the future of southern california

Murrieta

General Plan Update

Appendix N5:

Wasterwater Facilities Master Plan_2005

Final Report

2005 Wastewater Facilities Master Plan

April 2005
K/J 034404.00
RCWD No. 20107

Kennedy/Jenks Consultants
Engineers & Scientists

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A CMOM Checklist Completed by District in June 2004

Executive Summary

The Rancho California Water District (District) provides water and wastewater service to portions of the City of Temecula, the City of Murrieta and unincorporated portions of the County of Riverside. The District has experienced a steady growth in population, with an accompanying increased need for expanded wastewater service. In order to plan and develop a wastewater capital improvement program that ensures reliable and uninterrupted service, the District retained the services of Kennedy/Jenks Consultants to develop this wastewater system master plan.

The purpose of this Wastewater Facilities Master Plan was to update current and projected flows, and recommend system capital improvements and proposed facility cost estimates, based on the District's established design criteria. The development of an accurate wastewater hydraulic model, land use database and accurate wastewater projections were critical components of this Master Plan.

The District has established an ARC/INFO-based Geographic Information System (GIS) to assist in support of various planning, engineering and management-related projects. This Master Plan was developed in conjunction with the District's GIS to ensure the compatibility of the digital data and wastewater hydraulic model developed as part of this Master Plan.

The scope of work for this Master Plan included the following major tasks:

- Development of a land use database
- Development of EDU projections
- Review of multijurisdictional discharges
- Development of unit wastewater flows and sewer design criteria
- Development of projected wastewater flows
- Review of sewer system configuration and characteristics
- Assessment of the condition and capacity of existing facilities
- Evaluation of the Wastewater Treatment Plant
- Development of sewer hydraulic model using H20Map Sewer
- Hydraulic analysis of the existing and future collection system
- Review of recommended sewer system Capital Improvement Program
- Explanation and legislative background for the proposed Capacity, Management, Operations, and Maintenance (CMOM) Program

Findings

The findings of this study are based on a comprehensive evaluation of available data and an analysis of the existing wastewater system facilities ability to adequately meet existing and projected wastewater flows.

General

- The District's current wastewater production of 2.8 mgd is approximately 33.5% of the ultimate projected wastewater flow of 8.35 mgd. This total includes production from the City of Temecula, the City of Murrieta and unincorporated portions of the County of Riverside. New development and future growth will have a significant impact on the District's existing wastewater system and wastewater treatment facilities.

- Metering at SRWRF averaged 2.71 mgd for calendar year 2004, which is 22% less than predicted existing flows. This difference is attributed to pre-paid EDU's which have not yet been activated (approximately 541 EDUs), and an actual wastewater unit factor which is less than the conservative 250 gpd/EDU utilized in this master planning effort.

- The total estimated cost to construct the proposed ultimate wastewater system is $44.3 million. This cost includes recommended improvements for gravity mains and wastewater treatment facilities, as well as the costs associated with flow monitoring to insure that projects are implemented at the appropriate times. There are no recommended improvements for force mains or lift stations.

- The estimated rehabilitation cost due to depreciation of existing facilities over the next 4 years is $7.2 million, with an additional $126.5 million required over the lifetime of these facilities. This cost includes rehabilitation of existing gravity mains, force mains, lift stations, and the SRWRF.

Gravity Mains

- Approximately 11,982 LF of wastewater gravity pipelines have been identified as potentially hydraulically deficient. The capital improvement program (CIP) proposes for RCWD to upsize 3,455 LF of wastewater gravity pipelines, for a total estimated cost of $0.70 Million. This corresponds to 3.8% of the existing wastewater gravity system.

Wastewater Treatment Plants

- The SRWRF will require a capacity of 8.5 mgd to meet ultimate projected wastewater flow. Presently, the SRWRF has a 5.0 mgd capacity. The initial 2.5 mgd expansion, scheduled within the next five years, has an estimated cost of $31.4 million. The final 1.0 mgd expansion has an estimated cost of $12.0 million.

Capital Improvement Program

The purpose of the CIP is to enable the District to schedule projects and budget funds for the improvements proposed in this Wastewater Facilities Master Plan. The program establishes phasing of future improvements based upon the time increment that future facilities are

required. The CIP also includes costs associated with flow monitoring, which will allow the District to insure that projects are implemented at the appropriate time in order to mitigate future deficiencies. The CIP has been developed for wastewater facilities for the following time increments:

- 2005 through 2008
- 2009 through Ultimate

Facilities recommended in the Existing time step have been included in the 2005 through 2009 time increment.

Rehabilitation/Replacement Program

The wastewater collection system improvements recommended in the CIP were based upon existing versus future capacity requirements or hydraulic adequacy. The hydraulic capacity of the system was assessed using the District's H20Map Sewer computer model simulation, developed as part of this Wastewater Facilities Master Plan. However, a large portion of the existing collection system is adequately sized to accommodate future peak flows and therefore is not included in the recommended system improvements presented above. As time progresses, the condition of these facilities will deteriorate until such time as the facility needs to be repaired or replaced.

The District's oldest facilities within its wastewater collection were constructed around 1980. This collection system is relatively new compared to an average useful life of 90 years for wastewater collection system sewers. Although it will be approximately 70 years before the District needs to begin a rehabilitation/replacement program (assuming an average useful life of 90 years), the District needs to appropriate funds to cover these future repair/replacement costs.

The total annual cost for gravity sewer main rehabilitation is $525,200 and the total annual cost for force main rehabilitation is $16,100. In addition to gravity mains and force mains, existing lift stations were also assessed based upon condition and replacement/rehabilitation potential. The total annual cost for lift station rehabilitation is $51,000. Based upon historical data regarding repair and replacement for the SRWRF, the annualized capital repair/replacement cost for the SRWRF is estimated to be $1,215,500. Therefore, it is recommended that the District fund $1,807,300 annually to cover the cost of rehabilitation of existing wastewater facilities.

The summary of wastewater system facility costs is presented in the following table:

Table ES.1 – Summary of Wastewater System Facility Costs

Facility	Time Increment		Total
	2005 – 2008	2009 – Ultimate	
Flow Monitoring − Capacity Basis	$96,000	$160,000	$256,000
Gravity Sewers − Capacity Basis	$18,400	$684,290	$702,690
WWTP − Capacity Basis	$31,375,000	$12,000,000	$43,375,000

Table ES.1 – Summary of Wastewater System Facility Costs

SUBTOTAL – Capacity Basis	***$31,489,400***	***$12,844,290***	***$44,333,690***
Gravity Sewers − Rehabilitation Basis	$2,101,000	$36,766,000	$38,867,000
Force Mains − Rehabilitation Basis	$64,500	$1,129,000	$1,193,500
Lift Stations - Rehabilitation Basis	$204,100	$3,572,000	$3,776,100
WWTP - Rehabilitation Basis	$4,862,000	$85,085,000	$89,947,000
SUBTOTAL – Rehabilitation Basis	**$7,231,600**	**$126,552,000**	**$133,783,600**
GRAND TOTAL	***$38,721,000***	***$139,396,290***	***$178,117,290***

An explanation and legislative background for the proposed Capacity, Management, Operations, and Maintenance (CMOM) program is also included in this Wastewater Facilities Master Plan. Regulatory criteria which appear most probable to make the final CMOM program are discussed. Table 10.1 identifies the components of the Master Plan which address potential CMOM elements, as well as those portions of the CMOM program requiring further District attention.

Section 1: Introduction

1.1 General

The Rancho California Water District (District) is located in the southwestern portion of Riverside County and its southwestern border lies along the line with the County of San Diego. The location of the District is shown in Figure 1-1. The District total service area encompasses 100,100 acres (156.4 square miles) and is comprised of the City of Temecula, portions of the City of Murrieta, and unincorporated territory in the County of Riverside. The District provides wastewater services to only the western portion (50,520 acres known as the Santa Rosa Division) of its service area, which is the focus of this master plan.

The long-term vision of the Rancho California Water District is to effectively and efficiently meet the needs of its service area within the expressed and implied powers provided by law.

> **Mission Statement**
> The mission of the Rancho California Water District is to deliver reliable, high-quality water, sewer and reclamation services to its customers and communities in a prudent and sustainable manner.

As an agency in charge of providing water, wastewater, and reclamation service within its jurisdiction, the District periodically reviews and updates its Master Plan for providing services to future customers. This Wastewater Facilities Master Plan was prepared as an update to the District's 1997 Wastewater Facilities Master Plan (1997 Master Plan).

1.2 Authorization

Kennedy/Jenks Consultants was authorized by RCWD Project No. 20107 to perform this Wastewater Facilities Master Plan based on an engineering services agreement dated April 16, 2003.

1.3 Purpose and Scope

The purpose of this Wastewater Facilities Master Plan was to update the 1997 Master Plan while providing the District with the assumptions, data, results, and tools necessary for the District to perform future master plan updates. Therefore, development of accurate wastewater hydraulic models, a land use database, and accurate wastewater projections was an important facet of this Wastewater Facilities Master Plan.

The District has established an ArcGIS/ArcINFO-based geographic information system (GIS) to assist in support of various planning, engineering, and management-related projects. This Wastewater Facilities Master Plan was developed in conjunction with the District's GIS to ensure the compatibility of the digital data and wastewater hydraulic models developed as part of this Master Plan.

As part of the scope of work for this Master Plan Kennedy/Jenks Consultants will have performed the following major tasks:

- Created a GIS database containing annexed parcel information, land use data, and billing data using ArcMap.
- Developed design flow models, future flow projections, and system hydrographs.
- Developed a sewer model including tributary sewer systems and additional parcel loads using H_2OMap Sewer.
- Analyzed and calibrate existing sewer model establishing pipe design and unit cost criteria.
- Determined existing and future deficiencies in the sewer network.
- Analyzed future sewer system scenarios and preventable sanitary sewer overflows.
- Reviewed and evaluated the Santa Rosa Water Reclamation Facility to develop an expansion/replacement program.
- Developed a phased capital improvement and replacement program.
- Developed a CMOM compliance review

Consistent with the practice of master planning, project identification (including sizing, costs, time phasing, and location) are conceptual, and are based on projections of future indicators (such as growth and inflation costs). As such, recommended facilities contained in this master plan should undergo additional technical evaluations based on conditions present at the time of project implementation to confirm the recommendations (i.e. size, alignment, length, hydraulics, costs, etc.) of this master plan.

1.4 Abbreviations and Definitions

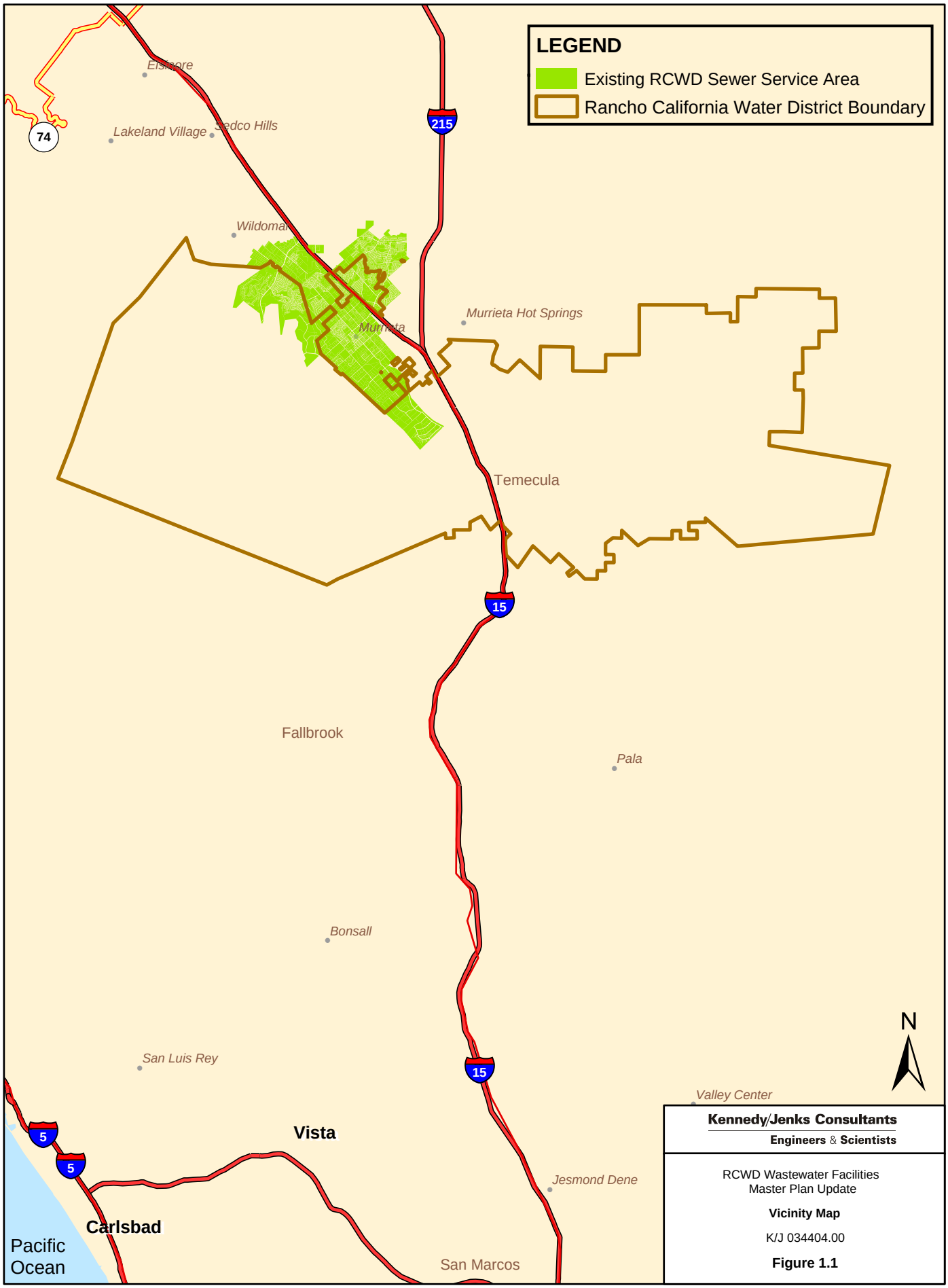
ac	acre
ADWF	average dry weather flow
APN	assessors parcel number
AWWF	average wet weather flow
CIP	capital improvement program
CMOM	capacity, management, operations, and maintenance program
CRP	capital replacement program
d/D	depth to diameter
dia.	diameter
EDU	equivalent dwelling unit
EMWD	Eastern Municipal Water District
ENR-CCI	Engineering News Record – construction cost index
EVMWD	Elsinore Valley Municipal Water District
fps	feet per second
FY	fiscal year

GIS	geographic information system
gpad	gallons per day per acre
gpd	gallons/day
gpm	gallons/minute
HGL	hydraulic grade line
hp	horsepower
I&I	infiltration and inflow
K/J	Kennedy/Jenks Consultants
LF	linear foot
LS	lift station
MCWD	Murrieta County Water District
mgd	million gallons/day
PDWF	peak dry weather flow
PVC	poly-vinyl chloride pipe
PWWF	peak wet weather flow
RCWD	Rancho California Water District
SCAG	Southern California Association of Governments
SRWRF	Santa Rosa Water Reclamation Facility
SSO	sanitary sewer overflow
VCP	vitrified clay pipe
WWTP	Wastewater Treatment Plant

1.5 References and Previous Planning Studies

Montgomery Watson, *Wastewater Facilities Master Plan*, Rancho California Water District, September 1997.

Rancho California Water District, *Sewer System Facility Requirements*, Rancho California Water District, January 1992.



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RCWD Wastewater Facilities
Master Plan Update

Vicinity Map

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Figure 1.1

Section 2: Study Area Characteristics

2.1 District Background

Rancho California Water District was formed from the consolidation of the Rancho California District and the Santa Rosa District. The former was originally organized on November 16, 1965 to supply water services to the eastern portion of the proposed Temecula/Rancho California development. The latter, organized two years later on January 24, 1968, was designated to serve the western portion of the development. Within a year of their respective formations, the Rancho California District was annexed by Eastern Municipal Water District (EMWD) and Santa Rosa District was annexed by Western Municipal Water District (WMWD). Both EMWD and WMWD are member agencies of the Metropolitan Water District of Southern California (MWD) which was also involved in the annexations of the Rancho California and Santa Rosa districts.

After its reformation and consolidation in early 1977, Rancho California Water District was allocated the authority by LAFCO to collect and treat wastewater from the area originally served by the Santa Rosa Water District (now called the Santa Rosa Division). The eastern portion of the Rancho California Water District is called the Rancho Division and is still served by EMWD for the purpose of wastewater collection and treatment. Water service for both divisions is handled by the Rancho California Water District.

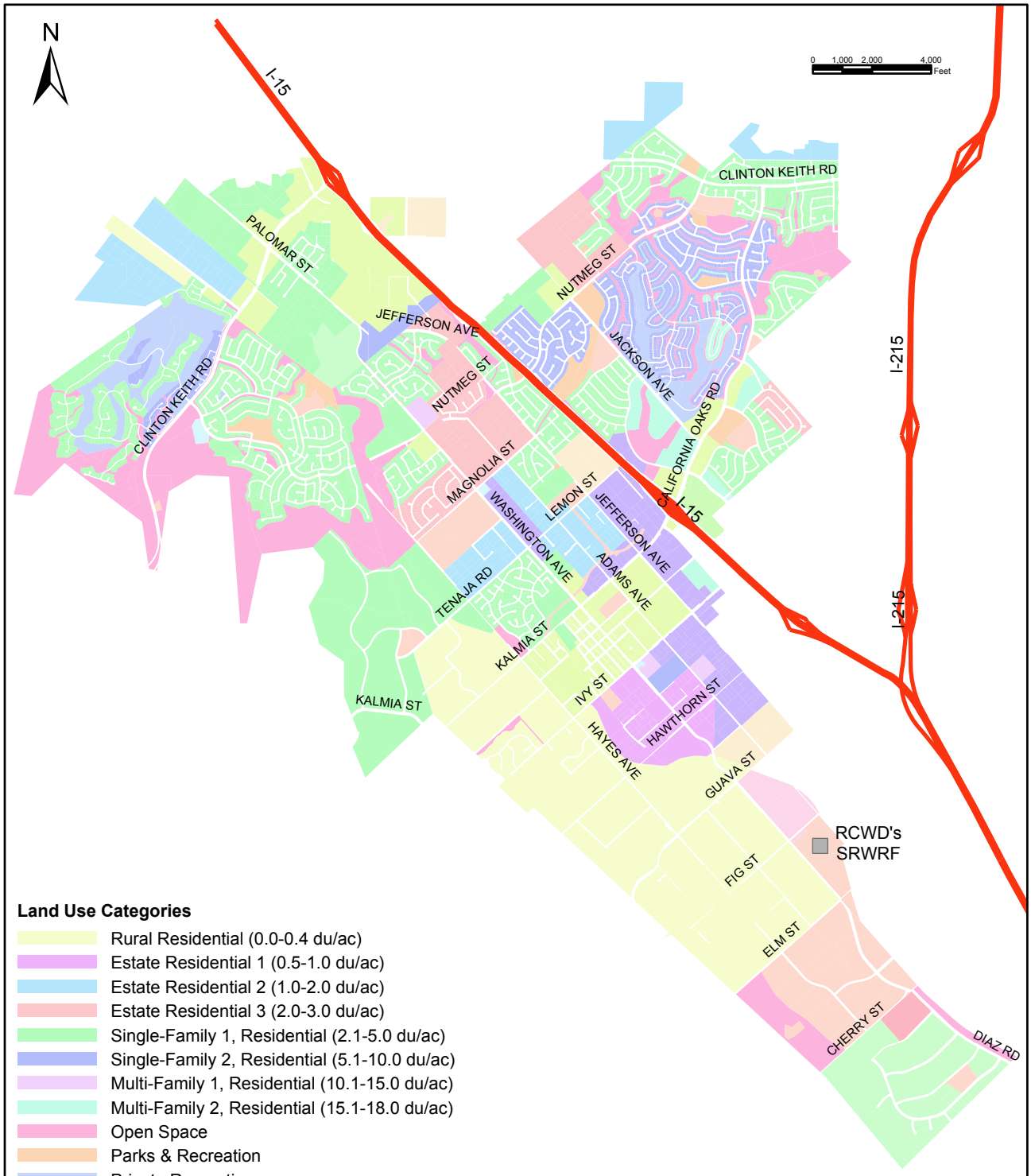
As of June 30, 2004, the District serves 14,671 EDU's producing approximately 2.8 mgd of flow. In addition to its own flow, the District accepts flows from the Murrieta County Water District and the Elsinore Valley Municipal Water District. The District also operates 103 miles of sewer lines and one treatment facility.

2.2 Study Area

The Rancho California Water District is responsible for wastewater collection and treatment within the Santa Rosa Division within the District's boundaries. This encompasses 50,250 acres (78.5 square miles) in the western portion of the District. Of this area, 10,644 acres lies within the District's ultimate sewer service boundary, including the City of Temecula, portions of the City of Murrieta, and unincorporated areas in the County of Riverside. The study area is presented in Figures 2.1 and 2.2.

2.3 Updated Parcel-Level Land Use Coverage

A master land use coverage file was developed in GIS to aid in the updating of this Wastewater Facilities Master Plan. GIS land use planning data was obtained from the City of Murrieta, and the City of Temecula and the County of Riverside in order to review land use types and current boundaries. The planning coverages for each separate land-planning agency were merged in GIS. The master GIS database includes 35 separate land use codes: 19 specific to the City of Murrieta, 4 specific to the City of Temecula, and 12 specific to the County of Riverside.



Land Use Categories

- Rural Residential (0.0-0.4 du/ac)
- Estate Residential 1 (0.5-1.0 du/ac)
- Estate Residential 2 (1.0-2.0 du/ac)
- Estate Residential 3 (2.0-3.0 du/ac)
- Single-Family 1, Residential (2.1-5.0 du/ac)
- Single-Family 2, Residential (5.1-10.0 du/ac)
- Multi-Family 1, Residential (10.1-15.0 du/ac)
- Multi-Family 2, Residential (15.1-18.0 du/ac)
- Open Space
- Parks & Recreation
- Private Recreation
- Neighborhood Commercial
- Community Commercial
- Civic/Institutional
- Business Park
- General Industrial
- Special Industrial
- Multiple Use
- Regional Commercial
- Temecula Education Complex

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Parcel-Level Land Use Map

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Figure 2.1

Each of the 35 specific land use classifications were used to create the land use categories for the District. Since RCWD contains less than 100 parcels from the City of Temecula, and County of Riverside and the City of Murrieta use similar land use categories, it was determined that the City of Murrieta's land use categories would be selected as the District's generalized land use categories. GIS overlay analysis was used to assign each parcel within the District's service area with a land use code specific to the 20 land use categories, creating a parcel-level GIS land use coverage. A comprehensive list of City of Temecula, City of Murrieta, and County of Riverside land uses used to reconcile the District's 20 land use codes and corresponding land use designations is presented as Table 2.1. Table 2.2 presents the 20 District land use designations.

Table 2.1 – Land Use Code Cross Reference

No.	Planning Agency	Planning Agency Land Use Code	Planning Agency Land Use Category	District Code	District Land Use Category
1	City of Murrieta	BP	Business Park	BP	Business Park
2	City of Murrieta	C/I	Civic/Institutional	C/I	Civic/Institutional
3	City of Murrieta	CC	Community Commercial	CC	Community Commercial
4	City of Murrieta	ER-1	Estate Residential 1	ER-1	Estate Residential 1
5	City of Murrieta	ER-2	Estate Residential 2	ER-2	Estate Residential 2
6	City of Murrieta	ER-3	Estate Residential 3	ER-3	Estate Residential 3
7	City of Murrieta	GI	General Industrial	GI	General Industrial
8	City of Murrieta	MF-1	Multi-Family 1, Residential	MF-1	Multi-Family 1, Residential
9	City of Murrieta	MF-2	Multi-Family 2, Residential	MF-2	Multi-Family 2, Residential
10	City of Murrieta	MU-3	Multiple Use, Area 3	MU	Multiple Use
11	City of Murrieta	NC	Neighborhood Commercial	NC	Neighborhood Commercial
12	City of Murrieta	OS	Open Space	OS	Open Space
13	City of Murrieta	P&R	Parks & Recreation	P&R	Parks & Recreation
14	City of Murrieta	PR	Private Recreation	PR	Private Recreation
15	City of Murrieta	RC	Regional Commercial	RC	Regional Commercial
16	City of Murrieta	RR	Rural Residential	RR	Rural Residential
17	City of Murrieta	SF-1	Single-Family 1, Residential	SF-1	Single-Family 1, Residential
18	City of Murrieta	SF-2	Single-Family 2, Residential	SF-2	Single-Family 2, Residential
19	City of Murrieta	SI	Special Industrial	SI	Special Industrial
20	City of Temecula	OS-C	Conservation	OS	Open Space
21	City of Temecula	LI	Light Industrial	GI	General Industrial
22	City of Temecula	PI	Public Institutional	C/I	Civic/Institutional
23	City of Temecula	PI	Public Institutional	TEC	Temecula Education Complex
24	County of Riverside	BP	Business Park	BP	Business Park
25	County of Riverside	C/I	Civic/Institutional	C/I	Civic/Institutional
26	County of Riverside	CC	Community Commercial	CC	Community Commercial
27	County of Riverside	ER-2	Estate Residential 2	ER-2	Estate Residential 2
28	County of Riverside	GI	General Industrial	GI	General Industrial

Table 2.1 – Land Use Code Cross Reference

No.	Planning Agency	Planning Agency Land Use Code	Planning Agency Land Use Category	District Code	District Land Use Category
29	County of Riverside	MF-2	Multi-Family 2, Residential	MF-2	Multi-Family 2, Residential
30	County of Riverside	OS	Open Space	OS	Open Space
31	County of Riverside	P&R	Parks & Recreation	P&R	Parks & Recreation
32	County of Riverside	PR	Private Recreation	PR	Private Recreation
33	County of Riverside	RR	Rural Residential	RR	Rural Residential
34	County of Riverside	SF-1	Single-Family 1, Residential	SF-1	Single-Family 1, Residential
35	County of Riverside	SF-2	Single-Family 2, Residential	SF-2	Single-Family 2, Residential

Table 2.2 – District Land Use Categories

No.	Land Use Category	Land Use Code
1	Rural Residential	RR
2	Estate Residential 1	ER-1
3	Estate Residential 2	ER-2
4	Estate Residential 3	ER-3
5	Single-Family 1, Residential	SF-1
6	Single-Family 2, Residential	SF-2
7	Multi-Family 1, Residential	MF-1
8	Multi-Family 2, Residential	MF-2
9	Open Space	PS
10	Parks & Recreation	P&R
11	Private Recreation	PR
12	Neighborhood Commercial	NC
13	Community Commercial	CC
14	Civic/Institutional	C/I
15	Business Park	BP
16	General Industrial	GI
17	Special Industrial	SI
18	Multiple Use	MU
19	Regional Commercial	RC
20	Temecula Education Complex	TEC

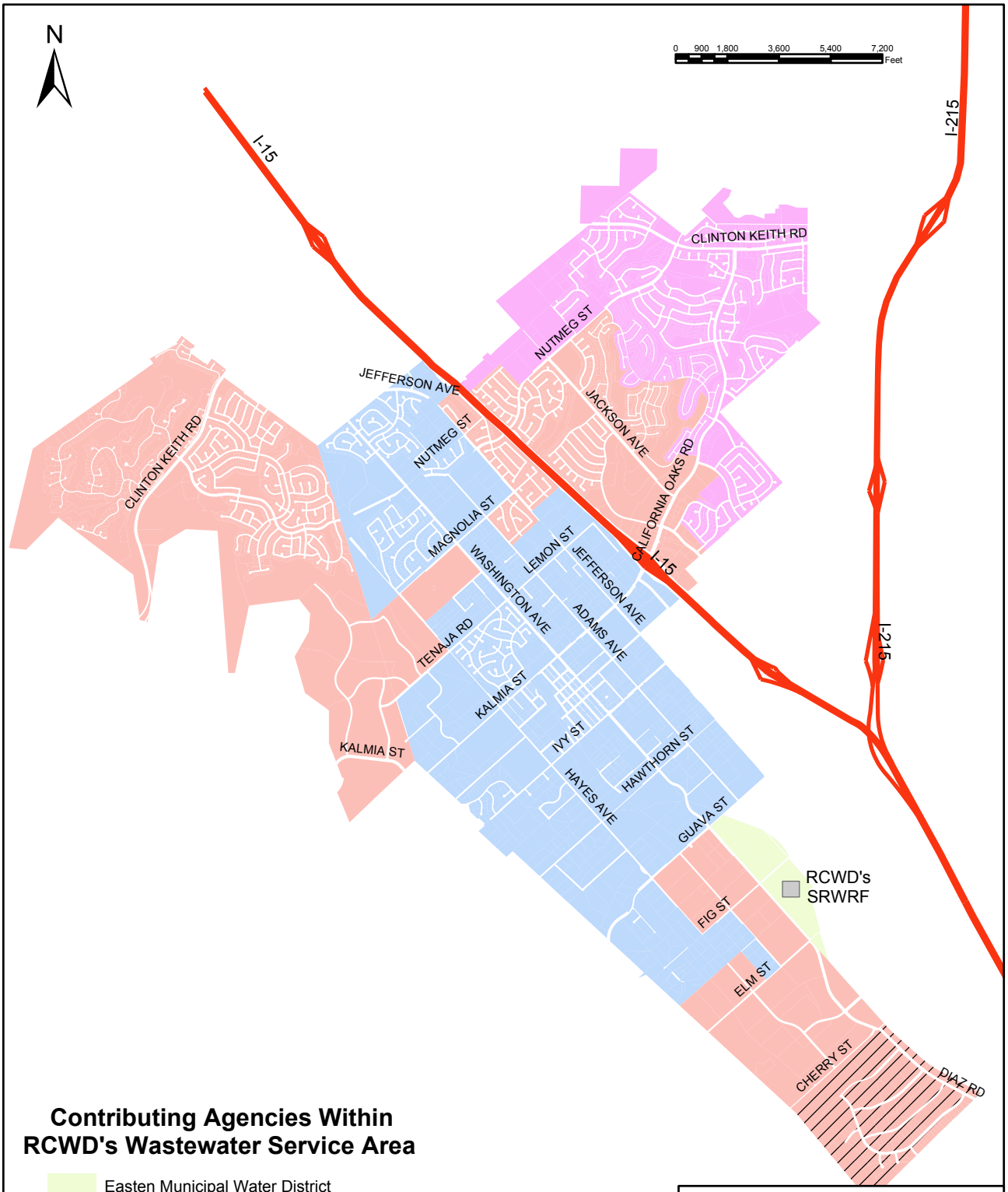
The planned land use coverage described above was overlaid with the District's GIS parcel coverage to develop a parcel-level land use coverage. This parcel-level land use coverage will be used to develop wastewater flows for each parcel within the District's ultimate wastewater boundary. The parcel-level land use coverage, as shown in Figure 2.1, has been supplied by District staff in digital shape file format (Parcels_kj.shp). Table 2.3 outlines the database structure for this file.

Table 2.3 – Planned Land Use (Parcels_kj.shp) Shape File Database Structure

Database Field Label	Description
APN	The planning agency supplied Assessor's Parcel Number.
AREA	The planning agency supplied parcel area in ft^2.
PERIMETER	The planning agency supplied parcel perimeter in ft.
LU_CODE	The planning agency supplied land use code. This code is unique to each planning agency.
DESCRIP	The planning agency supplied land use description.
DENSITY	The planning agency supplied density for residential parcels
FAR	The planning agency supplied Floor to Area Ratio for non-residential parcels.
CITY	The planning agency designation.
RCWD_CODE	The District generalized land use code.
RCWD_DESC	The District generalized land use description.

2.4 Proposed Wastewater Ultimate Service Area

In support of our overall master planning effort, K/J has developed the proposed ultimate wastewater service area to be used for this Wastewater Facilities Master Plan. This service area was developed based upon the 1997 ultimate service areas, conversations with the District, the District's current sewer boundaries, and wastewater service agreements with other agencies. Table 2.4 shows the acreage of each land use category based upon the proposed ultimate wastewater service areas. The ultimate wastewater service area and contributing agencies are shown in Figure 2.2. RCWD will cease treating wastewater flow from the Southwestern portion of Elsinore Valley Municipal Water District (EVMWD) in 2008, and therefore this portion of EVMWD is not shown in Figure 2.2.



Contributing Agencies Within RCWD's Wastewater Service Area

- Easten Municipal Water District
- Ellsinore Valley Municipal Water District
- Murrieta County Water District
- Rancho California Water District

Note: All properties in RCWD's wastewater service area are located in the City of Murrieta, with the exception of the cross-hatched area that is located in the City of Temecula.

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RCWD Wastewater Facilities
Master Plan Update

Proposed Ultimate Wastewater Service Area

K/J 034404.00

Figure 2.2

Table 2.4 – Acreage by RCWD Land Use Category

District Land Use Category	Sewer Area [ac]	Percentage of Total Ultimate Wastewater Service Area
Rural Residential	1,447	15.33%
Estate Residential 1	202	2.14%
Estate Residential 2	518	5.48%
Estate Residential 3	440	4.66%
Multi-Family 1, Residential	32	0.34%
Multi-Family 2, Residential	128	1.36%
Single-Family 1, Residential	2,295	24.29%
Single-Family 2, Residential	516	5.46%
Open Space	1,091	11.55%
Parks & Recreation	130	1.38%
Private Recreation	286	3.03%
Neighborhood Commercial	12	0.12%
Community Commercial	713	7.55%
Civic/Institutional	574	6.08%
Business Park	160	1.70%
General Industrial	399	4.23%
Special Industrial	70	0.74%
Multiple Use	358	3.79%
Regional Commercial	40	0.42%
Temecula Education Complex	33	0.35%
Total	***9,445***	***100.00%***

GIS data provided by the City of Murrieta, the City of Temecula, County of Riverside and the Rancho California Water District, had previously identified and removed public Right-of-Way area (ROW). This is significant as this land use category is not a source of wastewater and therefore, should not be considered in the overall area when calculating wastewater unit flow factors. As shown in Table 2.4, no acreage has been allocated as ROW. It is unclear as to whether ROW had been included in the 1997 Wastewater Facilities Master Plan. Table 2.5 illustrates the benefit of the removed ROW presented in this 2005 Wastewater Facilities Master Plan for the purposes of assigning acreage per land use category. As table 5 illustrates, the percentage of ROW removed from EVMWD, MCWD and RCWD is relatively equal.

Table 2.5 – Percent of District Acreage Excluded as ROW

Contributing Agency	Ultimate Service Area (ac)	Total Area of Parcels in Ultimate Service Area (ac)	Percentage of Ultimate Service Area Removed as ROW
EVMWD	2,680	2,372	11.49%
MCWD	3,528	3,158	10.49%
RCWD	4,436	3,915	11.74%
TOTAL	**10,644**	**9,445**	**11.26%**

Section 3: Wastewater System Design Criteria

3.1 Unit Wastewater Flow Factors

Each land use category in Table 2.1 was assigned a wastewater duty unit factor in Equivalent Dwelling Units (EDU's) per acre, which is consistent with RCWD design criteria referenced in Section III of the District Sewer System Facility Requirements Manual. The District considers an EDU to be equivalent to 250 gallons per day, as was verified using standard return-to-sewer ratios (explained below) and water billing data obtained within District boundaries.

The *1997 Wastewater Facilities Master plan* assigned wastewater duty factors for seven (7) land use categories as shown in Table 3.1.

Table 3.1 – 1997 Wastewater Facilities Master Plan EDU Projection by Land Use

Land Use	Projected EDU/ac
Rural Residential	0.2
Equestrian Residential	1.0
Single Family I	3.5
Single Family II	8.0
Multi-Family I	12.0
Multi-Family II	16.0
Commercial/Industrial/Business Park	10.0

The *2005 Wastewater Facilities Master Plan* land use categories presented, herein, contain eight (8) residential land use types as shown in Table 3.4. This is an increase from the six (6) used in 1997. The previous Master Plan grouped all non-residential land uses into 1 category. By splitting the non-residential land uses into 12 separate categories, as done in this *Wastewater Facilities Master Plan* (Table 3.5), allows for a higher degree of precision in estimating wastewater flows.

3.1.1 Sewer Billing Records

The District's sewer customer billing data was analyzed to determine which parcels had existing sewer accounts. For parcels with existing accounts, existing wastewater flows were assigned based on total EDUs presently billed to those parcels. If a parcel had no billing data, it was assumed to contribute no flow to the existing planning period. Table 3.2 illustrates the existing wastewater flows for development tracts and sub-areas utilized by K/J at the District's direction, sorted by contributing agency.

Table 3.2 – Existing EDUs Based on Customer Billing Data (As of 2003)

Contributing Agency	Sub-Area or Development Tract	Existing EDUs
EVMWD	6	59.00
EVMWD	12	7.00

Table 3.2 – Existing EDUs Based on Customer Billing Data (As of 2003)

Contributing Agency	Sub-Area or Development Tract	Existing EDUs
EVMWD	13	72.00
EVMWD	14	70.00
EVMWD	21072B	944.00
EVMWD	21515	241.00
EVMWD	22076	299.00
EVMWD	22077	631.00
EVMWD	22490	295.00
EVMWD	22491	116.00
EVMWD	22819	174.00
EVMWD	23049	160.00
EVMWD	23050	163.00
EVMWD	23108	337.00
EVMWD	23110	189.00
EVMWD	23155	72.00
EVMWD	23208	213.00
EVMWD	23435	252.00
EVMWD	24557	14.00
EVMWD	24592	100.00
EVMWD	25273	64.00
EVMWD	25362	136.00
EVMWD	28509	112.00
EVMWD	29231	56.00
EVMWD SUB-TOTAL		**4,776.00**
MCWD	17	4.18
MCWD	25	69.79
MCWD	26	3.31
MCWD	31	36.00
MCWD	38	1.69
MCWD	44	64.21
MCWD	49	1.28
MCWD	51	34.38
MCWD	55	2.81
MCWD	56	3.82
MCWD	57	26.00
MCWD	60	5.11
MCWD	61	16.02
MCWD	66	45.97
MCWD	69	0.86
MCWD	70	1.00
MCWD	79	3.01
MCWD	120	243.00

Table 3.2 – Existing EDUs Based on Customer Billing Data (As of 2003)

Contributing Agency	Sub-Area or Development Tract	Existing EDUs
MCWD	23095	426.00
MCWD	23187A	140.00
MCWD	23442	44.00
MCWD	28333	212.00
MCWD	28993	161.00
MCWD	29069	84.00
MCWD	29361	19.00
MCWD	29403	82.00
MCWD	29602	182.00
MCWD	30113	1.00
MCWD	30273	75.00
MCWD SUB-TOTAL		**1988.44**
RCWD	88	38.00
RCWD	89	30.00
RCWD	91	91.00
RCWD	92	3.00
RCWD	93	17.00
RCWD	94	112.00
RCWD	95	1.00
RCWD	99	391.00
RCWD	100	57.00
RCWD	103	16.00
RCWD	105	79.00
RCWD	106	95.00
RCWD	107	151.00
RCWD	109	3.00
RCWD	112	439.00
RCWD	119	345.00
RCWD	14854	274.00
RCWD	19535	80.00
RCWD	20403	59.00
RCWD	20840	233.00
RCWD	20841	335.00
RCWD	21072A	620.00
RCWD	21370	75.00
RCWD	21371	63.00
RCWD	21419	204.00
RCWD	21514	114.00
RCWD	21577	127.00
RCWD	21691	163.00
RCWD	21759	152.00

Table 3.2 – Existing EDUs Based on Customer Billing Data (As of 2003)

Contributing Agency	Sub-Area or Development Tract	Existing EDUs
RCWD	21987	57.00
RCWD	22346	71.00
RCWD	22437	384.00
RCWD	22603	37.00
RCWD	23127	90.00
RCWD	23187B	18.00
RCWD	23380	95.00
RCWD	23879	261.00
RCWD	23881	101.00
RCWD	24342	22.00
RCWD	28677A	873.00
RCWD	28677C	28.00
RCWD	29006	101.00
RCWD	29417	219.00
RCWD SUB-TOTAL		**6,724.00**
TOTAL		***13,488.44***

3.1.2 Additional District Direction

In the following cases, the District directed K/J to activate the following EDU's, based upon proposed specific plans, inter-agency agreements, and their local knowledge of development activity within the service area:

- The Temecula Educational Complex was assumed to contribute no flow in the existing time increment.
- Sewershed 9, which lies within EVMWD, contributes 347 EDUs to the existing time increment.

After identifying the parcels contributing flow using the District's customer billing data and using the District's specific guidance as described above for particular tracts or developments, existing active EDUs were defined. Applying the wastewater unit factor of 250 gpd/EDU yielded a total existing wastewater flow of 3.46 mgd (as shown in Table 4.1).

NOTE:

Metering at SRWRF averaged 2.71 mgd of influent entering the Santa Rosa WRF for calendar year 2004, which marks a 22% difference (0.75 mgd) from what was calculated in this Master Plan. This difference is due to pre-paid EDU's which have not yet been activated in RCWD's sewer service area (541 EDUs), and an actual wastewater unit factor which is less than 250 gpd/EDU (approximately 204 gpd/EDU).

3.1.3 Return-to-Sewer Ratios

In order to confirm the assumption that each EDU returns 250 gpd to the sewer, water billing data from RCWD was examined. RCWD was unable to access the complete billing data for the entire sewer service area, as Murrieta County Water District (MCWD) provides water service to a significant portion of RCWD's sewer service area. However, three years of billing data for 1348 of the 1398 residential Single-Family 2 (SF-2) parcels was provided. Based on the City of Murrieta's current zoning classifications, the residential land use classification SF-2 is 5.1-10.0 dwelling units per acre (du/ac). Table 3.3 shows the calculated sewer duty factor for this land use category assuming a zoned average of 7.5 du/ac.

Table 3.3 - Wastewater Unit Duty Factor for Single-Family 2, Residential

Zoned Average of 5.1 – 10.0 du/ac	Measured Water Duty (gpd/ac)	Assumed Return-to-Sewer Ratio	Calculated Sewer Duty (gpd/ac)	Calculated Unit Sewer Duty Factor (gpd/du)
7.5	2,939	60%	1763	235

Table 3.3 shows an average dwelling unit returned 235 gpd to the sewer based on RCWD consumption history and assumed Return-to-Sewer Ratio. In both the 1992 Sewer System Facility Requirements and the 1997 Wastewater Facilities Master plan, each EDU was assumed to return 250 gpd to the sewer. Therefore, Table 3.3 suggests that assigning each EDU a flow unit factor of 250 gpd is reasonable.

Having validated the wastewater duty unit factor utilized in the 1997 Wastewater Facilities Master Plan with the RCWD case study from Table 3.3 (above), it is now possible to assign wastewater duty factors to all residential land use categories. Each of the District's residential land use categories has a range of dwelling units that is described by the City of Murrieta's General Plan. Excluding Rural Residential, the average of this range, rounded up to the nearest integer, will be used in assigning wastewater duty unit factors to each residential land use category. Multi-Family 2, which has a range of 15.1-18.0 du/ac, will therefore be assigned a wastewater duty factor of 17.0 EDU/ac. Due to the low value for Rural Residential, 0.0-0.4 du/ac, the maximum value of 0.4 du/ac will be utilized for conservative purposes of this Master Plan. Table 3.4 shows the wastewater duty unit factors for all residential land use categories.

Table 3.4 – RCWD Wastewater Duty Unit Factors for Residential Dwellings

No.	Land Use Category	EDU/ac
1	Rural Residential (0.0-0.4 du/ac)	0.4
2	Estate Residential 1 (0.5-1.0 du/ac)	1.0
3	Estate Residential 2 (1.1-2.0 du/ac)	2.0
4	Estate Residential 3 (2.1-3.0 du/ac)	3.0
5	Single-Family 1, Residential (2.1-5.0 du/ac)	4.0
6	Single-Family 2, Residential (5.1-10.0 du/ac)	8.0
7	Multi-Family 1, Residential (10.1-15.0 du/ac)	13.0
8	Multi-Family 2, Residential (15.1-18.0 du/ac)	17.0

While residential land use categories have a specific range of dwelling units per acre, non-residential land use categories do not. Section III of the District Sewer System Facility Requirements references Section 8 of District ORD, No. 90-11-1 (Appendix R) which in turn outlines each non-residential land use category with an assigned Equivalent Dwelling Unit per unit of usage. Most non-residential land use categories are zoned to allow for a maximum Floor-to-Area ratio (FAR), which allows one to compute a maximum building floor area size allowed per unit parcel acreage area. Based on this computed maximum floor area and unit of usage per 1,000 sq. foot, as shown in Section 8 of District ORD, No. 90-11-1, the number of EDU's is determined. Adhering to this methodology, an average build out area per acre was calculated for each non-residential land use category by utilizing its maximum FAR. The wastewater duty unit factor was then calculated by assigning 1 EDU for the first 1,000 sq. feet of building floor area and an additional 0.6 EDU for each 1,000 square feet thereafter, pursuant to Section 8 of District ORD. No. 90-11-1 (Appendix R). If a maximum FAR could not be determined, the 1997 value of 10 EDU/ac was used. The EDU/ac value assigned to the proposed Temecula Education Complex Project (TEC), was generated from the conclusions drawn in the 2003 Initial Study for the Temecula Education Complex Project prepared by Tom Dodson & Associates. Table 3.5 below shows the calculated wastewater duty unit factors for the non-residential land use categories.

