19.0	0.3	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0
P99	284.9	8	33.9	7:00	11.6	15:00	15.6	0.2	7:00	0.1	15:00	0.1	0.0	7:00	0.0	15:00	0.0

Model Results
Potable Model Run #5 - Junctions
MDD (PHD @ Time 7:00), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J10	0.0	569.0	70.0	15:00	70.0	7:00	70.0
J12	7.2	569.5	69.8	15:00	69.7	7:00	69.8
J134	14.5	571.5	68.9	15:00	68.8	7:00	68.9
J136	9.0	570.5	69.3	15:00	69.2	7:00	69.3
J138	7.2	570.0	69.6	15:00	69.4	7:00	69.5
J14	9.0	570.5	69.3	15:00	69.2	7:00	69.3
J140	15.8	568.5	70.2	15:00	70.1	7:00	70.2
J142	8.8	568.5	70.2	15:00	70.1	7:00	70.2
J144	7.2	571.0	69.1	15:00	69.0	7:00	69.1
J146	1.2	567.5	70.6	15:00	70.4	7:00	70.6
J148	2.7	566.5	71.1	15:00	70.8	7:00	71.0
J150	5.3	569.5	69.8	15:00	69.5	7:00	69.7
J152	4.0	568.5	70.2	15:00	70.0	7:00	70.2
J154	6.7	567.0	70.8	15:00	70.6	7:00	70.8
J156	5.8	571.1	69.1	15:00	68.8	7:00	69.0
J158	5.2	571.2	69.0	15:00	68.8	7:00	69.0
J16	5.4	569.0	70.0	15:00	69.8	7:00	70.0
J160	4.0	570.0	69.5	15:00	69.3	7:00	69.5
J162	4.0	570.0	69.5	15:00	69.3	7:00	69.5
J164	4.0	569.8	69.6	15:00	69.4	7:00	69.6
J166	4.0	568.8	70.0	15:00	69.8	7:00	70.0
J168	6.3	569.0	70.0	15:00	69.7	7:00	69.9
J170	5.8	570.3	69.4	15:00	69.1	7:00	69.4
J172	2.9	571.5	68.9	15:00	68.6	7:00	68.8
J174	6.3	572.5	68.5	15:00	68.2	7:00	68.4
J176	3.5	575.5	67.2	15:00	66.9	7:00	67.1
J178	4.6	580.5	65.0	15:00	64.7	7:00	65.0
J18	9.0	571.0	69.1	15:00	69.0	7:00	69.1
J180	4.6	582.5	64.1	15:00	63.9	7:00	64.1
J182	4.6	588.0	61.7	15:00	61.5	7:00	61.7
J184	3.5	591.0	60.4	15:00	60.2	7:00	60.4
J186	5.5	569.2	69.9	15:00	69.7	7:00	69.9
J188	4.4	569.5	69.8	15:00	69.5	7:00	69.7
J190	7.7	568.0	70.4	15:00	70.2	7:00	70.4
J192	2.9	571.0	69.1	15:00	68.8	7:00	69.1
J194	1.7	570.5	69.3	15:00	69.1	7:00	69.3
J196	2.2	568.5	70.2	15:00	69.9	7:00	70.1
J198	4.0	570.0	69.5	15:00	69.3	7:00	69.5
J20	7.2	573.0	68.2	15:00	68.1	7:00	68.2
J200	4.0	570.5	69.3	15:00	69.1	7:00	69.3
J202	3.5	569.5	69.7	15:00	69.5	7:00	69.7
J204	3.5	569.5	69.7	15:00	69.5	7:00	69.7
J206	2.3	569.5	69.7	15:00	69.5	7:00	69.7
J208	4.0	569.5	69.7	15:00	69.5	7:00	69.7
J210	12.2	568.0	70.4	15:00	70.3	7:00	70.4
J212	14.0	569.5	69.8	15:00	69.6	7:00	69.7
J216	0.0	564.0	72.1	15:00	71.8	7:00	72.1
J218	5.4	568.5	72.2	15:00	72.0	7:00	72.1
J22	19.4	569.0	70.2	15:00	70.1	7:00	70.2
J24	0.0	569.0	70.0	15:00	69.9	7:00	70.0

