Recycled Water Master Plan Update

City of Carlsbad

July 15, 2019

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Contents

Tables

Figures

Appendices

Acknowledgements

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Acronyms and Abbreviations

AF	Acre-feet
AFY	Acre-feet per year
Carlsbad	City of Carlsbad
CWRF	Carlsbad Water Reclamation Facility
cfs	Cubic feet per second
CIP	Capital improvement program
City	City of Carlsbad
CMWD	Carlsbad Municipal Water District
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
EEPS	Encina Effluent Pump Station
EWA	Encina Wastewater Authority
EWPCF	Encina Water Pollution Control Facility
gpd	gallons per day
gpm	gallons per minute
LWD	Leucadia Wastewater District
MG	Million gallons
mgd	Million gallons per day
MOU	Memorandum of understanding
Meadowlark WRF	Meadowlark Water Recycling Facility
OMWD	Olivenhain Municipal Water District
RWQCB	Regional Water Quality Control Board
VID	Vista Irrigation District
VWD	Vallecitos Water District
WDF	Water Demand Forecast
WELO	Water Efficient Landscape Ordinance
WRP	Water Recycling Plant

Chapter 1 Introduction

The Carlsbad Municipal Water District (CMWD) covers an area of 20,682 acres, approximately 32 square miles, and provides potable and recycled water supply to most of the City of Carlsbad (the City or Carlsbad). CMWD's service area covers approximately 82 percent of the City's boundary, with neighboring Vallecitos Water District (VWD) and Olivenhain Municipal Water District (OMWD) providing potable service for the southeast corner of the City. CMWD supplies recycled water through two recycled water distribution systems, which include 77 miles of pipeline, six pressure zones, three storage tanks, three booster pumping stations, three supply sources with pumping stations, and four pressure regulating stations. CMWD receives recycled water from reclamation plants within the Encina Wastewater Authority (EWA) service area.

Carlsbad last updated its Recycled Water Master Plan in 2012 based on data through 2010. In the past six years, the economic recession, combined with a multi-year drought, resulted in significantly reduced water and recycled water demands and sewer flows, and consequentially reduced revenues to Carlsbad. As the economy rebounds and extreme drought conditions recede, there is also a need to adjust the current plans to correspond with the new General Plan, to reflect a "new normal" in water use behaviors, and to evaluate new opportunities for recycled water customers.

Preparation of the Potable Water, Recycled Water and Sewer Master Plan Updates was authorized by the Carlsbad City Council on January 24, 2017 in the form of a contract for engineering services granted to HDR Engineering Inc., entitled *Agreement for Engineering Services to update the Carlsbad Potable Water, Recycled Water and Sewer Master Plans.*

This Recycled Water Master Plan Update provides a system evaluation and capacity assessment of the recycled water system and recommends a capital improvement program to provide for continued reliable recycled water service through buildout conditions, which are projected to occur by 2040. By updating this master plan, the resulting capital improvement program (CIP) will help guide Carlsbad in spending precious funds in the most cost-effective manner.

Key references used in the development of the updated Recycled Water Master Plan include the following documents:

- CMWD, 2012 Recycled Water Master Plan
- City of Carlsbad, 2015 General Plan Update
- City of Carlsbad, 2015 Climate Action Plan
- CMWD, 2015 Urban Water Management Plan
- CMWD, 2012 Phase III Recycled Water Project Feasibility Study, Revised July 2016
- North San Diego Water Reuse Coalition, 2015 Regional Recycled Water Project EIR
- CMWD, 2016 Cost of Service Study

1.1 Background

The CMWD started its recycled water program in 1990 with the preparation of its first Recycled Water Master Plan. Subsequently, CMWD issued a mandatory use ordinance and started implementing the recycled water system facilities of Phase I. With recycled water purchased from neighboring agencies, Vallecitos Water District (VWD) and Leucadia Wastewater District (LWD), CMWD served over 1,000 acre-feet per year (afy), or 0.89 million gallons per day (mgd), of recycled water by 1995. With Phase I complete, CMWD in 1997 updated its recycled water master plan and prepared a plan for the Phase II expansion. Phase II included construction of the 4 mgd (4,480 afy) Carlsbad Water Recycling Facility (CWRF), increased supply from the Meadowlark Water Reclamation Facility (WRF) from 2.25 mgd (2,520 afy) to 5 mgd (5,600 afy), reliability and control improvements to Mahr Reservoir, three new booster pump stations, and 24 miles of additional recycled water pipeline.

Construction of Phase II was initiated in 2004 and went into full operation in January 2008. Between 2008 and 2013, CMWD successfully connected Phase II customers to the distribution system resulting in a system demand of approximately 4,100 afy, slightly below the Phase II target of 5,000 afy.

In 2012, CMWD embarked on the Phase III expansion program by updating the overall recycled water master plan and completing the Phase III Recycled Water Project Feasibility Study. Phase III included 3 mgd expansion of the Carlsbad Water Recycling Facility (CWRF), and 11 miles of additional recycled water pipeline identified by segment areas. The Phase III program was designed to increase system demand to approximately 7,200 afy, with approximately 2,000 afy being within the CMWD service area and 1,200 afy being outside the City limits. However, the drought and economic downturn have had major impacts on the Phase III program resulting in a reduction in overall City demand and much lower forecasted Phase III demand.

With Phase III near completion, CMWD is ready to explore opportunities for further recycled water system expansion. With most of the large water customers within the City already converted to recycled water, the challenge is finding cost effective expansions that effectively continue the development of CMWD's recycled water system.

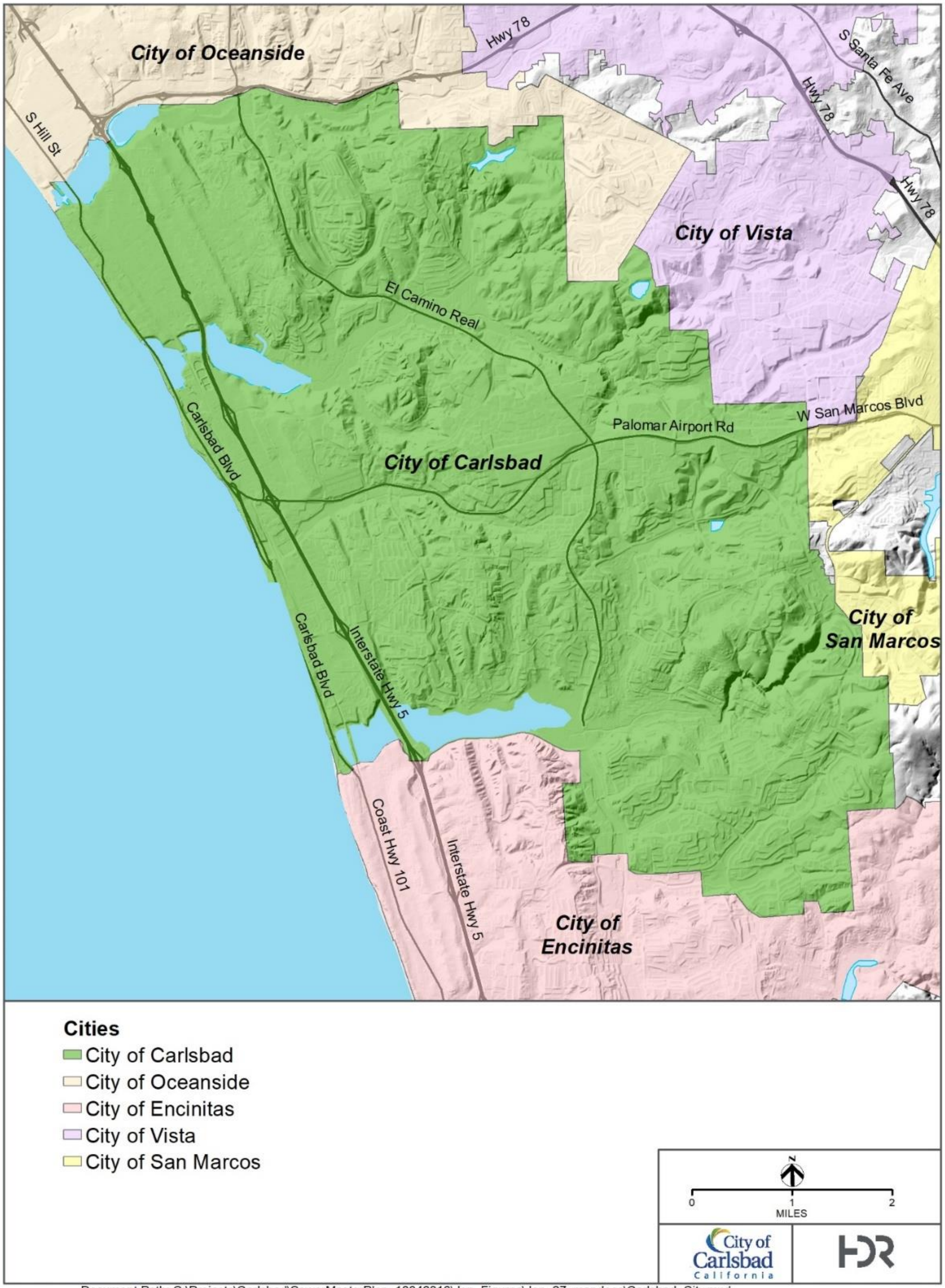
1.2 City of Carlsbad and Recycled Water Service Area Description

The City of Carlsbad occupies approximately 39 square miles of rolling hills, beaches and bluffs along the northern coast of San Diego County. Carlsbad is located about 30 miles north of San Diego and about 90 miles south of Los Angeles. The city boundaries are shown on Figure 1-1. In addition to the Pacific Ocean coastline along its western boundary, the communities surrounding Carlsbad include the city of Oceanside to the north, the city of Encinitas to the south, and the cities of Vista and San Marcos and unincorporated areas of San Diego County to the east.

1.2.1 Setting

Along Carlsbad's northern edge, urban development abuts Highway 78, with the highway and Buena Vista Lagoon acting as a boundary between Carlsbad and Oceanside. Similarly, Batiquitos Lagoon along the city's southern edge defines the boundary between Carlsbad and Encinitas. To the east, city boundaries are less distinctive, as a mix of hillsides and urban development are located adjacent to the cities of Vista and San Marcos and unincorporated lands. The topography ranges from sea level along the western coastline to nearly 700 feet above mean sea level (MSL) along the eastern boundary.

Figure 1-1: City of Carlsbad Location Map



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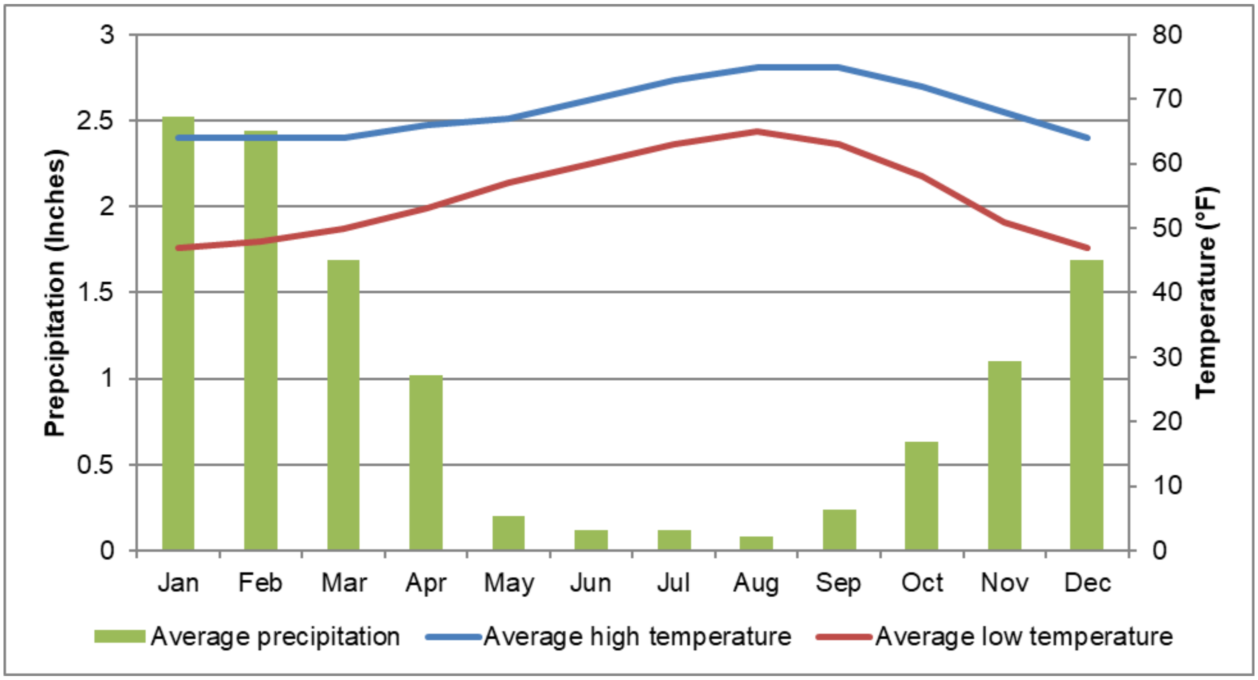
1.2.2 Climate

Carlsbad's climate is categorized as a semi-arid Mediterranean climate, with mild, sunny weather throughout the year. This mild climate is derived equally from the warm ocean water being pulled north from Mexico and from its subtropical, semi-desert locale. Daily temperatures range from a low of nearly 30°F in the winter months to a high of nearly 100°F in the summer. Based on the 30-year (1981-2010) normal, shown on Figure 1-2, monthly averages are approximately 55°F for the low and 68°F for the high.

Figure 1-2: Carlsbad 30-Year Climate Data (1981-2010)



Source: http://www.usclimatedata.com/climate-on-your-site.php?id=usca1608

The average annual precipitation ranges from approximately 11 to 13 inches, typically between the months of October and April. The months of September through February can bring warm wind from the desert called a "Santa Ana". Occurring about 10 days out of the year, these winds typically bring hot and dry conditions, which can spread and worsen wildfires.

As noted in Carlsbad's 2015 Urban Water Management Plan, data from the National Oceanic and Atmospheric Administration's (NOAA) climate station at the McClellan Palomar Airport indicates that temperatures have been above the 30-year normal in recent years, while precipitation has been lower. There has also been a shift in the precipitation pattern, with higher than the 30-year normal rainfall in the summer months and lower in the winter months.

1.3 Recycled Water Service Area

Carlsbad's service areas for recycled water do not coincide with the City's municipal boundary. Moreover, the potable and recycled water service areas are coincidental and are further described below.

The potable and recycled water service areas are governed by the CMWD, a subsidiary district of the City of Carlsbad operating under the Municipal Water District Act of 1911. The five-member

Carlsbad City Council governs CMWD and acts as CMWD's Board of Directors. CMWD management and engineering operate under the City's Utilities Department.

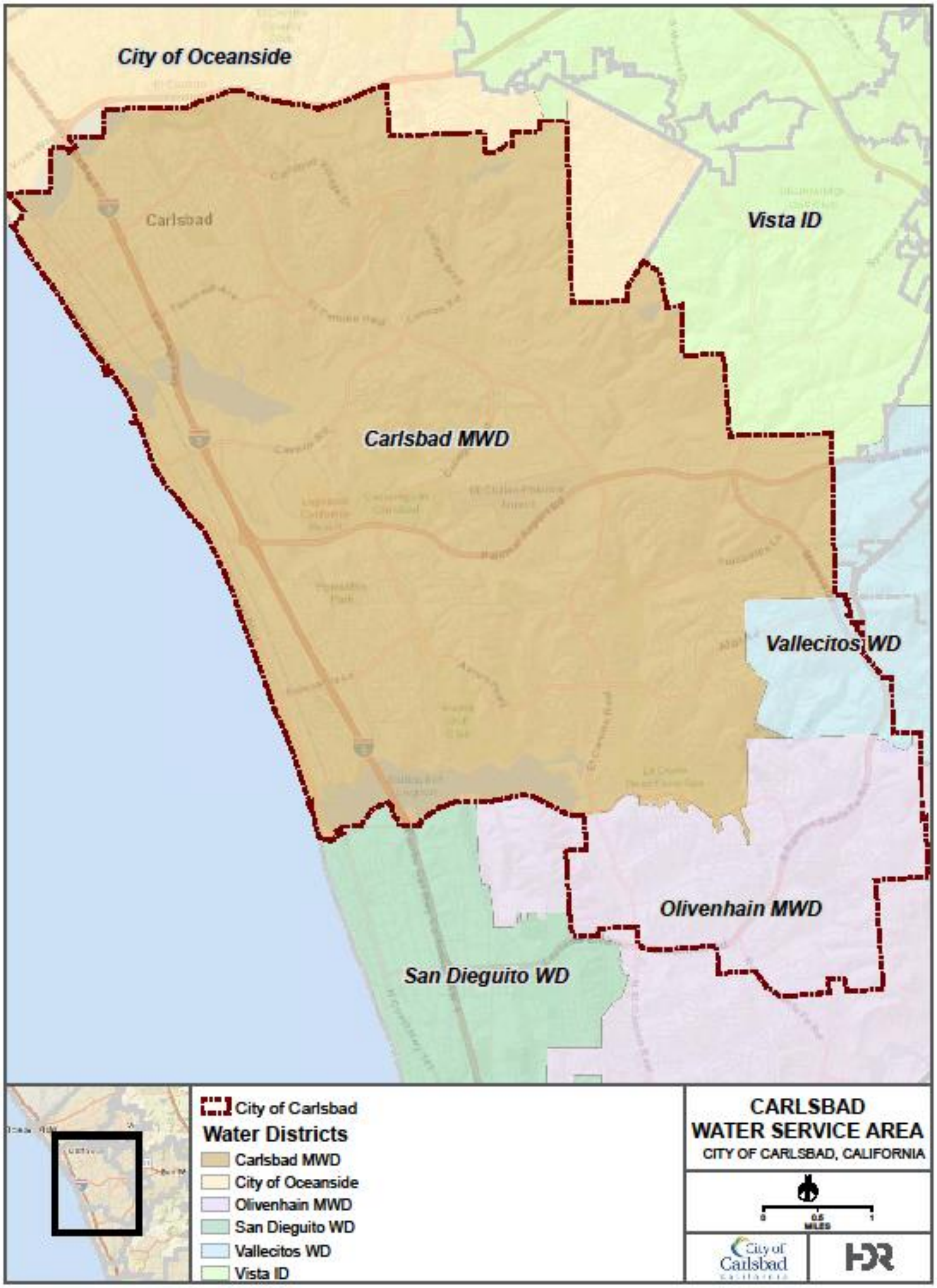
The City was incorporated in 1952, and the assets of the two previous water suppliers for the Carlsbad area were purchased by the City in 1957. CMWD was initially formed in 1954 to facilitate the transfer of imported water to the unincorporated areas surrounding the City and to wholesale water to the newly formed City. In 1983, the City conveyed all of its functional water responsibilities for the provision of water service to CMWD. In 1990, CMWD became a subsidiary district to the City of Carlsbad.

CMWD covers an area of 20,682 acres, approximately 32 square miles, and provides potable and recycled water supply to most of the City of Carlsbad (the City or Carlsbad). As shown in Figure 1-3, CMWD's service area covers 82 percent the City's boundary, with neighboring special service districts providing service for the southeast corner of the City.

CMWD supplies potable water within its service area and currently receives 100 percent of its potable water supply from SDCWA. The potable water distribution system consists of 450 miles of pipeline, 71 pressure regulating stations, three pump stations, eight storage tanks, and one reservoir.

CMWD supplies recycled water through two recycled water distribution systems, which include 77 miles of pipeline, six pressure zones, three storage tanks, three booster pumping stations, three supply sources with pumping stations, and five pressure regulating stations. Land uses within the service area are primarily residential with a mix of agricultural, light industrial and commercial. In addition, there is a county airport, tourist attractions such as Legoland, and a mix of resorts. Existing and projected buildout land uses are described in more detail below.

Figure 1-3: Water Service Area



1.3.1 Existing Land Use

The existing land uses within the service area are listed in Table 1-1 and the different categories are shown as a percentage of the total land use area in

Figure 1-4. The existing service area is predominantly residential, commercial and park /open space area, as shown in Figure 1-5. Approximately 1,220 acres, or 5 percent of the total service area, is currently undeveloped vacant properties. These vacant properties are anticipated to be developed in the future.

Table 1-1: Existing Land Use

Land Use	City Acres	% of Total Area
Single Family Residential	6,071	24%
Multi-Family Residential	983	4%
Commercial/Office	1,156	5%
Industrial	1,113	4%
Roads/ROW	4,213	17%
Institutional	578	2%
Park/Open Space	8.293	33%
Agriculture	568	2%
Water	839	3%
Vacant	1,220	5%
Total	**25,054**	**100%**

Source: San Diego Association of Governments (SANDAG) 2015 Existing Land Use shapefiles (2/2/2016)

Figure 1-4: Existing Land Uses

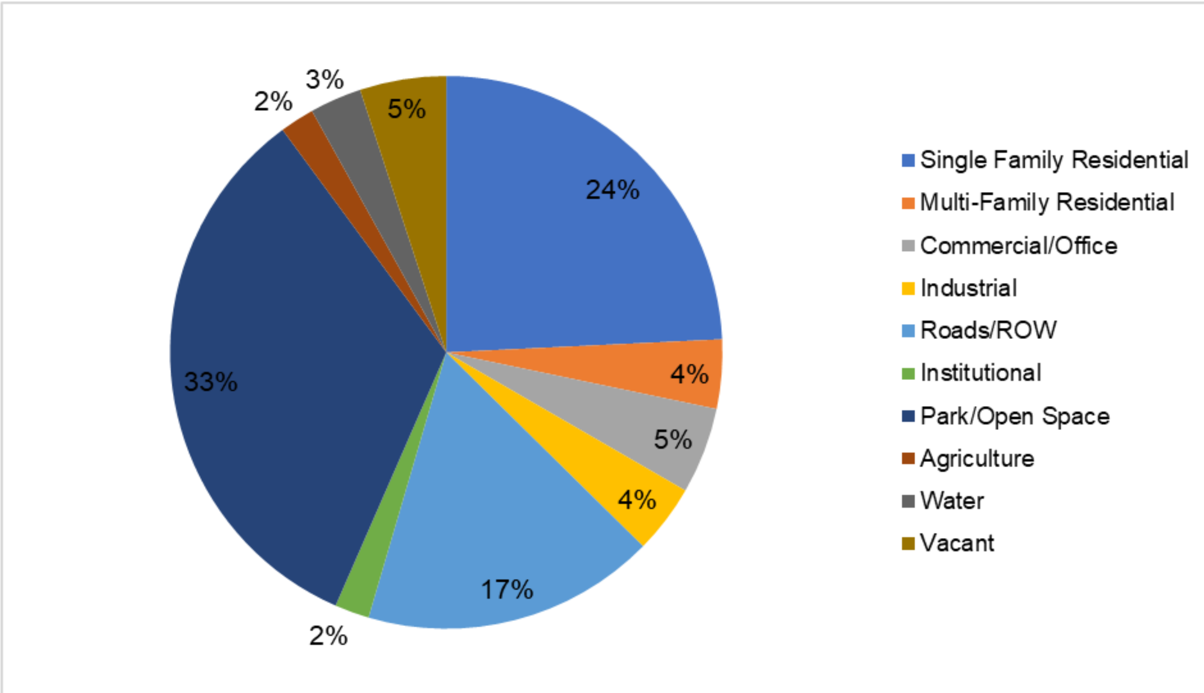
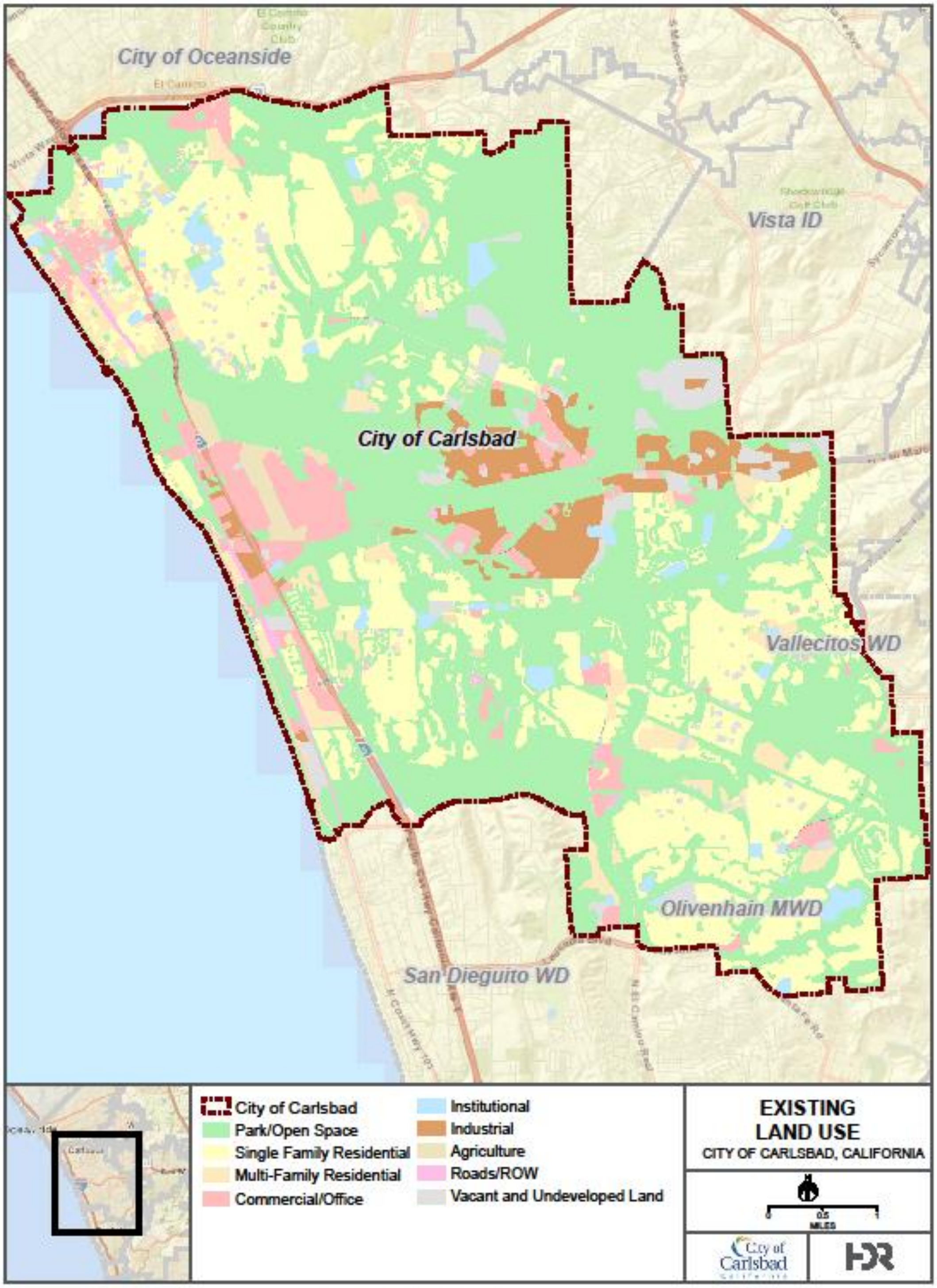


Figure 1-5: Existing Land Use Map



1.3.2 Buildout

In accordance with the City's 2015 General Plan, the buildout land uses within the service area are listed in Table 1-2 and the different categories are shown as a percentage of the total land use area in Figure 1-6. The buildout service area remains predominantly residential, commercial and park /open space area, as shown in Figure 1-7, with agricultural and vacant areas diminishing.

Table 1-2: Buildout Land Use

Land Use	City Acres	% of Total Area
Single Family Residential	6,940	28%
Multi-Family Residential	1,103	4%
Commercial/Office	1,398	6%
Industrial	1,508	6%
Roads/ROW	4,138	17%
Institutional	663	3%
Park/Open Space	8,335	33%
Agriculture	101	0%
Water	838	3%
Total	**25,024**	**100%**

Source: SANDAG Series 13 Planned Land Use shapefiles (10/2/2014)

Figure 1-6: Buildout Land Uses

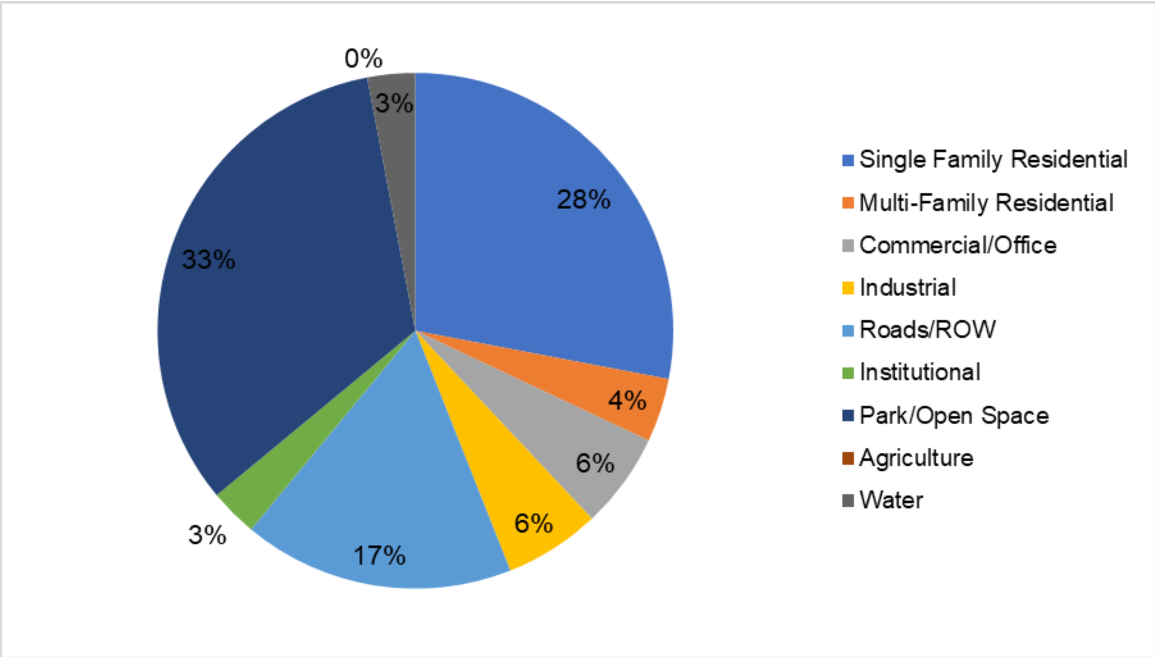
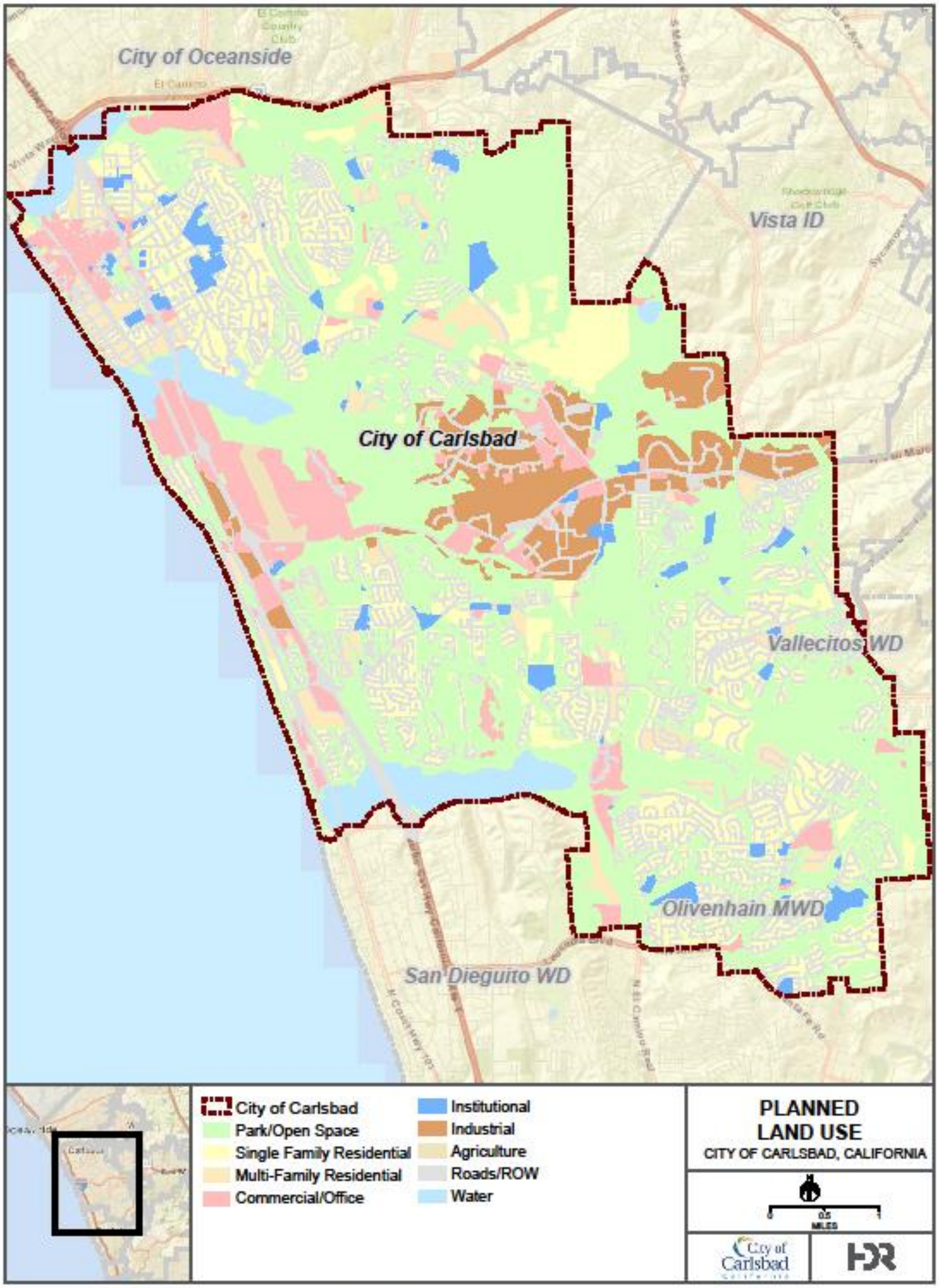
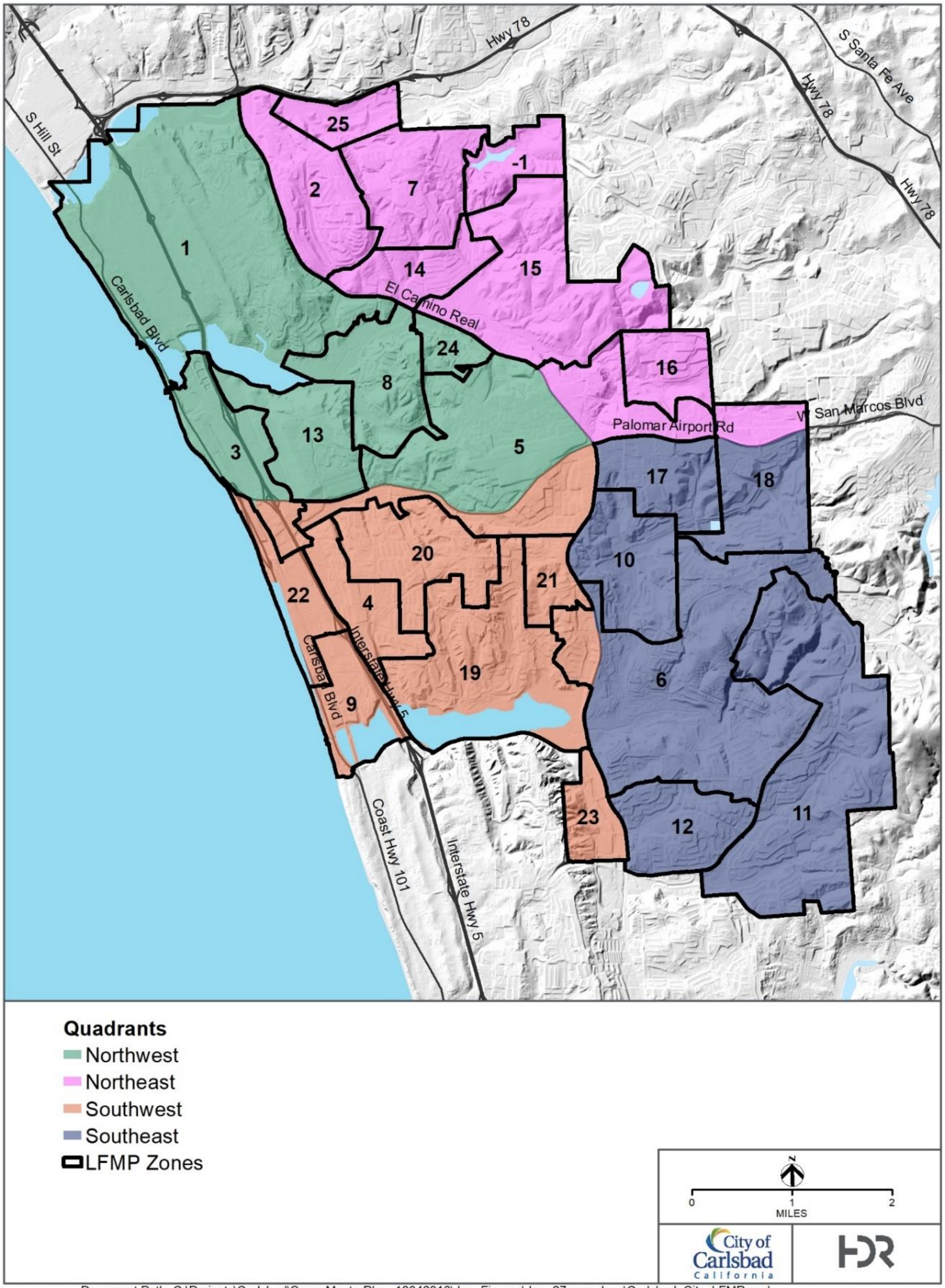


Figure 1-7: Buildout Land Use Map



To manage growth, the City was divided into 25 separate planning areas, referred to as Local Facility Management Zones (LFMZs), which are shown in Figure 1-8. The City has maintained a Growth Management Plan (GMP) and Growth Database since 1986 to monitor development within the City and to ensure that adequate facilities are constructed in an orderly manner to support future growth. The Growth Database includes information on existing and vacant parcels, including the existing and future land uses, current percent build-out, current population, future growth potential and anticipated timing of such growth. It should be noted that not all 25 LFMZs shown in Figure 1-8 are located within the City's service area. LFMZ 6 is partially served by Olivenhain Municipal Water District (OMWD), while LMFZs 11, 12, and 23 are entirely served by either Vallecitos Water District (VWD) or OMWD.

Figure 1-8: Local Facility Management Zones



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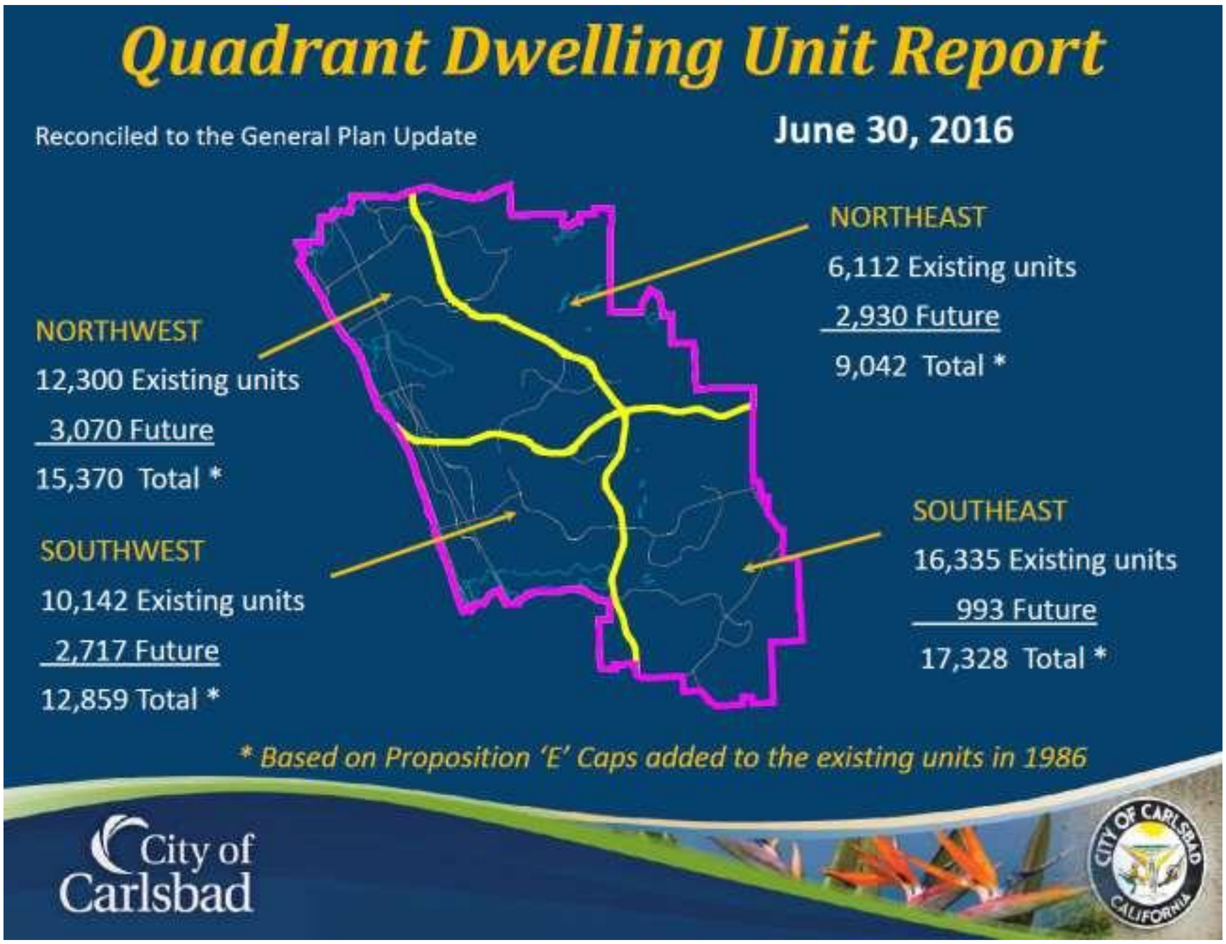
In addition to the 25 LFMZs, the City is also divided into four quadrants for planning purposes as shown on Figure 1-9. The City prepares an annual Growth Management Plan Monitoring Report, last updated in May 2017, which includes information on current and proposed development plans, including the number of projected residential dwelling units (DUs) and the estimated building square footage for non-residential land uses, as well as an estimated timing for when each unit will be constructed. City staff provided an update on growth projections by quadrant, as summarized on Figure 1-9.

Figure 1-9: GMP Dwelling Report Update



As shown in Table 1-3, the City is anticipating total buildout projections of 51,821 residential units, which is less than the maximum number of dwelling units that could be constructed under the GMP (54,599 units). The table shows potential buildout in the City resulting from application of land uses on vacant and underutilized sites, according to analysis undertaken for the General Plan update. A majority of the new development will continue to occur in the northern portion of the City. These developments are in various stages of planning, design, and construction. Additional growth within the City includes "in-fill" or redevelopment projects in the older portions of the City.

Table 1-3: GMF 2035 Dwelling Unit Projects

Quadrant	Dwelling Units	2035 Population Projection
NW	15,121	37,904
NE	8,945	22,423

Table 1-3: GMF 2035 Dwelling Unit Projects

Quadrant	Dwelling Units	2035 Population Projection
SW	11,088	27,795
SE	16,667	41,780
Citywide Total	**51,821**	**129,901**

Source: City of Carlsbad, Fiscal Year 2015-16 Growth Management Plan Monitoring Report, May 2017

The recent rebound of the economy has resulted in increased development activity throughout the City, including build-out of several master-planned communities and industrial parks, and the planning of new urban re-development projects. The master-planned communities that were underway or entitled during the last master plans are now substantially built-out including:

-
- Bressi Ranch
- Robertson Ranch
- Quarry Creek

Development activity has also increased for industrial land uses, which include Carlsbad Raceway Business Park along Faraday Road and Palomar Forum Business Park along Palomar Airport Road, both in the eastern portion of the City.

. The Cantarini and Mandana properties in the northeast are planned residential projects which require a major extension of College Avenue and appear to continue to be delayed due to funding constraints. This timing issue should be considered in planning facilities in the master plans. The planned Poinsettia 61 residential project is under construction and will complete the extension of Poinsettia Avenue.

The City has seen increased activity in urban re-development projects, in particular within the Village of Carlsbad. An approved Specific Plan for the core village area allows for the addition of 800 new residential units and there are discussions regarding residential apartment development at the Carlsbad Mall and El Camino Real.

1.3.3 Population

The 2010 Federal Census determined that the average number of persons per dwelling unit in Carlsbad is 2.36 persons (total population divided by total number of dwelling units). As of June 30, 2016, the City’s population is estimated to be 109,004, which is calculated by multiplying 2.36 persons per dwelling unit by the number of dwelling units and commercial living units (which were counted as dwelling units in the 2010 Federal Census); in total there are 46,182 dwellings and commercial living units, as shown in Table 1-4.

Table 1-4: 2016 Population Estimate

Quadrant	Dwelling Units	Second Dwelling Units	Commercial Living Units	Total Units	Population
NW	12,300	156	226	12,682	29,904
NE	6,112	42	—	6,154	14,511

SW	10,142	25	685	10,852	25,614
SE	16,335	159	—	16,494	38,975
Total	**44,889**	**382**	**911**	**46,182**	**109,004**

Source: Carlsbad 2016-17 Comprehensive Annual Financial Report, June 2017

It is important to note that although the construction of residential and commercial development is estimated to be built out by 2035, population is anticipated to continue to increase through 2050, as forecasted by San Diego Association of Governments (SANDAG). SANDAG is responsible for the development of demographic projections and various integrated land use, housing, employment, transportation programs, measures and strategies for the San Diego area.

Persons per dwelling unit may also increase. The population projections provided in Table 1-3 estimate a 2035 population of 129,901 with 51,821 dwelling units and an average of 2.5 persons per household.

The City of Carlsbad has a strong and growing economy. The top five clusters of business are estimated to employ over 40,000 people, as shown in Table 1-5.

Table 1-5: Business Employment Estimates

Business Category	Estimated Number of Employees
Hospitality and tourism	14,776
Information and communications technology	10,049
Life science	7,393
Clean technology	4,988
Action sports manufacturing	2,658

Source: Carlsbad 2016-17 Comprehensive Annual Financial Report, June 2017

The City's FY 2016-17 Comprehensive Annual Finance Report estimates a total employment population of 82,100 within the City. Annual visitors range from 3 to 4 million, with overnight guests ranging between approximately 75,000 and 199,000 people per month.

1.3.3.1 CMWD Population Projections

For the City's Urban Water Management Plan (UWMP), population within the CMWD service area was estimated to be 86,596 people in 2015. The San Diego County Water Authority (SDCWA) provided population projections for its member agencies during development of SDCWA's 2015 UWMP. These population projections were developed by SANDAG.

To confirm SDCWA's population projections for CMWD, the City sought to verify these projections using U.S. Census data. CMWD's service area is not a Census designated place, thus, population projections were calibrated using an alternative method. CMWD serves as the retail water supplier for approximately 85 percent of the City of Carlsbad. To determine population estimates for CMWD's service area, U.S. Census data was calibrated and verified using the 77.6 percent to interpolate CMWD's service area population for the years 2000 and 2010. The result of this analysis showed that the population in CMWD's service area in 2010 was 81,081.

Given the potential discrepancy between the estimated 2010 population (81,081) and SANDAG's projection for CMWD's service area population in 2012 (82,748), a secondary analysis of the population projections in CMWD’s service area was performed as part of the Carlsbad UWMP.. Table 1-6 and Figure 1-10 show the projected population figures for CMWD’s service area based on the revised analysis.

This analysis assumed that the 2010 population for CMWD’s service area was 81,081 per the analysis using the U.S. Census data. The analysis also assumed that growth will continue at the same rate as predicted using the Series 13 Growth Forecast , which utilizes a demographic model including economic factors to develop predictions. This information was compared with and then blended with the SANDAG projections for use in the UWMP.

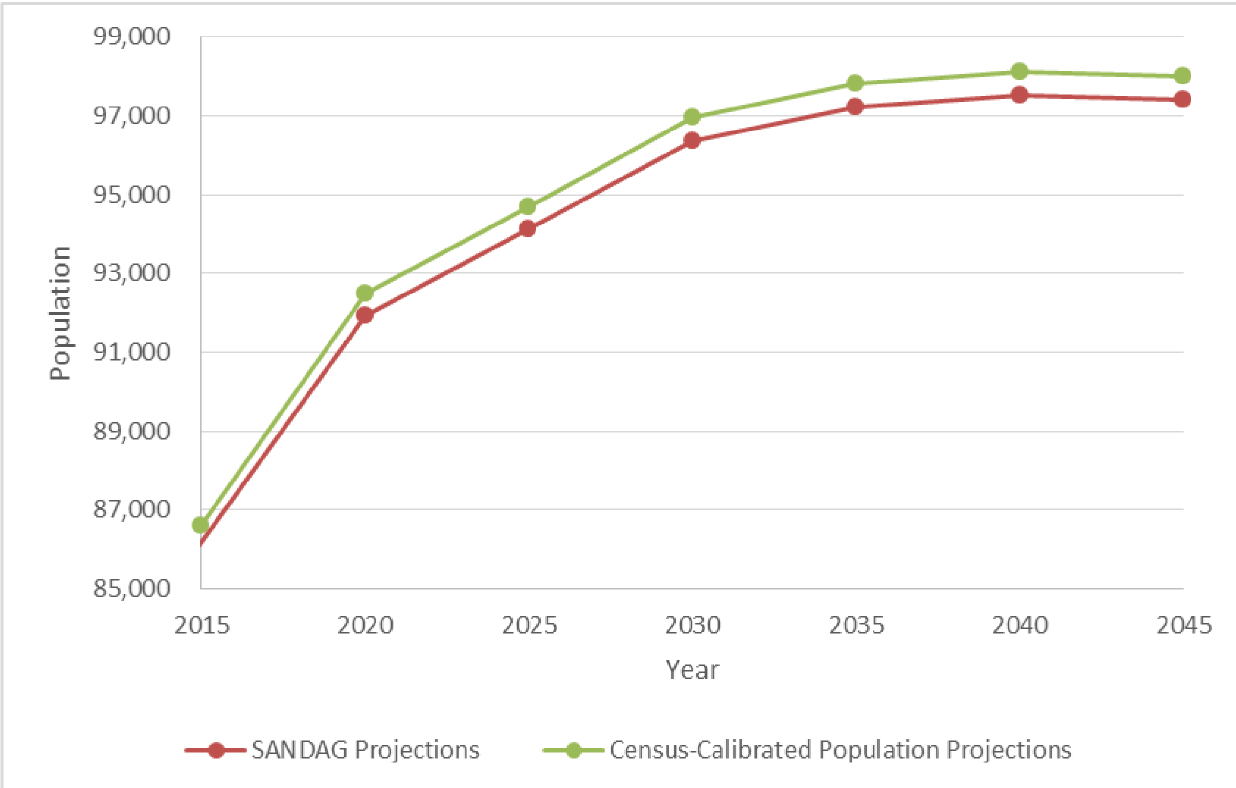
The current population represents a 4 percent increase since the previous 2012 Water Master Plan, which is within expectations based on recent trends over the last several years, as annual new building permits have significantly declined due to current economic constraints. Table 1-7 presents the CMWD service area current population and projections, in 5-year increments, through 2045. From 2016 to 2045, a 12.5 percent increase in population is anticipated.

Table 1-6: CMWD Population Projection Comparisons

Year	SANDAG Projections	2010 Census-based Projections	Difference between Projections	Blended Projection
2010	Not Available	81,081	—	81,081
2012	82,748	83,242	(494)	82,748
2015	Not Available	86,596	—	86,080
2020	91,935	92,485	(500)	91,935
2025	94,130	94,694	(564)	94,130
2030	96,375	96,952	(577)	96,375
2035	97,239	97,821	(582)	97,239
2040	97,525	98,109	(584)	97,525
2045	97,415	97,998	(583)	97,415

Source: CMWD Population Forecasts for 2015 UWMP Technical Memorandum, December 2015

Figure 1-10: CMWD Population Projections



Source: CMWD Population Forecasts for 2015 UWMP Technical Memorandum, December 2015

Table 1-7: Population Projections

Year	Population Projections	Population Rate of Change
2016	86,596	—
2020	91,935	6.17%
2025	94,130	2.39%
2030	96,375	2.38%
2035	97,239	0.90%
2040	97,525	0.29%
2045	97,415	-0.11%

Chapter 2 Recycled Water Facilities

This chapter summarizes the Carlsbad Municipal Water District's (CMWD) existing supply and related storage needs to meet existing and projected recycled water demands identified in Chapter 3. This chapter includes a description of the existing recycled water supply sources. Subsequently, the capacity of these sources is evaluated in Chapter 6 based on the existing recycled water demands and the projected recycled water demands to determine any supply shortfalls.

2.1 Recycled Water Supply and Distribution Facilities

This section discusses each of CMWD's existing recycled water supply sources and their associated capacities as well as the historical utilization of each supply source.

2.1.1 Supply Sources

CMWD receives recycled water from reclamation plants within the Encina Wastewater Authority (EWA) service area. EWA is a public agency owned by the City of Carlsbad, City of Vista, City of Encinitas, Vallecitos Water District (VWD), Buena Sanitation District (BSD), and Leucadia Wastewater District (LWD). EWA is operated through a Joint Powers Agreement dated April 21, 2005 (see Appendix A). Under the Joint Powers Agreement, these six agencies share the costs and management of wastewater treatment services through a joint outfall system. EWA manages the 36-mgd Encina Water Pollution Control Facility (EWPCF) and the Encina Ocean Outfall (EOO) at the terminus of this joint system. Member agencies are responsible for their individual wastewater collection systems that feed the trunk mains terminating at the EWPCF.

CMWD receives recycled water from three reclamation plants: Carlsbad Water Recycling Facility (CWRF), Meadowlark Water Reclamation Facility (WRF), and Gafner Water Reclamation Plant (WRP).

- The **CWRF** is owned by CMWD; and the Encina Wastewater Authority (EWA) has been contracted to provide operation and maintenance through a memorandum of understanding (MOU) dated May 1, 2005 (see Appendix A).
- The **Meadowlark WRF** is owned and operated by the Vallecitos Water District and serves both CMWD's recycled water system and a portion of the Olivenhain Municipal Water District's (OMWD) recycled water system within the City of Carlsbad.
- The **Gafner WRP** is owned and operated by the Leucadia Wastewater District and serves only the south golf course of the La Costa Resort. The Gafner WRP does not connect to the rest of CMWD's recycled water distribution system.

The CWRF and Gafner WRP currently operate as tertiary treatment plants, treating secondary effluent from the Encina Water Pollution Control Facility (EWPCF). Meadowlark WRF operates as a "skimming" plant, discharging solids into a 10-inch diameter sludge pipeline for treatment at the EWPCF. The capacities of the CWRF, Meadowlark WRF, and Gafner WRP are presented in Table 2-1 along with CMWD's recycled water capacity allocation.

Table 2-1: Recycled Water Supplies

Reclamation Plant Name	Owner	Permitted Capacity[1] (mgd)	Maximum CMWD Allocation (mgd)	Other Allocations (mgd)
CWRF	CMWD	7.0	7.00	0.0
Meadowlark WRF	VWD	5.0	3.00[2]	1.5[3]
Gafner WRP	LWD	1.0	0.75[4]	0.0
Total Capacity		**13.0**	**10.75**	**1.5**
Total CMWD Supply Capacity [5]		—	**10.60[5]**	**—**

Notes:

VWD = Vallecitos Water District; LWD = Leucadia Wastewater District

(1) Maximum discharge flow as stated in permit (CWRF Order No. 2016-0183; Meadowlark WRF Order No. R9-2007-0018; Gafner WRP Order No. R9 2004-0223).

(2) Rated capacity of Meadowlark WRF is 5.0 mgd, although the actual produced flow is less due to insufficient wastewater flow to Meadowlark. CMWD's agreement with VWD limits supply availability to 3.0 mgd during summer months and 2.0 mgd during winter months.

(3) Current Meadowlark WRF allocation for the Olivenhain Municipal Water District is 1.0 mgd with an option to purchase up to 1.5 mgd.

(4) Based on the agreement between LWD and CMWD that states that the Gafner WRP can produce up to 0.75 mgd, a maximum and minimum annual purchase of 840 AFY (0.75 mgd) and 394 AFY (0.35 mgd), respectively.

(5) As the Gafner WRP is not connected to CMWD's recycled water system and the demand of the La Costa Resort and Spa south golf course MMD is only 0.6 mgd (versus 0.75 mgd capacity at Gafner WRP), the total existing usable supply capacity is approximately 10.6 mgd.

As shown in Table 2-1, CMWD currently has 10.6 mgd of allocated supply capacity, although only 10.0 mgd is available to CMWD's primary recycled water distribution system as Gafner WRP only supplies the La Costa Resort and Spa south golf course and is not currently interconnected to the rest of the distribution system. In total, the reclamation plants have a permitted capacity of 13.0 mgd.

2.1.2 Storage Components

To operate the recycled water system with reservoirs that are supplied from the water reclamation facilities, three types of distribution system storage are available and are used within the CMWD's system. These include:

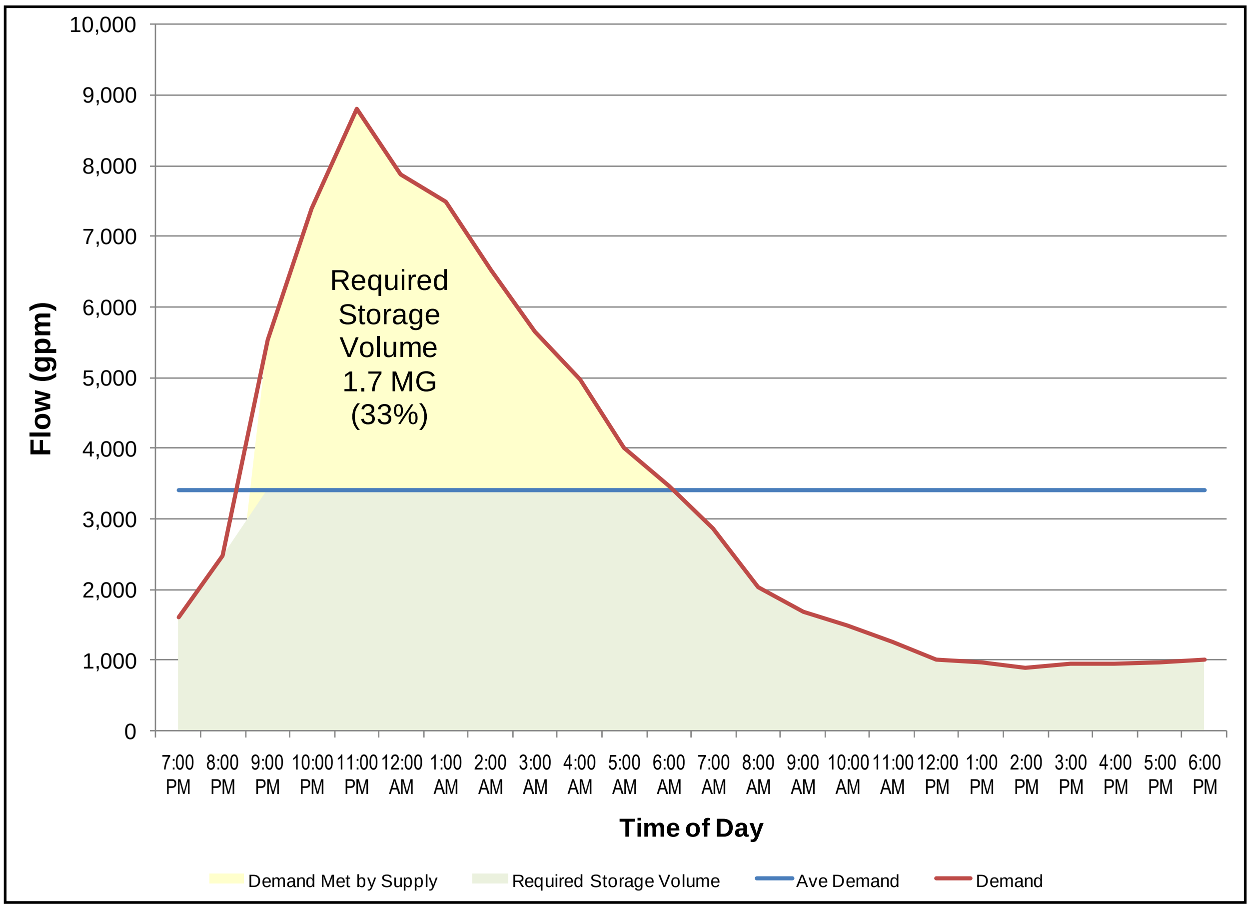
- The **Operational Storage** volume is used to mitigate demand fluctuations under maximum day demand (MDD) conditions. The volume required for this storage component can be highly dependent upon the hourly variation of the customer's demand and the variation of flow from the two main water reclamation facilities.
- The **Short-term Emergency Storage** component can provide a volume to protect reservoirs from complete drainage. Emergency storage provides a few hours to respond to an emergency and make operational adjustments without immediate interruption of service.
- The **Seasonal Storage** volume can be used to manage seasonal peak flows, allowing the system to supply peak demands in excess of the maximum daily supply capacity of CMWD's supply sources. Seasonal storage also allows recycled water to be stored during periods of

low demands, such as winter months, to be used during periods of high demands, such as summer months.

2.1.2.1 Operational Storage

Operational storage is calculated based on the estimated recycled water demand of the existing customers and their associated diurnal patterns. Figure 2-1 presents a typical historical CMWD's system diurnal curve. Assuming demands in excess of the average demand for the day should optimally be provided by operational storage, the area above the average demand line represents the amount of demand that must be provided from storage. In this example, the area represents approximately 33 percent of the average supply.

Figure 2-1: Operational Storage Requirement



Source: CMWD's System Diurnal Curve, Oct 2009

CMWD's operational storage is currently provided for the 550 and 384 pressure zones at several locations in the recycled water distribution system including:

- C Tank
- Twin D Tanks
- Mahr Reservoir

In addition, supply from the water reclamation facilities are buffered by:

- Mahr Reservoir

- Equalization basin at CWRF

Note that Mahr Reservoir is included in both, as CMWD does use Mahr Reservoir for daily peaking of the 550 pressure zone. For the purposes of this study, the supply equalization basin at CWRF was not considered as operational storage, but functionally, CMWD can use this facility, if necessary.

2.1.2.2 Short-term Emergency Storage

Short-term Emergency Storage is required to provide operational flexibility during emergencies, such as a temporary shutdown of any of the WRPs or pump stations. Based on an assumed emergency response time of 4 hours, an additional 17 percent of MDD (4 hrs / 24 hrs = 17% of MDD), is included to provide emergency needs.

2.1.2.3 Seasonal Storage

Since CMWD's demands are primarily landscape irrigation in nature, peak demands occur seasonally. Seasonal storage can be used to manage the peak seasonal flows when the daily demands exceed the supply capacity of the reclamation facility supply sources.. In order to use seasonal storage as a supply, excess supply in months of low seasonal demand may be placed into seasonal storage to be pulled out at times where demand exceeds supply capacity.

Carlsbad has operational flexibility with Mahr Reservoir in terms of meeting seasonal demands, if needed, and providing a large emergency storage. However, with the recently expanded CWRF, excess supply is currently available from the supply sources, and the need for seasonal storage is limited. Thus, Mahr Reservoir may serve more as operational storage for the 550 Zone than seasonal supply. Moreover, Mahr Reservoir historically has experienced the following issues:

- Water quality issues related to algae growth.
- Low reservoir levels related to insufficient flows from Meadowlark WRF.

These issues are interrelated as low water levels result in higher water temperatures, which then causes more algae growth. As Mahr Reservoir is located south from the Meadowlark WRF, the majority of reservoir outflow goes to OMWD's system, while CMWD receives treated water from Meadowlark WRF. When Meadowlark WRF produces more than CMWD's demand, the remaining flow is directed to Mahr Reservoir. Due to this system configuration, OMWD receives more water from Mahr Reservoir than CMWD and experiences the related water quality issues.

VWD is currently studying potential improvements to improve water quality in Mahr Reservoir and should facility recommendations be implemented, capital costs may be shared amongst the benefitting users. Alternatively, OMWD may be interested in reducing its direct supply from Mahr Reservoir and obtaining recycled water from the CWRF through a new pipeline connection along El Camino Real. For the Master Plan, it is assumed that OMWD will maintain its current take from Meadowlark WRF and its 18 MG share in Mahr Reservoir. For planning purposes, it is therefore assumed that CMWD's seasonal storage capacity in Mahr Reservoir remains 32 MG.

2.1.2.4 Summary of Storage Facilities Capacity

The existing system storage facilities are summarized in Table 2-2. Storage for the closed pumped 580 Zone and reduced 318 Zone are provided by reservoir capacity in Zone 384, and storage for the closed pumped 660 Zone and 550 Zone are provided by Mahr Reservoir. It should be noted that the Calavera hydro-pneumatic tank and Bressi hydro-pneumatic tank serving the pumped zones are not listed in this table, as they are not intended to provide storage.

Table 2-2: Summary of Storage Facilities by Pressure Zone

Reservoir	Zone	Volume (MG)
Twin D Tanks	384, 318	2.5
C Tank	384, 580, Quarry Creek 384	1.0
Mahr Reservoir	550, 660	32.0(1)
Total Storage	**—**	**35.5**

Note:

(1) CMWD is only allotted 32 MG of the 50 MG capacity of the Mahr Reservoir. The remaining capacity is allocated to the Olivenhain Municipal Water District.

As shown in Table 2-2, CMWD has a total of 35.5 MG of storage. 32 MG of this is associated with Mahr Reservoir, located in Vallecitos Water District's (VWD) service area. While Mahr Reservoir is used to provide operational and short-term emergency storage for CMWD's system, CMWD does not typically replenish the reservoir with recycled water from CWRF, and Meadowlark WRF is therefore the only source of replenishment for the reservoir. Evaluations of storage capacity for existing conditions and future build out are described in Chapter 6.

2.1.3 Pressure Regulating Facilities

Pressure regulating stations (PRS) allow distribution systems to convey water from higher pressure zones to lower pressure zones without exceeding the allowable pressures in the lower zones. Typically, a PRS contains pressure reducing valves (PRV), and may include a pressure sustaining valves (PSV) and/or pressure relief valves.

A PRV conveys water from an upper zone to a lower zone while reducing the pressure to a specified pressure setting on its downstream side. A PSV maintains a pressure setting on its upstream side while conveying flow. That is, the pressure sustaining valves will not allow water to transfer into the lower pressure zone if the pressure in the upper zone drops below a certain level. This ensures that a main break, or similar emergency, in the lower pressure zone does not drain too much water from the upper pressure zone. CMWD uses combined valves, which incorporate both pressure reducing and pressure sustaining features.

Pressure relief valves bleed water from areas of high pressure when pressure exceeds a certain threshold. CMWD's pressure regulating stations are configured to discharge from the lower pressure to atmosphere or into the storm drain if the pressure in the lower pressure zone gets too high.

CMWD's recycled water distribution system contains five pressure regulating stations, which generally convey and regulate the flow of water from higher pressure zones to the lower zones. Table 2-3 summarizes details of each PRS.

Table 2-3: Pressure Regulating Stations

Name	No. of Valves[(1)]	Year of Installation	Upstream Zone	Downstream Zone	Elevation (ft MSL)	Setting (psi)
Faraday PRS[(3)]	3	2003	550	384	220	70
La Costa/Poinsettia PRS[(3)]	3	2006	550	384	175	89
Twin D Flow Control Valve[(2)] (Ralph Valve)	1	2003	550	384	386	13
Avenida Encinas PRS[(3)]	3	2001	384	318	58	113
Quarry Creek PRS	2	2017	580	384	114	117

Notes:

(1) Each pressure regulating station includes a pressure relief valve (the Twin D PS also includes a pressure relief valve). The number of valves includes the pressure relief valve.

(2) The pressure regulating station at the Twin D PS acts as an altitude valve, replenishing the Twin D Tanks from the Meadowlark WRF and Mahr Reservoir via the Corintia Meter. The valve is a combination rate of flow, pressure sustaining, and solenoid control valve, but is controlled by SCADA based on tank level and demand.

(3) A PSV sustains a set pressure upstream of the valve, while a PRV maintains a set pressure downstream of the valve. CMWD uses combination pressure reducing and pressure sustaining valves with dual pilot controls at its pressure regulating stations.

As shown in Table 2-3, the Faraday PRV, La Costa PRV, and Twin D PSV supply Zone 384 from Zone 550. These three regulating stations are typically operated to deliver flow from Meadowlark WRF and Mahr Reservoir via the Corintia Meter. The Avenida Encinas PRV and Quarry Creek PRV are the sole conveyance to Zone 318 and 384 Quarry Creek, respectively, regardless of the supply source and operating conditions.

2.1.4 Distribution and Transmission Facilities

CMWD's primary recycled water distribution system consists of six pressure zones, three storage tanks, three booster pumping stations, two supply sources with pump stations, and five pressure regulating stations. LWD supplies recycled water to the south course of the La Costa Resort and Spa from the Gafner WRP through a separate distribution system with dedicated service to the La Costa Resort and Spa. Table 2-4 provides a summary of each of the facilities within the two distribution systems while Figure 2-2 illustrates the connectivity of the various facilities within the distribution system in a hydraulic profile format.

Table 2-4: Summary of Facilities by Pressure Zone

Table 2-4: Summary of Facilities by Pressure Zone

Pressure Zone HGL	Elevations Served (ft MSL)	Pumping Stations/Supply Sources[1]	Storage[1]	Pressure Regulating Stations
660	240' to 460'	Bressi PS[2]		n/a
580	200' to 430'	Calavera PS[2]		n/a
550	200' to 430'	Twin D PS (Meadowlark WRF)[3]	Mahr Reservoir	
384 Quarry Creek	50' to 200'	Calavera PS[2]		Quarry Creek
384	20' to 380'	CWRF	Twin D Tanks C Tank	Faraday PRV La Costa PRV Twin D FCV[4]
318	50' to 80'	n/a		Encinas PRV
Gafner	60'	Gafner WRP	On-site ponds	n/a

Notes:

PS = Pump Station; HT = Hydro-pneumatic Tank; PRV = Pressure Reducing Valve; PSV = Pressure Sustaining Valve.

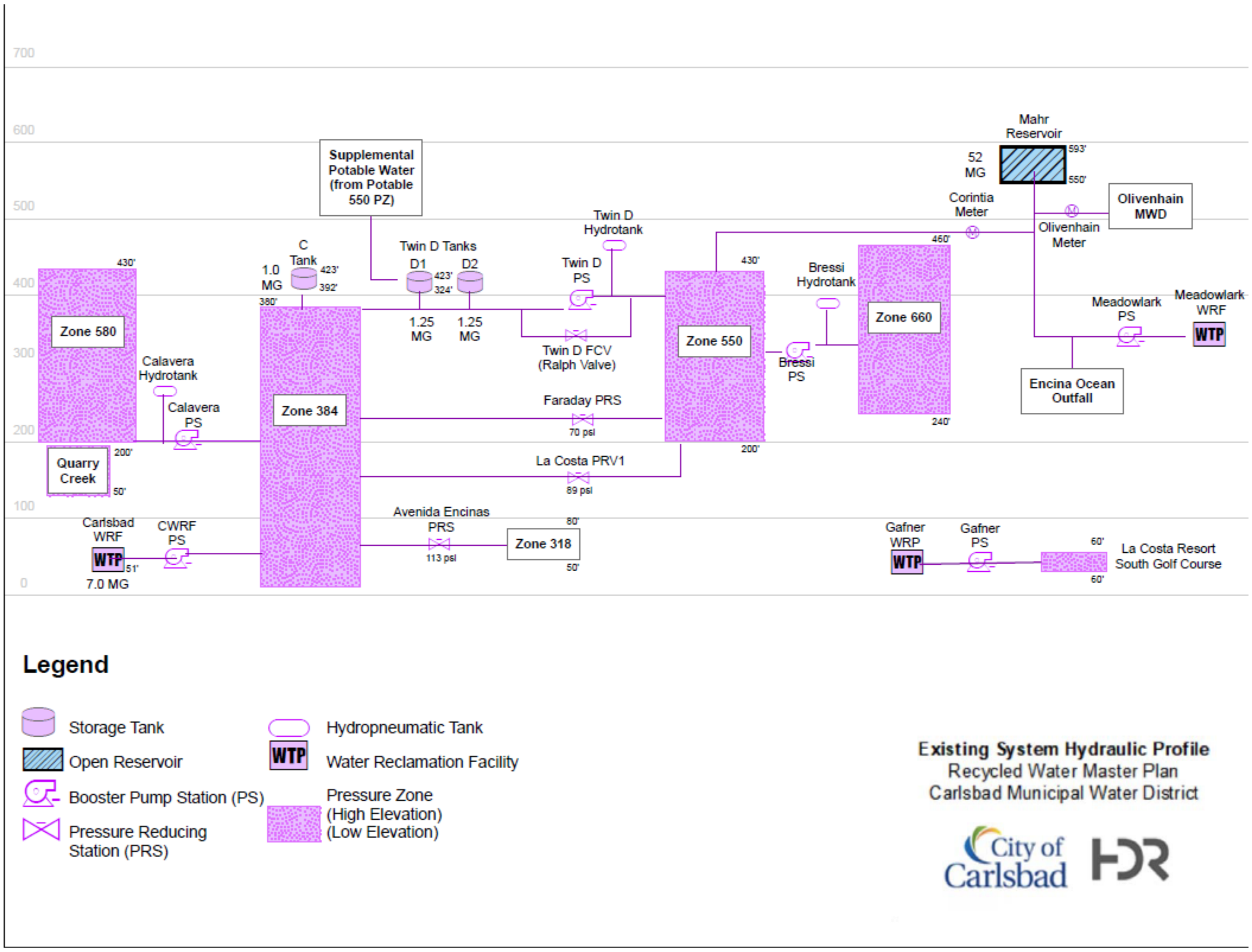
[1] Supply Sources and Storage indicate facilities that are either located in or directly feed the identified zone. Note that pressure zones utilize storage and supply sources in other pressure zones.

[2] Pump station includes a hydro-pneumatic tank; pressure zone supplied by this pump station does not include gravity storage.

[3] Flow from Meadowlark WRF enters CMWD's system through the Corintia Meter, which measures the amount of flow provided from Meadowlark WRF and Mahr Reservoir.

[4] Twin D FCV is also referred to as Ralph Valve. The valve is a combination rate of flow, pressure sustaining, and solenoid control valve, but is controlled by SCADA based on tank level and demand.

Figure 2-2: Existing System Hydraulic Profile



CMWD's recycled water distribution system includes approximately 78 miles of pipelines within its service area, ranging in size from 2 to 30 inches in diameter. Table 2-5 presents a breakdown of pipelines by diameter and material type, based on the GIS database received from the City on February 16, 2017.

Table 2-5: Recycled Water Distribution System Pipelines

Diameter (in)	Pipeline Length (ft) by Material Class					Total (ft)	Total (mi)
	PVC	ACP	CML&C STL	DIP	HDPE		
2	200	0	0	0	0	200	<0.1
4	28,400	0	100	0	0	28,500	5.4
6	27,400	1,500	1,200	2,200	0	32,300	6.1
8	142,780	400	1,600	1,300	0	146,080	27.7
10	6,500	100	0	0	0	6,600	1.3
12	84,500	10,800	2,100	10,700	0	108,100	20.5
14	0	0	4,600	2,700	0	7,300	1.4
16	8,600	0	200	900	0	9,700	1.8
18	8,200	0	500	8,300	0	17,000	3.2
20	4,500	0	3,500	0	0	8,000	1.5
24	0	0	22,800	0	50	22,850	4.3
27	0	0	4,800	0	0	4,800	0.9
30	0	0	19,300	1,300	50	20,650	3.9
Total (ft)	**311,080**	**12,800**	**60,700**	**27,400**	**100**	**412,080**	**-**
Total (mi)	**58.9**	**2.4**	**11.5**	**5.2**	**<0.1**	**—**	**78.0**

Notes:

PVC = polyvinyl chloride; ACP = asbestos cement pipeline; CML&C STL = cement mortar lined and coated steel; DIP = ductile iron pipeline; HDPE = high density polyethylene.

As shown in Table 2-5, the majority of CMWD's transmission and distribution mains consist of 8-inch diameter to 12-inch diameter pipelines. The majority of the pipelines (about 75 percent) are made of polyvinyl chloride (PVC) as shown in Figure 2-3.

According to CMWD's pipeline GIS database, as updated in 2017, approximately 59 percent of the recycled water distribution system pipelines were installed in the years 2000 through 2009, with less than one percent installed prior to 1985. Figure 2-4 summarizes the pipeline lengths by installation years, while

Table 2-6 summarizes the length of pipeline by material and installation year.

Figure 2-3: Pipelines by Material Type

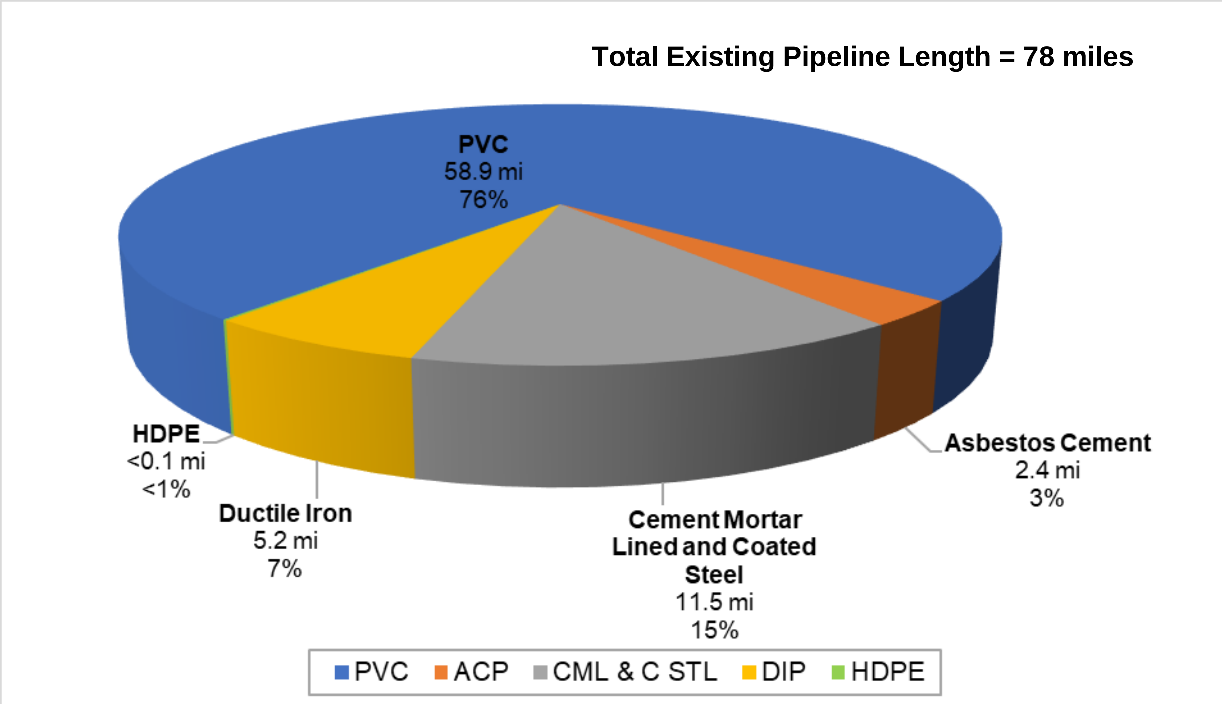


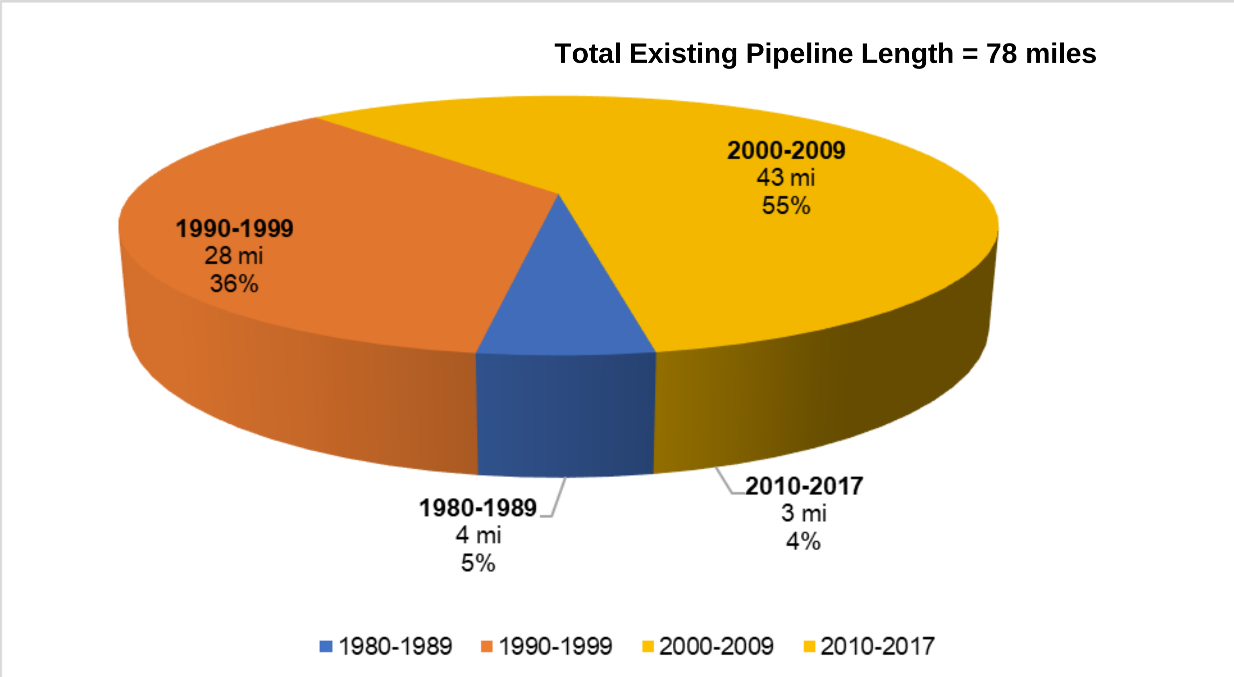
Table 2-6: Pipelines by Installation Year and Material Type

Material	Pipeline Length (ft) by Installation Year								Total (ft)	Total (mi)
	Unknown	<1960	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2017		
Total (ft)	0	0	0	0	21,120	147,840	227,040	15,840	406,560	—
Total (mi)	0	0	0	0	4	28	43	3	—	78

Notes:

PVC = polyvinyl chloride; ACP = asbestos cement pipeline; CML&C STL = cement mortar lined and coated steel; DIP = ductile iron pipeline; HDPE = high density polyethylene.

Figure 2-4: Pipelines by Installation Year



2.1.5 Pump Station Facilities

CMWD's recycled water distribution system contains four pump stations, one delivering flow from CWRF and three pump stations that move water within the distribution system between pressure zones. In addition, VWD uses a pump station to deliver water from Meadowlark WRF to Mahr Reservoir and LWD uses a pump station to deliver water from Gafner WRP to a lake for irrigation of the La Costa Resort and Spa south golf course. Table 2-7 lists details for each pump station.

The **Bressi PS** is the sole conveyance of recycled water into Zone 660 and consists of three main pump units and a small 300-gpm jockey pump with a 15-hp motor. The Bressi PS contains a hydro-pneumatic tank, which provides pressure surge relief.

The **Calavera PS** is the sole conveyance of recycled water into Zone 580 and consists of three main pump units and a small 200-gpm jockey pump unit with a 15-hp motor. This pump station contains a hydro-pneumatic tank, which in conjunction with the jockey pump provides pressure while the three main pump units are inactive and demand is low.

The **Twin D PS** is located at the site of the Twin D Tanks and consists of four pump units pumping from Zone 384 to Zone 550. This pump station is designed to supply the upper zones of CMWD's recycled water system from CWRF if supply from Meadowlark WRF is unavailable. The pump station is capable of conveying flow through the Corintia Meter into Mahr Reservoir.

Table 2-7: Summary of Pump Station Facilities

Pump Station	No. of Pump Units	Pump Capacity (gpm	Year of Installation	Suction Zone or Facility	Discharge Zone	Design Capacity (gpm)
Bressi PS	3 + JP(1)	1,000	2006	Zone 550	Zone 600	3,000
Calavera PS	3 + JP(1)	600	2004	Zone 384	Zone 580	1,800
Twin D PS	4	1,125	2003	Zone 384	Zone 550	4,500
CWRF PS	3	3,300	2002	CWRF	Zone 384	10,000
Meadowlark WRF PS (2)(3)	3	1,080	2005	Meadowlark WRF	Zone 550(1)	3,250
Gafner WRP PS(4)	2	1,125	1991	Gafner WRP	La Costa South Golf Course	2,250

Notes:

(1) Bressi PS and Calavera PS include 300 gpm and 200 gpm, respectively, jockey pump units for low flow conditions.

(2) This pump station feeds Zone 550 and through the Corintia Meter it can also feed Mahr Reservoir.

(3) Owned and operated by VWD.

(4) Owned and operated by LWD.

The CWRF PS is located at the CWRF and consists of three pump units that pump into Zone 384. The pump units are sized at 3,330 gpm each. The pump station design flow of 10,000 gpm requires simultaneous operation of all three pump units. Two empty pump bays provide space for future expansion of the pump station.

Meadowlark WRF PS consists of three variable frequency drive vertical turbine pump units. This pump station is not a part of CMWD's recycled water system and is owned and operated by VWD. This pump station feeds the Zone 550 through the Corintia Meter and is designed to pump to Mahr Reservoir.

Gafner WRP PS delivers recycled water to the La Costa Resort and Spa south golf course lake. It includes two 1,125-gpm pumps with 40-hp motors, one operating pump, and one standby pump. Water is pumped through a 12-inch diameter pipeline to the lake.

Evaluations of pump capacity for existing conditions and future build out are described in Chapter 6.

2.1.6 Abandoned Facilities

Potable water abandoned facilities including several pipelines and two abandoned potable reservoirs (Santa Fe 1 in the east and La Costa Lo in the south) were reviewed for potential use in the recycled water distribution system. However, based on the locations of these facilities relative to future recycled water demands in the pressure zones, coupled with unknown condition of the assets, these facilities were not considered for use in this Master Plan update.

2.2 Interconnections

CMWD's recycled water distribution system currently does not have any emergency interconnections with recycled water distribution systems of neighboring agencies. However, the OMWD recycled water distribution system is also connected to Mahr Reservoir and fed entirely by the Meadowlark WRF. Since the OMWD recycled water distribution system does not have an additional source of supply, OMWD would not be able to supply CMWD's recycled water distribution system in the event of an outage of Meadowlark WRF. However, CMWD could supply OMWD's recycled water distribution system from CWRF via CMWD's recycled water distribution system. In addition, CMWD continues to maintain a potable water make-up supply at the D Tank site, which can also be used in an emergency to back-up the recycled water system.

2.3 System Operations

The primary function of CMWD's recycled water distribution system is to distribute recycled water from the water reclamation facilities to CMWD's customers.

The **Meadowlark WRF** operates as a skimming plant, reclaiming treated wastewater and discharging solids to EWPCF. VWD operates the Meadowlark WRF PS to supply recycled water to the system. Flows from Meadowlark WRF depend on the influent flows to the treatment plant. The variation in influent flows to Meadowlark WRF, the diurnal variation of CMWD's customer demands, and the diurnal variation of OMWD's customer demands cause water level changes on a daily basis in Mahr Reservoir. CMWD strives to maintain at least 15 feet of water in Mahr Reservoir to avoid pressure problems in Zone 550.

In the case where recycled water demand is low and Mahr Reservoir is full, tertiary treatment can be curtailed and secondary treated water can be pumped through a separate pumping station to a 12-inch diameter “failsafe” pipeline. The “failsafe” pipeline can also receive flow from the tertiary pumping station through manually operated valves.

According to the Mahr Reservoir Operations and Maintenance Manual (Carlsbad, 2008), 32 MG of storage within Mahr Reservoir is dedicated to CMWD's recycled water distribution system storage needs. The Tri-Agency Operations MOU (Distribution of Reclaimed Water Produced at the Meadowlark Reclamation Facility) between VWD, CMWD, and OMWD, finalized January 3, 2017, is based on a supply from the Meadowlark WRF of 2.0 mgd during the winter (December through March) and 3.0 mgd during the summer (April through November). A copy of this MOU is included in Appendix A.

The expanded CWRF treats secondary effluent from the EWPCF for delivery to CMWD's recycled water distribution system from the west side of the service area. Recycled water is supplied to CMWD's recycled water distribution system by the CWRF PS. Under typical operations, the pump units are controlled by water levels in two of the Twin D tanks.

The CWRF PS pulls from two reclaimed water basins totaling 7.5 MG of recycled water storage. However, a single basin with about 3.75 MG of storage is usually sufficient for operation of CMWD's existing recycled water distribution system. The basins have a dual purpose as these provide buffering capacity to handle peak wet weather flows tributary to the EWPCF during the winter months and provide additional storage to accommodate daily irrigation peaking during the summer months for CMWD.

As discussed in more detail in Chapter 3, CMWD's recycled water distribution system reaches its peak demands during the evening hours for nighttime irrigation. Based on discussions with CMWD staff, the typical daily operations pattern is as follows:

When water levels in CMWD's storage reservoirs fall, the CWRF PS comes online, supplying the nighttime demand from the CWRF equalization basin and replenishing operational storage.

As the Twin D tank levels fall, the Twin D Flow Control Valve (Ralph Valve) will open based on the levels in the Twin D tanks to increase the flow being taken from Meadowlark WRF and Mahr Reservoir via the Corintia Meter.

The CWRF PS is turned off based on the levels in the Twin D tanks once the tanks replenish as the nighttime irrigation demands end. However, during peak months, the CWRF PS will be run all night to take advantage of non-peak time-of-use electrical rates to lift supply from CWRF to the storage tanks to avoid pumping during peak time-of-use electrical rates.

The Twin D Flow Control Valve (Ralph Valve) is left active until the totalized flow through the Corintia Meter reaches the allotment for the day or the operational storage is replenished. After SCADA closes the Twin D Flow Control Valve (Ralph Valve), the distribution system is supplied from operational storage and is supplemented by the CWRF, if necessary.

Recycled water demands in Zones 660 and 550 are typically supplied exclusively by Meadowlark WRF and Mahr Reservoir via the Corintia Meter throughout the day, as Zone 550 uses Mahr Reservoir for operational storage. This operation also takes advantage of the higher hydraulic gradient from the Meadowlark WRF. In addition, some of the demands in Zone 384 are supplied from Meadowlark WRF and Mahr Reservoir when the Twin D Flow Control Valve, Faraday PRV, and La Costa PRV are open. The remaining demands in Zones 384 (including Quarry Creek), 318, 446, and 580 are supplied from CWRF. Once the daily allotment from Meadowlark WRF has been reached, the Twin D Flow Control Valve is closed.

If Meadowlark WRF and Mahr Reservoir are not able to supply the system, the flow direction can be reversed so that the CWRF PS and the Twin D PS can supply the system. With the CWRF expanded from 4 MGD to 7 MGD, and the variability of wastewater flows from Meadowlark WRF, CMWD may periodically increase flows in the future from the Carlsbad WRP. This mode of operation should be considered in the amended agreement between CMWD and VWD for annual recycled water supply to provide the most flexibility for CMWD.

Gafner WRP exclusively serves the La Costa Resort south golf course. The golf course provides limited operational storage through lakes within the golf course. Since the La Costa Resort is the only customer supplied by Gafner WRP, the pump station is controlled based on the demands of the golf course (via lake level).

2.4 Water Quality Review

The 2012 Master Plan performed a detailed analysis and review of water quality from the existing sources to determine any restrictions that may exist for irrigation uses. This update reviews the findings. Water quality data was tabulated and compared to existing guidelines for irrigation use restrictions. Table 2-8 summarizes guidelines for irrigation use and includes the historical supply source key water quality data.

As shown in Table 2-8, the average historical water quality samples do not indicate any severe restrictions for any of CMWD's recycled water supply sources. As there are no parameters that fall in the severe restriction category, CMWD should be able to continue to use their existing recycled water sources for its irrigation demands with proper quality management.

However, as with most San Diego County recycled water systems, due to some water quality parameters, the use of recycled water may not be suitable for some sensitive plant species. Agricultural users, in particular flower growers, have indicated concerns about water quality parameters which may affect required treatment, including boron, manganese, and TDS.

Table 2-8: Water Quality Guidelines for Irrigation Use

Water Quality Parameter[1]	Unit	Degree of Use Restriction[1,2,3,4]			Supply Source		
		None	Slight to Moderate	Severe	Meadowlark WRF[7]	CWRF[8]	Gafner WRP[9]
Salinity							
EC_w	dS/m	<0.7	**0.7-3.0**	>3.0	1.63	1.70	1.73
TDS	mg/L	<450	**450-2000**	>2000	991	965	1,076
Permeability[5], EC_w = 0.9							
SAR = 0-3 and EC_w =		>0.7	0.7-0.2	<0.2			
SAR[6] = 3-6 and EC_w =		**>1.2**	1.2-0.3	<0.3	1.6	1.7	1.7
SAR = 6-12 and EC_w =		>1.9	1.9-0.5	<0.5			
SAR = 12-20 and EC_w =		>2.9	2.9-1.3	<1.3			
SAR = 20-40 and EC_w =		>5.0	5.0-2.9	<2.9			
Sodium (Na)							
Surface	SAR	<3	**3-9**	>9	4.0[6]	5.5[6]	5.6[6]
Sprinkler	mg/L	<70	**>70**		152	197	201
Chloride (Cl)							
Surface	mg/L	<140	**140-355**	>355	236	265	278
Sprinkler	mg/L	<100	**>100**		236	265	278
Boron (B)	mg/L	<0.7	**0.7-3.0**	>3.0	0.37	0.40	0.41
Bicarbonate	mg/L	<90	**90-500**	>500	192	219	225
pH	---	**6.5-8.4 (normal range)**			6.7	7.4	7.3
Nitrogen (N)							
Ammonia (NH_4)	mg/L	(see combined N values below)			N/A	N/A	N/A
Nitrate (NO_3)	mg/L	(see combined N values below)			N/A	N/A	N/A
Combined Nitrogen (N)	mg/L	<5	**5-30**	>30	N/A	N/A	16.1
Iron		Recommended maximum concentration of 5 mg/L. Not toxic to plants in aerated soils but can contribute to soil acidification and loss of reduced availability of essential phosphorus and molybdenum.					

Table 2-8: Water Quality Guidelines for Irrigation Use

Water Quality Parameter[1]	Unit	Degree of Use Restriction[1,2,3,4]			Supply Source		
		None	Slight to Moderate	Severe	Meadowlark WRF[7]	CWRF[8]	Gafner WRP[9]
Manganese		Recommended maximum concentration of 0.2 mg/L. Toxic to a number of crops at a few tenths to a few mg/L, but usually only in acid soils.					

Notes:

[1] Adapted from University of California Committee of Consultants (1974), and Ayers and Westcot (1994).

[2] Method and Timing of Irrigation: Assumes normal surface and sprinkler irrigation methods are used. Water is applied as needed, and the plants utilize a considerable portion of the available stored soil water (50% or more) before the next irrigation. At least 15 percent of the applied water percolates below the root zone (leaching fraction [LF] > 15%).

[3] Site Conditions: Assumes soil texture ranges from sandy loam to clay with good internal drainage with no uncontrolled shallow water table present.

[4] Bold text indicates where CMWD's Supply Sources from the right columns fall within the range shown.

Definitions of "The Degree of Use Restriction" terms:

None = Recycled water can be used similar to the best available irrigation water.

Slight = Some additional management will be required above that with the best available irrigation water in terms of leaching salts from the root zone and/or choice of plants.

Moderate = Increased level of management required and choice of plants limited to those which are tolerant of the specific parameters.

Severe = Typically cannot be used due to limitations imposed by the specific parameters.

[5] Permeability is evaluated based on the combination of adjusted sodium adsorption ratio (SAR) and Electrical Conductivity (EC_w) values.

[6] Adjusted SAR (adj. RNa) includes the effect of bicarbonate/calcium ratio (Cax).

[7] Average of Samples from January 1998 through September 2009. Source: (EJPA, 2009).

[8] Average of Samples from November 2005 through September 2009. Source: (EJPA, 2009).

[9] Average of Quarterly Samples from Oct 2008 through September 2009 (TDS, N, Conductivity, and pH), Annual samples in June 2008 (Cl, B), and intermittent samples from 2002 through 2009 (Na, HCO3). Source: (EJPA, 2009).

Source: 2012 Master Plan

2.4.1 Boron

One constituent of potential concern is boron. The newly expanded Carlsbad WRP has been in operation for about one year and the acceptance test data showed boron at 0.47 mg/L, in the recycle plant water.

The new Carlsbad Desalination facility has been in operation for three years, which uses reverse osmosis treatment to desalt ocean water for drinking water purposes. Typical ocean water has a boron concentration between 4 and 5 mg/L. Once this new supply is integrated with Carlsbad's existing potable water supply through a direct desalinated water connection, the concentration of boron may increase. As a result, the concentration of boron in wastewater will also increase. The increased concentration in wastewater does have the potential of pushing treated recycled water effluent above the limit for boron as stated in CMWD's discharge permit. Currently, the permit stipulates a boron concentration limit of 0.75 mg/L for the CWRF and 0.5 mg/L for the Meadowlark WRF. This should continue to be monitored in the future, especially with the new direct connection of desalinated water.

2.4.2 Manganese

Another constituent of concern is manganese since CMWD's CWRF has previously exceeded the permitted effluent limit of 0.05 mg/L. The CWRF was originally designed to treat 80 percent of the influent flow with granular media filtration and the remaining 20 percent of influent flow with MF/RO filtration. The flow streams are then blended prior to distribution. To reduce the manganese concentration, the plant was operated beyond the 20/80 flow split, sending a greater percentage of flow to the MF/RO units. While the MF/RO process reduces manganese, the CWRF expanded from 4 MGD to 7 MGD. With this expansion, the CMWD has greater flexibility to control the manganese as demands are lower than projected and excess supply is available.

2.4.3 Total Dissolved Solids (TDS)

The newly expanded CWRF and Meadowlark WRF continue to supply TDS in the ranges of 900 to 975 TDS, which are typical of most recycled water system in San Diego County. CMWD has seen a few unusual increases in TDS in the system that have not been reconciliated and should continue to be evaluated. The newly expanded CWRF offers greater flexibility in managing and controlling water quality with its new UF/RO system. Encina has the ability to turn on the RO system when the TDS exceeds 1100 mg/L, which has not happened over the last few years. The City may also see a reduction in TDS as more desalinated water is introduced into the potable water system, reducing the TDS in the wastewater quality.

Chapter 3 Recycled Water Demand and Supply

An important element of the recycled water master plan update is to establish the average existing recycled demand in the City and develop an updated forecast based on the recent trends, including drought and economy, and identify future customers to further increase recycling use. This section presents an updated recycled demand forecast for the City and also updates the recommended system expansion by segment for the 2012 Master Plan to serve future customers within and outside the City.

3.1 Existing Demands

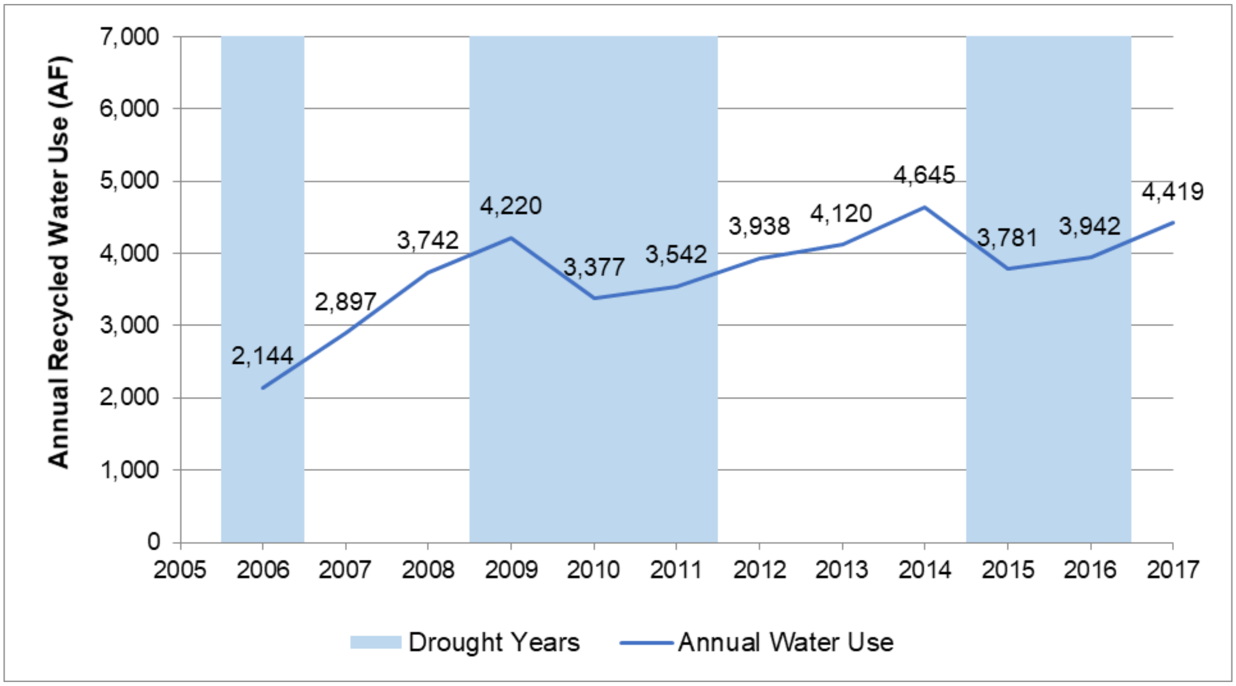
This section summarizes the process to develop the existing average annual recycled water demand for the CMWD service area and areas outside of the City. This “baseline” existing demand is used as the key starting point for the future demand forecasts as well. Given the annual variability in recycled water use seen by water purveyors the past few years throughout Southern California, selecting the baseline demand should consider appropriate planning level assumptions and the likelihood of recovering the irrigation demand post drought potable water use restrictions.