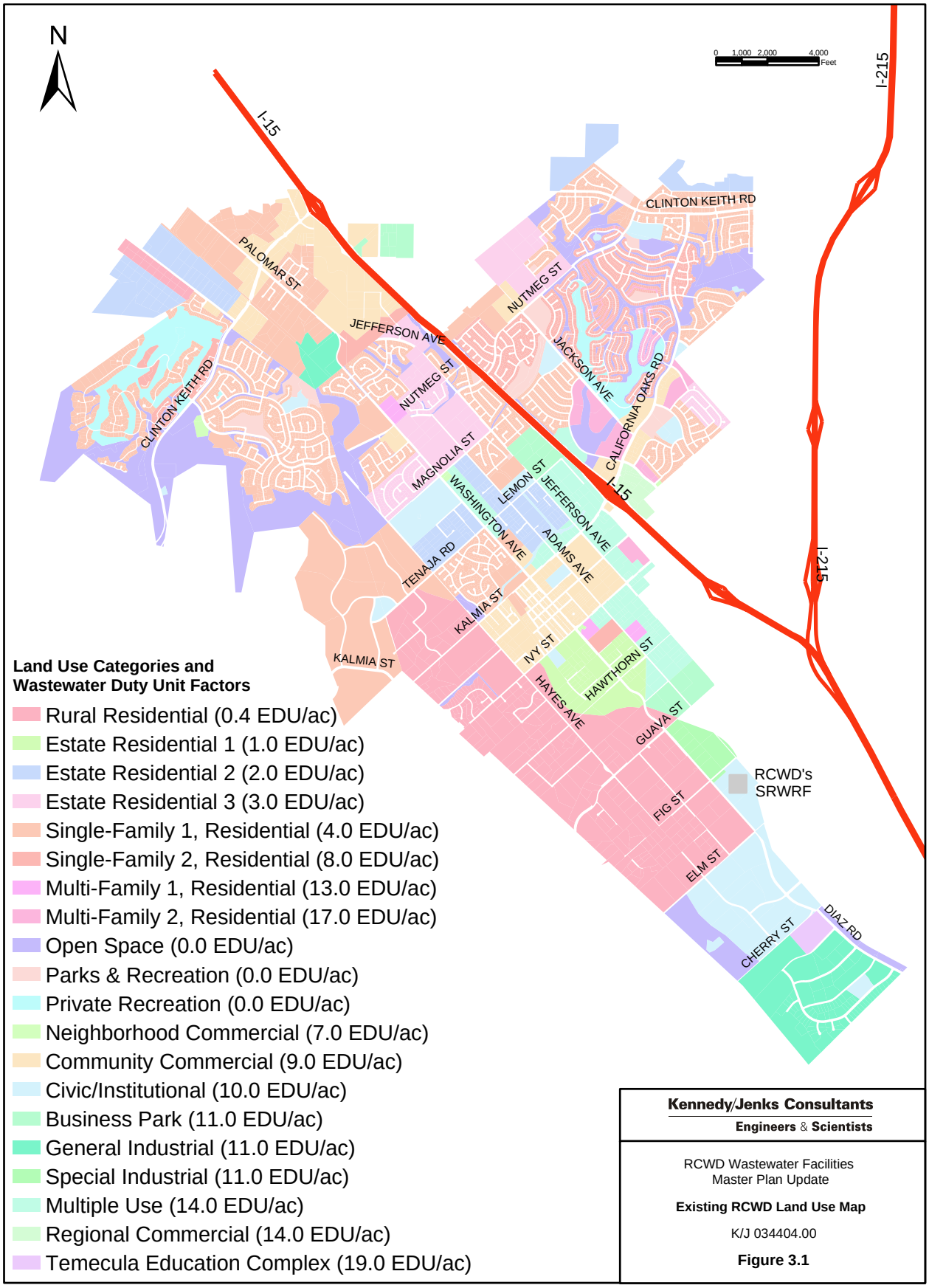
Table 3.5 - RCWD Non-Residential Wastewater Duty Unit Factors

No.	Land Use Category	Maximum Floor-Area-Ratio	EDU/ac
1	Open Space	0	0.0
2	Parks & Recreation	N/A	0.0
3	Private Recreation	N/A	0.0
4	Neighborhood Commercial	0.25	7.0
5	Community Commercial	0.27	8.0
6	Civic/Institutional	N/A	10.0
7	Business Park	0.4	11.0
8	General Industrial	0.4	11.0
9	Special Industrial	0.4	11.0
10	Multiple Use	0.5	14.0
11	Regional Commercial	0.5	14.0
12	Temecula Education Complex	N/A	19.0

The EDU/ac values generated from maximum Floor-to-Area Ratios shown in Table 3.5 range between 1750 gpd/ac (7.0 EDU/ac) and 3500 gpd/ac (14.0 EDU/ac) based on 250 gpd/EDU. The 1997 Wastewater Facilities Master Plan assumed a value of 10 EDU/ac for all non-residential land use categories. Table 3.6 summarizes the District's 20 generalized land use categories, along with their corresponding wastewater duty unit factors in EDU/ac. Figure 3.1 illustrates the RCWD Land Use Map as developed using methods described in this Master Plan.

Table 3.6 - Developed EDU/ac per Land Use Category

No.	Land Use Category	EDU/ac
1	Rural Residential (0.0-0.4 du/ac)	0.4
2	Estate Residential 1 (0.5-1.0 du/ac)	1.0
3	Estate Residential 2 (1.1-2.0 du/ac)	2.0
4	Estate Residential 3 (2.1-3.0 du/ac)	3.0
5	Single-Family 1, Residential (2.1-5.0 du/ac)	4.0
6	Single-Family 2, Residential (5.1-10.0 du/ac)	8.0
7	Multi-Family 1, Residential (10.1-15.0 du/ac)	13.0
8	Multi-Family 2, Residential (15.1-18.0 du/ac)	17.0
9	Open Space	0.0
10	Parks & Recreation	0.0
11	Private Recreation	0.0
12	Neighborhood Commercial	7.0
13	Community Commercial	8.0
14	Civic/Institutional	10.0
15	Business Park	11.0



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Existing RCWD Land Use Map

K/J 034404.00

Figure 3.1

3.1.4 Peak Dry Weather Curve

Three potential methods were available for generating Peak Dry Weather Curves. Each method produced varying levels of conservatism, especially near low flows. Selection of which curve to proceed with for the Capital Improvement Project (CIP) phase was based on District staff input and the results generated from the hydraulic model. The three methods are described below and provided in graphical view for comparison purposes as Figure 3.2.

- The 2001 Sewer Flow Monitoring Studies Report produced data to derive a peak wet weather curve. Temporary flow monitoring was conducted at nine sites throughout the District between February 9 and March 8, 2001. As discussed below in *Diurnal Patterns*, only eight of the nine sites were included in our analysis. Two separate rain events occurred during this study. Any data obtained during these rain events (or within 48 hours of a rain event) was classified as wet weather data. All other data was classified as dry weather data and was analyzed to calculate Average Dry Weather Flow Rates for each flow meter. A Peak Dry Weather Curve was derived by graphing the peaking factor derived from the measured Peak Dry Weather Flow Rates versus the Average Dry Weather Flow Rates for each of the eight (8) flow monitoring sites. This curve is illustrated as the "blue" curve in Figure 3.2.

- From Section III of the District's 1992 Sewer System Facility Requirements, a "step-function" is presented as a Peak Dry Weather Curve. This curve is shown as "orange" in Figure 3.2.

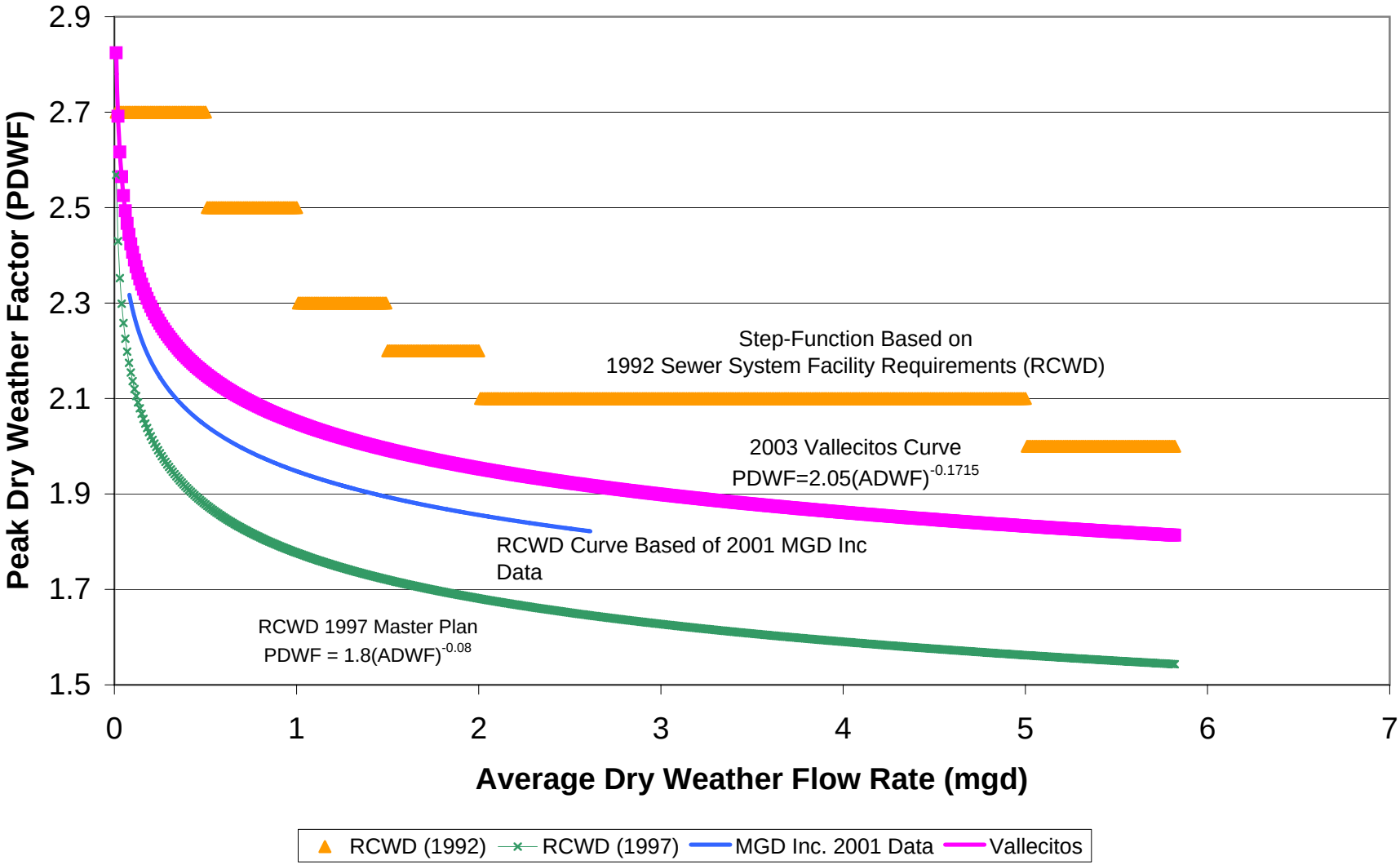
- In 1997 Montgomery Watson prepared RCWD's Wastewater Facilities Master Plan. The Peak Dry Weather Curve presented in that report is shown as "green" in Figure 3.2.

- In 2003 K/J prepared a Wastewater Facilities Master Plan for the Vallecitos Municipal Water District. The Peak Dry Weather Curve utilized in that report is presented as comparison for Peak Dry Weather Curves in similar communities of similar climate. This curve is presented as "magenta" in Figure 3.2.

As shown in Figure 3.2, the RCWD 1997 Master Plan curve is the least conservative estimate, while the District's 1992 sewer system facility requirements "Step-function" is the most conservative curve. These two curves appear to "bracket" a range of possible dry weather peaks corresponding to average dry weather flow rates. K/J recommends using the blue curve derived from the 2001 Sewer Flow Monitoring Survey Report, because it appears to consistently represent the District's wastewater collection system. The recommended peak dry weather curve is:

$$\textbf{Peak Dry Weather Factor} = 1.95 \times (\textbf{Average Dry Weather Flow Rate})^{-0.0696}$$

Figure 3.2 - Peak Dry Weather Curve Analysis



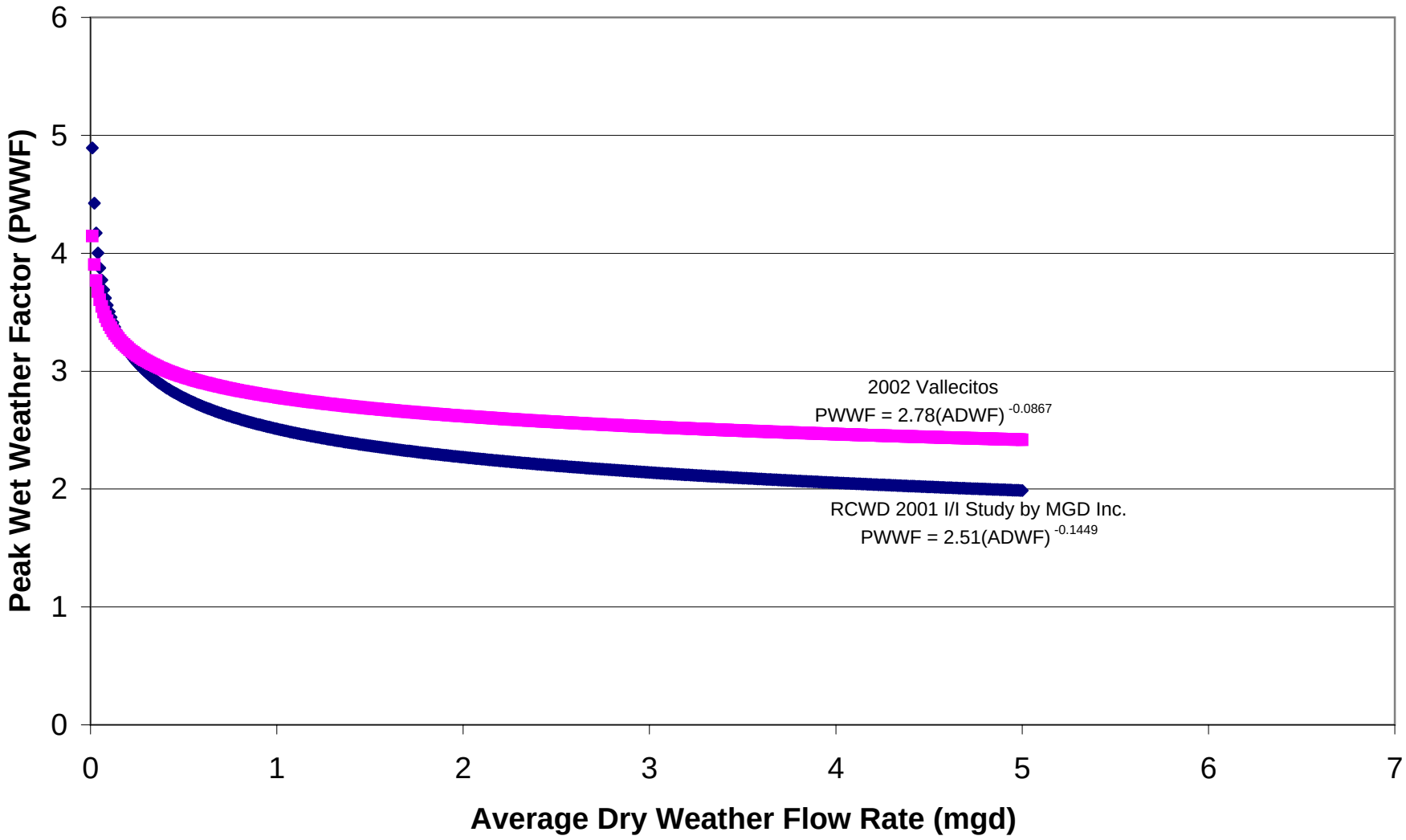
3.1.5 Peak Wet Weather Curve

The peak wet weather curve was calculated using data from the 2001 Sewer Flow Monitoring Studies Report. The wet weather flow monitoring data was analyzed as part of this TM. By plotting average dry weather flow rates versus peak flow rates, an equation for the Peak Wet Weather Factor (PWWF) was generated using a “best-fit” curve. The recommended equation for the PWWF curve is:

$$\textbf{Peak Wet Weather Factor} = 2.51 \times (\textbf{Average Dry Weather Flow Rate})^{-0.1449}$$

The PWWF Curve is illustrated in Figure 3.3, as well as the Peak Wet Weather Flow Factor Curve utilized in 2003 for the Vallecitos Municipal Water District for purposes of comparison.

Figure 3.3 - Peak Wet Weather Curve Analysis



3.2 Infiltration/Inflow Factors

For the purposes of modeling RCWD's Sewer System (as mentioned earlier) three main wastewater components were considered. For the purposes of approximating infiltration/inflow (I/I) and performing dynamic modeling each of these three components were estimated separately and then combined to determine the total wastewater flow. The three components in the I/I analysis are Base Wastewater Flow (BWF), Ground Water Infiltration (GWI) and Rainfall Dependent Infiltration/Inflow (RDI/I).

3.2.1 Base Flow

BWF is domestic (or sanitary) wastewater flow from residential, commercial, and institutional (schools, churches, hospitals, etc.) sources, plus industrial wastewater. The wastewater flow is affected by population and land uses in an area. Wastewater flow varies throughout the day in response to personal habits and business operation. BWF is normally estimated by applying wastewater duty unit factors to corresponding land use categories. The wastewater duty unit factors may be expressed in terms of average gallons per day (gpd) for a single family residential unit or per acre of commercial development. Diurnal and statistical variations are normally accounted for by applying a peak factor to the average BWF.

3.2.2 Groundwater Infiltration

GWI is defined as groundwater entering the collection system through pipe joints and manhole walls due to an aging system or improper construction. The magnitude of GWI depends on the depth of the groundwater table above the pipelines, the percentage of the system submerged, and the physical condition of the system. Variation in groundwater levels in the District is seasonal in nature. The GWI tends to be low during the summer and fall months (dry weather) and increases gradually as the wet weather season progresses. While GWI is affected by rainfall, it responds gradually and is not directly related to any one individual rainfall event.

It is assumed that the BWF and GWI are taken into account in the peak flow equations. Therefore, no further contingency for these components are necessary.

3.2.3 Rainfall Dependent Infiltration/Inflow

RDI/I is storm water that enters the wastewater collection system in direct response to the intensity and duration of individual rainfall events. RDI/I may recede gradually after a storm; however, any residual flow is considered to be a general increase in GWI. In addition to being dependent on rainfall events, RDI/I is sensitive to soil moisture, which may increase throughout the wet weather season. The ratio of RDI/I volume to the rainfall volume is referred to as the "R" value. K/J is recommending the following methodology for loading I/I into the wastewater system model for this Wastewater Facilities Master Plan:

1. Peak Dry Weather Flow (Average dry weather flow rate times the PDWF) at each time step will be routed through the model using the recommended diurnal pattern defined above. The volume at each outfall point is then totaled.

2. The Peak Wet Weather Flow (Average dry weather flow rate times the PWWF) at each time step will be calculated based upon the recommended peak wet weather flow curve discussed above.

3. The difference between the calculated Peak Dry Weather Flow and the modeled Peak Wet Weather Flow will be assumed to be attributed to RDI/I.

In both the *1992 Sewer System Facility Requirements* and the *1997 Wastewater Facilities Master Plan*, a "rule of thumb" RDI/I of 750 gpd/diameter-inch*mile was utilized in assigning I/I to each gravity main.

3.3 Collection System Design Criteria

Identifying Sanitary Sewer Overflows (SSOs) is a critical element of the U.S. Environmental Protection Agency (USEPA) Capacity, Management, Operations, and Maintenance (CMOM) program. Using the RCWD 1992 Sewer System Facility Requirements manual, facility system design criteria will be used to flag occurring SSOs and points of potential SSOs, while evaluating other important hydraulic criteria. There are three main components of the District's wastewater collection system: gravity sewers, force mains and lift stations. In an effort to address CMOM criteria and provide reliable gravity sewer service while minimizing excessive wear or energy usage through force mains and lift stations, design criteria for the following sub sections are recommended.

3.3.1 Gravity Main Criteria

For the purposes of the Wastewater Facilities Master Plan, gravity sewers will be evaluated through the use of a static sewer model. SSO identification and pipeline sizing will be based on the Manning's equation and the following criteria:

- Pipes 12-inches in diameter and smaller: ½ full at peak flow
- Pipes over 12-inches in diameter: ¾ full at peak flow
- Minimum velocity: 2 feet per second
- Maximum velocity: 10 feet per second
- Manning's n: .013
- Minimum Slope requirements: See Table 3.7 below

Table 3.7 – Minimum Slope Requirements

Sewer Size (in)	Grade (%)
8	0.400
10	0.280
12	0.240
15	0.120
18	0.108
21	0.088
24	0.068
27	0.060
30	0.052
33	0.044
36	0.040
42	0.032

3.3.2 Force Main Criteria

- Minimum Force Main Diameter: 4 inches
- Minimum Velocity: 3 feet per second
- Maximum Velocity: 5 feet per second
- Maximum allowable headloss: 10 feet/1000 feet of pipeline
- Maximum desirable headloss: 5 feet/1000 feet of pipeline
- Hazen-Williams C factor: 120

3.3.3 Lift Station Criteria

Lift Stations should be sized for the peak wet weather flow rate plus an additional 20% capacity to account for wear, miscellaneous debris, etc. that may reduce pumping performance. Lift stations should be capable of meeting the following criteria with the largest capacity pump serving as standby:

- Manufacturers recommended cycling times for pumping equipment.
- 60 percent pump efficiency should be assumed, except where other information is available.
- 90 percent motor efficiency should be assumed, except where other information is available.
- Wet well sized to minimize retention time such that maximum pump cycling time (usually at ½ design inflow) is within manufacturer's recommendations.

Section 4: Wastewater Flows and Projections

Wastewater flow projections for the Rancho California Water District were developed in support of the overall Wastewater Facilities Master Plan effort, including the development of the wastewater system hydraulic model.

Wastewater flow projections have been developed as described below:

- Wastewater flow projections by Development Tract
- Wastewater flow projections by District defined Sub-Areas for parcels outside of defined Development Tracts

It was important for the District to view projections by development tract or defined sub-area to refine the accuracy of the hydraulic model loading. The GIS database developed for these projections would allow the District to adjust future tract-specific flows to evaluate collection system and treatment plant impacts.

Wastewater flows were projected for the following time increments:

- Existing (2004) Conditions
- Five-year increments ('09,'14,'24)
- Ultimate (Build-out) Conditions

Multi-agency flows within the District's sewer service area have been considered as the agencies of Elsinore Valley Municipal Water District (EVMWD) and the Murrieta County Water District (MCWD) each contribute to the wastewater flow entering RCWD's collection system, with eventual treatment occurring at the Santa Rosa Wastewater Reclamation Facility (SRWRF).

Wastewater flow projections have been calculated for each time increment using either growth rates from the Southern California Association of Governments (SCAG) year 2000 census tract population projections, or existing inter-agency agreements with the District. Existing flows were developed based upon the District's existing sewer customer billing database, as well as specific plan information when applicable. Ultimate wastewater flow projections were calculated using the GIS land use database and the wastewater unit duty factors, as described in section 3, Wastewater System Design Criteria.

Historical and projected wastewater flows by year are presented as Figure 4.1. Table 4.1 below, summarizes projected wastewater flows to the SRWRF for existing, five-year time increments, and ultimate build-out, assuming 250 gpd/EDU.

Figure 4.1
Historic and Projected Watewater Flows

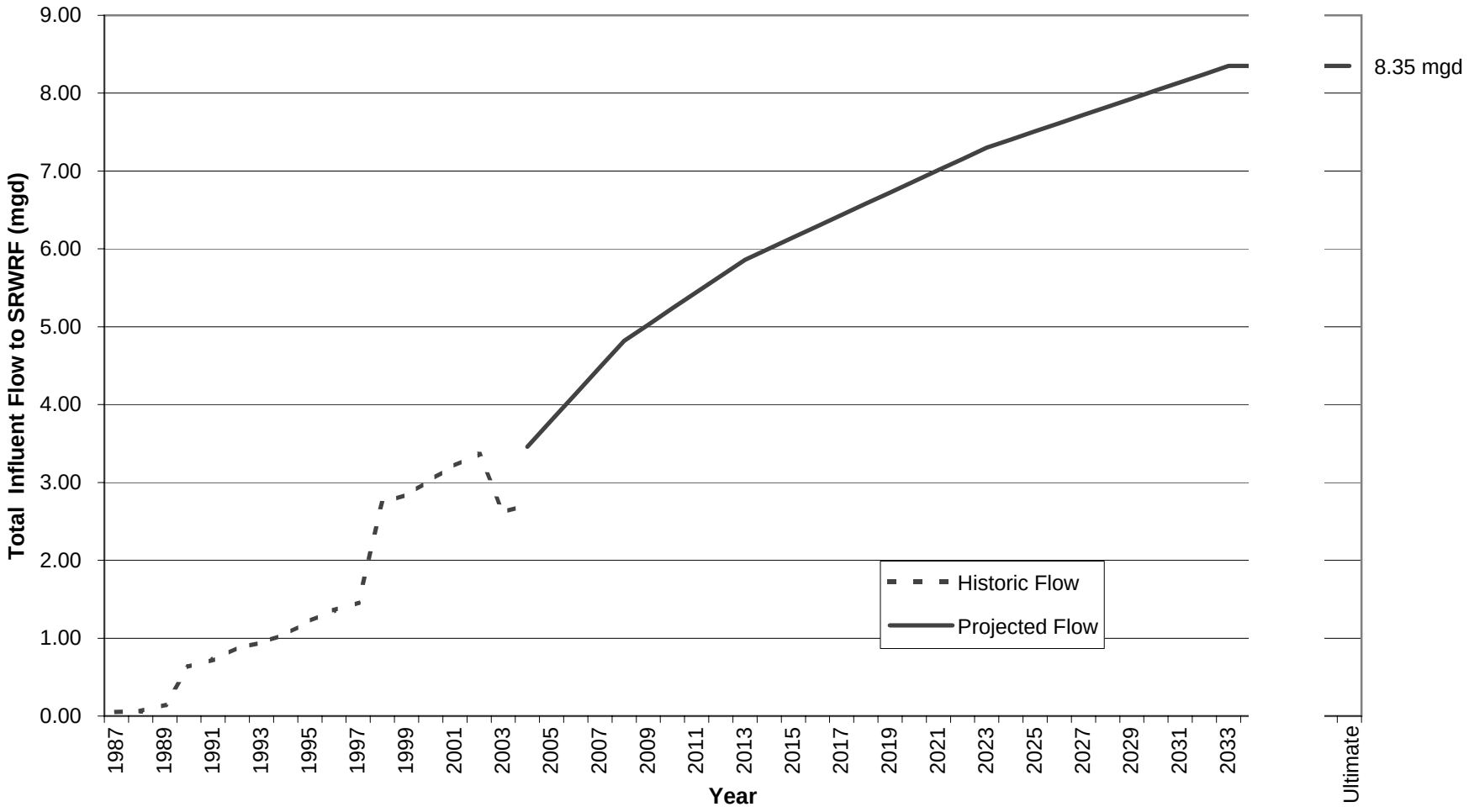


Table 4.1 - Proposed Wastewater Flow Projections

Contributing Agency	2004 (mgd)	2009 (mgd)	2014 (mgd)	2024 (mgd)	Ultimate (mgd)
EVMWD	1.28	1.50	1.34	1.47	1.47
MCWD	0.50	1.16	1.98	2.74	3.27
RCWD	1.68	2.16	2.54	3.09	3.61
SRWRF Total	**3.46**	**4.82**	**5.86**	**7.30**	**8.35**

Wastewater flow projections were developed by assigning each parcel in the District's GIS database an EDU value. The EDUs were then assigned the base unit flow factor of 250 gpd/EDU (as developed in section 3) to generate wastewater flows. If a different base unit flow factor (gpd/EDU) had been assigned, wastewater flow projections would change accordingly. Table 4.2, shown below, illustrates the sensitivity of projected wastewater flows to the base unit flow factor for the SRWRF for existing, five-year time increments, and ultimate build-out, assuming 210 gpd/EDU.

Table 4.2 – Wastewater Flow Projections Based on 210 gpd/EDU

Contributing Agency	2004 (mgd)	2009 (mgd)	2014 (mgd)	2024 (mgd)	Ultimate (mgd)
EVMWD	1.08	1.26	1.13	1.23	1.23
MCWD	0.42	0.98	1.66	2.30	2.74
RCWD	1.41	1.82	2.13	2.60	3.03
SRWRF Total	**2.91**	**4.05**	**4.92**	**6.13**	**7.01**

Figures 4.2, 4.2a, 4.2b and 4.2c illustrate the development tracts and sub-areas as used in the projections presented in Tables 4.1 and 4.2 above. The development tracts and sub-area flow projections for each contributing agency are presented in Tables 4.3 through 4.5.

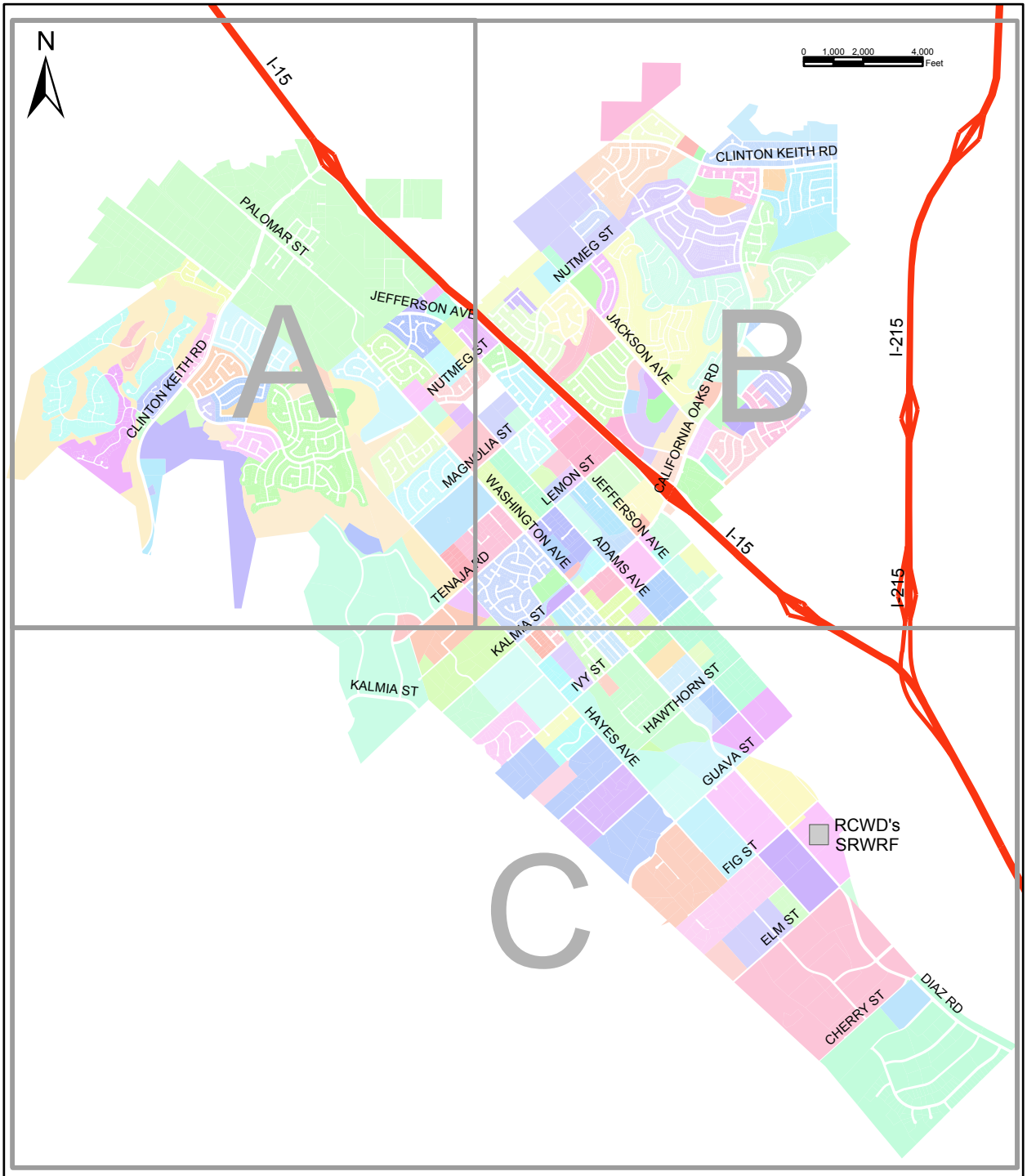


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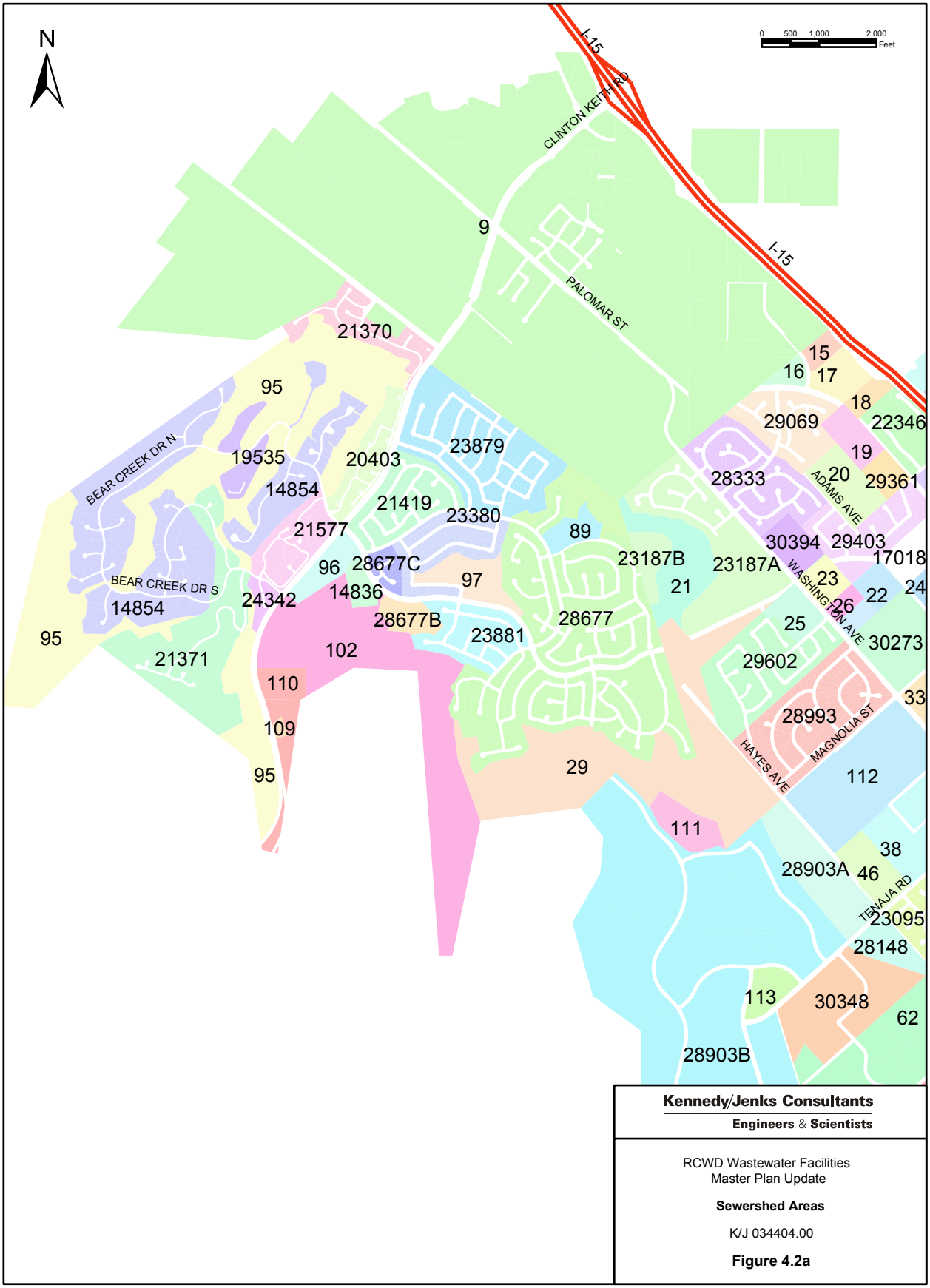
Figure 4.2


N
0 500 1,000 2,000
Feet
I-15
CLINTON KEITH RD
PALOMAR ST
BEAR CREEK DR N
BEAR CREEK DR S
ADAMS AVE
WASHINGTON AVE
MAGNOLIA ST
HAYES AVE
TENAJA RD
9
21370
95
19535
20403
23879
14854
21419
23380
21577
89
96
28677C
97
23187B
23187A
21
14854
24342
14836
28677B
28677
23881
95
21371
102
110
109
95
29
111
29069
28333
30394
29403
17018
15
16
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22346
19
20
29361
23
22
24
26
25
30273
29602
33
28993
112
38
28903A
46
23095
28148
113
30348
62
28903B
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Figure 4.2a

2B

2C

2A

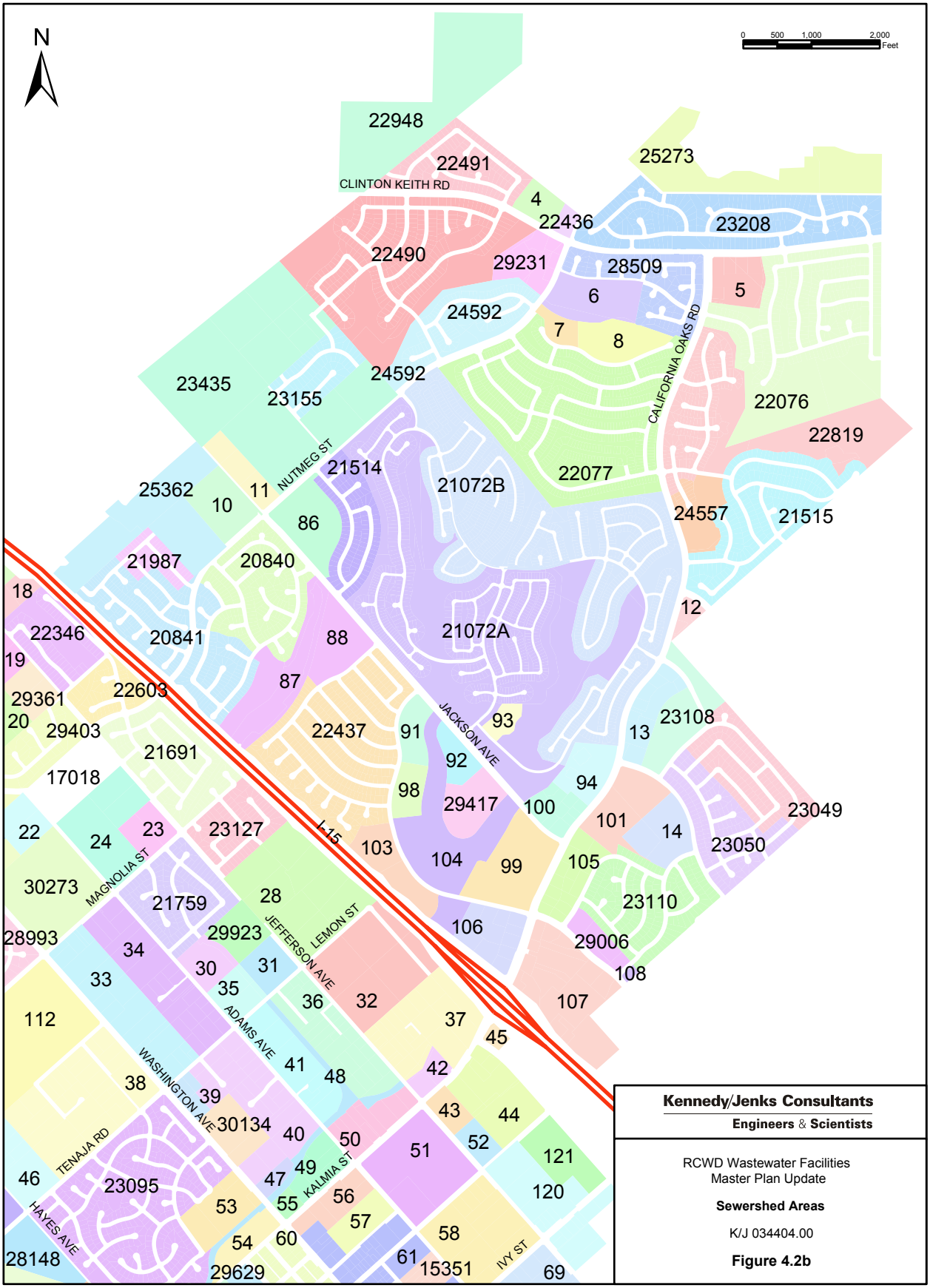

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Figure 4.2b

2C

2A 2B

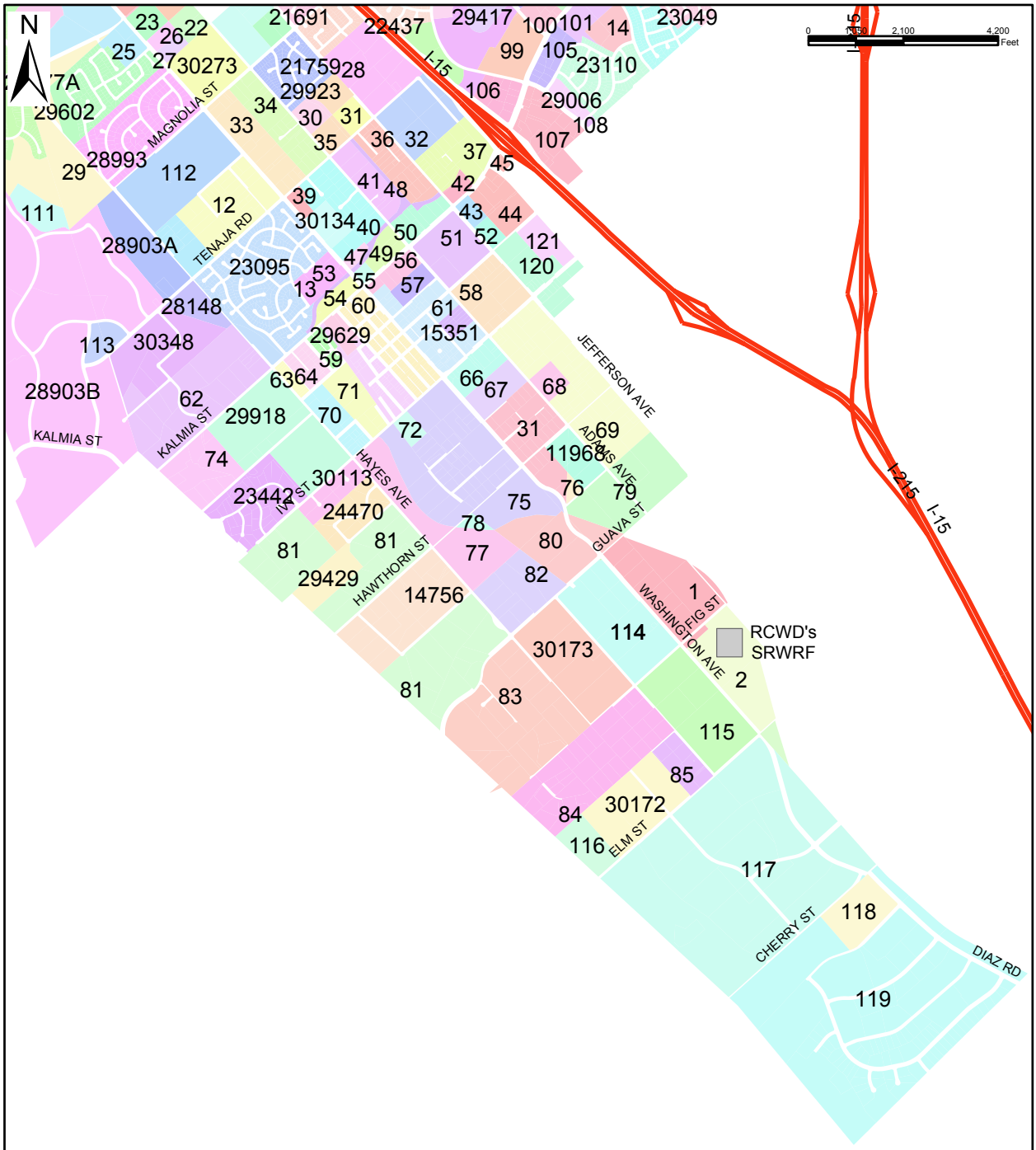

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Figure 4.2c

Table 4.3 – EVMWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2014 Flow (EDU)	2014 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
4	0	0.00	0	0.00	0	0.00	4	0.00	4	0.00	4	0.00
5	0	0.00	0	0.00	53	0.01	53	0.01	53	0.01	53	0.01
6	59	0.01	59	0.01	100	0.03	169	0.04	169	0.04	169	0.04
7	0	0.00	0	0.00	4	0.00	4	0.00	4	0.00	4	0.00
8	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
9	347	0.09	1,000	0.25	0	0.00	0	0.00	0	0.00	0	0.00
10	0	0.00	22	0.01	44	0.01	44	0.01	44	0.01	44	0.01
11	0	0.00	25	0.01	53	0.01	53	0.01	53	0.01	53	0.01
12	7	0.00	7	0.00	27	0.01	27	0.01	27	0.01	27	0.01
13	72	0.02	72	0.02	126	0.03	126	0.03	126	0.03	126	0.03
14	70	0.02	70	0.02	100	0.03	150	0.04	150	0.04	150	0.04
21072B	944	0.24	968	0.24	968	0.24	968	0.24	968	0.24	968	0.24
21515	241	0.06	241	0.06	241	0.06	241	0.06	241	0.06	241	0.06
22076	299	0.07	299	0.07	299	0.07	299	0.07	299	0.07	299	0.07
22077	631	0.16	631	0.16	631	0.16	631	0.16	631	0.16	631	0.16
22436	0	0.00	0	0.00	9	0.00	9	0.00	9	0.00	9	0.00
22490	295	0.07	295	0.07	295	0.07	295	0.07	295	0.07	295	0.07
22491	116	0.03	116	0.03	116	0.03	116	0.03	116	0.03	116	0.03
22819	174	0.04	174	0.04	174	0.04	174	0.04	174	0.04	174	0.04
22948	0	0.00	0	0.00	118	0.03	118	0.03	118	0.03	118	0.03
23049	160	0.04	160	0.04	160	0.04	160	0.04	160	0.04	160	0.04
23050	163	0.04	163	0.04	163	0.04	163	0.04	163	0.04	163	0.04
23108	337	0.08	337	0.08	337	0.08	337	0.08	337	0.08	337	0.08
23110	189	0.05	189	0.05	189	0.05	189	0.05	189	0.05	189	0.05
23155	72	0.02	72	0.02	72	0.02	72	0.02	72	0.02	72	0.02
23208	213	0.05	213	0.05	213	0.05	213	0.05	213	0.05	213	0.05
23435	252	0.06	306	0.08	306	0.08	306	0.08	306	0.08	306	0.08
24557	14	0.00	14	0.00	14	0.00	14	0.00	14	0.00	14	0.00
24592	100	0.03	100	0.03	100	0.03	100	0.03	100	0.03	100	0.03
25273	64	0.02	107	0.03	107	0.03	107	0.03	107	0.03	107	0.03
25362	136	0.03	187	0.05	187	0.05	187	0.05	187	0.05	187	0.05
28509	112	0.03	112	0.03	112	0.03	112	0.03	112	0.03	112	0.03
29231	56	0.01	56	0.01	56	0.01	56	0.01	56	0.01	56	0.01
TOTALS	***5,123***	***1.28***	***5,995***	***1.50***	***5,374***	***1.34***	***5,877****	***1.47****	***5,877****	***1.47****	***5,877****	***1.47****

