DRAFT

CSA NO. 71 MASTER SEWER PLAN UPDATE

COUNTY OF KERN

MARCH 2016

Prepared for:

County of Kern
Department of Public Works
Special District CSA 71

Prepared by:

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ABBREVIATIONS

CSA ..... County Service Area
ESFD ..... Equivalent Single Family Dwelling
ESPS ..... County of Kern Engineering Surveying and Permit Services Department
JPA ..... Joint Powers Agreement
NORSD ..... North of River Sanitary District
PSA ..... Planned Sewer Area
ESFDU ..... Equivalent Single Family Dwelling Units

EXECUTIVE SUMMARY

The CSA-71 Sewer Master Plan 2016 Update, prepared by the team of Provost & Pritchard Consulting Group and Akel Engineering Group, Inc., builds on the original 2004 Sewer Master Plan prepared by Quad Knopf. It includes newer development, changes to the Metropolitan Bakersfield General Plan, and the expansion of the corporate limits of the City of Bakersfield since the Master Plan was approved.

CSA-71 is a rapidly urbanizing area that consists of seven benefit areas, two in the North of River Sanitary District (NORSD) and five in the City of Bakersfield service area. In order to provide for continued urban growth, Kern County initiated the 2016 Sewer System Master Plan Update, which takes a fresh look at both the facilities needed to serve growth and the costs of those facilities. In this Update, a new hydraulic model was developed, incorporating refinements to County design criteria due to changes in State law respecting water use and sewage generation, including the 2013 CalGreen building code which mandates that future buildings reduce indoor water use 20 percent as compared with earlier construction. Based on a 2010 model but using a more–sophisticated modeling software for greater realism in the modeled scenarios, the model was built and design assumptions were refined by Akel Engineering, which prepared all of the hydraulic modeling for this Update. Infrastructure recommendations resulting from these modeling efforts have been incorporated into the Update.

Construction cost estimates have been updated to 2015 construction values and are based on the improvements required to construct the modeled sewer collection system. Cost estimates reflect the construction in each Planned Sewer Area (PSA) remaining to be completed in order to fully implement the Master Plan as updated.

Such costs include pumped or gravity connections to existing sewer lines, capacity-related shared costs of existing trunk lines, costs of any required new gravity or pumped force mains. They do not include residential sewer connections or in-street collector sewers where they do not now exist. In-tract facilities such as those will be a cost of development borne by the developer directly or could be paid through local assessment district or Community Facilities District (CFD) financing. Certain improvements shown are planned by NORSD or the City of Bakersfield, and while they are part of the hydraulic model prepared for this report, the cost of those facilities is not included in the construction cost estimates for the Planned Sewer Areas nor is it included in the proposed fees.

Because the benefit of the improvements considered in this report falls directly on the future sewer users within the benefit areas and not on the existing users or on the community as a whole, funding of these sanitary sewer collection facilities to accommodate additional development must be obtained from the new users. In many cases, existing users within a PSA have already paid fees based on the 2004 Master Plan, and will not be assessed new or updated fees. Accordingly, the remaining construction costs in each PSA have been spread to the remaining undeveloped (and unpaid) development areas.

Recommended impact fees vary by benefit area because of differing trunk sewer and pump station needs within the benefit areas.

Illustrated on **Figure 1-1** is the proposed updated sewer master plan. The updated sewer master plan is based on a computer model organized to simulate sewer flows based upon full build out conditions per the 2002 Metropolitan Bakersfield General Plan, and the Western Rosedale Specific Plan, required sewer capacities as developed in accordance with Kern County standards, recommendations on flow generation made as a part of preparation of this Plan Update, and the updated sewer model.

Proposed fees by Sewer Area appear in **Table ES-1** below.

Table ES-1
Projected Fees for Future Facilities Construction

Service Area	Facility Total Cost	Current Fund Bal	Net Cost to Assess	Total ESFDs	ESFDs Paid	Net ESFDs	Proposed Fee (per ESFD)	2004 Fees ESFDs
PSA A	$ 3,117,000	$ 43,797	$ 3,073,203	45,800	159	45,641	$ 67	$ 684
PSA B	$48,329,000	$ 1,426	$48,327,574	25,200	-	25,200	$ 1,918	$ 1,158
PSA 1	$13,256,200	$ 2,410,998	$10,845,202	9,000	645	8,355	$ 1,473	$ 1,476
PSA 2	$19,828,000	$ 313,455	$19,514,545	4,500	569	3,931	$ 4,406	$ 3,230
PSA 3	$ 1,833,786	$ 4,494	$ 1,829,293	2,300	1	2,299	$ 797	$ 871
PSA 4	$ 4,965,000	$ 70,941	$ 4,894,059	5,000	8	4,992	$ 993	$ 662
PSA 5	$ 9,715,000	$ 78,543	$ 9,636,457	2,700	-	2,700	$ 3,598	$ 1,226

- Total construction cost of trunk sewer and pump stations in 2015 dollars.

1 INTRODUCTION

The County of Kern Department of Public Works (County) has authorized an update of the Master Sewer Plan for County Service Area No. 71 (CSA 71). CSA 71 is a County Planned Sewer Area (PSA) encompassing approximately 73.4 square miles of urbanizing lands northwest of the City of Bakersfield. **Figure 1—1** shows the area included within the CSA 71 boundary. The northern portion of CSA 71 is within the North of River Sanitary District (NORSD) wastewater treatment service area. The southern portion of the area is within the City of Bakersfield (City) wastewater treatment service area for the City's Treatment Plant No. 3. A portion of the southern service area is within the City's corporate limits, while the rest are unincorporated County lands subject to wastewater treatment agreements with the City. See **Figure 1-2** for the service and Boundaries.

A Joint Powers Agreement (JPA) was executed in 1989 by and between the County, NORSD, and the City of Shafter. The JPA was developed to plan, design, construct, operate and maintain sewerage improvements to meet sewer needs of all of the parties to the JPA. The JPA has been amended at various times over the years but remains in effect.

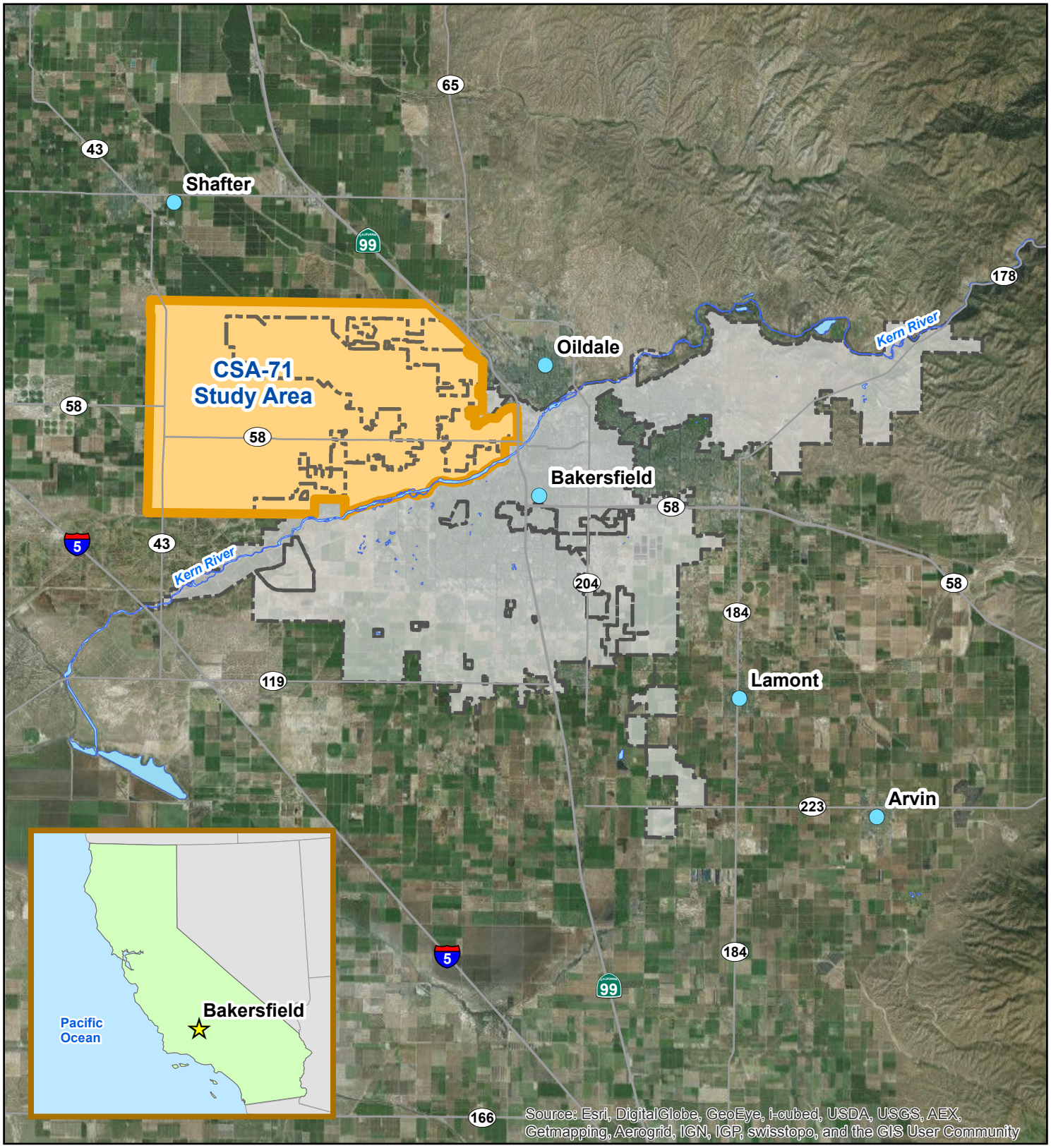
In 2004, an agreement between Kern County and the City of Bakersfield was executed. That agreement designates an area of County lands to be provided sewer service by the City of Bakersfield. The boundary established in the 2004 agreement reflects the existing division of NORSD and the City of Bakersfield sewer service areas.

Several previous studies addressing components of sewer master planning for CSA 71 have been conducted. These include:

- Quad Knopf, Inc. (March 2004). CSA-71 Sewer Master Plan. The recommendations of this original master plan are included as **Figure 1-3**.
- Parsons. (September 2006). City of Bakersfield Plant 3 Service Area Analysis and Future Plant 4 Feasibility Study at Build-Out.
- Quad Knopf, Inc. (May 2010). Draft CSA-71 Sewer Master Plan, 2010 Update. (This Draft Master Plan Update was not adopted by the County.)
- AECOM. (February 2013). North of River Sanitary District No. 1, Master Sewer Plan.
- Porter & Associates, Inc. (May 2014). Sewer Study for Stockdale Ranch to satisfy Condition of Approval No. 83.C of GPA/ZC 09-0263, for Bolthouse Properties, LLC.

1.1 Project Description

The unincorporated portion of northwest Bakersfield has historically been served by private septic systems. Newer developments have dry sewer systems installed but utilize private septic systems. Some areas close to major sewer trunk lines are connected directly to City or NORSD sewers. In 2004, a Master Sewer Plan (Plan) was developed and Planned Sewer Areas, with associated fees, were established. A 2010 Update was never implemented. The Plan is being updated to facilitate connecting the currently-unsewered areas and all future development to trunk lines and treatment facilities. This Update will serve as a guide for alignment, elevations, pipe size, and lift station locations. It will also provide a cost analysis and basis for sewer impact fees to provide funding for the construction of required infrastructure.



Legend

- Cities
- Study Area
- Bakersfield City Limits
- Highways
- Interstate
- Water Bodies

AKEL ENGINEERING GROUP, INC.

Updated: January 21, 2016

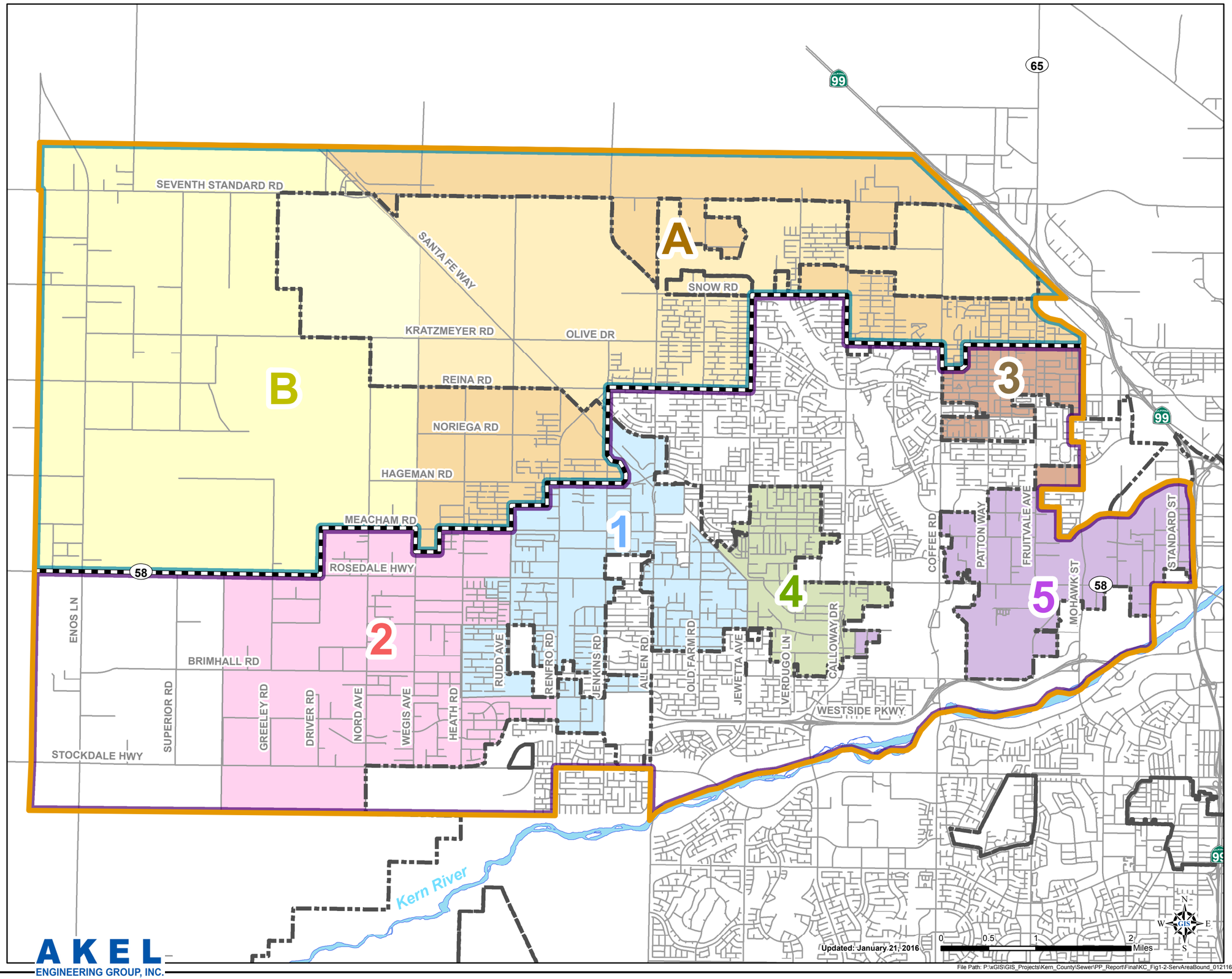
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Figure 1-1
CSA-71 Location Map

Sewer Master Plan
Kern County



Legend

- CSA-71 Boundary

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

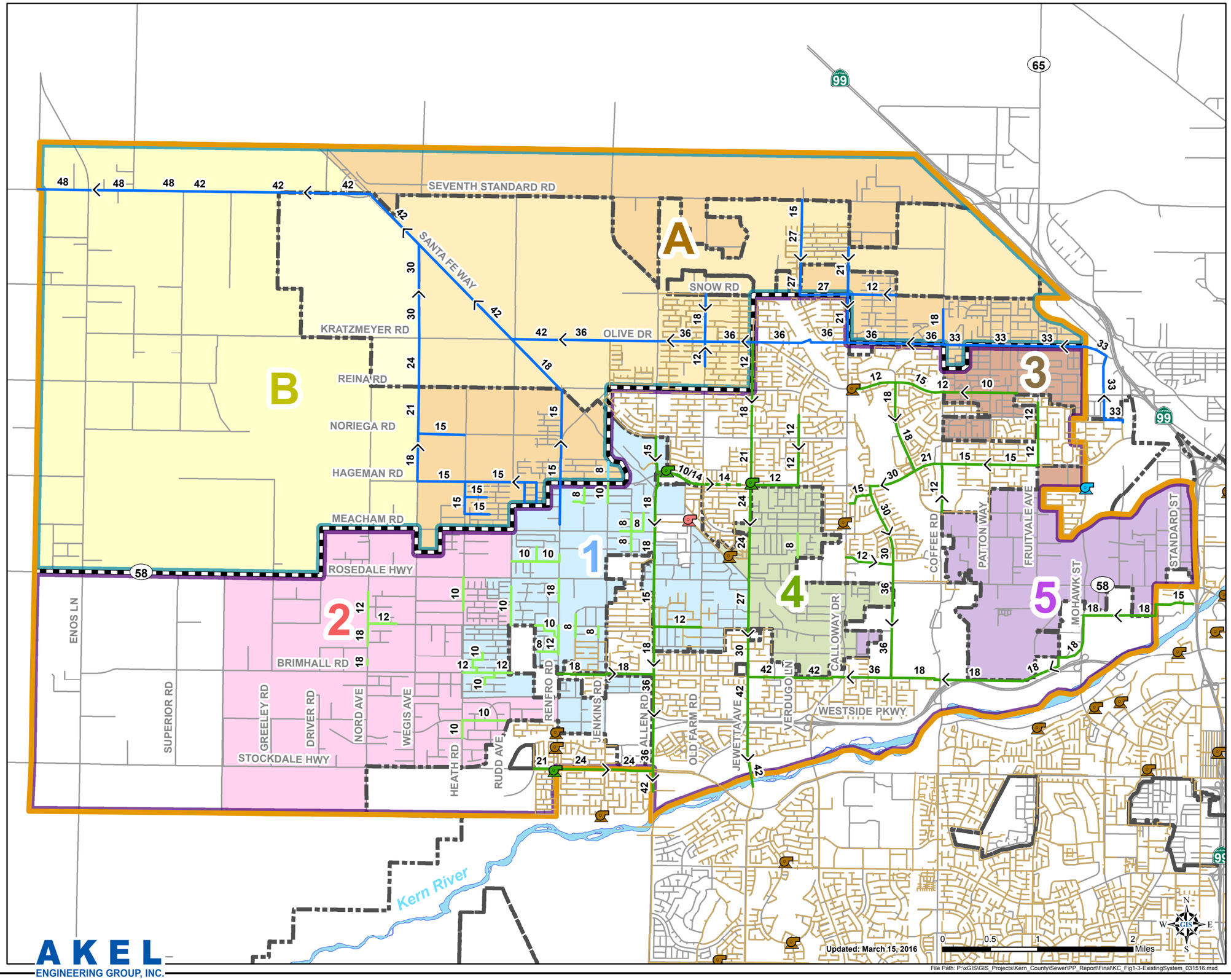
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 1-2
Service Area Boundaries

Sewer Master Plan
Kern County

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Legend

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main - Live
- City of Bakersfield Pipes - Live
- City of Bakersfield Pipes - Dry
- NORSD Pipes - Live
- NORSD Pipes - Dry

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 1-3
Existing Modeled System and Service Areas

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.

1.2 Scope of the Project

This Master Sewer Plan Update includes preparation of engineering reports, studies, alternates and recommendations as to the best course of action relative to sewerage alternatives for the property owners within the study area. The services performed by the Engineer include the following:

1. Review existing Master Sewer Plan for CSA 71 (both the original 2004 report and the unadopted draft 2010 update).

2. Evaluate existing dry sewer systems and future tie-ins to existing and future trunk lines.

3. Evaluate projected flow rates based on existing General Plan land use.

4. Coordinate conceptual design and disposal methods with North of River Sanitary District and the City of Bakersfield.

5. Develop cost estimates for required trunk lines and pump stations within CSA 71 and outside of COB and NORSD boundaries, to be used for determining PSA fees and reimbursement agreements.

6. Provide Draft report for review by County of Kern Department of Public Works (DPW). During the review process, the Engineer shall conduct two public meetings in order to receive comments from the public, stakeholders and other public agencies.

7. Provide engineering reports, studies, conclusions and recommendations regarding project feasibility and best course of action. Provide 12 copies and an electronic PDF of the studies/report and plans and an equal number of copies of the amended reports.

The studies and reports shall consider hydrology, drainage, hydrogeology, environmental, and topographic factors of the area.

2 EXISTING CONDITIONS

2.1 CSA 71 Service Area

The CSA-71 area is bounded by the Kern River in the south, State Route 99 in the east, Beech Avenue in the west, and to the north by an east-west line approximately one-half mile north of Seventh Standard Road. The approximate service areas and existing sewer systems are as follows:

- **North of River Sanitation District (NORSD):** The NORSD sewer service area within CSA 71 is approximately bounded by State Route 99 to the east, Beech Avenue to the west, and to the north by an east-west line approximately one-half mile north of Seventh Standard Road. The City of Shafter has annexed all the land north of 7th Standard Road, and the properties fronting the north side of that road will ultimately receive sewer service from City of Shafter facilities, which have yet to be planned or constructed.

  The southern boundary jogs between Rosedale Highway toward the western part of the district and Snow Road to the east. The NORSD sewer service area collects flow along one primary trunk, running from east to west along Norris Road, Santa Fe Way and Seventh Standard Road, ranging in size from 33 inches to 48 inches. This trunk sewer flows to NORSD WWTP located on 7th Standard Road, west of Shafter.

  Sewer mains, interceptors, trunk lines and lift stations to be owned and operated by NORSD will be designed to NORSD standards during final design, but are modeled in accordance with County standards for the purposes of this Update.

- **City of Bakersfield (City):** The City sewer service area within CSA 71 is approximately bounded by State Route 99 to the east, Beech Avenue to the west, and by the Kern River to the south. The northern boundary jogs between Rosedale Highway in the west and Snow Road in the east.

  The City sewer service area collects flow along two primary trunks: the Jewetta Avenue trunk, which ranges in size from 12 inches to 42 inches, and the Allen Road trunk, which ranges in size from 15 inches to 42 inches. These trunk sewers flow to City of Bakersfield WWTP #3.

The City and NORSD service areas are further subdivided into seven Planned Sewer Areas (PSAs), two in NORSD and five in the City. The PSAs are shown graphically on **Figure 1-2** and delineate areas of benefit for proposed improvements. Within the County-proposed service areas, many neighborhoods and development areas already have dry sewer pipelines in place. As part of this planning effort, existing final and tentative tract maps were reviewed to plan connections to the dry sewer pipelines. Appendix A documents the tract maps reviewed.

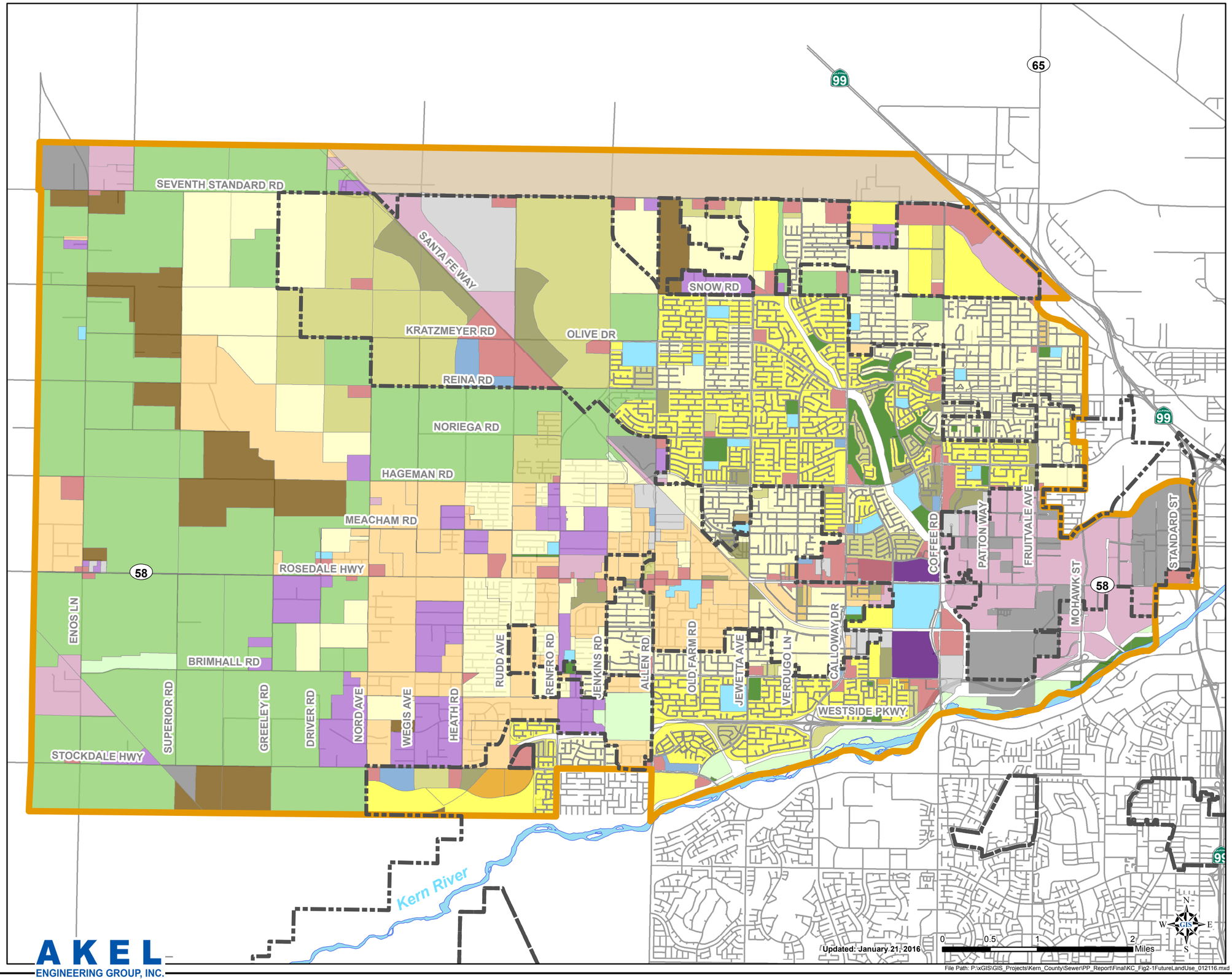
2.2 Land Use

Figure 2-1 is the land use plan developed for this Update by Akel Engineering Group Inc. As directed by County staff, the consolidated land use plan combines land use designations from the City of Bakersfield Metropolitan Plan for areas east of Jewetta Avenue with land use designations from the Western Rosedale Specific Plan for areas west of Jewetta Avenue.

Table 2.2-1 summarizes acreages of each land use classification by PSA, and is taken from Table 1 of the Akel Engineering Technical Memo. Acreages are taken from the referenced planning documents, and are net of road areas.

Acreages for each land use classification documented in Table 2.2-1 were then used to estimate total Equivalent Single Family Dwelling Units (ESFDUs) for the full build-out condition of each Planned Sewer Area. One ESFDU is defined by the County to be 280 gallons per day per dwelling unit, which is the expected average wastewater daily flow discharged from a typical single family home. The County's definition is used throughout this report.

Using the consolidated land uses, it is estimated that the NORSD PSAs will ultimately develop up to 71,000 ESFDUs, while the five City PSAs will develop a total of 23,500 ESFDUs.



Legend

- CSA-71 Boundary

Future Land Use

- Estate Residential
- Rural Residential
- Suburban Residential
- Low Density Residential
- Low Medium Density Residential
- Low/Low Medium Density Residential
- High Medium Density Residential
- High Density Residential
- Commercial
- Major Commercial
- Mixed Use
- Office Commercial
- Light Industrial
- Heavy Industrial
- Service Industrial
- Public Facilities
- Open Space
- Parks & Recreation Facilities
- Agriculture
- Mineral Petroleum
- Non-Jurisdictional Land
- Other Jurisdiction
- Streets
- Bakersfield City Limits

Figure 2-1
Consolidated Future Land Use

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

Table 2.2-1
Land Use Summary

Land Use Summary		NORSD			City of Bakersfield					
		Area A	Area B	Total NORSD	Area 1	Area 2	Area 3	Area 4	Area 5	Total City of Bakersfield
Type	Development Intensity (esfd/acre)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)
Residential										
Rural	0.4	207	86	293	377	987	0	0	0	1,363
Estate	1	39	1,128	1,168	107	948	0	66	0	1,121
Urban Estate	2	219	63	263	997	458	0	3	0	1,457
Suburban	4	1,989	1,500	3,489	804	457	547	692	0	2,501
Low	7.26	786	0	786	0	0	0	0	0	0
Low/ Low Medium	10	15	0	15	0	0	0	51	0	51
Low Medium	10	1,588	1,384	2,972	12	0	0	27	0	39
High Medium	17.42	305	87	391	53	0	0	46	0	99
Subtotal		5,147	4,249	9,396	2,349	2,850	547	884	0	6,631
Commercial/ Institutional										
Highway	6	0	0	0	0	0	0	0	2	2
General	6	588	92	681	102	57	5	39	0	203
Office	6	107	0	107	7	0	0	0	0	8
Major	6	0	0	0	0	0	0	0	0	0
Mixed Use	6	0	0	0	0	0	0	0	0	0
Public	6	0	3	3	10	6	0	0	0	16
Public/Private Schools	6	100	7	107	47	0	19	19	0	85
Subtotal		795	102	898	167	62	24	59	2	314
Industrial										
Light	6	453	10	464	75	0	0	12	0	87
Service	6	471	163	635	87	0	0	20	0	107
Modified Service	1.42	0	0	0	0	0	0	0	1,936	1,936
Heavy	6	0	167	167	83	0	0	0	0	83
Subtotal		925	341	1,266	245	0	0	32	1,936	2,213
Acreage Total		6,867	4,692	**11,559**	2,762	2,912	571	975	1,938	**9,158**

3 BENEFIT AREAS

With the adoption of the 2004 Sewer Master Plan, CSA 71 was divided into seven (7) benefit areas, designated as Planned Sewer Areas or PSAs. These benefit areas include County of Kern Planned Sewer Areas A and B, within the NORSD service area, and City of Bakersfield Planned Sewer Areas #1 through #5, within the City's service area. See **Figure 1-2** for the Planned Sewer Area boundaries. Detail maps showing each PSA are provided in Section 5.

PSA boundaries were developed in 2004, based on the following criteria:

- Economical connection to existing or proposed public sewer facilities.
- Recognition of topographic constraints.
- Evaluation of dry sewer and septic tank service area demands.
- Analysis of other constraints such as industrial development, freeway and rail right-of-way, environmental or water quality concerns.
- Equitable distribution of costs.

After evaluation of the original benefit areas and the effects of subsequent development within CSA 71, the following modifications have been made to the PSAs, based on the 2004 Sewer Master Plan, the draft Sewer Master Plan 2010 Update, and the analysis completed for the current Master Sewer Plan Update:

1. The extreme southwest portion of the study area was eliminated from the sewerage and benefit area because of environmental/water quality concerns including the existing slough, groundwater recharge areas, and excessive pumping costs. Development of this area within the Plan horizon is considered unlikely.

2. City Planned Sewer Area #1 (PSA #1) is as identified in 2002, with minor modifications made per the 2010 Update to reflect de-annexations and recent connections.

3. City Planned Sewer Area #2 (PSA #2) was identified as a logical benefit area in 2004 and expanded westerly in the 2010 Update. PSA #2 continues to have a significant number of parcels served only by septic tanks. The proposed sewer collection system requires three pump stations, with final discharge to the Allen Road trunk line. This Update evaluates the capacity of the existing Allen Road trunk line to accommodate flow from PSA #2, and identifies alternative means of transport to City Plant No. 3.

4. City Planned Sewer Area #3 (PSA #3) was identified in 2004. This Update incorporates new land use designations for the areas immediately north and south of Olive Drive in the northeast corner of the PSA.

5. City Planned Sewer Area #4 (PSA #4) was identified in 2004. This Update incorporates several revised land use designations, evaluates the capacity of the existing Buena Vista trunk line to accommodate the flow from PSA #4, and considers alternative means of sewage transport to City Plant No. 3.

6. City Planned Sewer Area #5 (PSA #5) was identified in 2004. It is a largely industrialized area in the southeasterly portion of CSA 71. Flows from PSA #5 have been estimated based upon field investigations to approximate those derived from an employment density of twenty employees per acre and a daily flow of 20 gallons per employee. Development in the area is principally Service Commercial and Light Industrial not involving industrial waste discharges, so no planning for industrial pre-treatment facilities is included.

7. NORSD Area A (PSA A) originally included area north of 7th Standard Road and east of Santa Fe which has now been annexed by the City of Shafter and will receive sewer service from Shafter eventually. These properties were originally planned to receive service from a sewer line to be constructed in 7th Standard Road, which the City of Shafter no longer plans to build. Service will be provided through other facilities to be constructed somewhere farther to the north. Until those City facilities are planned, this Update continues to show an un-sized sewer line in 7th Standard Road, flowing west to Santa Fe, as a placeholder for the flows from these transitioning properties. No assessment has been made for this particular line.

4 DESIGN ANALYSIS

4.1 Design Criteria

Future sewer flows were developed based on the consolidated land uses within each of the PSAs, both existing and planned, as discussed in Section 2. All design modeling for this Update was based on County of Kern design criteria. **Table 4.1-1** was developed by Akel Engineering Group, Inc. and documents both the County Design Standards and the revised flow factors used in this analysis.

Future flows for the unincorporated community of Oildale are estimated at 7.29 MGD, based on the equivalent family dwelling unit estimates in the NORSD 2013 Master Sewer Plan.

Table 4.1-1

Sewer System Design Criteria

Criteria[1]		
Average Discharge Rates	**Design Standards**	**Revised CSA-71 Criteria**
Single Family Residential (gpd/DU)	280	**280**
Multi-Family Residential (gpd/DU)	224	**224**
Average Commercial (gpd/GA)[2]	3589	**1680**
Average Industrial (gpd/GA)[2]	4848	**1680**
Modified Service Industrial (gpd/GA)[3]	N/A	**398**
Peaking Factors		
Residential	1.8	
Commercial	1.8	
Industrial	2.0	
Pipe Friction Factor (Manning's n)		
PVC	0.011	
Other	0.013	
Depth/Diameter (d/D) Ratio		
D <= 15"	0.7	
D > 15"	Full Flow	
Velocity		
Minimum- Full Flow (ft/s)	2.0	
Minimum-With County Approval (ft/s)	1.6	
Maximum (ft/s)	10.0	

Table 4.1-1, continued

Criteria[1]		
Minimum Slopes (ft/ft) by Pipe Diameter	**n=0.011**	**n=0.013**
6"	0.0038	0.005
8"	0.0025	0.0035
10"	0.002	0.0025
12"	0.0015	0.002
15"	0.0013	-
18"	0.0011	-
21"	0.0009	-
> 24"	0.0008	-
Manholes		
Maximum Spacing (D <= 15")	400'	
Maximum Spacing (D > 15")	600'	
Other		
Design Differences in Pipe Sizes	Match Soffits	
Curved Sewer Lines Allowed	Yes	
Minimum Cover Over Sewer Lines in Street	4.0'	

Notes:

1. Source: County of Kern Standards for Sanitary Sewers
2. Revised CSA 71 Criteria equivalent to 6.0 EDUs/gross acre, per County of Kern Staff, January 6, 2015
3. Modified Service Industrial is specific to City of Bakersfield PSA #5 and is equivalent to 1.42 EDUs/gross acre, per County of Kern Master Sewer Plan, 2004

Design of proposed pipelines utilizes the Manning Equation for pipe flow, utilizing a pipe friction factor (Manning's "n" value) equal to 0.011 for PVC pipes and 0.013 for other materials. This value may seem conservative for design of new High-Density Polyethylene pipe, but is considered realistic for long-term use in sewers where pipe roughness will be increased over time by grit carried in the sewage flow and by slime growth on pipe walls.

Sewer lines, interceptors, trunk mains and lift stations to be owned and operated by NORSD or the City will be designed in accordance with NORSD or City standards, respectively, which each differ slightly from County standards, as the project plans and specifications are prepared during final design prior to construction.

4.1.1 Hydraulic Model

As part of the work done for the unapproved draft 2010 Sewer System Master Plan Update, a hydraulic model of the CSA 71 collection system was developed in Bentley Systems SewerCAD. That model served as the basis for this Update, but significant changes and refinements were made to the model in association with County staff. In order to create a more refined analysis and improve the reliability of the recommended improvements included in this Update, the system hydraulic model was redeveloped by Akel Engineering Group, Inc. using Innovyze's H2OMap Sewer, which provides a more sophisticated approach to flow modeling and an inherently-greater level of confidence in the resulting recommendations for necessary facilities.

The geographic layout of the model was also revisited. Extensive review of approved tract maps, which were provided to the project team by the County, has served to verify the geometry

of the existing system, including pipe sizes and slopes, the locations and elevations of dry sewers and points of connectivity for future elements of the collection system.

4.1.2 Demand and Design Flows

The goal of a Master Sewer Plan is to provide a guide for future infrastructure to support the growing needs of CSA-71, based on adopted design criteria, which determine the estimated demand and design flows for the proposed infrastructure. The work done as part of this Update refines recommended pipe alignments, invert elevations, pipe sizing and lift station locations.

In order to determine the system's average and peak flow demands, the project team calculated the number of Equivalent Single Family Dwellings (ESFDs) in each area. An ESFD is a land use, whether residential, commercial, industrial or other, which generates an amount of sewage in a day equivalent to that generated by a typical single-family home. This allows direct comparison of the sewer demands of differing land uses and a common method of both calculating overall system flow requirements and spreading the burden of construction costs. ESFDs for the various land uses within CSA 71 are summarized in **Table 4.1-2**, taken from Table 2 of the Akel Engineering Technical Memo. These values were calculated based on the General Plan designation for undeveloped areas) and the corresponding land use densities.

Table 4.1-2

Equivalent Single Family Dwellings (ESFD) Summary

Land Use	NORSD			City of Bakersfield					
	Area A (ESFD)	Area B (ESFD)	Total NORSD (ESFD)	Area 1 (ESFD)	Area 2 (ESFD)	Area 3 (ESFD)	Area 4 (ESFD)	Area 5 (ESFD)	Total City of Bakersfield (ESFD)
Residential	35,500	22,600	58,100	6,500	4,100	2,200	4,400	0	17,200
Commercial	4,800	600	5,400	1,000	400	100	400	0	1,900
Industrial	5,500	2,000	7,500	1,500	0	0	200	2,700	4,400
Subtotal	45,800	25,200	71,000	9,000	4,500	2,300	5,000	2,700	23,500

Notes
1. Equivalent Single Family Dwellings (ESFD) calculated based on development intensities as shown in the City of Bakersfield Metropolitan Plan and the Western-Rosedale Specific Plan.
2. This includes development within the existing City of Bakersfield city limits.