Existing recycled water use records over the past decade were the primary source of evaluating the existing baseline demand and water use factors for the 2019 Recycled Water Master Plan. The CMWD staff utilizes a customer information system to maintain its account-level information. Other factors considered include past drought conditions and economic factors that may contribute to the recovery of recycled water use.

Review of Carlsbad’s customer billing data information indicates that the entirety of the CMWD’s recycled water customer base is comprised of irrigation accounts. There are no other non-potable uses such as industrial cooling towers. Billing information for the 2014 to 2016 calendar years reflect a total customer base of approximately 833 recycled water accounts, with active recycled water users totaling 713 accounts for 2014 and 805 accounts for 2016. Recycled water customers have used an average of 4,122 acre-feet (AF) or 3.16 mgd of water per year over that three-year period (2014-2016).

Historical recycled water use trends can be used to project future supply needs and to establish the baseline existing recycled water demand. Over the past decade, recycled water use within the CMWD service area has ranged from a low of 2,144 AF (1.9 mgd) in its infancy years, to a high of 4,645 AF (4.1 mgd), before the recent drought (Figure 3-1).

Figure 3-1: Historical Recycled Water Use



CMWD doubled its recycled water demand in the early years of its program. However, since 2010, fluctuations that are closely tied with weather patterns and economic conditions have been observed.

Similar to potable water usage, annual fluctuations in recycled water usage in the past have been primarily in response to local weather conditions. Typically, recycled water demands increase during hotter, drier years because more water is needed for customer use, particularly irrigation, and demands are lower during cooler, wetter years when less irrigation is required.

During the 2012 drought, North San Diego County experienced below-average rainfall, which has continued for most of the past decade. In addition, the region experienced an economic recession in the 2009 to 2011 period, essentially halting anticipated development and causing an increase in local unemployment, which resulted in a decrease in water use.

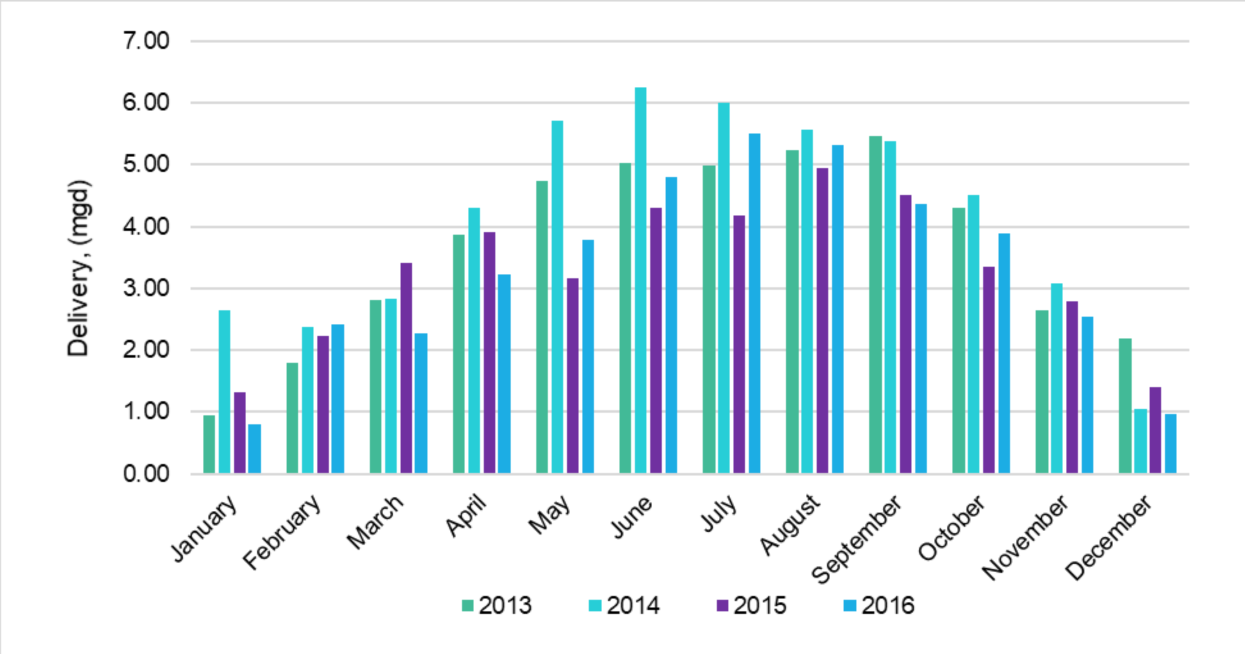
In July 2009, CMWD adopted a residential tiered water rate which further dampened potable water demand by the residential population. The region experienced record warm years in 2015 and 2016, which would typically result in water use increases. However, statewide mandatory conservation in response to statewide drought conditions contributed to a significant decrease in water use during those years.

While conservation mandates were only placed on potable water use, similar decreasing trends in recycled water demand were observed. Decreases in recycled water usage during the drought period demonstrates a potential behavioral element that may be important when projecting recycled water usage demands and developing customer communication materials. It is anticipated that in future non-drought years, recycled water demands will continue to increase beyond those seen in historical non-drought years (e.g. 2009).

3.1.1 Seasonal Variation in Recycled Water Use

The demand for recycled water fluctuates each month, and this variation is attributed to the seasonal variations in weather conditions. The amount of delivered recycled water is lower in the winter months and increases in the summer months due to irrigation needs. Figure 3-2 displays the monthly recycled water deliveries for 2013 through 2016.

Figure 3-2: Variations in Seasonal Delivery (2013-2016)



As shown on Figure 3-2, recycled water seasonal demand patterns have been consistent over time.

Due to drought conditions throughout California, Executive Order B-29-15 was issued on January 17, 2014. This order mandated a statewide 25 percent reduction in potable urban water usage through February 28, 2016. While this executive order did not apply to the use of recycled water, the summer months observed in 2015 and 2016 experienced below normal peak monthly recycled water demands. Public perception to curtail irrigation water use resulted in recycled water customers reducing irrigation rates and watering periods. The behavioral response by customers was to reduce outdoor irrigation use regardless of if they were using recycled water.

In addition to the temporary impacts on recycled water demands from seasonal fluctuations and behavioral responses to water use limits, permanent changes to recycled water systems also are impacting demands. Rebates offered to customers by MWD and CWA to remove sod and install higher efficiency irrigation systems has resulted in some decreases in recycled water demand. This is particularly true of schools that have converted grass fields to artificial turf.

3.1.2 Baseline Year 2014

The 2019 Water Master Plan determined that the potable water demand projections would use 2014 water demands as the basis for evaluating the existing water system. Year 2014 reflects a conservative average annual demand that was not subject to mandatory use restrictions and a reasonable period had expired from the 2009-2010 drought and economic recession, such that an appropriate rebound in demands would have occurred.

This master plan assumes similar for recycled water to account for some recovery from the mandated water use restrictions. Therefore, 2014 recycled water demands were used as the basis for evaluating the existing recycled water system. Using 2014 demands, the existing recycled water system demand for the 2019 Recycled Water Master Plan is approximately 4,650 AFY or 4.1 mgd. This demand will serve as the basis for the existing system capacity analysis for both recycled water distribution and supply. In addition, the 2014 recycled water demand was therefore used as the starting value for medium and high level recycled water demand forecast.

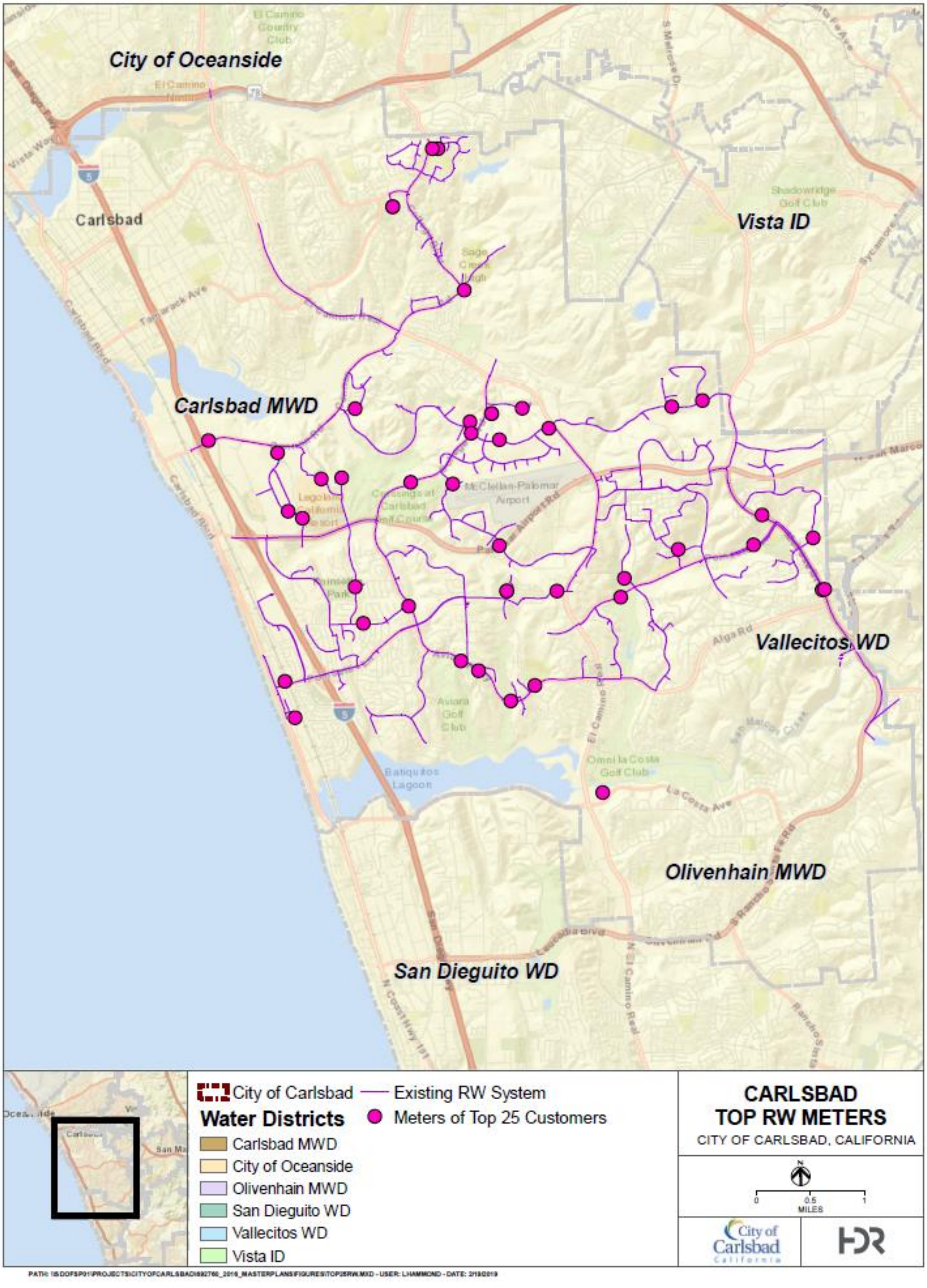
3.1.3 Top 25 Recycled Water Customers

The top 25 recycled water users for the baseline year are shown in Table 3-1 and have a combined demand of 2,004 AFY (1.8 mgd) and make up approximately 44 percent of the total recycled water demand. All current recycled water users are irrigation customers. Figure 3-3 shows the meters belonging to the current largest recycled water customers. Top customers include three golf courses, the Aviara Golf Course, the La Costa Golf Course, and The Crossings, a City-owned golf course operated by JC Resorts. Other major customers include Legoland, Caltrans, local hotels and resorts, homeowner associations, business parks, city parks and the local school district.

Table 3-1: Top 25 Recycled Water Customers for Baseline Year 2014

Class	Baseline Year Demand (AFY)	Customer
Irrigation	505.2	Park Hyatt Aviara Resort
Irrigation	316.9	KSL La Costa Resort Corp
Irrigation	289.5	JC Resorts
Irrigation	240.7	La Costa Hotel and Spa
Irrigation	83.3	City of Carlsbad Parks
Irrigation	81.8	Carlsbad Unified School
Irrigation	63.6	Rancho Carrillo Master Association
Irrigation	53.2	Legoland California LLC
Irrigation	41.9	Carlsbad Research Center
Irrigation	31.4	Carlsbad Oak North Bus Park
Irrigation	29.3	City of Carlsbad
Irrigation	28.8	Taylor Made Golf
Irrigation	28.0	Gemological Institute
Irrigation	26.7	La Terraza Associates
Irrigation	22.1	Salk Owners Association
Irrigation	21.9	Archstone Communities
Irrigation	18.9	Poinsettia Cove Fieldstone
Irrigation	18.9	La Costa Ridge Community Association
Irrigation	17.2	Bressi Ranch HOA
Irrigation	16.2	State Department of Transportation
Irrigation	14.5	Wave Crest Resorts II
Irrigation	14.2	Grand Pacific Resort
Irrigation	13.9	Mariners Point HOA
Irrigation	13.1	Invitrogen
Irrigation	12.6	Carlsbad Airport Center

Figure 3-3: Top 25 Recycled Water User Meters for Baseline Year 2014



3.1.4 Existing Demand by Pressure Zone

The existing recycled water demand was determined for each pressure zone as each recycled water meter account is coded to a specific pressure zone. Table 3-2 summarizes the demand data for each pressure zone for the Baseline year. The demand per zone is used to estimate recycled water supply and storage requirements, presented in Chapter 6, for the recycled water distribution system.

Table 3-2: Baseline Year Recycled Water Demands Per Pressure Zone

Pressure Zone	Demand (gpm)	Demand (mgd)
318	35	0.05
384	1,556	2.24
550	882	1.27
580	97	0.14
660	278	0.4
Total	**2,848**	**4.1**

3.1.5 Recycled Water Duty Factors

A water duty factor (WDF) is defined as the daily water use per some specified unit (e.g. acre, person or dwelling unit) for a given land use type and is a common element of recycled water system planning.

The methodology used to develop WDFs involves correlating historical parcel-level recycled water consumption data with its designated land use type. This allows for the actual water use per acre or per unit to be calculated. WDFs were reviewed from the 2012 Master Plan for irrigation associated with HOAs, commercial and industrial properties, golf courses, schools, and parks based on planning developments focused on irrigation activities. The recommended list of the WDFs are included in Table 3-3.

Table 3-3: Water Duty Factors

Category	Description	Duty Factor (gallons per day /acre)
HOAs	Includes irrigation of street medians and common areas of HOAs	700
Business Park	Landscape irrigation for commercial and industrial properties	600
School[1]	Irrigation of fields and landscaping of schools	1,000
Park	Irrigation of parks	2,000
Golf Course	Irrigation for golf courses	2,500

Table 3-3: Water Duty Factors

Category	Description	Duty Factor (gallons per day /acre)
Industrial	Cooling Towers	Case by Case

Notes:

(1) City schools continue to replace grass fields with artificial turf and should be reviewed on a case by case basis.

3.2 Market Analysis and Projected Demands

An important element in master planning is the assessment of future recycled water demands and supply requirements. Demand forecasting allows City staff to:

- Understand spatial and temporal patterns of future recycled water use
- Plan for future recycled water purchases and supply planning
- Plan for system expansion/system revenue/expenditures
- Optimize system operations

Recycled water use is expected to increase as development continues to occur and the distribution system is expanded. Conversion of existing potable water customers to the recycled water system as part of the City's ongoing Phase III program will lead to an expansion of the distribution system and an increase in demand. Additional future expansion is anticipated to occur from installation in the remaining future development areas near the backbone recycled system.

Note that CMWD's Ordinance 43 (signed in 2005 and included in Appendix B) establishes a policy requiring that recycled water be used within its jurisdiction. Recycled water is required wherever it is determined to be economically justified, financially and technically feasible, consistent with legal requirements, preserves public and environmental health, and does not impact safety and welfare. Section 4.2.5 of the Ordinance states that the Recycled Water Master Plan shall incorporate mandatory reuse, as follows:

> *Within the recycled water service area, a description shall be prepared of where greenbelt irrigation, agricultural irrigation, commercial office buildings, filling of artificial lakes, or industrial processes can be limited to the use of recycled water. This information shall be used by District officials to mandate construction of recycled water distribution systems or other facilities in new and existing developments for current or future recycled water use as a condition of any development approval or continued water service if future reclamation facilities are proposed in the Master Plan that could adequately serve the development.*

In May 2010, the City of Carlsbad adopted a Water Efficient Landscape Ordinance (WELO) in accordance with the State's Water Conservation in Landscaping Act of 2006 (Assembly Bill 1881). This Act promotes consistency in landscape regulations among land use authorities throughout San Diego County. The regulations reflect improvements for landscape and irrigation design plans, irrigation technologies, and water management for achievable water savings. The City's WELO also advocates for use of recycled water when feasible.

3.2.1 Market Analysis and Methodology

This section includes development of future recycled water demand estimates based on CMWD's Phase III expansion plans and experiences, review of potable water irrigation meters, and future expansion in areas outside the City.

Since the last Master Plan, CMWD has continued to review potential irrigation conversions from potable water to recycled water, primarily within the Phase III service area (the recycled system expansion proposed in CMWD's approved funding application). The Phase III potential customers were identified by 18 pipeline "segments" in the prior Master Plan. Each of the proposed segment areas from the previous master plan were reviewed with CMWD staff in the development of the 2019 Master Plan. Appendix C includes the "segment" figure from the 2012 Master Plan for reference.

Table 3-4 provides a comparison of the 2012 Master Plan assumptions for recycled water demands by segment with the current 2014 baseline demand and the currently projected demand for each of the 18 pipeline segments.

Specific sites with the potential to convert potable irrigation customers to recycled water were reviewed in detail. These locations are shown on Figure 3-4. In many cases, some irrigation meters identified for conversion were not completed due to significant retrofit costs to the customer or on-site physical constraints.

The following sections describe recycled water demand projections by segment for 2020, 2025, and 2040.

Figure 3-4: Potential Potable Water Conversion Sites

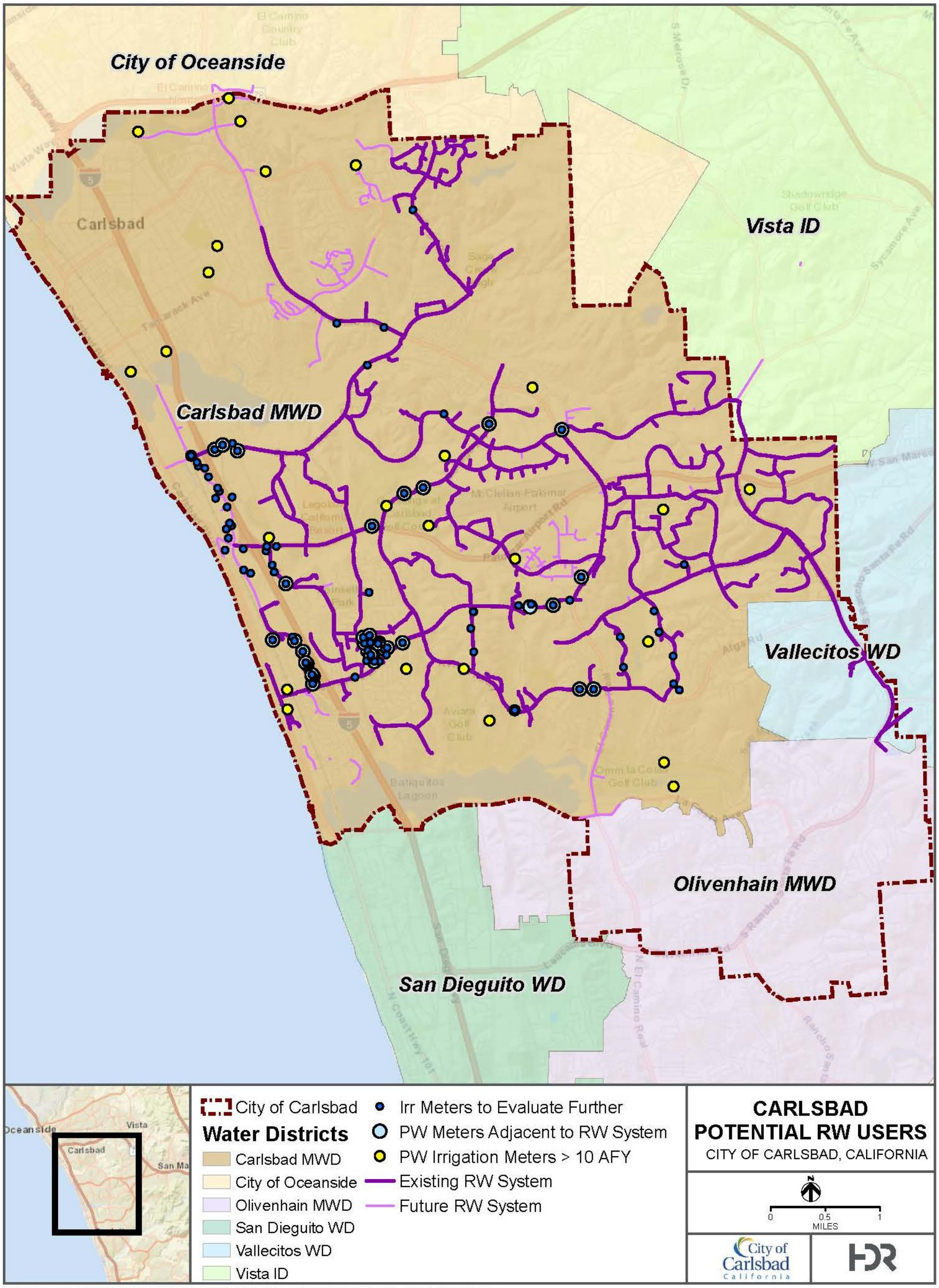


Table 3-4: Future Recycled Water Demands by Expansion Segment

2012 Recycled Water Master Plan Demand Projections				2019 Recycled Water Master Plan Demand Projections				
Expansion Segment	Number of Customers[1]	Potable Water Demand to be converted AFY	2014 Baseline Demand	Updated Number of Customers[3]	2020 Demand AFY[4]	2025 Demand AFY[5]	2040 Demand AFY[6]	Notes/Comments
Adjacent to Existing[2]	30	126		19	85	—	—	Priority connections for City ongoing.
1	19	97		15	0	20	—	Renamed to Segment 1A and 1B.
2	13	782		10	250	20	—	Connections underway; NRG Power Plant assumed. 2025 demand for future re-development of the NRG site.
3	6	53		5	0	250	—	Future developments Cantarini and Holly Springs Assume no recycled water for Rancho Carlsbad Golf Course which is on well water. Does not include Mandana planned development.
4A(2)	1	448		1	0	0	300	Assumes Shawdowridge Golf Course irrigation well recently constructed can no longer supplies irrigation water and VID develops new supply.
4B(2)	9	330		1		200		Demand assumed for **Oceanside** is the Ocean Hills Golf Course. Assume no smaller meters served by 2025. Consider wholesale cost alternatives for Oceanside.
4C(2)	1	582		0	0	0	0	No VID distribution system assumed.
5	16	193		20	180	180	—	Updated with Kennedy Jenks Tech Memo (NW, CEN, SW, SE). Year 2025 assumes El Camino Golf Course in Oceanside is served.

Table 3-4: Future Recycled Water Demands by Expansion Segment

2012 Recycled Water Master Plan Demand Projections				2019 Recycled Water Master Plan Demand Projections				
Expansion Segment	Number of Customers[1]	Potable Water Demand to be converted AFY	2014 Baseline Demand	Updated Number of Customers[3]	2020 Demand AFY[4]	2025 Demand AFY[5]	2040 Demand AFY[6]	Notes/Comments
6	3	20			0	—	20	Vallecitos service area.
7	1	0		1	50	—	—	Quarry Creek is connected. Demands will increase as development finishes.
8	2	520		1	0	—	500	Assumed future supply to either **OMWD or San Elijo.**
9	5	65			50	—	—	Connections underway. PL built in 2018.
10	2	82			0	0	0	No Vallecitos assumed.
11	16	120		8	0	—	50	Downtown appears not cost effective to expand. Minimum reuse assumed.
12	4	41		2	0	—	20	Downtown appears not cost effective to expand; School's converted to turf.
13	2	32			0	-	—	Already connected major users.
14	2	58		1	0	30	—	Need Pipeline to connect users.
15	3	22		2	0	15	—	Potential user. City to investigate sites.
16	1	10		1	0	10	—	Potential user. City to investigate sites.
17	6	85		5	0	80	—	Need pipelines – three HOAs to connect. Site investigations needed.

Table 3-4: Future Recycled Water Demands by Expansion Segment

2012 Recycled Water Master Plan Demand Projections				2019 Recycled Water Master Plan Demand Projections				
Expansion Segment	**Number of Customers[1]**	**Potable Water Demand to be converted AFY**	**2014 Baseline Demand**	**Updated Number of Customers[3]**	**2020 Demand AFY[4]**	**2025 Demand AFY[5]**	**2040 Demand AFY[6]**	**Notes/Comments**
18	1	31	—	1	30	—	—	Connected. Review 2017 irrigation use. No additional demands expected. All customers were connected in 2017.
Total	143	3,697	**4,645**		**645**	**805**	**890**	
2019 Demand Projections Grand Total							**2,285**	

Notes:

(1) Customers may include multiple irrigation meters/accounts

(2) Adjacent customers per City spreadsheet

(3) Based on City review of user sites and potable meters to connect

(4) Segments included as part of Phase III program, recently connected, soon-to-be, or under design

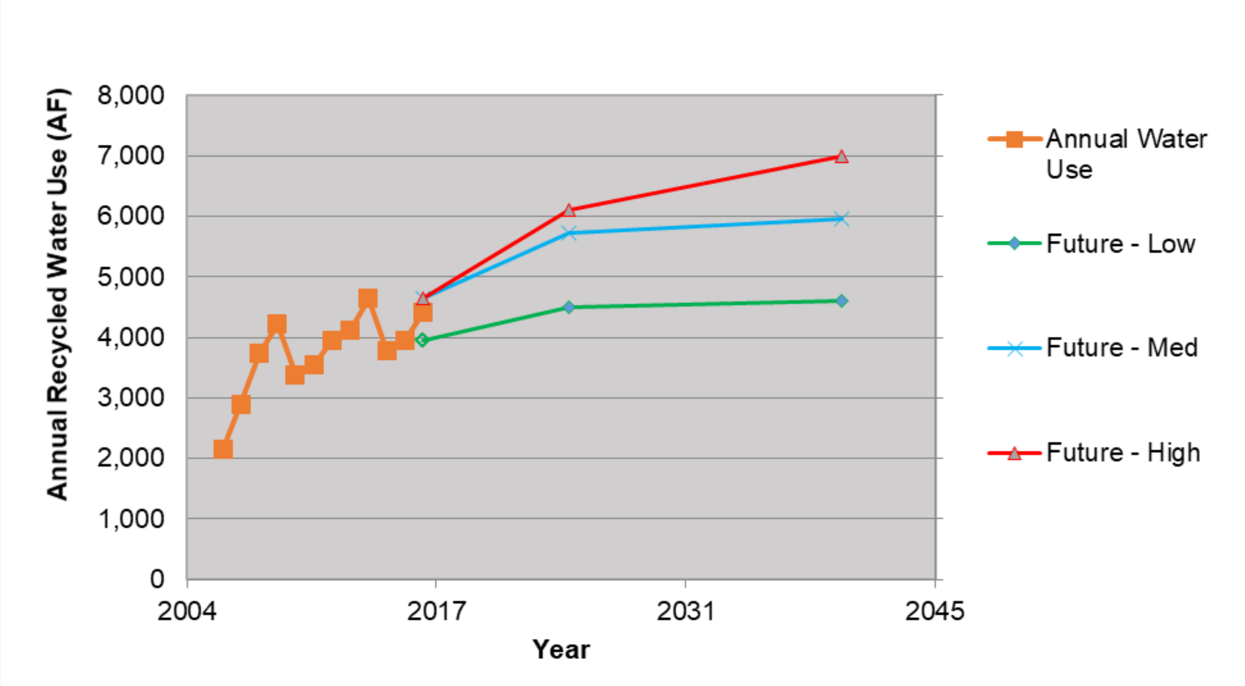
(5) Recommended demand for CIP planning

(6) Includes potential customers outside of City that may be long term or determined to not be feasible

3.2.2 Potential Markets and Phasing

A recycled water demand forecast range is shown on Figure 3-5 that includes the build-out of Phase III, 2025 future and 2040 demand estimates described in the previous section**.** The forecast is similar to potable water demand forecast approach for Carlsbad, with low, medium, and high projections. The projections are based on the proposed recycled water phasing presented in Table 3-4, with variable levels of success in converting potable water customers to recycled water.

Figure 3-5: Future Demand Forecast



The low demand forecast assumed no rebound from influence of state mandated potable water conservation seen the 2016 recycled water demand and assumes minimal expansion outside of the City. The high demand forecast assumes the recycled water uses presented in Table 3-4 are all connected.

The medium water demand forecast of 5,960 AFY or 5.32 mgd by 2040 will be used as the basis for the 2019 Master Plan capital improvement plan and future capacity analysis of the recycled water distribution system and supply system. This is about 30 percent lower than the Phase III total forecast used in the 2012 Recycled Water Master Plan, which projected a demand of 7,414 AFY.

The build out recycled water demand was also estimated for each pressure zone as each planned segment expansion is located in a specific zone. Table 3-5 shows the demand data for each pressure zone for the 2040 build out. Similarly, to Figure 3-5, medium and high demand forecasts are both shown.

Table 3-5: Build Out Recycled Water Demands per Pressure Zone

Pressure Zone	Incremental Demand Increase (gpm) *Medium*	Total Build Out Demand (gpm) *Medium*	Incremental Demand Increase (gpm) *High*	Total Build Out Demand (gpm) *High*
318	31	72	42	83
384	568	2,131	993	2,555
550	174	1,062	364	1,252
580	31	134	42	145
660	8	292	11	295
Total (gpm)	**812**	**3,692**	**1,451**	**4,330**
Total (mgd)	**1.17**	**5.32**	**2.09**	**6.24**

Note:

Incremental demands are based on 2014 Baseline Year values.

3.2.2.1 2020 Demand Forecast (Estimate 645 AFY)

CMWD is actively adding recycled water customers to its program. The additional recycled water uses projected by 2020 are described below.

Adjacent to Existing (85 AFY)

Conversion of existing potable irrigation meters to recycled water meters at commercial, industrial, and other public or HOA use sites will continue to increase recycled water demand. Some meter types have been determined by the City to not be suitable for conversion to recycled water such as potable meters serving both domestic and irrigation uses..

Potable water irrigation meters near existing recycled water pipelines have been evaluated and tabulated by the City for prioritizing conversions from potable to recycled water. Potable water connections near to existing recycled water pipelines have been evaluated and tabulated by CMWD staff for prioritizing conversion to recycled water. For this assessment, emphasis was placed on large potable water users to significantly reduce potable water demand and increase recycled water demand. An estimated 19 converted recycled water customers would provide an additional recycled water demand of 85 AFY for irrigation and commercial uses. This estimate has been lowered from previous estimates based on CMWD’s review of retrofit costs to convert potable irrigation meters.

Segment 2 (250 AFY)

CMWD has been connecting users in Segment 2, located west of Interstate 5 and between Cannon Road and Palomar Airport Road. The largest potential customer identified is the NRG Power Plant. The new Power Plant, however, will no longer be water cooled but air cooled. This transition will reduce the potential onsite demand significantly from the previous Master Plan projection. A total estimated demand of 250 AFY was assumed as part of the Phase III expansion.

Segments 5 and 7 (230 AFY)

The recycled water pipeline expansion of Segment 5 and Segment 7 has been approved and portions of Segment 5 have already been implemented. New portions of Segment 5 and Segment 7 will provide recycled water to customers in northern Carlsbad within Pressure Zone 384. Segment 5 will serve several existing HOAs and existing landscape irrigation.

The Segment 7 expansion on Tamarack Avenue will close the loop on Segment 7 to minimize pressure fluctuations within existing Segment 7 pipelines, but it will not serve any additional recycled water customers. Based on the Segment 5 and Segment 7 Market Assessment and Alignment Update (Kennedy/Jenks, 2017), 77 irrigation meters and 66 commercial meters may be converted to recycled water for a total demand of approximately 267 AFY. This demand estimate was based on 2013 irrigation data. A total Phase III demand of 230 AFY for segments 5 and 7 by 2020, as shown in Table 3-4, is based on an updated analysis completed by CMWD staff, assuming that only 20 customers would be converted.

Segments 1, 3, 9 and 18 (80 AFY)

CMWD staff continues to connect customers in each of the above segment areas, however, not all customers or site irrigation meters can be converted due to high cost to the user and/or ability to separate recycled water and potable irrigation systems satisfactory to the Health Department. Accordingly, the Phase III estimate has been reduced 40 to 50 percent based on discussions with CMWD staff from the previous Master Plan for these respective segment areas. To account for these reductions, 80 AFY has been included as part of the Phase III system.

3.2.2.2 2025 Demand Forecast (Estimate 805 AFY)

CMWD has been committed to maximizing the potential reuse for the Phase III system for the past several years. With the drop-off of potential reuse markets and less cost-effective customers to serve, CMWD will need to consider other potential expansion areas. This may include maximizing the recycle water demand from future development. The additional recycled water uses projected by 2025 are described below.

City of Oceanside Golf Courses (380 AFY)

The proximity of the Ocean Hills Golf Course and El Camino Country Club, although outside the City, should continue to be explored through a “wholesale” service agreement with the City of Oceanside that is mutually beneficial to both cities. The recycled water system has available capacity the system to serve both golf courses. No other irrigation users were included outside of the City by 2025, for a demand estimate of 380 AFY for Segments 4B and 5.

Segments 1A, 15, 16 and 17 (135 AFY)

CMWD continues to investigate customers in these segment areas. Investigations by CMWD have indicated that not all irrigation meters at customer sites are likely to be converted due to high cost to the user and/or ability to separate recycled water and potable irrigation systems. Estimates have been reduced about 25 percent from previous Master Plan but assumed to be converted by 2025 for a total estimated demand of 135 AFY.

The eastern area of the City has the potential for new recycled water demand with two new developments, Cantarini and Holly Springs, and the continued buildout of Robertson Ranch and Bressi Ranch.

3.2.2.3 2040 Demand Forecast (Estimate 890 AFY)

Olivenhain MWD and City of Oceanside have indicated interest in obtaining recycled water from CMWD's recycled water distribution system for their customers if it is cost effective and negotiable wholesale rates are set. Neighboring agencies Vista Irrigation District (VID) and Vallecitos Water District (VWD) have expressed interest in the past but appear to be no longer considering investing in a distribution of recycled water within their jurisdictions. The potential recycled water uses projected by 2040 are described below.

Segments 6, 11, and 12 (90 AFY)

All three of these segments' areas require pipeline extensions and will have significant costs to retrofit, especially in the downtown area. A reduced demand has been included for these irrigation sites of 90 AFY.

Vallecitos Water District Golf Course (150 AFY)

Although the City of Oceanside has two potential golf courses, VWD does include Lake San Marcos Golf Course which could be served via Rancho Santa Fe Road and may be a viable option compared to Ocean Hills, especially if no expansion ever occurs into VID.

Vista Irrigation District Shadowridge Golf Course (300 AFY)

The Shadowridge Golf Course, as with many San Diego County golf courses, has struggled with the rising cost of potable water. In the past few years, four golf courses have closed in the County attributed in part to these financial issues. In response, Shadowridge invested in developing a local well supply for irrigation in 2015. To date, the project has met the need of the golf course. Groundwater supplies in San Diego County can be highly variable. If the golf course was to see a drop in well production, there may be an option viable to transition to recycled water. If the City is successful in developing an agreement with Oceanside, there could be a potential future expansion to the Vista Irrigation District based on previous reuse estimates, a 2040 demand of 300 AFY was assumed.

OMWD and/or San Elijo (350 AFY)

Both OMWD and San Elijo continue to explore local water supply projects including water reuse, groundwater, and indirect/direct potable reuse. For example, recently San Elijo developed conceptual plans for a potable reuse project. If a project was implemented in the future, it is conceivable that additional recycled water supply may be needed. For that reason, an estimate of future supply of 350 AFY has been included in Table 3-4.

3.2.3 Interagency Opportunities

The master plans will explore opportunities with neighboring agencies to enhance the City's level of service, reliability and in some case lower costs. The City has experienced a 20 percent reduction in recycled water demand within the City. It will be challenging to both replace this reduced demand and increase the over recycled demand within the City limits. Interagency opportunities exist to increase recycled water demand in close proximity to the City and should be revisited in light of the above reductions. These include:

- VID – Melrose Extension area
- Oceanside – Melrose Extension and El Camino Real

- San Elijo JPA – New service to northern part of San Dieguito Water District (SDWD)

3.3 Recycled Water Supply

Recycled water is supplied to CMWD from three sources, the Carlsbad, Meadowlark and Gafner water reclamation plants, owned by CMWD, Vallecitos Water District (VWD) and Leucadia Wastewater District (LWD), respectively. The capacities of the CWRF, Meadowlark WRF, and Gafner WRP are presented in Table 3-6**,** along with CMWD's recycled water allocation from each source.

Table 3-6: Recycled Water Supplies

Reclamation Plant Name	Owner	Permitted Capacity[(1)] (mgd)	Maximum CMWD Allocation (mgd)	Other Allocations (mgd)
CWRF	CMWD	7.0	7.00	0.0
Meadowlark WRF	VWD	5.0	3.00[(2)]	1.5[(3)]
Gafner WRP	LWD	1.0	0.75[(4)]	0.0
Total Capacity		**13.0**	**10.75**	**1.5**
Total CMWD Capacity [(5)]			10.60[(5)]	

Notes:

(1) Maximum discharge flow as stated in permit (CWRF Order No. 2016-0183; Meadowlark WRF Order No. R9-2007-0018; Gafner WRP Order No. R9 2004-0223).

(2) Rated capacity of Meadowlark WRF is 5.0 mgd. However, discussions with VWD staff have indicated that the WRF historically has produced less flow than rated. While the rated capacity is 5.0 mgd, the actual produced flow is less due to insufficient wastewater flow to Meadowlark. CMWD's uses 3.0 mgd during summer months and 2.0 mgd during winter months.

(3) Current Meadowlark WRF allocation for the Olivenhain Municipal Water District is 1.0 mgd with an option to purchase up to 1.5 mgd.

(4) Based on the agreement between LWD and CMWD that states that the Gafner WRP can produce up to 0.75 mgd, a maximum and minimum annual purchase of 840 AFY (0.75 mgd) and 200 AFY (0.18 mgd), respectively.

(5) As the Gafner WRP is not connected to CMWD's recycled water system and the demand of the La Costa Resort and Spa south golf course MMD is only 0.6 mgd (versus 0.75 mgd capacity at Gafner WRP), the total existing usable capacity is limited to 10.6 mgd.

CWRF and Gafner WRP currently operate as tertiary treatment plants, treating secondary effluent from the Encina Water Pollution Control Facility (EWPCF). Meadowlark WRF operates as a "skimming" plant by VWD, and therefore discharges solids into a 10-inch diameter sludge pipeline for treatment at the EWPCF. The ability of VWD to reliably produce recycled water on an annual basis further offloads their wastewater treatment and disposal requirements at EWPCF. For this reason, VWD executed a "take-or-pay" agreement with CMWD for minimum quantities of recycled water on an annual basis to encourage a year-round consistent supply of recycled water from Meadowlark WRF.

The CWRF and Meadowlark WRF are located at opposite ends of the reclaimed water system and at much different elevations. One major benefit of the Meadowlark WRF is the ability to deliver recycled water at a much higher hydraulic elevation into the CMWD distribution system. Historically, CMWD has utilized this supply to more efficiently serve the higher 550 Pressure Zone. In contrast, the CWRF located at sea level requires pumping to reach the 384 Pressure Zone and a second pumped lift to reach the 550 Pressure Zone. Over the past few years, CMWD has seen deliveries on average 50 percent of the required supply from each Plant, based on the demands in the 384 and 550 pressure zones. These reclamation plants are further described below.

3.3.1 Carlsbad WRF

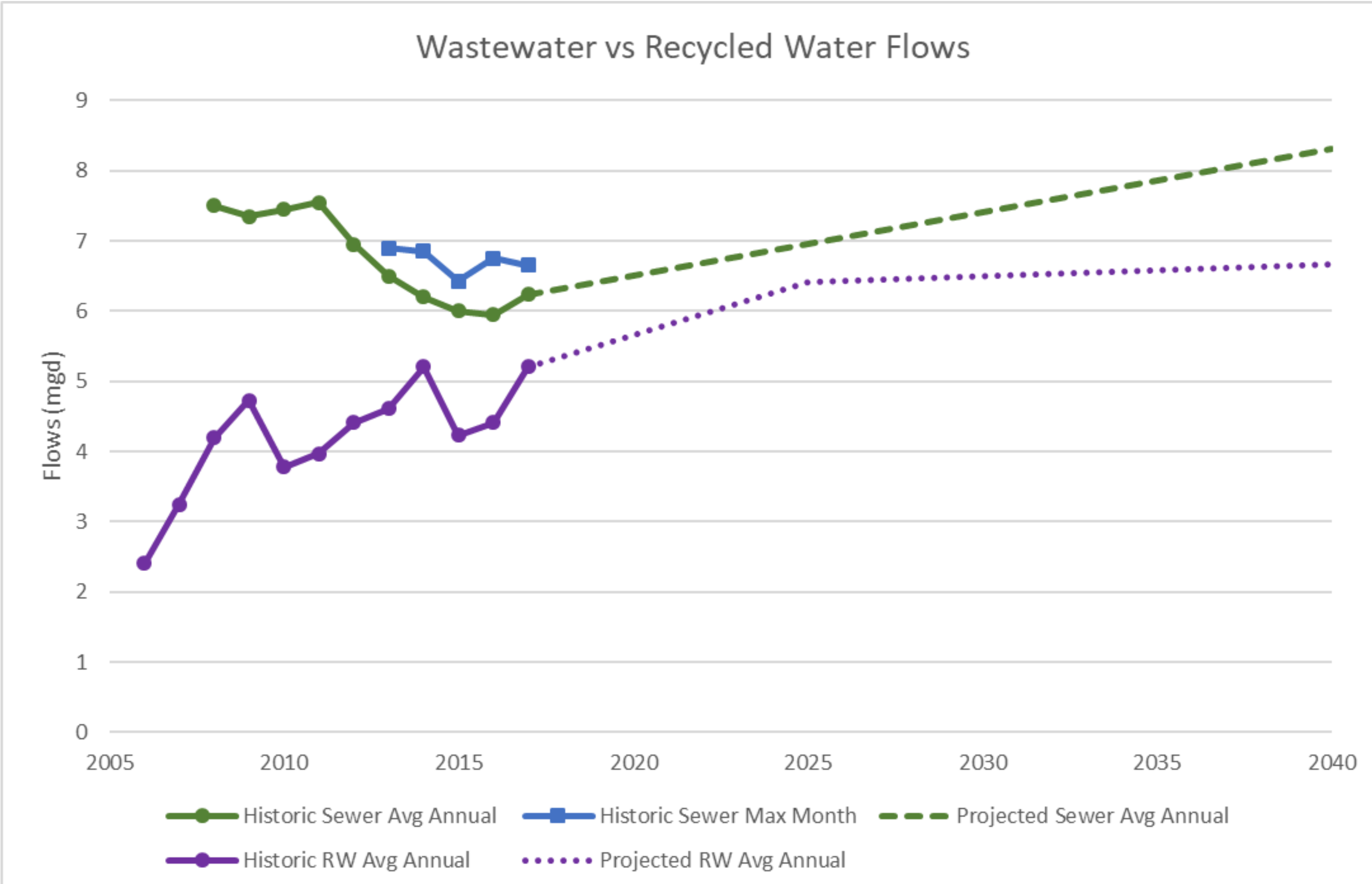
The CWRF treats secondary effluent from the adjacent Encina Water Pollution Control Facility (EWPCF). The CWRF is owned by CMWD and operated under contract by the Encina Wastewater Authority (EWA) through a memorandum of understanding (MOU) dated May 1, 2005. With the completion of the 3.0 mgd tertiary expansion, EWA will continue to operate the newly expanded plant via the existing joint sewage system agreement. EWCPF is operated under the 2014 Revised Basic Agreement for Ownership, Operation and Maintenance of a Joint Sewage System, signed by the Cities of Carlsbad, Vista and Encinitas, as well as the Buena Sanitation District and Leucadia Wastewater District. This agreement allows that any member agency, at its own expense, has the right to reclaim water from any wastewater in the Joint System which emanates within the jurisdiction of the respective member agency.

The CWRF was originally designed to produce up to 4.0 mgd of disinfected tertiary recycled water that meets Title 22 of the California Administrative Code for “unrestricted non-potable reuse”. The expansion of the CWRF to a 7.0 mgd capacity was completed in November 2016. The goals of the expansion were to increase filtration reliability, enhance operational flexibility, and improve stored recycled water quality. The CWRF currently operates under a master recycling permit from the San Diego Regional Water Quality Board (RWQCB), Order No. R9-2016-0183 (included in Appendix A). The order included a special provision (VI.C) that required the City to submit a nitrate study to verify that the use of recycled water from the CWRF for landscape irrigation does not cause groundwater to exceed the groundwater quality objective of 45 mg/L for nitrate. The study was provided to RWQCB on June 14, 2018.

The CWRF utilizes granular media filtration (GMF) and membrane microfiltration (MMF) for filtration of secondary effluent from the EWPCF to comply with Title 22 of the California Administrative Code for “unrestricted non-potable reuse.” The CWRF expansion included the addition of three pressurized ultrafiltration skids to produce 3.4 mgd of additional filtrate flow, the addition of a second chlorine contact basin to double the disinfection capacity, and replacement of alum and polymer metering pumps to increase coagulant feed capacities to the GMF train. It is the vision of CMWD to continue to expand the recycled water system with new users and increased demand to maximize and optimize the supply from the CWRF. Furthermore, based on the reduced recycled water demands projected for 2040, sufficient wastewater flows should be available at EWPCF.

Figure 3-6 illustrates the projected average annual wastewater flows from the City through 2040 as presented in the 2019 Sewer Master Plan. The projected increase in average annual recycled water use is also shown on Figure 3-6. In summary, on an annual volumetric basis, they City’s total wastewater volume produced exceeds the annual recycled water supplied.

Figure 3-6: Project Wastewater and Recycled Water Flows



3.3.2 Meadowlark WRF

The Meadowlark WRF is owned and operated by the Vallecitos Water District (VWD) and serves both CMWD's recycled water system and a portion of the Olivenhain Municipal Water District's (OMWD) recycled water system within the City of Carlsbad. The Meadowlark WRF is operated under Waste Discharge Requirements established by the San Diego Regional Water Quality Control Board in Order R9-2007-0018 (see Appendix A). The Meadowlark WRF consists of headworks, primary sedimentation tanks, roughing filters, aeration basins, secondary clarifiers, and new media granular filters and chlorination. The upgraded Meadowlark WRF produces disinfected tertiary effluent in compliance with Title 22 of the California Code of Regulations. This recycled water is delivered to Carlsbad and Olivenhain Municipal Water Districts for purveyance of recycled water under each District's master reclamation permit.

Recycled water produced at Meadowlark WRF is delivered to the Mahr Reservoir, from which CMWD and OMWD draw to supply their recycled water distribution systems. A Tri Agency Operations MOU for Mahr Reservoir, dated January 2017 (included in Appendix A), dictates the amount of recycled water available to each agency and provides operational guidelines for Mahr Reservoir to preserve minimum storage and optimize water quality in the reservoir.

Under normal operations, CMWD is contracted via the "take-or-pay" agreement for 2.0 mgd during the months of December, January, February and March. During the remaining months, CMWD is contracted for 3.0 mgd. If CMWD desires more, Carlsbad Operations staff may contact Vallecitos

Meadowlark WRF staff to discuss availability. Approval is dependent on Mahr Reservoir levels and Meadowlark WRF production. Agreed upon actions are addressed through written notification. Appendix A includes the VWD and CMWD recycled water agreement.

CMWD has the right to utilize a maximum of 32 MG of available storage when Mahr Reservoir is at full capacity (593 feet). Mahr Reservoir's maximum capacity available for CMWD's use is 60 percent of capacity between 593 feet and 560 feet at any time, unless there is a potential harm to Mahr Reservoir and/or Meadowlark WRF's operations.

CMWD may store reclaimed water produced at their reclamation plant in Mahr Reservoir, up to their maximum storage capacity of 32 MG. To discuss reclaimed water storage availability prior to delivering water to Marh Reservoir, the CMWD's Water Operations Supervisor may contact the Meadowlark WRF Plant Supervisor. This water is then tracked using the existing flow meter used to record Carlsbad's reclaimed water usage. The reclaimed water stored in Mahr Reservoir that was produced by Carlsbad's treatment plant is for the exclusive use of Carlsbad and is not delivered to another agency.

Wastewater flows to Meadowlark WRF and production of recycled water at Meadowlark WRF is highly dependent on available sewer flows to VWD Lift Station No. 1, which diverts flows to the Plant. The recent drought and water conservation have reduced many agencies' sewer flows and has at times reduced the available recycled water production at Meadowlark WRF. VWD anticipates continued growth in the sewer basin and further increases in wastewater flows to Meadowlark WRF.

Recycled water quality has significantly been improved the past several years at the Meadowlark WRF, with current Total Dissolved Solids (TDS) values ranging from 500 to 700 TDS. This has been a result of VWD now taking a direct supply of high quality desalinated potable water from the SDCWA's Carlsbad Desalination Plant, resulting in much higher influent quality at the Meadowlark WRF.

3.3.3 Gafner WRP

The Gafner WRP is owned and operated by the Leucadia Wastewater District (LWD) under San Diego Regional Water Quality Board Order R9-2004-0223 (see Appendix A). LWD owns and operates the Encina Effluent Pump Station (EEPS), located at the EWPCF. The EEPS diverts secondary effluent wastewater from the EWPCF upstream of the Encina Ocean Outfall. From the EEPS, the diverted wastewater is sent through the LWD Gafner Land Outfall, approximately 28,220 feet long (5.34 miles), to the Gafner WRP.

The Gafner WRP exclusively supplies recycled water for irrigation of the south golf course of the La Costa Resort and Spa, which lies within the CMWD. LWD wholesales the recycled water to CMWD who then retails it to La Costa Resort at the adopted rate. The Gafner WRP does not connect to the rest of CMWD's recycled water distribution system. The facility has only tertiary processes consisting of coagulant chemical addition, flocculation, clarification, filtration, and chlorine disinfection. Any reclaimed water that is undeliverable or fails to meet Title 22 standards is automatically diverted to the sanitary sewer for treatment at the EWPCF.

3.3.4 Existing and Future Available Supply Capacity

The recent expansion of the CWRF has positioned CMWD well to meet future recycled water demands and reliably provide supply to existing customers in the event of reduction or loss in recycled water supplies at the Meadowlark WRF. Under the baseline existing demand scenario (year

2014), average annual recycled water demands are approximately 4.1 mgd. Assuming a peaking factor of 1.7 for maximum month, required WRF supplies would be approximately 7.0 mgd. Referring to Table 4-1, CMWD is operating at about two-thirds capacity of their potential recycled water supplies. Moreover, CMWD now has the ability to fully meet its existing demand from the CWRF, which is rated at 7.0 mgd.

In the future demand scenarios, the “high” level demand forecast, including outside City demand, is approximately 7,000 AFY or 6.2 mgd. The “medium” forecast has been recommended for CIP planning and resulted in an average demand of approximately 5.32 MGD, which would require a maximum monthly supply of approximately 9.0 to 10.6 mgd. Should this level of demand be reached, it can be met by the existing WRF capacities. In summary, CMWD has sufficient available supply capacities, under its current agreements and assuming CMWD continues to purchase up to 3.0 MGD from VWD, to reliably meet existing and future demands of the recycled water system. There may be opportunities in the re-negotiation of the VWD/CMWD agreement to potentially reduce VWD “take or pay” supplies with the newly expanded CWRF supply.

Chapter 4 Regulations and Design Criteria

Recycled water service is provided by the Carlsbad Municipal Water District (CMWD). The production, discharge, distribution, and use of recycled water are subject to federal, state, and local regulations. The primary objective of these regulations is to protect public health.

While wastewater discharges are governed by both federal and state requirements, currently there are no federal regulations that directly govern water recycling practices in the United States (U.S.) Federal regulations relevant to the discharge of recycled water, wastewater, and any other liquid wastes to "navigable waters" are contained in the 1972 amendments to the federal Water Pollution Control Act of 1956, commonly known as the federal Clean Water Act (CWA) (Public Law 92-500).

In 2012, the U.S. Environmental Protection Agency (EPA) issued the updated "Guidelines for Water Reuse" to meet the needs of the 30 states that had adopted water reuse regulations and provide a national overview of practices. The document is available from WateReuse and can be found at this link: https://watereuse.org/wp-content/uploads/2015/04/epa-2012-guidelines-for-water-reuse.pdf.

This chapter provides a discussion of the roles and responsibilities of the agencies involved in the safe production and use of recycled water. Subsequently, the existing regulations on federal, state, regional, and local level are described. This section concludes with a discussion on future regulations and potential impacts to CMWD.

4.1 Recycled Water Regulations

This section provides an overview of recycled water regulations, including recent updates in regulations. A discussion is included on the State of California requirements for recycled water and governing codes. Lastly, the section presents the design criteria for the CMWD recycled water system.

4.1.1 Overview of Regulatory Agency Responsibilities

The primary areas of responsibility and authority between these agencies on the use of recycled water were originally allocated in the 1996 Memorandum of Agreement between the California Department of Public Health (CDPH), the State Water Resources Control Board (SWRCB), and the Regional Water Quality Control Boards (RWQCB). In 2016, the Drinking Water Program at CDPH became part of the SWRCB as the Division of Drinking Water (DDW).

These agencies work together to develop plant discharge or master reclamation permits for recycled water projects. Generally, the DDW interprets the laws dictated by the California Code of Regulations (CCR) applicable to reclamation and makes recommendations on individual projects to the RWQCB. The RWQCB issues the final permit for water reclamation projects, incorporating the recommendations of the DDW. In addition, in the County of San Diego, the former CDPH delegated the review of proposed recycled water use areas, use site distribution plans, complete cross connection control shutdown testing, and use site inspections to San Diego County's Department of Environmental Health (DEH). The roles of the agencies involved in the management of recycled water are summarized in Table 4-1.

Table 4-1: Roles of Agencies Involved in Recycled Water Use

Responsibility	DDW	RWQCB	CMWD	Recycled Water Customer	San Diego DEH
Treatment Facility					
Review treatment plant design criteria	□	■			
Title 22 Engineering Report	□	■			
Treatment Plan Inspections	□	■			
Discharge Permits	□	■			
Enforcement actions for non-compliance	□	■			
Distribution System					
Review for standards compliance	□		■		
Master reclamation permit		■			
Annual Title 17 Inspections	■				
Review cross-connection programs	□				
Customer Site Areas					
Develop standards for use areas			■		□
Review/approve supplier rules and regulations	□	■			
On-site inspection	□	□	■		■
Cross-connection inspection			■	■	■
Cross-connection testing			■	■	■
Monitoring on-site use			■	■	□
Enforcement actions for non-compliance		□	■		□

Source: California-Nevada Section American Water Works Association 1997

■ = Entity with primary responsibility

□ = Entity with secondary responsibility

4.1.2 Recent Updates in Recycled Water Regulations

The Carlsbad Water, Recycled Water, and Sewer Master Plans were last updated in 2012, reflecting current regulatory outlooks at that time. Regulatory concerns and requirements have changed over the past 5 years to reflect ongoing technology advancements, climate change and social values. This section provides updates to recycled water regulatory issues current to the 2017-2019 timeframe.

In general, the significant regulatory updates are summarized below. The following sections provide additional detail on the current state of recycled water regulations. The federal Clean Water Act (CWA) and State standards Title 22 and Title 17 are the guiding regulations for recycled water. Other relevant regulations include:

- Health and Safety Code, Division 6, Part 1, Sanitary Districts Act of 1923, Chapter 4
- Water Code, Division 7, Water Quality, Chapters 7 & 7.5

Recent regulatory changes that concern recycled water operations are listed below.

Federal

- No federal regulations are anticipated for recycled water.

State of California

- The allowance of groundwater recharge using recycled water for indirect potable reuse became effective June 18, 2014.
- The SWRCB is currently reviewing surface water augmentation amendments to Title 22 to provide standards for indirect potable reuse applications at surface reservoirs.
- The SWRCB determined in December 2016 that it was feasible to develop and adopt direct potable reuse regulations provided research and knowledge gaps are addressed. Regulations will not be finalized until these information gaps are filled.
- The Water Reclamation Requirements for Recycled Water Use became effective on August 6, 2016. That permit replaces the existing statewide waste discharge requirements (WDR) for Recycled Water Use (2014-0090-DWQ).
- The allowance of surface water augmentation using recycled water for indirect potable reuse became effective March 6, 2018.

As potable reuse became a more acceptable concept for the general public and regulations for safely implementing a potable reuse project advanced, two new guidance documents were published in 2017. The World Health Organization prepared the California-Nevada Section American Water Works Association (World Health Organization 2017), and the EPA issued the *2017 Potable Reuse Compendium* (EPA 2017) For a basic primer on potable reuse, the American Water Works Association published Potable Reuse 101: An Innovative and Sustainable Water Supply Solution (American Water Works Association 2016). Future regulatory considerations for the use of recycled water for potable reuse in the State of California include the following:

Indirect Potable Reuse

On March 6, 2018, the SWRCB adopted regulations establishing uniform water recycling criteria for the planned placement of recycled water into a surface water reservoir that is used as a source of raw water supply by a public water system for the provision of drinking water, such that the adherence to the criteria would result in public health being adequately protected. The planned placement of recycled water into a surface water reservoir that is used as a source of raw water supply by a public water system is known as surface water augmentation. Findings by an expert panel determined that the water recycling criteria in place for surface water augmentation does protect public health.

Direct Potable Reuse

On October 6, 2017, Assembly Bill 574 was signed into law to expand the use of recycled water. This follows the investigation required by the Recycled Water Policy to determine the feasibility and safety of direct potable reuse and the findings of the expert panel. Assembly Bill 574 is the next step in the effort to implement direct potable reuse. The bill provides the authority and a timeline for SWRCB to establish regulations for direct potable reuse. The forthcoming regulations will provide the framework for direct potable reuse and will provide agencies guidance on this prospective water source. The bill goes into effect January 1, 2018. Regulations will need to be completed by the SWRCB by December 31, 2023.

4.1.3 California Recycled Water Regulations

State requirements for production, discharge, distribution, and use of recycled water are contained in the:

- California Water Code (CWC), Division 7 (Water Quality), Sections 1300 through 13999.16
- California Administrative Code, Title 22 – Social Security, Division 4 – Environmental Health. Chapter 3 – Water Recycling Criteria, Sections 60301 through 60475
- California Administrative Code, Title 17 – Public Health, Division 1 – State Department of Health Services, Chapter 5 – Environmental Sanitation, Subchapter 1, Group 4 – Drinking Water Supplies, Sections 7583 through 7630

In addition, guidelines for the production, distribution, and use of recycled water have been prepared or endorsed by state agencies administering recycled water regulations. A summary of existing and future DDW statutes and regulations, along with the pertinent available guidance documents, is listed in Table 4-2.

Table 4-2: Summary of California Recycled Water Regulations

Regulations
Title 22, Division 4, Environmental Health, Chapter 3
Title 17, Division 1, California Department of Public Health, Chapter 5
Policy for Water Quality Control for Recycled Water (Recycled Water Policy) (2009, amended 2013)
Groundwater Recharge Regulations (2014)
Water Reclamation Requirements for Recycled Water Use (adopted 2014, updated 2016)
2016 California Plumbing Code
Surface Water Augmentation, Indirect Potable Reuse (2018)
Statutes
Health and Safety Code, Division 6, Part 1, Sanitary Districts Act of 1923, Chapter 4
Water Code, Division 7, Water Quality, Chapters 7 and 7.5
Draft Legislation
Direct Potable Reuse (Feasibility study performed in 2016; Assembly Bill 574 2017)
Guidance Documents
Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water

Sources: SWRCB 2009 and 2018

4.1.3.1 State Water Code

The Porter-Cologne Water Quality Control Act (CWC – Division 7), which was promulgated in 1969, established the SWRCB as the state agency with primary responsibility for the coordination and control of water quality, water pollution, and water rights. Nine RWQCBs were established to represent the SWRCB regionally and carry out the enforcement of water quality and pollution control measures. In addition, each RWQCB is required to formulate and adopt water quality control plans, establish requirements for waste discharge to waters of the state, and has the authority to carry out provisions of the CWCA. The San Diego RWQCB has jurisdiction over the City of Carlsbad.

4.1.3.2 Code of Regulations – Title 22

In accordance with the requirements of Division 7 – Chapter 7 of the Water Code, CDPH prepared Title 22 in 1975. The current requirements of Title 22, as revised in 1978, 1990, and 2001, regulate production and use of recycled water in California. Title 22 establishes the quality and/or treatment processes required for an effluent to be used for a specific non-potable application, such as irrigation. The following categories of recycled water are identified:

- Undisinfected secondary recycled water
- Disinfected secondary-23 recycled water (23 refers to the coliform count requirement of 23 most probable number/100 milliliter)
- Disinfected secondary-2.2 recycled water (2.2 refers to the coliform count requirement of 2.2 most probable number/100 milliliter)
- Disinfected tertiary recycled water
- Disinfected tertiary recycled water with conventional treatment
- Disinfected tertiary recycled water without conventional treatment

The recycled water uses allowed by Title 22 are dependent on the effluent quality of the supply source. The recycled water may be used for all application listed in Table 4-3.

Table 4-3: Approved Use Applications for Disinfected Tertiary Recycled Water

Irrigation Uses
Food crops where recycled water contacts the edible portion of the crop, including all crop roots
Parks and playgrounds
School yards
Residential landscaping
Unrestricted-access golf courses
Food Crops, surface-irrigated, above-ground edible portion, and non-contacted by recycled water
Cemeteries
Restricted-access golf courses
Ornamental nursery stock and sod farms with unrestricted public access
Freeway landscaping
Pasture for milk producing animals for human consumption
Nonedible vegetation with access control to prevent use as a park, playground or school yard

Table 4-3: Approved Use Applications for Disinfected Tertiary Recycled Water

Vineyards with no contact between edible portion and recycled water
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest
Fodder and fiber crops and pasture for animals not producing milk for human consumption
Seed crops not eaten by humans
Food crops undergoing commercial pathogen destroying processing before consumption by humans
Any other irrigation uses not prohibited by other provisions of the California Code Requirements
Supply for Impoundment
Non-restricted recreational impoundments, with supplemental monitoring for pathogenic organisms
Restricted recreational impoundments and publicly accessible fish hatcheries
Landscape impoundments without decorative fountains
Supply for Cooling and Air Conditioning
Industrial or commercial cooling or air-conditioning involving cooling tower, evaporative condenser, or spraying that creates mist
Industrial or commercial cooling or air-conditioning not involving cooling tower, evaporative condenser, or spraying that creates mist
Other Allowed Uses
Flushing toilets and urinals
Priming drain traps
Industrial process water that may contact workers
Structural fire fighting
Decorative fountains
Commercial laundries
Soil compaction
Dust control on roads and streets
Flushing sanitary sewers
Consolidation of backfill material around potable water pipelines
Backfill consolidation around non-potable piping
Artificial snow making for commercial outdoor use
Commercial car washes, not heating the water, excluding the general public from washing processes
Industrial process water that will not come into contact with workers
Industrial boiler feed water
Non-structural fire fighting
Mixing concrete
Cleaning roads, sidewalks, and outdoor work areas
Other Uses Subject to RWQCB Approval
Groundwater recharge (permits issued on a case-by-case basis by the RWQCBs)

While DDW provides input to protect public health, the RWQCB creates provisions in the permit for the protection of beneficial uses of water and the protection of water quality. These provisions are based on the Water Quality Control Plan the RWQCB has adopted, otherwise known as the "Basin Plan". The Basin Plan is the RWQCB guide for the protection of the beneficial uses of water and the enhancement of water quality. This document provides water quality objectives for continued beneficial use of water resources. This study's area of interest falls within the purview of the *San Diego Water Quality Improvement Plan* (San Diego Basin Plan).

To assist with the compliance with the requirements outlined in Title 22, the DDW has prepared a number of guideline documents. Documents relevant to the production, distribution, and use of recycled water are:

Engineering Report

According to CWC Section 13522.5, all water purveyors that use, or propose to use, recycled water must prepare an engineering report according to the guidelines described in the Guideline for the Preparation of an Engineering Report on the Production, Distribution, and Use of Recycled Water. This report must be submitted to the appropriate RWQCB and DDW. The report must describe the recycled water production process, including raw and treated water quality, treatment process, plant reliability features, supplemental water supply, monitoring program, and contingency plan to prevent distribution of inadequately treated water. The report must include maps of the distribution system and describe how the system will comply with CDPH and American Water Works Association guidelines and Title 17. The report must also include maps and descriptions of proposed use areas, types of uses proposed, people responsible for supervising the uses, design of the user systems, and the proposed user inspection and monitoring programs.

Cross-Connection Control

The Manual of Cross-Connection Control/Procedures and Practices was prepared by CDPH in 1981 (and updated periodically) and focuses on establishing a cross-connection control program to protect the public against backflow and back-siphonage of contamination. Main elements of the manual include areas where protection is required, causes of backflow, approved backflow preventers, procedures, installation, and certification of backflow preventers and water shutoff procedures for conditions that pose a hazard to the potable water supply.

The current Title 22 requirements that were previously known as the "Purple Book" are now collected under the SWRCB's website as Recycled Water-Related Statutes and Regulations. The most recent compilation of recycled water laws can be found online at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/rwstatutes_20170113.pdf . These regulations apply to drinking water and additional requirements for recycled regarding cross-connection control, the treatment of wastewater, and administrative laws are found on the Water Recycling Funding Program's website at https://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/directory.shtml

4.1.3.3 Code of Regulations – Title 17

The focus of Title 17 is protection of (potable) drinking water supplies through control of cross-connections with potential contaminants, including non-potable water supplies such as recycled water. Title 17, Group 4, Article 2 – Protection of Water System, specifies the minimum backflow protection required on the potable water system for situations in which there is potential for contamination to the potable water supply. Recycled water is addressed as follows:

- An air-gap separation is required on "Premises where the public water system is used to supplement the recycled water supply."

- A reduced pressure principle backflow prevention device is required on "premises where recycled water is used…and there is no interconnection with the potable water system".
- A double-check valve assembly may be used for "residences using recycled water for landscape irrigation as part of an approved dual plumbed use area unless the recycled water supplier obtains approval from the local public water supplier to utilize an alternative backflow prevention plan that includes an annual inspection and annual shutdown test of the recycled water and potable water systems".

4.1.3.4 Statewide Policy for Water Quality Control for Recycled Water

To reduce the uncertainty of the regulatory requirements for recycled water, the SWRCB adopted a statewide Recycled Water Policy in May 2009 (SWRCB 2009). The impetus for the development of a statewide Recycled Water Policy stemmed from the current water crisis and a need to streamline and expedite the use of recycled water throughout the state in a manner consistent with existing state and federal laws. The purpose of the policy is to provide direction to the RWQCBs and the public on the appropriate criteria for issuing permits for recycled water projects. The policy was amended in 2013 to reduce monitoring of priority pollutants in landscape irrigation and address monitoring of constituents of emerging concern (CEC) in groundwater recharge projects.

The policy follows Title 22 requirements and intends to streamline recycled water use through the following measures:

Streamlining of Recycled Water Use Permits

The policy establishes consistent criteria that are intended to streamline the permitting process for the vast majority of recycled water applications. These criteria should expedite projects and allow the RWQCBs both the time and authority to focus resources on projects with site-specific conditions. Projects that are eligible for enrollment under a general order shall be enrolled within 60 days. Other applications not enrolled in a general order shall be considered for permit adoption within 120 days by the RWQCB if certain criteria are met.

Mandated Recycled Water Use

The SWRCB establishes a statewide mandate to increase the use of recycled water by 200,000 acre-feet per year by 2020 and by an additional 300,000 acre-feet per year by 2030. Agencies not providing a downstream beneficial use for recycled effluent are required to make it available on reasonable terms. Existing legislation considers it a waste if recycled water is not utilized when available (Water Code Sections 13550 et seq.). As part of this new policy, the SWRCB would exercise its authority pursuant to Water Code Section 275 to enforce the aforementioned mandates. The mandates are contingent on the availability of sufficient capital funding for the construction of recycled water projects from private, local, state, and federal sources.

Salt Nutrient Management Plans

By 2014, all basins were required to develop salt and nutrient management plans (with a 2-year extension available). Such plans will help areas meet water quality objectives on a basin wide basis instead of restricting individual recycled water projects. The basin plan developed by the Santa Ana Watershed Project Authority and the basin plan being developed by the San Diego County Water Authority have become examples for the entire state on how to prepare these plans. The salt and nutrient management plans work in conjunction with the Basin Plans, which cover salts as well as other constituents, to preserve the existing groundwater quality.

Anti-Degradation

Projects that use recycled water for groundwater recharge are approved depending on a basin's capacity to assimilate the increased concentrations of chlorides and other compounds that may be present in recycled water. If necessary, projects would need to implement anti-degradation measures in order to gain approval. Recycled water use projects that meet the criteria for streamlined permitting in a basin with a salt and nutrient management plan do not need to perform an anti-degradation investigation. These criteria are defined in detail in the Recycled Water Policy.

Funding

The SWRCB will request priority funding for storm water and recycled water projects that augment the local water supplies from the California Department of Water Resources.

Additional measures are included in the policy to ensure that recycled water use does not adversely affect groundwater basin quality. Such measures include:

Monitoring of Groundwater Basins

The salt and nutrient management plans require the use of monitoring wells to record water quality data, which needs to be submitted to the Regional Board every three years.

CECs

Groundwater recharge projects are required to test and monitor CECs. A Blue Ribbon Panel conducted a study on CECs which led to the amendment of the Recycled Water Policy. The amendment established monitoring requirement for CECs and surrogates in recycled water use for groundwater recharge.

Control of Incidental Runoff

Landscaping projects using recycled water are required to control the incidental runoff of recycled water through measures that include, but are not limited to, the following practices: installation and use of proper sprinkler heads; an operations and management plan (can apply to multiple sites); and application of limited irrigation during precipitation events.

The state policy also notes that if an agency producing recycled water is not using it for a beneficial use, as defined in the policy, that agency needs to provide that water to a purveyor on reasonable terms.

4.1.3.5 Regulations for Groundwater Recharge Using Recycled Water

Federal requirements relevant to the use of recycled water for groundwater recharge are contained in the 1986 amendments of the Safe Drinking Water Act, which focuses on the regulation of drinking water and control of public health risks by establishing and enforcing maximum contaminant levels (MCLs) for various compounds in drinking water.

State regulations for Groundwater Recharge Using Recycled Water became effective on June 18, 2014. The California Title 22 statutes now allow groundwater recharge projects, including recharge through spreading basins. Groundwater recharge water projects are required to be:

- Metered
- Developed through planned investment by the urban water supplier or a wastewater treatment agency.
- Treated to a minimum tertiary level.

- Delivered within the service area of an urban retail water supplier or its urban wholesale water supplier that helps an urban retail water supplier meet its urban water use target.

4.1.3.6 California Plumbing Code

The California Plumbing Code was updated in 2016 to relax the restrictive rules for installing dual plumbing for indoor recycled water use, as well as gray water. These changes pertain to Chapter 16 of Title 24, Part 5 of the CCR.

The new rules continue to remove some of the restrictions on the installation of recycled water pipe in buildings and even recognize that recycled water may be required by a public agency for toilet flushing. Noted updates of the new code are:

- Recycled water and on-site treated non-potable gray water allowed (601.2, ex (3)).
- Recycled water may be required by a public agency for flushing of water closets and urinals (601.2, ex (4)).
- On-site non-potable gray water systems shall meet National Sanitation Foundation 350 (1501.7).

4.1.4 Local Recycled Water Regulations

4.1.4.1 CMWD Mandatory Use Ordinance (Ordinance No. 43)

In 2005, CMWD adopted Ordinance No. 43 mandating the use of recycled water in accordance with CWC, Sections 461, 13510, and 13550. The ordinance recognizes that recycled water can reduce dependence on imported water and that certain uses of potable water may pose a nuisance where recycled water is available. Accordingly, the ordinance declares that recycled water shall be used within the jurisdiction wherever it is economically justified, financially and technically feasible, and consistent with legal requirements for preservation of public health, safety and welfare, and the environment.

CMWD is responsible for making the preliminary determination as to which existing potable water customers shall be converted to recycled water. Notice of this determination is sent to the customer, and upon receipt the customer has 90 days to submit an implementation plan to CMWD. The cost for the preparation of this plan should be paid by the customers with the exception of customers that decide to ask CMWD to prepare this plan and are willing to sign an acknowledgement to accept and install the proposed improvements in the plan prepared by CMWD. Once approved, the plan must be implemented within six months. The customers have 30 days to contest any preliminary determination after notice of receipt.

As part of the application process for a new development project, CMWD staff review planning documents to determine if the proposed development requires recycled water, if the proposed development should include provisions for future recycled water use, or if the development is considered suitable for recycled water. Provisions for a current or future recycled water connection may be required as a condition of approval. In addition, applications for remodeling of a property may also be reviewed for recycled water use feasibility. If the property in question is considered suitable for existing or future recycled water use, the use of recycled water may be conditioned on the remodeling application.

The ordinance also specifies CMWD policies for requested recycled water service, plan approval, field inspection, temporary use of potable water (until recycled water is available), and the recycled water rate. The ordinance defines CMWD’s authority in requiring recycled water use, clearly lists criteria for identifying potential users, and outlines the process for new customer connections.

4.1.4.2 Recycled Water Design Standards

San Diego County's Department of Environmental Health (DEH) has specific regulations governing the inspection and implementation of recycled water connections, contained in the *Recycled Water Plan Check and Inspection Manual* (DEH 2001). In San Diego County, the plan check and inspection responsibilities are shared between DDW and the DEH. DDW is responsible for the plan review of treatment processes, treatment plants, main conveyance systems, and proposed new and unusual uses of recycled water. In conjunction with CMWD staff, the DEH is responsible for plan review and inspections of all recycled water use sites. The County's Recycled Water Plan Check and Inspection Manual require the following design standards:

Off-Site Requirements

- Minimum Separation/Proximity of Utilities: Vertical separation requirements must be met if the pipeline maintains a positive pressure during the day.
- Horizontal Separation: A 10-foot horizontal separation must be maintained between a recycled water pipeline and a sewer main or water pipeline. Separations smaller than 10 feet need approval from CMWD and/or the CDPH depending on the separation distance. The state now only requires a 4-foot horizontal separation between a disinfected tertiary treated recycled water pipeline and a potable pipeline.
- Vertical Separation: A potable water line must be installed at least 1 foot above a recycled water line, which must be installed at least 1 foot above a sanitary sewer.

On-Site Requirements

- Separation: At the user site, the separation of utilities is similar to the off-site requirements, but individual purveyors may modify the required on-site distances. Areas of potable water irrigation and recycled water irrigation must be physically separated either by distance, concrete mow strips, or other approved methods, such as fences or walls.
- Minimum Depth: The minimum pipeline depth is defined in the City's landscape manual and is as follows:
- Pressured pipeline less than 3 inches in diameter require 18-inch cover
- Pressured pipeline between 3 and 5.5 inches in diameter require 24-inch cover
- Pressured pipeline of 6 inches and greater in diameter require 36-inch cover
- Non-pressured pipelines require 12-inch cover
- System Identification. All appurtenances related to the system (sprinkler heads, valve boxes, tags, quick couplers, etc.) must be color coded purple. All valve boxes shall be tagged with recycled water tags. On retrofit jobs, underground piping does not need to be changed.
- Sprinkler Location. Sprinklers located close to swimming pools, eating areas, and sand-filled play areas for children should be of the bubbler non-spray type or have adjustable nozzles. Alternatively, sprinklers can be located so that these areas are not oversprayed. 180-degree turf sprinkler heads adjacent to sidewalks are not acceptable since they overspray and cover 190 degrees.
- Sprinkler Coverage. Sprinklers must only cover the designated area. Measures need to be taken to avoid misting and wind-blown mist.
- Drinking Fountains. Drinking fountains must be protected from recycled water runoff, spray, or mist.

- Ponds. If a pond is receiving recycled water, potable water to the pond must be delivered through an air gap. Ponds can have fountains provided that the County's design guidelines are followed.
- Food Establishments. Recycled water should not be installed near drive-through windows or outdoor patio eating areas
- Hours of Irrigation: The County's Manual describes standard plan notes requiring hours for irrigation to be between 10:00 p.m. and 6:00 a.m. However, if the recycled water meets tertiary treatment standards, the local water authority may modify the hours for irrigation under the qualification that irrigation during public use periods is supervised. Thus, CMWD could modify the hours of irrigation for customer sites where supervision during public hours is possible.
- Cross-Connection Testing: The County's manual also specifies testing procedures and frequency to ensure that there are no cross connections with the potable water system.

CMWD has also developed rules and regulations for the use of recycled water. These rules and regulations are incorporated as Attachment B to the 2016 Master Recycling Permit and included within three chapters of the *Engineering Standards: Volume 2, Potable and Recycled Water Standards* (CMWD 2016), as follows:

- Chapter 2 – Rules and Regulations for Use of Recycled Water: This chapter sets forth the general requirements and conditions as well as the administrative requirements pertaining to the use of recycled water in CMWD as required by the Master Reclamation Permit, the DDW, and the DEH.
- Chapter 3 – Design Guidelines and Procedures: This chapter provides the design procedures, planning and design criteria, as well as the specifications for the location, type, and size of water facilities.
- Chapter 5 – Requirements for Onsite Recycled Water Systems: This chapter defines the design requirements, construction specifications, and operational requirements for onsite (private) recycled water systems.

In June 2018, CMWD submitted a nitrate study to assess the impact of recycled water on underlying groundwater quality. This study addresses appropriate agronomic irrigation rates for recycled water specific to Carlsbad recycled water customers.

Recommendations

CMWD currently abides by the stipulations imposed by DDW through the 2016 Master Recycling Permit, and DEH through CMWD standards found in *Engineering Standards: Volume 2, Potable and Recycled Water Standards* (CMWD 2016).

CMWD should monitor the progress on the potable reuse regulations to prepare for upcoming opportunities for this new water source.

4.2 Design Criteria

As part of the planning process, design criteria from the previous master plans was reviewed with engineering and operations staff to re-confirm the design criteria or update specific criteria based on system operations the past five years. The design criteria also include higher level of service standards and goals that were revisited as part of the engineering and operations discussions. The design criteria for the 2019 Recycled Water Master Plan is shown in Table 4-4.

Table 4-4: 2019 Recycled Water Master Plan Design Criteria

Parameter	Criteria	Demand Condition
Demand Condition		
Average Day Demand (ADD)	1.0 x ADD	
Maximum Month Demand (MMD)	1.7 x ADD	
Minimum Month Demand (MinMD)	0.2 x ADD	
Peak Hour Demand	5.1 x ADD	
8-hour irrigation	3.0 x MMD or 5.1 x ADD	
3-hour irrigation	8.0 x MMD or 13.6 x ADD	
System Pressure		
Minimum System Pressure	60 psi	Peak Hour Demand
Maximum System Pressure	150 psi	Minimum Hour Demand
Pipeline Velocity		
Evaluation of Existing Pipelines:		
Max. Velocity	7 fps	Peak Hour Demand
Sizing of New Pipelines:		
Max. Velocity (Diameter > 12-inch)	5 fps	Peak Hour Demand
Max. Velocity (Diameter ≤ 12-inch)	7 fps	Peak Hour Demand
Pipeline Head Loss		
Evaluation of existing pipelines:		
Max. Head Loss	7 ft/1,000 ft	Peak Hour Demand
Sizing of new pipelines:		
Max. Head Loss	5 ft/1,000 ft	Peak Hour Demand
Friction Factor (Hazen-Williams)		
Existing Pipelines (< 20 years old)	130	All conditions
Pipelines (20-50 years old)	120	All conditions
Storage Volume		
Operational Storage	33% of MDD	Maximum Month Demand
Short-term Emergency Storage	17% of MDD	Maximum Month Demand
Total Storage	50% of MDD	Maximum Month Demand
Pump Station Standby Capacity		
For Zones with Gravity Storage	Meet MDD with largest pump unit out of service	Maximum Month Demand
For Zones without Gravity Storage	Meet PHD with largest pump unit out of service	Peak Hour Demand
Backup Power	Connection for Portable Generator (in Zones without Gravity Storage)	Peak Hour Demand

Chapter 5 Hydraulic Model Development

This section describes the hydraulic model development and update for the 2019 Master Plan. As part of this model development process, the hydraulic model used in the previous (2012) Master Plan was updated with regard to infrastructure and demand loading to represent the following systems:

- Existing System Hydraulic Model – Updated to represent the 2016 distribution system based on available information and meter data
- Buildout System Hydraulic Model – Updated with projected buildout flows and improvement projects and used to identify potential future capacity constraints.

5.1 Model Parameters

Hydraulic modeling and analysis were performed using the software package InfoWater by Innovyze. The version of the software used was InfoWater Suite 12.4. This section discusses some important aspects of the modeling software.

A detailed hydraulic model is a valuable tool used to analyze the complex operation of a water distribution system. The steps of model formulation include:

- inputting or obtaining the system's physical data in GIS format,
- translating the physical data into a network of nodes and links,
- determining "boundary" conditions,
- inputting accurate water demands, and
- calibrating the model to simulate actual field conditions.

The physical data includes the geographic network of pipes, nodes, tanks, pump stations, valves and supply sources that represent the CMWD recycled water system. The connectivity of the pipes and nodes in GIS is required such that the physical data in the model can be hydraulically linked. To perform the hydraulic analyses, the model software requires that certain information be entered into the database. Pipe information includes the pipe diameter, length, pipe material and associated roughness coefficient. The function of the roughness coefficient, which is known as the Hazen Williams "C" factor, is to estimate friction losses (pressure drop) in the pipelines. The "C" factor is assigned based on diameter, material, and age of the pipe, and values range from 70 to 140. Node information includes the node elevation and water demand (or supply) at that point in the system.

Initial hydraulic "boundary" conditions are also required to be entered into the model database, particularly for tanks (starting water level) and valve settings (pressure control, open/closed). CMWD water supply sources are modeled as constant supplies into the water system. Understanding and properly simulating these boundary conditions are critical to the successful calibration of the model.

Determining accurate water demands is another critical component to developing a reliable hydraulic model. Metered demands, water supplies, and changes in tank volumes are reviewed over a given period to determine actual daily demand patterns, while annual consumption by metered account provides a spatial distribution of demand and average system usage.

5.2 Existing System Model Update and Calibration

CMWD's initial hydraulic model of its recycled water distribution system was developed in 2000 as a part of the Encina Basin Recycled Water Distribution System Study (JPA, 2000) using H2ONET® Version 2.0. As part of the 2012 Recycled Water Master Plan, the hydraulic model was updated to H2OMAP® Water.

This Recycled Water Master Plan converted the H2OMAP Water hydraulic model to InfoWater and updated existing facilities based on CMWD's available GIS databases for pipes.

Demands were updated based on historical billing records for the calendar year 2016. Demands from customer meters were allocated to the existing junction within the hydraulic model nearest the location of the meter in CMWD's GIS layer of meters.

The model was calibrated during the 2012 Master Plan Update; as such, this Master Plan Update did not create a new calibration plan and assumed the model represents the operational parameters of the recycled water system.

5.3 Buildout Model Development

The future system hydraulic model was created to evaluate and size expansion alignments and storage recommendations discussed in Chapter 7.

Development of the future system model consisted of the following steps:

- Determine preliminary alignments of expansion segments based on locations of the potential customers from the customer database and recommendations from previous Master Plans.
- Incorporate preliminary expansion segments into the hydraulic model
- Assign demands from the customer database to the expansion segments
- Increase sizing of pipelines to resolve deficiencies in the proposed system, if necessary.

The future system model was created based on expansion segments identified in the 2012 Recycled Water Master Plan (See Appendix C). Demands were allocated into the model based on future conversion customers and estimated irrigation demands.

Chapter 6 System Evaluation

This section discusses the evaluation of the modeled systems discussed in Section 5, which includes capacity analysis of the existing and the future 2040 systems. Under the 2040 scenario the medium recycled water demand forecast was assumed for capital improvements, however, model scenarios did consider pipeline extension oversizing, if a future “high demand forecast” customer was along the pipeline. System evaluations were based on hydraulic capacity analyses conducted by running the models under peak summer irrigation demand conditions and comparing model results with the evaluation criteria discussed in Section 4.2. Pump station and storage capacity analyses are included in this section for both the existing and 2040 systems.

6.1 Existing System Capacity Analysis

The existing system capacity analysis is based on the existing demand of 4,650 AFY (4.1 MGD) presented in Section 3.1 and a maximum month demand of 7.0 MGD, based on a summertime peaking factor of 1.7 times average. The maximum month average daily demand (MMD) is the basis for evaluating pumping and storage capacities for the major pressure zones, as well as required recycled water supply from the reclamation plants. The remaining section summarizes the capacity analysis for the existing recycled water system

6.1.1 Capacity Model Analysis

Capacity assessment for the existing system was performed under an extended period simulation with demand patterns which were previously calibrated and reviewed from the 2012 Master Plan model simulations. The assessment was based on the evaluation criteria discussed in Section 4.2. A peak hour time step was selected to review minimum pressures, system headlosses, and pipelines velocities. Extended period simulations during maximum month demands allowed for review of tank operations. A summary of model findings and observations include:

- The majority of the CMWD recycled water system is operated with pressures ranging between 100 psi and 150 psi, due in part to the varying topography and the lower elevations along the coast.

- Low pressure areas are generally located near the D Tank area and are mostly contributed to the high elevations in this particular portion of the pressure zone. There are a few isolated lower pressure areas in the Bressi Ranch area. The lower pressure areas are not reported to be problems for users.

- Under peak hour demand conditions, pipeline velocities were well within design criteria. Transmission mains leading from the supply sources (WRF’s) and storage tanks are adequately sized.

- Tank C, the converted potable water tank, at times is reported to not cycle adequately. This is in part due to its location and water level in the 384 Pressure Zone. Its primary benefit is to serve as a forebay tank for the Calaveras Pump Station. However, given the low demand in the pumped system, CMWD could operate the system with Tank C offline, as in previous years.

- The current supply balance of recycled water from the CWRF and Meadowlark WRF appears to optimize the distribution energy costs as Meadowlark WRF is meeting most of the upper zone demands during maximum month demand from the higher gradient supply at Meadowlark WRF. The upper system (Zones 550 and 660) requires about +/- 2.9 MGD during summer demands, which can all be supplied by Meadowlark WRF and the lower system (Zones 318, 384, and 580) requires about 4.1 MGD from CWRF.

- The Twin D tank site provides an important function in the heart of the distribution system, as a critical hydraulic control for managing varying daily and seasonal supplies from Meadowlark WRF and the CWRF facilities. A flow control flow valve allows excess Meadowlark WRF supply to be stored in the D Tanks. And the Twin D PS can convey excess CWRF supply to the 550 Zone. The need for potable make-up water at this location in the summertime is no longer needed with the expanded CWRF but can still provide a redundant supply for the recycled water system.

- In the future, with excess tertiary capacity at CWRF, CMWD may desire to increase supplies from the CWRF for various operational needs including, improving water quality with its RO sidestream, increased utilization of the new expanded CMWD asset, reduced wastewater at Meadowlark WRF impacting supply, and possibly new terms of a re-negotiated purchase agreement with VWD. For these reasons, and to provide more system flexibility and reliability, increased storage is recommended at the D Tank site, especially in light of the operating challenges with C Tank.

The Peak Hour velocity and pressure plots are presented in Figure 6-1 and 6-2, respectively. Pressure and velocity ranges are well within evaluation criteria under peak demands. Appendix C, includes analysis results.

Figure 6-1: Recycled Water Peak Hour Velocity

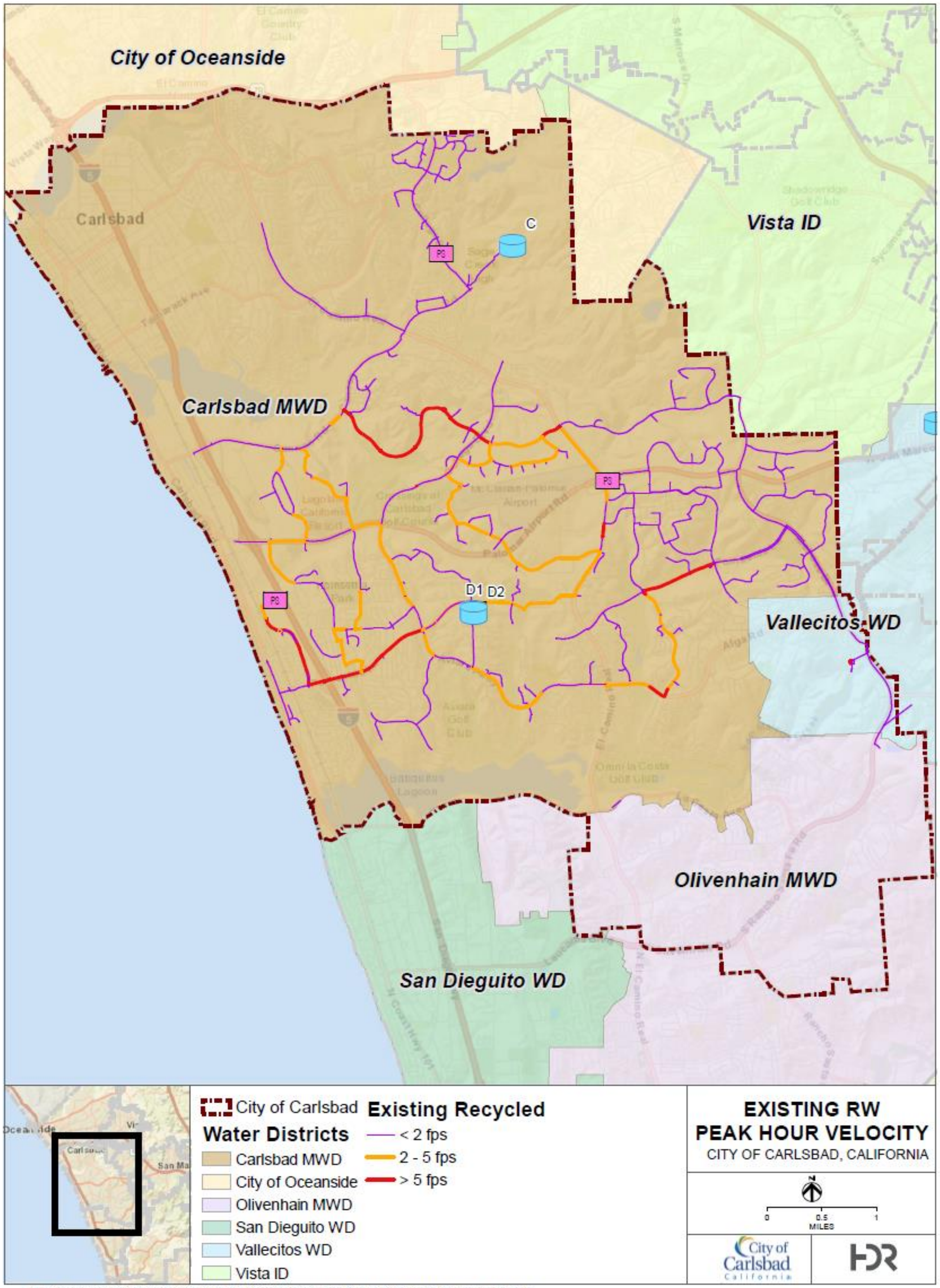
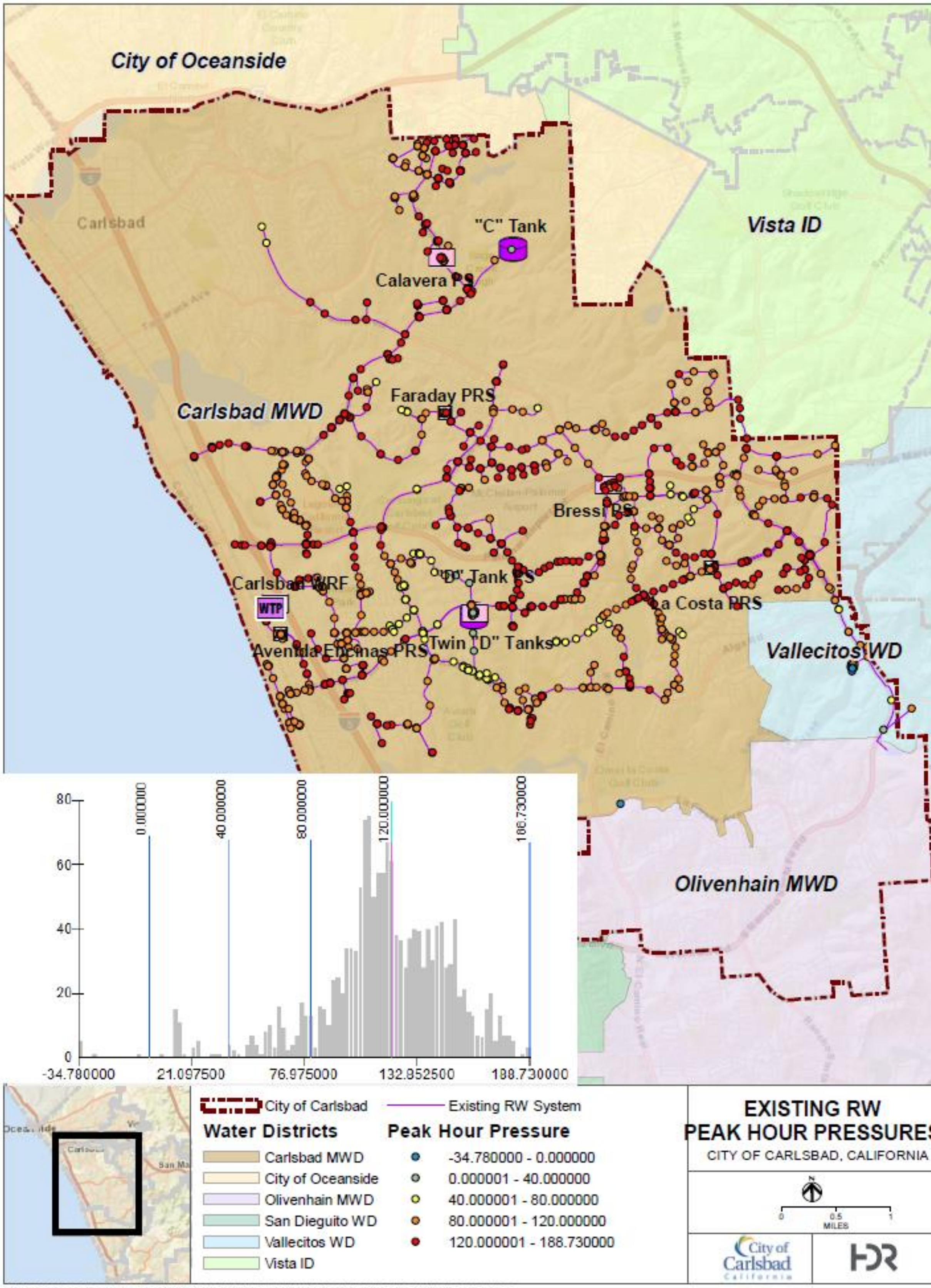


Figure 6-2: Recycled Water Peak Hour Pressure



6.1.2 Storage Capacity Analysis

Operational and short-term emergency storage requirements that were calculated based on the evaluation criteria discussed in Section 4-2 are presented in Table 6-1. Storage for the two closed pumped zones are included in the respective gravity zones providing the supply. For the reduced 318 Zone the storage capacity is assumed located in the 384 Zone, from which this zone is supplied. This table also shows a comparison of the requirements with the available existing storage capacity. It should be noted that a storage analysis is not conducted for Gafner WRP since operational storage is provided by the La Costa Golf Course (south) through on-site ponds and the system is isolated from the CMWD system.

Table 6-1: Storage Capacity Existing Evaluation

Zone	ADD	MMD (MGD)	Required Operational Storage(1,2) (MG)	Required Short-Term Emergency Storage(1,3) (MG)	Total Required Storage (MG)	Existing Storage (MG)	Balance (MG)
660	0.40	0.68	0.22	0.12	0.34	0.00	-0.34
550	1.27	2.16	0.71	0.37	1.08	0.00	-1.08
Subtotal	**1.67**	**2.84**	**0.94**	**0.48**	**1.42**	**0.00**	**-1.42**
Total w/ Mahr			**0.94**	**0.48**	**1.42**	**32.00**	**30.58**
580	0.14	0.24	0.08	0.04	0.12	0.00	-0.12
384	2.24	3.81	1.26	0.65	1.90	3.50	1.60
318	0.05	0.09	0.03	0.01	0.04	0.00	-0.04
Subtotal	**2.43**	**4.13**	**1.36**	**0.70**	**2.07**	**3.50**	**1.42**
Total w/o Mahr		**6.97**	**2.30**	**1.19**	**3.49**	**3.50**	**0.00**
Total w/ Mahr		**6.97**	**2.30**	**1.19**	**3.49**	**35.50**	**32.02**

Notes:

(1) Operational and Emergency Storage requirements are based on the evaluation criteria from Chapter 7.

(2) Based on the evaluation criteria, Operational Storage is 33 percent of the MMD.

(3) Based on the evaluation criteria, Emergency Storage is 17 percent of the MMD, or four hours.

(4) Supplies from Meadowlark WRF are taken at a constant rate greater than the demand of Zones 550 and 660. Consequently, Operational Storage for Zone 550 is not needed. When necessary, Mahr Reservoir can be used to buffer supplies at Meadowlark WRF.

As shown in Table 6-1, there is sufficient storage to meet operational and short-term emergency demand requirements under existing conditions. As noted in the table footnotes, Mahr Reservoir has the ability to provide operational storage for the 550 Zone and emergency storage for the entire system. Referring to Table 6-1, when Mahr Reservoir is included for the 550 and 660 Zones, there is a 30 MG surplus of storage for the zones. For the lower 384 Zone, CMWD has adequate storage for the existing system without any storage credit from Mahr Reservoir.

For this reason, the CMWD need for storage would be only for local operational benefit to stabilize pressures, for system flexibility in moving recycled water from CWRF. Moreover, CMWD also has 7.5 MG of equalization basin storage at the CWRF, which serves as a forebay for the CWRF Pump Station, which is also not included in the analysis but could provide additional storage benefits during peak demands or emergency needs. In summary, CMWD has adequate existing storage to meet demands assuming C Tank remains in service.

The following additional conclusions can be made regarding the existing system operations:

- Since supplies from Meadowlark WRF are taken at a constant rate and are at times greater than the demand of Zones 550 and 660, operational storage is not considered necessary within Zone 550. When necessary, Mahr Reservoir can be used to buffer supplies at Meadowlark WRF.
- For Zones 384, 580, and 318, which share common reservoir capacity, the total required operational and emergency storage is 2.07 MG. For Zones 550 and 660, the total required operational and emergency storage is 1.42 MG.

6.1.3 Pump Station Capacity Analysis

Pump station capacity requirements were also calculated based on the evaluation criteria discussed in Section 4-2 are presented in Table 6-2. The closed system pump stations must be sized for the highest demand condition which is peak hour and the pump station supplying reservoirs are typically sized for the systems MMD. However, given the potential varying supply capacities for the CWRF and Meadowlark WRF the following conservative assumptions were made:

- Twin D PS: Sized for MMD for the 550 and 660 Zones, conservatively assumes all supply from CWRF. Note, when Meadowlark WRF supplies all of the 550 Zone the Twin D PS may require minimum capacity and not even need to operate.
- CWRF PS: Sized for MMD for all pressure zones, conservatively assumes all supply from CWRF (100%). Note, when Meadowlark WRF supplies all of the 550 Zone the CWRF PS would operate to supply the remaining demand primarily in the 384 Zone.