* 380 EDUs activated in 2023 as per the District's instruction

Table 4.4 – MCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2018 Flow (EDU)	2018 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
1	0	0.00	0	0.00	218	0.05	432	0.11	748	0.19	748	0.19
15	0	0.00	4	0.00	8	0.00	14	0.00	14	0.00	14	0.00
16	0	0.00	5	0.00	9	0.00	16	0.00	16	0.00	16	0.00
17	4	0.00	10	0.00	20	0.00	34	0.01	34	0.01	34	0.01
18	0	0.00	3	0.00	7	0.00	11	0.00	11	0.00	11	0.00
19	0	0.00	12	0.00	24	0.01	41	0.01	41	0.01	41	0.01
20	0	0.00	22	0.01	43	0.01	75	0.02	75	0.02	75	0.02
21	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
22	0	0.00	8	0.00	17	0.00	29	0.01	29	0.01	29	0.01
23	0	0.00	17	0.00	33	0.01	57	0.01	57	0.01	57	0.01
24	0	0.00	25	0.01	49	0.01	84	0.02	84	0.02	84	0.02
25	70	0.02	70	0.02	83	0.02	99	0.02	99	0.02	99	0.02
26	3	0.00	4	0.00	9	0.00	15	0.00	15	0.00	15	0.00
27	0	0.00	4	0.00	8	0.00	15	0.00	15	0.00	15	0.00
28	0	0.00	0	0.00	167	0.04	331	0.08	573	0.14	573	0.14
30	0	0.00	11	0.00	21	0.01	37	0.01	37	0.01	37	0.01
31	36	0.01	36	0.01	51	0.01	88	0.02	88	0.02	88	0.02
33	0	0.00	154	0.04	304	0.08	450	0.11	526	0.13	526	0.13
34	0	0.00	22	0.01	43	0.01	74	0.02	74	0.02	74	0.02
35	0	0.00	18	0.00	35	0.01	61	0.02	61	0.02	61	0.02
36	0	0.00	24	0.01	47	0.01	81	0.02	81	0.02	81	0.02
37	0	0.00	142	0.04	281	0.07	350	0.09	487	0.12	487	0.12
38	2	0.00	46	0.01	91	0.02	109	0.03	109	0.03	109	0.03
39	0	0.00	19	0.00	37	0.01	64	0.02	64	0.02	64	0.02
40	0	0.00	31	0.01	62	0.02	107	0.03	107	0.03	107	0.03
41	0	0.00	13	0.00	27	0.01	46	0.01	46	0.01	46	0.01
42	0	0.00	21	0.01	42	0.01	72	0.02	72	0.02	72	0.02
43	0	0.00	23	0.01	45	0.01	79	0.02	79	0.02	79	0.02
44	64	0.02	101	0.03	200	0.05	346	0.09	346	0.09	346	0.09
45	0	0.00	4	0.00	9	0.00	15	0.00	15	0.00	15	0.00
46	0	0.00	16	0.00	31	0.01	38	0.01	38	0.01	38	0.01
47	0	0.00	7	0.00	15	0.00	26	0.01	26	0.01	26	0.01

Table 4.4 – MCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2018 Flow (EDU)	2018 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
48	0	0.00	37	0.01	50	0.01	100	0.03	128	0.03	128	0.03
49	1	0.00	43	0.01	85	0.02	100	0.02	147	0.04	147	0.04
50	0	0.00	57	0.01	114	0.03	150	0.04	197	0.05	197	0.05
51	34	0.01	80	0.02	158	0.04	200	0.05	274	0.07	274	0.07
52	0	0.00	23	0.01	45	0.01	77	0.02	77	0.02	77	0.02
53	0	0.00	18	0.00	35	0.01	61	0.02	61	0.02	61	0.02
54	0	0.00	11	0.00	21	0.01	37	0.01	37	0.01	37	0.01
55	0	0.00	6	0.00	12	0.00	21	0.01	21	0.01	21	0.01
56	4	0.00	25	0.01	50	0.01	86	0.02	86	0.02	86	0.02
57	26	0.01	28	0.01	55	0.01	96	0.02	96	0.02	96	0.02
58	0	0.00	85	0.02	150	0.04	200	0.05	291	0.07	291	0.07
59	0	0.00	14	0.00	28	0.01	49	0.01	49	0.01	49	0.01
60	5	0.00	50	0.01	100	0.02	150	0.04	239	0.06	239	0.06
61	16	0.00	97	0.02	191	0.05	250	0.06	331	0.08	331	0.08
62	0	0.00	17	0.00	33	0.01	40	0.01	40	0.01	40	0.01
63	0	0.00	12	0.00	23	0.01	39	0.01	39	0.01	39	0.01
64	0	0.00	28	0.01	56	0.01	96	0.02	96	0.02	96	0.02
65	0	0.00	52	0.01	104	0.03	150	0.04	180	0.04	180	0.04
66	46	0.01	69	0.02	137	0.03	175	0.04	237	0.06	237	0.06
67	0	0.00	45	0.01	88	0.02	100	0.03	153	0.04	153	0.04
68	0	0.00	36	0.01	70	0.02	122	0.03	122	0.03	122	0.03
69	1	0.00	415	0.10	822	0.21	1,000	0.25	1,423	0.36	1,423	0.36
70	1	0.00	45	0.01	90	0.02	125	0.03	156	0.04	156	0.04
71	0	0.00	52	0.01	103	0.03	150	0.04	179	0.04	179	0.04
72	0	0.00	19	0.00	38	0.01	66	0.02	66	0.02	66	0.02
73	0	0.00	14	0.00	28	0.01	48	0.01	48	0.01	48	0.01
74	0	0.00	7	0.00	13	0.00	16	0.00	16	0.00	16	0.00
75	0	0.00	42	0.01	84	0.02	100	0.02	145	0.04	145	0.04
76	0	0.00	12	0.00	24	0.01	41	0.01	41	0.01	41	0.01
77	0	0.00	8	0.00	15	0.00	26	0.01	26	0.01	26	0.01
78	0	0.00	1	0.00	2	0.00	3	0.00	3	0.00	3	0.00
79	3	0.00	211	0.05	418	0.10	600	0.15	724	0.18	724	0.18
80	0	0.00	6	0.00	12	0.00	21	0.01	21	0.01	21	0.01
81	0	0.00	34	0.01	67	0.02	81	0.02	81	0.02	81	0.02

Table 4.4 – MCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2018 Flow (EDU)	2018 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
82	0	0.00	5	0.00	10	0.00	18	0.00	18	0.00	18	0.00
83	0	0.00	4	0.00	9	0.00	28	0.01	53	0.01	53	0.01
84	0	0.00	3	0.00	8	0.00	22	0.01	43	0.01	43	0.01
85	0	0.00	1	0.00	1	0.00	4	0.00	8	0.00	8	0.00
120	9	0.00	131	0.03	260	0.07	451	0.11	451	0.11	451	0.11
121	235	0.06	235	0.06	235	0.06	235	0.06	235	0.06	235	0.06
11968	0	0.00	57	0.01	113	0.03	150	0.04	195	0.05	195	0.05
14756	0	0.00	13	0.00	26	0.01	32	0.01	32	0.01	32	0.01
15351	0	0.00	16	0.00	31	0.01	54	0.01	54	0.01	54	0.01
23095	426	0.11	426	0.11	426	0.11	426	0.11	426	0.11	426	0.11
23187A	140	0.04	140	0.04	223	0.06	267	0.07	267	0.07	267	0.07
23442	44	0.01	44	0.01	44	0.01	44	0.01	44	0.01	44	0.01
24470	0	0.00	4	0.00	9	0.00	10	0.00	10	0.00	10	0.00
28148	0	0.00	26	0.01	51	0.01	61	0.02	61	0.02	61	0.02
28333	212	0.05	212	0.05	212	0.05	212	0.05	212	0.05	212	0.05
28993	161	0.04	161	0.04	161	0.04	161	0.04	161	0.04	161	0.04
29069	84	0.02	89	0.02	89	0.02	89	0.02	89	0.02	89	0.02
29361	19	0.00	19	0.00	19	0.00	19	0.00	19	0.00	19	0.00
29403	82	0.02	82	0.02	82	0.02	82	0.02	82	0.02	82	0.02
29429	0	0.00	4	0.00	7	0.00	9	0.00	9	0.00	9	0.00
29602	182	0.05	183	0.05	183	0.05	183	0.05	183	0.05	183	0.05
29629	0	0.00	9	0.00	19	0.00	32	0.01	32	0.01	32	0.01
29918	0	0.00	16	0.00	31	0.01	38	0.01	38	0.01	38	0.01
29923	0	0.00	12	0.00	24	0.01	41	0.01	41	0.01	41	0.01
30113	1	0.00	3	0.00	6	0.00	7	0.00	7	0.00	7	0.00
30134	0	0.00	15	0.00	29	0.01	50	0.01	50	0.01	50	0.01
30273	75	0.02	81	0.02	81	0.02	81	0.02	81	0.02	81	0.02
30303	0	0.00	17	0.00	33	0.01	57	0.01	57	0.01	57	0.01
30348	0	0.00	10	0.00	19	0.00	23	0.01	23	0.01	23	0.01
30394	0	0.00	54	0.01	107	0.03	184	0.05	184	0.05	184	0.05
TOTALS	***1,987***	***0.50***	***4,643***	***1.16***	***7,906***	***1.98***	***10,942***	***2.74***	***13,062***	***3.27***	***13,062***	***3.27***

Table 4.5 – RCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2014 Flow (EDU)	2014 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
2	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
29	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
32	0	0.00	172	0.04	340	0.09	589	0.15	589	0.15	589	0.15
86	0	0.00	0	0.00	4	0.00	4	0.00	4	0.00	4	0.00
87	0	0.00	0	0.00	4	0.00	4	0.00	4	0.00	4	0.00
88	38	0.01	38	0.01	50	0.01	100	0.03	151	0.04	151	0.04
89	30	0.01	45	0.01	87	0.02	105	0.03	105	0.03	105	0.03
90	0	0.00	0	0.00	10	0.00	10	0.00	10	0.00	10	0.00
91	91	0.02	91	0.02	91	0.02	91	0.02	91	0.02	91	0.02
92	3	0.00	121	0.03	121	0.03	121	0.03	121	0.03	121	0.03
93	17	0.00	17	0.00	36	0.01	36	0.01	36	0.01	36	0.01
94	112	0.03	112	0.03	112	0.03	112	0.03	112	0.03	112	0.03
95	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00	1	0.00
96	0	0.00	29	0.01	58	0.01	69	0.02	69	0.02	69	0.02
97	0	0.00	2	0.00	3	0.00	4	0.00	4	0.00	4	0.00
98	0	0.00	129	0.03	129	0.03	129	0.03	129	0.03	129	0.03
99	391	0.10	391	0.10	391	0.10	391	0.10	391	0.10	391	0.10
100	57	0.01	75	0.02	75	0.02	75	0.02	75	0.02	75	0.02
101	0	0.00	20	0.01	20	0.01	20	0.01	20	0.01	20	0.01
102	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
103	16	0.00	50	0.01	100	0.02	205	0.05	205	0.05	205	0.05
104	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
105	79	0.02	79	0.02	114	0.03	114	0.03	114	0.03	114	0.03
106	95	0.02	122	0.03	122	0.03	122	0.03	122	0.03	122	0.03
107	151	0.04	250	0.06	350	0.09	450	0.11	559	0.14	559	0.14
108	0	0.00	5	0.00	5	0.00	5	0.00	5	0.00	5	0.00
109	3	0.00	6	0.00	13	0.00	15	0.00	15	0.00	15	0.00
110	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
111	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
112	439	0.11	439	0.11	637	0.16	763	0.19	763	0.19	763	0.19
113	0	0.00	21	0.01	42	0.01	50	0.01	50	0.01	50	0.01
114	0	0.00	2	0.00	5	0.00	16	0.00	30	0.01	30	0.01
115	0	0.00	2	0.00	6	0.00	16	0.00	31	0.01	31	0.01

Table 4.5 – RCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2014 Flow (EDU)	2014 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
116	0	0.00	1	0.00	1	0.00	4	0.00	8	0.00	8	0.00
117	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
118	0	0.00	625	0.16	625	0.16	625	0.16	625	0.16	625	0.16
119	345	0.09	345	0.09	697	0.17	2,021	0.51	3,880	0.97	3,880	0.97
14836	0	0.00	6	0.00	12	0.00	14	0.00	14	0.00	14	0.00
14854	274	0.07	274	0.07	274	0.07	274	0.07	274	0.07	274	0.07
19535	80	0.02	80	0.02	80	0.02	80	0.02	80	0.02	80	0.02
20403	59	0.01	59	0.01	59	0.01	59	0.01	59	0.01	59	0.01
20840	233	0.06	233	0.06	233	0.06	233	0.06	233	0.06	233	0.06
20841	335	0.08	336	0.08	336	0.08	336	0.08	336	0.08	336	0.08
21072A	620	0.16	620	0.16	620	0.16	620	0.16	620	0.16	620	0.16
21370	75	0.02	75	0.02	75	0.02	75	0.02	75	0.02	75	0.02
21371	63	0.02	63	0.02	63	0.02	63	0.02	63	0.02	63	0.02
21419	204	0.05	204	0.05	204	0.05	204	0.05	204	0.05	204	0.05
21514	114	0.03	114	0.03	114	0.03	114	0.03	114	0.03	114	0.03
21577	127	0.03	127	0.03	127	0.03	127	0.03	127	0.03	127	0.03
21691	163	0.04	163	0.04	163	0.04	163	0.04	163	0.04	163	0.04
21759	152	0.04	155	0.04	155	0.04	155	0.04	155	0.04	155	0.04
21987	57	0.01	57	0.01	57	0.01	57	0.01	57	0.01	57	0.01
22346	71	0.02	71	0.02	71	0.02	71	0.02	71	0.02	71	0.02
22437	384	0.10	384	0.10	384	0.10	384	0.10	384	0.10	384	0.10
22603	37	0.01	37	0.01	37	0.01	37	0.01	37	0.01	37	0.01
23127	90	0.02	90	0.02	90	0.02	90	0.02	90	0.02	90	0.02
23187B	18	0.00	18	0.00	33	0.01	40	0.01	40	0.01	40	0.01
23380	95	0.02	95	0.02	95	0.02	95	0.02	95	0.02	95	0.02
23879	261	0.07	261	0.07	261	0.07	261	0.07	261	0.07	261	0.07
23881	101	0.03	101	0.03	101	0.03	101	0.03	101	0.03	101	0.03
24342	22	0.01	22	0.01	22	0.01	22	0.01	22	0.01	22	0.01
28677A	873	0.22	873	0.22	873	0.22	873	0.22	873	0.22	873	0.22
28677B	0	0.00	4	0.00	4	0.00	4	0.00	4	0.00	4	0.00
28677C	28	0.01	28	0.01	28	0.01	28	0.01	28	0.01	28	0.01
28903A	0	0.00	108	0.03	108	0.03	108	0.03	108	0.03	108	0.03
28903B	0	0.00	431	0.11	845	0.21	1,013	0.25	1,013	0.25	1,013	0.25
29006	101	0.03	152	0.04	152	0.04	152	0.04	152	0.04	152	0.04

Table 4.5 – RCWD Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2014 Flow (EDU)	2014 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
29417	219	0.05	219	0.05	219	0.05	219	0.05	219	0.05	219	0.05
30172	0	0.00	2	0.00	4	0.00	13	0.00	25	0.01	25	0.01
30173	0	0.00	2	0.00	6	0.00	17	0.00	32	0.01	32	0.01
TOTALS	***6,724***	***1.68***	***8,655***	***2.16***	***10,155***	***2.54***	***12,369***	***3.09***	***14,449***	***3.61***	***14,449***	***3.61***

Table 4.6 – Service Area Summary of Sub-Area/Development Tract Wastewater Flow Projections

Sub-Area or Development Tract	2004 Flow (EDU)	2004 Flow (mgd)	2009 Flow (EDU)	2009 Flow (mgd)	2014 Flow (EDU)	2014 Flow (mgd)	2024 Flow (EDU)	2024 Flow (mgd)	2034 Flow (EDU)	2034 Flow (mgd)	Ultimate Flow (EDU)	Ultimate Flow (mgd)
EVMWD	5,123	1.28	5,995	1.5	5,374	1.34	5,877	1.47	5,877	1.47	5,877	1.47
MCWD	1,987	0.5	4,643	1.16	7,906	1.98	10,942	2.74	13,062	3.27	13,062	3.27
RCWD	6,724	1.68	8,655	2.16	10,155	2.54	12,369	3.09	14,449	3.61	14,449	3.61
TOTALS	***13,834***	***3.46***	***19,293***	***4.82***	***23,435***	***5.86***	***29,188***	***7.30***	***33,388***	***8.35***	***33,388***	***8.35***

4.1 Historic Wastewater Flows

With input from the District and the provision of key District data layers, K/J has used several methods to identify active EDUs for the existing time increment. The active EDUs were then assigned the base unit flow factor of 250 gpd/EDU (as developed in section 3) to generate wastewater flows. The development of existing EDUs involved varying levels of reconciliation that involved using customer billing data, and additional District direction, both of which are further described in Section 3.

4.2 Projected Wastewater Flows

4.2.1 Ultimate Wastewater Flow

4.2.1.1 District Direction

The District directed K/J to assign the following ultimate EDU values, based upon their local knowledge of development activity within the service area. The District also informed K/J as to which Development Tracts and Sub-Areas were already built-out in the existing time increment, and as a result these Development Tracts and Sub-Areas would have ultimate wastewater flow projections equal to their existing wastewater flow projections. Table 4.7 illustrates the ultimate wastewater flows for development tracts and sub-areas utilized by K/J at the District's direction, sorted by contributing agency.

Table 4.7 – Ultimate EDUs Based on District Direction

Contributing Agency	Sub-Area or Development Tract	Ultimate EDUs
EVMWD	4	4.00
EVMWD	5	53.00
EVMWD	6	169.00
EVMWD	7	4.00
EVMWD	8	0.00
EVMWD	10	44.00
EVMWD	11	53.00
EVMWD	12	27.00
EVMWD	13	126.00
EVMWD	14	150.00
EVMWD	21072B	968.00
EVMWD	21515	241.00
EVMWD	22076	299.00
EVMWD	22077	631.00
EVMWD	22436	9.00
EVMWD	22490	295.00
EVMWD	22491	116.00
EVMWD	22819	174.00
EVMWD	22948	118.00
EVMWD	23049	160.00

Table 4.7 – Ultimate EDUs Based on District Direction

Contributing Agency	Sub-Area or Development Tract	Ultimate EDUs
EVMWD	23050	163.00
EVMWD	23108	337.00
EVMWD	23110	189.00
EVMWD	23155	72.00
EVMWD	23208	213.00
EVMWD	23435	306.00
EVMWD	24557	14.00
EVMWD	24592	100.00
EVMWD	25273	107.00
EVMWD	25362	187.00
EVMWD	28509	112.00
EVMWD	29231	56.00
EVMWD SUB-TOTAL		**5,497.00**
MCWD	1	748.00
MCWD	23095	426.00
MCWD	23187A	267.00
MCWD	23442	44.00
MCWD	28333	212.00
MCWD	28993	161.00
MCWD	29069	89.00
MCWD	29361	19.00
MCWD	29403	82.00
MCWD	29602	183.00
MCWD	30273	81.00
MCWD SUB-TOTAL		**2,312.00**
RCWD	86	4.00
RCWD	87	4.00
RCWD	90	10.00
RCWD	91	91.00
RCWD	93	36.00
RCWD	95	1.00
RCWD	96	69.00
RCWD	97	4.00
RCWD	99	391.00
RCWD	101	20.00
RCWD	109	15.00
RCWD	113	50.00
RCWD	14836	14.00
RCWD	14854	274.00
RCWD	19535	80.00

Table 4.7 – Ultimate EDUs Based on District Direction

Contributing Agency	Sub-Area or Development Tract	Ultimate EDUs
RCWD	20403	59.00
RCWD	20840	233.00
RCWD	20841	336.00
RCWD	21072A	620.00
RCWD	21370	75.00
RCWD	21371	63.00
RCWD	21419	204.00
RCWD	21514	114.00
RCWD	21577	127.00
RCWD	21691	163.00
RCWD	21759	155.00
RCWD	21987	57.00
RCWD	22346	71.00
RCWD	22437	384.00
RCWD	22603	37.00
RCWD	23127	90.00
RCWD	23187B	40.00
RCWD	23380	95.00
RCWD	23879	261.00
RCWD	23881	101.00
RCWD	24342	22.00
RCWD	28677A	873.00
RCWD	28677B	4.00
RCWD	28677C	28.00
RCWD	28903A	108.00
RCWD	28903B	1013.00
RCWD	29006	152.00
RCWD	29417	219.00
RCWD	30172	25.00
RCWD	30173	32.00
RCWD SUB-TOTAL		**6,824.00**
TOTAL		***14,633.00***

4.2.1.2 Inter-Agency Agreements

In accordance with existing inter-agency agreements between EVMWD and RCWD the following ultimate wastewater flow projections were assigned:

- Sub-Area 9 (the southwestern portion of EVMWD) will contribute no wastewater flow in the ultimate time increment.

- 380 EDUs were distributed in the ultimate time increment at the four metering manholes monitoring flow from the Southeastern portion of EVMWD. This accounts for the discrepancy between the ultimate wastewater flows assigned to each development tract and sub-area in this portion on EVMWD, and the inter-agency agreement between RCWD and EVMWD. The 380 EDUs were divided among the four metering manholes based on the total flow tributary to each manhole.

4.2.1.3 Land Use

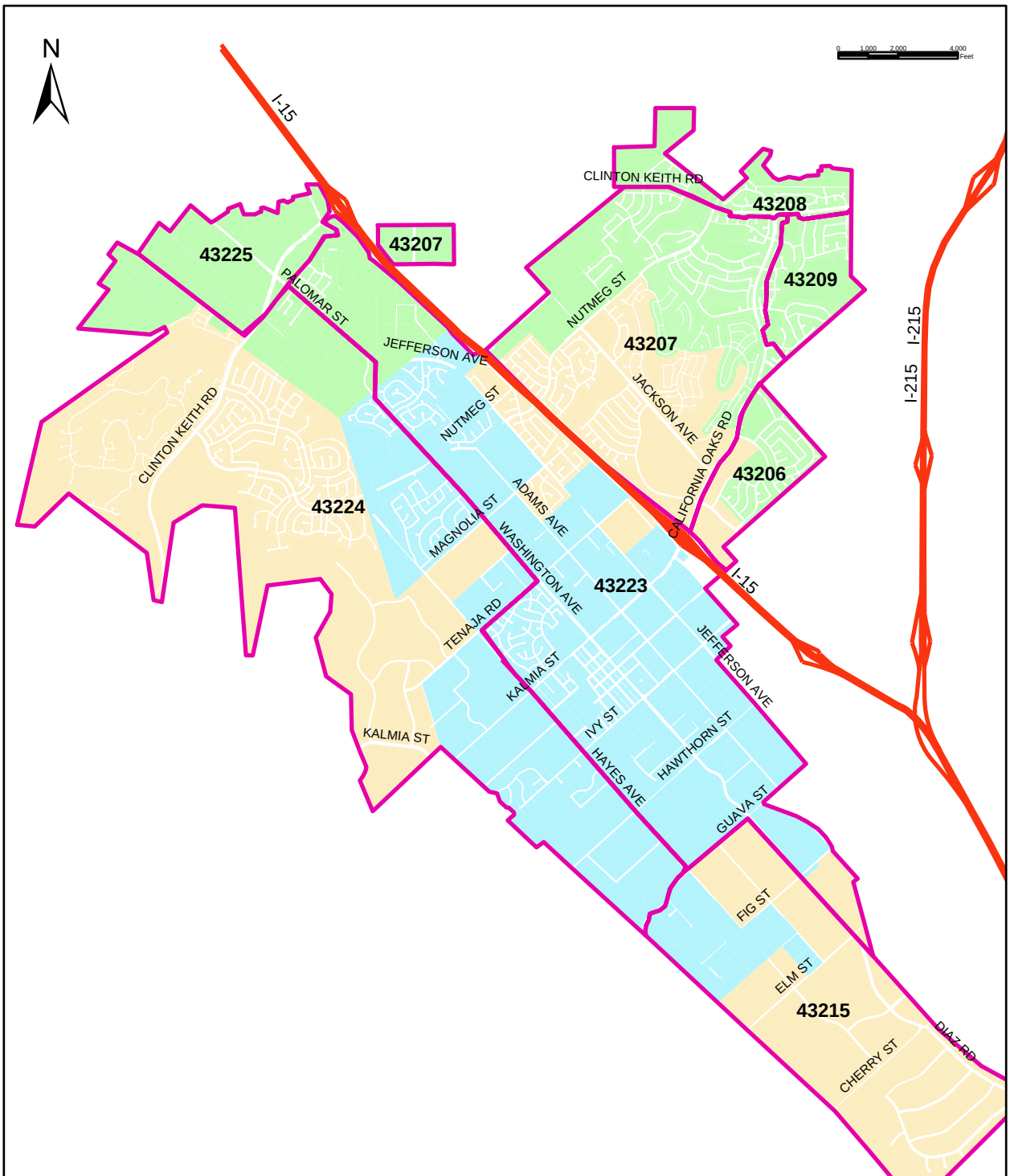
For all other parcels, ultimate wastewater flows were calculated using the wastewater duty unit factors and land use categories developed in section 3. Ultimate EDUs were calculated by multiplying the area of each parcel by its assigned wastewater duty unit factor.

4.2.2 Wastewater Flow Projections

K/J utilized SCAG's year 2000 census data to project how the District's wastewater flow generation will grow from existing to ultimate build-out. The SCAG data contained population projections for each census tract in the District for the years 2000, 2010, 2015, 2020, 2025 and 2030. A linear interpolation was conducted to determine population by census tracts for the planning periods of 2009, 2014, 2024, and 2034 for use in this Plan. A GIS layer containing the census tract boundaries was overlaid on all parcels within the District's sewer service area, as is illustrated in Figure 4.3.

Activation rates for parcels were then calculated based on the growth rate of the census data within the District. Having determined which parcels were currently active within the District, the total number of active residential dwelling units could be determined within the District per census tract. Similarly, since all parcels will be active in the ultimate build-out condition, an ultimate number of residential dwelling units for the District per census tract could also be calculated. Each census tract growth rate was then applied to the active residential dwelling units within the District's sewer service area, resulting in the number of 2009 active residential dwelling units. This process was then repeated for each 5-year increment until the ultimate amount of residential dwelling units for the area lying within the District's sewer service area based on census tract was reached.

For example, if within a census tract there were 1000 active residential dwelling units, 2500 ultimate residential dwelling units, and the SCAG population growth rate from 2004 to 2009 was 25% then the 2009 active residential dwelling units were calculated to be 1250. Since an additional 250 residential dwelling units out of an ultimate 1500 additional residential dwelling units were now active, the residential activation rate would be 16.7% (250/1500) for 2009. A one-to-one correlation between residential activation rates and commercial activation rates was assumed throughout the district. Therefore, for all existing inactive EDUs lying within this census tract in the District, 16.7% of their ultimate flow would be turned on in the year 2009.



Contributing Agencies within RCWD Sewer Service Area

- Elsinore Valley Municipal Water District
- Murrieta County Water District
- Rancho California Water District

Kennedy/Jenks Consultants
Engineers & Scientists

RCWD Wastewater Facilities
Master Plan Update

Census Tract Boundaries

K/J 034404.00

Figure 4.3

After discussions with the District, the following parcels were activated in a different manner.

- Sewershed 9 (the southwestern portion of EVMWD) was set to 1000 EDUs in 2008 and then turned off for all remaining time increments. This activation time reflects the proposed agreements between EVMWD and RCWD regarding treatment of EVMWD flows at the SRWRF.

- All parcels in the Southeastern portion of EVMWD were set to 100% in 2014, as projected in EVMWD *2002 Wastewater Facilities Master Plan*. The remaining 380 EDUS, discussed above, were activated in 2024 per the District's direction.

- The Temecula Educational Complex was set to 100% in 2009 and kept at 100% for all subsequent time increments.

Figure 4.4 illustrates the wastewater flow projections based on contributing agency. Figure 4.5 shows the total recommended wastewater flow projections developed by K/J. In addition, it also illustrates for comparison purposes the following:

- Total Capacity – The District's treatment capacity at the SRWRF is 5 mgd.

- Historic – This is the District's historic wastewater generation from 1987 – 2004.

- Projected Historic – This is a straight-line linear extrapolation of the District's historical growth.

- 1000 EDU/year –This is based upon the District's estimate of historical maximum connections per year.

Figure 4.4
Projected Flows to SRWRF by Contributing Agency

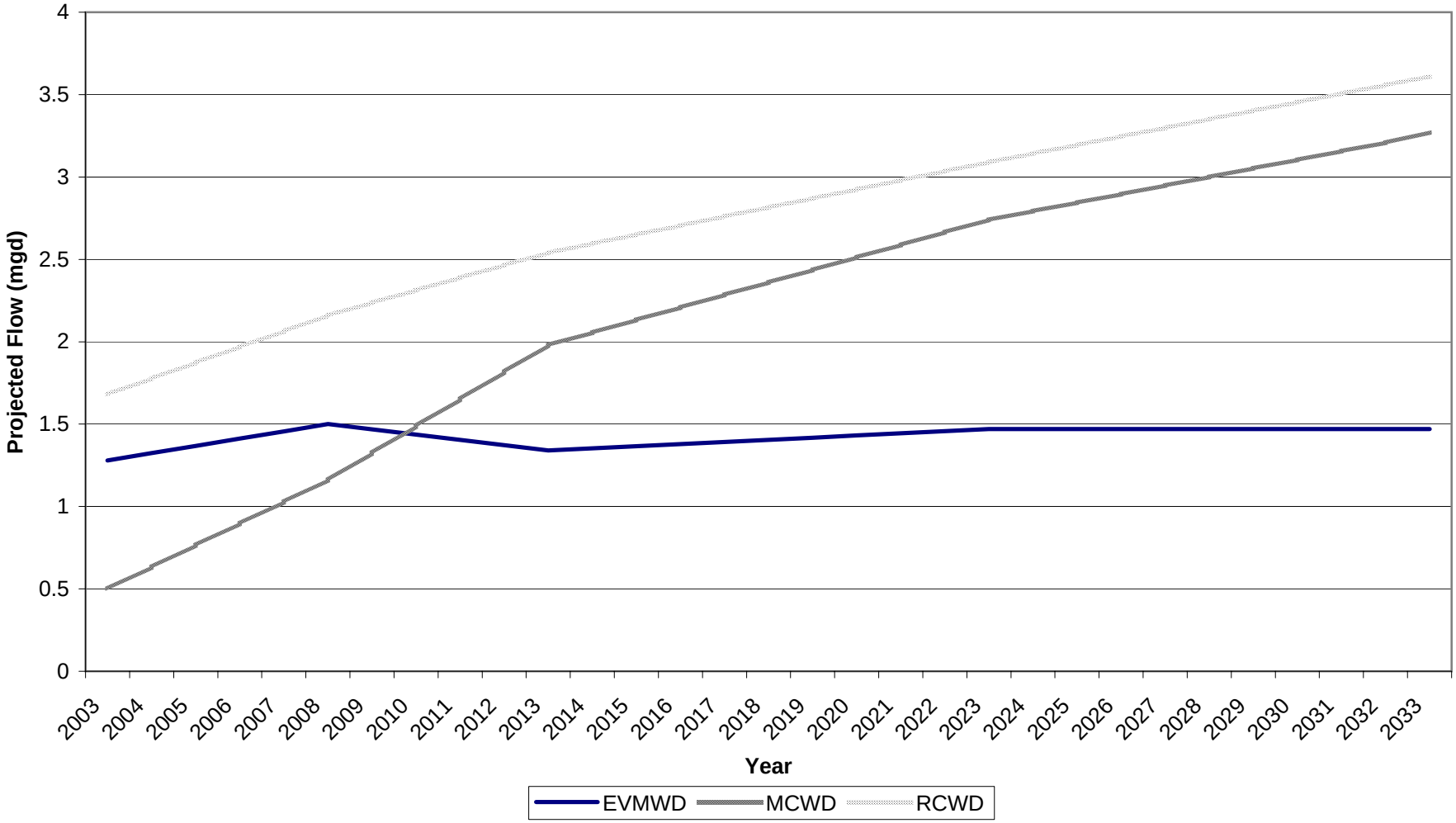


Figure 4.5
Wastewater Flow Projection Alternatives

Section 5: Santa Rosa Water Reclamation Facility Evaluation

In support of our overall master planning effort, Kennedy/Jenks Consultants (K/J) has evaluated the Santa Rosa Water Reclamation Facility (SRWRF) with regards to operational and expansion issues. This section addresses the following:

- Existing Treatment Processes and Operations
- Evaluation of Treatment Processes and Operational Issues
- Projected flow increase
- Improvements required for future expansion of SRWRF
- SRWRF Capital Replacement Program

5.1 Existing Treatment Processes and Operations

The SRWRF currently produces disinfected tertiary effluent suitable for all permitted uses provided in Title 22 California Code Regulations. SRWRF is regulated by Order No. 94-92 and Addenda No. 1, No. 2, No. 3, and No. 4 *Waste Discharge Requirements for the Rancho California Water District Wastewater Reclamation Facilities, Riverside County.* Order No. 94-92 sets forth effluent limitations for irrigation uses and percolation within onsite basins. The maximum allowable 24 hour discharge rate is 5.0 mgd. The treatment process includes headworks, secondary treatment, tertiary treatment, disinfection, and dechorination unit processes.

5.1.1 Headworks

Wastewater enters SRWRF through a Parshall Flume then flows through a drum grinder and on to the influent pump station. The headworks are designed for a peak flow of 40 mgd and an average flow of 25 mgd. To accommodate the current low flows, a smaller 12-inch flume has been installed into the larger 48-inch flume.

The existing drum grinders are designed hold a peak flow capacity of 16 mgd each. A bar screen bypass channel is provided for maintenance purposes.

The influent pump station is sized for an ultimate capacity of 25 mgd. The pump station consists of four vertical screw submersible centrifugal pumps with constant speed motors, in a dry pit configuration. There is capacity for a total of eight pumps at 4,000 gpm within the pump station for future flows. In the event that the dry well is flooded, submersible motors and pumps have been installed to allow continuous operation.

Flows from the pump station are delivered to the aerated grit chamber. The existing grit chamber is designed to handle 10 mgd with a detention time of 2.5 minutes. The system has been designed to accommodate three more grit chambers for future flows up to 40 mgd. From the grit chamber, wastewater flows are gravity fed to the sequencing batch reactors (SBRs).

5.1.2 Secondary Treatment

There are currently five SBRs online, each with the dimensions of 140 feet by 40 feet by 20 feet. Batch testing has been done with 4 SBRs online, resulting in a treated batch volume of 250,000 gallons per SBR. The SBRs were designed with a design detention time of 16 hours and an F/M ration of 0.15. Table 5.1 provides a summary of design criteria for SRWRF secondary treatment facilities.

A programmable controller regulates the SBR process and adjusts process conditions based upon flow. Effluent from the SBRs flows by gravity to either on-site percolation ponds or to two flow equalizations basin and then on to tertiary treatment. The waste activated sludge (WAS) from the SBRs is pumped to an aerobic digester.

Table 5.1 - Design Criteria for SRWRF Secondary Treatment Facilities

Category	Parameter	Criteria
Flow	Average design flow	5.0 million gallons per day (mgd)
	Peak design flow	10.0 mgd
	Rated plant hydrologic capacity	10.0 mgd
Influent flow meter	Type	Parshall flume
	Size	48-inch, with 12-inch nested flume
	Level Sensor	Ultrasonic
Influent screening	Type	Double drum grinder
	Size	4 feet
	Number	2
	Capacity: Average flow	4.5 mgd each
	Peak Flows	16 mgd each
	Maximum head-loss	6 inches
	Horsepower	5 hp
Influent pumps	Type	Wemco vertical screw centrifugal
	Number	4
	Capacities	Four @4000gallons per minute, 100 hp
Grit removal	Type	Aerated
	Volume	17,360 gallons
	Detention time	2.5 minutes
	Blower horsepower	5 hp
Grit pumps	Type	Wemco Model C
	Number	2
	Capacity	250 gallons per minute (gpm)
	Horsepower	25 hp
Cyclones	Type	Wemco Model 1000C
	Number	2
	Size	4-inch vortex, 6-ich pipe apex
	Capacity	250 gpm @ 6 pounds per square inch
Classifier	Type	Wemco 18-inch Full Fare
	Number	1
	RPM	1750
	Horsepower	1 hp

Table 5.1 - Design Criteria for SRWRF Secondary Treatment Facilities

Category	Parameter	Criteria
Sequential batch reactors	Number	5
	Volume per tank	830,000 gallons
	Hydraulic detention time	16 hours
	Aeration	Jet aeration, 1450 std. Cubic feet per minute
	Air supply: Aeration air supply	Positive displacement blowers
	Number of blowers	6
	Blower horsepower	150 hp
	Mixing horsepower	Lawrence Pumps, 100 hp each
	Side water depth	14 feet (minimum)
		20 feet (maximum)
	Dimensions	140 feet x 40 feet x 20 feet deep
Aerobic Digester	Volume	830,000 gallons
	Number	1
	Dimensions	140 feet x 40 feet x 20 feet deep
	Aeration	Jet aeration
	Air supply	Positive displacement blowers
	Number of blowers	1
	Mixing	Lawrence Pumps, 100 hp each
	Detention time	16 days@ 2 percent solids
	Solids loading rate	0.08 lbs per cubic foot per day
Gravity sludge thickener	Number	1
	Size	2 meter
	Horsepower	7.5 horsepower
	Liquid loading rate	200 gallons per minute
	Solids capture	99 percent
	Product solids	5 percent max
	Sludge pumps	In: Mono-15 hp, Series 500
		Out: Mono-10 hp, Series 400
Belt filter presses	Size	2 meter
	Horsepower	7.5 horsepower
	Number	2
	Solids loading rate	1100 pounds per hour
	Liquid loading rate	100 gallons per minute
	Solids capture	99 percent
	Product solids	12-14 percent
	Polymer usage	5 pounds per ton of dry solids
	Sludge pumps	Two Mono-10hp, 400 gpm
Percolation Ponds	Number	2 basins
	Area	10 acres (existing)
Waste activated sludge pumps	Type	Mono
	Number	4
Waste activated sludge pumps	Capacity	200 to 400 gallons per second
	Horsepower	20 horsepower
Final effluent flow	Type	Sparling

Table 5.1 - Design Criteria for SRWRF Secondary Treatment Facilities

Category	Parameter	Criteria
meter		
	Size	48-inch
	Sensor	Ultrasonic

5.1.3 Tertiary Treatment

The SRWRF produces disinfected tertiary effluent suitable for all permitted uses provided in Title 22 California Code Regulations and was designed to meet required reliability requirements for flows up to 5.0 mgd. Table 5.2 provides a detailed summary of the tertiary treatment facilities.

Table 5.2 - Design Criteria for SRWRF Tertiary Treatment Facilities

Category	Parameter	Criteria
Flow equalization basins	Number	2
	Volume	750,000 gallons
	Dimensions, per basin	150 feet x 100 feet x 12 feet deep
	Type	Earthen basin
	Basin side slopes	2:1
	Liner Material	High density polyethylene
Pump station	Number	Three (two duty, one standby)
	Type	Vertical turbine
	Capacity, per pump	3500 gpm at 30-foot dynamic head
	Horsepower, each	50 horsepower
	Speed control	Manually adjustable
Chemical rapid mix	Number	2
	Volume	1740 gallons
	Dimensions	4 feet x 4 feet x 14.5 feet deep
	Detention time	30 seconds
	Mixing gradient	1000 $seconds^{-1}$, 1-10 NPHP mixer
Flocculation basins	Number (with phosphorus removal)	4 basins, 6 cells per basin
	Volume, per basin	26,000 gallons
	Dimensions, per basin	30 feet x 10 feet x 11.6 feet deep
	Detention time (with phosphorus removal)	30 minutes
	Mixing gradient	100 $seconds^{-1}$, 3-1.0 NPHP mixers per basin
	Energy control	VFD speed control
Gravity filters	Number	4
	Type	Down-flow, dual media

Table 5.2 - Design Criteria for SRWRF Tertiary Treatment Facilities

Category	Parameter	Criteria
	Dimensions, per unit	13 feet x 18 feet
	Hydraulic loading (maximum)	5 gallons per square foot
	Sand Media: Depth	24 inches
	Effective size	0.5 to 0.6 millimeters
	Uniformity coefficient	1.6
	Anthracite: Depth	12 inches
	Effective size	1.0 to 1.2 millimeters
	Uniformity coefficient	1.6
	Capacity, per pump	6 to 8 feet
	Backwash rate	20 gallons per minute per square foot
	Air scour rate	2 - 4 cubic feet per minute per square foot
	Number of backwash pumps	Two (one duty, one standby)
	Backwash pump capacity, per pump	4700 gpm @ 10-15 foot total dynamic head
	Number of air scour blowers	Two (one duty, one standby)
	Capacity of each blower	1100 cubic feet per minute @ 6 pounds per square inch
Tertiary clarifiers	Number	2
	Volume, per clarifier	347,800 gallons
	Dimension, per clarifier	63 feet x 15 feet
	Detention time	3.3 hours
	Hydraulic loading	900 gallons per day per square foot (600 gpd per square foot for 1.0 mg/l phosphorus removal)
Chorine contact basin	Number	2
	Volume, per basin	208,300 gallons
	Detention time	120 minutes
	Passes, per basin	5
	Dimension, per basin	101 feet x 5 feet x 11 feet
	Length to width ratio	101:1
	Length to depth ratio	46:1
	Chlorine mixing	100 $seconds^{-1}$, 1-25 NPHP mixer
	Chlorine feed control	Forward feed
Sulfur dioxide contact basin	Number	1
	Volume	3500 gallons
Sulfur dioxide contact basin (cont'd)	Dimensions	10 feet x 4 feet x 11 feet deep
	Detention time	1.0 minute
	Chemical feed	Forward feed

Table 5.2 - Design Criteria for SRWRF Tertiary Treatment Facilities

Category	Parameter	Criteria
Spent filter backwash basin	Number	2
	Volume, per basin	51,582 cubic feet each
Sludge drying beds	Number	5
	Dimensions, per bed	75 feet x 85 feet x 5 feet deep
	Influent solids concentration	10,000 gpd @ 3 percent
	Detention time	120 days
	Final solids concentration	30 percent
Chlorination	Number of chlorinators	Three (two duty, one standby)
	Feed-rate	400 to 800 pounds per day
	Storage	10 days
	Number of residual analyzers	3
	Dosage range	10 to 20 mg/l
Dechlorination	Type	Sulfur dioxide
	Number of sulfonators	Two (one duty, one standby)
	Feed-rate	40 to 400 pounds per day
	Storage	20 days
	Number of residual analyzers	Two (one duty, one standby)
	Dosage range	1 to 10 mg/l

The equalization basins are designed to handle 15% of the 5 mgd – each having outer and inner lengths of 150 feet and 102 feet respectively, outer and inner widths of 100 feet and 52 feet, respectively, side water depth of 12 feet, and walls sloping at 2:1.