In areas designated for residential development, ESFDs are equal to the number of planned residential dwellings, by definition. Multiplying the total number of ESFDs within each PSA by 280 gallons per ESFD per day resulted in the total daily residential flow for each PSA. In commercial and industrial land use areas, sewage flow was estimated by applying standard per-acre generation factors.

The total daily flow for each PSA is the sum of the residential, commercial and industrial flows. The actual design flows for each pipeline and pump station were calculated in accordance with Kern County Development Standards, Section 302.1 “Sanitary Sewers Design Criteria” and based on the total flows using the facility, increased by peaking factors to account for the daily variations in flow observed at peak-use hours.

The design of invert elevations requires topographic analysis of the undeveloped areas as well as record sewer improvement plans for the existing sewer system. Contours for the undeveloped areas were created using USGS Quadrangle maps which have a vertical accuracy of +/- five feet. While such topographical data is obviously not sufficient to provide for detailed design, it is adequate to evaluate feasibility of construction for future underground facilities in relatively-flat areas such as the study area.

With the design criteria described above, the proposed infrastructure was designed using the sewer model described above. Smaller pipelines (diameters less than and equal to 15-inch) were designed at a Depth/Diameter ratio of 0.70. Larger pipes were designed to flow full. All pipes were analyzed at peak flows. Pump stations were sized to provide peak design flows. See **Table 4.1-1** for complete design criteria.

4.2 Sewer Area Design Analyses

The following sections summarize the design analysis of the Planned Sewer Areas, performed by Akel Engineering and fully set forth in the Appendix. Planned improvements, including pipelines and lift stations, are listed. Challenges to sewer service are briefly discussed; complete solutions are deferred to design when complete topographical and existing conditions information can be analyzed.

Controlling invert elevations used in the model were obtained from record construction plans where available. Other road elevations were obtained using Google Earth. Construction plan elevations were cross-checked against USGS quad sheet elevations and normalized with the WGS84-based elevations in Google Earth, which is the datum consistently referenced in this report. It is very important that any future design be based on field survey data, which was beyond the scope of this report. The Google Earth data, while believed to be the most reliable available to the project team, is not sufficiently precise for the design of sewer collection facilities in terrain as flat as the project area.

All of the proposed improvements, including sewer pipe sizes, are shown on **Figures 4-1 through 4-4** and are also included in **Appendix A**. Slopes for every pipe as used in the hydraulic model are shown on Figures 6 and 6A through 6D, all of Appendix A. The Appendix also lists slopes of proposed sewer trunk mains for clarification of sufficiency for dry sewer connections. According to the record data available, all dry sewers shown will connect to the planned collector and trunk facilities without need for pump stations other than those shown.

Recommended new and supplemental improvements were sized based on the future flows and the design criteria discussed above. These facilities are intended to address deficiencies identified in the existing system based upon the design demands, and to service new growth in each of the PSAs as defined by the consolidated land use plan. The following sections document the improvements proposed in each PSA, including new and potential parallel pipelines and new lift stations. In some cases, recommendations for new construction call for larger pipes than have been recommended in previous master plans.

Where the Figures show two diameters for a single pipe, there is an existing under-sized sewer in place in that location. Two choices are available for improvement: replacement of the line

with a larger pipe (the larger diameter shown) and construction of a smaller, parallel pipe that would operate together with the existing pipe. Both choices will function equally. The cost estimates assume that an acceptable location for the second pipeline can be found and the less-expensive parallel line will be constructed.

Potential flow routing was evaluated based on existing invert and rim elevations extracted from the hydraulic model and analysis of tract map improvement plans received from County staff. Proposed invert and rim elevations are documented in Appendix A on Figure 6 and in detail on Figures 6A-6D. **Note: ALL invert and rim elevations must be verified during the design phase.** The data available for this Update was not all "survey grade," and accordingly is not detailed or precise enough to be the sole foundation of facility designs.

4.2.1 Specific Design Issues

- County staff identified two areas within the existing City of Bakersfield service area for consideration of reassigning service responsibility from the City to NORSD. Both were evaluated as part of this design analysis:

  - **Renfro Road south of Hageman Road:** Existing portions of this area are currently serviced by NORSD, with dry pipelines that can be routed to the existing NORSD pipeline on Renfro Road.

  - **South of Norris Road near Fruitvale Avenue:** This area is south of Norris Road from approximately Evergreen Street to Mohawk Street, and is immediately adjacent to the existing 33-inch NORSD sewer line.

  In both cases, the reassignment makes sense from an engineering design perspective and this Update incorporates both changes. Reassignment will, however, require a modified agreement between the City and the County.

- The hydraulic analysis also showed that the Stockdale Ranch Specific Plan development may require slightly larger sewer mains than are recommended in the 2014 Stockdale Ranch Sewer Study. The changes include upsizing 18-inch and 21-inch mains to 21-inch and 27-inch, respectively. Those changes are included in the cost estimates and recommendations for this Update.

- County staff stated that the western portion of PSA #2 may not develop in the near term. At the time that development is proposed for areas one-half mile or more west of Greeley Road in PSA 2, a revised or new Master Plan will be needed because there will not be sufficient downstream capacity in the Allen Trunk sewer to accommodate such development. Additional facilities will be required, which should be at the expense of those developing areas, not of PSA #2.

- The hydraulic analysis found the Allen Road trunk to be at its capacity in the CSA 71 area by build-out of the combination of PSA #1 and PSA #2. If there is any backwater condition placed on this sewer by conditions farther downstream, this trunk would be placed into a deficient condition. While that is not considered likely, such backwater analysis was beyond the scope of this Update. It is recommended that additional studies include the downstream portions of the City sewer system along Allen Road to determine the downstream effect, if any, on the capacity adequacy of the Allen Road trunk.

4.2.2 County of Kern Planned Sewer Areas A and B (NORSD)

The North of River Sanitary District No. 1 (NORSD) Master Sewer Plan, prepared in February, 2013, provides for flow from an existing outfall to the NORSD treatment plant and requires no analysis of alternatives. A number of new collector sewers and lift stations will be required to provide complete service to PSAs A and B.

Planned Sewer Area A

New or parallel pipelines are required for these segments. All pipes listed would be new except as noted:

- 15-inch pipe in 7th Standard Rd from Santa Fe Way to Rudd Ave
- 42-inch parallel pipe or 54-inch replacement pipe in Santa Fe Way from 7th Standard Rd to Olive Dr
- 48-inch replacement pipe in Olive Dr from Santa Fe Way to 2,700 ft w/o Renfro Rd
- 27-inch parallel pipe or 42-inch replacement pipe in Olive Dr from 2,700 ft w/o Renfro Rd to 500 ft e/o Allen Rd
- 15-inch pipe in Allen Rd from Olive Dr to Snow Rd
- 15-inch pipe in Zerker Rd from Snow Rd to 7th Standard Rd
- 12-inch pipe in 7th Standard Rd from Zerker Rd to Allen Rd
- 21-inch parallel pipe or 36-inch replacement pipe in Olive Dr from 500 ft e/o Allen Rd to Calloway Dr
- 18-inch pipe in Shane St from Snow Rd to Etchart Rd
- 12-inch pipe in Shane St from Etchart Rd to 7th Standard Rd
- 12-inch pipe in 7th Standard Rd from Shane St one-half mile east of Shane St
- 15-inch pipe in Calloway Dr from Etchart Rd to 7th Standard Rd
- 12-inch pipe in Coffee Rd from Etchart Rd to 7th Standard Rd
- 33-inch replacement pipe in Norris Rd from 150 feet e/o O'Keefe St to Crestwood St
- 12-inch pipe in Fruitvale Ave from Norris Rd to Snow Rd
- 10-inch pipe in future right of way from 150 feet north of the intersection of Jenkins Rd and Cascade Ct to 200 feet north of Renfro Rd and Noriega Rd

Slope adjustment is suggested for consideration for the pipe replacement in Norris Rd from 150 feet east of O'Keefe St to Crestwood St.

Slope adjustment means that the available slope in the segment of concern is less than the required minimum, but that the segment upstream or downstream currently has greater slope than is needed, meaning some additional slope could be added in the segment of concern by re-laying pipe either upstream or downstream to create additional elevation differential. Detailed engineering study may determine this is not necessary due to the effects of overall energy gradeline. As well, cost considerations may prove this suggestion infeasible and the design engineer may choose to proceed with less-than-standard slopes in the segments of concern.

A small area north of 7th Standard Road and east of Santa Fe Way was modeled in the 2004 Plan to be sewered in 7th Standard Road, flowing west to connect to the 7th Standard Road trunk line in PSA B. All the area north of 7th Standard Road has since been annexed into the City of Shafter and will be provided sewer service by facilities to be designed and constructed by the

City. The County has learned that the City no longer plans a collector in 7th Standard Road east of Santa Fe, but the final location and size of the sewer that will service this area has not been determined. This update shows an un-sized line in the former location, as a placeholder and a way to direct this flow to the PSA B trunk line. No cost for this pipeline has been assessed to PSA A as the facility will be constructed by the City of Shafter.

All existing and proposed facilities for PSA A are shown on **Figures 4-1** and **4-2**.

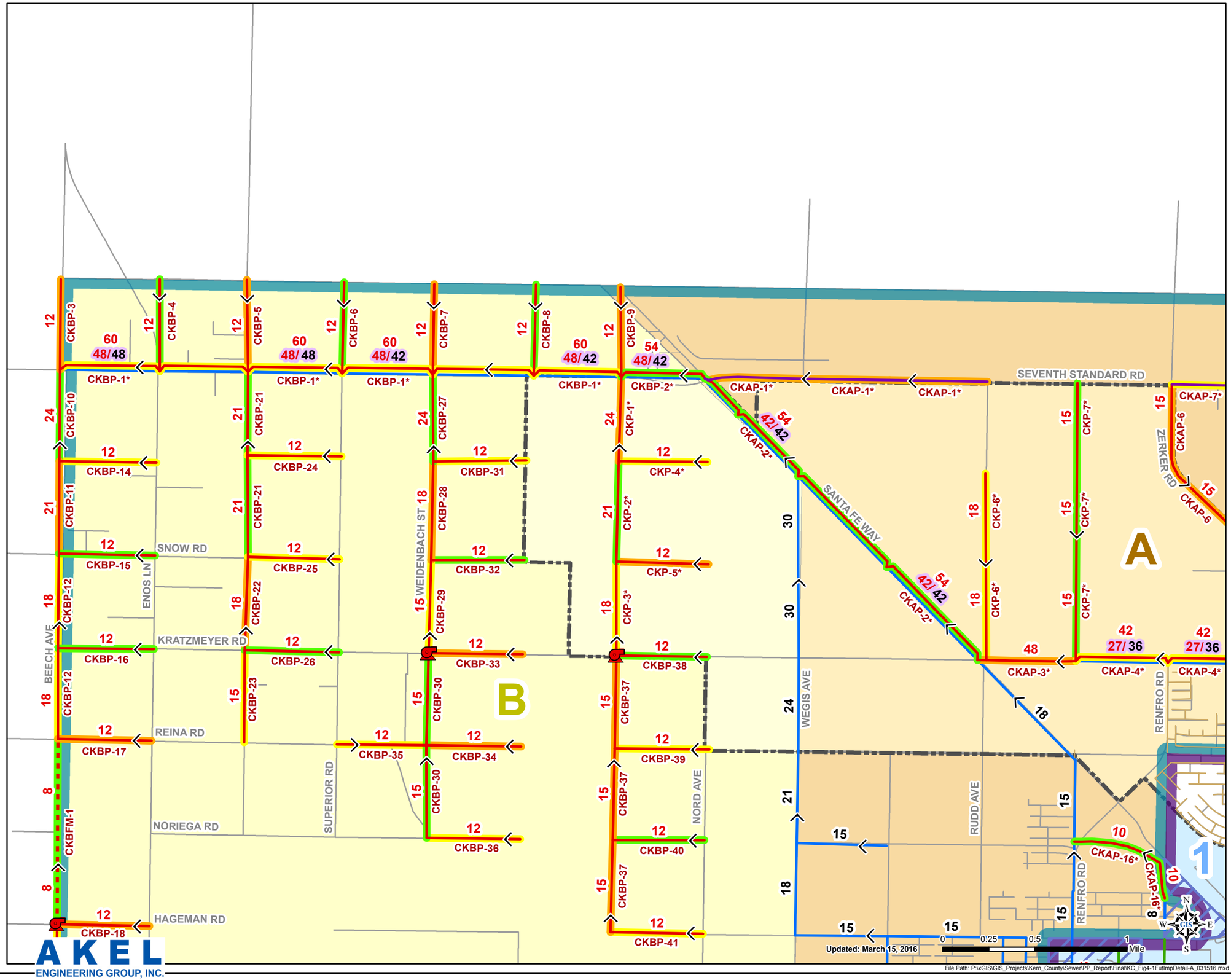
Planned Sewer Area B

New or parallel pipelines and facilities are required for these segments. All pipes listed would be new except as noted:

- 48-inch parallel pipe or 60-inch replacement pipe in 7th Standard Rd from Beech Ave to Driver Rd
- 48-inch parallel pipe or 54-inch replacement pipe in 7th Standard Rd from Driver Rd to Santa Fe
- 12-inch pipe in Beech Ave from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Enos Lane from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Cherry Ave from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Superior Rd from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Weidenbach St from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Greeley Rd from 7th Standard Rd to Coberly Rd
- 12-inch pipe in Driver Rd from 7th Standard Rd to Coberly Rd
- 24-inch pipe in Beech Ave from 7th Standard Rd to Baker Rd
- 21-inch pipe in Beech Ave from Baker Rd to Snow Rd
- 18-inch pipe in Beech Ave from Snow Rd to Reina Rd
- 12-inch pipe in Beech Ave from Hageman Rd to Rosedale Hwy
- 12-inch pipe in Baker Rd from Beech Ave to Enos Lane
- 12-inch pipe in Snow Rd from Beech Ave to Enos Lane
- 12-inch pipe in Kratzmeyer Rd from Beech Ave to Enos Lane
- 12-inch pipe in Reina Rd from Beech Ave to Enos Lane
- 10-inch pipe in Hageman Rd from Beech Ave to Enos Lane
- 10-inch pipe in Meacham Rd from Beech Ave to Enos Lane
- 10-inch pipe in Rosedale Hwy from Beech Ave to Enos Lane
- 21-inch pipe in Cherry Ave from 7th Standard Rd to Snow Rd
- 18-inch pipe in Cherry Ave from Snow Rd to Kratzmeyer Rd
- 15-inch pipe in Cherry Ave from Kratzmeyer Rd to Reina Rd
- 12-inch pipe in Baker Rd from Cherry Ave to Superior Rd

- 12-inch pipe in Snow Rd from Cherry Ave to Superior Rd
- 12-inch pipe in Kratzmeyer Rd from Cherry Ave to Superior Rd
- 24-inch pipe in Weidenbach St from 7th Standard Rd to Baker Rd
- 18-inch pipe in Weidenbach St from Baker Rd to Snow Rd
- 15-inch pipe in Weidenbach St from Snow Rd to Kratzmeyer Rd
- 15-inch pipe in Weidenbach St from Kratzmeyer Rd to Noriega Rd
- 12-inch pipe in Baker Rd from Weidenbach St to Greeley Rd
- 12-inch pipe in Snow Rd from Weidenbach St to Greeley Rd
- 12-inch pipe in Kratzmeyer Rd from Weidenbach St to Greeley Rd
- 12-inch pipe in Reina Rd from Weidenbach St to Greeley Rd
- 12-inch pipe in Reina Rd from Weidenbach St to Superior Rd
- 12-inch pipe in Noriega Rd from Weidenbach St to Greeley Rd
- 15-inch pipe in Driver Rd from Kratzmeyer Rd to Hageman Rd
- 12-inch pipe in Kratzmeyer Rd from Driver Rd to Nord Ave
- 12-inch pipe in Reina Rd from Driver Rd to Nord Ave
- 12-inch pipe in Noriega Rd from Driver Rd to Nord Ave
- 12-inch pipe in Hageman Rd from Driver Rd to Nord Ave
- 12-inch force main in Beech Ave from Reina Rd to Hageman Rd
- 6-inch force main in Weidenbach St from Kratzmeyer Rd to 50 feet north of Kratzmeyer Rd
- 6-inch force main in Driver Rd from Kratzmeyer Rd to 50 feet north of Kratzmeyer Rd
- 0.3 mgd lift station Hageman Rd and Beech Ave
- 0.5 mgd lift station at Kratzmeyer Rd and Weidenbach St
- 0.5 mgd lift station at Kratzmeyer Rd and Driver Rd

All existing and proposed facilities for PSA B are shown on **Figures 4-1** and **4-3.**



Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

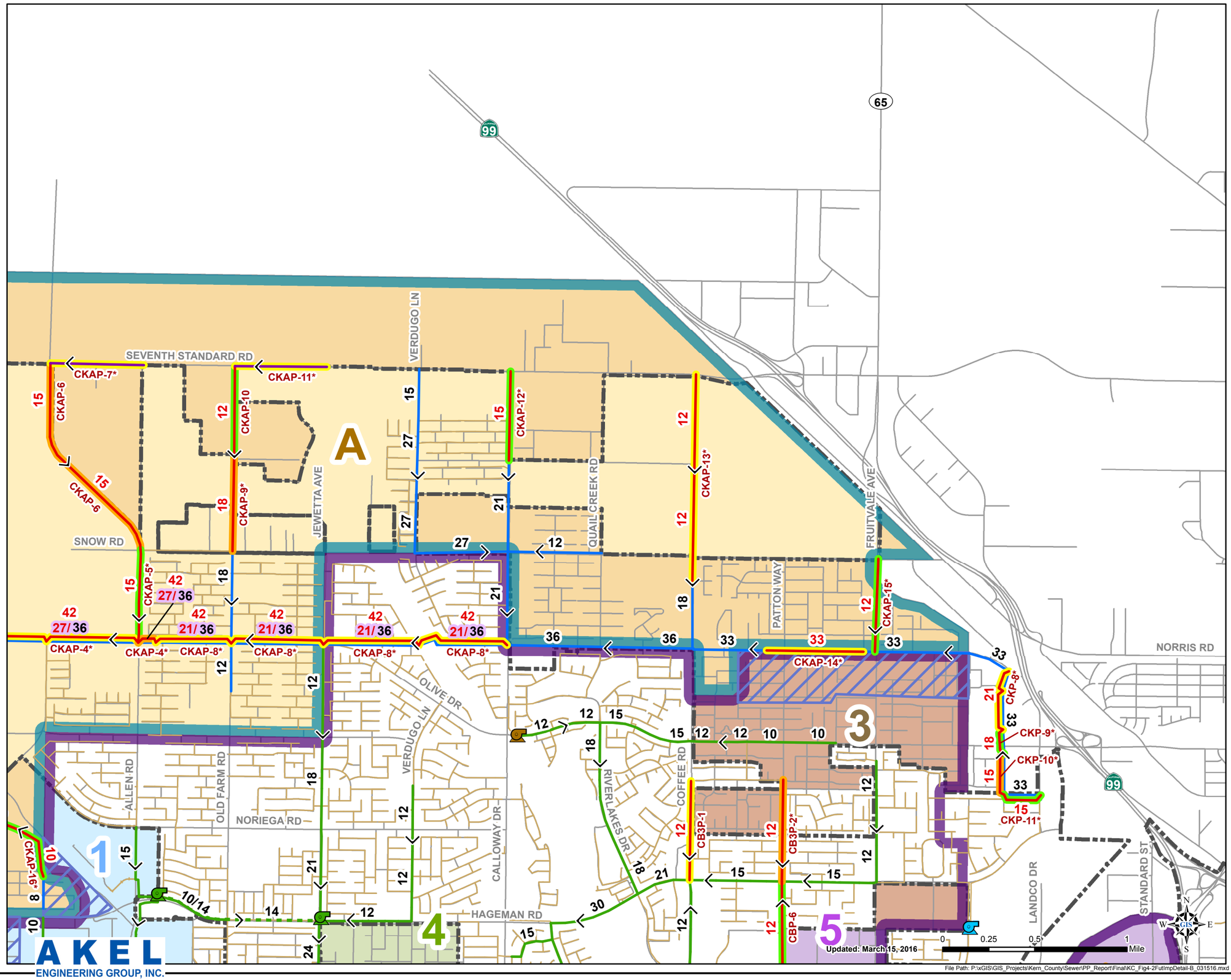
Planned Sewer Areas
- County Area - A
- County Area - B
- City Area - 1
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1*
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main
* = Facility Not Included in Fee Calculation

Figure 4-1
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight (60 / 48/48)
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

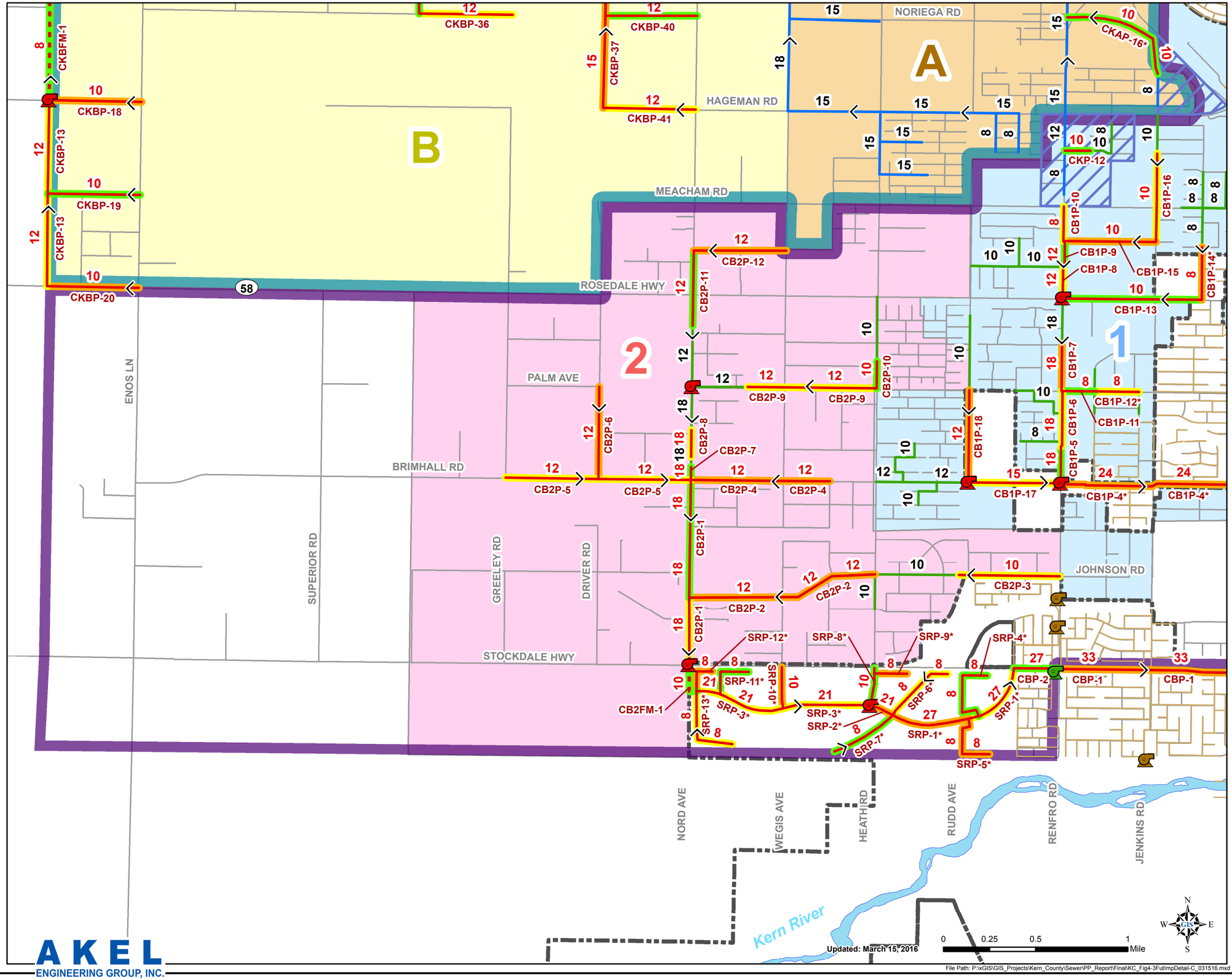
CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

Planned Sewer Areas
- County Area - A
- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1*
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main
* = Facility Not Included in Fee Calculation

Figure 4-2
Existing Modeled System with Future Improvements
Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Updated: March 15, 2016

Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- 60 / 48/48 Future Parallel Pipe Alternative Highlight
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

Planned Sewer Areas
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- Streets
- Bakersfield City Limits

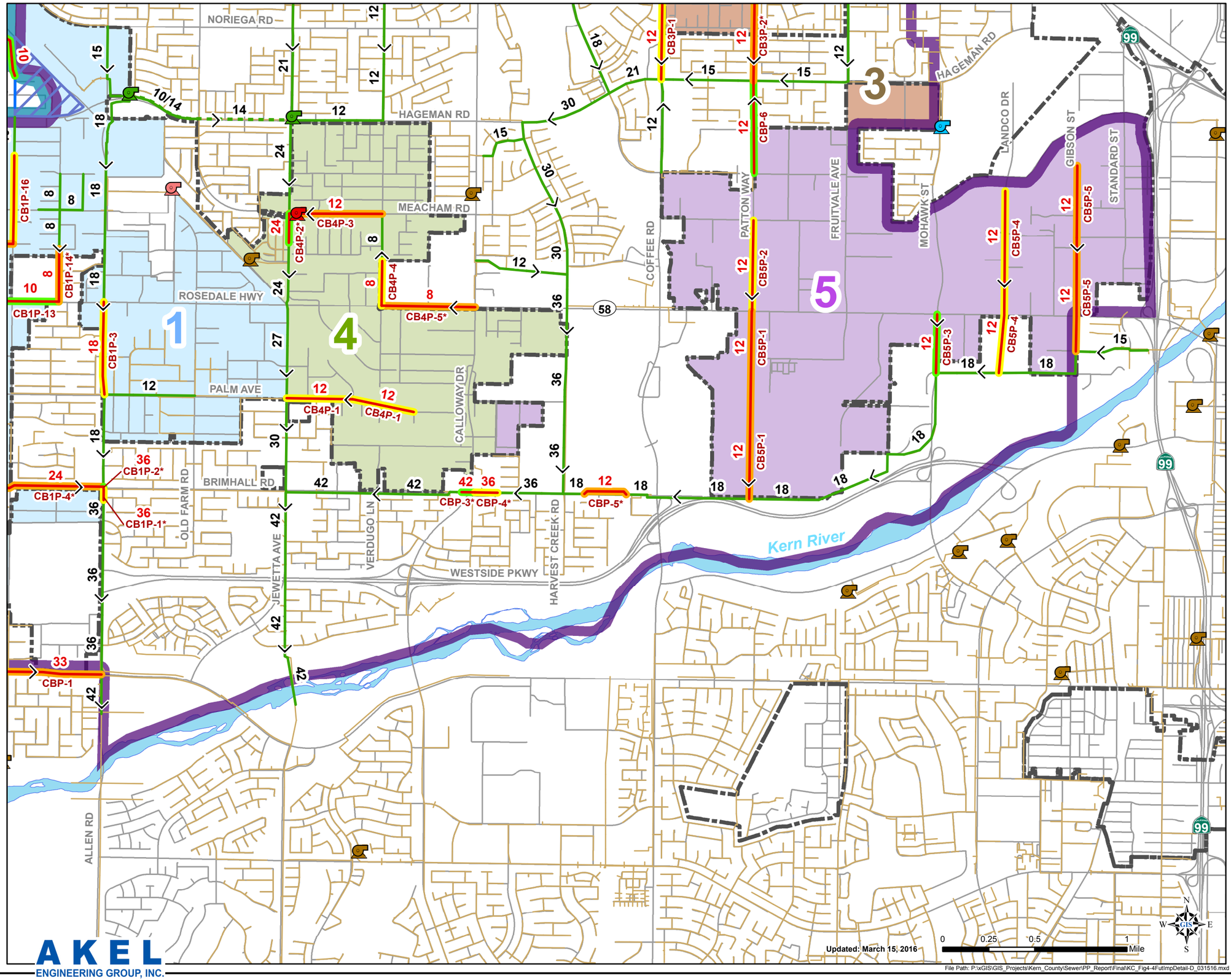
Improvement Numbering System: CKBP-1*
CK/CB/SR = NORSD/City of Bakersfield/ Stockdale Ranch
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main
* = Facility Not Included in Fee Calculation

Figure 4-3
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

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Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- 60 / 48/48 Future Parallel Pipe Alternative Highlight
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

Planned Sewer Areas
- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1*
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main
* = Facility Not Included in Fee Calculation

Updated: March 15, 2016

0 0.25 0.5 1 Mile

N W GIS E S

Figure 4-4
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

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4.2.3 City of Bakersfield Planned Sewer Area #1

The boundaries of PSA #1 are shown on **Figures 4-2** and **4-3**. The figures also show the existing dry sewers with associated connection locations.

New or parallel pipelines and facilities are required for these segments. All pipes listed would be new except as noted:

- 36-inch replacement pipe in Allen Rd from 380 feet south of Brimhall Rd to Brimhall Rd
- 18-inch replacement pipe in Allen Rd from 80 ft s/o Brimhall Rd to Brimhall Rd
- 18-inch replacement pipe in Allen Rd from Palm Ave to Rosedale Hwy
- 24-inch replacement pipe in Brimhall Rd from Allen Rd to Renfro Rd
- 18-inch pipe in Renfro Rd from Brimhall Rd to 1,050 feet north of Brimhall Rd
- 18-inch pipe in Renfro Rd from 1,050 feet north of Brimhall Rd to Palm Ave
- 18-inch pipe in Renfro Rd from Palm Ave to Henderson Ave
- 12-inch pipe in Renfro Rd from Rosedale Hwy to Dobbs Ave
- 12-inch pipe in Renfro Rd from Dobbs Ave to Mausbach Ave
- 8-inch pipe in Renfro Rd from Mausbach Ave to Meacham Rd
- 8-inch pipe in Palm Ave from Renfro Rd to Westdale Dr
- 8-inch pipe in Palm Ave from Renfro Rd to Longreach Dr
- 10-inch pipe in Rosedale Hwy from Renfro Rd to Sablewood Dr
- 8-inch pipe in Sablewood Dr from Rosedale Hwy to Pergola Ave
- 10-inch pipe in Mausbach Ave from Renfro Rd to Jenkins Rd
- 10-inch pipe in Jenkins Rd from Mausbach Rd to Spring Mountain Ave
- 15-inch pipe in Brimhall Rd from Renfro Rd to Rudd Rd
- 12-inch pipe in Rudd Rd from Brimhall Rd to Palm Ave
- 12-inch force main Brimhall Rd from Renfro Rd to 50 feet east of Renfro Rd
- 6-inch force main Brimhall Rd from Rudd Rd to 50 feet east of Rudd Rd
- 8-inch force main Renfro Rd from Rosedale Hwy to 50 feet south of Rosedale Hwy
- 3.2 mgd lift station at Brimhall Rd and Renfro Rd
- 0.8 mgd lift station at Brimhall Rd and Rudd Rd
- 1.2 mgd lift station at Rosedale Hwy and Renfro Rd

4.2.4 City of Bakersfield Planned Sewer Area #2

The topography of PSA #2, and its relationship to the Allen Road trunk sewer, dictate the installation of three lift stations for effective service to the entire PSA #2 boundary area. Collection pipelines will flow by gravity to those lift stations and sewage will then be pumped via force mains to the Allen Road trunk line.

The boundaries of PSA #2 are shown on **Figures 4-2** and **4-3**. Supporting calculations are included in Appendix A.

New or parallel pipelines and facilities are required for these segments. All pipes listed would be new except as noted:

- 18-inch pipe in Nord Ave from Stockdale Hwy to Tiata Ave
- 12-inch pipe in Johnson Rd from Nord Ave to Heath Rd
- 10-inch pipe in Johnson Rd from 2,400 ft east of Heath Rd to Renfro Rd
- 12-inch pipe in Brimhall Rd from Nord Ave to Moon Ranch St
- 12-inch pipe in Brimhall Rd from Nord Ave to Greeley Rd
- 12-inch pipe in Driver Rd from Brimhall Rd to Palm Ave
- 18-inch pipe in Nord Ave from Brimhall Rd to 370 ft north of Brimhall Rd
- 18-inch pipe in Nord Ave from 660 ft north of Brimhall Rd to 1,420 ft north of Brimhall Rd
- 12-inch pipe in Palm Ave from 1,590 ft east of Nord Ave to Heath Rd
- 10-inch pipe in Heath Rd from Palm Ave to 770 ft north of Palm Ave
- 12-inch pipe in Nord Ave from 1,750 ft north of Palm Ave to 1,320 ft north of Rosedale Hwy
- 12-inch pipe in Rosedale Hwy from Nord Ave to Wegis Ave
- 10-inch force main in Nord Ave from Stockdale Hwy to Stockdale Ranch Dr
- 6-inch force main at Nord Ave from Palm Ave to 50 ft south of Palm Ave
- 2.6 mgd lift station at Stockdale Hwy and Nord Ave
- 0.9 mgd lift station at Palm Ave and Nord Ave

4.2.5 City of Bakersfield Planned Sewer Area #3

PSA #3, located north of the industrial area and an intervening sewered residential development, required analysis of the sewer sizes needed to serve as collectors in order to adequately determine the size of portions of the Allen Road trunk sewer systems.

The sewer main installations necessary to effect these connections are shown on **Figure 4-3** and supporting calculations are included in Appendix A.

New or parallel pipelines are required for these segments:

- 12-inch pipe in Coffee Rd from Hageman Rd to 2,840 ft north of Hageman Rd
- 12-inch pipe in Patton Wy from Hageman Rd to Hooper Ave

4.2.6 City of Bakersfield Planned Sewer Area #4

The flows from this area, together with the incremental flows from Sewer Area #3, made it necessary to review the capacity of the Buena Vista trunk line and the Allen Road trunk line to its terminus at the CSA 71 boundary. This review and the supporting calculations for connections from the Area to the Buena Vista trunk sewer and for trunk line sewer capacity are included in Appendix A. **Figure 4-4** shows the required sewer connections.

New or parallel pipelines and facilities are required for these segments. All pipes listed would be new except as noted:

- 12-inch pipe in Palm Ave from Jewetta Ave to Marietta St
- 24-inch replacement pipe in Jewetta Ave from 830 ft south of Meacham Rd to Meacham Rd
- 12-inch pipe in Meacham Rd from Jewetta Ave to Verdugo Ln
- 8-inch pipe in Verdugo Ln from 400 ft south of Eagle Ranch Dr to Rosedale Hwy
- 8-inch pipe in Rosedale Hwy from Verdugo Ln to Calloway Dr
- 6-inch force main in Jewetta Ave from Meacham Rd to 50 ft south of Meacham Rd
- 3.2 mgd lift station at Meacham Rd and Jewetta Ave

Slope adjustment is suggested for the new pipeline in two segments of Jewetta Ave, for the 260 feet south of Rosedale Hwy and for the 830 feet south of Meacham Rd

Slope adjustment means that the available slope in the segment of concern is less than the required minimum, but that the segment upstream or downstream currently has greater slope than is needed, meaning some additional slope could be added in the segment of concern by re-laying pipe either upstream or downstream to create additional elevation differential. Detailed engineering study may determine this is not necessary due to the effects of overall energy gradeline. As well, cost considerations may prove this suggestion infeasible and the design engineer may choose to proceed with less-than-standard slopes in the segments of concern.

4.2.7 City of Bakersfield Planned Sewer Area #5

The flows from a centralized sewer collection system for existing light industrial and general commercial areas currently served by septic tank service is connected through 18” main trunk sewer line (Mohawk Sewer) as shown on **Figure 4-4** to the South. Flows from the area have been estimated, based upon field investigation, to approximate those derived from an employment density of twenty per acre and a flow generation rate of 20 gallons per employee per day. This review and the supporting calculations for connections from PSA #5 to the Buena Vista trunk sewer, as well as for trunk sewer capacity, are included in Appendix A.

New or parallel pipelines are required for these segments. All pipes listed would be new except as noted:

- 12-inch pipe in future right of way from Brimhall Rd to Rosedale Hwy
- 12-inch pipe in Patton Wy from Rosedale Hwy to Downing Ave
- 12-inch pipe in Mohawk St from Walker Tr to Rosedale Hwy
- 12-inch pipe in Landco Dr from Rosedale Hwy to 1,770 ft north of Gilmore Ave
- 12-inch pipe in Gibson St from Rosedale Hwy to 790 ft north of Turcon Ave

Costs presented in Section 5 are based on the assumption that the needed facilities will be constructed while they are still within the County, and have not been annexed into the City or taken over by NORSD. NORSD uses different methodology for constructing capital improvements than the County contemplates for CSA 71.

Anticipated costs for trunk sewers are included in NORSD capacity fees. All trunk sewers that are within NORSD boundaries will be constructed by those capacity fees.

Interceptor sewers and lift stations in NORSD are typically constructed by developers under contract with NORSD, and are not constructed by NORSD nor paid out of collected fees.

Kern County will enter into reimbursement agreements with NORSD to partially offset the cost of facilities that NORSD constructs, for which fees have already been collected by the County. Such agreements will be negotiated individually to account for the specific circumstances involved in each one.

5 COST ESTIMATES

This section summarizes the cost estimates for each of the proposed Sewer Areas. Appendix B provides additional details of the cost estimates.

No additional improvements are planned within PSA #3, so there is no table of costs associated with that sub-area.

The following criteria were used in calculating these estimates:

- Pipe materials were assumed to be PVC – D3034, SDR 35 and SDR 26 up to 30-inch diameter, and fused HDPE smooth-wall pipe in larger diameters.
- Average trench depths of 25 feet were considered in the unit costs. SDR 35 pipe accommodates a maximum cover depth of approximately 26 feet, therefore final unit costs are an average of SDR 35 and SDR 26 costs.
- Unit costs were based on bids received for similar public works construction in the Central Valley in 2015. Prices are all given in 2015 dollars.
- The ENR Construction Cost Index for February, 2015 was 9,961.75 (1913 costs = 100.0). According to this index, current construction costs are nearly 49 percent higher than the costs appearing in the 2004 Sewer Master Plan. At that time the ENR Construction Cost Index was at 6,694.
- Trench dewatering, pavement resurfacing and utility connection restoration were considered based on full replacement of the AC pavement section.
- A 30 percent overhead factor was added to all construction costs. This includes 15% construction contingency and 15% for design engineering, surveying and construction administration. The construction contingency is appropriate to the level of uncertainty remaining in design of the improvements at this time. The design engineering, surveying and construction administration estimates are considered conservative and sufficient for calculation of necessary impact fees.
- All extended costs are rounded to the nearest $1,000. Math checks will not match more closely than that.