Table 6-2: Pumping Capacity Evaluation - Existing Recycled Water System (100% CWRF Supply)

Booster Stations	Discharge	No. Pumps	Total Capacity (gpm)	Firm Capacity (gpm)	Required Capacity (gpm)	Surplus (gpm)
Bressi PS	660	2 duty, 1 standby	4,500	3,000	1,418	1,582
Calavera PS	580	2 duty, 1 standby	2,700	1,800	495	1,305
Twin D PS	550	3 duty, 1 standby	6,000	4,500	2,137	2,363
CWRF PS	384	3 duty	10,000	6,667	4,369	2,298

As shown above, all CMWD pump stations have sufficient pumping capacity to meet peak demands under the most conservative assumptions on supply.

6.2 2040 Capacity Analysis

As discussed in Section 5.3 the buildout model represents the 2040 system with planned future infrastructure and projected buildout flows under the medium demand forecast. The 2040 system capacity analysis is based on the medium demand forecast of approximately 5,950 AFY (5.3 MGD) summarized on Table 3-5 and a maximum month demand of 9.0 MGD, based on a summertime peaking factor of 1.7 times average. This section discusses the capacity analysis of the future 2040 system.

6.2.1 Capacity Model Analysis

Capacity assessment for the 2040 system was also performed under peak hour demands to review minimum pressures, system headlosses, and pipelines velocities with the increased demand and new pipeline segments added to the system. A summary of findings and observations include:

- The MMD demand under the 2040 scenario is projected to increase by approximately 2 MGD or 1,400 gpm, which would n be supplied from the CWRF and Meadowlark WRF. As noted in Section 3.3.4, CMWD has sufficient supplies to meet future 2040 demand under both medium (9.0 MGD) and high demand forecast scenarios (10.6 MGD).
- The 2040 modeling scenarios assume similar operating conditions as the existing system, with Meadowlark WRF supplying up to a maximum day of 3.0 MGD as in the current VWD agreement. Remaining supply would come from CRWF which would increase to 6.0 MGD during MMD.
- All new distribution pipelines added to the model are primarily to expand the system and increase demand, since the existing system performs well in meeting design criteria. The 2 MGD average annual demand increase in demand does not significantly impact the pressure or velocities.
- Transmission mains leading from the Plants and storage tanks are still sufficiently sized under 2040 demands.
- Section 6.3 includes several alternative scenarios which CMWD has requested to be presented in support of future decisions to be made in long term operations of the recycled water system. These are related to storage, water quality and supply options.

Appendix D includes 2040 hydraulic analysis results.

6.2.2 Storage Capacity

Storage requirements were also calculated for the 2040 system based on the evaluation criteria discussed in Section 4-2 and presented in Table 6-3. This table also shows a comparison of the requirements with the available existing storage capacity.

Table 6-3: Storage Capacity Evaluation for Year 2040

Zone	Average Demand (MGD)	Max Day Demand (MGD)	Operational Storage(1,2) (MG)	Short-Term Emergency Storage(1,3) (MG)	Total Required Storage (MG)	Existing Storage (MG)	Balance (MG)
660	0.42	0.71	0.24	0.12	0.36	0.00	-0.36
550	1.53	2.60	0.86	0.44	1.30	0.00	-1.30
Subtotal	**1.95**	**3.31**	**1.09**	**0.56**	**1.66**	**0.00**	**-1.66**
Subtotal w/Mahr			**1.09**	**0.56**	**1.66**	**32.00**	**30.14**
580	0.19	0.33	0.11	0.06	0.16	0.00	-0.16
384	3.07	5.22	1.72	0.89	2.61	3.50	0.89
318	0.10	0.18	0.06	0.03	0.09	0.00	-0.09
Subtotal	**3.36**	**5.73**	**1.89**	**0.97**	**2.86**	**3.50**	**0.64**
Total w/o Mahr	**5.32**	**9.04**	**2.98**	**1.54**	**4.52**	**3.50**	**-1.02**
Total w/ Mahr	**5.32**	**9.04**	**2.98**	**1.54**	**4.52**	**35.50**	**30.98**

Notes:

(1) Operational and Emergency Storage requirements are based on the evaluation criteria from Chapter 6.

(2) Based on the evaluation criteria, Operational Storage is 33 percent of the MMD.

(3) Based on the evaluation criteria, Emergency Storage is 17 percent of the MMD, or four hours.

(4) Supplies from Meadowlark WRF are taken at a constant rate greater than the demand of Zones 550 and 660. Consequently, Operational Storage for Zone 550 is not needed. When necessary, Mahr Reservoir can be used to buffer supplies at Meadowlark WRF.

As shown in Table 6-3, there is sufficient storage to meet operational and short-term emergency demand requirements under 2040 demand conditions, assuming Mahr Reservoir provides operational and emergency storage for the 550 and 660 Zone. For the lower 384 Zone, in the future, CMWD could benefit from an additional 1.0 MG of storage, assuming no storage credit from Mahr Reservoir. However, because of the ability to move Mahr Reservoir supply to the D Tank site, it is reasonable to credit the emergency storage component for the lower zones in Mahr Reservoir. Referring to Table 6-3, this emergency component is approximately 0.97 MG, which would result in minimal future storage deficiencies, assuming CMWD continues to maintain and operate its three distribution tanks. Section 6.3 discusses the merits of shifting C Tank storage to the D Tank Site for improved flexibility and reliability in future operations.

6.2.3 Pump Station Capacity Evaluation

The CMWD recycled water system has excess pump capacity since many of the stations were designed and constructed for ultimate conditions. Since demand has not been realized, especially in the closed zones, excess capacity exists at each of the stations. The closed zones have had to be retrofitted with smaller jockey pumps to more efficiently operate to meet the low demand conditions. The 2040 pump station capacity requirements were updated based on the evaluation criteria and similar existing system assumptions and presented in Table 6-4.

Table 6-4: Pumping Capacity Evaluation - Year 2040 Recycled Water System (100% CWRF Supply)

Booster Stations	Discharge	No. Pumps	Total Capacity (gpm)	Firm Capacity (gpm)	Required Capacity (gpm)	Surplus (gpm)
Bressi PS	660	2 duty, 1 standby	4,500	3,000	1,489	1,511
Calavera PS	580	2 duty, 1 standby	2,700	1,800	683	1,117
Twin D PS	550	3 duty, 1 standby	6,000	4,500	2,530	1,970
CWRF PS	384	3 duty	10,000	6,667	5,778	889

6.3 Additional Scenario Analyses

The section presents a discussion on additional analyses to further improve and enhance system operations.

6.3.1 C Tank Operations

The C Tank is a 1.0 MG 23-foot steel tank with high water level at 423 feet. The C Tank was a former potable tank that was converted to recycled water several years ago. Its primary function is to provide operational storage for the northeast portion of the CMWD system, including serving as a forebay reservoir for the Calavera PS. The tank has operating challenges including:

- Hydraulic elevation at the edge of system causes challenges in turnover, and loss of chlorine residual.
- The 384 Zone demand in this portion of the City is low there by further impacting the ability of the tank to drain during peak demands.
- The Calavera PS service area is much smaller than planned and is only serving an average demand of approximately 100 gpm. The pump station has 1,800 gpm of capacity and had to be retrofitted with a 50 gm 15 HP pump to meet the low demand. Which is not a large demand off the C Tank when operated.
- Therefore, the benefit of taking suction from a nearby tank is not as beneficial with low demands, as the 384 transmission mains could provide the required suction supply without large pressure swings.
- Emergency and operational storage could actually be located in the D Tanks in place of operating the C Tank.

- Given the future demands in this area are not anticipated to increase significantly, the operational challenges will continue for CMWD.
- By eliminating the C Tank, it appears reasonable to replace the lost storage at the D Tank site instead of relying on the higher Mahr Reservoir further away.

Based on the available and planned storage, and hydraulic analysis it appears reasonable to remove the C Tank (1.0) MG and add new storage at the D Tank site as discussed in the next section.

6.3.2 D Tank Storage

As earlier noted, the Twin D tanks provide an important storage function in the heart of the distribution system, this become more important should CMWD remove the C Tank from operations. In the future CMWD will be increasing supply from CWRF, assuming flows are maintained by agreement from VWD. It is also possible that CMWD may desire to increase supply, which will be available from CWRF. The ability to store and move this water at the D Site becomes more important.

Referring to Table 6-3, by year 2040, the lower 384 Zone is estimated to have a surplus storage of 0.64 MG, not including storage from Mahr Reservoir. However, assuming C Tank (1.0 MG) is abandoned, this system would have a storage deficiency of 0.40 MG. Moreover, the total CMWD recycled system, conservatively not including Mahr Reservoir, would see a total system deficiency increase from 1.0 to 2.0 MG.

It is therefore recommended that CMWD proceed with the planned third D Tank at a capacity between 1.5 MG and 2.0 MG. Final Tank volume can be addressed during final design based on site conditions and constraints. The basis for the new D Tank capacity is summarized as follows:

- Replaces C Tank storage and allows for C Tank to be removed.
- Adds volume to meet total storage requirements for CMWD system without having to rely on Mahr Reservoir.
- Provides emergency storage volume that can be supplied by either Meadowlark WRF or CRWF.
- Allows for Twin D PS to operate at full capacity (4,500 gpm) for several hours without having to have CWRF flows increased simultaneously. This added forebay storage volume would provide operators great flexibility in meeting a short-term system need.
- Additional operational storage to meet peak demands for La Costa Golf Course (South) should it be served by CMWD in the future.
- Increased storage may be beneficial overall to CMWD, depending on the terms of a re-newed supply agreement with VWD.

6.3.3 La Costa Golf Course (South)

The CWRF will have excess supply capacity of at least 1.0 MGD and potentially more based on the medium demand forecast. Depending on the long-term agreement and operating costs with Gafner WRF, CMWD could potentially directly supply the La Costa Golf Course (South) from the CMWD system with the recently constructed pipeline extension in El Camino Real.

6.3.4 Recycled Water Supply Reliability and Indirect Potable Reuse

As presented in Section 3.3.4 with the recent expansion of the CWRF, CMWD is well positioned to meet future recycled water demands and reliably provide supply to existing customers. Currently, under existing maximum month demands, in the event of reduction or a major loss in recycled water supplies at the Meadowlark WRF, CMWD can deliver 100 percent of the MMD supply.

In the future, assuming a baseload demand of 3 MGD from VWD and depending on the success rate of developing recycled water markets outside CMWD, it is possible that CMWD may have excess tertiary supplies of 2 to 3 MGD in the summer months and more in the winter months. This supply could be available in a long-term indirect potable reuse project that is currently being studied by Encina. A similar project is also being conceptualized by San Eljio JPA, to beneficial reuse its recycled water for drinking water supply. Under such a scenario, it is possible that San Elijo JPA may be interested in future tertiary recycled water for continued operations of its recycled system serving SDWD and OMWD, which is supplied by San Elijo.

6.4 Recommended System Improvements

CMWD should continue to implement the final phases of its successful Phase III program, by completing Segments 5 and 7 serving the far north of the City and connecting planned users adjacent to existing recycled water pipelines. The staff also should continue its diligent work with potential future customers, in particular the many homeowner associates that expressed interest in converting from potable water to recycled water in future proposed segment areas. The City should also explore the use of recycled fill stations which can be made available for public use for smaller volume irrigation or even construction water. Several San Diego County water agencies have successfully implemented this type of facility. The City should continue to monitor water quality and odor issues in the distribution system, especially during the low winter time demands, and may consider some operational changes to promote increased water circulation. Chlorine injection may also need to be considered should water quality issues persist.

As noted in Section 3 market assessment, CMWD's has experienced some customers unable to make the conversions to recycled water due to a number of issues, including but not limited to capital costs, cross connection issues, recycled water quality, difficult retrofits and many others. For that reason, the CMWD potential demand is much reduced from 2012 as well as the recommended capital improvement projects.

There are at least four golf courses in the study area which are recommended for CMWD to target. These represent the largest potential demand for only a handful of customers and would meet the vision of the North County reuse vision. However, these users are located outside the City (Oceanside, VID and VWD), and will require negotiated service agreements to serve wholesale customers by the City. These users are an opportunity to significantly increase reuse demand in the North County.

The recommended recycled water improvements are described in this section and are based on the following:

- Storage and Pump Station capacity analysis
- Updated Market Assessment and Pipeline Segments to meet the projected demand
- Model results of both the existing system and new or revised improvement projects to meet hydraulic capacity and evaluation criteria.
- Reliability projects to improve system feasibility and operations.

Table 6-5 summarizes the recommended improvement projects by segment area, and by planning phase. As noted, unit costs include all soft costs and are based on recent Carlsbad pipeline projects. The segment unit cost also includes lateral and meter costs, but not onsite user retrofit costs.

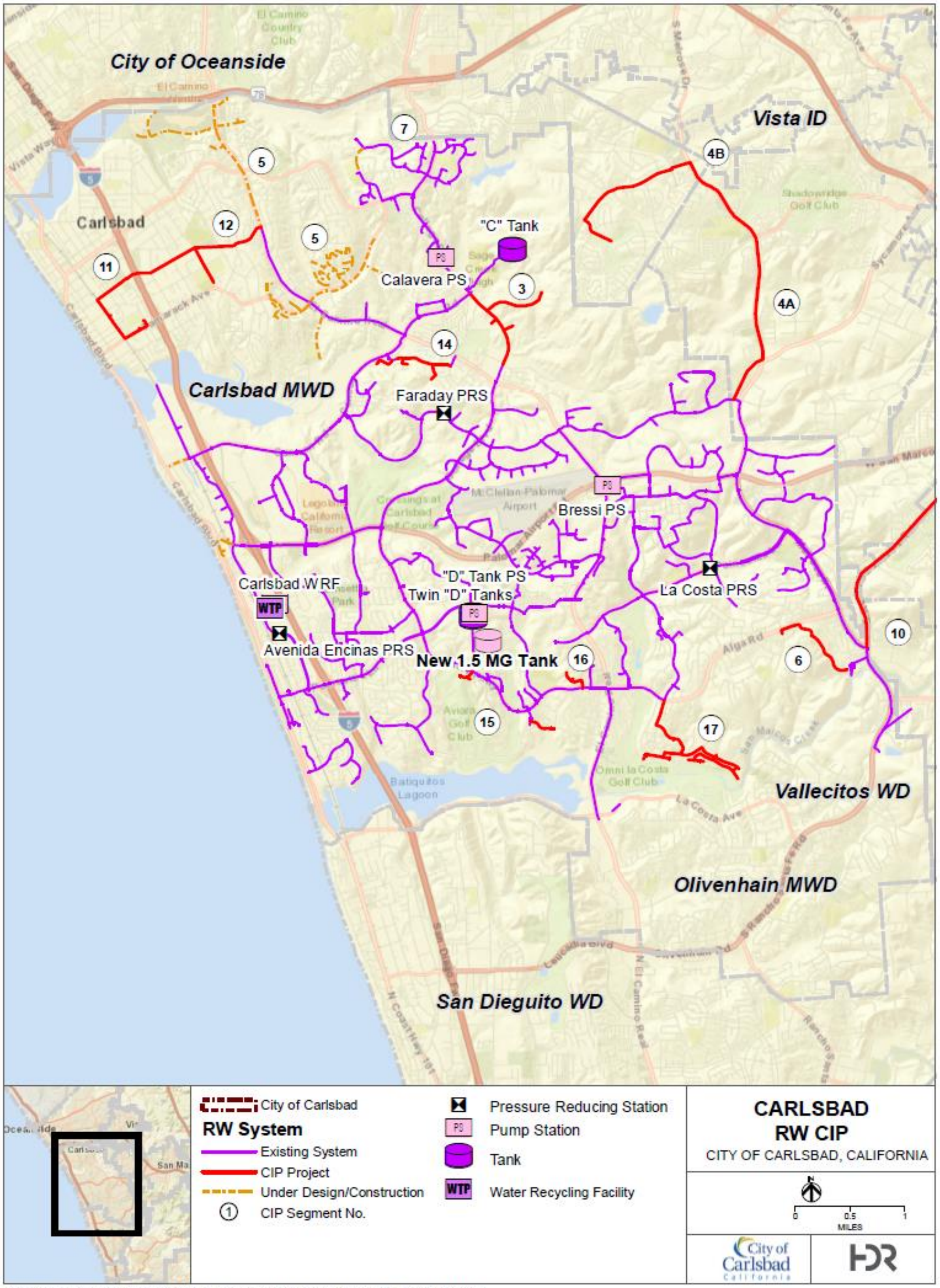
Recommended projects are shown by segment number on Figure 6-2. The segment pipeline extensions have been considerably reduced based on the potential to convert existing potable customers and the high costs to expand into areas such as a Downtown area. Allowances have been included to make the user connection, but retrofit costs are assumed by the customer. The table should provide CMWD a basis to apply for funding and grants to complete another phase of expansion. A major part of that will be deciding whether to include a few of the outside City customers. A third D Tank has been included in the improvement projects and CMWD should continue to proceed with its design.

In summary, an estimated capital cost of approximately $28.6 million is recommended to build-out the remaining Segments of the recycled water distribution system in the City and also extending to the City of Oceanside, VID and VWD. This infrastructure is estimated to serve approximately 1,400 afy, although it would have capacity to serve a higher demand if full market potential was realized. The approximate range of unit cost of this final increment of recycled water would likely range from $1,700 to $2,200 afy depending on the market served. (Note: This order of magnitude estimate assumes 20-year payback and 5 percent interest).

Table 6-5: Recycled Water Capital Improvement Program

ID No.	Zone	Project Type	Description/Location	Planning Phase	Size	Unit Type	Diameter	Unit	Unit Cost
	384	Pipeline	Segment 3	2025	7,500	ft	12	in	426
	660	Pipeline	Segment 4A	2040	1	interconnect			100,000
	660	Pipeline	Segment 4A	2040	5,000	ft	12	in	426
	660	Pipeline	Segment 4B	2025	12,000	ft	12	in	426
	384	Pipeline	Segment 5 (SR78)	2040	3,000	ft	8	in	355
	550	Pipeline	Segment 6	2040	2,100	ft	6	in	327
	580	Pipeline	Segment 7	2020	2,500	ft	8	in	355
	384	Pipeline	Segment 8	2040	1	interconnect			100,000
	550	Pipeline	Segment 10	2040	10,000	ft	8	in	355
	384	Pipeline	Segment 11	2040	7,500	ft	6	in	327
	384	Pipeline	Segment 12	2040	3,000	ft	8	in	355
	384	Pipeline	Segment 14	2025	3,000	ft	6	in	327
	384	Pipeline	Segment 15	2025	1,300	ft	6	in	327
	384	Pipeline	Segment 16	2025	1,400	ft	6	in	327
	384	Pipeline	Segment 17	2025	5,000	ft	6	in	327
	384	Pipeline	Segment 17	2025	4,000	ft	8	in	355
	384	Storage	Zone 384 Reservoir	2025	1.5	MG			2.25
									Total Cost of Recommended Improv
Notes:	Segment 5 through 7 are under construction, excluding Segment 5 (SR78)								
	Unit costs include soft costs for planning, design, legal, construction administration, owner administration, and contingency.								

Figure 6-2: Recommended Improvement Projects



Appendix A. Interagency Agreements and Permits

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Tri-Agency Operations MOU

Distribution of Reclaimed Water Produced at the Meadowlark Reclamation Facility

Vallecitos Water District / Carlsbad Municipal Water District / Olivenhain Municipal Water District

<u>Normal Operations</u>

1. The Carlsbad Municipal Water District (Carlsbad) is contracted for 2 million gallons, provided adequate effluent is available, in a 24 hour day during the months of December, January, February and March.

2. Carlsbad is contracted for 3 million gallons, provided adequate effluent is available, in a 24 hour day during the months of April, May, June, July, August, September, October and November.

3. If Carlsbad desires more reclaimed water, Carlsbad Operations shall contact Vallecitos MRF Operations to discuss reclaimed water availability. Approval will be dependent on Mahr Reservoir levels and Meadowlark Reclamation Facility (MRF) production. The agreed upon action will be addressed through written notification such as e-mail.

4. For maintaining regulatory compliance and continued operations at MRF, Carlsbad's pumping rate from MRF's distribution system is to be incremented up or down at 300 gpm every 1 minute until the desired pumping rate is achieved.

5. Olivenhain Municipal Water District (Olivenhain) is contracted for a maximum of 1.5 million gallons per day, year round, provided adequate effluent is available.

6. If Olivenhain desires more reclaimed water, Olivenhain Operations shall contact Vallecitos MRF Operations to discuss reclaimed water availability. Approval will be dependent on Mahr Reservoir levels and MRF's production. The agreed upon action will be addressed through written notification such as e-mail.

7. Operations supervisors and staff from all three agencies will meet on a quarterly basis to discuss operational issues and review any potential changes to normal procedures.

<u>Mahr Storage</u>

1. Carlsbad has the right to utilize a maximum of 32 million gallons (MG) of storage available when Mahr Reservoir is at full capacity (593 feet).

2. Mahr Reservoir's maximum capacity available for Carlsbad's use is 60% of capacity between 593 feet and 560 feet at any time, unless there is a potential harm to Mahr Reservoir and/or MRF's operations.

3. Carlsbad may store reclaimed water produced at their reclamation plant in Mahr Reservoir, up to their maximum storage capacity of 32 MG. Carlsbad's Water Operations Supervisor shall contact the Vallecitos Wastewater Treatment Plant Supervisor to discuss reclaimed water storage availability prior to delivering water to Mahr Reservoir. This water shall be tracked using the existing flow meter used to record Carlsbad's reclaimed water usage. The reclaimed water stored in Mahr Reservoir that was produced by Carlsbad's treatment plant shall be for the exclusive use of Carlsbad and shall not be delivered to another agency.

4. Olivenhain has the right to utilize a maximum of 16 MG of storage available when Mahr Reservoir is at full capacity (593 feet).

5. Mahr Reservoir's maximum capacity available for Olivenhain's use is 30% of capacity between 593 feet and 560 feet at any time, unless there is a potential harm to Mahr Reservoir and/or MRF's operations.

Reclaimed Water Curtailment

1. Carlsbad and Olivenhain Operations will be notified when Mahr Reservoir's water level drops below 570 feet. If reclaimed water is unavailable to meet an agency's desired reclaimed flows, the agency supervisor may request the addition of potable water to Mahr Reservoir. Approval is required from the Vallecitos and requesting agency's Operations Managers before potable may be added to Mahr Reservoir. The agreed upon action will be addressed through written notification such as e-mail.

2. Carlsbad and Olivenhain will be required to curtail any additional usage above contracted amounts when Mahr Reservoir's water level reaches 559 feet. Actions required are:

    - MRF Operations will contact Carlsbad and Olivenhain Operations to notify them when Mahr Reservoir's water level is at 559 feet and curtailment is required.

    - MRF Operations can determine how many gallons of reclaimed water are available for each agency in the current 24 hour period, based on reclaimed production at MRF.

3. Carlsbad and Olivenhain will be required to **stop** reclaimed water usage when Mahr Reservoir's level reaches 557 feet. Actions required are:

- MRF Operations will contact Carlsbad and Olivenhain Operations and request they **stop** using reclaimed water completely from Mahr Reservoir and/or MRF's distribution system when Mahr Reservoir's water level reaches 557 feet.

Reclaimed Water Effluent Chlorine Residual

1. Vallecitos shall maintain the chlorine residual leaving MRF from 10 mg/L to 15 mg/L during the hours of operation that Carlsbad is drawing reclaimed water from the distribution system.

2. Carlsbad shall provide time periods during the day when reclaimed water is not being utilized. When all reclaimed water is going to Mahr Reservoir, MRF staff can turn off the dechlorination chemical and allow higher chlorine residuals into Mahr Reservoir to assist with water quality.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2016-0183

MASTER RECYCLING PERMIT FOR CARLSBAD MUNICIPAL WATER DISTRICT, CARLSBAD WATER RECYCLING FACILITY, SAN DIEGO COUNTY

Carlsbad Municipal Water District is subject to waste discharge requirements as set forth in this Order.

Table 1. Discharger Information

Discharger	Carlsbad Municipal Water District
Name of Facility	Carlsbad Water Recycling Facility
Facility Address	6220 Avenida Encinas
	Carlsbad, CA 92011
	San Diego County
Facility Contact, Title and Phone	Ms. Wendy Chambers, (760) 438-2722
Mailing Address	1635 Faraday Avenue, Carlsbad, CA 92008
Type of Facility	Wastewater Treatment Plant
Facility Design Flow	7.0 million gallons per day (mgd)

Table 2. Discharge Location

Discharge Point	Effluent Description	Hydrologic Area/Subarea of Discharges
Various recycled water use sites.	Disinfected Tertiary Recycled Water	El Salto HSA (904.21), Los Monos HSA (904.31), Encinas HA (904.4), Batiquitos HSA (904.51), Richland HSA (904.52)

Table 3. Effective Date

This Order was adopted by the California Regional Water Quality Control Board, San Diego Region and is effective on:	December 14, 2016

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on December 14, 2016.

David W. Gibson, Executive Officer

Table of Contents

List of Tables

List of Attachments

I. FINDINGS

The California Regional Water Quality Control Board, San Diego Region (San Diego Water Board), finds:

A. **Background**. Carlsbad Municipal Water District (hereinafter Discharger) submitted a Report of Waste Discharge (ROWD), dated May 23, 2016, which describes proposed upgrades to expand the capacity of the CWRF from 4 mgd to 7 mgd. Upon adoption, Order No. R9-2016-0183 (Order) will supersede and replace the Discharger's Master Reclamation Permit[1] except for enforcement purposes. The Order increases the permitted flowrate from 4 mgd to 7 mgd, revises some of the discharge specifications, adds requirements of the State *Recycled Water Policy,*[2] and adds requirements for recycled water fill stations.

The Discharger intends to purchase and use up to 5.0 mgd of recycled water from the Vallecitos Water District Meadowlark Water Reclamation Plant and up to 2.0 mgd of recycled water from the Leucadia Wastewater District Gafner Water Reclamation Plant. Recycled water quality and production at the Meadowlark and Gafner facilities are regulated by separate waste discharge requirements established by the San Diego Water Board. The use of this water within the Discharger's service area is regulated by this Order.

B. **Legal Authorities.** This Order is issued pursuant to sections 13263 and 13523.1 of the Water Code. This Order serves as a Master Recycling Permit, which also includes Waste Discharge Requirements (WDRs) issued pursuant to article 4, chapter 4, division 7 of the Water Code.

C. **Background and Rationale for Requirements.** The San Diego Water Board developed the requirements in this Order based on information in the ROWD, self-monitoring reports, water quality control plans and policies, observations made during compliance inspections and site visits, and other available information. An Information Sheet (Attachment C) was prepared for this Order, which contains background information and rationale for Order requirements. The Information Sheet is hereby incorporated into and constitutes findings for this Order.

D. **Antidegradation Policy.** The State Water Resources Control Board (State Water Board) established California's Antidegradation Policy in Resolution No. 68-16, the Statement of Policy with Respect to Maintaining High Quality of Waters in California. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements and incorporates by reference both the State and federal antidegradation policies. As discussed in Section V of the Information Sheet, the discharge regulated by this Order is consistent with the Antidegradation Policy.

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[1] Order No. R9-2001-352 as amended by Order No. R9-2012-0027, *Master Reclamation Permit with Waste Discharge Requirements for the Production and Purveyance of Recycled Water for Carlsbad Municipal Water District, Carlsbad Water Recycling Facility, San Diego County*

[2] State Water Board *Recycled Water Policy* (2009 as modified in 2013): http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/draft_amendment_to_policy.shtml

E. **Notification of Interested Persons**. The San Diego Water Board has notified the Discharger and interested agencies and persons of its intent to adopt a Master Recycling Permit that also prescribes WDRs in this Order. The San Diego Water Board also provided stakeholders with an opportunity to submit their written comments and recommendations. Details of the notification are provided in Section IX of the Information Sheet.

F. **Consideration of Public Comment**. The San Diego Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the scheduling for the Public Hearing are provided in Section IX of the Information Sheet.

G. **California Environmental Quality Act**. As a responsible agency under the California Environmental Quality Act, the San Diego Water Board considered the mitigated negative declaration prepared by the Discharger, who is the lead agency for the project. The Board concurs that the project will not have a significant impact on the environment.

THEREFORE, IT IS HEREBY ORDERED, that this Order supersedes Order No. 2001-352 as amended by Order No. R9-2012-0027 upon the effective date of this Order except for enforcement purposes. In order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and applicable regulations, it is further ordered that the Discharger comply with the requirements in this Order. If any part of this Order is subject to a temporary stay of enforcement, unless otherwise specified in the order granting stay, the Discharger shall comply with the analogous portions of the previous Order. This action does not prevent the San Diego Water Board from taking enforcement actions for past violations of Order No. R9-2001-352.

II. DISCHARGE PROHIBITIONS

A. Discharge of waste, other than incidental runoff, to lands which have not been specifically described in this Order or in the Report of Waste Discharge, and for which valid waste discharge requirements are not in force are prohibited.

B. Discharges of treated or untreated solid or liquid waste to waters of the United States are prohibited unless as authorized by a National Discharge Pollution Discharge Elimination System permit issued by the San Diego Water Board.

C. Discharges of treated or untreated solid or liquid waste directly or indirectly to any surface waters of the State (including ephemeral streams and vernal pools) are prohibited.

D. The treatment, storage, or disposal of waste in a manner that creates pollution, contamination, or nuisance, as defined by Water Code section 13050, is prohibited.

III. DISCHARGE SPECIFICATIONS

A. The daily flow from the CWRF shall not exceed 7 mgd.

B. Recycled water discharged from the CWRF shall not contain constituents in excess of discharge specifications listed in Table 4.

Table 4. Discharge Specifications

Constituent	Units	Daily Maximum[1]	Monthly Average[2]	Annual Average[3]
Biological Oxygen Demand (BOD_5 @ 20ºC)	mg/L	45	30	
Total Suspended Solids (TSS)	mg/L	45	30	
pH	pH units	Within the limits of 6.5-8.5 at all times		
Total Dissolved Solids (TDS)	mg/L	-	-	1,100
Chloride (Cl)	mg/L	-	-	350
Sulfate (SO_4)	mg/L	-	-	350
Percent Sodium (% Na)	%	-	-	60%
Iron (Fe)	mg/L	-	-	0.3
Manganese (Mn)	mg/L	-	-	0.1
Methylene Blue- Activated Substances (MBAS)	mg/L	-	-	0.5
Boron (B)	mg/L	-	-	0.75
Fluoride (F)	mg/L	-	-	1.0
Aluminum	mg/L	-	-	1.0
Arsenic	mg/L	-	-	0.05
Antimony	mg/L	-	-	0.006
Barium	mg/L	-	-	1.0
Beryllium	mg/L	-	-	0.004
Cadmium	mg/L	-	-	0.005
Cyanide	mg/L	-	-	0.2
Mercury	mg/L	-	-	0.002
Nickel	mg/L	-	-	0.1
Perchlorate	mg/L	-	-	0.006
Selenium	mg/L	-	-	0.05
Thallium	mg/L	-	-	0.002

[1]The daily maximum discharge specification shall apply to the results of a single composite or grab sample representing non-overlapping 24 hour periods.

[2]The monthly average discharge specification shall apply to the arithmetic mean of the results of all samples collected during each calendar month.

[3]The annual average discharge specification shall apply to the arithmetic mean of the results of all samples collected during a calendar year period.

C. Recycled water discharged from the CWRF shall comply with the following requirements:

1. The chlorine disinfection process must provide a chlorine contact time (or CT)[3] value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow.

2. The median density of total coliform bacteria measured in the disinfected recycled water effluent from the CWRF shall not exceed a Most Probable Number (MPN) of 2.2 organisms per 100 milliliters, utilizing the bacteriological results of the last seven days for which analyses have been completed; and the number of total coliform bacteria shall not exceed a MPN of 23 organisms per 100 milliliters in more than one sample in any 30-day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

D. Turbidity in effluent from the granular media filtration units shall not exceed a daily average value of 2 Nephelometric Turbidity Units (NTU), shall not exceed 5 NTU more than 5 percent of the time during a 24-hour period, and shall not exceed 10 NTU at any time. Coagulation need not be used as part of the granular media filtration treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes as specified in title 22 sections 60304 and 60307.

E. Turbidity in effluent from the microfiltration or ultrafiltration units shall not exceed 0.2 NTU more than 5 percent of the time within a 24-hour period and 0.5 NTU at any time.

IV. WATER RECYCLING REQUIREMENTS

A. The Discharger must maintain and submit the following to the San Diego Water Board, State Water Board Division of Drinking Water (DDW) and County of San Diego Department of Environmental Health (County DEH) upon request.

1. *Rules and Regulations for Recycled Water Users* governing the design and construction of recycled water use facilities and the use of recycled water. Rules and regulations for purveyance of recycled water shall, at a minimum, include the requirements which are contained in Attachment B to this Order.

2. A program to conduct compliance inspections of recycled water reuse sites. The program shall be adequate to determine the status of compliance with the Discharger's approved rules and regulations for recycled water users.

3. A report containing the information listed below. The Discharger may submit a report that covers more than one reuse site. The report shall include a detailed description of each reuse site identifying all of the information below:

[3] Defined as the product of total chlorine residual and modal contact time measured at the same point.

a. The number, location, and type of facilities within the use area proposing to use domestic and recycled water. "Facility" means any type of building or structure, or defined area of specific public use that utilizes or proposes to utilize a dual plumbed system.

b. The specific boundaries of the proposed use site area including a map showing the location of each facility, drinking water fountain and impoundment to be served.

c. The person or persons responsible for operation of the recycled water system at each use area.

d. The specific use to be made of the recycled water at each use area.

e. The methods to be used by the Discharger to assure that the installation and operation of the recycled system will not result in cross connections between the recycled water piping system and the potable water piping system. This shall include a description of pressure, dye, or other test methods to be used to test the system.

f. Plans and specifications. These shall include the following and shall be submitted to the DDW and County DEH:

   i. Proposed piping system to be used.

   ii. Pipe locations of both the recycled and potable systems.

   iii. Type and location of the outlets and plumbing fixtures that will be accessible to the public.

   iv. The methods and devices to be used to prevent backflow of recycled water into the public water system.

   v. Plan notes relating to recycled water specific installation and use requirements.

B. Prior to providing recycled water to a new use site, the Discharger shall do the following:

1. Submit for review and approval a letter certifying that the project conforms to all criteria described in Water Recycling Requirements IV.A.3. The letter shall document that all criteria described in Water Recycling Requirements IV.A.3 has been submitted to and approved by the appropriate regulatory agency. Information submitted as a supplement to this letter shall document compliance with any criteria, as described by Water Recycling Requirements IV.A.3, not met through submittal of the initial report.

2. Ensure that any dual plumbed system within each facility and use area is inspected for possible cross connections with the potable water system. The recycled water

system shall also be tested for possible cross connections at least once every four years. The testing shall be conducted in accordance with the method described in the report submitted pursuant to title 22, California Code of Regulations,[4] section 60314. The inspections and the testing shall be performed by a cross connection control specialist certified by the California-Nevada section of the American Water Works Association or an organization with equivalent certification requirements. The County DEH shall be notified at least 30 days prior to any cross connection test, or per notification requirements within the Recycled Water Oversight Consent Agreement between the Discharger and the County DEH.[5] A written report documenting the result of the inspection or testing for the prior year shall be submitted to the County DEH within 30 days following completion of the inspection or testing, or per notification requirements within the Recycled Water Oversight Consent Agreement between the Discharger and the County DEH.

C. The Discharger shall ensure the following requirements are met for all reuse sites:

1. Enforce recycled water rules and regulations.

2. Conduct recycled water reuse site compliance inspections in accordance with the program submitted in compliance with Section IV.A.2 of this Order.

3. Notify the DDW and the County DEH of any incidence of recycled water backflow into the potable water system as soon as possible, but in no case later than 24 hours after finding the incident.

4. Maintain a current list of all on-site recycled water supervisors.

V. PROVISIONS

A. The Discharger shall comply with all of the following Standard Provisions:

1. The Discharger must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the Water Code and is grounds for (a) enforcement action; (b) termination, revocation and reissuance, or modification of this Order; or (c) denial of a report of waste discharge in application for new or revised waste discharge requirements.

2. The Discharger shall allow the San Diego Water Board, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to do the following:

   a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Order,

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[4] In this Order, Monitoring and Reporting Program, and Information Sheet, the terms titles 17, 22, and 23 are understood to refer to the California Code of Regulations from this point forward.

[5] The Consent Agreement establishes notification and requirements for the County DEH regulation of the Discharger's recycled water use.

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order,

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this Order, and

d. Sample or monitor, at reasonable times for the purposes of assuring compliance with this Order or as otherwise authorized by the Water Code, any substances or parameters at any location.

B. The Discharger shall report any noncompliance that may endanger health or the environment. Pursuant to section 5411.5 of the Health and Safety Code, any overflow or spill which results in a discharge of treated or untreated wastewater, or waste to waters of the state shall be immediately reported to the County DEH. In addition, any such information shall be reported to the California Office of Emergency Services and provided orally to the San Diego Water Board within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided to the San Diego Water Board within 5 days of the time the Discharger becomes aware of the circumstances. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The San Diego Water Board may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the San Diego Water Board within 24 hours:

1. Any bypass from any portion of the treatment facility.

2. Any discharge of treated or untreated wastewater that occurs downstream of the plant headworks resulting from pipeline breaks, obstruction, surcharge, or any other circumstances.

3. Any treatment plant upset which causes the discharge specifications of this Order to be exceeded.

4. Failure of the disinfection system.

5. Disinfected tertiary effluent total coliform bacteria greater than 240 MPN/ 100mL.

C. The Discharger shall report all overflow events that occur at the CWRF. For purposes of this reporting requirement, an overflow event is defined as a discharge of treated or untreated wastewater at a location onsite or other lands owned by the Discharger not authorized by waste discharge requirements which results from a pump station failure, line break, obstruction, surcharge, or any other operational dysfunction. This reporting requirement applies to all overflow events other than those events subject to regulation under the State Board Order No. 2006-0003-DWQ and San Diego Water Board Order No. R9-2007-0005. Overflows of the kind identified under this provision shall be reported to the San Diego Water Board with the monthly monitoring report in which the overflow occurs.

D. If the Discharger or end user, without regard to intent or negligence, causes or permits an unauthorized discharge of 50,000 gallons or more of recycled water that has been treated to at least disinfected tertiary recycled water[6] or 1,000 gallons or more of recycled water that is treated at a level less than disinfected tertiary recycled water in or on any waters of the State, or causes or permits such unauthorized discharge to be discharged where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (1) that person has knowledge of the discharge, (2) notification is possible, and (3) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the San Diego Water Board and submit a written report within 5 days containing information described in Provision V.B.

E. The incidental discharge of recycled water to waters of the State is not a violation of these requirements if the incidental discharge does not unreasonably affect the beneficial uses of the water, and does not result in the receiving water exceeding an applicable water quality objective.

F. If a need for a discharge bypass is known in advance, the Discharger shall submit prior notice (stating, at a minimum, the purpose, anticipated dates, duration, level of treatment, and volume of bypass) and, if at all possible, the San Diego Water Board shall be made aware of such notice at least 10 days prior to the date of the bypass. “Bypass” means the intentional diversion of waste streams from any portion of the treatment facility other than a sewer system.

G. The Discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

H. Upon reduction, loss, or failure of the treatment facility the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies for example, when the primary source of power of the treatment facility has failed, is reduced, or is lost.

I. Except for a discharge which is in compliance with this Order, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, shall as soon as (a) that person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the County DEH in accordance with Health and Safety Code section 5411.5 and the California Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Government Code title 2, division 1, chapter 7, article 3.7 (commencing with section 8574.17), and immediately notify the State Water Board or the San Diego Water Board of the discharge. This provision does not require

[6] Disinfected tertiary recycled water is defined in title 22, section 60301.230

reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of section 13271 of the Water Code unless the Discharger is in violation of a prohibition in the *Water Quality Control Plan for the San Diego Basin* (Basin Plan).

J. Except for a discharge which is in compliance with this Order, any person who without regard to intent or negligence, causes or permits any oil or petroleum product to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (a) such person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the California Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan adopted pursuant to Government Code title 2, division 1, chapter 7, article 3.7 (commencing with section 8574.1). This requirement does not require reporting of any discharge of less than 42 gallons unless the discharge is also required to be reported pursuant to Clean Water Act section 311, or the discharge is in violation of a Basin Plan prohibition.

K. A copy of this Order shall be maintained at the CWRF and shall be available to operating personnel at all times.

L. The Discharger shall furnish to the San Diego Water Board, within a reasonable time, any information which the San Diego Water Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Discharger shall also furnish to the San Diego Water Board, upon request, copies of records required to be kept by this Order.

M. This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

1. Violation of any terms or conditions of this Order.

2. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts.

3. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

N. The filing of a request by the Discharger for the modification, revocation, reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

O. The Discharger shall file a new Report of Waste Discharge, stamped and signed by a licensed professional,[7] at least 120 days prior to the following:

[7] All reports, plans, and documents required under this Order must be prepared under the direction of appropriately qualified professionals. California Business and Professions Code sections 6735, 7835, and 7835.1 require that engineering and geologic evaluations and judgments be performed by or under the direction

1. Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the wastes.

2. Significant change in the treatment or disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste).

3. Change in the disposal area from that described in the findings of this Order.

4. Increase in flow beyond that specified in this Order.

5. Other circumstances that result in a material change in character, amount, or location of the waste discharge.

6. Any planned change in the regulated facility or activity which may result in noncompliance with this Order.

P. This Order is not transferable to any person except after notice to the San Diego Water Board. This notice must be in writing and received by the San Diego Water Board at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new Discharger containing a specific date for the transfer of this Order's responsibility and coverage between the current Discharger and the new discharger. This agreement shall include an acknowledgement that the existing Discharger is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on and forward. The San Diego Water Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the Water Code.

Q. Where the Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the San Diego Water Board, it shall promptly submit such facts or information.

R. All applications, reports, or information submitted to the San Diego Water Board shall be signed and certified as follows:

1. The Report of Waste Discharge shall be signed as follows:

   a. For a corporation by either a principal executive officer or ranking elected official;

   b. For a municipality, State, federal, or other public agency by either a public Executive Officer or ranking official

   c. By direction of the person designated in paragraph “a” or “b” of this provision, only if:

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of licensed professionals. The lead professional shall sign and affix their license stamp to the report, plan, or document.

i. The authorization is made in writing by a person described in paragraph R.1.a or R1.b of this provision;

ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and

2. All other reports required by this Order and other information required by the San Diego Water Board shall be signed by a person designated in paragraph (R.1) of this provision or a duly authorized representative of that person. An individual is a duly authorized representative only if all of the following are true:

   a. The authorization is made in writing by a person described in paragraph R.1.a. or R.1.b. of this provision.

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity.

   c. The written authorization is submitted to the San Diego Water Board.

3. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment."

S. The Discharger shall submit reports required under this Order in text searchable PDF format to the San Diego Water Board via email. The email submittals must include a signed cover/transmittal letter (with the facility name, facility contact information, and reference code), and, unless directed otherwise by the Executive Officer, be sent via email to sandiego@waterboards.ca.gov.

VI. SPECIAL PROVISIONS: FACILITY DESIGN AND OPERATION SPECIFICATIONS.

A. The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

B. The Discharger must implement the following to ensure that recycled water and fertilizer are applied in use sites at agronomic rates:[8]

1. Monitor nutrient concentrations in recycled water supplies and notify recycled water site supervisors of the nutrient concentrations of recycled water. In the case of recycled water fill stations, customers must be notified of the nutrient concentrations in the recycled water.

2. Conduct periodic inspections of end use sites to verify the agronomic application rates of fertilizer and recycled water to the landscape.

C. The Discharger shall conduct a nitrate study to verify that the use of recycled water from the CWRF for landscape irrigation does not cause groundwater to exceed the groundwater quality objective for nitrate of 45 mg/L nitrate as NO_3 in areas with applicable groundwater quality objectives. The nitrate study must evaluate factors such as existing nitrogen removal achieved at the plant, need for additional treatment processes to remove nitrate, fate and transport of nitrogen in the groundwater, groundwater monitoring, application of recycled water and fertilizer at agronomic rates, nitrogen uptake by turfgrass or other vegetation, and other best management practices. A workplan for the nitrate study must be received by the San Diego Water by 5:00 p.m. on September 15, 2017, which identifies proposed tasks and milestones for completing the nitrate study, and a schedule for completing study activities. A nitrate study report documenting the results of the study must be received by the San Diego Water Board by 5:00 p.m. on June 15, 2018.

D. Recycled water treatment, distribution, and use shall comply with all applicable sections of titles 17 and 22.

E. Recycled water shall be treated, distributed, and used as described in an approved Engineering Report pursuant to title 22, section 60323 that demonstrates compliance with the Uniform Statewide Recycling criteria (and amendments). Prior to any changes in the treatment facilities, the Discharger shall prepare an amended or new Engineering Report. The Engineering Report shall be submitted to the DDW, County DEH, and San Diego Water Board.

F. A copy of the facility operations manual shall be maintained at the plant and shall be available to operation personnel and San Diego Water Board staff at all times. The following portions of the operations manual shall be posted at the treatment plant as a quick reference for treatment plant operators.

1. Alarm set points for secondary turbidity, tertiary turbidity, and chlorine residual.

2. Levels at which flow will be diverted for secondary turbidity, tertiary turbidity, and chlorine residual.

[8] Agronomic rates refers to rate of application of recycled water to plants necessary to satisfy the plants' evapotranspiration requirements, considering allowances for supplemental water (e.g., effective precipitation), irrigation distribution uniformity, and leaching requirement, thus minimizing the movement of nutrients below the plants' root zone.

3. When to divert flow for high daily and weekly median total coliform.

4. When the authorities (DDW, County DEH, San Diego Water Board) will be notified of a diversion.

5. Names and numbers of those authorities to be notified in case of a diversion.

6. Frequency of calibration for turbidity meters and chlorine residual analyzers.

G. The CWRF shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to title 23, chapter 3, subchapter 14.

H. All waste treatment, storage and distribution facilities shall be protected against 100-year peak stream flows as defined by the San Diego County flood control agency.

I. All wastewater and recycled water storage facilities, shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24-hour frequency storm. The recycled water storage ponds at the North La Costa Golf Course are exempt from this requirement. These ponds shall be operated to prevent discharges of recycled water from the ponds to San Marcos Creek and Batiquitos Lagoon. Delivery of recycled water to the ponds shall be terminated at all times when there is a potential for precipitation to cause the ponds to overflow.

J. The Discharger shall comply with the Monitoring and Reporting Program (Attachment D to Order No. R9-2016-0183) and future revisions thereto as specified by the San Diego Water Board. Monitoring results shall be reported at the frequency specified in Monitoring and Reporting Program No. R9-2016-0183.

VII. NOTIFICATIONS

A. The San Diego Water Board may initiate enforcement action against the Discharger, which may result in the termination of the recycled water discharge, if any person uses, transports, or stores such water in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code section 13050.

B. This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the Discharger from liability under federal, State or local laws, nor create a vested right for the Discharger to continue the waste discharge.

C. These requirements have not been officially reviewed by the United States Environmental Protection Agency and are not issued pursuant to Clean Water Act section 402.

D. Any person aggrieved by this action of the San Diego Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

E. This Order becomes effective on the date of adoption by the San Diego Water Board.

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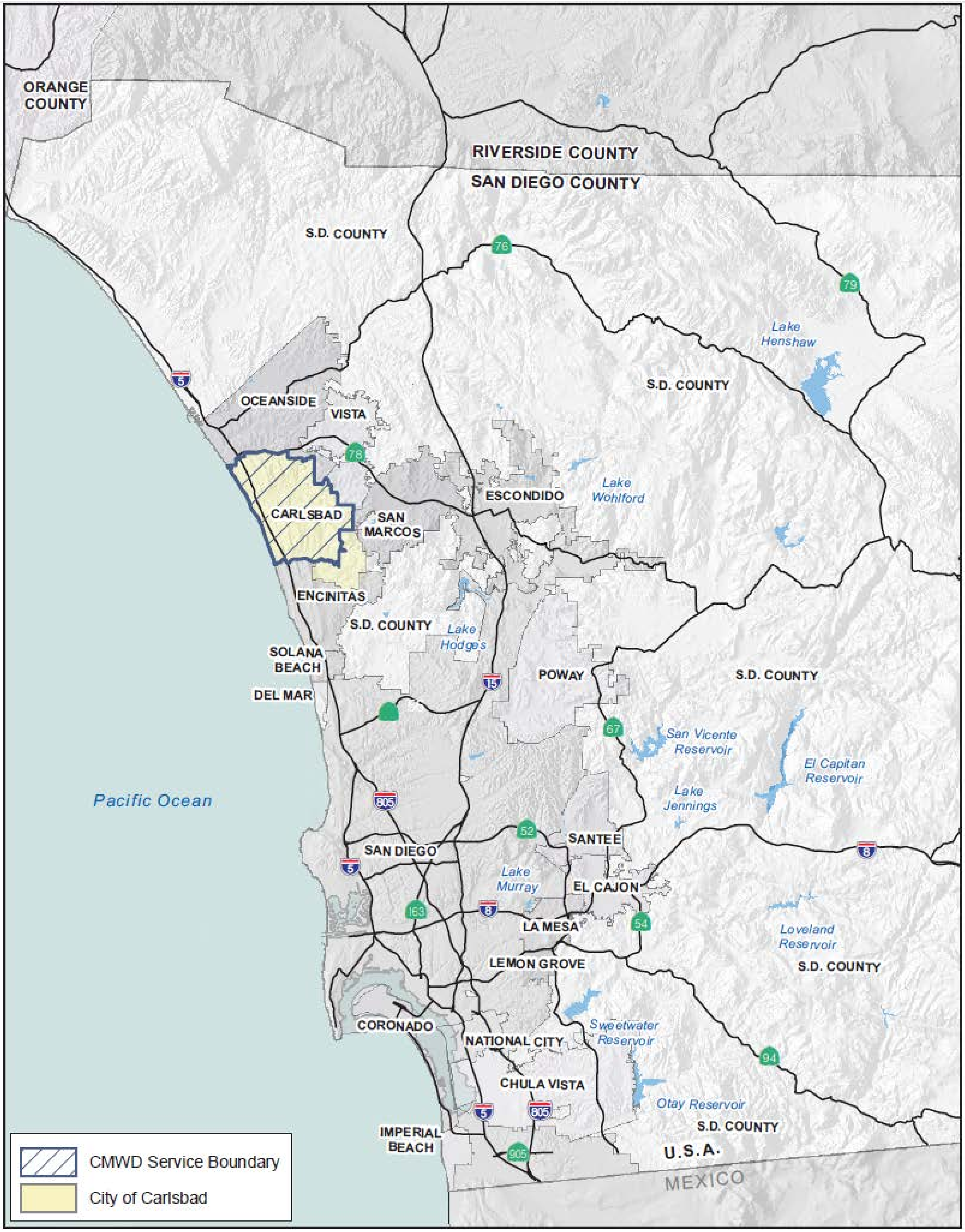
ATTACHMENT A – REGIONAL LOCATION MAP



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ATTACHMENT B - RULES AND REGULATIONS FOR RECYCLED WATER USE

Pursuant to Water Code Section 13523.1(b) (3), this Order requires the Discharger to establish and to enforce rules and regulations governing the design, construction and use of recycled water distribution and disposal systems by its customers. The rules and regulations shall be consistent with the following criteria:

- Title 22, division 4, chapter 3 (Water Recycling Criteria)
- Title 17, division 1, chapter 5, group 4, article 1 and 2;
- The State Water Board Division of Drinking Water (DDW) *Guidelines For Use of Recycled Water, Guidelines for Use of Recycled Water for Construction*; and
- Any measures that are deemed necessary for protection of public health, such as the American Water Works Association (AWWA) California/Nevada Section, *Guidelines for the Distribution of Non-Potable Water and Guidelines for Retrofitting to Recycled Water* or alternate measures that are acceptable to the DDW.

I. STANDARD RULES AND REGULATIONS

At a minimum, the rules and regulations shall notify the users that:

A. The use of recycled water shall not cause a condition of pollution, contamination or nuisance, as defined by Water Code section 13050. The Discharger, the San Diego Water Board, the DDW, and the County Department of Environmental Health (County DEH), or an authorized representative of these parties, upon presentation of proper credentials, shall have the right to enter upon the recycled water use site during reasonable hours, to verify that the user is complying with the Discharger's rules and regulations.

B. The recycled water user shall provide written notification, in a timely manner, to the Discharger of any material change or proposed change in the character of the use of recycled water.

C. Prior to the initiation of recycled water service, the recycled water user shall submit to the Discharger plans and specifications for recycled water distribution facilities.

D. The recycled water user shall designate an on-site recycled water supervisor who is responsible for the recycled water system at each use area under the user's control. Specific responsibilities of the recycled water supervisor include the proper installation, operation, and maintenance of the irrigation system; compliance of the project with the Discharger's rules and regulations, prevention of potential hazards and preservation of the recycled water distribution system plans in "as built" form. Designated recycled water supervisors shall obtain instruction in the use of recycled water from an institution approved by the DDW and County DEH, as required.

E. The Discharger may terminate service to a recycled water user who uses, transports, or stores such water in violation of the Discharger's rules and regulations.

F. All recycled water storage facilities owned and/or operated by recycled water users shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24 hour frequency storm unless the San Diego Water Board approves relaxed storm protection measures for the facility.

G. All recycled water storage facilities owned and/or operated by recycled water users shall be protected against 100-year frequency peak stream flows as defined by the San Diego County flood control agency unless the San Diego Water Board approves relaxed storm protection measures for the facility.

H. The San Diego Water Board may initiate enforcement action against any recycled water user who discharges recycled water in violation of any applicable discharge requirement prescribed by the San Diego Water Board or in a manner which creates or threatens to create conditions of pollution, contamination or nuisance, as defined in Water Code section 13050.

I. A copy of the recycled water rules and regulations, irrigation system layout map, and a recycled water system operations manual shall be maintained at the use area. These documents shall be available to operating personnel at all times.

J. Irrigation with disinfected tertiary recycled water shall not take place within 50 feet of any domestic water supply well unless all of the following conditions have been met:

1. A geological investigation demonstrates that an aquitard exists at the well between the uppermost aquifer being drawn from and the ground surface.

2. The well contains an annular seal that extends from the surface into the aquitard.

3. The well is housed to prevent any recycled water spray from coming into contact with the wellhead facilities.

4. The ground surface immediately around the wellhead is contoured to allow surface water to drain away from the well.

5. The owner of the well approves of the elimination of the buffer zone requirement.

K. Impoundment of disinfected tertiary recycled water shall not occur within 100 feet of any domestic water supply well.

L. Irrigation with, or impoundment of, disinfected secondary-2.2[1] or disinfected secondary -23[2] recycled water shall not take place within 100 feet of any domestic water supply well.

M. Irrigation with, or impoundment of, undisinfected secondary recycled water shall not take place within 150 feet of any domestic water supply well.

[1] Disinfected secondary-2.2 recycled water is defined in title 22, section 60301.220
[2] Disinfected secondary-23 recycled water is defined in title 22, section 60301.225

N. Recycled water facilities shall be operated in accordance with best management practices (BMPs) to prevent direct human consumption of reclaimed water and to minimize misting, ponding, and runoff. BMPs shall be implemented that will minimize both public contact and discharge onto areas not under customer control.

O. Irrigation with recycled water shall be during periods of minimal human use of the service area. Consideration shall be given to allow a maximum dry-out time before the irrigated area will be used by the public.

P. All drinking fountains located within the approved use area shall be protected by location and/or structure from contact with recycled water spray, mist, or runoff. Protection shall be by design, construction practice, or system operation.

Q. Facilities that may be used by the public, including but not limited to eating surfaces and playground equipment and located within the approved use areas, shall be protected to the maximum extent possible by siting and/or structure from contact by irrigation with recycled water spray, mist, or runoff. Protection shall be by design, construction practice or system operation.

R. Spray irrigation with recycled water, other than disinfected tertiary recycled water, shall not take place within 100 feet of the property line of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.

S. All use areas where recycled water is used and that are accessible to the public shall be posted with conspicuous signs, in a size no less than 4 inches by 8 inches, that include the following wording is a size no less than 4 inches high by 8 inches wide: "RECYCLED WATER - DO NOT DRINK". The sign(s) shall be of a size easily readable by the public.

T. No physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.

U. The recycled water piping system shall not include any hose bibs. Quick couplers that are different from that used on the potable water system may be used.

V. The public water supply shall not be used as a backup or supplemental source of water for a recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of title 17, sections 7602(a) and 7603(a) and the approval of the public water system has been obtained. If a "Swivel-ell" type connection is used it must be used in accordance with conditions specified by DDW. Approved backflow prevention devices shall be provided, installed, tested, and maintained by the recycled water user in accordance with the applicable provisions of title 17, division 1, chapter 5, group 4, article 2.

W. No person other than the Discharger shall make a connection to the recycled water distribution system.

X. All recycled water piping and appurtenances in new installations and appurtenances in retrofit installations shall be colored purple or distinctively wrapped with purple tape in accordance with the Health and Safety Code, chapter 7.9, section 4049.54.

Y. Reuse site shut down tests and inspections shall be monitored by the DDW.

Z. Customer complaints concerning recycled water use that may involve public illness shall be reported to the County DEH, the DDW, and to the Discharger who shall maintain a log of all customer complaints regarding recycled water.

AA. Any backflow prevention device installed to protect the public water system shall be inspected and maintained in accordance with title 17, section 7605.

BB. Recycled water and fertilizer shall be applied to landscapes at agronomic rates.

CC. Overwatering of landscapes and runoff shall be avoided.

DD. Recycled water supervisors shall be responsible for determining onsite fertilizer needs to ensure that recycled water is applied to landscapes at agronomic rates, and shall complete training and education in compliance with recycled water agency rules and regulations to: (1) Minimize the potential for runoff or over-irrigation and, (2) Determine the fertilizer needs of the landscape taking into account the nutrient value of recycled water.

II. General Requirements for Hauling or Transportation of Recycled Water Using Vehicles

The Discharger's and Regulations for Recycled Water Use must include requirements that will be implemented to ensure use and transport of recycled water from the fill stations will be protective of public health and the environment. At a minimum the Rules and Regulations must include the requirements below. The Discharger or hauler must comply with the following requirements in sections II-IV of Attachment B to this Order, unless the DDW or the County of San Diego Department of Environmental Health (County DEH) determine that alternative criteria provide equivalent or better protection of public health and the environment.

A. Haulers interested in participating in this program must apply for a Recycled Water Use Permit issued by the Discharger.

B. Use areas receiving hauled recycled water must follow the same title 17 and title 22, requirements as a similar use area receiving traditionally piped recycled water. These requirements must be addressed in the Discharger's permitting process.

C. Before trucks or containers can be filled for the first time, all haulers are required to attend a brief on-site orientation or training in order to learn about using the filling station and the proper handling and safe use of recycled water. Annual refresher training should be required. Records of training should be maintained by the Discharger.

D. Once the hauler completes the on-site orientation or training and a MRP Recycled Water Program inspector verifies the tanker truck or containers meet the recycled water use requirements, the inspector will issue a signed Recycled Water Use Permit. The Recycled Water Use Permit must be available for inspection at all times. The hauler must carry a copy in the vehicle at all times while hauling recycled water.

E. Recycled water must not be introduced into any potable water piping system and no connection shall be made between the tank and any part of a potable water system.

F. If the hauler requests to supply recycled water to a use area that uses any plumbed potable or recycled water distribution systems, the Discharger must follow all applicable title 17 and title 22 requirements, including cross connection control testing and backflow prevention device installation prior to allowing pick up of recycled water. Dual plumbed use areas can only receive recycled water from a recycled water agency as specified in title 22, section 60313(a).

G. The hauler must keep a log book for each vehicle, tank, or container used to transport recycled water. The log book must be available for inspection at all times. The hauler must carry a copy in the vehicle at all times while hauling recycled water. The log book should include:

1. Date of delivery/use,
2. Volume of water delivered/used,
3. Intended use of water,
4. Name and address of the recipient/customer.

H. The hauler or Recycled Water Site Supervisor must notify workers and the public recycled water is used at a site and inform workers and the public not to drink recycled water or use it for food preparation.

I. Precautions should be taken to avoid food coming in contact with recycled water while the use site is wet.

J. No irrigation or impoundment of recycled water is allowed within a minimum of 50 feet of any domestic drinking water well.

K. The haulers shall take adequate measures to prevent overspray, ponding, or run off of recycled water from the authorized recycled water use area.

L. The Recycled Water Use Permit issued by the Discharger must be available for inspection at all times.

M. Recycled water must not be introduced into any potable water piping system and no connection shall be made between the tank and any part of a potable water system.

N. Tank trucks, containers, and appurtenances must be clearly identified as “non-potable”, equipped with a legally sized air gap, and must not be used to provide potable water.

Containers and hoses associated with hauling recycled water must not be used for potable water. Commercial hauling trucks that may be filled with potable water for non-potable uses must have two separate filling systems, one dedicated to potable water and one dedicated to recycled water. When the truck is filled from a potable water source, there must be a water agency or municipality provided meter and backflow device between the truck fill line and the potable source.

O. Vehicles, tanks, and containers must have water-tight valves and fittings, must not leak or spill contents during transport, and are cleaned of contaminants. This must be checked by the hauler before each use. Water-containing vessels that are open to the atmosphere during hauling are not acceptable for use.

P. Haulers should not overfill containers or trucks.

Q. Hoses used for the application of recycled water shall be removable and shall be stored in a disconnected condition during transport. Hoses should be inspected prior to filling to ensure that they are in serviceable condition and free from leaks.

R. In the event of an emergency concerning the recycled water hydrant, meter, fill pipe or hose (spillage, leaks, etc.), the hauler should call the emergency contact number listed on the filling station sign for further instructions.

S. The Discharger may conduct use area visits to ensure proper use of recycled water according to all applicable requirements of titles 17 and 22 and Recycled Water Use Permit conditions. This may include follow up phone calls or surveys of end users about completion of the hauling process and recycled water application.

T. Conditions under which haulers may lose their permits should be clarified. Including failure to follow program requirements and/or adhere to applicable State, County or local codes will result in suspension of the haulers permit. Violations of such codes may also result in fines and applicable administrative fees.

U. Residential hauling programs shall have fill stations staffed at all times by a representative from the Discharger. This is to ensure proper handling and filling procedures are being conducted at the fill stations.

V. Residential hauling programs must limit onetime hauls to 300 gallons.

W. The permitted hauler shall notify the Discharger prior to using recycled water for a use not approved by the Discharger.

X. The Discharger, San Diego Water Board, DDW, and County DEH will have the right to enter any recycled water use site during reasonable hours to ensure the user is complying with these requirements and the Discharger's Rules and Regulations for Recycled Water Use.

III. Rules and Regulations for Hauling or Transportation of Recycled Water From Commercial Vehicle Fill Stations

A. Trucks hauling recycled water that may also be filled with potable supplies for non-potable purposes shall have a dedicated potable use fill line through an air gap separation. The fill lines shall be properly labeled as potable or recycled water. As an alternative, the water supplier may install a reduced pressure principle backflow device on the potable system for filling trucks with potable water. Vehicles used to transport recycled water shall not be used to carry water for potable purposes.

B. The risers, hoses, and fittings for each supply shall be color coded (painted), blue for potable and purple for recycled water.

C. The hoses, hydrants and risers for each supply shall have separate and unique fittings (e.g., 2-1/2 inch diameter on the potable system and 2 inch diameter on the recycled water system) such that the potable system cannot accidentally be used on the recycled system and vice versa.

D. All vehicles used in transporting recycled water must be clearly marked with typical signage that reads: "CAUTION: RECYCLED WATER - DO NOT DRINK" in English and Spanish. The Discharger shall conduct annual inspections of the trucks to assure that all requirements in this Order are being met and that recycled water is being used in compliance with the requirements of this Order.

E. Vehicles used for transportation or distribution of recycled water, or for street sweeping must be equipped with an air gap to ensure backflow protection.

F. The use of recycled water for street sweeping or construction shall comply with the appropriate local storm water ordinance. Typical compliance measures include preventing overspray, ponding, or runoff of recycled water from the use area.

G. Haulers shall be required to enter the date and amount collected on the fill station log sheet during each visit. Include locations the recycled water will be used and approximate amounts.

H. For Hydrant Meter Filling Stations ensure the meter is shut off before disconnecting the fill line and make sure no water is leaking from the meter or hydrant.

I. For Gate Access Filling Stations ensure no water is leaking from the fill pipe or hose and securely re-lock the gate after leaving the filling station.

J. A truck or tank that has contained material from a septic tank or cesspool shall not be used to contain or distribute recycled water.

IV. Rules and Regulations for Use of Recycled Water for Fire Fighting

A. Unused recycled water must not be released into streams, rivers, or waterways.

B. Fire hydrants supplied with recycled water must be clearly identified by purple paints, signs, tags, stencils, or other such labeling, in order to notify firefighters that the fire hydrants are supplied with recycled water.

C. Fire truck tanks must be disinfected following the use of recycled water for firefighting since fire trucks could be used to distribute drinking water during civil emergencies.

D. Firefighting personnel must be adequately trained in safe use of recycled water. New and current firefighting personnel must receive periodic refresher courses regarding proper handling and use of recycled water.

ATTACHMENT C

INFORMATION SHEET

ORDER NO. R9-2016-0183

**MASTER RECYCLING PERMIT
FOR THE CARLSBAD MUNICIPAL WATER DISTRICT,
CARLSBAD WATER RECYLING FACILITY, SAN DIEGO COUNTY**

This Information Sheet includes the legal requirements and technical rationale that serve as the basis for the waste discharge requirements (WDRs) in Order No. R9-2016-0183 (Order), and directives in Monitoring and Report Program No. R9-2016-0183 (MRP). The Information Sheet contains background information and rationale for MRP directives. The Information Sheet is hereby incorporated into and constitutes findings for this MRP.

I. INTRODUCTION

The Order establishes WDRs for the production, distribution, and use of recycled water from the Carlsbad Water Recycling Facility (CWRF), and serves as a Master Recycling Permit. The CWRF has been regulated under Order No. R9-2001-352 as amended by Order No. R9-2012-0027, *Master Reclamation Permit with Waste Discharge Requirements for the Production and Purveyance of Recycled Water for Carlsbad Municipal Water District, Carlsbad Water Recycling Facility, San Diego County.* The Order is an updated Master Recycling Permit for the CWRF. The Order increases the permitted flowrate from 4 million gallons per day (mgd) to 7mgd, revises some of the discharge specifications, adds requirements of the State *Recycled Water Policy,*[1] and adds requirements for recycled water fill stations.

The Discharger intends to purchase and use up to 5.0 mgd of recycled water from the Vallecitos Water District Meadowlark Water Reclamation Plant and up to 2.0 mgd of recycled water from the Leucadia Wastewater District Gafner Water Reclamation Plant. Recycled water quality and production at the Meadowlark and Gafner facilities are regulated by separate waste discharge requirements established by the San Diego Water Board. The use of this water within the Discharger's service area is regulated by this Order.

The MRP (Attachment D) requires the Discharger to furnish monitoring reports to demonstrate compliance with the WDRs in the Order. The San Diego Water Board developed the WDRs in the Order and directives in the MRP based on information in the report of waste discharge, monitoring reports, water quality control plans and policies, and other available information. The Information Sheet is hereby incorporated as findings for the Order and MRP.

[1] State Water Board's Recycled Water Policy (2009 as modified in 2013): http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/draft_amendment_to_policy.shtml

For the purposes of this Order and MRP, references to the “discharger” in applicable State laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

A. On January 17, 2014, California’s Governor proclaimed a Drought State of Emergency and directed state officials to take all necessary actions to prepare for drought conditions. The California Legislature has declared that a substantial portion of the future water requirements of the State may be economically met by beneficial use of recycled water (Water Code, section 13511). The Legislature also expressed its intent that the State under take all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the State (Water Code, section 13512). The Order is consistent with the legislature’s declaration because it encourages the increased use of recycled water in place of potable water supplies.

B. On February 3, 2009, the State Water Resources Control Board (State Water Board) adopted Resolution No. 2009-0011, *Adoption of a Policy for Water Quality Control for Recycled Water* (Recycled Water Policy, revised January 22, 2013 and effective April 25, 2013).[2] The Recycled Water Policy promotes the use of recycled water to achieve sustainable local water supplies and reduce greenhouse gas emissions. This Order is consistent with the Recycled Water Policy because it requires the Discharger to conduct priority pollutant monitoring and implement nutrient management measures.

   Recycled water use can help to reduce the scarcity of local water supplies. It is not the only option for bringing supply and demand into a better balance, but it is a viable cost effective solution that is appropriate in many cases. The feasibility of recycled water use depends on local circumstances, which affect the balance of costs and benefits. In drought conditions, recycled water can be particularly valuable given the scarcity of alternative potable water supplies. In normal precipitation years recycled water use may reduce groundwater extraction. Broader and more effective uses of recycled water are consistent with the goals and objectives of the Recycled Water Policy and the San Diego Water Board’s Practical Vision strategy for achieving a sustainable local water supply.[3]

C. The Order adds new provisions for the safe transport and use of recycled water from possible future recycled water fill stations. If the Discharger chooses to establish recycled water fill stations, the Order requires the Discharger to amend its *Rules and Regulations for Recycled Water Use* and implement measures to ensure that the use and transport of recycled water from the fill stations complies with the Uniform Statewide Recycling Criteria, and is protective of public health and the environment.

[2] http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2013/rs2013_0003_a.pdf
[3] See Practical Vision for “Strategy for Achieving a Sustainable Local Water Supply” http://www.waterboards.ca.gov/sandiego/water_issues/Practical_Vision/index.shtml

II. FACILITY DESCRIPTION

A. **Description of the Carlsbad Water Recycling Facility**. The CWRF receives secondary treated effluent from the Encina Water Pollution Control Facility (EWPCF). The EWPCF is owned and operated by Encina Wastewater Authority, which consists of six member agencies including the Discharger.

The existing CWRF has a treatment capacity of 4 mgd and features two treatment trains. One treatment train is comprised of in-line coagulation/flocculation followed by continuous backwash granular media filtration (GMF). The second treatment train consists of prescreening with a 500-micron wedge wire screen and automatic strainers, microfiltration (MF), and reverse osmosis (RO) treatment. Product water from the two treatment trains are blended and chlorinated using sodium hypochlorite. Recycled water TDS concentrations can fluctuate based on TDS levels in secondary effluent received from the EWPCF and TDS levels in Encina Wastewater Authority's potable water supply. Therefore, the coagulation/flocculation/GMF train is sized to produce up to 4.0 mgd of filtered recycled water during times when MF/RO is not required to reduce concentrations of total dissolved solids (TDS) in the recycled water. When recycled water TDS concentrations need to be controlled, the second MF/RO train can produce up to 0.69 mgd that is blended with water from the GMF train. Both treatment trains are designed to comply with reliability and redundancy criteria established within the California Code of Regulations, title 22[4] sections 60333 through 60533. When the MF/RO treatment train is operated, flows through the coagulation/ flocculation/GMF train are regulated to ensure that CWRF product water flows are equal to or less than 4.0 mgd.

The Discharger is not making significant changes to the GMF and MF treatment systems as part of the CWRF expansion. A third treatment train, however, is being added to the CWRF as part of the plant expansion. This third treatment train will include a new set of pretreatment strainers followed by ultrafiltration (UF) treatment. The UF units are sized to produce up to 3.8 mgd of product water during peak production times (when no backwashing is occurring). Average daily production capacity of the UF units will be 3.38 mgd. The three treatment trains will be operated to produce up to 7.0 mgd of disinfected tertiary recycled water.

Product water from the three treatment trains will be combined and disinfected. New disinfection facilities to be included as part of the expansion project include a third metering pump, an upgraded rapid mixer, and a new chlorine contact basin. In addition to the third treatment train, several improvements and upgrades are being implemented within the existing two treatment trains.

B. **Recycled Water Use and Discharge**. Recycled water produced from the CWRF will be used mainly for landscape irrigation at end use sites. The Discharger's recycled

[4] In this Information Sheet, the terms titles 17, 22, and 23 are understood to refer to the California Code of Regulations from this point forward.

water distribution area is within the El Salto Hydrologic Sub Area (HSA), Los Monos HSA, Encinas Hydrologic Area (HA), Batiquitos HSA, and Richland HSA.

The Order also includes requirements for the transport and use of water from recycled water fill stations. Recycled water transported from fill stations may be used for the following purposes:

- Street sweeping and cleaning of sidewalks and outdoor work areas.
- Dust control, soil compaction, and construction.
- Sewer flushing and pressure testing of newly constructed tertiary recycled water pipelines, sewer force main pipelines, and gas pipelines.
- Irrigation of commercial and residential landscapes, crops, and nursery stock.
- Fire protection.
- Other uses approved in title 22 upon receiving approval from the State Water Resources Control Board Division of Drinking Water (DDW).

C. **Recycled Water Quality**. Table 1 below provides a summary of recycled water quality from 2010-2015 for various chemical constituents.

Table 1. Recycled Water Quality from the CWRF (units in millgrams per liter, mg/L)

Constituent	Units	2010		2011		2012		2013		2014		2015	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
BOD	mg/L	3.22	5.40	4.04	5.80	6.72	11.20	5.79	6.60	5.39	8.50	4.69	6.00
pH	pH units	7.16	7.80	7.39	7.67	7.43	7.51	7.52	7.75	7.56	7.97	7.46	7.74
TSS	mg/L	2.2	5.6	2.9	5.0	2.8	5.0	1.8	3.1	1.7	4.1	1.9	3.8
MBAS	mg/L	0.05	0.05	0.10	0.10	0.11	0.15	0.11	0.11	0.14	0.14	NA	NA
Alkalinity	mg/L	174	317	292	331	288	325	291	315	291	331	289	291
Boron	mg/L	0.32	0.43	0.35	0.36	0.36	0.38	0.35	0.37	0.35	0.41	0.37	0.42
Calcium	mg/L	42	72	65	73	63	66	72	81	87	93	89	94
Chloride	mg/L	191	286	271	310	279	330	276	303	275	303	288	342
Fluoride	mg/L	NA	NA	0.65	0.65	0.81	0.72	0.81	0.81	0.70	0.70	NA	NA
Iron	mg/L	0.20	0.41	0.27	0.70	0.28	1.00	0.28	0.46	0.17	0.29	0.16	0.21
Manganese	mg/L	0.06	0.08	0.08	0.15	0.07	0.15	0.08	0.09	0.08	0.09	0.08	0.09

Constituent	Units	2010		2011		2012		2013		2014		2015	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max	Ave	Max
Magnesium	mg/L	13.00	28.70	28.39	38.28	27.27	28.90	28.57	34.00	31.86	34.00	34.86	35.42
Percent Sodium	%	NA	NA	NA	NA	NA	NA	NA	55	53	56	53	54
Sodium Adsorption Ratio (SAR)	%	4.22	6.22	5.91	6.16	6.02	6.68	5.94	6.18	5.30	5.73	5.68	5.68
Sulfate	mg/L	147	254	178	222	176	194	221	253	208	264	267	288
TDS	mg/L	970	994	927	1,019	941	1,042	980	1,055	970	1,055	1,037	1,139

End notes for Table 1: mg/L= milligrams per liter, BOD = Biological Oxygen Demand, TSS = Total Suspended Solids, TDS = Total Dissolved Solids, % = Percent

D. **Proposed Changes in Master Recycling Permit**. The Order increases the permitted flow capacity of the CWRF from 4.0 to 7.0 mgd. The Order also includes requirements for Rules and Regulations for hauling and transporting recycled water, includes updated effluent monitoring requirements, establishes annual average discharge specifications as a calendar average,[5] and requires the Discharger to conduct a nitrate study. In addition, the Order also eliminates daily maximum and 30-day discharge specifications and establishes discharge specifications based on calendar averages for the following constituents:

- Boron
- Chloride
- Iron
- Manganese
- Sulfate; and
- TDS.

The use of annual average discharge specifications is appropriate for regulating mineral concentrations in recycled water applications to land, as groundwater quality is not discernibly impacted by short-term differences in the quality of applied water, but can be influenced by long-term trends.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the Order are based on the requirements and authorities described in this section.

[5] The annual average discharge specifications from Order No. 2001-352 as amended by Order No. R9-2012-0027 have been retained in this Order. However, the annual average discharge specifications in this Order are expressed as calendar averages rather than running averages.

A. **Legal Authorities**. This Order is issued pursuant to Water Code sections 13263 and 13523.1. This Order serves as a Master Recycling Permit, which also includes Waste Discharge Requirements (WDRs) issued pursuant to article 4, chapter 4, division 7 of the Water Code.

B. **California Environmental Quality Act.** The discretionary decision to adopt a Master Recycling Permit and MRP is a project under the California Environmental Quality Act (CEQA).[6] As the lead agency for the project, the Discharger prepared a Mitigated Negative Declaration for the project pursuant to the requirements of CEQA. The Mitigated Negative Declaration concludes that the project will not have a significant impact on the environment because mitigation measures have been included as part of the project. The San Diego Water Board is a responsible agency under CEQA. As such, the Board considered the Negative Declaration, and the project's environmental effects as described in that document. The Board concurs that the project will not have a significant impact on the environment.

C. **Water Quality Control Plans**. The *Water Quality Control Plan for the San Diego Basin* (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. The beneficial uses of groundwater in the HA/HSAs in which recycled water from the CWRF is used are shown in Table 2:

Table 2. Beneficial Uses

Beneficial Uses	Hydrologic Area or Sub Area
Municipal supply, Agricultural supply, Industrial supply	El Salto HSA,[1] Los Monos HSA,[1,2,3] Batiquitos HSA,[1,4,5] Richland HSA[1,4]
Excepted from Municipal supply	Encinas HA

End notes for Table 2

1. These beneficial uses do not apply westerly of the easterly boundary of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

2. These beneficial uses designations apply to the portion of HSA 4.31 bounded on the west by the easterly boundary of Interstate Highway 5 right-of-way; on the east by the easterly boundary of El Camino Real; and on the north by a line extending along the southerly edge of Agua Hedionda Lagoon to the easterly end of the lagoon, thence in an easterly direction to Evans Point, thence easterly to El Camino Real along the ridge lines separating Letterbox Canyon and the area draining to the Marcario Canyon.

3. These beneficial uses apply to the portion of HSA 4.31 tributary to Agua Hedionda Creek downstream from the El Camino Real crossing, except lands tributary to Marcario Canyon (located directly southerly of Evans Point, land directly south of Agua Hedionda Lagoon, and areas west of Interstate Highway 5.

[6] Pub. Resources Code section 21000 et seq.

4. These beneficial uses do not apply to HSA 4.51 and HSA 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek, Cottonwood Creek and to Encinitas Creek and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the subarea are as shown.

5. These beneficial uses apply to the portion of HSA 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate Highway 5 right-of-way, on the north by the subarea boundary and on the east by the easterly boundary of El Camino Real.

This Order implements the Basin Plan by prescribing requirements for the production, reuse, and disposal of recycled water that will not adversely impact water quality, beneficial uses, human health, or the environment.

D. **Recycled Water Policy**. The Recycled Water Policy establishes criteria for recycled water projects, recycling requirements, and WDRs. The intent of the Policy is to fully implement State and federal water quality laws and regulations while increasing recycled water use, allowing for streamlined permitting for appropriate landscape irrigation projects, and allowing basin-wide management of salts and nutrients.

The Recycled Water Policy states that the appropriate way to address salts and nutrients is through development of regional and sub-regional salt and nutrient management plans (SNMPs). The Guidelines for Salinity/Nutrient Management Planning in the San Diego Region (guidelines)[7] outline a prioritization approach for developing SNMPs. Under this approach, the groundwater basins are grouped into five tiers (A through E). Criteria used for grouping the basins are storage volumes and yield, level of municipal water supply use, availability of information on water resources in the basins, and water quality considerations. The highest level of effort is required in developing the SNMPs for the Tier A basins, while the guidelines recommend that SNMPs not be required for the Tier D and E basins. This approach is consistent with the Recycled Water Policy which recognizes that the degree of specificity of the SNMPs should be dependent on factors such as size and complexity of the basin, source water quality, aquifer water quality, etc. The tiered approach also ensures a level of consistency in salt and nutrient management planning efforts within individual groundwater basins of the San Diego Region.

A large portion of the Discharger's service area is within basins designated as low priority Tier D basins in the guidelines. Tier D basins have high concentrations of TDS in the groundwater and have TDS groundwater quality objectives that exceed 1,200 mg/L. The guidelines conclude that SNMPs should not be required within Tier D basins, as recycled water compliance with existing Basin Plan salinity objectives is not a concern within the Tier D basins.

Rather than ignore Tier D and E basins, the San Diego Water Board worked with the San Diego County Water Authority to include salt and nutrient management planning elements for Tier D and E basins in the 2013 Integrated Regional Water Management Plan (IRWM Plan) that covers the San Diego Region. Attachment B to the Order

[7] The guidelines were endorsed by the San Diego Water Board on November 10, 2010 with adoption of Resolution No. R9-2010-0125.

requires the Discharger to implement the elements in the IRWM Plan for salt and nutrient management in its Rules and Regulations for Recycled Water Use. These measures include ensuring recycled water and fertilizer are applied in end use areas at agronomic rates, avoiding overwatering of landscapes, and training and education of recycled water site supervisors.

E. **Antidegradation Policy**. The Basin Plan implements and incorporates by reference both the State[8] and federal antidegradation policies. The State policy requires that existing quality of waters be maintained unless degradation is justified based on specific findings. As discussed in Section V of this Information Sheet, regulation of the discharges of recycled water from the CWRF will result in receiving water quality that is consistent with the State and federal antidegradation policies.

IV. RATIONALE FOR DISCHARGE SPECIFICATIONS

The Order establishes technology and water quality based discharge specifications, and discharge specifications based on title 22, for the discharge of recycled water from the CWRF.

A. **Technology-based Discharge Specifications**. The Order establishes technology based effluent specifications for biological oxygen demand, total suspended solids, and pH. These discharge specifications are based on design criteria for removal of these constituents by secondary wastewater treatment technology.

B. **Water Quality-based Discharge Specifications**. The Order establishes water quality-based discharge specifications derived from the water quality objectives needed to support the beneficial uses of groundwater in the HA/HSAs in which recycled water from the CWRF is used, and on basin-specific objectives in Table 3 below (from Table 3-3 of the Basin Plan).

Table 3. Basin-Specific Groundwater Water Quality Objectives

HYDROLOGIC AREA	CONSTITUENT (mg/L or as noted) (Concentrations not to be exceeded more than 10% of the time during any one year period)												
	TDS	Cl^-	SO_4	%Na	NO_3^-	Fe	Mn	MBAS	B	ODOR	TURB (NTU)	COLOR (UNITS)	F^-
El Salto HSA 904.21[a]	3,500	800	500	60	45	0.3	0.05	0.5	2.0	None	5	15	1.0
Los Monos HSA 904.31[a,c]	3,500	800	500	60	45	0.3	0.05	0.5	2.0	none	5	15	1.0

[8] State Water Board Resolution No. 68-16, *Policy with Respect to Maintaining High Quality of Waters in California*.

HYDROLOGIC AREA	CONSTITUENT (mg/L or as noted) (Concentrations not to be exceeded more than 10% of the time during any one year period)												
	TDS	Cl^-	SO_4	%Na	NO_3^-	Fe	Mn	MBAS	B	ODOR	TURB (NTU)	COLOR (UNITS)	F^-
Encinas HA 904.4[a]	3,500[b]	800[b]	500	60	45[b]	0.3[b]	0.05[b]	0.5	2.0[b]	none	5	15	1.0
Batiquitos HSA 904.51[a,b,d]	3,500	800	500	60	45	0.3	0.05	0.5	0.75	none	5	15	1.0
Richland HSA 904.52[a,b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Endnotes for Table 3

a. The water quality objectives do not apply westerly of the easterly boundary of Interstate Highway 5. The objectives for the remainder of the Hydrologic Area (Subarea) are as shown.

b. The water quality objectives do not apply to hydrologic subareas 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek, Cottonwood Creek and Encinitas Creek. The objectives for the remainder of the Hydrologic Area are as shown.

c. The water quality objectives apply to the portion of Subarea 4.31 bounded on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

d. The water quality objectives apply to the portion of Subarea 4.51 bounded on the south by the north shore of Batiquitos Lagoon, on the west by the easterly boundary of the Interstate 5 right-of-way and on the east by the easterly boundary of El Camino Real.

mg/L = milligrams per liter, TDS = Total Dissolved Solids, Cl- = Chloride, SO4 = Sulfate, % Na = Percent Sodium, NO3 -= Nitrate, Fe = Iron, Mn = Manganese, MBAS = Methylene Blue Activated Substances, B = Boron, TURB = Turbidity, NTU = Nephelometric Turbidity Units, F- = Fluoride

The Order eliminates the daily maximum and 30-day average discharge specifications for chloride and boron, and eliminates the daily maximum discharge specifications for TDS and sulfate. The Order also retains the annual average discharge specifications from the previous Order, and establishes new annual average discharge specifications for selected constituents. Compliance with the annual average discharge specifications for all constituents in the Order is based upon the calendar year rather than the running average of the previous 12 months. This change is appropriate because short-term fluctuations in recycled water quality may cause a running average discharge specification to be exceeded, but not adversely impact receiving groundwater quality in the long term. The use of annual average discharge specifications is appropriate for regulating mineral concentrations in recycled water applications to land, as groundwater quality is not discernibly impacted by short-term differences in the quality of applied water, but can be influenced by long-term trends.

C. **Title 22 Specifications.** This Order contains discharge specifications for chlorine residual, turbidity, chlorine contact time, and total coliform bacteria. These specifications are based upon concentration limits found in title 22 and recommendations from the DDW for the protection of human health at use sites. Recycled water from the CWRF discharged to reuse sites must meet the definition of "disinfected tertiary recycled water" in title 22 section 60301.230 and by reference "filtered wastewater" in title 22 section 60301.320, including future changes to the incorporated provisions as the changes take effect. The turbidity discharge specification in the Order is based on title 22 section 6031.320 (b) and requires that the turbidity of effluent from the microfiltration and ultrafiltration units not exceed 0.2 NTU more than 5 percent of the time within a 24-hour period and 0.5 NTU at any time.

D. **Discharge Specifications for Order No. R9-2016-0183.** The discharge specifications contained in the Order are shown in Table 4.

Table 4. Discharge Specifications

Constituent	Units	Daily Maximum[1]	Monthly Average[2]	Annual Average[3]
Biological Oxygen Demand (BOD_5 @ 20ºC)	mg/L	45	30	
Total Suspended Solids (TSS)	mg/L	45	30	
pH	pH units	Within the limits of 6.5-8.5 at all times		
Total Dissolved Solids (TDS)	mg/L	-	-	1,100
Chloride (Cl)	mg/L	-	-	350
Sulfate (SO_4)	mg/L	-	-	350
Percent Sodium (% Na)	%	-	-	60%
Iron (Fe)	mg/L	-	-	0.3
Manganese (Mn)	mg/L	-	-	0.1
Methylene Blue- Activated Substances (MBAS)	mg/L	-	-	0.5
Boron (B)	mg/L	-	-	0.75
Fluoride (F)	mg/L	-	-	1.0
Aluminum	mg/L	-	-	1.0
Arsenic	mg/L	-	-	0.05
Antimony	mg/L	-	-	0.006
Barium	mg/L	-	-	1.0
Beryllium	mg/L	-	-	0.004
Cadmium	mg/L	-	-	0.005
Cyanide	mg/L	-	-	0.2
Mercury	mg/L	-	-	0.002

Constituent	Units	Daily Maximum[1]	Monthly Average[2]	Annual Average[3]
Nickel	mg/L	-	-	0.1
Perchlorate	mg/L	-	-	0.006
Selenium	mg/L	-	-	0.05
Thallium	mg/L	-	-	0.002

[1]The daily maximum discharge specification shall apply to the results of a single composite or grab sample representing non-overlapping 24 hour periods.

[2]The monthly average discharge specification shall apply to the arithmetic mean of the results of all samples collected during each calendar month.

[3]The annual average discharge specification shall apply to the arithmetic mean of the results of all samples collected during a calendar year period in accordance with the Monitoring and Reporting Program.

V. COMPLIANCE WITH THE ANTIDEGRADATION POLICY

State Water Board Resolution No. 68-16, the *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (the Antidegradation Policy) requires that disposal of waste into the waters of the State be regulated to achieve the highest water quality consistent with the maximum benefit to the people of the State. The quality of some waters is higher than established by adopted policies and that higher quality water must be maintained to the maximum extent possible consistent with the Antidegradation Policy. The Antidegradation Policy requires the following.

- Higher quality water will be maintained until it has been demonstrated to the State that any change will be consistent with the maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of the water, and will not result in water quality less than that prescribed in the Basin Plan.

- Any activity that produces waste or may produce waste or increased volume or concentration of waste, and discharges to existing high quality waters will be required to meet waste discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure pollution or nuisance will not occur, and the highest water quality consistent with the maximum benefit to the people of the State will be maintained.

A. **Maximum Benefit to the People of the State**. In a semi-arid climate, such as that of the San Diego Region, the maximum benefit to the people of the State can only be achieved by ensuring long and short-term protection of economic opportunities, human health, and environmental protection. In order to do that, water uses must be better matched to water quality, and use of local supplies must be encouraged to the extent possible, including reusing treated wastewater that would otherwise flow to the ocean or other salt sinks without supporting beneficial uses during transmission.[9] The use of recycled water in place of both raw and potable water supplies for the non-potable uses allowed under this Order improves water supply availability and helps to ensure that higher quality water will continue to be available for human uses and for in stream uses for fish and wildlife. The limited degradation of receiving groundwater that may occur as the result of recycling under the conditions of the Order provides maximum benefit to the people of the State, provided recycled water treatment and use are managed to ensure long-term reasonable protection of beneficial uses of waters of the State.

B. **Present and Anticipated Uses of Water and Water Quality Prescribed in the Basin Plan**. Constituents associated with recycled water that have the potential to degrade groundwater quality include Total Dissolved Solids (TDS or salts), nutrients, pathogens (represented by coliform bacteria), disinfection by-products (DBPs), and other mineral constituents. The use of recycled water permitted under the Order will not unreasonably affect present and anticipated beneficial uses or result in water quality that is less than that prescribed in the Basin Plan because of the following characteristics of the discharge and Order requirements associated with each of the recycled water constituents of concern. Each of the recycled water constituents are discussed below.

1. The TDS groundwater quality objective for the HA/HSAs in which recycled water from the CWRF is used is 3,500 mg/L. Some portions of the HAs/HSAs have no designated beneficial uses for groundwater, thus no groundwater quality objectives apply in these areas. Average annual TDS concentrations in recycled water between 2010-2015 ranged from 927-1037 mg/L, which is well below the TDS groundwater quality objective of 3,500 mg/L. As a result, the use of recycled water from the CWRF is not expected to cause the concentration of TDS in groundwater to exceed the TDS groundwater quality objective nor to further degrade the TDS quality of the groundwater.

2. Nitrogen is a nutrient that may be present in recycled water at a concentration that can degrade groundwater quality. This Order requires end users to take into consideration nutrient levels in recycled water and nutrient demand by plants when using recycled water for landscape irrigation. Application of recycled water at agronomic rates considers nutrient and water demand, and minimizes the movement of nutrients below the plant's root zone. When applied to cropped or landscaped areas, some of the nitrogen in recycled water will be taken up by the plants, and lost to the atmosphere through volatilization of ammonia or denitrification. The Rules and Regulations for Recycled Water Use (Attachment B) require recycled water supervisors to ensure that recycled water and fertilizer are applied to landscapes at agronomic rates in end use areas, and to avoid overwatering. Furthermore, supervisors are required to receive the training needed to manage fertilizer and recycled water applications to achieve agronomic rates. The Discharger is required to inform the recycled water supervisors of the nitrogen

[9] The Legislature also expressed its intent that the State undertake all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the state (Water Code section 13512).

content of the recycled water supplied for irrigation. These requirements are expected to prevent the use of recycled water from impairing an existing or potential beneficial use of groundwater. Nonetheless, the Order includes a special provision that the Discharger conduct a nitrate study to verify that the discharge of recycled water will not cause receiving groundwater to exceed 45 mg/L in areas with nitrate groundwater quality objectives where recycled water is applied to the landscape. The result of the study will enable the San Diego Water Board to determine if a discharge specification for total nitrogen should be added to the Order in the future.

3. Pathogens and other microorganisms may be present in recycled water depending upon the disinfection status of the recycled water. Recycled water from the CWRF has been treated to levels that comply with discharge specifications contained in the Order pursuant to the Basin Plan and title 22 requirements. Treatment technologies required under title 22 include secondary treatment, tertiary treatment, and disinfection for pathogen removal. Title 22 imposes limitations on the uses of recycled water based on the level of treatment and the specific uses in order to protect human health. This Order restricts the uses of recycled water to be consistent with title 22 requirements ensuring that recycled water is used safely.

   Coliform bacteria are used as a surrogate (indicator) for pathogens because they are present in untreated wastewater, survive in the environment similar to pathogenic bacteria, and are easy to detect and quantify. Pathogens are generally limited in their environmental mobility when applied to land.

   Setbacks from recycled water use areas are required in, title 22 as a means of reducing pathogenic risks by coupling pathogen inactivation rates with groundwater travel time to a well or other potential exposure route such as water contact activities. In general, a substantial unsaturated zone reduces pathogen survival compared to saturated soil conditions. Fine grained soil particles, like silt or clay, reduce the rate of groundwater transport and therefore are generally less likely to allow transport of pathogens in groundwater. Setbacks also provide attenuation of other recycled water constituents through physical, chemical, and biological processes. Attachment B of the Order requires the Discharger to include requirements for implementing and maintaining adequate setback distances in the end use areas from drinking water wells. These requirements must be specified in the Discharger’s Rules and Regulations for Recycled Water Use. This Order also requires the Discharger to treat recycled water to meet disinfection requirements for pathogens for tertiary treated recycled water as specified in title 22.

4. Disinfection by-products consisting of organic and inorganic substances may be present in recycled water. These by-products may be produced by the interaction of chemical disinfectants with naturally occurring substances in the water source. Common disinfection by-products (DBPs) include trihalomethanes, haloacetic acids, bromate, and chlorite. DBPs present in recycled water receive additional treatment when applied to land. Biodegradation, adsorption, volatilization, and other attenuative processes that occur naturally in soil will reduce the concentrations and retard migration of DBPs in the subsurface.

5. Average annual concentrations for manganese in recycled water from 2011-2015 ranged from 0.06-0.08 mg/L which exceeds the groundwater quality objective for manganese of 0.05 mg/L. The annual average discharge specification for manganese specified in the Order is 0.1 mg/L, which also exceeds the groundwater quality objective for manganese. This discharge specification is carried over from the previous Order as explained below.

   Manganese is an essential nutrient for plant growth. Uptake of manganese by vegetation irrigated with recycled water will reduce the potential for manganese to affect groundwater quality or impact beneficial uses. The discharge specification for manganese in the Discharger's previous Order was raised to 0.1 mg/L based on a Report of Waste Discharge (ROWD) submitted by the Discharger in June 2011. The Discharger reported in the aforementioned ROWD that most of the use areas are planted in turf grass. The annual mass of manganese in recycled water applied to irrigated areas from applied water containing manganese at a concentration of 0.1 mg/L is 0.65 pounds/acre (lbs/ac), while typical annual manganese demand of turf grass is estimated to be in the range of 0.5-1lb/ac. As a result, uptake of manganese by vegetation in the end use areas is expected to prevent the use of recycled water from causing manganese concentrations in groundwater to exceed 0.05 mg/L.

   In addition, the groundwater quality objective of 0.05 mg/L is also the secondary drinking water standard for manganese. Elevated levels of manganese in water supplies can cause unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures, but is not expected to cause adverse human health effects.

VI. RATIONALE FOR WATER RECYCLING REQUIREMENTS

Water recycling requirements are included in this Order pursuant to Water Code section 13523 and are based on recommendations from the DDW. In accordance with title 22, the DDW reviews Engineering Reports for the production, distribution, and use of recycled water. The San Diego Water Board relies on the expertise of the DDW and includes recommendations from DDW in WDRs to ensure recycled water is treated and used in a manner that protects human health. The Discharger has prepared an Engineering Report pursuant to title 22, section 60323. The Engineering Report identifies the means of compliance with the applicable sections of title 22, and has been reviewed by the DDW. The Order also requires the Discharger to maintain Rules and Regulations for Recycled Water Use (Attachment B) that comply with DDW's requirements. The Rules and Regulations must include an inspection and cross-connection testing program.

VII. RATIONALE FOR STANDARD PROVISIONS, SPECIAL PROVISIONS, AND NOTIFICATIONS

A. Standard Provisions

The standard provisions contain language that allows the San Diego Water Board to enforce Order No. R9-2016-0183. Provisions include need for inspection, spill and emergency reporting, records maintenance, and reporting of changes. Standard provisions apply to all WDRs and are consistent with San Diego Water Board findings.

B. **Special Provisions- Facility Design and Operation Specifications**

The CWRF was designed and constructed in accordance with an Engineering Report which was reviewed by the DDW. The Design and Operation Specifications in the Order require that the CWRF be operated and recycled water be distributed in accordance with the Engineering Report; and require the Discharger to comply with all applicable sections of titles 17 and 22 to ensure recycled water is treated and distributed in a manner that is protective of public health. The Design and Operation Specifications in the Order also require that the plant be operated by appropriately certified wastewater operators, require application of recycled water and fertilizer in end use sites at agronomic rates, require maintenance of a facility operation manual and appropriate references, and require implementation of best management practices for protection of human health.

As previously mentioned, this Order includes a special provision that the Discharger conduct a nitrate study to verify that the use of recycled water for landscape irrigation will not cause receiving groundwater to exceed 45 mg/L. If not, the San Diego Water Board will amend the Order to add a discharge specification for total nitrogen.

C. **Notifications**

Notifications are included in the Order to inform the Discharger of administrative issues regarding this Order.

VIII. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The purpose of Monitoring and Reporting Program (MRP) No. R9-2016-0183 (the MRP) is to determine and ensure compliance with discharge specifications and other requirements established in this Order, assess treatment efficiency, and characterize effluents to evaluate the potential effects of the discharge on the receiving water. The MRP also specifies requirements concerning the proper use, maintenance, and installation of monitoring equipment and methods, and the monitoring type intervals and frequency necessary to yield data that are representative of the activities and discharges regulated under this Order.

The MRP is issued pursuant to Water Code section 13267, which authorizes the San Diego Water Board to require the Discharger to furnish technical and monitoring reports. The use of laboratories evaluated and accredited under the DDW's Environmental Laboratory Accreditation Program, and implementation of proper quality assurance and control procedures ensures the reliability and validity of the data as well as consistency and comparability with regulations.

Consistent with the Framework for Monitoring and Assessment in the San Diego Region,[10] which requires that all monitoring be question driven, the monitoring required by the MRP is designed to answer the two overarching questions below.

- Will the production, conveyance, and end use of recycled water regulated by this Order be done in a manner that protects public health and the environment?

- Is groundwater designated for municipal and domestic use safe to drink in irrigation end use areas regulated by this Order?

The MRP has two basic components; effluent quality monitoring, and recycled water production and distribution monitoring. Monitoring required by the MRP for these two components is designed to answers the following specific monitoring questions that relate to the overarching questions.

1. Effluent monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent discharge specifications and/or assess potential impacts to groundwater water quality. Monitoring is typically conducted at the end of the treatment process and prior to distribution of recycled water to use sites. Effluent monitoring will answer the following questions.

    a. Does the effluent comply with permit discharge specifications and other requirements of this Order, thereby ensuring that water quality objectives are achieved in the groundwater?

    b. Does the effluent comply with the statewide treatment standards for recycled water, as required by title 22?

    c. Is the Facility being properly operated and maintained to ensure compliance with the conditions of the Order?

2. Recycled water distribution monitoring provides information necessary to track the distribution of recycled water in the San Diego Region. This information provides an essential part of a cumulative picture of the distribution and use of recycled water within the San Diego Region.

    Collection and analysis of recycled water production and use site data will help answer the following questions.

    a. What is the total volume of recycled water produced from the CWRF?

    b. Where are the recycled water use sites located?

    c. What is the volume of recycled water delivered to each use site?

    d. What is the level of compliance with Rules and Regulations at recycled water reuse sites?

[10] California Regional Water Quality Control Board, San Diego Region, Staff Report, November 2012.

IX. PUBLIC PARTICIPATION

Two of the four values of the San Diego Water Board espoused in its Practical Vision are communication and transparency. Participation of the public in the decision making process of the Board is a hallmark of the board governmental structure in California and essential to this Board's success. The San Diego Water Board has taken the following steps to encourage public participation in the adoption process for this Master Recycling Permit and Monitoring and Reporting Program.

A. Notification of Interested Parties

Consistent with Water Code section 13167.5, the San Diego Water Board notified the Discharger and interested agencies and persons of its intent to adopt a Master Recycling Permit and Monitoring and Reporting Program for the discharge and made Order No. R9-2016-0183 available on its website. Furthermore, the San Diego Water provided the public with an opportunity to submit their written comments and recommendations. Notification was provided through the San Diego Water Board website and board meeting agenda publication.

B. Written Comments

Interested parties and persons were invited to submit written comments concerning Order No. R9-2016-0183. Comments were submitted either in person, in writing, or by email including a signed cover/transmittal letter sent via email to sandiego@waterboards.ca.gov. Written comments were received before the **November 15, 2016** due date.

C. Public Hearing

The San Diego Water Board held a public hearing to consider adoption of Order No. R9-2016-0183 during its regular Board meeting on the following date and time, and at the following location:

Date:	**December 14, 2016**
Time:	**9:00 am**
Location:	**2375 Northside Drive, Suite 100 San Diego, CA 92108**

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the San Diego Water Board regarding the final WDRs. The petition must be submitted within 30 days of the San Diego Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. **Information and Copying**

This Order, the Report of Waste Discharge (ROWD), related documents, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the San Diego Water Board by calling 619-516-1990.