The pump station for the AWT contains 2 duty and 1 standby 50 hp pumps that allow for a safety factor of 1.15.

Two rapid mix basins are 232 ft^3 each, 4 feet by 4 feet with a side water depth of 14.5 feet and have detention times of 30 seconds. Only one tank is necessary but two are provided in case one is out of service or 1 minute of detention time is needed.

Flocculation basins, two 2.5 mgd trains, 6965 ft^3 each, have three staged flocculation with a velocity gradient (G) range of 10 to 150 sec^{-1}. Basins allow for 30 minutes of detention time for phosphorus removal with alum. Although not in the design, polymer is also being added to aid in phosphorus and turbidity removal. Turbine mixers were designed with 4 blades of 124 in^2 each.

Two circular tertiary clarifiers have hydraulic loading rates of 900 gpd/ft^2 and areas of 3,100 ft^2 each (600 gpd/ft^2 for 1.0 mg/l of phosphorus removal). The side water depth is 15 feet with a diameter of 63 feet. Water is pumped from the flocculation basin up through the center of the basin providing a detention time of 3.33 hours.

Four gravity filters, 13 feet by 18 feet each, have maximum hydraulic loading rates of 5 gpm/ft^2 each; the design allows for one filter to be backwashing while three operate. Filter run time is

assumed as 12 hours resulting in 2 backwashes per filter per day. Backwash rate is 20 gpm/ft^2 for 20 minutes. Two backwash basins of 25,000 ft^3 are provided. Back wash pumps operate at 4,700 gpm with a total dynamic head (TDH) of 10 feet to 15 feet. Air scour is 4.7 ft^3/min at 6 psig.

120 minutes of detention time is provided in the two chlorine contact basins, each having 5 passes with length, width, and height dimensions of 127 feet, 3.5 feet, and 12.5 feet respectively. One chlorine mixer of 15 hp is provided for each of the two chlorine mixing basins. Each basin is 5 feet by 3.5 feet by 12.5 feet. Sulfur dioxide is added after the chlorine contactor by a rotometer and operated when live stream discharge is used (Murrieta Creek or Temescal Wash).

Chemical requirements are shown in Table 5.3.

Table 5.3 - Chemical Requirements for SRWRF Facilities

Chemical	Maximum Dose Concentration Design	Current Operational Dose Concentration
Alum	100 mg/l	29 mg/l
Chlorine	20 mg/l	15.0 mg/l
Sulfur Dioxide [1]	10 mg/l	0 mg/l

1. Use limited to live stream discharge (Murrieta Creek or Temescal Wash) operating periods

Rancho California Water District (RCWD) has developed an extensive recycled water distribution system that includes pumping, pipeline, and storage facilities. Disinfected tertiary effluent is either pumped directly into the distribution system for delivery to irrigators or is placed into three existing seasonal storage reservoirs for future use.

5.1.4 Solids Handling Facilities

Grit captured in the aerated grit system is dewatered and washed and hauled offsite to a landfill.

Settled solids from the tertiary clarifier and the tertiary scum are sent to the aerobic digester after first filling the drying beds. Supernatant and leachate from the drying beds are reprocessed in the equalization basin. Filters are backwashed into the filter backwash basins. Filter backwash basin decant is sent to the equalization basin while the settled solids are pumped to either the drying beds or, if full, the aerobic digester. According to the operators, it takes 1 week to fill a drying bed and 3 months for that bed to dry.

The sludge dewatering basins were designed to accommodate 19,800 gpd of tertiary sludge with a liquid detention time of 19 days assuming a 1% solids concentration. The effluent is decanted leaving sludge at an assumed 10% solids concentration. This sludge is supposed to be transferred to another bed in order to dry to 50% solids; storage time was calculated at 38 days, yet instructions were given to clean the basins once a month.

WAS from the SBR process is sent directly to an aerobic digester. The digester has a volume of 830,000 gallons with an average flow rate at 8% of 57,000 gpd. A gravity thickener controls the concentration of sludge within the digester. A second thickener is located in the existing building to provide redundancy. A belt filter press and 40 gph polymer feed pump, with a second press and pump on standby, dewaters sludge from the aerobic digester mechanically. Space is available to install two more belt presses and four polymer feed pumps. Dewatered sludge is then is then trucked offsite for disposal or reclamation.

5.2 Existing Capacity and Facility Modifications

5.2.1 Capacity Analysis

Wastewater discharging into SRWRF includes flow from Elsinore Valley Municipal Water District and Murrieta County Water District. Wastewater from the Eastern Municipal Water District (EMWD) collection system has been diverted to the SRWRF at times, but a permanent discharge to the SRWRF has not yet been finalized between both agencies.

EMWD is discharging disinfected tertiary effluent into the SRWRF recycled water distribution system. This flow is combined with SRWRF effluent and delivered to recycled water users and/or stored in seasonal storage ponds located immediately adjacent to SRWRF.

An analysis of SRWRF capacity was developed in "Santa Rosa Water Reclamation Facility Interim Facility Improvements Project Report", May 2002, (*Interim Facility Improvements Project Report*). The analysis identified improvements needed within SRWRF to meet effluent limitations as flows approached the permitted capacity of 5.0 mgd.

At the time of the *Interim Facility Improvements Project Report* preparation, RCWD was discharging a portion of the effluent to the adjoining Murrieta Creek (live stream discharge), percolating effluent to the local groundwater basin and providing effluent for irrigation uses. The analysis concluded the existing facilities could meet effluent limitations for groundwater and irrigation discharges without major plant improvements. Meeting live stream effluent limitations would require the construction of additional sequencing batch reactor basins and improvements to the tertiary solids handling system.

A review of the daily and seasonal variation of influent flows indicated peak influent flows occur during weekend and holiday periods. This local area flow condition indicates the existing facilities capacity will be reached when these peak day flow periods reach 5 mgd and that will occur before the average annual daily flow reaches 5.0 mgd. The analysis concluded the maximum permitted 24 hour flow would likely occur when the average daily flow reaches 90% of the permitted capacity or 4.5 mgd.

Peak hourly flows are generally below the facility design value of 200% of the average flow. However peak flow rates have exceeded the design value on occasion. The *Interim Facility Improvements Project Report* developed a recommended maximum instantaneous design flow rate of 2.5 times the average daily flow rather than the 2.0 peaking factor used in the original design. The analysis determined such a peak flow rate can be accommodated by the existing unit processes up to the current permitted maximum 24 hour discharge flow of 5.0 mgd.

The existing plant site was established to accommodate a treatment facility considerably larger than the current 5.0 mgd facility. There is sufficient land for a larger facility that could serve as a regional water reclamation plant beyond the current service area.

5.2.2 Existing Facility Modifications

A number of modifications to several units processes is planned to improve operation efficiency and accommodate the increase of flows up to the permitted capacity of 5.0 mgd.

5.2.2.1 Headworks

The nested 12-inch Parshall flume will require replacement with a 24-inch flume (as recommended in a separate study) as the peak flows reach the capacity of 10.0 mgd, which will then accommodate flows up to 20 mgd. The existing 48-inch Parshall flume is capable of a maximum capacity of 40 mgd. The remaining headworks process units are capable of handling the anticipated peak flows.

The in-channel-grinders located in the influent channels immediately downstream from the parshall flume allow the passage of materials that can interfere with downstream unit processes, potentially reducing their efficiency. The installation of augers capable of removing larger solids from the grinder units prior to a future plant expansion project is recommended for increased operation and maintenance efficiency.

5.2.2.2 Sequencing Batch Reactors

The *Interim Facility Improvement Projects Report* identified the need to add two additional sequencing batch reactor (SBR) basins if nutrient removal is required to meet effluent limitations (as required for live stream discharge). Additional reactor basins are not required for the production of 5.0 mgd if effluent is utilized for irrigation as nutrient reduction is not required.

Although not analyzed in the *Interim Facility Improvement Projects Report*, biological nutrient removal required for the discharge of effluent into the onsite percolation basins may require an additional SBR tank for the design capacity of 5.0 mgd. A separate evaluation is recommended for this analysis.

Additional operating reliability and flexibility would be provided if one additional reactor basin is constructed as this would provide operators with the ability to remove a reactor out of service (at full permitted capacity) for maintenance and cleaning. The construction of two basins at one time offers an economical way of accomplishing this goal and would provide a second aerobic digester discussed in the following section.

5.2.2.3 Solids Handling System

The existing solids system is limited due to the size of the single aerobic digester. Designed in the late 1980's prior to the adoption of federal regulations now in affect, the original design criteria produces a non-Class B sludge. Additional aerobic digester basin capacity will be needed or conversion to an alternative digestion process (such as anaerobic digestion) is required to produce a sludge that would allow more disposal options (Class B or additional treatment process units capable of producing Class A as provided in USEPA 40 CFR 503 "Standards for the use and Disposal of Sewage Sludge" regulations). A second aerobic digester was identified in the *Interim Facility Improvements Project Report* in order to provide greater operation flexibility and a higher level of digestion (meeting Class B criteria).

Treatment of sewage sludge can achieve Class A requirements in several alternative treatment process trains. Generally, Class A biosolids has a greatly reduced level of pathogens and high level of organics stabilization that minimize vector attraction. The regulations include specific treatment requirements for a number of available technologies that expose the biomass to heat, various forms of radiation and chemicals.

Sludge disposal over the long term is problematic as counties are adopting more stringent land application rules. Consideration of alternative digestion processes will be needed as disposal options and associated treatment levels become more clear in the near future.

5.2.2.4 Tertiary Filters

Secondary effluent is discharged from the SBR basins into two flow equalization basins that provide sufficient storage to allow a constant flow rate into the advanced water treatment (AWT) process units. The AWT pump station delivers flows to flocculation basins, sedimentation basins, filters and chlorine contact basins.

The four existing filters are sized to provide a loading rate of 5 gpm/sf when the plant reaches the design influent rate of 5 mgd with one filter out of service. Flow through the tertiary filters includes the total influent flow plus backwash flows returned from the filters that are discharged into the flow equalization basins. When the plant influent flow reaches 5.0 mgd, flows through the filters would exceed 5.0 mgd and the 5 gpm/sf loading rate would be exceeded with one filter out of service.

The discharge requirements for SRWRF (Order No. 94-94) do not presently include a limit on the filter loading rates. Such a limit could be included in a future discharge order revision and the scheduling for the expansion of SRWRF should take this possibility into consideration.

The AWT pump station capacity is 6 mgd (two of three AWT pumps running at full speed) determined in a review of AWT pump curves and the development of a system head curve for the discharge piping system.

5.2.2.5 Seasonal Storage

Tertiary effluent flow exceeding irrigation demand and percolation pond capacity is stored in a series of seasonal storage ponds located immediately adjacent to the SRWRF site. RCWD has acquired sufficient land for the construction of additional ponds that may be required as flows increase. The construction of additional storage ponds will be addressed separately in the Water Facilities Master Plan.

RCWD has a connection to the effluent pipeline previously constructed by the Eastern Municipal Water District (EMWD), extending from the EMWD water reclamation facility located in Temecula to a discharge point within Temescal Wash, providing an additional discharge option for SRWRF. If this discharge option is used, then the volume required within the seasonal storage basins could be reduced, and further expansion may be deferred.

5.2.3 Existing Facility Replacements

RCWD has completed the Interim Facility Improvements as developed in the *Interim Facility Improvements Project Report*. The improvements implemented include odor control upgrades, gas delivery system upgrades, replacement of sequencing batch reactor (SBR) decant mechanisms, coating of the digester and batch reactor structures, addition of chorine analyzers, installation of an additional blower and miscellaneous improvements that will improve the operation and maintenance of the flow equalization basin and effluent pump station fore-bay.

Additional recommended improvements that were not constructed include the addition of two SBR units and the installation of new auger screens in the headworks. Normal replacement of equipment will continue as various process and support facilities reach the end of their useful lives and this will be discussed in the Capital Replacement Program section.

5.2.4 Evaluation of Treatment Process Modifications

There are a number of potential factors that could lead to the need for process modifications within SRWRF beyond the need to add process units as flows reach the current 5.0 mgd capacity.

5.2.5 Revised Units Processes

The existing facility utilizes the sequencing batch reactor (SBR) as the primary and secondary treatment process. This type of secondary process combines several unit process operations in a single basin and accommodates biological reduction of nutrients if required. The SBR process was selected to take advantage of the single reactor vessel process size efficiency and provide the ability to meet nutrient effluent limitations that required nutrient reduction in the treatment process.

The SBR process is a means of providing biological nutrient reduction in a single reactor vessel as noted. The primary benefit is the avoidance of multiple unit processes that would otherwise be required to meet effluent limitations. The SBR process requires a higher level of energy use compared to other processes as all of the reduction of the biological oxygen demand (BOD) takes place in the aerated reactor where mixing and aeration are required. Other unit process units are available (such as primary sedimentation basins) can be installed prior to the aeration system that would remove BOD and a portion of the total suspended solids with a corresponding lower energy consumption rate.

The SBR process also relies on a decant mechanism to remove settled secondary effluent. Large secondary clarifiers following aeration basins (in a conventional process train) offer a more controllable sedimentation process.

Alternative treatment process trains are possible including the process units mentioned above (such as primary sedimentation, aeration and clarification) and emerging technologies (such as membrane bioreactor systems). Sufficient land is available at the SRWRF site to accommodate expansion to alternative treatment process units.

An order of magnitude cost evaluation for the conversion of the existing 5.0 mgd facility to an alternative process has been prepared in an effort to determine the feasibility of such a change. The process units selected for the analysis include the replacement of the existing SBR unit process with the following process units:

- Installation of primary sedimentation basins
- Conversion of existing SBR basins to the mLE biological nutrient removal (BNR) process
- Installation of secondary clarifiers.

The existing SBR basins would be modified to provide nutrient removal as they would be configured with anoxic and oxic zones with internal return flows (MLE process). The estimated

capital cost (order of magnitude level) for these improvements is $11,781,000 as summarized in Table 5.4.

Table 5.4 - Conversion of SRWRF to mLE Process (Order of Magnitude Cost Estimate)

Item	Estimated Cost
Primary Sedimentation	1,650,000
SBR Basin Conversion to mLE	$3,150,000
Secondary Clarifiers	$2,160,000
Subtotal	$6,960,000
Site work, yard piping, electrical	$1,948,800
Subtotal	$8,908,000
Contingencies & Admin/Engineering	$2,873,000
Total	***$11,781,000***

The primary savings with this conversion is reduced energy consumption. The primary sedimentation basins would remove a portion of the organic matter thereby reducing aeration requirements within the activated sludge portion of the process (MLE basins). The estimated reduction in annual energy cost is $70,000 to $100,000 per year. Assuming an interest rate of 4%, the present worth value of such a savings is $950,000 to $1,400,000.

The analysis indicates the conversion of the existing SBR treatment process units to an alternative activated sludge process would not reduce operating cost sufficiently to justify the conversion capital cost.

For the expansion of SRWRF, a comparison of adding additional SBR basins with the conversion concept considered in this Section and other alternative processes should be investigated as a part of the preliminary design process. Other factors that might impact the economic analysis for the expansion include the need to increase aerobic digester capacity to meet Class B 40 CFR 503 regulations in addition to the higher solids loading from the higher plant flow. It is recommended to perform this analysis as part of a preliminary design report for the next facility expansion.

5.2.6 Extending Irrigation into Areas with more Stringent Effluent Limitations

Order No. 94-92 specifies areas where effluent can be utilized for irrigation. The specified use areas do not include the entire District service area.

The setting of effluent limits by the Regional Water Quality Control Board, San Diego Region (Regional Board) is determined by surface and groundwater quality objectives contained in the *Comprehensive San Diego Water Quality Control Plan* (Basin Plan). The current approved use areas allow disinfected tertiary effluent produced by SRWRF to be used without additional treatment.

A portion of the District's service area (Hydrologic sub area 2.42 in the eastern portion of RCWD), has groundwater quality objectives that would require the addition of demineralization process units. The addition of this type of unit process has generally been found to be cost prohibitive due to the high capital and operating costs and the need to dispose waste flow (concentrate) from the demineralization process. A separate detailed engineering analysis is recommended to investigate this option.

5.2.7 Live Stream Discharge Implementation

Discharge of disinfected tertiary effluent into Murrieta Creek was terminated by the District when the Regional Board issued a revised National Pollution Discharge Elimination System (NPDES) permit with nutrient limitations far more stringent that the previous NPDES permit and significant monitoring requirements. Significant process modifications would be required to meet the adopted limitations.

A preliminary review of the process requirements indicated the need to expand the SBR process to provide a higher level of nutrient reduction and the addition of a process such as reverse osmosis to reliably meet the nutrient limitations. As noted above, high capital and operating costs would be incurred and a method of disposing concentrate from the reverse osmosis process would be required. A detailed analysis of this option is not recommended until the Regional Board adopts a TMDL Plan for Murrieta Creek and the Santa Margarita River.

5.2.8 Groundwater Recharge

The current Order No. 94-92 allows percolation of effluent within on-site percolation basins. The volume is limited by percolation basin capacity constraints and is not a significant discharge option.

Groundwater is a major component of the District's water supply and recharge of groundwater basins represents and opportunity to expand effluent discharge options and augment local water supplies.

The local groundwater system is complex with shallow and deep aquifers extending over several large groundwater basins. The development and implementation of a planned groundwater recharge program would require a modification of existing Waste Discharge Requirements (Order No. 94-92). Revised effluent limitations would likely be included as this type of discharge would be regulated in accordance with groundwater recharge regulations contained in the State of California Water Code (Title 22).

The required plant process modifications are not clear without further study. Other important factors include the percentage of extracted groundwater derived from the discharge, travel time and distance form the point of discharge to extraction. A separate engineering analysis is recommended to investigate this option.

5.3 Future SRWRF Improvements

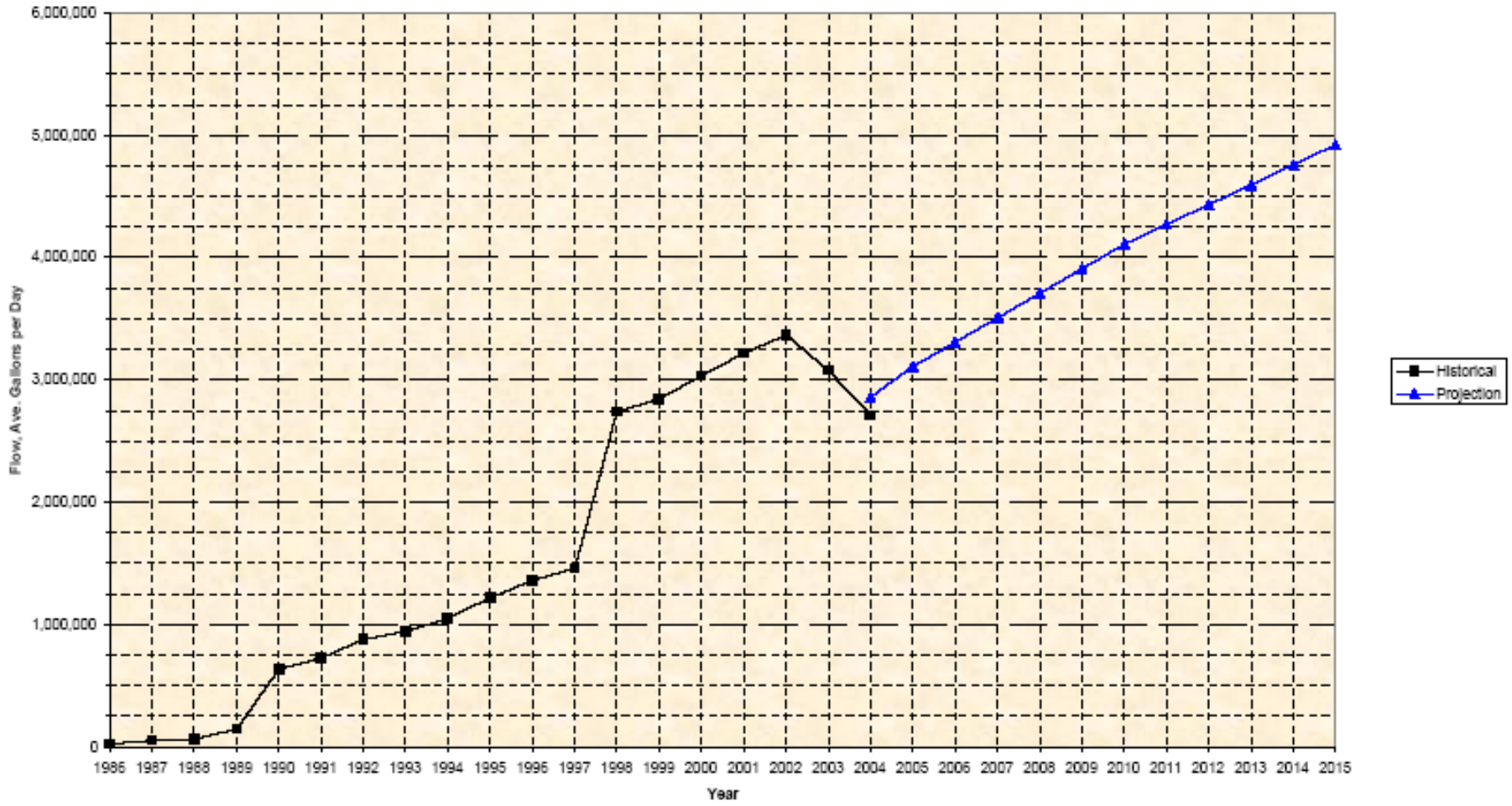
5.3.1 Expansion Schedule Requirements

The expansion of SRWRF is required by Discharge Order No 94-92 to be completed sufficiently advance of the date when flows are expected to reach the facility capacity to ensure compliance with discharge limitations. A plan for such expansion must be submitted to the Regional Board when the facility reaches 75% of its rated capacity. SRWRF is expected to reach the 75% capacity in 2008 and planning for the expansion should begin prior to that time, assuming no wastewater diversion from EMWD.

As discussed in section 4, wastewater flows were developed using the District's existing sewer customer database, as well as specific plan information for development tracts when available. Ultimate wastewater flow projections were calculated using the GIS land use database and the wastewater unit duty factors, both developed in section 3. Figure 5.1 summarizes predicted SRWRF wastewater influent flows based upon historical influent data, rather than the overly conservative EDU flow projection developed for Figure 4.1. The influent flow projection shown in Figure 5.1 is used only for the future SRWRF improvements.

Expansion from the current capacity of 5.0 mgd to 7.5 mgd would accommodate the projected increase in flow to about 2020 and appears to be the next logical expansion increment.

Figure 5.1 – Sewer Influent Projection



Legend	Description
Influent	Average Annual Historic Influent 1986 – 2004
Projection	See Notes

Notes	
Slope (1986-19979)	144,291
Slope projections 2004-2005 (1,000 EDU/year)	250,000
Slope projections 2006-2010 (800 EDU/year)	200,000
Slope projections 2011-2015 (650 EDU/year)	162,500

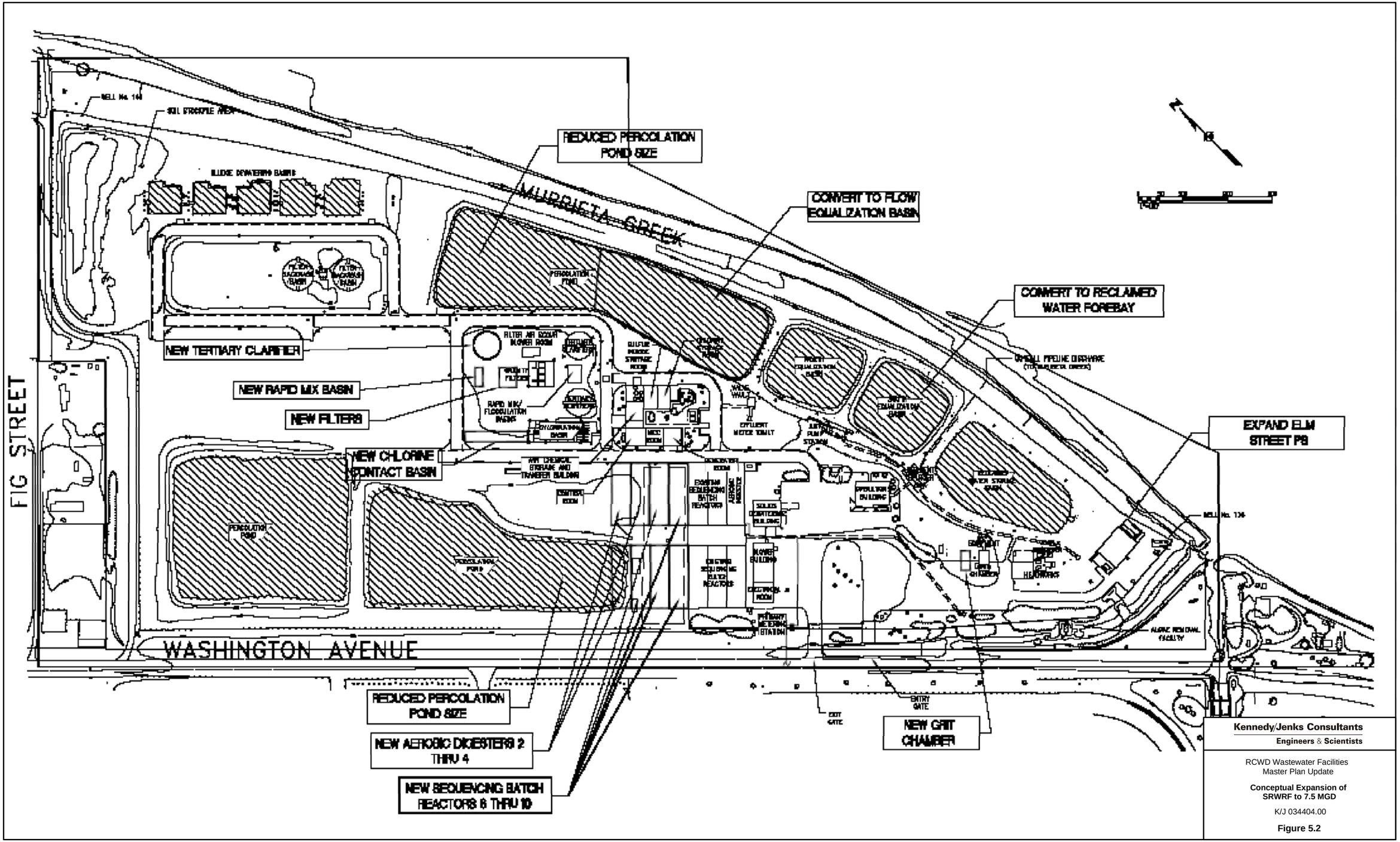
5.3.2 Expansion Improvements

Increasing the design capacity to 7.5 mgd, as illustrated in Figure 5.2, would require expansion of the following unit processes:

- Parshall flume modification (24”)
- Additional influent pump station pumps and motors (2 new pumps and piping modifications)
- Grit removal (new grit chamber, classifier and pumps)
- Additional sequencing batch reactors (5 basins)
- Flow equalization basins and AWT pump station (2 new pumps)
- Rapid mix/flocculation basins, sedimentation and gravity filters (1 four filter module)
- Tertiary clarifier (1 clarifier)
- Chlorine contact basin (1 bay of a two bay module)
- Additional aerobic digester basins (3 basins)
- Elm Street Pump Station forebay (effluent forebay, flow equalization and onsite percolation/holding)

A budget level estimate of the expansion and upgrade capital cost is provided in Table 5.5. The estimate is based on the following assumptions:

1. Biological nutrient removal is required for continued discharge into the onsite percolation ponds and discharge into the Temescal Wash outfall pipeline.
2. The SBR process expansion includes 5 new basins for a total of 10 basins. Nine (9) are required to provide capacity for full nitrification and denitrification and 1 would serve as a redundant unit. The number of SBR basins recommended is based on providing full nitrification and denitrification to accommodate discharge requirements to Temescal Wash, as well as providing a stand-by basin. It is assumed there will be some discharge to Temescal Wash during the winter months, and this level of treatment would not be required for irrigation only discharge.
3. The aerobic digestion process will be modified to enable production of Class B biosolids for the expanded plant. Three (3) new basins would be added, each with the same configuration as the existing aerobic and SBR basins. A total of four (4) operating basins are required to meet Class B biosolids requirements as specified in 40 CFR 503 regulations. The number of addition digester basins is needed to produce Class B sludge.
4. The advanced water treatment process expansion will include units identical to the existing processes (rapid mix/flocculation basins, sedimentation basins, gravity filtration and chlorination).



Kennedy/Jenks Consultants

Engineers & Scientists

RCWD Wastewater Facilities
Master Plan Update

Conceptual Expansion of SRWRF to 7.5 MGD

K/J 034404.00

Figure 5.2

Table 5.5 – Opinion of Capital Cost for SWRF Expansion to 7.5 mgd (revise per CIP table)

Facility	Cost
New Influent Meter	$20,000
Influent Pump Station	$275,000
Grinder Augers	$800,000
Grit Removal	$476,000
SBR Basins	$8,460,000
Flow Equalization Basins	$337,500
AWT Pump Station	$90,000
Flocculation Basin	$294,500
Tertiary Sedimentation	$679,500
Filters	$862,400
Chlorine Contact Basin	$607,775
Aerobic Digesters	$5,076,000
Effluent Forebay	$225,000
Elm Street Pump Station	$350,000
Subtotal	**$18,533,675**
Site Work (8%)	$1,482,694
Yard Piping (10%)	$1,853,368
Electrical/Instrumentation (10%)	$1,853,368
Subtotal	**$23,723,104**
Contingencies (15%)	$3,558,466
Opinion of Construction Cost	**$27,281,570**
Administration & engineering (15%)	$4,093,430
Opinion of Total Project Cost	***$31,375,000***

The opinion of cost includes the addition of a new auger system to remove solids captured in the headworks grinders, additional blowers along with associated electrical, instrumentation and piping needed for the expanded unit processes.

The effluent pump station (Elm Street reclaimed Water Pump Station) would also require expansion for distribution of increased flows to the district's reuse areas along with the effluent forebay to accommodate higher flows.

An analysis of the existing gravity belt thickener and belt filter press units is needed to determine the ability of these existing units to accommodate the increased flow and associated increase in solids.

Additional improvements to the solids handling system (digester, thickening and dewatering systems) will be required if alternative methods of biosolids disposal become necessary or desirable.

Alternative filtration process units (such as disk filter units) are now available and may prove to be more cost effective than the existing gravity filter units. Also, the existing AWT combination of flocculation, sedimentation and filtration was designed to promote the reduction of phosphorus in order to meet live stream discharge limitations. Direct filtration systems (that do not include sedimentation basins) are commonly used to meet disinfected tertiary limitations and should be evaluated during the design phase of the next expansion.

Converting the SBR process units to an alternative BNR process (such as mLE) should be evaluated as a part of the preliminary design process. The economic comparison provided earlier indicates such a conversion is not cost effective when considering the current 5.0 mgd facility. A cost analysis for the expansion would include a comparison of additional SBR basins with such a conversion and should be reviewed again.

5.3.3 Capital Replacement Program

Based upon historical data regarding repair and replacement projects for the SRWRF, the annualized capital repair/replacement cost for the SRWRF is estimated to be $1,215,500.

Section 6: Existing Wastewater Facilities and Wastewater System Analysis

This section provides an overview of the existing wastewater collection system that is owned and operated by the District. Figure 6.1 shows an outline of all existing wastewater collection facilities contributing flow to the Santa Rosa Water Reclamation Facility (SRWRF), and delineates those facilities that are owned by Rancho California Water District (RCWD).

The District currently operates the SRWRF, which is discussed in detail in Section 5, *Wastewater Treatment Plant Evaluation.* The Elsinore Valley Municipal Water District (EVMWD) and the Murrieta County Water District (MCWD) each contribute to the wastewater flow entering RCWD's collection system, with eventual treatment occurring at the Santa Rosa Wastewater Reclamation Facility (SRWRF).

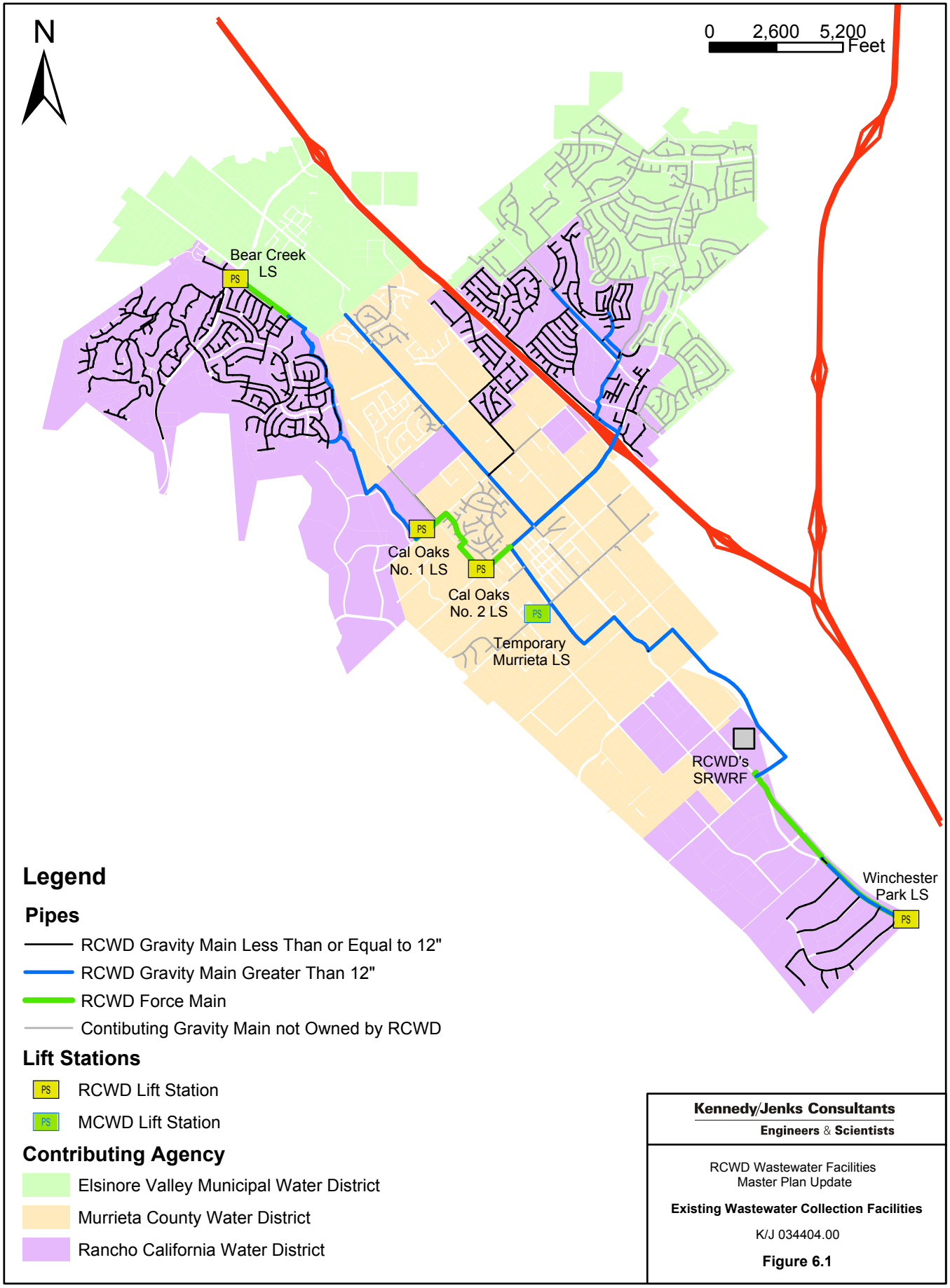
The District's service area consists of gravity collectors, trunk lines, lift stations and force mains, all of which convey flow to the SRWRF. Presently, there are 5 lift stations operating within the District's service area, although only four are owned and operated by RCWD. The wastewater collection system was analyzed using an H_20MAP Sewer hydraulic model in conjunction with the wastewater system design criteria established in Section 3, *Wastewater System Design Criteria*. Collection system deficiencies are presented for facilities owned by RCWD in the Existing, 2009 and Ultimate time increments.

6.1 Existing Wastewater Pumping and Collection System Facilities

This section provides a summary of the existing wastewater collection facilities that are owned and operated by RCWD, which primarily consist of gravity sewer mains, force mains and lift stations.

6.1.1 Wastewater Lift Stations

he District currently owns and operates 4 lift stations: Bear Creek, Cal Oaks No.1, Cal Oaks No.2 and Winchester Park. Tables 6.1 and 6.2 show the operation data, as obtained from as-built drawings and pump curves, for the wet wells and pumps currently comprising each of these lift stations.



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Existing Wastewater Collection Facilities

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Figure 6.1

Table 6.1 – Wet Well Hydraulic Information

Wet Well	Diameter (ft)	Lead Pump Off Level (ft)	Lead Pump On Level (ft)	Standby Pump Off Level (ft)	Standby Pump On Level (ft)
Bear Creek	10	3.5	6.5	4.5	7.5
Cal Oaks No. 1	12	4.0	10.0	5.0	11.0
Cal Oaks No. 2	9	4.0	10.0	5.0	11.0
Winchester Park	12	4.0	10.0	5.0	11.0

Table 6.2 – Pump Hydraulic Information

Pump Station	Function	Design Head (ft)	Design Flow Rate (gpm)	Horsepower (hp)
Bear Creek	Lead	65	610	20
Bear Creek	Standby	65	610	20
Cal Oaks No. 1	Lead	70	1700	50
Cal Oaks No. 1	Standby	70	1700	50
Cal Oaks No. 2	Lead	40	500	15
Cal Oaks No. 2	Standby	40	500	15
Winchester Park	Lead	65	1880	50
Winchester Park	Standby	65	1880	50

6.1.2 Wastewater Gravity Mains

A large portion of the District's collection system consists of 6-inch through 24-inch diameter collector and trunk sewer lines, primarily constructed with vitrified clay pipe (VCP) and poly-vinyl chloride pipe (PVC). Currently, the District's main interceptor line conveys flows from lift stations Cal Oaks No. 1 and No.2, as well as all EVMWD, to the SRWRF via a 21-inch to 24-inch VCP pipe. Table 6.3 provides a summary of RCWD's gravity sewer mains. All lengths and materials were obtained from the District's GIS database.

Table 6.3 – RCWD's Existing Gravity Mains

Diameter (in)	Material	Length (ft)
6	PVC	80
	VCP	40
	6" TOTAL	**120**
8	DIP	4,310
	PVC	93,740
	VCP	114620
	8" TOTAL	**212,670**
10	PVC	3,670
	VCP	7,150
	10" TOTAL	**10,850**
12	PVC	11,590
	VCP	9,970
	12" TOTAL	**21,560**
15	PVC	14,840
	VCP	14,060

Table 6.3 – RCWD's Existing Gravity Mains

Diameter (in)	Material	Length (ft)
	15" TOTAL	**28,900**
18	PVC	3,860
	VCP	9,740
	18" TOTAL	**13,600**
21	DIP	260
	VCP	5,290
	21" TOTAL	**5,550**
24	DIP	3,200
	VCP	14,220
	24" TOTAL	**17,420**
27	VCP	470
	27" TOTAL	**470**
33	VCP	1,190
	33" TOTAL	**1,190**
	GRAND TOTAL	***312,330***

6.1.3 Wastewater Force Mains

The District's wastewater collection system includes force mains ranging in size from 8-inch to 14-inch, each constructed of PVC. Table 6.4 provides a summary of force mains owned by RCWD. All lengths and materials were obtained from the District's GIS database.

Table 6.4 – RCWD's Existing Force Mains

Diameter (in)	Material	Length (ft)
8	PVC	2,570
12	PVC	5,730
14	PVC	8,480
	Grand Total	***16,780***

6.2 Proposed Facility Improvements

Utilizing the H_20map Sewer hydraulic model discussed in section 7, *Sewer System Model Development*, RCWD's collection facilities were analyzed in the Existing, 2009 and Ultimate time increments. Facility improvements have been identified for facilities owned by RCWD in order to mitigate system deficiencies, and meet projected wastewater flows in accordance with the District's design criteria. There are no recommended force main improvements in either of the time increments.

6.2.1 Wastewater Gravity Main Improvements

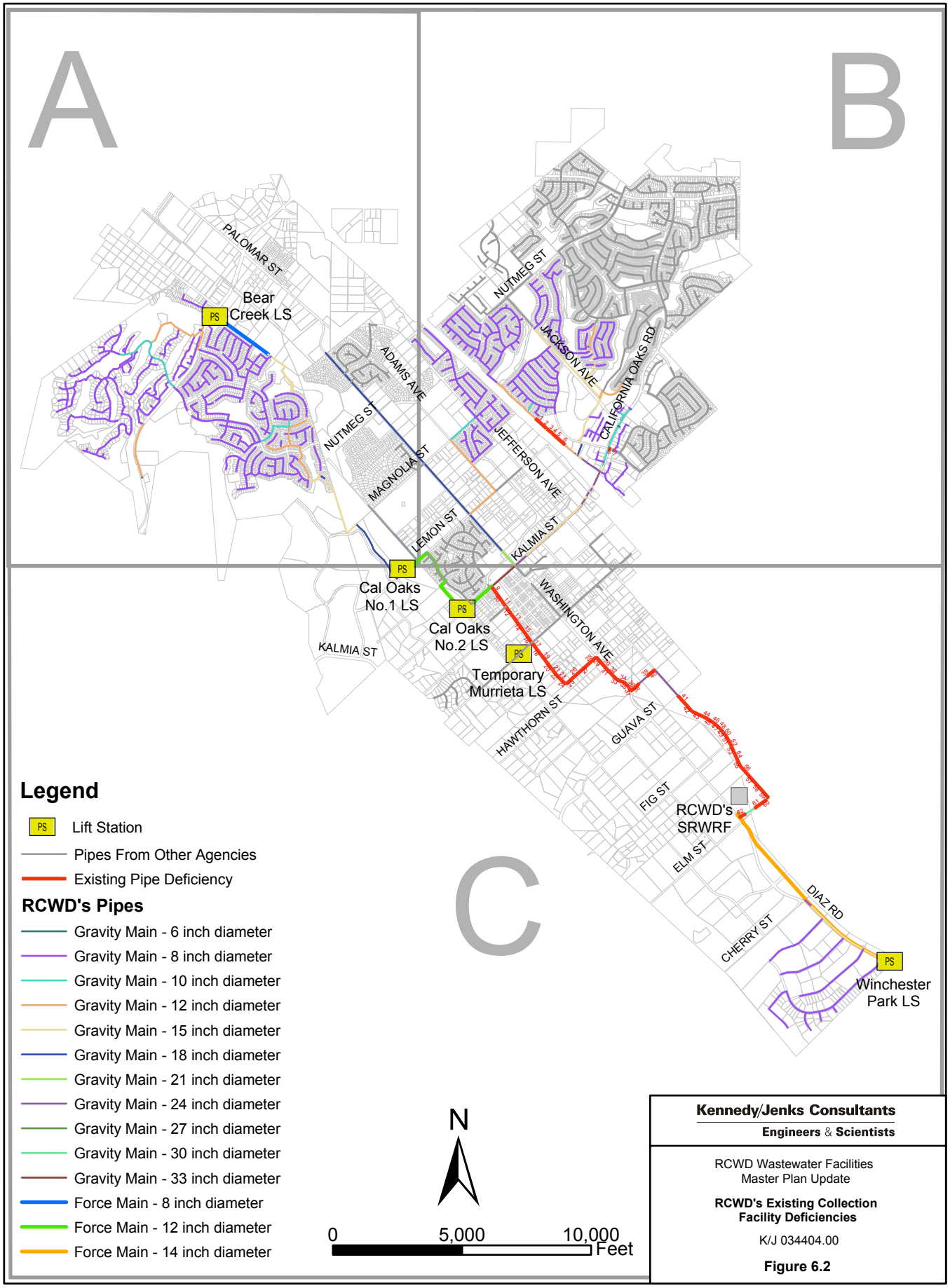
Gravity main improvements have been evaluated based on meeting the projected peak weather wastewater flows in accordance with the design criteria established in section 3, *Design Criteria*. As was discussed in section 7, *Sewer System Model Development*, the gravity mains were evaluated utilizing the H_20map Sewer hydraulic model developed as part of this Wastewater Facilities Master Plan in the Existing, 2009 and Ultimate time increments. Specifically, gravity mains that failed to meet the District's established design criteria in the Peak Wet Weather Scenario were identified.

Figures 6.2, 6.2a, 6.2b and 6.2c illustrate the location of the Existing gravity main deficiencies, and identify each deficiency with a corresponding Pipe ID. Table 6.5 presents the hydraulic information for these pipes as well as their recommended replacement diameters.

As shown in Figure 6.2c, pipes 9 through 62 are components of the District's main interceptor line, which conveys flows from the intersection of New Clay and Kalmia St to the SRWRF via a 21-inch to 24-inch VCP pipe. Although these pipes are shown as deficient in the Existing time increment, the flow in these pipes is actually less than the H_20map Sewer hydraulic model is predicting. This is attributed to the conservative wastewater flow projections that were discussed in Section 4, *Wastewater Flows and Projections*. This higher than observed peak wastewater flow is attributed to pre-paid EDU's which have not yet been activated in RCWD's sewer service area, and an actual wastewater unit factor which is less than 250 gpd/EDU.