Model Results

Potable Model Run #5 - Junctions

MDD (PHD @ Time 7:00), 18-in Transmission Pipeline, Modified Pipeline Sizing

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)				
			Max. Value	Max.Time	Min.Value	Min.Time	Average
J26	6.6	568.1	70.0	15:00	69.9	7:00	70.0
J30	3.5	569.3	70.4	15:00	70.2	7:00	70.3
J32	2.3	569.7	69.8	15:00	69.6	7:00	69.8
J38	0.0	566.5	69.7	15:00	69.5	7:00	69.6
J40	0.0	566.5	71.1	15:00	70.9	7:00	71.0
J42	4.0	566.5	71.1	15:00	70.9	7:00	71.0
J44	5.3	568.0	71.1	15:00	70.8	7:00	71.0
J46	5.3	567.5	70.4	15:00	70.2	7:00	70.4
J48	4.0	569.0	70.6	15:00	70.4	7:00	70.6
J50	2.7	568.5	70.0	15:00	69.7	7:00	69.9
J52	2.7	568.0	70.2	15:00	70.0	7:00	70.2
J54	1.3	568.0	70.4	15:00	70.2	7:00	70.4
J56	1.7	568.9	70.4	15:00	70.2	7:00	70.4
J58	2.9	568.7	70.0	15:00	69.8	7:00	70.0
J60	1.7	568.0	70.1	15:00	69.8	7:00	70.1
J62	1.2	568.5	70.4	15:00	70.1	7:00	70.4
J64	2.3	568.5	70.2	15:00	69.9	7:00	70.1
J66	4.0	569.5	70.2	15:00	69.9	7:00	70.1
J68	4.0	567.5	69.7	15:00	69.5	7:00	69.7
J70	3.5	570.5	70.6	15:00	70.3	7:00	70.6
J72	2.3	571.0	69.3	15:00	69.1	7:00	69.3
J74	2.3	569.5	69.1	15:00	68.8	7:00	69.1
J76	3.4	568.8	69.7	15:00	69.5	7:00	69.7
J78	2.9	590.3	70.1	15:00	69.8	7:00	70.0
J80	3.5	591.8	60.7	15:00	60.5	7:00	60.7
J82	3.3	568.5	60.1	15:00	59.8	7:00	60.1
J84	4.0	569.5	70.2	15:00	69.9	7:00	70.1
J86	1.2	569.0	69.7	15:00	69.5	7:00	69.7
J88	2.9	568.8	70.0	15:00	69.7	7:00	69.9
J90	1.7	567.5	70.0	15:00	69.8	7:00	70.0
J92	3.3	569.2	70.6	15:00	70.3	7:00	70.6
J94	3.5	567.5	69.9	15:00	69.6	7:00	69.8
J96	4.4	568.0	70.6	15:00	70.4	7:00	70.6
J98	4.4	568.0	70.4	15:00	70.1	7:00	70.4

Model Results
Recycled Model Run - Pipelines
PHD (IEUA and City Facilities at Year 2015)

ID	Length (feet)	Diameter (inches)	Flow Results (gpm)	Velocity Results (feet/sec)	Headloss Results (feet)
P179	314.7	4	15.7	0.4	0.1
P181	452.6	6	259.0	2.9	2.8
P183	157.2	12	390.2	1.1	0.1
P185	1,424.3	6	169.3	1.9	3.9
P187	342.2	8	463.1	3.0	1.5
P189	2,027.9	8	375.0	2.4	6.0
P191	590.2	8	88.7	0.6	0.1
P193	1,197.0	6	244.4	2.8	6.5
P195	623.5	8	463.7	3.0	2.7
P197	1,629.4	12	777.6	2.2	2.6
P199	1,478.3	12	708.1	2.0	2.0
P205	1,278.5	12	758.1	2.2	1.9
P81	340.4	6	292.6	3.3	2.6
P83	947.6	12	974.7	2.8	2.3
P85	292.2	4	42.7	1.1	0.5
P87	955.8	12	962.2	2.7	2.3
P89	827.0	6	274.8	3.1	5.6
P91	855.6	12	687.5	2.0	1.1
P93	339.2	4	58.8	1.5	1.0
P95	1,054.8	8	331.5	2.1	2.5
P97	1,319.4	12	1,499.8	4.3	7.1

Model Results
Recycled Model Run - Junctions
PHD (IEUA and City Facilities at Year 2015)

ID	Demand (gpm)	Elevation (feet)	Pressure Results (psi)
J38	232.4	569.0	59.5
J40	292.6	540.0	70.9
J42	58.5	568.0	58.9
J44	42.7	545.0	68.7
J46	0.0	568.0	58.0
J48	15.7	545.0	65.5
J50	0.0	571.0	56.2
J52	58.8	545.0	67.0
J54	463.1	545.0	65.7
J68	337.6	569.5	62.4
J70	259.0	527.5	71.9
J72	0.0	568.5	55.3
J74	169.3	518.0	77.5
J76	127.9	570.5	56.4
J78	0.0	569.5	58.3
J80	243.4	568.0	56.4
J82	244.4	545.0	67.3
J84	0.0	569.5	59.5
J86	14.8	565.6	62.1
J90	0.0	569.5	61.5

Appendix D
Treatment Calculations

Treatment Sizing Calculations

Water Quality Data

State Well Number	TDS	NO3	Unit
17B	850	402	mg/L
17G	1010	368	mg/L
18H	1220	353	mg/L
Average	1027	374	mg/L

Preliminary WTP Capacity

Description	Raw	RO	IX	Bypass	Effluent	Goal
Recovery		80%	95%	100%	85%	
NO3 Removal Efficiency		98%	98%	0%	67%	
TDS Removal Efficiency		98%	0%	0%	95%	
TDS - mg/L	1027	21	1027	850	340	350
NO3 - mg/L	374	7	7	230	20	25
Effluent - mgd		0.82	0.33	0.07	1.22	
Influent - mgd	1.44	1.03	0.35	0.07		
Brine - mgd		0.21	0.02	0.00	0.22	

Treatment Assumptions
Source/Goal Water Quality
Treatment Sizing Inputs
Treatment Calculations
Achieved Water Quality

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