F. **Register of Interested Persons**

Any person interested in being placed on the mailing list for information regarding the Order should contact Mr. Fisayo Osibodu at (619) 521-8036 or at Olufisayo.Osibodu@waterboards.ca.gov reference this facility, and provide a name, address, phone number, and email address.

G. **Additional Information**

Requests for additional information or questions regarding this order should be directed to Mr. Fisayo Osibodu at (619) 521-8036 or at Olufisayo.Osibodu@waterboards.ca.gov.

ATTACHMENT D

MONITORING AND REPORTING PROGRAM NO. R9-2016-0183

FOR CARLSBAD MUNICIPAL WATER DISTRICT
CARLSBAD WATER RECYLING FACILITY, SAN DIEGO COUNTY

This Monitoring and Reporting Program (MRP) is issued to the Carlsbad Municipal Water District (Discharger) pursuant to Water Code section 13267, which authorizes the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) to require the Discharger to furnish technical and monitoring reports. The San Diego Water Board Executive Officer has the authority to modify this MRP as appropriate. Monitoring in accordance with this MRP shall begin on January 1, 2017.

I. GENERAL MONITORING PROVISIONS

A. Samples and measurements collected as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be collected at the monitoring points specified in this MRP and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water or substance. Monitoring points shall not be changed without notifying, and receiving approval from the San Diego Water Board for the proposed monitoring location change.

B. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10 percent from true discharge rates throughout the range of expected discharge volumes.

C. Monitoring must be conducted according to United States Environmental Protection Agency (USEPA) test procedures approved under 40, Code of Federal Regulations (CFR), part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act* (USEPA Guidelines) as amended, unless other test procedures have been specified in this MRP.

D. Unless otherwise permitted by the San Diego Water Board, all analyses shall be conducted at a laboratory certified to perform such analyses by the State Water Resources Control Board Division of Drinking Water (DDW). The Discharger must use a laboratory capable of producing and providing quality assurance/quality control (QA/QC) records for San Diego Water Board review. The director of the laboratory whose name appears on the certification must supervise all analytical work in his/her laboratory and must sign all reports submitted to the San Diego Water Board.

E. Any report presenting new analytical data is required to include the complete laboratory and analytical report(s). The laboratory analytical report must be signed by the laboratory director and contain:

1. A complete sample analytical report.

2. A complete laboratory quality assurance/quality control (QA/QC) report.

3. A discussion of the QA/QC data.

4. A transmittal letter indicating whether or not all the analytical work was supervised by the director of the laboratory. The transmittal laboratory must contain the following statement, "All analyses were conducted at a laboratory certified for such analyses by the DDW in accordance with current USEPA procedures."

F. Specific methods of analysis must be identified in the Discharger's monitoring reports. If the Discharger proposes to use methods or test procedures other than those included in the most current version of the USEPA Guidelines, the exact methodology must be submitted for review and must be approved by the San Diego Water Board prior to use.

G. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation and copies of all reports required by this MRP, and records of all data used to complete the Report of Waste Discharge (ROWD) for Order No. R9-2016-0183 and any subsequent ROWDs. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report or ROWD. This period may be extended during the course of any unresolved litigation regarding this discharge or when required by the San Diego Water Board. Records of monitoring information shall include the following:

1. The date, exact place, and time of sampling or measurements.

2. The individual(s) who performed the sampling or measurements.

3. The date(s) analyses were performed.

4. The individual(s) who performed the analyses.

5. The analytical techniques or methods used.

6. The results of such analyses.

H. All monitoring instruments and devices that are used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

I. All applications, reports, or information submitted to the San Diego Water Board shall be signed and certified as follows:

1. The Report of Waste Discharge shall be signed as follows.

a. For a corporation- by a principal Executive Officer of at least the level of Vice President.

b. For a partnership or sole proprietorship- by a general partner or the proprietor, respectively.

c. For a municipality, State, federal or other public agency- by either a public Executive Officer or ranking elected officials.

2. All other reports required by Order No. R9-2016-0183 and other information required by the San Diego Water Board shall be signed by a person designated in Section I.1 or a duly authorized representative of that person. An individual is duly authorized representative only if the following are true:

   a. The authorization is made in writing by a person described in Section I.1;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity; and

   c. The written authorization is submitted to the San Diego Water Board.

3. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

J. A composite sample is defined as a combination of at least eight sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

K. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

L. The Discharger shall identify all missing or non-valid monitoring or sampling results in monitoring reports submitted. All instances of missing or non-valid results must be accompanied by an explanation of their root cause and the steps the Discharger has or will take to prevent future instances. Missing or non-valid results may be considered violations of Order No. R9-2016-0183 that could result in enforcement action depending on the frequency of such instances and efforts by the Discharger to prevent such failures.

II. DISCHARGE MONITORING REQUIREMENTS

A. Effluent Monitoring Requirements

1. Effluent that will be discharged to landscape irrigation sites or reuse sites subject to Water Recycling Criteria specified in title 22, shall be monitored downstream from the chlorine contact basin. Required effluent monitoring is shown in Table 1. Required monitoring for constituents specified in Table 1 shall begin on January 1, 2017.

2. Effluent samples collected to determine turbidity (when required) shall be collected after the media filters. Effluent tertiary turbidity analyses shall be conducted continuously using a continuous monitoring and recording turbidity meter. Compliance with the daily average operating filter effluent turbidity limit of 2 NTU shall be determined using levels of recorded turbidity taken at a minimum of four-hour intervals over a 24-hour period. Compliance with the turbidity standard of not exceeding 0.2 NTU from the microfiltration or ultrafiltration or 5 NTU more than 5 percent of the time from the granular media filters over a 24-hour period shall be determined using the levels of recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period. Should the continuous turbidity meter and/or recorder fail, grab sampling at a minimum frequency of 1.2 hours may be substituted for a period of up to 24 hours. The Discharger shall report monthly results of four-hour turbidity readings, average effluent turbidity (24-hours), 95 percentile effluent turbidity (24-hours), and daily maximum turbidity readings.

3. Turbidity of the combined microfiltration and ultrafiltration units effluent shall be measured prior to the break tank to demonstrate compliance with section 60301.32 (b) of title 22, and section III.E of Order No. R9-2016-0183. Turbidity of the granular media filters shall be measured from each individual unit or from the combined effluent of the two units.

Table 1. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency [a,b]	Reporting Frequency
Flow Rate	mgd	Continuous	Continuous	Monthly
Chlorine Residual[c]	mg/L	Continuous	Continuous	Monthly
Chlorine-Contact Time (CT)[c]	mg-min/L	Continuous	Continuous	Monthly
Total Coliform Bacteria[d]	MPN/ 100 mL	Grab	Daily	Monthly
Turbidity[e]	NTU	Continuous	Continuous	Monthly
Biological Oxygen Demand (BOD_5 @ 20ºC)	mg/L	Composite	Weekly	Monthly
Total Suspended Solids	mg/L	Composite	Weekly	Monthly
pH	pH units	Grab	Weekly	Monthly

Parameter	Units	Sample Type	Minimum Sampling Frequency [a,b]	Reporting Frequency
Chloride (Cl)	mg/L	Composite	Quarterly	Quarterly
Sulfate (SO_4)	mg/L	Composite	Quarterly	Quarterly
Percent Sodium (% Na)	%	Composite	Quarterly	Quarterly
Nitrate (NO_3)	mg/L	Composite	Quarterly	Quarterly
Total Nitrogen	mg/L	Composite	Quarterly	Quarterly
Iron (Fe)	mg/L	Composite	Quarterly	Quarterly
Manganese (Mn)	mg/L	Composite	Quarterly	Quarterly
Methylene Blue-Activated Substances (MBAS)	mg/L	Composite	Quarterly	Quarterly
Boron (B)	mg/L	Composite	Quarterly	Quarterly
Fluoride (F)	mg/L	Composite	Quarterly	Quarterly
Total Dissolved Solids (TDS)	mg/L	Composite	Quarterly	Quarterly
Aluminum	mg/L	Composite	Annually	Annually
Barium	mg/L	Composite	Annually	Annually
Perchlorate	mg/L	Composite	Annually	Annually
Priority Pollutants[f]	mg/L	Composite	Annually	Annually

a. The Discharger shall increase the sampling frequency from weekly to daily, from quarterly to monthly, and from annually to quarterly for any constituent that exceeds the discharge specifications of this Order. The increased frequency of monitoring shall continue until the Discharger achieves compliance with the specification for three consecutive periods, at which point the Discharger shall resume sampling at the specified frequency.

b. Weekly is defined as a calendar week (Sunday through Saturday). Monthly is defined as a calendar month. Quarterly is defined as a period of three consecutive calendar months beginning on January 1, April 1, July 1, or October 1. Annually is defined as a period of 12 consecutive calendar months beginning on January 1.

c. Calculated CT (chlorine concentration multiplied by modal contact time) values shall be determined and recorded continuously. The daily minimum CT value shall be reported monthly. The Discharger shall report monthly the date(s), value(s), time and duration when the CT value falls below 450 mg-min/L, and/or the modal contact time falls below 90 minutes.

d. Samples for total coliform bacteria shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. Results of daily coliform bacteria monitoring, running 7-day median determination shall be reported monthly.

e. See Sections II. A. 2 and II.A.3 of this MRP.

f. Priority pollutant monitoring is required by Section 7.b.4 of the State Water Board *Recycled Water Policy*. Priority pollutants are constituents listed in Appendix A to the 40 Code of Federal Regulations part 423.

III. RECYCLED WATER REPORTS

A. The Discharger shall submit quarterly recycled water users' summary reports containing the following information.

1. Total volume of recycled water supplied to all recycled water users for each month of the reporting period.

2. Total number of recycled water use sites receiving recycled water.

3. Address of the recycled water use site.

4. Basin Plan name and number of hydrologic subarea underlying the recycled water use sites.

B. The Discharger shall submit annual recycled water users' compliance reports containing the following information:

1. Recycled water use site summary report

   a. Name of each recycled water reuse site.

   b. Owner of each recycled water use facility.

   c. Address of each reuse site.

   d. Name of the recycled water on-site user supervisor.

   e. Phone number of the on-site user supervisor.

   f. Mailing address of the recycled water on-site use supervisor, if different from site address.

   g. Volume of reclaimed water delivered to each reuse site for each of the 12 months in a calendar year.

   h. Total area (in acres) of each landscape irrigation site.

   i. The amount of nitrogen (in pounds per acre per year) applied in recycled water on each landscape irrigation site.

2. Recycled water user site inspections.

   The Discharger shall report the number of recycled water reuse site inspections conducted by its staff and identify the sites inspected for the reporting period.

3. Recycled water user violations of the Discharger's rules and regulations**.**

   The Discharger shall identify all recycled water users known to be in violation of its rules and regulations for recycled water users**.** The report shall include a description of the noncompliance and its cause, including the period of noncompliance, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

C. If the Discharger establishes recycled water fill stations, then the following information shall also be included in the annual recycled water compliance report.

1. A list of all approved residential and commercial recycled water haulers. The Discharger's annual list must indicate any new recycled water haulers that were approved during the calendar year.

2. A list of users receiving or proposing to receive recycled water from the fill stations (including a list of uses of recycled water for each user).

3. A list of recycled water end use sites outside the Discharger's recycled water service area.

4. A summary of the volume of recycled water used (in acre feet) from the fill stations each quarter during the calendar year.

5. A summary table of all inspections conducted of recycled water use sites which received water from the fill stations during the calendar year, and enforcement and corrective actions initiated by the Discharger during the calendar year. Include a discussion of compliance and the corrective action taken, as well as any planned or proposed actions needed to bring the discharge into compliance with the Order. Copies of any enforcement actions taken by the Discharger shall be provided to DDW, the San Diego Water Board, and County DEH.

6. An evaluation of the performance of the recycled water treatment facility, including discussion of capacity issues, system problems, and a forecast of the flows anticipated in the next year.

7. The name and contact information for the recycled water operator/staff responsible for overseeing operation, maintenance, and system monitoring of the fill stations.

D The Discharger shall submit results of a nitrate study by June 15, 2018 which demonstrates whether or not the discharge from the plant will cause groundwater to exceed the proposed groundwater quality objective for nitrate of 45 mg/L as nitrate (in areas with applicable numerical groundwater quality objectives). The nitrate study must evaluate factors such as existing nitrogen removal achieved at the plant, need for additional treatment processes to remove nitrate, fate and transport of nitrogen in the groundwater, nitrate uptake rates by vegetation in the use sites, groundwater monitoring, application of recycled water and fertilizer at agronomic rates, and other best management practices. A workplan for the nitrate study must be submitted by September 15, 2017 which identifies proposed tasks and milestones for completing the nitrate study.

IV. REPORTING REQUIREMENTS

A. The Discharger shall prepare Self-Monitoring Reports (SMR) that include the results of all monitoring specified in Section II (Discharge Monitoring Requirements) of this MRP. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

B. Monitoring periods and reporting for all required monitoring shall be completed according to the schedule in Table 2:

Table 2. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period	SMR Due Date
Continuous	All	Submit with monthly SMR
Daily	Daily	Submit with monthly SMR
Monthly	January, February, March, April, May, June, July, August, September, October, November, December	By the first day of the second month following sampling (i.e March 1 for January)
Quarterly	January 1 through March 30 April 1 through June 30 July 1 through September 30 October 1 through December 31	May 1 August 1 November 1 February 1
Annually	January 1 through December 31	February 1

Laboratory reporting limits shall be lower than or equal to the discharge specifications. Constituents not detected below the method detection limit shall be reported as non-detect with the applicable value (e.g. ND<0.05 mg/L). Constituents detected between the laboratory reporting limit and method detection limit shall be reported as "estimated concentrations" or noted with appropriate laboratory flags.

C. The Discharger shall furnish SMRs in accordance with the following requirements:

1. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with discharge specifications.

2. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the Master Recycling Permit; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. For identified violations, the letter must include a description of the requirement that was violated and a description of the violation.

3. SMRs must be submitted in text searchable PDF format to the San Diego Water Board via email. The email submittals must include a signed cover/transmittal letter (with the facility name, facility contact information, and reference code), and, unless directed otherwise by the Executive Officer, be sent via email to sandiego@waterboards.ca.gov.

Ordered by: David W. Gibson

David W. Gibson
Executive Officer
DATE: December 14, 2016

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2007-0018

WASTE DISCHARGE REQUIREMENTS
FOR
VALLECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

Table of Contents

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2007-0018

WASTE DISCHARGE REQUIREMENTS
FOR
VALLECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. The Vallecitos Water District (hereafter Discharger) owns and operates Meadowlark Water Reclamation Plant (MWRP) that discharges up to 2.25 million gallons per day (MGD) of tertiary treated effluent used for irrigation under Order No. R9-1993-0023.

2. On May 6, 2006, the Discharger submitted a complete Report of Waste Discharge (ROWD) prepared by Kennedy/Jenks Consultants proposing to upgrade the MWRP and increase its capacity to 5.0 MGD.

3. When upgraded, the MWRP, which is located at 7941 Corintia Street in Carlsbad, will consist of headworks, primary sedimentation tanks, roughing filters, aeration basins, secondary clarifiers, and new media granular filters and chlorination. The upgraded MWRP will produce disinfected tertiary effluent in compliance with Title 22 of the California Code of Regulations. This recycled water will be delivered to Carlsbad and Olivenhain Water Districts for purveyance of recycled water under each District's master reclamation permits.

4. The Discharger maintains an existing pipeline to the Encina Water Pollution Control Facility (EWPCF) ocean outfall. During wet weather or periods of low irrigation, the MWRP can discharge up to 5.0 MGD of secondary treated wastewater to the ocean outfall under the requirements of Order No. R9-2005-0219, NPDES Permit No. CA0107395. The Discharger also sends all solids produced by MWRP, to the EWPCF via a land outfall for treatment and disposal.

5. In accordance with Section 2200, Title 23 of the California Code of Regulation, the threat to water quality and complexity of the treated wastewater effluent from MWRP is determined as category 2B.

6. The Discharger reported that the upgraded MWRP will produce a tertiary effluent with the following characteristics:

Constituent	Units	Projected Effluent Water Quality
Biochemical Oxygen Demand$_5$	mg/L	30
Total Suspended Solids	mg/L	30
Total Dissolved Solids	mg/L	1100
Chloride	mg/L	260
Manganese	mg/L	0.050
Iron	mg/L	0.3
Boron	mg/L	0.5

7. The Discharger will produce recycled water for distribution by Carlsbad and Olivenhain Water Districts at use sites within the El Salto Hydrologic Subarea (HSA) (4.21), Los Monos HSA (4.31), Batiquitos HAS (4.51), Richland HSA (4.52), San Elijo HSA (4.61), and Encinas Hydrologic Area (4.40).

8. This Regional Board, acting in accordance with section 13244 of the California Water Code, adopted the Water Quality Control Plan for the San Diego Basin (9), (hereinafter Basin Plan) on September 8, 1994. The Basin Plan was subsequently approved by the State Water Resources Control Board (SWRCB) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Board and approved by the SWRCB. The Basin Plan contains beneficial uses and water quality objectives.

9. A discharge in compliance with this Order will be consistent with the standards, policies, and regulations established in the Basin Plan for the achievement of water quality objectives.

10. In establishing the requirements contained herein the Regional Board considered factors including, but not limited to, the following:
    a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose,
    b. Other waste discharges,
    c. The need to prevent nuisance,
    d. Past, present, and probable future beneficial uses of the hydrologic subunits under consideration,
    e. Environmental characteristics of the hydrologic subunits under consideration,
    f. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area,
    g. Economic considerations,
    h. The need for additional housing within the region, and

i. The need to develop and use recycled water.

11. The proposed project will make use of recycled water consistent with the goals of California Water Code, Division 7, Chapter 7, Water Recycling Law.

12. The Regional Board considered all environmental factors associated with the discharge of recycled water from MWRP. This project involves the permitting of existing sewerage facilities. As such, this project is categorically exempt from the requirements of the California Environmental Quality Act (CEQA) as provided by Section 15301, and in compliance with Section 15300.2, of California Code of Regulations Title 14.

13. The Regional Board has notified the Discharger all known interested parties of its intent to adopt waste discharge requirements for production of recycled water by MWRP.

14. In accordance with the *Memorandum Of Agreement Between The Department Of Health Services And The State Water Resources Control Board On Use Of Reclaimed Wate*r, this Order incorporates any conditions of approval submitted as part of the State Department of Health Services' recommendations into water recycling requirements proposed for adoption by this Regional Board.

15. The Regional Board in a public meeting, heard and considered all comments pertaining to the discharge of recycled water from MWRP.

IT IS HEREBY ORDERED THAT the Vallecitos Water District (hereafter Discharger) in order to meet the provisions contained in Division 7 of the California Water Code and Regulations adopted thereunder, shall comply with the following requirements, which supersede the requirements prescribed by Order No. R9-1993-0023, for the discharge and purveyance of disinfected tertiary effluent for recycled water from MWRP:

A. PROHIBITIONS

1. Discharge of wastes in a manner other than as described in the findings of this Order is prohibited unless the Discharger obtains revised waste discharge requirements that provide for the proposed change.
2. Discharges of treated or untreated solid or liquid waste to a navigable water or tributary of a navigable water are prohibited unless as authorized by an NPDES permit issued by this Regional Board.
3. Neither the treatment, storage nor disposal of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.
4. The discharge of treated wastewater shall not cause a violation of the prohibitions contained in the Basin Plan, incorporated herein by reference.

B. DISCHARGE SPECIFICATIONS

1. The discharge of treated effluent from the MWRP containing pollutants in excess of the following effluent limitations:

CONSTITUENT	Units	MONTHLY AVERAGE[1]	DAILY MAXIMUM[2]
Biochemical Oxygen Demand ($CBOD_5$ @ 20℃)	mg/L	30	45
Total Suspended Solids	mg/L	30	45
pH (within limits shown at all times)	pH units	6.0 - 8.5	

[1] The monthly average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during each calendar month.

[2] The daily maximum effluent limitation shall apply to the results of a single composite or grab sample representing a 24-hour period.

2. The discharge of treated effluent from the MWRP and to the recycled water use areas containing pollutants in excess of the following effluent limitations is prohibited:

CONSTITUENT	Units	12-MONTH AVERAGE[1]	DAILY MAXIMUM[2]
Total Dissolved Solids (TDS)	mg/L	1100	1500
Chloride (Cl)	mg/L	400	500
Manganese (Mn)	mg/L	0.05	0.06
Iron	mg/L	0.3	0.4
Boron (B)	mg/L	0.5	0.6

[1] The 12-month average effluent limitation shall apply to the arithmetic mean of the results of all samples collected during the current calendar month and the preceding 11 calendar months.

[2] The daily maximum effluent limitation shall apply to the results of a single composite or grab sample representing a 24-hour period.

3. The median concentration of total coliform bacteria measured in the disinfected tertiary recycled water from MWRP shall not exceed a Most Probable Number

(MPN) of 2.2 per 100 mL, utilizing the bacteriological results of the last seven days for which analyses have been completed; and the number of total coliform bacteria shall not exceed an MPN of 23 per 100 mL in more than one sample in any 30-day period. No sample shall exceed a MPN of 240 total coliform bacteria per 100 mL.

4. The turbidity of the disinfected tertiary recycled water from MWRP shall not exceed a daily average value of 2 NTU (nephelometric turbidity units), shall not exceed 5 NTU more than 5% of the time during a 24-hour period based on the total number of recorded measurements, and shall not exceed 10 NTU at any time.

5. The average daily effluent flow rate for the existing MWRP shall not exceed 2.25 MGD. After the Discharger receives authorization to discharge pursuant to Section C.2 of this Order, the average daily effluent flow rate from the new MWRP shall not exceed 5.0 MGD.

C. FACILITY DESIGN AND OPERATION SPECIFICATIONS

1. PROPER OPERATION

The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

2. CERTIFICATION REPORT

The Discharger shall submit a report certifying that the treatment and disposal facilities have been constructed as designed and will meet the Discharge Specifications in Section B for the new full design flow of 5.0 MGD for tertiary treatment with disinfection. The design engineer shall affix their signature and engineering license number to the certification report. Prior to exceeding the existing average daily effluent flow rate of 2.25 MGD, the following requirements shall be met:

a. The certification report is received by the Regional Board,

b. The Regional Board has been notified of the completion of facilities by the Discharger,

c. An Inspection of the facilities has been made by the Regional Board,

d. The Regional Board notifies the Discharger that the new discharge can be initiated.

3. CONSTRUCTION PROGRESS REPORTS

The Discharger shall notify the Regional Board when each new treatment, storage, and disposal component has been completed and certify that the new component has been constructed as designed.

4. ENGINEERING REPORT

The Discharger shall meet the design, operational, and reliability requirements of Articles 7, 8, 9 and 10 of the California Code of Regulations, Title 22, Division 4, Chapter 3. The Discharger shall prepare an engineering report conforming to the California Code of Regulations, Title 22, Engineering Report Guidelines, Sections 3 and 4. The engineering report shall be submitted to the State DHS, County DEH, and the Regional Board.

5. COAGULATION ALTERNATIVE

Coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is capability to automatically activate chemical addition or divert wastewater should the turbidity of the influent to the filters exceed 5 NTU for more than 15 minutes.

6. DISINFECTION PROCESS

The chlorine disinfection process chlorine of recycled water shall comply with all requirements of California Code of Regulations, Title 22, Division 4 and provide a CT (chlorine concentration times modal contact time) value of not less than 450 mg-min/liter at all times with a modal chlorine contact time of at least 90 minutes based on peak dry weather design flow.

7. OPERATION MANUAL

A copy of the facility operations manual shall be maintained at the Discharger's facility and shall be available to operation personnel and Regional Board staff at all times. The following portions of the operations manual shall be posted at the treatment plant as a quick reference for treatment plant operators:

a. Alarm set points for secondary turbidity, tertiary turbidity, and chlorine residual.

b. Levels at which flow will be diverted for secondary turbidity, tertiary turbidity, and chlorine residual.

c. When to divert flow for high daily and weekly median total coliform.

d. When the authorities (State DHS, County DEH, Regional Board) will be notified of a diversion.

e. Names and numbers of those authorities to be notified in case of a diversion.

f. Frequency of calibration for turbidimeters and chlorine residual analyzers.

8. OPERATORS CERTIFICATION

The Discharger's wastewater treatment facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 3, Subchapter 14, Title 23 of the California Code of Regulations.

9. FLOOD PROTECTION

All waste treatment, storage and purveyance facilities shall be protected against 100-year peak stream flows as defined by the San Diego County flood control agency.

10. RUNOFF PROTECTION

All wastewater and recycled water storage facilities shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24-hour frequency storm.

11. MONITORING AND REPORTING

The Discharger shall comply with the attached Monitoring and Reporting Program No. R9-2007-0018 and future revisions thereto as specified by the Regional Board. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. R9-2007-0018.

D. STANDARD PROVISIONS

1. ENFORCEMENT

The Regional Board may initiate enforcement action against the recycled water agency, which may result in the termination of the recycled water supply, if any person uses, transports, or stores such water in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in Water Code section 13050.

2. DUTY TO COMPLY

The Discharger must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for (a) enforcement action; (b) termination, revocation and reissuance, or modification of this Order; or (c) denial of a report of waste discharge in application for new or revised master reclamation permit requirements.

3. ENTRY AND INSPECTION

The Discharger shall allow the Regional Board, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to do the following:

a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Order,

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order,

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this Order, and

d. Sample or monitor, at reasonable times for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.

4. CIVIL MONETARY REMEDIES

The California Water Code provides that any person who intentionally or negligently violates any master reclamation permit requirements issued, reissued, or amended by this Regional Board shall be liable civilly in accordance with California Water Code section 13350 (d), (e), or (f).

5. PENALTIES FOR INVESTIGATION, MONITORING OR INSPECTION VIOLATIONS

The California Water Code provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or falsifying any information provided in the monitoring reports is guilty of a misdemeanor and is subject to a civil liability in accordance with CWC Section 13268.

6. ENDANGERMENT OF HEALTH AND ENVIRONMENT

The Discharger shall report any noncompliance that may endanger health or the environment. Any such information shall be provided orally to the Regional Board within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Regional Board, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the Regional Board within 24 hours:

a. Any bypass from any portion of the treatment facility. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility to other than a sewer system.

b. Any discharge of non-disinfected effluent or untreated wastewater resulting from sewer line breaks, obstruction, surcharge, or any other circumstances.

c. Any treatment plant upset which causes the effluent limitations of this Order to be exceeded including, but not limited to, the following:

    (1) Failure of chlorination equipment

    (2) Effluent total coliform bacteria greater than 240 MPN/100 ml

    (3) Turbidity greater than 10 NTU if distributed to any recycled water user

    (4) CT less than 450 mg-min/L if distributed to any recycled water user

    These incidents shall also be reported orally to the State DHS and County DEH within 24-hours of the incident.

7. PLANT OVERLFOW EVENTS

The Discharger shall report all overflow events that occur at MWRP. For purposes of this reporting requirement, an overflow event is defined as a discharge of treated or untreated wastewater at a location onsite not authorized by waste discharge requirements and/or NPDES permit which results from a pump station failure, line break, obstruction, surcharge, or any other operational dysfunction. This reporting requirement applies to all overflow events other than those events subject to regulation under this Regional Board's Order No. R9-2007-00015, Waste Discharge Requirements for Sanitary Sewer Agencies in the San Diego Region. Overflows of the kind identified under this provision shall be reported to the Regional Board with the monthly monitoring report in which the overflow occurs.

8. UNAUTHORIZED DISCHARGES OF RECYCLED WATER

Pursuant to CWC Section 13529.2, any person who, without regard to intent or negligence, causes or permits an unauthorized discharge of 50,000 gallons or more of recycled water that has been treated to at least disinfected tertiary 2.2 recycled water or 1,000 gallons or more of recycled water that is treated at a level less than disinfected tertiary 2.2 recycled water in or on any waters of the state, or causes or permits such unauthorized discharge to be discharged where it is, or probably will be, discharged in or on any waters of the state, shall, as soon as (1) that person has knowledge of the discharge, (2) notification is possible, and (3) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify this Regional Board in accordance with reporting requirements in Standard Provision F.6.

9. PRIOR NOTICE OF BYPASS

If a need for a discharge bypass is known in advance, the Discharger shall submit prior notice (stating, at a minimum, the purpose, anticipated dates, duration, level of treatment, and volume of bypass) and, if at all possible, such notice shall be submitted at least 10 days prior to the date of the bypass. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility to other than a sewer system.

10. CORRECTIVE ACTION

The Discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

11. TREATMENT FAILURE

In an enforcement action, it shall not be a defense for the Discharger that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies for example, when the primary source of power of the treatment facility is failed, reduced, or lost.

12. <u>HAZARDOUS RELEASES</u>

Except for a discharge which is in compliance with these master reclamation permit requirements, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, shall as soon as (a) that person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Director of Environmental Health Services, County of San Diego in accordance with California Health and Safety Code section 5411.5 and the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the State Board or the appropriate Regional Board of the discharge. This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of section 13271 of the Water Code unless the Discharger is in violation of a prohibition in the applicable Water Quality Control Plan.

13. <u>PETROLEUM RELEASES</u>

Except for a discharge which is in compliance with these master reclamation permit requirements, any person who without regard to intent or negligence, causes or permits any oil or petroleum product to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (a) such person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan adopted pursuant to Article 3.5 (commencing with section 8574.1) of Chapter 7 of Division 1 of Title 2 of the Government Code. This requirement does not require reporting of any discharge of less than 42 gallons unless the discharge is also required to be reported pursuant to Section 311 of the Clean Water Act or the discharge is in violation of a prohibition in the applicable Water Quality Control Plan.

14. PERMIT REPOSITORY

A copy of this Order shall be maintained at the Discharger's facility and shall be available to operating personnel at all times.

15. RETENTION OF RECORDS

The Discharger shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board.

16. GENERAL REPORTING REQUIREMENT

The Discharger shall furnish to the Regional Board, within a reasonable time, any information which the Regional Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Discharger shall also furnish to the Regional Board, upon request, copies of records required to be kept by this Order.

17. PERMIT REVISION

This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this Order.
b. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts.
c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the Discharger for the modification, revocation and reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

18. CHANGE IN DISCHARGE

The Discharger shall file a new Report of Waste Discharge at least 120 days prior to the following:

a. Addition of a major industrial waste discharge to a discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the wastes.

b. Significant change in the treatment or disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste).

c. Change in the disposal area from that described in the findings of this Order.

d. Increase in flow beyond that specified in this Order.

e. Other circumstances that result in a material change in character, amount, or location of the waste discharge.

f. Any planned change in the regulated facility or activity which may result in noncompliance with this Order.

19. CHANGE IN OWNERSHIP

This Order is not transferable to any person except after notice to the Regional Board. The Discharger shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new owner containing a specific date for the transfer of this Order's responsibility and coverage between the current Discharger and the new owner. This agreement shall include an acknowledgement that the existing Discharger is liable for violations up to the transfer date and that the new Discharger is liable from the transfer date on. The Regional Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the California Water Code.

20. INCOMPLETE REPORTS

Where the Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information.

21. REPORT DECLARATION

All applications, reports, or information submitted to the Regional Board shall be signed and certified as follows:

a. The Report of Waste Discharge shall be signed as follows by either a principal Executive Officer or ranking elected official.

b. All other reports required by this Order and other information required by the Regional Board shall be signed by a person designated in paragraph (a) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if all of the following are true:

(1) The authorization is made in writing by a person described in paragraph (a) of this provision,

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, and

(3) The written authorization is submitted to the Regional Board.

c. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

22. REGIONAL BOARD ADDRESS

The Discharger shall submit reports required under this Order or other information required by the Regional Board to the following address:

Northern Core Regulatory Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

E. NOTIFICATIONS

1. VESTED RIGHTS

This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the Discharger from liability under federal, state or local laws, nor create a vested right for the Discharger to continue the waste discharge.

2. U.S. EPA REVIEW

These requirements have not been officially reviewed by the United States Environmental Protection Agency and are not issued pursuant to section 402 of the Clean Water Act.

3. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

4. PREVIOUS ORDERS

The requirements prescribed by this Order supersede the requirements prescribed by Order No. R9-1993-0023.

5. EFFECTIVE DATE

This Order becomes effective on the date of adoption by the San Diego RWQCB.

6. CORRESPONDENCE AND REPORT CODING

To ensure that correspondence and reports submitted in compliance with this Order are acknowledged, the following code number must be included in the heading or subject line portion of all correspondence and reports submitted to the Regional Board: "NCRU: 01-0247"

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on April 11, 2007.

John H Robertus

JOHN H. ROBERTUS
Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

MONITORING AND REPORTING PROGRAM
FOR ORDER NO. R9-2007-0018
FOR
VALLECITOS WATER DISTRICT
MEADOWLARK WATER RECLAMATION PLANT
SAN DIEGO COUNTY

A. MONITORING PROVISIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this Order and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Regional Board.

2. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ±5 percent from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration and operation of acceptable flow measurement devices can be obtained from the following references:

   (a) "A Guide to Methods and Standards for the Measurement of Water Flow," U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U. S. Government Printing Office, Washington, D. C. 20402. Order by SD Catalog No. C13.10:421.)

   (b) “Water Measurement Manual," U. S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U. S. Government Printing Office, Washington D. C. 20402. Order by Catalog No. 127,19/2:W29/2, Stock No. SIN 24003-0027.)

   (c) "Flow Measurement in Open Channels and Closed Conduits," U. S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS) Springfield, VA 22151. Order by NTIS No. PB-273-535/5ST.)

   (d) "NPDES Compliance Sampling Manual," U. S. Environmental Protection Agency, Office of Water Enforcement. Publication MCD-51, 1977, 140 pp.

(Available from the General Services Administration (8FFS), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225.

3. Monitoring must be conducted according to United States Environmental Protection Agency test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified in this Order.
4. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Regional Board.
5. Monitoring results must be reported on discharge monitoring report forms approved by the Regional Board.
6. If the Discharger monitors any pollutants more frequently than required by this order, using test procedures approved under 40 CFR, Part 136, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharger's monitoring report. The increased frequency of monitoring shall also be reported.
7. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings, where used, for continuous monitoring instrumentation, copies of all reports required by this order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board.
8. Records of monitoring information shall include:
   (a) The date, exact place, and time of sampling or measurements;
   (b) The individual(s) who performed the sampling or measurements;
   (c) The date(s) analyses were performed;
   (d) The individual(s) who performed the analyses;
   (e) The analytical techniques or method used; and
   (f) The results of such analyses.
9. All monitoring instruments and devices which are used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.
10. The Discharger shall report all instances of noncompliance not reported under Reporting Requirement E.7 of this Order at the time monitoring reports are submitted. The reports shall contain the information listed in Reporting Requirement E.7.
11. The monitoring reports shall be signed by an authorized person as required by Reporting Requirement F.21.

12. A composite sample is defined as a combination of at least eight sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24 hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.
13. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.
14. Sampling and analysis shall, as a minimum, be conducted in accordance with Article 6 of California Code of Regulations, Title 22, Division 4, Chapter 3 (Water Recycling Criteria).

B. EFFLUENT MONITORING

1. Samples of the effluent discharged from MWRP shall be collected at a point downstream of the disinfection process, and prior to any dilution.
2. The Discharger shall determine the volume of recycled water delivered to Carlsbad and Olivenhain Water Districts each calendar month in units of million gallons and report this volume monthly.
3. The Discharger is responsible for monitoring and reporting in accordance with the following criteria:

CONSTITUENT/ PARAMETER	UNIT	TYPE OF SAMPLE	SAMPLING FREQUENCY[1,2]	REPORTING FREQUENCY
Flowrate	GPD	Continuous	Continuous	Monthly
Turbidity	NTU	Continuous	*	Monthly
Chlorine Contact Time (CT) [3]	mg-min/L	Calculated	**	Monthly
Total Chlorine Residual[3]	mg/L	Continuous	***	Monthly
Total Coliform	MPN/100ml	Grab	****	Monthly
Biochemical Oxygen Demand ($CBOD_5$ @ 20°C)	mg/L	Composite	3 Times Per Week	Monthly
Total Suspended Solids	mg/L	Composite	3 Times Per Week	Monthly
pH	Unit	Grab	3 Times Per Week	Monthly
Total Dissolved Solids	mg/L	Composite	Monthly	Monthly
Chloride	mg/L	Composite	Monthly	Monthly

CONSTITUENT/ PARAMETER	UNIT	TYPE OF SAMPLE	SAMPLING FREQUENCY[1,2]	REPORTING FREQUENCY
Iron (Fe)	mg/L	Composite	Monthly	Monthly
Manganese (Mn)	mg/L	Composite	Monthly	Monthly
Boron (B)	mg/L	Composite	Monthly	Monthly
Aluminum	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Arsenic	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Antimony	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Barium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Beryllium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Cadmium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Chromium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Copper	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Cyanide	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Mercury	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Nickel	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Selenium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years
Thallium	mg/L	Composite	Once Every 5 Years	Once Every 5 Years

Notes: ***MPN/100 ml = Most Probable Number per 100 milliliters***
mg/L = milligrams per liter
NTU = Nephelometric Turbidity Units
dS/m = deciseimens per meter

[1] Weekly is defined as a calendar week (Sunday through Saturday). Monthly is defined as a calendar month. Quarterly is defined as a period of three consecutive calendar months beginning on January 1, April 1, July 1, or October 1. Semiannually is defined as a period of six consecutive calendar months beginning on January 1 or July 1. Annually is defined as a calendar year.

[2] The Discharger shall increase the sampling frequency from monthly to weekly, from quarterly to monthly, from semiannually to quarterly, and from annually to semiannually for any noted constituent that exceeds the limit specified by Discharge Specification B.2-B.6 of this Order. The increased frequency of monitoring shall continue until the Discharger achieves compliance with the limitations for three consecutive periods.

[3] Required if chlorine disinfection process is used.

* Effluent turbidity analyses shall be conducted continuously using a continuous monitoring and recording turbidity meter. Compliance with the daily average operating filter effluent turbidity limit of 2 NTU shall be determined by averaging the recorded turbidity levels at a minimum of four-hour intervals over a 24-hour period. Compliance with the turbidity standard of not exceeding 5 NTU more than 5 percent of the time over a 24-hour period shall be determined using the levels of recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period. Should the continuous turbidity meter and/or recorder fail, grab sampling at a minimum frequency of one sample every 1.2 hours may be substituted until the turbidity meter and/or recorder is fixed. The Discharger shall report monthly results of four-hour turbidity readings, average effluent turbidity (24-hours), 95 percentile effluent turbidity (24-hours), and the daily maximum turbidity (daily being defined as the 24-hour period from 12 am to 12 am). Continuous turbidity monitoring must also be provided prior to filtration to ensure adequate process control, and automatic actuated coagulant feed when the turbidity of the secondary treated effluent is greater than 10 NTU.

** Calculated CT (chlorine concentration multiplied by modal contact time) values shall be determined and recorded continuously. The daily minimum CT value shall be reported monthly. The Discharger shall report monthly the date(s), value(s), time, and duration when the CT value falls below 450 mg-min/L, and/or the modal contact time falls below 90 minutes.

*** Chlorine concentrations shall be recorded by a continuous recording meter. Minimum daily chlorine residual shall be reported monthly.

**** Samples for total coliform bacteria shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. Results of daily total coliform bacteria monitoring, running 7-day median determination, and maximum daily coliform reading shall be reported monthly. If the maximum number of total coliform bacteria exceeds a MPN of 23 per 100 mL, the Discharger shall certify whether or not the MPN of 23 per 100 mL was exceeded in the previous 30-day period.

4. The Discharger shall review the monitoring results for compliance with Order No. R9-2007-0018 and submit a statement of compliance as part of this Monitoring and Reporting Program. The statement of compliance shall identify and report all violations of effluent limitations contained in Section B - Discharge Specifications of Order No. R9-2007-0018.

C. FILTRATION PROCESS MONITORING

1. Turbidity of the filter influent and effluent shall be continuously measured. If effluent turbidity exceeds 2 NTU based on a 24-hour average, or if the influent turbidity exceeds 5 NTU for more than 15 minutes or 10 NTU at any time, then the Discharger shall submit a written report of the incident as part of the monthly monitoring report to the Regional Board. The report shall describe the measures taken to automatically activate chemical addition or to divert wastewater.

D. REPORT SCHEDULE

1. Monitoring reports shall be submitted to the Regional Board in accordance with the following schedule:

REPORTING FREQUENCY	REPORT PERIOD	REPORT DUE
Monthly	January, February, March, April, May, June, July, August, September, October, November, December	By the 1st day of the second month following the month of sampling or monitoring
Every 5 Years	January – December	February 1st

Monitoring reports shall be submitted to:

ATTN: Northern Core Regulatory Program Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Ordered by: John H. Robertus
JOHN H. ROBERTUS
Executive Officer

Date: April 11, 2007

Exhibit 3

AGREEMENT FOR RECYCLED WATER SERVICE BETWEEN THE VALLECITOS WATER DISTRICT AND THE CARLSBAD MUNICIPAL WATER DISTRICT

THIS AGREEMENT for Recycled Water Service, dated as of September 24, 2008 ("Agreement") is made and entered into by and between the VALLECITOS WATER DISTRICT ("VALLECITOS"), a public agency organized and existing pursuant to the County Water District Law, California Water Code Section 30000 et. seq., and the CARLSBAD MUNICIPAL WATER DISTRICT ("CARLSBAD"), a public agency organized under the Municipal Water Act of 1911, and a subsidiary District to the City of CARLSBAD organized and existing pursuant to Water Code Section 71000 et. seq. (collectively, the "Parties").

RECITALS

A. VALLECITOS and CARLSBAD both have the legal authority to provide potable water and recycled water service to customers within their respective service areas.

B. CARLSBAD and VALLECITOS have overlapping recycled water service areas as shown on the attached Exhibit "A", with potable water service being provided by VALLECITOS in the overlapping areas. CARLSBAD has recycled water pipelines within a portion of VALLECITOS that can be used to deliver recycled water for irrigation purposes within the VALLECITOS service area.

C. CARLSBAD has adopted Ordinance No. 43 requiring the use of recycled water within its service area wherever it has determined that its use is economically justified, financially and technically feasible, and consistent with legal requirements, preservation of public health, safety and welfare, and the environment.

D. Through the Agreement to Purchase Reclaimed Water dated August 20, 2003, ("RECLAIMED WATER AGREEMENT") between the Parties, VALLECITOS has agreed to provide up to 3.0 million gallons per day (mgd) of recycled water from the Meadowlark Water Reclamation Facility to CARLSBAD's recycled water system, referred to as the "Encina Basin Water Reclamation Program".

E. By this Agreement, VALLECITOS desires to provide recycled water within its service area including that portion of the VALLECITOS service area within the City of CARLSBAD, and CARLSBAD is willing to provide recycled water to VALLECITOS customers within the VALLECITOS service area at retail rates in accordance with the terms and conditions of this Agreement.

COVENENTS

NOW, THEREFORE, it is agreed by and between the parties as follows:

SECTION 1. Recycled Water Delivery Area. VALLECITOS and CARLSBAD have determined that some VALLECITOS customers, located along Rancho Santa Fe Road in Carlsbad, California can be served recycled water from CARLSBAD's recycled water system, by connection to VALLECITOS' "Recycled Water Transmission Main" located in Rancho Santa Fe Road. VALLECITOS agrees to allow these customers to be served recycled water by CARLSBAD. The recycled water customers shall be limited to that portion of the VALLECITOS service area within the City of Carlsbad, as shown on the attached Exhibit "A".

SECTION 2. Discharge Standards. All recycled water supplied by CARLSBAD to the customers in the VALLECITOS service area shall meet federal, state, and local discharge requirements, which shall include all generally adopted requirements for CARLSBAD as approved by the Regional Water Quality Control Board, San Diego Region.

SECTION 3. Operation and Maintenance of Facilities. CARLSBAD shall be responsible for operating and maintaining its recycled water system, including pipelines, meters, service lines, and corporation valves in a state of repair and condition that will meet the standards referenced in the above Section 2 of this Agreement. These facilities also include pipelines, meters, service lines, and corporation valves connected to VALLECITOS' "Recycled Water Transmission Main" located in Rancho Santa Fe Road as shown on Exhibit "A", and CARLSBAD's recycled water pipelines connected to VALLECITOS' "Recycled Water Transmission Main" intended for local distribution of recycled water by CARLSBAD. The point of connection to VALLECITOS' "Recycled Water Transmission Main", including the branch valve shall be owned and maintained by VALLECITOS with the provision that VALLECITOS shall provide CARLSBAD notice within 24 hours of any adjustment or operation of the branch valve(s) by VALLECITOS, excluding emergencies. In an emergency such as a pipeline break CARLSBAD shall be permitted to close the branch valve(s) to make necessary repairs to its recycled water system. CARLSBAD shall notify VALLECITOS as soon as possible regarding operation of the valve(s). CARLSBAD shall be responsible for any damages caused by their operation of the branch valve(s).

SECTION 4. Recycled Water Customer Requirements. Recycled water service to customers shall meet the requirements of CARLSBAD's Ordinance No. 43, California State Department of Health Services requirements, which requires the need to perform annual walk-through inspections on every site by CARLSBAD and Order No. 2001-352 "Master Reclamation Permit with Waste Discharge Requirements for the Production and Purveyance of Recycled Water", adopted by the California Regional Water Quality Control Board, San Diego Region and amendments thereto. Also, depending on site characteristics there may be either a "no shut-down test" required, an annual "shut-down test" or a "shut down test" performed once every four years. VALLECITOS will cooperate with CARLSBAD to establish a mutual agreeable time to perform the required shutdown tests. The shut-down tests will require shutting off potable water supplies to

7

some potable water customers during the test time period not to exceed 24 hours, except that the test time period for residential customers shall not exceed 12 hours. VALLECITOS shall provide contact information to CARLSBAD of potable water customers impacted by the testing. CARLSBAD shall provide a fourteen day advance notice to recycled water and potable water customers, and to VALLECITOS regarding any shut-down testing to be performed.

SECTION 5. Billing and Rates. It shall be CARLSBAD's responsibility to read the recycled water meters of customers within the service area described herein and to provide the billing for the customers based on CARLSBAD's adopted retail recycled water rates in affect at the time of the billing and to collect the billing from the recycled water customer.

SECTION 6. Term of Agreement. This Agreement shall be effective as of the date first above written, and shall run concurrent with the term of the RECLAIMED WATER AGREEMENT. In the event the RECLAIMED WATER AGREEMENT terminates for any reason, this Agreement shall also terminate with the understanding that CARLSBAD will continue to provide recycled water to the customers identified in Section 1 above until either a new agreement has been entered into between VALLECITOS and CARLSBAD to continue recycled water delivery to these customers by CARLSBAD, or VALLECITOS has made the necessary modifications, and improvements required to supply water to these customers. VALLECITOS agrees to provide written notification to CARLSBAD that it is ready to supply water to the customers beginning on a date to be specified by VALLECITOS. The parties shall cooperate in transferring customers from CARLSBAD to VALLECITOS including coordination of all notices, and transfer of customer accounts. Construction costs incurred by CARLSBAD for new capital improvements, within the service area (Exhibit "A"), required to provide recycled water to VALLECITOS customers from the date of this Agreement shall be reimbursed by VALLECITOS (20 year depreciation) if VALLECITOS terminates the August 20, 2003 Agreement without cause. CARLSBAD shall provide documentation to VALLECITOS on an annual basis of any new capital improvements.

SECTION 7. Miscellaneous Provisions.

7.1 Venue. In the event of any legal or equitable proceeding to enforce or interpret the terms or conditions of this Agreement, the parties agree that venue shall lie only in the Federal or State courts in or nearest to the North County Judicial District, County of San Diego, State of California.

7.2 Modification. This Agreement may not be altered in whole or in part except by a modification, in writing, executed by all the parties to this Agreement.

7.3 Incorporation of Agreement to Purchase Reclaimed Water. A copy of the Agreement to Purchase Reclaimed Water dated August 20, 2003, is attached hereto as Exhibit "B" and incorporated herein by reference.

7.4 Entire Agreement. This Agreement, together with all the exhibits attached to this Agreement, contains all representations and the entire understanding between the parties with respect to the limited subject matter of this Agreement. This Agreement shall not modify or supersede the RECLAIMED WATER AGREEMENT.

"VALLECITOS"

VALLECITOS WATER DISTRICT

By: _______________________
Timothy M. Shell, President

ATTEST:

____
WILLIAM W. RUCKER, Secretary
Board of Directors

"CARLSBAD"

CARLSBAD MUNICIPAL WATER DISTRICT

By: _______________________
Claude "Bud" Lewis, President

ATTEST:

_______________________ , Deputy
LORRAINE M. WOOD
City Clerk

CITY OF CARLSBAD CALIFORNIA
EUREKA

APPROVED AS TO FORM:

JEFFREY G. SCOTT, Legal Counsel

By: _______________________

RONALD R. BALL, City Attorney

By: _______________________
9/18/08.

9

EXHIBIT “A”

MAP OF CARLSBAD MUNICIPAL WATER DISTRICT’S RECYCLED WATER SERVICE AREA WITHIN VALLECITOS WATER DISTRICT

10

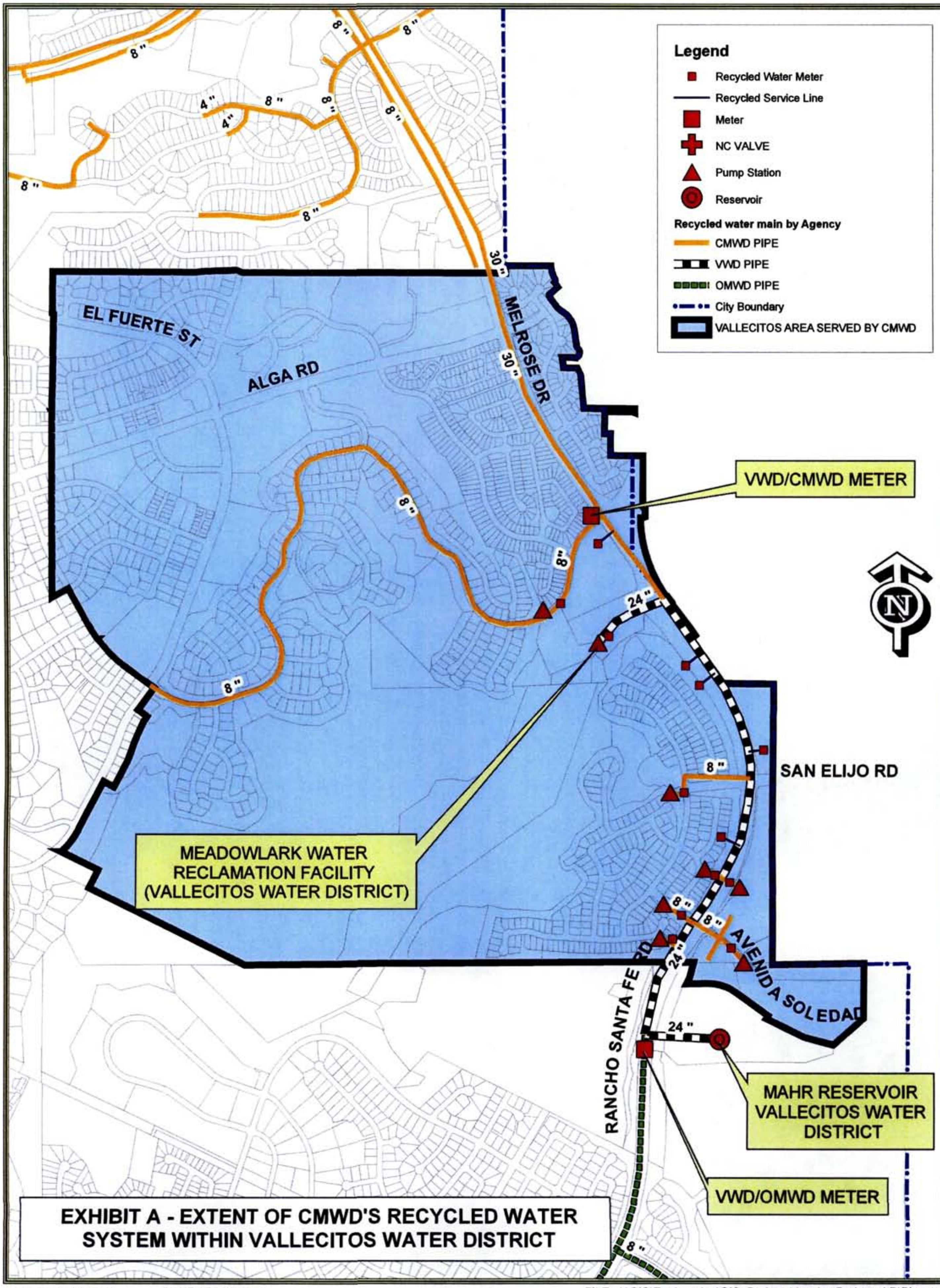

EXHIBIT A - EXTENT OF CMWD'S RECYCLED WATER SYSTEM WITHIN VALLECITOS WATER DISTRICT

DATE: 08/12/2008 NAME: LRosu/Arome FILE: J:\GIS\Engineering\GIS_Projects\ArcviewProjects-LR\Plummer

11

AGREEMENT FOR SALE OF RECYCLED WATER AND USE OF MAHR RESERVOIR BETWEEN THE VALLECITOS WATER DISTRICT AND THE CARLSBAD MUNICIPAL WATER DISTRICT

This Agreement is made and entered into by and between the VALLECITOS WATER DISTRICT ("VALLECITOS"), organized and existing pursuant to Water Code section 30000 et seq., and the CARLSBAD MUNICIPAL WATER DISTRICT ("CARLSBAD"), a Public Agency organized under the Municipal Water Act of 1911, and a subsidiary district of the City of Carlsbad organized and existing pursuant to Water Code section 71000 et seq. (collectively, the "Parties").

RECITALS

A. On June 13, 1991, the Parties entered into an agreement (the "1991 Agreement") for the sale of recycled water from the VALLECITOS' Meadowlark Reclamation Facility ("MRF"). Since July 1991, VALLECITOS has provided recycled water to CARLSBAD in accordance with the terms and conditions of the 1991 Agreement.

B. VALLECITOS is currently in the process of evaluating an expansion of the MRF and the increase in production from two (2) million gallons per day ("MGD") of recycled water to a potential of five (5) MGD.

C. VALLECITOS also owns, operates, and maintains the Mahr Reservoir, which has the capacity to store fifty-four (54) million gallons ("MG") of recycled water and is located within the boundaries of both VALLECITOS and the City of Carlsbad.

D. CARLSBAD is in the process of developing an expansion of its recycled water system referred to as the Encina Basin Water Reclamation Program, Phase II Project ("Phase

II Project"). CARLSBAD desires to use the Mahr Reservoir for seasonal, operational (diurnal), and emergency storage as part of the Phase II Project. The scheduled dates for implementation of the Phase II Project is July 2005.

E. VALLECITOS agrees to allow CARLSBAD to use a portion of the storage capacity of Mahr Reservoir, provided CARLSBAD constructs certain improvements to the Mahr Reservoir. The storage capacity available to CARLSBAD in the Mahr Reservoir shall be up to 32 MG, provided CARLSBAD purchases from VALLECITOS an additional one (1) MGD of recycled water (for a total of 3 MGD) as part of the Phase II Project.

F. CARLSBAD acknowledges that delivery of the recycled water volume outlined in this Agreement is contingent upon the expansion of the MRF by VALLECITOS and sufficient development within VALLECITOS and build out of the Meadowlark area and drainage basin to provide enough effluent to produce the recycled water.

NOW, THEREFORE, the Parties agree to the following terms and conditions:

1. Construction of Mahr Reservoir Improvements. CARLSBAD shall be responsible for constructing and installing certain improvements (the "Improvements") that include, but may not be limited to, the draining and cleaning of the interior storage area of the Mahr Reservoir, installing a chlorination system and aeration system, modifying the inlet/outlet works, and installing an asphalt concrete liner and floating polypropylene cover as further described in the Encina Basin Recycled Water Distribution Study prepared by CGvL Engineers in association with John Powell & Associates, Inc., dated May 2000 (the "Study"). A copy of the Study is attached to this Agreement as Exhibit "A" and incorporated herein by reference. VALLECITOS has reviewed the Study and consents to the recommended Improvements and other pertinent improvements. CARLSBAD shall provide VALLECITOS with sixty (60) days written notice prior to beginning construction of the

improvements. Construction of the Improvements shall be subject to coordination with VALLECITOS staff. The schedule to construct the Improvements is based on CARLSBAD receiving a commitment for funding from the State of California in 2003, whereby construction would begin in 2003 and extend through 2004.

2. Funding and Design of Improvements. CARLSBAD shall construct the Improvements with funding obtained from state and federal loans and grants. CARLSBAD shall be responsible for the design and preparation of the plans and specifications for the Improvements and will obtain any necessary permits on behalf of VALLECITOS and with the written consent of VALLECITOS, which consent shall not be unreasonably withheld. All plans and specifications for the Improvements shall be submitted to VALLECITOS for review and approval, which approval shall not be unreasonably withheld. CARLSBAD shall construct the Improvements in accordance with the approved plans and specifications and permit conditions including compliance with CEQA and all other regulatory bodies. The Improvements shall become the property of VALLECITOS and shall be dedicated to VALLECITOS for operation and maintenance. If funding for the Improvements is not approved by the State of California, then CARLSBAD is not obligated to design or construct the Improvements. In the event the Improvements are not constructed, for whatever reason, all rights of CARLSBAD to purchase recycled water beyond 2 MGD and to utilize storage in the Mahr Reservoir shall terminate in the discretion of VALLECITOS.

3. Mahr Reservoir Storage Capacity. CARLSBAD shall have the right to utilize up to 32 MG of storage capacity available in the Mahr Reservoir for its Phase II Project. In the event CARLSBAD discontinues the purchase of recycled water from VALLECITOS, the use of storage capacity of the Mahr Reservoir shall automatically revert to VALLECITOS. CARLSBAD shall be allowed to utilize Mahr Reservoir for peak demands in accordance with the approved Operations and Maintenance manual referenced in Section 5. In no event shall CARLSBAD have any priority in Hydraulic Grade Line (HGL) or

available capacity of the reservoir and shall be entitled to up to a maximum of 60% of the storage available at any given time.

4. Master Flow Meters. Master recycled water flow meters ("Master Flow Meter(s)") shall be installed by CARLSBAD at or near the MRF, in locations mutually agreeable to the Parties, to measure the quantity of recycled water supplied to CARLSBAD from the MRF. VALLECITOS shall be responsible for operating, maintaining, calibrating, and reading the Master Flow Meter(s) on a routine basis. VALLECITOS shall read and report to CARLSBAD the meter results no less than once per month and shall provide copies to CARLSBAD of calibration results on an annual basis. VALLECITOS shall deliver recycled water to CARLSBAD to the mutually agreed upon locations of the Master Flow Meter(s) and shall have no responsibility or obligation to deliver recycled water beyond the Master Flow Meter location(s).

5. Ownership, Operation, and Maintenance of Mahr Reservoir Improvements. VALLECITOS shall own, operate, and maintain the Mahr Reservoir and all Improvements constructed for the Mahr Reservoir. A draft operation and maintenance manual shall be prepared by CARLSBAD for review, and approval by VALLECITOS, for operation and maintenance of the Improvements, which will be incorporated in an operations and maintenance manual for the operation of MRF, Mahr and the Failsafe pipeline. VALLECITOS shall operate the Improvements in conformance with the approved operations and maintenance manual. Notwithstanding the foregoing, in no case shall VALLECITOS be required to operate the Improvements in a fashion that will be harmful or detrimental to the operation of the MRF, Mahr Reservoir, or the Fail Safe pipeline.

6. Operation and Maintenance of Other Related Facilities. VALLECITOS shall own, operate, and maintain, per the approved operations and maintenance manual, the

recycled water transmission pipeline identified on the attached Exhibit "B," which is incorporated herein by reference.

Each party shall grant to the other necessary easements and rights-of-way to construct, operate and maintain the recycled water facilities described in this Agreement that they respectively control and assist each other to obtain easements or rights-of-way on lands controlled by other entities not subject to this Agreement.

7. Failsafe Pipeline Capacity and Operation. CARLSBAD acknowledges and agrees that under certain operational scenarios, the full production of MRF may exceed the failsafe pipeline capacity of 3 MGD and to accommodate operational goals, the Mahr Reservoir may be at capacity with no additional, available storage. To accommodate such an event, CARLSBAD agrees, per the approved operations and maintenance manual, to provide adequate facilities and operational flexibility to VALLECITOS to dispose of the additional flow into the CARLSBAD recycled water distribution system for either use or disposal. Disposal of recycled water through the CARLSBAD system is subject to and predicated upon the availability of adequate capacity at the Encina Wastewater Authority (EWA) flow equalization facility and coordination with EWA. All excess recycled water, beyond purchases required in Section 8 and peak demands, shall meet the quality requirements contained in Section 10. The method of disposing shall be identified in the operational parameters agreed upon between the Parties.

CARLSBAD agrees to completely remove the existing Phase I Pump Station, located at El Camino Real, prior to or concurrent with the initial delivery of 3 mgd of recycled water in accordance with Section 8. CARLSBAD agrees to replace the existing 12-inch Failsafe pipeline with like pipeline material in accordance with VALLECITOS standards.

8. Quantities of Recycled Water to be Purchased. During the term of this Agreement, CARLSBAD agrees to purchase, and VALLECITOS agrees to deliver to the CARLSBAD recycled water distribution system (provided flows are sufficient), the following minimum amounts of recycled water from the MRF:

a. Prior to completion of the Phase II Project, CARLSBAD shall continue to purchase a minimum of 2 MGD of recycled water which is approximately 2,240 acre-feet per year.

b. Upon completion of the Phase II Project, and provided VALLECITOS has completed the expansion of the MRF and adequate effluent is available, CARLSBAD agrees to purchase a minimum of 2 MGD of recycled water during the months of December, January, February, and March and 3 MGD of recycled water for the remaining months which is approximately 2,989 acre-feet per year.

9. Interruption of Delivery of Recycled Water. Notwithstanding the provisions of section 8 above, the Parties understand and agree that there shall be no liability to VALLECITOS to supply recycled water, or obligation of Carlsbad to purchase recycled water for day-to-day interruptions in delivery of recycled water due to plant emergencies requiring plant shut down and repairs associated with acts of God, permit compliance, orders by regulatory bodies or judicial courts, and/or equipment breakdowns, or substantial maintenance activities. VALLECITOS shall make good faith efforts to resume delivery of recycled water in a timely manner after completing the necessary efforts to restore the operation of MRF. If recycled water delivery is discontinued for more than seven (7) consecutive days, then VALLECITOS shall provide CARLSBAD a time schedule indicating when delivery is expected to resume.

10. Treatment Standards. VALLECITOS shall treat the recycled water from the MRF in conformance with the water quality requirements as provided by Title 22, Division 4, of the California Code of Regulations ("CCR"), section 60305, "Use of Recycled Water for Impoundments," intended as a source of supply for non-restricted recreational impoundments suitable for body contact in compliance with the criteria specified in CCR section 60301.230(b) for "Disinfected Tertiary Recycled Water" (Title 22). VALLECITOS shall use its best good faith efforts to ensure that said recycled water meets the forgoing CCR Title 22 standards, however, VALLECITOS does not guarantee or warrant the quality of the recycled water provided CARLSBAD or subsequent users. Both Parties understand that the presence of dissolved minerals in the recycled water is measured as total dissolved solids (TDS) and other substances in higher concentrations can be deleterious to the plants irrigated with such water. Both Parties agree that VALLECITOS' failure to supply recycled water with TDS concentration of less than 1000 milligrams per liter (MG/L), as determined in conformance with the methodology specified in the Encina Waste Pollution Control Facility Waste Discharge Permit, will be grounds for CARLSBAD to suspend its obligation to accept and pay for recycled water from VALLECITOS until quality is restored to less than 1000 MG/L TDS.

VALLECITOS agrees to limit the total chlorine residual to 10 parts per million (ppm) or less, based upon a 24 hour period average, for recycled water discharged from the MRF. This limitation shall not be applicable to water discharged to the VALLECITOS Failsafe pipeline.

The Parties further recognize that during periods of drought VALLECITOS may experience lower flow as a result of conservation efforts. However, the amounts of salts received would not decrease and can cause the TDS levels to rise. During such drought periods as designated by the Metropolitan Water District ("MWD") and/or the San Diego County Water Authority ("Water Authority"), the Parties agree that recycled water with TDS concentration of no more than 1200 MG/L will be an acceptable quality to CARLSBAD under the terms of this Agreement.

11. Recycled Water Delivery Pressure. Recycled water delivered by VALLECITOS to the CARLSBAD distribution system shall not be at a guaranteed minimum pressure. However, the following hydraulic grade line ("HGL") shall be met for recycled water discharges from the MRF to the Mahr Reservoir facility. Discharge pressure for delivery at the Mahr Reservoir shall be equivalent to a minimum HGL of 550 feet, including all pipeline headloss, with an operational HGL goal of 590 feet to maximize operational flexibility.

12. Compliance With Regulatory Requirements. CARLSBAD agrees to comply with all applicable recycled water distribution regulations issued and/or mandated by the State of California Department of Health Services (DHS), the County of San Diego Department of Environmental Health (DEH), and the California Regional Water Quality Control Board, San Diego Region (Regional Board). CARLSBAD shall be responsible for insuring that all users of recycled water within CARLSBAD's jurisdiction shall be in compliance with CARLSBAD's discharge order issued by the Regional Board, and that all users shall be made to comply with CARLSBAD's most recent recycled water rules and regulations.

13. Price of Recycled Water. Through Fiscal Year 2003/2004, CARLSBAD shall purchase, disinfected tertiary recycled water from VALLECITOS at the rate of Three Hundred Sixty-One Dollars ($361.00) per acre-foot, and CARLSBAD shall pay VALLECITOS for the recycled water based on quarterly statements submitted by VALLECITOS. Beginning Fiscal Year 2004/2005 the purchase cost shall be based on the table for Pre-Expansion Annual Cost for the MRF Tertiary Facilities listed in Exhibit "C". Upon completion of the MRF expansion, and initial delivery of 3 MGD to CARLSBAD,

CARLSBAD shall purchase, in accordance with section 8(b), disinfected tertiary recycled water from VALLECITOS using the table for Post-Expansion Annual Cost for MRF Tertiary Facilities listed in Exhibit "C." CARLSBAD shall pay VALLECITOS the annual cost in twelve (12) equal payments throughout each fiscal year. Both the Pre-Expansion and the Post-Expansion Annual Costs shall be based on VALLECITOS' budgeted figures as of the beginning of each fiscal year and adjusted to actual costs through retrospective adjustments after the conclusion of each fiscal year. The recycled water cost shall be adjusted on July 1 of each year during the term of this Agreement to reflect CARLSBAD'S proportionate share of the budgeted operational, overhead, and capital recovery costs for the MRF Tertiary Facilities, Lift Station No. 1, and Mahr Reservoir as shown in Exhibit "C". VALLECITOS will provide CARLSBAD thirty (30) days' advance written notice of any changes in the annual cost. VALLECITOS will bill or credit CARLSBAD annually for retrospective adjustments to reflect actual water delivery costs incurred. CARLSBAD will be notified of the retrospective adjustment by November 30 of each fiscal year and the adjustment credit/invoice shall be due and payable within 30 days of said date. At any time during the term of this agreement, the price of the recycled water shall not exceed seventy-five percent (75%) of CARLSBAD'S wholesale cost of potable water from the San Diego County Water Authority.

The definitions for terms used in this section 13 and Exhibit "C" follow:

<u>MRF Facilities</u> – Wastewater treatment, filtration, disinfection, conveyance, storage and effluent pumping facilities shown on Exhibit "B". Also known as Meadowlark Reclamation Facility (MRF).

<u>MRF Tertiary Facilities</u> – Filtration, disinfection, and effluent pumping facilities relating to Tertiary Treatment at the MRF.

Mahr Reservoir – A 54 million-gallon earthen reservoir used to store tertiary treated recycled water located as shown on Exhibit "B".

Lift Station No. 1 – Components associated with the existing lift station used to divert sewage to the MRF for treatment and production of recycled water.

Overhead – Wastewater Department Overhead – General, administrative and overhead costs incurred within the Wastewater Department not directly associated with the collection, conveyance and treatment of wastewater.

Pre-Expansion Cost – This includes all costs associated with the operation and maintenance of the MRF Tertiary Facilities, Lift Station No. 1, Mahr Reservoir and identified capital recovery costs, shown in Exhibit "C" under the title "Pre-Expansion Annual Cost."

Post-Expansion Cost – This includes all costs associated with the operation and maintenance of the MRF Tertiary Facilities, Lift Station No. 1, Mahr Reservoir and capital recovery costs shown in Exhibit "C" under the title "Post-Expansion Annual Cost." These costs will apply after VALLECITOS has begun the initial delivery of 3 mgd to CARLSBAD.

14. Terms of Payment. CARLSBAD shall be invoiced by VALLECITOS on a monthly basis for the minimum delivery scheduled amounts plus any amounts that exceed the minimum amounts. CARLSBAD agrees to pay VALLECITOS for such purchases within thirty (30) days of invoice receipt. In the event that payment is more than thirty (30) days in arrears, VALLECITOS reserves the right to stop delivery of recycled water until payment is made and charge interest of one percent (1%) per month on delinquent amounts.

15. Right to Sell to Others/Utilization of Storage. In the event CARLSBAD fails to purchase the minimum quantities of recycled water as required in section 8 of this Agreement, VALLECITOS shall have the absolute right and discretion to sell the unused recycled water to other parties. Any amounts sold by VALLECITOS to other parties shall be deducted from any remaining amounts that CARLSBAD is obligated to purchase pursuant to section 8 of this Agreement. In addition, in the event CARLSBAD fails to purchase the minimum quantities of recycled water as required in section 8 of this Agreement, all rights of CARLSBAD to utilize storage in the Mahr Reservoir shall revert to VALLECITOS and VALLECITOS shall have no obligation or liability to reimburse CARLSBAD for the cost of the Improvements. Provided, however, in the event VALLECITOS willfully refuses to provide recycled water to CARLSBAD, when available, prior to complete depreciation of the Improvements identified in section 1 "Construction of Improvements," VALLECITOS shall reimburse CARLSBAD for the lesser of the fair market value or the undepreciated value of the Improvements. In the event VALLECITOS uses or sells recycled water to additional parties, VALLECITOS will reimburse or credit CARLSBAD with up to forty percent (40%)of the cost of the improvements, based upon a ratio of water sold to CARLSBAD and total sales, of the annual depreciated value of the Improvements identified in Section 1 based upon a thirty (30) year useful life. The reimbursement or credit shall be in accordance with the annual review of the price of the recycled water in accordance with Section 13.

16. Access to Records. The Parties shall each keep proper books and records in which complete and correct entries shall be made of all recycled water delivered to CARLSBAD throughout the duration of this Agreement. These books and records shall, upon written request, be subject to inspection by any duly authorized representative of each party and of the Regional Board.

17. Notices. Notices required or permitted under this Agreement shall be given in writing and may either be served personally upon the party to whom it is directed or by deposit in the United States Mail, postage pre-paid, certified, return receipt requested, addressed to the Parties' following addresses:

CARLSBAD: Carlsbad Municipal Water District
1635 Faraday Avenue
Carlsbad, CA 92008
Attention: Public Works Director

VALLECITOS: Vallecitos Water District,
201 Vallecitos de Oro
San Marcos, CA 92069
Attention: General Manager

18. Assignment. This Agreement or any interest therein or any monies due or that are to become due thereunder shall not be assigned, hypothecated, or otherwise disposed of without the prior written consent of both Parties to this Agreement, which consent shall not be unreasonably withheld. This Agreement shall become effective on the date it is executed by the Parties.

19. Term of Agreement. The term of this Agreement shall be twenty-two (22) years from the effective date, subject to the rights of the Parties to an earlier termination as provided in this Agreement. This Agreement shall continue in force from year to year after the initial 22-year term until either party gives one (1) year's written notice to the other of its intention to terminate or renegotiate the Agreement. This Agreement shall terminate one (1) year from the date upon which such written notice is received unless the Parties agree otherwise in writing.

20. Early Termination. If at any time during the term of this Agreement recycled water in compliance with the standards referenced herein cannot lawfully be used by CARLSBAD for the purposes intended by this Agreement, because of government

regulations now in effect or hereinafter imposed, or, if CARLSBAD should for any reason breach its obligations under this Agreement in any material respect, including, but not limited to, failure to pay for recycled water as required, failure to accept recycled water as required, failure to maintain facilities, or other substantial failure, VALLECITOS may terminate this Agreement with no further obligation by giving sixty (60) days' written notice thereof to CARLSBAD. During said sixty (60) day period, CARLSBAD shall have the opportunity to cure the breach in the Agreement before termination occurs. In the event VALLECITOS refuses to deliver recycled water to CARLSBAD in conformance with this Agreement for any reason, CARLSBAD may terminate this AGREEMENT with no further obligation upon sixty (60) days' written notice thereof to VALLECITOS.

21. Entire Agreement. This Agreement constitutes the entire understanding between the Parties with respect to the subject matter hereof superseding all negotiations, prior discussions, agreements, and understandings, written or oral, including the 1991 agreement. This Agreement shall not be amended, except by written consent of the Parties, and no waiver of any rights under this Agreement shall be binding unless it is in writing signed by the party waiving such rights. In the event any provision of this Agreement shall be held to be invalid and unenforceable, the other provisions of this Agreement shall be held to be valid and binding on the Parties.

22. Binding Effect. This Agreement shall be binding upon the Parties and their respective successors in interest, permitted assigns, executors, administrators, and personal representatives.

23. Indemnification. VALLECITOS agrees, to the fullest extent permitted by law, to indemnify and hold CARLSBAD, its directors, officers, employees, or authorized volunteers harmless from any damage, liability, or cost (including attorney's fees and costs of defense) to the extent caused by VALLECITOS' negligent acts, errors, or omissions in

the performance of work pursuant to this Agreement, including such negligent acts, errors, or omissions by subcontractors or others for whom VALLECITOS is legally liable. CARLSBAD agrees, to the fullest extent permitted by law, to indemnify and hold VALLECITOS, its directors, officers, employees, or authorized volunteers harmless from any damage, liability, or cost (including attorney's fees and costs of defense) to the extent caused by CARLSBAD's negligent acts, errors, or omissions in the performance of work pursuant to this Agreement including such negligent acts, errors, or omissions by subcontractors or others for whom CARLSBAD is legally liable.

24. Venue. In the event of any legal or equitable proceeding to enforce or interpret the terms or conditions of this Agreement, the Parties agree that venue shall lie only in the courts in or nearest to the North County Judicial District, County of San Diego, State of California.

25. Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, but all of which, taken together, shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed and effective as of August 20, 2003.

"VALLECITOS":

VALLECITOS WATER DISTRICT

By: Trish Hannan
Trish Hannan
President

ATTEST:

General Manager

Date: 8/20/03

APPROVED AS TO FORM:

Jeffrey G. Scott, General Counsel

"CARLSBAD":

CARLSBAD MUNICIPAL WATER DISTRICT

By: Claude "Bud" Lewis
Claude "Bud" Lewis
President

ATTEST:

Lorraine M Wood
Board Secretary

Date: August 10, 2003

Julia Coleman
Ronald R. Ball, General Counsel
BY: DEPUTY CITY ATTORNEY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ORDER NO. R9-2004-0223

WASTE DISCHARGE REQUIREMENTS
FOR
LEUCADIA WASTEWATER DISTRICT
FOREST R. GAFNER WATER RECLAMATION PLANT
SAN DIEGO COUNTY

The California Regional Water Quality Control Board, San Diego Region (hereinafter Regional Board), finds that:

1. On May 21, 1979, this Regional Board adopted Order No. 79-35, "Waste Discharge Requirements for Leucadia County Water District (LCWD), Forest R. Gafner Water Reclamation Plant (FRGWRP), San Diego County." Order No. 79-35 and addenda thereto established requirements for the disposal of reclaimed water to the La Costa Golf Course, which is located within the Batiquitos (4.51) Hydrologic Subarea (HSA) between El Camino Real and Highway 78. Addendum No. 1 to Order No. 79-35 specifically excepted the La Costa Golf Course reclaimed water storage pond from the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) requirement that all waste treatment, containment, and disposal facilities be protected against a 100-year, 24-hour storm and a 100-year frequency peak stream flow event.

2. On May 4, 1987, this Regional Board adopted Order No. 87-82, "Waste Discharge Requirements for Leucadia County Water District Forest R. Gafner Water Reclamation Plant, San Diego County." Order No. 87-82 superseded Order No. 79-35 and authorized the disposal of up to 0.75 millions gallons per day (MGD) of reclaimed water to the La Costa Golf Course. Addendum No. 1 to Order No. 87-82 authorized the LCWD to supply up to 0.75 MGD of reclaimed water to the Carlsbad Municipal Water District (CMWD) for distribution within portions of the Carlsbad Hydrologic Unit (HU) (904.00) in the following Hydrologic Areas (HA) and Subareas (HSA):

   a. Buena Vista Creek (4.20) HA, El Salto (4.21) HSA within the City of Carlsbad;
   b. Agua Hedionda (4.30) HA, Los Monos (4.31) HSA within the City of Carlsbad;
   c. Encinas (4.40) HA within the City of Carlsbad;
   d. San Marcos (4.50) HA, Batiquitos (4.51) HSA within the City of Carlsbad; and
   e. San Marcos (4.50) HA, Richland (4.52) HSA.

3. On December 20, 1993, this Regional Board adopted Order No. 93-41, "Waste Discharge Requirements for Leucadia County Water District Forest R. Gafner

Water Reclamation Plant, San Diego County." Order No. 93-41 superseded Order No. 87-82 and authorized the LCWD to supply up to 0.75 MGD of reclaimed water to the CMWD for distribution within the portions of the Carlsbad HU (904.00) listed in Finding No. 2. Addendum No. 1 to Order No. 93-41, adopted on October 10, 2001, increased the maximum allowable flow rate from 0.75 MGD to 1.0 MGD.

4. In order to substantiate that the intermittent overflow of the La Costa Golf Course reclaimed water storage pond does not impact surface water quality, Order 93-41 required regular monitoring of surface water and intense monitoring during any overflow event. In addition, Order 93-41 required the LCWD to implement appropriate and reasonable measures to prevent discharge of reclaimed water into San Marcos Creek or Batiquitos Lagoon, including termination of the discharge to the storage pond when there is a potential for overflow.

   The surface water monitoring program mandated by Order No. 93-41 requires monthly monitoring from November through March for flow, total dissolved solids (TDS), and total hardness (a measure of the sum of calcium and magnesium concentrations expressed as calcium carbonate) 250 feet upstream of the reclaimed water storage reservoir, 250 feet downstream, and at a point where first contact would occur with San Marcos Creek in a flood event. No significant effect of the use or storage of reclaimed water at the La Costa Golf Course on water quality in San Marcos Creek has been observed. According to reports from the LCWD, since issuance of Order No. 93-41, San Marcos Creek overflowed its banks and caused commingling of water in the reclaimed water storage pond with the creek on two occasions, January 5 and 12, 1995. On both days the creek waters receded the same day as the flooding. Monitoring data collected on both days at the points described above did not provide any conclusive evidence that the flooding degraded water quality in San Marcos Creek.

5. On May 20, 1991, this Regional Board adopted Order No. 91-60, "Water Reclamation Requirements for the Purveyance of Reclaimed Water for the Carlsbad Municipal Water District, San Diego County." Order No. 91-60 authorized the CMWD to purvey water from the LCWD FRGWRP, Buena Sanitary District Shadowridge Water Reclamation Plant, and Vallecitos Water District Medowlark Water Reclamation Plant to areas within portions of the Carlsbad HU (904.00).

6. On December 16, 1998, this Regional Board adopted Order No. 98-200, "Master Reclamation Permit for the Carlsbad Municipal Water District, San Diego County." Order No. 98-200 superseded Order No. 91-60 and authorized the CMWD to purvey reclaimed water to areas within portions of the Carlsbad HU (904.00).

7. On December 12, 2001, this Regional Board adopted Order No. 2001-352, "Master Reclamation Permit with Waste Discharge Requirements for the Production and Purveyance of Reclaimed Water for the Carlsbad Municipal Water District Carlsbad Water Recycling Facility, San Diego County." Order No. 2001-352 superseded Order No. 98-200 and authorizes the CMWD to produce and purvey reclaimed water to areas within the Carlsbad HU (904.00). Reclaimed water produced at the FRGWRP and delivered to the CMWD for purveyance is currently subject to the requirements of Order No. 2001-352.

8. On April 2, 2003, the LCWD changed its name to the Leucadia Wastewater District (LWD).

9. By letter dated April 13, 2004, the LWD was notified that the Regional Board was in the process of reviewing Order No. 93-41 as part of the Regional Board's permit update program. This Order incorporates updated information submitted by the discharger and other information obtained by Regional Board staff during the update process.

10. At the request of the LWD, this Order only authorizes distribution of reclaimed water produced at the FRGWRP to the La Costa Golf Course, which is located within the Batiquitos (4.51) HSA between El Camino Real and Highway 78. Distribution of recycled water to other areas in the Carlsbad HU (904.00) previously authorized by Order No. 93-41 and Order No. 2001-352 is prohibited.

11. The LWD owns and operates the Encina Effluent Pump Station (EEPS), located at the Encina Wastewater Authority's Encina Water Pollution Control Facility (EWPCF). The EEPS diverts secondary effluent wastewater from the EWPCF upstream of the Encina Ocean Outfall. From the EEPS, the diverted wastewater is sent through the LWD Gafner Land Outfall, approximately 28,220 feet long (5.34 miles), to the FRGWRP. In order to minimize spills, an alarm point in the FRGWRP control system constantly compares flow meter readings at both ends of the Gafner Land Outfall and automatically shuts down the EEPS whenever a significant disparity in flow rates occur.

12. The FRGWRP is located at 1960 La Costa Avenue, adjacent to San Marcos Creek and immediately upstream of Batiquitos Lagoon. The facility has only tertiary processes consisting of coagulant chemical addition, flocculation, clarification, filtration, and chlorine disinfection. Any reclaimed water that is undeliverable or fails to meet Title 22 standards is automatically diverted to the sanitary sewer for treatment at the EWPCF. The FRGWRP no longer has the capability to discharge directly to the Encina Ocean Outfall.

13. This Regional Board, acting in accordance with Section 13244 of the California Water Code, adopted the Water Quality Control Plan for the San Diego Basin (9), (hereinafter Basin Plan) on September 8, 1994. The Basin Plan was approved by the State Water Resources Control Board (SWRCB) on December 13, 1994. Subsequent revisions to the Basin Plan have also been adopted by the Board and approved by the SWRCB. The Basin Plan contains beneficial uses, water quality objectives and waste discharge prohibitions.

14. Table 2-2 of the Basin Plan lists the following beneficial uses for San Marcos Creek and Encinitas Creek, surface waters within the Batiquitos (4.51) HSA:

    a. Agricultural Supply
    b. Contact Water Recreation
    c. Non-contact Water Recreation
    d. Warm Freshwater Habitat
    e. Wildlife Habitat

15. Table 2-3 of the Basin Plan lists the following beneficial uses for Batiquitos Lagoon, coastal water within the Batiquitos (4.51) HSA:

    a. Contact Water Recreation
    b. Non-contact Water Recreation
    c. Preservation of Biological Habitats of Special Significance
    d. Estuarine Habitat
    e. Wildlife Habitat
    f. Rare, Threatened, or Endangered Species Habitat
    g. Marine Habitat
    h. Migration of Aquatic Organisms

16. Table 2-5 of the Basin Plan lists the following potential beneficial uses for groundwater within the Batiquitos (4.51) HSA:

    a. Municipal and Domestic Supply
    b. Agricultural Supply
    c. Industrial Process Supply

    However, Note 7 of Table 2-5 states that the beneficial uses do not apply for the area of the Batiquitos HSA (between El Camino Real and Highway 78) within which the La Costa Golf Course is located.

17. Tables 3-2 and 3-3 of the Basin Plan list the following water quality objectives for the Batiquitos (4.51) HSA (note that the groundwater quality objectives listed do not apply to the portion of the Batiquitos (4.51) HSA between Highway 78 and El Camino Real, within which the La Costa Golf Course is located):

Basin Plan Water Quality Objectives for Batiquitos (4.51) HSA		
CONSTITUENT	Concentration not to be exceeded more than 10% of the time during any one year period (mg/l or as noted)	
	Inland Surface Water	**Groundwater**[4]
Total Dissolved Solids	500	3500
Chloride	250	800
Sulfate	250	500
Percent Sodium	60%	60%
Nitrate (as NO3)	---	45
Nitrogen and Phosphorus	see note 3	---
Iron	0.3	0.3
Manganese	0.05	0.05
Methylene Blue Active Substances	0.5	0.5
Boron	0.5	2.0
Odor	None	None
Turbidity	20 NTU	5 NTU
Color	20 units	15 units
Fluoride	1.0	1.0

Notes:
1. mg/l = milligrams per liter
2. NTU = Nephelometric turbidity units
3. Concentrations of nitrogen and phosphorous, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total phosphorous (P) concentrations shall not exceed 0.05 mg/L in any stream at the point where it enters any standing body of water, nor 0.025 mg/L in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/L total P. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorous are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N:P = 10:1 shall be used.
4. The water quality objectives do not apply to hydrologic subareas 4.51 and 4.52 between Highway 78 and El Camino Real and to all lands which drain to Moonlight Creek and Encinitas Creek. The objectives for the remainder of the Hydrologic Areas are as shown.

18. A discharge in compliance with this Order will be consistent with the standards, policies, and regulations established in the Basin Plan for the achievement of water quality objectives.

19. In establishing the requirements contained herein the Regional Board considered factors including, but not limited to, the following:

    a. Beneficial uses to be protected and the water quality objectives reasonably required for that purpose,

b. Other waste discharges,

c. The need to prevent nuisance,

d. Past, present, and probable future beneficial uses of the hydrologic subunits under consideration,

e. Environmental characteristics of the hydrologic subunits under consideration, including the quality of water thereto,

f. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area,

g. Economic considerations,

h. The need for developing housing within the region, and

i. The need to develop and use recycled water.

20. The proposed project will make use of recycled water consistent with the goals of California Water Code, Division 7, Chapter 7, Water Recycling Law.

21. In accordance with the Memorandum Of Agreement Between The Department Of Health Services And The State Water Resources Control Board On Use Of Reclaimed Water, this Order incorporates any conditions of approval submitted as part of the State DHS recommendations into water reclamation requirements proposed for adoption by this Regional Board.

22. This Regional Board has considered all water resource related environmental factors associated with the proposed discharge of waste from the FRGWRP.

23. The FRGWRP is an existing facility and this re-issuance of waste discharge requirements allows negligible or no expansion of existing uses; therefore, this Order is categorically exempt from the requirements of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.) in accordance with Title 14, Division 6, Chapter 3, Article 19, Section 15301 of the California Code of Regulations.

24. This Regional Board has notified the LWD and all known interested parties of the intent to prescribe master reclamation permit requirements for the discharge described in the Findings of this Order.

25. This Regional Board in a public meeting has heard and considered all comments pertaining to the proposed discharge of waste from the FRGWRP.

IT IS HEREBY ORDERED THAT, the LWD, in order to meet the provisions contained in Division 7 of the California Water Code and Regulations adopted thereunder, shall comply with the following requirements for FRGWRP:

A. PROHIBITIONS

1. Discharges of waste to lands which have not been specifically described in the findings and for which valid waste discharge requirements are not in force are prohibited.

2. The discharge of waste in a manner other than as described in the findings of this Order is prohibited unless the discharger obtains revised waste discharge requirements that provide for the proposed change.

3. Compliance with the Waste Discharge Prohibitions, as stated in the 1994 Basin Plan (Attachment 1), is required as a condition of this Order.

4. The discharge of wastewater shall not cause, wholly or in combination with any other discharge(s), this Regional Board's objectives for the ground or surface waters of the Carlsbad HU (904.00), as established in the Basin Plan, to be exceeded.

5. Neither the treatment, storage nor disposal of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.

6. The discharge of a 30-day average treated wastewater flow volume for irrigation in excess of 1.0 MGD is prohibited unless the discharger obtains revised waste discharge requirements for the proposed increased flow.

B. DISCHARGE SPECIFICATIONS

1. Effluent used for landscape irrigation purposes shall be treated to the most restricted level in conformance with all applicable provisions of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria) for landscaping irrigation [currently Section 60304 (a) and 60320.5].

2. The median concentration of total coliform bacteria measured in the disinfected effluent shall not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which

analyses have been completed and the number of total coliform bacteria shall not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

3. Turbidity concentration of the recycled water effluent from the FRGWRP shall not exceed a 24-hour average value of 2 NTU (nephelometric turbidity units), shall not exceed 5 NTU more than 5% of the time during a 24-hour period, and shall not exceed 10 NTU at any time.

C. RECYCLED WATER PURVEYANCE REQUIREMENTS

1. If the LWD begins purveyance of reclaimed water directly to parties other than itself (for onsite use only) or the CMWD, the LWD shall be considered a Recycled Water Agency and shall be subject to the provisions of this section. The LWD shall notify the Regional Board 120 days prior to commencement of the purveyance of reclaimed water directly to parties other than the CMWD.

2. The Recycling Water Agency shall establish new Regional Board, State DHS and the San Diego County Department of Environmental Health (County DEH) approved *Rules and Regulations for Recycled Water Users* governing the design and construction of recycled water use facilities and the use of recycled water. The Recycled Water Agency shall ensure that the rules and regulations are implemented and enforced with respect to the recycled water users. The Recycled Water Agency shall certify prior to the commencement of purveyance, that the Recycled Water Agency's *Rules and Regulations for Recycled Water Users* are consistent with the requirements contained in Attachment No. 2 of this Order.

3. The Recycled Water Agency shall certify, prior to commencement of purveyance, that it has developed and submitted for approval a program to conduct compliance inspections of recycled water reuse sites to the Regional Board, State DHS and County DEH. Inspections shall determine the status of compliance with the Recycled Water Agency's approved rules and regulations for recycled water users.

4. The Recycled Water Agency shall certify, prior to commencement of purveyance, that the following information has been developed and is available to the State DHS and the County DEH, for all current recycled water use areas:

   a. The number, location, and type of facilities within the use area proposing to use domestic and recycled water. "Facility" means any type of building or structure, or defined area of specific public use that utilizes or proposes to utilize a dual plumbed system.

b. The average number of persons estimated to be served by each facility on a daily basis.

c. The specific boundaries of the proposed use site area including a map showing the location of each facility, drinking water fountain and impoundment to be served.

d. The person or persons responsible for operation of the recycled water system at each use area.

e. The specific use to be made of the recycled water at each use area.

f. The methods to be used by the Recycled Water Agency to assure that the installation and operation of the recycled system will not result in cross connections between the recycled water piping system and the potable water piping system. This shall include a description of pressure, dye or other test methods to be used to test the system.

g. Plans and specifications shall include the following and shall be submitted to the State DHS and County DEH for approval:

(1) Proposed piping system to be used,

(2) Pipe locations of both the recycled and potable systems,

(3) Type and location of the outlets and plumbing fixtures that will be accessible to the public,

(4) The methods and devices to be used to prevent backflow of recycled water into the public water system,

(5) Plan notes relating to recycled water specific installation and use requirements.

5. The Recycled Water Agency shall do the following for all reuse sites:

a. Enforce recycled water rules and regulations,

b. Conduct recycled water reuse site compliance inspections in accordance with the program submitted in compliance with *Recycled Water Purveyance Requirements C.3* of this Order,

c. Notify the State DHS and the County DEH of any incidence of recycled water backflow into the potable water system as soon as possible, but in no case later than 24 hours of finding the incident, and

d. Maintain a current list of all on-site recycled water supervisors.

6. Prior to providing recycled water to a dual plumbed system as defined in Title 22, Chapter 3, Article 1, of the California Code of Regulations, the Recycled Water Agency shall obtain an amendment to this Order.

7. Recycled water shall not be supplied to parties who use, transport, or store such water in a manner which causes a pollution, contamination or nuisance, as defined by Section 13050 of the California Water Code.

D. FACILITY DESIGN AND OPERATION SPECIFICATIONS

1. PROPER OPERATION

The LWD shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the LWD to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

2. WET WEATHER STORAGE

The discharger shall provide adequate storage facilities to contain recycled water, or have in place alternate recycled water disposal methods approved by the Regional Board, during and after periods of rainfall when disposal by irrigation cannot be successfully practiced and to prevent the discharge of treated or untreated recycled water to any surface water body.

3. COAGULATION ALTERNATIVE

Coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is capability to automatically activate chemical addition or divert wastewater should the turbidity of the influent to the filters exceed 5 NTU for more than 15 minutes.

4. DISINFECTION PROCESS

Disinfection of recycled water shall comply with all requirements of California Code of Regulations, Title 22, Division 4. Disinfection may be accomplished by either:

a. A chlorine disinfection process that provides a CT (chlorine concentration times modal contact time) value of not less than 450 mg-min/liter at all times with a modal chlorine contact time of at least 90 minutes based on peak dry weather design flow; or

b. A disinfection process, that, when combined with the filtration process, has been demonstrated to reduce the concentration of plaque-forming units of F-specific bacteriophage MS2, or polio virus, per unit volume of water in the wastewater to one hundred thousandths (1/100,000) of the initial concentration in the filter influent throughout the range of qualities of wastewater that will occur during the recycling process. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

5. OPERATION MANUAL

A copy of the facility operations manual shall be maintained at the FRGWRP and shall be available to operation personnel and Regional Board staff upon request at all times. The following portions of the operations manual shall be posted at the treatment plant as a quick reference for treatment plant operators:

a. Alarm set points for secondary turbidity, tertiary turbidity and chlorine residual.

b. Levels at which flow will be diverted for secondary turbidity, tertiary turbidity and chlorine residual.

c. When to divert flow for high daily and weekly median total coliform.

d. When the authorities (State DHS, County DEH, Regional Board) will be notified of a diversion.

e. Names and numbers of those authorities to be notified in case of a diversion.

f. Frequency of calibration for turbidimeters and chlorine residual analyzers.

6. OPERATORS CERTIFICATION

The LWD's wastewater treatment facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 3, Chapter 26, Title 23 of the California Code of Regulations.

7. RUNOFF AND FLOOD PROTECTION

a. The discharge to any landscape impoundment, including the La Costa Golf Course storage pond, shall be terminated whenever rainfall or flooding is likely to cause the impoundment to overflow.

b. All waste treatment, storage and purveyance facilities, with the exception of irrigation areas and the La Costa Golf Course storage pond, shall be protected against 100-year peak stream flows as defined by the San Diego County flood control agency.

c. All wastewater and recycled water storage facilities, with the exception of irrigation areas and the La Costa Golf Course storage pond, shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24-hour frequency storm.

8. MONITORING AND REPORTING

The LWD shall comply with the attached Monitoring and Reporting Program No. R9-2004-0223, and future revisions thereto as specified by the Executive Officer. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. R9-2004-0223.

9. MAINTENANCE

A preventive maintenance program shall be provided at the FRGWRP reclamation plant to ensure that all equipment is kept in a reliable operating condition.

10. RELIABILITY REQUIREMENTS

The LWD's facilities shall comply with all applicable reliability requirements contained in Title 22, Division 4, Chapter 3, Article 10, *Alternative Reliability Requirements for Uses Requiring Oxidized Disinfected Wastewater or Oxidized, Coagulated, Clarified, Filtered, Disinfected*

Wastewater, of the California Code of Regulations.

E. BIOSOLIDS SPECIFICATIONS

1. Collected screenings, sludges, other solids removed from liquid wastes, and filter backwash shall be disposed of in a manner approved by the Executive Officer. Before sludge is disposed of by means other than discharge to the EWPCF or a landfill regulated under waste discharge requirements, the discharge shall submit written notification to the Executive Officer of the proposed disposal method. Such disposal, use or supply for reuse by others shall not be initiated until approved by the Executive Officer.

2. Solids and sludge treatment, storage, and disposal or reuse shall not create a nuisance, such as objectionable odors or flies, and shall not result in groundwater contamination.

3. The solids and sludge treatment site and storage site shall have facilities adequate to divert surface water runoff from adjacent areas, to protect the boundaries of the site from erosion, and to prevent drainage from the treatment and storage site. Adequate protection is defined as protection from at least a 100-year storm and protection from the highest possible tidal stage that may occur.

4. The discharge of sewage sludge and solids shall not cause waste material to be in a position where it is, or can be, conveyed from the treatment and storage sites and deposited in the waters of the state.

F. STANDARD PROVISIONS

1. <u>ENFORCEMENT</u>

   The Regional Board may initiate enforcement action against the LWD, which may result in the termination of the recycled water supply, if any person uses, transports, or stores such water in a manner which creates, or threatens to create conditions of pollution, contamination, or nuisance, as defined in the California Water Code, Section 13050.

2. DUTY TO COMPLY

The LWD must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for (a) enforcement action; (b) termination, revocation and reissuance, or modification of this Order; or (c) denial of a report of waste discharge in application for new or revised master reclamation permit requirements.

3. ENTRY AND INSPECTION

The LWD shall allow the Regional Board, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to do the following:

a. Enter upon the LWD's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Order,

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order,

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this Order, and

d. Sample or monitor, at reasonable times for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.

4. CIVIL MONETARY REMEDIES

The California Water Code provides that any person who intentionally or negligently violates any master reclamation permit requirements issued, reissued, or amended by this Regional Board shall be liable civilly in accordance with California Water Code.

5. PENALTIES FOR INVESTIGATION, MONITORING OR INSPECTION VIOLATIONS

The California Water Code provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or falsifying any information provided in the monitoring reports is guilty of a misdemeanor and is subject to a civil liability for each day in which the violation occurs.

6. ENDANGERMENT OF HEALTH AND ENVIRONMENT

The LWD shall report any noncompliance that may endanger health or the environment. Any such information shall be provided orally to the Executive Officer within 24 hours from the time the LWD becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the LWD becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours. The following occurrence(s) must be reported to the Executive Officer within 24 hours:

a. Any bypass from any portion of the treatment facility that will result in noncompliance with any of the terms and conditions of this Order. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility to other than a sewer system.

b. Any discharge of non-disinfected effluent or untreated wastewater that may endanger public health, or is greater than 1,000 gallons, or reaches surface waters.

c. Any treatment plant upset which causes the effluent limitations of this Order to be exceeded including, but not limited to, the following:

   (1) Failure of chlorination equipment

   (2) Effluent total coliform bacteria greater than 240 MPN/100 ml

   (3) Turbidity greater than 10 NTU if distributed to any recycled water user

   (4) CT less than 450 mg-min/L if distributed to any recycled water user

These incidents shall also be reported orally to the State DHS and County DEH with in 24-hours of the incident.

7. PLANT OVERLFOW EVENTS

The discharger shall report all overflow events that occur at the FRGWRP. For purposes of this reporting requirement, an overflow event is defined as a discharge of treated or untreated wastewater not authorized by waste discharge requirements and/or a NPDES permit which results from a pump station failure, line break, obstruction, surcharge, or any other operational dysfunction. This reporting requirement applies to all overflow events other than: 1) events required to be reported under Standard Provision 6 above, and 2) those events subject to regulation under this Regional Board's Order No. 96-04, *General Waste Discharge Requirements Prohibiting Sanitary Sewer Overflows by Sewage Collection Agencies*. Overflows identified under this provision shall be reported to the Regional Board with the quarterly monitoring report for the period in which the overflow occurs.

8. UNAUTHORIZED DISCHARGES OF RECYCLED WATER

Any person who, without regard to intent or negligence, causes or permits an unauthorized discharge of 50,000 gallons or more of recycled water that has been treated to at least disinfected tertiary 2.2 recycled water or 1,000 gallons or more of recycled water that is treated at a level less than disinfected tertiary 2.2 recycled water in or on any waters of the state, or causes or permits such unauthorized discharge to be discharged where it is, or probably will be, discharged in or on any waters of the state, shall, as soon as (1) that person has knowledge of the discharge, (2) notification is possible, and (3) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify this Regional Board in accordance with reporting requirements in Standard Provision F.6.

9. PRIOR NOTICE OF BYPASS

If a need for a discharge bypass is known in advance, the LWD shall submit prior notice (stating, at a minimum, the purpose, anticipated dates, duration, level of treatment, and volume of bypass) and, if at all possible, shall submit such notice at least 10 days prior to the date of the bypass. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility to other than a sewer system.

10. CORRECTIVE ACTION

The LWD shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this Order, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

11. TREATMENT FAILURE

In an enforcement action, it shall not be a defense for the LWD that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the LWD shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies for example, when the primary source of power of the treatment facility is failed, reduced, or lost.

12. HAZARDOUS RELEASES

Except for a discharge which is in compliance with these master reclamation permit requirements, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, shall as soon as (a) that person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Director of County DEH in accordance with California Health and Safety Code Section 5411.5 and the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the State Board or the appropriate Regional Board of the discharge. This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of Section 13271 of the Water Code unless the LWD is in violation of a prohibition in the applicable Water Quality Control Plan.