The District reports that the existing peak flow conveyed by the District's main interceptor line to the SRWRF is 4.56 mgd. With less than 4 EDUs of wastewater flow entering the District's main interceptor line downstream of pipe 21, the flow in pipes 21 through 24 is approximately 4.56 mgd as well. Based on the District's design criteria, each of these pipes have design capacities between 4.47 and 4.55 mgd, confirming that these pipes are currently at their design capacity for peak wet weather flow.

Pipe deficiencies 9 through 62, which appear as Existing deficiencies, do not appear in either the 2009 or Ultimate deficiency tables or figures. With the planned construction of the Murrieta Valley Interceptor trunk line by 2006, these pipes are no longer deficient in the later time increments.



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RCWD's Existing Collection Facility Deficiencies

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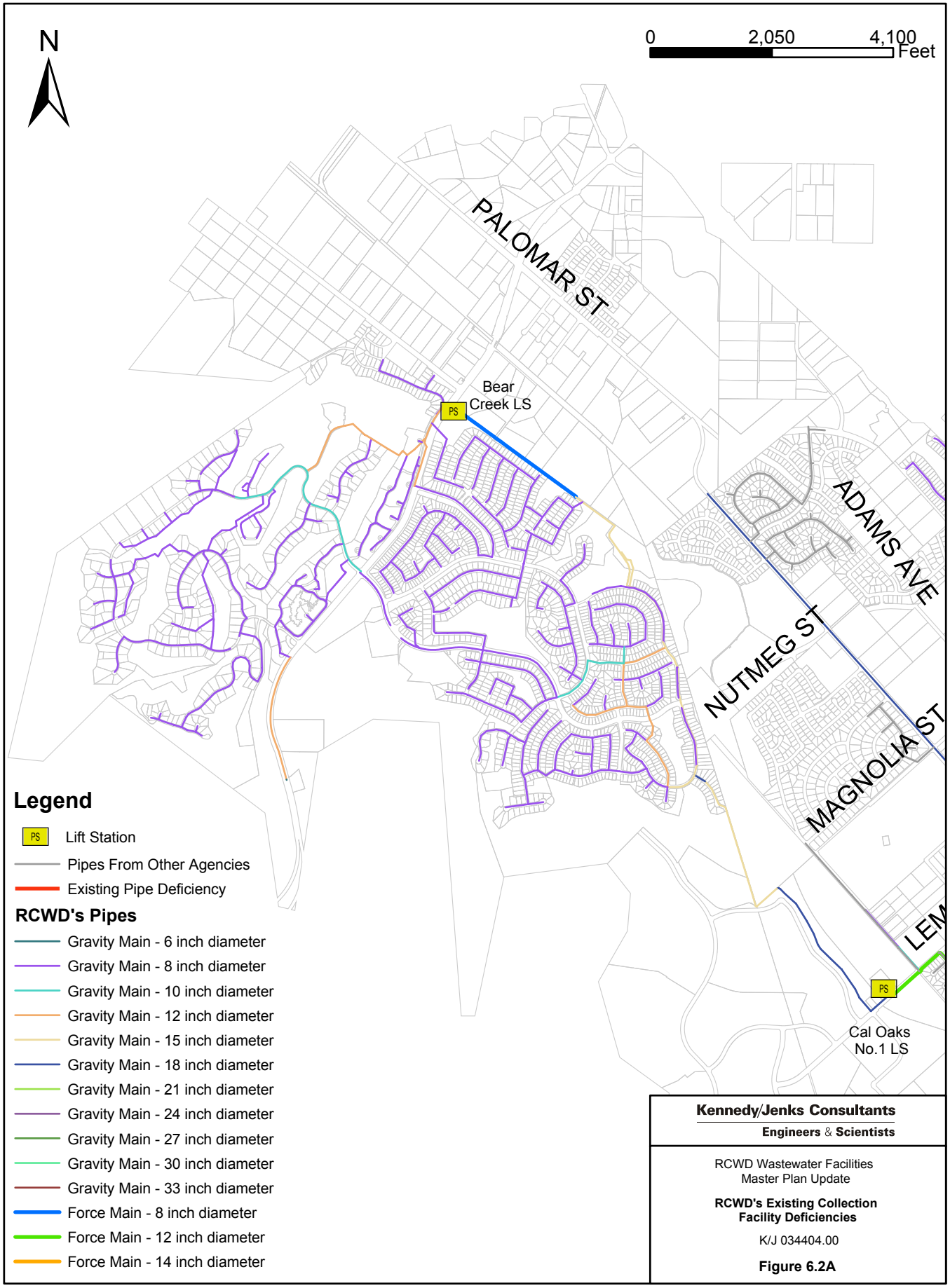
Figure 6.2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0
2,050
4,100
Feet
PALOMAR ST
Bear
Creek LS
PS
ADAMS AVE
NUTMEG ST
MAGNOLIA ST
LEM
PS
Cal Oaks
No.1 LS
Legend
PS Lift Station
Pipes From Other Agencies
Existing Pipe Deficiency
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
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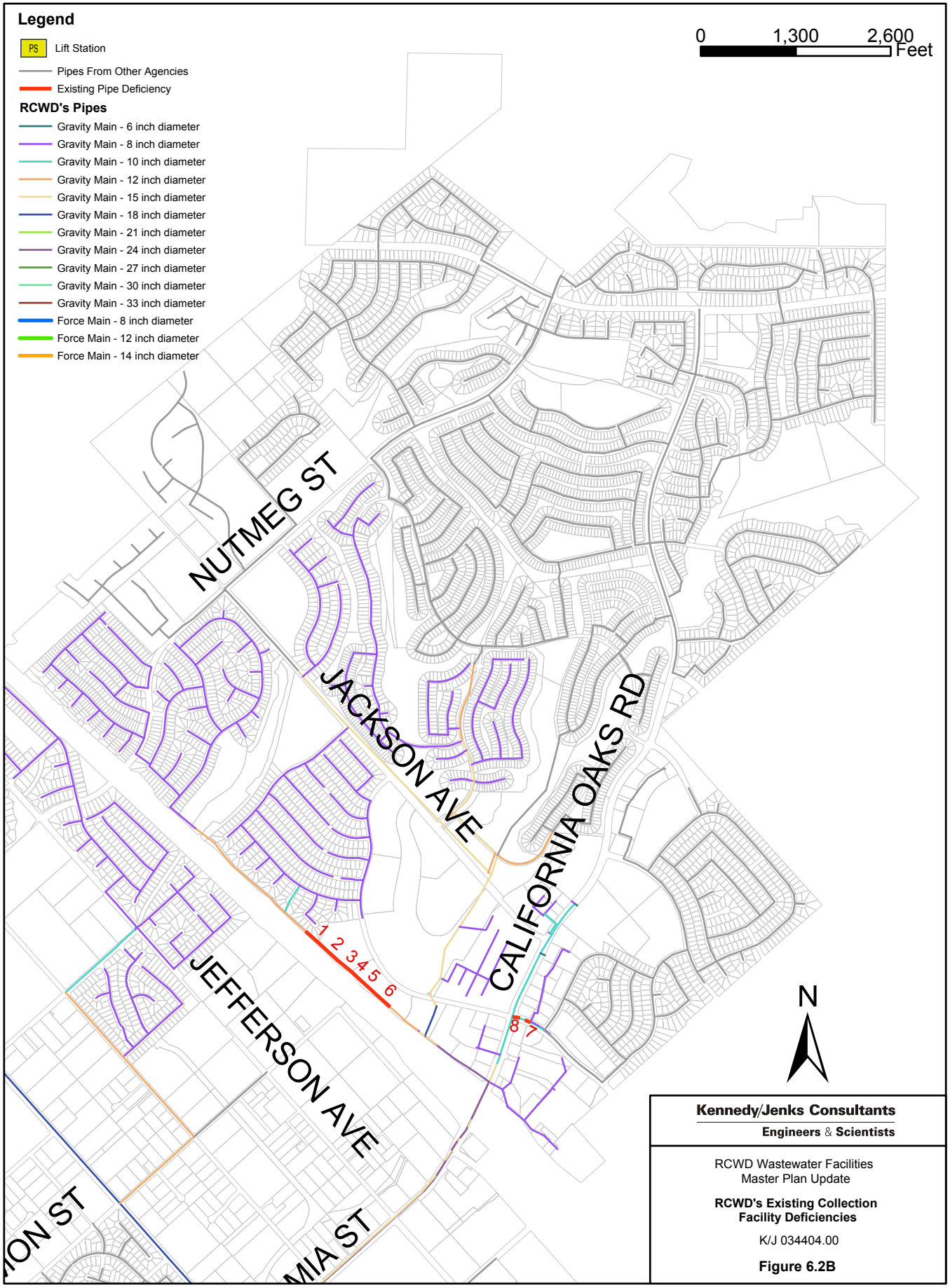
Master Plan Update
RCWD's Existing Collection
Facility Deficiencies
K/J 034404.00
Figure 6.2A

2B

2C


Legend
PS Lift Station
Pipes From Other Agencies
Existing Pipe Deficiency
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
0 1,300 2,600 Feet
NUTMEG ST
JACKSON AVE
CALIFORNIA OAKS RD
JEFFERSON AVE
1 2 3 4 5 6
8 7
N
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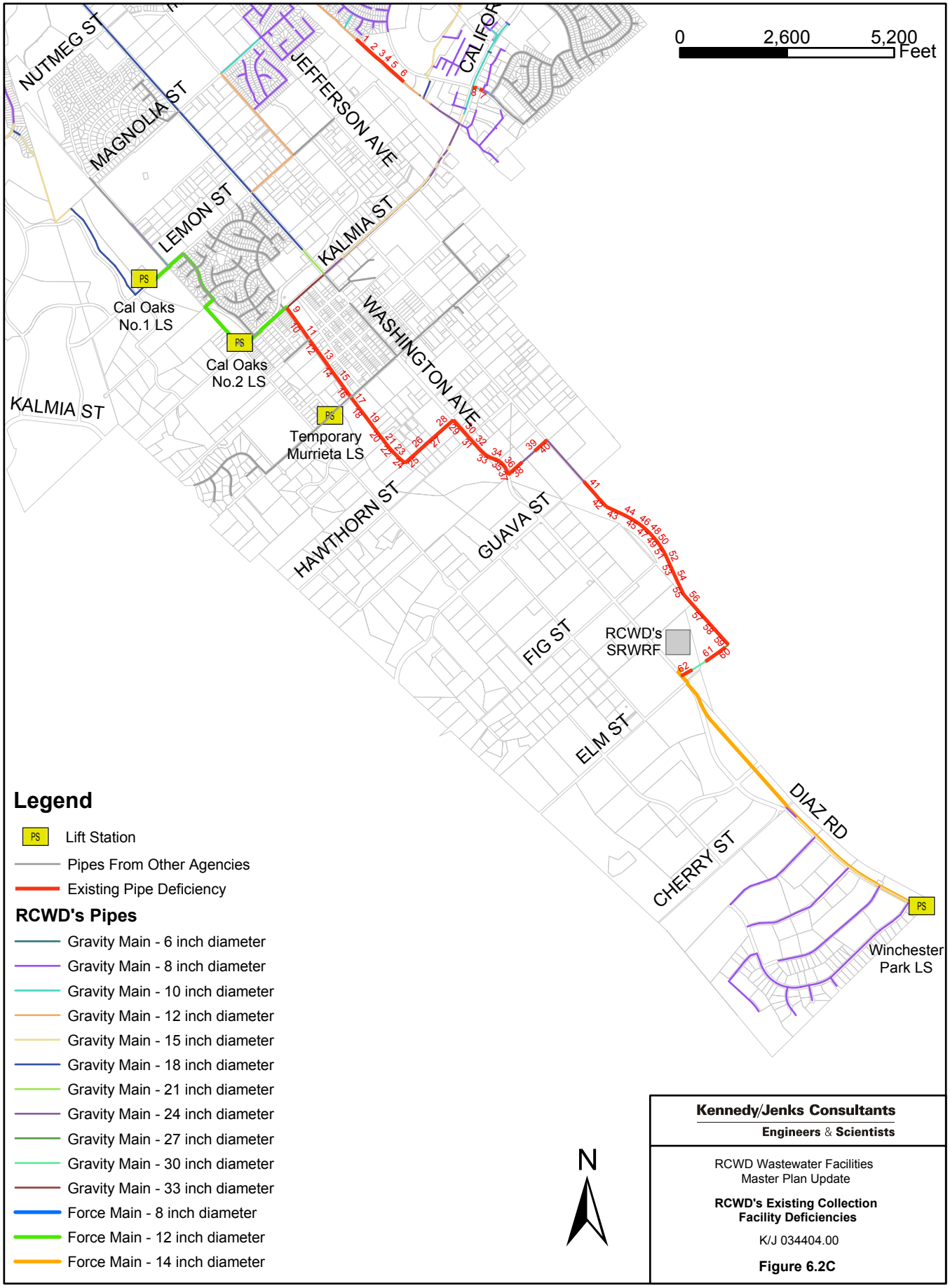
RCWD's Existing Collection
Facility Deficiencies
K/J 034404.00
Figure 6.2B

2A

2C

2A 2B



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RCWD's Existing Collection Facility Deficiencies

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Figure 6.2C

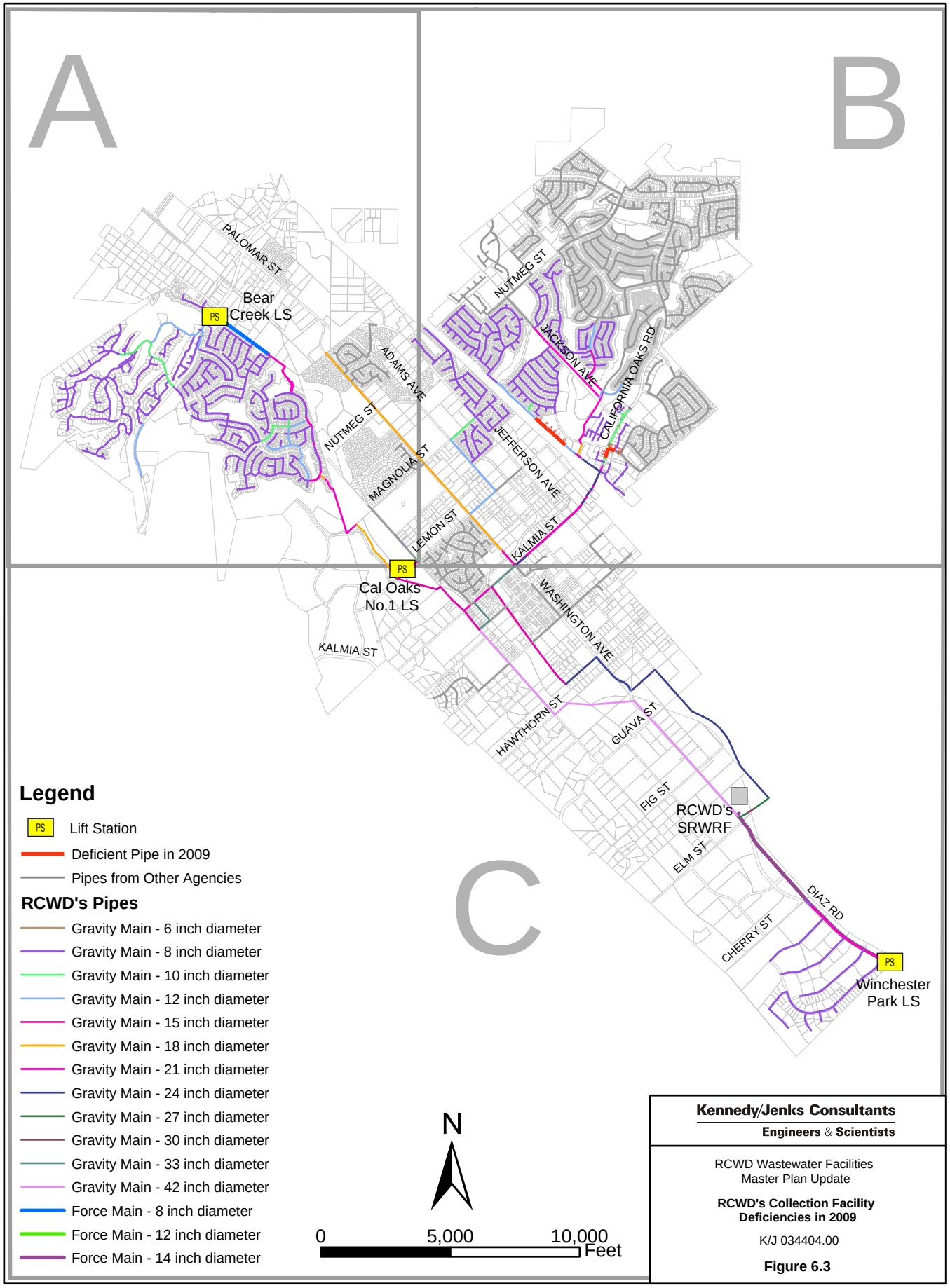
Table 6.5 – Existing Sewer Pipe Deficiencies

ID Number	RCWD Line No	Type	Existing Diameter (in)	Upstream Invert (ft)	Downstream Invert (ft)	Length (ft)	Slope	PWWF (mgd)	Projected d/D in 2004	Recommended Replacement Diameter (in)	Replacement d/D
1	S141088	Gravity Main	12	1,188.44	1,187.74	292	0.0024	0.73	0.58	15	0.41
2	S141086	Gravity Main	12	1,187.74	1,187.07	284	0.0024	0.73	0.59	15	0.41
3	S141084	Gravity Main	12	1,186.89	1,186.19	249	0.0028	0.73	0.56	15	0.40
4	S141071	Gravity Main	12	1,185.99	1,185.75	119	0.0020	0.74	0.62	15	0.43
5	S141080	Gravity Main	12	1,185.75	1,185.03	300	0.0024	0.74	0.59	15	0.41
6	S141078	Gravity Main	12	1,185.03	1,184.31	298	0.0024	0.74	0.59	15	0.41
7	T151032	Gravity Main	10	1,173.52	1,172.80	78	0.0093	0.70	0.51	12	0.38
8	T151030	Gravity Main	10	1,171.98	1,171.50	92	0.0052	0.70	0.60	15	0.33
9	R171014	Gravity Main	21	1,083.40	1,081.07	347	0.0067	8.76	1.00	24	0.63
10	R171024	Gravity Main	21	1,081.07	1,078.91	300	0.0072	8.76	1.00	24	0.62
11	R171006	Gravity Main	21	1,078.91	1,077.80	292	0.0038	8.76	1.00	27	0.62
12	R181002	Gravity Main	21	1,077.80	1,076.43	362	0.0038	8.76	1.00	27	0.62
13	R181001	Gravity Main	21	1,076.43	1,074.91	400	0.0038	8.77	1.00	27	0.62
14	S181010	Gravity Main	21	1,074.91	1,073.82	286	0.0038	8.77	1.00	27	0.62
15	S181011	Gravity Main	21	1,073.82	1,072.78	274	0.0038	8.77	1.00	27	0.62
16	S181012	Gravity Main	21	1,072.78	1,071.26	400	0.0038	8.77	1.00	27	0.62
17	S181016	Gravity Main	21	1,071.26	1,069.59	266	0.0063	9.28	1.00	24	0.68
18	S181015	Gravity Main	21	1,069.59	1,067.94	261	0.0063	9.29	1.00	24	0.67
19	S181018	Gravity Main	21	1,067.94	1,065.43	401	0.0063	9.29	1.00	24	0.68
20	S191016	Gravity Main	21	1,065.43	1,062.88	400	0.0064	9.29	1.00	24	0.67
21	S191020	Gravity Main	21	1,062.88	1,062.58	131	0.0023	9.29	1.00	30	0.63
22	S191019	Gravity Main	21	1,062.58	1,062.12	200	0.0023	9.29	1.00	30	0.63
23	S191021	Gravity Main	21	1,062.12	1,061.66	200	0.0023	9.29	1.00	30	0.63
24	S191022	Gravity Main	21	1,061.66	1,061.15	216	0.0024	9.30	1.00	30	0.63
25	S191026	Gravity Main	24	1,061.05	1,060.15	393	0.0023	9.30	1.00	30	0.63
26	S191027	Gravity Main	24	1,060.15	1,059.23	400	0.0023	9.30	1.00	30	0.63
27	S191029	Gravity Main	24	1,059.23	1,058.31	400	0.0023	9.30	1.00	30	0.63
28	S191030	Gravity Main	24	1,058.31	1,057.35	416	0.0023	9.31	1.00	30	0.63
29	T191019	Gravity Main	24	1,057.25	1,056.63	271	0.0023	9.31	1.00	30	0.64
30	T191018	Gravity Main	24	1,056.63	1,055.94	298	0.0023	9.31	1.00	30	0.63
31	T191014	Gravity Main	24	1,055.94	1,054.93	437	0.0023	9.32	1.00	30	0.63
32	T191013	Gravity Main	24	1,054.83	1,054.50	145	0.0023	9.32	1.00	30	0.64
33	T191012	Gravity Main	24	1,054.40	1,054.07	145	0.0023	9.32	1.00	30	0.64
34	T191011	Gravity Main	24	1,053.97	1,053.63	150	0.0023	9.32	1.00	30	0.64
35	T191010	Gravity Main	24	1,053.53	1,053.19	146	0.0023	9.32	1.00	30	0.63
36	T191009	Gravity Main	24	1,053.09	1,052.75	146	0.0023	9.32	1.00	30	0.63
37	T191007	Gravity Main	24	1,052.65	1,052.31	146	0.0023	9.32	1.00	30	0.63
38	T191008	Gravity Main	24	1,052.21	1,051.15	460	0.0023	9.33	1.00	30	0.63
39	T191005	Gravity Main	24	1,046.88	1,046.60	91	0.0031	9.33	1.00	27	0.70
40	T191005	Gravity Main	24	1,046.40	1,045.29	309	0.0036	9.33	1.00	27	0.66
41	U191010	Gravity Main	24	1,038.09	1,037.07	445	0.0023	9.35	1.00	30	0.64
42	U201017	Gravity Main	24	1,036.97	1,036.14	406	0.0020	9.35	1.00	30	0.66
43	U201016	Gravity Main	24	1,036.04	1,034.99	455	0.0023	9.35	1.00	30	0.64
44	U201015	Gravity Main	24	1,034.79	1,034.44	196	0.0018	9.35	1.00	30	0.70
45	U201014	Gravity Main	24	1,034.44	1,033.89	196	0.0028	9.36	1.00	27	0.73
46	U201013	Gravity Main	24	1,033.79	1,033.34	196	0.0023	9.36	1.00	30	0.64

Table 6.5 – Existing Sewer Pipe Deficiencies

ID Number	RCWD Line No	Type	Existing Diameter (in)	Upstream Invert (ft)	Downstream Invert (ft)	Length (ft)	Slope	PWWF (mgd)	Projected d/D in 2004	Recommended Replacement Diameter (in)	Replacement d/D
47	U201012	Gravity Main	24	1,033.24	1,032.79	196	0.0023	9.36	1.00	30	0.64
48	U201011	Gravity Main	24	1,032.69	1,032.33	160	0.0023	9.36	1.00	30	0.64
49	U201018	Gravity Main	24	1,032.33	1,032.24	36	0.0025	9.36	1.00	30	0.62
50	U201010	Gravity Main	24	1,032.14	1,031.69	196	0.0023	9.36	1.00	30	0.64
51	U201009	Gravity Main	24	1,031.59	1,031.14	196	0.0023	9.36	1.00	30	0.64
52	U201008	Gravity Main	24	1,031.04	1,030.39	282	0.0023	9.37	1.00	30	0.64
53	U201007	Gravity Main	24	1,030.39	1,029.93	200	0.0023	9.37	1.00	30	0.64
54	U201006	Gravity Main	24	1,029.93	1,029.01	398	0.0023	9.37	1.00	30	0.64
55	U211003	Gravity Main	24	1,028.91	1,028.46	196	0.0023	9.37	1.00	30	0.64
56	U211002	Gravity Main	24	1,028.36	1,027.44	404	0.0023	9.37	1.00	30	0.64
57	V211049	Gravity Main	24	1,027.44	1,026.52	400	0.0023	9.38	1.00	30	0.64
58	V211046	Gravity Main	24	1,026.52	1,025.60	400	0.0023	9.38	1.00	30	0.64
59	V211047	Gravity Main	24	1,025.60	1,024.68	398	0.0023	9.38	1.00	30	0.64
60		Gravity Main	27	1,019.99	1,019.22	350	0.0022	9.39	0.82	30	0.65
61		Gravity Main	27	1,019.22	1,018.48	341	0.0022	9.39	1.00	30	0.65
62		Gravity Main	27	1,017.69	1,017.44	117	0.0021	9.39	1.00	30	0.65

Figures 6.3, 6.3a, 6.3b and 6.3c illustrate the location of the 2009 gravity main deficiencies, and identify each deficiency with a corresponding Pipe ID. Similarly, figures 6.4, 6.4a, 6.4b and 6.4c correspond to the Ultimate gravity main deficiencies. Tables 6.6 and 6.7 present the hydraulic information for the 2009 and Ultimate deficient pipes respectively, as well as their recommended replacement diameters. Figures 6.5 through 6.8 present a more detailed illustration of all ultimate gravity main pipe deficiencies, with their corresponding pipe ID.



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RCWD's Collection Facility Deficiencies in 2009

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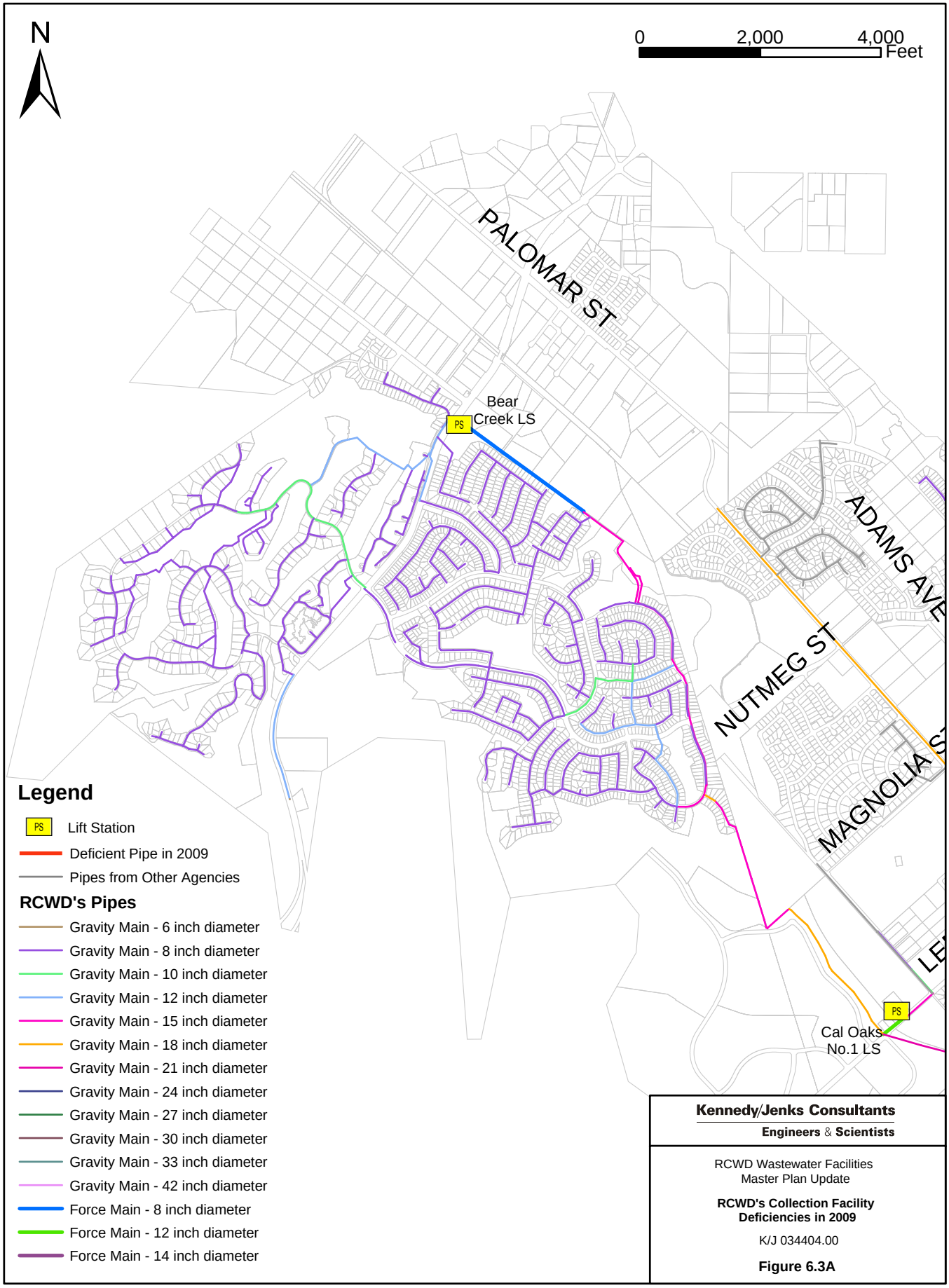
Figure 6.3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2,000
4,000
Feet
PALOMAR ST
Bear
Creek LS
PS
ADAMS AVE
NUTMEG ST
MAGNOLIA ST
Cal Oaks
No.1 LS
PS
Legend
Lift Station
Deficient Pipe in 2009
Pipes from Other Agencies
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Gravity Main - 42 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
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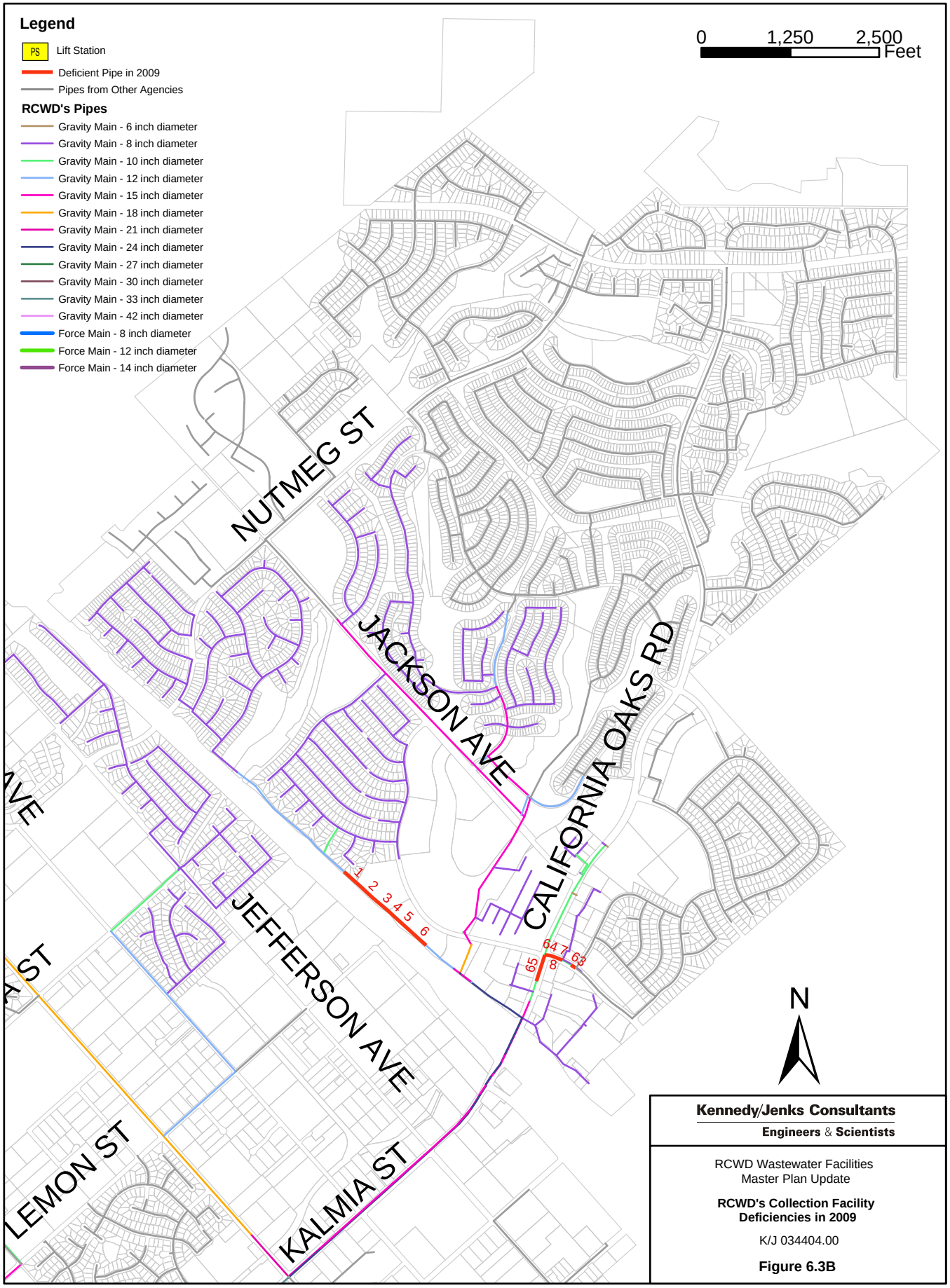
RCWD's Collection Facility
Deficiencies in 2009
K/J 034404.00
Figure 6.3A

3B

3C


Legend
PS Lift Station
Deficient Pipe in 2009
Pipes from Other Agencies
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Gravity Main - 42 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
0 1,250 2,500 Feet
NUTMEG ST
JACKSON AVE
CALIFORNIA OAKS RD
JEFFERSON AVE
KALMIA ST
LEMON ST
AVE
ST
1 2 3 4 5 6
64 7 63
65 8
N
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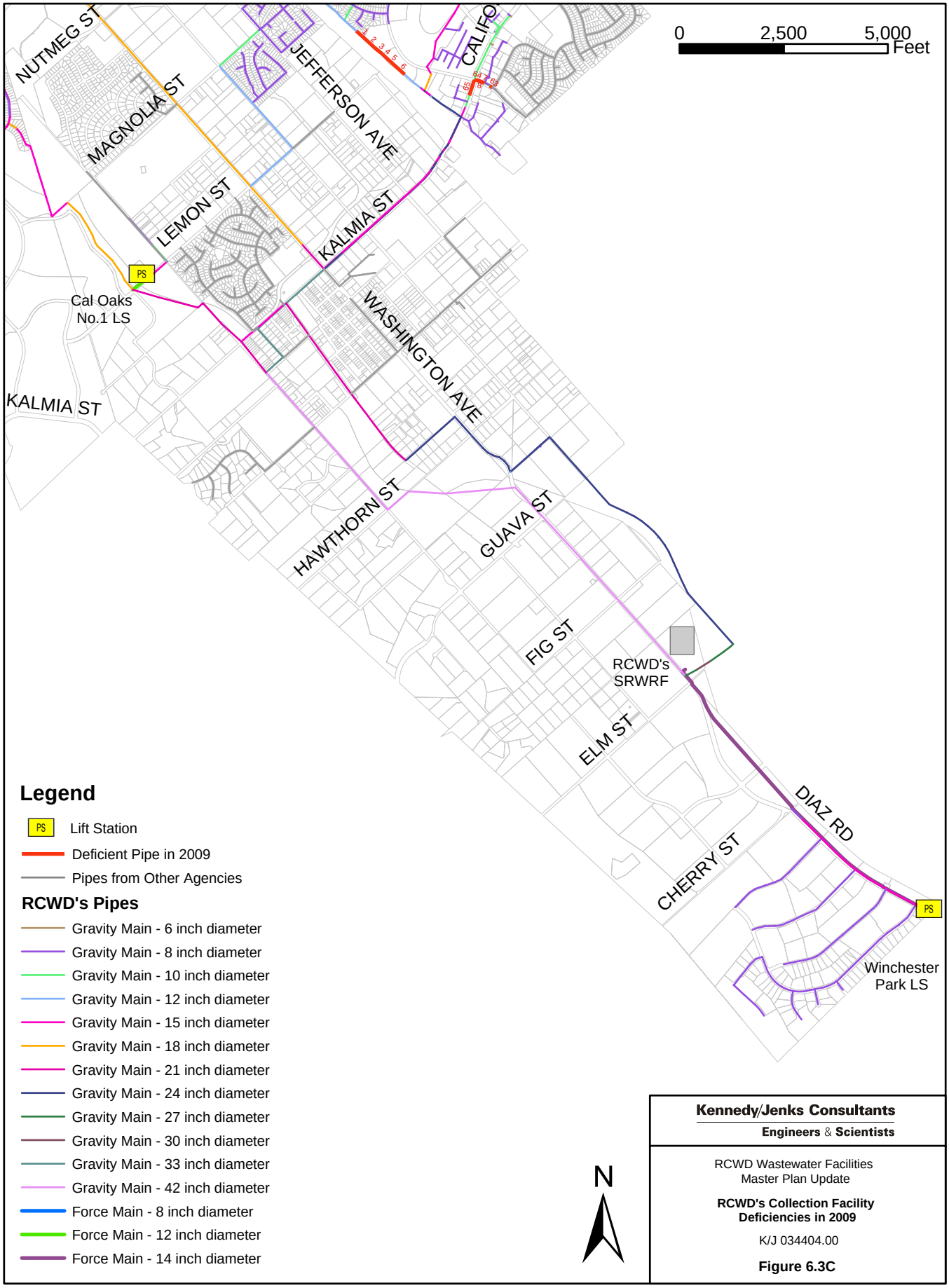
RCWD Wastewater Facilities
Master Plan Update
RCWD's Collection Facility
Deficiencies in 2009
K/J 034404.00
Figure 6.3B

3A

3C

3A 3B



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RCWD's Collection Facility Deficiencies in 2009

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Figure 6.3C

Table 6.6 - Sewer Pipe Deficiencies in 2009

ID Number	RCWD Line No	Type	Existing Diameter (in)	Upstream Invert (ft)	Downstream Invert (ft)	Length (ft)	Slope	PWWF (mgd)	Projected d/D in 2009	Recommended Replacement Diameter (in)	Replacement d/D
1	S141088	Gravity Main	12	1,188.44	1,187.74	292	0.0024	0.80	0.62	15	0.43
2	S141086	Gravity Main	12	1,187.74	1,187.07	284	0.0024	0.81	0.63	15	0.44
3	S141084	Gravity Main	12	1,186.89	1,186.19	249	0.0028	0.81	0.59	15	0.42
4	S141071	Gravity Main	12	1,185.99	1,185.75	119	0.0020	0.82	0.67	15	0.46
5	S141080	Gravity Main	12	1,185.75	1,185.03	300	0.0024	0.82	0.63	15	0.44
6	S141078	Gravity Main	12	1,185.03	1,184.31	298	0.0024	0.83	0.63	15	0.44
7	T151032	Gravity Main	10	1,173.52	1,172.80	78	0.0093	0.72	0.52	12	0.39
8	T151030	Gravity Main	10	1,171.98	1,171.50	92	0.0052	0.73	0.62	15	0.33
63	T151051	Gravity Main	10	1,175.81	1,175.00	92	0.0088	0.68	0.51	12	0.38
64	T151031	Gravity Main	10	1,172.70	1,172.00	74	0.0095	0.72	0.51	12	0.39
65	T151034	Gravity Main	10	1,171.45	1,166.77	388	0.0121	0.84	0.52	12	0.40

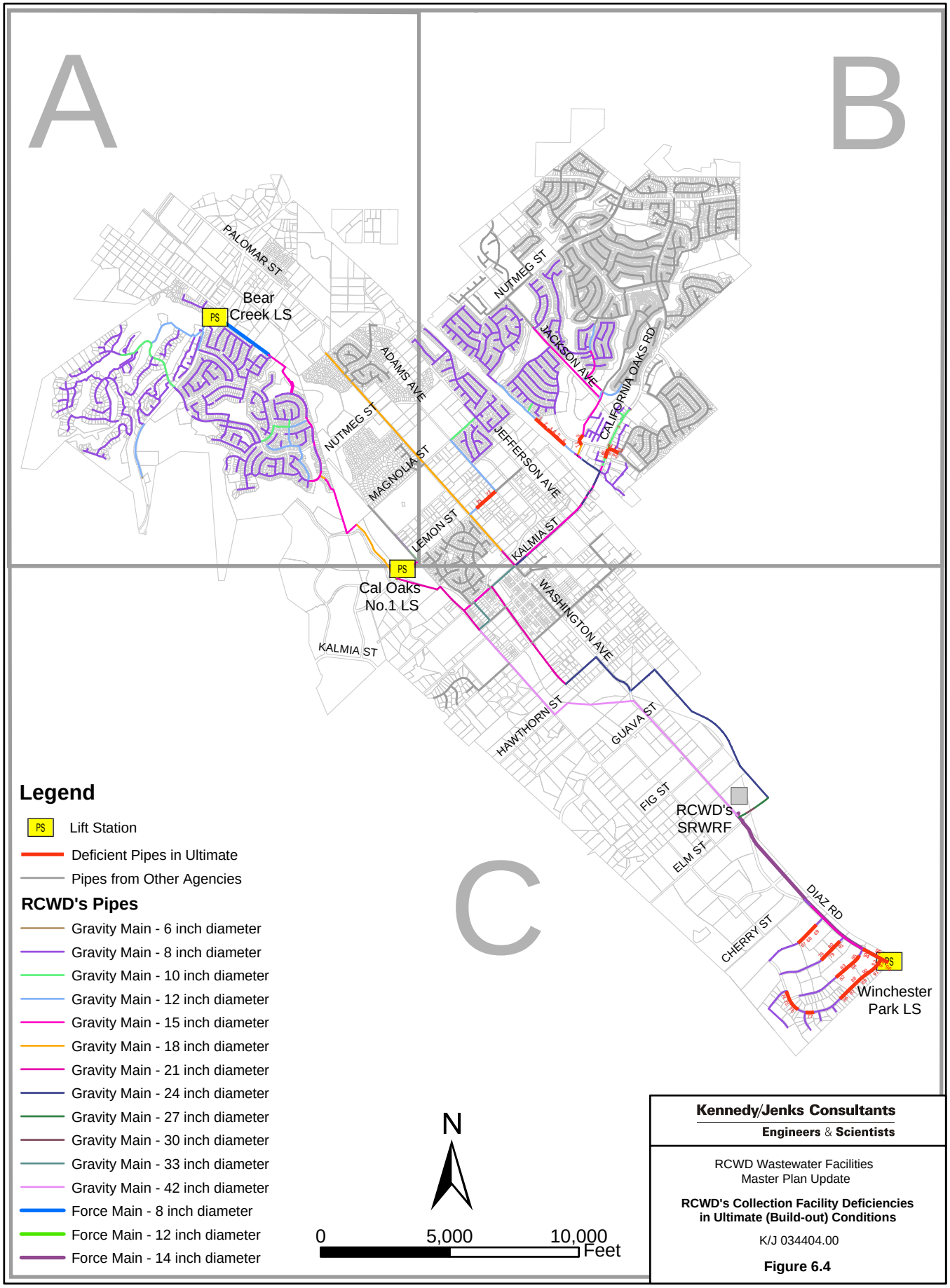

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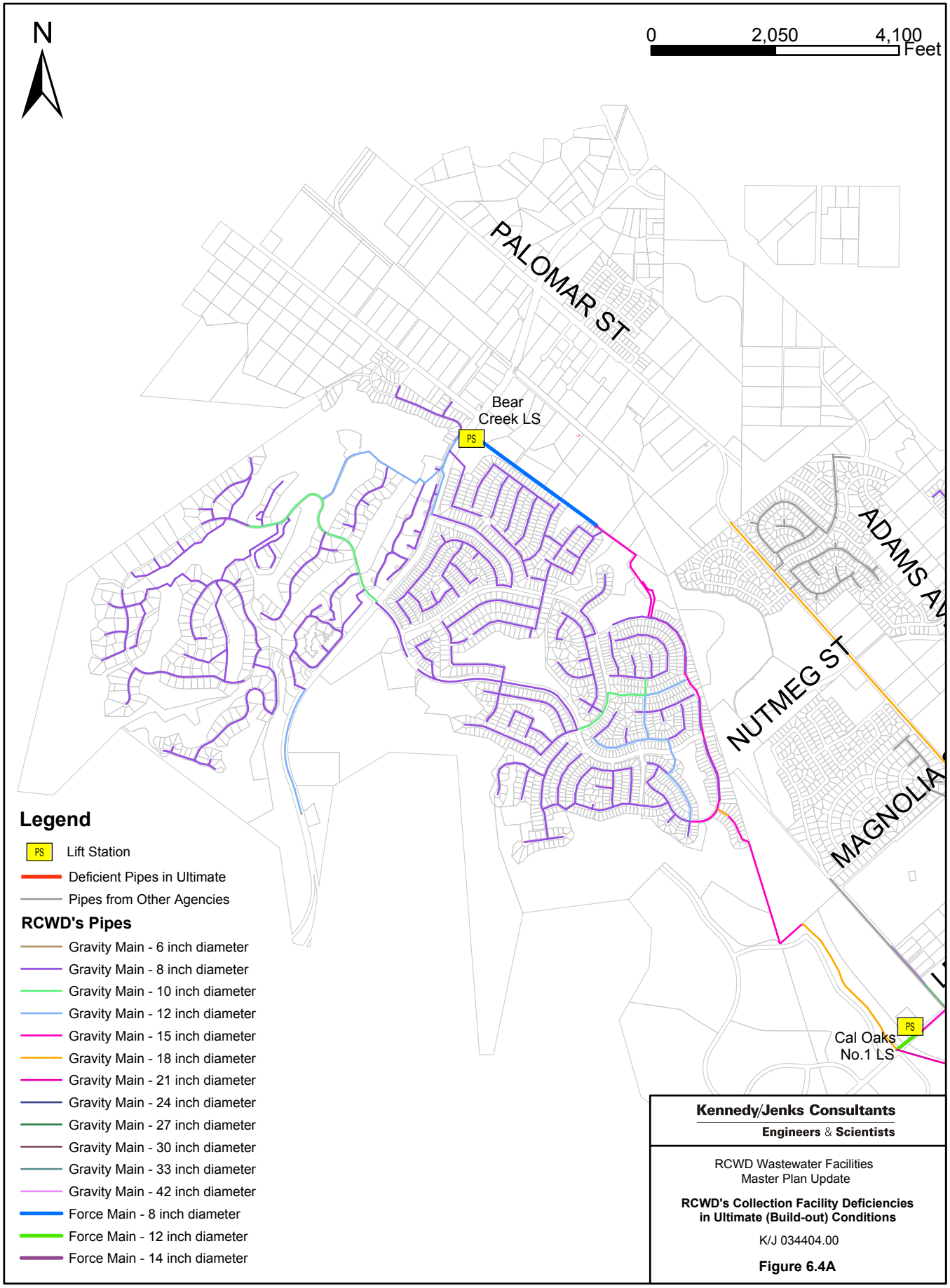
Figure 6.4