Table 5-1. County of Kern Planned Sewer Area A

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	1	LS	$112,777	$113,000
2	Traffic Control	1	LS	59,797	$60,000
3	Trench Repair	155,842	SF	$6	$935,000
4	Sawcutting	17,800	LF	$2	$36,000
5	12" PVC Sewer Pipeline	2,600	LF	$124	$322,000
6	15" PVC Sewer Pipeline	6,300	LF	$129	$813,000
7	Manhole	20	EA	$4,500	$90,000
	Contingency			15%	$342,000
	Construction	SUBTOTAL:			$2,710,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$407,000
	PRELIMINARY COST ESTIMATE:				$3,117,000

Table 5-2. County of Kern Planned Sewer Area B

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

COUNTY OF KERN

CSA-71 SEWER MASTER PLAN UPADATE

Planned Sewer Area B

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$1,746,756	$1,747,000
2	Traffic Control	Lump Sum	LS	$786,430	786,000
3	Trench Repair	1,929,517	SF	$5	$9,648,000
4	6" Force Main	100	LF	$61	$6,000
5	8" Force Main	5,300	LF	$63	$334,000
6	18" Force Main	50	LF	$102	$5,000
7	10" PVC Sewer Pipeline	5,200	LF	$120	$624,000
8	12" PVC Sewer Pipeline	66,700	LF	$124	$8,271,000
9	15" PVC Sewer Pipeline	18,400	LF	$129	$2,374,000
10	18" PVC Sewer Pipeline	10,800	LF	$162	$1,750,000
11	21" PVC Sewer Pipeline	7,900	LF	$185	$1,462,000
12	54" Sewer Pipeline	2,600	LF	$369	$959,000
13	60" Sewer Pipeline	17,200	LF	$393	$6,760,000
14	Real Estate Procurement	3	EA	$25,000	$75,000
15	0.3 mgd Lift Station	1	EA	$225,000	$225,000
16	0.5 mgd Lift Station	1	EA	$300,000	$300,000
15	0.5 mgd Lift Station	1	EA	$300,000	$300,000
17	Manhole	235	EA	$4,500	$1,058,000
	Contingency			15%	$5,344,000
	Construction		SUBTOTAL:		$42,026,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$6,304,000
	PRELIMINARY COST ESTIMATE:				**$48,329,000**

Table 5-3. City of Bakersfield Planned Sewer Area #1

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 1

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$479,760	$480,000
2	Traffic Control	Lump Sum	LS	$188,461	$188,000
3	Trench Repair	371,242	SF	$5	$1,856,000
4	Sawcutting	56,100	LF	$2	$112,200
5	6" Force Main	50	LF	$61	$3,000
6	8" Force Main	50	LF	$63	$3,000
7	12" Force Main	50	LF	$69	$3,000
8	8" PVC Sewer Pipeline	4,700	LF	$117	$550,000
9	10" PVC Sewer Pipeline	9,200	LF	$120	$1,104,000
10	12" PVC Sewer Pipeline	4,300	LF	$124	$533,000
11	15" PVC Sewer Pipeline	3,200	LF	$129	$413,000
12	18" PVC Sewer Pipeline	6,500	LF	$162	$1,053,000
13	24" PVC Sewer Pipeline	5,300	LF	$193	$1,023,000
14	36" PVC Sewer Pipeline	400	LF	$255	$102,000
13	1.0 mgd Lift Station	1	EA	$550,000	$550,000
14	1.0 mgd Lift Station	1	EA	$550,000	$550,000
15	3.0 mgd Lift Station	1	EA	$1,160,000	$1,160,000
16	Manhole	87	EA	$4,500	$392,000
	Contingency			15%	$1,452,000
	Construction	SUBTOTAL:			$11,527,200
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$1,729,000
	PRELIMINARY COST ESTIMATE:				**$13,256,200**

Table 5-4. City of Bakersfield Planned Sewer Area #2

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$725,950	$726,000
2	Traffic Control	Lump Sum	LS	$204,922	$205,000
3	Trench Repair	509,317	SF	$5	$2,547,000
4	Sawcutting	107,000	LF	$2	$214,000
5	6" Force Main	50	LF	$61	$3,000
6	10" Force Main	900	LF	$66	$59,000
7	12" Force Main	50	LF	$69	$3,000
8	10" PVC Sewer Pipeline	3,700	LF	$120	$444,000
9	12" PVC Sewer Pipeline	25,800	LF	$124	$3,199,000
10	18" PVC Sewer Pipeline	6,500	LF	$162	$1,053,000
11	21" PVC Sewer Pipeline	5,700	LF	$185	$1,055,000
12	27" PVC Sewer Pipeline	5,600	LF	$206	$1,154,000
13	33" PVC Sewer Pipeline	5,200	LF	$238	$1,238,000
14	0.6 mgd Lift Station	1	EA	$350,000	$350,000
15	2.6 Lift Station	1	EA	$1,060,000	$1,060,000
16	3.6 mgd Lift Station	1	EA	$1,300,000	$1,300,000
17	Manhole	141	EA	$4,500	$635,000
	Contingency			15%	$1,997,000
	Construction	SUBTOTAL:			$17,242,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$2,586,000
	PRELIMINARY COST ESTIMATE:				**$19,828,000**

Table 5-5. City of Bakersfield Planned Sewer Area #3

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

PROVOST& PRITCHARD CONSULTING GROUP

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 3

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$66,000.00	$66,000
2	Traffic Control	Lump Sum	LS	38,297	38,297
3	Trench Repair	98,800	SF	$5	$494,000
4	Sawcutting	11,400	LF	$2	$22,800
4	12" PVC Sewer Pipeline	5,700	LF	$124	$706,800
5	Manhole	15	EA	$4,500	$67,500
	Contingency			15%	$199,200
	Construction	SUBTOTAL:			$1,594,597
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$239,190
	PRELIMINARY COST ESTIMATE:				**$1,833,786**

Table 5-6. City of Bakersfield Planned Sewer Area #4

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

PROVOST& PRITCHARD CONSULTING GROUP

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 4

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	179,650	180,000
2	Traffic Control	Lump Sum	LS	74,914	75,000
3	Trench Repair	124,633	SF	$5	$623,000
4	Sawcutting	22,300	LF	$2	$45,000
5	6" Force Main	50	LF	$61	$3,000
5	8" PVC Sewer Pipeline	4,000	LF	$117	$468,000
6	12" PVC Sewer Pipeline	6,300	LF	$124	$781,000
8	24" PVC Sewer Pipeline	800	LF	$193	$154,000
9	3.2 mgd Lift Station	1	EA	$1,300,000	$1,300,000
10	Manhole	32	EA	$4,500	$144,000
	Contingency			15%	$544,000
	Construction	SUBTOTAL:			$4,317,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$648,000
	PRELIMINARY COST ESTIMATE:				**$4,965,000**

Table 5-7. City of Bakersfield Planned Sewer Area #5

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$351,550	$352,000
2	Traffic Control	Lump Sum	LS	147,141	$147,000
3	Trench Repair	759,200	SF	$5	$3,796,000
4	Sawcutting	43,800	LF	$2	$88,000
5	12" PVC Sewer Pipeline	21,900	LF	$124	$2,716,000
6	Manhole	63	EA	$4,500	$284,000
	Contingency			15%	$1,065,000
	Construction	SUBTOTAL:			$8,448,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$1,267,000
	PRELIMINARY COST ESTIMATE:				**$9,715,000**

6 FEE PROJECTIONS AND IMPLEMENTATION

6.1 Fee Projection Methodology

This Section presents projected Development Impact Fees which can be justified by the facility improvements in each Planned Sewer Area discussed in the preceding sections. As with the 2004 Master Plan, some simplifying assumptions have been made in the calculations:

- Fee projections have not been adjusted for inflation during the implementation period. All costs and fees are presented in 2015 dollars. If nothing about the Update changes over time, the fees must still be revisited regularly to adjust them for changes in the ENR Construction Cost Index.
- No adjustments have been made for the time value of money. Should the County choose to seek bond or commercial financing to construct some or all of the recommended improvements; adjustments to the fees will be needed to account for the cost of such financing.

In addition to the original assumptions, the circumstances involved in calculating fees for a Master Plan Update are different than those for the original calculation, and this necessitates additional considerations for making correct estimates of the necessary fees:

- Much of the originally-planned infrastructure has already been constructed in several of the PSAs, and the new fees should not plan to generate revenues for that work already completed.
- Similarly, many of the parcels and planned development areas included in the 2004 Master Sewer Plan as benefitting from the planned facilities have now been constructed, have already paid their fees, and will not be paying new fees.
- The 2004 fees collected to date have not been completely expended in construction of the completed facilities, leaving cash balances available to each of the PSAs which must be used toward the construction of other necessary improvements. These cash balances have been accounted for in calculation of the new recommended fees.

6.2 Fee Projections

The total cost per ESFD (i.e. per lot or parcel) includes construction costs, design engineering, construction administration, land costs for lift stations and a reasonable contingency. Other costs, including purchase of extra treatment plant capacity, repayment of existing trunk line construction, and the current City or NORSD connection fees, must be added in to reach a complete cost recapture but are beyond the scope of this report. Details of the included costs are presented in the Planned Sewer Area cost estimates in Section 5. Recommended fees for each PSA are presented in **Table 6.2-1.**

Table 6.2-1
Projected Fees for Future Facilities Construction

Service Area	Facility Total Cost	Current Fund Bal	Net Cost to Assess	Total ESFDs	ESFDs Paid	Net ESFDs	Proposed Fee (per ESFD)	2004 Fees ESFDs
PSA A	$ 3,117,000	$ 43,797	$ 3,073,203	45,800	159	45,641	$ 67	$ 684
PSA B	$48,329,000	$ 1,426	$48,327,574	25,200	-	25,200	$ 1,918	$ 1,158
PSA 1	$13,256,200	$ 2,410,998	$10,845,202	9,000	645	8,355	$ 1,473	$ 1,476
PSA 2	$19,828,000	$ 313,455	$19,514,545	4,500	569	3,931	$ 4,406	$ 3,230
PSA 3	$ 1,833,786	$ 4,494	$ 1,829,293	2,300	1	2,299	$ 797	$ 871
PSA 4	$ 4,965,000	$ 70,941	$ 4,894,059	5,000	8	4,992	$ 993	$ 662
PSA 5	$ 9,715,000	$ 78,543	$ 9,636,457	2,700	-	2,700	$ 3,598	$ 1,226

6.3 Effects of This Update

This section summarizes the changes to the recommended impact fees for each PSA.

6.3.1 PSA A (NORSD)

The recommended fee is reduced 90% from the adopted 2004 fee. Construction has been completed but it has been in proportion to the fees paid. The 2004 study included in the fee calculation pipelines that will be constructed by NORSD and will not be paid out of these fees. Those facilities are not included in this updated calculation. There is a current $43,797 fund balance, which will pay for about 1.4% of the remaining improvements. 159 of 45,800 EDUs within the PSA have paid fees to date.

6.3.2 PSA B (NORSD)

The recommended fee is increased 65% from the adopted 2004 fee. The proposed assessment is higher, primarily due to an increase in the estimated cost of construction recommended to serve the area based on the ENR Cost of Construction index. None of the 25,200 EDUs within the PSA have paid fees to date.

6.3.3 PSA #1 (City of Bakersfield)

The recommended fee is virtually the same as the adopted 2004 fee. Construction scope remaining to be built has gone down but the decrease is offset by the expected increase in construction prices. The PSA has a cash balance of over $2.4 million, offsetting the cost of 18% of the remaining construction. 645 of the 9,000 EDUs within the PSA have paid fees to date, the second-highest paid percentage of the benefit areas.

6.3.4 PSA #2 (City of Bakersfield)

The recommended fee is increased 36% from the adopted 2004 fee. Construction scope remaining to be built has stayed nearly constant while construction prices have risen as explained in Section 5. The PSA has a cash balance of 1.6% of remaining construction value. 569 of the 4,500 EDUs (12.6%) within the PSA have paid fees to date, the highest percentage of paid assessments of any of the benefit areas.

6.3.5 PSA #3 (City of Bakersfield)

The recommended fee is reduced 9% from the adopted 2004 fee. Some facilities have been constructed but is partly offset by the increase in construction prices. The PSA has a cash balance of $4,494, offsetting 0.2% of the cost of the remaining construction. Only one of the 2,300 EDUs within the PSA has paid fees to date.

6.3.6 PSA #4 (City of Bakersfield)

The recommended fee is increased 50% from the adopted 2004 fee. Construction scope has held steady but is offset by the increase in construction prices. PSA #4 has a cash balance of $70,941, offsetting 1.4% of the cost of the remaining construction. Eight of the 5,000 EDUs within the PSA have paid fees to date.

6.3.7 PSA #5 (City of Bakersfield)

The recommended fee is increased 193% from the adopted 2004 fee, the highest percentage increase of all the PSAs, largely due to identification of some additional large infrastructure needs within the area, as well as the increase in the construction cost index. PSA #5 has a cash balance of $78,543, offsetting just less than 1% of the cost of the remaining construction. None of the 2,700 EDUs within the PSA have paid fees to date.

6.4 Implementation Recommendations

Several steps must be completed by the County in order to adopt and implement the recommendations of the Update. These include:

- This Update should be adopted as a master plan in accordance with the requirements of Section 66483 of the Government Code, which provide local agency authority to establish fees for construction of storm drain and sewer improvements.
- Planned Sewer Area fees should be established in the amounts noted above for each PSA, per ESFD or per acre, depending upon land use classification.
- The recommended fees for each PSA should be collected according to Section 66007, et seq. of the Government Code, which provides the legal basis for levy and collection of mitigation fees by local governments.
- Construction and connection of the major trunk sewer lines should be planned, scheduled and budgeted.
- Additional fees to reimburse the City of Bakersfield or NORSD for trunk sewer lines already constructed and for connection (capacity) fees are necessary.
- Incremental construction can be completed as funds accumulate, but should be spent within five years of collection to avoid issues with potential mandatory refunds.
- Fees should be adjusted annually for inflation according to the change in the Engineering News Record (ENR) Construction Cost Index, which provides a universally-accepted cost index most relevant to the actual costs of construction rather than the more broad-based Consumer Price Index. City of Bakersfield and NORSD connection charges should be the current connection fee at the time the fees are paid.
- As portions of the PSAs are annexed into NORSD and/or the City, these implementation recommendations need to be revisited and adjusted as circumstances change.

7 REFERENCES

AECOM, 2013. *North of River Sanitary District No. 1 Master Sewer Plan*, February 28, 2013.

Parsons, 2006. *City of Bakersfield Plant 3 Service Area analysis and Future Plant 4 Feasibility Study at Build-Out*, September 18, 2006.

Porter & Associates, Inc. 2014. *Sewer Study for Stockdale Ranch to Satisfy Condition of Approval No. 83.C of GPA/ZC 09-0263* for Bolthouse Properties, LLC, City of Bakersfield, CA, May 12, 2014.

Quad Knopf, 2004. *County of Kern CSA-71 Sewer Master Plan*, March 2004.

Quad Knopf, 2010. *County of Kern CSA-71 Sewer Master Plan 2010 Update*, May 2010.

Kern County General Plan, September 22, 2009.

Metropolitan Bakersfield General Plan, December 11, 2007.

Western Rosedale Specific Plan, September 12, 1994 (Revised December 11, 2007).

APPENDIX A

CSA-71 SEWER SYSTEM MASTER PLAN

COUNTY OF KERN

TECHNICAL MEMORANDUM

CSA-71 SEWER SYSTEM MASTER PLAN

Final Draft

March 2016

Prepared for:

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Prepared by:

AKEL
ENGINEERING GROUP, INC.

AKEL
ENGINEERING GROUP, INC.

March 15, 2016

Provost and Pritchard
1800 30th St., Suite 280
Bakersfield, CA 93301

Attention: Mr. David McGlasson, P.E.
Project Manager

Subject: Technical Memorandum – CSA-71 Sewer System Master Plan

Dear David:

We are pleased to submit this technical memorandum documenting the hydraulic analysis of the County of Kern Service Area 71 (CSA-71) sewer system and recommended improvements to service future growth.

BACKGROUND AND PURPOSE

CSA-71 is located in the northwest quadrant of the City of Bakersfield (City) Metropolitan Area (**Figure 1**). The County of Kern (County) has taken a proactive approach to the planning and development of lands within CSA-71, completing a sewer system master plan in 2004, and again in 2010. In recent years, the City has been experiencing new development, and has completed annexations of land within the CSA-71 area. As such, and in keeping with the proactive approach, the County initiated the 2015 Sewer System Master Plan.

The County entered into an agreement with Provost and Pritchard to provide services to update the master plan. Provost and Pritchard subsequently entered into an agreement with Akel Engineering Group in October 2014 to complete the hydraulic analysis for the sewer system, and recommend improvements to service future growth.

EXISTING SYSTEM DESCRIPTION

The CSA-71 area is bounded by the Kern River in the south, State Route 99 in the east, Beech Avenue in the west, and to the north by an east-west line approximately one-half mile north of Seventh Standard Road. This area has two main sewer service providers: North of River Sanitation District and the City of Bakersfield (**Figure 2**). The approximate service areas and existing sewer systems are as follows:

- **North of River Sanitation District (NORSD):** The NORSD sewer service area is approximately bounded by State Route 99 to the east, Beech Avenue to the west, and to the north by an east-west line approximately one-half mile north of Seventh Standard Road. The

southern boundary jogs between Rosedale Highway in the west and Snow Road in the east. The NORSD sewer service area collects flow along one primary trunk, running from east to west along Norris Road, Santa Fe Way, and Seventh Standard Road, ranging in size from 33-inches to 48-inches (**Figure 3**).

- **City of Bakersfield (City):** The City sewer service area is approximately bounded by State Route 99 to the east, Beech Avenue to the west, and to the south by the Kern River. The northern boundary jogs between Rosedale Highway in the west and Snow Road in the east. The City sewer service area collects flow along two primary trunks: the Jewetta Avenue trunk, which ranges in size from 12-inches to 42-inches and the Allen Road trunk, which ranges in size from 15-inches to 42-inches (**Figure 3**).

The City and NORSD service areas are further subdivided into Planned Sewer Areas, and shown graphically on **Figure 2**. These sewer areas are used to delineate areas of benefit for proposed improvements.

It should be noted that many areas within the City proposed service area had dry sewer pipelines. As part of this planning effort, many tract maps were reviewed to adequately plan connections to the dry sewer pipelines. **Appendix A** documents the tract maps reviewed, and delineates sewer pipelines as dry or wet.

LAND USE

Sewer flows were estimated based on two separate land use plans, as directed by County staff. The Western Rosedale Specific Plan land use was evaluated west of Jewetta Avenue, and the City of Bakersfield Metropolitan Plan was evaluated east of Jewetta Avenue. The consolidated land use is shown graphically on **Figure 4**.

Acreages for each of the Planned Sewer Areas were documented as part of this analysis, and are included on **Table 1**. Additionally, proposed equivalent single family dwelling units (ESFDUs) were estimated in accordance with the approved planning and design criteria, which is discussed in the following section. One single family dwelling unit is estimated at 280 gallons per day per dwelling unit. It is estimated that approximately 71,000 ESFDUs will develop in the NORSD tributary areas, while approximately 23,500 ESFDUs will develop in the City tributary areas (**Table 2**).

HYDRAULIC MODEL AND DESIGN CRITERIA

As part of the 2010 Sewer System Master Plan, a hydraulic model was developed in Bentley Systems SewerCAD. This model served as the benchmark for the analysis and recommended improvements Sewer System Master Plan Update. As a part of the Master Plan Update, the model was redeveloped in Innovyze's H2OMap Sewer. Extensive review of tract maps, provided by the County, served to verify the existing system and points of connectivity for the future system.

Future flows were developed based on the consolidated land use, described previously, and County approved flow factors. The flow factors have been updated from the County Design Standards, as directed by County staff. NORSD and the City of Bakersfield have criteria that differs from the County

approved criteria. For the purposes of design, the criteria of the appropriate jurisdiction should be used. **Table 3** documents the County Design Standards and the revised flow factors used in this analysis. For the purposes of the hydraulic analysis, existing pipes were assigned a Mannings "n" coefficient of 0.013. Future pipes 12-inches and smaller were assigned a Mannings "n" of 0.013, while larger pipelines were assigned a Mannings "n" of 0.011.

Future flows for the City of Oildale are estimated at 7.29 MGD, based on the equivalent family dwelling unit estimates in the NORSD 2013 Master Sewer Plan.

PROPOSED IMPROVEMENTS

Improvements were sized based on the future flows and the design criteria discussed previously. These improvements are intended to mitigate deficiencies within the existing systems, and to service new growth. **Table 4** documents the proposed improvements, and includes parallel and replacement sizing requirements. These improvements are shown graphically on **Figure 5** and in detail on **Figures 5A-5D**. Several improvements are intended to mitigate potential slope deficiencies, and only show a replacement size. It should be noted that pipelines along 7th Standard Road and east of Santa Fe Way will be constructed by the City of Shafter. As such, pipelines shown are placeholders for County flows that may flow north, with the final alignment and sizing to be determined by the City of Shafter.

Potential flow routing was evaluated based on existing invert and rim elevations extracted from the hydraulic model and tract maps received from County staff. **Appendix B** documents the model output results for the proposed improvements. Proposed invert and rim elevations are documented on **Figure 6** and in detail on **Figures 6A-6D**. Please note that elevations were normalized to the NAD83/WGS84 datum. It is highly recommended that all invert and rim elevations be verified during the pre-design phase. Additionally, three areas within the existing City of Bakersfield service area were identified by County staff for consideration of moving service from the City to NORSD:

- **Renfro Road south of Hageman Road:** Existing portions of this area are currently serviced by NORSD, with dry pipelines that can be routed to the existing NORSD pipeline on Renfro Road.
- **Jenkins Road north of Hageman Road:** Existing dry pipelines within this area are currently routed towards the existing NORSD pipeline on Renfro Road. It is anticipated that when the dry lines are made active, they will route flows to the Renfro Road sewer pipeline.
- **South of Norris Road near Fruitvale Avenue:** This area is south of Norris Road from approximately Evergreen Street to Mohawk Street, and is immediately adjacent to the existing 33-inch NORSD sewer line.

It should be noted that hydraulic analysis indicated that the Stockdale Ranch Specific Plan development may require slightly larger sewer mains than as recommended in the 2014 Stockdale Ranch Sewer Study. The changes include upsizing 18-inch and 21-inch mains to 21-inch and 27-inch, respectively. For the purposes of this study, and as noted by County staff, the western portion of Planned Sewer Area 2 may not develop in the near term. As Planned Sewer Area 2 development intensifies, the sewer trunk sizing should be revisited.

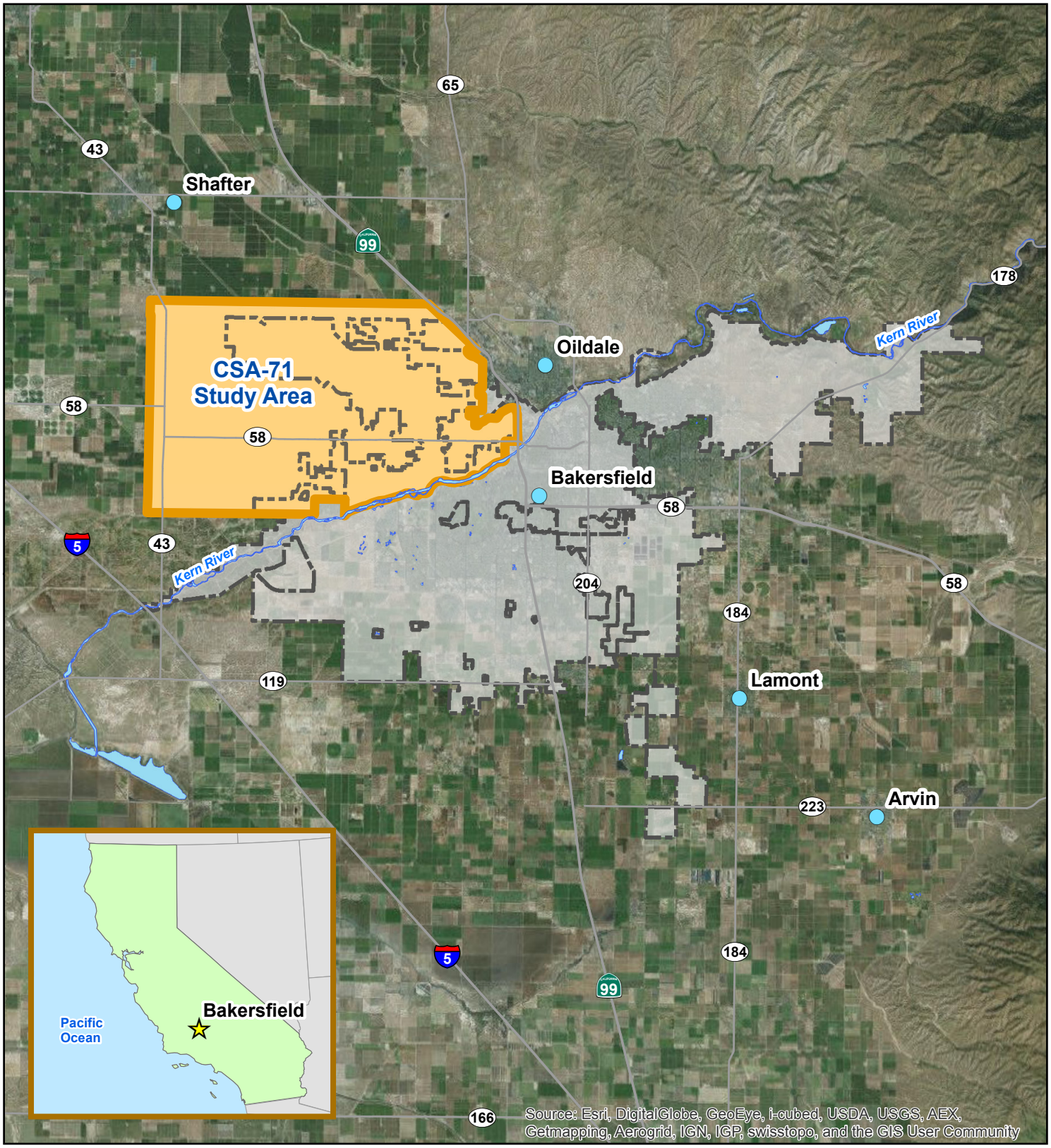
Additionally, this hydraulic analysis noted the Allen Road trunk is deficient at buildout conditions of Planned Sewer Areas 1 and 2. Additionally, areas outside of the CSA-71 boundary, and adjacent to the Allen Road trunk and north of the Kern River are discharging to the trunk. It is recommended that additional studies include the downstream portions of the City sewer system along Allen Road to determine the capacity adequacy of this trunk.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Principal

FIGURES



Legend

- Cities
- Study Area
- Bakersfield City Limits
- Highways
- Interstate
- Water Bodies

Updated: January 21, 2016

0 1.25 2.5 5 Miles

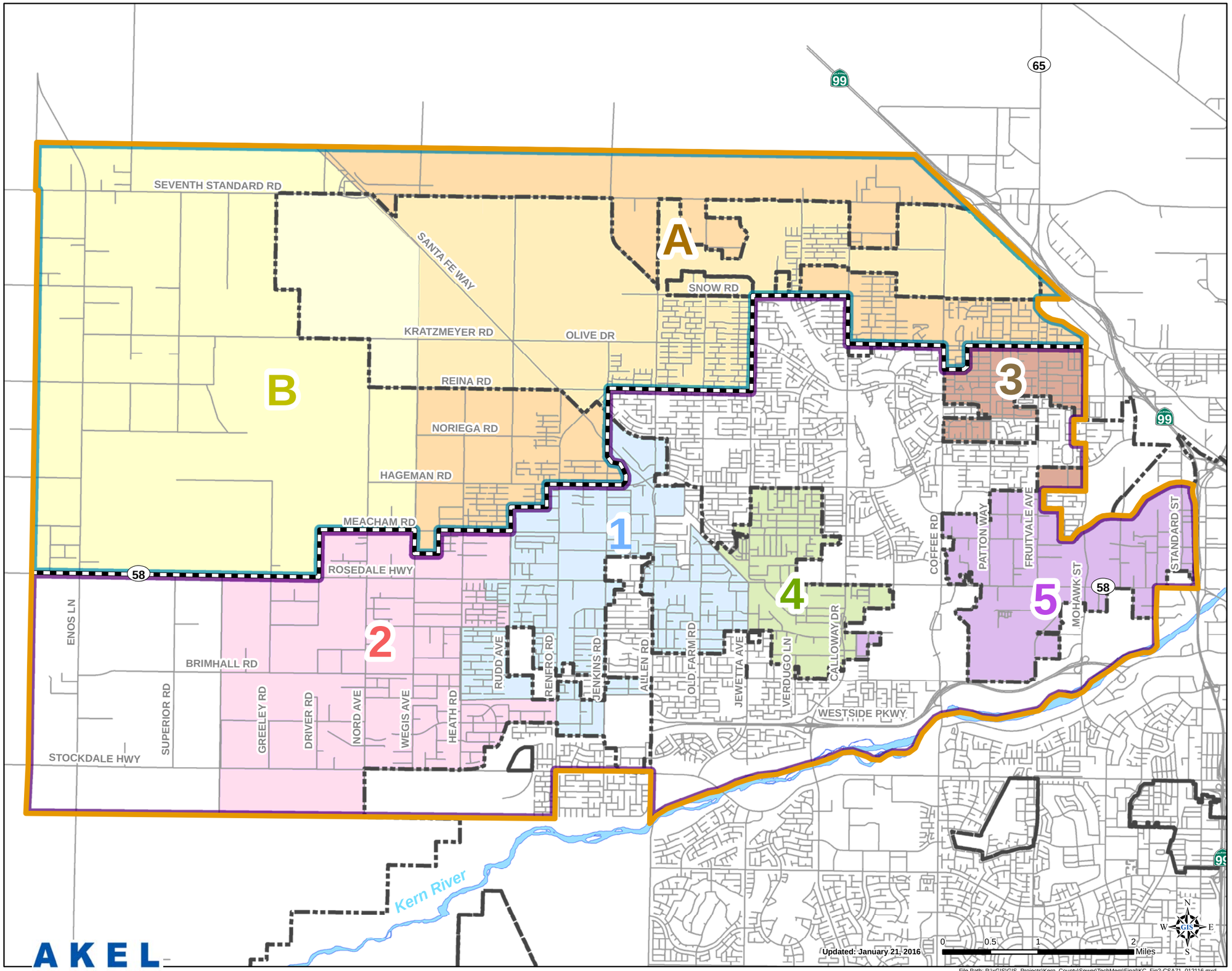
N W GIS E S

AKEL ENGINEERING GROUP, INC.

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Figure 1
Regional Location Map

Sewer Master Plan
Kern County



Legend

- CSA-71 Boundary

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

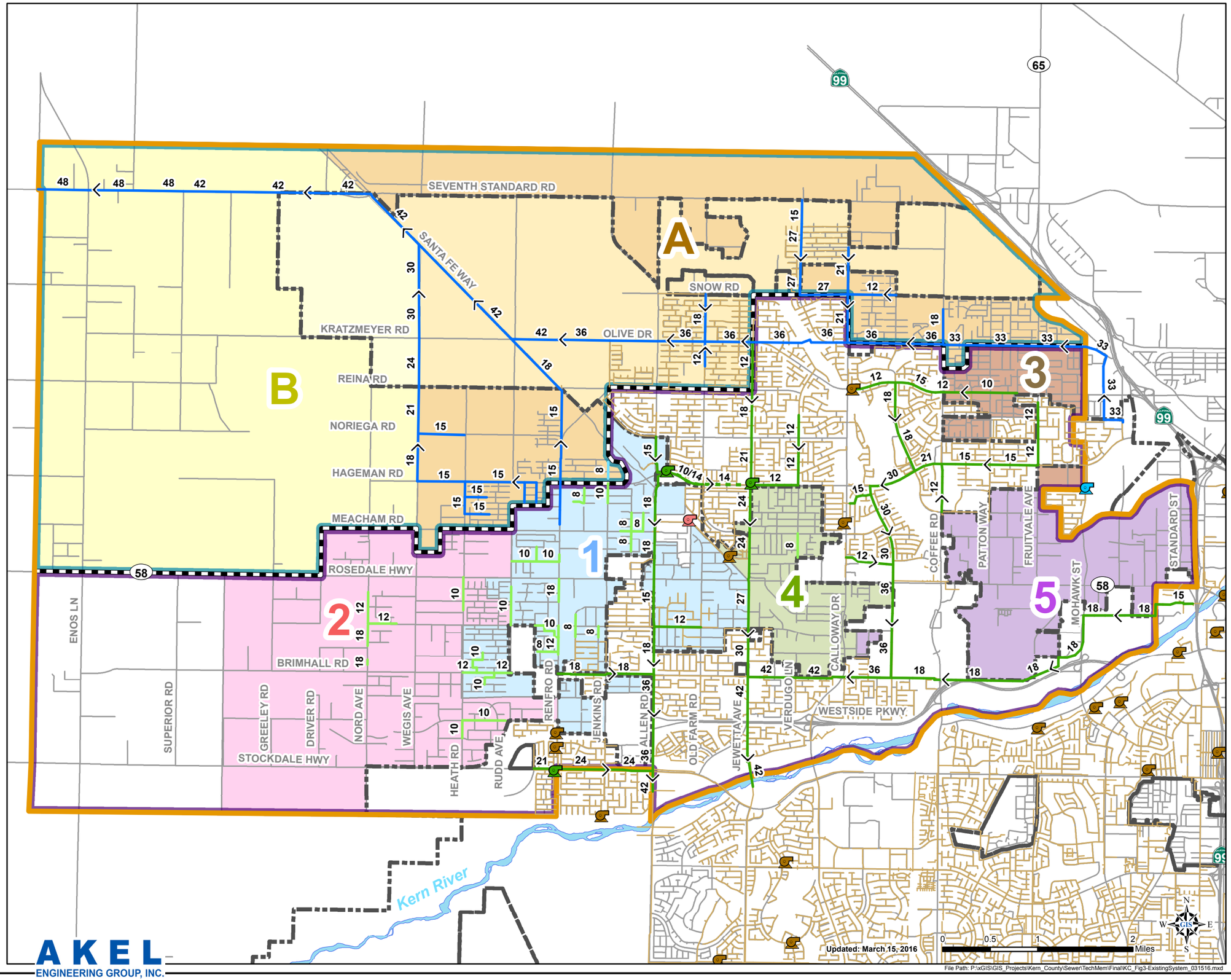
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 2
CSA-71 Sewer Boundaries

Sewer Master Plan
Kern County

AKEL
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Legend

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main - Live
- City of Bakersfield Pipes - Live
- City of Bakersfield Pipes - Dry
- NORSD Pipes - Live
- NORSD Pipes - Dry

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

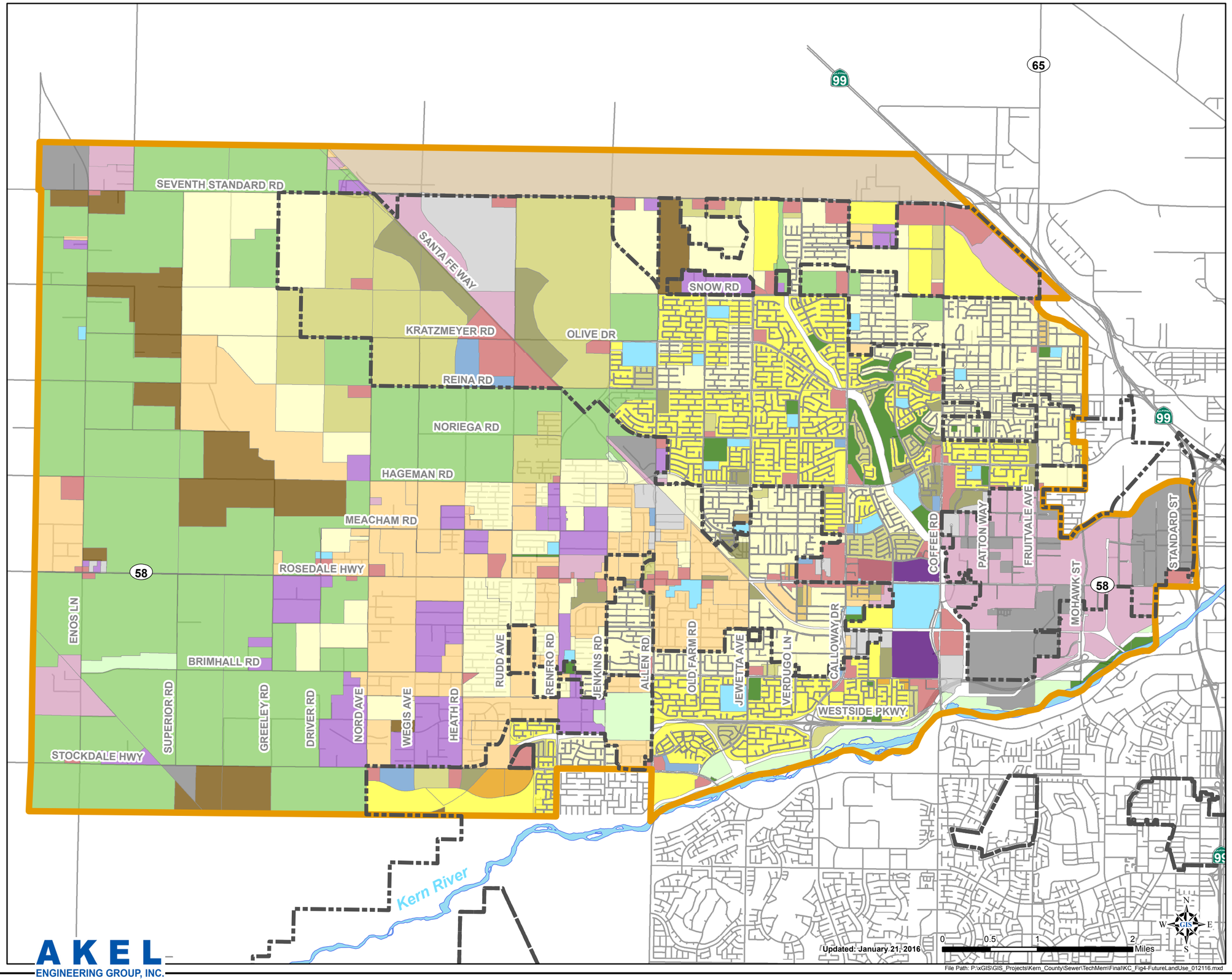
Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 3
Existing Modeled System and Service Areas