13. PETROLEUM RELEASES

Except for a discharge which is in compliance with these master reclamation permit requirements, any person who without regard to intent or negligence, causes or permits any oil or petroleum product to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall, as soon as (a) such person has knowledge of the discharge, (b) notification is possible, and (c) notification can be provided without substantially impeding cleanup or other emergency measures, immediately notify the Office of Emergency Services of the discharge in accordance with the spill reporting provision of the State oil spill contingency plan adopted pursuant to Article 3.5 (commencing with Section 8574.1) of Chapter 7 of Division 1 of Title 2 of the Government Code. This requirement does not require reporting of any discharge of less than 42 gallons unless the discharge is also required to be reported pursuant to Section 311 of the Clean Water Act or the discharge is in violation of a prohibition in the applicable Water Quality Control Plan.

14. PERMIT REPOSITORY

A copy of this Order shall be maintained at the LWD's facility and shall be available to operating personnel at all times.

15. RETENTION OF RECORDS

The LWD shall retain records of all monitoring information, including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

16. GENERAL REPORTING REQUIREMENT

The LWD shall furnish to the Executive Officer of this Regional Board, within a reasonable time, any information which the Executive Officer may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The LWD shall also furnish to the Executive Officer, upon request, copies of records required to be kept by this Order.

17. PERMIT REVISION

This Order may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this Order.

b. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts.

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the LWD for the modification, revocation and reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

18. CHANGE IN DISCHARGE

The LWD shall file a new Report of Waste Discharge at least 120 days prior to the following:

a. Significant change in the treatment or disposal method (e.g., change in the method of treatment which would significantly alter the nature of the waste.)

b. Change in the disposal area from that described in the findings of this Order.

c. Increase in flow beyond that specified in this Order.

d. Other circumstances that result in a material change in character, amount, or location of the waste discharge.

e. Any planned change in the regulated facility or activity which may result in noncompliance with this Order.

19. CHANGE IN OWNERSHIP

This Order is not transferable to any person except after notice to the Executive Officer. The LWD shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new discharger containing a specific date for the transfer of this Order's responsibility and coverage between the LWD and the new discharger. This agreement shall include an acknowledgement that the LWD is liable for violations up to the transfer date and that the new discharger is liable from the transfer date on. The

Regional Board may require modification or revocation and reissuance of this Order to change the name of the discharger and incorporate such other requirements as may be necessary under the California Water Code.

20. INCOMPLETE REPORTS

Where the LWD becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Board, it shall promptly submit such facts or information.

21. REPORT DECLARATION

All applications, reports, or information submitted to the Executive Officer shall be signed and certified as follows:

a. The Report of Waste Discharge shall be signed as follows:

(1) For a corporation - by a principal executive officer of at least the level of vice-president.

(2) For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal or other public agency - by either a principal executive officer or ranking elected official.

b. All other reports required by this Order and other information required by the Executive Officer shall be signed by a person designated in paragraph (a) of this provision, or by a duly authorized representative of that person. An individual is a duly authorized representative only if all of the following are true:

(1) The authorization is made in writing by a person described in paragraph (a) of this provision,

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, and

(3) The written authorization is submitted to the Executive Officer.

c. Any person signing a document under this section shall make the following certification:

"*I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment*."

22. REGIONAL BOARD ADDRESS

The LWD shall submit reports required under this Order or other information required by the Executive Officer to the following address:

POTW Compliance Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

G. SPECIAL PROVISIONS

1. Within 180 days from the adoption of this Order, the LWD shall submit a supplement to the Engineering Report for the FRGWRP, in accordance with guidelines established under Title 22 CCR, Articles 7 through 10, to the RWQCB and the DHS. This report shall include the results of:

   a. An alarm simulation shut down test to ensure that the FRGWRP is properly operating.

   b. The modal contact time of the chlorination chamber, as defined under Title 22, Division 4, Chapter 3, Section 60301.600, from a tracer study conducted to ensure that the effluent meets the requirements of Title 22.

H. NOTIFICATIONS

1. VESTED RIGHTS

This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the LWD from liability under federal, state or local laws, nor create a vested right for the LWD to continue the waste discharge.

2. U.S. EPA REVIEW

These requirements have not been officially reviewed by the United States Environmental Protection Agency and are not issued pursuant to Section 402 of the Clean Water Act.

3. SEVERABILITY

The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

4. PREVIOUS ORDER

The requirements prescribed in this Order supersede the requirements prescribed in Order No. 93-41.

5. EFFECTIVE DATE

This Order becomes effective on the date of adoption by the San Diego RWQCB.

I, John H. Robertus, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Diego Region, on September 8, 2004.

JOHN H. ROBERTUS
Executive Officer

ATTACHMENT NO. 1

1994 WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN (BASIN PLAN) WASTE DISCHARGE PROHIBITIONS

California Water Code Section 13243 provides that a Regional Board, in a water quality control plan, may specify certain conditions or areas where the discharge of waste, or certain types of waste is not permitted. The following discharge prohibitions are applicable to any person as defined by Section 13050(c) of the California Water Code and to any person who is a citizen, domiciliary, or political agency or entity of California whose activities in California could affect the quality of waters of the state within the boundaries of the San Diego Region.

1. The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in California Water Code Section 13050, is prohibited.
2. The discharge of waste to land, except as authorized by waste discharge requirements or the terms described in California Water Code Section 13264, is prohibited.
3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in California Water Code §13376) is prohibited
4. The discharge of treated or untreated waste to lakes or reservoirs used for municipal water supply, or to inland surface water tributaries thereto, is prohibited.
5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the Regional Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be permitted if streamflow provided 100:1 dilution capability.
6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the Regional Board.
7. The dumping, deposition, or discharge of waste directly into waters of the state, or adjacent to such waters in any manner which may permit its being transported into the waters, is prohibited unless authorized by the Regional Board.
8. Any discharge to a storm water conveyance system that is not composed entirely of storm water is prohibited unless authorized by the Regional Board. (The

federal regulations, 40CFR 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40CFR 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to a NPDES permit and discharge resulting from fire fighting activities.) (§122.26 amended at 56 FR 56553, November 5, 1991 57 FR 11412, April 2, 1992).

9. The unauthorized discharge of treated or untreated sewage to waters of the state or to a storm water conveyance system is prohibited.

10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in California Water Code Section 13264, is prohibited.

11. The discharge of radioactive waste amenable to alternative methods of disposal into the waters of the state is prohibited.

12. The discharge of any radiological, chemical, or biological warfare agent into waters of the state is prohibited.

13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the Regional Board.

14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the state or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

15. The discharge of treated or untreated sewage from vessels to Mission Bay, Oceanside Harbor, Dana Point Harbor, or other small boat harbors is prohibited.

16. The discharge of untreated sewage from vessels to San Diego Bay is prohibited.

17. The discharge of treated sewage from vessels to portion of San Diego Bay that are less than 30 feet deep at mean lower low water (MLLW) is prohibited.

18. The discharge of treated sewage from vessels, which do not have a properly functioning US Coast Guard certified Type I or Type II marine sanitation device, to portions of San Diego Bay that are greater than 30 feet deep a mean lower low water (MLLW) is prohibited.

ATTACHMENT NO. 2
RULES AND REGULATIONS FOR RECYCLED WATER USE PROJECTS

Pursuant to California Water Code (CWC) Section 13523.1(b)(3), this Order requires the Recycled Water Agency to establish and to enforce rules and regulations governing the design, construction and use of recycled water distribution and disposal systems by its customers. The rules and regulations shall be consistent with the following criteria:

- Title 22, Division 4, Chapter 3, *Wastewater Reclamation Criteria;*
- Title 17, Division 1, Chapter 5, Group 4, Article 1 & 2, of the California Code of Regulations;
- The State Department of Health Services (State DHS) *Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water*;
- Any measures that are deemed necessary for protection of public health, such as the American Water Works Association (AWWA) California/Nevada section, *Guidelines for the Distribution of Non-Potable Water and Guidelines for Retrofitting To Recycled Water* or alternate measures that are acceptable to the State DHS.

At a minimum, the rules and regulations shall notify the users that:

1. The use of recycled water shall not cause pollution, contamination, or nuisance, as defined by Section 13050 of the California Water Code.
2. The Recycled Water Agency, Regional Board, State DHS, County DEH or an authorized representative of these parties, upon presentation of proper credentials, shall have the right to enter upon the recycled water use site during reasonable hours, to verify that the user is complying with the Recycled Water Agency's rules and regulations.
3. The recycled water user shall provide written notification, in a timely manner, to the Recycled Water Agency of any material change or proposed change in the character of the use of recycled water.
4. Prior to the initiation of recycled water service, the recycled water user shall submit plans and specifications for recycled water distribution facilities to the Recycled Water Agency.
5. The recycled water user shall designate a recycled water supervisor who is responsible for the recycled water system at each use area under the user's control. Specific responsibilities of the recycled water supervisor include the

proper installation, operation, and maintenance of the irrigation system; compliance of the project with the Recycled Water Agency's rules and regulations, prevention of potential hazards and preservation of the recycled water distribution system plans in "as built" form.

6. The Recycled Water Agency may terminate service to a recycled water user who uses, transports, or stores such water in violation of the Recycled Water Agency's rules and regulations.

7. The Regional Board may initiate enforcement action against any recycled water user, including but not limited to the termination of the recycled water supply, who:

   a. Discharges recycled water in violation of any applicable discharge requirement prescribed by the Regional Board or in a manner which creates or threatens to create conditions of pollution, contamination, or nuisance, as defined in the California Water Code Section 13050.

   b. Uses, transports, or stores such water in violation of the rules and regulations governing the design, construction and use of recycled water distribution and disposal systems issued by the recycled water agency in accordance with this attachment; or in a manner which creates or threatens to create conditions of pollution, contamination, or nuisance, as defined in the California Water Code Section 13050.

8. A copy of the recycled water rules and regulations, irrigation system layout map, and a recycled water system operations manual shall be maintained at the use area. These documents shall be available to operating personnel at all times.

9. Irrigation with disinfected tertiary recycled water shall not take place within 50 feet of any domestic water supply well unless all of the following conditions have been met:

   a. A geological investigation demonstrates that an aquitard exists at the well between the uppermost aquifer being drawn from and the ground surface.

   b. The well contains an annular seal that extends from the surface into the aquitard.

   c. The well is housed to prevent any recycled water spray from coming into contact with the wellhead facilities.

   d. The ground surface immediately around the wellhead is contoured to allow surface water to drain away from the well.

e. The owner of the well approves of the elimination of the buffer zone requirement.

10. Impoundment of disinfected tertiary recycled water shall not occur within 100 feet of any domestic water supply well.

11. Irrigation with, or impoundment of, disinfected secondary-2.2 or disinfected secondary-23 recycled water shall not take place within 100 feet of any domestic water supply well.

12. Irrigation with, or impoundment of, undisinfected secondary recycled water shall not take place within 150 feet of any domestic water supply well.

13. Recycled water facilities shall be operated in accordance with best management practices (BMP's) to prevent public contact with, and prevent direct human consumption of reclaimed water. All windblown spray of reclaimed water applied for irrigation onto property not owned or controlled by the discharger or reclaimed water user shall be prevented by the implementation of BMP's.

14. Facilities that may be used by the public shall be protected to the maximum extent possible by siting and/or structure from contact by irrigation with recycled water spray, mist, or runoff. Protection shall be by design, construction practice or system operation.

15. Any use of recycled water shall comply with the following:

a. Any irrigation runoff shall be confined to the recycled water use area.

b. Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.

c. Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.

16. Irrigation with reclaimed water shall be during periods of minimal human use of the service area. Consideration shall be given to allow an adequate dry-out time before the irrigated area will be used by the public.

17. Spray irrigation with recycled water, other than disinfected tertiary recycled water, shall not take place within 100 feet of the property line of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.

18. All use areas where recycled water is used and that are accessible to the public shall be posted with conspicuous signs, in a size no less than 4 inches by 8 inches, that include the following wording and picture in a size no less than 4 inches high by 8 inches wide: "RECYCLED WATER - DO NOT DRINK". See Attachment No. 3 for the acceptable symbol. The sign(s) shall be of a size easily readable by the public. The prescribed wording should also be translated into Spanish and other appropriate languages and included in the required signs.

19. Except as allowed under Section 7604 of Title 17, California Code of Regulations, no physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.

20. The recycled water piping system shall not include any hose bibs. Quick couplers that are different from that used on the potable water system may be used.

21. The public water supply shall not be used as a backup or supplemental source of water for a recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of Sections 7602(a) and 7603(a) of Title 17 and the approval of the public water system has been obtained. If a "Swivel-ell" type connection is used it must be used in accordance with the provisions of the Department of Health Services Policy Memo 95-004. Approved backflow prevention devices shall be provided, installed, tested, and maintained by the recycled water user in accordance with the applicable provisions of Title 17, Division 1, Chapter 5, Group 4, Article 2.

22. No person other than the Recycled Water Agency shall deliver recycled water to a facility. Connection to the irrigation system by an individual residence is prohibited.

23. All recycled water piping and appurtenances in new installations and appurtenances in retrofit installations shall be colored purple or distinctively wrapped with purple tape in accordance with Chapter 7.9, Section 4049.54 of the California Health and Safety Code.

24. Customer complaints concerning recycled water use that may involve public illness shall be reported to the County DEH and the State DHS, and to the Recycled Water Agency who shall maintain a log of all customer complaints regarding recycled water.

25. All reclaimed water storage facilities owned and/or operated by the Recycled Water Agency shall be protected against erosion, overland runoff, and other

impacts resulting from a 100-year frequency storm, 24 hour storm.

26. All reclaimed water storage facilities owned and/or operated by the Recycled Water Agency shall be protected against 100-year frequency peak stream flows as defined by the local flood control agency.

27. Any backflow prevention device installed to protect the public water system shall be inspected and maintained in accordance with Section 7605 of Title 17.

ATTACHMENT NO. 3

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

MONITORING AND REPORTING PROGRAM NO. R9-2004-0223

FOR
LEUCADIA WASTEWATER DISTRICT
FOREST R. GAFNER WATER RECLAMATION PLANT
SAN DIEGO COUNTY

A. MONITORING PROVISIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this Monitoring and Reporting Program (M&RP) and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water or substance. M onitoring points shall not be changed without notification to and the approval of the Executive Officer.

2. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than +10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring must be conducted according to United States Environmental Protection Agency (USEPA) test procedures approved under Title 40, Code of Federal Regulations (CFR), Part 136, "Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act" as amended, unless other test procedures have been specified in this M&RP.

4. All analyses shall be performed in a laboratory certified to perform such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.

5. Monitoring results must be reported on discharge monitoring report forms approved by the Executive Officer.

6. If the Leucadia Wastewater District (discharger) monitors any pollutants more frequently than required by this M&RP, using test procedures

approved under 40 CFR, Part 136, or as specified in this M&RP, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the discharger's monitoring report. The increased frequency of monitoring shall also be reported.

7. The discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation and copies of all reports required by this M&RP, and records of all data used to complete the application for this M&RP. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Board Executive Officer.

8. Records of monitoring information shall include the following:

   a. The date, exact place, and time of sampling or measurements,
   b. The individual(s) who performed the sampling or measurements,
   c. The date(s) analyses were performed,
   d. The individual(s) who performed the analyses,
   e. The analytical techniques or method used, and
   f. The results of such analyses.

9. All monitoring instruments and devices that are used by the discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy.

10. The discharger shall report all instances of noncompliance not reported under Provision F.6 of Order No. R9-2004-0223 at the time monitoring reports are submitted. The reports shall contain the information described in Provision F.6.

11. The monitoring reports shall be signed by an authorized person as required by Provision F.21.

12. A composite sample is defined as a combination of at least eight sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquot must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the

collection of the previous aliquot. Aliquot may be collected manually or automatically.

13. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

14. Sampling and analysis shall, at a minimum, be conducted in accordance with Article 6 of California Code of Regulations, Title 22, Division 4, Chapter 3 (Reclamation Criteria).

15. Any known direct cross-connection between recycled and potable water shall be reported to the Regional Board, State DHS, and County DEH within 24 hours.

B. EFFLUENT MONITORING

1. Samples of the effluent discharged from the Forest R. Gafner Water Reclamation Plant (FRGWRP) shall be collected at a point at or nearest to the effluent pump station, downstream of the disinfection process and prior to any dilution.

2. The discharger is responsible for monitoring and reporting in accordance with the following criteria:

CONSTITUENT	UNIT	TYPE OF SAMPLE	SAMPLING FREQUENCY	REPORTING FREQUENCY
Flowrate[1]	MGD	Continuous	Continuous	Quarterly
Turbidity	NTU	Continuous	Continuous[2]	Quarterly
Chlorine Contact Time (CT)	mg-min/L	Calculated	Continuous[3]	Quarterly
Chlorine Residual	mg/L	Continuous	Continous[4]	Quarterly
Total Coliform	MPN/100ml	Grab	Daily[5]	Quarterly
Total Dissolved Solids	mg/L	Composite	Quarterly	Quarterly
Electroconductivity[6]	dS/m	Composite	Quarterly	Quarterly
pH	Unit	Grab	Quarterly	Quarterly
Total Nitrogen	mg/L	Composite	Quarterly	Quarterly
Total Phosphorus	mg/L	Composite	Quarterly	Quarterly
Chloride	mg/L	Composite	Annually	Annually

CONSTITUENT	UNIT	TYPE OF SAMPLE	SAMPLING FREQUENCY	REPORTING FREQUENCY
Sulfate	mg/L	Composite	Annually	Annually
Adjusted Sodium Adsorption Ratio[7]	---	Composite	Annually	Annually
Iron	mg/L	Composite	Annually	Annually
Manganese	mg/L	Composite	Annually	Annually
Methylene Blue Active Substances	mg/L	Composite	Annually	Annually
Boron	mg/L	Composite	Annually	Annually
Fluoride	mg/L	Composite	Annually	Annually
Aluminum	mg/L	Composite	Annually	Annually
Antimony	mg/L	Composite	Annually	Annually
Arsenic	mg/L	Composite	Annually	Annually
Barium	mg/L	Composite	Annually	Annually
Beryllium	mg/L	Composite	Annually	Annually
Cadmium	mg/L	Composite	Annually	Annually
Chromium	mg/L	Composite	Annually	Annually
Copper	mg/L	Composite	Annually	Annually
Cyanide	mg/L	Composite	Annually	Annually
Mercury	mg/L	Composite	Annually	Annually
Nickel	mg/L	Composite	Annually	Annually
Selenium	mg/L	Composite	Annually	Annually
Thallium	mg/L	Composite	Annually	Annually

Notes: MGD = Million gallons per day
MPN/100 ml = Most Probable Number per 100 milliliters
mg-min/L = milligrams-minutes per liter
mg/L = milligrams per liter
NTU = Nephelometric Turbidity Units
dS/m = deciseimens per meter

1 Report both the daily average and daily maximum.

2 Effluent turbidity analyses shall be conducted continuously using a continuous monitoring and recording turbidimeter. Compliance with the daily average operating filter effluent turbidity limit of 2 NTU shall be determined by averaging the recorded turbidity levels at a minimum of four-hour intervals over a 24-hour period. Compliance with the turbidity standard of not exceeding 5 NTU more than 5 percent of the time over a 24-hour period shall be determined

using the levels of recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period. Should the continuous turbidity meter and/or recorder fail, grab sampling at a minimum frequency of one sample every 1.2 hours may be substituted until the turbidity meter and/or recorder is fixed. The discharger shall report the daily average effluent turbidity, the daily duration that turbidity exceeds 5 NTU, and the daily maximum turbidity (daily being defined as the 24-hour period from 12 am to 12 am). Continuous turbidity monitoring must also be provided prior to filtration to ensure adequate process control, and automatic actuate coagulant feed when the turbidity of the secondary treated effluent is greater than 10 NTU.

3 Calculated CT (chlorine concentration multiplied by modal contact time) values shall be determined and recorded continuously. The discharger shall report the daily minimum CT value and daily minimum modal contact time. The discharger shall report the date(s), value(s), time, and duration when the CT value falls below 450 mg-min/L, and/or the modal contact time falls below 90 minutes.

4 Chlorine concentrations shall be recorded by a continuous recording meter. The discharger shall report the minimum daily chlorine residual.

5 Samples for total coliform bacteria shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. The discharger shall report the results of daily total coliform bacteria monitoring and running 7-day median determination.

6 Samples for electroconductivity shall be monitored concurrently with ASAR.

7 The adjusted sodium adsorption ratio (Adj. SAR) is calculated as follows:

$$\text{Adj. SAR} = \frac{Na}{\sqrt{(Ca_x + Mg)/2}}$$

where Na, Ca_x, and Mg are in milliequivalent per liter (meq/L). Ca_x is a modified Ca value calculated using Table 3-2 contained in *Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual*.

3. The discharger shall review the monitoring results for compliance with Order No. R9-2004-0223 and submit a statement of compliance as part of this Monitoring and Reporting Program. The statement of compliance shall identify and report all violations of effluent limitations or disinfection requirements of Order No. R9-2004-0223.

C. SAN MARCOS CREEK

1. The discharger shall monitor San Marcos Creek at the following stations:

   a. a station located upstream of the La Costa Golf Course;
   b. a station located downstream of the La Costa Golf Course after the confluence of the north fork of San Marcos Creek;
   c. a station located where a discharge into or from the La Costa Golf Course reclaimed water storage pond would first contact San Marcos Creek during an overflow or flood event.

2. The discharger shall monitor the stations within San Marcos Creek according to the following table:

CONSTITUENT	UNIT	TYPE OF SAMPLE	SAMPLING FREQUENCY	REPORTING FREQUENCY
Flowrate	Gallons/Day	Estimate[1]	Quarterly[2]	Quarterly
Total Dissolved Solids	mg/L	Grab	Quarterly[2]	Quarterly
Total Nitrogen	mg/L	Grab	Quarterly[2]	Quarterly
Total Phosphorous	mg/L	Grab	Quarterly[2]	Quarterly
Methylene Blue Active Substances	mg/L	Grab	Quarterly[2]	Quarterly
Total Coliform	MPN/100ml	Grab	Quarterly[2]	Quarterly

Notes:
1. Calculate from estimate of creek cross sectional area and velocity.
2. If there is an overflow or flood event causing water contact between the La Costa Golf Course reclaimed water storage pond and San Marcos Creek the discharger shall begin monitoring on the first day of the overflow or flood event and continue monitoring daily until contact between the reclaimed water storage pond and San Marcos Creek has been terminated.

D. FILTRATION PROCESS MONITORING

If coagulation is not used as part of the treatment process, the turbidity of the filter influent and effluent shall be continuously measured. If effluent turbidity exceeds 2 NTU based on a 24-hour average, or if the influent turbidity exceeds 5 NTU for more than 15 minutes or 10 NTU at any time, then discharger shall submit a written report of the incident as part of the monthly monitoring report to the Regional Board. The report shall describe the measures taken to automatically activate chemical addition or to divert wastewater.

E. SEWAGE SOLIDS AND BIOSOLIDS

If solids are disposed of by means other than discharge to the Encina Water Pollution Control Facility, a record of the type, quantity, and manner of disposal and/or reuse of all solids removed in the course of sewage treatment shall be maintained at the FRGWRP and be made available to Regional Board staff upon request.

F. RECYCLED WATER USERS SUMMARY REPORT

1. If the LWD is supplying reclaimed water directly to parties other than itself (for onsite use only) or the Carlsbad Municipal Water District (CMWD), the

LWD shall submit a quarterly recycled water users summary report containing the following information:

a. Total volume of recycled water supplied to all recycled water users for each month of the reporting period,
b. Total number of recycled water use sites,
c. Address of the recycled water use sites and
d. Basin Plan name and number of hydrologic subarea underlying the recycled water use site.

2. If the LWD is supplying reclaimed water directly to parties other than itself (for onsite use only) or the Carlsbad Municipal Water District (CMWD), the LWD shall submit an annual recycled water users compliance report containing the following information:

   a. Recycled water use site summary report

      (1) Name of the reclaimed water reuse site
      (2) Owner of the reclaimed water use facility
      (3) Address of the reuse site
      (4) Name of the reclaimed water user supervisor
      (5) Phone number of the on-site water user supervisor
      (6) Mailing address of the recycled water use supervisor, if different from site address
      (7) Volume of reclaimed water delivered to the reuse site on a monthly basis

   b. Recycled water user site inspections

      Number of reclaimed water reuse site inspections conducted by discharger/producer staff and identification of sites inspected for the year.

   c. Recycled water user violations of the LWD's rules and regulations

      The discharger shall identify all recycled water users known to be in violation of the LWD's rules and regulations for recycled water users. The report shall include a description of the noncompliance and its cause, including the period of noncompliance, and if the noncompliance has not been corrected; the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

G. REPORT SCHEDULE

Monitoring reports shall be submitted to the Executive Officer in accordance with the following schedule:

Reporting Frequency	Report Period	Report Due
Quarterly	January - March	May 1st
	April - June	August 1st,
	July - September	November 1st
	October - December	February 1st
Annually	January-December	February 1st

Monitoring reports shall be submitted to:

ATTN: POTW Compliance Unit
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Ordered by: John H Robertus
JOHN H. ROBERTUS
Executive Officer

Date: September 8, 2004

ATTACHMENT B - RULES AND REGULATIONS FOR RECYCLED WATER USE

Pursuant to Water Code Section 13523.1(b) (3), this Order requires the Discharger to establish and to enforce rules and regulations governing the design, construction and use of recycled water distribution and disposal systems by its customers. The rules and regulations shall be consistent with the following criteria:

- Title 22, division 4, chapter 3 (Water Recycling Criteria)
- Title 17, division 1, chapter 5, group 4, article 1 and 2;
- The State Water Board Division of Drinking Water (DDW) *Guidelines For Use of Recycled Water, Guidelines for Use of Recycled Water for Construction*; and
- Any measures that are deemed necessary for protection of public health, such as the American Water Works Association (AWWA) California/Nevada Section, *Guidelines for the Distribution of Non-Potable Water and Guidelines for Retrofitting to Recycled Water* or alternate measures that are acceptable to the DDW.

I. STANDARD RULES AND REGULATIONS

At a minimum, the rules and regulations shall notify the users that:

A. The use of recycled water shall not cause a condition of pollution, contamination or nuisance, as defined by Water Code section 13050. The Discharger, the San Diego Water Board, the DDW, and the County Department of Environmental Health (County DEH), or an authorized representative of these parties, upon presentation of proper credentials, shall have the right to enter upon the recycled water use site during reasonable hours, to verify that the user is complying with the Discharger's rules and regulations.

B. The recycled water user shall provide written notification, in a timely manner, to the Discharger of any material change or proposed change in the character of the use of recycled water.

C. Prior to the initiation of recycled water service, the recycled water user shall submit to the Discharger plans and specifications for recycled water distribution facilities.

D. The recycled water user shall designate an on-site recycled water supervisor who is responsible for the recycled water system at each use area under the user's control. Specific responsibilities of the recycled water supervisor include the proper installation, operation, and maintenance of the irrigation system; compliance of the project with the Discharger's rules and regulations, prevention of potential hazards and preservation of the recycled water distribution system plans in "as built" form. Designated recycled water supervisors shall obtain instruction in the use of recycled water from an institution approved by the DDW and County DEH, as required.

E. The Discharger may terminate service to a recycled water user who uses, transports, or stores such water in violation of the Discharger's rules and regulations.

F. All recycled water storage facilities owned and/or operated by recycled water users shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24 hour frequency storm unless the San Diego Water Board approves relaxed storm protection measures for the facility.

G. All recycled water storage facilities owned and/or operated by recycled water users shall be protected against 100-year frequency peak stream flows as defined by the San Diego County flood control agency unless the San Diego Water Board approves relaxed storm protection measures for the facility.

H. The San Diego Water Board may initiate enforcement action against any recycled water user who discharges recycled water in violation of any applicable discharge requirement prescribed by the San Diego Water Board or in a manner which creates or threatens to create conditions of pollution, contamination or nuisance, as defined in Water Code section 13050.

I. A copy of the recycled water rules and regulations, irrigation system layout map, and a recycled water system operations manual shall be maintained at the use area. These documents shall be available to operating personnel at all times.

J. Irrigation with disinfected tertiary recycled water shall not take place within 50 feet of any domestic water supply well unless all of the following conditions have been met:

1. A geological investigation demonstrates that an aquitard exists at the well between the uppermost aquifer being drawn from and the ground surface.

2. The well contains an annular seal that extends from the surface into the aquitard.

3. The well is housed to prevent any recycled water spray from coming into contact with the wellhead facilities.

4. The ground surface immediately around the wellhead is contoured to allow surface water to drain away from the well.

5. The owner of the well approves of the elimination of the buffer zone requirement.

K. Impoundment of disinfected tertiary recycled water shall not occur within 100 feet of any domestic water supply well.

L. Irrigation with, or impoundment of, disinfected secondary-2.2[1] or disinfected secondary - 23[2] recycled water shall not take place within 100 feet of any domestic water supply well.

M. Irrigation with, or impoundment of, undisinfected secondary recycled water shall not take place within 150 feet of any domestic water supply well.

[1] Disinfected secondary-2.2 recycled water is defined in title 22, section 60301.220
[2] Disinfected secondary-23 recycled water is defined in title 22, section 60301.225

N. Recycled water facilities shall be operated in accordance with best management practices (BMPs) to prevent direct human consumption of reclaimed water and to minimize misting, ponding, and runoff. BMPs shall be implemented that will minimize both public contact and discharge onto areas not under customer control.

O. Irrigation with recycled water shall be during periods of minimal human use of the service area. Consideration shall be given to allow a maximum dry-out time before the irrigated area will be used by the public.

P. All drinking fountains located within the approved use area shall be protected by location and/or structure from contact with recycled water spray, mist, or runoff. Protection shall be by design, construction practice, or system operation.

Q. Facilities that may be used by the public, including but not limited to eating surfaces and playground equipment and located within the approved use areas, shall be protected to the maximum extent possible by siting and/or structure from contact by irrigation with recycled water spray, mist, or runoff. Protection shall be by design, construction practice or system operation.

R. Spray irrigation with recycled water, other than disinfected tertiary recycled water, shall not take place within 100 feet of the property line of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.

S. All use areas where recycled water is used and that are accessible to the public shall be posted with conspicuous signs, in a size no less than 4 inches by 8 inches, that include the following wording is a size no less than 4 inches high by 8 inches wide: "RECYCLED WATER - DO NOT DRINK". The sign(s) shall be of a size easily readable by the public.

T. No physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.

U. The recycled water piping system shall not include any hose bibs. Quick couplers that are different from that used on the potable water system may be used.

V. The public water supply shall not be used as a backup or supplemental source of water for a recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of title 17, sections 7602(a) and 7603(a) and the approval of the public water system has been obtained. If a "Swivel-ell" type connection is used it must be used in accordance with the provisions of the CDPH Policy Memo 95-004. Approved backflow prevention devices shall be provided, installed, tested, and maintained by the recycled water user in accordance with the applicable provisions of title 17, division 1, chapter 5, group 4, article 2.

W. No person other than the Discharger shall make a connection to the recycled water distribution system.

X. All recycled water piping and appurtenances in new installations and appurtenances in retrofit installations shall be colored purple or distinctively wrapped with purple tape in accordance with the Health and Safety Code, chapter 7.9, section 4049.54.

Y. Reuse site shut down tests and inspections shall be monitored by the DDW.

Z. Customer complaints concerning recycled water use that may involve public illness shall be reported to the County DEH, the DDW, and to the Discharger who shall maintain a log of all customer complaints regarding recycled water.

AA. Any backflow prevention device installed to protect the public water system shall be inspected and maintained in accordance with title 17, section 7605.

BB. Recycled water and fertilizer shall be applied to landscapes at agronomic rates.

CC. Overwatering of landscapes and runoff shall be avoided.

DD. Recycled water supervisors shall be responsible for determining onsite fertilizer needs to ensure that recycled water is applied to landscapes at agronomic rates, and shall complete training and education in compliance with recycled water agency rules and regulations to: (1) Minimize the potential for runoff or over-irrigation and, (2) Determine the fertilizer needs of the landscape taking into account the nutrient value of recycled water.

II. General Requirements for Hauling or Transportation of Recycled Water Using Vehicles

The Discharger's and Regulations for Recycled Water Use must include requirements that will be implemented to ensure use and transport of recycled water from the fill stations will be protective of public health and the environment. At a minimum the Rules and Regulations must include the requirements below. The Discharger or hauler must comply with the following requirements in sections II-IV of Attachment B to this Order, unless the DDW or the County of San Diego Department of Environmental Health (County DEH) determine that alternative criteria provide equivalent or better protection of public health and the environment.

A. Haulers interested in participating in this program must apply for a Recycled Water Use Permit issued by the Discharger.

B. Use areas receiving hauled recycled water must follow the same title 17 and title 22, requirements as a similar use area receiving traditionally piped recycled water. These requirements must be addressed in the Discharger's permitting process.

C. Before trucks or containers can be filled for the first time, all haulers are required to attend a brief on-site orientation or training in order to learn about using the filling station and the proper handling and safe use of recycled water. Annual refresher training should be required. Records of training should be maintained by the Discharger.

D. Once the hauler completes the on-site orientation or training and a MRP Recycled Water Program inspector verifies the tanker truck or containers meet the recycled water use requirements, the inspector will issue a signed Recycled Water Use Permit. The Recycled Water Use Permit must be available for inspection at all times. The hauler must carry a copy in the vehicle at all times while hauling recycled water.

E. Recycled water must not be introduced into any potable water piping system and no connection shall be made between the tank and any part of a potable water system.

F. If the hauler requests to supply recycled water to a use area that uses any plumbed potable or recycled water distribution systems, the Discharger must follow all applicable title 17 and title 22 requirements, including cross connection control testing and backflow prevention device installation prior to allowing pick up of recycled water. Dual plumbed use areas can only receive recycled water from a recycled water agency as specified in title 22, section 60313(a).

G. The hauler must keep a log book for each vehicle, tank, or container used to transport recycled water. The log book must be available for inspection at all times. The hauler must carry a copy in the vehicle at all times while hauling recycled water. The log book should include:

1. Date of delivery/use,

2. Volume of water delivered/used,

3. Intended use of water,

4. Name and address of the recipient/customer.

H. The hauler or Recycled Water Site Supervisor must notify workers and the public recycled water is used at a site and inform workers and the public not to drink recycled water or use it for food preparation.

I. Precautions should be taken to avoid food coming in contact with recycled water while the use site is wet.

J. No irrigation or impoundment of recycled water is allowed within a minimum of 50 feet of any domestic drinking water well.

K. The haulers shall take adequate measures to prevent overspray, ponding, or run off of recycled water from the authorized recycled water use area.

L. The Recycled Water Use Permit issued by the Discharger must be available for inspection at all times.

M. Recycled water must not be introduced into any potable water piping system and no connection shall be made between the tank and any part of a potable water system.

N. Tank trucks, containers, and appurtenances must be clearly identified as “non-potable”, equipped with a legally sized air gap, and must not be used to provide potable water.

Containers and hoses associated with hauling recycled water must not be used for potable water. Commercial hauling trucks that may be filled with potable water for non-potable uses must have two separate filling systems, one dedicated to potable water and one dedicated to recycled water. When the truck is filled from a potable water source, there must be a water agency or municipality provided meter and backflow device between the truck fill line and the potable source.

O. Vehicles, tanks, and containers must have water-tight valves and fittings, must not leak or spill contents during transport, and are cleaned of contaminants. This must be checked by the hauler before each use. Water-containing vessels that are open to the atmosphere during hauling are not acceptable for use.

P. Haulers should not overfill containers or trucks.

Q. Hoses used for the application of recycled water shall be removable and shall be stored in a disconnected condition during transport. Hoses should be inspected prior to filling to ensure that they are in serviceable condition and free from leaks.

R. In the event of an emergency concerning the recycled water hydrant, meter, fill pipe or hose (spillage, leaks, etc.), the hauler should call the emergency contact number listed on the filling station sign for further instructions.

S. The Discharger may conduct use area visits to ensure proper use of recycled water according to all applicable requirements of titles 17 and 22 and Recycled Water Use Permit conditions. This may include follow up phone calls or surveys of end users about completion of the hauling process and recycled water application.

T. Conditions under which haulers may lose their permits should be clarified. Including failure to follow program requirements and/or adhere to applicable State, County or local codes will result in suspension of the haulers permit. Violations of such codes may also result in fines and applicable administrative fees.

U. Residential hauling programs shall have fill stations staffed at all times by a representative from the Discharger. This is to ensure proper handling and filling procedures are being conducted at the fill stations.

V. Residential hauling programs must limit onetime hauls to 300 gallons.

W. The permitted hauler shall notify the Discharger prior to using recycled water for a use not approved by the Discharger.

X. The Discharger, San Diego Water Board, DDW, and County DEH will have the right to enter any recycled water use site during reasonable hours to ensure the user is complying with these requirements and the Discharger's Rules and Regulations for Recycled Water Use.

III. Rules and Regulations for Hauling or Transportation of Recycled Water From Commercial Vehicle Fill Stations

A. Trucks hauling recycled water that may also be filled with potable supplies for non-potable purposes shall have a dedicated potable use fill line through an air gap separation. The fill lines shall be properly labeled as potable or recycled water. As an alternative, the water supplier may install a reduced pressure principle backflow device on the potable system for filling trucks with potable water. Vehicles used to transport recycled water shall not be used to carry water for potable purposes.

B. The risers, hoses, and fittings for each supply shall be color coded (painted), blue for potable and purple for recycled water.

C. The hoses, hydrants and risers for each supply shall have separate and unique fittings (e.g., 2-1/2 inch diameter on the potable system and 2 inch diameter on the recycled water system) such that the potable system cannot accidentally be used on the recycled system and vice versa.

D. All vehicles used in transporting recycled water must be clearly marked with typical signage that reads: "CAUTION: RECYCLED WATER - DO NOT DRINK" in English and Spanish. The Discharger shall conduct annual inspections of the trucks to assure that all requirements in this Order are being met and that recycled water is being used in compliance with the requirements of this Order.

E. Vehicles used for transportation or distribution of recycled water, or for street sweeping must be equipped with an air gap to ensure backflow protection.

F. The use of recycled water for street sweeping or construction shall comply with the appropriate local storm water ordinance. Typical compliance measures include preventing overspray, ponding, or runoff of recycled water from the use area.

G. Haulers shall be required to enter the date and amount collected on the fill station log sheet during each visit. Include locations the recycled water will be used and approximate amounts.

H. For Hydrant Meter Filling Stations ensure the meter is shut off before disconnecting the fill line and make sure no water is leaking from the meter or hydrant.

I. For Gate Access Filling Stations ensure no water is leaking from the fill pipe or hose and securely re-lock the gate after leaving the filling station.

J. A truck or tank that has contained material from a septic tank or cesspool shall not be used to contain or distribute recycled water.

IV. Rules and Regulations for Use of Recycled Water for Fire Fighting

A. Unused recycled water must not be released into streams, rivers, or waterways.

B. Fire hydrants supplied with recycled water must be clearly identified by purple paints, signs, tags, stencils, or other such labeling, in order to notify firefighters that the fire hydrants are supplied with recycled water.

C. Fire truck tanks must be disinfected following the use of recycled water for firefighting since fire trucks could be used to distribute drinking water during civil emergencies.

D. Firefighting personnel must be adequately trained in safe use of recycled water. New and current firefighting personnel must receive periodic refresher courses regarding proper handling and use of recycled water.

Appendix B. Ordinances

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ORDINANCE NO. 43

AN ORDINANCE OF THE BOARD OF DIRECTORS OF CARLSBAD MUNICIPAL WATER DISTRICT (CMWD), CARLSBAD, CALIFORNIA, MANDATING USE OF RECYCLED WATER AND RESCINDING ORDINANCE NO. 31

WHEREAS, the people of the State of California have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state; and (California Water Code Section 13510); and

WHEREAS, conservation of all available water resources requires the maximum reuse of wastewater for beneficial uses of water (California Water Code Section 461); and

WHEREAS, continued use of potable water for irrigation of greenbelt areas may be an unreasonable use of such water where recycled water is available (California Water Code Section 13550);

NOW, THEREFORE, the Board of Directors of the Carlsbad Municipal Water District (CMWD) of the City of Carlsbad, California, hereby ordains as follows:

SECTION 1: FINDINGS

The state policies described above are in the best interest of the District. The majority of jurisdictions in San Diego County have adopted measures to promote water reclamation. This ordinance is necessary to protect the common water supply of the region which is vital to public health and safety, and to prevent endangerment of public and private property. San Diego County is highly dependent on limited imported water for domestic, agricultural, and industrial uses. The reliability of the supply of imported water is uncertain. By developing and utilizing recycled water, the need for additional imported water can be reduced. In light of these circumstances, certain uses of potable water may be considered unreasonable or to constitute a nuisance where recycled water is available or production of recycled water is unduly impaired. Recycled water would be more readily available in seasons of drought when the supply of potable water for nonessential uses may be uncertain.

SECTION 2:WATER RECLAMATION POLICY

It is the policy of the District that recycled water shall be used within the jurisdiction wherever it has determined that its use is economically justified, financially and technically feasible, and consistent with legal requirements, preservation of public health, safety and welfare, and the environment.

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SECTION 3: DEFINITIONS

The following terms are defined for purposes of this ordinance:

3.1 AGRICULTURAL PURPOSES: Agricultural purposes include the growing of field and nursery crops, row crops, trees, and vines and the feeding of fowl and livestock.

3.2 ARTIFICIAL LAKES: A human-made lake, pond, lagoon, or other body of water that is used wholly or partly for landscape, scenic or noncontact recreational purposes.

3.3 COMMERCIAL OFFICE BUILDINGS: Any building for office or commercial uses with water requirements which include, but are not limited to, landscape irrigation, toilets, urinals and decorative fountains.

3.4 COVERAGE TEST: The coverage test means a field investigation by a cross-connection control specialist to verify that there is no overspray, misting, ponding, and runoff occurring when the irrigation system is in operation, and that proper color coding and signage is in place for the on-site facilities.

3.5 CROSS-CONNECTION TEST: A cross-connection test means to verify that the potable and recycled water supplies are not connected to each other by shutting down the recycled water supply to the on-site facilities for 24 hours and determining that the on-site facilities do not become pressurized by the potable water supply at any location. The purpose for the test is to demonstrate that at the time of the test there are no discoverable cross-connections between the site's potable and recycled systems.

3.6 GREENBELT AREAS: A greenbelt area includes, but is not limited to, golf courses, cemeteries, parks and landscaping.

3.7 INDUSTRIAL PROCESS WATER: Water used by any industrial facility with process water requirements which include, but are not limited to, rinsing, washing, cooling and circulation, or construction, including any facility regulated by the Industrial Waste Discharge Ordinance regulated by Chapter 13.16 of the Carlsbad Municipal Code.

3.8 OFF-SITE FACILITIES: Water facilities from the source of supply to the point of connection with the on-site facilities, normally up to and including the water meter.

3.9 ON-SITE FACILITIES: Water facilities under the control of the owner, normally downstream from the water meter.

3.10 POTABLE WATER: Water which conforms to the federal, state and local standards for human consumption.

3.11 RECYCLED WATER: Recycled water means water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource. (See California Water Code Section 13050(n).)

3.12 RECYCLED WATER DISTRIBUTION SYSTEMS: A piping system intended for the delivery of recycled water separate from and in addition to the potable water distribution system.

3.13 WASTE DISCHARGE: Waste discharge means water deposited, released or discharged into a sewer system from any commercial, industrial or residential source which contains levels of any substance or substances which may cause substantial harm to any water treatment or reclamation facility or which may prevent any use of recycled water authorized by law.

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SECTION 4:WATER RECLAMATION MASTER PLAN

4.1 GENERAL: Upon adoption of this ordinance, the District shall prepare and adopt by resolution a Water Reclamation Master Plan to define, encourage, and develop the use of recycled water within its boundaries. The Master Plan shall be updated not less often than every five years.

4.2 CONTENTS OF THE WATER RECLAMATION MASTER PLAN: The Water Reclamation Master Plan (Master Plan) will include the following:

4.2.1 PLANTS AND FACILITIES. Evaluation of the location and size of present and future reclamation treatment plants, distribution pipelines, pump stations, reservoirs, and other related facilities, including cost estimates and potential financing methods.

4.2.2 RECYCLED WATER SERVICE AREAS. A designation of the lands within the District service area that can or may in the future use recycled water in lieu of potable water. Recycled water uses may include, but are not limited to, the irrigation of greenbelt and agricultural areas, filling of artificial lakes, and appropriate industrial and commercial uses.

4.2.3 QUALITY OF WATER TO BE RECLAIMED. For each water reclamation treatment facility, an evaluation of water quality with respect to the effect on anticipated uses of recycled water to be served by each treatment facility.

4.2.4 WATER QUALITY PROTECTION MEASURES. Recommend control measures and management practices to maintain or improve the quality of recycled water.

4.2.5 MANDATORY RECYCLED WATER USE. Within the recycled water service area, a description shall be prepared of where greenbelt irrigation, agricultural irrigation, commercial office buildings, filling of artificial lakes, or industrial processes can be limited to the use of recycled water. This information shall be used by District officials to mandate construction of recycled water distribution systems or other facilities in new and existing developments for current or future recycled water use as a condition of any development approval or continued water service if future reclamation facilities are proposed in the Master Plan that could adequately serve the development.

4.2.6 RULES AND REGULATIONS FOR RECYCLED WATER USE. Establish by resolution, general rules and regulations governing the use and distribution of recycled water.

4.2.7 COORDINATION AMONG AGENCIES FOR RECYCLED WATER USE. An examination shall be made of the potential for initiating a coordinated effort between the Carlsbad Municipal Water District and other regional agencies to share in the production and utilization of recycled water.

SECTION 5: PROCEDURES

5.1 EXISTING POTABLE WATER SERVICE:

5.1.1 PRELIMINARY DETERMINATION. Based upon the Master Plan, and upon the designation of each recycled water service area or the commencement of the design of new recycled water facilities, the District shall make preliminary determinations as to which existing potable water customers shall be converted to the use of recycled water. Each water customer shall be notified of the basis for a determination that conversion to recycled water service will be required, as well as the proposed conditions and of the need for a plan of implementation for such conversion.

5.1.2 NOTICE. The notice of the preliminary determination, including the proposed conditions and time schedule for compliance, shall be sent to the water customer by certified mail.

5.1.3 IMPLEMENTATION. The water customer shall be required to submit a plan of implementation to the Carlsbad Municipal Water District's Executive Manager or his designee within ninety (90) days after receipt of the notice of preliminary determination.

The plan of implementation shall describe in detail how the water customer intends to retrofit his water facilities to use recycled water in accordance with all Federal, State and local laws and public health guidelines. The District shall provide the water customer upon request a copy of its "Rules and Regulations for Recycled Water Use" to be a reference for water customer's in preparing the required plan of implementation for their on-site facilities. All costs for preparation of the plan of implementation are the responsibility of the water customer. Carlsbad Municipal Water District's Executive Manager or his designee shall have the authority to approve the water customer's plan of implementation within thirty (30) days after it is submitted to the District. As an option, the District will prepare the "Plan of Implementation" at the District's cost for the water customer, provided the water customer signs an acknowledgement to install and accept the proposed improvements shown on the District approved Plan of Implementation. Once approved, the plan of implementation must be implemented within six (6) months by the water customer including completion of all coverage and cross connection tests and payment of any plancheck and inspection fees if applicable. All costs for implementation of the improvements on the Plan of Implementation are the responsibility of the water customer. If more than six (6) months is required for the implementation, an appeal may be made for additional time to the Carlsbad Municipal Water District's Board of Directors by submitting such appeal in writing to the Executive Manager of the District.

5.1.4 OBJECTIONS; APPEALS. The water customer may file a notice of objection with the District within thirty (30) days after any notice of determination to comply is delivered or mailed to the customer, and may request reconsideration of the determination or modification of the proposed conditions or schedule for conversion. The objection must be in writing and specify the reasons for the objection. The preliminary determination shall be final if the customer does not file a timely objection. The Executive Manager or his designee, shall review the objection with the objector, and shall confirm, modify or abandon the preliminary determination or submit the objection to the District's Board of Directors. The Board, at its sole discretion may confirm, modify or abandon the preliminary determination or establish an alternative program intended to facilitate the orderly development of the recycled water system.

5.2 NEW DEVELOPMENT AND WATER SERVICE APPROVALS:

5.2.1 CONDITIONS. Upon application by a developer, owner or water customer (herein referred to as "applicant") for a tentative map, subdivision map, land use permit, or other development project as defined by Government Code Section 65928, staff shall review the Master Plan and make a preliminary determination whether the current or proposed use of the subject property is required to be served with recycled water or to include facilities designed to accommodate the use of recycled water in the future. Based upon such determination, use of recycled water and provision of recycled water distribution systems or other facilities for the use of recycled water, and such use may be required as a condition of approval of any such application, in addition to any other conditions of approval.

5.2.2 ALTERATIONS AND REMODELING. On a case by case basis, upon application for a permit for the alteration or remodeling of multi-family, commercial or industrial structures (including, for example, hotels), staff shall review the Master Plan and make a preliminary determination whether the subject property shall be required to be served with recycled water or to include facilities designed to accommodate the use of recycled water in the future. Based upon such determination, use of recycled water and provision of recycled water distribution systems or other facilities for the use of recycled water, and application for a permit for such use, may be required as a condition of approval of the application.

5.2.3 NOTICE OF DETERMINATION. A notice of the basis for the preliminary determination, proposed conditions of approval and schedule for compliance shall be provided to the applicant prior to approval of the development application.

5.2.4 REQUESTED SERVICE. On a case by case basis, to use recycled water on a property not covered by Sections 5.1.1, 5.2.1, or 5.2.2 above, the District shall review the Master Plan and make a determination whether the subject property shall be served with recycled water. Based upon such determination, a written Notice of Determination will be provided to the water customer by the District.

5.2.5 PLAN APPROVAL. Plans for the recycled and non-recycled water distribution systems for the parcel shall be reviewed and approved by the District before on-site facilities are constructed. A recycled water number will be assigned by the District and this number shall be placed on the plans for record purposes.

5.2.6 FIELD INSPECTION. Prior to the use of recycled water, the District will perform a coverage test and cross-connection test of the constructed on-site facilities to verify that they are in compliance with the approved Plan and meet all California State Department of Health Services requirements for use of recycled water. Upon approval of the coverage test, the water customer will be required to fill out a Notice of Appointment of Site Supervisor form, and will be provided Rules & Regulations for Recycled Water Use. The water customer's Site Supervisor will also be required to attend the San Diego County Water Authority's training class on use and handling of recycled water, or other approved training class. The coverage test will take place after the recycled water meter is installed. The District and the City of Carlsbad has no required fees for this work but the water customer is responsible for paying San Diego County Department of Environmental Health applicable fees associated with this work.

5.3 TEMPORARY USE OF POTABLE WATER: At the discretion of the Executive Manager or his designee, potable water may be made available on a temporary basis until recycled water is available. Before the applicant receives temporary potable water, the on-site facilities must be constructed in accordance with the Plan of Implementation and field inspected by the staff for new on-site distribution facilities. Prior to commencement of recycled water service, a coverage and cross-connection test of the on-site facilities will be conducted to verify that the facilities have been maintained and are in compliance with the recycled water irrigation system Plan of Implementation and current requirements for service. Upon verification of compliance, recycled water shall be served to the parcel for the intended use. The District shall provide written notice if the facilities are not in compliance, and the applicant shall be notified of the corrective actions necessary and shall have sixty (60) days to take such actions prior to initiation of enforcement proceedings. The water customer will be required to fill out the form described in Section 5.2.6, and the Site Supervisor will be required to attend the San Diego County Water Authority's class on use and handling of recycled water or other approved training class.

5.4 RECYCLED WATER RATE: The rate charged for reclaimed water shall be established by resolution of the Board of Directors.

SECTION 6: REGULATION OF BRINE DISCHARGE TO SEWAGE SYSTEMS

6.1 INTENT: The Carlsbad Municipal Water District recognizes that to maintain adequate wastewater quality for water reclamation treatment processes, and to protect public and private property, restrictions may be required on certain industrial, commercial, and residential waste discharges to a sewerage system that is located within a designated tributary area of an existing or planned reclamation facility.

6.2 ADOPTED TRIBUTARY PROTECTION MEASURES: Waste discharges to the sewage system from any industrial, commercial, or residential source, may be restricted or prohibited upon a finding, following a noticed public hearing, that the type or class of discharge involved is capable of causing or may cause substantial damage or harm to any sewage treatment or reclamation facility or to any significant user or users or potential user or users of reclaimed water within an area which has been planned for reclaimed water services.

SECTION 7: SANCTIONS

7.1 PUBLIC: Discharge by any person or entity of wastes or the use of recycled water in any manner in violation of this ordinance or of any permit issued hereunder is subject to prosecution for a misdemeanor.

7.2 INJUNCTION: Whenever a discharge of wastes or use of recycled water is in violation or threatens to cause a violation of this ordinance, the District's attorney may seek injunctive relief as may be appropriate to enjoin such discharge or use.

7.3 REVOCATION: In addition to any other statute or rule authorizing termination of water service, the District may revoke the use of recycled water if a violation of any provision of this ordinance is found to exist or if a discharge of wastes or use of recycled water causes or threatens to cause violation of this ordinance.

7.4 PENALTY: Except as provided in Subsection 7.1, any owner and/or operator who violates this ordinance shall be subject to:

A. A fine not exceeding one hundred dollars for the first violation;
B. A fine not exceeding two hundred dollars for the second violation within one year;
C. A fine not exceeding five hundred dollars for the third violation within one year;
D. A fine not exceeding one thousand dollars for the fourth and each additional violation within one year.

Each and every day during any portion of which any violation of this ordinance is committed, continued or permitted shall be a separate offense. In addition, potable water service to the property may be discontinued.

SECTION 8: VALIDITY

If any provision of this ordinance or the application thereof to any person or circumstance is held invalid, the remainder of the ordinance and the application of such provisions to other persons or circumstances shall not be affected thereby.

SECTION 9: The District finds that this Ordinance and actions taken hereafter pursuant to this Ordinance are exempt from the California Environmental Quality Act as actions taken to assure the presentation and enhancement of water resources in accordance with CEQA Guidelines Sections 15307 and 15308. The Executive Manager of the District is authorized and directed to file a Notice of Exemption as soon as possible following adoption of this Ordinance.

SECTION 10: EFFECTIVE DATE

This ordinance shall be effective thirty (30) days after its adoption and the Secretary of the Board of Directors shall certify to the adoption of this ordinance and cause it to be published at least once in a newspaper of general circulation in the City of Carlsbad within fifteen (15) days after its adoption.

SECTION 11: (REPEAL)

That Ordinance No. 31 of the District, relating to mandating the use of reclaimed water, is hereby repealed in its entirety.

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INTRODUCED AND FIRST READ at a regular meeting of said Board of Directors held on the 14th day of JUNE, 2005, and thereafter,

PASSED, APPROVED AND ADOPTED at a special meeting of the Carlsbad Municipal Water District held on the 21st day of JUNE, 2005 by the following vote, to wit:

AYES: Board Members Lewis, Hall, Kulchin, Packard, Sigafoose

NOES: None

ABSENT: None

APPROVED AS TO FORM AND LEGALITY:

Ronald R. Ball

RONALD R. BALL, General Counsel

6/22/05.

Claude A. Lewis

CLAUDE A. LEWIS, President

ATTEST:

Isabelle Paulsen, Deputy

LORRAINE M. WOOD, Secretary

(SEAL)

Appendix C. 2012 Master Plan Excerpt

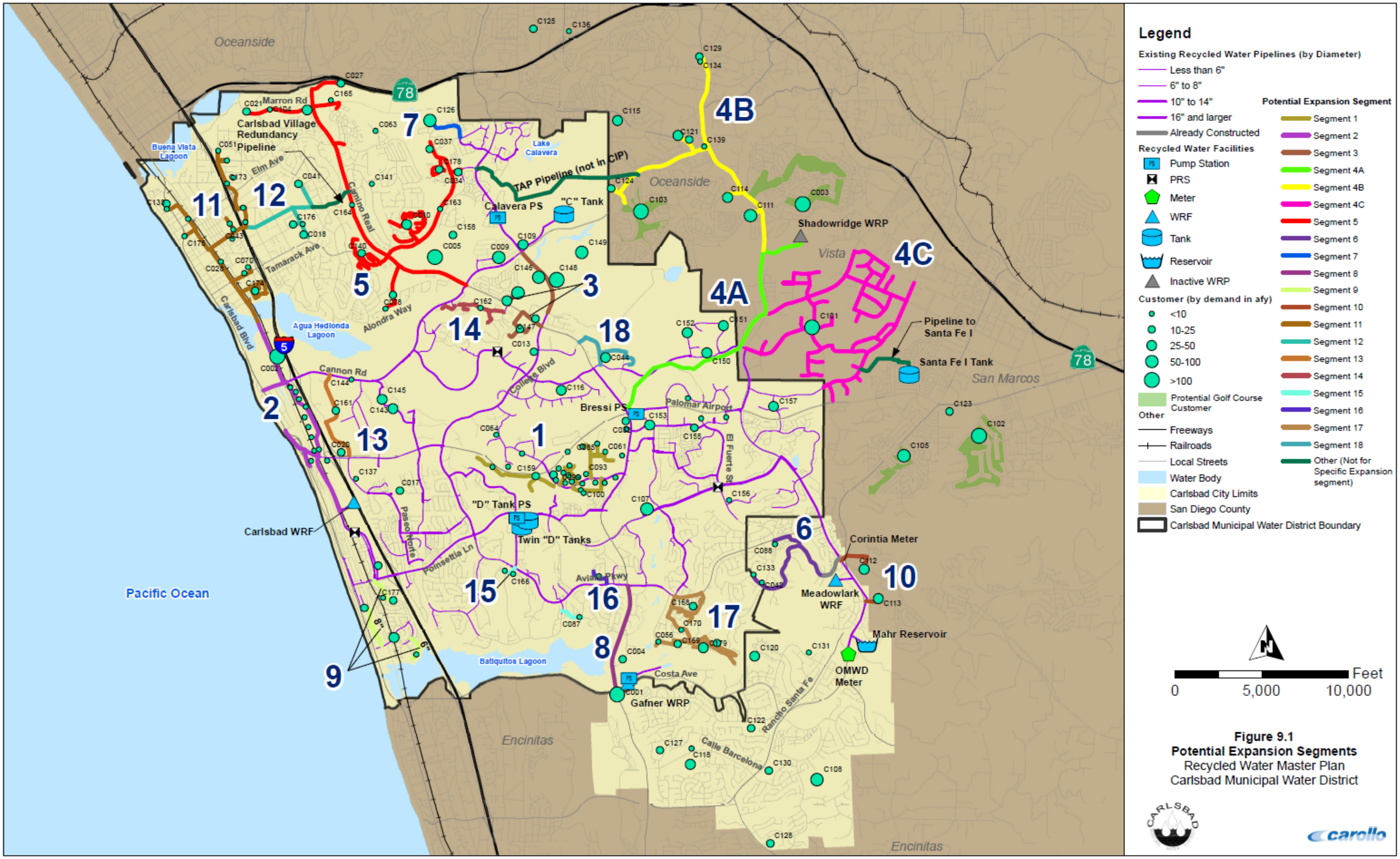

Figure 9.1
Potential Expansion Segments
Recycled Water Master Plan
Carlsbad Municipal Water District

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Appendix D. Hydraulic Model Data

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Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J10	182.031	0.000	415.990	101.370
J12	182.333	0.000	415.990	101.240
J14	266.970	0.000	577.080	134.370
J16	256.000	0.000	576.100	138.700
J18	268.000	0.000	577.100	133.930
J20	191.719	0.000	404.840	92.350
J22	191.716	0.000	404.840	92.350
J24	183.827	0.000	412.620	99.140
J26	209.472	0.000	412.620	88.020
J28	183.260	0.000	412.620	99.380
J30	183.182	0.000	412.610	99.410
J32	191.716	0.000	404.840	92.350
J34	191.592	0.000	404.840	92.400
J36	114.265	0.000	413.180	129.520
J38	90.915	0.000	414.420	140.170
J40	143.683	0.000	411.790	116.170
J42	144.257	0.000	411.780	115.920
J44	144.000	12.160	411.780	116.030
J46	152.546	0.000	410.660	111.840
J48	143.893	0.000	411.760	116.070
J50	152.633	0.000	410.660	111.800
J52	151.375	0.000	410.660	112.350
J54	192.449	0.000	404.840	92.030
J56	205.010	0.000	623.010	181.120
J58	82.000	0.000	406.350	140.540
J60	106.667	0.000	406.350	129.850
J62	61.161	0.000	406.350	149.570
J64	61.086	0.000	406.350	149.600
J66	62.822	10.050	406.350	148.850
J68	60.947	0.000	406.350	149.660
J70	70.934	0.000	405.640	145.030
J72	71.000	0.000	405.640	145.000
J74	160.000	16.530	407.770	107.360
J76	162.443	0.000	408.420	106.580
J78	162.000	0.000	407.310	106.290
J80	162.000	0.000	407.310	106.290
J82	162.000	0.000	407.320	106.300
J84	71.561	0.000	405.640	144.750
J86	40.290	0.000	405.740	158.350
J88	39.542	0.000	405.740	158.670
J90	41.000	0.000	405.740	158.040
J92	38.714	3.750	405.740	159.030
J94	189.308	0.000	417.160	98.730
J96	241.290	21.180	417.070	76.160
J98	466.000	0.000	578.060	48.560
J100	441.583	0.000	578.220	59.200

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J102	366.292	0.000	577.780	91.640
J104	363.726	0.000	577.770	92.750
J106	366.010	0.000	577.780	91.760
J108	274.366	59.660	577.300	131.260
J110	363.406	23.760	577.770	92.880
J112	281.309	0.000	576.920	128.090
J114	200.411	3.610	576.920	163.140
J116	200.104	0.000	576.920	163.280
J118	200.024	0.000	576.920	163.310
J120	249.000	0.000	680.260	186.870
J122	251.000	0.000	680.260	186.000
J124	311.045	0.000	680.260	159.980
J126	311.060	0.000	680.260	159.980
J128	457.164	14.720	680.230	96.660
J130	459.139	0.000	680.230	95.800
J132	464.617	0.000	680.240	93.430
J134	192.135	1.590	404.840	92.170
J136	191.771	0.000	404.840	92.320
J138	290.519	0.000	576.920	124.100
J140	261.000	0.000	576.920	136.890
J142	315.000	26.900	576.920	113.490
J144	189.291	0.000	417.160	98.740
J146	191.000	0.000	417.160	98.000
J148	403.432	0.000	680.270	119.950
J150	403.121	0.000	680.270	120.090
J152	413.567	2.670	680.510	115.670
J154	432.000	0.000	680.440	107.650
J156	413.007	10.560	680.510	115.910
J158	412.208	0.000	680.510	116.250
J160	326.000	6.530	576.440	108.520
J162	306.120	0.000	576.710	117.240
J164	326.000	0.000	576.440	108.520
J166	326.000	0.000	576.440	108.520
J168	241.624	0.000	419.340	77.000
J170	241.588	0.000	419.340	77.020
J172	241.418	0.200	419.330	77.090
J174	218.770	0.000	418.710	86.630
J176	193.260	8.200	415.990	96.510
J178	185.000	5.810	415.990	100.090
J180	182.821	2.720	415.990	101.030
J182	403.786	0.000	680.620	119.950
J184	181.000	0.600	576.920	171.550
J186	199.631	0.000	576.920	163.480
J188	189.148	0.000	417.160	98.800
J190	192.038	0.000	404.840	92.210
J192	191.378	0.000	404.850	92.500

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J194	191.037	11.920	404.850	92.640
J196	72.038	0.000	405.640	144.550
J198	70.943	0.000	405.640	145.020
J200	73.100	0.000	405.640	144.090
J202	56.000	0.000	405.660	151.510
J204	56.000	0.000	405.660	151.510
J206	56.000	0.000	405.660	151.510
J208	56.000	0.000	405.660	151.510
J210	57.299	2.450	405.660	150.950
J212	56.000	0.000	405.660	151.510
J214	311.417	0.000	622.970	135.000
J216	303.787	3.580	622.970	138.300
J218	72.505	0.000	405.640	144.350
J220	72.862	0.000	405.640	144.190
J222	75.000	0.000	405.640	143.260
J224	75.000	0.000	405.640	143.260
J226	392.000	0.000	622.970	100.080
J228	392.000	0.000	622.970	100.080
J230	392.000	3.440	622.970	100.080
J232	427.622	0.000	622.970	84.640
J234	72.000	0.000	405.650	144.570
J236	72.000	0.000	405.650	144.570
J238	311.743	0.000	622.990	134.860
J240	311.545	0.000	622.990	134.950
J242	311.598	0.000	622.990	134.930
J244	72.000	0.000	405.650	144.570
J246	311.521	0.000	622.990	134.960
J248	56.000	10.390	405.660	151.510
J250	144.500	6.040	405.810	113.230
J252	127.089	71.510	405.810	120.770
J254	22.990	0.000	405.870	165.900
J256	22.896	0.000	405.870	165.940
J258	72.000	0.000	405.630	144.560
J260	392.000	0.000	406.970	6.490
J262	70.972	0.000	405.630	145.010
J264	72.099	0.000	405.630	144.520
J266	335.000	7.490	573.710	103.430
J268	334.967	2.460	573.710	103.450
J270	353.180	6.410	573.680	95.540
J272	324.400	4.000	573.720	108.030
J274	337.000	0.000	573.710	102.570
J276	406.853	0.140	680.470	118.560
J278	420.000	10.500	680.470	112.860
J280	389.806	3.290	680.510	125.960
J282	411.587	0.490	680.510	116.530
J284	411.901	0.000	680.510	116.390

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J286	105.463	14.910	415.520	134.350
J288	86.231	22.310	415.520	142.680
J290	85.000	0.000	415.520	143.210
J292	243.000	1.000	417.070	75.420
J294	285.000	0.000	417.050	57.220
J296	324.565	0.000	680.890	154.400
J298	295.000	0.000	573.370	120.620
J300	348.514	0.000	680.250	143.740
J302	348.788	0.000	680.250	143.620
J304	348.724	0.000	680.250	143.650
J306	330.000	0.000	680.250	151.760
J308	366.944	0.000	680.250	135.760
J310	349.165	0.000	680.250	143.460
J312	338.319	11.340	680.250	148.160
J314	330.000	0.000	680.250	151.760
J316	330.000	0.000	680.250	151.760
J318	63.560	0.000	467.460	175.010
J320	64.910	0.000	467.460	174.430
J330	384.055	0.000	415.890	13.800
J332	383.911	0.000	415.910	13.870
J334	122.997	0.000	409.500	124.140
J336	123.464	57.800	409.520	123.950
J338	366.313	0.000	577.780	91.630
J340	108.000	0.000	438.070	143.020
J342	105.000	0.000	441.460	145.790
J344	101.000	0.000	441.730	147.640
J346	108.000	0.000	437.920	142.960
J348	63.548	0.000	448.260	166.700
J350	101.509	0.000	441.720	147.410
J352	75.763	0.960	309.630	101.340
J354	62.413	0.000	309.650	107.130
J356	168.000	0.000	423.860	110.860
J358	168.000	0.000	423.860	110.860
J360	168.000	0.000	423.860	110.860
J364	46.000	2.620	406.350	156.140
J366	80.000	0.000	417.790	146.370
J368	77.721	0.000	417.790	147.350
J370	235.724	0.000	419.340	79.560
J372	169.169	1.590	417.340	107.530
J374	150.898	8.700	417.250	115.410
J376	157.404	0.000	413.420	110.930
J378	156.276	14.450	413.420	111.420
J380	180.000	0.000	413.420	101.140
J382	187.088	9.960	413.420	98.070
J384	161.000	2.780	413.410	109.370
J386	152.000	0.130	413.420	113.270

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J388	180.608	0.000	586.110	175.700
J390	184.874	1.570	586.110	173.860
J392	180.020	0.000	586.110	175.960
J394	242.000	0.000	590.320	150.930
J396	201.000	0.000	588.610	167.950
J398	315.059	0.000	591.780	119.900
J400	287.018	1.390	573.730	124.230
J402	288.000	0.000	573.730	123.810
J404	288.000	0.000	573.710	123.800
J406	306.000	0.000	576.730	117.310
J408	306.000	0.000	576.730	117.310
J410	306.000	0.000	576.730	117.310
J412	251.000	0.000	597.100	149.960
J414	247.000	0.000	597.090	151.690
J416	253.159	0.000	597.950	149.400
J418	252.965	0.000	597.950	149.480
J420	252.936	0.000	597.950	149.500
J422	252.527	0.000	597.950	149.670
J424	310.000	0.000	598.850	125.160
J426	310.000	0.000	598.850	125.160
J428	310.000	0.000	598.830	125.150
J430	310.000	0.000	598.820	125.150
J432	310.000	0.000	598.840	125.150
J434	382.121	0.000	416.220	14.770
J436	382.331	0.000	416.210	14.680
J438	381.868	0.000	416.220	14.890
J440	378.000	0.000	416.290	16.590
J442	382.774	0.000	416.220	14.490
J444	366.000	3.530	600.710	101.700
J446	366.000	0.000	600.710	101.700
J448	362.608	0.000	416.990	23.570
J450	366.672	10.390	416.990	21.800
J452	362.048	0.000	416.990	23.810
J454	381.282	0.000	601.370	95.370
J456	381.950	0.000	601.370	95.080
J458	283.000	0.000	600.710	137.660
J460	366.000	2.340	600.710	101.700
J462	278.530	0.000	421.040	61.750
J464	363.000	0.000	417.010	23.400
J466	273.000	0.000	600.710	142.000
J468	277.000	0.000	600.710	140.260
J470	273.000	0.000	600.710	142.000
J472	273.000	0.000	600.710	142.000
J474	273.000	0.000	600.710	142.000
J476	273.000	0.000	422.670	64.850
J478	273.218	0.000	422.670	64.760

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J480	132.000	0.000	432.340	130.140
J482	183.941	0.000	429.020	106.190
J484	134.841	0.140	432.360	128.920
J486	273.000	0.000	422.630	64.840
J488	274.735	0.000	422.670	64.100
J490	265.178	13.780	422.610	68.220
J492	273.000	0.000	600.710	142.000
J494	273.000	0.000	600.710	142.000
J496	313.000	0.000	594.510	121.980
J498	313.000	0.000	594.500	121.970
J504	63.513	0.000	448.280	166.720
J506	63.293	0.000	448.300	166.830
J512	58.000	0.460	461.910	175.010
J514	58.922	0.000	465.470	176.160
J516	58.947	0.000	465.490	176.160
J518	265.000	0.000	595.810	143.340
J520	255.557	0.000	596.470	147.720
J522	255.000	0.000	596.550	147.990
J524	326.992	0.470	593.830	115.620
J526	319.953	0.000	593.610	118.570
J528	317.000	16.550	594.230	120.120
J530	325.000	1.910	593.850	116.490
J532	317.000	0.000	594.240	120.130
J534	317.546	0.000	594.250	119.890
J536	58.000	0.000	309.680	109.050
J538	58.000	0.000	309.680	109.050
J540	58.000	0.000	309.680	109.050
J542	59.153	0.000	309.610	108.520
J544	58.912	0.000	309.610	108.630
J546	265.000	0.000	595.800	143.330
J548	286.000	0.000	595.050	133.910
J550	62.885	0.000	309.650	106.920
J552	56.864	0.000	309.610	109.520
J554	58.178	0.000	309.610	108.950
J556	57.621	0.000	309.610	109.190
J564	169.212	0.000	417.340	107.510
J566	169.463	0.000	417.350	107.410
J568	152.909	0.000	423.100	117.080
J570	152.598	0.000	423.100	117.210
J572	136.000	0.000	435.390	129.720
J574	128.572	24.570	435.300	132.910
J576	136.000	0.000	435.390	129.720
J590	158.000	0.000	427.540	116.790
J592	90.981	4.180	427.530	145.830
J594	163.000	0.000	425.730	113.840
J596	163.000	0.000	425.730	113.840

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J598	158.000	0.000	427.540	116.790
J600	158.000	2.200	427.520	116.780
J602	158.000	0.000	427.560	116.800
J604	154.660	0.000	423.150	116.340
J606	154.981	0.000	423.160	116.200
J608	150.938	0.000	423.120	117.940
J610	150.831	0.000	423.120	117.980
J612	168.385	0.000	422.310	110.030
J614	159.000	0.000	422.630	114.230
J616	158.482	0.000	422.640	114.460
J618	158.725	0.650	422.620	114.340
J620	131.000	0.000	413.480	122.400
J622	131.000	0.000	413.480	122.400
J624	138.963	0.000	413.540	118.970
J626	132.624	0.000	413.480	121.700
J628	160.000	0.000	413.480	109.830
J630	160.855	0.000	413.490	109.470
J632	141.000	0.000	413.510	118.080
J634	141.642	0.000	413.510	117.800
J636	138.595	0.000	413.540	119.130
J638	138.706	0.000	413.540	119.090
J640	138.344	0.000	413.540	119.240
J642	292.917	3.250	415.520	53.120
J644	292.411	135.260	415.380	53.280
J646	278.849	1.760	415.680	59.290
J648	291.012	0.000	415.520	53.950
J650	278.996	0.000	415.680	59.230
J652	278.998	0.000	415.680	59.220
J654	300.315	0.000	415.520	49.920
J656	297.784	0.000	415.520	51.010
J658	291.281	0.000	415.520	53.830
J660	222.000	0.000	416.740	84.380
J662	222.000	13.480	416.710	84.370
J664	222.000	0.000	416.740	84.380
J666	222.000	8.900	416.810	84.410
J668	222.000	0.000	416.770	84.400
J676	143.653	16.500	413.500	116.930
J678	274.954	0.000	414.560	60.490
J680	252.215	11.220	414.550	70.340
J682	274.957	0.000	414.560	60.490
J684	276.859	0.000	414.580	59.670
J686	276.396	0.000	414.570	59.870
J688	124.472	0.000	416.450	126.510
J690	172.000	0.000	416.490	105.940
J692	317.206	0.000	622.960	132.490
J694	316.713	0.000	622.960	132.700

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J696	214.000	5.230	416.550	87.770
J698	210.838	18.960	416.620	89.170
J700	320.000	0.000	622.960	131.270
J702	319.000	0.000	622.960	131.710
J704	325.815	1.970	622.960	128.760
J706	301.247	0.000	622.970	139.400
J708	301.000	0.000	622.970	139.510
J710	454.380	0.070	680.390	97.930
J712	502.228	6.910	680.390	77.200
J714	300.064	0.000	622.970	139.910
J716	446.934	0.280	680.390	101.160
J718	398.179	1.490	680.390	122.280
J720	362.239	0.150	573.710	91.630
J726	375.994	2.300	573.710	85.670
J728	300.790	0.670	573.710	118.250
J730	335.000	0.000	573.710	103.430
J732	326.963	20.140	573.710	106.910
J734	370.910	7.530	680.410	134.100
J736	424.303	3.910	680.400	110.960
J738	372.750	0.000	680.410	133.310
J742	359.524	4.530	680.410	139.040
J744	358.861	0.000	680.410	139.330
J746	416.915	0.000	680.410	114.170
J748	265.000	0.000	622.970	155.110
J750	283.964	0.000	622.970	146.890
J752	264.813	0.000	622.970	155.190
J754	265.773	0.000	622.970	154.770
J756	242.722	0.000	573.710	143.420
J758	256.885	1.620	573.710	137.280
J760	243.000	0.000	573.710	143.300
J762	264.000	0.000	573.710	134.200
J764	243.000	0.000	573.710	143.300
J766	247.000	0.000	573.710	141.560
J768	417.498	0.000	680.410	113.920
J770	425.000	0.000	680.410	110.670
J772	434.000	0.000	680.410	106.770
J774	434.000	0.000	680.410	106.770
J776	462.363	9.030	680.410	94.480
J778	320.741	0.000	622.970	130.950
J780	296.408	31.730	622.970	141.500
J782	320.630	0.000	622.970	131.000
J784	320.291	0.000	622.970	131.150
J786	281.000	16.530	622.970	148.170
J788	449.188	0.000	680.410	100.190
J790	448.000	0.000	680.420	100.710
J792	449.045	0.000	680.410	100.250

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J794	448.000	0.330	680.410	100.700
J796	449.317	0.000	680.410	100.130
J798	78.000	0.000	405.630	141.960
J800	188.870	4.190	580.830	169.840
J802	170.177	4.740	580.850	177.940
J804	217.252	2.600	580.110	157.220
J806	170.000	1.270	580.100	177.700
J808	77.515	0.000	405.640	142.170
J810	258.823	0.800	583.540	140.700
J812	230.000	0.000	581.640	152.370
J814	258.706	5.460	583.550	140.750
J816	280.576	62.120	573.910	127.100
J818	294.000	36.770	573.870	121.270
J820	239.000	0.000	573.950	145.130
J822	251.000	55.740	573.950	139.930
J824	308.000	2.760	573.830	115.190
J826	308.000	0.000	573.830	115.190
J828	312.000	0.000	573.910	113.480
J830	312.000	36.880	573.910	113.480
J832	292.440	0.000	574.030	122.010
J834	296.187	0.520	574.030	120.390
J836	292.300	11.730	574.040	122.080
J838	266.466	4.090	574.280	133.380
J840	272.432	0.000	574.220	130.760
J842	266.472	0.000	574.280	133.370
J844	273.408	1.830	575.450	130.880
J846	256.000	2.100	576.080	138.690
J848	273.633	0.890	575.450	130.780
J850	119.000	0.000	411.650	126.810
J852	115.000	0.000	411.650	128.540
J854	121.000	28.590	411.650	125.940
J856	151.261	0.000	411.670	112.840
J858	143.035	0.000	411.670	116.400
J860	174.151	0.000	411.680	102.920
J862	143.020	28.920	411.670	116.410
J864	140.000	12.580	411.660	117.710
J866	143.050	0.000	411.670	116.390
J868	142.861	0.000	411.670	116.470
J870	177.548	23.570	405.970	98.970
J872	137.195	3.210	405.970	116.460
J874	219.980	12.120	405.970	80.590
J878	231.000	32.450	573.950	148.600
J880	231.000	6.960	573.950	148.600
J882	260.962	14.400	573.940	135.620
J884	235.000	1.420	573.950	146.870
J886	239.000	8.720	573.950	145.130

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J888	209.000	0.000	580.920	161.150
J890	209.000	0.520	580.910	161.150
J892	208.377	0.000	411.730	88.110
J894	213.000	0.000	411.710	86.100
J896	211.000	34.230	411.800	87.010
J898	217.640	33.400	411.750	84.110
J900	122.807	0.000	409.500	124.230
J902	288.492	2.430	574.100	123.750
J904	291.000	0.000	574.100	122.670
J906	217.629	0.000	409.780	83.260
J908	229.218	5.010	409.720	78.210
J910	201.582	0.000	409.670	90.160
J912	200.268	0.000	409.620	90.710
J914	202.487	0.000	409.660	89.770
J916	201.983	0.000	409.670	89.990
J918	235.196	0.590	409.770	75.650
J920	267.518	2.830	409.770	61.640
J922	215.000	0.000	409.780	84.400
J924	216.954	0.000	409.780	83.550
J926	215.556	4.230	409.780	84.160
J928	204.595	3.190	409.810	88.920
J934	113.000	0.000	411.740	129.440
J936	119.000	8.770	411.830	126.880
J938	117.403	0.000	411.640	127.490
J940	117.416	0.000	411.640	127.490
J942	117.646	0.000	411.640	127.390
J944	122.895	1.080	411.060	124.860
J946	114.668	0.000	411.640	128.680
J948	152.000	0.000	411.600	112.480
J950	158.106	16.700	411.590	109.840
J952	136.756	0.000	411.610	119.090
J954	121.373	18.910	411.620	125.760
J956	200.809	0.000	411.590	91.330
J958	218.054	0.000	411.590	83.860
J960	137.000	0.000	412.110	119.200
J962	137.000	0.000	412.110	119.200
J964	132.000	0.000	412.040	121.340
J966	131.000	0.000	412.020	121.770
J968	127.000	0.000	411.930	123.460
J970	268.000	0.000	577.110	133.940
J972	313.955	0.000	578.030	114.420
J974	314.717	0.000	578.040	114.100
J976	314.913	0.000	578.040	114.010
J978	126.000	0.000	405.970	121.310
J980	125.000	0.000	405.970	121.750
J982	88.242	0.600	405.990	137.680

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J984	99.000	0.000	405.980	133.010
J986	54.701	0.000	405.990	152.210
J988	54.000	0.000	405.990	152.520
J990	54.000	0.000	405.990	152.520
J992	397.840	0.000	622.970	97.550
J994	397.973	0.000	622.970	97.490
J996	358.469	0.000	622.970	114.610
J998	366.937	0.000	622.970	110.940
J1000	358.426	0.000	622.970	114.630
J1002	358.367	30.460	622.970	114.650
J1004	427.229	0.000	622.970	84.810
J1006	392.000	0.000	622.970	100.080
J1008	359.000	0.000	622.970	114.380
J1010	357.269	1.680	622.970	115.130
J1012	320.945	0.000	622.970	130.870
J1014	359.185	10.580	622.970	114.300
J1016	307.327	4.740	622.970	136.770
J1018	359.000	0.000	622.970	114.380
J1020	357.222	0.000	622.970	115.150
J1022	81.174	0.000	417.730	145.830
J1024	81.314	0.000	417.710	145.760
J1026	81.089	0.000	417.740	145.870
J1028	94.179	0.000	415.710	139.320
J1030	93.374	0.000	415.710	139.670
J1032	93.000	0.000	415.700	139.830
J1034	93.000	0.000	415.700	139.830
J1036	82.898	0.000	414.510	143.690
J1038	78.454	0.000	414.540	145.630
J1040	197.000	0.000	410.650	92.580
J1042	196.549	0.000	410.660	92.770
J1044	186.000	0.000	407.120	95.810
J1046	182.000	0.000	407.390	97.660
J1048	186.000	0.000	407.100	95.800
J1050	239.227	0.000	412.620	75.130
J1052	162.998	0.000	413.060	108.350
J1054	182.670	0.000	412.630	99.640
J1056	163.301	0.000	413.070	108.220
J1058	163.549	1.600	413.070	108.120
J1060	162.596	0.000	413.070	108.530
J1062	162.703	0.000	413.080	108.490
J1064	90.744	0.000	414.440	140.260
J1066	164.000	0.000	408.950	106.140
J1068	164.000	0.000	408.950	106.140
J1070	170.000	0.000	408.680	103.420
J1072	164.389	3.040	408.950	105.970
J1074	108.827	0.000	406.350	128.920

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1076	150.000	9.430	406.350	111.080
J1078	155.836	0.000	406.350	108.550
J1080	155.701	0.000	406.350	108.600
J1082	162.356	0.000	408.440	106.630
J1084	161.000	2.630	408.440	107.220
J1086	56.516	0.000	406.020	151.440
J1088	52.000	0.000	406.000	153.390
J1090	55.485	0.000	406.020	151.890
J1092	122.271	5.640	406.230	123.040
J1094	86.342	0.000	406.190	138.590
J1096	183.117	0.000	406.340	96.720
J1098	182.689	0.000	406.350	96.910
J1100	186.000	0.000	407.090	95.800
J1102	183.578	0.000	406.340	96.520
J1112	173.232	0.000	422.290	107.920
J1114	160.567	0.000	413.380	109.550
J1116	84.891	0.000	413.240	142.270
J1118	182.706	0.000	422.220	103.780
J1120	173.338	7.000	422.290	107.870
J1122	378.173	0.000	578.390	86.760
J1124	350.000	0.000	588.820	103.480
J1126	378.817	0.000	578.390	86.480
J1128	440.946	0.000	578.220	59.480
J1130	249.001	0.000	680.260	186.870
J1132	271.000	0.000	680.260	177.330
J1134	285.881	5.010	680.260	170.890
J1136	366.891	0.000	680.250	135.780
J1138	367.476	0.000	680.250	135.530
J1140	307.000	0.000	680.260	161.730
J1142	366.208	0.000	680.250	136.080
J1144	404.777	0.000	680.250	119.360
J1146	377.431	0.450	680.250	131.210
J1148	418.000	7.840	680.250	113.630
J1150	401.408	33.660	680.250	120.820
J1152	243.503	0.000	576.920	144.470
J1154	259.148	0.000	422.030	70.580
J1156	242.970	0.000	422.090	77.610
J1158	293.730	0.000	421.970	55.560
J1160	377.000	30.000	680.280	131.410
J1164	439.000	0.000	680.350	104.580
J1166	420.994	23.610	680.290	112.350
J1168	440.586	13.860	680.370	103.900
J1170	443.601	0.000	680.370	102.590
J1172	450.000	0.000	680.410	99.840
J1174	404.396	0.000	680.270	119.540
J1176	408.690	29.670	680.270	117.680

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1178	337.210	0.000	680.270	148.650
J1180	403.505	0.000	680.270	119.920
J1182	390.096	0.000	680.260	125.730
J1184	433.381	3.580	680.280	106.980
J1186	397.917	0.000	680.270	122.340
J1188	433.680	0.000	680.280	106.850
J1190	433.554	0.000	680.280	106.900
J1192	433.993	0.000	680.280	106.710
J1194	296.455	0.000	576.790	121.470
J1196	321.651	5.710	576.770	110.540
J1198	263.425	60.330	576.820	135.790
J1200	223.572	0.000	576.840	153.070
J1202	201.000	0.000	576.860	162.860
J1204	377.240	0.000	680.820	131.540
J1206	384.000	5.920	680.850	128.630
J1212	244.250	0.000	577.090	144.220
J1214	244.698	0.000	680.260	188.730
J1218	177.000	0.000	412.390	101.990
J1220	192.000	0.000	576.880	166.770
J1222	192.000	0.000	576.880	166.770
J1224	192.000	0.000	576.880	166.770
J1226	266.225	8.050	576.760	134.560
J1228	372.000	0.000	576.490	88.600
J1234	377.063	0.000	680.820	131.620
J1236	372.000	0.000	576.490	88.600
J1238	297.557	0.000	576.320	120.790
J1240	298.152	0.000	576.310	120.520
J1242	297.739	0.000	576.320	120.710
J1244	350.910	0.000	576.700	97.840
J1246	350.826	2.140	576.700	97.870
J1248	350.989	0.000	576.700	97.800
J1250	273.000	0.000	422.590	64.820
J1252	273.000	0.000	422.590	64.820
J1254	287.628	0.000	421.470	57.990
J1258	287.378	0.000	421.470	58.100
J1260	175.000	0.000	416.030	104.440
J1262	175.000	0.000	416.040	104.440
J1264	175.000	0.000	416.020	104.440
J1266	176.307	0.000	415.990	103.850
J1268	44.000	0.000	405.670	156.710
J1270	380.042	12.190	622.970	105.260
J1272	344.603	0.000	622.980	120.620
J1274	378.883	1.870	622.970	105.760
J1276	357.425	0.000	622.970	115.060
J1278	326.961	0.000	576.770	108.240
J1280	338.437	16.970	576.760	103.260

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1282	379.331	0.000	622.970	105.570
J1284	379.653	0.000	622.970	105.430
J1286	386.125	23.560	576.740	82.590
J1288	366.324	0.000	576.750	91.180
J1290	407.000	0.000	576.730	73.540
J1292	108.000	0.000	415.300	133.150
J1294	132.976	6.390	415.480	122.410
J1296	143.357	0.000	415.670	117.990
J1298	85.000	0.000	415.110	143.040
J1300	379.824	0.000	622.970	105.360
J1302	317.215	5.060	622.960	132.480
J1304	319.000	0.000	622.960	131.710
J1306	316.824	0.000	622.960	132.650
J1308	300.976	1.620	622.960	139.520
J1310	283.772	0.000	622.970	146.970
J1312	281.842	0.000	622.970	147.810
J1314	279.858	3.350	622.970	148.670
J1316	305.000	0.000	622.970	137.770
J1318	283.144	0.000	622.970	147.250
J1320	271.847	19.130	622.970	152.140
J1322	281.000	0.000	622.970	148.170
J1324	281.000	0.000	622.970	148.170
J1326	266.688	0.000	622.970	154.380
J1328	265.000	0.000	622.970	155.110
J1330	266.912	0.000	622.970	154.280
J1332	320.378	0.000	622.970	131.110
J1334	320.527	0.000	622.970	131.050
J1336	348.000	0.000	576.740	99.110
J1338	346.619	0.000	576.740	99.710
J1340	398.175	0.000	622.970	97.400
J1342	401.000	15.090	622.970	96.180
J1344	397.529	0.000	622.970	97.680
J1346	366.075	0.000	622.970	111.310
J1348	345.161	13.760	622.970	120.370
J1350	366.554	0.000	622.970	111.100
J1352	366.990	0.000	622.970	110.920
J1354	367.431	0.000	622.970	110.720
J1356	347.477	0.000	622.970	119.370
J1358	346.578	0.000	622.970	119.760
J1360	347.900	0.000	622.970	119.190
J1362	348.291	0.000	622.970	119.020
J1364	259.581	0.000	576.720	137.420
J1366	314.632	0.000	576.730	113.570
J1368	78.000	0.000	405.630	141.960
J1370	78.000	0.000	405.630	141.960
J1372	78.000	0.000	405.630	141.960

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1374	243.084	0.000	422.090	77.560
J1376	208.512	9.560	422.150	92.570
J1378	243.253	0.000	422.090	77.490
J1380	405.064	0.000	576.730	74.380
J1382	259.380	0.000	576.720	137.500
J1384	244.958	22.480	411.580	72.200
J1386	259.616	0.000	576.720	137.400
J1388	342.413	3.760	576.740	101.530
J1390	358.796	0.000	576.740	94.440
J1392	259.783	16.490	576.720	137.330
J1394	306.122	0.000	576.710	117.240
J1398	306.134	2.700	576.710	117.240
J1400	305.937	0.000	576.710	117.330
J1402	346.514	0.000	576.740	99.760
J1404	348.000	0.000	576.740	99.110
J1406	141.801	27.890	411.660	116.930
J1408	261.048	0.000	623.000	156.830
J1410	259.740	0.000	623.000	157.400
J1412	311.000	0.000	405.970	41.150
J1414	166.127	2.290	405.970	103.920
J1416	311.334	0.000	405.970	41.000
J1418	312.308	0.000	405.970	40.580
J1420	23.002	0.000	405.870	165.900
J1422	75.837	1.530	405.840	142.990
J1424	351.386	0.000	622.960	117.670
J1426	351.249	0.000	622.960	117.730
J1428	381.000	0.000	622.970	104.850
J1430	435.277	10.860	680.450	106.230
J1432	424.090	2.050	680.450	111.080
J1434	420.000	0.000	680.470	112.860
J1436	415.000	6.930	680.490	115.040
J1438	411.960	8.390	680.510	116.360
J1440	385.000	14.430	680.710	128.130
J1442	375.000	54.690	680.770	132.490
J1444	388.148	12.150	680.890	126.840
J1446	387.895	0.000	680.890	126.950
J1448	260.166	0.000	623.000	157.220
J1450	259.666	0.000	623.000	157.430
J1452	259.704	0.000	623.000	157.420
J1454	227.870	0.000	411.680	79.650
J1456	236.753	37.020	411.680	75.800
J1458	60.000	0.000	309.620	108.160
J1460	56.000	0.000	309.620	109.890
J1462	62.000	0.000	309.620	107.290
J1464	62.000	0.000	309.620	107.290
J1466	68.000	0.000	309.620	104.690

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1468	68.000	0.000	309.620	104.690
J1470	68.000	0.000	309.620	104.690
J1472	68.000	0.000	309.620	104.690
J1480	106.067	0.000	415.520	134.090
J1482	106.419	0.000	415.520	133.930
J1484	105.373	0.000	415.520	134.390
J1486	105.034	0.000	415.520	134.530
J1488	168.948	1.080	417.340	107.630
J1490	437.330	1.380	680.420	105.330
J1492	302.524	0.000	417.040	49.620
J1494	318.746	17.000	417.030	42.590
J1496	330.000	0.000	680.250	151.760
J1498	342.980	0.000	417.010	32.080
J1500	242.000	5.710	417.070	75.860
J1502	264.395	0.000	417.070	66.150
J1504	241.000	0.000	417.070	76.290
J1506	241.040	0.000	417.070	76.270
J1508	85.414	5.180	405.640	138.760
J1510	86.607	0.000	405.640	138.240
J1512	90.335	0.000	405.640	136.620
J1514	92.747	0.000	405.640	135.580
J1516	87.293	0.000	405.640	137.940
J1518	86.504	0.890	405.640	138.280
J1520	88.360	0.000	405.640	137.480
J1522	54.430	0.000	467.520	178.990
J1524	64.220	0.000	467.450	174.720
J1526	64.980	0.000	467.160	174.260
J1528	65.000	0.000	467.150	174.250
J1530	307.151	0.000	622.970	136.840
J1532	301.541	0.000	592.900	126.250
J1534	301.179	0.000	592.900	126.400
J1536	301.821	0.000	592.900	126.130
J1538	169.471	0.000	423.100	109.900
J1540	170.199	0.000	423.100	109.580
J1542	186.000	0.000	407.100	95.800
J1544	186.000	0.000	407.100	95.800
J1546	170.000	0.000	408.680	103.420
J1548	170.000	0.000	408.680	103.420
J1550	310.000	0.000	622.990	135.620
J1552	311.360	0.000	622.990	135.030
J1554	108.000	0.000	437.920	142.960
J1560	235.381	0.000	419.340	79.710
J1562	366.633	0.000	680.250	135.890
J1564	306.000	0.000	576.730	117.310
J1566	306.000	0.000	576.730	117.310
J1568	306.000	0.000	576.730	117.310

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1570	278.375	0.000	597.950	138.470
J1572	278.613	0.000	597.960	138.370
J1574	297.000	53.510	597.960	130.400
J1576	255.159	1.960	597.950	148.530
J1578	254.320	5.710	597.950	148.900
J1580	278.660	0.000	597.960	138.350
J1582	382.663	0.000	416.190	14.530
J1584	383.011	0.000	416.170	14.370
J1586	384.000	4.690	416.220	13.960
J1588	381.623	0.000	416.020	14.900
J1590	383.000	0.000	415.860	14.240
J1592	379.750	0.000	416.150	15.770
J1594	366.000	0.000	416.990	22.090
J1596	366.000	0.000	416.990	22.100
J1598	72.094	0.000	422.730	151.930
J1600	78.338	8.710	422.700	149.210
J1602	72.345	0.000	422.730	151.820
J1604	72.348	1.690	422.730	151.820
J1606	72.315	0.000	422.730	151.830
J1608	72.344	0.000	422.730	151.820
J1610	72.560	0.000	422.730	151.730
J1612	72.802	0.000	422.730	151.620
J1614	184.295	0.000	429.020	106.040
J1616	184.263	0.000	429.020	106.050
J1618	184.122	0.000	429.020	106.110
J1620	313.000	0.000	594.490	121.970
J1622	254.204	0.000	596.550	148.340
J1624	254.569	0.000	596.550	148.180
J1626	63.195	0.000	448.330	166.880
J1628	68.000	14.710	454.540	167.490
J1630	254.586	0.000	596.490	148.150
J1632	254.679	0.000	596.480	148.100
J1634	52.707	0.000	466.270	179.200
J1636	51.531	0.000	466.270	179.710
J1638	51.999	0.000	466.270	179.510
J1640	301.621	0.000	592.640	126.100
J1642	301.691	0.000	592.630	126.070
J1644	302.000	0.000	592.630	125.930
J1646	302.000	0.000	592.630	125.930
J1648	287.040	0.000	573.730	124.220
J1650	287.133	0.000	573.730	124.180
J1652	315.335	0.000	591.790	119.790
J1654	315.606	0.000	591.790	119.670
J1656	326.912	0.000	593.840	115.660
J1658	280.508	57.480	414.640	58.120
J1660	281.233	0.000	414.640	57.800

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1662	321.000	0.000	414.640	40.570
J1664	61.437	1.540	309.680	107.560
J1666	61.000	0.000	309.680	107.750
J1668	59.147	0.000	309.610	108.530
J1670	56.579	0.000	309.610	109.640
J1672	55.000	8.980	309.610	110.320
J1674	58.659	0.000	309.610	108.740
J1676	62.267	0.000	309.650	107.190
J1678	62.445	0.000	309.650	107.110
J1680	62.172	1.640	309.650	107.230
J1682	63.035	0.000	309.650	106.860
J1684	62.672	0.000	309.650	107.010
J1686	58.502	3.420	309.610	108.810
J930	137.364	0.000	0.000	0.000
J932	143.294	0.000	0.000	0.000
J1108	388.000	0.000	0.000	0.000
J1110	448.535	0.000	0.000	0.000
J1208	404.077	0.000	0.000	0.000
J1210	448.464	0.000	0.000	0.000
J1230	371.000	0.000	0.000	0.000
J1232	373.270	0.000	0.000	0.000
J1688	58.000	10.290	309.610	109.020
J1702	161.000	0.000	423.180	113.600
J1704	153.000	0.000	423.110	117.040
J1706	165.000	0.000	423.180	111.870
J1708	161.749	0.000	423.180	113.280
J1710	165.063	0.000	423.370	111.920
J1712	155.222	0.000	423.170	116.100
J1714	168.000	0.000	423.850	110.860
J1718	64.000	0.000	309.620	106.430
J1720	133.287	13.910	435.780	131.070
J1722	136.000	0.000	435.390	129.730
J1724	133.332	0.000	435.790	131.050
J1726	133.000	0.000	432.320	129.690
J1728	133.000	0.000	432.330	129.700
J1730	133.000	0.000	432.350	129.710
J1732	138.888	0.000	431.110	126.620
J1734	137.446	0.000	431.100	127.240
J1736	165.003	0.000	425.270	112.770
J1738	165.093	7.370	425.250	112.730
J1740	163.000	0.000	425.710	113.830
J1742	163.000	0.000	425.730	113.840
J1744	138.952	0.000	431.100	126.590
J1746	138.767	0.000	431.100	126.670
J1748	138.512	0.000	431.100	126.780
J1750	150.344	33.630	423.120	118.190

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1752	150.738	0.000	423.120	118.020
J1754	147.000	4.910	423.110	119.640
J1756	150.805	0.000	423.120	117.990
J1758	154.859	0.000	423.160	116.250
J1760	154.000	0.000	423.160	116.630
J1762	202.096	2.990	414.550	92.050
J1764	197.000	1.410	414.530	94.260
J1766	141.412	0.000	413.500	117.900
J1768	139.000	0.000	413.500	118.940
J1770	140.620	0.000	413.500	118.240
J1772	194.940	11.060	413.440	94.680
J1774	160.000	9.990	413.480	109.830
J1776	137.000	0.000	413.530	119.820
J1778	137.000	0.000	413.530	119.820
J1780	137.000	0.000	413.530	119.820
J1782	137.000	0.000	413.530	119.820
J1784	64.000	11.710	309.620	106.430
J1786	381.945	1.290	415.860	14.700
J1788	178.624	0.000	413.430	101.740
J1790	178.193	0.000	413.430	101.930
J1792	188.677	40.570	413.460	97.400
J1794	179.127	0.000	413.430	101.520
J1796	144.205	0.000	405.810	113.350
J1798	131.000	16.670	413.480	122.400
J1800	131.000	0.000	413.480	122.400
J1802	138.804	19.820	413.540	119.040
J1804	138.808	0.000	413.540	119.040
J1806	298.364	0.000	415.070	50.570
J1808	297.796	0.000	415.070	50.820
J1810	298.626	1.930	415.070	50.460
J1812	144.423	0.000	405.810	113.260
J1814	144.461	0.000	405.810	113.240
J1816	131.000	0.000	413.480	122.400
J1818	132.969	0.000	413.480	121.550
J1820	159.951	0.000	416.500	111.160
J1822	159.632	0.000	416.500	111.300
J1824	159.564	0.000	416.500	111.330
J1826	172.000	0.000	416.490	105.940
J1828	172.000	0.000	416.490	105.940
J1830	110.323	2.230	416.430	132.640
J1832	70.563	0.000	416.420	149.860
J1834	70.176	0.000	416.420	150.030
J1836	52.000	0.000	416.420	157.900
J1838	48.000	0.000	405.680	154.980
J1840	43.000	0.000	405.670	157.150
J1842	290.000	0.000	573.710	122.930

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1844	372.838	0.000	680.410	133.270
J1846	358.276	0.000	680.410	139.580
J1848	434.000	1.290	680.410	106.770
J1850	435.271	32.010	680.410	106.220
J1852	417.000	0.000	680.410	114.130
J1854	434.000	0.000	680.410	106.770
J1856	290.000	0.000	573.710	122.930
J1858	290.000	0.000	573.710	122.930
J1862	319.068	0.000	573.710	110.330
J1864	290.000	32.820	573.710	122.930
J1866	225.456	0.000	584.410	155.540
J1868	225.154	0.000	584.420	155.670
J1870	171.869	0.000	415.520	105.580
J1872	163.000	0.000	415.390	109.360
J1874	171.784	0.000	415.520	105.610
J1876	172.030	0.000	415.520	105.510
J1878	260.912	2.270	573.950	135.640
J1880	266.343	5.920	574.280	133.430
J1882	260.912	4.090	573.950	135.640
J1884	263.000	0.000	573.950	134.730
J1886	272.225	0.000	574.220	130.850
J1888	277.000	4.630	574.150	128.750
J1890	194.698	0.000	411.830	94.080
J1892	194.513	0.000	411.830	94.160
J1894	152.547	32.500	411.880	112.370
J1896	122.607	0.000	409.500	124.310
J1898	96.000	9.450	409.500	135.840
J1900	87.000	0.000	409.500	139.740
J1902	83.000	0.000	409.500	141.470
J1904	85.136	0.000	409.500	140.550
J1906	87.000	0.000	409.500	139.740
J1908	253.235	0.000	409.770	67.830
J1910	253.002	0.000	409.770	67.930
J1912	253.449	0.000	409.770	67.730
J1914	262.702	0.000	409.770	63.730
J1916	253.741	0.000	409.770	67.610
J1918	117.691	0.000	411.640	127.370
J1920	119.000	0.000	411.640	126.800
J1922	137.000	0.000	412.110	119.200
J1924	199.812	3.260	412.050	91.960
J1926	200.835	29.420	412.060	91.520
J1928	187.241	43.560	412.030	97.400
J1930	256.000	0.000	576.090	138.700
J1932	54.000	0.000	405.990	152.520
J1934	27.802	1.530	405.830	163.800
J1936	49.270	0.000	405.930	154.540