N
0
2,050
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Feet
PALOMAR ST
Bear
Creek LS
PS
ADAMS AV
NUTMEG ST
MAGNOLIA
Cal Oaks
No.1 LS
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Legend
PS Lift Station
Deficient Pipes in Ultimate
Pipes from Other Agencies
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Gravity Main - 42 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
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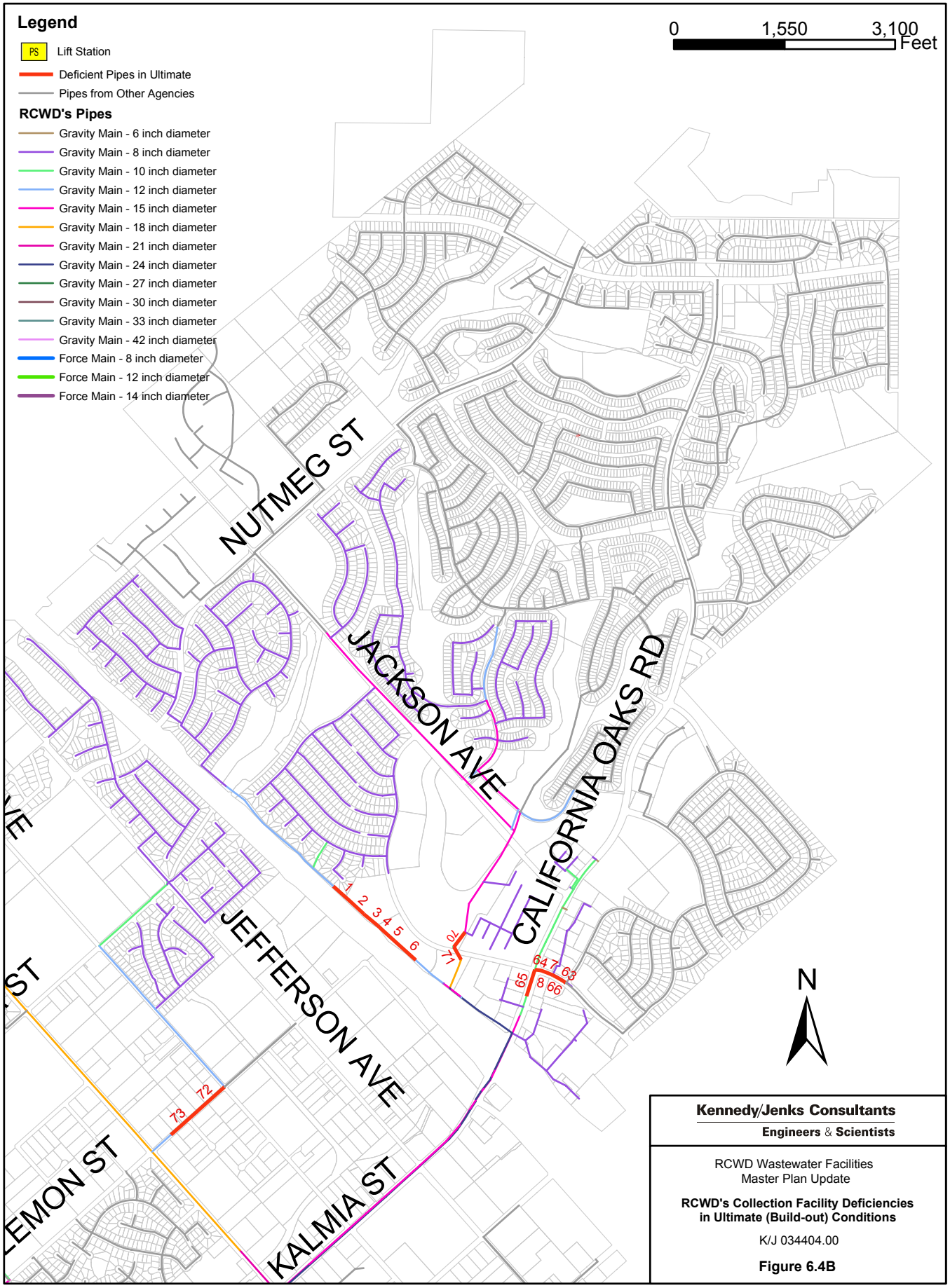
Figure 6.4A

4B

4C

4A


Legend
PS Lift Station
Deficient Pipes in Ultimate
Pipes from Other Agencies
RCWD's Pipes
Gravity Main - 6 inch diameter
Gravity Main - 8 inch diameter
Gravity Main - 10 inch diameter
Gravity Main - 12 inch diameter
Gravity Main - 15 inch diameter
Gravity Main - 18 inch diameter
Gravity Main - 21 inch diameter
Gravity Main - 24 inch diameter
Gravity Main - 27 inch diameter
Gravity Main - 30 inch diameter
Gravity Main - 33 inch diameter
Gravity Main - 42 inch diameter
Force Main - 8 inch diameter
Force Main - 12 inch diameter
Force Main - 14 inch diameter
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JACKSON AVE
CALIFORNIA OAKS RD
JEFFERSON AVE
KALMIA ST
LEMON ST
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73
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Figure 6.4B

4C

4A 4B

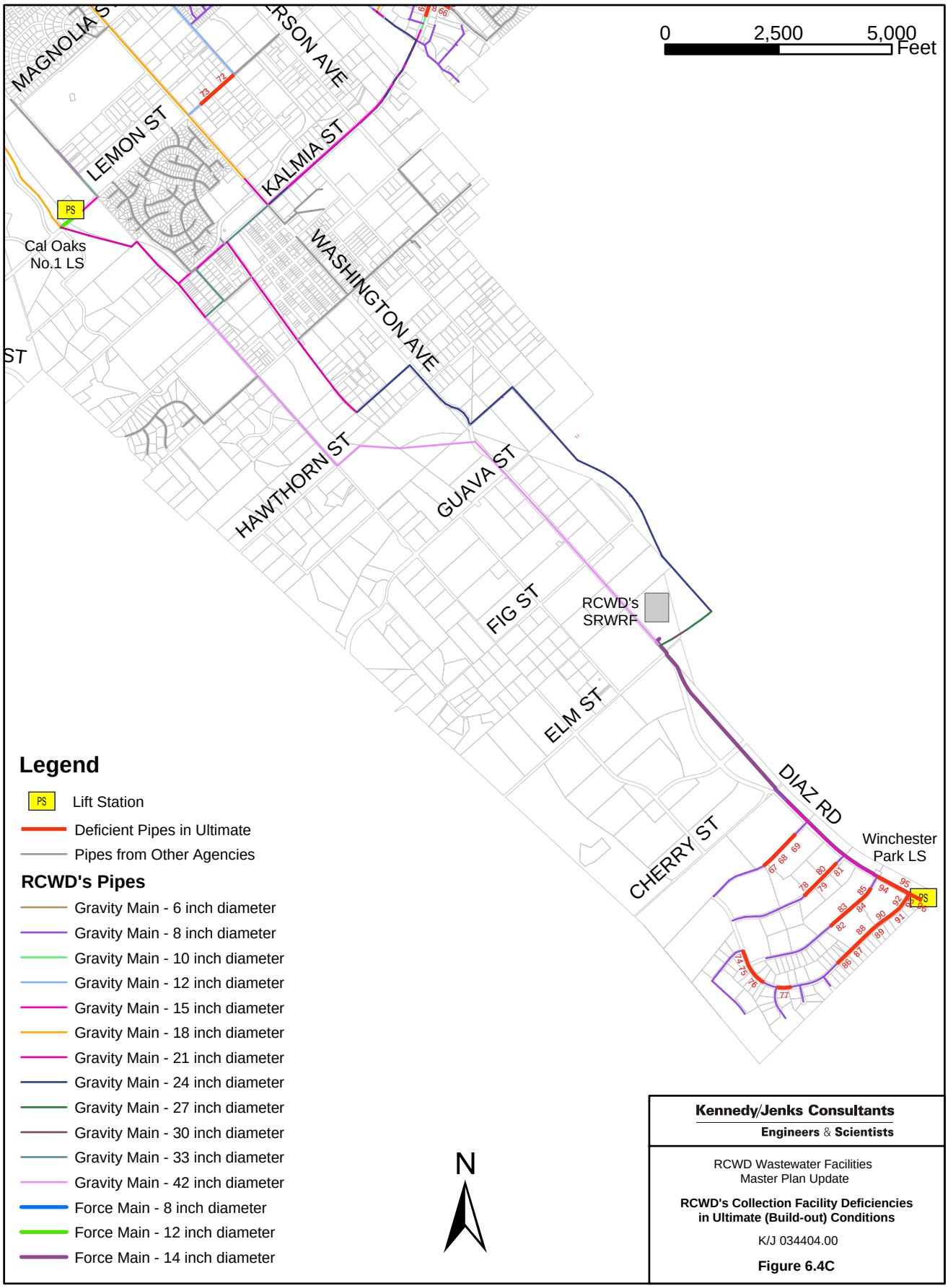

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Figure 6.4C

Table 6.7 - Sewer Pipe Deficiencies in Ultimate

ID Number	RCWD Line No	Type	Existing Diameter	Upstream Invert (ft)	Downstream Invert (ft)	Length (ft)	Slope	PWWF (mgd)	Projected d/D in Ultimate	Recommended Replacement Diameter	Replacement d/D
1	S141088	Gravity Main	12	1,188.44	1,187.74	292	0.0024	0.85	0.65	15	0.45
2	S141086	Gravity Main	12	1,187.74	1,187.07	284	0.0024	0.91	0.68	15	0.47
3	S141084	Gravity Main	12	1,186.89	1,186.19	249	0.0028	0.91	0.64	15	0.45
4	S141071	Gravity Main	12	1,185.99	1,185.75	119	0.0020	0.96	0.76	15	0.51
5	S141080	Gravity Main	12	1,185.75	1,185.03	300	0.0024	0.96	0.71	15	0.48
6	S141078	Gravity Main	12	1,185.03	1,184.31	298	0.0024	0.96	0.70	15	0.48
7	T151032	Gravity Main	10	1,173.52	1,172.80	78	0.0093	0.81	0.55	12	0.42
8	T151030	Gravity Main	10	1,171.98	1,171.50	92	0.0052	0.85	0.69	15	0.36
63	T151051	Gravity Main	10	1,175.81	1,175.00	92	0.0088	0.75	0.54	12	0.40
64	T151031	Gravity Main	10	1,172.70	1,172.00	74	0.0095	0.85	0.57	12	0.43
65	T151034	Gravity Main	10	1,171.45	1,166.77	388	0.0121	0.96	0.57	12	0.43
66	T151033	Gravity Main	10	1,175.00	1,173.56	148	0.0097	0.75	0.69	12	0.39
67	V241012	Gravity Main	8	1,025.50	1,023.90	229	0.0070	0.45	0.61	10	0.43
68	V241011	Gravity Main	8	1,023.90	1,020.15	370	0.0101	0.53	0.60	10	0.42
69	V241010	Gravity Main	8	1,020.15	1,018.15	400	0.0050	0.53	0.79	12	0.39
70	S141079	Gravity Main	15	1,157.38	1,155.47	255	0.0075	3.39	0.77	18	0.54
71	S141037	Gravity Main	15	1,155.37	1,153.84	209	0.0073	3.39	0.78	18	0.55
72	R151001	Gravity Main	12	1,120.19	1,119.00	496	0.0024	1.13	1.00	15	0.53
73	R161010	Gravity Main	12	1,118.90	1,115.03	496	0.0078	1.14	0.53	15	0.38
74	V251043	Gravity Main	8	1,081.30	1,079.86	289	0.0050	0.31	0.53	10	0.38
75	V251045	Gravity Main	8	1,079.86	1,078.59	255	0.0050	0.31	0.53	10	0.38
76	V251047	Gravity Main	8	1,078.59	1,076.99	320	0.0050	0.34	0.56	10	0.40
77	V251052	Gravity Main	8	1,072.70	1,068.34	342	0.0127	0.46	0.51	10	0.37
78	V241001	Gravity Main	8	1,022.36	1,020.92	293	0.0049	0.34	0.57	10	0.40
79	W241021	Gravity Main	8	1,020.92	1,019.64	257	0.0050	0.36	0.59	10	0.41
80	W241022	Gravity Main	8	1,019.64	1,018.39	250	0.0050	0.39	0.62	10	0.43
81	W241023	Gravity Main	8	1,018.39	1,017.18	241	0.0050	0.39	0.62	10	0.43
82	W251030	Gravity Main	8	1,017.06	1,015.80	314	0.0040	0.28	0.54	10	0.38
83	W251032	Gravity Main	8	1,015.80	1,014.54	314	0.0040	0.28	0.54	10	0.38
84	W251034	Gravity Main	8	1,014.54	1,013.29	314	0.0040	0.28	0.54	10	0.38
85	W241028	Gravity Main	8	1,013.29	1,012.12	292	0.0040	0.35	0.62	10	0.43
86	W251024	Gravity Main	8	1,021.81	1,015.94	290	0.0202	0.60	0.52	10	0.37
87	W251025	Gravity Main	8	1,015.94	1,014.40	385	0.0040	0.62	1.00	12	0.45
88	W251027	Gravity Main	8	1,014.40	1,012.86	386	0.0040	0.64	1.00	12	0.46
89	W251029	Gravity Main	8	1,012.86	1,012.11	187	0.0040	0.65	1.00	12	0.47
90	W251031	Gravity Main	8	1,012.11	1,010.75	340	0.0040	0.65	1.00	12	0.47
91	W251033	Gravity Main	8	1,010.75	1,009.67	270	0.0040	0.67	1.00	12	0.47
92	W251035	Gravity Main	8	1,009.67	1,008.60	262	0.0041	0.68	1.00	12	0.48
93	W241019	Gravity Main	8	1,008.60	1,006.33	105	0.0216	0.68	0.55	10	0.39
94	W241017	Gravity Main	15	1,007.03	1,006.41	400	0.0016	1.64	0.82	18	0.57
95	W241018	Gravity Main	15	1,006.39	1,005.75	400	0.0016	1.65	0.98	18	0.56
96	W241020	Gravity Main	15	1,005.75	1,005.20	333	0.0016	2.24	1.00	18	0.68

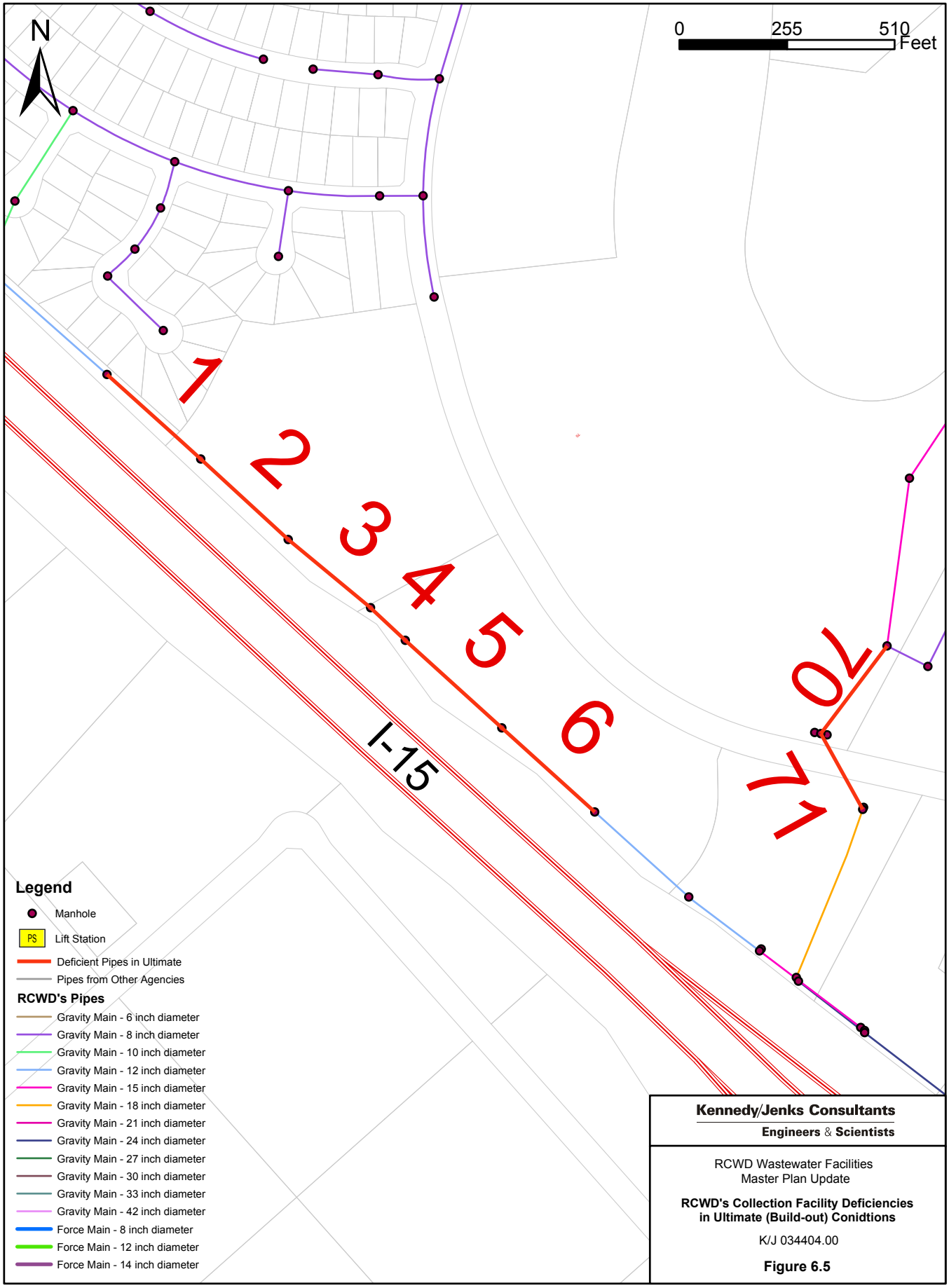

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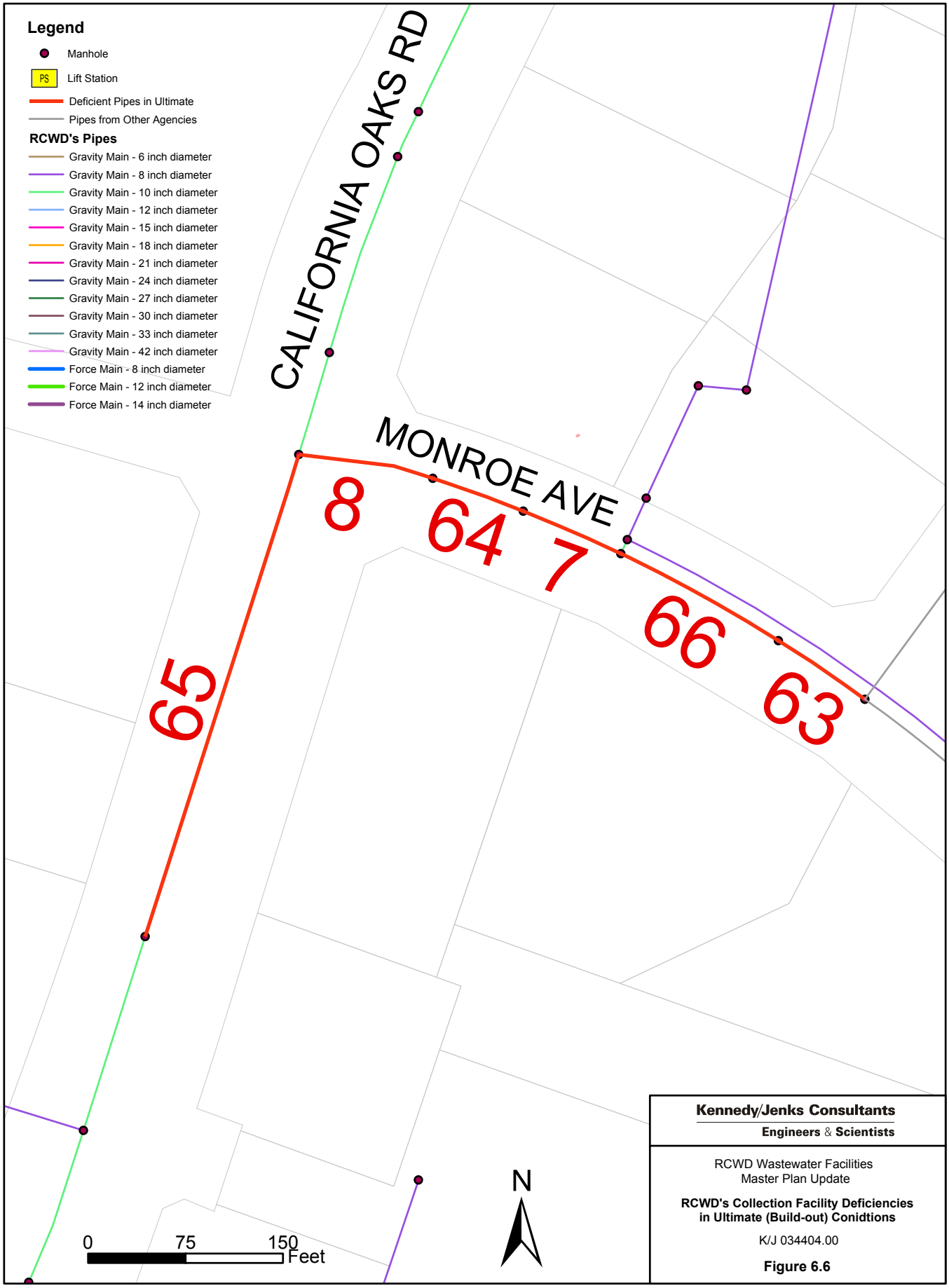
Figure 6.5



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RCWD's Collection Facility Deficiencies in Ultimate (Build-out) Conidtions

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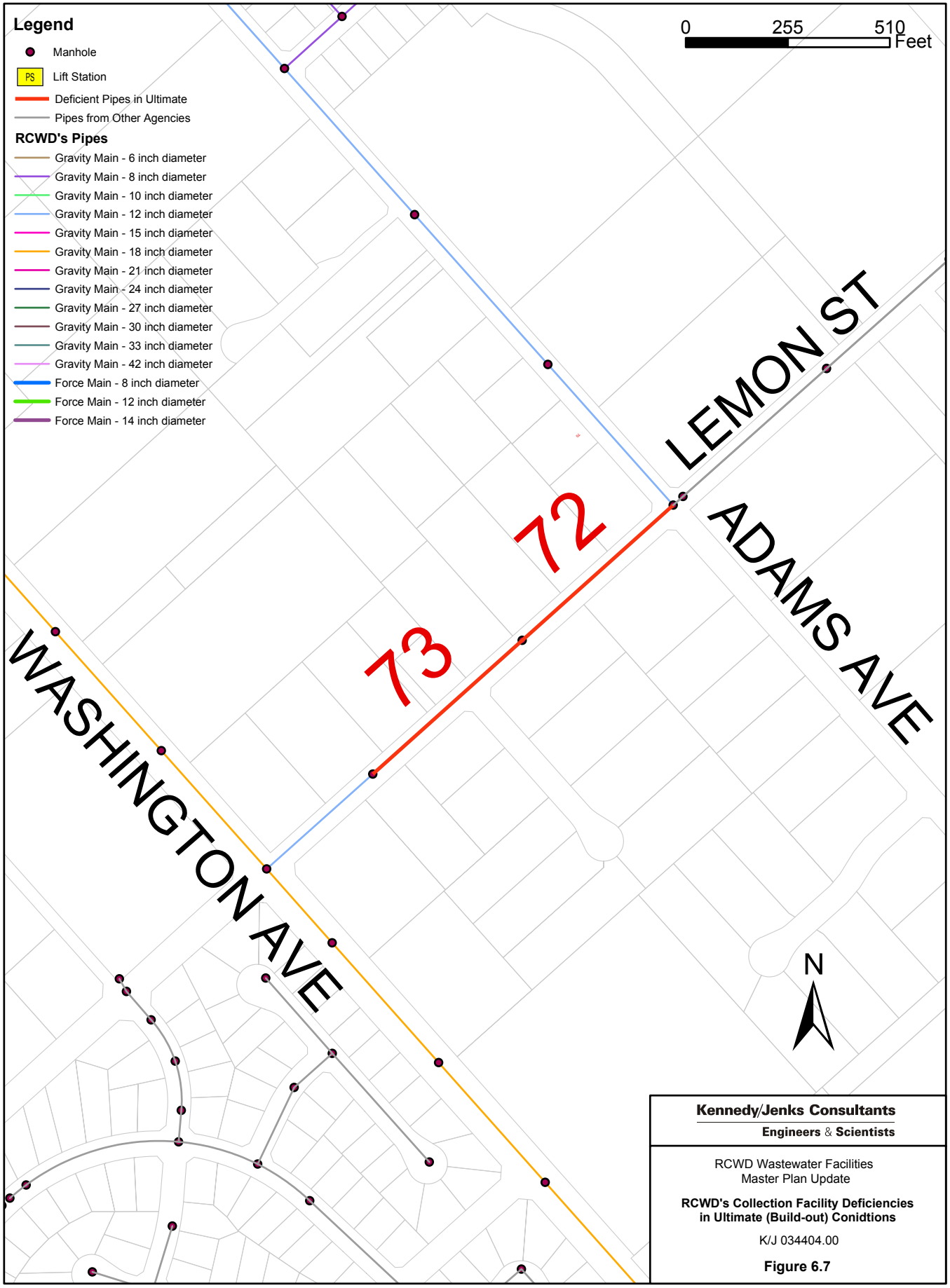
Figure 6.6



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RCWD's Collection Facility Deficiencies in Ultimate (Build-out) Conidtions

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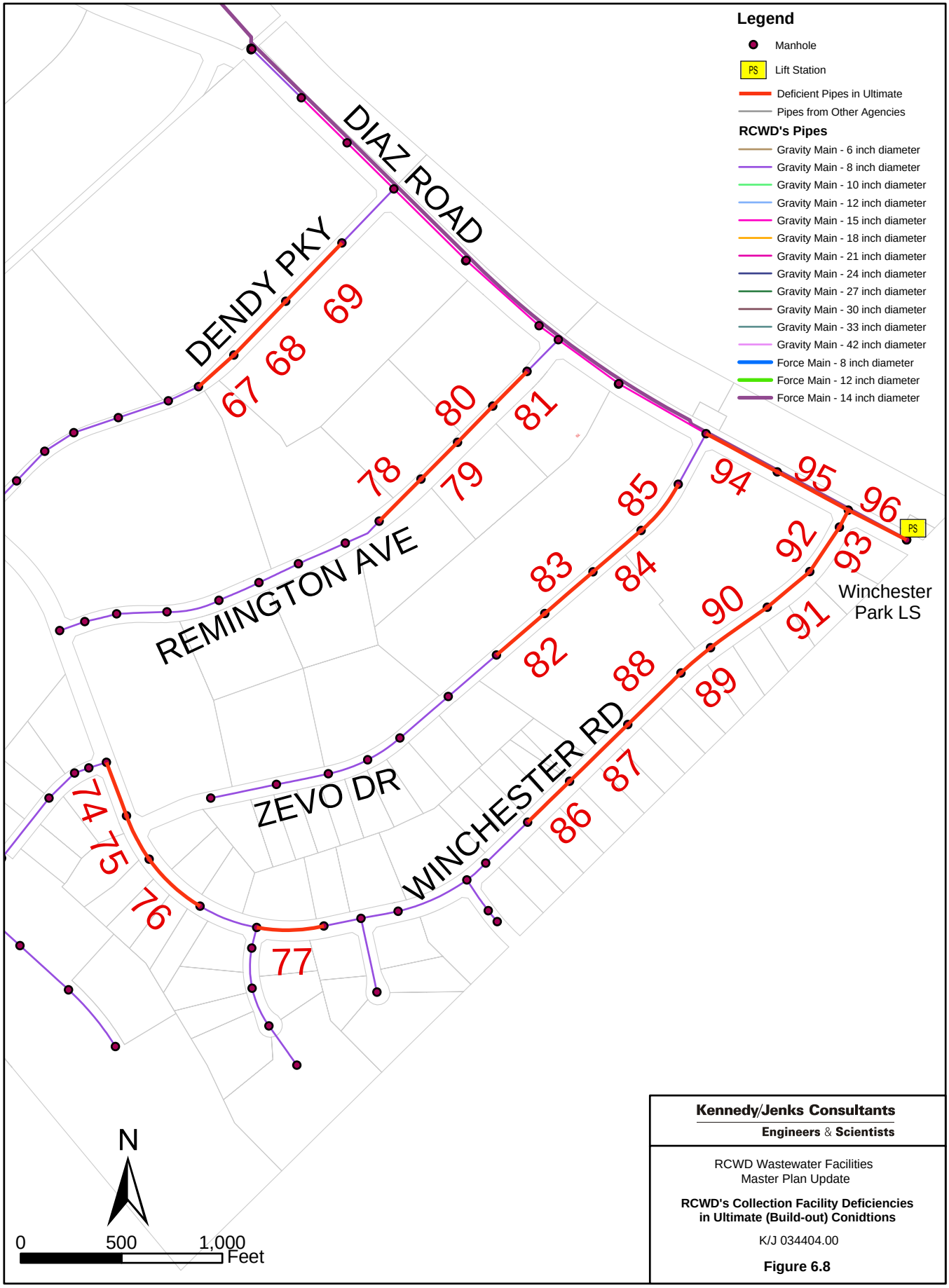
Figure 6.7



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RCWD's Collection Facility Deficiencies in Ultimate (Build-out) Conidtions

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Figure 6.8

Section 7: Sewer System Model Development

A wastewater collection system hydraulic model (model) for the Rancho California Water District (RCWD) was developed in H2OMAP hydraulic modeling software. The model was used to evaluate existing and future collection facilities, and will be submitted to the District as a deliverable.

The District's GIS database was used to create the wastewater collection facilities in the H20MAP Sewer hydraulic model. Hydraulic information was assigned to all wet wells, pump stations, gravity mains, force mains and manholes in the hydraulic model. Four wastewater flow scenarios were modeled for the existing time increment, and seven wastewater flow scenarios were modeled for both the 2009 and Ultimate time increments.

The main components involved in developing the RCWD wastewater system model are as follows:

- Assignment of attribute data and system controls to emulate RCWD's physical facilities and system operations, respectively.
- Parcel-level loading of existing and projected wastewater flows.
- Scenario development for the CIP, involving 1) identification of deficiencies per planning period and 2) analysis of system-specific operational issues, per District direction.

7.1 Modeling RCWD's Collection System Facilities

7.1.1 Wet Wells and Pump Stations

With the exception of the temporary wet well in MCWD, all wet well geometries and pump activation levels were obtained from as built drawings. Hydraulic information for the temporary wet well and pump station was supplied through conversations with MCWD. As instructed by RCWD, all wet wells are active in the existing time increment, while only Bear Creek, Cal Oaks No.1 and Winchester Park are active in the 2009 and Ultimate Time increments. All wet well hydraulic information is presented in Table 7.1.

Table 7.1 – Wet Well Hydraulic Information

Wet Well	Diameter (ft)	Lead Pump Off Level (ft)	Lead Pump On Level (ft)	Standby Pump Off Level (ft)	Standby Pump On Level (ft)
Bear Creek	10	3.5	6.5	4.5	7.5
Cal Oaks No. 1	12	4.0	10.0	5.0	11.0
Cal Oaks No. 2	9	4.0	10.0	5.0	11.0
Temporary MCWD	9	2.5	6.5	3.5	7.5
Winchester Park	12	4.0	10.0	5.0	11.0

All pump hydraulic information is shown below in Table 7.2.

Table 7.2 – Pump Hydraulic Information

Pump Station	Function	Design Head (ft)	Design Flow Rate (gpm)	Horsepower (hp)
Bear Creek	Lead	65	500	20
Bear Creek	Standby	65	500	20
Cal Oaks No. 1	Lead	70	1700	50
Cal Oaks No. 1	Standby	70	1700	50
Cal Oaks No. 2	Lead	40	500	15
Cal Oaks No. 2	Standby	40	500	15
Temporary MCWD	Lead	30	200	15
Temporary MCWD	Standby	30	200	15
Winchester Park	Lead	65	1880	50
Winchester Park	Standby	65	1880	50

7.1.2 Sewer Pipes

Invert elevations, length, material, and diameters were obtained from the District's GIS database for all gravity and force mains in RCWD's collection system. Pursuant to conversations with the District, sewer pipes were identified as being active in the existing time increment and/or the 2009 and Ultimate time increments. Table 7.3 presents the total linear feet of gravity mains in both the 2004 and 2009/Ultimate time increments.

Table 7.3 – Gravity Main Hydraulic Information

Diameter (in)	2004 Linear Feet	2009/Ultimate Linear Feet
6	1,811	1,811
8	406,297	406,297
10	32,680	32,680
12	30,254	30,254
15	32,216	32,216
18	14,134	17,558
21	5,552	5,532
24	17,550	17,550
27	905	905
30	362	362
33	1,210	3,597
42	0	14,045

Table 7.4 presents the total linear feet of the force mains in the 2004 and 2009/Ultimate time increments.

Table 7.4 – Force Main Hydraulic Information

Diameter (in)	2004 Linear Feet	2009/Ultimate Linear Feet
8	2,623	2,575
12	5,732	574
14	8,480	8,480

7.2 Loading the Wastewater Model

The projected wastewater flows, presented in section 4, were extracted from RCWD's GIS database into the H20MAP Sewer hydraulic model. Each parcel in RCWD's wastewater service area has been assigned a wastewater flow projection for each time increment in RCWD's GIS database. All parcels generating wastewater flow in each time increment were identified. Each contributing parcel's projected wastewater flow was assigned to the furthest upstream manhole that conveys that flow to the remainder of the wastewater collection facilities in the H20MAP Sewer hydraulic model.

7.3 Hydraulic Model Scenario Development

Development of the scenarios in H20Map Sewer which modeled three time increments (Existing, 2009, Ultimate) are explained in this section.

7.3.1 2004 Facilities Model (Existing)

Four different scenarios were developed to model RCWD's 2005 Wastewater collection facilities:

- Average Dry Weather Flow (ADWF) – A steady state scenario where the wastewater flows in each pipe were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- Peak Dry Weather Flow (PDWF) – A steady state scenario where the wastewater flows in each gravity main were peaked according to the Peak Dry Weather Factor (PDWF) curve presented in Section 3. Wastewater Flows in force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- Peak Wet Weather Flow (PWWF) – A steady state scenario where the wastewater flows in each gravity main were peaked according to the Peak Wet Weather Factor (PWWF) curve presented in section 3. Wastewater Flows in the force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- Extended Period Simulation (EPS) – A 24 hour extended period simulation where the wastewater flow assigned to each manhole was adjusted hourly according to the Diurnal Pattern presented in section 3. The difference between the wastewater flow received at the Santa Rosa Wastewater Reclamation Facility (SRWRF) in the PWWF steady state scenario and the PDWF steady state scenario was assumed to be a result of Rainfall Dependent Inflow & Infiltration (RDI/I), as discussed in section 3. The total RDI/I of the system was divided among all gravity mains based on diameter inch – mile of pipe. RDI/I flow was not peaked. All pumps were allowed to turn on and off as needed throughout the EPS and as validated with SRWRF plant operators.

7.3.2 2009 and Ultimate Facilities Model

Seven different scenarios were developed to model both the 2009 and Ultimate wastewater collection facilities:

- ADWF with NEW CLAY DIVERSION - A steady state scenario where the wastewater flows in each pipe were not peaked. Half of the wastewater flow, up to 2 mgd, in the 33" gravity main in Kalmia St was diverted to the 21" gravity main in New Clay St. The 33" gravity main on Kalmia St conveys the remainder of the flow towards the Murrieta Valley Interceptor. This diversion is illustrated in Figure 7.1. Wastewater flows in force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- PDWF with NEW CLAY DIVERSION - A steady state scenario where the wastewater flows in each gravity main were peaked according the Peak Dry Weather Factor (PDWF) curve presented in Section 3. Half of the wastewater flow, up to 2 mgd, in the 33" gravity main in Kalmia St was diverted to the 21" gravity main in New Clay St. The 33" gravity main on Kalmia St conveys the remainder of the flow towards the Murrieta Valley Interceptor. This diversion is illustrated in Figure 7.1. Wastewater flows in force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- PWWF with NEW CLAY DIVERSION - A steady state scenario where the wastewater flows in each gravity main were peaked according to the Peak Wet Weather Factor (PWWF) curve presented in section 3. Half of the wastewater flow, up to 2 mgd, in the 33" gravity main in Kalmia St was diverted to the 21" gravity main in New Clay St. The 33" gravity main on Kalmia St conveys the remainder of the flow towards the Murrieta Valley Interceptor. This diversion is illustrated in Figure 7.1. Wastewater flows in the force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- EPS with NEW CLAY DIVERSION – A 24 hour extended period simulation where the wastewater flow assigned to each manhole was adjusted hourly according to the Diurnal Pattern presented in section 3. The difference between the wastewater flow received at the Santa Rosa Wastewater Reclamation Facility (SRWRF) in the PWWF with New Clay Diversion steady state scenario and the PDWF with NEW CLAY DIVERSION steady state scenario was assumed to be a result of Rainfall Dependent Inflow & Infiltration (RDI/I). The total RDI/I was divided among all gravity mains based on diameter inch – mile of pipe. RDI/I flow was not peaked. Half of the wastewater flow, up to 2 mgd, in the 33" gravity main in Kalmia St was diverted to the 21" gravity main in New Clay St. The 33" gravity main on Kalmia St conveys the remainder of the flow towards the Murrieta Valley Interceptor. All pumps were allowed to turn on and off as needed throughout the EPS.

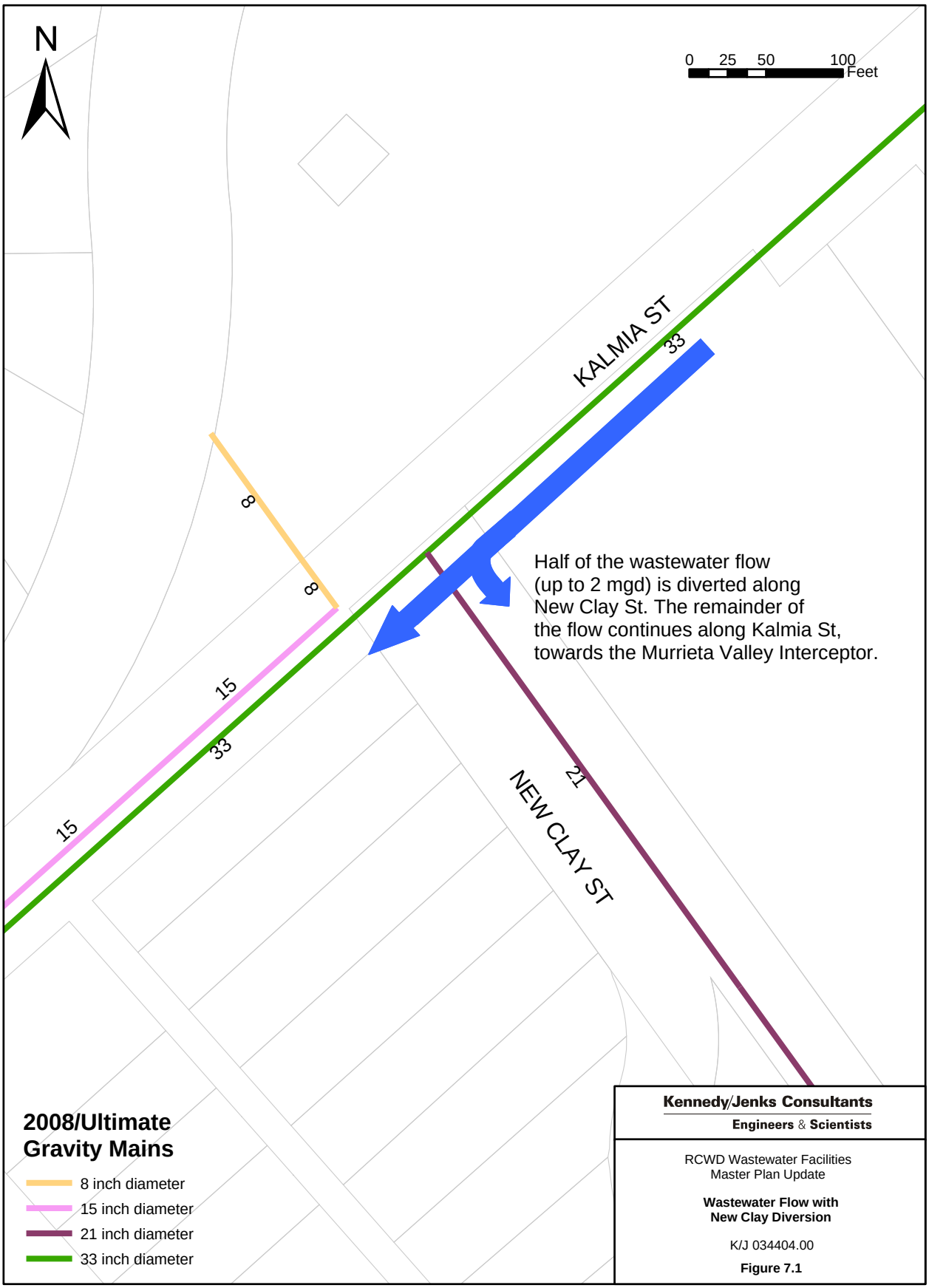
- ADWF without NEW CLAY DIVERSION - A steady state scenario where the wastewater flows in each pipe were not peaked. No wastewater flow in the 33" gravity main on Kalmia St was diverted to the 21" gravity main on New Clay St, with all flow continuing along the 33" gravity main on Kalmia St towards the Murrieta Valley Interceptor. The wastewater flow along Kalmia St is illustrated in Figure 7.2. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- PDWF without NEW CLAY DIVERSION – A steady state scenario where the wastewater flows in each gravity main were peaked according the Peak Dry Weather Factor (PDWF) curve presented in section 3. No wastewater flow in the 33" gravity main on Kalmia St was diverted to the 21" gravity main on New Clay St, with all flow continuing along the 33" gravity main on Kalmia St towards the Murrieta Valley Interceptor. The wastewater

flow along Kalmia St is illustrated in Figure 7.2. Wastewater Flows in force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

- PWWF without NEW CLAY DIVERSION – A steady state scenario where the wastewater flows in each gravity main were peaked according to the Peak Wet Weather Factor (PWWF) curve presented in section 3. No wastewater flow in the 33" gravity main on Kalmia was diverted to the 21" gravity main on New Clay St, with all flow continuing along the 33" gravity main on Kalmia St towards the Murrieta Valley Interceptor. The wastewater flow along Kalmia St is illustrated in Figure 7.2. Wastewater Flows in the force mains were not peaked. All lead pumps were modeled as on, while all standby pumps were modeled as off.

It is the intent of the District to utilize the EPS models to examine the variable flow rates arriving at the Santa Rosa Wastewater Reclamation Facility (SRWRF) throughout a peak wet weather day, and the effect that these flow rates have upon the facilities at the SRWRF. The New Clay Diversion had no effect upon the flow patterns observed in the hydraulic models at the SRWRF. Therefore, it was not necessary to develop a separate EPS scenario for the 2009 and Ultimate conditions without the New Clay Diversion.