Sewer Master Plan
Kern County

AKEL
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Legend

- CSA-71 Boundary

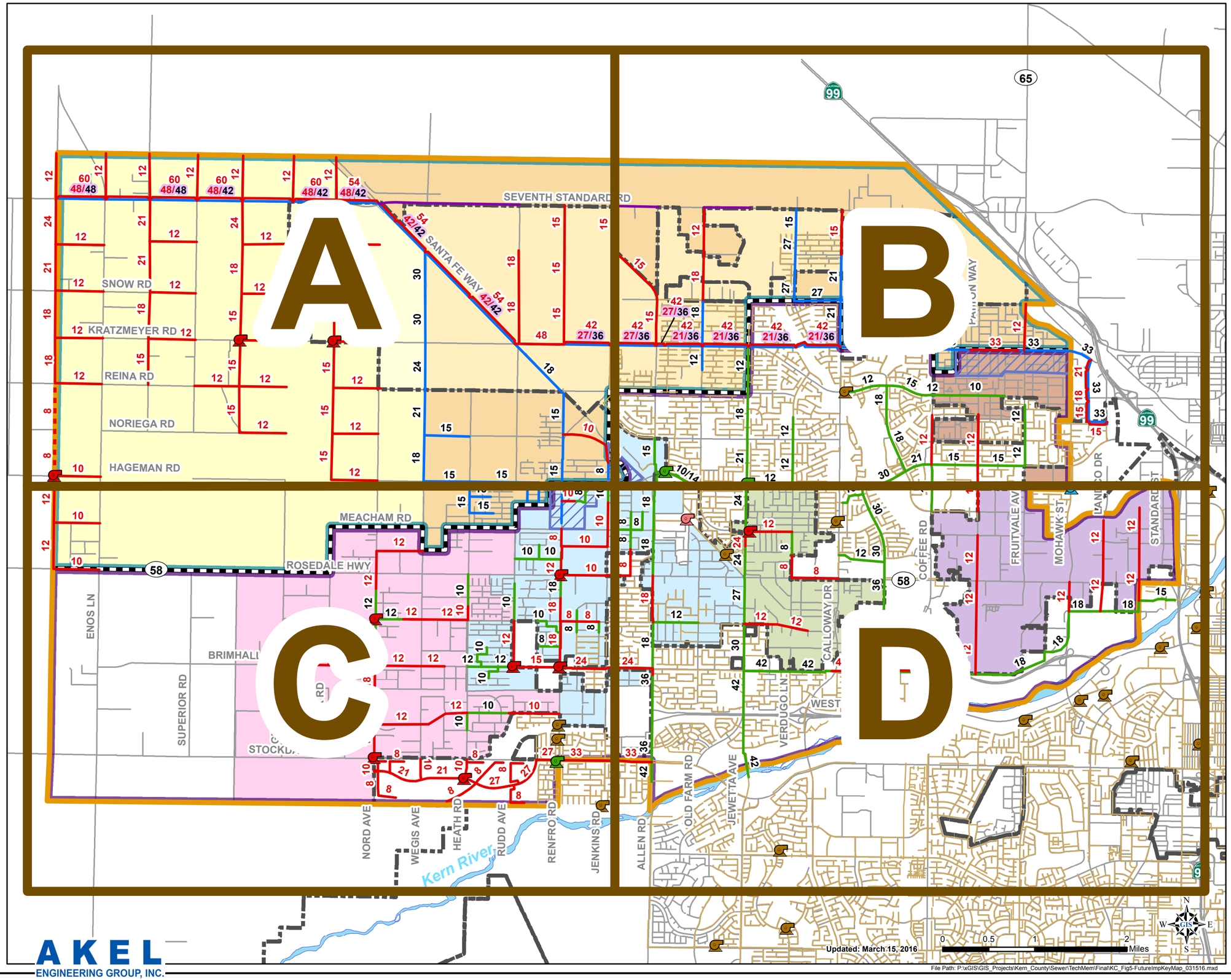
Future Land Use

- Estate Residential
- Rural Residential
- Suburban Residential
- Low Density Residential
- Low Medium Density Residential
- Low/Low Medium Density Residential
- High Medium Density Residential
- High Density Residential
- Commercial
- Major Commercial
- Mixed Use
- Office Commercial
- Light Industrial
- Heavy Industrial
- Service Industrial
- Public Facilities
- Open Space
- Parks & Recreation Facilities
- Agriculture
- Mineral Petroleum
- Non-Jurisdictional Land
- Other Jurisdiction
- Streets
- Bakersfield City Limits

Figure 4
Consolidated Future Land Use

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

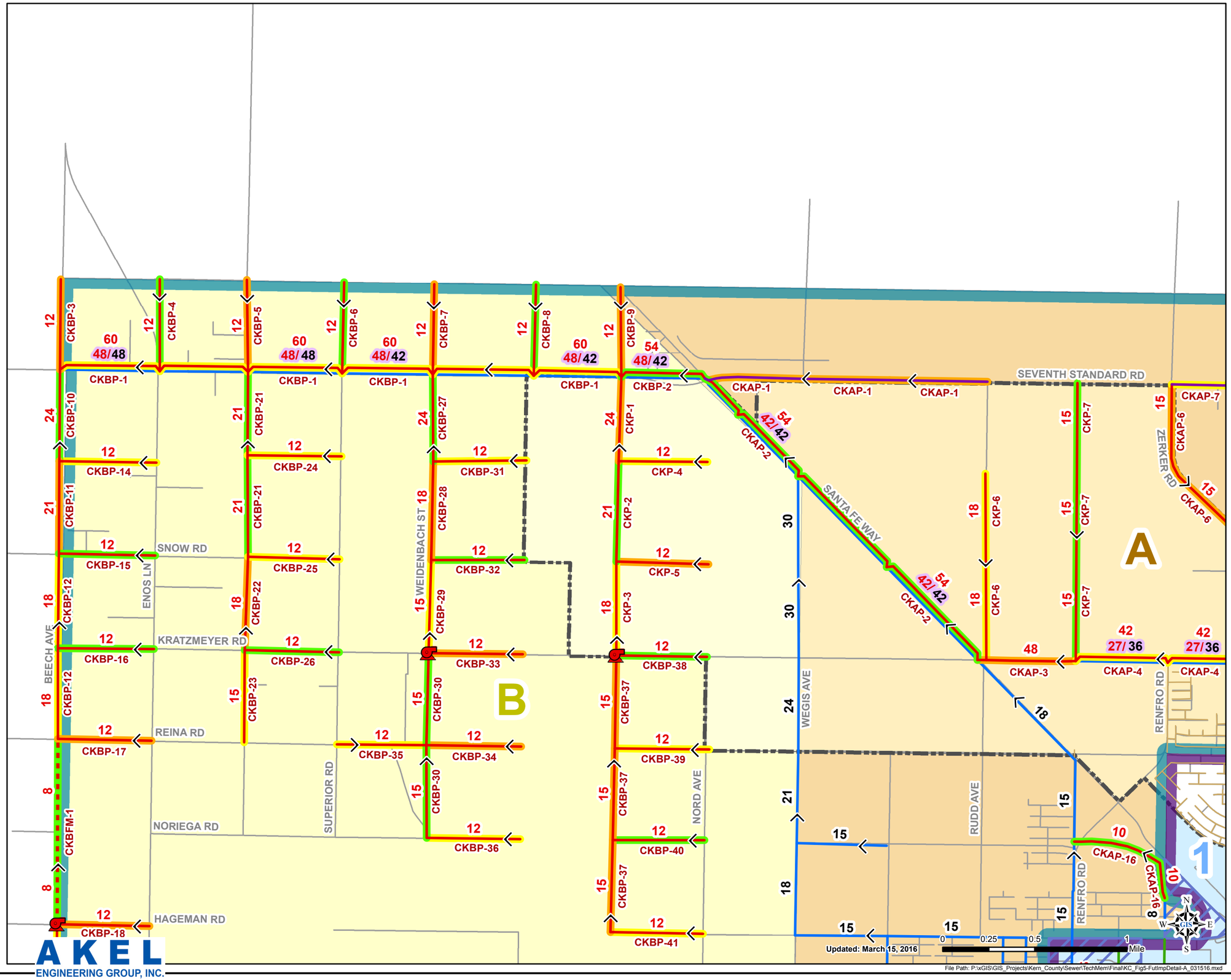
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 5
Existing Modeled System with Future Improvements Key Map

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\KC_Fig5-FutureImpKeyMap_031516.mxd



Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

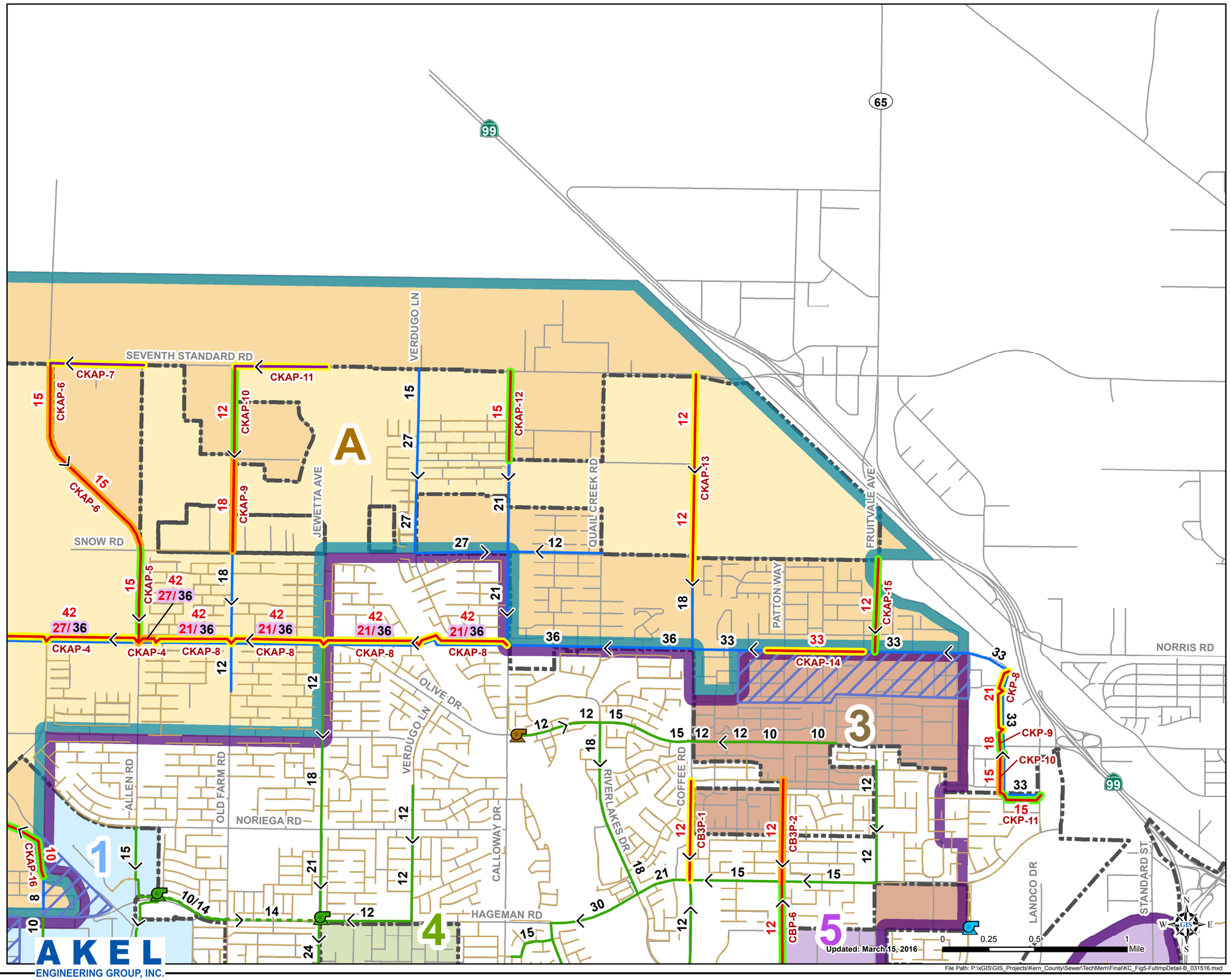
Planned Sewer Areas
- County Area - A
- County Area - B
- City Area - 1
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 5-A
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight (60 / 48/48)
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

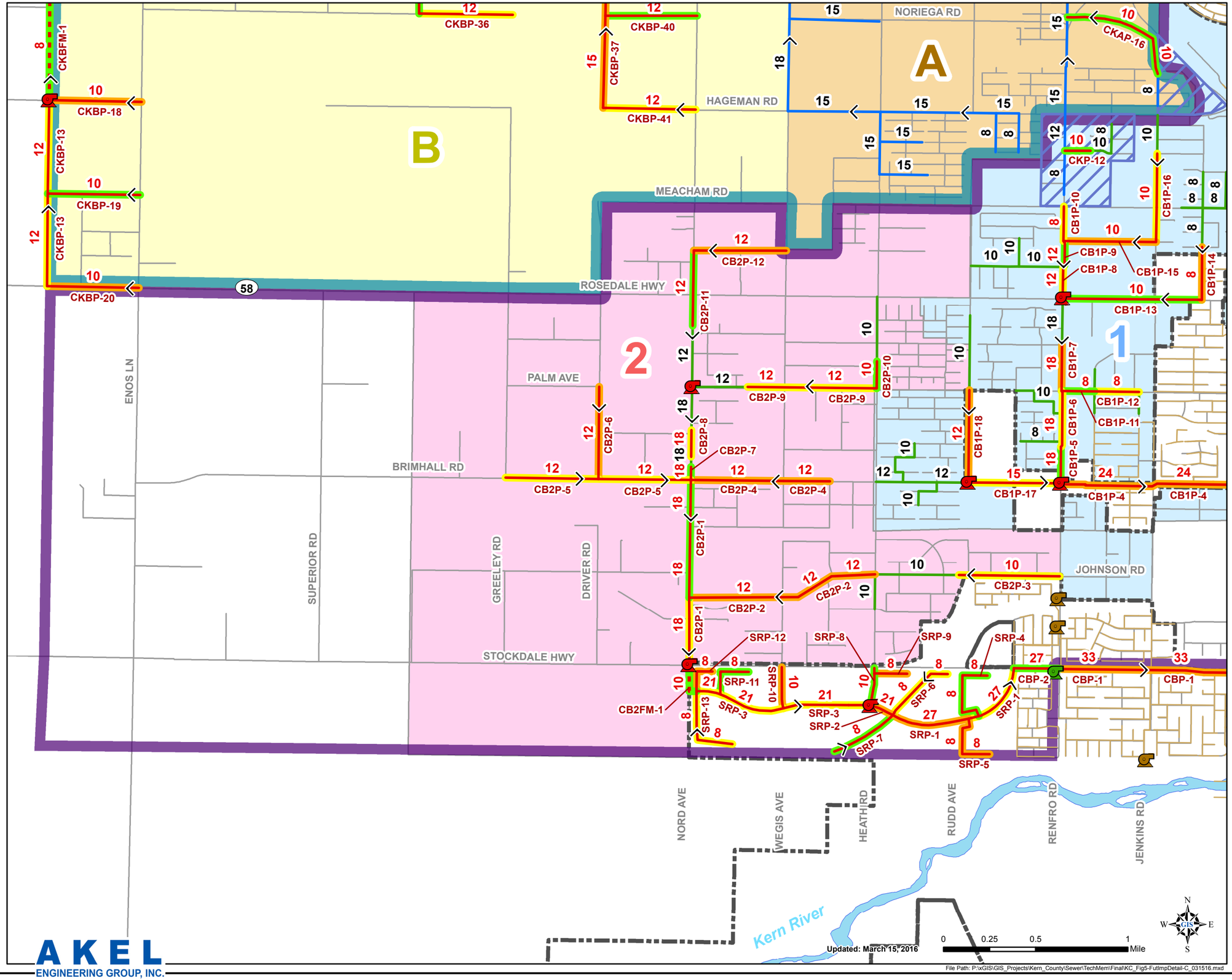
CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

Planned Sewer Areas
- County Area - A
- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 5-B
Existing Modeled System with Future Improvements
Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight (60 / 48/48)
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

Planned Sewer Areas
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- Streets
- Bakersfield City Limits

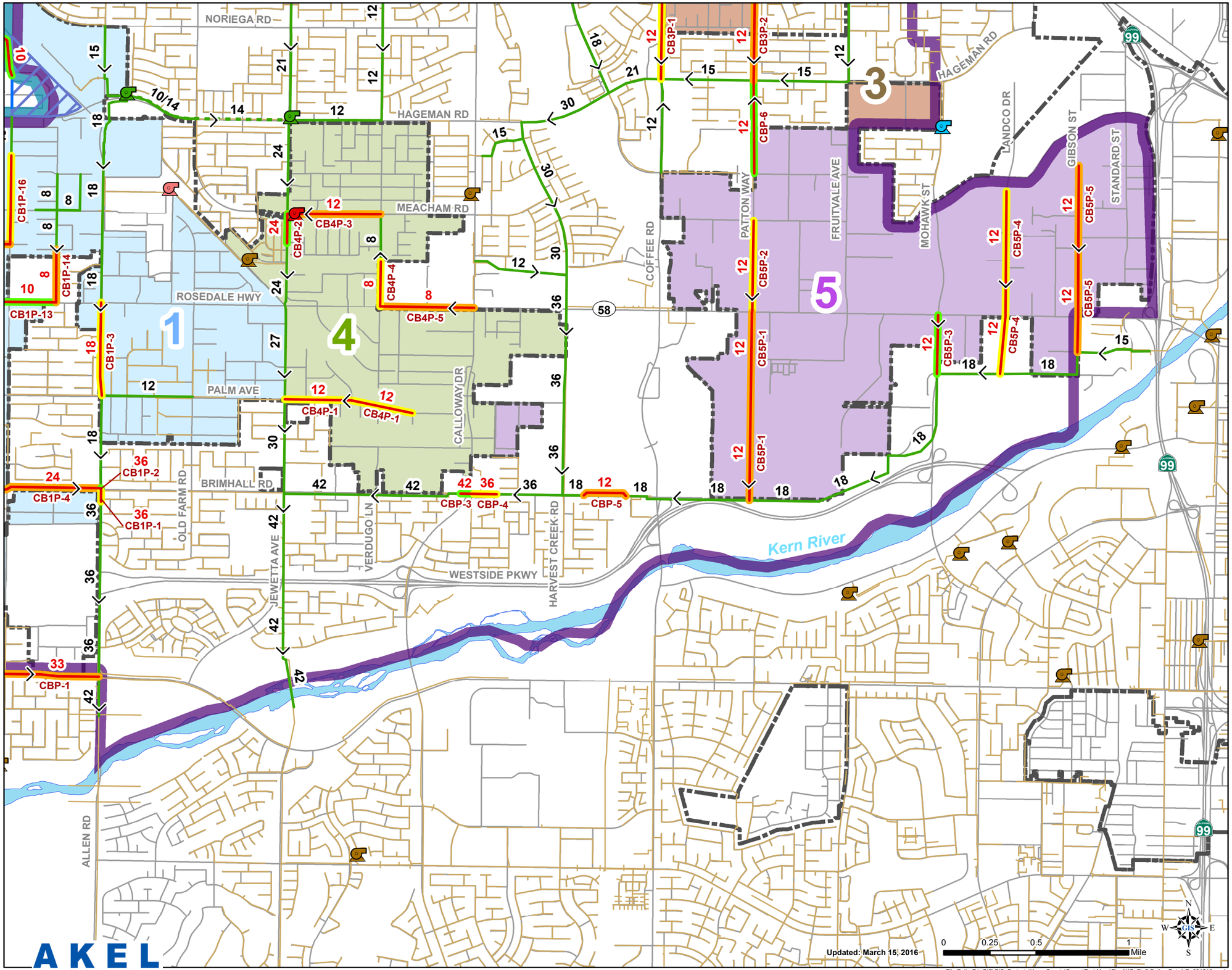
Improvement Numbering System: CKBP-1
CK/CB/SR = NORSD/City of Bakersfield/ Stockdale Ranch
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 5-C
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

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Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- 60 / 48/48 — Future Parallel Pipe Alternative Highlight
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 5-D
Existing Modeled System with Future Improvements

Sewer Master Plan
Kern County

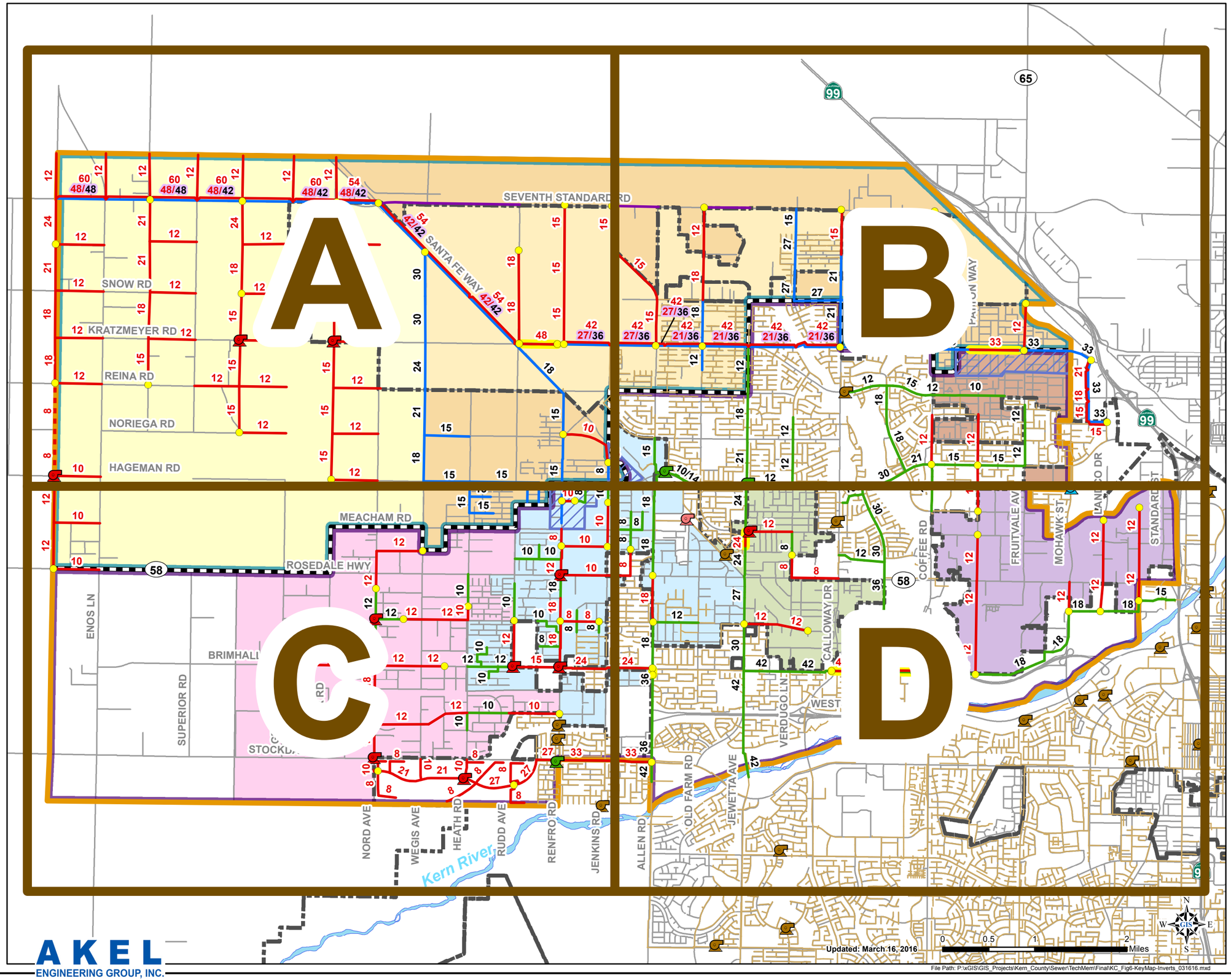
Updated: March 15, 2016

0 0.25 0.5 1 Mile

N W E S

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\KC_Fig5-FutImpDetail-D_031516.mxd

AKEL
ENGINEERING GROUP, INC.



Legend

- Manhole Inverts

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Pipe Slope Improvement
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

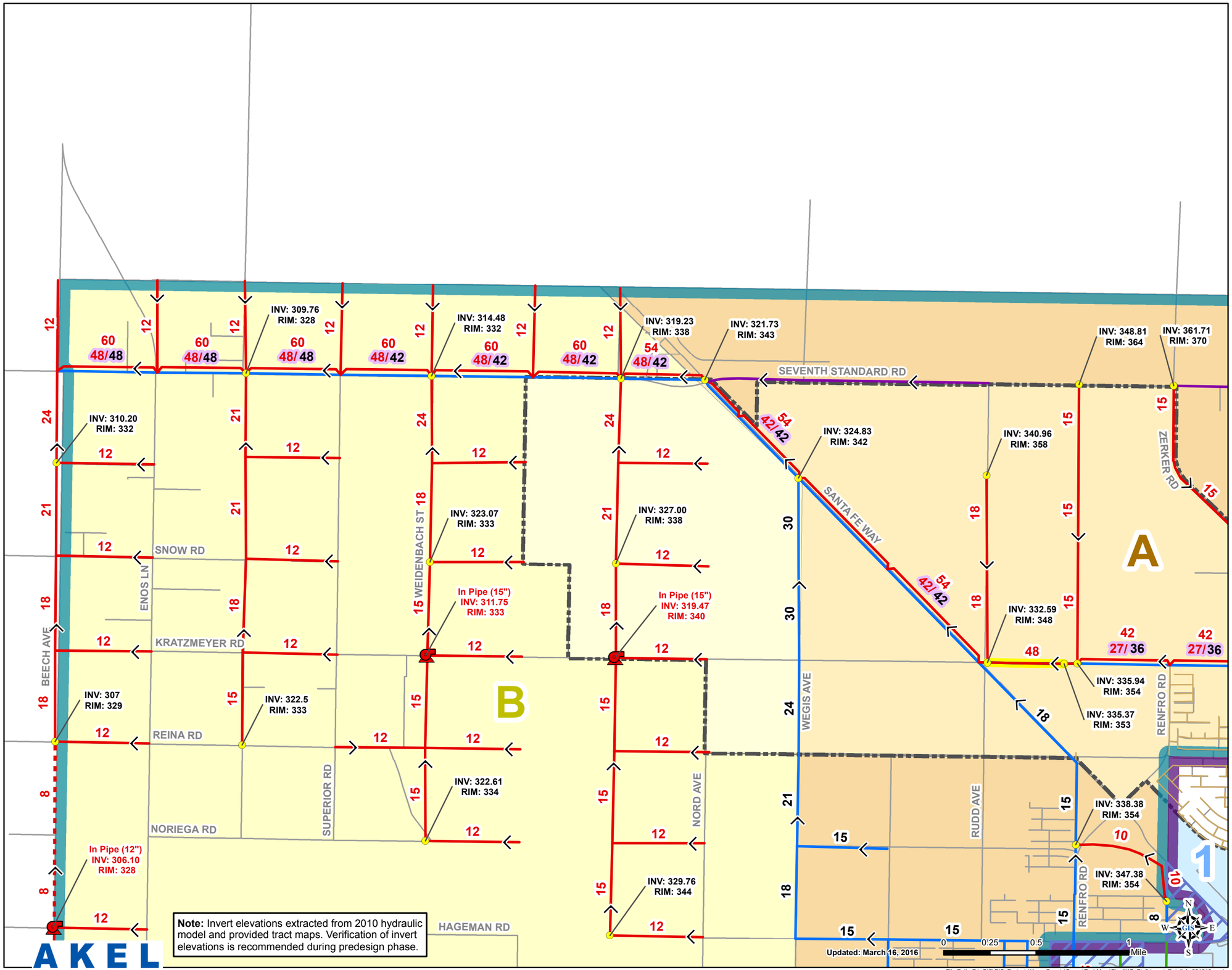
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Bakersfield City Limits

Figure 6
Potential Flow Routing Plan
Key Map

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\KC_Fig6-KeyMap-Inverts_031616.mxd



Note: Invert elevations extracted from 2010 hydraulic model and provided tract maps. Verification of invert elevations is recommended during predesign phase.

AKEL ENGINEERING GROUP, INC.

Legend

- Manhole Inverts

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Pipe Slope Improvement
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

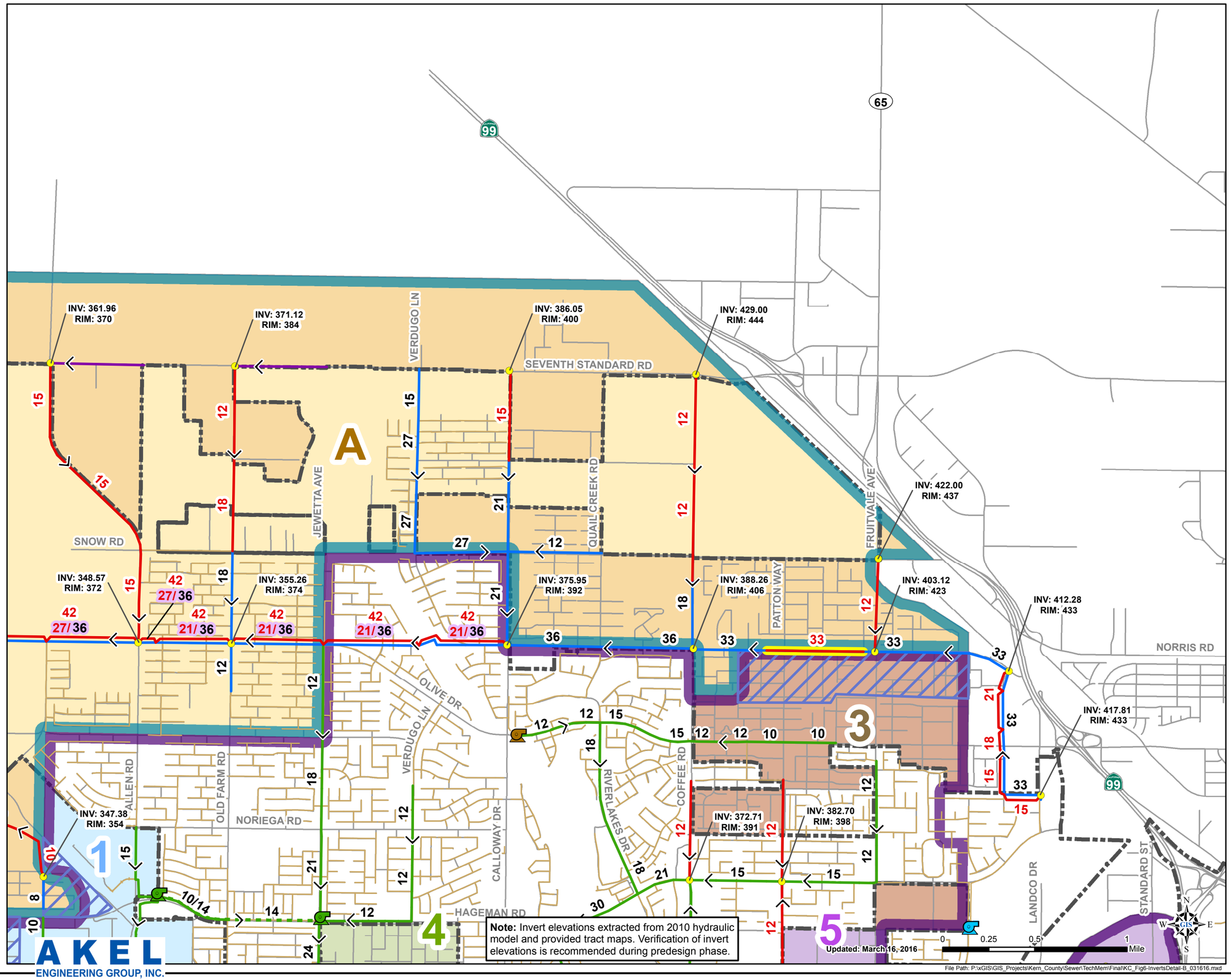
- City of Bakersfield
- NORSD

Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 6-A
Potential Flow Routing Plan

Sewer Master Plan
Kern County



Note: Invert elevations extracted from 2010 hydraulic model and provided tract maps. Verification of invert elevations is recommended during predesign phase.

AKEL
ENGINEERING GROUP, INC.

Legend

- Manhole Inverts

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Pipe Slope Improvement
- Future Parallel Pipe Alternative Highlight (60 / 48/48)
- City of Shafter Pipes

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

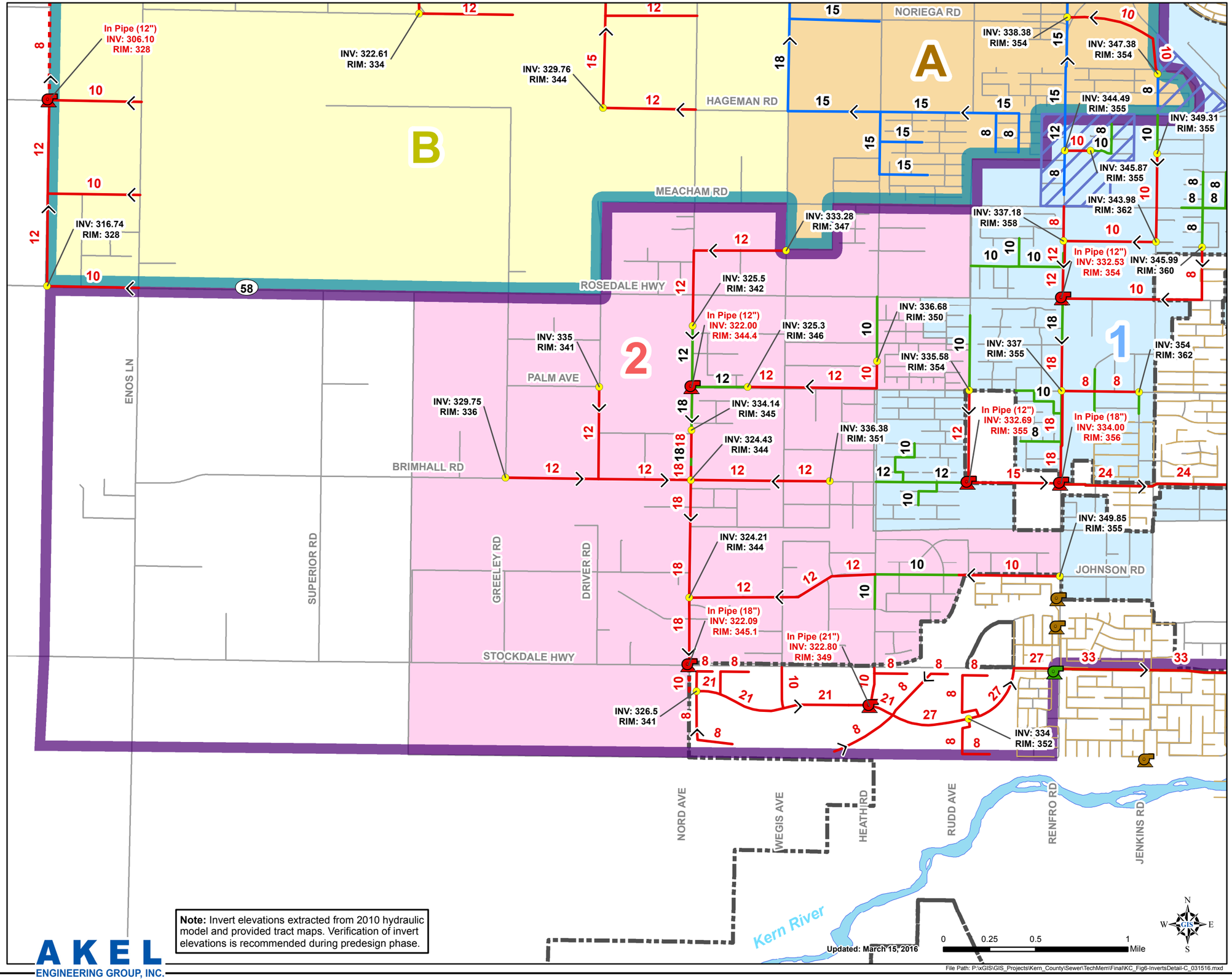
- City of Bakersfield
- NORSD

Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 6-B
Potential Flow Routing Plan

Sewer Master Plan
Kern County



Legend

- Manhole Inverts

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Pipe Slope Improvement
- 60 / 48/48 — Future Parallel Pipe Alternative Highlight

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

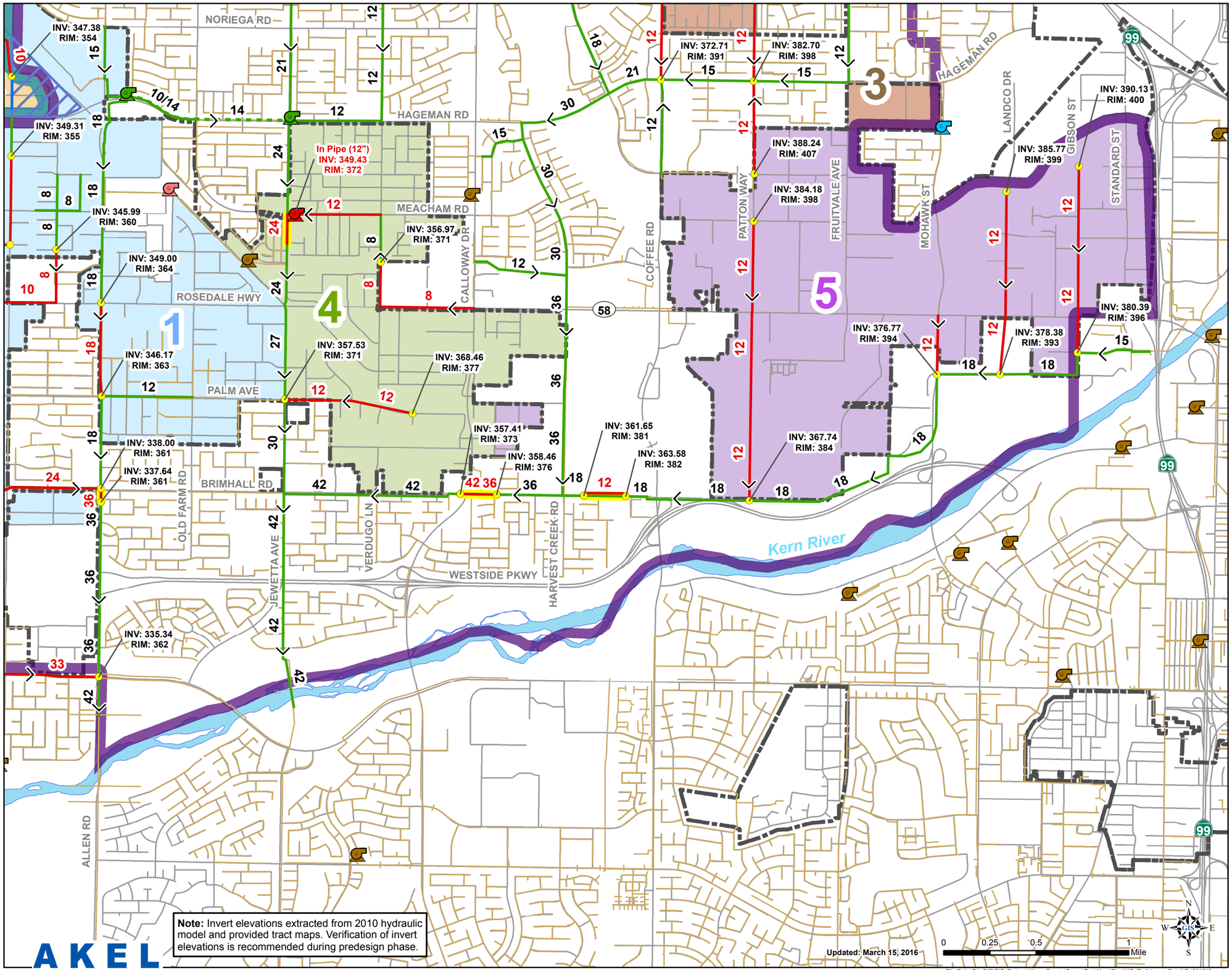
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Note: Invert elevations extracted from 2010 hydraulic model and provided tract maps. Verification of invert elevations is recommended during predesign phase.