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J1938	51.000	0.570	405.990	153.820
J1940	381.000	0.000	622.970	104.850
J1942	311.898	6.210	573.740	113.450
J1944	315.507	13.450	573.750	111.900
J1946	320.000	0.000	573.760	109.950
J1948	437.385	6.390	680.420	105.310
J1950	431.000	14.100	680.430	108.080
J1952	344.089	0.000	680.410	145.730
J1954	344.347	0.000	680.410	145.610
J1956	351.720	0.000	680.410	142.420
J1958	349.000	0.000	680.400	143.600
J1960	328.262	31.950	680.400	152.580
J1962	128.636	0.500	405.980	120.170
J1964	99.000	0.000	405.980	133.010
J1966	408.690	39.990	576.720	72.810
J1968	366.000	15.010	600.750	101.720
J1970	380.990	0.000	601.370	95.490
J1972	366.000	0.000	600.720	101.700
J1974	72.098	0.000	422.720	151.930
J1976	72.163	0.000	422.730	151.900
J1978	155.000	4.270	428.830	118.650
J1980	155.000	0.000	428.850	118.660
J1982	155.000	0.000	428.870	118.670
J1984	194.879	0.000	411.690	93.940
J1988	324.000	12.720	576.770	109.530
J1990	340.710	0.000	576.760	102.280
J1994	320.457	11.090	591.800	117.570
J1996	313.099	0.000	591.800	120.760
J1998	317.250	2.130	591.810	118.970
J2000	104.000	2.880	405.650	130.700
J2002	104.000	1.660	405.650	130.700
J2004	278.077	0.000	622.970	149.440
J2010	315.809	0.000	591.810	119.590
J2012	316.040	0.000	591.810	119.490
J2014	203.513	7.600	404.790	87.210
J2016	168.000	0.000	423.860	110.860
J2018	252.894	2.260	425.260	74.690
J2020	296.482	0.000	597.960	130.630
J2022	303.595	0.000	597.960	127.550
J2024	359.000	0.000	415.780	24.600
J2026	310.000	0.000	598.840	125.150
J2028	278.724	0.000	597.960	138.320
J2030	58.000	0.000	309.680	109.050
J2032	58.000	0.000	309.680	109.050
J2034	58.000	0.000	309.680	109.050
J2036	93.000	0.000	415.700	139.830

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2038	94.498	5.550	415.700	139.180
J2040	62.997	0.000	309.650	106.870
J2042	62.000	0.000	309.650	107.310
J2044	310.884	2.840	591.460	121.580
J2046	305.991	0.000	576.730	117.310
J2048	315.527	0.000	591.790	119.700
J2050	302.715	0.000	592.620	125.620
J2052	315.746	0.000	591.800	119.620
J2054	301.995	0.000	592.620	125.930
J2060	94.957	0.000	415.700	138.980
J2062	93.845	0.000	415.710	139.460
J2064	64.000	0.080	309.660	106.440
J2066	58.142	0.000	309.610	108.960
J2068	53.000	0.000	309.610	111.190
J2070	195.000	3.930	410.660	93.450
J2072	196.496	1.820	410.670	92.800
J2074	80.000	0.000	427.530	150.580
J2076	72.804	8.570	427.520	153.700
J2078	179.551	0.000	409.410	99.600
J2080	181.724	0.000	408.140	98.100
J2082	169.373	0.000	423.100	109.940
J2084	167.278	0.000	423.100	110.850
J2086	155.000	0.000	428.850	118.660
J2088	155.000	0.000	428.850	118.660
J2090	163.000	0.000	425.750	113.850
J2092	158.002	0.000	422.690	114.690
J2094	179.000	0.000	419.440	104.180
J2096	131.000	0.000	413.480	122.400
J2098	131.000	0.000	413.480	122.400
J2100	297.204	5.800	415.520	51.260
J2102	338.429	0.000	415.660	33.460
J2104	300.000	2.060	415.510	50.050
J2106	107.510	0.000	414.120	132.860
J2108	239.170	5.840	416.060	76.650
J2110	222.000	1.630	416.740	84.380
J2114	84.000	0.000	414.840	143.350
J2116	160.000	0.000	413.480	109.830
J2118	84.000	0.000	414.850	143.360
J2120	84.000	8.600	414.850	143.360
J2122	414.000	0.000	680.400	115.430
J2124	300.790	0.000	573.710	118.250
J2126	224.979	0.000	573.710	151.100
J2128	266.000	19.600	573.710	133.330
J2130	230.030	0.000	573.710	148.920
J2132	232.150	0.000	573.710	148.000
J2134	451.299	12.030	680.410	99.270

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2136	90.000	0.000	414.450	140.580
J2138	90.000	0.960	414.450	140.580
J2140	90.000	0.000	414.450	140.580
J2142	417.059	0.000	680.410	114.110
J2144	157.893	29.120	409.830	109.160
J2146	157.778	2.880	409.820	109.210
J2148	158.189	0.000	409.840	109.040
J2150	143.761	0.000	411.780	116.130
J2152	387.942	0.000	680.890	126.930
J2154	229.860	3.620	581.640	152.430
J2156	258.804	13.050	583.540	140.710
J2158	308.623	36.170	582.660	118.740
J2160	306.873	28.630	573.830	115.670
J2162	319.636	17.850	573.910	110.180
J2164	300.000	5.710	573.980	118.720
J2166	300.000	0.000	573.980	118.720
J2168	296.000	9.970	574.030	120.470
J2170	256.000	9.700	576.090	138.700
J2172	257.000	21.600	576.090	138.260
J2174	273.200	14.800	575.450	130.970
J2176	255.000	17.040	575.450	138.850
J2178	217.402	0.000	580.110	157.160
J2180	217.114	2.200	580.110	157.290
J2182	162.000	0.000	409.390	107.190
J2184	162.000	0.000	409.390	107.190
J2186	122.869	0.000	409.500	124.200
J2188	202.574	0.000	409.670	89.730
J2190	222.200	1.580	409.670	81.230
J2192	167.000	0.000	409.900	105.250
J2194	136.443	151.150	409.990	118.530
J2196	163.850	0.000	409.260	106.340
J2198	162.000	3.980	409.390	107.190
J2200	164.071	0.000	408.950	106.110
J2202	71.738	7.420	408.950	146.110
J2204	155.730	0.000	406.350	108.590
J2206	107.975	0.080	416.460	133.670
J2208	92.000	11.590	415.810	140.310
J2210	156.048	0.000	406.350	108.450
J2212	108.467	0.000	406.350	129.070
J2214	108.439	0.000	406.350	129.080
J2216	170.000	0.000	408.680	103.420
J2218	164.801	0.000	408.480	105.590
J2220	164.566	0.000	408.480	105.690
J2222	164.650	2.610	408.480	105.650
J2224	162.000	0.000	407.310	106.290
J2226	162.000	17.340	407.300	106.290

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2228	90.000	0.000	414.450	140.580
J2230	82.000	0.000	417.610	145.420
J2232	90.000	0.000	414.460	140.590
J2234	81.309	0.000	417.730	145.770
J2236	79.371	1.990	417.730	146.610
J2238	94.568	0.000	415.700	139.150
J2240	84.000	0.170	414.850	143.360
J2242	172.107	8.530	409.000	102.650
J2244	166.000	7.200	409.300	105.420
J2246	172.267	8.270	408.720	102.450
J2252	325.450	0.000	680.890	154.010
J2254	52.000	0.000	405.990	153.390
J2256	85.076	0.000	406.180	139.140
J2258	85.688	0.000	406.190	138.870
J2260	85.258	0.000	406.190	139.060
J2262	311.070	0.000	680.260	159.970
J2264	346.000	47.670	680.260	144.830
J2266	463.000	9.210	680.280	94.150
J2268	423.180	0.000	680.290	111.400
J2270	427.000	0.000	680.280	109.750
J2272	420.836	7.670	680.290	112.420
J2274	158.435	0.000	412.260	109.980
J2276	177.000	15.510	576.710	173.200
J2278	192.000	0.000	576.880	166.770
J2280	186.079	0.000	576.930	169.350
J2282	413.313	16.980	680.670	115.850
J2284	403.665	0.000	680.620	120.000
J2286	402.854	2.080	576.550	75.260
J2288	306.700	0.000	576.380	116.850
J2290	310.981	0.000	576.380	115.000
J2292	297.493	0.000	576.320	120.820
J2294	307.272	0.000	576.380	116.610
J2296	287.435	0.000	573.750	124.060
J2298	301.000	8.550	576.320	119.300
J2300	175.656	0.000	415.990	104.130
J2302	175.882	0.000	415.990	104.040
J2304	165.411	16.370	415.820	108.500
J2306	287.279	28.650	421.470	58.140
J2308	273.000	21.050	422.590	64.820
J2310	179.584	0.000	406.340	98.250
J2312	180.061	0.000	406.340	98.050
J2314	179.656	0.000	406.340	98.220
J2316	72.000	0.000	405.640	144.570
J2318	72.000	0.000	405.650	144.570
J2320	281.000	12.720	622.970	148.170
J2322	358.111	0.000	622.970	114.760

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2324	351.073	2.430	622.970	117.810
J2326	357.671	0.000	622.970	114.950
J2328	427.053	0.000	622.970	84.890
J2330	422.910	2.830	622.970	86.690
J2332	243.000	0.000	422.090	77.600
J2334	241.028	1.380	422.090	78.450
J2336	243.348	0.000	422.090	77.450
J2338	242.621	0.000	422.090	77.760
J2340	248.162	0.000	422.090	75.360
J2342	293.952	0.000	576.710	122.520
J2344	280.000	10.000	576.720	128.570
J2346	277.000	25.250	576.720	129.870
J2348	347.157	7.120	576.740	99.480
J2350	95.640	0.000	405.640	134.330
J2352	381.411	0.000	601.380	95.310
J2354	382.625	0.280	601.460	94.820
J2356	53.000	0.000	309.620	111.190
J2358	155.025	0.000	405.810	108.670
J2364	306.590	0.000	622.970	137.090
J2366	306.017	62.600	622.970	137.330
J2368	105.000	0.000	441.570	145.840
J2370	108.000	0.000	437.990	142.990
J2372	70.628	0.000	408.950	146.590
J2374	73.586	0.000	414.450	147.700
J2376	54.568	0.000	414.450	155.940
J2378	305.820	0.000	597.960	126.580
J2380	213.161	0.000	597.960	166.730
J2382	144.716	0.000	405.810	113.130
J2384	225.201	6.260	405.810	78.260
J2386	320.856	0.000	573.760	109.580
J2388	423.904	3.680	680.450	111.160
J2390	424.015	0.000	680.450	111.110
J2392	420.000	0.000	680.470	112.860
J2394	411.865	10.800	680.510	116.410
J2396	396.348	4.730	680.550	123.140
J2398	311.040	0.000	622.990	135.170
J2400	259.319	0.000	623.000	157.580
J2402	195.237	0.000	411.690	93.790
J2404	62.000	0.000	309.620	107.290
J2406	64.000	0.000	309.620	106.430
J2408	64.000	0.000	309.620	106.430
J2410	68.000	0.000	309.620	104.690
J2412	68.000	0.000	309.620	104.690
J2414	140.013	0.000	416.930	119.990
J2416	336.000	0.000	417.020	35.110
J2418	186.953	2.100	417.160	99.750

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2422	235.596	0.000	419.340	79.610
J2424	235.671	0.000	419.340	79.580
J2426	234.940	0.000	419.340	79.900
J2428	278.810	32.350	597.960	138.290
J2430	248.877	0.000	597.950	151.250
J2432	123.565	7.200	422.690	129.610
J2434	177.061	7.120	422.680	106.430
J2436	79.785	0.000	422.700	148.590
J2438	256.613	3.700	600.700	149.090
J2440	64.000	0.000	458.160	170.790
J2444	301.895	0.000	592.630	125.980
J2446	287.378	0.000	573.740	124.080
J2448	287.180	0.000	573.730	124.160
J2452	58.000	0.000	309.680	109.050
J2456	137.066	0.000	435.390	129.260
J2458	137.000	15.400	435.380	129.290
J2460	168.000	0.000	423.870	110.870
J2462	147.000	4.870	423.120	119.640
J2464	141.000	0.000	413.510	118.080
J2466	138.183	3.820	413.540	119.310
J2468	121.779	0.000	413.800	126.530
J2470	119.626	0.000	413.800	127.460
J2472	120.805	0.040	413.800	126.950
J2474	70.717	5.940	416.420	149.790
J2476	27.832	2.520	416.410	168.370
J2478	67.000	0.920	416.500	151.440
J2480	70.215	7.700	416.500	150.040
J2482	159.296	17.360	416.500	111.450
J2484	172.000	21.020	416.490	105.940
J2486	172.723	0.000	416.490	105.630
J2488	328.934	0.000	573.710	106.060
J2490	351.568	0.000	573.710	96.250
J2492	461.774	1.670	680.400	94.730
J2494	371.473	0.000	680.410	133.860
J2496	225.082	2.330	584.420	155.700
J2498	278.000	8.210	584.330	132.730
J2500	225.234	0.000	584.420	155.630
J2502	211.224	5.650	584.400	161.700
J2504	195.337	13.710	415.310	95.310
J2506	272.954	35.290	415.250	61.660
J2508	263.000	0.000	573.950	134.730
J2510	264.000	10.780	573.950	134.300
J2512	272.060	8.690	574.220	130.930
J2514	282.840	17.310	574.220	126.250
J2516	254.000	0.000	409.770	67.500
J2518	254.000	0.000	409.770	67.500

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2520	254.000	10.860	409.770	67.500
J2522	367.051	0.000	576.750	90.860
J2524	51.000	0.000	405.990	153.820
J2526	55.000	0.000	405.990	152.090
J2528	311.057	0.000	680.260	159.980
J2530	438.129	0.000	680.240	104.910
J2532	368.058	0.000	680.250	135.270
J2534	367.844	0.000	680.250	135.370
J2536	368.269	19.260	680.250	135.180
J2538	310.722	2.680	680.260	160.120
J2540	309.000	0.000	680.260	160.870
J2542	311.380	0.000	680.260	159.840
J2544	175.000	0.000	412.290	102.820
J2546	182.000	0.000	411.770	99.560
J2548	205.132	20.780	410.660	89.060
J2550	152.335	16.970	410.640	111.930
J2552	161.445	0.000	409.650	107.550
J2554	164.000	0.000	409.600	106.420
J2556	162.000	0.000	409.390	107.190
J2558	159.950	0.000	406.350	106.760
J2560	155.634	0.000	406.360	108.640
J2562	60.686	0.000	406.350	149.770
J2564	46.000	0.000	406.350	156.140
J2566	55.270	0.000	406.030	151.980
J2568	53.000	0.000	406.030	152.970
J2570	179.422	0.000	406.340	98.320
J2572	181.905	0.000	406.340	97.250
J2574	260.356	0.000	412.620	65.980
J2576	288.000	0.000	680.250	169.960
J2578	288.000	0.000	680.250	169.960
J2580	288.000	0.000	680.250	169.960
J2582	445.271	0.000	680.280	101.830
J2584	377.154	0.000	680.820	131.580
J2586	185.845	0.880	576.930	169.460
J2588	402.000	0.000	576.660	75.680
J2590	64.000	0.000	309.620	106.430
J2592	288.000	4.830	680.250	169.960
J2594	324.000	0.000	576.770	109.530
J2596	403.437	0.000	680.270	119.950
J2598	273.000	0.000	422.640	64.840
J2600	273.000	0.000	422.590	64.820
J2604	269.000	0.450	420.380	65.590
J2606	270.876	0.000	420.380	64.780
J2608	271.080	0.000	420.390	64.690
J2610	270.669	3.560	420.380	64.870
J2612	64.000	5.150	309.620	106.430

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2614	126.862	4.940	405.260	120.630
J2616	72.000	0.000	405.650	144.570
J2618	72.000	0.000	405.650	144.570
J2620	72.000	0.000	405.650	144.570
J2622	70.000	0.000	309.620	103.830
J2624	84.000	0.000	414.850	143.360
J2626	420.823	0.000	680.290	112.430
J2628	419.000	0.000	680.290	113.220
J2630	319.000	0.000	622.960	131.710
J2632	319.000	7.100	622.960	131.710
J2634	366.688	0.000	680.250	135.870
J2636	366.657	0.000	680.250	135.880
J2638	71.305	19.710	405.640	144.870
J2640	275.572	0.000	622.970	150.530
J2642	348.020	0.000	622.970	119.140
J2644	347.734	0.000	622.970	119.260
J2646	426.975	5.110	622.970	84.920
J2648	377.025	0.000	680.820	131.640
J2650	377.687	0.000	680.820	131.350
J2652	410.824	3.710	680.510	116.850
J2654	416.580	0.000	680.510	114.360
J2656	186.250	0.000	576.930	169.280
J2658	351.352	0.000	622.960	117.690
J2660	360.000	16.820	622.950	113.940
J2662	185.694	0.740	576.920	169.520
J2664	185.906	0.000	576.930	169.430
J2666	195.204	0.000	411.690	93.800
J2668	195.574	0.000	411.690	93.640
J2670	185.965	0.000	576.930	169.400
J2672	53.000	0.000	309.620	111.190
J2674	56.476	0.000	309.620	109.690
J2678	105.713	0.000	415.520	134.240
J2680	105.905	0.000	415.520	134.160
J2682	403.713	0.000	680.620	119.980
J2684	305.110	0.000	405.970	43.700
J2686	354.211	0.000	680.250	141.270
J2688	68.752	0.000	309.620	104.370
J2690	64.000	0.000	309.620	106.430
J2692	310.000	0.000	590.400	121.500
J2694	313.356	15.380	590.400	120.050
J2696	404.007	16.120	576.550	74.760
J2698	79.000	0.000	309.630	99.930
J2700	75.000	0.000	309.630	101.660
J2702	79.000	0.000	309.630	99.930
J2704	193.000	0.000	586.110	170.330
J2706	196.000	7.810	584.770	168.450

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2708	193.000	0.000	586.110	170.340
J2710	193.000	0.000	586.110	170.340
J2712	193.000	0.000	586.120	170.340
J2714	190.000	0.000	587.100	172.060
J2716	306.000	1.930	576.720	117.300
J2722	278.971	0.000	597.960	138.220
J2724	299.000	0.000	598.540	129.790
J2726	301.005	0.140	598.540	128.920
J2728	66.000	0.000	309.650	105.570
J2730	67.000	0.970	309.650	105.140
J2006	244.862	0.000	0.000	0.000
J2008	291.636	0.000	0.000	0.000
J2112	273.350	0.000	0.000	0.000
J2450	314.770	0.000	0.000	0.000
J2718	316.830	0.000	0.000	0.000
J2720	317.940	0.000	0.000	0.000
J2732	59.000	0.000	309.680	108.620
J2738	148.017	11.290	413.530	115.050
J2740	150.654	5.680	413.520	113.900
J2742	147.015	8.470	413.950	115.660
J2744	414.717	1.810	680.400	115.120
J2746	357.111	0.620	680.410	140.080
J2748	299.000	0.000	680.250	165.200
J2750	312.447	0.000	576.380	114.360
J2752	310.943	0.000	576.380	115.020
J2754	233.000	2.800	579.440	150.110
J2756	230.000	6.960	581.640	152.370
J2758	224.904	0.250	584.420	155.780
J2760	171.580	0.100	415.520	105.700
J2762	320.000	18.080	573.760	109.950
J2764	278.000	43.670	574.900	128.650
J2766	136.920	0.000	411.660	119.040
J2768	138.000	0.000	411.660	118.580
J2770	239.000	17.340	573.950	145.130
J2772	248.000	8.110	573.910	141.210
J2774	239.000	0.000	573.950	145.130
J2776	243.777	14.430	573.950	143.060
J2778	277.000	0.000	574.150	128.750
J2780	281.000	12.910	574.150	127.020
J2782	291.200	0.000	574.100	122.580
J2784	277.000	1.610	574.150	128.750
J2786	261.149	0.000	573.950	135.540
J2788	315.011	0.000	578.050	113.970
J2790	330.000	11.590	578.040	107.470
J2792	176.096	0.000	415.990	103.950
J2794	327.535	0.000	576.770	107.990

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2796	288.000	0.000	680.250	169.960
J2798	324.454	0.000	680.250	154.170
J2800	80.000	0.000	417.790	146.370
J2802	80.000	0.000	417.790	146.370
J2804	80.000	0.910	417.790	146.370
J2806	41.969	0.000	405.740	157.620
J2808	53.000	0.000	405.740	152.840
J2810	43.383	0.000	405.740	157.010
J2812	44.902	0.000	405.740	156.350
J2814	83.033	0.000	413.110	143.020
J2816	144.000	17.330	412.190	116.210
J2818	160.376	0.000	413.380	109.630
J2820	160.065	0.000	413.380	109.760
J2822	241.793	0.000	419.340	76.930
J2824	287.485	0.000	576.920	125.410
J2826	417.428	0.000	680.290	113.900
J2828	137.000	0.000	412.110	119.200
J2830	404.956	0.000	576.550	74.350
J2832	314.834	30.930	576.380	113.330
J2834	195.184	7.810	418.050	96.570
J2836	240.928	0.000	417.070	76.320
J2838	240.894	0.000	417.070	76.340
J2840	259.257	0.000	623.000	157.610
J2842	174.404	0.000	416.040	104.700
J2844	177.718	30.500	416.040	103.270
J2846	310.000	0.000	590.400	121.500
J2848	175.000	0.000	416.060	104.450
J2850	366.000	0.000	600.710	101.700
J2852	273.000	0.000	422.660	64.850
J2854	212.932	7.010	427.460	92.960
J2856	186.000	10.230	429.010	105.300
J2858	286.000	0.000	595.050	133.910
J2860	287.398	0.000	573.720	124.060
J2862	315.569	0.000	591.790	119.690
J2864	315.677	0.000	591.800	119.640
J2866	311.212	0.000	593.350	122.250
J2868	319.731	0.000	593.600	118.670
J2870	58.000	0.000	309.680	109.050
J2872	57.000	0.000	309.680	109.490
J2874	58.105	0.000	309.680	109.010
J2876	161.117	0.000	423.630	113.750
J2878	168.000	0.000	423.850	110.860
J2880	140.085	0.000	431.080	126.090
J2882	133.567	8.440	413.530	121.310
J2884	135.912	1.910	413.530	120.290
J2886	132.771	0.000	413.480	121.630

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J2888	132.663	0.000	413.480	121.680
J2890	373.354	20.190	680.410	133.050
J2892	319.528	2.760	593.600	118.760
J2894	323.366	1.180	593.600	117.090
J2896	312.000	3.820	573.910	113.490
J2898	300.000	0.000	573.980	118.720
J2900	302.000	9.670	573.980	117.850
J2902	293.238	16.190	574.100	121.700
J2904	278.000	0.870	574.910	128.650
J2906	306.000	14.090	574.910	116.520
J2908	278.000	0.000	574.910	128.650
J2910	194.583	0.000	411.830	94.130
J2912	205.479	27.390	411.830	89.410
J2914	84.000	0.000	409.500	141.040
J2916	149.598	25.230	409.500	112.620
J2918	272.588	0.000	409.770	59.440
J2920	276.417	0.000	409.770	57.780
J4000	290.000	0.000	573.710	122.930
J4002	300.790	0.000	573.710	118.250
J4004	319.668	0.000	593.600	118.700
J4006	23.083	0.530	405.870	165.860
J4008	270.873	0.000	420.380	64.780
J4010	287.477	0.000	421.460	58.060
J4012	235.553	0.000	419.340	79.630
J4014	182.608	0.000	415.990	101.120
J4016	182.217	0.000	415.990	101.290
J4018	182.251	0.000	415.990	101.280
J4020	384.000	0.000	415.930	13.840
J4022	195.419	0.000	411.690	93.710
10	51.000	0.000	81.980	13.420
12	46.170	0.000	81.980	15.520
14	51.000	0.000	81.980	13.420
16	49.000	0.000	467.530	181.350
18	55.450	0.000	467.530	178.550
20	62.610	0.000	467.530	175.450
22	59.000	0.000	461.910	174.580
24	58.080	0.000	309.690	109.020
26	59.830	0.000	461.910	174.220
28	55.737	0.000	461.910	175.990
30	58.131	0.000	309.690	109.000
32	57.763	0.000	309.690	109.160
34	382.685	0.000	414.150	13.640
36	382.862	0.000	413.650	13.340
38	383.351	0.000	413.670	13.140
40	384.160	0.000	413.770	12.830
42	384.000	0.000	422.590	16.720

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
44	383.856	0.000	610.600	98.250
46	383.027	0.000	610.580	98.600
48	383.900	0.000	610.470	98.170
50	384.427	0.000	601.110	93.890
52	383.932	0.000	610.540	98.190
54	383.643	0.000	413.700	13.030
56	318.000	0.000	237.750	-34.770
58	330.000	0.000	589.090	112.260
60	177.000	0.000	576.670	173.170
62	177.000	0.000	576.670	173.170
66	177.000	0.360	412.400	102.000
68	177.000	0.000	412.400	102.000
72	309.933	0.000	573.030	114.000
74	309.430	1.010	573.110	114.250
76	309.000	0.000	573.110	114.440
78	314.674	0.000	681.100	158.770
80	313.570	0.000	680.900	159.170
82	313.148	0.000	680.900	159.350
84	222.990	4.700	573.950	152.070
86	219.607	0.490	405.970	80.750
88	224.882	0.000	573.950	151.250
90	220.618	0.000	405.970	80.310
94	225.916	0.000	573.950	150.800
98	204.015	0.000	404.800	87.000
100	205.000	0.000	622.990	181.110
102	205.000	0.000	623.010	181.120
104	205.242	0.000	623.010	181.020
106	203.757	0.000	404.680	87.060
108	204.730	0.000	404.680	86.640
110	203.209	0.000	404.680	87.300
112	222.710	0.000	621.910	172.970
114	166.130	5.210	405.970	103.920
J3006	156.412	0.000	406.350	108.300
M9600526	156.220	0.000	406.350	108.380
J3008	155.490	0.000	409.980	110.270
M9687080	155.000	7.930	409.970	110.480
J3000	241.000	0.000	415.650	75.670
M9683152	242.608	0.000	415.650	74.980
J3002	299.533	0.000	578.200	120.750
M9669055	298.079	222.610	578.200	121.380
M9600350	294.760	0.000	415.380	52.260
J3004	230.113	3.160	414.310	79.810
M9600353	229.360	0.000	414.310	80.140
M9600160	115.980	401.220	413.460	128.900
J674	114.989	0.000	413.620	129.400
J672	115.000	0.000	413.480	129.330

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
J670	113.000	0.000	413.580	130.240
J3010	123.000	0.000	411.280	124.910
M9699900	123.390	0.000	411.280	124.740
M9690000	61.000	0.000	0.000	-26.430
120	72.000	0.060	406.350	144.870
122	530.000	9.770	588.960	25.550
124	350.000	3.300	588.750	103.450
126	46.170	0.000	82.000	15.520
128	46.170	0.000	143.000	41.960
130	49.000	0.000	81.990	14.290
OMWD	378.170	0.000	588.960	91.330
132	350.000	41.380	578.530	99.020
134	184.360	0.000	411.690	98.500
138	54.000	0.640	417.790	157.630
140	318.000	0.000	237.720	-34.780
142	318.000	0.000	237.730	-34.780
144	330.000	0.000	589.090	112.260
146	330.000	0.000	589.100	112.270
148	330.000	0.000	589.090	112.260
150	318.000	0.000	237.730	-34.780
152	373.270	0.000	680.790	133.250
154	437.330	0.000	680.420	105.330
156	162.000	0.000	411.660	108.180
F10	187.100	0.000	586.320	172.980
F18	202.890	2.130	588.750	167.190
F34	54.000	0.000	417.790	157.630
F314	419.610	39.800	588.900	73.350
172	330.000	0.000	317.980	-5.210
476	225.454	0.000	589.570	157.770
478	193.620	0.000	587.440	170.640
510	103.777	0.000	406.350	131.100
514	43.406	0.000	405.740	157.000
648	142.000	0.000	412.230	117.090
770	321.934	0.000	573.740	109.110
782	135.000	0.000	413.530	120.690
816	353.255	0.000	622.960	116.860
898	49.000	0.000	82.000	14.300
910	318.000	0.000	237.740	-34.780
C005	99.489	73.330	402.960	131.500
C152	357.730	0.000	573.710	93.580
C164	247.343	1.240	405.620	68.580
958	298.000	0.000	574.940	120.000
960	298.000	0.000	575.110	120.070
970	402.704	1.470	680.560	120.400
982	66.000	0.000	452.590	167.510
986	78.000	0.580	417.790	147.230

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
990	179.589	17.870	415.530	102.230
994	58.304	0.000	309.610	108.890
1034	307.000	1.700	582.100	119.200
1040	195.836	0.000	585.460	168.830
1046	209.246	0.000	589.000	164.550
1070	72.621	0.000	417.790	149.560
1072	207.000	0.160	585.130	163.840
1076	104.000	0.000	405.650	130.700
1078	85.000	0.000	405.620	138.930
1082	276.462	2.490	590.840	136.220
1084	181.201	0.000	580.840	173.160
1088	194.969	0.590	587.730	170.180
1098	46.988	0.000	420.540	161.860
1102	124.924	0.000	410.450	123.720
1124	195.000	0.000	410.380	93.320
1126	148.000	0.000	406.350	111.940
1128	181.003	0.000	408.810	98.710
1136	313.751	0.990	573.710	112.640
1138	482.481	6.710	680.390	85.760
1140	322.367	0.000	576.420	110.080
1142	432.000	0.000	680.440	107.650
1144	414.000	0.320	576.620	70.460
1146	206.870	0.000	576.920	160.340
1148	415.380	0.000	680.410	114.840
1150	248.000	2.740	582.290	144.850
1152	288.362	0.000	573.880	123.710
1154	396.256	2.700	680.630	123.220
1160	224.665	0.000	579.670	153.830
1188	290.000	0.000	574.040	123.070
64	177.000	0.000	0.000	0.000
70	177.000	0.000	0.000	0.000
92	221.140	0.000	0.000	0.000
96	226.490	0.000	0.000	0.000
F282	379.870	0.000	0.000	0.000
164	379.870	0.000	0.000	0.000
166	379.870	0.000	0.000	0.000
168	379.870	0.000	0.000	0.000
170	379.870	0.000	0.000	0.000
174	49.000	0.000	0.000	0.000
178	143.000	0.000	0.000	0.000
590	159.000	0.000	0.000	0.000
826	383.000	0.000	0.000	0.000
828	411.221	0.000	0.000	0.000
832	320.000	0.000	0.000	0.000
834	252.956	0.000	0.000	0.000
836	64.680	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
838	282.000	0.000	0.000	0.000
840	250.707	0.000	0.000	0.000
892	49.000	0.000	0.000	0.000
894	143.000	0.000	0.000	0.000
C028	47.665	0.000	0.000	0.000
C029	43.222	0.000	0.000	0.000
C072	61.577	0.000	0.000	0.000
C090	434.130	0.000	0.000	0.000
C025	49.221	0.000	0.000	0.000
C021	22.000	0.000	0.000	0.000
C012	48.156	0.000	0.000	0.000
C004	32.585	0.000	0.000	0.000
C002	53.000	0.000	0.000	0.000
C035	64.000	0.000	0.000	0.000
C033	72.000	0.000	0.000	0.000
C026	151.000	0.000	0.000	0.000
C027	31.803	0.000	0.000	0.000
C020	74.000	0.000	0.000	0.000
C023	64.000	0.000	0.000	0.000
C013	241.297	0.000	0.000	0.000
C003	505.250	0.000	0.000	0.000
C038	66.044	0.000	0.000	0.000
C014	60.846	0.000	0.000	0.000
C067	185.509	0.000	0.000	0.000
C046	85.986	0.000	0.000	0.000
C045	77.000	0.000	0.000	0.000
C047	62.000	0.000	0.000	0.000
C070	62.000	0.000	0.000	0.000
C018	170.591	0.000	0.000	0.000
C040	25.728	0.000	0.000	0.000
C078	18.000	0.000	0.000	0.000
C043	62.000	0.000	0.000	0.000
C037	226.000	0.000	0.000	0.000
C060	120.727	0.000	0.000	0.000
C051	107.159	0.000	0.000	0.000
C068	55.046	0.000	0.000	0.000
C034	349.297	0.000	0.000	0.000
C041	206.554	0.000	0.000	0.000
C044	325.070	0.000	0.000	0.000
C056	45.565	0.000	0.000	0.000
C042	557.000	0.000	0.000	0.000
C088	528.889	0.000	0.000	0.000
C010	198.000	0.000	0.000	0.000
C087	59.084	0.000	0.000	0.000
C062	262.439	0.000	0.000	0.000
C083	52.718	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
C085	256.000	0.000	0.000	0.000
C079	61.784	0.000	0.000	0.000
C080	49.654	0.000	0.000	0.000
C073	297.825	0.000	0.000	0.000
C092	218.000	0.000	0.000	0.000
C057	57.302	0.000	0.000	0.000
C089	210.000	0.000	0.000	0.000
C054	269.000	0.000	0.000	0.000
C086	305.303	0.000	0.000	0.000
C049	229.852	0.000	0.000	0.000
C074	49.532	0.000	0.000	0.000
C052	52.000	0.000	0.000	0.000
C084	299.969	0.000	0.000	0.000
C066	262.000	0.000	0.000	0.000
C082	196.208	0.000	0.000	0.000
C065	54.263	0.000	0.000	0.000
C075	52.000	0.000	0.000	0.000
C081	240.000	0.000	0.000	0.000
C055	300.255	0.000	0.000	0.000
C061	261.343	0.000	0.000	0.000
C069	237.190	0.000	0.000	0.000
C053	50.978	0.000	0.000	0.000
C058	201.845	0.000	0.000	0.000
C050	54.000	0.000	0.000	0.000
C059	62.000	0.000	0.000	0.000
C039	221.973	0.000	0.000	0.000
C008	58.000	0.000	0.000	0.000
C001	24.747	0.000	0.000	0.000
C009	104.000	0.000	0.000	0.000
C096	246.000	0.000	0.000	0.000
C094	290.000	0.000	0.000	0.000
C076	168.896	0.000	0.000	0.000
C091	215.000	0.000	0.000	0.000
C100	235.929	0.000	0.000	0.000
C099	208.805	0.000	0.000	0.000
C093	214.000	0.000	0.000	0.000
C104	38.630	0.000	0.000	0.000
C135	56.151	0.000	0.000	0.000
C132	42.538	0.000	0.000	0.000
C137	52.209	0.000	0.000	0.000
C109	76.668	0.000	0.000	0.000
C107	117.844	0.000	0.000	0.000
C133	522.920	0.000	0.000	0.000
C113	346.273	0.000	0.000	0.000
C124	388.000	0.000	0.000	0.000
C117	308.000	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
C121	319.882	0.000	0.000	0.000
C139	378.609	0.000	0.000	0.000
C134	355.315	0.000	0.000	0.000
C129	348.425	0.000	0.000	0.000
C114	400.263	0.000	0.000	0.000
C111	360.892	0.000	0.000	0.000
C101	482.284	0.000	0.000	0.000
C112	361.260	0.000	0.000	0.000
C103	396.481	0.000	0.000	0.000
C143	189.255	0.000	0.000	0.000
C144	149.050	0.000	0.000	0.000
C145	181.061	0.000	0.000	0.000
C146	71.444	0.000	0.000	0.000
C147	90.614	0.000	0.000	0.000
C148	150.961	0.000	0.000	0.000
C149	290.940	0.000	0.000	0.000
C150	357.296	0.000	0.000	0.000
C151	481.420	0.000	0.000	0.000
C153	323.752	0.000	0.000	0.000
C154	432.000	0.000	0.000	0.000
C155	414.000	0.000	0.000	0.000
C156	202.000	0.000	0.000	0.000
C157	415.110	0.000	0.000	0.000
C110	255.632	0.000	0.000	0.000
C116	297.000	0.000	0.000	0.000
C119	396.470	0.000	0.000	0.000
C126	116.740	0.000	0.000	0.000
C158	187.313	0.000	0.000	0.000
C159	169.000	0.000	0.000	0.000
C064	207.866	0.000	0.000	0.000
C160	123.000	0.000	0.000	0.000
C161	97.000	0.000	0.000	0.000
C162	83.128	0.000	0.000	0.000
C163	209.419	0.000	0.000	0.000
C165	90.000	0.000	0.000	0.000
C178	260.000	0.000	0.000	0.000
C166	287.514	0.000	0.000	0.000
C167	227.674	0.000	0.000	0.000
C168	213.818	0.000	0.000	0.000
C169	35.863	0.000	0.000	0.000
C170	118.349	0.000	0.000	0.000
C171	151.000	0.000	0.000	0.000
C179	64.000	0.000	0.000	0.000
C172	74.948	0.000	0.000	0.000
C173	86.056	0.000	0.000	0.000
C174	50.692	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
C175	59.539	0.000	0.000	0.000
C176	162.450	0.000	0.000	0.000
C177	66.000	0.000	0.000	0.000
C032	279.000	0.000	0.000	0.000
C017	134.955	0.000	0.000	0.000
954	48.338	0.000	0.000	0.000
956	48.337	0.000	0.000	0.000
966	40.000	0.000	0.000	0.000
968	66.000	0.000	0.000	0.000
972	49.361	0.000	0.000	0.000
974	46.773	0.000	0.000	0.000
976	35.881	0.000	0.000	0.000
978	43.980	0.000	0.000	0.000
980	64.000	0.000	0.000	0.000
984	145.988	0.000	0.000	0.000
988	63.056	0.000	0.000	0.000
992	459.318	0.000	0.000	0.000
996	62.000	0.000	0.000	0.000
998	179.000	0.000	0.000	0.000
1000	86.932	0.000	0.000	0.000
1002	79.429	0.000	0.000	0.000
1004	181.155	0.000	0.000	0.000
1006	18.000	0.000	0.000	0.000
1008	62.000	0.000	0.000	0.000
1010	224.456	0.000	0.000	0.000
1012	119.649	0.000	0.000	0.000
1014	87.826	0.000	0.000	0.000
1016	339.263	0.000	0.000	0.000
1018	209.000	0.000	0.000	0.000
1020	315.518	0.000	0.000	0.000
1022	46.327	0.000	0.000	0.000
1024	550.000	0.000	0.000	0.000
1026	535.829	0.000	0.000	0.000
1028	178.959	0.000	0.000	0.000
1030	61.000	0.000	0.000	0.000
1032	262.260	0.000	0.000	0.000
1036	212.712	0.000	0.000	0.000
1038	53.923	0.000	0.000	0.000
1042	262.528	0.000	0.000	0.000
1044	287.554	0.000	0.000	0.000
1048	56.000	0.000	0.000	0.000
1050	268.954	0.000	0.000	0.000
1052	204.833	0.000	0.000	0.000
1054	56.000	0.000	0.000	0.000
1056	50.000	0.000	0.000	0.000
1058	237.578	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1060	233.962	0.000	0.000	0.000
1062	243.125	0.000	0.000	0.000
1064	58.000	0.000	0.000	0.000
1066	208.514	0.000	0.000	0.000
1068	50.000	0.000	0.000	0.000
1074	63.000	0.000	0.000	0.000
1080	242.975	0.000	0.000	0.000
1086	224.683	0.000	0.000	0.000
1090	209.392	0.000	0.000	0.000
1092	34.359	0.000	0.000	0.000
1094	54.000	0.000	0.000	0.000
1096	43.373	0.000	0.000	0.000
1100	258.135	0.000	0.000	0.000
1104	503.773	0.000	0.000	0.000
1106	379.235	0.000	0.000	0.000
1108	308.000	0.000	0.000	0.000
1110	318.000	0.000	0.000	0.000
1112	390.748	0.000	0.000	0.000
1114	374.016	0.000	0.000	0.000
1116	359.252	0.000	0.000	0.000
1118	406.824	0.000	0.000	0.000
1120	373.000	0.000	0.000	0.000
1122	389.000	0.000	0.000	0.000
1130	110.775	0.000	0.000	0.000
1132	86.000	0.000	0.000	0.000
1134	107.635	0.000	0.000	0.000
1156	115.310	0.000	0.000	0.000
1158	131.784	0.000	0.000	0.000
1162	123.000	0.000	0.000	0.000
1164	83.000	0.000	0.000	0.000
1166	247.000	0.000	0.000	0.000
1168	225.149	0.000	0.000	0.000
1170	223.299	0.000	0.000	0.000
1172	30.341	0.000	0.000	0.000
1174	118.164	0.000	0.000	0.000
1176	123.000	0.000	0.000	0.000
1178	64.000	0.000	0.000	0.000
1180	74.897	0.000	0.000	0.000
1182	87.605	0.000	0.000	0.000
1184	49.276	0.000	0.000	0.000
1186	159.294	0.000	0.000	0.000
1190	63.590	0.000	0.000	0.000
1192	64.220	0.000	0.000	0.000
1194	81.450	0.000	0.000	0.000
1196	79.555	0.000	0.000	0.000
1198	63.850	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1200	253.883	0.000	0.000	0.000
1202	238.741	0.000	0.000	0.000
1204	288.647	0.000	0.000	0.000
1206	223.769	0.000	0.000	0.000
1208	78.654	0.000	0.000	0.000
1210	47.000	0.000	0.000	0.000
1212	50.000	0.000	0.000	0.000
1214	47.000	0.000	0.000	0.000
1216	28.547	0.000	0.000	0.000
1218	27.776	0.000	0.000	0.000
1220	37.502	0.000	0.000	0.000
1236	73.083	0.000	405.620	144.090
1238	80.661	0.000	405.620	140.810
1244	48.684	0.000	405.620	154.660
1448	348.769	0.000	578.580	99.580
1542	287.834	0.000	405.620	51.040
1790	56.887	0.000	309.640	109.520
1802	206.000	0.000	406.280	86.780
1224	42.000	0.000	0.000	0.000
1226	120.000	0.000	0.000	0.000
1228	258.510	0.000	0.000	0.000
1230	92.269	0.000	0.000	0.000
1232	112.442	0.000	0.000	0.000
1234	14.735	0.000	0.000	0.000
1240	106.112	0.000	0.000	0.000
1242	102.057	0.000	0.000	0.000
1246	20.854	0.000	0.000	0.000
1248	40.206	0.000	0.000	0.000
1250	46.000	0.000	0.000	0.000
1252	62.000	0.000	0.000	0.000
1254	60.588	0.000	0.000	0.000
1256	46.000	0.000	0.000	0.000
1258	63.106	0.000	0.000	0.000
1260	64.000	0.000	0.000	0.000
1262	43.631	0.000	0.000	0.000
1264	51.317	0.000	0.000	0.000
1266	127.828	0.000	0.000	0.000
1268	47.040	0.000	0.000	0.000
1270	102.025	0.000	0.000	0.000
1272	34.042	0.000	0.000	0.000
1274	356.225	0.000	0.000	0.000
1276	386.000	0.000	0.000	0.000
1278	338.000	0.000	0.000	0.000
1280	380.578	0.000	0.000	0.000
1282	442.000	0.000	0.000	0.000
1284	398.622	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1286	375.905	0.000	0.000	0.000
1288	359.908	0.000	0.000	0.000
1290	356.955	0.000	0.000	0.000
1292	318.000	0.000	0.000	0.000
1294	308.000	0.000	0.000	0.000
1296	436.352	0.000	0.000	0.000
1298	472.441	0.000	0.000	0.000
1300	419.948	0.000	0.000	0.000
1302	488.845	0.000	0.000	0.000
1304	528.215	0.000	0.000	0.000
1306	516.000	0.000	0.000	0.000
1308	551.181	0.000	0.000	0.000
1310	544.619	0.000	0.000	0.000
1312	561.024	0.000	0.000	0.000
1314	554.462	0.000	0.000	0.000
1316	557.743	0.000	0.000	0.000
1318	561.024	0.000	0.000	0.000
1320	557.743	0.000	0.000	0.000
1322	547.900	0.000	0.000	0.000
1324	516.000	0.000	0.000	0.000
1326	516.000	0.000	0.000	0.000
1328	406.000	0.000	0.000	0.000
1330	426.509	0.000	0.000	0.000
1332	524.934	0.000	0.000	0.000
1334	479.003	0.000	0.000	0.000
1336	465.879	0.000	0.000	0.000
1338	498.688	0.000	0.000	0.000
1340	551.181	0.000	0.000	0.000
1342	410.000	0.000	0.000	0.000
1344	414.000	0.000	0.000	0.000
1346	397.006	0.000	0.000	0.000
1348	524.934	0.000	0.000	0.000
1350	528.215	0.000	0.000	0.000
1352	462.598	0.000	0.000	0.000
1354	444.259	0.000	0.000	0.000
1356	480.000	0.000	0.000	0.000
1358	531.000	0.000	0.000	0.000
1360	565.000	0.000	0.000	0.000
1362	534.777	0.000	0.000	0.000
1364	557.743	0.000	0.000	0.000
1366	470.258	0.000	0.000	0.000
1368	500.655	0.000	0.000	0.000
1370	555.895	0.000	0.000	0.000
1372	575.049	0.000	0.000	0.000
1374	556.000	0.000	0.000	0.000
1376	569.000	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1378	507.000	0.000	0.000	0.000
1380	532.000	0.000	0.000	0.000
1382	478.000	0.000	0.000	0.000
1384	481.702	0.000	0.000	0.000
1386	456.000	0.000	0.000	0.000
1388	465.000	0.000	0.000	0.000
1390	493.000	0.000	0.000	0.000
1392	406.000	0.000	0.000	0.000
1394	436.352	0.000	0.000	0.000
1396	485.564	0.000	0.000	0.000
1398	465.879	0.000	0.000	0.000
1400	426.000	0.000	0.000	0.000
1402	429.790	0.000	0.000	0.000
1404	396.982	0.000	0.000	0.000
1406	491.280	0.000	0.000	0.000
1408	611.892	0.000	0.000	0.000
1410	625.015	0.000	0.000	0.000
1412	649.000	0.000	0.000	0.000
1414	561.426	0.000	0.000	0.000
1416	562.000	0.000	0.000	0.000
1418	549.314	0.000	0.000	0.000
1420	500.401	0.000	0.000	0.000
1422	395.000	0.000	0.000	0.000
1424	44.000	0.000	0.000	0.000
1426	77.003	0.000	0.000	0.000
1428	166.895	0.000	0.000	0.000
1430	90.000	0.000	0.000	0.000
1432	86.414	0.000	0.000	0.000
1434	217.000	0.000	0.000	0.000
1436	209.000	0.000	0.000	0.000
1438	178.895	0.000	0.000	0.000
1440	178.379	0.000	0.000	0.000
1442	186.851	0.000	0.000	0.000
1444	157.947	0.000	0.000	0.000
1446	54.062	0.000	0.000	0.000
1450	257.000	0.000	0.000	0.000
1452	284.000	0.000	0.000	0.000
1454	142.000	0.000	0.000	0.000
1456	144.808	0.000	0.000	0.000
1458	111.000	0.000	0.000	0.000
1460	198.554	0.000	0.000	0.000
1462	64.000	0.000	0.000	0.000
1464	66.000	0.000	0.000	0.000
1466	107.000	0.000	0.000	0.000
1468	105.481	0.000	0.000	0.000
1470	64.951	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1472	34.791	0.000	0.000	0.000
1474	86.338	0.000	0.000	0.000
1476	87.000	0.000	0.000	0.000
1478	91.388	0.000	0.000	0.000
1480	131.861	0.000	0.000	0.000
1482	146.994	0.000	0.000	0.000
1484	137.704	0.000	0.000	0.000
1486	191.348	0.000	0.000	0.000
1488	193.431	0.000	0.000	0.000
1490	192.353	0.000	0.000	0.000
1492	194.276	0.000	0.000	0.000
1494	210.112	0.000	0.000	0.000
1496	227.596	0.000	0.000	0.000
1498	236.187	0.000	0.000	0.000
1500	251.094	0.000	0.000	0.000
1502	276.932	0.000	0.000	0.000
1504	260.108	0.000	0.000	0.000
1506	269.243	0.000	0.000	0.000
1508	282.831	0.000	0.000	0.000
1510	237.265	0.000	0.000	0.000
1512	236.571	0.000	0.000	0.000
1514	223.056	0.000	0.000	0.000
1516	226.245	0.000	0.000	0.000
1518	232.472	0.000	0.000	0.000
1520	186.000	0.000	0.000	0.000
1522	179.091	0.000	0.000	0.000
1524	137.339	0.000	0.000	0.000
1526	138.936	0.000	0.000	0.000
1528	137.024	0.000	0.000	0.000
1530	136.531	0.000	0.000	0.000
1532	135.040	0.000	0.000	0.000
1534	139.062	0.000	0.000	0.000
1536	98.000	0.000	0.000	0.000
1538	106.718	0.000	0.000	0.000
1540	233.320	0.000	0.000	0.000
1544	125.564	0.000	0.000	0.000
1546	126.154	0.000	0.000	0.000
1548	158.468	0.000	0.000	0.000
1550	285.000	0.000	0.000	0.000
1552	162.594	0.000	0.000	0.000
1554	188.888	0.000	0.000	0.000
1556	230.446	0.000	0.000	0.000
1558	275.687	0.000	0.000	0.000
1560	274.640	0.000	0.000	0.000
C140	281.094	0.000	0.000	0.000
1564	310.279	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1566	223.210	0.000	0.000	0.000
1568	200.751	0.000	0.000	0.000
1570	245.000	0.000	0.000	0.000
1572	273.357	0.000	0.000	0.000
1574	269.064	0.000	0.000	0.000
1576	261.898	0.000	0.000	0.000
1578	260.795	0.000	0.000	0.000
1580	176.933	0.000	0.000	0.000
1582	306.140	0.000	0.000	0.000
1584	281.904	0.000	0.000	0.000
1586	261.000	0.000	0.000	0.000
1588	209.078	0.000	0.000	0.000
1590	231.140	0.000	0.000	0.000
1592	291.087	0.000	0.000	0.000
1594	267.315	0.000	0.000	0.000
1596	268.003	0.000	0.000	0.000
1598	173.000	0.000	0.000	0.000
1600	154.488	0.000	0.000	0.000
1602	155.000	0.000	0.000	0.000
1604	182.000	0.000	0.000	0.000
1606	179.000	0.000	0.000	0.000
1608	112.584	0.000	0.000	0.000
1610	158.960	0.000	0.000	0.000
1612	77.045	0.000	0.000	0.000
1614	45.000	0.000	0.000	0.000
1616	43.000	0.000	0.000	0.000
1618	47.035	0.000	0.000	0.000
1620	32.397	0.000	0.000	0.000
1622	30.354	0.000	0.000	0.000
1624	45.000	0.000	0.000	0.000
1626	30.000	0.000	0.000	0.000
1628	137.219	0.000	0.000	0.000
1630	123.000	0.000	0.000	0.000
1632	133.000	0.000	0.000	0.000
1634	126.827	0.000	0.000	0.000
1638	37.041	0.000	0.000	0.000
1640	53.892	0.000	0.000	0.000
1642	92.262	0.000	0.000	0.000
1644	113.709	0.000	0.000	0.000
1646	112.000	0.000	0.000	0.000
1648	89.159	0.000	0.000	0.000
1650	99.682	0.000	0.000	0.000
1652	79.022	0.000	0.000	0.000
1654	68.823	0.000	0.000	0.000
1656	46.000	0.000	0.000	0.000
1658	64.000	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1660	82.000	0.000	0.000	0.000
1662	47.738	0.000	0.000	0.000
1664	86.703	0.000	0.000	0.000
1666	92.018	0.000	0.000	0.000
1668	37.844	0.000	0.000	0.000
1670	46.141	0.000	0.000	0.000
1672	45.393	0.000	0.000	0.000
1674	48.000	0.000	0.000	0.000
1676	52.000	0.000	0.000	0.000
1678	61.024	0.000	0.000	0.000
1680	62.000	0.000	0.000	0.000
1682	62.000	0.000	0.000	0.000
1684	62.672	0.000	0.000	0.000
1686	53.960	0.000	0.000	0.000
1688	77.000	0.000	0.000	0.000
1690	80.851	0.000	0.000	0.000
1692	81.000	0.000	0.000	0.000
1694	354.357	0.000	0.000	0.000
1696	340.935	0.000	0.000	0.000
1698	302.407	0.000	0.000	0.000
1700	300.769	0.000	0.000	0.000
1702	259.000	0.000	0.000	0.000
1704	268.425	0.000	0.000	0.000
1706	419.000	0.000	0.000	0.000
1708	56.000	0.000	0.000	0.000
1710	66.000	0.000	0.000	0.000
1712	55.021	0.000	0.000	0.000
1714	81.379	0.000	0.000	0.000
1716	66.000	0.000	0.000	0.000
1718	144.894	0.000	0.000	0.000
1720	175.694	0.000	0.000	0.000
1722	148.810	0.000	0.000	0.000
1724	180.917	0.000	0.000	0.000
1726	178.979	0.000	0.000	0.000
1728	63.480	0.000	0.000	0.000
1730	40.000	0.000	0.000	0.000
1732	70.349	0.000	0.000	0.000
1734	43.162	0.000	0.000	0.000
1736	40.000	0.000	0.000	0.000
1738	63.324	0.000	0.000	0.000
1740	63.000	0.000	0.000	0.000
1742	70.935	0.000	0.000	0.000
1744	83.869	0.000	0.000	0.000
1746	84.092	0.000	0.000	0.000
1748	84.031	0.000	0.000	0.000
1750	84.048	0.000	0.000	0.000

Existing RW Peak Hour Pressures

Node ID	Elevation (ft)	Demand (gpm)	Head (ft)	Pressure (psi)
1752	75.156	0.000	0.000	0.000
1754	73.000	0.000	0.000	0.000
1756	60.000	0.000	0.000	0.000
1758	60.000	0.000	0.000	0.000
1760	83.122	0.000	0.000	0.000
1762	83.746	0.000	0.000	0.000
1764	82.841	0.000	0.000	0.000
1766	83.000	0.000	0.000	0.000
1768	99.000	0.000	0.000	0.000
1770	269.406	0.000	0.000	0.000
1772	63.399	0.000	0.000	0.000
1774	225.695	0.000	0.000	0.000
1776	52.521	0.000	0.000	0.000
1778	63.420	0.000	0.000	0.000
1780	236.635	0.000	0.000	0.000
1782	378.000	0.000	0.000	0.000
1786	63.129	0.000	0.000	0.000
1788	0.000	0.000	0.000	0.000
1792	386.000	0.000	0.000	0.000
1794	386.000	0.000	0.000	0.000
1796	386.000	0.000	0.000	0.000
1798	340.000	0.000	0.000	0.000
1800	340.000	0.000	0.000	0.000
1804	375.900	0.000	0.000	0.000

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
6729	12	845.73	130	2149.66	6.10	8.84
6744	8	10.26	130	390.95	2.50	0.03
6745	8	6.09	130	11.59	0.07	0.00
6746	8	866.70	130	390.95	2.50	2.78
6763	12	499.03	130	1941.15	5.51	4.32
6829	12	94.77	130	1941.15	5.51	0.82
6830	8	6.55	130	76.23	0.49	0.00
6836	8	500.74	130	22.48	0.14	0.01
6839	8	532.89	130	39.18	0.25	0.02
6840	8	475.09	130	39.18	0.25	0.02
6841	8	212.71	130	39.18	0.25	0.01
6842	12	8.75	130	273.00	0.77	0.00
6843	12	6.92	130	273.00	0.77	0.00
6845	12	6.34	130	1932.38	5.48	0.05
6846	12	507.98	130	1932.38	5.48	4.36
6849	8	207.91	130	117.58	0.75	0.07
6850	8	7.62	130	113.35	0.72	0.00
6851	8	7.31	130	14.28	0.09	0.00
6852	8	264.07	130	14.28	0.09	0.00
6853	8	504.82	130	13.69	0.09	0.00
6871	8	3.44	130	92.48	0.59	0.00
6872	8	474.42	130	92.48	0.59	0.11
6873	8	1000.04	130	92.48	0.59	0.22
6874	8	518.34	130	94.06	0.60	0.12
6875	8	484.54	130	99.08	0.63	0.12
6889	4	6.63	130	16.19	0.41	0.00
6898	8	4.68	130	34.68	0.22	0.00
6924	12	809.23	130	1567.67	4.45	4.72
6926	12	409.85	130	1586.39	4.50	2.44
6936	8	6.26	130	469.90	3.00	0.03
6937	12	1090.48	130	2183.34	6.19	11.74
6938	4	650.22	130	14.40	0.37	0.13
6939	12	471.57	130	2169.04	6.15	5.01
6941	12	899.32	130	2170.28	6.16	9.57
6942	12	349.89	130	2157.07	6.12	3.68
6969	12	4.82	130	1607.12	4.56	0.03
6970	12	7.26	130	27.89	0.08	0.00
6971	12	5.08	130	1622.75	4.60	0.03
6972	12	295.53	130	1638.95	4.65	1.87
6973	12	253.19	130	1607.12	4.56	1.55
6974	12	201.95	130	1607.12	4.56	1.23
6975	12	178.68	130	1662.01	4.71	1.16
6976	12	323.74	130	1662.01	4.71	2.10
6994	8	4.50	130	370.67	2.37	0.01
6995	8	610.52	130	380.74	2.43	1.86
6996	8	4.86	130	299.52	1.91	0.01

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
6997	8	487.04	130	300.58	1.92	0.96
6999	8	6.71	130	326.55	2.08	0.02
7000	4	6.98	130	10.49	0.27	0.00
7005	4	7.21	130	54.72	1.40	0.02
7006	12	3.79	130	1603.28	4.55	0.02
7007	12	859.43	130	1600.52	4.54	5.20
7009	12	651.25	130	2201.93	6.25	7.12
7010	12	873.60	130	1591.00	4.51	5.23
7018	8	4.17	130	419.79	2.68	0.02
7019	8	1182.69	130	418.99	2.67	4.31
7020	4	907.76	130	1.27	0.03	0.00
7021	4	458.39	130	4.19	0.11	0.01
7057	12	4.04	130	265.07	0.75	0.00
7058	12	4.23	130	142.36	0.40	0.00
7059	12	24.21	130	142.36	0.40	0.00
7060	12	129.58	130	407.43	1.16	0.06
7279	8	424.54	130	9.03	0.06	0.00
7280	8	3.00	130	9.03	0.06	0.00
7285	6	917.31	130	0.00	0.00	0.00
176	8	3.33	130	37.02	0.24	0.00
175	12	3.04	130	1607.12	4.56	0.02
31	8	6.55	130	0.00	0.00	0.00
78	12	4.21	130	802.47	2.28	0.01
83	12	578.54	130	659.94	1.87	0.68
92	12	4.40	130	0.00	0.00	0.00
93	12	4.14	130	649.14	1.84	0.00
94	12	72.23	130	0.00	0.00	0.00
95	12	618.48	130	649.14	1.84	0.70
116	12	7.61	130	37.22	0.11	0.00
117	12	5.83	130	0.00	0.00	0.00
122	8	635.55	130	0.00	0.00	0.00
123	8	937.69	130	0.00	0.00	0.00
124	8	3.29	130	5.15	0.03	0.00
125	8	6.96	130	27.84	0.18	0.00
193	8	3.80	130	155.83	0.99	0.00
194	8	635.35	130	162.22	1.04	0.40
196	16	1129.87	130	2024.07	3.23	2.60
197	16	996.93	130	2027.55	3.24	2.30
198	16	880.01	130	2033.76	3.25	2.05
206	12	6.91	130	257.37	0.73	0.00
207	8	1025.68	130	16.82	0.11	0.01
285	24	4.61	130	782.73	0.56	0.00
286	24	490.26	130	857.30	0.61	0.03
293	6	3.04	130	70.46	0.80	0.00
296	6	2.70	130	78.25	0.89	0.00
297	6	3.00	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
299	6	555.93	130	71.99	0.82	0.32
367	12	4.50	130	286.38	0.81	0.00
368	8	488.94	130	0.00	0.00	0.00
434	8	2.82	130	146.21	0.93	0.00
435	12	3.06	130	140.61	0.40	0.00
436	12	2.99	130	140.61	0.40	0.00
452	12	640.72	130	140.61	0.40	0.04
456	12	2.98	130	140.61	0.40	0.00
480	8	530.04	130	23.20	0.15	0.01
481	8	430.96	130	29.30	0.19	0.01
486	8	610.73	130	37.48	0.24	0.03
531	12	490.64	130	302.27	0.86	0.14
532	12	391.35	130	302.27	0.86	0.11
539	12	446.22	130	313.21	0.89	0.13
540	12	148.35	130	320.21	0.91	0.05
613	12	6.47	130	73.11	0.21	0.00
614	8	6.16	130	85.14	0.54	0.00
615	8	1171.98	130	74.57	0.48	0.17
616	8	571.19	130	95.56	0.61	0.13
617	12	431.04	130	73.11	0.21	0.01
627	6	6.95	130	34.44	0.39	0.00
628	12	8.08	130	35.23	0.10	0.00
632	6	6.08	130	3.17	0.04	0.00
633	6	6.01	130	5.60	0.06	0.00
634	6	308.92	130	5.60	0.06	0.00
642	4	5.29	130	15.09	0.39	0.00
702	8	109.29	130	0.00	0.00	0.00
703	8	5.53	130	0.00	0.00	0.00
704	16	217.95	130	739.57	1.18	0.08
722	12	6.30	130	60.25	0.17	0.00
723	12	592.58	130	60.25	0.17	0.01
724	6	6.42	130	31.73	0.36	0.00
725	6	385.24	130	31.73	0.36	0.05
733	12	7.94	130	31.00	0.09	0.00
734	8	9.81	130	31.00	0.20	0.00
735	8	932.49	130	31.00	0.20	0.03
742	8	6.17	130	11.87	0.08	0.00
743	4	6.22	130	3.35	0.09	0.00
748	6	445.69	130	1.97	0.02	0.00
749	8	348.22	130	1.97	0.01	0.00
750	8	6.13	130	8.51	0.05	0.00
889	8	4.97	130	23.55	0.15	0.00
890	16	6.62	130	759.19	1.21	0.00
891	16	5.70	130	759.28	1.21	0.00
892	16	5.77	130	759.28	1.21	0.00
942	8	6.30	130	7.60	0.05	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
943	8	12.18	130	1.59	0.01	0.00
963	16	5.65	130	739.57	1.18	0.00
964	16	6.53	130	739.57	1.18	0.00
965	16	91.18	130	803.54	1.28	0.04
966	8	5.43	130	1.59	0.01	0.00
967	8	6.65	130	1.59	0.01	0.00
968	8	5.38	130	7.60	0.05	0.00
999	8	2.69	130	16.73	0.11	0.00
1061	8	3.47	130	410.93	2.62	0.01
1062	8	960.31	130	410.93	2.62	3.38
1063	6	3.65	130	30.50	0.35	0.00
1064	6	20.69	130	30.50	0.35	0.00
1091	12	3.17	130	810.48	2.30	0.01
1092	12	628.58	130	810.48	2.30	1.08
1118	8	691.61	130	4.83	0.03	0.00
1119	8	6.50	130	4.83	0.03	0.00
1122	8	6.24	130	37.48	0.24	0.00
1123	12	6.07	130	37.48	0.11	0.00
1124	12	3.34	130	426.49	1.21	0.00
1125	12	81.04	130	426.49	1.21	0.04
1126	8	3.99	130	16.73	0.11	0.00
1135	8	6.37	130	30.93	0.20	0.00
1136	20	6.03	130	2099.74	2.14	0.01
1137	8	6.44	130	30.93	0.20	0.00
1138	8	6.22	130	30.93	0.20	0.00
1141	8	351.89	130	0.00	0.00	0.00
1175	8	6.38	130	16.12	0.10	0.00
1182	30	745.80	130	1988.73	0.90	0.08
1183	8	6.10	130	271.39	1.73	0.01
1184	8	6.23	130	271.39	1.73	0.01
1186	30	6.08	130	32.00	0.01	0.00
1187	8	6.24	130	32.00	0.20	0.00
1188	30	6.02	130	1982.24	0.90	0.00
1189	12	6.24	130	1982.24	5.62	0.06
1190	12	208.70	130	1981.50	5.62	1.88
1191	30	6.56	130	4093.43	1.86	0.00
1192	30	1305.00	130	4093.43	1.86	0.52
1198	8	6.31	130	3.71	0.02	0.00
1199	8	19.54	130	0.00	0.00	0.00
1202	8	6.22	130	288.37	1.84	0.01
1203	8	6.22	130	0.00	0.00	0.00
1204	8	38.35	130	0.00	0.00	0.00
1214	8	6.03	130	100.56	0.64	0.00
1215	8	6.03	130	63.52	0.41	0.00
1216	8	6.27	130	113.80	0.73	0.00
1221	8	7.38	130	89.34	0.57	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
1222	8	6.26	130	58.12	0.37	0.00
1223	8	4.17	130	31.22	0.20	0.00
1225	8	6.03	130	63.52	0.41	0.00
1226	8	6.27	130	113.80	0.73	0.00
1235	8	6.23	130	50.43	0.32	0.00
1245	8	4.73	130	0.00	0.00	0.00
1246	8	709.86	130	80.10	0.51	0.12
1264	8	6.05	130	0.00	0.00	0.00
1265	8	6.41	130	0.00	0.00	0.00
1308	8	6.00	130	92.02	0.59	0.00
1309	8	5.35	130	97.03	0.62	0.00
1310	8	766.95	130	89.34	0.57	0.16
1311	8	6.36	130	31.22	0.20	0.00
1312	8	6.09	130	33.98	0.22	0.00
1313	8	1011.32	130	14.72	0.09	0.01
1314	8	11.10	130	10.02	0.06	0.00
1315	8	760.53	130	14.72	0.09	0.01
1316	8	754.58	130	5.01	0.03	0.00
1324	8	6.29	130	30.52	0.19	0.00
1325	8	6.39	130	3.61	0.02	0.00
1492	12	6.21	130	1305.60	3.70	0.03
1493	12	6.33	130	0.00	0.00	0.00
1504	24	6.31	130	647.83	0.46	0.00
1505	8	6.17	130	0.00	0.00	0.00
1534	24	6.99	130	988.11	0.70	0.00
1535	14	6.00	130	988.11	2.06	0.01
1536	14	16.96	130	968.48	2.02	0.02
1537	24	6.74	130	1956.59	1.39	0.00
1538	24	6.95	130	880.87	0.62	0.00
1578	8	6.08	130	613.63	3.92	0.04
1579	8	6.09	130	0.00	0.00	0.00
1580	8	6.31	130	613.63	3.92	0.05
1581	8	6.61	130	294.73	1.88	0.01
1582	8	6.29	130	0.00	0.00	0.00
1588	6	6.81	130	0.00	0.00	0.00
1589	8	6.14	130	292.12	1.86	0.01
1612	20	39.81	130	12.73	0.01	0.00
1613	20	6.26	130	12.73	0.01	0.00
1614	20	10.93	130	0.00	0.00	0.00
1617	20	6.81	130	647.83	0.66	0.00
1618	20	6.14	130	630.97	0.64	0.00
1619	8	6.32	130	7.42	0.05	0.00
1620	8	815.25	130	7.42	0.05	0.00
1621	8	527.95	130	281.66	1.80	0.92
1622	8	211.00	130	281.66	1.80	0.37
1631	8	6.13	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
1636	8	6.70	130	538.10	3.43	0.04
1637	8	6.22	130	525.94	3.36	0.03
1638	8	6.22	130	12.16	0.08	0.00
1639	8	6.32	130	552.05	3.52	0.04
1640	8	6.05	130	290.68	1.86	0.01
1646	12	6.23	130	525.94	1.49	0.00
1647	12	6.16	130	0.96	0.00	0.00
1668	12	5.94	130	1029.07	2.92	0.02
1669	12	5.86	130	1277.47	3.62	0.02
1673	12	500.81	130	1277.47	3.62	2.00
1674	12	734.14	130	1277.47	3.62	2.93
1675	12	6.25	130	1279.07	3.63	0.02
1676	12	6.09	130	0.00	0.00	0.00
1685	12	561.66	130	1305.60	3.70	2.33
1686	12	507.37	130	1305.60	3.70	2.11
1687	12	731.55	130	1305.60	3.70	3.04
1690	12	6.29	130	1280.89	3.63	0.03
1691	8	5.84	130	24.71	0.16	0.00
1699	12	10.43	130	294.07	0.83	0.00
1700	12	4.74	130	294.07	0.83	0.00
1701	12	7.39	130	5.55	0.02	0.00
1702	12	49.52	130	5.55	0.02	0.00
2241	24	893.86	130	880.30	0.62	0.06
2242	24	907.99	130	880.30	0.62	0.06
2244	24	553.26	130	860.51	0.61	0.04
2245	24	1498.26	130	859.58	0.61	0.10
2247	12	6.19	130	2024.69	5.74	0.06
2248	12	7.03	130	2149.04	6.10	0.07
2286	8	5.79	130	390.95	2.50	0.02
2330	8	525.37	130	43.56	0.28	0.03
2331	8	408.16	130	46.82	0.30	0.03
2332	12	319.57	130	1941.15	5.51	2.77
2337	8	6.78	130	1662.01	10.61	0.32
2338	8	168.25	130	1662.01	10.61	7.87
2339	8	6.34	130	58.09	0.37	0.00
2342	8	7.19	130	10.86	0.07	0.00
2343	8	435.64	130	10.86	0.07	0.00
2344	8	7.27	130	0.00	0.00	0.00
2345	8	16.88	130	0.00	0.00	0.00
2385	8	4.60	130	0.00	0.00	0.00
2386	8	5.12	130	0.00	0.00	0.00
2387	8	90.65	130	0.00	0.00	0.00
2388	8	291.70	130	0.00	0.00	0.00
2389	8	371.19	130	9.45	0.06	0.00
2404	12	479.53	130	1533.15	4.35	2.68
2405	12	3.10	130	1548.50	4.39	0.02

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
2406	12	343.11	130	1548.50	4.39	1.95
2414	4	4.22	130	21.36	0.55	0.00
2451	8	7.13	130	307.31	1.96	0.01
2452	8	534.61	130	307.31	1.96	1.10
2453	8	6.29	130	646.50	4.13	0.05
2454	8	800.21	130	647.56	4.13	6.54
2455	12	613.94	130	2216.36	6.29	6.79
2466	12	4.44	130	86.32	0.24	0.00
2467	6	4.15	130	49.00	0.56	0.00
2468	6	910.29	130	49.00	0.56	0.25
2473	8	4.25	130	494.37	3.16	0.02
2474	8	580.27	130	494.37	3.16	2.88
2666	12	3.56	130	36.93	0.10	0.00
2667	12	3.73	130	33.81	0.10	0.00
2668	12	2.83	130	33.81	0.10	0.00
2669	8	994.11	130	0.99	0.01	0.00
2670	8	3.41	130	3.12	0.02	0.00
2679	8	2.92	130	42.33	0.27	0.00
2680	8	292.53	130	42.33	0.27	0.02
2681	6	682.19	130	32.01	0.36	0.09
2739	12	4.47	130	49.22	0.14	0.00
2754	8	3.09	130	55.44	0.35	0.00
2771	8	3.36	130	1.62	0.01	0.00
2773	12	397.79	130	36.93	0.10	0.00
2872	4	465.10	130	0.00	0.00	0.00
2873	4	6.21	130	0.00	0.00	0.00
2874	4	486.09	130	8.47	0.22	0.04
2879	4	214.88	130	10.70	0.27	0.03
2894	8	6.11	130	10.70	0.07	0.00
2895	8	6.13	130	0.00	0.00	0.00
2896	8	6.45	130	57.70	0.37	0.00
2897	8	1379.99	130	57.70	0.37	0.13
2898	8	6.08	130	31.71	0.20	0.00
2939	18	6.27	130	1442.95	1.82	0.00
2940	18	6.08	130	16.67	0.02	0.00
2982	6	6.07	130	0.00	0.00	0.00
2983	12	384.56	130	1159.49	3.29	1.28
2984	6	68.05	130	0.00	0.00	0.00
2985	16	3.42	130	1401.30	2.24	0.00
2986	6	6.08	130	36.79	0.42	0.00
2987	18	6.29	130	0.00	0.00	0.00
2992	18	1192.18	130	1482.35	1.87	0.87
2994	18	5.78	130	1482.35	1.87	0.00
2996	10	99.83	130	1.29	0.01	0.00
3004	6	6.08	130	10.35	0.12	0.00
3005	6	6.08	130	8.44	0.10	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
3006	6	6.25	130	1.91	0.02	0.00
3023	4	738.03	130	11.06	0.28	0.09
3024	6	23.45	130	21.05	0.24	0.00
3025	6	3.77	130	21.05	0.24	0.00
3026	4	42.04	130	21.05	0.54	0.02
3040	2	193.00	130	1.41	0.14	0.02
3056	8	6.40	130	43.41	0.28	0.00
3057	8	6.00	130	43.41	0.28	0.00
3058	4	6.85	130	4.91	0.13	0.00
3059	4	351.98	130	4.91	0.13	0.01
3060	6	6.04	130	38.50	0.44	0.00
3061	8	7.21	130	0.00	0.00	0.00
3062	12	6.18	130	0.00	0.00	0.00
3063	12	6.13	130	0.00	0.00	0.00
3064	12	7.67	130	1034.93	2.94	0.02
3065	12	176.06	130	1034.93	2.94	0.48
3066	12	6.85	130	1034.93	2.94	0.02
3072	12	6.79	130	1054.15	2.99	0.02
3073	12	466.94	130	1054.15	2.99	1.30
3074	12	7.07	130	1054.15	2.99	0.02
3075	12	4.49	130	1054.15	2.99	0.01
3076	4	6.30	130	53.88	1.38	0.02
3077	4	710.56	130	39.97	1.02	0.98
3099	12	7.76	130	735.12	2.09	0.01
3100	12	569.30	130	735.12	2.09	0.82
3146	12	602.65	130	324.83	0.92	0.19
3147	6	7.30	130	0.00	0.00	0.00
3148	6	7.97	130	0.00	0.00	0.00
3149	12	226.35	130	324.83	0.92	0.07
3201	6	8.08	130	12.75	0.14	0.00
3235	6	6.08	130	13.71	0.16	0.00
3236	6	660.66	130	10.29	0.12	0.01
3243	20	5.71	130	0.00	0.00	0.00
3244	12	181.15	130	42.15	0.12	0.00
3245	12	6.18	130	40.51	0.11	0.00
3246	20	12.42	130	40.51	0.04	0.00
3247	18	6.01	130	2268.19	2.86	0.01
3249	18	6.11	130	2268.19	2.86	0.01
3250	6	6.49	130	8.98	0.10	0.00
3251	6	6.05	130	0.00	0.00	0.00
3252	6	46.51	130	8.98	0.10	0.00
3253	6	27.53	130	0.00	0.00	0.00
3282	6	190.18	130	1.54	0.02	0.00
3314	8	6.24	130	0.00	0.00	0.00
3315	6	335.05	130	0.00	0.00	0.00
3316	12	63.00	130	1216.97	3.45	0.23

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
3327	18	6.27	130	2249.73	2.84	0.01
3328	18	6.27	130	2249.73	2.84	0.01
3329	10	6.10	130	525.56	2.15	0.01
3330	10	6.04	130	525.56	2.15	0.01
3331	18	6.18	130	2035.15	2.57	0.01
3332	18	6.10	130	2035.15	2.57	0.01
3340	12	6.08	130	0.00	0.00	0.00
3341	20	6.12	130	2246.54	2.29	0.01
3346	30	6.10	130	0.00	0.00	0.00
3347	24	6.02	130	0.00	0.00	0.00
3348	30	653.96	130	8340.74	3.79	0.97
3352	18	6.25	130	2268.19	2.86	0.01
3365	24	1208.02	130	8280.82	5.87	5.25
3366	24	6.04	130	8280.82	5.87	0.03
3368	6	3.26	130	0.00	0.00	0.00
3370	18	6.04	130	2268.19	2.86	0.01
3371	18	186.07	130	2268.19	2.86	0.30
3381	6	6.09	130	10.23	0.12	0.00
3382	6	6.07	130	10.23	0.12	0.00
3383	4	6.09	130	10.23	0.26	0.00
3402	12	5.83	130	324.82	0.92	0.00
3403	12	6.14	130	324.82	0.92	0.00
3404	12	6.00	130	1.69	0.00	0.00
3405	4	6.46	130	1.69	0.04	0.00
3406	6	350.62	130	23.03	0.26	0.02
3411	24	6.18	130	6325.58	4.49	0.02
3412	24	3.03	130	6919.42	4.91	0.01
3413	24	322.76	130	6919.42	4.91	1.01
3414	10	5.59	130	2261.27	9.24	0.16
3415	10	6.30	130	2261.27	9.24	0.18
3419	24	17.69	130	4.69	0.00	0.00
3420	18	6.12	130	4828.65	6.09	0.04
3421	18	6.09	130	4828.65	6.09	0.04
3422	18	6.03	130	2268.19	2.86	0.01
3424	8	6.57	130	5.71	0.04	0.00
3425	8	6.50	130	1.96	0.01	0.00
3426	18	394.27	130	53.51	0.07	0.00
3427	18	648.13	130	2268.19	2.86	1.04
3438	20	6.14	130	1647.87	1.68	0.00
3439	20	6.09	130	1709.56	1.75	0.00
3588	8	6.94	130	0.00	0.00	0.00
3598	8	2.83	130	0.00	0.00	0.00
3599	8	2.85	130	0.00	0.00	0.00
3668	24	2.18	130	4198.58	2.98	0.00
3732	6	1.58	130	0.00	0.00	0.00
3733	12	2.24	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
3734	12	2.17	130	0.00	0.00	0.00
3736	8	5.35	130	0.00	0.00	0.00
3737	8	64.74	130	0.00	0.00	0.00
3746	8	4.43	130	69.83	0.45	0.00
3760	30	6.61	130	8340.74	3.79	0.01
3761	24	72.96	130	8340.74	5.92	0.32
3762	30	6.19	130	8340.74	3.79	0.01
3763	30	47.29	130	8340.74	3.79	0.07
3773	6	4.64	130	0.00	0.00	0.00
3774	6	5.60	130	15.91	0.18	0.00
3775	6	4.66	130	15.91	0.18	0.00
3776	6	6.73	130	0.00	0.00	0.00
3777	6	8.23	130	15.92	0.18	0.00
3811	8	69.37	130	5.71	0.04	0.00
3812	8	39.16	130	5.71	0.04	0.00
3813	8	231.58	130	0.00	0.00	0.00
3873	18	1050.00	130	604.23	0.76	0.15
3874	8	3.57	130	41.95	0.27	0.00
3918	18	598.97	130	621.25	0.78	0.09
3920	18	574.04	130	621.25	0.78	0.08
3936	27	24.77	130	154.45	0.09	0.00
3952	12	5.12	130	938.79	2.66	0.01
3959	12	6.09	130	0.00	0.00	0.00
3960	12	5.91	130	0.00	0.00	0.00
3969	8	104.35	130	0.00	0.00	0.00
3970	8	4.21	130	0.00	0.00	0.00
3971	8	4.69	130	0.00	0.00	0.00
3972	8	31.68	130	0.00	0.00	0.00
3975	8	258.35	130	22.69	0.14	0.00
3976	8	720.91	130	22.69	0.14	0.01
4028	8	215.68	130	37.02	0.24	0.01
4035	8	7.98	130	0.00	0.00	0.00
4036	12	7.16	130	286.38	0.81	0.00
4041	8	3.02	130	322.15	2.06	0.01
4042	8	1322.80	130	310.00	1.98	2.76
4043	8	700.45	130	255.31	1.63	1.02
4044	8	6.47	130	218.87	1.40	0.01
4045	8	650.07	130	210.48	1.34	0.66
4046	4	6.02	130	10.64	0.27	0.00
4047	4	353.02	130	10.86	0.28	0.04
4062	12	94.20	130	274.19	0.78	0.02
4063	8	2.02	130	0.00	0.00	0.00
4185	6	700.88	130	70.46	0.80	0.38
4198	6	2.98	130	0.00	0.00	0.00
4200	6	38.35	130	0.00	0.00	0.00
4202	6	840.37	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
4232	4	708.16	130	0.00	0.00	0.00
4296	8	738.47	130	27.89	0.18	0.02
4303	12	7.73	130	144.37	0.41	0.00
4304	8	3.04	130	3.76	0.02	0.00
4324	12	3.07	130	65.51	0.19	0.00
4325	12	3.24	130	140.47	0.40	0.00
4326	12	733.79	130	140.49	0.40	0.05
4327	12	1.42	130	0.00	0.00	0.00
4351	8	507.83	130	3.76	0.02	0.00
4376	8	271.55	130	23.20	0.15	0.00
4435	12	4.07	130	303.65	0.86	0.00
4436	12	442.27	130	303.65	0.86	0.12
4518	16	6.24	130	829.60	1.32	0.00
4519	12	6.12	130	0.00	0.00	0.00
4526	12	6.62	130	27.29	0.08	0.00
4527	12	6.05	130	0.00	0.00	0.00
4528	12	13.27	130	0.00	0.00	0.00
4529	6	6.75	130	5.60	0.06	0.00
4530	6	6.42	130	19.36	0.22	0.00
4531	6	379.31	130	19.36	0.22	0.02
4532	6	7.08	130	13.76	0.16	0.00
4533	4	6.82	130	13.76	0.35	0.00
4534	4	284.83	130	13.76	0.35	0.05
4539	6	4.65	130	34.44	0.39	0.00
4540	6	4.52	130	19.36	0.22	0.00
4541	4	214.96	130	15.09	0.39	0.05
4542	6	762.86	130	34.44	0.39	0.11
4633	6	6.20	130	3.58	0.04	0.00
4634	4	6.37	130	3.58	0.09	0.00
4635	4	494.16	130	3.58	0.09	0.01
4639	12	8.41	130	31.00	0.09	0.00
4640	12	10.43	130	0.00	0.00	0.00
4641	12	39.85	130	0.00	0.00	0.00
4642	12	4.39	130	0.00	0.00	0.00
4643	8	556.02	130	19.13	0.12	0.01
4644	8	441.45	130	11.87	0.08	0.00
4645	8	391.37	130	8.51	0.05	0.00
4646	4	654.61	130	3.35	0.09	0.01
4648	8	7.14	130	31.00	0.20	0.00
4649	8	6.14	130	11.87	0.08	0.00
4663	8	6.29	130	6.90	0.04	0.00
4664	4	6.18	130	1.62	0.04	0.00
4665	4	417.59	130	1.62	0.04	0.00
4666	8	283.55	130	1.84	0.01	0.00
4704	12	87.56	130	0.00	0.00	0.00
4713	12	504.37	130	451.42	1.28	0.29

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
4714	12	502.25	130	445.03	1.26	0.28
4715	12	491.55	130	451.42	1.28	0.29
4811	12	3.15	130	0.00	0.00	0.00
4866	12	1179.22	130	255.50	0.72	0.24
4868	12	953.23	130	286.38	0.81	0.24
4914	16	1093.89	130	782.73	1.25	0.43
5030	8	262.89	130	16.73	0.11	0.00
5031	8	4.01	130	426.49	2.72	0.02
5032	8	3.15	130	426.49	2.72	0.01
5061	12	2.99	130	814.49	2.31	0.01
5062	12	3.16	130	302.27	0.86	0.00
5065	8	2.76	130	0.00	0.00	0.00
5100	8	7.08	130	45.52	0.29	0.00
5101	8	6.40	130	45.52	0.29	0.00
5108	20	6.03	130	2099.74	2.14	0.01
5109	20	6.03	130	3692.71	3.77	0.01
5163	30	775.38	130	1985.77	0.90	0.08
5177	30	1953.31	130	1983.43	0.90	0.20
5180	12	6.32	130	216.39	0.61	0.00
5181	12	6.32	130	216.39	0.61	0.00
5196	8	192.99	130	0.00	0.00	0.00
5197	30	1397.89	120	4093.43	1.86	0.64
5209	8	317.14	130	288.37	1.84	0.58
5224	12	493.60	130	216.39	0.61	0.07
5225	12	465.46	130	216.39	0.61	0.07
5226	12	505.35	130	183.77	0.52	0.06
5227	12	496.17	130	183.77	0.52	0.05
5242	8	6.45	130	92.89	0.59	0.00
5243	8	6.55	130	9.21	0.06	0.00
5244	8	850.99	130	80.10	0.51	0.14
5260	8	425.41	130	50.43	0.32	0.03
5261	8	657.38	130	50.43	0.32	0.05
5263	8	6.02	130	50.43	0.32	0.00
5264	8	152.07	130	50.43	0.32	0.01
5296	8	681.99	130	265.07	1.69	1.07
5298	8	51.50	130	0.00	0.00	0.00
5300	8	1064.41	130	251.21	1.60	1.51
5304	8	975.12	130	97.03	0.62	0.24
5322	8	682.32	130	26.91	0.17	0.02
5336	8	391.75	130	33.66	0.21	0.01
5341	8	498.09	130	41.50	0.26	0.03
5346	8	519.83	130	41.50	0.26	0.03
5371	8	821.85	130	89.34	0.57	0.17
5374	8	10.26	130	31.22	0.20	0.00
5377	8	669.52	130	0.00	0.00	0.00
5379	8	1060.49	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
5382	8	4.94	130	0.00	0.00	0.00
5385	30	9.93	130	4115.02	1.87	0.00
5386	30	1180.02	120	4115.02	1.87	0.55
5387	30	10.26	130	4115.02	1.87	0.00
5388	30	324.98	130	4159.70	1.89	0.15
5389	12	186.83	130	1505.23	4.27	1.01
5390	12	1050.11	130	1505.23	4.27	5.68
5676	12	6.85	130	1305.60	3.70	0.03
5677	12	559.43	130	1305.60	3.70	2.32
5678	24	1386.16	130	1953.43	1.39	0.41
5680	24	515.57	130	1956.59	1.39	0.15
5717	24	6.03	130	988.11	0.70	0.00
5718	24	370.67	130	1956.59	1.39	0.11
5760	8	6.51	130	604.37	3.86	0.05
5761	8	6.31	130	309.63	1.98	0.01
5766	8	6.26	130	289.08	1.85	0.01
5801	20	384.25	130	22.16	0.02	0.00
5802	20	6.52	130	22.16	0.02	0.00
5803	20	1327.05	130	12.73	0.01	0.00
5808	8	513.54	130	292.12	1.86	0.96
5809	8	6.38	130	281.66	1.80	0.01
5837	8	6.08	130	525.94	3.36	0.03
5884	12	6.41	130	1277.47	3.62	0.03
5885	12	6.41	130	1279.07	3.63	0.03
5886	6	6.11	130	1.60	0.02	0.00
5887	6	22.00	130	1.60	0.02	0.00
5888	12	299.93	130	1279.07	3.63	1.20
5900	12	462.71	130	0.00	0.00	0.00
5901	12	12.89	130	1305.60	3.70	0.05
5902	12	203.85	130	1305.60	3.70	0.85
5908	12	6.85	130	1305.60	3.70	0.03
5911	8	207.70	130	203.20	1.30	0.20
5959	12	7.94	130	288.52	0.82	0.00
5960	12	6.77	130	946.44	2.68	0.02
6008	8	7.24	130	319.79	2.04	0.02
6009	8	6.75	130	321.78	2.05	0.02
6719	8	7.48	130	124.35	0.79	0.00
6720	12	1073.87	130	2149.04	6.10	11.22
6722	12	1278.73	130	2149.38	6.10	13.37
6728	12	14.18	130	2149.66	6.10	0.15
7288	12	3.52	130	38.55	0.11	0.00
7289	12	3.34	130	36.93	0.10	0.00
7290	12	809.61	130	36.93	0.10	0.00
7291	8	453.57	130	1.62	0.01	0.00
7356	8	727.87	130	42.33	0.27	0.04
7359	12	4.61	130	125.47	0.36	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
7374	8	3.11	130	42.33	0.27	0.00
7375	6	1982.52	130	5.58	0.06	0.01
7395	12	507.80	130	78.30	0.22	0.01
7400	8	3.02	130	0.82	0.01	0.00
7401	8	908.24	130	0.15	0.00	0.00
7407	8	563.98	130	2.30	0.01	0.00
7408	8	30.16	130	0.00	0.00	0.00
7414	8	579.49	130	0.28	0.00	0.00
7422	8	939.40	130	1.84	0.01	0.00
7499	8	1304.48	130	62.93	0.40	0.14
7527	4	771.88	130	10.70	0.27	0.09
7536	12	6.53	130	1216.97	3.45	0.02
7537	6	6.30	130	15.62	0.18	0.00
7538	6	397.88	130	15.62	0.18	0.01
7584	3	7.27	130	16.50	0.75	0.01
7616	6	6.51	130	278.05	3.16	0.05
7617	6	6.29	130	95.36	1.08	0.01
7618	6	75.43	130	95.36	1.08	0.07
7623	8	7.46	130	176.81	1.13	0.01
7624	12	242.98	130	229.53	0.65	0.04
7625	12	6.07	130	229.53	0.65	0.00
7626	6	6.01	130	0.00	0.00	0.00
7627	6	70.53	130	0.00	0.00	0.00
7628	8	226.31	130	176.81	1.13	0.17
7629	6	74.82	130	135.26	1.53	0.14
7630	16	6.19	130	1390.95	2.22	0.01
7631	6	6.06	130	10.35	0.12	0.00
7632	6	15.51	130	16.50	0.19	0.00
7633	4	93.09	130	21.05	0.54	0.04
7634	16	504.09	130	1421.91	2.27	0.60
7635	18	6.27	130	1459.62	1.84	0.00
7700	8	6.84	130	411.58	2.63	0.02
7701	8	6.15	130	320.21	2.04	0.01
7702	8	279.88	130	320.21	2.04	0.62
7705	6	6.06	130	43.41	0.49	0.00
7706	12	8.35	130	691.71	1.96	0.01
7714	12	7.15	130	1049.88	2.98	0.02
7715	12	8.41	130	1037.13	2.94	0.02
7716	12	7.79	130	0.00	0.00	0.00
7717	6	889.05	130	12.75	0.14	0.02
7727	4	7.50	130	24.57	0.63	0.00
7728	4	386.15	130	24.57	0.63	0.22
7792	12	7.62	130	0.00	0.00	0.00
7884	8	6.08	130	8.98	0.06	0.00
7885	8	345.90	130	8.98	0.06	0.00
7895	18	569.05	130	2268.19	2.86	0.91

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
7896	8	8.84	130	0.00	0.00	0.00
7918	8	6.33	130	1.54	0.01	0.00
7919	8	6.20	130	43.20	0.28	0.00
7956	18	6.18	130	2268.19	2.86	0.01
7957	18	9.26	130	2268.19	2.86	0.01
7958	18	294.64	130	2251.64	2.84	0.47
7959	18	173.20	130	2249.60	2.84	0.27
7987	18	411.84	130	2268.19	2.86	0.66
7988	18	508.95	130	2268.19	2.86	0.82
8003	24	6.29	130	8340.74	5.92	0.03
8004	24	967.83	130	8340.74	5.92	4.26
8007	24	6.05	130	8280.82	5.87	0.03
8008	24	6.08	130	8280.82	5.87	0.03
8010	18	5.89	130	2268.19	2.86	0.01
8015	4	6.31	130	0.00	0.00	0.00
8016	12	281.96	130	300.72	0.85	0.08
8017	12	11.48	130	300.72	0.85	0.00
8018	24	787.72	130	6325.58	4.49	2.08
8019	8	790.57	130	3.70	0.02	0.00
8032	24	6.02	130	7172.65	5.09	0.02
8033	24	1247.48	130	7172.65	5.09	4.15
8034	12	7.25	130	300.72	0.85	0.00
8035	8	6.11	130	3.70	0.02	0.00
8036	4	6.39	130	3.70	0.09	0.00
8037	4	6.18	130	3.70	0.09	0.00
8038	4	6.13	130	3.70	0.09	0.00
8063	24	1995.67	130	6325.58	4.49	5.26
8064	8	1990.68	130	3.70	0.02	0.00
8080	10	5.95	130	0.00	0.00	0.00
8081	18	3.75	130	593.84	0.75	0.00
8082	18	14.89	130	593.84	0.75	0.00
8083	18	4.61	130	2301.75	2.90	0.01
8084	18	1332.56	130	2298.22	2.90	2.19
8085	24	6.10	130	4.69	0.00	0.00
8086	24	78.62	130	4833.34	3.43	0.13
8087	24	6.24	130	4833.34	3.43	0.01
8088	24	6.11	130	4828.65	3.42	0.01
8089	18	6.19	130	2298.22	2.90	0.01
8090	18	6.15	130	2298.22	2.90	0.01
8091	18	6.16	130	2298.22	2.90	0.01
8094	8	6.04	130	1.96	0.01	0.00
8095	8	6.01	130	5.71	0.04	0.00
8099	18	6.11	130	2268.19	2.86	0.01
8114	12	6.16	130	87.65	0.25	0.00
8115	12	63.91	130	87.65	0.25	0.00
8116	20	200.56	130	3047.39	3.11	0.33

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
8117	18	511.36	130	2033.76	2.56	0.67
8118	10	1091.28	130	525.56	2.15	2.04
8119	10	872.57	130	523.07	2.14	1.62
8120	8	6.41	130	1.57	0.01	0.00
8121	4	115.50	130	1.57	0.04	0.00
8248	18	452.68	130	1502.45	1.89	0.34
8249	6	738.13	130	9.96	0.11	0.01
8250	6	450.57	130	9.96	0.11	0.01
8251	6	6.58	130	24.41	0.28	0.00
8301	8	165.76	130	0.00	0.00	0.00
8335	8	423.04	130	1.22	0.01	0.00
8385	24	56.12	130	2.62	0.00	0.00
8387	12	6.20	130	0.00	0.00	0.00
8388	6	6.07	130	0.00	0.00	0.00
8391	8	625.93	130	40.51	0.26	0.03
8396	20	3.86	130	4198.58	4.29	0.01
8397	20	761.51	130	8280.82	8.46	8.04
8398	14	11.03	130	4082.25	8.51	0.18
8399	14	20.64	130	4082.25	8.51	0.33
8400	14	257.69	130	4082.25	8.51	4.17
8418	8	48.03	130	0.00	0.00	0.00
8421	8	764.58	130	34.68	0.22	0.03
8473	16	3.84	130	4374.39	6.98	0.04
8474	16	29.11	130	5448.60	8.69	0.40
8502	14	41.81	130	767.10	1.60	0.03
8515	30	6.14	130	0.00	0.00	0.00
8712	8	3.30	130	4.83	0.03	0.00
8713	8	3.66	130	46.78	0.30	0.00
8714	8	172.43	130	11.34	0.07	0.00
8715	8	312.47	130	58.12	0.37	0.03
8716	8	486.70	130	46.78	0.30	0.03
8735	8	6.61	130	11.34	0.07	0.00
8736	8	4.87	130	46.78	0.30	0.00
8758	18	607.69	130	621.25	0.78	0.09
8781	12	51.64	130	0.00	0.00	0.00
8782	12	841.80	130	22.31	0.06	0.00
8824	8	6.09	130	3.78	0.02	0.00
8825	8	435.10	130	3.29	0.02	0.00
8826	4	447.28	130	0.14	0.00	0.00
8827	8	5.60	130	78.30	0.50	0.00
8828	8	890.12	130	94.66	0.60	0.21
8829	4	558.11	130	6.41	0.16	0.03
8830	4	5.93	130	13.90	0.35	0.00
8867	14	3.04	130	0.00	0.00	0.00
8868	14	491.59	130	0.00	0.00	0.00
8872	24	2.86	130	861.04	0.61	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
8873	24	2.87	130	880.30	0.62	0.00
8881	6	807.44	130	84.29	0.96	0.61
8909	8	4.58	130	0.00	0.00	0.00
8910	8	4.65	130	0.00	0.00	0.00
8911	12	4.66	130	286.38	0.81	0.00
9091	12	7.18	130	38.67	0.11	0.00
9092	12	699.99	130	35.23	0.10	0.00
9093	12	6.57	130	73.11	0.21	0.00
9110	16	5.96	130	19.71	0.03	0.00
9111	8	5.53	130	0.00	0.00	0.00
9123	4	269.23	130	3.58	0.09	0.00
9219	8	5.78	130	23.55	0.15	0.00
9220	8	52.68	130	23.55	0.15	0.00
9221	16	7.60	130	782.73	1.25	0.00
9222	16	6.11	130	759.19	1.21	0.00
9269	16	5.71	130	759.28	1.21	0.00
9270	16	5.88	130	759.28	1.21	0.00
9271	16	5.51	130	0.00	0.00	0.00
9272	16	5.88	130	812.74	1.30	0.00
9273	16	5.82	130	812.74	1.30	0.00
9274	16	5.79	130	803.54	1.28	0.00
9275	16	5.34	130	803.54	1.28	0.00
9313	8	708.27	130	30.52	0.19	0.02
9314	8	620.66	130	271.39	1.73	1.01
9325	8	2.35	130	2.72	0.02	0.00
9326	8	2.36	130	5.81	0.04	0.00
9327	8	18.32	130	2.72	0.02	0.00
9328	8	35.67	130	5.81	0.04	0.00
9329	8	175.88	130	8.20	0.05	0.00
9330	12	3.87	130	810.48	2.30	0.01
9331	12	379.09	130	810.28	2.30	0.65
9332	8	3.51	130	0.00	0.00	0.00
9361	8	6.49	130	139.68	0.89	0.00
9362	8	6.33	130	139.68	0.89	0.00
9363	8	713.89	130	146.21	0.93	0.37
9372	8	6.31	130	259.36	1.66	0.01
9376	8	1079.40	130	252.98	1.61	1.55
9386	8	5.36	130	0.00	0.00	0.00
9412	8	329.58	130	0.00	0.00	0.00
9413	8	340.03	130	0.00	0.00	0.00
9439	8	674.33	130	14.72	0.09	0.01
9444	8	12.63	130	0.00	0.00	0.00
9445	8	5.58	130	0.00	0.00	0.00
9448	8	95.27	130	0.00	0.00	0.00
9450	8	6.53	130	26.91	0.17	0.00
9451	8	1077.93	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (1	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
9452	30	3189.67	120	4108.87	1.86	1.48
9453	8	6.16	130	0.00	0.00	0.00
9454	30	35.35	130	4115.02	1.87	0.01
9455	30	1939.89	120	4115.02	1.87	0.90
9456	30	1035.13	120	4115.02	1.87	0.48
9528	24	5.24	130	859.58	0.61	0.00
9529	24	5.63	130	859.58	0.61	0.00
9530	8	5.23	130	0.00	0.00	0.00
9632	8	256.89	130	613.63	3.92	1.90
9633	8	70.23	130	0.00	0.00	0.00
9637	8	349.02	130	604.37	3.86	2.51
9644	24	7.64	130	12.67	0.01	0.00
9645	8	6.13	130	10.05	0.06	0.00
9646	8	74.34	130	10.05	0.06	0.00
9647	24	376.94	130	12.67	0.01	0.00
9648	24	844.96	130	12.73	0.01	0.00
9653	8	6.25	130	0.00	0.00	0.00
9654	8	29.71	130	0.00	0.00	0.00
9655	8	392.74	130	538.10	3.43	2.28
9656	8	63.88	130	12.16	0.08	0.00
9657	8	466.92	130	525.94	3.36	2.59
9658	8	418.62	130	525.94	3.36	2.33
9674	12	6.42	130	1279.07	3.63	0.03
9675	12	240.34	130	0.00	0.00	0.00
9980	8	14.54	130	390.95	2.50	0.05
9981	8	927.19	130	390.95	2.50	2.97
10004	12	582.90	130	151.49	0.43	0.04
10005	12	6.57	130	1941.15	5.51	0.06
10006	12	6.48	130	1985.29	5.63	0.06
10007	8	753.42	130	76.23	0.49	0.12
10014	8	334.32	130	10.86	0.07	0.00
10015	8	710.84	130	10.86	0.07	0.00
10016	8	539.01	130	10.86	0.07	0.00
10044	8	342.52	130	25.23	0.16	0.01
10045	8	5.08	130	9.45	0.06	0.00
10046	8	36.11	130	0.00	0.00	0.00
10058	12	3.10	130	27.39	0.08	0.00
10059	8	306.08	130	27.39	0.17	0.01
10060	8	350.03	130	1514.94	9.67	13.80
10069	8	4.44	130	365.26	2.33	0.01
10070	8	541.19	130	369.78	2.36	1.57
10071	4	5.67	130	14.96	0.38	0.00
10072	4	592.02	130	14.09	0.36	0.12
10073	12	7.27	130	2218.63	6.29	0.08
10074	12	7.07	130	1574.92	4.47	0.04
10075	4	380.31	130	16.19	0.41	0.10