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Wastewater Flow with
New Clay Diversion

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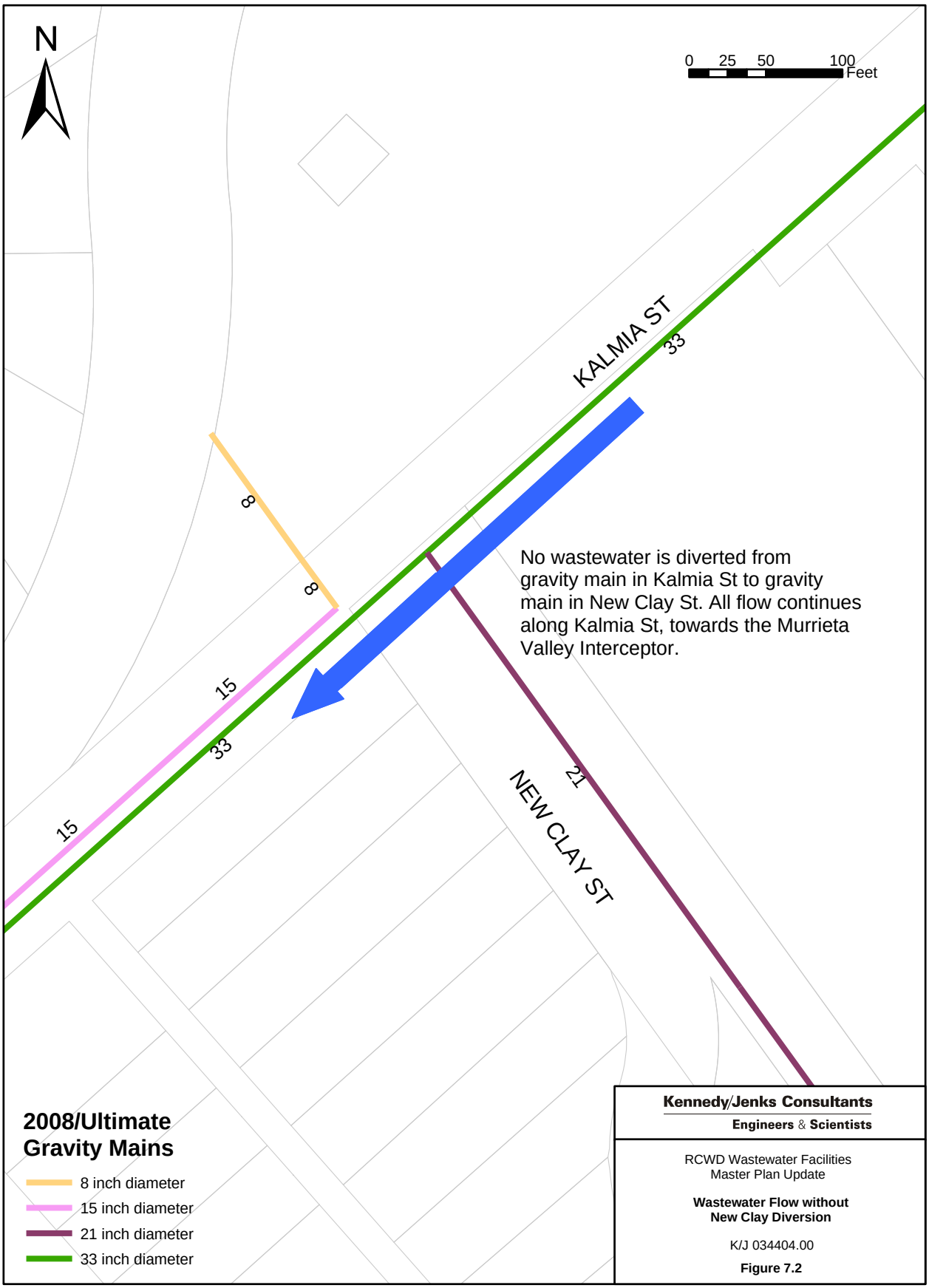
Figure 7.1



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Wastewater Flow without New Clay Diversion

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Figure 7.2

Section 8: Capital Improvement Program

A Wastewater Facilities Master Plan Capital Improvement Program (CIP) was developed in support of the overall planning efforts. The development of the CIP is based on the hydraulic capacity of the District's wastewater collection facilities, and does not incorporate costs associated with replacing existing facilities to mitigate deterioration due to age. Replacement costs are discussed in *Section. 9 – Capital Replacement Costs* (CRP). Specifically, the CIP addresses the following:

- Unit Costs
  - Flow Monitoring
  - Gravity Sewers
  - Wastewater Treatment Facilities
- Proposed Wastewater Collection System Improvements and Cost Estimates
  - Flow Monitoring
  - Gravity Sewers
  - Wastewater Treatment Facilities

The wastewater system was analyzed using the H_20map Sewer wastewater collection system model developed as part of this Master Plan effort, and discussed in *Section 7- Sewer System Model Development*. The H_20map Sewer model was used to identify facility requirements for each time interval by routing Peak Wet Weather Flows (PWWF) through the H_20map Sewer model. Facilities not meeting the design criteria established in *Section 3 - Wastewater Collection System Design Criteria,* were designated as deficient and recommended improvements were defined. Proposed improvements to gravity sewers were presented in *Section 6- Existing System Deficiencies*. Proposed improvements, as well as associated costs, to the Santa Rosa Water Reclamation Facility (SRWRF) are detailed in *Section 5 - Treatment Plant Update*. The total estimated cost to construct the proposed ultimate wastewater system is $44.3 million.

8.1 Unit Costs

The capital cost estimates for the proposed facilities were developed based on the Engineering New Record Construction Cost Index (ENR-CCI). The ENR-CCI is an inflation index used to adjust prices from one time period to another. The cost estimates presented in this Master Plan are based upon an ENR-CCI cost index of 7298, for September 2004. Costs estimated herein for recommended facilities should be adjusted in the future either by making new estimates or by comparing the future ENR-CCI index value.

The capital costs provided in this Master Plan are based on unit costs obtained from recently designed and constructed projects. These unit construction costs are approximate planning costs and include miscellaneous work necessary for complete and operable facilities, but they do not include right-of-way or site acquisition.

Engineering and administration services have been included as a percentage of total construction costs. A factor of 25 percent of total construction cost has been used for engineering and administration, which includes but is not limited to the following:

- Planning and design reports
- Design
- CEQA Compliance
- Permits
- Surveying/Soils Testing
- Services during construction (submittals, as-builts)
- Inspection

A contingency factor of 20 percent of construction costs has been added to develop the total project cost.

8.1.1 Unit Cost Estimate for Flow Monitoring

The District has elected to perform flow monitoring studies on all ultimate gravity main deficiencies presented in Section 6 - Existing System Deficiencies. The individual consulting firms which perform these flow monitoring studies base their fee upon the total number of flow monitoring sites, the weather during the study, as well as the length of the study. As the number of flow monitoring sites increases, the price per flow monitoring site decreases. Therefore, it is difficult to give an exact cost estimate for each flow monitoring site. However, based upon similar studies that K/J has recently been involved in, the price of performing a two-week flow monitoring study at 11 sites is approximately $32,000.

8.1.2 Unit Cost Estimate for Gravity Sewers

Pipe materials, pavement replacement, traffic control, installation of miscellaneous appurtenances, excavation, bedding and backfill were taken into consideration in developing unit costs for gravity sewer construction. Table 8.1 represents gravity sewer unit costs used in developing capital costs.

Table 8.1 - Gravity Main Total Project Unit Costs

Pipe Diameter (in)	Pipe Unit Cost ($/LF)
8	120
10	160
12	190
15	200
18	230
21	270
24	310
27	345
30	380

Table 8.1 - Gravity Main Total Project Unit Costs

Pipe Diameter (in)	Pipe Unit Cost ($/LF)
33	425
36	460
39	535
42	570

8.1.3 Unit Cost Estimate for Wastewater Treatment Facilities

Wastewater Treatment Facility costs for the proposed 2.5 mgd plant expansion are discussed in detail in *Section 5 – Treatment Plan Update*. The costs for the ultimate 1.0 mgd expansion are based on a treatment cost of $12/gallon of treated capacity. The costs outlined in *Section 5 – Treatment Plant Update*, as well as the unit cost, include engineering, administration and contingencies.

8.2 Proposed Facilities Excluded from Capital Costs

In some instances, deficiencies will not influence the capital improvements plan, as the eventual costs associated with facility replacement will be assigned to parties other than the District. These deficiencies, presented by time increment and their previously assigned Pipe ID include the following:

2005-2008:

- Pipes 1 through 6: Replacement costs potentially assigned to future development activity in sub-area 103. Replacement costs are not included in the CIP due to potential developer upsizing and detailed flow monitoring which will determine actual need for pipe upsizing.
- Pipes 9 through 62: With the planned construction of the Murrieta Valley Interceptor (MVI) Trunk Sewer by 2006, these pipes will no longer be deficient, and therefore require no upsizing.
- Pipes 63 and 66: Replacement costs assigned to EVMWD.
- Pipes 7, 64 and 65: Pipes are marginally over-capacity. Detailed flow monitoring will determine the actual need for upsizing these pipes.
- Pipes 70 and 71: Replacement costs assigned to EVMWD, per existing agreement.

2009 - Buildout:

- Pipes 72 and 73: Replacement costs assigned to MCWD/Development Activity.
- Pipes 67 though 68, 74 though 86, and 93: The H_20Map Sewer hydraulic indicates that these pipes are marginally over capacity in the ultimate (build-out) conditions. Detailed flow monitoring will determine the actual need for upsizing of these pipes. Maximum average daily flows for each of these pipes have been calculated in order to comply with the District's design criteria. The maximum average daily flows for these pipes are

presented in Table 8.2. If these average daily flows are exceeded, the resultant peak wet weather flow would violate the District's sewer design criteria based on pipeline capacity. Replacement costs for these pipes could potentially be assigned to whichever development exceeds the maximum average daily flow allotted to each pipe. For the sake of completeness, all deficient gravity mains in the City of Temecula have been included in Table 8.2.

Table 8.2 - Capacity Limits for Deficient Pipes in Temecula

Pipe No.	Maximum Average Flow Allowable Based on Capacity (EDU)
67	580
68	708
69	480
74	479
75	478
76	477
77	790
78	476
79	479
80	479
81	479
82	427
83	425
84	422
85	422
86	1,008
87	403
88	401
89	402
90	399
91	398
92	401
93	1,036
94	2,943
95	2,991
96	2,996

8.3 Estimated Cost of Proposed Facilities Based on Hydraulic Capacity

Costs for flow monitoring, and the proposed improvements to the wastewater collection system and treatment facilities are presented in Tables 8.3 through 8.8. These costs are presented by their corresponding time increment as follows:

- 2005 through 2008 facilities

- 2009 through ultimate facilities

Construction of the MVI Trunk Sewer, which is currently under design, is the critical facility improvement identified for the 2004 time increment. All proposed improvements identified in this Master Plan are assigned subsequent time steps. The time step associated with each proposed improvement is based upon inter-agency agreements, the District's local knowledge of development activity within the service area, and the Southern California Association of Governments (SCAG) year 2000 census tract population projections. However, the exact timing of recommended wastewater facility improvements is dependant upon the level and location of actual development in the community. If growth does not occur as projected and the projected wastewater flow is not reached, facility improvements may be delayed. Conversely, if actual growth occurs more rapidly than projected growth, facility improvements may be required before they are scheduled to occur as part of this CIP. Results from annual flow monitoring studies will allow the District to adjust these time increments as needed, based on the actual levels of growth experienced by the District.

8.4 Estimated Annual Cost for District Flow Monitoring

Beginning in 2006, the District has elected to perform an annual two-week flow monitoring study on all gravity main deficiencies presented in section 6 - Existing System Deficiencies. While costs associated with replacement facilities are assigned to specific time increments in the CIP based upon the hydraulic model results, the flow monitoring results will allow the District to enact replacement projects when facilities are operating near capacity. K/J has identified 11 sites for flow monitoring, which will allow the District to monitor all of the identified ultimate gravity main deficiencies. Table 8.3 illustrates which gravity mains, based on pipe ID numbers, each flow monitor site will evaluate.

Table 8.3 – Flow Monitoring Sites

Flow Monitor Number	Pipe IDs Evaluated
1	1 – 6
2	7-8, 63-66
3	9-62
4	67-79
5	70-71
6	72-73
7	74-77
8	78-81
9	82-85
10	86-93
11	94-96

It is estimated that the annual cost of performing a two-week flow monitoring study at 11 sites is $32,000 per year. For the purposes of this CIP, it is assumed that only five annual flow monitoring studies will be necessary in the 2009 through ultimate time step. Table 8.4 presents the total costs associated with the proposed flow monitoring studies.

Table 8.4 - Proposed Flow Monitoring Costs

Number of Annual Flow Monitoring Studies During Time Increment	Time Increment	
	2005 - 2008	2009 - Ultimate
3	$96,000	-
5	-	$160,000
GRAND TOTAL		***$256,000***

8.4.1 Gravity Sewer Replacement Cost Estimate

Gravity sewer requirements have been evaluated based upon meeting projected peak wet weather wastewater flows in accordance with the design criteria established in *Section 3 - Wastewater Collection System Design Criteria*. Gravity sewers have been evaluated utilizing the H_20map Sewer hydraulic model developed as part of this Master Plan.

All proposed sewers are assumed to replace the existing gravity sewer main. It is anticipated that the replacement costs for Pipes 7 through 8, and 63 through 66 will be pro-rated between RCWD and EVMWD based on the percent of total wastewater flow generated by each agency. Cost estimates for proposed replacement gravity sewers are presented in Table 8.5.

Table 8.5 - Proposed Replacement Gravity Main Costs

Pipe ID	Existing RCWD Line No	Replacement Diameter (in)	Length (ft)	Time Increment	
				2005 - 2008	2009 - Ultimate
8	T151030	15	92	$18,400	-
69	V241010	12	400	-	$76,000
87	W251025	12	385	-	$73,150
88	W251027	12	386	-	$73,340
89	W251029	12	187	-	$35,530
90	W251031	12	340	-	$64,600
91	W251033	12	270	-	$51,300
92	W251035	12	262	-	$49,780
94	W251017	18	400	-	$92,000
95	W251018	18	400	-	$92,000
96	W251020	18	333	-	$76,590
TOTAL				**$18,400**	**$684,290**
GRAND TOTAL					***$702,690***

8.4.2 Wastewater Treatment Facilities Cost Estimate

Wastewater treatment facility costs are specific to the proposed 2.5 mgd expansion, scheduled prior to 2008. These costs are outlined in *Section 5 – Treatment Plan Update*. For the remaining 1.0 mgd expansion, the costs were based on a treatment unit cost of $12/gallon of treated capacity. These costs, presented in Table 8.6, include engineering, administration and contingencies.

Table 8.6 – Proposed Wastewater Treatment Plant Costs

Treatment Plant	WWTP Capacity (mgd)	Incremental Capacity (mgd)	Time Increment	
			2005 - 2008	2009 - Ultimate
SRWRF	8.5	3.5	$31,375,000	$12,000,000
GRAND TOTAL				***$43,375,000***

Table 8.7 summarizes the hydraulic capacity wastewater system capital costs, including costs for flow monitoring, gravity sewers, and treatment facilities. Based on hydraulic capacity, the total estimated cost to construct the proposed ultimate wastewater system is $44.3 million.

Table 8.7– Summary of Capital Costs Based on Capacity Analysis

Facility	Time Increment		Total
	2005 - 2008	2009 - Ultimate	
Flow Monitoring	$96,000	$160,000	$256,000
Gravity Sewers	$18,400	$684,290	$702,690
WWTP	$31,375,000	$12,000,000	$43,375,000
TOTAL	***$31,489,400***	***$12,844,290***	***$44,333,690***

Section 9: Capital Replacement Program

Rancho California Water District's (RCWD) wastewater system was studied to assess the existing conditions of the collection and treatment facilities. Existing capacities and future deficiencies for the collections system were presented in *Section 6– Existing System Deficiencies*. The Santa Rosa Water Reclamation Facility (SRWRF) conditions and recommendations were presented in *Section 5 – Treatment Plant Update.* The cost of these recommended improvements, which were based upon hydraulic adequacy, were presented in *Section 8 – Capital Improvement Plan.*

A majority of the existing collection system is adequately sized to accommodate future peak flows and therefore is not included in the recommended system improvements discussed above. As time progresses, the condition of these facilities will deteriorate until such time as the facility needs to be repaired or replaced. K/J has evaluated the condition of these collection facilities, and has developed a Capital Replacement Program (CRP) based upon the average useful life of the District's collection and conveyance facilities. The estimated annual cost of the of the District's CRP is presented below in Table 9.1.

Table 9.1 – Estimated Annual Cost of RCWD's CRP

Facility	Annual Cost ($/yr)
Gravity Sewers	$525,200
Force Mains	$16,100
Lift Stations	$51,000
SRWRF	$1,215,000
TOTAL	***$1,807,300***

9.1 Sewer Flow Monitoring Study

In an effort to better assess the condition of its wastewater collection system and the magnitude of existing infiltration/inflow rates, Kennedy/Jenks Consultants prepared the *2001 Sewer Flow Monitoring Study* for the Rancho California Water District. This study included the following:

- Summary of collection system video inspections conducted in insitu conditions between January 29, 2001 and April 2, 2001, and again between October 2, 2001 and October 4, 2001 on portions of the District's wastewater collection system
- Evaluation of wet weather wastewater flows at 7 locations throughout the District's collection system for 28 consecutive days, beginning February 9, 2001 and ending March 8, 2001.
- Assessment of infiltration and inflow rates based on the collected flow monitoring data.

Based on a review of the sewer inspection videos, the *2001 Sewer Flow Monitoring Study* contained the following general conclusions pertaining to the condition of the District's existing wastewater collection:

- The District's vitrified clay pipe sewers and PVC appear overall to be in good condition, free from excessive amounts of cracking, root intrusions, joint defects, or sags.

- Routine pipe cleaning may be able to help reduce grease and debris problems in low laying areas of the collection system to further reduce the potential for flow blockages or overflows.

- A cursory review of the sewer manholes video inspections suggests that the majority of the collection manholes appear to be in adequate condition. However, in other locations, there were signs of hydrogen sulfide corrosion, as evidences by exposed concrete aggregate and corroded manhole ladder rungs and manhole covers.

- Provide further investigation of the existing corroded section of 10-inch cast iron pipe located between Manholes 2-179-06 and 2-243-07.

- Perform follow-up video inspection of the trunk sewer collection system within the next 5 years.

Since the completion of the *2001 Sewer Flow Monitoring Study*, the District has taken the following actions to address the above conclusions:

- The District has expanded the location and frequency of cleaning efforts to address those areas where moderate to heavy grease buildup and debris deposits were observed.

- The 10-inch cast iron pipe located between Manholes 2-179-06 and 2-243-07 has been replaced with PVC.

- Pipes and manholes with root intrusion have been treated with a foam herbicide.

- Manholes identified with hydrogen sulfide corrosion have been lined with an epoxy, to prevent future corrosion.

- Infiltration & Inflow (I&I) problem areas have been remedied as they have been detected.

9.2 Repair/Replacement of Existing Facilities

The District's oldest facilities within its wastewater collection system are approximately 25 years old. As illustrated in the *2001 Sewer Flow Monitoring Study*, the system is in relatively new and good condition, when compared to the average useful life of 90 years for wastewater collection system facilities. The CRP presents the costs that the District will incur for either repairing or replacing these facilities over the course of their average useful life.

The decision to repair or replace existing facilities is based primarily on facility condition. Eroding pipelines with reasonable structural integrity are often repaired using a "slip lining" or "cure-in-place" process. While this common approach is less disruptive than pipeline replacement, facility replacement is generally considered the most cost effective solution for extremely deteriorated pipelines and facilities that have exceeded or are approaching their presumed useful life. Accordingly, facility type and probable life expectancy must be accurately

assessed to establish the appropriate remedy for component of the District's wastewater collection system.

9.3 Unit Costs

The capital cost estimates for repair and replacement of facilities were developed based on the Engineering New Record Construction Cost Index (ENR-CCI). The ENR-CCI is an inflation index used to adjust prices from one time period to another. The cost estimates presented in this Master Plan are based upon an ENR-CCI of 7298, for September 2004. Costs estimated herein for recommended facilities should be adjusted in the future either by making new estimates or by comparing the future ENR-CCI value.

The capital costs provided in this Master Plan are based on unit costs obtained from recently designed and constructed projects. These unit construction costs are approximate planning costs and include miscellaneous work necessary for complete and operable facilities, but they do not include right-of-way or site acquisition.

Engineering and administration services have been included as a percentage of total construction costs. A factor of 25 percent of total construction cost has been used for engineering and administration, which includes but is not limited to the following:

- Planning and design reports
- Design
- CEQA Compliance
- Permits
- Surveying/Soils Testing
- Services during construction (submittals, as-builts)
- Inspection

A contingency factor of 20 percent of construction costs has been added to develop the total project cost. Replacement unit costs and repair unit costs for gravity mains and for force mains are presented in Tables 9.2 and 9.3.

Table 9.2 – Gravity Sewer Unit Replacement/Repair Costs

Pipe Diameter (inches)	Pipe Unit Cost ($/LF)	Repair Unit Cost ($/LF)
8	120	70
10	160	95
12	190	105
15	200	115
18	230	150
21	270	180
24	310	210

Table 9.2 – Gravity Sewer Unit Replacement/Repair Costs

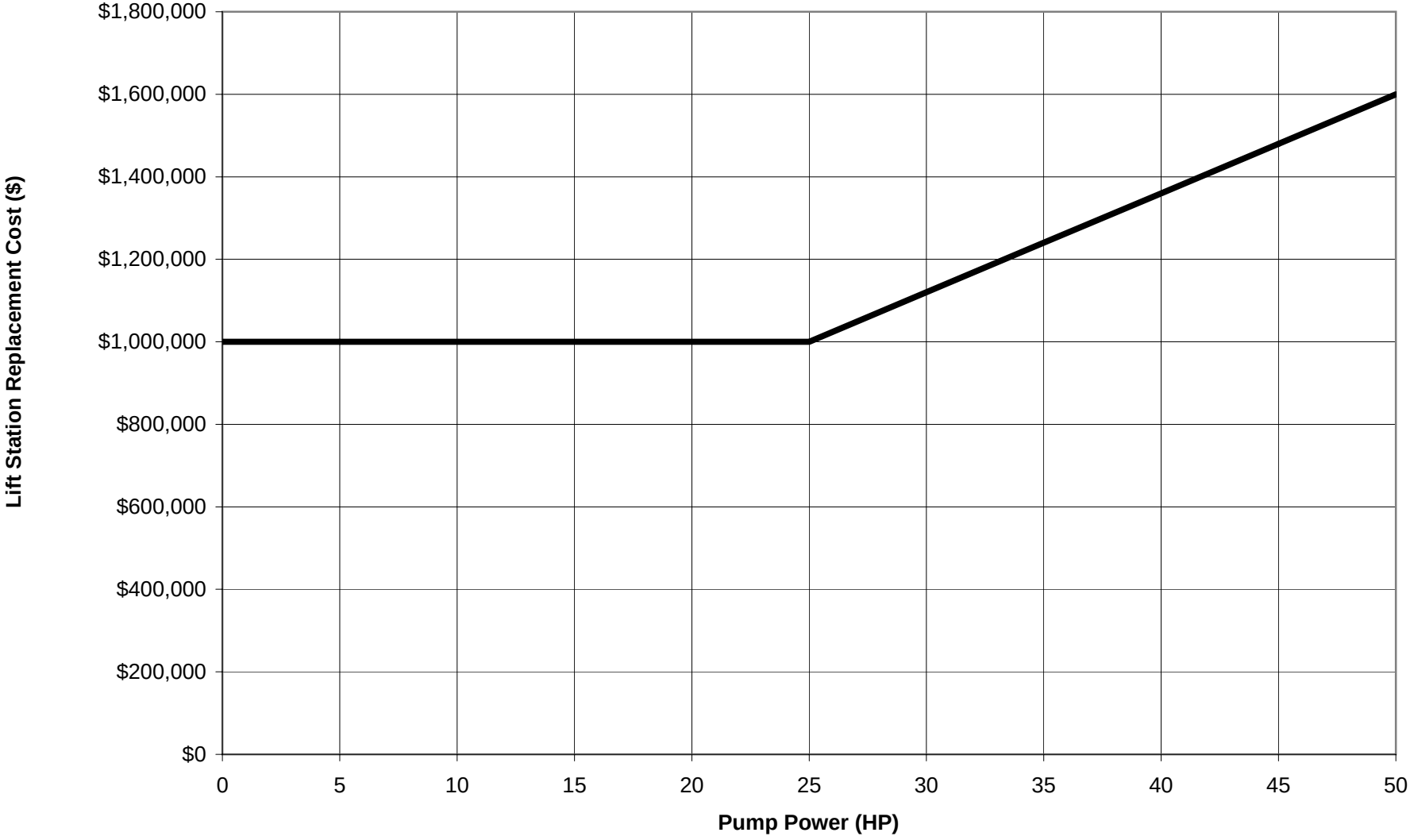
Pipe Diameter (inches)	Pipe Unit Cost ($/LF)	Repair Unit Cost ($/LF)
27	345	220
30	380	235
33	425	260

Table 9.3 – Force Main Unit Replacement/Repair Costs

Pipe Diameter (inches)	Pipe Unit Cost ($/LF)	Repair Unit Cost ($/LF)
8	95	60
14	165	95

Lift station capital costs are estimated based on the operating pump horsepower (not including redundant pump) of the lift station. The unit cost for lift stations includes pumps and motors (not including standby), lift station building, odor controls, grading, miscellaneous piping and valving, fencing, landscaping, instrumentation, controls engineering, administration, and contingencies. Basically, this is the cost to completely replace the lift station. Figure 9.1 presents the lift station unit cost curve assumed for the CRP.

Figure 9.1 - Lift Station Replacement Cost by HP



9.4 Annual Cost

To determine the annual cost, the facility replacement cost is divided by the remaining life of the facility. As mentioned earlier, unit cost is the facility replacement cost divided by a representative unit such as total lineal feet of pipe or total pump horsepower. Since annual cost and unit cost both use the same facility replacement value, annual cost is assumed using the September 2004 ENR-CCI mentioned in the Unit Costs section. Future costs should be adjusted using the current ENR-CCI index.

9.5 Pipeline Rehabilitation Costs

With all existing wastewater pipelines less than 25 years old, it is assumed that when existing facilities reach their presumed useful life, they will be remediated with a 50/50 repair/replacement strategy. Utilizing the “install date” attribute field in the District’s GIS database, pipelines were tabulated by diameter and age to determine the repair/replacement cost of existing gravity mains and force mains. If a pipeline was included in the District’s CIP due to deficient capacity, it was not included in the rehabilitation program.

- In addition, the following assumptions were made when calculating rehabilitation costs for the District’s gravity mains:
- 6-inch gravity pipelines will be replaced with 8-inch facilities.
- Ductile Iron pipelines are lined with cement mortar, resulting in all future costs allocated to replacement costs, with no future repair costs.

Rehabilitation costs for gravity mains and force mains are presented in Tables 9.4 and 9.5. The total annual cost for gravity sewer main rehabilitation is $525,200 and the total annual cost for force main rehabilitation is $16,100.

Table 9.4 – Rehabilitation Costs for Gravity Mains

Year	Age (yrs)	Diameter (in)	Total Length (ft)	Replace Unit Cost ($/lf)	Repair Unit Cost ($/lf)	Replace Length (ft)	Replace Cost ($)	Repair Length (ft)	Repair Cost ($)	Total Cost ($)	Remaining Life (yrs)	Total Annual Cost
1980	25	8	33,263	$120	$70	16,631	$1,995,759	16,631	$1,164,193	$3,159,952	65	$48,615
1980	25	10	3,558	$160	$95	1,779	$284,618	1,779	$168,992	$453,609	65	$6,979
1980	25	12	3,641	$190	$105	1,820	$345,858	1,820	$191,132	$536,990	65	$8,261
1980	25	15	2,160	$200	$115	1,080	$216,035	1,080	$124,220	$340,255	65	$5,235
1985	20	6	122	$120	-	61	$7,320	0	$0	$7,320	70	$105
1985	20	8	91,032	$120	$70	46,563	$5,587,566	44,469	$3,112,834	$8,700,400	70	$124,291
1985	20	10	3,790	$160	$95	1,895	$303,178	1,895	$180,012	$483,191	70	$6,903
1985	20	12	11,098	$190	$105	5,549	$1,054,268	5,549	$582,622	$1,636,889	70	$23,384
1985	20	15	15,867	$200	$115	7,934	$1,586,732	7,934	$912,371	$2,499,103	70	$35,701
1985	20	18	9,736	$230	$150	4,868	$1,119,674	4,868	$730,222	$1,849,896	70	$26,427
1985	20	21	5,536	$270	$180	2,898	$782,495	2,638	$474,863	$1,257,359	70	$17,962
1985	20	24	11,450	$310	$210	7,325	$2,270,708	4,125	$866,221	$3,136,929	70	$44,813
1985	20	27	812	$345	$220	406	$140,148	406	$89,370	$229,517	70	$3,279
1985	20	30	362	$380	$235	181	$68,746	181	$42,514	$111,260	70	$1,589
1990	15	8	31,138	$120	$70	15,680	$1,881,612	15,458	$1,082,067	$2,963,679	75	$39,516
1990	15	10	487	$160	$95	244	$38,960	244	$23,133	$62,093	75	$828
1990	15	12	22	$190	$105	11	$2,090	11	$1,155	$3,245	75	$43
1995	10	8	38,932	$120	$70	19,905	$2,388,571	19,027	$1,331,873	$3,720,444	80	$46,506
1995	10	10	2,109	$160	$95	1,054	$168,699	1,054	$100,165	$268,864	80	$3,361
1995	10	12	1,748	$190	$105	874	$166,058	874	$91,769	$257,827	80	$3,223
1995	10	15	9,275	$200	$115	4,637	$927,470	4,637	$533,295	$1,460,765	80	$18,260
1995	10	18	3,443	$230	$150	1,722	$396,000	1,722	$258,261	$654,261	80	$8,178
1995	10	24	5,974	$310	$210	2,987	$925,897	2,987	$627,221	$1,553,118	80	$19,414
1995	10	33	3,490	$425	$260	1,745	$741,665	1,745	$453,725	$1,195,390	80	$14,942
2000	5	8	11,605	$120	$70	5,802	$696,291	5,802	$406,170	$1,102,461	85	$12,970
2000	5	10	45	$160	$95	23	$3,600	23	$2,138	$5,738	85	$68
2000	5	12	2,525	$190	$105	1,263	$239,887	1,263	$132,569	$372,457	85	$4,382
Total			***303,219***			***154,936***	***$24,339,906***	***148,221***	***$13,683,105***	***$38,023,011***		***$525,234***

Table 9.5 – Rehabilitation Costs for Force Mains

Year	Age (yrs)	Diameter (in)	Total Length (ft)	Replace Unit Cost ($/lf)	Repair Unit Cost ($/lf)	Replace Length (ft)	Replace Cost ($)	Repair Length (ft)	Repair Cost ($)	Total Cost ($)	Remaining Life (yrs)	Total Annual Cost
1995	10	14	8,480	$165	$95	4,240	$699,600	4,240	$402,800	$1,102,400	80	$13,780
2000	5	8	2,575	$95	$60	1,288	$122,313	1,288	$77,250	$199,563	85	$2,348
Total			***11,055***			***5,528***	***$821,913***	***5,528***	***$480,050***	***$1,301,963***		***$16,128***

9.6 Lift Station Rehabilitation Costs

Existing lift stations must be assessed based upon condition and replacement/rehabilitation potential. Kennedy/Jenks Consultants worked with the District to assess the condition and capacity of the Bear Creek, Cal Oaks #1 and Winchester Park Lift Stations. Cal Oaks #2 lift station is not included in the CRP, as is scheduled to be decommissioned once the Murrieta Valley Interceptor (MVI) is constructed.

After reviewing maintenance records and pump efficiency data, the condition of each lift station was determined. Less than 10 years old, the lift stations are in very good condition and do not need rehabilitation in the foreseeable future. As rehabilitation is required, it is assumed that the District will elect to replace failing components of their lift stations. The total annual cost for the lift station rehabilitation is $51,000, and is presented in Table 9.6. The lift station conditions are presented in Table 9.7, attached to the end of this document.

Table 9.6 – Rehabilitation Cost for Lift Stations

Name	Year Built	Age (yrs)	HP	Replacement Cost ($)	Remaining Life (yrs)	Total Annual Cost ($/yr)
Bear Creek	1999	5	20	$1,000,000	85	$11,765
Cal Oaks #1	1995	9	50	$1,600,000	81	$19,755
Winchester Park	1996	8	50	$1,600,000	82	$19,515
Total				***$4,200,000***		***$51,035***

Table 9.7 – Lift Station Conditions

	Bear Creek	Cal Oaks #1	Winchester Park
Year Built	1999	1995	1996
Maintenance Dates/Schedule	Weekly - equipment check Monthly - pump & motor check Quarterly - clean wet well Semiannual - motor oil change, generator maintenance, & odor reduction unit maintenance	Weekly - equipment check Monthly - pump & motor check Quarterly - clean wet well Semiannual - motor oil change, generator maintenance, & odor reduction unit maintenance	Weekly - equipment check Monthly - pump & motor check Quarterly - clean wet well & air scour blower maintenance Semiannual - motor oil change, generator maintenance, & odor reduction unit maintenance
Dates/Type of Minor Upgrades/Rehab/Mods	None	None	None
Age of Pump (Date of Replacement)	5 Years Pump #1 overhaul: 5/02 & 5/04	9 years Pump #1 overhaul: 02/04 Pump #2 replaced volute and wear rings 06/04	8 Years
Age of Motor (Date of Replacement)	5 Years Motor #1 overhaul: 5/02 & 5/04	9 years Motor #1 overhaul: 02/04	8 Years
Name/Address/ Contact Person of Pump Maintenance Contractor	Mark Sturns Swain's Electric Motor Service 400 E. Devonshire Hemet, CA 92543	Mark Sturns Swain's Electric Motor Service 400 E. Devonshire Hemet, CA 92543	Mark Sturns Swain's Electric Motor Service 400 E. Devonshire Hemet, CA 92543
Stand-by Power Source	Generac	Onan	Onan
Generator Condition	Very good	Very good	Very good
Wet Well Condition	Very good	Very good	Very good
Pipe Condition	Very good	Very good	Very good
Gate Valves	None	None	None
Check Valve Condition	Good	Good	Good
Controls (e.g. MCC)	Very good	Very good	Very good
SCADA	Very good	Very good	Very good

Table 9.7 – Lift Station Conditions

	Bear Creek	Cal Oaks #1	Winchester Park
Traffic Conditions	Moderate	Moderate	Moderate
Site Accessibility	1 Double Gate (Front) 1 Single Gate (Side)	1 Double Gate	2 Double Gates
Wet Well Access	Dual Hatches with Railings	Dual Hatches with Railings	Dual Hatches with Railings
Wet Well Lid Condition	Very good	Very good	Very good
Wet Well Lid Material	Diamond Plate Aluminum	Diamond Plate Aluminum	Diamond Plate Aluminum
Wet-Well Lining	T-lock	T-lock	T-lock
Gas Detection System	None	None	None
Odors (Prevention)	Minor (No Prevention Method)	Minor (Odor Scrubber Unit)	Minor (Odor Scrubber Unit)

9.7 SRWRF Costs

As identified in Section 5.3.3, the annualized capital repair/replacement cost for the SRWRF is $1,215,500. This annual amount was utilized for all years included in the CRP. Similar to other costs outlined in the CRP, future costs should be adjusted using the most up-to-date ENR-CCI index.

9.8 Cost Summary

Table 9.7 presents the District's Capital Rehabilitation Costs allocated to the 2005 through 2008, and 2009 - Ultimate time increments.

Table 9.7 – Summary of Capital Costs Based on Repair/Replacement Analysis

Facility	Time Increment		Total
	2005 - 2008	2009 – Ultimate	
Gravity Sewers	$2,101,000	$36,766,000	$38,867,000
Force Mains	$64,500	$1,129,000	$1,193,500
Lift Stations	$204,100	$3,572,000	$3,776,100
SRWRF	$4,862,000	$85,085,000	$89,947,000
TOTAL	***$7,231,600***	***$126,552,000***	***$133,783,600***

Not included in this cost summary is the determination of the rehabilitation cost participation from RCWD's contract sewer agencies, EVMWD and MCWD.

Section 10: CMOM Compliance Summary

This Section provides the explanation and legislative background for the proposed Capacity, Management, Operations, and Maintenance (CMOM) program. Regulatory criteria which appear most probable to make the final CMOM program are discussed. Table 10.1 identifies the components of the *2005 Wastewater Facilities Master Plan* which address potential CMOM elements, as well as those portions of the CMOM program requiring further District attention.

10.1 Background

Municipal sanitary sewer collection systems with discharges to waters of the United States are required by the Clean Water Act of 1972 to have a National Pollutant Discharge Elimination System (NPDES) permit. In response to the increasing frequency of sanitary sewer overflows (SSO) in the United States, the EPA has developed the proposed SSO rule focused on the capacity, management, operation, and maintenance (CMOM) of sanitary sewer collection systems. CMOM is intended to be a proactive approach for reducing the public health and environmental impact of overflows, extending the life of sanitary sewer collection systems, and improving customer service.

The proposed SSO rule will impact all current NPDES permit-holders and owners of satellite sewer collection systems by requiring them to develop and implement CMOM programs. After adoption, the proposed SSO rule will require collection system owners and operators to implement CMOM programs that:

- Properly manage, operate, and maintain their sanitary sewer collection systems
- Provide adequate collection system capacity
- Respond promptly and effectively to stop or mitigate SSO events
- Notify affected parties of an SSO event
- Make the CMOM Program Plan and ongoing audits available to the general public

Currently, the SSO rule is awaiting review by the Federal Office of Management and Budget (OMB) before being published in the *Federal Register* for public review and comment. Public comments will be incorporated into the final SSO rule for adoption, at which time CMOM requirements for sanitary sewer collection systems will become enforceable.

To satisfy the regulatory requirements of the proposed SSO Rule, communities will be required to develop a CMOM Program Plan with four primary components:

1. CMOM Program Summary;
2. System Evaluation and Capacity Assurance Plan (SECAP);
3. Overflow Emergency Response Plan; and
4. Ongoing CMOM program audits.

10.2 CMOM Program Summary

The CMOM Program Summary is a general compilation of information about the management, operation and maintenance of the District's sanitary sewer collection system, including:

- Program goals;
- Organization;
- Legal Authority;
- Measures and Activities;
- Design and Performance Provisions;
- Monitoring, Measurement and Program Modifications; and
- Communication.

10.2.1 Program Goals

Program goals help determine the steps that must be undertaken to establish the CMOM program, and should define the purpose and anticipated results of the program. Goals should reflect performance, safety, customer service, resource use, compliance, and other considerations.

Some example goals for a sanitary sewer system, contained in *Wastewater Collection Systems Management Manual of Practice #7* by the Water Environment Federation, include:

- Prevent public health hazards;
- Minimize inconvenience and damage by responsibly handling service interruptions;
- Protect municipal invest by maximizing the useful life and capacities of the sanitary sewer collection system;
- Prevent unnecessary damage;
- Use funds efficiently;
- Convey wastewater with minimum inflow, infiltration, and exfiltration;
- Prevent excessive claims and legal fees related to backup by providing immediate, concerned, and efficient service to all emergency calls; and
- Perform all activities safely and avoid injury.

10.2.2 Organization

An organization chart should be provided identifying administration and management positions responsible for implementing the CMOM program, as well as operations and maintenance personal. Employees must be provided with required training to perform their assigned CMOM activity.

The chain of communication for reporting SSO events should be provided from receipt of a complaint to the notification of permitting authorities, other agencies, and the public.

10.2.3 Legal Authority

Sufficient legal authority must be provided to implement an effective CMOM program. The proposed SSO Rule identifies five areas where legal authority is necessary for implementing an effective CMOM program:

- Controlling inflow and infiltration (I/I);
- Requiring sewers and connections to be properly designed and constructed;
- Ensure proper installation, testing, and inspection of new and rehabilitated sewers;
- Addressing flows from municipal satellite collection systems; and
- Implementing the general and specific prohibitions of the national pretreatment program under 40 CFR 403.5.

Legal authority can be provided through sewer use ordinances, service agreements, or other legally binding documents.

10.2.4 Measures and Activities

Measures and activities specified for implementation as part of a CMOM program should be tailored to the size, complexity, and specific features of the District's collection system. The CMOM Program Summary should include the six measures and activities and identify the person or position on the organization chart responsible for each.

10.2.4.1 Maintenance of facilities

List all maintenance facilities owned by the District and used for operation and maintenance of the sanitary sewer collection system.

10.2.4.2 Maintenance of a collection system map

Describe how the District maintains and updates the existing GIS coverages and databases for the sanitary sewer collection system.

10.2.4.3 Management and use of information to establish and prioritize CMOM activities

Describe the District's information management systems used for tracking all CMOM-related information, including maintenance, rehabilitation, and emergency calls. Identify and illustrate trends in SSO events. A dynamic CMOM program should focus on approaches for planning, implementing, reviewing, evaluating, and taking appropriate actions in response to available information. The key to these approaches is the ability to disseminate information to managers in the field. Timely information is necessary for:

- Emergency response;
- Investigating problems and complaints that cause or may lead to overflows and determining an appropriate response;
- Scheduling and tracking inspections;
- Planning maintenance activities, schedules, and work orders;
- Managing parts, equipment, and tool inventories;
- Developing training plans and schedules;
- Tracking and preventing safety incidents;
- Planning staffing and budgeting;
- Identifying hydraulic and physical deficiencies and prioritizing responses; and
- Identifying programmatic deficiencies and developing appropriate responses.

10.2.4.4 Routine preventive, operation, and maintenance activities

Describe routine preventive operation and maintenance activities. A good preventive maintenance program is one of the best ways to keep a system in good repair and to prevent service interruptions and system failures that can result in overflows or back-ups. A preventive maintenance program also protects the capital investment in the collection system. Preventive maintenance activities involve:

- Routine inspection of the sanitary sewer collection system, including pump stations, and addressing noted problems;
- Planning for scheduled and systematic inspections of the collection system to determine current conditions and plan for maintenance and repairs;
- Planning for scheduled cleaning and repair of the collection system based on past performance history;
- Proper sealing and maintenance of manholes;
- Regular repair of deteriorating sewer lines;

- Remediation of poor construction;
- Inspection and maintenance of pump stations and other appurtenances; and
- A program to ensure that new sewers and connections are properly designed and constructed and that new connection of inflow sources are prohibited.

10.2.4.5 Appropriate training on a regular basis

Develop a training program for inspectors, operators, and maintenance personnel. Training programs should address emergency response, safety procedures and confined space entry, collection system operation and maintenance, and other training to ensure District collection system staff are adequately prepared to implement provisions of the CMOM program.

10.2.4.6 General and Critical equipment and replacement parts inventories

Include an inventory of equipment and replacement parts and a list of critical parts needed for collection system operation. Maintain an adequate replacement parts inventory, and provide proper storage facilities. The process for identifying critical parts should be based on a review of existing equipment and manufacturers' recommendations, supplemented by the experience of District collection system staff. The quantity and type of replacement parts will depend on size, age, and condition of the sewer collection system.

10.2.5 Design and Performance Provisions

The District is required to develop and implement programs to ensure new and rehabilitated sewers are properly designed and installed, and will not contribute to future SSO events or operation and maintenance problems. The District will be required to develop Design and Performance Standards to ensure:

- Requirements and standards are in place for the design and construction of new and rehabilitated of collection system components; and
- Procedures and specifications to ensure the inspection and testing of new and rehabilitated collection system components.

10.2.6 Monitoring, Measurement, and Program Modifications

Activities and methods to be used in evaluating CMOM program implementation should be specified. Standards for measuring and monitoring progress in program implementation should also be specified. Specific program elements should be modified as appropriate based upon performance evaluations. Resulting program modifications should be summarized and included in ongoing audits and the CMOM Program Summary. Satisfaction of this requirement will involve the development of performance indicators to describe and track CMOM program implementation.

10.2.7 Communication

Communication systems should be established in the CMOM program to allow interested parties to provide input to the District as the program is being developed and implemented. Communication systems may include public education and outreach programs, public notification, and public workshops. Communication systems should seek broad public input before major CMOM program components are developed and at key points during program implementation. A formal communications plan for the program should be included in the CMOM Program Summary.

10.3 System Evaluation and Capacity Assurance Plan (SECAP)

Most of the essential SECAP elements are addressed in the District's sanitary sewer collection system master plan. At a minimum, the SECAP must include a collection system evaluation, recommended capacity enhancement measures, and provide for future updates.

10.3.1 Collection System Evaluation

Evaluation of a sanitary sewer collection system should include a summary of steps planned or undertaken to identify and characterize hydraulic deficiencies contributing to SSOs. The scope of evaluation for each identified deficiency will vary depending on it's cause, nature, complexity, and severity.

The system evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system), provide capacity estimates for key system components, identify hydraulic deficiencies, identify components of the system with limiting capacity, and identify the major sources of inflow and infiltration contributing to SSO events. The evaluation should also include recommended remedial actions to address system deficiencies.

10.3.2 Capacity Assurance

Capacity assurance is the process of developing solutions to address hydraulic deficiencies identified during the sanitary sewer collection system evaluation. Under the proposed CMOM permit provision, permittees would be required to implement a program to assess the current capacity of the collection system and treatment facilities that they own or over which they have operation control (i.e. satellite collection systems).

Capacity enhancement measures should establish short and long term actions to correct each identified hydraulic deficiency contributing to SSOs. Short and long term actions for each hydraulic deficiency should include alternative analyses, a prioritization of recommended projects, and an implementation schedule.

10.3.3 Future SECAP Updates

Updates to the SECAP should be completed on a regularly scheduled basis to describe any significant change in proposed actions and/or implementation schedule. The SECAP should also be updated to reflect available information on the performance of implemented measures. It is recommended that hydraulic models used to identify deficiencies either be maintained on a continuous basis, or updated on the same regularly scheduled basis.

10.4 Overflow Emergency Response Plan

An Overflow Emergency Response Plan (OERP) provides a standardized course of action to be followed by collection system personnel during an SSO to protect public health and the environment. An up-to-date OERP is necessary to ensure that a municipality is adequately prepared to respond to an SSO event. The OERP should describe the protocols SSO response, remediation, and notification under varying scenarios. The public should be given access to review and comment on the OERP.