AKEL ENGINEERING GROUP, INC.

Figure 6-C
Potential Flow Routing Plan

Sewer Master Plan
Kern County



Note: Invert elevations extracted from 2010 hydraulic model and provided tract maps. Verification of invert elevations is recommended during predesign phase.

AKEL ENGINEERING GROUP, INC.

Legend

- Manhole Inverts

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Pipe Slope Improvement
- 60 48/48 Future Parallel Pipe Alternative Highlight

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 6-D
Potential Flow Routing Plan

Sewer Master Plan
Kern County

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\KC_Fig6-InvertsDetail-D_031516.mxd

TABLES

Table 1 Land Use Acreages by Sewer Area

CSA-71 Sewer System Master Plan
County of Kern

Land Use Summary		NORSD[1]			City of Bakersfield					
Type	Development Intensity (esfd/ac)	Area A (acres)	Area B (acres)	Total NORSD (acres)	Area 1 (acres)	Area 2 (acres)	Area 3 (acres)	Area 4 (acres)	Area 5 (acres)	Total City of Bakersfield (acres)
Residential[2]										
Rural	0.4	207	86	293	377	987	0	0	0	1,363
Estate	1	39	1,128	1,168	107	948	0	66	0	1,121
Urban Estate	2	219	63	283	997	458	0	3	0	1,457
Surburban	4	1,989	1,500	3,489	804	457	547	692	0	2,501
Low	7.26	786	0	786	0	0	0	0	0	0
Low/Low Medium	10	15	0	15	0	0	0	51	0	51
Low Medium	10	1,588	1,384	2,972	12	0	0	27	0	39
High Medium	17.42	305	87	391	53	0	0	46	0	99
Subtotal		5,147	4,249	9,396	2,349	2,850	547	884	0	6,631
Commercial/Institutional[3]										
Highway	6	0	0	0	0	0	0	0	2	2
General	6	588	92	681	102	57	5	39	0	203
Office	6	107	0	107	7	0	0	0	0	8
Major	6	0	0	0	0	0	0	0	0	0
Mixed Use	6	0	0	0	0	0	0	0	0	0
Public	6	0	3	3	10	6	0	0	0	16
Public/Private Schools	6	100	7	107	47	0	19	19	0	85
Subtotal		795	102	898	167	62	24	59	2	314
Industrial[3]										
Light	6	453	10	464	75	0	0	12	0	87
Service	6	471	163	635	87	0	0	20	0	107
Modified Service[4]	1.42	0	0	0	0	0	0	0	1,936	1,936
Heavy	6	0	167	167	83	0	0	0	0	83
Subtotal		925	341	1,266	245	0	0	32	1,936	2,213
Acreage Total										
		6,867	4,692	**11,559**	2,762	2,912	571	975	1,938	**9,158**

Notes:

3/16/2016

1. Includes areas within the limits of the City of Bakersfield.
2. Development intensities taken from City of Bakersfield Metropolitan Plan.
3. Unless noted otherwise, development intensities taken from revised CSA-71, per County of Kern Staff, January 6, 2015.
4. Modified Service Industrial is specific to City of Bakersfield Planned Sewer Area 5 and is equivalent to 1.42 EDUs/acre. Per County of Kern Staff, January 6, 2015.
5. Calculated acreage as extracted from parcel database assumed to reflect net acreage.

Table 2 Equivalent Single Family Dwelling Units by Sewer Area

CSA-71 Sewer System Master Plan

County of Kern

Land Use	NORSD			City of Bakersfield					
	Area A (ESFD)	Area B (ESFD)	Total NORSD (ESFD)	Area 1 (ESFD)	Area 2 (ESFD)	Area 3 (ESFD)	Area 4 (ESFD)	Area 5 (ESFD)	Total City of Bakersfield (ESFD)
Residential	35,500	22,600	58,100	6,500	4,100	2,200	4,400	0	17,200
Commercial	4,800	600	5,400	1,000	400	100	400	0	1,900
Industrial	5,500	2,000	7,500	1,500	0	0	200	2,700	4,400
Subtotal	45,800	25,200	**71,000**	9,000	4,500	2,300	5,000	2,700	**23,500**

Notes: 2/25/2015

1. Equivalent Single Family Dwellings (ESFD) calculated based on development intensities as shown in the City of Bakersfield Metropolitan Plan and the Western-Rosedale Specific Plan.
2. This includes development within the existing City of Bakersfield city limits.

Table 3 Design Criteria

CSA-71 Sewer System Master Plan
County of Kern

Criteria[1]		
Average Discharge Rates		
	Design Standards	**Revised CSA-71 Criteria**
Single Family Residential (gpd/DU)	280	**280**
Multi-Family Residential (gpd/DU)	224	**224**
Average Commercial (gpd/GA)[2]	3,589	**1,680**
Average Industrial (gpd/GA)[2]	4,848	**1,680**
Modified Service Industrial (gpd/GA)[3]	N/A	**398**
Peaking Factors		
Residential	1.8	
Commercial	1.8	
Industrial	2.0	
Pipe Friction		
P.V.C.	0.011	
Other	0.013	
d/D Ratio		
d ≤ 15"	0.70	
d > 15"	Full Flow	
Velocity		
Minimum - Full Flow (ft/s)	2.0	
Minimum - With County Approval (ft/s)	1.6	
Maximum (ft/s)	10.0	
Minimum Slopes (ft/ft) by Pipe Diameter		
	n = 0.011	**n = 0.013**
6"	0.0038	0.0050
8"	0.0025	0.0035
10"	0.0020	0.0025
12"	0.0015	0.0020
15"	0.0013	---
18"	0.0011	---
21"	0.0009	---
≥ 24"	0.0008	---
Manholes		
Maximum Spacing, d < 15"	400'	
Maximum Spacing, d ≥ 15"	600'	
Other		
Design Differences in Pipe Sizes	Match Soffits	
Curved SS Lines Allow EO	Yes	
Min. Cover Over Sewer Lines in Street	4.0'	

Note: 6/4/2015

1. Source: County of Kern, Standards for Sanitary Sewers
2. Revised CSA-71 Criteria equivalent to 6.0 EDUs/gross acre. Per County of Kern Staff, January 6, 2015.
3. Modified Service Industrial is specific to City of Bakersfield Planned Sewer Area 5 and is equivalent to 1.42 EDUs/gross acre. Per 2004 CSA-71 MSP.

Table 4 Proposed Improvements

CSA-71 Sewer System Master Plan
County of Kern

Improvement ID	Type of Improvement	Alignment	Limits	Existing Pipe Diameter (in)	Parallel, Replace, or New	Diameter (in)	Length (ft)	Lift Station Capacity (mgd)	Comments
County of Kern - Planned Sewer Area A									
CKAP-1	Pipe								Alignment and size to be determined by City of Shafter
CKAP-2	Pipe	Santa Fe Wy	From 7th Standard Rd to Olive Dr	42	Parallel/Replace	42/54	11,200		
CKAP-3	Pipe	Olive Dr	From Sante Fe Wy to 2,700' w/o Renfro Rd	42	Replace	48	2,800		Pipe Slope Improvement
CKAP-4	Pipe	Olive Dr	From 2,700' w/o Renfro Rd to 500' e/o Allen Rd	36	Parallel/Replace	27/42	5,800		
CKAP-5	Pipe	Allen Rd	From Olive Rd to Snow Rd	---	New	15	2,600		
CKAP-6	Pipe	Zerker Rd	From Snow Rd to 7th Standard Rd	---	New	15	6,300		
CKAP-7	Pipe								Alignment and size to be determined by City of Shafter
CKAP-8	Pipe	Olive Dr	From 500' e/o Allen Rd to Calloway Dr	36	Parallel/Replace	21/36	10,300		
CKAP-9	Pipe	Shane St	From Snow Rd to Etchart Rd	---	New	18	2,700		
CKAP-10	Pipe	Shane St	From Etchart Rd to 7th Standard Rd	---	New	12	2,600		
CKAP-11	Pipe								Alignment and size to be determined by City of Shafter
CKAP-12	Pipe	Calloway Dr	From Etchart Rd to 7th Standard Rd	---	New	15	2,600		
CKAP-13	Pipe	Coffee Rd	From Date Palm Ct to 7th Standard Rd	---	New	12	5,900		
CKAP-14	Pipe	Norris Rd	From 150' e/o O' Keefe St to Crestwood St	33	Replace	33	2,800		Pipe Slope Improvement
CKAP-15	Pipe	Fruitvale Ave	From Norris Rd to Snow Rd	---	New	12	2,700		
CKAP-16	Pipe	Future ROW	From 150' n/o intersection of Jenkins Rd and Cascade Ct to 200' n/o intersection of Renfro Rd and Noriega Rd	---	New	10	3,600		
County of Kern - Planned Sewer Area B									
CKBP-1	Pipe	7th Standard Rd	Beech Ave to Driver Rd	48/42	Parallel/Replace	48/60	16,100		
CKBP-2	Pipe	7th Standard Rd	Driver Rd to Sante Fe Wy	42	Parallel/Replace	48/54	2,400		
CKBP-3	Pipe	Beech Ave	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-4	Pipe	Enos Ln	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-5	Pipe	Cherry Ave	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-6	Pipe	Superior Rd	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-7	Pipe	Weidenbach St	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-8	Pipe	Greeley Rd	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-9	Pipe	Driver Rd	From 7th Standard Rd to Coberly Rd	---	New	12	2,600		
CKBP-10	Pipe	Beech Ave	From 7th Standard Rd to Baker Rd	---	New	24	2,600		
CKBP-11	Pipe	Beech Ave	From Baker Rd to Snow Rd	---	New	21	2,600		
CKBP-12	Pipe	Beech Ave	From Snow Rd to Reina Rd	---	New	18	5,300		
CKBP-13	Pipe	Beech Ave	From Hageman Rd to Rosedale HWY	---	New	12	5,300		
CKBP-14	Pipe	Baker Rd	Fromn Beech Ave to Enos Ln	---	New	12	2,600		
CKBP-15	Pipe	Snow Rd	Fromn Beech Ave to Enos Ln	---	New	12	2,600		
CKBP-16	Pipe	Kratzmeyer Rd	Fromn Beech Ave to Enos Ln	---	New	12	2,600		
CKBP-17	Pipe	Reina Rd	Fromn Beech Ave to Enos Ln	---	New	12	2,600		
CKBP-18	Pipe	Hageman Rd	From Beech Ave to Enos Ln	---	New	10	2,600		
CKBP-19	Pipe	Meacham Rd	From Beech Ave to Enos Ln	---	New	10	2,600		
CKBP-20	Pipe	Rosedale HWY	From Beech Ave to Enos Ln	---	New	10	2,600		
CKBP-21	Pipe	Cherry Ave	From 7th Standard Rd to Snow Rd	---	New	21	5,300		
CKBP-22	Pipe	Cherry Ave	From Snow Rd to Kratzmeyer Rd	---	New	18	2,600		
CKBP-23	Pipe	Cherry Ave	From Kratzmeyer Rd to Reina Rd	---	New	15	2,600		
CKBP-24	Pipe	Baker Rd	From Cherry Ave to Superior Rd	---	New	12	2,600		
CKBP-25	Pipe	Snow Rd	From Cherry Ave to Superior Rd	---	New	12	2,600		
CKBP-26	Pipe	Kratzmeyer Rd	From Cherry Ave to Superior Rd	---	New	12	2,600		
CKBP-27	Pipe	Weidenbach St	From 7th Standard Rd to Baker Rd	---	New	24	2,600		
CKBP-28	Pipe	Weidenbach St	From Baker Rd to Snow Rd	---	New	18	2,600		
CKBP-29	Pipe	Weidenbach St	From Snow Rd to Kratzmeyer Rd	---	New	15	2,600		
CKBP-30	Pipe	Weidenbach St	From Kratzmeyer Rd to Noriega Rd	---	New	15	5,300		
CKBP-31	Pipe	Baker Rd	From Weidenbach St to Greeley Rd	---	New	12	2,600		
CKBP-32	Pipe	Snow Rd	From Weidenbach St to Greeley Rd	---	New	12	2,600		
CKBP-33	Pipe	Kratzmeyer Rd	From Weidenbach St to Greeley Rd	---	New	12	2,600		
CKBP-34	Pipe	Reina Rd	From Weidenbach St to Greeley Rd	---	New	12	2,600		
CKBP-35	Pipe	Reina Rd	From Weidenbach St to Superior Rd	---	New	12	2,600		
CKBP-36	Pipe	Noriega Rd	From Weidenbach St to Greeley Rd	---	New	12	2,600		
CKBP-37	Pipe	Driver Rd	From Kratzmeyer Rd to Hageman Rd	---	New	15	7,900		
CKBP-38	Pipe	Kratzmeyer Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKBP-39	Pipe	Reina Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKBP-40	Pipe	Noriega Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKBP-41	Pipe	Hageman Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKBFM-1	Force Main	Beech Ave	From Reina Rd to Hageman Rd	---	New	8	5,300		

Table 4 Proposed Improvements

CSA-71 Sewer System Master Plan
County of Kern

Improvement ID	Type of Improvement	Alignment	Limits	Existing Pipe Diameter (in)	Parallel, Replace, or New	Diameter (in)	Length (ft)	Lift Station Capacity (mgd)	Comments
CKBFM-2	Force Main	Weidenbach St	From Kratzmeyer Rd to 50' n/o Kratzmeyer Rd	---	New	6	50		
CKBFM-3	Force Main	Driver Rd	From Kratzmeyer Rd to 50' n/o Kratzmeyer Rd	---	New	6	50		
CKBLS-1	Lift Station	Hageman Rd and Beech Ave		---	New			0.3	
CKBLS-2	Lift Station	Kratzmeyer Rd and Weidenbach St		---	New			0.5	
CKBLS-3	Lift Station	Kratzmeyer Rd and Driver Rd		---	New			0.5	
County of Kern - Outside Planned Sewer Areas									
CKP-1	Pipe	Driver Rd	From 7th Standard Rd to Baker Rd	---	New	24	2,600		
CKP-2	Pipe	Driver Rd	From Baker Rd to Snow Rd	---	New	21	2,600		
CKP-3	Pipe	Driver Rd	From Snow Rd to Kratzmeyer Rd	---	New	18	2,600		
CKP-4	Pipe	Baker Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKP-5	Pipe	Snow Rd	From Driver Rd to Nord Ave	---	New	12	2,600		
CKP-6	Pipe	Rudd Ave	From Olive Dr 5,280' n/o Olive Dr	---	New	15	5,300		
CKP-7	Pipe	ROW	From Olive Dr to 7th Standard Rd	---	New	15	7,900		
CKP-8	Pipe	Victor St	From 450' n/o Olive Dr to Norris Rd	33	Parallel	21	1,800		
CKP-9	Pipe	Victor St	From 230' s/o Olive Dr to 450' n/o Olive Dr	33	Parallel	18	700		
CKP-10	Pipe	Victor St	From 1,400' s/o Olive Dr to 230' s/o Olive Dr	33	Parallel	15	1,200		
CKP-11	Pipe	Future ROW	From Knudsen Dr to Victor St	33	Parallel	15	1,100		
CKP-12	Pipe	Future ROW	From Renfro Rd to Sante Fe Ct	---	New	10	700		
City of Bakersfield - Planned Sewer Area 1									
CB1P-1	Pipe	Allen Rd	From 380' s/o Brimhall Rd to 80' s/o Brimhall Rd	36	Replace	36	300		
CB1P-2	Pipe	Allen Rd	From 80' s/o Brimhall Rd to Brimhall Rd	21	Replace	36	80		
CB1P-3	Pipe	Allen Rd	From Palm Ave to Rosedale HWY	15	Replace	18	2,700		
CB1P-4	Pipe	Brimhall Rd	From Allen Rd to Renfro Rd	18	Replace	24	5,300		
CB1P-5	Pipe	Renfro Rd	From Brimhall Rd to 1050' n/o Brimhall Rd	---	New	18	1,000		
CB1P-6	Pipe	Renfro Rd	From 1050' n/o Brimhall Rd to Palm Ave	---	New	18	1,600		
CB1P-7	Pipe	Renfro Rd	From Palm Ave to Henderson Ave	---	New	18	1,300		
CB1P-8	Pipe	Renfro Rd	From Rosedale HWY to Dobbs Ave	---	New	12	900		
CB1P-9	Pipe	Renfro Rd	From Dobbs Ave to Mausbach Ave	---	New	12	800		
CB1P-10	Pipe	Renfro Rd	From Mausbach Ave to Meacham Rd	---	New	8	1,000		
CB1P-11	Pipe	Palm Ave	From Renfro Rd to Westdale Dr	---	New	8	900		
CB1P-12	Pipe	Palm Ave	From Westdale Dr to Longreach Dr	---	New	8	1,300		
CB1P-13	Pipe	Rosedale HWY	From Renfro Rd to Sablewood Dr	---	New	10	4,000		
CB1P-14	Pipe	Sablewood Dr	From Rosedale HWY to Pergola Ave	---	New	8	1,500		
CB1P-15	Pipe	Mausbach Ave	From Renfro Rd to Jenkins Rd	---	New	10	2,700		
CB1P-16	Pipe	Jenkins Rd	Mausbach Rd to Spring Mountain Ave	---	New	10	2,500		
CB1P-17	Pipe	Brimhall Rd	From Renfro Rd to Rudd Rd	---	New	15	2,600		
CB1P-18	Pipe	Rudd Rd	From Brimhall Rd to Palm Ave	---	New	12	2,600		
CB1FM-1	Force Main	Brimhall Rd	From Renfro Rd to 50' e/o Renfro Rd	---	New	12	50		
CB1FM-2	Force Main	Brimhall Rd	From Rudd Rd to 50' e/o Rudd Rd	---	New	6	50		
CB1FM-3	Force Main	Renfro Rd	From Rosedale Hwy to 50' s/o Rosedale HWY	---	New	8	50		
CB1LS-1	Lift Station	Brimhall Rd and Renfro Rd		---	New			3.2	
CB1LS-2	Lift Station	Brimhall Rd and Rudd Rd		---	New			0.8	
CB1LS-3	Lift Station	Rosedale HWY and Renfro Rd		---	New			1.2	
City of Bakersfield - Planned Sewer Area 2									
CB2P-1	Pipe	Nord Ave	From Stockdale HWY to Tiata Ave	---	New	18	5,300		
CB2P-2	Pipe	Johnson Rd	From Nord Ave to Heath Rd	---	New	12	5,500		
CB2P-3	Pipe	Johnson Rd	From 2,400' e/o Heath Rd to Renfro Rd	---	New	10	2,900		
CB2P-4	Pipe	Brimhall Rd	From Nord Ave to Moon Ranch St	---	New	12	4,000		
CB2P-5	Pipe	Brimhall Rd	From Nord Ave to Greeley Rd	---	New	12	5,300		
CB2P-6	Pipe	Driver Rd	From Brimhall Rd to Palm Ave	---	New	12	2,600		
CB2P-7	Pipe	Nord Ave	From Brimhall Rd to 370' n/o Brimhall Rd	---	New	18	400		
CB2P-8	Pipe	Nord Ave	From 660' n/o Brimhall Rd to 1,420' n/o Brimhall Rd	---	New	18	800		
CB2P-9	Pipe	Palm Ave	From 1,590' e/o Nord Ave to Heath Rd	---	New	12	3,700		
CB2P-10	Pipe	Heath Rd	From Palm Ave to 770' n/o Palm Ave	---	New	10	800		
CB2P-11	Pipe	Nord Ave	From 1,750' n/o Palm Ave to 1,320' n/o Rosedale HWY	---	New	12	2,100		
CB2P-12	Pipe	Rosedale HWY	From Nord Ave to Wegis Ave	---	New	12	2,600		
CB2FM-1	Force Main	Nord Ave	From Stockdale HWY to Stockdale Ranch Dr	---	New	10	900		
CB2FM-2	Force Main	Nord Ave	From Palm Ave to 50' s/o Palm Ave	---	New	6	50		

Table 4 Proposed Improvements

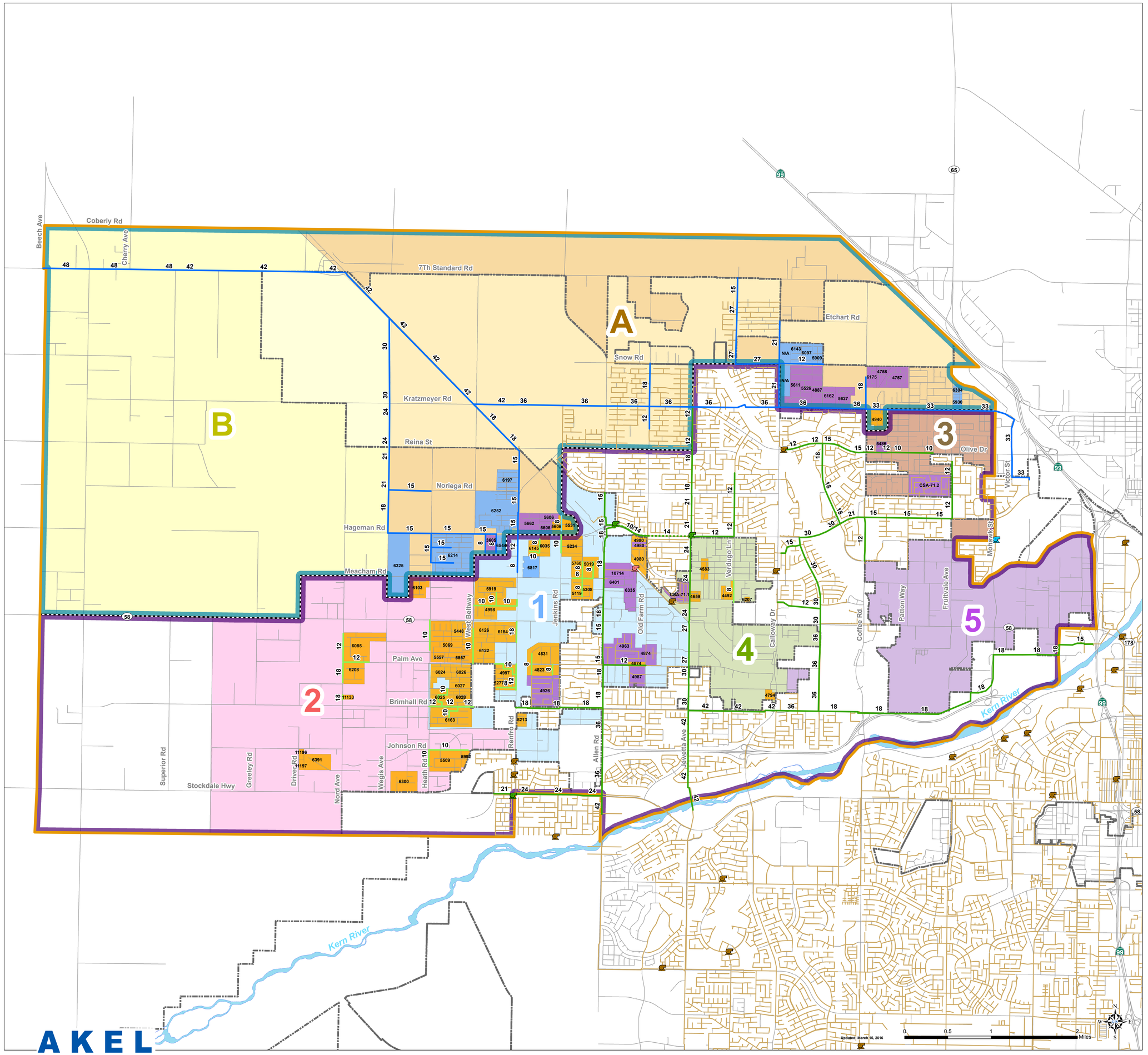
CSA-71 Sewer System Master Plan
County of Kern

Improvement ID	Type of Improvement	Alignment	Limits	Existing Pipe Diameter (in)	Parallel, Replace, or New	Diameter (in)	Length (ft)	Lift Station Capacity (mgd)	Comments
CB2LS-1	Lift Station	Stockdale HWY and Nord Ave		---	New			2.6	
CB2LS-2	Lift Station	Palm Ave and Nord Ave		---	New			0.9	
City of Bakersfield - Planned Sewer Area 3									
CB3P-1	Pipe	Coffee Rd	From Hageman Rd to 2,840' n/o Hageman Rd	---	New	12	2,800		
CB3P-2	Pipe	Patton Wy	From Hageman Rd to Hooper Ave	---	New	12	2,900		
City of Bakersfield - Planned Sewer Area 4									
CB4P-1	Pipe	Palm Ave	From Jewetta Ave to Marietta St	---	New	12	3,700		
CB4P-2	Pipe	Jewetta Ave	From 830' s/o Meacham Rd to Meacham Rd	24	Replace	24	800		Pipe Slope Improvement
CB4P-3	Pipe	Meacham Rd	From Jewetta Ave to Verdugo Ln	---	New	12	2,600		
CB4P-4	Pipe	Verdugo Ln	From 400' s/o Eagle Ranch Dr to Rosedale HWY	---	New	8	1,300		
CB4P-5	Pipe	Rosedale HWY	From Verdugo Ln to Calloway Dr	---	New	8	2,700		
CB4FM-1	Force Main	Jewetta Ave	From Meacham Rd to 50' s/o Meacham Rd	---	New	6	50		
CB4LS-1	Lift Station	Meacham Rd and Jewetta Ave		---	New			3.2	
City of Bakersfield - Planned Sewer Area 5									
CB5P-1	Pipe	Future ROW	From Brimhall Rd to Rosedale HWY	---	New	12	5,400		
CB5P-2	Pipe	Patton Wy	From Rosedale HWY to Downing Ave	---	New	12	2,600		
CB5P-3	Pipe	Mohawk St	From Walker Tr to Rosedale HWY	---	New	12	1,700		
CB5P-4	Pipe	Landco Dr	From1,660' s/o Rosedale HWY to 1,770' n/o Gilmore Ave	---	New	12	5,200		
CB5P-5	Pipe	Gibson St	From Marriot Dr to 790' n/o Turcon Ave	---	New	12	4,400		
Stockdale Ranch Development									
SRP-1	Pipe	Stockdale Ranch Dr	From Stockdale HWY to 640' e/o Heath Rd	---	New	27	4,300		
SRP-2	Pipe	Stockdale Ranch Dr	From 640' e/o Heath Rd to Heath Rd	---	New	21	600		
SRP-3	Pipe	Stockdale Ranch Dr	From Heath Rd to Nord Ave	---	New	21	5,100		
SRP-4	Pipe	Future ROW	From Stockdale Ranch Dr to 2,390' n/o Stockdale Ranch Dr	---	New	8	2,400		
SRP-5	Pipe	Future ROW	From Stockdale Ranch Dr to 1,970' n/o Stockdale Ranch Dr	---	New	8	2,000		
SRP-6	Pipe	Future ROW	From Stockdale Ranch Dr to 2,090' n/o Stockdale Ranch Dr	---	New	8	2,100		
SRP-7	Pipe	Future ROW	From Stockdale Ranch Dr to 1,990' n/o Stockdale Ranch Dr	---	New	8	2,000		
SRP-8	Pipe	Heath Rd	From Stockdale Ranch Dr to Stockdale HWY	---	New	10	1,100		
SRP-9	Pipe	Future ROW	From Heath Rd to 940' e/o Heath Rd	---	New	8	900		
SRP-10	Pipe	Wegis Ave	From Stockdale Ranch Dr to Stockdale HWY	---	New	10	1,200		
SRP-11	Pipe	Future ROW	From Stockdale Ranch Dr to 1,460' n/o Stockdale Ranch Dr	---	New	8	1,500		
SRP-12	Pipe	Future ROW	From Stockdale Ranch Dr to 1,020' n/o Stockdale Ranch Dr	---	New	8	1,000		
SRP-13	Pipe	Future ROW	From Stockdale Ranch Dr to 2,400' n/o Stockdale Ranch Dr	---	New	8	2,400		
SRFM-1	Force Main	Stockdale Ranch Dr	From Heath Rd to 50' e/o Heath Rd	---	New	12	50		
SRLS-1	Lift Station	Stockdale Ranch Dr and Heath Rd		---	New			3.6	
City of Bakersfield - Outside Planned Sewer Areas									
CBP-1	Pipe	Stockdale HWY	From Allen Rd to Renfro Rd	24	Replace	33	5,200		Pipe Slope Improvement
CBP-2	Pipe	Stockdale HWY	From Renfro Rd to Claudia Autumn Dr	21	Replace	27	1,300		
CBP-3	Pipe	Brimhall Rd	From 210' w/o Calloway Dr to 170' e/o Calloway Dr	42	Replace	42	400		Pipe Slope Improvement
CBP-4	Pipe	Brimhall Rd	From 170' e/o Calloway Dr to 820' e/o Calloway Dr	36	Replace	42	700		Pipe Slope Improvement
CBP-5	Pipe	Brimhall Rd	From 610' w/o Harvest Creek Rd to 880' w/o Coffee Rd	18	Parallel	12	1,200		Pipe Slope Improvement
CBP-6	Pipe	Patton Wy	From Meany Ave to Hageman Rd	---	New	12	2,600		
CBLS-1[1]	Lift Station	Stockdale HWY and Renfro Rd		---				5.0	
CBLS-2[1]	Lift Station	Hageman Rd and Jewetta Ave		---				2.5	

Notes:

1. Existing system lift station with unknown capacity; capacity shown is required capacity at buildout conditions.

Appendix A



Legend

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main - Live
- City of Bakersfield Pipes - Live
- City of Bakersfield Pipes - Dry
- NORSD Pipes - Live
- NORSD Pipes - Dry

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Sewer Service Areas

- Dry Sewer
- NORSD
- Live Sewer

Planned Sewer Areas

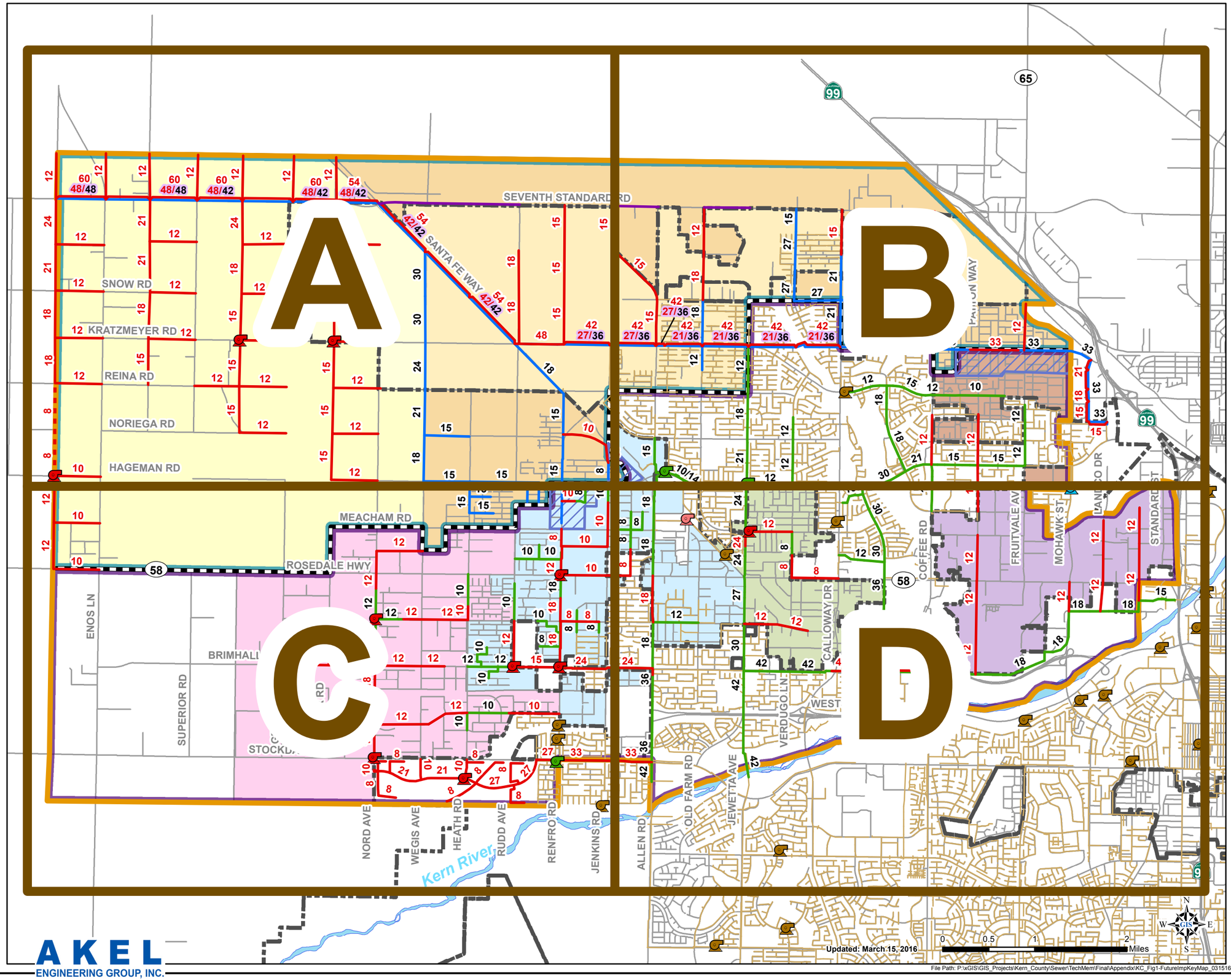
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- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Exhibit 1
Existing Modeled System and Service Areas

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.

Appendix B



Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- CSA-71 Boundary
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

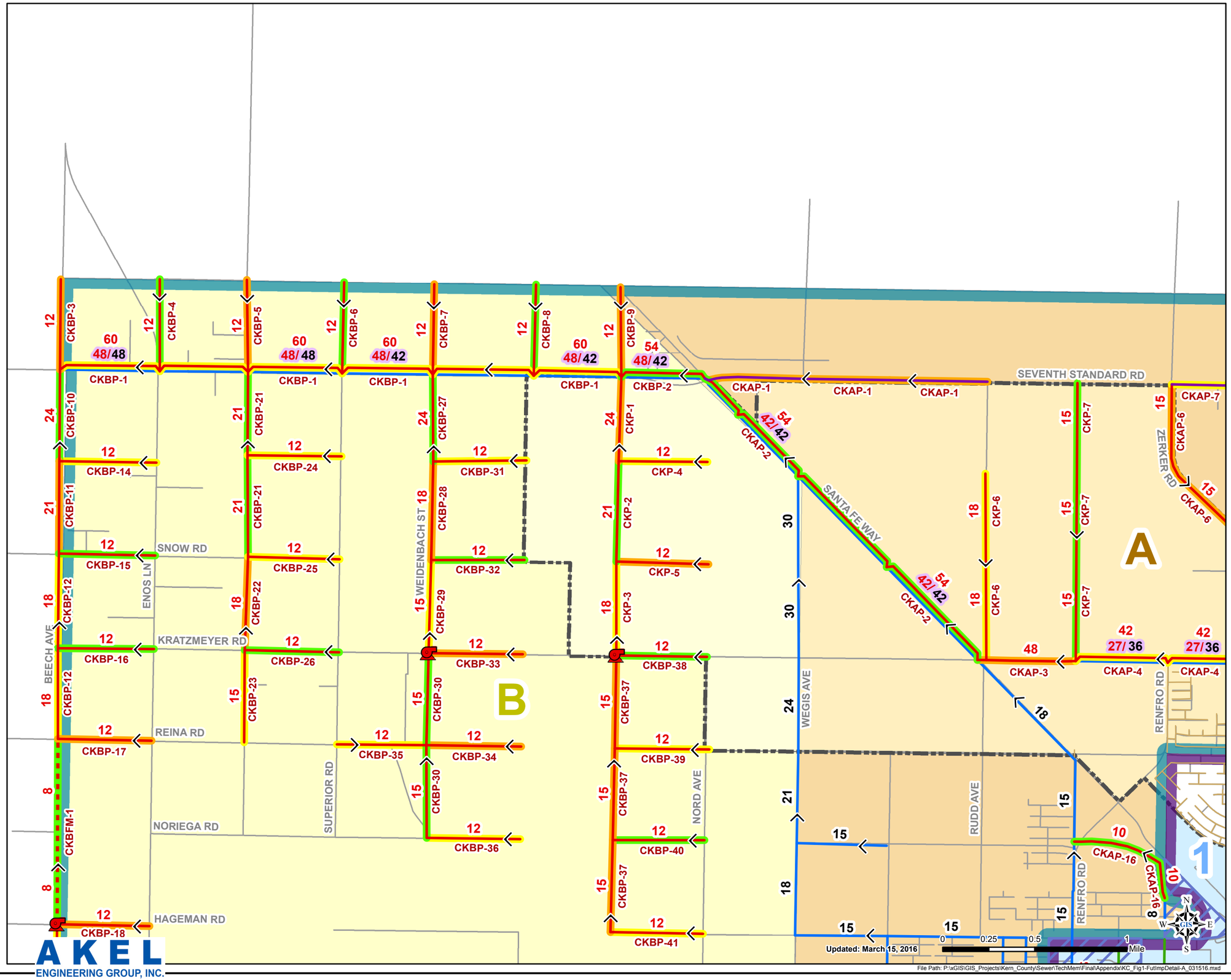
- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Figure 1
Model Output
Key Map

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.