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
10076	4	7.18	130	9.67	0.25	0.00
10077	4	179.54	130	9.67	0.25	0.02
10078	8	825.96	130	333.63	2.13	1.98
10079	8	4.06	130	337.45	2.15	0.01
10080	8	1003.77	130	351.62	2.24	2.65
10173	12	2.52	130	3.94	0.01	0.00
10174	12	295.82	130	1.18	0.00	0.00
10192	8	1507.01	130	75.63	0.48	0.23
10205	12	728.60	130	0.00	0.00	0.00
10210	8	6.58	130	17.27	0.11	0.00
10261	16	6.10	130	1442.95	2.30	0.01
10262	16	6.27	130	1442.95	2.30	0.01
10263	16	6.36	130	1442.95	2.30	0.01
10283	6	1071.63	130	286.95	3.26	7.87
10289	18	6.51	130	1482.35	1.87	0.00
10290	18	862.07	130	946.40	1.19	0.27
10299	6	45.61	130	1.91	0.02	0.00
10300	6	310.79	130	8.44	0.10	0.00
10329	12	6.37	130	1054.15	2.99	0.02
10330	12	858.40	130	1054.15	2.99	2.40
10369	12	704.77	130	324.83	0.92	0.22
10370	12	6.28	130	324.83	0.92	0.00
10371	12	834.11	130	324.83	0.92	0.26
10405	6	10.14	130	0.00	0.00	0.00
10406	6	6.34	130	0.00	0.00	0.00
10407	6	79.12	130	1.54	0.02	0.00
10408	6	6.46	130	1.54	0.02	0.00
10434	20	5.84	130	2249.60	2.30	0.01
10435	20	330.09	130	2246.54	2.29	0.31
10436	20	580.54	130	2246.54	2.29	0.55
10437	12	6.05	130	0.00	0.00	0.00
10438	20	6.08	130	2241.54	2.29	0.01
10439	20	6.27	130	2241.54	2.29	0.01
10440	20	5.98	130	1715.97	1.75	0.00
10441	20	6.23	130	1715.97	1.75	0.00
10442	20	6.08	130	2035.15	2.08	0.00
10443	20	6.10	130	3047.39	3.11	0.01
10444	20	6.19	130	3047.39	3.11	0.01
10459	18	48.01	130	2268.19	2.86	0.08
10463	6	5.11	130	0.00	0.00	0.00
10465	6	3.02	130	0.00	0.00	0.00
10471	4	127.15	130	10.23	0.26	0.01
10472	24	585.03	130	7162.42	5.08	1.94
10473	24	829.83	130	7155.41	5.07	2.75
10474	12	7.32	130	617.60	1.75	0.01
10475	12	26.31	130	617.60	1.75	0.03

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
10486	4	6.06	130	1.69	0.04	0.00
10487	12	6.06	130	23.03	0.07	0.00
10488	8	6.15	130	6.04	0.04	0.00
10489	18	4.88	130	6.04	0.01	0.00
10629	8	4.75	130	15.38	0.10	0.00
10649	8	75.98	130	0.00	0.00	0.00
10687	12	5.11	130	622.25	1.77	0.01
10688	12	4.94	130	627.96	1.78	0.01
10689	12	4.73	130	5.71	0.02	0.00
10690	8	3.96	130	5.71	0.04	0.00
10818	8	2.82	130	8.20	0.05	0.00
10840	8	238.21	130	4.83	0.03	0.00
10845	12	400.25	130	810.28	2.30	0.69
10846	12	432.23	130	802.47	2.28	0.73
10862	8	700.13	130	30.93	0.20	0.02
10868	8	411.51	130	0.00	0.00	0.00
10871	8	888.03	130	43.38	0.28	0.05
10878	12	570.99	130	1985.29	5.63	5.15
10900	8	115.78	130	127.03	0.81	0.05
10901	8	735.41	130	127.03	0.81	0.29
10915	8	360.71	130	26.91	0.17	0.01
10916	8	399.69	130	26.91	0.17	0.01
10932	12	4.76	130	0.00	0.00	0.00
10933	12	6.14	130	0.00	0.00	0.00
10934	12	967.46	130	1505.23	4.27	5.23
10935	30	5.09	130	4115.02	1.87	0.00
10936	8	907.59	130	1505.23	9.61	35.35
10993	6	6.38	130	0.00	0.00	0.00
10995	6	34.13	130	0.00	0.00	0.00
10996	8	228.30	130	0.00	0.00	0.00
10997	8	401.67	130	0.00	0.00	0.00
11040	8	533.23	130	293.56	1.87	1.01
11079	8	26.91	130	1.22	0.01	0.00
11080	8	10.27	130	0.91	0.01	0.00
11081	8	52.56	130	0.91	0.01	0.00
11082	8	28.57	130	319.79	2.04	0.06
11256	12	14.82	130	2149.38	6.10	0.15
11257	8	7.18	130	390.95	2.50	0.02
11258	8	405.64	130	11.59	0.07	0.00
11259	8	8.39	130	393.95	2.51	0.03
11280	8	486.54	130	22.48	0.14	0.01
11281	12	502.84	130	1932.38	5.48	4.32
11296	12	853.73	130	1574.92	4.47	5.02
11298	8	6.97	130	315.28	2.01	0.02
11299	8	486.03	130	316.89	2.02	1.06
11300	8	3.97	130	316.89	2.02	0.01

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
11301	8	629.52	130	323.52	2.06	1.42
11302	4	6.20	130	12.91	0.33	0.00
11303	4	340.54	130	12.91	0.33	0.06
11318	12	3.92	130	2185.60	6.20	0.04
11319	4	3.48	130	14.43	0.37	0.00
11320	4	734.43	130	14.43	0.37	0.15
11321	4	3.77	130	25.45	0.65	0.00
11322	4	549.53	130	8.11	0.21	0.04
11338	12	251.07	130	1646.00	4.67	1.60
11341	12	246.04	130	1646.00	4.67	1.57
11342	12	493.02	130	1646.00	4.67	3.14
11348	12	1360.41	130	37.22	0.11	0.01
11349	8	640.68	130	353.96	2.26	1.71
11351	12	3.85	130	1980.39	5.62	0.03
11352	12	998.06	130	1962.31	5.57	8.82
11353	12	3.65	130	37.32	0.11	0.00
11356	10	517.85	130	510.81	2.09	0.92
11357	10	4.15	130	510.56	2.09	0.01
11358	8	542.84	130	469.90	3.00	2.45
11359	4	5.92	130	54.59	1.39	0.01
11360	4	1213.40	130	56.39	1.44	3.16
11361	4	750.35	130	8.93	0.23	0.06
11362	8	649.01	130	460.45	2.94	2.82
11363	8	367.92	130	454.38	2.90	1.56
11476	8	8.50	130	76.25	0.49	0.00
11488	8	741.52	130	1.77	0.01	0.00
11495	8	1010.71	130	8.75	0.06	0.00
11512	14	24.18	130	1216.97	2.54	0.04
11515	14	358.58	130	1221.54	2.55	0.62
11531	6	671.81	130	16.97	0.19	0.03
11555	24	978.67	130	8226.94	5.83	4.20
11615	8	381.80	130	43.12	0.28	0.02
11616	8	145.58	130	0.00	0.00	0.00
11617	12	1094.62	130	42.15	0.12	0.01
11618	12	491.21	130	42.15	0.12	0.00
11644	8	20.07	130	0.14	0.00	0.00
11645	18	201.85	130	2298.22	2.90	0.33
11646	18	413.26	130	2298.08	2.90	0.68
11648	18	6.31	130	2298.08	2.90	0.01
11657	20	1102.53	130	1647.37	1.68	0.59
11658	20	6.16	130	1647.87	1.68	0.00
11659	10	1045.27	130	520.94	2.13	1.92
11660	8	6.27	130	1.57	0.01	0.00
11661	10	1049.40	130	520.35	2.13	1.93
11662	10	6.02	130	518.78	2.12	0.01
11663	10	6.13	130	520.35	2.13	0.01

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
11664	8	240.35	130	1.57	0.01	0.00
11665	10	917.87	130	518.78	2.12	1.68
11727	8	7.02	130	5.01	0.03	0.00
11740	8	508.47	130	27.84	0.18	0.01
11741	8	8.96	130	39.55	0.25	0.00
11742	8	24.02	130	39.55	0.25	0.00
11743	8	277.77	130	39.55	0.25	0.01
11759	8	87.79	130	13.22	0.08	0.00
11761	8	98.47	130	15.38	0.10	0.00
11793	8	11.99	130	0.00	0.00	0.00
11794	8	119.24	130	11.71	0.07	0.00
11817	8	5.98	130	58.12	0.37	0.00
11818	8	383.33	130	41.95	0.27	0.02
11819	8	450.20	130	41.95	0.27	0.02
11842	6	340.60	130	0.00	0.00	0.00
11849	12	5.89	130	0.00	0.00	0.00
11850	12	6.23	130	37.22	0.11	0.00
11858	8	4.81	130	22.69	0.14	0.00
11859	8	5.06	130	0.00	0.00	0.00
11860	8	266.61	130	0.00	0.00	0.00
11882	12	2.91	130	1586.39	4.50	0.02
11883	12	2.75	130	37.02	0.11	0.00
11885	8	6.70	130	0.00	0.00	0.00
11899	8	6.56	130	16.82	0.11	0.00
11900	8	615.65	130	16.82	0.11	0.01
11901	8	6.18	130	16.82	0.11	0.00
11954	6	3.00	130	71.99	0.82	0.00
11955	6	3.00	130	6.26	0.07	0.00
12073	12	3.51	130	302.27	0.86	0.00
12074	12	9.21	130	303.65	0.86	0.00
12126	12	6.61	130	97.24	0.28	0.00
12127	12	6.38	130	255.50	0.72	0.00
12133	12	7.45	130	32.40	0.09	0.00
12134	12	854.13	130	27.29	0.08	0.00
12135	16	6.39	130	829.60	1.32	0.00
12148	6	7.86	130	27.29	0.31	0.00
12149	6	1338.86	130	27.29	0.31	0.13
12150	6	7.39	130	0.00	0.00	0.00
12152	6	6.01	130	2.43	0.03	0.00
12199	8	6.48	130	62.60	0.40	0.00
12200	4	482.71	130	0.00	0.00	0.00
12205	16	37.82	130	19.71	0.03	0.00
12206	16	826.72	130	829.60	1.32	0.37
12225	12	6.19	130	95.56	0.27	0.00
12231	8	4.96	130	1.84	0.01	0.00
12232	8	4.28	130	0.56	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
12233	8	760.57	130	7.23	0.05	0.00
12234	4	4.66	130	1.97	0.05	0.00
12264	12	3.68	130	451.42	1.28	0.00
12265	12	708.72	130	451.42	1.28	0.41
12318	16	5.68	130	748.80	1.19	0.00
12319	16	6.01	130	748.80	1.19	0.00
12320	8	6.11	130	10.48	0.07	0.00
12321	8	5.85	130	10.48	0.07	0.00
12322	8	486.92	130	10.48	0.07	0.00
12352	12	60.01	130	274.19	0.78	0.01
12365	16	5.65	130	19.71	0.03	0.00
12366	12	96.14	130	0.00	0.00	0.00
12367	16	951.05	130	824.66	1.32	0.42
12437	12	2.44	130	814.04	2.31	0.00
12438	12	3.09	130	814.49	2.31	0.01
12439	12	646.58	130	814.49	2.31	1.12
12440	8	2.64	130	0.45	0.00	0.00
12441	8	17.12	130	0.45	0.00	0.00
12442	12	3.20	130	587.36	1.67	0.00
12443	12	3.12	130	617.60	1.75	0.00
12444	12	2.93	130	617.60	1.75	0.00
12445	12	44.03	130	617.60	1.75	0.05
12459	12	6.24	130	183.69	0.52	0.00
12460	12	6.15	130	164.21	0.47	0.00
12472	30	520.74	130	2101.45	0.95	0.06
12481	8	6.48	130	4.83	0.03	0.00
12509	30	1171.88	130	1988.41	0.90	0.12
12514	8	411.79	130	31.12	0.20	0.01
12517	8	6.31	130	255.65	1.63	0.01
12521	8	6.76	130	288.37	1.84	0.01
12536	8	576.05	130	92.89	0.59	0.13
12537	8	464.28	130	92.89	0.59	0.10
12554	8	991.18	130	10.02	0.06	0.00
12602	8	16.62	130	89.34	0.57	0.00
12710	12	377.06	130	0.00	0.00	0.00
12717	8	63.25	130	0.00	0.00	0.00
12718	8	37.21	130	0.00	0.00	0.00
12719	24	162.26	130	647.83	0.46	0.01
12720	24	6.21	130	1953.43	1.39	0.00
12734	14	523.72	130	988.11	2.06	0.61
12735	14	524.03	130	968.48	2.02	0.59
12736	14	16.32	130	968.48	2.02	0.02
12737	14	6.31	130	988.11	2.06	0.01
12738	12	6.00	130	2024.69	5.74	0.06
12757	8	385.01	130	292.12	1.86	0.72
12775	24	951.21	130	2.62	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
12776	24	7.03	130	2.62	0.00	0.00
12777	8	6.33	130	630.97	4.03	0.05
12778	8	602.72	130	630.97	4.03	4.69
12781	24	601.51	130	647.83	0.46	0.02
12782	8	6.45	130	277.68	1.77	0.01
12783	8	6.35	130	0.00	0.00	0.00
12792	8	338.18	130	277.68	1.77	0.58
12793	8	373.64	130	277.68	1.77	0.64
12797	8	255.97	130	293.56	1.87	0.48
12799	8	6.30	130	538.10	3.43	0.04
12804	12	29.53	130	525.94	1.49	0.02
12805	8	6.26	130	203.20	1.30	0.01
12806	8	6.54	130	321.78	2.05	0.01
12823	12	6.10	130	203.03	0.58	0.00
12831	8	35.98	130	20.78	0.13	0.00
12832	12	774.06	130	1279.07	3.63	3.09
12833	12	362.76	130	1279.07	3.63	1.45
12834	12	228.51	130	1279.07	3.63	0.91
12843	12	5.28	130	1024.25	2.91	0.01
12844	12	6.14	130	294.07	0.83	0.00
13180	12	117.08	130	2024.69	5.74	1.10
13181	12	183.86	130	2024.69	5.74	1.72
13217	8	11.65	130	29.30	0.19	0.00
13218	8	548.99	130	29.30	0.19	0.01
13227	8	700.32	130	22.48	0.14	0.01
13234	8	7.42	130	10.86	0.07	0.00
13235	8	6.23	130	10.86	0.07	0.00
13236	8	4.43	130	10.86	0.07	0.00
13270	12	7.17	130	2177.44	6.18	0.08
13299	4	6.38	130	25.99	0.66	0.00
13300	4	500.73	130	17.31	0.44	0.15
13301	4	4.36	130	10.78	0.28	0.00
13302	4	375.43	130	10.78	0.28	0.05
13307	6	514.55	130	49.00	0.56	0.14
13308	6	943.80	130	35.29	0.40	0.14
13314	4	4.48	130	5.65	0.14	0.00
13315	4	571.76	130	5.65	0.14	0.02
13316	4	4.04	130	10.54	0.27	0.00
13317	4	1224.17	130	8.21	0.21	0.09
13459	6	3.01	130	33.30	0.38	0.00
13465	6	4.44	130	0.00	0.00	0.00
13527	8	3.13	130	13.11	0.08	0.00
13528	8	4.62	130	13.11	0.08	0.00
13541	6	964.25	130	1.67	0.02	0.00
13586	8	303.82	130	0.00	0.00	0.00
13616	8	1097.31	130	81.89	0.52	0.19

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
13628	8	36.25	130	0.00	0.00	0.00
13629	8	6.10	130	10.70	0.07	0.00
13630	8	463.58	130	31.71	0.20	0.01
13631	8	6.08	130	25.99	0.17	0.00
13632	8	1429.71	130	8.62	0.06	0.00
13637	8	21.84	130	7.70	0.05	0.00
13644	6	6.30	130	0.04	0.00	0.00
13647	4	6.61	130	8.47	0.22	0.00
13648	4	1015.46	130	2.52	0.06	0.01
13688	6	6.15	130	278.05	3.16	0.04
13699	6	67.92	130	0.04	0.00	0.00
13702	14	12.29	130	1390.95	2.90	0.03
13705	6	6.20	130	16.50	0.19	0.00
13741	6	329.59	130	43.41	0.49	0.07
13742	6	6.02	130	4.91	0.06	0.00
13743	6	955.66	130	4.87	0.06	0.00
13746	12	553.97	130	1027.56	2.91	1.48
13747	12	6.29	130	1027.56	2.91	0.02
13748	12	7.84	130	0.00	0.00	0.00
13755	12	6.05	130	1054.15	2.99	0.02
13757	4	7.31	130	39.97	1.02	0.01
13758	4	7.99	130	15.40	0.39	0.00
13759	4	101.23	130	15.40	0.39	0.02
13774	12	8.89	130	735.12	2.09	0.01
13863	6	4.95	130	8.98	0.10	0.00
13870	20	12.19	130	40.51	0.04	0.00
13871	20	6.11	130	40.51	0.04	0.00
13872	20	6.45	130	0.00	0.00	0.00
13902	8	6.08	130	44.74	0.29	0.00
13903	8	71.54	130	44.74	0.29	0.00
13928	20	6.08	130	3692.71	3.77	0.01
13929	20	6.03	130	3692.71	3.77	0.01
13937	20	6.08	130	2246.54	2.29	0.01
13938	20	6.21	130	2246.54	2.29	0.01
13961	24	1058.40	130	8295.53	5.88	4.61
13962	24	1022.39	130	8295.53	5.88	4.46
13965	18	415.58	130	2268.19	2.86	0.67
13969	4	884.91	130	3.70	0.09	0.01
13970	4	6.13	130	0.00	0.00	0.00
13990	6	16.49	130	14.32	0.16	0.00
13991	6	441.63	130	14.32	0.16	0.01
13992	6	635.69	130	7.12	0.08	0.00
13999	10	5.44	130	2261.27	9.24	0.15
14000	18	6.05	130	593.84	0.75	0.00
14001	10	6.10	130	0.00	0.00	0.00
14003	18	70.00	130	4828.65	6.09	0.45

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
14004	18	6.03	130	2298.22	2.90	0.01
14009	8	6.09	130	40.02	0.26	0.00
14010	8	908.16	130	7.67	0.05	0.00
14011	18	6.01	130	53.51	0.07	0.00
14020	20	6.02	130	1709.56	1.75	0.00
14021	12	6.11	130	87.65	0.25	0.00
14083	18	352.72	130	1482.35	1.87	0.26
14084	18	293.25	130	1502.38	1.89	0.22
14099	8	7.79	130	0.00	0.00	0.00
14100	8	3.45	130	0.00	0.00	0.00
14101	8	58.28	130	0.00	0.00	0.00
14132	8	9.87	130	58.12	0.37	0.00
14182	12	547.13	130	939.87	2.67	1.24
14185	12	3.55	130	661.53	1.88	0.00
14194	12	508.92	130	651.24	1.85	0.58
14195	12	5.13	130	649.14	1.84	0.01
14200	18	516.88	130	604.25	0.76	0.07
14203	18	762.10	130	604.25	0.76	0.11
14210	12	484.82	130	939.87	2.67	1.10
14221	8	5.00	130	0.00	0.00	0.00
14222	8	48.72	130	0.00	0.00	0.00
14224	8	3.65	130	22.69	0.14	0.00
14225	8	366.31	130	22.69	0.14	0.01
14226	8	2.21	130	0.00	0.00	0.00
14253	8	508.41	130	37.02	0.24	0.02
14255	12	7.03	130	286.38	0.81	0.00
14256	12	814.09	130	286.38	0.81	0.20
14259	12	981.72	130	286.38	0.81	0.25
14260	8	80.68	130	0.00	0.00	0.00
14269	8	1089.64	130	238.18	1.52	1.40
14270	8	6.40	130	222.65	1.42	0.01
14271	8	541.99	130	233.45	1.49	0.67
14272	8	6.23	130	203.55	1.30	0.01
14273	8	535.04	130	203.55	1.30	0.51
14274	8	6.32	130	192.91	1.23	0.01
14275	8	406.09	130	192.91	1.23	0.35
14276	8	746.44	130	176.32	1.13	0.55
14277	4	6.02	130	12.91	0.33	0.00
14278	8	4.01	130	98.66	0.63	0.00
14279	8	899.98	130	98.66	0.63	0.23
14280	8	51.82	130	78.30	0.50	0.01
14343	6	618.48	130	6.26	0.07	0.00
14353	6	1032.90	130	124.35	1.41	1.61
14400	12	308.01	130	0.00	0.00	0.00
14402	12	363.66	130	0.00	0.00	0.00
14404	12	409.96	130	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
14405	12	78.99	130	0.00	0.00	0.00
14411	8	7.76	130	0.00	0.00	0.00
14418	14	5.05	130	4198.58	8.75	0.09
14419	14	258.03	130	4198.58	8.75	4.40
14420	14	10.76	130	4198.58	8.75	0.18
14450	4	5.37	130	62.60	1.60	0.02
14469	6	186.85	130	0.00	0.00	0.00
14472	8	5.13	130	22.69	0.14	0.00
14489	18	5.00	130	2311.68	2.91	0.01
14490	18	54.37	130	2311.68	2.91	0.09
14497	4	524.95	130	21.10	0.54	0.22
14498	6	5.00	130	15.92	0.18	0.00
14499	4	65.50	130	0.00	0.00	0.00
14500	4	1239.60	130	15.02	0.38	0.28
14589	12	25.78	130	144.37	0.41	0.00
14590	8	518.86	130	3.76	0.02	0.00
14610	12	477.83	130	87.65	0.25	0.01
14615	12	497.35	130	69.39	0.20	0.01
14616	12	514.88	130	65.51	0.19	0.01
14618	12	267.56	130	65.51	0.19	0.00
14627	12	602.72	130	140.61	0.40	0.04
14675	8	142.20	130	0.00	0.00	0.00
14676	8	497.67	130	302.27	1.93	0.99
14677	8	3.27	130	1.38	0.01	0.00
14678	8	3.63	130	0.00	0.00	0.00
14679	8	214.99	130	1.38	0.01	0.00
14680	12	464.93	130	313.21	0.89	0.14
14751	12	6.09	130	85.14	0.24	0.00
14759	4	7.01	130	2.83	0.07	0.00
14760	4	165.53	130	2.83	0.07	0.00
14762	4	6.01	130	2.43	0.06	0.00
14763	4	111.53	130	2.43	0.06	0.00
14834	12	4.35	130	43.72	0.12	0.00
14835	12	4.19	130	43.71	0.12	0.00
14836	12	779.84	130	31.00	0.09	0.00
14840	8	6.85	130	19.13	0.12	0.00
14849	8	6.31	130	8.51	0.05	0.00
15014	16	1353.59	130	748.80	1.19	0.49
15015	16	782.59	130	759.28	1.21	0.29
15016	16	594.27	130	759.28	1.21	0.22
15101	12	1118.52	130	604.79	1.72	1.12
15122	12	379.16	130	445.03	1.26	0.21
15123	12	416.19	130	435.86	1.24	0.23
15124	12	3.58	130	435.86	1.24	0.00
15136	20	6.03	130	1638.82	1.67	0.00
15137	20	768.28	130	3692.71	3.77	1.82

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
15138	30	868.33	130	2099.74	0.95	0.10
15139	8	129.00	130	30.93	0.20	0.00
15169	30	6.15	130	1985.77	0.90	0.00
15170	30	978.57	130	1985.77	0.90	0.10
15177	8	627.36	130	271.39	1.73	1.02
15189	12	329.11	130	216.39	0.61	0.05
15190	30	7.02	130	2170.85	0.99	0.00
15191	30	625.24	130	2170.85	0.99	0.08
15198	12	459.35	130	1985.29	5.63	4.15
15231	8	486.42	130	92.89	0.59	0.11
15232	8	334.09	130	92.89	0.59	0.07
15235	8	6.07	130	83.68	0.53	0.00
15241	8	646.75	130	9.21	0.06	0.00
15245	8	1938.42	130	50.43	0.32	0.14
15321	8	2.13	130	0.00	0.00	0.00
15422	27	1426.31	130	616.44	0.35	0.03
15562	8	498.48	130	307.00	1.96	1.02
15567	8	88.49	130	294.73	1.88	0.17
15629	8	482.47	130	302.37	1.93	0.96
15630	8	471.37	130	297.59	1.90	0.91
15710	8	1815.71	130	203.20	1.30	1.73
15711	12	1387.03	130	1024.25	2.91	3.67
15712	12	126.02	130	946.44	2.68	0.29
15756	8	10.44	130	1.99	0.01	0.00
15757	8	145.59	130	1.99	0.01	0.00
15758	8	53.81	130	321.78	2.05	0.12
15759	8	1642.31	130	321.78	2.05	3.67
15760	8	342.58	130	203.20	1.30	0.33
16143	24	854.54	130	857.30	0.61	0.06
16170	12	766.50	130	939.95	2.67	1.73
16220	12	501.28	130	1941.15	5.51	4.34
16221	8	499.74	130	271.92	1.74	0.82
16225	8	508.21	130	120.77	0.77	0.19
16226	8	488.34	130	120.77	0.77	0.18
16268	8	489.10	130	58.09	0.37	0.05
16283	8	6.94	130	99.08	0.63	0.00
16284	8	3.72	130	94.06	0.60	0.00
16290	8	3.16	130	1.58	0.01	0.00
16291	8	222.87	130	1.58	0.01	0.00
16308	8	4.68	130	25.23	0.16	0.00
16319	12	394.35	130	1586.39	4.50	2.35
16323	8	4.12	130	458.25	2.92	0.02
16324	4	4.72	130	3.87	0.10	0.00
16343	4	7.99	130	31.84	0.81	0.01
16344	4	397.67	130	17.04	0.43	0.11
16345	8	6.66	130	382.84	2.44	0.02

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
16346	4	6.75	130	31.30	0.80	0.01
16347	4	903.62	130	21.60	0.55	0.40
16348	8	4.04	130	653.48	4.17	0.03
16349	4	252.75	130	9.97	0.25	0.03
16350	8	547.96	130	329.65	2.10	1.28
16351	8	6.80	130	331.13	2.11	0.02
16352	4	725.21	130	17.85	0.46	0.22
16353	8	9.14	130	359.03	2.29	0.03
16357	4	5.98	130	72.66	1.86	0.02
16358	4	977.09	130	65.75	1.68	3.38
16359	8	3.71	130	416.25	2.66	0.01
16376	27	1.87	130	0.00	0.00	0.00
16377	12	66.76	130	265.07	0.75	0.01
16409	8	4.66	130	42.33	0.27	0.00
16410	8	4.66	130	42.33	0.27	0.00
16508	12	557.08	130	38.55	0.11	0.00
16548	12	883.91	130	142.03	0.40	0.06
16549	12	447.87	130	130.00	0.37	0.03
16577	12	497.77	130	58.16	0.16	0.01
16578	12	493.07	130	58.16	0.16	0.01
16579	12	495.59	130	58.16	0.16	0.01
16581	12	482.65	130	58.16	0.16	0.01
16584	8	431.77	130	3.12	0.02	0.00
16585	8	2.96	130	3.12	0.02	0.00
16623	12	799.63	130	17.27	0.05	0.00
16710	6	6.07	130	21.05	0.24	0.00
16711	6	6.16	130	21.05	0.24	0.00
16734	8	6.53	130	183.62	1.17	0.01
16735	8	924.87	130	182.42	1.16	0.72
16737	8	542.54	130	178.11	1.14	0.41
16745	12	6.07	130	1159.49	3.29	0.02
16746	12	381.26	130	1159.49	3.29	1.27
16747	18	6.17	130	952.20	1.20	0.00
16748	18	971.96	130	946.40	1.19	0.31
16749	6	434.62	130	10.35	0.12	0.01
16750	16	5.01	130	1401.30	2.24	0.01
16751	18	6.08	130	1459.62	1.84	0.00
16752	18	894.81	130	1459.62	1.84	0.63
16753	18	6.47	130	16.67	0.02	0.00
16754	18	24.32	130	16.67	0.02	0.00
16782	4	642.98	130	4.40	0.11	0.01
16800	8	903.92	130	410.93	2.62	3.18
16802	12	422.23	130	691.71	1.96	0.54
16803	8	6.24	130	691.71	4.42	0.06
16808	12	705.30	130	1034.93	2.94	1.91
16809	12	7.88	130	1034.93	2.94	0.02

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
16810	12	5.97	130	0.00	0.00	0.00
16811	12	8.00	130	0.00	0.00	0.00
16856	12	130.91	130	0.00	0.00	0.00
16857	12	6.62	130	0.00	0.00	0.00
16858	12	10.61	130	0.00	0.00	0.00
16859	12	6.30	130	324.83	0.92	0.00
16861	12	1186.99	130	324.82	0.92	0.37
16886	6	607.75	130	8.57	0.10	0.01
16887	6	849.32	130	8.57	0.10	0.01
16930	8	169.15	130	22.69	0.14	0.00
16931	8	6.08	130	22.69	0.14	0.00
16978	8	983.17	130	43.20	0.28	0.05
17011	20	6.22	130	2246.54	2.29	0.01
17012	20	1176.73	130	2246.54	2.29	1.11
17013	20	691.67	130	1715.97	1.75	0.40
17014	10	608.08	130	1711.26	6.99	10.13
17019	8	112.14	130	0.00	0.00	0.00
17020	30	596.59	130	8340.74	3.79	0.89
17028	8	6.13	130	44.74	0.29	0.00
17029	8	6.00	130	0.00	0.00	0.00
17052	18	6.09	130	40.02	0.05	0.00
17056	12	6.10	130	0.00	0.00	0.00
17160	18	866.33	130	946.40	1.19	0.28
17172	12	24.66	130	0.00	0.00	0.00
17233	12	418.78	130	0.00	0.00	0.00
17240	24	973.27	130	7153.15	5.07	3.22
17241	24	19.00	130	6325.58	4.49	0.05
17243	6	4.47	130	0.00	0.00	0.00
17267	12	500.20	130	286.38	0.81	0.13
17278	4	875.15	130	7.60	0.19	0.06
17315	8	5.32	130	13.22	0.08	0.00
17324	10	84.62	130	0.00	0.00	0.00
17365	6	3.67	130	12.14	0.14	0.00
17428	6	429.21	130	11.09	0.13	0.01
17429	6	733.03	130	11.09	0.13	0.01
17636	12	11.85	130	320.21	0.91	0.00
17765	12	598.83	130	151.49	0.43	0.05
17769	12	422.59	130	1586.39	4.50	2.52
17770	12	114.21	130	1607.12	4.56	0.70
17789	12	7.46	130	1054.15	2.99	0.02
17790	12	6.29	130	1054.15	2.99	0.02
17791	12	500.18	130	1049.88	2.98	1.39
17796	6	6.08	130	23.03	0.26	0.00
17797	12	6.12	130	317.66	0.90	0.00
17798	18	4.79	130	2307.79	2.91	0.01
17799	18	22.59	130	2307.79	2.91	0.04

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
17800	18	439.88	130	2311.68	2.91	0.73
17822	8	496.95	130	23.20	0.15	0.01
17823	30	961.43	130	1975.38	0.90	0.10
17839	12	891.74	130	2149.38	6.10	9.32
17841	12	966.93	130	2149.66	6.10	10.11
17975	12	1474.05	130	49.22	0.14	0.01
17976	12	487.42	130	49.22	0.14	0.00
17977	12	492.80	130	49.22	0.14	0.00
17978	12	494.48	130	49.22	0.14	0.00
17979	12	1022.03	130	49.22	0.14	0.01
P11	10	76.89	130	1715.24	7.01	1.29
P13	20	4.41	130	2241.54	2.29	0.00
P15	20	341.73	130	2246.54	2.29	0.32
P17	16	303.66	130	1442.95	2.30	0.37
P19	24	604.78	130	8280.82	5.87	2.63
P21	20	2.48	130	2249.60	2.30	0.00
P23	12	11.14	130	176.81	0.50	0.00
P25	8	46.58	130	0.00	0.00	0.00
P27	8	5.99	130	5.71	0.04	0.00
P29	16	71.21	130	1431.16	2.28	0.09
11	36	8.38	130	8340.74	2.63	0.01
13	36	16.34	130	2816.66	0.89	0.00
15	36	17.48	130	2707.37	0.85	0.00
17	36	17.53	130	2707.37	0.85	0.00
19	36	14.61	130	2816.66	0.89	0.00
21	36	12.66	130	8340.74	2.63	0.01
23	36	26.37	130	44.74	0.01	0.00
25	8	98.08	130	44.74	0.29	0.01
27	8	8.85	130	44.74	0.29	0.00
29	8	8.30	130	32.95	0.21	0.00
33	8	9.94	130	44.74	0.29	0.00
35	8	9.18	130	32.95	0.21	0.00
37	10	59.47	120	2259.98	9.23	1.92
39	10	28.70	120	7713.32	31.51	9.02
41	18	6.66	120	5771.42	7.28	0.07
43	18	7.26	120	3839.51	4.84	0.04
45	18	17.48	120	1921.31	2.42	0.02
47	18	35.29	120	5832.00	7.35	0.38
49	18	25.08	120	5832.00	7.35	9.17
51	18	6.63	120	5771.42	7.28	0.07
53	18	7.23	120	3839.51	4.84	0.04
55	18	13.26	120	1921.31	2.42	0.02
57	18	21.23	120	7713.32	9.72	0.38
61	22	25.63	120	5448.60	4.60	0.09
MAHR_PIPE	30	2431.16	130	2076.71	0.94	0.27
MEADOWLARK_PIPE	24	297.75	130	902.09	0.64	0.02

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
65	24	780.83	130	2083.00	1.48	0.26
67	12	40.59	120	1977.48	5.61	0.42
69	12	22.36	120	0.00	0.00	0.00
75	12	23.71	120	0.00	0.00	0.00
77	12	32.72	120	1985.29	5.63	0.34
79	18	80.70	120	3047.39	3.84	0.26
81	18	100.10	120	1519.48	1.92	0.09
85	18	93.49	120	0.00	0.00	0.00
87	16	91.83	120	0.00	0.00	0.00
89	16	127.73	120	1519.48	2.42	0.20
91	16	524.46	120	616.44	0.98	0.16
99	12	44.33	120	2177.07	6.18	0.55
101	12	36.17	120	2177.56	6.18	0.45
105	12	56.03	120	2164.34	6.14	0.69
107	12	41.41	120	2164.34	6.14	0.51
113	12	41.10	130	286.38	0.81	0.01
115	12	16.76	130	727.58	2.06	0.02
119	12	19.76	130	0.00	0.00	0.00
121	12	19.76	130	0.00	0.00	0.00
127	12	19.52	130	0.00	0.00	0.00
129	12	70.53	130	803.54	2.28	0.12
131	6	30.03	130	727.58	8.26	1.24
133	27	14.03	130	616.44	0.35	0.00
135	12	766.96	130	2152.87	6.11	8.04
137	6	38.78	130	2.29	0.03	0.00
139	8	42.35	130	11.71	0.07	0.00
5296_2	8	336.36	130	251.21	1.60	0.48
141	12	514.56	130	431.99	1.23	0.28
153	6	51.26	130	0.00	0.00	0.00
P2007	20	10.22	130	647.83	0.66	0.00
149	6	7.27	130	0.00	0.00	0.00
12779	20	91.54	130	647.83	0.66	0.01
P2009	8	51.71	130	552.05	3.52	0.31
147	2	11.47	130	7.93	0.81	0.02
12798	8	253.18	130	547.60	3.50	1.52
P2001	12	2724.95	130	288.52	0.82	0.69
2288	12	5657.91	130	104.19	0.30	0.22
143	4	34.71	130	249.72	6.38	1.42
P2003	8	145.97	130	393.95	2.51	0.47
145	4	26.99	130	222.61	5.68	0.89
11260	8	1075.98	130	451.58	2.88	4.51
P2005	14	581.01	130	1218.38	2.54	1.00
155	6	52.73	130	0.00	0.00	0.00
11513	14	822.41	130	1221.54	2.55	1.43
7589	6	19.27	130	401.22	4.55	0.26
7588	6	6.32	130	401.22	4.55	0.09

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
157	6	3.66	130	401.22	4.55	0.05
13701	14	512.92	130	1388.81	2.89	1.13
13700	14	420.14	130	1221.58	2.55	0.73
P2011	8	173.71	130	273.00	1.74	0.29
6844	8	289.58	130	273.00	1.74	0.48
151	4	12.67	130	0.00	0.00	0.00
159	24	460.12	130	12.73	0.01	0.00
161	30	1308.16	130	2126.28	0.97	0.15
165	24	21.29	130	0.00	0.00	0.00
167	24	14.62	130	0.00	0.00	0.00
169	36	15.47	130	8340.74	2.63	0.01
173	30	1697.74	130	0.00	0.00	0.00
185	30	846.62	120	4115.02	1.87	0.42
187	12	122.08	130	1607.12	4.56	0.74
195	8	1314.36	130	0.64	0.00	0.00
203	6	90.00	130	727.58	8.26	5.40
205	12	150.17	130	2889.00	8.20	2.72
211	24	41.49	130	1041.50	0.74	0.00
213	24	35.09	130	2083.00	1.48	0.01
215	24	82.87	130	0.00	0.00	0.00
217	24	80.36	130	1041.50	0.74	0.01
219	24	78.90	130	1041.50	0.74	0.01
221	24	73.45	130	0.00	0.00	0.00
223	8	392.17	140	294.29	1.88	0.65
225	8	358.86	130	288.37	1.84	0.66
227	8	1563.50	140	288.37	1.84	2.49
229	27	707.03	130	407.43	0.23	0.01
231	8	354.99	140	252.98	1.61	0.44
233	12	78.84	130	0.00	0.00	0.00
8119_2	10	166.68	130	520.94	2.13	0.31
195_2	8	192.59	130	0.64	0.00	0.00
11661_2	10	251.13	120	520.35	2.13	0.54
MAHR_PIPE_2	30	1507.95	120	2116.51	0.96	0.20
989	10	577.06	120	523.07	2.14	1.24
9648_2	24	59.87	120	12.73	0.01	0.00
10300_2	6	183.91	120	8.44	0.10	0.00
10936_2	8	33.26	120	1505.23	9.61	1.50
10997_2	8	260.68	120	0.00	0.00	0.00
11659_2	10	346.01	120	520.35	2.13	0.74
14279_2	8	476.10	120	98.66	0.63	0.14
207_2_2	8	102.07	120	16.82	0.11	0.00
1067	36	7.47	130	8340.74	2.63	0.00
1079	24	27.14	130	2083.00	1.48	0.01
1111	20	79.51	130	5465.07	5.58	0.37
7813	8	1108.86	130	317.66	2.03	2.42
LAT060	4	818.74	150	73.33	1.87	2.66

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
FUT005	24	180.81	130	1180.91	0.84	0.02
FUT006	24	41.49	130	1041.50	0.74	0.00
FUT008	24	82.87	130	0.00	0.00	0.00
FUT009	24	80.36	130	1041.50	0.74	0.01
FUT010	24	78.90	130	1041.50	0.74	0.01
FUT011	24	73.45	130	0.00	0.00	0.00
FUT040	12	2544.68	130	74.57	0.21	0.05
FUT043	12	1559.25	130	1.24	0.00	0.00
FUT044	8	888.92	130	1.24	0.01	0.00
FUT208	8	809.38	130	0.00	0.00	0.00
FUT209	8	3725.44	130	1.24	0.01	0.00
FUT353	30	368.42	130	4156.40	1.89	0.15
1153	20	495.39	120	3692.71	3.77	1.36
1155	20	94.53	120	3692.71	3.77	0.26
1687_2	12	176.53	120	1305.60	3.70	0.85
2669_2	8	33.66	120	0.00	0.00	0.00
3365_2	24	477.61	120	8280.82	5.87	2.41
5322_2	8	272.52	120	26.91	0.17	0.01
5803_2	20	137.54	120	12.73	0.01	0.00
7010_2	12	238.45	120	1591.00	4.51	1.66
7019_2	8	533.47	120	416.25	2.66	2.23
7021_2	4	338.01	120	4.19	0.11	0.01
7356_2	8	679.58	120	42.33	0.27	0.04
7885_2	8	280.65	120	8.98	0.06	0.00
8118_2	10	523.00	120	523.07	2.14	1.13
8335_2	8	32.90	120	0.64	0.00	0.00
9314_2	8	560.27	120	269.92	1.72	1.05
9376_2	8	9.89	120	252.98	1.61	0.02
11363_2	8	175.49	120	454.38	2.90	0.86
11495_2	8	909.58	120	15.46	0.10	0.01
1165	10	291.86	120	520.35	2.13	0.62
11665_2	10	410.55	120	518.78	2.12	0.87
11665_3	10	446.76	120	518.62	2.12	0.95
12322_2	8	19.40	120	10.48	0.07	0.00
12472_2	30	233.92	120	2101.45	0.95	0.03
12509_2	30	526.56	120	1988.73	0.90	0.06
14269_2	8	770.45	120	240.88	1.54	1.17
16221_2	8	322.11	120	271.92	1.74	0.61
17014_2	10	361.20	120	1709.56	6.98	6.97
2288_2	12	148.60	120	86.32	0.24	0.00
1167	8	167.13	120	0.64	0.00	0.00
989_2	10	251.84	120	523.07	2.14	0.54
7813_2	8	1398.71	130	317.66	2.03	3.05
FUT040_2	12	522.80	130	1.24	0.00	0.00
1169	8	191.64	120	40.51	0.26	0.01
1197	14	978.22	130	767.10	1.60	0.72

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
1201	16	2017.53	140	767.10	1.22	0.67
BRPS_P11	12	1.00	150	1519.48	4.31	0.00
BRPS_P12	12	1.00	150	1519.48	4.31	0.00
BRPS_P21	12	1.00	150	1526.90	4.33	0.00
BRPS_P22	12	1.00	150	1526.90	4.33	0.00
BRPS_P31	12	1.00	150	0.00	0.00	0.00
BRPS_P32	12	1.00	150	0.00	0.00	0.00
CALVPS_P11	12	1.00	150	0.00	0.00	0.00
CALVPS_P12	12	1.00	150	0.00	0.00	0.00
CALVPS_P21	12	1.00	150	803.54	2.28	0.00
CALVPS_P22	12	1.00	150	803.54	2.28	0.00
CALVPS_P31	12	1.00	150	0.00	0.00	0.00
CALVPS_P32	12	1.00	150	0.00	0.00	0.00
CWRF_P11	12	1.00	150	2816.66	7.99	0.01
CWRF_P12	12	1.00	150	2816.66	7.99	0.01
CWRF_P21	12	1.00	150	2816.71	7.99	0.01
CWRF_P22	12	1.00	150	2816.71	7.99	0.01
CWRF_P31	12	1.00	150	2707.37	7.68	0.01
CWRF_P32	12	1.00	150	2707.37	7.68	0.01
MDWLPS_P11	12	1.00	150	2083.00	5.91	0.01
MDWLPS_P12	12	1.00	150	2083.00	5.91	0.01
MDWLPS_P21	12	1.00	150	0.00	0.00	0.00
MDWLPS_P22	12	1.00	150	0.00	0.00	0.00
MDWLPS_P31	12	1.00	150	0.00	0.00	0.00
MDWLPS_P32	12	1.00	150	0.00	0.00	0.00
NCV011	8	1.00	150	0.00	0.00	0.00
NCV012	8	1.00	150	0.00	0.00	0.00
PRV_AE_11	3	1.00	150	44.74	2.03	0.01
PRV_AE_12	3	1.00	150	44.74	2.03	0.01
PRV_AE_21	8	1.00	150	32.95	0.21	0.00
PRV_AE_22	8	1.00	150	32.95	0.21	0.00
PRV_FAR_11	6	1.00	150	0.00	0.00	0.00
PRV_FAR_12	6	1.00	150	0.00	0.00	0.00
PRV_FAR_21	10	1.00	150	2164.34	8.84	0.02
PRV_FAR_22	10	1.00	150	2177.56	8.90	0.02
PRV_POI_11	6	1.00	150	1977.48	22.44	0.20
PRV_POI_12	6	1.00	150	1985.65	22.53	0.20
PRV_POI_21	8	1.00	150	0.00	0.00	0.00
PRV_POI_22	8	1.00	150	0.00	0.00	0.00
S_CARLSBADWRF1	24	1.00	150	0.00	0.00	0.00
S_CARLSBADWRF2	24	1.00	150	0.00	0.00	0.00
S_MEAD_EQFCV1	24	1.00	150	2083.00	1.48	0.00
TDPS_P11	12	1.00	150	1921.31	5.45	0.01
TDPS_P12	12	1.00	150	1921.31	5.45	0.01
TDPS_P21	12	1.00	150	1918.20	5.44	0.01
TDPS_P22	12	1.00	150	1918.20	5.44	0.01

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
TDPS_P31	12	1.00	150	1931.91	5.48	0.01
TDPS_P32	12	1.00	150	1931.91	5.48	0.01
TDPS_P41	12	1.00	150	1941.90	5.51	0.01
TDPS_P42	12	1.00	150	1941.90	5.51	0.01
TDPS_PRV11	10	1.00	150	5832.00	23.82	0.12
TDPS_PRV12	10	1.00	150	5832.00	23.82	0.12
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (f	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

Existing RW Peak Hour Velocity

Pipe ID	Diameter (	Length (	Roughness	Flow (gpm	Velocity (ft/s)	Headloss (ft)
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00
	0	0.00	0	0.00	0.00	0.00

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (1	Head (ft)	Pressure (psi)
10	0	51	64.83	5.99
100	0	205	615.41	177.83
1010	0	224.46	612.89	168.31
1016	0	339.26	612.92	118.58
102	0	205	615.41	177.83
1020	0	315.52	415.43	43.29
1034	0	307	457.85	65.36
1036	0	212.71	492.75	121.34
104	0	205.24	615.41	177.73
1040	0	195.84	483.96	124.84
1042	0	262.53	490.85	98.93
1044	0	287.55	500.48	92.26
1046	0	209.25	501.31	126.55
1048	0	56	403.89	150.74
1050	0	268.95	490.85	96.15
1052	0	204.83	490.64	123.84
1054	0	56	402.93	150.32
1056	0	50	399.15	151.29
1058	0	237.58	490.76	109.7
106	0	203.76	395.31	83
1060	0	233.96	500.48	115.48
1062	0	243.12	490.79	107.31
1064	0	58	402.25	149.16
1066	0	208.51	492.93	123.24
1068	0	50	399.65	151.5
1070	0	72.62	403.8	143.5
1072	0	207	481.47	118.93
1076	0	104	396.16	126.59
1078	0	85	395.83	134.68
108	0	204.73	395.31	82.58
1080	0	242.98	502.7	112.54
1082	0	276.46	511.67	101.91
1084	0	181.2	441.73	112.89
1086	0	224.68	500	119.29
1088	0	194.97	497.18	130.95
1090	0	209.39	500.49	126.13
1098	0	46.99	386.49	147.11
110	0	203.21	395.31	83.24
1102	0	124.92	380.31	110.66
112	0	222.71	615.27	170.1
1124	0	195	388.57	83.87
1126	0	148	396.28	107.58
1128	0	181	391.4	91.16
1136	0	313.75	410.62	41.97
1138	0	482.48	614.98	57.41
114	5.77	166.13	395.73	99.48

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
1140	0	322.37	419.94	42.28
1142	0	432	619.43	81.22
1144	0	414	419.54	2.4
1146	0	206.87	417.52	91.27
1148	0	415.38	613.52	85.85
1150	0	248	454.43	89.44
1152	0	288.36	414.2	54.53
1154	0	396.26	649.91	109.91
1156	0	115.31	612.13	215.27
1160	0	224.67	430.54	89.21
1166	0	247	612.89	158.54
1188	0	290	419.66	56.18
12	0	46.17	64.82	8.08
120	0	72	397.6	141.08
1200	0	253.88	490.86	102.68
1202	0	238.74	500.48	113.41
1204	0	288.65	500.48	91.79
1206	0	223.77	500.48	119.9
1208	0	78.65	407.34	142.42
1210	0	47	397.9	152.05
1214	0	47	397.9	152.05
1216	0	28.55	395.75	159.11
122	0	530	589.57	25.81
1236	0	73.08	395.83	139.85
1238	0	80.66	395.83	136.56
124	0	350	590.02	104
1244	0	48.68	395.83	150.42
126	0	46.17	64.85	8.09
128	0	46.17	143	41.96
130	0	49	64.84	6.86
132	0	350	418.97	29.88
134	0	184.36	375.48	82.81
138	0	54	406.9	152.91
14	0	51	64.82	5.99
140	0	318	238.92	-34.27
142	0	318	238.93	-34.26
144	0	330	590.29	112.78
1448	0	348.77	590.02	104.53
1450	0	257	500.48	105.5
146	0	330	590.29	112.79
148	0	330	590.29	112.78
150	0	318	238.93	-34.26
152	0	373.27	664.76	126.3
154	0	437.33	616.31	77.55
1542	0	287.83	395.83	46.79
156	0	162	377.26	93.27

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
1564	0	310.28	612.92	131.13
1566	0	223.21	612.9	168.85
1570	0	245	612.89	159.41
1572	0	273.36	612.89	147.12
1574	0	269.06	612.89	148.98
1576	0	261.9	612.89	152.08
1578	0	260.8	612.89	152.56
1582	0	306.14	612.22	132.62
16	0	49	415.37	158.75
1696	0	340.94	415.43	32.28
1698	0	302.41	415.43	48.98
1700	0	300.77	415.43	49.68
1708	0	56	304	107.46
1710	0	66	303.99	103.12
172	0	330	317.98	-5.21
1770	0	269.41	490.85	95.95
1790	0	56.89	304	107.07
1798	0	340	612.92	118.26
18	0	55.45	415.37	155.95
1800	0	340	612.92	118.26
1802	0	206	398.07	83.22
20	0	62.61	415.37	152.85
22	0	59	409.59	151.91
24	0	58.08	309.4	108.9
26	0	59.83	409.57	151.54
28	0	55.74	409.59	153.32
30	0	58.13	309.43	108.89
32	0	57.76	309.4	109.03
34	0	382.68	355.53	-11.77
36	0	382.86	355.11	-12.03
38	0	383.35	355.12	-12.23
40	0	384.16	355.21	-12.54
42	0	384	355.92	-12.17
44	0	383.86	585.99	87.58
46	0	383.03	585.97	87.93
476	0	225.45	503.22	120.36
478	0	193.62	496.26	131.13
48	0	383.9	585.88	87.52
50	0	384.43	578.29	84
510	0	103.78	397.23	127.15
514	0	43.41	395.86	152.72
52	0	383.93	585.94	87.53
54	0	383.64	355.15	-12.35
56	0	318	238.95	-34.25
58	0	330	590.28	112.78
60	0	177	417.62	104.26

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (1	Head (ft)	Pressure (psi)
62	0	177	417.62	104.26
648	0	142	371	99.23
66	0	177	397.02	95.33
68	0	177	397.02	95.33
72	0	309.93	419.6	47.52
74	20.15	309.43	419.6	47.74
76	0	309	419.6	47.92
770	0	321.93	415.44	40.52
78	0	314.67	677.31	157.13
782	0	135	366.59	100.35
80	0	313.57	677.31	157.61
816	0	353.25	612.94	112.52
82	0	313.15	677.31	157.79
84	0	222.99	412.71	82.21
86	0	219.61	395.72	76.31
88	0	224.88	412.71	81.39
898	0	49	64.85	6.87
90	0	220.62	395.72	75.87
910	0	318	238.94	-34.26
94	0	225.92	412.71	80.94
954	20.15	48.34	398.74	151.83
956	0	48.34	398.36	151.66
958	0	298	419.84	52.79
960	0	298	419.88	52.81
968	0	66	303.99	103.12
970	0	402.7	636.64	101.36
978	0	43.98	395.75	152.42
98	0	204.01	395.42	82.94
982	0	66	401.94	145.56
986	0	78	392.93	136.46
990	0	179.59	373.32	83.94
994	0	58.3	302.42	105.78
C002	440.79	53	372.01	138.23
C005	73.33	99.49	393.17	127.25
C034	9.24	349.3	612.91	114.23
C037	8.25	226	612.88	167.64
C039	7.94	221.97	481.45	112.43
C044	19.22	325.07	415.34	39.12
C049	4.91	229.85	501.31	117.62
C050	4.84	54	399.65	149.77
C052	4.32	52	403.89	152.47
C053	4.25	50.98	402.24	152.2
C054	4.2	269	490.85	96.13
C058	3.77	201.85	492.92	126.12
C061	3.72	261.34	500.48	103.62
C065	3.43	54.26	402.92	151.07

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
C066	3.3	262	490.85	99.16
C069	3.19	237.19	490.79	109.88
C072	3.1	61.58	303.99	105.04
C074	3.09	49.53	398.36	151.15
C075	3.09	52	399.15	150.42
C079	2.75	61.78	406.89	149.53
C080	2.72	49.65	398.74	151.26
C081	2.64	240	490.76	108.65
C082	2.62	196.21	490.64	127.58
C083	2.61	52.72	401.68	151.21
C085	2.46	256	500.48	105.93
C086	2.46	305.3	500.48	84.57
C089	2.19	210	483.96	118.71
C091	2.09	215	496.49	121.97
C092	1.91	218	492.75	119.05
C093	1.6	214	500.49	124.13
C096	1.49	246	502.7	111.23
C099	0.69	208.8	497.18	124.95
C100	0.58	235.93	500	114.42
C126	39.96	116.74	612.12	214.65
C152	0	357.73	410.7	22.95
C164	1.24	247.34	395.83	64.34
C177	9.24	66	303.99	103.12
C178	12.4	260	612.87	152.9
F10	0	187.1	490.38	131.41
F18	0	202.89	500.49	128.95
F314	0	419.61	589.76	73.73
F34	0	54	405.35	152.24
J10	0	182.03	380.84	86.14
J100	0	441.58	418.97	-9.8
J1000	0	358.43	612.17	109.95
J1002	19.99	358.37	612.17	109.97
J1004	0	427.23	612.26	80.17
J1006	7.24	392	612.27	95.44
J1008	0	359	612.29	109.75
J1010	0	357.27	612.29	110.5
J1012	0	320.94	611.94	126.09
J1014	9.51	359.19	612.28	109.67
J1016	4.03	307.33	611.43	131.77
J1018	0	359	612.29	109.75
J102	0	366.29	418.97	22.83
J1020	0	357.22	612.29	110.52
J1022	0	81.17	389.27	133.5
J1024	0	81.31	389.26	133.43
J1026	0	81.09	389.29	133.54
J1028	0	94.18	377.26	122.66

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1030	0	93.37	377.26	123.01
J1032	0	93	377.25	123.17
J1034	0	93	377.25	123.17
J1036	0	82.9	384.63	130.74
J1038	0	78.45	384.26	132.51
J104	0	363.73	418.97	23.94
J1040	0	197	388.08	82.79
J1042	0	196.55	388.06	82.98
J1044	0	186	394.44	90.32
J1046	0	182	393.95	91.84
J1048	0	186	394.47	90.33
J1050	0	239.23	384.77	63.06
J1052	0	163	384.04	95.78
J1054	0	182.67	384.75	87.56
J1056	0	163.3	384.02	95.64
J1058	0	163.55	384.02	95.53
J106	0	366.01	418.97	22.95
J1060	0	162.6	384.02	95.94
J1062	0	162.7	384	95.89
J1064	0	90.74	385.24	127.61
J1066	0	164	385.87	96.14
J1068	0	164	385.86	96.13
J1070	0	170	386.59	93.85
J1072	0	164.39	385.88	95.97
J1074	0	108.83	397.18	124.94
J1076	25.97	150	396.17	106.67
J1078	0	155.84	395.92	104.03
J108	57.78	274.37	418.98	62.66
J1080	0	155.7	395.92	104.09
J1082	0	162.36	387.27	97.45
J1084	0	161	387.26	98.04
J1086	0	56.52	395.84	147.03
J1088	0	52	395.84	148.99
J1090	0	55.48	395.84	147.48
J1092	4.85	122.27	395.84	118.54
J1094	4.57	86.34	395.84	134.11
J1096	0	183.12	395.84	92.17
J1098	0	182.69	395.82	92.35
J110	81.6	363.41	418.97	24.08
J1100	0	186	394.48	90.34
J1102	0	183.58	395.84	91.97
J1112	0	173.23	379.93	89.56
J1114	0	160.57	366.94	89.42
J1116	0	84.89	367.44	122.43
J1118	0	182.71	379.57	85.3
J112	157.73	281.31	416.92	58.76

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1120	0	173.34	379.92	89.51
J1122	0	378.17	418.97	17.68
J1124	71.34	350	590.02	104
J1126	0	378.82	418.97	17.4
J1128	0	440.95	418.97	-9.52
J1130	0	249	585.04	145.61
J1132	0	271	585.23	136.16
J1134	0	285.88	585.35	129.76
J1136	0	366.89	583.53	93.87
J1138	0	367.48	583.52	93.61
J114	0	200.41	417.57	94.09
J1140	0	307	584.39	120.19
J1142	0	366.21	583.53	94.17
J1144	35.58	404.78	582.57	77.04
J1146	13.88	377.43	582.72	88.95
J1148	0	418	582.5	71.28
J1150	71.7	401.41	582.45	78.44
J1152	0	243.5	417.41	75.35
J1154	0	259.15	378.7	51.8
J1156	0	242.97	378.92	58.91
J1158	0	293.73	378.42	36.7
J116	0	200.1	417.57	94.23
J1160	83.22	377	587.83	91.35
J1164	0	439	603.03	71.07
J1166	38.37	420.99	590.92	73.63
J1168	53.37	440.59	606.86	72.05
J1170	0	443.6	606.86	70.74
J1172	0	450	615.64	71.77
J1174	0	404.4	585.29	78.38
J1176	93.83	408.69	585.38	76.56
J1178	0	337.21	584.91	107.33
J118	0	200.02	417.57	94.26
J1180	0	403.5	585.29	78.77
J1182	0	390.1	584.66	84.3
J1184	0	433.38	587.55	66.8
J1186	0	397.92	586.37	81.66
J1188	0	433.68	587.56	66.68
J1190	0	433.55	587.56	66.73
J1192	0	433.99	587.57	66.54
J1194	100.13	296.45	419.05	53.12
J1196	32.71	321.65	419.09	42.22
J1198	74.94	263.42	419.05	67.43
J12	0	182.33	380.84	86.01
J120	0	249	585.04	145.61
J1200	0	223.57	419.05	84.7
J1202	0	201	419.05	94.48

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1204	0	377.24	668.94	126.39
J1206	0	384	672.51	125.01
J1212	0	244.25	418.98	75.71
J1214	0	244.7	585.04	147.47
J1218	38.42	177	396.83	95.25
J122	82.41	251	585.04	144.74
J1220	0	192	419.06	98.38
J1222	0	192	419.06	98.38
J1224	0	192	419.06	98.38
J1226	0	266.22	419.27	66.31
J1228	0	372	419.81	20.72
J1234	0	377.06	668.8	126.41
J1236	0	372	419.81	20.72
J1238	0	297.56	420.12	53.11
J124	0	311.04	585.49	118.92
J1240	0	298.15	420.12	52.85
J1242	0	297.74	420.11	53.02
J1244	0	350.91	419.37	29.67
J1246	0	350.83	419.37	29.7
J1248	0	350.99	419.38	29.63
J1250	0	273	376.36	44.79
J1252	0	273	376.36	44.79
J1254	0	287.63	376.37	38.45
J1258	0	287.38	376.37	38.56
J126	0	311.06	585.49	118.91
J1260	0	175	380.85	89.2
J1262	0	175	380.86	89.2
J1264	0	175	380.85	89.2
J1266	0	176.31	380.85	88.63
J1268	0	44	395.88	152.47
J1270	0	380.04	613.07	100.97
J1272	0	344.6	613.68	116.59
J1274	0	378.88	612.97	101.43
J1276	0	357.43	612.29	110.43
J1278	0	326.96	419.08	39.92
J128	0	457.16	583.48	54.73
J1280	47.89	338.44	418.97	34.89
J1282	0	379.33	613.03	101.26
J1284	0	379.65	613.03	101.12
J1286	57.9	386.12	418.93	14.21
J1288	0	366.32	418.94	22.8
J1290	0	407	418.93	5.17
J1292	0	108	380.94	118.26
J1294	0	132.98	380.9	107.43
J1296	0	143.36	380.87	102.91
J1298	43.67	85	380.98	128.25

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J130	0	459.14	583.48	53.88
J1300	0	379.82	613.03	101.05
J1302	0	317.22	611.5	127.51
J1304	0	319	611.48	126.73
J1306	0	316.82	611.5	127.68
J1308	1.21	300.98	611.5	134.55
J1310	0	283.77	611.58	142.04
J1312	12.06	281.84	611.58	142.87
J1314	1.76	279.86	611.53	143.71
J1316	0	305	611.53	132.82
J1318	10.24	283.14	611.58	142.31
J132	0	464.62	583.48	51.51
J1320	14.37	271.85	611.57	147.2
J1322	0	281	611.9	143.38
J1324	0	281	611.9	143.38
J1326	0	266.69	611.87	149.57
J1328	0	265	611.87	150.3
J1330	0	266.91	611.87	149.47
J1332	0	320.38	611.94	126.33
J1334	0	320.53	611.94	126.27
J1336	68.35	348	419.34	30.91
J1338	0	346.62	419.34	31.51
J134	24.6	192.13	395.46	88.1
J1340	0	398.18	612.18	92.73
J1342	23.44	401	612.06	91.45
J1344	0	397.53	612.18	93.01
J1346	0	366.07	612.17	106.63
J1348	7	345.16	612.16	115.69
J1350	0	366.55	612.17	106.43
J1352	0	366.99	612.17	106.24
J1354	0	367.43	612.17	106.05
J1356	0	347.48	612.25	114.73
J1358	0	346.58	612.25	115.12
J136	0	191.77	395.46	88.26
J1360	0	347.9	612.25	114.54
J1362	0	348.29	612.25	114.37
J1364	0	259.58	419.84	69.44
J1366	0	314.63	419.58	45.48
J1368	0	78	396.34	137.94
J1370	0	78	396.34	137.94
J1372	0	78	396.34	137.93
J1374	23.12	243.08	378.93	58.86
J1376	59.59	208.51	379.21	73.96
J1378	0	243.25	378.93	58.79
J138	0	290.52	417.29	54.93
J1380	60.45	405.06	418.94	6.01

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1382	0	259.38	419.84	69.53
J1384	37.1	244.96	382.01	59.38
J1386	0	259.62	419.84	69.43
J1388	0	342.41	419.31	33.32
J1390	44.34	358.8	419.31	26.22
J1392	53.42	259.78	419.85	69.35
J1394	0	306.12	420.23	49.44
J1398	57.22	306.13	420.23	49.44
J14	0	266.97	414.85	64.08
J140	0	261	417.29	67.72
J1400	0	305.94	420.23	49.52
J1402	0	346.51	419.34	31.56
J1404	0	348	419.34	30.91
J1406	38.99	141.8	376.24	101.58
J1408	9.99	261.05	614.62	153.2
J1410	10.13	259.74	614.7	153.8
J1412	0	311	395.73	36.71
J1414	3.94	166.13	395.73	99.49
J1416	0	311.33	395.73	36.57
J1418	0	312.31	395.73	36.14
J142	77.55	315	417.29	44.32
J1420	0	23	395.85	161.55
J1422	0	75.84	395.65	138.57
J1424	0	351.39	612.94	113.33
J1426	0	351.25	612.94	113.39
J1428	0	381	612.97	100.51
J1430	17.05	435.28	624.92	82.17
J1432	0	424.09	625.02	87.06
J1434	0	420	627.81	90.04
J1436	12.06	415	631.68	93.89
J1438	0	411.96	636.52	97.3
J144	0	189.29	372.86	79.54
J1440	30.71	385	657.2	117.94
J1442	35.32	375	663.42	124.97
J1444	12.12	388.15	676.33	124.87
J1446	0	387.89	676.36	124.99
J1448	13.37	260.17	614.69	153.62
J1450	0	259.67	614.7	153.84
J1452	0	259.7	614.7	153.82
J1454	0	227.87	375.27	63.87
J1456	60.56	236.75	375.25	60.01
J1458	0	60	302.55	105.1
J146	0	191	372.86	78.8
J1460	0	56	302.45	106.79
J1462	0	62	302.59	104.25
J1464	0	62	302.59	104.25

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1466	0	68	302.64	101.67
J1468	0	68	302.64	101.67
J1470	0	68	302.64	101.67
J1472	0	68	302.64	101.67
J148	0	403.43	585.29	78.8
J1480	0	106.07	373.2	115.75
J1482	0	106.42	373.2	115.6
J1484	0	105.37	373.2	116.05
J1486	0	105.03	373.2	116.2
J1488	0	168.95	375.27	89.4
J1490	0	437.33	616.31	77.55
J1492	0	302.52	371.13	29.73
J1494	32.71	318.75	370.96	22.62
J1496	0	330	583.03	109.64
J1498	0	342.98	370.6	11.97
J150	0	403.12	585.29	78.93
J1500	0	242	371.5	56.11
J1502	0	264.4	371.5	46.41
J1504	0	241	371.5	56.54
J1506	0	241.04	371.5	56.53
J1508	0	85.41	396.05	134.6
J1510	0	86.61	396.05	134.08
J1512	0	90.34	396.05	132.47
J1514	0	92.75	396.05	131.42
J1516	0	87.29	396.05	133.78
J1518	0	86.5	396.05	134.13
J152	0	413.57	629.93	93.75
J1520	0	88.36	396.05	133.32
J1522	0	54.43	415.36	156.39
J1524	0	64.22	415.24	152.1
J1526	0	64.98	414.78	151.57
J1528	0	65	414.77	151.55
J1530	0	307.15	611.42	131.84
J1532	0	301.54	524.79	96.73
J1534	0	301.18	524.79	96.89
J1536	0	301.82	524.79	96.61
J1538	0	169.47	383.87	92.9
J154	0	432	619.32	81.17
J1540	0	170.2	383.87	92.59
J1542	0	186	394.47	90.33
J1544	0	186	394.47	90.33
J1546	0	170	386.6	93.85
J1548	0	170	386.6	93.85
J1550	0	310	614.01	131.73
J1552	0	311.36	614.01	131.14
J1554	0	108	389.91	122.15

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J156	15.87	413.01	630.05	94.05
J1560	0	235.38	375.79	60.84
J1562	0	366.63	583.51	93.97
J1564	0	306	422.37	50.42
J1566	0	306	422.38	50.43
J1568	0	306	422.35	50.42
J1570	20.58	278.37	555.04	119.88
J1572	0	278.61	555.09	119.8
J1574	139.88	297	555.09	111.83
J1576	0	255.16	554.63	129.76
J1578	0	254.32	554.63	130.12
J158	0	412.21	629.99	94.37
J1580	0	278.66	555.09	119.78
J1582	0	382.66	369.39	-5.75
J1584	0	383.01	369.39	-5.9
J1586	0	384	369.39	-6.33
J1588	0	381.62	367.63	-6.06
J1590	0	383	366.61	-7.1
J1592	0	379.75	368.5	-4.87
J1594	0	366	370.3	1.86
J1596	0	366	370.31	1.87
J1598	0	72.09	384.22	135.24
J16	0	256	413.43	68.22
J160	0	326	419.92	40.69
J1600	0	78.34	384.22	132.54
J1602	0	72.34	384.22	135.13
J1604	0	72.35	384.22	135.13
J1606	0	72.32	384.22	135.15
J1608	0	72.34	384.22	135.13
J1610	0	72.56	384.21	135.04
J1612	0	72.8	384.21	134.93
J1614	10.73	184.3	382.24	85.77
J1616	0	184.26	382.24	85.78
J1618	0	184.12	382.24	85.85
J162	0	306.12	420.23	49.44
J1620	0	313	534.13	95.82
J1622	0	254.2	546.51	126.66
J1624	0	254.57	546.51	126.5
J1626	0	63.19	398.44	145.26
J1628	9.02	68	403.54	145.39
J1630	0	254.59	546.13	126.33
J1632	0	254.68	546.08	126.27
J1634	0	52.71	413.37	156.27
J1636	0	51.53	413.37	156.78
J1638	0	52	413.36	156.58
J164	0	326	419.92	40.69

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1640	0	301.62	523.29	96.05
J1642	0	301.69	523.27	96.01
J1644	0	302	523.24	95.86
J1646	0	302	523.24	95.86
J1648	0	287.04	419.6	57.44
J1650	0	287.13	419.6	57.4
J1652	0	315.34	517.93	87.79
J1654	0	315.61	517.97	87.68
J1656	0	326.91	530.19	88.08
J1658	0	280.51	367.92	37.88
J166	0	326	419.91	40.69
J1660	0	281.23	367.92	37.56
J1662	0	321	367.92	20.33
J1664	0	61.44	308.88	107.22
J1666	0	61	308.88	107.41
J1668	0	59.15	302.42	105.41
J1670	0	56.58	302.42	106.52
J1672	0	55	302.42	107.21
J1674	0	58.66	302.42	105.62
J1676	45.56	62.27	304.33	104.89
J1678	0	62.44	304.33	104.81
J168	0	241.62	375.79	58.13
J1680	0	62.17	304.34	104.93
J1682	0	63.03	304.39	104.58
J1684	0	62.67	304.33	104.71
J1686	0	58.5	302.42	105.69
J1688	73.36	58	302.03	105.74
J170	0	241.59	375.79	58.15
J1702	0	161	383.81	96.54
J1704	1.08	153	383.87	100.04
J1706	0	165	383.81	94.81
J1708	0	161.75	383.81	96.22
J1710	0	165.06	383.64	94.71
J1712	0	155.22	382.3	98.39
J1714	0	168	383.19	93.24
J1718	0	64	302.79	103.47
J172	0	241.42	375.78	58.22
J1720	20.43	133.29	388.14	110.43
J1722	0	136	387.75	109.08
J1724	0	133.33	388.16	110.42
J1726	0	133	385.35	109.34
J1728	0	133	385.35	109.34
J1730	0	133	385.35	109.34
J1732	0	138.89	385.04	106.66
J1734	0	137.45	385.03	107.28
J1736	0	165	383.55	94.7

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1738	6.62	165.09	383.54	94.66
J174	0	218.77	375.62	67.96
J1740	0	163	383.66	95.61
J1742	0	163	383.66	95.61
J1744	0	138.95	385.03	106.63
J1746	0	138.77	385.03	106.71
J1748	0	138.51	385.03	106.82
J1750	49.95	150.34	382.12	100.43
J1752	16.04	150.74	382.12	100.26
J1754	0	147	382.12	101.88
J1756	0	150.81	382.12	100.23
J1758	0	154.86	382.28	98.54
J176	11.3	193.26	380.84	81.28
J1760	0	154	382.28	98.92
J1762	15.07	202.1	367.61	71.72
J1764	0	197	367.61	73.93
J1766	0	141.41	366.68	97.61
J1768	0	139	366.72	98.67
J1770	0	140.62	366.73	97.97
J1772	45.84	194.94	363.56	73.07
J1774	89.79	160	364.87	88.77
J1776	0	137	366.59	99.48
J1778	0	137	366.59	99.48
J178	7.31	185	380.84	84.86
J1780	50.8	137	366.59	99.48
J1782	0	137	366.6	99.48
J1784	0	64	302.79	103.47
J1786	0	381.95	366.61	-6.64
J1788	0	178.62	366.8	81.54
J1790	0	178.19	366.81	81.73
J1792	70.95	188.68	366.76	77.16
J1794	0	179.13	366.8	81.32
J1796	28.48	144.21	395.49	108.88
J1798	0	131	366.74	102.15
J18	0	268	414.87	63.64
J180	11.24	182.82	380.84	85.8
J1800	0	131	366.74	102.15
J1802	30.02	138.8	366.73	98.76
J1804	0	138.81	366.73	98.76
J1806	40.41	298.36	368.38	30.34
J1808	0	297.8	368.38	30.58
J1810	2.11	298.63	368.38	30.22
J1812	45.26	144.42	395.48	108.78
J1814	0	144.46	395.49	108.77
J1816	0	131	366.74	102.15
J1818	0	132.97	366.74	101.29

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J182	0	403.79	642.93	103.62
J1820	0	159.95	366.61	89.55
J1822	0	159.63	366.62	89.69
J1824	0	159.56	366.62	89.72
J1826	0	172	366.55	84.3
J1828	0	172	366.55	84.3
J1830	0	110.32	365.32	110.49
J1832	0	70.56	364.71	127.45
J1834	0	70.18	364.71	127.62
J1836	0	52	364.71	135.5
J1838	0	48	395.88	150.73
J184	0	181	418.46	102.89
J1840	0	43	395.88	152.9
J1842	0	290	410.7	52.3
J1844	0	372.84	613.74	104.38
J1846	0	358.28	615.2	111.33
J1848	59.05	434	613.22	77.66
J1850	24.17	435.27	613.17	77.08
J1852	0	417	613.31	85.06
J1854	0	434	613.22	77.66
J1856	0	290	410.7	52.3
J1858	0	290	410.7	52.3
J186	0	199.63	417.58	94.44
J1862	54.36	319.07	410.62	39.67
J1864	85.95	290	410.7	52.3
J1866	0	225.46	476.04	108.58
J1868	0	225.15	476.11	108.74
J1870	0	171.87	373.22	87.25
J1872	124.95	163	370.36	89.85
J1874	0	171.78	373.24	87.29
J1876	132.65	172.03	373.24	87.18
J1878	0	260.91	413.08	65.93
J188	0	189.15	372.86	79.6
J1880	0	266.34	412.92	63.51
J1882	32.09	260.91	413.08	65.93
J1884	0	263	413.08	65.03
J1886	0	272.22	412.85	60.93
J1888	0	277	412.85	58.86
J1890	0	194.7	372.81	77.17
J1892	0	194.51	372.8	77.25
J1894	56.51	152.55	372.48	95.3
J1896	0	122.61	376.26	109.91
J1898	0	96	376.26	121.44
J190	0	192.04	395.46	88.14
J1900	0	87	376.26	125.34
J1902	0	83	376.26	127.07

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1904	0	85.14	376.26	126.15
J1906	7.88	87	376.26	125.34
J1908	0	253.23	375.22	52.86
J1910	0	253	375.22	52.96
J1912	0	253.45	375.22	52.76
J1914	31.05	262.7	375.28	48.78
J1916	24.72	253.74	375.22	52.64
J1918	0	117.69	382.27	114.64
J192	0	191.38	395.46	88.43
J1920	0	119	382.17	114.03
J1922	0	137	391.78	110.4
J1924	0	199.81	391.29	82.97
J1926	66.67	200.83	391.37	82.56
J1928	87.73	187.24	391.18	88.37
J1930	0	256	413.43	68.21
J1932	0	54	395.81	148.11
J1934	2.57	27.8	395.85	159.48
J1936	0	49.27	395.85	150.17
J1938	0	51	395.84	149.42
J194	36.65	191.04	395.46	88.58
J1940	0	381	612.97	100.51
J1942	0	311.9	418.58	46.23
J1944	45.71	315.51	417.72	44.29
J1946	0	320	416.81	41.95
J1948	16.94	437.39	616.34	77.54
J1950	12.92	431	620.24	82
J1952	0	344.09	615.11	117.43
J1954	0	344.35	615.17	117.35
J1956	0	351.72	615.08	114.11
J1958	26.42	349	615.05	115.28
J196	0	72.04	396.32	140.51
J1960	109.74	328.26	614.98	124.24
J1962	16.04	128.64	395.75	115.74
J1964	0	99	395.77	128.59
J1966	44.34	408.69	419.02	4.48
J1968	21.82	366	573.65	89.98
J1970	0	380.99	577.76	85.26
J1972	0	366	573.44	89.88
J1974	0	72.1	384.22	135.24
J1976	0	72.16	384.22	135.21
J1978	0	155	384.45	99.42
J198	0	70.94	396.32	140.98
J1980	0	155	384.46	99.42
J1982	0	155	384.46	99.43
J1984	0	194.88	375.33	78.19
J1988	0	324	419.09	41.2

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J1990	0	340.71	419.21	34.01
J1994	22.88	320.46	517.96	85.58
J1996	0	313.1	518.01	88.79
J1998	0	317.25	518.04	87
J20	0	191.72	395.46	88.28
J200	0	73.1	396.31	140.05
J2000	0	104	396.15	126.59
J2002	0	104	396.16	126.59
J2004	0	278.08	611.9	144.65
J2010	0	315.81	518.04	87.63
J2012	0	316.04	518.04	87.53
J2014	36.76	203.51	394.43	82.72
J2016	0	168	383.2	93.25
J2018	0	252.89	378.76	54.54
J202	0	56	396.01	147.32
J2020	0	296.48	555.09	112.05
J2022	0	303.59	555.09	108.97
J2024	0	359	369.23	4.43
J2026	0	310	560.89	108.71
J2028	0	278.72	555.09	119.75
J2030	0	58	309.12	108.81
J2032	0	58	309.12	108.81
J2034	0	58	309.1	108.8
J2036	0	93	377.25	123.17
J2038	0	94.5	377.25	122.52
J204	0	56	396.01	147.33
J2040	0	63	304.33	104.57
J2042	0	62	304.33	105
J2044	22.64	310.88	515.89	88.83
J2046	0	305.99	422.4	50.44
J2048	0	315.53	517.93	87.7
J2050	0	302.71	523.19	95.53
J2052	0	315.75	518.02	87.65
J2054	0	301.99	523.21	95.85
J206	0	56	396.01	147.32
J2060	0	94.96	377.26	122.32
J2062	0	93.84	377.26	122.8
J2064	0	64	306.05	104.88
J2066	0	58.14	302.42	105.85
J2068	0	53	302.44	108.08
J2070	0	195	388.06	83.65
J2072	0	196.5	388.05	83
J2074	0	80	384.1	131.77
J2076	5.59	72.8	384.09	134.88
J2078	0	179.55	390.32	91.32
J208	0	56	396.01	147.32

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2080	0	181.72	392.61	91.38
J2082	0	169.37	383.87	92.94
J2084	0	167.28	383.87	93.85
J2086	0	155	384.46	99.42
J2088	0	155	384.46	99.42
J2090	0	163	383.67	95.62
J2092	4.85	158	381.71	96.93
J2094	0	179	381.27	87.64
J2096	0	131	366.74	102.15
J2098	0	131	366.74	102.15
J210	0	57.3	396.01	146.76
J2100	0	297.2	368.9	31.07
J2102	0	338.43	369.07	13.28
J2104	3.03	300	368.89	29.85
J2106	9.53	107.51	382.25	119.04
J2108	7.42	239.17	368.92	56.22
J2110	2.57	222	368.95	63.67
J2114	0	84	381.07	128.72
J2116	0	160	364.88	88.78
J2118	0	84	381.06	128.72
J212	0	56	396.01	147.32
J2120	13.13	84	381.04	128.71
J2122	0	414	614.98	87.09
J2124	0	300.79	410.7	47.63
J2126	0	224.98	410.93	80.57
J2128	58.58	266	410.84	62.76
J2130	0	230.03	411.02	78.42
J2132	0	232.15	411.1	77.54
J2134	48.5	451.3	615.36	71.09
J2136	0	90	385.24	127.93
J2138	0	90	385.24	127.93
J214	0	311.42	611.93	130.21
J2140	0	90	385.24	127.93
J2142	0	417.06	613.31	85.03
J2144	47.38	157.89	385.2	98.49
J2146	0	157.78	385.2	98.54
J2148	0	158.19	385.2	98.36
J2150	0	143.76	385.2	104.61
J2152	0	387.94	676.36	124.97
J2154	30.04	229.86	447.74	94.41
J2156	24.25	258.8	467.08	90.24
J2158	46.77	308.62	454.66	63.28
J216	2.17	303.79	611.93	133.52
J2160	39.06	306.87	415.09	46.89
J2162	22.7	319.64	413.55	40.69
J2164	20.65	300	413.26	49.07

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2166	0	300	413.26	49.08
J2168	24.25	296	412.87	50.64
J2170	35.88	256	413.37	68.19
J2172	65.18	257	410.3	66.43
J2174	31.16	273.2	413.01	60.58
J2176	38.25	255	412.51	68.25
J2178	0	217.4	434.57	94.1
J218	0	72.5	396.32	140.31
J2180	0	217.11	434.62	94.24
J2182	0	162	385.17	96.7
J2184	0	162	385.17	96.7
J2186	0	122.87	376.26	109.8
J2188	0	202.57	376.8	75.49
J2190	0	222.2	376.8	66.99
J2192	0	167	378.51	91.65
J2194	0	136.44	379.55	105.34
J2196	0	163.85	385.37	95.99
J2198	0	162	385.18	96.7
J22	0	191.72	395.46	88.28
J220	0	72.86	396.32	140.15
J2200	0	164.07	385.87	96.11
J2202	0	71.74	385.81	136.09
J2204	0	155.73	395.92	104.07
J2206	0	107.97	376.33	116.28
J2208	21.69	92	377.12	123.54
J2210	0	156.05	395.92	103.93
J2212	0	108.47	397.18	125.1
J2214	0	108.44	397.18	125.11
J2216	0	170	386.6	93.85
J2218	0	164.8	387.15	96.34
J222	0	75	396.32	139.23
J2220	0	164.57	387.15	96.44
J2222	0	164.65	387.14	96.4
J2224	0	162	391.53	99.46
J2226	0	162	391.57	99.47
J2228	0	90	385.23	127.92
J2230	0	82	389.13	133.08
J2232	7.59	90	385.26	127.93
J2234	0	81.31	389.27	133.44
J2236	0	79.37	389.27	134.28
J2238	0	94.57	377.28	122.5
J224	0	75	396.32	139.23
J2240	0	84	381.06	128.72
J2242	42.41	172.11	386	92.68
J2244	21.46	166	385.66	95.18
J2246	37.1	172.27	386.53	92.84

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2252	0	325.45	676.51	152.11
J2254	0	52	395.84	148.99
J2256	0	85.08	395.84	134.65
J2258	0	85.69	395.84	134.39
J226	0	392	612.27	95.44
J2260	0	85.26	395.84	134.57
J2262	0	311.07	585.49	118.91
J2264	132.78	346	583.54	102.93
J2266	22.67	463	587.55	53.97
J2268	48.44	423.18	589.81	72.2
J2270	0	427	589.27	70.31
J2272	0	420.84	590.89	73.68
J2274	0	158.44	394.6	102.33
J2276	25.87	177	417.86	104.36
J2278	0	192	419.05	98.38
J228	0	392	612.27	95.44
J2280	0	186.08	418.99	100.92
J2282	42.76	413.31	649.41	102.3
J2284	0	403.66	643.05	103.73
J2286	0	402.85	419.69	7.29
J2288	0	306.7	420	49.09
J2290	0	310.98	419.99	47.24
J2292	0	297.49	420.11	53.13
J2294	0	307.27	420	48.85
J2296	0	287.44	419.61	57.27
J2298	0	301	420.13	51.62
J230	0	392	612.27	95.44
J2300	24.94	175.66	380.85	88.91
J2302	0	175.88	380.85	88.81
J2304	224.55	165.41	380.84	93.34
J2306	3.48	287.28	376.37	38.6
J2308	11.82	273	376.36	44.79
J2310	0	179.58	395.85	93.71
J2312	0	180.06	395.85	93.5
J2314	0	179.66	395.85	93.68
J2316	1.54	72	396.25	140.5
J2318	0	72	396.16	140.46
J232	0	427.62	612.26	80
J2320	9.96	281	611.9	143.38
J2322	0	358.11	612.17	110.09
J2324	1.83	351.07	612.17	113.13
J2326	0	357.67	612.17	110.28
J2328	0	427.05	612.26	80.25
J2330	2.07	422.91	612.26	82.05
J2332	0	243	378.92	58.9
J2334	0	241.03	378.92	59.75

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2336	0	243.35	378.93	58.75
J2338	0	242.62	378.92	59.06
J234	0	72	396.16	140.46
J2340	0	248.16	378.93	56.66
J2342	0	293.95	420.51	54.84
J2344	42.17	280	421.04	61.11
J2346	58.03	277	421.61	62.66
J2348	0	347.16	419.33	31.27
J2350	0	95.64	396.05	130.17
J2352	0	381.41	577.8	85.1
J2354	0	382.62	578.31	84.79
J2356	0	53	302.45	108.08
J2358	0	155.03	395.48	104.19
J236	0	72	396.16	140.46
J2364	0	306.59	611.42	132.08
J2366	117.42	306.02	611.24	132.25
J2368	0	105	392.9	124.75
J2370	0	108	389.97	122.18
J2372	48.8	70.63	385.81	136.57
J2374	0	73.59	385.24	135.04
J2376	0	54.57	385.24	143.28
J2378	0	305.82	555.09	108.01
J238	0	311.74	614	130.97
J2380	0	213.16	555.09	148.16
J2382	0	144.72	395.49	108.66
J2384	0	225.2	395.49	73.78
J2386	0	320.86	416.8	41.57
J2388	0	423.9	625.02	87.14
J2390	0	424.01	625.06	87.11
J2392	0	420	627.85	90.06
J2394	31.62	411.86	636.61	97.38
J2396	0	396.35	641.03	106.02
J2398	5.96	311.04	614.01	131.28
J24	0	183.83	384.77	87.07
J240	0	311.54	614.01	131.06
J2400	15.37	259.32	614.7	153.99
J2402	0	195.24	375.32	78.03
J2404	0	62	302.59	104.25
J2406	0	64	302.64	103.4
J2408	0	64	302.64	103.4
J2410	0	68	302.64	101.67
J2412	0	68	302.64	101.67
J2414	0	140.01	375.77	102.15
J2416	0	336	370.81	15.09
J2418	0	186.95	372.87	80.56
J242	0	311.6	614.01	131.03

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (1	Head (ft)	Pressure (psi)
J2422	0	235.6	375.79	60.74
J2424	0	235.67	375.79	60.71
J2426	0	234.94	375.79	61.03
J2428	70.71	278.81	555.08	119.71
J2430	103.74	248.88	554.62	132.48
J2432	0	123.56	384.22	112.94
J2434	0	177.06	384.22	89.76
J2436	0	79.78	384.22	131.91
J2438	0	256.61	573.4	137.26
J244	0	72	396.16	140.46
J2440	9.59	64	406.51	148.41
J2444	0	301.9	523.24	95.91
J2446	0	287.38	419.6	57.29
J2448	0	287.18	419.6	57.38
J2452	0	58	308.9	108.71
J2456	0	137.07	387.74	108.62
J2458	16.5	137	387.71	108.63
J246	14.34	311.52	614.01	131.07
J2460	0	168	383.21	93.25
J2462	0	147	382.12	101.88
J2464	0	141	366.73	97.81
J2466	10.39	138.18	366.73	99.03
J2468	0	121.78	366.93	106.23
J2470	0	119.63	366.93	107.16
J2472	0	120.81	366.93	106.65
J2474	25.8	70.72	364.7	127.38
J2476	12.22	27.83	364.54	145.9
J2478	0	67	366.59	129.81
J248	0	56	396.01	147.33
J2480	23.57	70.22	366.59	128.42
J2482	30.31	159.3	366.61	89.83
J2484	30.82	172	366.55	84.3
J2486	0	172.72	366.55	83.99
J2488	0	328.93	410.62	35.39
J2490	0	351.57	410.62	25.59
J2492	0	461.77	613.74	65.85
J2494	0	371.47	613.74	104.97
J2496	0	225.08	476.11	108.77
J2498	0	278	476.11	85.84
J250	0	144.5	395.49	108.75
J2500	0	225.23	476.11	108.7
J2502	0	211.22	476.11	114.77
J2504	0	195.34	370.18	75.76
J2506	56.45	272.95	369.83	41.98
J2508	0	263	413.07	65.03
J2510	51.31	264	412.25	64.24

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2512	30.1	272.06	412.84	61
J2514	26.74	282.84	412.51	56.19
J2516	0	254	375.22	52.53
J2518	0	254	375.22	52.52
J252	23.23	127.09	395.54	116.32
J2520	44.12	254	375.22	52.52
J2522	0	367.05	418.95	22.49
J2524	0	51	395.83	149.41
J2526	0	55	395.84	147.69
J2528	0	311.06	585.49	118.91
J2530	36.33	438.13	583.48	62.98
J2532	0	368.06	583.52	93.36
J2534	0	367.84	583.52	93.45
J2536	22.78	368.27	583.52	93.27
J2538	0	310.72	585.48	119.05
J254	0	22.99	395.85	161.56
J2540	38.1	309	584.4	119.33
J2542	0	311.38	585.5	118.78
J2544	0	175	385.33	91.14
J2546	0	182	386.2	88.48
J2548	0	205.13	388.06	79.26
J2550	11.59	152.34	385.19	100.9
J2552	0	161.45	385.35	97.02
J2554	25.12	164	385.18	95.84
J2556	220.9	162	385.17	96.7
J2558	2.17	159.95	395.9	102.24
J256	0	22.9	395.85	161.6
J2560	0	155.63	395.87	104.1
J2562	0	60.69	397.72	146.04
J2564	0	46	398.01	152.53
J2566	0	55.27	395.84	147.57
J2568	0	53	395.84	148.55
J2570	0	179.42	395.85	93.78
J2572	0	181.91	395.85	92.7
J2574	0	260.36	384.77	53.91
J2576	0	288	583.01	127.83
J2578	0	288	583.01	127.83
J258	0	72	396.34	140.54
J2580	0	288	583.01	127.83
J2582	0	445.27	588.33	61.99
J2584	0	377.15	668.87	126.4
J2586	0	185.84	418.98	101.02
J2588	0	402	419.47	7.57
J2590	0	64	302.64	103.4
J2592	23.48	288	583.01	127.83
J2594	0	324	419.09	41.2

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2596	0	403.44	585.29	78.8
J2598	0	273	376.36	44.79
J26	0	209.47	384.77	75.96
J260	0	392	399.91	3.43
J2600	0	273	376.36	44.79
J2604	0	269	376.08	46.4
J2606	0	270.88	376.08	45.58
J2608	0	271.08	376.08	45.49
J2610	0	270.67	376.07	45.67
J2612	45.79	64	302.64	103.4
J2614	0	126.86	395.93	116.59
J2616	0	72	396.16	140.46
J2618	0	72	396.16	140.46
J262	0	70.97	396.34	140.98
J2620	0	72	396.16	140.46
J2622	0	70	302.64	100.8
J2624	0	84	381.06	128.72
J2626	0	420.82	590.9	73.69
J2628	0	419	590.9	74.48
J2630	0	319	611.48	126.73
J2632	0	319	611.48	126.73
J2634	0	366.69	583.53	93.96
J2636	0	366.66	583.52	93.97
J2638	0	71.3	396.32	140.83
J264	0	72.1	396.34	140.49
J2640	104.15	275.57	607.33	143.75
J2642	0	348.02	612.25	114.49
J2644	0	347.73	612.25	114.61
J2646	0	426.98	612.26	80.28
J2648	0	377.03	668.87	126.46
J2650	0	377.69	668.87	126.17
J2652	0	410.82	629.99	94.97
J2654	0	416.58	629.99	92.47
J2656	0	186.25	418.99	100.85
J2658	0	351.35	612.94	113.35
J266	0	335	411.48	33.14
J2660	0	360	612.94	109.6
J2662	0	185.69	418.95	101.07
J2664	0	185.91	418.99	100.99
J2666	0	195.2	375.32	78.05
J2668	0	195.57	375.32	77.88
J2670	0	185.96	418.99	100.97
J2672	0	53	302.45	108.08
J2674	0	56.48	302.45	106.58
J2678	0	105.71	373.2	115.9
J268	0	334.97	411.48	33.15

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2680	0	105.91	373.2	115.82
J2682	0	403.71	642.99	103.68
J2684	0	305.11	395.73	39.26
J2686	0	354.21	582.86	99.08
J2688	0	68.75	302.82	101.42
J2690	90.65	64	302.79	103.47
J2692	0	310	509.31	86.36
J2694	24.87	313.36	509.31	84.9
J2696	51.37	404.01	419.69	6.79
J2698	0	79	302.86	97
J270	0	353.18	411.48	25.26
J2700	0	75	302.83	98.72
J2702	0	79	302.82	96.98
J2704	0	193	488.78	128.16
J2706	0	196	478.8	122.54
J2708	0	193	488.82	128.18
J2710	0	193	488.82	128.18
J2712	0	193	488.85	128.19
J2714	0	190	495.37	132.32
J2716	22.57	306	422.34	50.41
J272	0	324.4	413.45	38.58
J2722	0	278.97	555.15	119.67
J2724	33.4	299	558.91	112.62
J2726	0	301.01	558.91	111.75
J2728	62.28	66	304.52	103.35
J2730	0	67	304.96	103.11
J2732	0	59	309.12	108.38
J2738	9.93	148.02	366.67	94.74
J274	0	337	411.46	32.26
J2740	15.35	150.65	366.56	93.55
J2742	15.3	147.02	367.11	95.37
J2744	0	414.72	614.98	86.78
J2746	0	357.11	615.2	111.83
J2748	0	299	583.01	123.06
J2750	0	312.45	419.99	46.6
J2752	0	310.94	419.99	47.25
J2754	0	233	428.31	84.63
J2756	22.51	230	447.76	94.35
J2758	0	224.9	476.13	108.86
J276	0	406.85	627.81	95.74
J2760	0.8	171.58	373.24	87.38
J2762	0	320	416.81	41.95
J2764	20.83	278	412.93	58.46
J2766	0	136.92	377.71	104.34
J2768	0	138	377.26	103.67
J2770	20.77	239	412.8	75.31

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2772	0	248	412.8	71.41
J2774	29.85	239	412.79	75.3
J2776	30.16	243.78	412.19	72.97
J2778	33.08	277	412.83	58.86
J278	18.28	420	627.81	90.04
J2780	24.31	281	412.65	57.04
J2782	0	291.2	412.88	52.72
J2784	0	277	412.85	58.86
J2786	0	261.15	413.08	65.83
J2788	0	315.01	416.24	43.86
J2790	38.74	330	416.2	37.35
J2792	0	176.1	380.85	88.72
J2794	0	327.54	419.09	39.67
J2796	0	288	583.01	127.83
J2798	0	324.45	583.03	112.04
J28	0	183.26	384.77	87.31
J280	0	389.81	636.56	106.92
J2800	0	80	389.36	134.04
J2802	0	80	389.36	134.04
J2804	0	80	389.36	134.04
J2806	0	41.97	395.86	153.34
J2808	22.32	53	395.85	148.56
J2810	0	43.38	395.86	152.73
J2812	0	44.9	395.86	152.07
J2814	0	83.03	367.9	123.43
J2816	26.49	144	371.14	98.42
J2818	0	160.38	366.94	89.51
J282	0	411.59	636.56	97.48
J2820	21.35	160.07	366.94	89.64
J2822	13.36	241.79	375.79	58.06
J2824	0	287.49	417.34	56.27
J2826	0	417.43	590.48	74.98
J2828	0	137	391.84	110.42
J2830	0	404.96	419.69	6.38
J2832	52.05	314.83	419.94	45.54
J2834	0	195.18	375.45	78.11
J2836	0	240.93	371.5	56.58
J2838	0	240.89	371.5	56.59
J284	0	411.9	636.56	97.35
J2840	0	259.26	614.7	154.01
J2842	0	174.4	380.86	89.46
J2844	0	177.72	380.86	88.02
J2846	0	310	509.31	86.36
J2848	0	175	380.86	89.2
J2850	0	366	573.4	89.87
J2852	0	273	376.36	44.79

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J2854	3.08	212.93	380.8	72.74
J2856	14.78	186	382.21	85.02
J2858	0	286	537.49	108.97
J286	42.58	105.46	373.2	116.01
J2860	0	287.4	419.6	57.28
J2862	0	315.57	517.95	87.69
J2864	0	315.68	517.99	87.66
J2866	27.36	311.21	527.33	93.64
J2868	0	319.73	528.8	90.59
J2870	0	58	308.88	108.71
J2872	0	57	308.88	109.14
J2874	0	58.1	308.88	108.66
J2876	0	161.12	383.4	96.32
J2878	0	168	383.2	93.25
J288	44.69	86.23	373.19	124.34
J2880	0	140.08	385.03	106.13
J2882	0	133.57	366.59	100.97
J2884	0	135.91	366.59	99.95
J2886	0	132.77	366.74	101.38
J2888	0	132.66	366.74	101.43
J2890	47.53	373.35	613.74	104.16
J2892	0	319.53	528.78	90.67
J2894	34.08	323.37	528.78	89.01
J2896	0	312	413.91	44.16
J2898	0	300	413.25	49.07
J290	0	85	373.19	124.87
J2900	26.62	302	413.14	48.16
J2902	22.08	293.24	412.7	51.76
J2904	0	278	412.91	58.46
J2906	54.04	306	411.49	45.71
J2908	0	278	412.93	58.46
J2910	0	194.58	372.8	77.22
J2912	56.28	205.48	372.78	72.49
J2914	0	84	376.26	126.64
J2916	81.51	149.6	376.2	98.19
J2918	98.69	272.59	375.42	44.56
J292	0	243	371.49	55.67
J2920	0	276.42	376.07	43.18
J294	0	285	371.31	37.4
J296	0	324.56	676.51	152.5
J298	21.64	295	419.6	53.99
J30	0	183.18	384.78	87.35
J300	0	348.51	583.28	101.72
J3000	0	241	375.97	58.48
J3002	0	299.53	416.53	50.69
J3004	0	230.11	367.53	59.54

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (1	Head (ft)	Pressure (psi)
J3006	0	156.41	395.91	103.78
J3008	0	155.49	385.19	99.53
J3010	0	123	381.67	112.08
J302	0	348.79	583.28	101.61
J304	0	348.72	583.28	101.63
J306	0	330	583.03	109.64
J308	0	366.94	583.51	93.84
J310	0	349.16	583.29	101.44
J312	30.92	338.32	583.28	106.14
J314	0	330	583.03	109.64
J316	0	330	583.03	109.64
J318	0	63.56	415.26	152.39
J32	0	191.72	395.46	88.28
J320	0	64.91	415.26	151.81
J330	0	384.06	369.38	-6.36
J332	0	383.91	369.38	-6.3
J334	0	123	376.27	109.74
J336	10.39	123.46	376.42	109.61
J338	0	366.31	418.97	22.82
J34	0	191.59	395.46	88.34
J340	0	108	390.03	122.2
J342	0	105	392.81	124.71
J344	0	101	393.03	126.54
J346	0	108	389.91	122.15
J348	0	63.55	398.39	145.09
J350	0	101.51	393.02	126.31
J352	37.45	75.76	303.14	98.52
J354	0	62.41	304.33	104.82
J356	0	168	383.2	93.25
J358	0	168	383.2	93.25
J36	0	114.27	385.22	117.41
J360	0	168	383.2	93.25
J364	11.19	46	398.04	152.54
J366	0	80	389.57	134.14
J368	3.77	77.72	393.24	136.71
J370	0	235.72	375.79	60.69
J372	26.43	169.17	375.26	89.3
J374	13.87	150.9	373.97	96.66
J376	0	157.4	366.82	90.74
J378	0	156.28	366.81	91.23
J38	0	90.91	385.24	127.53
J380	0	180	366.14	80.65
J382	92.98	187.09	365.73	77.4
J384	0	161	366.86	89.2
J386	0.11	152	366.84	93.09
J388	0	180.61	488.82	133.55

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J390	0	184.87	488.82	131.7
J392	0	180.02	488.82	133.8
J394	0	242	508.2	115.35
J396	0	201	500.04	129.57
J398	0	315.06	517.9	87.89
J40	0	143.68	385.2	104.65
J400	0	287.02	419.59	57.45
J4000	0	290	410.7	52.3
J4002	0	300.79	410.7	47.63
J4004	0	319.67	528.78	90.61
J4006	0	23.08	395.85	161.52
J4008	0	270.87	376.08	45.58
J4010	0	287.48	376.37	38.52
J4012	0	235.55	375.79	60.76
J4014	0	182.61	380.84	85.89
J4016	0	182.22	380.84	86.06
J4018	0	182.25	380.84	86.05
J402	0	288	419.34	56.91
J4020	0	384	369.38	-6.33
J4022	0	195.42	375.32	77.95
J404	0	288	419.6	57.02
J406	0	306	422.35	50.41
J408	0	306	422.26	50.38
J410	0	306	422.36	50.42
J412	52.99	251	549.82	129.48
J414	0	247	549.77	131.19
J416	38.74	253.16	554.63	130.63
J418	0	252.96	554.63	130.71
J42	0	144.26	385.2	104.4
J420	0	252.94	554.63	130.73
J422	0	252.53	554.63	130.9
J424	0	310	561	108.76
J426	0	310	560.94	108.73
J428	0	310	560.83	108.68
J430	20.4	310	560.77	108.66
J432	0	310	560.89	108.71
J434	0	382.12	369.39	-5.51
J436	0	382.33	369.39	-5.61
J438	0	381.87	369.39	-5.4
J44	0	144	385.2	104.51
J440	0	378	369.4	-3.73
J442	0	382.77	369.39	-5.8
J444	0	366	573.36	89.85
J446	0	366	573.4	89.87
J448	0	362.61	370.31	3.34
J450	19.01	366.67	370.31	1.58