The OERP should identify measures to protect the public health and the environment for a broad range of potential collection system failures that could lead to an SSO. At a minimum, the OERP should ensure:

- Identification of all SSOs;
- Immediate response, emergency operations, and submittal of reports to appropriate personnel for investigation;
- Appropriate notification and reporting to the public, health officials, NPDES authority, and other affected entities;
- Personnel are aware of the OERP and properly trained in responding to an SSO; and
- Effective organization of emergency operations during an SSO.

10.5 Ongoing CMOM Program Audits

Ongoing audits are required to demonstrate CMOM program effectiveness to the NPDES permitting authority, health officials, and the public. The CMOM audit should include a discussion of CMOM program compliance with permit requirements, identified CMOM deficiencies, and necessary corrective measures. The audit should indicate the size of the sewer collection system and the quantity and severity of SSO events.

10.5.1 2005 Wastewater Facilities Master Plan Relevance to CMOM Program Compliance

Through the preparation of the *2005 Wastewater Facilities Master Plan*, certain elements of the CMOM program have been addressed by the District. In addition, the District recently completed a checklist to identify areas of the CMOM program that require further attention, attached as an appendix to this master plan. Probable components of the CMOM program addressed in the master plan, as well as those elements yet to be satisfied, are presented in Table 1. The summary table also provides recommendations for the District in order to satisfy the remaining components.

10.5.2 System Evaluation and Capacity Assurance Plan (SECAP)

Most of the essential SECAP elements have been addressed in the District's sanitary sewer collection system master plan. As Table 1 illustrates, the elements of two major SECAP components, Collection System Evaluation and Capacity Assurance, have been discussed

throughout this Wastewater Facilities Master Plan. Due to the pending nature of CMOM legislation, it remains uncertain which components of RCWD's wastewater system will be considered key components, and thereby require capacity limitations as a component of SECAP. Limitations for all lift stations and SRWRF have been provided in this Wastewater Facilities Master Plan. However, it is difficult to predict which trunk sewer lines comprise "key system elements." For this reason, the District has elected to show deficiencies for all District owned gravity mains in Existing, 2009 and the Ultimate (build-out) conditions. In addition, the District has identified specific projects in their Capital Improvements Program to mitigate each one of these deficiencies, in order to eliminate any future preventable SSOs. If, at a later date, it should be necessary to produce capacity elements for specific trunk sewer lines, the H20MAP hydraulic model, developed as part of this master planning effort, can be utilized to easily satisfy this requirement.

Table 10.1 – Summary Table of CMOM Criteria

CMOM Component	Description	Applicable Method/Activity Undertaken by RCWD	Location in 2005 Wastewater Facilities Master Plan	Future RCWD Action Recommended
CMOM PROGRAM SUMMARY	General compilation of information about the management, operation and maintenance of the sanitary sewer collection system.	N/A	N/A	N/A
Program Goals	The purpose and anticipated results of the CMOM program	Preparation of the *2005 Wastewater Facilities Master Plan.*	Section 10.2.1 lists typical goals.	RCWD should generate program goals specific to its sanitary sewer collection system as part of the final development of the CMOM program.
Organization	Identifies administration and management positions responsible for implementing the CMOM program, as well as operations and maintenance personal. Includes the chain of communication for reporting SSO events.	RCWD has created an organizational chart, which includes: • Up-to-date job descriptions; • Responsibilities of personnel; • Authority for each position. Organizational Structure (OC) is addressed on Page 6 of the CMOM checklist.	Organization chart not included in *Wastewater Facilities Master Plan*. The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	None
Legal Authority	Sufficient legal authority to implement an effective CMOM program includes: • Controlling inflow and infiltration (I/I); • Requiring sewers and connections to be properly designed and constructed; • Ensuring proper installation, testing, and inspection of new and rehabilitated sewers; • Addressing flows from municipal satellite collection systems; • Implementing the general and specific prohibitions of the national pretreatment program under 40 CFR 403.5	"Rules and Regulations Governing Sewer System Facilities and Services" as outlined in Exhibit "A" of *Ordinance No. 90-11-1*, as adopted on November 9, 1990 by the Board of Directors of the Rancho California Water District, governs the general and specific provisions regarding sewer facilities and sewer service in RCWD. Satellite communities are required to enter into agreements with RCWD. Satellite communities and sewer use ordinances (SUO) are addressed on page 5 of the CMOM checklist.	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	None
Measures and Activities Measures and Activities	Identified the measures, activities, person and/or position on the organization responsible for: • Maintenance of facilities • Maintenance of a collection system map • Management and use of information to establish and prioritize CMOM	Organizational chart identifies personnel/position responsible for maintenance of facilities and collection system map. System Mapping (MAP) is addressed on page 15 of the CMOM checklist. Management Information System (MIS) maintained by	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	None

Table 10.1 – Summary Table of CMOM Criteria

CMOM Component	Description	Applicable Method/Activity Undertaken by RCWD	Location in 2005 Wastewater Facilities Master Plan	Future RCWD Action Recommended
(cont.)	activities • Routine preventive, operation, and maintenance activities. • Appropriate training on a regular basis • General and Critical equipment and replacement parts inventories	RCWD tracks maintenance activities, and is addressed on page 14 of the CMOM checklist. Mandatory training (TR) for key personnel is addressed on page 9 of the CMOM checklist. Equipment and collection system maintenance (ESM) is addressed on page 12 of the CMOM checklist. Equipment parts inventory (EPI) is addressed on page 13 of the CMOM checklist.		
Design and Performance Provisions	Develop and implement programs to ensure new and rehabilitated sewers are properly designed and installed, and will not contribute to future SSO events or operation and maintenance problems.	Design criteria, testing and inspection procedures for new and rehabilitated sewers are outlined in RCWD's Sewer System Design Criteria. Engineering design (ED) is addressed on page 4 of the CMOM checklist. *Section 3 – Wastewater System Design Criteria* details the design criteria utilized for the purposes of this *Wastewater Facilities Master Plan*.	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	None
Monitoring, Measurement and Program Modifications	Activities and methods to be used in evaluating CMOM program implementation should be specified. Standards for measuring and monitoring progress in program implementation should also be specified. Involves the development of performance indicators to describe and track CMOM program implementation.	None	None	RCWD should establish monitoring, measurement and CMOM program modifications upon adopting their CMOM program.
Communication Communication (cont)	Communication systems should be established in the CMOM program to allow interested parties to provide input to the City as the program is being developed and implemented.	Internal communications (IC) are addressed on page 7 of the CMOM checklist. Customer Service (CS) is addressed on Page 11 of the CMOM checklist. Communications between the public and RCWD can occur via telephone, e-mail, fax, mail, in-person at RCWD's headquarters, or at the monthly RCWD Board meetings.	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	RCWD should develop a specific communications plan to be included in their CMOM program.
SECAP	Includes a collection system evaluation, recommended capacity enhancement	N/A	N/A	N/A

Table 10.1 – Summary Table of CMOM Criteria

CMOM Component	Description	Applicable Method/Activity Undertaken by RCWD	Location in 2005 Wastewater Facilities Master Plan	Future RCWD Action Recommended
	measures, and provides for future updates.			
Collection System Evaluation	Identifies and characterizes hydraulic deficiencies contributing to SSOs. The system evaluation must include: • Estimates of peak flows (including flows from SSOs that escape from the system); • Capacity estimates for key system components; • Identify hydraulic deficiencies, components of the system with limiting capacity, and the major sources of inflow and infiltration contributing to SSO events. • Recommends remedial actions to address system deficiencies.	Peaking factors are presented in *Section 3 – Wastewater System Design Criteria,* and peak flows are utilized in developing the hydraulic model scenarios presented in *Section 7 – Sewer System Model Development*. Capacity estimates for all pump stations are addressed in *Section 6.1.1 – Wastewater Lift Stations*, and capacity estimates for the SRWRF are presented in *Section 5 – Santa Rosa Reclamation Facility Evaluation*. Hydraulic Deficiencies are presented in *Section 6.2 – Proposed Facility Improvements.* The methodology for Estimating Infiltration and Inflow is detailed in *Section 3 – Wastewater System Design Criteria*, and is utilized in the development of the hydraulic model presented in *Section 7 – Sewer System Model Development*. Actions necessary to mitigate all deficiencies and SSOs are presented in *Section 8 – Capital Improvement Program*. Recent SSOs are discussed on page 21 (TRK) of the CMOM checklist.	The following Sections are components of this *Wastewater Facilities Master Plan*: • *Section 3 – Wastewater System Design Criteria* • *Section 6 – Existing Wastewater Facilities and Wastewater System Analysis* • *Section 7 – Sewer System Model Development* • *Section 8 – Capital Improvement Program.* The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	RCWD should generate capacity estimates for the major trunk sewer lines comprising their wastewater collection system during the preparation of their CMOM program.
Capacity Assurance	Assess the current capacity of the collection system and treatment facilities, and address the hydraulic deficiencies identified during the sanitary sewer collection system evaluation. Establish short and long term actions to correct each deficiency contributing to SSOs, including alternative analyses, a prioritization of recommended projects, and an implementation schedule.	Hydraulic deficiencies for all collection facilities are addressed in *Section 6.2 – Proposed Facility Improvements*. Capacity estimates for the Santa Rosa Water Reclamation Facility are addressed in *Section 5 – Santa Rosa Reclamation Facility Evaluation*. Actions necessary to mitigate all deficiencies and SSOs, as well as their prioritization based on time (phasing/implementation schedule), are presented in *Section 8 – Capital Improvement Program.*	The following Sections are components of *this Wastewater Facilities Master Plan*: • *Section 5 – Santa Rosa Reclamation Facility Evaluation* • *Section 6 – Existing Wastewater Facilities and Wastewater System Analysis* • *Section 8 – Capital Improvement Program* The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	RCWD should generate capacity estimates for the major trunk sewer lines comprising their wastewater collection system during the preparation of their CMOM program.
Future SECAP Updates	Describes any significant change in proposed actions and/or implementation schedule. The	SECAP Updates will be addressed in future Wastewater Facilities Master Plans commissioned by RCWD.	This Wastewater Facilities Master Planning effort.	Continue commissioning Wastewater Facilities Master Plans as necessary.

Table 10.1 – Summary Table of CMOM Criteria

CMOM Component	Description	Applicable Method/Activity Undertaken by RCWD	Location in 2005 Wastewater Facilities Master Plan	Future RCWD Action Recommended
	SECAP should also be updated to reflect available information on the performance of implemented measures.			
OVERFLOW EMERGENCY RESPONSE PLAN	Provides a standardized course of action to be followed by collection system personnel during an SSO to protect public health and the environment. The OERP should describe the protocols SSO response, remediation, and notification under varying scenarios. At a minimum, the OERP should ensure: • Identification of all SSOs; • Immediate response, emergency operations, and submittal of reports to appropriate personnel for investigation; • Appropriate notification and reporting to the public, health officials, NPDES authority, and other affected entities; • Personnel are aware of the OERP and properly trained in responding to an SSO; • Effective organization of emergency operations during an SSO.	The overflow emergency response plan (OERP) is addressed on page 22 of the CMOM checklist. RCWD has a documented an OERP available for utility staff to use.	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	None
ONGOING CMOM AUDITS	Includes a discussion of CMOM program compliance with permit requirements, identified CMOM deficiencies, and necessary corrective measures. The audit should indicate the size of the sewer collection system and the quantity and severity of SSO events.	The size of the collection system (Collection System Design) is addressed on pages 2 and 3 of the CMOM checklist. The size and severity of recent SSO events (TRK) is addressed on page 21 of the CMOM checklist.	The CMOM checklist is located in an appendix to this *Wastewater Facilities Master Plan*.	Upon implementation of a CMOM program, RCWD should develop an appropriate audit program.

References

Montgomery Watson, *Wastewater Facilities Master Plan*, Rancho California Water District, September 1997.

Rancho California Water District, *Sewer System Facility Requirements*, Rancho California Water District, January 1992.

Appendix A

CMOM Checklist Completed by District in June 2004

Appendix A – CMOM Checklist Completed by RCWD in 2004

General Information

CHECKLIST COMPLETED BY:

Name: Michael Calvert

Date: 6/8/04

Daytime Telephone Number: 909 296 6965

UTILITY CONTACT INFORMATION

Utility Name: Rancho CA Water District

LOCATION

Street Address: P.O. Box 9017

Street Address (continued):

City, State, Zip: Temecula CA 92589-9017

STAFF

Name: Michael Calvert

Title: Water Reclamation Manager

Email: CalvertM@ranchowater.com

Phone: 909 296 6965 Fax: 909 698 5839

PERMITTED TREATMENT & COLLECTION FACILITIES

NPDES or STATE PERMIT #	PERMITTEE/CO-PERMITTEE/JURISDICTIONS	WWTP Effluent	Collection System	WWTP Facility
94-92		☒	☐	☐
96-04		☐	☒	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐

Page 1

Collection System Description

SYSTEM INVENTORY

1 (NUMBER) # of Treatment facilities

Treatment Facilities

WWTP design capacity	5.0 MGD
Average daily flow	2.7 MGD
Average dry weather fow	2.7 MGD

Access & Maintenance

Manholes	1620 NUMBER
Number of air vacuum relief valves	3 NUMBER

Conveyance & Pumping

	Gravity Sewers	Force Mains	Pump Stations
Pipes and pumps Length/quantity	65 MILES	11.6 MILES	4 NUMBER
Age of system 0 - 25 years old	100 % PERCENT	100 % PERCENT	100 % NUMBER
26 - 50 years old	% PERCENT	% PERCENT	% NUMBER
51 - 75 years old	% PERCENT	% PERCENT	% NUMBER
>76 years old	% PERCENT	% PERCENT	% NUMBER

Number of inverted siphons 0

SERVICE AREA CHARACTERISTICS

Service area	3,915 ACRES
Service population	13,320 PEOPLE
Annual precipitation	13" INCHES

Number of Service Connections

Residential		Commercial		Industrial		TOTAL
5,128 NUMBER	+	96 NUMBER	+	32 NUMBER	=	5,256 NUMBER

Collection system service lateral responsibility *(check one)*

- ☐ At main line connection only
- ☒ From main line to property line or easement/cleanout
- ☐ Beyond property line/clean out
- ☐ Other: _____

Combined Sewer Systems

What percent of sewer system is served by combined sewers (i.e., sanitary sewage and storm water in the same pipe)? 0% PERCENT

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Collection System Description

	Gravity Sewers	Force Mains
8 inches or less	68 %	15 %
9 - 18 inches	24 %	85 %
19 - 36 inches	8 %	0 %
>36 inches	0 %	0 %

	Gravity Sewers	Force Mains
Prestressed concrete cylinder pipe (PCCP)	%	%
High density polyethylene (HDPE)	%	%
Reinforced concrete pipe (RCP)	%	%
Polyvinylchloride (PVC)	41 %	100%
Vitrified clay pipe (VCP)	57 %	
Ductile iron	2 %	%
Non-reinforced concrete pipe	%	%
Asbestos cement pipe	%	%
Cast iron	%	%
Brick	%	%
Fiberglass	%	%
Other (*Explain*) _____	%	%

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Engineering Design (ED)

ED-01	Is there a document which includes design criteria and standard construction details?	☒ YES	☐ NO
ED-02	Is there a document that describes the procedures that the utility follows in construction design review?	☒ YES	☐ NO
ED-03	Are WWTP and O&M staff involved in the design review process?	☒ YES	☐ NO
ED-04	Is there a procedure for testing and inspecting new or rehabilitated system elements both during and after the construction is completed?	☒ YES	☐ NO
ED-05	Are construction sites supervised by qualified personnel (such as professional engineers or certified engineering technicians) to ascertain that the construction is taking place in accordance with the agreed upon plans and specifications?	☒ YES	☐ NO
ED-06	Are new manholes tested for inflow and infiltration?	☐ YES	☒ NO
ED-07	Are new gravity sewers checked using closed circuit TV inspection?	☒ YES	☐ NO
ED-08	Does the utility have documentation on private service lateral design and inspection standards?	☐ YES	☒ NO
ED-09	Does the utility attempt to standardize equipment and sewer system components?	☒ YES	☐ NO

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Satellite Communities and Sewer Use Ordinance (SUO)

SUO-01	Does the utility receive flow from satellite communities? IF NO, GO TO PAGE 6	YES	NO
SUO-02	What is the total area from satellite communities that contribute flow to the collection system? *(Acres or square miles)*		
SUO-03	Does the utility require satellite communities to enter into an agreement? IF NO, GO TO QUESTION SUO-06.	YES	NO
SUO-04	Does the agreement include the requirements listed in the sewer use ordinance (SUO)?	YES	NO
SUO-05	Do the agreements have a date of termination and allow for renewal under different terms?	YES	NO
SUO-06	Does the utility maintain the legal authority to control the maximum flow introduced into the collection system from satellite communities?	YES	NO
SUO-07	Are standards, inspections, and approval for new connections clearly documented in a SUO?	YES	NO
SUO-08	Does the SUO require satellite communities to adopt the same industrial and commercial regulator discharge limits as the utility?	YES	NO
SUO-09	Does the SUO require satellite communities to adopt the same inspection and sampling schedules as required by the pretreatment ordinance?	YES	NO
SUO-10	Does the SUO require that satellite communities or the utility to issue control permits for significant industrial users?	YES	NO
SUO-11	Does the SUO contain provisions for addressing overstrength wastewater from satellite communities?	YES	NO

SUO-12 Does the SUO contain procedures for the following? *(Check all that apply)*

- [X] Inspection standards
- [X] Pretreatment requirements
- [X] Building/sewer permit issues

SUO-13 Does the SUO contain general prohibitions of the following materials? *(Check all that apply)*

- [X] Fire and explosions hazards
- [X] Corrosive materials
- [X] Obstructive materials
- [X] Oils or petroleum
- [X] Material which may cause interference at the wastewater treatment plant

SUO-14 Does the SUO contain procedures and enforcement actions for the following? *(Check all that apply)*

- [X] Fats, oils, and grease (FOG)
- [X] Storm water connections to sanitary lines (downspouts)
- [X] Infiltration and inflow
- [ ] Defects in service laterals located on private property
- [ ] Building structures over the sewer lines
- [X] Sump pumps, air conditioner connections

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Organizational Structure (OC)

OC-01	Is an organizational chart available that shows the overall personnel structure for the utility, including operation and maintenance staff?	☒ YES	☐ NO
OC- 02	Are up-to-date job descriptions available that delineate responsibilities and authority for each position?	☒ YES	☐ NO

OC-03 Are the following items discussed in the job descriptions? *(Check all that apply)*

- ☒ Nature of work to be performed
- ☒ Examples of the types of work
- ☒ Minimum requirements for the position
- ☒ List of licenses required for the position
- ☒ Necessary special qualifications or certifications
- ☒ Performance measures or promotion potential

OC-04	What percent of staff positions are currently vacant?	0 %
OC-05	On average how long do positions remain vacant? *(months)*	2
OC-06	What percent of utility work is contracted out?	0 %

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Internal Communications (IC)

IC-01 Which of the following methods are used to communicate with utility staff? *(Check all that apply)*

☒ Regular meetings ☒ Bulletin board ☒ E-mail ☒ Other (walkie talkie/pager)

IC-02 How often are staff meetings held? *(e.g., Daily, Weekly, Monthly, etc.)* Daily

IC-03 Are incentives offered to employees for performance improvements? YES ☒ NO

IC-04 Does the utility have an "Employee of the Month/Quarter/Year" program? YES NO ☒

IC-05 How often are performance reviews conducted? *(e.g. Semi-annually, Annually, etc.)* Annually

IC-06 Does the utility regularly communicate/coordinate with other municipal departments? YES NO ☒

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Budgeting (BUD)

BUD-01	What is the average annual fee for residential users?	$ 300
BUD-02	How often are user charges evaluated and adjusted? *(e.g. annually, biannually, etc.)*	annually
BUD-03	Are utility-generated funds used for non-utility programs?	YES [ ] NO [X]
BUD-04	Are costs for collection system operation and maintenance (O&M) separated from other utility services such as water, storm water, and treatment plants? IF NO, GO TO QUESTION BUD-07.	YES [X] NO [ ]
BUD-05	What is your average annual (O&M) budget?	$ 220,000
BUD-06	What percentage of the utility's overall budget is allocated to maintenance of the collection system?	5 %
BUD-07	Does the utility have a Capital Improvement Plan (CIP) that provides for system repairs/replacements on a prioritized basis?	YES [X] NO [ ]
BUD-08	What is your average annual CIP budget?	$ 350,000
BUD-09	What percentage of the maintenance budget is allotted to the following maintenance?	
	Predictive maintenance (tracking design, life span, and scheduled parts replacements)	0 %
	Preventive maintenance (identifying and fixing system weaknesses which, if left unaddressed, could lead to overflows)	1 %
	Corrective maintenance (fixing system components that are functioning but not at 100% capacity/efficiency, for example partially blocked lines)	10 %
	Emergency maintenance (reactive maintenance, overflows, equipment breakdowns)	10 %
BUD-10	Does the utility have a budgeted program for the replacement of under-capacity pipes?	YES [ ] NO [X]
BUD-11	Does the utility have a budgeted program for the replacement of over-capacity pipes?	YES [X] NO [ ]

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Training (TR)

TR-01	Does the utility have a formal job knowledge, skills, and abilities (KSA) training program?	YES	NO
TR-02	Does the training program address the fundamental mission, goals, and policies of the utility?	YES	NO
TR-03	Does the utility have mandatory training requirements identified for key employees?	YES	NO
TR-04	What percentage of employees met or exceeded their annual training goals during the past year?	100 %	

TR-05 Does the utility provide training in the following areas? *(Check all that apply)*

- [x] Safety
- [x] Traffic control
- [ ] Public relations
- [ ] Routine line maintenance
- [ ] Record keeping
- [x] SSO/Emergency response
- [x] Confined space entry
- [ ] Electrical and instrumentation
- [x] Pump station operations and maintenance
- [ ] Other
- [ ] Pipe repair
- [x] CCTV and trench/shoring
- [ ] Bursting CIPP

TR-06	Are operator and maintenance certification programs used? IF NO, GO TO QUESTION TR-08	YES	NO
TR-07	Are operator and maintenance certification programs required?	YES	NO
TR-08	Is on-the-job training progress and performance measured?	YES	NO

TR-09 Which of the following methods are used to assess the effectiveness of the training? *(Check all that apply)*

- [ ] None
- [ ] Periodic testing
- [ ] Drills
- [x] Demonstrations

TR-10 What percentage of the training offered by the utility is in the form of the following?

Manufacturer training 25 %

In-house classroom training 0 %

On-the-job training 50 %

Industry-wide training 25 %

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Safety (SAF)

SAF-01	Does the utility have a written safety policy?	☒ YES	☐ NO
SAF-02	How often are safety procedures reviewed and revised? *(e.g. Semiannually, Annually, etc.)* 3-5 years	☐ YES	☐ NO
SAF-03	Does the utility have a safety committee?	☒ YES	☐ NO
SAF-04	Are regular safety meetings held with the utility employees?	☒ YES	☐ NO
SAF-05	Does the utility have a safety training program?	☒ YES	☐ NO
SAF-06	Are records of employee safety training kept up to date?	☒ YES	☐ NO

SAF-07 Does the utility have written procedures for the following? *(Check all that apply)*

- ☒ Lockout/tagout
- ☒ Material safety data sheets (MSDS)
- ☒ Chemical handling
- ☒ Confined spaces permit program
- ☒ Trenching and excavations safety
- ☒ Biological hazards in wastewater
- ☒ Traffic control and work site safety
- ☒ Electrical and mechanical systems
- ☒ Pneumatic and hydraulic systems safety

SAF-08 What is your agency's lost-time injury rate? 4.1 % or _____ hours

SAF-09 Are the following equipment items available and in adequate supply? *(Check all that apply)*

- ☒ Rubber/disposable gloves
- ☒ Confined space ventilation equipment
- ☒ Hard hats, safety glasses, rubber boots
- ☒ Antibacterial soap and first aid kit
- ☒ Tripods or non-entry rescue equipment
- ☒ Fire extinguishers
- ☒ Equipment to enter manholes
- ☒ Portable crane/hoist
- ☒ Atmospheric testing equipment and gas detectors
- ☒ Oxygen sensors
- ☒ H_2S Monitors
- ☒ Full body harness
- ☒ Protective clothing
- ☒ Traffic/public access control equipment
- ☒ 5-minute escape breathing devices
- ☒ Life preservers for lagoons
- ☒ Safety buoy at activated sludge plants
- ☒ Fiberglass or wooden ladders for electrical work
- ☒ Respirators and/or self contained breathing apparatus
- ☒ Methane gas or optical vector (GVA) analyzer
- ☒ Lower explosion limit (LEL) metering

SAF-10 Are safety monitors clearly identified? ☒ YES ☐ NO

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Customer Service (CS)

CS-01	Does the utility have a customer service and public relations program? IF NO GO TO QUESTION CS-03	YES ☒	NO ☐
CS-02	Does the customer service program include giving formal presentations on the wastewater field to the following? *(Check all that apply)* ☒ Schools and universities ☐ Local officials ☐ Media ☐ Building Inspector(s) ☒ Community gatherings ☐ Businesses ☒ Citizens ☐ Public utility officials		
CS-03	Are employees of the utility specifically trained in customer service?	YES ☒	NO ☐
CS-04	Are there sample correspondence, Q/A's, or "scripts" to help guide staff through written or oral responses to customers?	YES ☐	NO ☒
CS-05	What methods are used to notify the public of major construction or maintenance work? *(Check all that apply)* ☐ Door hangers ☒ Newspaper ☒ Fliers ☒ Signs ☐ Other ☐ None ☐ Public radio or T.V. announcements		
CS-06	Is a homeowner notified prior to construction that his/her property may be affected?	YES ☒	NO ☐
CS-07	Do you provide information to residents on cleanup and safety procedures following basement backups and overflows from manholes when they occur?	YES ☒	NO ☒
CS-08	Does the utility have a customer service evaluation program to obtain feedback from the community?	YES ☐	NO ☒
CS-09	Do customer service records include the following information? *(Check all that apply)* ☐ Personnel who received the complaint or request ☐ Name, address, and telephone number of customer ☐ Nature of the complaint or request ☐ Location of the problem ☐ To whom the follow-up action was assigned ☐ Date the follow up action was assigned ☐ Date of the complaint or request ☐ Cause of the problem ☐ Date the complaint or request was resolved ☐ Feedback to customer ☐ Total days to end the problem		
CS-10	Does the utility have a goal for how quickly customer complaints (or emergency calls) are resolved? IF NO, GO TO THE NEXT PAGE.	YES ☐	NO ☒
CS-11	What percentage of customer complaints (or emergency calls) are resolved within the timeline goals?		%

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Equipment and Collection System Maintenance (ESM)

ESM-01	Is a maintenance card or record kept for each piece of mechanical equipment within the collection system? IF NO, GO TO QUESTION ESM-03.	YES ☒	NO ☐
ESM-02	Do equipment maintenance records include the following information? *(Check all that apply)* ☒ Maintenance recommendations ☒ Instructions on conducting the specific maintenance activity ☒ Other observations on the equipment ☒ Maintenance schedule ☒ A record of maintenance on the equipment to date		
ESM-03	Are dated tags used to show out-of-service equipment?	YES ☒	NO ☐
ESM-04	Is there an established system for prioritizing equipment maintenance needs?	YES ☒	NO ☐
ESM-05	What percent of repair funds are spent on emergency repairs?		___ %
ESM-06	Are corrective repair work orders backlogged more than six months?	YES ☐	NO ☒
ESM-07	Do collection system personnel coordinate with state, county, and local personnel on repairs, before the street is paved?	YES ☐	NO ☒

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Equipment Parts Inventory (EPI)

EPI-01	Have critical spare parts been identified?	YES	NO
EPI-02	Are adequate supplies on hand to allow for two point repairs in any part of the system?	YES	NO
EPI-03	Is there a parts standardization policy in place?	YES	NO
EPI-04	Does the utility have a central location for storing spare parts?	YES	NO
EPI-05	Does the utility maintain a stock of spare parts on its maintenance vehicles?	YES	NO
EPI-06	Does the utility have a system in place to track and maintain an accurate inventory of spare parts?	YES	NO
EPI-07	For those parts which are not kept in inventory, does the utility have a readily available source or supplier?	YES	NO

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Management Information System (MIS)

MIS-01	Does the utility have a management information system (MIS) in place for tracking maintenance activities? *(Either electronic or good paper files)* IF NO, GO TO PAGE 15.	YES ☒	NO ☐
MIS-02	Are the MIS records maintained for a period of at least three years?	YES ☒	NO ☐
MIS-03	Is the MIS able to distinguish activities taken in response to an overflow event?	YES ☐	NO ☒

MIS-04 Are there written instructions for managing and tracking the following information? *(Check all that apply)*

- ☐ Complaint work orders
- ☒ Scheduled inspections
- ☐ Compliance/overflow tracking
- ☒ Scheduled work orders
- ☒ Sewer system inventory
- ☒ Equipment/tools tracking
- ☐ Customer service
- ☐ Safety incidents
- ☐ Parts inventory
- ☒ Scheduled preventive maintenance
- ☒ Scheduled monitoring/sampling

MIS-05 Do the written instructions for tracking procedures include the following information? *(Check all that apply)*

- ☒ Accessing data and information
- ☒ Updating the MIS
- ☒ Instructions for using the tracking system
- ☒ Developing and printing reports

MIS-06 How often is the management information system updated? *(Check one)*

- ☐ Immediately
- ☐ Within one week of the incident
- ☒ Monthly
- ☐ As time permits

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System Mapping (MAP)

MAP-01 Are "as built" plans (record drawings) or maps available for use by field crews in the office and in the field? [X] YES [ ] NO

MAP-02 Is there a procedure for field crews to record changes or inaccuracies in the maps and update the mapping system? [X] YES [ ] NO

MAP-03 Do the maps show the date the map was drafted and the date of the last revision? [X] YES [ ] NO

MAP-04 Do the sewer line maps include the following? *(Check all that apply)*

- [X] Scale
- [X] North arrow
- [X] Date the map was drafted
- [X] Date of last revision
- [X] Service area boundaries
- [X] Property lines
- [X] Other landmarks (Roads, water bodies, etc.)
- [X] Manhole and other access points
- [X] Location of building laterals
- [X] Street names
- [ ] SSOs occurrences/CSOs outfalls
- [X] Flow monitors
- [X] Force mains
- [X] Pump stations
- [X] Lined sewers
- [X] Main, trunk, and interceptor sewers
- [X] Easement lines and dimensions
- [X] Pipe material
- [X] Pipe diameter
- [X] Installation date
- [X] Slope
- [X] Manhole rim elevation
- [X] Manhole coordinates
- [X] Manhole invert elevation
- [X] Distance between manholes

MAP-05 Are the following sewer attributes recorded? *(Check all that apply)*

- [X] Size
- [X] Shape
- [X] Invert elevation
- [X] Material
- [X] Separate/combined sewer
- [X] Installation Date

MAP-06 Are the following manhole attributes recorded? *(Check all that apply)*

- [X] Shape
- [X] Type (e.g., precast, cast in place, etc.)
- [X] Depth
- [X] Age
- [X] Material

MAP-07 Is there a systematic numbering and identification method/system established to identify sewer system manhole, sewer lines, and other items (pump stations, etc.)? [X] YES [ ] NO

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Internal TV Inspection (TVI)

TVI-01	Does the utility have a standardized pipeline condition assessment program?	YES ☒	NO ☐
TVI-02	Is internal TV inspection used to perform condition assessment? IF NO, GO TO PAGE 17.	YES ☒	NO ☐
TVI-03	Are there written operation procedures and guidelines for the internal TV inspection program?	YES ☒	NO ☐

TVI-04 Do the internal TV record logs include the following? *(Check all that apply)*

- ☒ Pipe size, type, length, and joint spacing
- ☒ Distance recorded by internal TV
- ☒ Results of the internal TV inspection (including a structural rating)
- ☒ Internal TV operator name
- ☒ Cleanliness of the line
- ☒ Location and identification of line being televised by manholes

TVI-05	Is a rating system used to determine the severity of the defects found during the inspection process?	YES ☒	NO ☐
TVI-06	Is there documentation explaining the codes used for internal TV results reporting?	YES ☒	NO ☐

TVI-07 Approximately what percent of the total defects determined by TV inspection during the past 5 years were the following?

Failed coatings or linings	0 %	Line deflection	32 %
House connection leaks	0 %	Joint separation	1 %
Illegal connections	0 %	Crushed pipes	0 %
Pipe corrosion (H_2S)	1 %	Collapsed pipes	0 %
Fats, oil, and grease	26 %	Offset joints	1 %
Broken pipes	0 %	Root intrusions	7 %
Debris	29 %	Minor cracks	3 %
Other	0 %		

TVI-08	Are main line and lateral repairs checked by internal TV inspection after the repair(s) have been made?	YES ☒	NO ☐

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Sewer Cleaning (CLN)

CLN-01	What is the system cleaning frequency? (the entire system is cleaned every "X" years)	1
CLN-02	What is the utility's plan for system cleaning (% or frequency in years)?	Lea Plan
CLN-03	What percent of the sewer lines are cleaned, even high/repeat cleaning trouble spots, during the past year? Entire system annually trouble spots quarterly	%
CLN-04	Is there a program to identify sewer line segments, with chronic problems, that should be cleaned on a more frequent schedule?	YES ☒ NO ☐
CLN-05	Does the utility have a root control program? (PERFORMED ON A AS-NEEDED BASIS)	YES ☐ NO ☒
CLN-06	Does the utility have a fats, oils, and grease (FOG) program?	YES ☒ NO ☐
CLN-07	What is the average number of stoppages experienced per mile of sewer pipe per year?	>1 %
CLN-08	Has the number of stoppages increased, decreased, or stayed the same over the past 5 years? ☐ Increased ☒ Decreased ☐ Stayed the same	
CLN-09	Are stoppages plotted on maps and correlated with other data such as pipe size and material or location?	YES ☒ NO ☐
CLN-10	Do the sewer cleaning records include the following information? *(Check all that apply)* ☒ Date and time ☒ Method of cleaning ☒ Identity of cleaning crew ☒ Cause of stoppage ☒ Location of stoppage or routine cleaning activity ☒ Further actions necessary/initiated	
CLN-11	If sewer cleaning is done by a contractor are videos taken of before and after cleaning?	YES ☒ NO ☐

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Manhole Inspection and Assessment (MAN)

MAN-01	Does the utility have a routine manhole inspection and assessment program? IF NO, GO TO QUESTION MAN-06.	☒ YES	☐ NO
MAN-02	Are the results and observations from the routine manhole inspections recorded?	☒ YES	☐ NO
MAN-03	Does the utility have a goal for the number of manholes inspected annually?	☐ YES	☒ NO
MAN-04	How many manholes were inspected during the past year?	800	

MAN-05 Do the records for manhole/pipe inspection include the following? *(Check all that apply)*

- ☒ Conditions of the frame and cover
- ☒ Evidence of surcharge
- ☒ Offsets or misalignments
- ☐ Atmospheric hazards measurements (especially hydrogen sulfide)
- ☒ Details on the root cause of cracks or breaks in the manhole or pipe including blockages
- ☒ Recording conditions of (corbel, walls, bench, trough, and pipe scale)
- ☐ Presence of corrosion
- ☐ If repair is necessary
- ☒ Manhole identifying number/location
- ☐ Wastewater flow characteristics (flowing freely or backed up)
- ☒ Accumulations of grease, debris, or grit
- ☐ Presence of infiltration, location, and estimated quantity
- ☒ Inflow from manhole covers

MAN-06	Does the utility have a grouting program? (PERFORMED ON AN AS-NEEDED BASIS)	☐ YES	☒ NO

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Pump Stations (PS)

PS-01	Are Standard Operation Procedures (SOPs) and Standard Maintenance Procedures (SMPs) used for each pump station?	YES	NO
PS-02	Are there enough trained personnel to properly maintain all pump stations?	YES	NO
PS-03	Is there an emergency operating procedure for each pump station?	YES	NO
PS-04	Is there an alarm system to notify personnel of pump station failures and overflow?	YES	NO
PS-05	Percent of pump stations with back up power sources	100 %	
PS-06	Does the utility use the following methods when loss of power occurs? *(Check all that apply)* ☑ On-site electrical generators ☑ Portable electric generators ☑ Alternate power source ☐ Other ☑ Vacuum trucks to bypass pump station		
PS-07	Is there a procedure for manipulating pump operations (manually or automatically) during wet weather to increase in-line storage of wet weather flows?	YES	NO
PS-08	Are wet well operating levels set to limit pump start/stops?	YES	NO
PS-09	Are the lead, lag, and backup pumps rotated regularly?	YES	NO
PS-10	Are operation logs maintained for all pump stations?	YES	NO
PS-11	Are the original manuals that contain the manufacturers recommended maintenance schedules for all pump station equipment easily available?	YES	NO
PS-12	On average, how often were pump stations inspected during the past year? Weekly	YES	NO
PS-13	Are records maintained for each inspection?	YES	NO
PS-14	Average annual labor hours spent on pump station inspection	48	
PS-15	Percent of pump stations with pump capacity redundancy	100 %	
PS-16	Percent of pump stations with dry weather capacity limitations	0 %	
PS-17	Percent of pump stations with wet weather capacity limitations	0 %	
PS-18	Percent of pump stations calibrated annually	100 %	
PS-19	Percent of pump stations with permanent flow meters	0 %	

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Capacity Assessment (CA)

CA-01	Does the utility have a flow monitoring program?	YES ☒	NO ☐
CA-02	Does the utility have a comprenhensive capacity assessment and planning program?	YES ☒	NO ☐
CA-03	Are flows measured prior to allowing new connections?	YES ☒	NO ☐
CA-04	Do you have a tool (hydraulic model, spreadsheet, etc.) for assessing whether adequate capacity exists in the sewer system? IF NO, GO TO QUESTION CA-06.	YES ☒	NO ☐
CA-05	Does your capacity assessment tool produce results consistent with conditions observed in the system?	YES ☒	NO ☐
CA-06	What is the ratio of peak wet weather flow to average dry weather flow at the wastewater treatment plant?	1.74	
CA-07	How many permanent flow meters are currently in the system? *(Include meters at pump stations and wastewater treatment plants)*	10	
CA-08	How frequently are the flow meters checked? *(e.g. Daily, Weekly, Monthly, etc.)*	Monthly	
CA-09	Do the flow meter checks include the following? *(Check all that apply)* ☒ Independent water level ☒ Velocity reading ☒ Downloading data ☒ Checking the desiccant ☒ Cleaning away debris ☒ Battery condition		
CA-10	Are records maintained for each inspection? IF NO, GO TO QUESTION CA-12.	YES ☒	NO ☐
CA-11	Do the flow monitoring records include the following? *(Check all that apply)* ☒ Descriptive location of flow meter ☒ Frequency of flow meter inspection ☒ Type of flow meter ☒ Frequency of flow meter calibration		
CA-12	Does the utility maintain any rain gauges or have access to local rainfall data?	YES ☒	NO ☐
CA-13	Does the utility have any wet weather capacity problems?	YES ☒	NO ☐
CA-14	Are low points or flood-plain areas monitored during rain events?	YES ☒	NO ☐
CA-15	Does the utility have any dry weather capacity problems?	YES ☐	NO ☒
CA-16	Is flow monitoring used for billing purposes, capacity analysis, and/or inflow and infiltration investigations?	YES ☒	NO ☐

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Tracking SSOs (TRK)

TRK-01 How many SSO events have been reported in the past 5 years? 3

TRK-02 What percent of the SSOs were less than 1,000 gallons in the past 5 years ? 100 %

TRK-03 Does the utility document and report all SSOs regardless of size? YES [X] NO [ ]

TRK-04 Does the utility document basement backups? YES [ ] NO [X]

TRK-05 Are there areas that experience frequent basement or street flooding? YES [ ] NO [X]

TRK-06 Approximately what percent of SSOs discharges were from each of the following in the last 5 years?

Manholes 100 % Main and trunk sewers ___ % Structural bypasses ___ %

Pump stations ___ % Lateral and branch sewers ___ %

TRK-07 Approximately what percent of SSOs discharges were caused by the following in the last 5 years?

Debris buildup 33 % Root intrusion 33 % Excessive infiltration and inflow 0 %

Collapsed pipe 0 % Capacity limitations 0 % Fats, oil, and grease 0 %

Vandalism 33 %

TRK-07A What percentage of SSOs were released to:

Soil 66 % Basements 0 % Paved area 0 %

Surface water (rivers/lakes/streams) 33 % Coastal ocean, beaches 0 %

TRK-07B For surface water releases, what percent are to areas that could affect: N/A

Contact recreation (beaches, swimming, areas) ___ % Drinking water sources ___ %

Shellfish growing areas ___ %

TRK-08 How many chronic SSO locations are in the collection system? 0

TRK-09 Are pipes with chronic SSOs being monitored for sufficient capacity and/or structural condition? YES [ ] NO [ ] N/A

TRK-10 Prior to collapse, are structurally deteriorating pipelines being monitored for renewal or replacement? YES [X] NO [ ]

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Overflow Emergency Response Plan (OERP)

OERP-01	Does the utility have a documented OERP available for utility staff to use? IF NO, GO TO QUESTION OERP-04.	YES ☒	NO ☐
OERP-02	How often is the OERP reviewed and updated? *(Annually, Biannually, etc.)*	Annually	
OERP-03	Are specific responsibilities detailed in the OERP for personnel who respond to emergencies?	YES ☒	NO ☐
OERP-04	Are staff continuously trained and drilled to respond to emergency situations?	YES ☒	NO ☐
OERP-05	Do work crews have immediate access to tools and equipment during emergencies?	YES ☒	NO ☐
OERP-06	Does the utility have standard procedures for notifying state agencies, local health departments, the NPDES authority, the public, and drinking water authorities of significant overflow events?	YES ☒	NO ☐
OERP-07	Does the procedure include a current list of the names, titles, phone numbers, and responsibilities of all personnel involved?	YES ☒	NO ☐
OERP-08	Does the utility have a public notification plan?	YES ☒	NO ☐
OERP-09	Does the utility have procedures to limit public access to and contact with areas affected with SSOs? *(Procedure can be delegated to another authority)*	YES ☒	NO ☐
OERP-10	Does the utility use containment techniques to protect the storm drainage systems?	YES ☒	NO ☐
OERP-11	Do the overflow records include the following information? *(Check all that apply)* ☒ Date and time ☒ Location ☒ Any remediation efforts ☒ Cause ☒ How it was stopped ☒ Estimated flow/volume discharged ☒ Names of affected receiving water(s) ☒ Duration of overflow		
OERP-12	Does the utility have signage to keep public from effected area?	YES ☒	NO ☐

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Smoke and Dye Testing (SDT)

SDT-01	Does the utility have a smoke testing program to identify sources of inflow and infiltration?	YES	~~NO~~
SDT-01A	Does the utility have a smoke testing program to identify sources of inflow and infiltration in illegal connectors?	YES	~~NO~~
SDT-01B	Does the utility have a smoke testing program to identify sources of inflow and infiltration in house laterals (private service laterals)?	YES	~~NO~~
SDT-02	Are there written procedures for the frequency and schedule of smoke testing?	YES	~~NO~~
SDT-03	Is there a documented procedure for isolating line segments?	YES	~~NO~~
SDT-04	Is there a documented procedure for notifying local residents that smoke testing will be conducted in their area?	YES	~~NO~~
SDT-05	What is the guideline for the maximum amount of the line to be tested at one time? *(Feet or Miles)*	N/A	
SDT-06	Are there guidelines for the weather conditions under which smoke testing should be conducted?	YES	~~NO~~
SDT-07	Does the utility have a goal for the percent of the system smoke tested each year?	YES	~~NO~~
SDT-08	What percent of the system has been smoke tested over the past year?	N/A	%
SDT-09	Do the written records contain location, address, and description of the smoking element that produced a positive result?	YES	~~NO~~
SDT-10	Does the utility have a dye testing program?	YES	~~NO~~
SDT-11	Are there written procedures for dye testing?	YES	~~NO~~
SDT-12	Does the utility have a goal for the percent of the system dye tested each year?	YES	~~NO~~
SDT-13	What percent of the main collection system has been dye tested over the past year?	N/A	%
SDT-14	Does the utility share smoke and dye testing equipment with another utility?	YES	~~NO~~

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Hydrogen Sulfide Monitoring and Control (HSMC)

HSMC-01 How would you rate the system's vulnerability for hydrogen sulfide corrosion? *(Check only one)*

☒ Not a problem ☐ Only in a few isolated areas ☐ A major problem

HSCM-02	Does the utility have a corrosion control program?	YES	~~NO~~
HSCM-03	Does the utility take hydrogen sulfide corrosion into consideration when designing new or replacement sewers?	~~YES~~	NO
HSCM-04	Does the utility have written procedures for the application of chemical dosages?	YES	~~NO~~
HSCM-05	Are the chemical dosages, dates, and locations documented?	YES	~~NO~~
HSCM-06	Does the utility document where odor is a continual problem in the system?	YES	~~NO~~
HSCM-07	Does the utility have a program in place for renewing or replacing severely corroded sewer lines to prevent collapse?	~~YES~~	NO

HSCM-08 Are the following methods used for hydrogen sulfide control? *(Check all that apply)*

☐ Aeration ☐ Chlorine ☐ Potassium permanganate
☐ Iron salts ☐ Sodium hydroxide ☐ Bioinfusion
☐ Enzymes ☐ Hydrogen peroxide ☐ Other
☐ Activated charcoal canisters

HSCM-09	Does the system contain air relief valves at the high points of the force main system?	~~YES~~	NO

HSCM-10 How often are the valves maintained and inspected? *(Weekly, Monthly, etc.)*

HSMC-11	Does the utility enforce pretreatment requirements?	~~YES~~	NO

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