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Legend

Future System Improvements
- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider
- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System
- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries
- City of Bakersfield
- NORSD

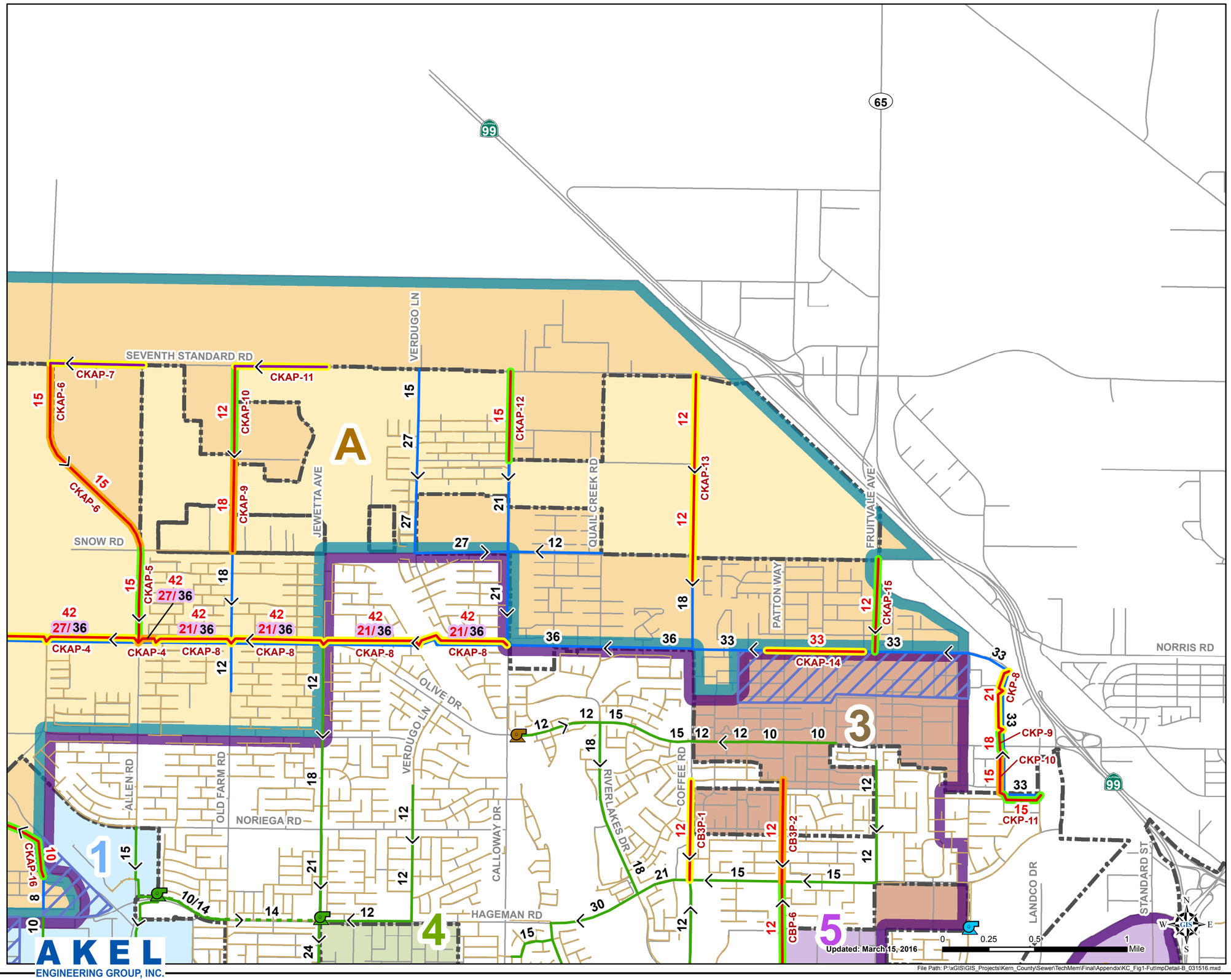
Planned Sewer Areas
- County Area - A
- County Area - B
- City Area - 1
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 1-A
Model Output

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.



Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight
- City of Shafter Pipes
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

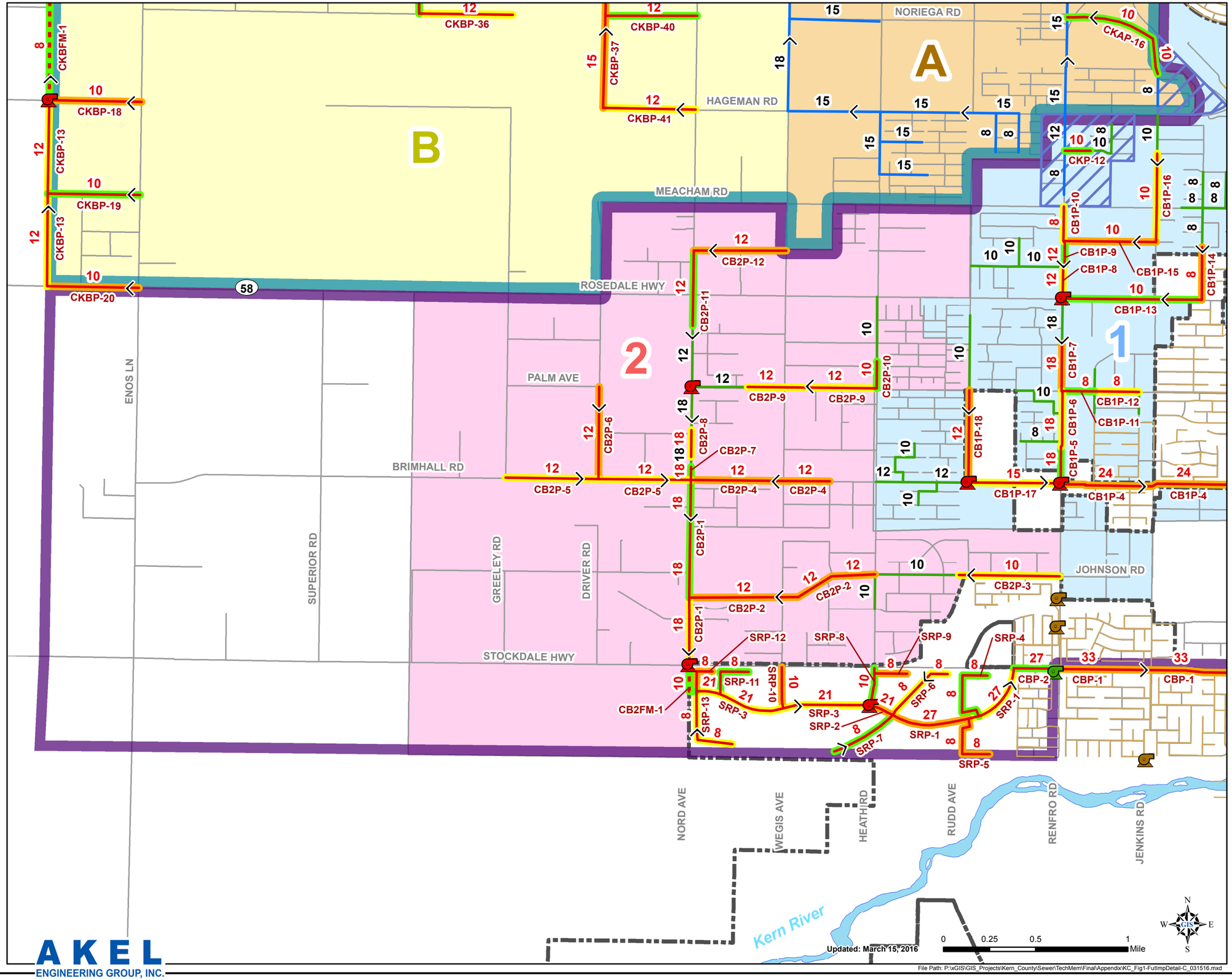
- County Area - A
- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 1-B
Model Output

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.



Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- Future Parallel Pipe Alternative Highlight (60 / 48/48)
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

- County Area - A
- County Area - B
- City Area - 1
- City Area - 2
- Streets
- Bakersfield City Limits

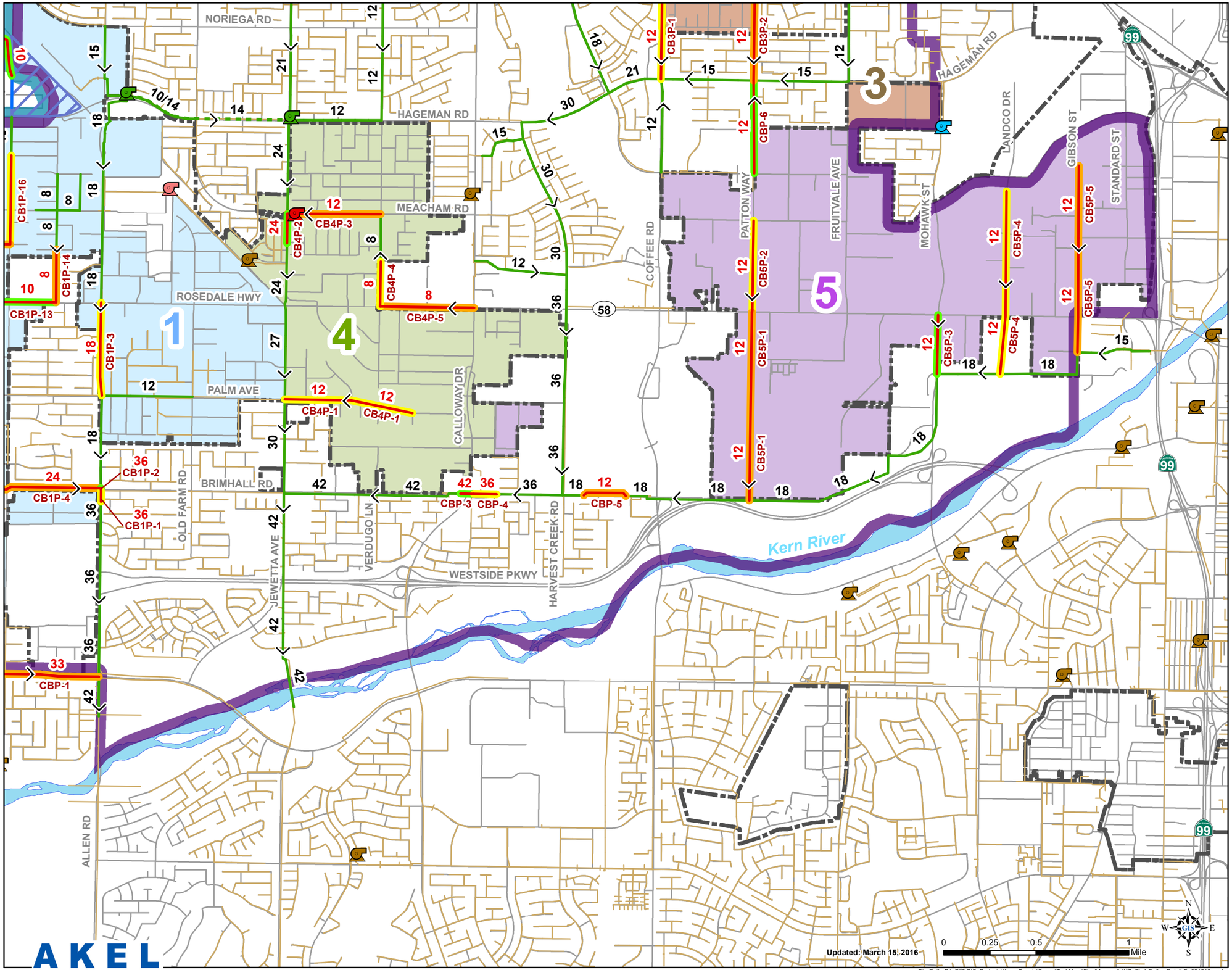
Improvement Numbering System: CKBP-1
CK/CB/SR = NORSD/City of Bakersfield/ Stockdale Ranch
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 1-C
Model Output

Sewer Master Plan
Kern County

AKEL
ENGINEERING GROUP, INC.

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\Appendix\KC_Fig1-FutImpDetail-C_031516.mxd



Legend

Future System Improvements

- Lift Stations
- Force Mains
- Pipes
- 60 / 48/48 — Future Parallel Pipe Alternative Highlight
- Pipe Improvement Segment
- Pipe Improvement Segment
- Pipe Improvement Segment

Modeled System by Service Provider

- City of Bakersfield Lift Stations
- City of Bakersfield Force Main
- City of Bakersfield Pipes
- NORSD Pipes

Non-Modeled System

- City of Bakersfield Lift Stations
- Kern County Lift Station
- NORSD Lift Station
- City of Bakersfield Pipes
- Consideration for Service by NORSD

CSA-71 Service Provider Boundaries

- City of Bakersfield
- NORSD

Planned Sewer Areas

- City Area - 1
- City Area - 3
- City Area - 4
- City Area - 5
- Streets
- Bakersfield City Limits

Improvement Numbering System: CKBP-1
CK/CB = NORSD/City of Bakersfield
A/B/1-5 = Planned Sewer Areas
P/LS/FM = Pipe/Lift Station/Force Main

Figure 1-D
Model Output

Sewer Master Plan
Kern County

AKEL ENGINEERING GROUP, INC.

Updated: March 15, 2016

0 0.25 0.5 1 Mile

N W E S

File Path: P:\xGIS\GIS_Projects\Kern_County\Sewer\TechMem\Final\Appendix\KC_Fig1-FutImpDetail-D_031516.mxd

Table 1 Model Output

CSA-71 Sewer System Master Plan

County of Kern

Improvement ID	Existing Pipe Diameter (in)	Parallel, Replace, or New	Improvement Diameter (in)	Average Dry Weather Flow[1]	Peak Dry Weather Flow[1]
County of Kern - Planned Sewer Area A					
CKAP-1					
CKAP-2	42	Parallel/Replace	42/54	21.22	38.19
CKAP-3	42	Replace	48	17.79	32.03
CKAP-4	36	Parallel/Replace	27/42	15.84	28.51
CKAP-5	---	New	15	0.62	1.12
CKAP-6	---	New	15	0.62	1.12
CKAP-7					
CKAP-8	36	Parallel/Replace	21/36	14.45	26.01
CKAP-9	---	New	18	0.74	1.33
CKAP-10	---	New	12	0.49	0.88
CKAP-11					
CKAP-12	---	New	15	0.92	1.65
CKAP-13	---	New	12	0.71	1.27
CKAP-14	33	Replace	33	0.33	0.59
CKAP-15	---	New	12	8.44	15.19
CKAP-16	---	New	10	0.29	0.52
County of Kern - Planned Sewer Area B					
CKBP-1	48/42	Parallel/Replace	48/60	27.44	49.38
CKBP-2	42	Parallel/Replace	48/54	22.26	40.07
CKBP-3	---	New	12	0.06	0.10
CKBP-4	---	New	12	0.03	0.05
CKBP-5	---	New	12	0.03	0.05
CKBP-6	---	New	12	0.06	0.10
CKBP-7	---	New	12	0.03	0.05
CKBP-8	---	New	12	0.03	0.05
CKBP-9	---	New	12	0.10	0.18
CKBP-10	---	New	24	0.20	0.36
CKBP-11	---	New	21	0.19	0.35
CKBP-12	---	New	18	0.19	0.35
CKBP-13	---	New	12	0.09	0.16
CKBP-14	---	New	12	0.01	0.01
CKBP-15	---	New	12	0.00	0.00
CKBP-16	---	New	12	0.01	0.02
CKBP-17	---	New	12	0.00	0.00
CKBP-18	---	New	10	0.03	0.06
CKBP-19	---	New	10	0.01	0.02
CKBP-20	---	New	10	0.03	0.05
CKBP-21	---	New	21	1.06	1.90
CKBP-22	---	New	18	0.27	0.49
CKBP-23	---	New	15	0.09	0.16
CKBP-24	---	New	12	0.25	0.45
CKBP-25	---	New	12	0.34	0.61
CKBP-26	---	New	12	0.09	0.16
CKBP-27	---	New	24	1.40	2.52
CKBP-28	---	New	18	1.18	2.12
CKBP-29	---	New	15	0.38	0.68
CKBP-30	---	New	15	0.11	0.19
CKBP-31	---	New	12	0.07	0.13
CKBP-32	---	New	12	0.40	0.72
CKBP-33	---	New	12	0.18	0.32
CKBP-34	---	New	12	0.03	0.05
CKBP-35	---	New	12	0.03	0.05
CKBP-36	---	New	12	0.03	0.05
CKBP-37	---	New	15	0.63	1.13
CKBP-38	---	New	12	0.18	0.32
CKBP-39	---	New	12	0.15	0.27
CKBP-40	---	New	12	0.08	0.14
CKBP-41	---	New	12	0.10	0.18
CKBFM-1	---	New	8	0.18	0.32

Table 1 Model Output

CSA-71 Sewer System Master Plan

County of Kern

Improvement ID	Existing Pipe Diameter (in)	Parallel, Replace, or New	Improvement Diameter (in)	Average Dry Weather Flow[1]	Peak Dry Weather Flow[1]
CKBFM-2	---	New	6	0.29	0.52
CKBFM-3	---	New	6	0.81	1.45
County of Kern - Outside Planned Sewer Areas					
CKP-1	---	New	24	2.06	3.70
CKP-2	---	New	21	1.79	3.22
CKP-3	---	New	18	0.99	1.78
CKP-4	---	New	12	0.27	0.48
CKP-5	---	New	12	0.40	0.72
CKP-6	---	New	15	0.36	0.65
CKP-7	---	New	15	0.63	1.13
CKP-8	33	Parallel	21	0.30	2.30
CKP-9	33	Parallel	18	0.24	1.97
CKP-10	33	Parallel	15	0.17	1.58
CKP-11	33	Parallel	15	0.18	1.52
CKP-12	---	New	10	0.06	0.11
City of Bakersfield - Planned Sewer Area 1					
CB1P-1	36	Replace	36	3.99	7.18
CB1P-2	21	Replace	36	3.99	7.18
CB1P-3	15	Replace	18	1.53	2.76
CB1P-4	18	Replace	24	1.93	3.48
CB1P-5	---	New	18	1.26	2.28
CB1P-6	---	New	18	1.10	1.99
CB1P-7	---	New	18	0.89	1.60
CB1P-8	---	New	12	0.34	0.61
CB1P-9	---	New	12	0.16	0.28
CB1P-10	---	New	8	0.03	0.06
CB1P-11	---	New	8	0.21	0.39
CB1P-12	---	New	8	0.09	0.16
CB1P-13	---	New	10	0.27	0.48
CB1P-14	---	New	8	0.16	0.28
CB1P-15	---	New	10	0.09	0.17
CB1P-16	---	New	10	0.06	0.11
CB1P-17	---	New	15	0.45	0.81
CB1P-18	---	New	12	0.19	0.34
CB1FM-1	---	New	12	1.71	3.08
CB1FM-2	---	New	6	0.45	0.81
CB1FM-3	---	New	8	0.61	1.10
City of Bakersfield - Planned Sewer Area 2					
CB2P-1	---	New	18	1.51	2.71
CB2P-2	---	New	12	0.38	0.68
CB2P-3	---	New	10	0.07	0.12
CB2P-4	---	New	12	0.08	0.14
CB2P-5	---	New	12	0.07	0.13
CB2P-6	---	New	12	0.03	0.06
CB2P-7	---	New	18	0.66	1.18
CB2P-8	---	New	18	0.66	1.18
CB2P-9	---	New	12	0.10	0.18
CB2P-10	---	New	10	0.10	0.18
CB2P-11	---	New	12	0.34	0.61
CB2P-12	---	New	12	0.10	0.18
CB2FM-1	---	New	10	1.51	2.71
CB2FM-2	---	New	6	0.51	0.92
City of Bakersfield - Planned Sewer Area 3					
CB3P-1	---	New	12	0.12	0.21
CB3P-2	---	New	12	0.12	0.21

Table 1 Model Output

CSA-71 Sewer System Master Plan

County of Kern

Improvement ID	Existing Pipe Diameter (in)	Parallel, Replace, or New	Improvement Diameter (in)	Average Dry Weather Flow[1]	Peak Dry Weather Flow[1]
City of Bakersfield - Planned Sewer Area 4					
CB4P-1	---	New	12	0.21	0.38
CB4P-2	24	Replace	24	2.65	4.76
CB4P-3	---	New	12	2.19	3.94
CB4P-4	---	New	8	0.28	0.50
CB4P-5	---	New	8	0.16	0.29
CB4FM-1	---	New	6	2.07	3.73
City of Bakersfield - Planned Sewer Area 5					
CB5P-1	---	New	12	0.34	0.61
CB5P-2	---	New	12	0.11	0.20
CB5P-3	---	New	12	0.03	0.05
CB5P-4	---	New	12	0.10	0.18
CB5P-5	---	New	12	0.16	0.29
Stockdale Ranch Development					
SRP-1	---	New	27	2.85	5.13
SRP-2	---	New	21	2.02	3.63
SRP-3	---	New	21	1.95	3.50
SRP-4	---	New	8	0.12	0.22
SRP-5	---	New	8	0.05	0.09
SRP-6	---	New	8	0.11	0.20
SRP-7	---	New	8	0.04	0.07
SRP-8	---	New	10	0.06	0.11
SRP-9	---	New	8	0.02	0.03
SRP-10	---	New	10	0.03	0.06
SRP-11	---	New	8	0.02	0.04
SRP-12	---	New	8	0.01	0.02
SRP-13	---	New	8	0.18	0.33
SRFM-1	---	New	12	2.01	3.61
City of Bakersfield - Outside Planned Sewer Areas					
CBP-1	24	Replace	33	3.12	5.61
CBP-2	21	Replace	27	2.85	5.13
CBP-3	42	Replace	42	5.59	10.05
CBP-4	36	Replace	42	5.42	9.75
CBP-5	18	Parallel	12	1.26	1.98
CBP-6	---	New	12	0.09	0.15

Notes:

1. For improvements designated as "Parallel" or "Parallel/Replace", Dry Weather Flow values shown are flow through combined segment.

APPENDIX B

PROPOSED SEWER AREA COSTS

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area A

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	1	LS	$112,777	$113,000
2	Traffic Control	1	LS	59,797	$60,000
3	Trench Repair	155,842	SF	$6	$935,000
4	Sawcutting	17,800	LF	$2	$36,000
5	12" PVC Sewer Pipeline	2,600	LF	$124	$322,000
6	15" PVC Sewer Pipeline	6,300	LF	$129	$813,000
7	Manhole	20	EA	$4,500	$90,000
	Contingency			15%	$342,000
	Construction	SUBTOTAL:			$2,710,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$407,000
	PRELIMINARY COST ESTIMATE:				$3,117,000

NOTE(S):
* Presumes Landowner removes unsuitable material

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

COUNTY OF KERN

CSA-71 SEWER MASTER PLAN UPADATE

Planned Sewer Area B

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$1,746,756	$1,747,000
2	Traffic Control	Lump Sum	LS	$786,430	786,000
3	Trench Repair	1,929,517	SF	$5	$9,648,000
4	6" Force Main	100	LF	$61	$6,000
5	8" Force Main	5,300	LF	$63	$334,000
6	18" Force Main	50	LF	$102	$5,000
7	10" PVC Sewer Pipeline	5,200	LF	$120	$624,000
8	12" PVC Sewer Pipeline	66,700	LF	$124	$8,271,000
9	15" PVC Sewer Pipeline	18,400	LF	$129	$2,374,000
10	18" PVC Sewer Pipeline	10,800	LF	$162	$1,750,000
11	21" PVC Sewer Pipeline	7,900	LF	$185	$1,462,000
12	54" Sewer Pipeline	2,600	LF	$369	$959,000
13	60" Sewer Pipeline	17,200	LF	$393	$6,760,000
14	Real Estate Procurement	3	EA	$25,000	$75,000
15	0.3 mgd Lift Station	1	EA	$225,000	$225,000
16	0.5 mgd Lift Station	1	EA	$300,000	$300,000
15	0.5 mgd Lift Station	1	EA	$300,000	$300,000
17	Manhole	235	EA	$4,500	$1,058,000
	Contingency			15%	$5,344,000
	Construction		SUBTOTAL:		$42,026,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$6,304,000
	PRELIMINARY COST ESTIMATE:				**$48,329,000**

NOTE(S):

* Presumes Landowner removes unsuitable material

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

EST. 1968 PROVOST& PRITCHARD CONSULTING GROUP An Employee Owned Company

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 1

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$479,760	$480,000
2	Traffic Control	Lump Sum	LS	$188,461	$188,000
3	Trench Repair	371,242	SF	$5	$1,856,000
4	Sawcutting	56,100	LF	$2	$112,200
5	6" Force Main	50	LF	$61	$3,000
6	8" Force Main	50	LF	$63	$3,000
7	12" Force Main	50	LF	$69	$3,000
8	8" PVC Sewer Pipeline	4,700	LF	$117	$550,000
9	10" PVC Sewer Pipeline	9,200	LF	$120	$1,104,000
10	12" PVC Sewer Pipeline	4,300	LF	$124	$533,000
11	15" PVC Sewer Pipeline	3,200	LF	$129	$413,000
12	18" PVC Sewer Pipeline	6,500	LF	$162	$1,053,000
13	24" PVC Sewer Pipeline	5,300	LF	$193	$1,023,000
14	36" PVC Sewer Pipeline	400	LF	$255	$102,000
13	1.0 mgd Lift Station	1	EA	$550,000	$550,000
14	1.0 mgd Lift Station	1	EA	$550,000	$550,000
15	3.0 mgd Lift Station	1	EA	$1,160,000	$1,160,000
16	Manhole	87	EA	$4,500	$392,000
	Contingency			15%	$1,452,000
	Construction		SUBTOTAL:		$11,527,200
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$1,729,000
	PRELIMINARY COST ESTIMATE:				**$13,256,200**

NOTE(S):

* Presumes Landowner removes unsuitable material

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 2

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$725,950	$726,000
2	Traffic Control	Lump Sum	LS	$204,922	$205,000
3	Trench Repair	509,317	SF	$5	$2,547,000
4	Sawcutting	107,000	LF	$2	$214,000
5	6" Force Main	50	LF	$61	$3,000
6	10" Force Main	900	LF	$66	$59,000
7	12" Force Main	50	LF	$69	$3,000
8	10" PVC Sewer Pipeline	3,700	LF	$120	$444,000
9	12" PVC Sewer Pipeline	25,800	LF	$124	$3,199,000
10	18" PVC Sewer Pipeline	6,500	LF	$162	$1,053,000
11	21" PVC Sewer Pipeline	5,700	LF	$185	$1,055,000
12	27" PVC Sewer Pipeline	5,600	LF	$206	$1,154,000
13	33" PVC Sewer Pipeline	5,200	LF	$238	$1,238,000
14	0.6 mgd Lift Station	1	EA	$350,000	$350,000
15	2.6 Lift Station	1	EA	$1,060,000	$1,060,000
16	3.6 mgd Lift Station	1	EA	$1,300,000	$1,300,000
17	Manhole	141	EA	$4,500	$635,000
	Contingency			15%	$1,997,000
	Construction		SUBTOTAL:		$17,242,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$2,586,000
	PRELIMINARY COST ESTIMATE:				**$19,828,000**

NOTE(S):
* Presumes Landowner removes unsuitable material

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 3

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$66,000.00	$66,000
2	Traffic Control	Lump Sum	LS	38,297	38,297
3	Trench Repair	98,800	SF	$5	$494,000
4	Sawcutting	11,400	LF	$2	$22,800
4	12" PVC Sewer Pipeline	5,700	LF	$124	$706,800
5	Manhole	15	EA	$4,500	$67,500
	Contingency			15%	$199,200
	Construction		SUBTOTAL:		$1,594,597
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$239,190
		PRELIMINARY COST ESTIMATE:			**$1,833,786**

NOTE(S):
* Presumes Landowner removes unsuitable material

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 4

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	179,650	180,000
2	Traffic Control	Lump Sum	LS	74,914	75,000
3	Trench Repair	124,633	SF	$5	$623,000
4	Sawcutting	22,300	LF	$2	$45,000
5	6" Force Main	50	LF	$61	$3,000
5	8" PVC Sewer Pipeline	4,000	LF	$117	$468,000
6	12" PVC Sewer Pipeline	6,300	LF	$124	$781,000
8	24" PVC Sewer Pipeline	800	LF	$193	$154,000
9	3.2 mgd Lift Station	1	EA	$1,300,000	$1,300,000
10	Manhole	32	EA	$4,500	$144,000
	Contingency			15%	$544,000
	Construction		SUBTOTAL:		$4,317,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$648,000
	PRELIMINARY COST ESTIMATE:				**$4,965,000**

NOTE(S):
* Presumes Landowner removes unsuitable material

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

COUNTY OF KERN
CSA-71 SEWER MASTER PLAN UPADATE
Planned Sewer Area 5

Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Amount
1	Mobilization/demobilization, bonds & insurance, worker protection, miscellaneous facilities and operations	Lump Sum	LS	$351,550	$352,000
2	Traffic Control	Lump Sum	LS	147,141	$147,000
3	Trench Repair	759,200	SF	$5	$3,796,000
4	Sawcutting	43,800	LF	$2	$88,000
5	12" PVC Sewer Pipeline	21,900	LF	$124	$2,716,000
6	Manhole	63	EA	$4,500	$284,000
	Contingency			15%	$1,065,000
	Construction		SUBTOTAL:		$8,448,000
	Engineering, environmental, surveying, legal, admin., construction staking, construction management			15%	$1,267,000
			PRELIMINARY COST ESTIMATE:		**$9,715,000**

NOTE(S):
* Presumes Landowner removes unsuitable material

APPENDIX C

CSA 71 AGREEMENTS

Kern County
Agt. #109-92

CITY OF BAKERSFIELD
Agreement No. 93-14
Approved JUL 28 1993

AMENDMENT TO AGREEMENT FOR SEWER MAINTENANCE AND SEWAGE TRANSPORT, TREATMENT AND DISPOSAL A PORTION OF COUNTY SERVICE AREA NO. 71

THIS AMENDMENT TO AGREEMENT, made this 7th day of April, 1992, by and between the COUNTY OF KERN, a political subdivision of the State of California (hereinafter "COUNTY") and the CITY OF BAKERSFIELD, a municipal corporation (hereinafter "CITY").

W I T N E S S E T H:

WHEREAS, COUNTY and CITY entered into County Agreement #480-89, City Agreement #89-197, dated August 30, 1989 (Exhibit "1") concerning sewage transport, treatment and disposal; and

WHEREAS, COUNTY and CITY amended said agreement on April 23, 1991, to permit release of CSA No. 71 funds upon formation of an assessment district for construction of a trunk line; and

WHEREAS, in said agreement COUNTY and CITY designated the CITY SERVICE AREA whereby the CITY shall be responsible for providing sewerage service to a portion of County Service Area No. 71 and the COUNTY, through a separate agreement with the North of the River Sanitation District, will provide service to the remainder of the territory; and

WHEREAS, due to the completion of the North of the River Sanitation District sewer trunk line, residents of the northern portion of the CITY SERVICE AREA can be more effectively served by the COUNTY; and

WHEREAS, due to the pattern of residential development, residents of the southern portion of CSA No. 71 not originally designated to be served by the CITY may now be more effectively served by the new sewage treatment plant planned by the CITY.

NOW, THEREFORE, COUNTY and CITY do hereby mutually agree to alter the boundaries of the CITY SERVICE AREA, by revising Exhibit "A" to Agreement #480-89 (Exhibit "1" hereof), to appear as shown on Exhibit "2" hereof; and

COUNTY and CITY further agree that all terms and conditions set forth in the County Agreement #480-89, City Agreement #89-197 of August 30, 1989, as amended April 23, 1991, are continued hereafter in full force and effect, and all parties agree to continue performance in accordance with all terms of the agreement as amended.

IN WITNESS WHEREOF, CITY and COUNTY have caused this Amendment to be executed by their respective authorized offices, to be effective on the date first above written.

APPROVED AS TO FORM:

By Robert M. Sheffy for
City Attorney

Countersigned

By
Finance Director

CITY OF BAKERSFIELD

By
Mayor

"CITY"

APPROVED AS TO CONTENT:
Public Works Department

By
Director, Ed Schulz

APPROVED AS TO FORM:
Office of County Counsel

By
Deputy

COUNTY OF KERN

By
Chairman, Board of Supervisors

"COUNTY"

APPROVED AS TO CONTENT
Department of Public Works

By
Interim Director, Joel Heinrichs

RJB:cf
CSA71AMD.A12

EXHIBIT "1"

Kern County
Agt. # 480-89

89-197

AGREEMENT

Sewer Maintenance and
Sewage Transport, Treatment and Disposal
A Portion of County Service Area 71

THIS AGREEMENT, made and entered into as of the _____ day of AUG 30 1989, 1989, by and between the CITY OF BAKERSFIELD, a municipal corporation (hereinafter "CITY"), and the COUNTY OF KERN, a political subdivision of the State of California (hereinafter "COUNTY");

RECITALS

WHEREAS, both CITY and COUNTY are empowered to acquire, construct, operate and maintain sewerage systems that include, but are not limited to sewer lines, sewage lift stations, wastewater treatment plants and treated wastewater effluent disposal areas; and

WHEREAS, COUNTY established County Service Area 71 (hereinafter "CSA 71") to provide for the collection, treatment, disposal and maintenance of facilities for wastewater within its boundaries; and

WHEREAS, COUNTY has approved subdivisions and development within the area comprising CSA 71; and

WHEREAS, since the formation of CSA 71, the approval of subdivisions and developments have been and will continue to be conditioned upon the developers constructing certain sewer service improvements and dedicating and/or conveying those improvements and necessary easements to COUNTY; and

WHEREAS, COUNTY believes it would be more timely, efficient and a benefit to both the CITY and COUNTY if wastewater generated within portions of CSA 71 as designated within this Agreement were

transported to CITY's present or future proposed sewer trunk line that is best able to transport this wastewater for treatment and disposal by CITY; and

WHEREAS, CITY can effectively serve and provide sewerage services to the area designated on Exhibit "A" to this Agreement and hereinafter referred to as "CITY SERVICE AREA" and CSA 71 can provide sewerage service to the remainder of the territory through a separate agreement proposed to be entered into with the North of the River Sanitation District; and

WHEREAS, CITY and COUNTY are willing to accommodate the need for sewerage service and desire to cooperate in meeting the need for collection, treatment and disposal of wastewater within the boundaries of CSA 71 and agree that CITY shall be responsible for providing sewerage service to CITY SERVICE AREA, and COUNTY shall be responsible for collecting sewer service charges and paying CITY those amounts, all pursuant to the terms and conditions of this Agreement; and

WHEREAS, if service areas are not agreed upon, both CITY and COUNTY may continue to construct and plan sewerage facilities to serve uncertain and changing boundaries, potentially over-building said facilities and creating overlapping service areas; and

WHEREAS, neither CITY nor CSA 71 separately has sufficient funding to acquire or construct sewerage facilities that would be adequate for their individual needs, but jointly the two agencies have sufficient funding capability to acquire and construct a sewerage system that would be adequate to meet the needs of both

agencies and, therefore, it is to the mutual benefit of both parties that a sewerage system be constructed to serve both CITY areas and CITY SERVICE AREA, with said sewerage system to be operated and maintained by CITY.

NOW, THEREFORE, in consideration of the mutual promises and covenants herein contained, CITY and COUNTY agree as follows:

1. CITY hereby agrees to accept sewage from the entire service area as shown on Exhibit "A" attached hereto and made a part of this Agreement and designated thereon as CITY SERVICE AREA, subject to the terms and conditions of this Agreement.

2. COUNTY hereby conveys to CITY those portions of the sewerage system within each tract or development previously dedicated or conveyed to COUNTY within CITY SERVICE AREA including, but not limited to, street laterals, sewage lift stations and necessary easements. Hereafter, upon completion and acceptance of a tract or subdivision within CITY SERVICE AREA, COUNTY shall convey to CITY those portions of the sewerage system within said completed and accepted tract or subdivision. COUNTY shall approve sewerage service improvements when appropriately engineered and constructed on the basis of directing the flow of sewage to certain proposed or existing sewer lines to be designated by mutual agreement between COUNTY and CITY.

3. Conveyance of all portions of the sewerage system by COUNTY to CITY as provided in Paragraph 2 of this Agreement is subject to the following:

a. CITY shall accept, maintain and operate all portions

of sewerage systems located in CITY SERVICE AREA;

b. CITY shall construct, or cause to be constructed, those trunk sewers found necessary by CITY to connect portions of sewerage systems located in CITY SERVICE AREA to trunk sewer lines of CITY and shall maintain and operate those connecting trunk sewers;

c. CITY expressly accepts responsibility and liability for any operation or maintenance task necessary to maintain the sewerage system in a serviceable condition, with the exception of service laterals (from use to main), and shall indemnify COUNTY from any liability resulting from any sewer-related operation or maintenance task performed after acceptance of the applicable portion of the system by CITY;

d. Maintenance and operation of sewerage systems, portions of sewerage systems and trunk sewers shall include, but not be limited to, sewer cleaning, root control, vector control, adjustment of sewer manholes to street grade, replacement and/or repair of sewers and sewer manholes, response to complaints of sewer stoppages, repair of roadways or easements if damaged by sewers or sewage (although this shall not relieve developers of their responsibilities during the one year guarantee period as provided in any subdivision improvement agreement between COUNTY and developer), and such other tasks as are required from time to

time to maintain sewerage service provided, or to be provided, to property-owners and property located within CITY SERVICE AREA with the exception of service laterals;

e. The level of maintenance and operation provided by CITY shall be the same as that provided by CITY for sewerage service to properties located within CITY.

4. CITY shall permit COUNTY and residents and landowners within CITY SERVICE AREA to discharge sewage into CITY-operated sewerage system and agrees to transport it to a sewage plant and make proper disposal of all of said sewage, subject to those same regulations and restrictions as CITY requires of sewage generated within CITY.

5. Upon the date of this Agreement, or as soon thereafter as is practical, COUNTY shall transfer CSA 71 funds in the amount of $1,500,000 to an interest-bearing "CAPITAL IMPROVEMENT ACCOUNT" to be established and maintained by the Kern County Treasurer's Office.

6. CITY and COUNTY shall jointly, and to the satisfaction of each, determine the percentage of CITY SERVICE AREA to be served by each of the trunk sewers indicated on the drawing attached hereto and marked as Exhibit "A". Thereupon, the $1,500,000 transferred to CAPITAL IMPROVEMENT ACCOUNT shall be apportioned between the trunk sewers in accordance with the percentage of CITY SERVICE AREA to be served. Upon completion of construction of one or more of the trunk sewers, the funds apportioned to the completed sewer, along with interest accrued on that portion of the funds, shall be used to

defray the cost of constructing the applicable trunk sewer with the intent to reduce assessments to be charged to properties within CITY SERVICE AREA for connection to that sewer or its tributary sewers.

7. As provided in Section 25210.72a of the Government Code, COUNTY may fix and collect charges for services provided within a county service area, including sewerage services, and COUNTY will fix and collect such charges for sewerage services provided to CITY SERVICE AREA.

8. The cost of maintenance and operation charged to property located in CITY SERVICE AREA shall be calculated in the same manner and shall be the same as those charges assessed to property with similar sewerage uses located within CITY. Neither COUNTY nor any property-owner or sewer user within CITY SERVICE AREA shall pay any sewer service charge, maintenance fee, or other related fee or charge for CITY providing sewerage service except as specifically provided for in this Agreement. This provision shall not prohibit CITY, COUNTY or a developer/property owner from initiating Assessment District proceedings for the purpose of financing capital improvements related to the transportation of sewerage generated within CITY SERVICE AREA, nor shall it prohibit CITY from charging a Connection Fee for connection to CITY facilities where that Connection Fee is equal to that charged to CITY properties receiving the same service, nor shall it prohibit CITY from charging for the previous oversizing of facilities as required by CITY Agreement No. 88-117 (Laborde), nor shall it prohibit CITY from charging an additional connection charge or surcharge to pay the cost of

extending the CITY's Buena Vista sewer trunk line from the intersection of White Lane and Buena Vista Road to the City's Wastewater Treatment Plant No. 3.