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J452	0	362.05	370.31	3.58
J454	0	381.28	577.76	85.13
J456	0	381.95	577.76	84.84
J458	0	283	573.4	125.83
J46	0	152.55	385.19	100.81
J460	0	366	573.4	89.87
J462	79.63	278.53	374.59	41.62
J464	0	363	370.32	3.17
J466	0	273	573.4	130.16
J468	0	277	573.4	128.43
J470	0	273	573.4	130.16
J472	0	273	573.4	130.16
J474	0	273	573.4	130.16
J476	0	273	376.36	44.79
J478	0	273.22	376.36	44.69
J48	22.83	143.89	385.2	104.56
J480	0	132	385.34	109.77
J482	0	183.94	382.24	85.92
J484	0	134.84	385.36	108.55
J486	0	273	376.32	44.77
J488	0	274.73	376.35	44.03
J490	126.2	265.18	376.22	48.12
J492	0	273	573.4	130.16
J494	0	273	573.4	130.16
J496	0	313	534.23	95.86
J498	0	313	534.18	95.84
J50	0	152.63	385.19	100.77
J504	0	63.51	398.41	145.11
J506	0	63.29	398.42	145.21
J512	0	58	409.59	152.34
J514	0	58.92	412.7	153.29
J516	0	58.95	412.72	153.29
J518	0	265	542.01	120.03
J52	0	151.38	385.19	101.31
J520	0	255.56	546.04	125.86
J522	0	255	546.51	126.31
J524	96.15	326.99	530.14	88.02
J526	47.7	319.95	528.82	90.5
J528	0	317	532.55	93.4
J530	0	325	530.24	88.93
J532	0	317	532.62	93.43
J534	0	317.55	532.67	93.21
J536	0	58	308.88	108.71
J538	0	58	308.86	108.7
J54	0	192.45	395.45	87.96
J540	0	58	308.88	108.71

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J542	0	59.15	302.42	105.41
J544	0	58.91	302.42	105.51
J546	20.27	265	541.96	120.01
J548	0	286	537.49	108.97
J550	0	62.88	304.33	104.62
J552	0	56.86	302.42	106.4
J554	0	58.18	302.42	105.83
J556	0	57.62	302.42	106.07
J56	13.37	205.01	615.38	177.81
J564	0	169.21	375.26	89.28
J566	37.96	169.46	375.27	89.17
J568	0	152.91	383.87	100.08
J570	0	152.6	383.87	100.21
J572	0	136	387.74	109.08
J574	8.16	128.57	387.71	112.29
J576	0	136	387.74	109.08
J58	100.98	82	397.46	136.69
J590	0	158	384.12	97.98
J592	6.68	90.98	384.1	127.01
J594	0	163	383.66	95.61
J596	0	163	383.66	95.61
J598	0	158	384.12	97.98
J60	0	106.67	397.21	125.89
J600	0	158	384.11	97.97
J602	0	158	384.12	97.98
J604	0	154.66	382.27	98.63
J606	0	154.98	382.29	98.49
J608	0	150.94	382.12	100.17
J610	0	150.83	382.12	100.22
J612	0	168.39	380.04	91.71
J614	38.64	159	381.62	96.46
J616	0	158.48	381.66	96.7
J618	0	158.72	381.65	96.59
J62	0.8	61.16	397.72	145.83
J620	0	131	366.74	102.15
J622	0	131	366.74	102.15
J624	0	138.96	366.73	98.69
J626	0	132.62	366.74	101.44
J628	0	160	364.9	88.78
J630	0	160.86	366.13	88.94
J632	0	141	366.73	97.81
J634	0	141.64	366.73	97.53
J636	0	138.59	366.73	98.85
J638	0	138.71	366.73	98.8
J64	0	61.09	397.72	145.86
J640	0	138.34	366.73	98.96

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J642	6.56	292.92	368.9	32.92
J644	0	292.41	368.9	33.14
J646	2.34	278.85	368.9	39.02
J648	0	291.01	368.9	33.75
J650	0	279	368.9	38.96
J652	0	279	368.9	38.96
J654	0	300.31	368.9	29.72
J656	0	297.78	368.9	30.81
J658	0	291.28	368.9	33.63
J66	0	62.82	397.72	145.11
J660	0	222	368.92	63.66
J662	21.52	222	368.6	63.52
J664	0	222	368.95	63.67
J666	18.84	222	369.03	63.71
J668	0	222	368.99	63.69
J670	0	113	366.56	109.87
J672	0	115	366.04	108.77
J674	0	114.99	366.73	109.08
J676	2.85	143.65	366.73	96.66
J678	0	274.95	367.82	40.24
J68	0	60.95	397.72	145.92
J680	20.55	252.22	367.76	50.07
J682	0	274.96	367.82	40.24
J684	0	276.86	367.84	39.42
J686	0	276.4	367.84	39.62
J688	0	124.47	365.59	104.48
J690	0	172	366.55	84.3
J692	0	317.21	611.5	127.52
J694	0	316.71	611.5	127.73
J696	0	214	367.14	66.35
J698	72.21	210.84	367.63	67.94
J70	0	70.93	396.32	140.99
J700	0	320	611.48	126.3
J702	0	319	611.48	126.73
J704	1.52	325.81	611.48	123.78
J706	0	301.25	611.53	134.45
J708	0	301	611.53	134.55
J710	0	454.38	614.98	69.59
J712	0	502.23	614.98	48.86
J714	7.69	300.06	611.53	134.96
J716	0	446.93	614.98	72.82
J718	0	398.18	614.98	93.94
J72	0	71	396.32	140.96
J720	0	362.24	410.7	21
J726	0	375.99	410.7	15.04
J728	0	300.79	410.7	47.63

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J730	0	335	411.35	33.08
J732	82.16	326.96	411.19	36.5
J734	51.6	370.91	613.74	105.22
J736	0	424.3	613.74	82.08
J738	0	372.75	613.74	104.42
J74	17.98	160	389.65	99.51
J742	0	359.52	615.21	110.79
J744	0	358.86	615.2	111.07
J746	0	416.92	613.31	85.1
J748	0	265	611.86	150.3
J750	11.03	283.96	611.58	141.96
J752	0	264.81	611.87	150.38
J754	0	265.77	611.87	149.96
J756	0	242.72	410.78	72.82
J758	38.99	256.88	410.76	66.68
J76	79.11	162.44	387.3	97.43
J760	0	243	410.78	72.7
J762	0	264	410.73	63.58
J764	0	243	410.78	72.7
J766	0	247	410.78	70.97
J768	0	417.5	613.31	84.84
J770	0	425	613.31	81.59
J772	0	434	613.22	77.66
J774	0	434	613.22	77.66
J776	22.08	462.36	613.22	65.37
J778	0	320.74	611.94	126.18
J78	0	162	391.53	99.46
J780	17.34	296.41	611.92	136.71
J782	0	320.63	611.94	126.22
J784	8.41	320.29	611.94	126.37
J786	12.79	281	611.9	143.38
J788	0	449.19	615.77	72.18
J790	0	448	616.26	72.91
J792	0	449.05	615.76	72.24
J794	32.58	448	615.75	72.69
J796	0	449.32	615.76	72.12
J798	0	78	396.34	137.94
J80	0	162	391.53	99.46
J800	0	188.87	441.73	109.56
J802	0	170.18	441.73	117.66
J804	0	217.25	434.57	94.16
J806	0	170	434.57	114.64
J808	0	77.52	396.32	138.14
J810	0	258.82	467.13	90.26
J812	25.68	230	447.78	94.36
J814	0	258.71	467.18	90.33

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J816	55.16	280.58	413.58	57.63
J818	37.19	294	414.4	52.17
J82	0	162	391.49	99.44
J820	0	239	412.8	75.31
J822	21.02	251	412.93	70.16
J824	0	308	415.1	46.41
J826	0	308	415.1	46.41
J828	0	312	413.91	44.16
J830	21.14	312	413.9	44.15
J832	0	292.44	413.01	52.24
J834	0	296.19	413	50.62
J836	24.38	292.3	413.01	52.3
J838	33.64	266.47	412.92	63.46
J84	0	71.56	396.32	140.72
J840	0	272.43	412.85	60.84
J842	0	266.47	412.92	63.46
J844	0	273.41	413.04	60.5
J846	0	256	413.42	68.21
J848	0	273.63	413.04	60.41
J850	0	119	378.99	112.66
J852	0	115	379.66	114.68
J854	50.4	121	378.63	111.63
J856	0	151.26	375.99	97.38
J858	0	143.03	376.26	101.06
J86	0	40.29	395.87	154.07
J860	0	174.15	375.65	87.31
J862	62.1	143.02	376.28	101.07
J864	30.37	140	376.79	102.6
J866	0	143.05	376.27	101.05
J868	0	142.86	376.27	101.14
J870	15.58	177.55	395.72	94.54
J872	0	137.2	395.73	112.02
J874	24.03	219.98	395.72	76.15
J878	22.51	231	412.71	78.73
J88	0	39.54	395.87	154.4
J880	25.25	231	412.67	78.72
J882	84.21	260.96	409.12	64.2
J884	22.01	235	412.71	77
J886	23.69	239	412.8	75.31
J888	0	209	441.79	100.87
J890	0	209	441.73	100.84
J892	0	208.38	374.36	71.92
J894	0	213	374.83	70.12
J896	65.87	211	373.09	70.23
J898	42.81	217.64	373.91	67.71
J90	0	41	395.87	153.76

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J900	0	122.81	376.26	109.82
J902	0	288.49	412.88	53.9
J904	20.33	291	412.87	52.81
J906	0	217.63	377.08	69.09
J908	6.56	229.22	376.94	64.01
J910	0	201.58	376.81	75.92
J912	0.63	200.27	376.68	76.44
J914	0	202.49	376.8	75.53
J916	0	201.98	376.8	75.75
J918	0	235.2	376.83	61.37
J92	21.69	38.71	395.87	154.75
J920	0	267.52	376.37	47.17
J922	0	215	377.08	70.23
J924	0	216.95	377.08	69.38
J926	0	215.56	377.1	70
J928	0	204.6	377.52	74.93
J934	0	113	384.26	117.54
J936	0	119	386.25	115.8
J938	0	117.4	382.27	114.77
J94	0	189.31	372.85	79.53
J940	0	117.42	382.29	114.77
J942	0	117.65	382.26	114.66
J944	0	122.89	381.32	111.98
J946	0	114.67	382.26	115.95
J948	0	152	382.1	99.7
J950	26.37	158.11	382.08	97.05
J952	0	136.76	382.15	106.33
J954	0	121.37	382.21	113.02
J956	0	200.81	382.05	78.53
J958	0	218.05	382.03	71.05
J96	5.82	241.29	371.51	56.42
J960	0	137	391.8	110.41
J962	0	137	391.81	110.41
J964	0	132	390.53	112.02
J966	0	131	390.16	112.29
J968	0	127	388.21	113.18
J970	0	268	414.89	63.65
J972	0	313.95	416.21	44.31
J974	0	314.72	416.22	43.98
J976	0	314.91	416.22	43.9
J978	0	126	395.74	116.88
J98	155.42	466	418.97	-20.38
J980	0	125	395.74	117.31
J982	4.79	88.24	395.79	133.26
J984	3.71	99	395.77	128.59
J986	0	54.7	395.81	147.8

2040 RW Peak Hour Pressures

Node ID	Demand (g	Elevation (f	Head (ft)	Pressure (psi)
J988	0	54	395.81	148.11
J990	46.63	54	395.81	148.11
J992	0	397.84	612.18	92.87
J994	0	397.97	612.17	92.81
J996	0	358.47	612.17	109.93
J998	0	366.94	612.17	106.26
M9600160	579.71	115.98	365.94	108.31
M9600350	0	294.76	368.9	32.12
M9600353	0	229.36	367.53	59.87
M9600526	327.07	156.22	395.84	103.83
M9669055	458.1	298.08	413.13	49.85
M9683152	0	242.61	375.97	57.79
M9687080	67.62	155	383.97	99.21
M9690000	0	61	0	-26.43
M9699900	0	123.39	381.67	111.91
OMWD	0	378.17	589.57	91.6

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
10004	582.9	12	130	258.58	0.73	0.12
10005	6.57	12	130	-1,264.13	3.59	0.03
10006	6.48	12	130	-1,418.53	4.02	0.03
10007	753.42	8	130	-154.4	0.99	0.43
10014	334.32	8	130	198.58	1.27	0.31
10015	710.84	8	130	198.58	1.27	0.65
10016	539.01	8	130	99.89	0.64	0.14
10044	342.52	8	130	81.51	0.52	0.06
10045	5.08	8	130	7.88	0.05	0
10046	36.11	8	130	0	0	0
10058	3.1	12	130	56.28	0.16	0
10059	306.08	8	130	56.28	0.36	0.03
10060	350.03	8	130	431.21	2.75	1.35
10069	4.44	8	130	-37.34	0.24	0
10070	541.19	8	130	-91.39	0.58	0.12
10071	5.67	4	130	54.04	1.38	0.01
10072	592.02	4	130	54.04	1.38	1.42
10073	7.27	12	130	279.48	0.79	0
10074	7.07	12	130	-449.54	1.28	0
10075	380.31	4	130	22.08	0.56	0.17
10076	7.18	4	130	26.62	0.68	0
10077	179.54	4	130	26.62	0.68	0.12
10078	825.96	8	130	-183.01	1.17	0.65
10079	4.06	8	130	-183.01	1.17	0
10080	1,003.77	8	130	-226.85	1.45	1.18
101	36.17	12	120	0	0	0
10173	2.52	12	130	34.08	0.1	0
10174	295.82	12	130	34.08	0.1	0
10192	1,507.01	8	130	204.44	1.3	1.46
10205	728.6	12	130	0	0	0
10210	6.58	8	130	0	0	0
10261	6.1	16	130	-219.33	0.35	0
10262	6.27	16	130	-219.33	0.35	0
10263	6.36	16	130	-219.33	0.35	0
10283	1,071.63	6	130	273.38	3.1	7.2
10289	6.51	18	130	-290.28	0.37	0
10290	862.07	18	130	-692.62	0.87	0.15
10299	45.61	6	130	0	0	0
10300	310.79	6	130	0	0	0
10300_2	183.91	6	120	0	0	0
10329	6.37	12	130	483.54	1.37	0
10330	858.4	12	130	483.54	1.37	0.57
10369	704.77	12	130	-305.86	0.87	0.2
10370	6.28	12	130	-305.86	0.87	0
10371	834.11	12	130	-305.86	0.87	0.24
10405	10.14	6	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
10406	6.34	6	130	0	0	0
10407	79.12	6	130	0	0	0
10408	6.46	6	130	0	0	0
10434	5.84	20	130	5,206.89	5.32	0.03
10435	330.09	20	130	5,172.81	5.28	1.46
10436	580.54	20	130	5,145.44	5.25	2.54
10437	6.05	12	130	0	0	0
10438	6.08	20	130	5,122.56	5.23	0.03
10439	6.27	20	130	5,122.56	5.23	0.03
10440	5.98	20	130	4,162.85	4.25	0.02
10441	6.23	20	130	4,162.85	4.25	0.02
10442	6.08	20	130	1,192.77	1.22	0
10443	6.1	20	130	41.79	0.04	0
10444	6.19	20	130	41.79	0.04	0
10459	48.01	18	130	-5,371.01	6.77	0.38
10463	5.11	6	130	0	0	0
10465	3.02	6	130	0	0	0
10471	127.15	4	130	14.78	0.38	0.03
10472	585.03	24	130	6,098.09	4.32	1.44
10473	829.83	24	130	6,095.01	4.32	2.04
10474	7.32	12	130	35.4	0.1	0
10475	26.31	12	130	35.4	0.1	0
10486	6.06	4	130	0	0	0
10487	6.06	12	130	0	0	0
10488	6.15	8	130	0	0	0
10489	4.88	18	130	0	0	0
105	56.03	12	120	0	0	0
1061	3.47	8	130	-131.66	0.84	0
1062	960.31	8	130	-131.66	0.84	0.41
10629	4.75	8	130	24.87	0.16	0
1063	3.65	6	130	0	0	0
1064	20.69	6	130	0	0	0
10649	75.98	8	130	0	0	0
1067	7.47	36	130	10,160.54	3.2	0.01
10687	5.11	12	130	-912.58	2.59	0.01
10688	4.94	12	130	912.58	2.59	0.01
10689	4.73	12	130	0	0	0
10690	3.96	8	130	0	0	0
107	41.41	12	120	0	0	0
1079	27.14	24	130	2,083.00	1.48	0.01
10818	2.82	8	130	11.3	0.07	0
10840	238.21	8	130	23.48	0.15	0
10845	400.25	12	130	382.61	1.09	0.17
10846	432.23	12	130	382.61	1.09	0.18
10862	700.13	8	130	-52.05	0.33	0.05
10868	411.51	8	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
10871	888.03	8	130	125.35	0.8	0.35
10878	570.99	12	130	-1,418.53	4.02	2.77
10900	115.78	8	130	416.24	2.66	0.42
10901	735.41	8	130	416.24	2.66	2.65
1091	3.17	12	130	-382.61	1.09	0
10915	360.71	8	130	-77.55	0.5	0.06
10916	399.69	8	130	-77.55	0.5	0.06
1092	628.58	12	130	-395.96	1.12	0.29
10932	4.76	12	130	21.35	0.06	0
10933	6.14	12	130	21.35	0.06	0
10934	967.46	12	130	-404.72	1.15	0.46
10935	5.09	30	130	-155.42	0.07	0
10936	907.59	8	130	-404.72	2.58	3.1
10936_2	33.26	8	120	-404.72	2.58	0.13
10993	6.38	6	130	0	0	0
10995	34.13	6	130	0	0	0
10996	228.3	8	130	22.32	0.14	0
10997	401.67	8	130	22.32	0.14	0.01
10997_2	260.68	8	120	22.32	0.14	0
11	8.38	36	130	10,160.54	3.2	0.01
11040	533.23	8	130	154.73	0.99	0.31
11079	26.91	8	130	638.03	4.07	0.21
11080	10.27	8	130	0	0	0
11081	52.56	8	130	0	0	0
11082	28.57	8	130	331.08	2.11	0.07
1118	691.61	8	130	23.48	0.15	0.01
1119	6.5	8	130	23.48	0.15	0
1122	6.24	8	130	-85.23	0.54	0
1123	6.07	12	130	-85.23	0.24	0
1124	3.34	12	130	-131.66	0.37	0
1125	81.04	12	130	-131.66	0.37	0
11256	14.82	12	130	65.36	0.19	0
11257	7.18	8	130	-261.85	1.67	0.01
11258	405.64	8	130	38.74	0.25	0.02
11259	8.39	8	130	-300.6	1.92	0.02
1126	3.99	8	130	29.85	0.19	0
11260	1,075.98	8	130	758.7	4.84	11.79
11280	486.54	8	130	37.1	0.24	0.02
11281	502.84	12	130	-1,264.13	3.59	1.97
11296	853.73	12	130	-449.54	1.28	0.49
11298	6.97	8	130	-44.7	0.29	0
11299	486.03	8	130	-44.7	0.29	0.03
113	41.1	12	130	-559.57	1.59	0.04
11300	3.97	8	130	-44.7	0.29	0
11301	629.52	8	130	-87.11	0.56	0.13
11302	6.2	4	130	57.4	1.47	0.02

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
11303	340.54	4	130	24.31	0.62	0.19
11318	3.92	12	130	-177.68	0.5	0
11319	3.48	4	130	60.01	1.53	0.01
11320	734.43	4	130	30.16	0.77	0.6
11321	3.77	4	130	20.77	0.53	0
11322	549.53	4	130	0	0	0
11338	251.07	12	130	-844.7	2.4	0.47
11341	246.04	12	130	-844.7	2.4	0.46
11342	493.02	12	130	-844.7	2.4	0.91
11348	1,360.41	12	130	-87.28	0.25	0.04
11349	640.68	8	130	-16.51	0.11	0.01
1135	6.37	8	130	52.05	0.33	0
11351	3.85	12	130	807.8	2.29	0.01
11352	998.06	12	130	-807.8	2.29	1.7
11353	3.65	12	130	-88.08	0.25	0
11356	517.85	10	130	907.95	3.71	2.67
11357	4.15	10	130	907.95	3.71	0.02
11358	542.84	8	130	758.7	4.84	5.95
11359	5.92	4	130	-63.51	1.62	0.02
1136	6.03	20	130	-2,143.68	2.19	0.01
11360	1,213.40	4	130	-86.02	2.2	6.9
11361	750.35	4	130	0	0	0
11362	649.01	8	130	758.7	4.84	7.11
11363	367.92	8	130	758.7	4.84	4.03
11363_2	175.49	8	120	758.7	4.84	2.23
1137	6.44	8	130	-52.05	0.33	0
1138	6.22	8	130	-52.05	0.33	0
1141	351.89	8	130	0	0	0
1147	346.98	20	130	2,432.31	2.48	0.38
11476	8.5	8	130	-204.44	1.3	0.01
1147_2	293.39	20	130	2,429.22	2.48	0.32
11488	741.52	8	130	0	0	0
1149	55.38	4	150	2.72	0.07	0
11495	1,010.71	8	130	0	0	0
11495_2	909.58	8	120	0	0	0
115	16.76	12	130	-220.5	0.63	0
1151	54.32	4	150	3.09	0.08	0
11512	24.18	14	130	666.27	1.39	0.01
11513	822.41	14	130	630.66	1.31	0.42
11515	358.58	14	130	615.36	1.28	0.17
1153	495.39	20	120	1,234.56	1.26	0.18
11530	488.67	4	130	-15.35	0.39	0.11
11531	671.81	6	130	-25.29	0.29	0.05
1153_2	163.24	20	120	1,234.56	1.26	0.06
1155	94.53	20	120	1,234.56	1.26	0.03
11555	978.67	24	130	-6,607.15	4.69	2.8

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
116	7.61	12	130	-87.28	0.25	0
11615	381.8	8	130	367.43	2.35	1.09
11616	145.58	8	130	0	0	0
11617	1,094.62	12	130	367.43	1.04	0.43
11618	491.21	12	130	305.15	0.87	0.14
11644	20.07	8	130	0	0	0
11645	201.85	18	130	5,831.05	7.35	1.86
11646	413.26	18	130	5,797.65	7.31	3.77
11648	6.31	18	130	5,797.65	7.31	0.06
1165	291.86	10	120	644.05	2.63	0.92
11657	1,102.53	20	130	3,378.24	3.45	2.21
11658	6.16	20	130	-3,400.81	3.47	0.01
11659	1,045.27	10	130	644.74	2.63	2.86
11659_2	346.01	10	120	574.16	2.35	0.88
11660	6.27	8	130	0	0	0
11661	1,049.40	10	130	869.81	3.55	4.99
11661_2	251.13	10	120	918.07	3.75	1.53
11662	6.02	10	130	918.07	3.75	0.03
11663	6.13	10	130	-918.07	3.75	0.03
11664	240.35	8	130	0	0	0
11665	917.87	10	130	918.07	3.75	4.83
11665_2	410.55	10	120	915.89	3.74	2.49
11665_3	446.76	10	120	907.95	3.71	2.67
1167	167.13	8	120	-641.8	4.1	1.56
1169	191.64	8	120	-259.59	1.66	0.33
117	5.83	12	130	0	0	0
1171	73.06	8	130	-12.34	0.08	0
11727	7.02	8	130	-82.41	0.53	0
11740	508.47	8	130	119.15	0.76	0.18
11741	8.96	8	130	-209.8	1.34	0.01
11742	24.02	8	130	-209.8	1.34	0.02
11743	277.77	8	130	-209.8	1.34	0.28
1175	6.38	8	130	51.37	0.33	0
11759	87.79	8	130	22.88	0.15	0
11761	98.47	8	130	24.87	0.16	0
11793	11.99	8	130	90.65	0.58	0
11794	119.24	8	130	-90.65	0.58	0.03
11817	5.98	8	130	175.56	1.12	0
11818	383.33	8	130	-121.17	0.77	0.14
11819	450.2	8	130	-121.17	0.77	0.17
1182	745.8	30	130	2,172.68	0.99	0.09
1183	6.1	8	130	727.39	4.64	0.06
1184	6.23	8	130	727.39	4.64	0.06
11842	340.6	6	130	0	0	0
11849	5.89	12	130	0	0	0
11850	6.23	12	130	-87.28	0.25	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
11858	4.81	8	130	73.36	0.47	0
11859	5.06	8	130	0	0	0
1186	6.08	30	130	235.28	0.11	0
11860	266.61	8	130	0	0	0
1187	6.24	8	130	235.28	1.5	0.01
1188	6.02	30	130	1,482.82	0.67	0
11882	2.91	12	130	652.68	1.85	0
11883	2.75	12	130	60.56	0.17	0
11885	6.7	8	130	-20.13	0.13	0
1189	6.24	12	130	1,482.82	4.21	0.03
11899	6.56	8	130	29.88	0.19	0
119	19.76	12	130	0	0	0
1190	208.7	12	130	1,482.82	4.21	1.1
11900	615.65	8	130	0	0	0
11901	6.18	8	130	0	0	0
1191	6.56	30	130	294.8	0.13	0
1192	1,305.00	30	130	294.8	0.13	0
1195	106.73	8	130	29.88	0.19	0
11954	3	6	130	21.57	0.24	0
11955	3	6	130	0	0	0
1197	978.22	14	130	-1,278.13	2.66	1.84
1198	6.31	8	130	0	0	0
1199	19.54	8	130	0	0	0
1201	2,017.53	16	140	-1,278.13	2.04	1.73
1202	6.22	8	130	-770.15	4.92	0.07
1203	6.22	8	130	0	0	0
1204	38.35	8	130	0	0	0
12073	3.51	12	130	-446.66	1.27	0
12074	9.21	12	130	-446.66	1.27	0.01
121	19.76	12	130	0	0	0
12126	6.61	12	130	160.21	0.45	0
12127	6.38	12	130	-447.15	1.27	0
12133	7.45	12	130	60.71	0.17	0
12134	854.13	12	130	60.71	0.17	0.01
12135	6.39	16	130	-878.08	1.4	0
1214	6.03	8	130	319.89	2.04	0.01
12148	7.86	6	130	20.75	0.24	0
12149	1,338.86	6	130	20.75	0.24	0.08
1215	6.03	8	130	208.12	1.33	0.01
12150	7.39	6	130	0	0	0
12152	6.01	6	130	1.83	0.02	0
1216	6.27	8	130	-368.07	2.35	0.02
12199	6.48	8	130	221.57	1.41	0.01
122	635.55	8	130	0	0	0
12200	482.71	4	130	104.15	2.66	3.91
12205	37.82	16	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
12206	826.72	16	130	878.08	1.4	0.41
1221	7.38	8	130	212.51	1.36	0.01
1222	6.26	8	130	-175.56	1.12	0
12225	6.19	12	130	160.21	0.45	0
1223	4.17	8	130	36.94	0.24	0
12231	4.96	8	130	51.2	0.33	0
12232	4.28	8	130	49.69	0.32	0
12233	760.57	8	130	49.69	0.32	0.05
12234	4.66	4	130	1.52	0.04	0
1225	6.03	8	130	208.12	1.33	0.01
1226	6.27	8	130	368.07	2.35	0.02
12264	3.68	12	130	191.36	0.54	0
12265	708.72	12	130	191.36	0.54	0.08
123	937.69	8	130	0	0	0
12318	5.68	16	130	-389.67	0.62	0
12319	6.01	16	130	-389.67	0.62	0
12320	6.11	8	130	8.83	0.06	0
12321	5.85	8	130	8.83	0.06	0
12322	486.92	8	130	8.83	0.06	0
12322_2	19.4	8	120	8.83	0.06	0
1235	6.23	8	130	-154.95	0.99	0
12352	60.01	12	130	-477.03	1.35	0.04
12365	5.65	16	130	0	0	0
12366	96.14	12	130	0	0	0
12367	951.05	16	130	878.08	1.4	0.47
124	3.29	8	130	-45.79	0.29	0
12437	2.44	12	130	-395.96	1.12	0
12438	3.09	12	130	-395.97	1.12	0
12439	646.58	12	130	-395.97	1.12	0.29
12440	2.64	8	130	0	0	0
12441	17.12	8	130	0	0	0
12442	3.2	12	130	-50.69	0.14	0
12443	3.12	12	130	35.4	0.1	0
12444	2.93	12	130	35.4	0.1	0
12445	44.03	12	130	35.4	0.1	0
1245	4.73	8	130	0	0	0
12459	6.24	12	130	-173.35	0.49	0
1246	709.86	8	130	248.77	1.59	0.99
12460	6.15	12	130	-258.58	0.73	0
12472	520.74	30	130	2,091.63	0.95	0.06
12472_2	233.92	30	120	2,091.63	0.95	0.03
12481	6.48	8	130	23.48	0.15	0
125	6.96	8	130	-119.15	0.76	0
12509	1,171.88	30	130	2,172.68	0.99	0.14
12509_2	526.56	30	120	2,172.68	0.99	0.08
12514	411.79	8	130	235.28	1.5	0.52

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
12517	6.31	8	130	711.52	4.54	0.06
12521	6.76	8	130	-770.15	4.92	0.08
12536	576.05	8	130	271.45	1.73	0.94
12537	464.28	8	130	271.45	1.73	0.76
12554	991.18	8	130	22.17	0.14	0.02
12602	16.62	8	130	212.51	1.36	0.02
1264	6.05	8	130	0	0	0
1265	6.41	8	130	0	0	0
127	19.52	12	130	0	0	0
12710	377.06	12	130	0	0	0
12717	63.25	8	130	0	0	0
12718	37.21	8	130	0	0	0
12719	162.26	24	130	918.54	0.65	0.01
12720	6.21	24	130	-50.46	0.04	0
12734	523.72	14	130	-30.24	0.06	0
12735	524.03	14	130	-29.64	0.06	0
12736	16.32	14	130	-29.64	0.06	0
12737	6.31	14	130	-30.24	0.06	0
12738	6	12	130	167.43	0.47	0
12757	385.01	8	130	248.92	1.59	0.54
12775	951.21	24	130	-1,977.24	1.4	0.29
12776	7.03	24	130	-1,977.24	1.4	0
12777	6.33	8	130	601.72	3.84	0.05
12778	602.72	8	130	601.72	3.84	4.3
12779	91.54	20	130	920.71	0.94	0.02
12781	601.51	24	130	918.54	0.65	0.04
12782	6.45	8	130	200.12	1.28	0.01
12783	6.35	8	130	0	0	0
12792	338.18	8	130	-20.79	0.13	0
12793	373.64	8	130	-45.9	0.29	0.02
12797	255.97	8	130	-154.73	0.99	0.15
12798	253.18	8	130	-6.17	0.04	0
12799	6.3	8	130	-17.76	0.11	0
12804	29.53	12	130	-40.59	0.12	0
12805	6.26	8	130	282.9	1.81	0.01
12806	6.54	8	130	-323.49	2.06	0.01
12823	6.1	12	130	-282.9	0.8	0
12831	35.98	8	130	0	0	0
12832	774.06	12	130	969	2.75	1.85
12833	362.76	12	130	969	2.75	0.87
12834	228.51	12	130	969	2.75	0.55
12843	5.28	12	130	1,037.88	2.94	0.01
12844	6.14	12	130	402.13	1.14	0
129	70.53	12	130	780.07	2.21	0.11
13	16.34	36	130	3,413.95	1.08	0
1308	6	8	130	250.61	1.6	0.01

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
1309	5.35	8	130	-333.03	2.13	0.01
131	30.03	6	130	220.5	2.5	0.14
1310	766.95	8	130	250.61	1.6	1.08
1311	6.36	8	130	36.94	0.24	0
1312	6.09	8	130	59.11	0.38	0
1313	1,011.32	8	130	36.33	0.23	0.04
1314	11.1	8	130	22.17	0.14	0
1315	760.53	8	130	0	0	0
1316	754.58	8	130	82.41	0.53	0.14
13180	117.08	12	130	167.43	0.47	0.01
13181	183.86	12	130	167.43	0.47	0.02
13217	11.65	8	130	-37.34	0.24	0
13218	548.99	8	130	37.34	0.24	0.02
13227	700.32	8	130	-37.1	0.24	0.03
13234	7.42	8	130	44.12	0.28	0
13235	6.23	8	130	44.12	0.28	0
13236	4.43	8	130	44.12	0.28	0
1324	6.29	8	130	235.28	1.5	0.01
1325	6.39	8	130	157.73	1.01	0
13270	7.17	12	130	22.51	0.06	0
13299	6.38	4	130	56.84	1.45	0.02
133	14.03	27	130	1,495.20	0.84	0
13300	500.73	4	130	26.74	0.68	0.33
13301	4.36	4	130	51.31	1.31	0.01
13302	375.43	4	130	51.31	1.31	0.82
13307	514.55	6	130	56.45	0.64	0.19
13308	943.8	6	130	56.45	0.64	0.34
13314	4.48	4	130	0	0	0
13315	571.76	4	130	0	0	0
13316	4.04	4	130	0	0	0
13317	1,224.17	4	130	0	0	0
13459	3.01	6	130	-83.22	0.94	0
13465	4.44	6	130	0	0	0
135	766.96	12	130	-49.32	0.14	0.01
13527	3.13	8	130	51.6	0.33	0
13528	4.62	8	130	51.6	0.33	0
13541	964.25	6	130	0	0	0
13586	303.82	8	130	0	0	0
13616	1,097.31	8	130	-194.93	1.24	0.97
13628	36.25	8	130	0	0	0
13629	6.1	8	130	-38.02	0.24	0
13630	463.58	8	130	-68.84	0.44	0.06
13631	6.08	8	130	53.88	0.34	0
13632	1,429.71	8	130	23.57	0.15	0.03
13637	21.84	8	130	23.57	0.15	0
13644	6.3	6	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
13647	6.61	4	130	38.02	0.97	0.01
13648	1,015.46	4	130	12.22	0.31	0.16
13688	6.15	6	130	254.55	2.89	0.04
13699	67.92	6	130	0	0	0
137	38.78	6	130	3.94	0.04	0
13700	420.14	14	130	615.36	1.28	0.2
13701	512.92	14	130	35.65	0.07	0
13702	12.29	14	130	25.26	0.05	0
13705	6.2	6	130	2.85	0.03	0
13741	329.59	6	130	65.99	0.75	0.16
13742	6.02	6	130	16.04	0.18	0
13743	955.66	6	130	0	0	0
13746	553.97	12	130	464.65	1.32	0.34
13747	6.29	12	130	464.65	1.32	0
13748	7.84	12	130	0	0	0
13755	6.05	12	130	-483.54	1.37	0
13757	7.31	4	130	24.66	0.63	0
13758	7.99	4	130	16.5	0.42	0
13759	101.23	4	130	16.5	0.42	0.03
13774	8.89	12	130	-770.51	2.19	0.01
13863	4.95	6	130	0	0	0
13870	12.19	20	130	259.59	0.27	0
13871	6.11	20	130	259.59	0.27	0
13872	6.45	20	130	0	0	0
139	42.35	8	130	90.65	0.58	0.01
13902	6.08	8	130	-367.43	2.35	0.02
13903	71.54	8	130	-367.43	2.35	0.2
13928	6.08	20	130	1,234.56	1.26	0
13929	6.03	20	130	1,234.56	1.26	0
13937	6.08	20	130	5,145.44	5.25	0.03
13938	6.21	20	130	5,145.44	5.25	0.03
13961	1,058.40	24	130	-6,670.85	4.73	3.08
13962	1,022.39	24	130	-6,661.26	4.72	2.97
13965	415.58	18	130	5,350.74	6.75	3.26
13969	884.91	4	130	0	0	0
13970	6.13	4	130	0	0	0
13990	16.49	6	130	0	0	0
13991	441.63	6	130	0	0	0
13992	635.69	6	130	0	0	0
13999	5.44	10	130	5,819.43	23.77	0.87
14000	6.05	18	130	-860.86	1.09	0
14001	6.1	10	130	0	0	0
14003	70	18	130	692.62	0.87	0.01
14004	6.03	18	130	5,851.45	7.38	0.06
14009	6.09	8	130	213.2	1.36	0.01
14010	908.16	8	130	142.48	0.91	0.45

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
14011	6.01	18	130	139.88	0.18	0
14020	6.02	20	130	-4,115.34	4.2	0.02
14021	6.11	12	130	714.53	2.03	0.01
14083	352.72	18	130	290.28	0.37	0.01
14084	293.25	18	130	383.26	0.48	0.02
14099	7.79	8	130	0	0	0
141	514.56	12	130	0	0	0
14100	3.45	8	130	0	0	0
14101	58.28	8	130	0	0	0
14132	9.87	8	130	-175.56	1.12	0.01
14182	547.13	12	130	-614.05	1.74	0.56
14185	3.55	12	130	958.7	2.72	0.01
14194	508.92	12	130	918.4	2.61	1.1
14195	5.13	12	130	918.4	2.61	0.01
14200	516.88	18	130	879.87	1.11	0.14
14203	762.1	18	130	879.87	1.11	0.21
14210	484.82	12	130	614.05	1.74	0.5
14221	5	8	130	0	0	0
14222	48.72	8	130	0	0	0
14224	3.65	8	130	73.36	0.47	0
14225	366.31	8	130	73.36	0.47	0.05
14226	2.21	8	130	0	0	0
14253	508.41	8	130	-60.56	0.39	0.05
14255	7.03	12	130	-530.83	1.51	0.01
14256	814.09	12	130	-546.2	1.55	0.67
14259	981.72	12	130	-497.33	1.41	0.68
14260	80.68	8	130	-5.96	0.04	0
14269	1,089.64	8	130	-646.9	4.13	8.88
14269_2	770.45	8	120	-646.9	4.13	7.29
14270	6.4	8	130	-615.28	3.93	0.05
14271	541.99	8	130	-646.9	4.13	4.42
14272	6.23	8	130	-603.22	3.85	0.04
14273	535.04	8	130	-603.22	3.85	3.83
14274	6.32	8	130	-584.94	3.73	0.04
14275	406.09	8	130	-584.94	3.73	2.75
14276	746.44	8	130	-567.9	3.62	4.78
14277	6.02	4	130	-17.05	0.44	0
14278	4.01	8	130	339.26	2.17	0.01
14279	899.98	8	130	-320.04	2.04	1.99
14279_2	476.1	8	120	-339.26	2.17	1.36
14280	51.82	8	130	-320.04	2.04	0.11
143	34.71	4	130	0	0	0
14343	618.48	6	130	0	0	0
14353	1,032.90	6	130	-46.93	0.53	0.27
14400	308.01	12	130	0	0	0
14402	363.66	12	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
14404	409.96	12	130	0	0	0
14405	78.99	12	130	0	0	0
14411	7.76	8	130	48.8	0.31	0
14418	5.05	14	130	-3,372.85	7.03	0.06
14419	258.03	14	130	-3,372.85	7.03	2.93
14420	10.76	14	130	-3,372.85	7.03	0.12
14450	5.37	4	130	221.57	5.66	0.18
14469	186.85	6	130	0	0	0
14472	5.13	8	130	73.36	0.47	0
14489	5	18	130	-5,873.27	7.4	0.05
14490	54.37	18	130	-5,873.27	7.4	0.51
14497	524.95	4	130	-8.83	0.23	0.04
14498	5	6	130	-8.83	0.1	0
14499	65.5	4	130	0	0	0
145	26.99	4	130	458.1	11.7	3.4
14500	1,239.60	4	130	-8.83	0.23	0.1
14589	25.78	12	130	258.58	0.73	0.01
14590	518.86	8	130	44.34	0.28	0.03
14610	477.83	12	130	-714.53	2.03	0.65
14615	497.35	12	130	656.5	1.86	0.58
14616	514.88	12	130	614.34	1.74	0.53
14618	267.56	12	130	614.34	1.74	0.28
14627	602.72	12	130	371.27	1.05	0.24
14675	142.2	8	130	0	0	0
14676	497.67	8	130	-446.66	2.85	2.04
14677	3.27	8	130	0	0	0
14678	3.63	8	130	0	0	0
14679	214.99	8	130	0	0	0
14680	464.93	12	130	-529.37	1.5	0.36
147	11.47	2	130	67.62	6.91	1.22
14751	6.09	12	130	185.43	0.53	0
14759	7.01	4	130	2.07	0.05	0
14760	165.53	4	130	2.07	0.05	0
14762	6.01	4	130	1.83	0.05	0
14763	111.53	4	130	1.83	0.05	0
14834	4.35	12	130	119.51	0.34	0
14835	4.19	12	130	119.51	0.34	0
14836	779.84	12	130	109.55	0.31	0.03
14840	6.85	8	130	24.61	0.16	0
14849	6.31	8	130	-52.41	0.33	0
149	7.27	6	130	327.07	3.71	0.07
1492	6.21	12	130	969	2.75	0.01
1493	6.33	12	130	0	0	0
15	17.48	36	130	3,332.57	1.05	0
15014	1,353.59	16	130	-389.67	0.62	0.15
15015	782.59	16	130	-398.51	0.64	0.09

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
15016	594.27	16	130	-400.05	0.64	0.07
1504	6.31	24	130	918.54	0.65	0
1505	6.17	8	130	0	0	0
151	12.67	4	130	0	0	0
15101	1,118.52	12	130	47.21	0.13	0.01
15122	379.16	12	130	147.69	0.42	0.03
15123	416.19	12	130	-76.86	0.22	0.01
15124	3.58	12	130	-101.81	0.29	0
15136	6.03	20	130	-3,378.24	3.45	0.01
15137	768.28	20	130	1,234.56	1.26	0.24
15138	868.33	30	130	2,143.68	0.97	0.1
15139	129	8	130	52.05	0.33	0.01
15169	6.15	30	130	2,224.05	1.01	0
15170	978.57	30	130	2,224.05	1.01	0.13
15177	627.36	8	130	727.39	4.64	6.36
15189	329.11	12	130	34.43	0.1	0
15190	7.02	30	130	2,012.90	0.91	0
15191	625.24	30	130	2,012.90	0.91	0.07
15198	459.35	12	130	1,418.53	4.02	2.22
15231	486.42	8	130	319.89	2.04	1.08
15232	334.09	8	130	271.45	1.73	0.55
15235	6.07	8	130	248.77	1.59	0.01
15241	646.75	8	130	22.67	0.14	0.01
15245	1,938.42	8	130	-154.95	0.99	1.12
153	51.26	6	130	0	0	0
15321	2.13	8	130	0	0	0
1534	6.99	24	130	-30.24	0.02	0
1535	6	14	130	-30.24	0.06	0
1536	16.96	14	130	-29.64	0.06	0
1537	6.74	24	130	-59.88	0.04	0
1538	6.95	24	130	-227.31	0.16	0
15422	1,426.31	27	130	1,495.20	0.84	0.15
155	52.73	6	130	0	0	0
15562	498.48	8	130	255.7	1.63	0.73
15567	88.49	8	130	248.92	1.59	0.12
15629	482.47	8	130	218.6	1.4	0.53
15630	471.37	8	130	176.19	1.12	0.35
157	3.66	6	130	579.71	6.58	0.1
15710	1,815.71	8	130	282.9	1.81	3.2
15711	1,387.03	12	130	1,037.88	2.94	3.77
15712	126.02	12	130	635.74	1.8	0.14
15756	10.44	8	130	0	0	0
15757	145.59	8	130	0	0	0
15758	53.81	8	130	331.08	2.11	0.13
15759	1,642.31	8	130	331.08	2.11	3.87
15760	342.58	8	130	282.9	1.81	0.6

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
1578	6.08	8	130	601.72	3.84	0.04
1579	6.09	8	130	0	0	0
1580	6.31	8	130	601.72	3.84	0.04
1581	6.61	8	130	248.92	1.59	0.01
1582	6.29	8	130	0	0	0
1588	6.81	6	130	0	0	0
1589	6.14	8	130	248.92	1.59	0.01
159	460.12	24	130	1,976.45	1.4	0.14
161	1,308.16	30	130	2,011.66	0.91	0.14
1612	39.81	20	130	1,875.47	1.92	0.03
1613	6.26	20	130	1,875.47	1.92	0
1614	10.93	20	130	0	0	0
16143	854.54	24	130	-323.93	0.23	0.01
1617	6.81	20	130	1,247.78	1.27	0
16170	766.5	12	130	-614.05	1.74	0.79
1618	6.14	20	130	601.72	0.61	0
1619	6.32	8	130	48.8	0.31	0
1620	815.25	8	130	48.8	0.31	0.06
1621	527.95	8	130	200.12	1.28	0.49
1622	211	8	130	200.12	1.28	0.2
16220	501.28	12	130	-1,264.13	3.59	1.96
16221	499.74	8	130	305.55	1.95	1.02
16221_2	322.11	8	120	305.55	1.95	0.76
16225	508.21	8	130	305.55	1.95	1.03
16226	488.34	8	130	305.55	1.95	0.99
16268	489.1	8	130	-63.47	0.41	0.05
16283	6.94	8	130	106.97	0.68	0
16284	3.72	8	130	100.41	0.64	0
16290	3.16	8	130	0	0	0
16291	222.87	8	130	0	0	0
16308	4.68	8	130	81.51	0.52	0
1631	6.13	8	130	0	0	0
16319	394.35	12	130	-652.68	1.85	0.45
16323	4.12	8	130	758.7	4.84	0.05
16324	4.72	4	130	0	0	0
16343	7.99	4	130	69.4	1.77	0.03
16344	397.67	4	130	38.25	0.98	0.5
16345	6.66	8	130	-160.79	1.03	0
16346	6.75	4	130	101.06	2.58	0.05
16347	903.62	4	130	65.18	1.66	3.07
16348	4.04	8	130	-86.67	0.55	0
16349	252.75	4	130	24.25	0.62	0.14
16350	547.96	8	130	-135.74	0.87	0.25
16351	6.8	8	130	-156.39	1	0
16352	725.21	4	130	22.7	0.58	0.35
16353	9.14	8	130	-265.9	1.7	0.01

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
16357	5.98	4	130	157.04	4.01	0.1
16358	977.09	4	130	132.79	3.39	12.42
16359	3.71	8	130	725.23	4.63	0.04
1636	6.7	8	130	-40.59	0.26	0
1637	6.22	8	130	-40.59	0.26	0
16376	1.87	27	130	0	0	0
16377	66.76	12	130	-827.88	2.35	0.12
1638	6.22	8	130	0	0	0
1639	6.32	8	130	61.45	0.39	0
1640	6.05	8	130	-154.73	0.99	0
16409	4.66	8	130	-105.31	0.67	0
16410	4.66	8	130	-105.31	0.67	0
1646	6.23	12	130	-40.59	0.12	0
1647	6.16	12	130	0	0	0
165	21.29	24	130	0	0	0
16508	557.08	12	130	179.3	0.51	0.06
16548	883.91	12	130	389.1	1.1	0.39
16549	447.87	12	130	340.61	0.97	0.15
16577	497.77	12	130	237.89	0.67	0.09
16578	493.07	12	130	237.89	0.67	0.09
16579	495.59	12	130	237.89	0.67	0.09
16581	482.65	12	130	237.89	0.67	0.09
16584	431.77	8	130	0	0	0
16585	2.96	8	130	0	0	0
16623	799.63	12	130	0	0	0
1668	5.94	12	130	1,051.00	2.98	0.02
1669	5.86	12	130	-959.47	2.72	0.01
167	14.62	24	130	0	0	0
16710	6.07	6	130	-135.62	1.54	0.01
16711	6.16	6	130	-135.62	1.54	0.01
1673	500.81	12	130	-959.47	2.72	1.18
16734	6.53	8	130	38.1	0.24	0
16735	924.87	8	130	35.53	0.23	0.03
16737	542.54	8	130	28.11	0.18	0.01
1674	734.14	12	130	-969	2.75	1.76
16745	6.07	12	130	711.83	2.02	0.01
16746	381.26	12	130	708.8	2.01	0.51
16747	6.17	18	130	-692.62	0.87	0
16748	971.96	18	130	-692.62	0.87	0.17
16749	434.62	6	130	50.8	0.58	0.13
1675	6.25	12	130	-969	2.75	0.01
16750	5.01	16	130	-25.54	0.04	0
16751	6.08	18	130	-219.33	0.28	0
16752	894.81	18	130	-219.33	0.28	0.02
16753	6.47	18	130	0	0	0
16754	24.32	18	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
1676	6.09	12	130	0	0	0
16782	642.98	4	130	15.07	0.38	0.15
16800	903.92	8	130	131.66	0.84	0.39
16802	422.23	12	130	704.52	2	0.56
16803	6.24	8	130	699.67	4.47	0.06
16808	705.3	12	130	471.27	1.34	0.44
16809	7.88	12	130	471.27	1.34	0
16810	5.97	12	130	0	0	0
16811	8	12	130	0	0	0
1685	561.66	12	130	969	2.75	1.34
16856	130.91	12	130	0	0	0
16857	6.62	12	130	0	0	0
16858	10.61	12	130	0	0	0
16859	6.3	12	130	-306.94	0.87	0
1686	507.37	12	130	969	2.75	1.21
16861	1,186.99	12	130	-306.95	0.87	0.34
1686_2	388.65	12	120	969	2.75	1.08
1687	731.55	12	130	969	2.75	1.75
1687_2	176.53	12	120	969	2.75	0.49
16886	607.75	6	130	5.59	0.06	0
16887	849.32	6	130	5.59	0.06	0
169	15.47	36	130	10,160.54	3.2	0.01
1690	6.29	12	130	969	2.75	0.02
1691	5.84	8	130	0	0	0
16930	169.15	8	130	73.36	0.47	0.02
16931	6.08	8	130	73.36	0.47	0
16978	983.17	8	130	367.43	2.35	2.81
1699	10.43	12	130	402.13	1.14	0
17	17.53	36	130	3,332.57	1.05	0
1700	4.74	12	130	402.13	1.14	0
1701	7.39	12	130	0	0	0
17011	6.22	20	130	5,145.44	5.25	0.03
17012	1,176.73	20	130	5,145.44	5.25	5.15
17013	691.67	20	130	4,162.85	4.25	2.04
17014	608.08	10	130	4,115.34	16.81	51.46
17014_2	361.2	10	120	4,115.34	16.81	35.45
17019	112.14	8	130	0	0	0
1702	49.52	12	130	0	0	0
17020	596.59	30	130	7,038.28	3.19	0.65
17028	6.13	8	130	367.43	2.35	0.02
17029	6	8	130	0	0	0
17052	6.09	18	130	213.2	0.27	0
17056	6.1	12	130	0	0	0
17160	866.33	18	130	692.62	0.87	0.15
17172	24.66	12	130	0	0	0
17233	418.78	12	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
17240	973.27	24	130	6,095.01	4.32	2.4
17241	19	24	130	5,730.81	4.06	0.04
17243	4.47	6	130	0	0	0
17267	500.2	12	130	477.03	1.35	0.32
17278	875.15	4	130	-36.76	0.94	1.03
173	1,697.74	30	130	0	0	0
17315	5.32	8	130	22.88	0.15	0
17324	84.62	10	130	0	0	0
17365	3.67	6	130	-8.83	0.1	0
17428	429.21	6	130	-22.88	0.26	0.03
17429	733.03	6	130	-22.88	0.26	0.05
175	3.04	12	130	-713.24	2.02	0
176	3.33	8	130	60.56	0.39	0
17636	11.85	12	130	-529.37	1.5	0.01
17765	598.83	12	130	-258.58	0.73	0.12
17769	422.59	12	130	-652.68	1.85	0.49
17770	114.21	12	130	-713.24	2.02	0.15
17789	7.46	12	130	483.54	1.37	0
17790	6.29	12	130	483.54	1.37	0
17791	500.18	12	130	483.54	1.37	0.33
17796	6.08	6	130	0	0	0
17797	6.12	12	130	-306.95	0.87	0
17798	4.79	18	130	-5,851.45	7.38	0.04
17799	22.59	18	130	-5,851.45	7.38	0.21
17800	439.88	18	130	-5,873.27	7.4	4.11
17822	496.95	8	130	81.01	0.52	0.09
17823	961.43	30	130	2,047.33	0.93	0.11
17839	891.74	12	130	65.36	0.19	0.01
17841	966.93	12	130	49.32	0.14	0.01
17975	1,474.05	12	130	-109.74	0.31	0.06
17976	487.42	12	130	-136.16	0.39	0.03
17977	492.8	12	130	-136.16	0.39	0.03
17978	494.48	12	130	136.16	0.39	0.03
17979	1,022.03	12	130	-136.16	0.39	0.06
185	846.62	30	120	0	0	0
187	122.08	12	130	-713.24	2.02	0.17
19	14.61	36	130	3,413.95	1.08	0
193	3.8	8	130	-538.04	3.43	0.02
194	635.35	8	130	-554.98	3.54	3.9
195	1,314.36	8	130	-641.8	4.1	10.56
195_2	192.59	8	130	-641.8	4.1	1.55
196	1,129.87	16	130	1,147.06	1.83	0.91
197	996.93	16	130	1,192.77	1.9	0.86
198	880.01	16	130	1,192.77	1.9	0.76
203	90	6	130	-220.5	2.5	0.56
205	150.17	12	130	-1,495.20	4.24	0.8

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
206	6.91	12	130	-447.15	1.27	0
207	1,025.68	8	130	29.88	0.19	0.03
207_2_2	102.07	8	120	0	0	0
21	12.66	36	130	10,160.54	3.2	0.01
211	41.49	24	130	1,041.50	0.74	0
213	35.09	24	130	2,083.00	1.48	0.01
215	82.87	24	130	0	0	0
217	80.36	24	130	1,041.50	0.74	0.01
219	78.9	24	130	1,041.50	0.74	0.01
221	73.45	24	130	0	0	0
223	392.17	8	140	-770.15	4.92	3.85
2241	893.86	24	130	-227.31	0.16	0
2242	907.99	24	130	-227.31	0.16	0.01
2244	553.26	24	130	-277.36	0.2	0
2245	1,498.26	24	130	-279.92	0.2	0.01
2247	6.19	12	130	167.43	0.47	0
2248	7.03	12	130	73.86	0.21	0
225	358.86	8	130	-770.15	4.92	4.04
227	1,563.50	8	140	770.15	4.92	15.35
2286	5.79	8	130	261.85	1.67	0.01
2288	5,657.91	12	130	402.13	1.14	2.65
2288_2	148.6	12	120	402.13	1.14	0.08
229	707.03	27	130	1,249.56	0.7	0.05
23	26.37	36	130	367.43	0.12	0
231	354.99	8	140	711.52	4.54	3.01
233	78.84	12	130	0	0	0
2330	525.37	8	130	87.73	0.56	0.11
2331	408.16	8	130	-87.73	0.56	0.08
2332	319.57	12	130	-1,264.13	3.59	1.25
2337	6.78	8	130	895.1	5.71	0.1
2338	168.25	8	130	-895.1	5.71	2.5
2339	6.34	8	130	-63.47	0.41	0
2342	7.19	8	130	44.12	0.28	0
2343	435.64	8	130	68.84	0.44	0.06
2344	7.27	8	130	0	0	0
2345	16.88	8	130	0	0	0
2385	4.6	8	130	7.88	0.05	0
2386	5.12	8	130	0	0	0
2387	90.65	8	130	0	0	0
2388	291.7	8	130	7.88	0.05	0
2389	371.19	8	130	7.88	0.05	0
2404	479.53	12	130	487.72	1.38	0.32
2405	3.1	12	130	-544	1.54	0
2406	343.11	12	130	-544	1.54	0.28
2414	4.22	4	130	109.46	2.79	0.04
2451	7.13	8	130	12.7	0.08	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
2452	534.61	8	130	12.7	0.08	0
2453	6.29	8	130	118.76	0.76	0
2454	800.21	8	130	-86.67	0.55	0.16
2455	613.94	12	130	279.48	0.79	0.15
2466	4.44	12	130	269.48	0.76	0
2467	4.15	6	130	181.4	2.06	0.01
2468	910.29	6	130	181.4	2.06	2.86
2473	4.25	8	130	907.95	5.8	0.06
2474	580.27	8	130	907.95	5.8	8.86
25	98.08	8	130	367.43	2.35	0.28
2666	3.56	12	130	140.31	0.4	0
2667	3.73	12	130	140.31	0.4	0
2668	2.83	12	130	140.31	0.4	0
2669	994.11	8	130	54.36	0.35	0.08
2669_2	33.66	8	120	54.36	0.35	0
2670	3.41	8	130	0	0	0
2679	2.92	8	130	-105.31	0.67	0
2680	292.53	8	130	-105.31	0.67	0.08
2681	682.19	6	130	24.17	0.27	0.05
27	8.85	8	130	367.43	2.35	0.03
2739	4.47	12	130	136.16	0.39	0
2754	3.09	8	130	156.91	1	0
2771	3.36	8	130	-38.99	0.25	0
2773	397.79	12	130	140.31	0.4	0.03
285	4.61	24	130	398.5	0.28	0
286	490.26	24	130	-323.93	0.23	0.01
2872	465.1	4	130	0	0	0
2873	6.21	4	130	0	0	0
2874	486.09	4	130	-38.02	0.97	0.61
2879	214.88	4	130	-38.02	0.97	0.27
2894	6.11	8	130	-38.02	0.24	0
2895	6.13	8	130	0	0	0
2896	6.45	8	130	-122.72	0.78	0
2897	1,379.99	8	130	-122.72	0.78	0.52
2898	6.08	8	130	-68.84	0.44	0
29	8.3	8	130	0	0	0
293	3.04	6	130	50.05	0.57	0
2939	6.27	18	130	-219.33	0.28	0
2940	6.08	18	130	0	0	0
296	2.7	6	130	-23.7	0.27	0
297	3	6	130	-45.27	0.51	0
2982	6.07	6	130	40.41	0.46	0
2983	384.56	12	130	666.28	1.89	0.46
2984	68.05	6	130	0	0	0
2985	3.42	16	130	-25.54	0.04	0
2986	6.08	6	130	55.31	0.63	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
2987	6.29	18	130	0	0	0
299	555.93	6	130	50.05	0.57	0.16
2992	1,192.18	18	130	-290.28	0.37	0.04
2994	5.78	18	130	-290.28	0.37	0
2996	99.83	10	130	0	0	0
3004	6.08	6	130	50.8	0.58	0
3005	6.08	6	130	50.8	0.58	0
3006	6.25	6	130	0	0	0
3023	738.03	4	130	-45.84	1.17	1.31
3024	23.45	6	130	-135.62	1.54	0.04
3025	3.77	6	130	-135.62	1.54	0.01
3026	42.04	4	130	-135.62	3.46	0.56
3040	193	2	130	0	0	0
3056	6.4	8	130	65.99	0.42	0
3057	6	8	130	65.99	0.42	0
3058	6.85	4	130	16.04	0.41	0
3059	351.98	4	130	0	0	0
3060	6.04	6	130	49.95	0.57	0
3061	7.21	8	130	0	0	0
3062	6.18	12	130	0	0	0
3063	6.13	12	130	0	0	0
3064	7.67	12	130	471.27	1.34	0
3065	176.06	12	130	471.27	1.34	0.11
3066	6.85	12	130	471.27	1.34	0
3072	6.79	12	130	-483.54	1.37	0
3073	466.94	12	130	-483.54	1.37	0.31
3074	7.07	12	130	-483.54	1.37	0
3075	4.49	12	130	-483.54	1.37	0
3076	6.3	4	130	45.09	1.15	0.01
3077	710.56	4	130	24.66	0.63	0.4
3099	7.76	12	130	-770.51	2.19	0.01
31	6.55	8	130	0	0	0
3100	569.3	12	130	-770.51	2.19	0.89
3146	602.65	12	130	-305.86	0.87	0.17
3147	7.3	6	130	0	0	0
3148	7.97	6	130	0	0	0
3149	226.35	12	130	-305.86	0.87	0.06
3201	8.08	6	130	12.27	0.14	0
3235	6.08	6	130	73.36	0.83	0
3236	660.66	6	130	73.36	0.83	0.39
3243	5.71	20	130	0	0	0
3244	181.15	12	130	305.15	0.87	0.05
3245	6.18	12	130	305.15	0.87	0
3246	12.42	20	130	259.59	0.27	0
3247	6.01	18	130	5,371.01	6.77	0.05
3249	6.11	18	130	5,371.01	6.77	0.05

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
3250	6.49	6	130	0	0	0
3251	6.05	6	130	0	0	0
3252	46.51	6	130	0	0	0
3253	27.53	6	130	0	0	0
3282	190.18	6	130	0	0	0
33	9.94	8	130	-367.43	2.35	0.03
3314	6.24	8	130	0	0	0
3315	335.05	6	130	0	0	0
3316	63	12	130	-666.27	1.89	0.08
3327	6.27	18	130	5,350.74	6.75	0.05
3328	6.27	18	130	5,350.74	6.75	0.05
3329	6.1	10	130	959.71	3.92	0.03
3330	6.04	10	130	959.71	3.92	0.03
3331	6.18	18	130	1,192.77	1.5	0
3332	6.1	18	130	1,192.77	1.5	0
3340	6.08	12	130	0	0	0
3341	6.12	20	130	5,145.44	5.25	0.03
3346	6.1	30	130	3,122.26	1.42	0
3347	6.02	24	130	3,122.26	2.21	0
3348	653.96	30	130	########	4.61	1.4
3352	6.25	18	130	5,371.01	6.77	0.05
3365	1,208.02	24	130	-6,652.24	4.72	3.5
3365_2	477.61	24	120	-6,652.24	4.72	1.6
3366	6.04	24	130	6,652.24	4.72	0.02
3368	3.26	6	130	0	0	0
3370	6.04	18	130	5,350.74	6.75	0.05
3371	186.07	18	130	5,350.74	6.75	1.46
3381	6.09	6	130	25.51	0.29	0
3382	6.07	6	130	25.51	0.29	0
3383	6.09	4	130	14.78	0.38	0
3402	5.83	12	130	-306.95	0.87	0
3403	6.14	12	130	-306.95	0.87	0
3404	6	12	130	0	0	0
3405	6.46	4	130	0	0	0
3406	350.62	6	130	0	0	0
3411	6.18	24	130	5,651.19	4.01	0.01
3412	3.03	24	130	6,512.05	4.62	0.01
3413	322.76	24	130	6,512.05	4.62	0.9
3414	5.59	10	130	5,819.43	23.77	0.9
3415	6.3	10	130	5,819.43	23.77	1.01
3419	17.69	24	130	0	0	0
3420	6.12	18	130	692.62	0.87	0
3421	6.09	18	130	692.62	0.87	0
3422	6.03	18	130	5,444.58	6.86	0.05
3424	6.57	8	130	0	0	0
3425	6.5	8	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
3426	394.27	18	130	139.88	0.18	0
3427	648.13	18	130	5,424.00	6.84	5.22
3438	6.14	20	130	-3,400.81	3.47	0.01
3439	6.09	20	130	-4,115.34	4.2	0.02
35	9.18	8	130	0	0	0
3588	6.94	8	130	0	0	0
3598	2.83	8	130	0	0	0
3599	2.85	8	130	0	0	0
3668	2.18	24	130	-3,372.85	2.39	0
367	4.5	12	130	-497.33	1.41	0
368	488.94	8	130	0	0	0
37	59.47	10	120	-5,819.43	23.77	11.09
3732	1.58	6	130	0	0	0
3733	2.24	12	130	0	0	0
3734	2.17	12	130	0	0	0
3736	5.35	8	130	0	0	0
3737	64.74	8	130	0	0	0
3746	4.43	8	130	-171.88	1.1	0
3760	6.61	30	130	########	4.61	0.01
3761	72.96	24	130	########	7.21	0.46
3762	6.19	30	130	########	4.61	0.01
3763	47.29	30	130	########	4.61	0.1
3773	4.64	6	130	0	0	0
3774	5.6	6	130	-8.83	0.1	0
3775	4.66	6	130	-8.83	0.1	0
3776	6.73	6	130	0	0	0
3777	8.23	6	130	-8.83	0.1	0
3811	69.37	8	130	0	0	0
3812	39.16	8	130	0	0	0
3813	231.58	8	130	0	0	0
3873	1,050.00	18	130	-879.87	1.11	0.29
3874	3.57	8	130	-121.17	0.77	0
39	28.7	10	120	7,017.56	28.67	7.57
3918	598.97	18	130	912.58	1.15	0.18
3920	574.04	18	130	912.58	1.15	0.17
3936	24.77	27	130	538.04	0.3	0
3952	5.12	12	130	614.05	1.74	0.01
3959	6.09	12	130	0	0	0
3960	5.91	12	130	0	0	0
3969	104.35	8	130	0	0	0
3970	4.21	8	130	0	0	0
3971	4.69	8	130	0	0	0
3972	31.68	8	130	0	0	0
3975	258.35	8	130	73.36	0.47	0.04
3976	720.91	8	130	73.36	0.47	0.1
4028	215.68	8	130	60.56	0.39	0.02

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
4035	7.98	8	130	0	0	0
4036	7.16	12	130	-510.7	1.45	0.01
4041	3.02	8	130	725.04	4.63	0.03
4042	1,322.80	8	130	-712.93	4.55	12.91
4043	700.45	8	130	-677.61	4.33	6.22
4044	6.47	8	130	615.28	3.93	0.05
4045	650.07	8	130	-615.28	3.93	4.83
4046	6.02	4	130	-18.28	0.47	0
4047	353.02	4	130	-17.05	0.44	0.1
4062	94.2	12	130	-477.03	1.35	0.06
4063	2.02	8	130	0	0	0
41	6.66	18	120	5,248.36	6.62	0.06
4185	700.88	6	130	50.05	0.57	0.2
4198	2.98	6	130	0	0	0
4200	38.35	6	130	0	0	0
4202	840.37	6	130	0	0	0
4232	708.16	4	130	-9.99	0.26	0.07
4296	738.47	8	130	-38.99	0.25	0.03
43	7.26	18	120	3,496.63	4.41	0.03
4303	7.73	12	130	-258.58	0.73	0
4304	3.04	8	130	-44.34	0.28	0
4324	3.07	12	130	614.34	1.74	0
4325	3.24	12	130	481.91	1.37	0
4326	733.79	12	130	424.7	1.2	0.38
4327	1.42	12	130	0	0	0
434	2.82	8	130	132.42	0.85	0
435	3.06	12	130	371.27	1.05	0
4351	507.83	8	130	0	0	0
436	2.99	12	130	371.27	1.05	0
4376	271.55	8	130	-20.56	0.13	0
4435	4.07	12	130	-446.66	1.27	0
4436	442.27	12	130	-469.78	1.33	0.28
45	17.48	18	120	1,748.20	2.2	0.02
4518	6.24	16	130	878.08	1.4	0
4519	6.12	12	130	0	0	0
452	640.72	12	130	371.27	1.05	0.26
4526	6.62	12	130	60.71	0.17	0
4527	6.05	12	130	39.96	0.11	0
4528	13.27	12	130	39.96	0.11	0
4529	6.75	6	130	1.06	0.01	0
4530	6.42	6	130	-8.06	0.09	0
4531	379.31	6	130	-8.06	0.09	0
4532	7.08	6	130	7	0.08	0
4533	6.82	4	130	7	0.18	0
4534	284.83	4	130	7	0.18	0.02
4539	4.65	6	130	-31.5	0.36	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
4540	4.52	6	130	-8.06	0.09	0
4541	214.96	4	130	23.44	0.6	0.11
4542	762.86	6	130	-31.5	0.36	0.09
456	2.98	12	130	302.92	0.86	0
4633	6.2	6	130	2.17	0.02	0
4634	6.37	4	130	2.17	0.06	0
4635	494.16	4	130	2.17	0.06	0
4639	8.41	12	130	109.55	0.31	0
4640	10.43	12	130	0	0	0
4641	39.85	12	130	0	0	0
4642	4.39	12	130	0	0	0
4643	556.02	8	130	14.37	0.09	0
4644	441.45	8	130	61.85	0.39	0.05
4645	391.37	8	130	52.41	0.33	0.03
4646	654.61	4	130	1.76	0.04	0
4648	7.14	8	130	98.52	0.63	0
4649	6.14	8	130	73.91	0.47	0
4663	6.29	8	130	51.2	0.33	0
4664	6.18	4	130	1.21	0.03	0
4665	417.59	4	130	1.21	0.03	0
4666	283.55	8	130	51.2	0.33	0.02
47	35.29	18	120	1,144.29	1.44	0.02
4704	87.56	12	130	0	0	0
4713	504.37	12	130	147.69	0.42	0.04
4714	502.25	12	130	147.69	0.42	0.04
4715	491.55	12	130	147.69	0.42	0.04
480	530.04	8	130	-20.56	0.13	0.01
481	430.96	8	130	-37.34	0.24	0.02
4811	3.15	12	130	0	0	0
486	610.73	8	130	85.23	0.54	0.12
4866	1,179.22	12	130	447.15	1.27	0.67
4868	953.23	12	130	-477.03	1.35	0.61
49	25.08	18	120	1,198.13	1.51	0.39
4914	1,093.89	16	130	-398.5	0.64	0.12
5030	262.89	8	130	29.85	0.19	0.01
5031	4.01	8	130	-131.66	0.84	0
5032	3.15	8	130	-131.66	0.84	0
5061	2.99	12	130	-395.97	1.12	0
5062	3.16	12	130	446.66	1.27	0
5065	2.76	8	130	0	0	0
51	6.63	18	120	5,248.36	6.62	0.06
5100	7.08	8	130	125.35	0.8	0
5101	6.4	8	130	125.35	0.8	0
5108	6.03	20	130	-2,143.68	2.19	0.01
5109	6.03	20	130	1,234.56	1.26	0
5163	775.38	30	130	2,224.05	1.01	0.1

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
5177	1,953.31	30	130	2,047.33	0.93	0.22
5180	6.32	12	130	34.43	0.1	0
5181	6.32	12	130	34.43	0.1	0
5196	192.99	8	130	0	0	0
5197	1,397.89	30	120	294.8	0.13	0
5209	317.14	8	130	-770.15	4.92	3.57
5224	493.6	12	130	34.43	0.1	0
5225	465.46	12	130	34.43	0.1	0
5226	505.35	12	130	-40.51	0.11	0
5227	496.17	12	130	-140.64	0.4	0.03
5242	6.45	8	130	271.45	1.73	0.01
5243	6.55	8	130	22.67	0.14	0
5244	850.99	8	130	248.77	1.59	1.18
5260	425.41	8	130	-154.95	0.99	0.25
5261	657.38	8	130	-154.95	0.99	0.38
5263	6.02	8	130	-154.95	0.99	0
5264	152.07	8	130	-154.95	0.99	0.09
5296	681.99	8	130	827.88	5.28	8.78
5296_2	336.36	8	130	774.5	4.94	3.83
5298	51.5	8	130	0	0	0
53	7.23	18	120	3,496.63	4.41	0.03
5300	1,064.41	8	130	774.5	4.94	12.11
5304	975.12	8	130	333.03	2.13	2.32
531	490.64	12	130	-446.66	1.27	0.28
532	391.35	12	130	-446.66	1.27	0.22
5322	682.32	8	130	-77.55	0.5	0.11
5322_2	272.52	8	120	-77.55	0.5	0.05
5336	391.75	8	130	-71.7	0.46	0.05
5341	498.09	8	130	-71.7	0.46	0.07
5346	519.83	8	130	-107.28	0.68	0.15
5371	821.85	8	130	212.51	1.36	0.85
5374	10.26	8	130	36.94	0.24	0
5377	669.52	8	130	82.41	0.53	0.12
5379	1,060.49	8	130	82.41	0.53	0.19
5382	4.94	8	130	0	0	0
5385	9.93	30	130	0	0	0
5386	1,180.02	30	120	0	0	0
5387	10.26	30	130	0	0	0
5388	324.98	30	130	0	0	0
5389	186.83	12	130	-383.38	1.09	0.08
539	446.22	12	130	-529.37	1.5	0.35
5390	1,050.11	12	130	-404.72	1.15	0.5
540	148.35	12	130	-529.37	1.5	0.12
55	13.26	18	120	1,748.20	2.2	0.02
5676	6.85	12	130	969	2.75	0.02
5677	559.43	12	130	969	2.75	1.34

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
5678	1,386.16	24	130	-50.46	0.04	0
5680	515.57	24	130	-55.31	0.04	0
57	21.23	18	120	7,017.56	8.85	0.32
5717	6.03	24	130	-30.24	0.02	0
5718	370.67	24	130	-59.88	0.04	0
5760	6.51	8	130	504.62	3.22	0.03
5761	6.31	8	130	255.7	1.63	0.01
5766	6.26	8	130	248.92	1.59	0.01
5801	384.25	20	130	1,849.50	1.89	0.25
5802	6.52	20	130	-1,849.50	1.89	0
5803	1,327.05	20	130	1,875.47	1.92	0.9
5803_2	137.54	20	120	1,875.47	1.92	0.11
5808	513.54	8	130	248.92	1.59	0.71
5809	6.38	8	130	200.12	1.28	0.01
5837	6.08	8	130	-40.59	0.26	0
5884	6.41	12	130	-969	2.75	0.02
5885	6.41	12	130	-969	2.75	0.02
5886	6.11	6	130	0	0	0
5887	22	6	130	0	0	0
5888	299.93	12	130	-969	2.75	0.72
5900	462.71	12	130	0	0	0
5901	12.89	12	130	969	2.75	0.03
5902	203.85	12	130	969	2.75	0.49
5908	6.85	12	130	969	2.75	0.02
5911	207.7	8	130	282.9	1.81	0.37
5959	7.94	12	130	402.13	1.14	0
5960	6.77	12	130	635.74	1.8	0.01
6008	7.24	8	130	331.08	2.11	0.02
6009	6.75	8	130	331.08	2.11	0.02
61	25.63	22	120	0	0	0
613	6.47	12	130	101.51	0.29	0
614	6.16	8	130	185.43	1.18	0.01
615	1,171.98	8	130	175.91	1.12	0.86
616	571.19	8	130	160.21	1.02	0.35
617	431.04	12	130	101.51	0.29	0.02
627	6.95	6	130	38.73	0.44	0
628	8.08	12	130	62.78	0.18	0
632	6.08	6	130	0.76	0.01	0
633	6.01	6	130	-1.06	0.01	0
634	308.92	6	130	-1.06	0.01	0
642	5.29	4	130	23.44	0.6	0
65	780.83	24	130	2,083.00	1.48	0.26
67	40.59	12	120	1,456.95	4.13	0.24
6719	7.48	8	130	93.56	0.6	0
6720	1,073.87	12	130	73.86	0.21	0.02
6722	1,278.73	12	130	69.07	0.2	0.02

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
6728	14.18	12	130	49.32	0.14	0
6729	845.73	12	130	49.32	0.14	0.01
6744	10.26	8	130	-261.85	1.67	0.02
6745	6.09	8	130	38.74	0.25	0
6746	866.7	8	130	-261.85	1.67	1.32
6763	499.03	12	130	-1,264.13	3.59	1.95
6829	94.77	12	130	1,264.13	3.59	0.37
6830	6.55	8	130	-154.4	0.99	0
6836	500.74	8	130	37.1	0.24	0.02
6839	532.89	8	130	63.47	0.41	0.06
6840	475.09	8	130	63.47	0.41	0.05
6841	212.71	8	130	63.47	0.41	0.02
6842	8.75	12	130	305.55	0.87	0
6843	6.92	12	130	305.55	0.87	0
6844	289.58	8	130	305.55	1.95	0.59
6845	6.34	12	130	-1,264.13	3.59	0.02
6846	507.98	12	130	-1,264.13	3.59	1.99
6849	207.91	8	130	305.55	1.95	0.42
6850	7.62	8	130	305.55	1.95	0.02
6851	7.31	8	130	198.58	1.27	0.01
6852	264.07	8	130	198.58	1.27	0.24
6853	504.82	8	130	198.58	1.27	0.46
6871	3.44	8	130	100.41	0.64	0
6872	474.42	8	130	100.41	0.64	0.12
6873	1,000.04	8	130	99.78	0.64	0.26
6874	518.34	8	130	-100.41	0.64	0.13
6875	484.54	8	130	106.97	0.68	0.14
6889	6.63	4	130	42.41	1.08	0.01
6898	4.68	8	130	-89.39	0.57	0
69	22.36	12	120	0	0	0
6924	809.23	12	130	-609.87	1.73	0.82
6926	409.85	12	130	-652.68	1.85	0.47
6936	6.26	8	130	758.7	4.84	0.07
6937	1,090.48	12	130	-153.98	0.44	0.09
6938	650.22	4	130	84.21	2.15	3.55
6939	471.57	12	130	0	0	0
6941	899.32	12	130	-24.03	0.07	0
6942	349.89	12	130	-39.61	0.11	0
6969	4.82	12	130	-713.24	2.02	0.01
6970	7.26	12	130	38.99	0.11	0
6971	5.08	12	130	-752.23	2.13	0.01
6972	295.53	12	130	-814.33	2.31	0.51
6973	253.19	12	130	-713.24	2.02	0.34
6974	201.95	12	130	-713.24	2.02	0.27
6975	178.68	12	130	-895.1	2.54	0.37
6976	323.74	12	130	-895.1	2.54	0.67

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
6994	4.5	8	130	-91.39	0.58	0
6995	610.52	8	130	-160.79	1.03	0.38
6996	4.86	8	130	103.18	0.66	0
6997	487.04	8	130	69.54	0.44	0.06
6999	6.71	8	130	-111.49	0.71	0
7000	6.98	4	130	24.25	0.62	0
7005	7.21	4	130	43.84	1.12	0.01
7006	3.79	12	130	541.9	1.54	0
7007	859.43	12	130	-541.9	1.54	0.7
7009	651.25	12	130	-258.46	0.73	0.13
7010	873.6	12	130	-504.71	1.43	0.62
7010_2	238.45	12	120	-504.71	1.43	0.2
7018	4.17	8	130	750.91	4.79	0.04
7019	1,182.69	8	130	750.91	4.79	12.71
7019_2	533.47	8	120	750.91	4.79	6.65
702	109.29	8	130	0	0	0
7020	907.76	4	130	0	0	0
7021	458.39	4	130	0	0	0
7021_2	338.01	4	120	0	0	0
703	5.53	8	130	0	0	0
704	217.95	16	130	-400.05	0.64	0.02
7057	4.04	12	130	-827.88	2.35	0.01
7058	4.23	12	130	421.69	1.2	0
7059	24.21	12	130	421.69	1.2	0.01
7060	129.58	12	130	-1,249.56	3.54	0.5
722	6.3	12	130	140.7	0.4	0
723	592.58	12	130	132.3	0.38	0.04
724	6.42	6	130	17.34	0.2	0
725	385.24	6	130	17.34	0.2	0.02
7279	424.54	8	130	-22.08	0.14	0.01
7280	3	8	130	-22.08	0.14	0
7285	917.31	6	130	0	0	0
7288	3.52	12	130	179.3	0.51	0
7289	3.34	12	130	140.31	0.4	0
7290	809.61	12	130	140.31	0.4	0.05
7291	453.57	8	130	38.99	0.25	0.02
733	7.94	12	130	109.55	0.31	0
734	9.81	8	130	109.55	0.7	0
735	932.49	8	130	109.55	0.7	0.28
7356	727.87	8	130	-105.31	0.67	0.21
7356_2	679.58	8	120	-105.31	0.67	0.22
7359	4.61	12	130	340.61	0.97	0
7374	3.11	8	130	-105.31	0.67	0
7375	1,982.52	6	130	0	0	0
7395	507.8	12	130	320.04	0.91	0.16
7400	3.02	8	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
7401	908.24	8	130	0	0	0
7407	563.98	8	130	0	0	0
7408	30.16	8	130	0	0	0
7414	579.49	8	130	0	0	0
742	6.17	8	130	-54.17	0.35	0
7422	939.4	8	130	0	0	0
743	6.22	4	130	-1.76	0.04	0
748	445.69	6	130	-1.52	0.02	0
749	348.22	8	130	-1.52	0.01	0
7499	1,304.48	8	130	-122.72	0.78	0.49
75	23.71	12	120	0	0	0
750	6.13	8	130	52.41	0.33	0
7527	771.88	4	130	-38.02	0.97	0.97
7536	6.53	12	130	666.27	1.89	0.01
7537	6.3	6	130	35.62	0.4	0
7538	397.88	6	130	35.62	0.4	0.06
7584	7.27	3	130	2.85	0.13	0
7588	6.32	6	130	579.71	6.58	0.17
7589	19.27	6	130	579.71	6.58	0.52
7616	6.51	6	130	254.55	2.89	0.04
7617	6.29	6	130	216.45	2.46	0.03
7618	75.43	6	130	216.45	2.46	0.33
7623	7.46	8	130	25.77	0.16	0
7624	242.98	12	130	19.2	0.05	0
7625	6.07	12	130	19.2	0.05	0
7626	6.01	6	130	0	0	0
7627	70.53	6	130	0	0	0
7628	226.31	8	130	25.77	0.16	0
7629	74.82	6	130	0	0	0
7630	6.19	16	130	25.26	0.04	0
7631	6.06	6	130	50.8	0.58	0
7632	15.51	6	130	2.85	0.03	0
7633	93.09	4	130	-135.62	3.46	1.23
7634	504.09	16	130	80.85	0.13	0
7635	6.27	18	130	-219.33	0.28	0
77	32.72	12	120	1,456.95	4.13	0.19
7700	6.84	8	130	-131.66	0.84	0
7701	6.15	8	130	568.01	3.63	0.04
7702	279.88	8	130	-529.37	3.38	1.57
7705	6.06	6	130	65.99	0.75	0
7706	8.35	12	130	-704.52	2	0.01
7714	7.15	12	130	483.54	1.37	0
7715	8.41	12	130	471.27	1.34	0.01
7716	7.79	12	130	0	0	0
7717	889.05	6	130	12.27	0.14	0.02
7727	7.5	4	130	8.16	0.21	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
7728	386.15	4	130	8.16	0.21	0.03
7792	7.62	12	130	0	0	0
78	4.21	12	130	-344.65	0.98	0
7813	1,108.86	8	130	-306.95	1.96	2.27
7813_2	1,398.71	8	130	-306.95	1.96	2.87
7884	6.08	8	130	0	0	0
7885	345.9	8	130	0	0	0
7885_2	280.65	8	120	0	0	0
7895	569.05	18	130	5,350.74	6.75	4.47
7896	8.84	8	130	0	0	0
79	80.7	18	120	20.14	0.03	0
7918	6.33	8	130	0	0	0
7919	6.2	8	130	367.43	2.35	0.02
7956	6.18	18	130	5,350.74	6.75	0.05
7957	9.26	18	130	5,350.74	6.75	0.07
7958	294.64	18	130	5,350.74	6.75	2.31
7959	173.2	18	130	5,254.59	6.62	1.32
7987	411.84	18	130	5,371.01	6.77	3.26
7988	508.95	18	130	-5,371.01	6.77	4.03
8003	6.29	24	130	-7,038.28	4.99	0.02
8004	967.83	24	130	-7,038.28	4.99	3.11
8007	6.05	24	130	6,652.24	4.72	0.02
8008	6.08	24	130	6,652.24	4.72	0.02
8010	5.89	18	130	5,350.74	6.75	0.05
8015	6.31	4	130	0	0	0
8016	281.96	12	130	399.59	1.13	0.13
8017	11.48	12	130	399.59	1.13	0.01
8018	787.72	24	130	5,730.81	4.06	1.73
8019	790.57	8	130	0	0	0
8032	6.02	24	130	6,123.60	4.34	0.01
8033	1,247.48	24	130	6,123.60	4.34	3.1
8034	7.25	12	130	399.59	1.13	0
8035	6.11	8	130	0	0	0
8036	6.39	4	130	0	0	0
8037	6.18	4	130	0	0	0
8038	6.13	4	130	0	0	0
8063	1,995.67	24	130	5,651.19	4.01	4.27
8064	1,990.68	8	130	0	0	0
8080	5.95	10	130	0	0	0
8081	3.75	18	130	-860.86	1.09	0
8082	14.89	18	130	-860.86	1.09	0
8083	4.61	18	130	5,851.45	7.38	0.04
8084	1,332.56	18	130	5,851.45	7.38	12.35
8085	6.1	24	130	0	0	0
8086	78.62	24	130	692.62	0.49	0
8087	6.24	24	130	692.62	0.49	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
8088	6.11	24	130	692.62	0.49	0
8089	6.19	18	130	5,851.45	7.38	0.06
8090	6.15	18	130	5,851.45	7.38	0.06
8091	6.16	18	130	5,851.45	7.38	0.06
8094	6.04	8	130	0	0	0
8095	6.01	8	130	0	0	0
8099	6.11	18	130	5,371.01	6.77	0.05
81	100.1	18	120	0	0	0
8114	6.16	12	130	714.53	2.03	0.01
8115	63.91	12	130	714.53	2.03	0.09
8116	200.56	20	130	41.79	0.04	0
8117	511.36	18	130	1,192.77	1.5	0.25
8118	1,091.28	10	130	959.71	3.92	6.23
8118_2	523	10	120	959.71	3.92	3.46
8119	872.57	10	130	959.71	3.92	4.98
8119_2	166.68	10	130	644.74	2.63	0.46
8120	6.41	8	130	0	0	0
8121	115.5	4	130	0	0	0
8248	452.68	18	130	383.38	0.48	0.03
8249	738.13	6	130	92.98	1.06	0.67
8250	450.57	6	130	92.98	1.06	0.41
8251	6.58	6	130	92.98	1.06	0.01
83	578.54	12	130	932.27	2.64	1.29
8301	165.76	8	130	0	0	0
8335	423.04	8	130	-638.03	4.07	3.36
8335_2	32.9	8	120	-638.03	4.07	0.3
8385	56.12	24	130	-2,418.04	1.71	0.02
8387	6.2	12	130	0	0	0
8388	6.07	6	130	0	0	0
8391	625.93	8	130	-247.25	1.58	0.86
8396	3.86	20	130	-3,372.85	3.44	0.01
8397	761.51	20	130	-6,652.24	6.79	5.36
8398	11.03	14	130	-3,279.40	6.83	0.12
8399	20.64	14	130	-3,279.40	6.83	0.22
8400	257.69	14	130	-3,279.40	6.83	2.78
8418	48.03	8	130	0	0	0
8421	764.58	8	130	-89.39	0.57	0.16
8473	3.84	16	130	0	0	0
8474	29.11	16	130	0	0	0
85	93.49	18	120	0	0	0
8502	41.81	14	130	1,278.13	2.66	0.08
8515	6.14	30	130	0	0	0
87	91.83	16	120	0	0	0
8712	3.3	8	130	-23.48	0.15	0
8713	3.66	8	130	144.64	0.92	0
8714	172.43	8	130	30.92	0.2	0.01

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
8715	312.47	8	130	175.56	1.12	0.23
8716	486.7	8	130	-144.64	0.92	0.25
8735	6.61	8	130	-30.92	0.2	0
8736	4.87	8	130	-144.64	0.92	0
8758	607.69	18	130	912.58	1.15	0.18
8781	51.64	12	130	0	0	0
8782	841.8	12	130	44.69	0.13	0.01
8824	6.09	8	130	0	0	0
8825	435.1	8	130	0	0	0
8826	447.28	4	130	0	0	0
8827	5.6	8	130	-320.04	2.04	0.01
8828	890.12	8	130	-320.04	2.04	1.97
8829	558.11	4	130	0	0	0
8830	5.93	4	130	0	0	0
8867	3.04	14	130	0	0	0
8868	491.59	14	130	0	0	0
8872	2.86	24	130	277.36	0.2	0
8873	2.87	24	130	227.31	0.16	0
8881	807.44	6	130	-23.7	0.27	0.06
889	4.97	8	130	8.83	0.06	0
89	127.73	16	120	0	0	0
890	6.62	16	130	-389.67	0.62	0
8909	4.58	8	130	14.34	0.09	0
891	5.7	16	130	-398.51	0.64	0
8910	4.65	8	130	5.96	0.04	0
8911	4.66	12	130	-477.03	1.35	0
892	5.77	16	130	-398.51	0.64	0
9091	7.18	12	130	62.78	0.18	0
9092	699.99	12	130	62.78	0.18	0.01
9093	6.57	12	130	101.51	0.29	0
91	524.46	16	120	-1,495.20	2.39	0.8
9110	5.96	16	130	0	0	0
9111	5.53	8	130	0	0	0
9123	269.23	4	130	2.17	0.06	0
92	4.4	12	130	0	0	0
9219	5.78	8	130	-8.83	0.06	0
9220	52.68	8	130	-8.83	0.06	0
9221	7.6	16	130	398.5	0.64	0
9222	6.11	16	130	-389.67	0.62	0
9269	5.71	16	130	-400.05	0.64	0
9270	5.88	16	130	-400.05	0.64	0
9271	5.51	16	130	0	0	0
9272	5.88	16	130	841.43	1.34	0
9273	5.82	16	130	841.43	1.34	0
9274	5.79	16	130	780.07	1.24	0
9275	5.34	16	130	780.07	1.24	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
93	4.14	12	130	918.4	2.61	0.01
9313	708.27	8	130	235.28	1.5	0.89
9314	620.66	8	130	727.39	4.64	6.29
9314_2	560.27	8	120	727.39	4.64	6.58
9325	2.35	8	130	11.24	0.07	0
9326	2.36	8	130	7.31	0.05	0
9327	18.32	8	130	11.24	0.07	0
9328	35.67	8	130	7.31	0.05	0
9329	175.88	8	130	11.3	0.07	0
9330	3.87	12	130	382.61	1.09	0
9331	379.09	12	130	382.61	1.09	0.16
9332	3.51	8	130	0	0	0
9361	6.49	8	130	-132.42	0.85	0
9362	6.33	8	130	-132.42	0.85	0
9363	713.89	8	130	-132.42	0.85	0.31
9372	6.31	8	130	711.52	4.54	0.06
9376	1,079.40	8	130	711.52	4.54	10.5
9376_2	9.89	8	120	711.52	4.54	0.11
9386	5.36	8	130	0	0	0
94	72.23	12	130	0	0	0
9412	329.58	8	130	0	0	0
9413	340.03	8	130	0	0	0
942	6.3	8	130	36.76	0.23	0
943	12.18	8	130	24.6	0.16	0
9439	674.33	8	130	0	0	0
9444	12.63	8	130	0	0	0
9445	5.58	8	130	0	0	0
9448	95.27	8	130	0	0	0
9450	6.53	8	130	-77.55	0.5	0
9451	1,077.93	8	130	-157.73	1.01	0.64
9452	3,189.67	30	120	237.02	0.11	0.01
9453	6.16	8	130	0	0	0
9454	35.35	30	130	155.42	0.07	0
9455	1,939.89	30	120	155.42	0.07	0
9456	1,035.13	30	120	0	0	0
95	618.48	12	130	918.4	2.61	1.34
9528	5.24	24	130	302.24	0.21	0
9529	5.63	24	130	279.92	0.2	0
9530	5.23	8	130	22.32	0.14	0
963	5.65	16	130	-400.05	0.64	0
9632	256.89	8	130	601.72	3.84	1.83
9633	70.23	8	130	0	0	0
9637	349.02	8	130	583.74	3.73	2.35
964	6.53	16	130	-400.05	0.64	0
9644	7.64	24	130	-1,977.24	1.4	0
9645	6.13	8	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
9646	74.34	8	130	0	0	0
9647	376.94	24	130	1,976.45	1.4	0.12
9648	844.96	24	130	1,875.47	1.33	0.23
9648_2	59.87	24	120	1,875.47	1.33	0.02
965	91.18	16	130	780.07	1.24	0.04
9653	6.25	8	130	0	0	0
9654	29.71	8	130	0	0	0
9655	392.74	8	130	-17.76	0.11	0
9656	63.88	8	130	0	0	0
9657	466.92	8	130	-40.59	0.26	0.02
9658	418.62	8	130	-40.59	0.26	0.02
966	5.43	8	130	24.6	0.16	0
967	6.65	8	130	24.6	0.16	0
9674	6.42	12	130	-969	2.75	0.02
9675	240.34	12	130	0	0	0
968	5.38	8	130	36.76	0.23	0
989	577.06	10	120	659.89	2.7	1.91
989_2	251.84	10	120	654.98	2.68	0.82
99	44.33	12	120	0	0	0
9980	14.54	8	130	261.85	1.67	0.02
9981	927.19	8	130	261.85	1.67	1.42
999	2.69	8	130	29.85	0.19	0
BRPS_P11	1	12	150	0	0	0
BRPS_P12	1	12	150	0	0	0
BRPS_P21	1	12	150	0	0	0
BRPS_P22	1	12	150	0	0	0
BRPS_P31	1	12	150	0	0	0
BRPS_P32	1	12	150	0	0	0
CALVPS_P1	1	12	150	0	0	0
CALVPS_P1	1	12	150	0	0	0
CALVPS_P2	1	12	150	780.07	2.21	0
CALVPS_P2	1	12	150	780.07	2.21	0
CALVPS_P3	1	12	150	0	0	0
CALVPS_P3	1	12	150	0	0	0
CWRF_P11	1	12	150	3,413.95	9.68	0.02
CWRF_P12	1	12	150	3,413.95	9.68	0.02
CWRF_P21	1	12	150	3,414.01	9.68	0.02
CWRF_P22	1	12	150	3,414.01	9.68	0.02
CWRF_P31	1	12	150	3,332.57	9.45	0.02
CWRF_P32	1	12	150	3,332.57	9.45	0.02
FUT005	180.81	24	130	1,180.91	0.84	0.02
FUT006	41.49	24	130	1,041.50	0.74	0
FUT008	82.87	24	130	0	0	0
FUT009	80.36	24	130	1,041.50	0.74	0.01
FUT010	78.9	24	130	1,041.50	0.74	0.01
FUT011	73.45	24	130	0	0	0

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
FUT016	950.24	6	130	-48.26	0.55	0.26
FUT016_2	417.4	6	130	-50.88	0.58	0.12
FUT016_3	77.76	6	130	-53.52	0.61	0.03
FUT016_4	196.44	6	130	-56.71	0.64	0.07
FUT017	583.09	8	130	-295.65	1.89	1.11
FUT018	1,321.69	8	130	10.24	0.07	0
FUT018_2	1,056.00	8	130	8.64	0.06	0
FUT019	723.41	6	130	2.46	0.03	0
FUT019_2	15.4	6	130	0	0	0
FUT020	400.14	6	130	6.18	0.07	0
FUT021	657.33	4	130	2.46	0.06	0.01
FUT022	388.82	6	130	3.72	0.04	0
FUT023	3,472.64	20	130	3,122.26	3.19	6.02
FUT024	399.51	20	130	2,480.46	2.53	0.45
FUT025	2,654.35	20	130	2,477.71	2.53	3
FUT025_2	855.38	20	130	2,473.39	2.53	0.96
FUT025_3	605.13	20	130	2,469.96	2.52	0.68
FUT025_4	505.49	20	130	2,465.71	2.52	0.57
FUT026	1,814.44	20	130	2,463.10	2.52	2.03
FUT026_2	376.03	20	130	2,455.18	2.51	0.42
FUT026_3	447.03	20	130	2,458.26	2.51	0.5
FUT028	3,879.02	12	130	440.79	1.25	2.16
FUT028_2	2,326.63	12	130	0	0	0
FUT040	2,544.68	12	130	74.57	0.21	0.05
FUT040_2	522.8	12	130	1.24	0	0
FUT043	1,559.25	12	130	1.24	0	0
FUT044	888.92	8	130	1.24	0.01	0
FUT155	1,811.81	8	130	-297.75	1.9	3.51
FUT155_2	267.49	8	130	-299.82	1.91	0.52
FUT155_3	1,388.98	8	130	-298.32	1.9	2.7
FUT156	860.9	4	130	69.89	1.78	3.33
FUT156_2	570.72	4	130	64.21	1.64	1.89
FUT156_3	50.96	4	130	66.12	1.69	0.18
FUT157	371.19	4	130	3.3	0.08	0.01
FUT158	736.92	4	130	0	0	0
FUT208	809.38	8	130	0	0	0
FUT209	3,725.44	8	130	1.24	0.01	0
FUT220	1,110.81	8	130	20.64	0.13	0.02
FUT221	1,181.84	6	130	8.25	0.09	0.01
FUT222	474.04	6	130	12.4	0.14	0.01
FUT223	367.45	4	130	0	0	0
FUT224	288.26	4	130	0	0	0
FUT225	23.09	8	130	0	0	0
FUT226	791.65	6	130	0	0	0
FUT226_2	121.21	6	130	-12.4	0.14	0
FUT228	729.16	8	130	39.96	0.26	0.03

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
FUT229	1,734.53	8	130	39.96	0.26	0.08
FUT294	783.84	6	130	0	0	0
FUT295	401.95	6	130	0	0	0
FUT296	681.96	8	130	0	0	0
FUT296_2	368.22	8	130	-19.22	0.12	0
FUT301	1,293.14	8	130	12.34	0.08	0.01
FUT301_2	123.28	8	130	9.24	0.06	0
FUT302	434.05	8	130	9.24	0.06	0
FUT309	609.54	8	130	29.88	0.19	0.02
FUT309_2	411.4	8	130	20.64	0.13	0.01
FUT329	447.45	4	130	4.2	0.11	0.01
FUT329_2	180.05	4	130	0	0	0
FUT351	54.98	8	130	-641.8	4.1	0.44
FUT363	198.81	12	130	440.79	1.25	0.11
FUT363_2	0.69	12	130	0	0	0
LAT001	168.38	4	150	-3.1	0.08	0
LAT007	263.84	4	150	-440.79	11.25	23.73
LAT023	151.2	4	150	-8.25	0.21	0.01
LAT025	111.57	4	150	-9.24	0.24	0.01
LAT027	336.61	4	150	-19.22	0.49	0.09
LAT036	210.98	4	150	-1.91	0.05	0
LAT038	104.77	4	150	-2.19	0.06	0
LAT039	204.04	4	150	-4.2	0.11	0
LAT040	240.31	4	150	-2.46	0.06	0
LAT041	261.55	4	150	-4.91	0.13	0.01
LAT043	271.12	4	150	-4.32	0.11	0
LAT045	332.29	4	150	-3.3	0.08	0
LAT046	241.91	4	150	-2.62	0.07	0
LAT047	393.69	4	150	-3.43	0.09	0
LAT048	162.87	4	150	-3.09	0.08	0
LAT049	181.63	4	150	-2.64	0.07	0
LAT051	212.63	4	150	-3.72	0.09	0
LAT052	149.94	4	150	-3.19	0.08	0
LAT053	358.69	4	150	-4.25	0.11	0.01
LAT054	230.63	4	150	-3.77	0.1	0
LAT055	131.73	4	150	-4.84	0.12	0
LAT057	212.61	4	150	-7.94	0.2	0.01
LAT060	818.74	4	150	-73.33	1.87	2.66
LAT061	213.56	4	150	-1.49	0.04	0
LAT064	168.04	4	150	-0.58	0.01	0
LAT065	152.45	4	150	-0.69	0.02	0
LAT066	255.36	4	150	-1.6	0.04	0
LAT101	11.01	4	150	-39.96	1.02	0.01
LAT106	157.88	4	150	-12.4	0.32	0.02
MAHR_PIP	2,431.16	30	130	2,011.67	0.91	0.26
MAHR_PIP	1,507.95	30	120	2,011.67	0.91	0.19

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
MDWLPS_I	1	12	150	2,083.00	5.91	0.01
MDWLPS_I	1	12	150	2,083.00	5.91	0.01
MDWLPS_I	1	12	150	0	0	0
MDWLPS_I	1	12	150	0	0	0
MDWLPS_I	1	12	150	0	0	0
MDWLPS_I	1	12	150	0	0	0
MEADOWL	297.75	24	130	902.09	0.64	0.02
NCV011	1	8	150	0	0	0
NCV012	1	8	150	0	0	0
NCV021	1	8	150	29.88	0.19	0
NCV022	1	8	150	29.88	0.19	0
P11	76.89	10	130	4,140.21	16.91	6.58
P13	4.41	20	130	5,122.56	5.23	0.02
P15	341.73	20	130	5,145.44	5.25	1.49
P17	303.66	16	130	-219.33	0.35	0.01
P19	604.78	24	130	-6,652.24	4.72	1.75
P2001	2,724.95	12	130	402.13	1.14	1.28
P2003	145.97	8	130	300.6	1.92	0.29
P2005	581.01	14	130	630.66	1.31	0.3
P2007	10.22	20	130	1,247.78	1.27	0
P2009	51.71	8	130	61.45	0.39	0.01
P2011	173.71	8	130	305.55	1.95	0.35
P21	2.48	20	130	5,206.89	5.32	0.01
P23	11.14	12	130	25.77	0.07	0
P25	46.58	8	130	103.74	0.66	0.01
P27	5.99	8	130	142.48	0.91	0
P29	71.21	16	130	83.7	0.13	0
PRV_AE_1:	1	3	150	367.43	16.68	0.26
PRV_AE_1:	1	3	150	367.43	16.68	0.26
PRV_AE_2:	1	8	150	0	0	0
PRV_AE_2:	1	8	150	0	0	0
PRV_FAR_:	1	6	150	0	0	0
PRV_FAR_:	1	6	150	0	0	0
PRV_FAR_:	1	10	150	0	0	0
PRV_FAR_:	1	10	150	0	0	0
PRV_POI_1	1	6	150	1,456.95	16.53	0.11
PRV_POI_1	1	6	150	1,456.95	16.53	0.11
PRV_POI_2	1	8	150	0	0	0
PRV_POI_2	1	8	150	0	0	0
S_CARLSBA	1	24	150	0	0	0
S_CARLSBA	1	24	150	0	0	0
S_MEADOV	1	16	150	0	0	0
S_MEADOV	1	16	150	0	0	0
S_MEAD_E	1	24	150	2,083.00	1.48	0
S_MEAD_E	1	24	150	2,083.00	1.48	0
TDPS_P11	1	12	150	1,748.20	4.96	0.01

2040 RW Peak Hour Velocity

Pipe ID	Length (ft)	Diameter (	Roughness	Flow (gpm)	Velocity (ft	Headloss (ft)
TDPS_P12	1	12	150	1,748.20	4.96	0.01
TDPS_P21	1	12	150	1,748.43	4.96	0.01
TDPS_P22	1	12	150	1,748.43	4.96	0.01
TDPS_P31	1	12	150	1,751.73	4.97	0.01
TDPS_P32	1	12	150	1,751.73	4.97	0.01
TDPS_P41	1	12	150	1,769.20	5.02	0.01
TDPS_P42	1	12	150	1,769.20	5.02	0.01
TDPS_PRV1	1	10	150	1,144.29	4.67	0.01
TDPS_PRV1	1	10	150	1,198.13	4.89	0.01

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