9. COUNTY shall, annually, pay CITY for providing sewerage services to CITY SERVICE AREA. The amount to be paid CITY shall be the same as the amount charged to CITY properties for equivalent sewerage use and shall be the same as the sewer service charge established by the CITY each year on a charge per Equivalent Single Family Dwelling (ESFD) basis. The number of ESFD for which the CITY SERVICE AREA shall be charged shall be determined on the same basis used for CITY sewer connections calculated on March 1st of the year prior to the date payment is due and the rate shall be that established by CITY for the fiscal year (July 1 to June 30) following that March 1st date, with the payment due CITY on or before 20 calendar days following the second installment payment deadline date of the COUNTY taxes. That is, for the payment due CITY on or before April 30, 1990 the amount due shall be based upon the ESFD connected to the sewer on March 1, 1989 and calculated at the charge per ESFD in effect for CITY sewer users for fiscal year 1989-90.

10. At the time of connection to the sewer in CITY SERVICE AREA, CITY shall collect such Connection Fees as are required to reimburse CITY for construction costs of that portion of wastewater collection and disposal facilities reserved, constructed or made available for sewage flows from CITY SERVICE AREA. Additionally, CITY or COUNTY may collect such Assessment Fees as may be established from time to time in relation to assessment districts or

other such means of financing construction of trunk sewers, collection sewer mains and local street sewers, with the funds to be conveyed to the applicable financing agency or entity. The intent is to have CITY form and administer assessment districts to cause to have installed trunk sewers, collection sewer mains and local street sewers.

11. COUNTY shall inspect, or cause to be inspected, construction of new or replacement building sewers from the building drain to, and including, the connection to sewer main. Building sewers shall thereafter be responsibility of the property owner. Building sewers located in the CITY SERVICE AREA shall be constructed to the standards of the COUNTY. Sewer connection permits may be issued by COUNTY but construction shall not be accepted as final until COUNTY is presented with verification from CITY that applicable Connection Fees have been paid. CITY may also collect at this time any oversizing charges and any pro-rated sewer service charge for the remaining portion of the fiscal year, this charge to be determined in the same manner as is used by CITY for CITY users at that time.

12. Issuance of sewer connection permits for industrial uses shall be subject to prior review and approval by CITY for the purpose of regulating constituents in sewage flows determined by CITY to potentially have adverse affect on wastewater treatment and disposal processing facilities. Industrial discharges from the CITY SERVICE AREA shall satisfy all requirements of Chapter 14.12 of the Bakersfield Municipal Code as the same exists and may later be amended.

13. At such time as an area within CITY SERVICE AREA may annex into CITY, that portion of sewer service charges and/or fees associated with the annexed area shall no longer be charged to CITY SERVICE AREA, but upon completion of annexation shall become the responsibility of CITY to collect.

14. A Technical Advisory Committee (TAC) shall be created and be comprised of two members from each party and shall meet at least quarterly for the first four years of this Agreement and biannually thereafter. Additional meetings shall be convened when requested by either party to this agreement. As soon as practical following the effective date of this agreement, the TAC shall establish a proposed time schedule for construction of trunk lines to serve the CITY SERVICE AREA. This time schedule shall be periodically reviewed by the TAC for progress and compliance. The TAC shall also prepare recommendations for the two governing bodies regarding fees and charges, including level, duration and nature, as well as means of financing sewer line and other capital improvements.

15. Nothing in this Agreement shall be construed to prohibit CITY from contracting with North of the River Sanitary District or any other appropriate district to provide sewerage service for any portion of CITY SERVICE AREA if so recommended by the Technical Advisory Committee to be in the best interest of COUNTY, and approved by CITY and COUNTY.

16. Upon the advice of the TAC and based upon a persistent dispute as to the amount of sewer maintenance charges imposed by CITY, with six (6) month notice to CITY, COUNTY may assume

responsibility for sewer maintenance in CITY SERVICE AREA, and that portion of the sewer service charge (representing sewer maintenance for the portion of the lines the COUNTY has elected to perform maintenance on) shall be deducted from monies which may become due CITY.

IN WITNESS WHEREOF, CITY and COUNTY have caused this Agreement to be executed by their respective authorized officers, to be effective on the date first above written.

APPROVED AS TO FORM:

By _____
City Attorney

Countersigned

By _____
Finance Director

APPROVED AS TO CONTENT:
Public Works Director

By _____
Director, Ed Schulz

CITY OF BAKERSFIELD

By _____
Mayor

"CITY"

APPROVED AS TO FORM:
Office of County Counsel

By _____
Deputy

APPROVED AS TO CONTENT:
Department of Public Works

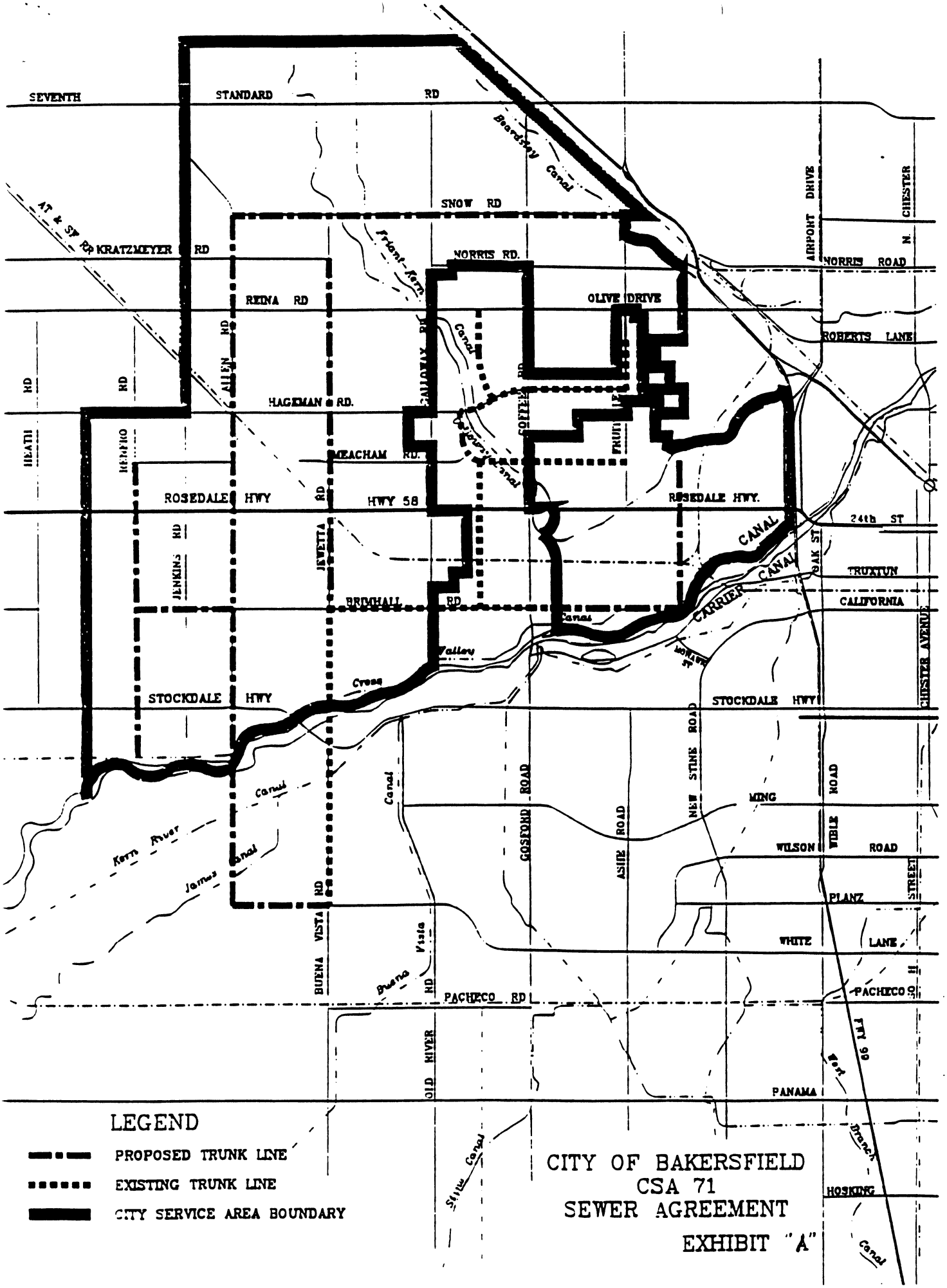
By _____
Director, L. Dale Mills

COUNTY OF KERN

By _____
Chairman Board of Supervisors

"COUNTY" SEP 12 1989

agrmt.sew
SDS:fd/wl



LEGEND

- PROPOSED TRUNK LINE
- EXISTING TRUNK LINE
- CITY SERVICE AREA BOUNDARY

CITY OF BAKERSFIELD
CSA 71
SEWER AGREEMENT
EXHIBIT "A"

Agt. #187-71

CITY OF BAKERSFIELD
Agreement No. 91-67
April 10, 1991

AMENDMENT TO AGREEMENT FOR SEWER MAINTENANCE AND SEWAGE TRANSPORT, TREATMENT AND DISPOSAL A PORTION OF COUNTY SERVICE AREA NO. 71

THIS AMENDMENT TO AGREEMENT, made this 23rd day of April, 1991, by and between the COUNTY OF KERN, a political subdivision of the State of California (hereinafter "COUNTY") and the CITY OF BAKERSFIELD, a municipal corporation (hereinafter "CITY").

W I T N E S S E T H:

WHEREAS, COUNTY and CITY entered into County Agreement #480-89, City Agreement #89-197, dated August 30, 1989 (Exhibit "A") concerning sewage transport, treatment and disposal; and

WHEREAS, in said agreement CITY has agreed to construct, or cause to be constructed, those trunk sewers found necessary by CITY to connect portions of sewerage systems located in CITY SERVICE AREA to trunk sewer lines of CITY and shall maintain and operate those connecting trunk sewers; and

WHEREAS, per said agreement CSA 71 CAPITAL IMPROVEMENT ACCOUNT funds shall be apportioned to completed trunk sewers; and

WHEREAS, certain trunk sewers will be constructed utilizing assessment district financing; and

WHEREAS, significant costs associated with bond financing can be avoided if CSA 71 funds are applied at time of assessment district formation rather than at completion of construction; and

WHEREAS, COUNTY and CITY believe it would be more cost effective to apply CSA 71 funds towards its share of costs at time of assessment district formation; and

WHEREAS, COUNTY and CITY desire to modify said agreement to allow allocation of CSA 71 funds at the time assessment districts are formed to construct sewer trunk lines which will serve CSA 71.

NOW, THEREFORE, COUNTY and CITY do hereby mutually agree as follows:

1. Paragraph 6 of County Agreement #480-89, City Agreement #89-197, is revised as follows:

> CITY and COUNTY shall jointly, and to the satisfaction of each, determine the percentage of CITY SERVICE AREA to be served by each of the trunk sewers indicated on the drawing attached hereto and marked as Exhibit "A". Thereupon, the $1,500,000

transferred to CAPITAL IMPROVEMENT ACCOUNT shall be apportioned between the trunk sewers in accordance with the percentage of CITY SERVICE AREA to be served. Upon completion of construction of one or more of the trunk sewers, the funds apportioned to the completed sewer, along with interest accrued on that portion of the funds, shall be used to defray the cost of constructing the applicable trunk sewer with the intent to reduce assessments to be charged to properties within CITY SERVICE AREA for connection to that sewer or its tributary sewers. At the time an assessment district is to be formed to construct trunk sewers to serve CITY SERVICE AREA of County Service Area No. 71, CSA 71 CAPITAL IMPROVEMENT ACCOUNT funds may be applied to the project prior to the completion of construction at COUNTY's discretion.

2. All the remaining terms and conditions set forth in the County Agreement #480-89, City Agreement #89-197, of August 30, 1989, are continued hereafter in full force and effect, and all parties agree to continue performance in accordance with all terms of the agreement as amended.

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IN WITNESS WHEREOF, CITY and COUNTY have caused this Amendment to be executed by their respective authorized offices, to be effective on the date first above written.

APPROVED AS TO FORM:

By _____
City Attorney

Countersigned

By _____
Finance Director

CITY OF BAKERSFIELD

By _____
Mayor

"CITY"

APPROVED AS TO CONTENT:
Public Works Department

By _____
Director, Ed Schulz

APPROVED AS TO FORM:
Office of County Counsel

By _____
Deputy

COUNTY OF KERN

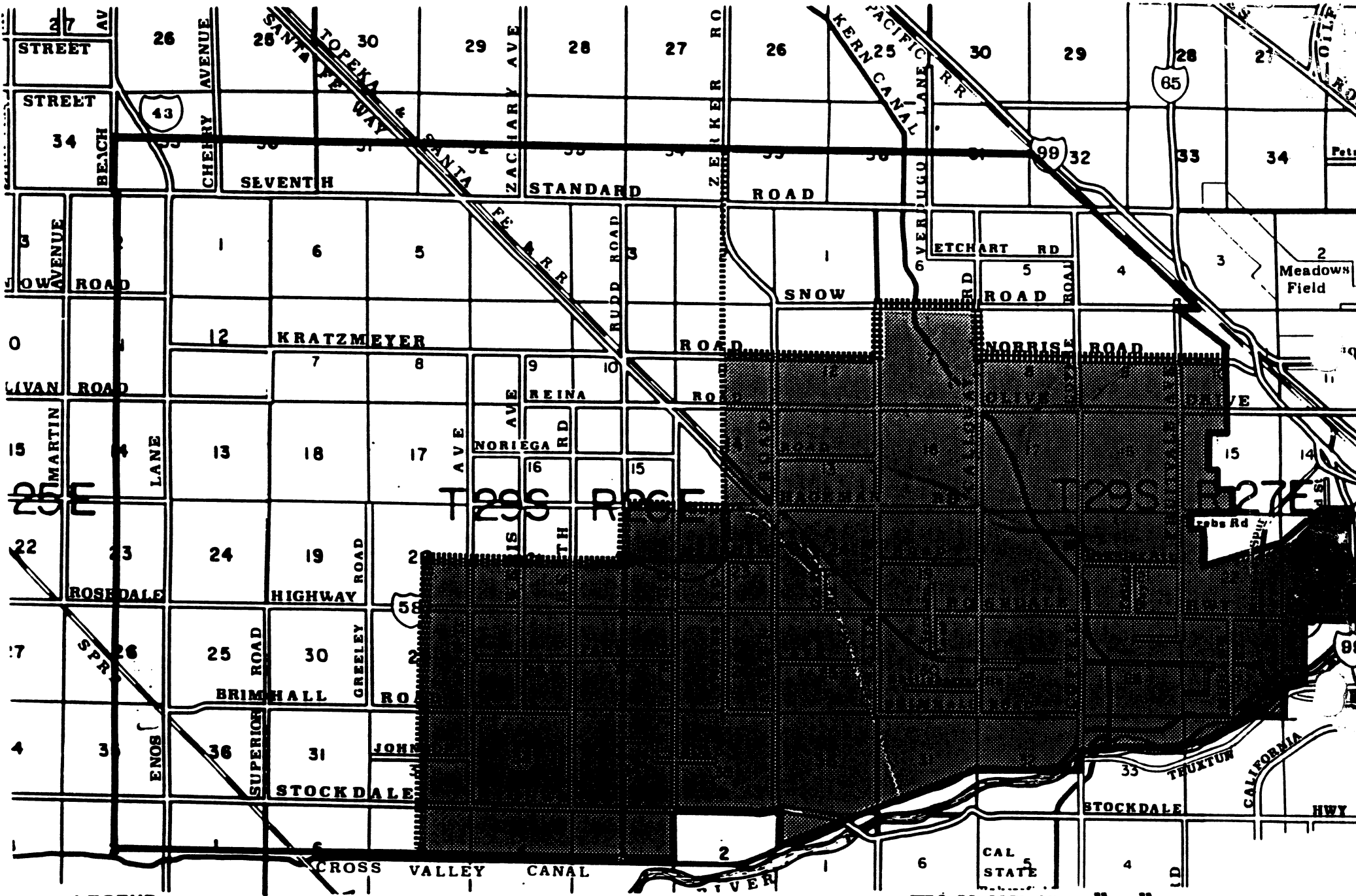
By _____
Chairman, Board of Supervisors

"COUNTY"

APPROVED AS TO CONTENT
Department of Public Works

By _____
Director, L. Dale Mills

RJB:cf
CSA71AG.A10



LEGEND

AMENDED CITY SERVICE AREA BOUNDARY

ORIGINAL CSA 71 BOUNDARY

EXHIBIT "2"

CITY OF BAKERSFIELD

CSA 71 SEWER AGREEMENT

AMENDED CITY SERVICE AREA BOUNDARY

RESOLUTION NO. 185-97

A RESOLUTION ADOPTING SEWER CONNECTION FEES PURSUANT TO THE REVENUE/COST COMPARISON SYSTEM UNDER CHAPTER 3.70 AND SECTION 14.12.380 OF THE BAKERSFIELD MUNICIPAL CODE.

WHEREAS, Chapter 3.70 of the Bakersfield Municipal Code authorizes the establishment and increase of Sewer Connection Fees under the revenue/cost comparison system; and

WHEREAS, Section 14.12.380 of the Bakersfield Municipal Code authorizes the establishment each fiscal year of sewer connection fees sufficient for the City to recover the reasonable costs of providing sewer connection services; and

WHEREAS, a public hearing before the City Council was advertised twice in the Bakersfield Californian, a newspaper of general circulation; and

WHEREAS, City staff has computed the reasonable cost of providing sewer connection service through fiscal year 2004-2005; and

WHEREAS, the sewer connection fees set forth in **Exhibit "A"** attached hereto and incorporated by reference as though fully set forth herein, do not exceed the reasonable estimated cost of providing the services for which the fees are charged; and

WHEREAS, the fees shall be due and payable upon application for a building permit or permit to connect an existing building to the City sewer system.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Bakersfield as follows:

1. The above recitals and findings are true and correct.

2. The fees concerning service charges under Chapter 3.70 and Section 14.12.380 of the Bakersfield Municipal Code are hereby adopted and shall become effective on the dates and in the amounts set forth in **Exhibit "A"**, attached hereto.

CITY OF BAKERSFIELD ORIGINAL

I HEREBY CERTIFY that the foregoing Resolution was passed and adopted by the Council of the City of Bakersfield at a regular meeting thereof held on DEC 3 1997, 1997 by the following vote:

AYES: COUNCILMEMBER DeMOND, CARSON, ~~SMITH~~, ~~McDERMOTT~~, ROWLES, SULLIVAN, SALVAGGIO
NOES: COUNCILMEMBER McDermott
ABSTAIN: COUNCILMEMBER none
ABSENT: COUNCILMEMBER Smith

Pamela A. McCarthy
CITY CLERK and EX OFFICIO of the
Council of the City of Bakersfield

APPROVED: DEC 3 1997

BOB PRICE, MAYOR
CITY OF BAKERSFIELD

APPROVED AS TO FORM:

JUDY K. SKOUSEN
CITY ATTORNEY

By: _____
JUDY K. SKOUSEN
City Attorney

CITY OF BAKERSFIELD ORIGINAL

EXHIBIT "A"

I. CONNECTION CHARGES

All new connections or new fixture units connected to the City sewer system will require payment of a sewer connection charge. Any individual, firm, company or corporation making such connection shall pay the charge at the time the building permit is issued in accordance with the following:

Effective Date	Single Family Dwellings	Multiple Family Dwellings	Dwellings With 14 or Less Fixture Units (A)	Per Fixture Unit for Commercial or Industrial (B)
Sep 15, 1997	$1,500	$1,080	$ 920	$ 66
July 1, 1998	$1,750	$1,260	$1,120	$ 80
July 1, 1999	$2,000	$1,440	$1,260	$ 90
July 1, 2000	$2,100	$1,520	$1,330	$ 95
July 1, 2001	$2,200	$1,590	$1,400	$100
July 1, 2002	$2,300	$1,660	$1,470	$105
July 1, 2003	$2,400	$1,730	$1,540	$110
July 1, 2004	$2,500	$1,800	$1,610	$115

(A) Single family dwellings or units in multiple family dwellings with 14 or less fixture units (including shared fixtures in multiple unit complexes) as per Uniform Building Code and with 2 bedrooms or less.

(B) Equivalency factor shall be 1.0 for all uses excepting markets, mortuaries, restaurants/coffee shops, food service shops and bakeries which uses shall have an equivalency factor of 2.0.

To determine the total connection charge, multiply the number of fixture units (as per Uniform Plumbing Code) by the per fixture charge and that answer by the equivalency multiplier.

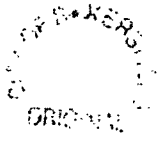
The equivalency multiplier adjusts for loadings greater or less than the residential loadings.

II. TIMING AND BASIS

The sewer connection charge is to be paid prior to issuance of a building permit, and will be based on the current adopted charges at the time of issuance of the permit.

Fixture Units shall be as defined in the Uniform Plumbing Code.

JAN:js
S:\COUNCIL\RES\SEWRCON.FEE
--November 17, 1997



RESOLUTION NO. 65-00

A RESOLUTION ESTABLISHING SEWER AND STORM SEWER SERVICE USER CHARGES.

WHEREAS, Chapter 14.12 of the Bakersfield Municipal Code authorizes the establishment and increase of fees and charges to recover costs for services rendered; and

WHEREAS, a public hearing before the City Council was advertised twice in the *Bakersfield Californian*, a newspaper of general circulation; and

WHEREAS, a public hearing was held to determine whether the proposed fees and charges are discriminatory or excessive; and

WHEREAS, the fees and charges set forth in **Exhibit "A,"** attached hereto and incorporated by reference, do not exceed the reasonable estimated cost of providing the services for which the fees are charged.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Bakersfield as follows:

1. The above recitals and findings are true and correct and are incorporated herein by reference.

2. The fees and charges set forth in **Exhibit "A"** are hereby adopted and shall become effective on July 1, 2000.

3. The adoption of these fees and charges complies with Proposition 218.

4. Pursuant to the Bakersfield Municipal Code, the fees and charges herein shall be collected by the Kern County Tax Collector on the property tax rolls.

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CITY OF BAKERSFIELD ORIGINAL

I HEREBY CERTIFY that the foregoing Resolution was passed and adopted by the Council of the City of Bakersfield at a regular meeting thereof held on JUN 14 2000, by the following vote:

AYES:	COUNCILMEMBER CARSON, DEMOND, MAGGARD, COUCH, ROWLES, SULLIVAN, SALVAGGIO
NOES:	COUNCILMEMBER NONE
ABSTAIN:	COUNCILMEMBER NONE
ABSENT:	COUNCILMEMBER NONE

Pamela A. McCarthy
CITY CLERK and Ex Officio Clerk of the
Council of the City of Bakersfield

APPROVED JUN 14 2000

BOB PRICE
MAYOR of Bakersfield

APPROVED as to form:
BART J. THILTGEN, City Attorney

By: Alan D. Daniel
ALAN D. DANIEL
Assistant City Attorney

RMS:ADD:dlr

C:\WINDOWS\TEMP\gwprint\FeeIncSewerUserRes.wpd
-May 30, 2000

CITY OF BAKERSFIELD ORIGINAL

SEWER USER FEES AND CHARGES
FLAT RATE SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

Kern County Assessor Use Code	Description	SFDE	Flat Rate Charge	Surcharge Schedule
0100 - 0106	Single Family Residence	1	$115.00	
0200 - 0602	Multiple Dwelling	0.8	$92.00 /unit	
0107 - 0199, 2900	Mobile Home, Mobile Home Park	0.8	$92.00 /unit	
1100	Small Stores and Shops	1.4	$161.00	A
1200	Combination Stores & Offices	2.4	$276.00	A
1300	Large Stores	1.4	$161.00	A
1400	Markets	1.4	$161.00	B
1500	Shopping Centers	1.4	$161.00	A or B
1600, 2100	Office & Financial Bldgs	1.4	$161.00	A
1701-1703, 1712, 1714	Hospital, Retirement Home, etc.	0.3	$34.50 /bed	
1704, 1705	Med. Lab, Ambulance serv.	1.4	$161.00	A
1706	Church	1.1	$126.50	
1707-1709	Mortuary, etc.	1.4	$161.00	B
1710, 1713	Schools, Day Care Center	0.031	$3.57 /student	
1800	Food or Beverage	1.4	$161.00	A or B
1900	Recreational	1.4	$161.00	A
2200	Service Shops	1.4	$161.00	A
2300	Petroleum	1.4	$161.00	A
2400	Sales	1.4	$161.00	A
2600	Nurseries	1.4	$161.00	A
2700, 2800	Hotel-Motel	0.3	$34.50 /room	
2901	Travel Trailer or R.V. Park	0.3	$34.50 /space	
3100, 3200	Light & Heavy Industry	1.4	$161.00	A
3300, 3400	Timber & Produce Plants	1.4	$161.00	A
3500	Food Processing	1.4	$161.00	B
3600, 3700	Storage-Warehouse	1.4	$161.00	A
3800	Industrial Sales	1.4	$161.00	A

CITY OF BAKERSFIELD
ORIGINAL
05/30/00

SEWER USER FEES AND CHARGES
MISCELLANEOUS SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

I. Surcharge Schedule A - Commercial and Industrial

This schedule shall apply to the commercial and light industrial users with BOD and TSS concentrations less than 400 mg/L and flow greater than 0.16 million gallons/year. The surcharge for excess flow shall be $703.40 per million gallons/year.

II. Surcharge Schedule B - Commercial and Industrial

This schedule shall apply to the commercial and light industrial users with BOD and TSS concentrations greater than 400 mg/L and flow greater than 0.16 million gallons/year. The surcharge for the excesses shall be as follows:

BOD greater than 595 lb/year	$77.40/1000 lb.
TSS greater than 534 lb/year	$75.30/1000 lb.
Flow greater than 0.16 million gallons/year	$469.30 per million gallons/year

III. Monitored Users

This schedule shall apply to Monitored users (commercial and industrial discharges) as defined in "Revenue Program Guidelines for Wastewater Agencies", published by the State Water Resources Control Board - Division of Water Quality. The following rates or charges shall be applied to Monitored Users based upon total annual BOD and TSS concentrations and flow:

BOD	$67.20/1000 lb.
TSS	$71.30/1000 lb.
Flow	$473.40/million gallons

IV. Surcharge for Outside Users

$54.00/yr./connection

This surcharge includes two components:

1. Charges per BMC 14.16.050:
$30.00/yr/connection for a capacity charge, which shall be for the purpose of reserving a portion of City's trunkline and sewage treatment facilities for the applicant. (Typical for single family dwelling, see BMC for other uses); and

2. $24.00/yr./connection for recovery of subsequent City capital costs.

V. Septic Discharges

The rate per gallon, shall be $0.02.

CITY OF BAKERSFIELD
ORIGINAL
5/31/00

SEWER USER FEES AND CHARGES
MISCELLANEOUS SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

VI. Surcharge for Outside Septic Discharges

The rate per gallon, shall be $0.02. This surcharge is to recover capital expenditures and administrative costs.

VII. Industrial Waste Discharge Monitoring

1.	Discharge monitoring annual fee	$550.00
2.	Noncompliance re-inspections	$550.00
3.	Outside laboratory testing fees	actual costs

VIII. Wastewater Services - Other Agencies

1.	East Niles Community Services Dist.	$336,900.00(Est.)
2.	Kern Sanitation Authority	$103,000.00 (Est.)
3.	County Service Area 71	$44,000.00 (Est.)

Wastewater service is provided for these unincorporated areas.

IX. Connection Fee For Major Industrial Discharger

Unit Rates: Based on maximum month loadings.

Flow	$0.68/gpd
BOD	$468/ppd
TSS	$149/ppd

x. Wastewater/Stormsewer Apportionment

The rates contained in this exhibit cover 100% of costs reasonably incurred in providing the operation, maintenance, replacement, and capital improvements of the wastewater plants, sewers, and stormsewer systems. Ninety -two (92) percent of said rates are attributable to sanitary sewer use, maintenance, replacement and improvements and eight (8) percent of said rates are attributable to stormsewer use , maintenance, replacement and improvements.

Definitions:

BOD - Means "biochemical oxygen demand"
TSS - Means "total suspended solids"
mg/L - Means "milligrams per liter"
SFDE - Means "single family dwelling equivalent"

CITY OF BAKERSFIELD
5/31/00 ORIGINAL

ADMINISTRATIVE REPORT

MEETING DATE: June 14, 2000	**AGENDA SECTION**: Hearings **ITEM**: 9.f.

TO: Honorable Mayor and City Council

FROM: Raul M. Rojas, Public Works Director

DATE: June 6, 2000

APPROVED

DEPARTMENT HEAD RMR For RR

CITY ATTORNEY

CITY MANAGER

SUBJECT: Hearing to consider a resolution establishing sewer service user charges for Fiscal Year 2000-01 (1.8% proposed rate increase). (All Wards)

RECOMMENDATION: Staff recommends adoption of the Resolution

BACKGROUND: Sewer user charges and fees are established annually pursuant to Section 14.12.380 of the Bakersfield Municipal Code. With the exception of the following, a 1.8% increase in sewer user charges is proposed for Fiscal Year 2000-01 to cover increased cost of operation, maintenance, and future replacement of existing equipment and treatment plant facilities:

MISCELLANEOUS SCHEDULE

IV. Surcharge for Outside Users - No increase.

V. Septic Discharges - No increase.

VI. Surcharge for Outside Septic Discharges - No increase.

VII. Industrial Waste Discharge Monitoring - No increase.

VIII. Wastewater Services - Other Agencies
Fee will be determined in accordance with agreements entered into between the City and other agencies.

IX. Connection Fee For Major Industrial Discharger - No increase.

See Exhibit A of attached resolution for details.

If approved, the rate for a single family dwelling will increase from $113 to $115 per year.

Sewer user charges are collected with property taxes by the Kern County Tax Collector pursuant to the Bakersfield Municipal Code.

RESOLUTION NO. _____

A RESOLUTION ESTABLISHING SEWER AND STORM SEWER SERVICE USER CHARGES.

WHEREAS, Chapter 14.12 of the Bakersfield Municipal Code authorizes the establishment and increase of fees and charges to recover costs for services rendered; and

WHEREAS, a public hearing before the City Council was advertised twice in the *Bakersfield Californian*, a newspaper of general circulation; and

WHEREAS, a public hearing was held to determine whether the proposed fees and charges are discriminatory or excessive; and

WHEREAS, the fees and charges set forth in **Exhibit "A,"** attached hereto and incorporated by reference, do not exceed the reasonable estimated cost of providing the services for which the fees are charged.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Bakersfield as follows:

1. The above recitals and findings are true and correct and are incorporated herein by reference.

2. The fees and charges set forth in **Exhibit "A"** are hereby adopted and shall become effective on July 1, 2000.

3. The adoption of these fees and charges complies with Proposition 218.

4. Pursuant to the Bakersfield Municipal Code, the fees and charges herein shall be collected by the Kern County Tax Collector on the property tax rolls.

----------o0o----------

I HEREBY CERTIFY that the foregoing Resolution was passed and adopted by the Council of the City of Bakersfield at a regular meeting thereof held on _____, by the following vote:

AYES: COUNCILMEMBER CARSON, DEMOND, MAGGARD, COUCH, ROWLES, SULLIVAN, SALVAGGIO
NOES: COUNCILMEMBER_____
ABSTAIN: COUNCILMEMBER_____
ABSENT: COUNCILMEMBER_____

_____
CITY CLERK and Ex Officio Clerk of the
Council of the City of Bakersfield

APPROVED_____

_____
BOB PRICE
MAYOR of Bakersfield

APPROVED as to form:
BART J. THILTGEN, City Attorney

By:_____
ALAN D. DANIEL
Assistant City Attorney

RMS:ADD:dlr

C:\WINDOWS\TEMP\gwpnnt\FeeIncSewerUserRes.wpd
-May 30, 2000

SEWER USER FEES AND CHARGES
FLAT RATE SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

Kern County Assessor Use Code	Description	SFDE	Flat Rate Charge	Surcharge Schedule
0100 - 0106	Single Family Residence	1	$115.00	
0200 - 0602	Multiple Dwelling	0.8	$92.00 /unit	
0107 - 0199, 2900	Mobile Home, Mobile Home Park	0.8	$92.00 /unit	
1100	Small Stores and Shops	1.4	$161.00	A
1200	Combination Stores & Offices	2.4	$276.00	A
1300	Large Stores	1.4	$161.00	A
1400	Markets	1.4	$161.00	B
1500	Shopping Centers	1.4	$161.00	A or B
1600, 2100	Office & Financial Bldgs	1.4	$161.00	A
1701-1703, 1712, 1714	Hospital, Retirement Home, etc.	0.3	$34.50 /bed	
1704, 1705	Med. Lab, Ambulance serv.	1.4	$161.00	A
1706	Church	1.1	$126.50	
1707-1709	Mortuary, etc.	1.4	$161.00	B
1710, 1713	Schools, Day Care Center	0.031	$3.57 /student	
1800	Food or Beverage	1.4	$161.00	A or B
1900	Recreational	1.4	$161.00	A
2200	Service Shops	1.4	$161.00	A
2300	Petroleum	1.4	$161.00	A
2400	Sales	1.4	$161.00	A
2600	Nurseries	1.4	$161.00	A
2700, 2800	Hotel-Motel	0.3	$34.50 /room	
2901	Travel Trailer or R.V. Park	0.3	$34.50 /space	
3100, 3200	Light & Heavy Industry	1.4	$161.00	A
3300, 3400	Timber & Produce Plants	1.4	$161.00	A
3500	Food Processing	1.4	$161.00	B
3600, 3700	Storage-Warehouse	1.4	$161.00	A
3800	Industrial Sales	1.4	$161.00	A

SEWER USER FEES AND CHARGES
MISCELLANEOUS SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

I. Surcharge Schedule A - Commercial and Industrial

This schedule shall apply to the commercial and light industrial users with BOD and TSS concentrations less than 400 mg/L and flow greater than 0.16 million gallons/year. The surcharge for excess flow shall be $703.40 per million gallons/year.

II. Surcharge Schedule B - Commercial and Industrial

This schedule shall apply to the commercial and light industrial users with BOD and TSS concentrations greater than 400 mg/L and flow greater than 0.16 million gallons/year. The surcharge for the excesses shall be as follows:

BOD greater than 595 lb/year	$77.40/1000 lb.
TSS greater than 534 lb/year	$75.30/1000 lb.
Flow greater than 0.16 million gallons/year	$469.30 per million gallons/year

III. Monitored Users

This schedule shall apply to Monitored users (commercial and industrial discharges) as defined in "Revenue Program Guidelines for Wastewater Agencies", published by the State Water Resources Control Board - Division of Water Quality. The following rates or charges shall be applied to Monitored Users based upon total annual BOD and TSS concentrations and flow:

BOD	$67.20/1000 lb.
TSS	$71.30/1000 lb.
Flow	$473.40/million gallons

IV. Surcharge for Outside Users

$54.00/yr./connection

This surcharge includes two components:

1. Charges per BMC 14.16.050:
$30.00/yr/connection for a capacity charge, which shall be for the purpose of reserving a portion of City's trunkline and sewage treatment facilities for the applicant. (Typical for single family dwelling, see BMC for other uses); and

2. $24.00/yr./connection for recovery of subsequent City capital costs.

V. Septic Discharges

The rate per gallon, shall be $0.02.

SEWER USER FEES AND CHARGES
MISCELLANEOUS SCHEDULE
FISCAL YEAR 2000-01

EXHIBIT A

VI. Surcharge for Outside Septic Discharges

The rate per gallon, shall be $0.02. This surcharge is to recover capital expenditures and administrative costs.

VII. Industrial Waste Discharge Monitoring

1.	Discharge monitoring annual fee	$550.00
2.	Noncompliance re-inspections	$550.00
3.	Outside laboratory testing fees	actual costs

VIII. Wastewater Services - Other Agencies

1.	East Niles Community Services Dist.	$336,900.00(Est.)
2.	Kern Sanitation Authority	$103,000.00 (Est.)
3.	County Service Area 71	$44,000.00 (Est.)

Wastewater service is provided for these unincorporated areas.

IX. Connection Fee For Major Industrial Discharger

Unit Rates: Based on maximum month loadings.

Flow	$0.68/gpd
BOD	$468/ppd
TSS	$149/ppd

x. Wastewater/Stormsewer Apportionment

The rates contained in this exhibit cover 100% of costs reasonably incurred in providing the operation, maintenance, replacement, and capital improvements of the wastewater plants, sewers, and stormsewer systems. Ninety -two (92) percent of said rates are attributable to sanitary sewer use, maintenance, replacement and improvements and eight (8) percent of said rates are attributable to stormsewer use , maintenance, replacement and improvements.

Definitions:

BOD	- Means "biochemical oxygen demand"
TSS	- Means "total suspended solids"
mg/L	- Means "milligrams per liter"
SFDE	- Means "single family dwelling equivalent"

EXHIBIT 'G'

MGD FORMULA

Total Flow for Service Area	=	27.85 MGD[1]
Total Cost of System	=	$16,000,000
Cost per MGD	=	$16,000,000 / 27.85 = $574,506 per MGD

An Area's Flow = Acreage x Factor per Acre[2]

The Area's Cost = $574,506 x Area Flow

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[1]The total design peak flow is calculated from actual base service area, north of the river, which the GIS application computed (21.91 MGD) plus Areas 4 & 5 flows from the Carollo study, south of the river (5.94 MGD).

[2]Each Land Use designation has a flow factor per acre associated with it, based upon Bakersfield City Standards.

RMA

NOTICE OF EXEMPTION

(CALIFORNIA ENVIRONMENTAL QUALITY ACT OF 1970)

TO WHOM IT MAY CONCERN:

1. The Board of Supervisors of the County of Kern has approved the following described project in the County of Kern, State of California:

   a. Sponsoring agency: **Resource Management Agency**

   b. Name of Project: **Sewer Maintenance and Sewage Transport, Treatment and Disposal for a Portion of County Service Area 71**

   c. Location of Project: **Northwest area of Bakersfield, California**

   d. Description of Project: **Establishment of area to be provided sewer maintenance and sewage transport, treatment, and disposal service by the City of Bakersfield**

The form of such approval and the date thereof is: Agreement No. 943-99

3. The Board of Supervisors of the County of Kern has determined that it can be seen with certainty that there is no possibility that the action herein taken may have a significant effect on the environment and that, therefore, under the provisions of Section 15061(b)(3) of the State CEQA Guidelines such action is not covered by the requirements of the Environmental Quality Act of 1970, as amended (CEQA) and the State CEQA Guidelines concerning the evaluation of projects, and the preparation and review of environmental documents do not apply to such action, for which reasons no environmental documents were required for consideration of such matter.

Dated this 26th day of October, 1999.

DENISE PENNELL
Clerk of the Board of Supervisors
County of Kern, State of California

Telephone No. 805/868-3585

Judy A. Denny
Deputy Clerk

Sewer Service Area

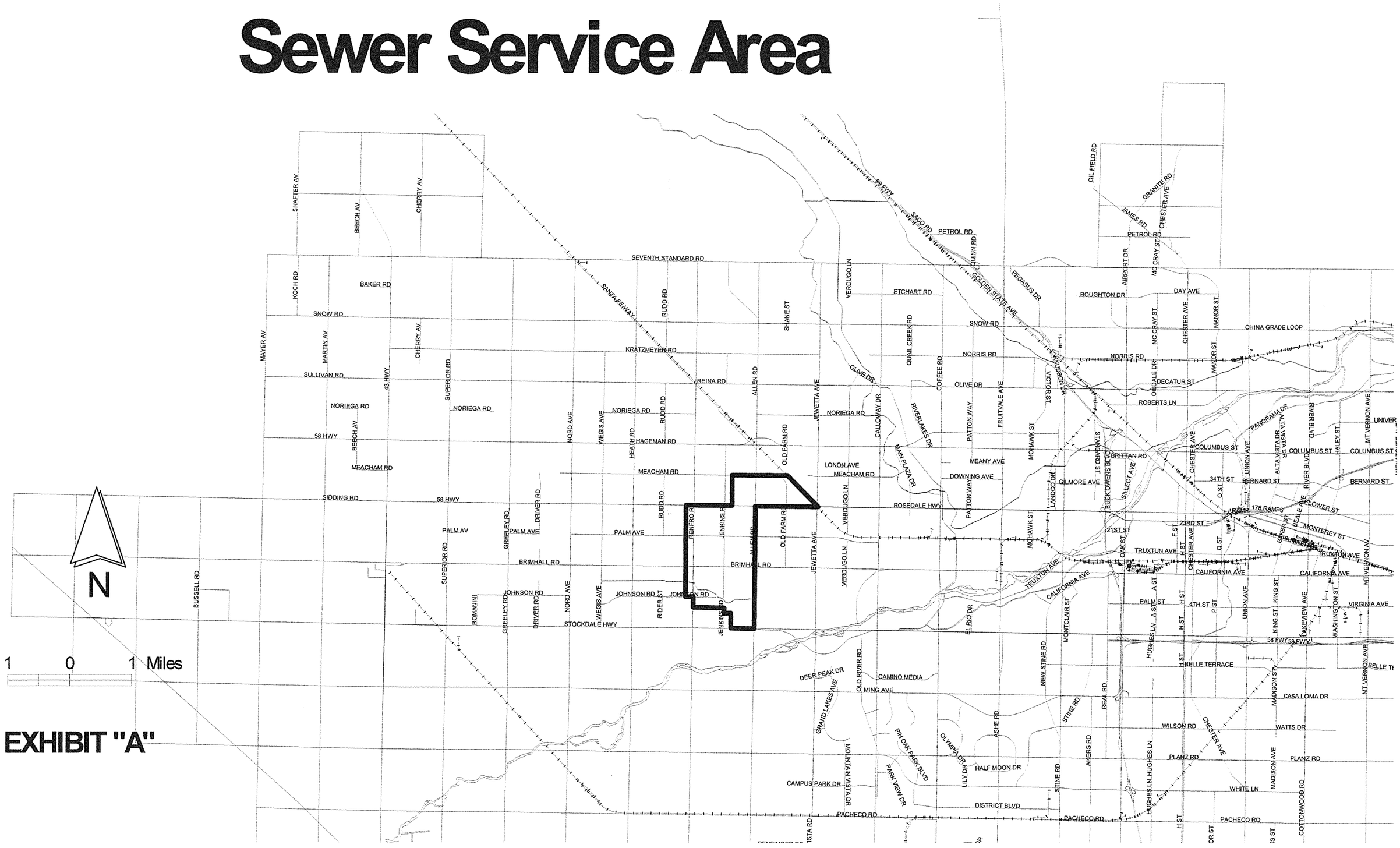


EXHIBIT "A"

Eligible Area

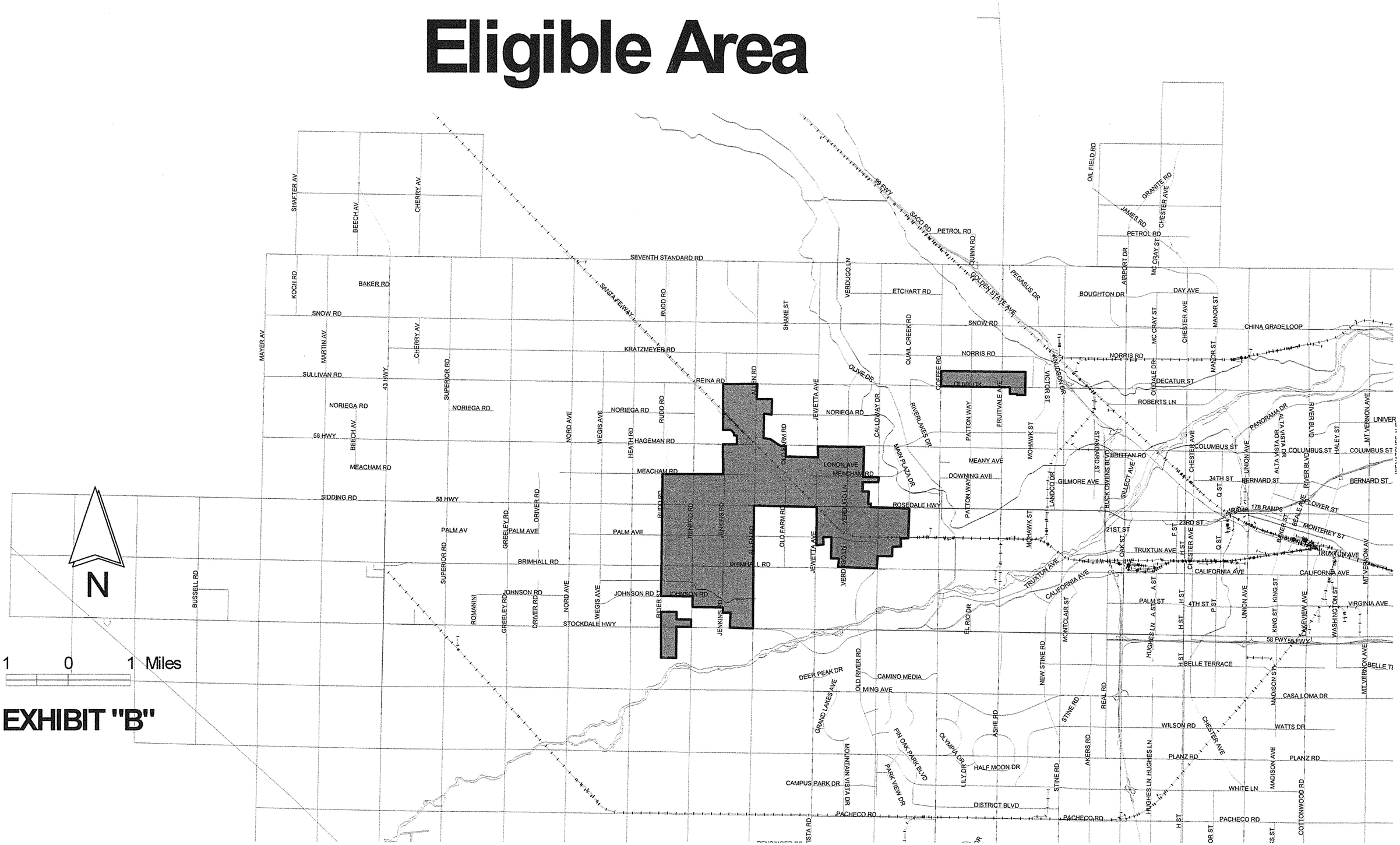


EXHIBIT "B"

CSA 71 Excluded Area

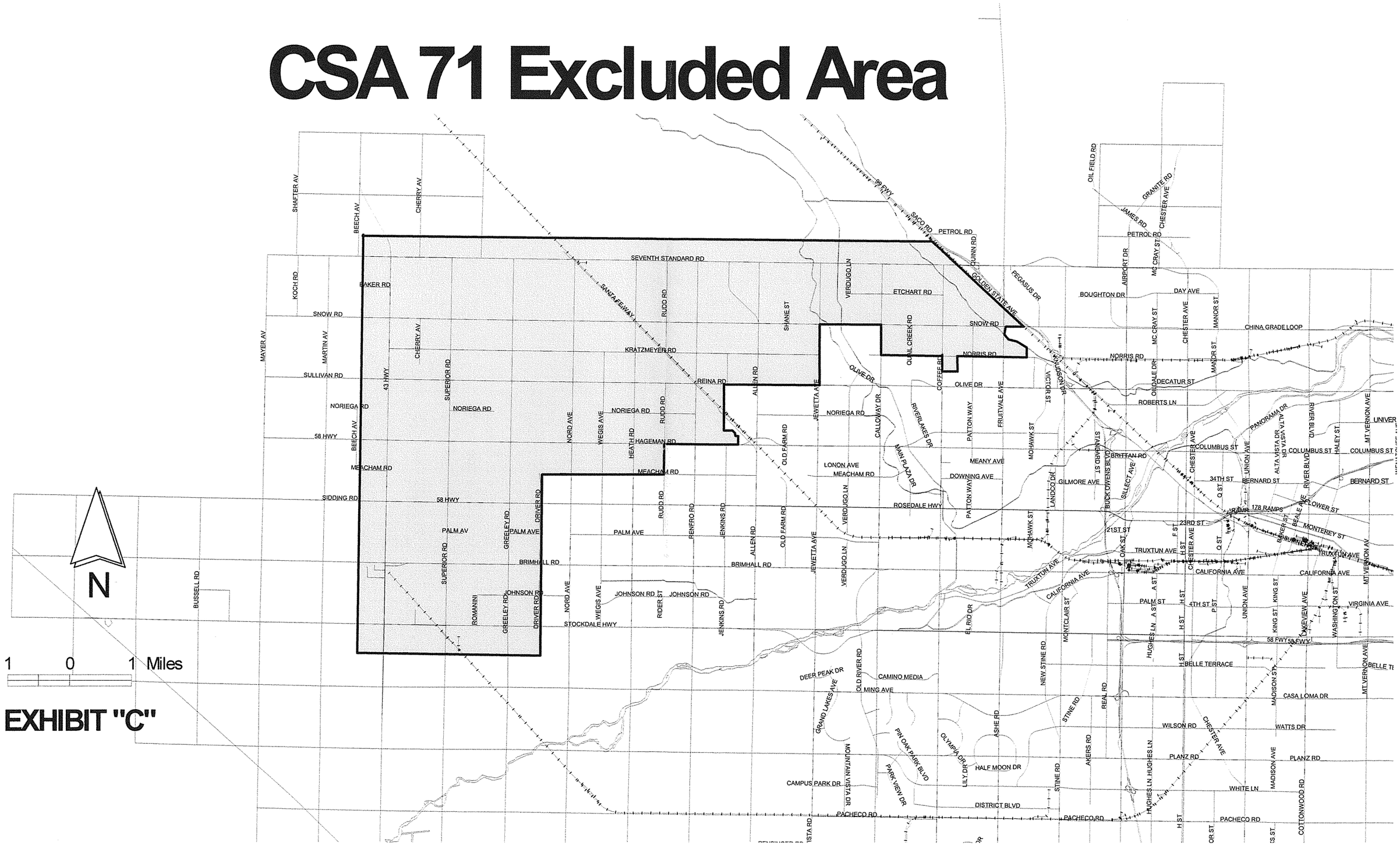
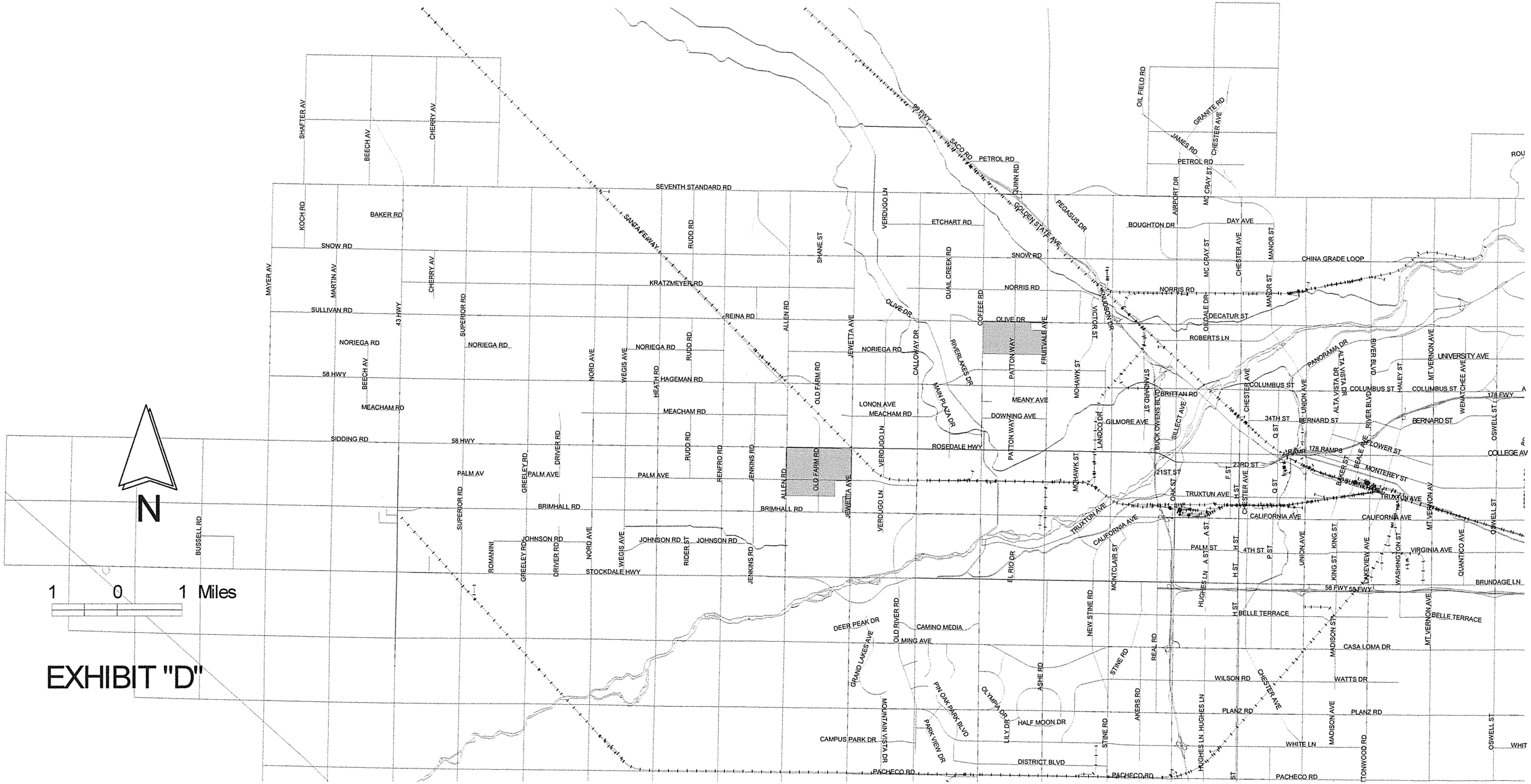
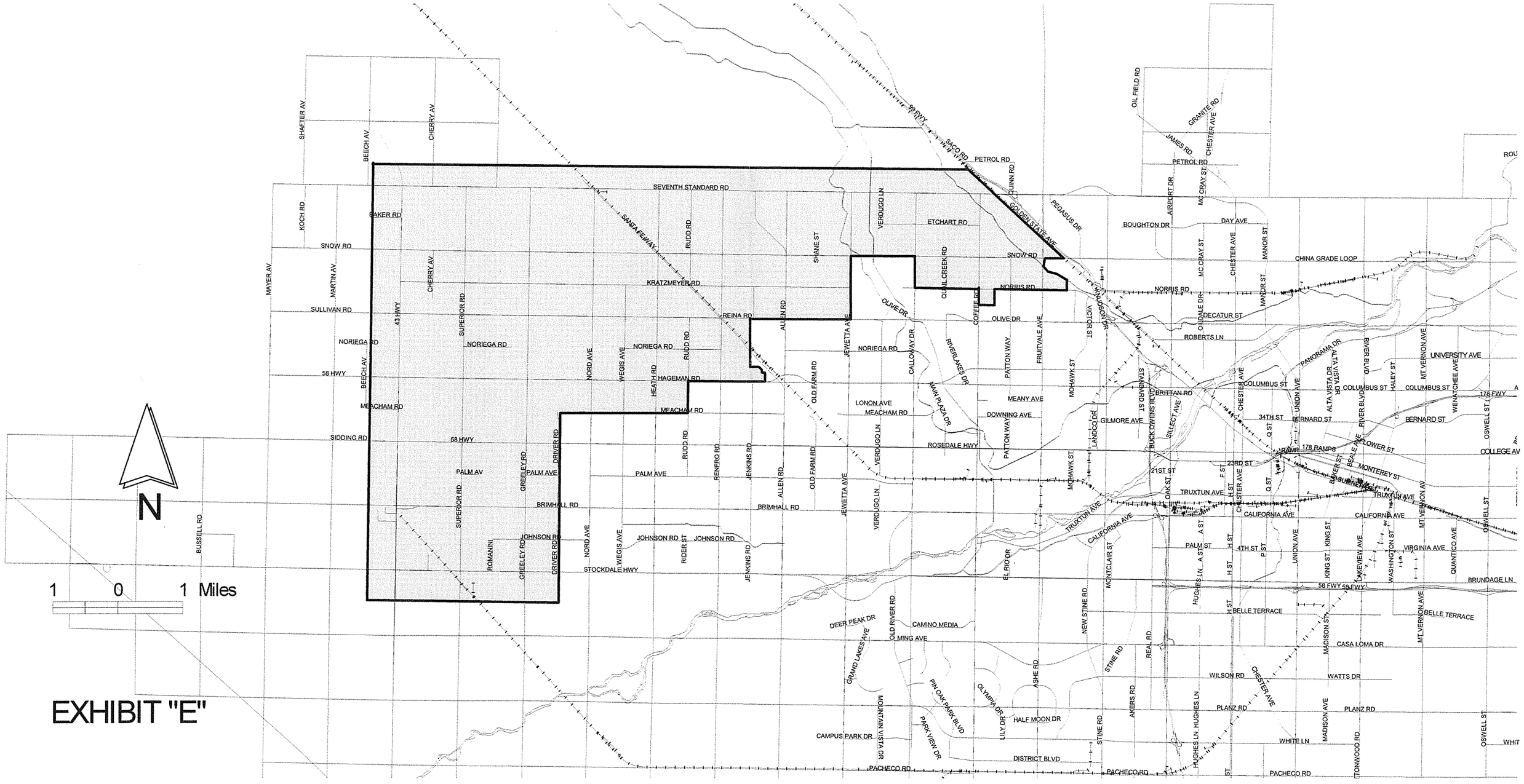


EXHIBIT "C"

New Annexations



North of the River Sanitary District No.1



N

Exhibit F
Future Service Expansion Areas

Proposed CSA71 City Service Boundary
Initital Buy-in
Balance of CSA 71
Future Sewer Service Area at Negotiated Rate
Potential City Service Area

Kern County

Agt. # 943-99

AGREEMENT NO. 99-266

SEWER MAINTENANCE AND SEWAGE TRANSPORT, TREATMENT AND DISPOSAL FOR A PORTION OF COUNTY SERVICE AREA 71

THIS AGREEMENT is made and entered into on OCT 20 1999, by and between the **CITY OF BAKERSFIELD**, a charter city and municipal corporation, ("CITY" herein) and the **COUNTY OF KERN**, a political subdivision of the State of California, ("COUNTY" herein).

RECITALS

WHEREAS, CITY and COUNTY have previously entered into several agreements concerning County Service Area 71 ("CSA 71" hereafter) concerning sewer service including agreements numbered 89-197 (CITY), 480-89 (COUNTY); 91-67 (CITY), 187-91 (COUNTY); and 93-149 (CITY), 109-92 (COUNTY); and

WHEREAS, CITY and COUNTY desire the above-listed agreements be terminated and all obligations, duties and rights set forth in said agreements be terminated and superseded by this Agreement; and

WHEREAS, CITY has awarded a contract for construction of the Allen Road Sewer Trunkline which can serve a portion of CSA 71; and

WHEREAS, COUNTY has previously contributed to the financing of the Jewetta Trunkline, the extension of the trunkline in Fruitvale Road and has constructed the trunkline in Olive Drive; and

WHEREAS, CITY intends to build another sewer trunkline known as the Buena Vista Sewer Trunkline II which can serve portions of CSA 71; and

WHEREAS, CITY estimates its cost of constructing the Allen Road Sewer Trunkline and Buena Vista Trunkline II will exceed Sixteen Million Dollars ($16,000,000); and

WHEREAS, the cost per MGD ("million gallons per day") will change from time to time as computed by CITY; and

WHEREAS, the cost per MGD calculation is attached to this Agreement as **Exhibit "G"**; and

WHEREAS, COUNTY wishes to connect to the Allen Road Sewer Trunkline to serve a portion of CSA 71; and

WHEREAS, COUNTY has currently available Two Million Dollars ($2,000,000) to pay for connecting a portion of CSA 71 to the Allen Road Sewer Trunkline; and

WHEREAS, both CITY and COUNTY are empowered to acquire, construct, operate and maintain sewerage systems; and

WHEREAS, COUNTY established CSA 71 to provide for sewerage service within its boundaries; and

WHEREAS, COUNTY has approved subdivision development in CSA 71 prior to the execution of this Agreement; and

WHEREAS, by this Agreement CITY AND COUNTY intend to designate an area within CSA 71 which will be allowed to connect to the CITY sewer system for the payment by COUNTY of Two Million Dollars ($2,000,000) for sewer trunkline fees and other fees as set forth below; and

WHEREAS, by this Agreement CITY and COUNTY are establishing conditions where other portions of CSA 71(beyond those set forth in **Exhibit "A"**) could receive sewer service through the CITY's facilities; and

WHEREAS, COUNTY may choose to expand the Sewer Service Area (**Exhibit "A"**) through additional payments; and

WHEREAS, the parties desire to define what payment amounts would be necessary to cover sewer trunkline fees in the event the COUNTY wishes to add "Eligible Area" or portion thereof (**Exhibit "B"**) to the "Sewer Service Area" (**Exhibit "A"**) or "Other Area" (**Exhibit "F"**); and

WHEREAS, areas set forth in **Exhibit "F"** may receive COUNTY service in the future for the payment of additional fees, these additional fees will be calculated on a formula similar to the formula set forth in **Exhibit "G,"** and said new formula will be subject to future negotiations; and

WHEREAS, CITY desires a limit on the maximum area to be served by CITY.

NOW, THEREFORE, incorporating the foregoing recitals herein, CITY and COUNTY mutually agree as follows:

1. **AREAS OF SERVICE.** The following exhibits are attached to this Agreement and each exhibit is incorporated by reference as though fully set forth. CITY and COUNTY agree the exhibits accurately reflect their intentions concerning service areas:

1.1 Exhibit "A": Shows the area which will be served upon the payment of Two Million Dollars ($2,000,000) and the fulfillment of other conditions set forth in this Agreement ("Sewer Service Area" herein);

1.2 Exhibit "B": Shows the area CITY sewer service may be expanded into upon the fulfillment of the conditions set forth in this Agreement ("Eligible Area" herein);

1.3 Exhibit "C": Shows the area within the original CSA 71 boundary which is now excluded from CITY sewer service under this Agreement;

1.4 Exhibit "D": Shows the area newly annexed and a part of CITY;

1.5 Exhibit "E": Shows the area currently served by North of the River Sanitary District No. 1 ("NOR").

1.6 Exhibit "F": Shows area for future service expansion by COUNTY which COUNTY may buy into for a contribution to future infrastructure costs (including but not limited to trunkline fees). A formula for the expansion of COUNTY service into these areas will be agreed to in the future. COUNTY and CITY agree the formula will be similar to the formula set forth in **Exhibit "G."**

1.7 Exhibit "G": Shows the MGD formula which will be used to calculate amounts that would be necessary for the COUNTY to pay the CITY to add territory to the "Service Area" (**Exhibit "A"**) from the "Eligible Area" (**Exhibit "B"**). All other applicable fees and policies would still be in effect.

2. **PAYMENT AND SERVICE.**

2.1 Sewer Service Area. COUNTY shall pay sewer trunkline fees to CITY in the sum of Two Million Dollars ($2,000,000) upon execution of this Agreement and CITY shall provide sewerage service to the area in CSA 71 designated in **Exhibit "A."** This area designated in **Exhibit "A"** as the Sewer Service Area is the only portion of CSA 71 that will be allowed to connect to the CITY sewer trunkline system for the Two Million Dollar ($2,000,000) payment. Connections outside the Sewer Service Area shall be permitted only under section 2.2 of this Agreement ("Adding Areas for Service"). COUNTY agrees to pay additional connection, operations and maintenance fees for all areas as set forth hereafter in this Agreement. CITY shall permit COUNTY and residents and landowners within Sewer Service Area to discharge sewage into CITY-operated sewerage system and agrees to transport it to a sewage plant and make proper disposal of all of said

sewage, subject to those same regulations and restrictions as CITY requires of sewage generated within CITY. COUNTY shall only accept properly disposed of sewage for discharge into CITY system. If areas within **Exhibit "A"** (Sewer Service Area) are annexed prior to their connection to the sewer a credit shall be given to COUNTY which may be used as part of any payment required under this Agreement for adding territory in the Eligible Area (**Exhibit "B"**). Said credit shall be based on the formula set forth in **Exhibit "G."** As for properties currently within the COUNTY and receiving service from CITY, CITY will continue to provide sewer service consistent with the terms of this Agreement.

2.2 **Adding Areas for Service.** In the Eligible Area only COUNTY shall be entitled to add area for sewer service in only the following way:

2.2.1 Eligible Area. COUNTY will pay all trunkline fees for the entire new area which COUNTY has requested be added to the Sewer Service Area. COUNTY understands and agrees that new areas must be of at least twenty (20) acres in size before CITY will approve service. Said payment will be made within thirty (30) days after submission by COUNTY of the written request for additional areas. The trunkline fees will be paid by COUNTY to CITY in an amount set by CITY in accordance with the terms of this Agreement. The connection fees shall be paid by the COUNTY within thirty (30) days of the time each property connects to the CITY sewer.

2.3 **Palm/Olive Areas.** Should any of the areas shown on **Exhibit "D"** de-annex and are no longer part of the CITY, said area shall become part of the Eligible Area (**Exhibit "B"**) and shall be subject to the same conditions for sewer service as other areas in **Exhibit "B."**

2.4 **Other Areas.** COUNTY may add areas beyond the Eligible Area by payment of a portion of future sewer collection system costs (including but not limited to trunkline fees). (See **Exhibit "F"**.) A formula for the expansion of COUNTY service into these areas will be agreed to in the future. CITY and COUNTY agree the formula will be similar to the formula set forth in **Exhibit "G."**

3. **SERVICE AREAS. Exhibit "B"** will designate the total area within CSA 71 which may connect to the CITY sewer system ("Eligible Area"). **Exhibit "A"** will designate the area within the Eligible Area which will be able to connect upon completion of the CITY sewer trunkline now under construction. Thus, **Exhibit "A"** will set forth the area to be immediately served by CITY, and **Exhibits "B"** and **"F"** will designate the future area of service by CITY within the CSA 71 boundaries.

4. **OPERATION AND MAINTENANCE.** COUNTY shall own and properly maintain and operate all portions of the sewer system located within its jurisdiction. CITY shall own and properly maintain and operate all portions of the sewer system within its jurisdiction. The CITY's jurisdiction shall be deemed to be its corporate boundaries (city

limits). COUNTY shall pay to CITY, annually, for providing sewer service as set forth in this Agreement. Said payment shall be for the operation and maintenance of the CITY sewer system including wastewater treatment plants, pipeline maintenance and other associated expenses excepting operations and maintenance for the COUNTY maintained portions of the sewer lines. The amount paid by COUNTY to CITY shall be the same as would be charged by the CITY to CITY property owners for equivalent types of usage within the CITY's jurisdiction. The amount shall be calculated by CITY on the basis of sewer connections in the Sewer Service Area and said calculation shall be forwarded to COUNTY on or about March 1st of each year. The payment will be calculated on the rate established by CITY for the fiscal year (July 1 to June 30) following the March 1st date. The payment shall be due to CITY from COUNTY on or before thirty (30) calendar days following the second installment payment deadline date for COUNTY property taxes. Should COUNTY fail to pay the charges in a timely manner, COUNTY shall pay interest on the outstanding sum at the legal rate, compounded monthly, from the date the charges accrue. CITY shall give COUNTY notice of its failure to pay and COUNTY shall have ninety (90) days from the date of the notice from CITY to pay all past due charges plus interest. Should COUNTY fail to pay after the ninety (90) day cure period, COUNTY shall be in material breach of this Agreement. Maintenance and operation of sewerage systems, portions of sewerage systems and trunk sewers shall include, without restriction, sewer cleaning, root control, vector control, adjustment of sewer manholes to street grade, replacement and/or repair of sewers and sewer manholes, response to complaints to sewer stoppages, repair of roadways or easements if damaged by sewers or sewage (although this shall not relieve developers of their responsibilities during any guarantee period as provided in any subdivision improvement agreement between CITY or COUNTY and a developer), and other such tasks as are required from time to time to maintain sewerage service provided, or to be provided, to property owners. CITY shall have the right to terminate or suspend service to any parcel served under this Agreement in order to comply with State law.

5. CONNECTION FEE. COUNTY shall pay CITY fees set by CITY for each connection to any parcel in the Sewer Service Area. This connection fee is based upon capacity usage of the wastewater treatment facilities constructed by CITY. Said amount may be adjusted by CITY. CITY shall not charge property owners in the Sewer Service Area more than is charged to CITY users under similar circumstances. This fee is separate and distinct from any trunkline fees discussed above.

6. CONSTRUCTION OF SEWERS. Within one hundred eighty (180) days of the date of this Agreement, the COUNTY shall modify the COUNTY standards for sewers to the equivalent engineering standards for CITY sewers, COUNTY shall also, as a condition of approval of new tracts or other construction within the Sewer Service Area, Eligible Area or Other Area (**Exhibits "A," "B,"** and **"F"**), require that sewers be constructed to the new COUNTY standards. It shall be COUNTY's responsibility to inspect sewers in their area.

7. **INDUSTRIAL USERS.** Sewer connection permits for industrial users, as defined in the Bakersfield Municipal Code, shall be subject to prior written approval by CITY. Industrial users may not discharge sewerage constituents into the sewer system that have an adverse affect on pipelines, wastewater treatment and disposal facilities or public health. All industrial discharges must meet the requirements of the Bakersfield Municipal Code Chapter 14 as it now exists or may hereafter be amended as well as all State of California and United States laws and regulatory requirements.

8. **ANNEXATION.** Should any portion of the Sewer Service Area annex into CITY jurisdiction, that portion of the annual sewer operation and maintenance expense attributable to the annexed area shall no longer be paid by COUNTY; however, CITY shall collect such charges allowed by the Bakersfield Municipal Code from the annexed area unless the annexed area is part of the NOR service area.

9. **PREVIOUS AGREEMENT.** All previous agreements concerning CSA 71 sewerage between the CITY and COUNTY are hereby terminated. No rights, duties or obligations shall inure to or be imposed upon either party concerning the previous agreements for CSA 71 sewerage.

10. **ASSIGNMENT.** Neither this Agreement, nor any interest in it, may be assigned or transferred by any party without the prior written consent of all the parties. Any such assignment will be subject to such terms and conditions as CITY may choose to impose.

11. **BINDING EFFECT.** The rights and obligations of this Agreement shall inure to the benefit of, and be binding upon, the parties to the Agreement and their heirs, administrators, executors, personal representatives, successors and assigns.

12. **CORPORATE AUTHORITY.** Each individual signing this Agreement on behalf of entities represent and warrant that they are, respectively, duly authorized to sign on behalf of the entities and to bind the entities fully to each and all of the obligations set forth in this Agreement.

13. **EXECUTION.** This Agreement is effective upon execution. It is the product of negotiation and all parties are equally responsible for authorship of this Agreement. Section 1654 of the California Civil Code shall not apply to the interpretation of this Agreement.

14. **EXHIBITS.** In the event of a conflict between the terms, conditions or specifications set forth in this Agreement and those in exhibits attached hereto, the terms, conditions, or specifications set forth in this Agreement shall prevail. All exhibits to which reference is made in this Agreement are deemed incorporated in this Agreement, whether or not actually attached.

15. FORUM. Any lawsuit pertaining to any matter arising under, or growing out of, this Agreement shall be instituted in Kern County, California.

16. JOINT LIMITATION ON LIABILITIES AND INDEMNIFICATION.

16.1 Neither party shall be liable to the other party for any loss, damage, liability, claim or cause of action for damage to or destruction of property or for injury to or death of persons arising solely from any act or omission of the other party's officers, agents or employees.

16.2 CITY and COUNTY agree to indemnify and hold each other harmless from any and all claims, demands, liabilities, losses or causes of action which arise by virtue of its own acts or omissions (either directly or through or by its agents, officers, or employees) to such extent and in such part as the respective parties are found by reason of law to have proximately caused the injury or damage.

16.3 The party against whom any claim arising from any subject matter of this Agreement is filed shall give prompt notice of the filing of the claim to the other party.

17. MERGER AND MODIFICATION. All prior agreements between the parties are incorporated in this Agreement which constitutes the entire agreement. Its terms are intended by the parties as a final expression of their agreement with respect to such terms as are included herein and may not be contradicted by evidence of any prior agreement or contemporaneous oral agreement. The parties further intend this Agreement constitutes the complete and exclusive statement of its terms and no extrinsic evidence whatsoever may be introduced in any judicial or arbitration proceeding involving this Agreement. This Agreement may be modified only in a writing approved by the CITY Council and the COUNTY Board of Supervisors and signed by all the parties. CITY and COUNTY shall notify NOR of any proposed changes to this Agreement.

18. NEGATION OF PARTNERSHIP. CITY shall not become or be deemed a partner or joint venturer with COUNTY or associate in any such relationship with COUNTY by reason of the provisions of this Agreement. COUNTY shall not for any purpose be considered an agent, officer or employee of CITY, and CITY shall not for any purpose be considered an agent, officer or employee of COUNTY.

19. NON-INTEREST. No officer or employee of the CITY or COUNTY shall hold any interest in this Agreement (California Government Code section 1090).

20. NOTICES. All notices relative to this Agreement shall be given in writing and shall be personally served or sent by certified or registered mail and be effective upon actual personal service or depositing in the United States mail. The parties shall be addressed as follows, or at any other address designated by notice:

CITY: CITY OF BAKERSFIELD
City Hall
1501 Truxtun Avenue
Bakersfield, California, 93301

COUNTY: COUNTY OF KERN
Engineering and Survey Services Department
2700 M Street, Suite 570
Bakersfield, California 93301

21. PRE-JUDGMENT INTEREST. In the event of a default by any party to this Agreement, the non-defaulting party shall be allowed to recover interest on all damages at the legal rate from the date of the breach.

22. TIME. Time is of the essence in this Agreement.

23. NO WAIVER OF DEFAULT. The failure of any party to enforce against another a provision of this Agreement shall not constitute a waiver of that party's right to enforce such a provision at a later time, and shall not serve to vary the terms of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed, the day and year first-above written.

"CITY"
CITY OF BAKERSFIELD

By:_____
BOB PRICE, Mayor

"COUNTY"
COUNTY OF KERN

By:_____ OCT 26 1999
JON McQUISTON
Chairman, Board of Supervisors

APPROVED AS TO CONTENT:
PUBLIC WORKS DEPARTMENT

By:_____
RAUL ROJAS
Public Works Director

APPROVED AS TO CONTENT:
RESOURCE MANAGEMENT AGENCY

By:_____
DAVID PRICE III
Resource Management Agency Director

More Signatures on Following Page

APPROVED AS TO FORM:
BART J. THILTGEN
City Attorney

By:_____
ALAN D. DANIEL
Assistant City Attorney

APPROVED AS TO FORM:
OFFICE OF COUNTY COUNSEL

By:_____
STEPHEN D. SCHUETT
Assistant County Counsel

COUNTERSIGNED:

By:_____
GREGORY J. KLIMKO
Finance Director

ADD:dlr

Attachments:
Exhibits "A," "B," "C," "D," "E," "F," & "G"

CERTIFICATE OF ADOPTION OF RESOLUTION
AUTHORIZING CHAIRMAN TO SIGN INSTRUMENT

The undersigned, Clerk of the Board of Supervisors of the County of Kern, hereby certifies that the following resolution was adopted by said Board of Supervisors at a regular meeting duly convened on the 26th day of October, 1999:

"WHEREAS, this Board has determined that the County of Kern should approve a certain Agreement No. 99-266 between Kern County and the City of Bakersfield re sewer maintenance and sewage transport, treatment and disposal for a portion of County Service Area 71 (Kern County Agreement No. 943-99), bearing the date October 20, 1999.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Kern, State of California, that said instrument be, and it is hereby executed on behalf and in the name of said County of Kern, and the Chairman of this Board is hereby authorized and directed to sign his name thereto on behalf of said County."

The undersigned further certifies that on the date last mentioned the person who so signed said instrument was the duly elected Chairman of said Board and that his signature on said instrument is genuine.

The undersigned further certifies that said resolution was adopted by the following vote:

Ayes: McQuiston, Perez, Patrick, Peterson, Parra

Noes: None

Absent: None

Dated: October 26, 1999

BOARD OF SUPERVISORS KERN COUNTY, CA

DENISE PENNELL
Clerk of the Board of Supervisors
County of Kern

By: Judy A. Denny
Deputy Clerk

Reference: Item No. 5

Kern County
Agt. #071-90

JOINT EXERCISE OF POWERS AGREEMENT

BETWEEN

NORTH OF RIVER SANITARY DISTRICT NO. 1,

COUNTY OF KERN,

AND

CITY OF SHAFTER

PARTIES AND DATE

This Agreement is made this 16th day of February 1990 between the CITY OF SHAFTER, a municipal corporation (hereinafter referred to as "SHAFTER"), the NORTH OF RIVER SANITARY DISTRICT NO. 1, a special district of the State of California (hereinafter referred to as "NORSD"), and the County of Kern, a political subdivision of the State of California (hereinafter referred to as "COUNTY").

R E C I T A L S

WHEREAS, SHAFTER, NORSD, and COUNTY, are empowered to acquire, construct, operate and maintain sewerage systems that include, but are not limited to, sewer lines, sewage lift stations, wastewater treatment plants and treated wastewater effluent disposal areas; and

WHEREAS, COUNTY established County Service Area 71, also known as "CSA 71", to provide for the collection, treatment, and disposal of wastewater produced within its boundaries and the construction and maintenance of facilities therefor; and,

WHEREAS, it has been shown that a regional sewerage system, as hereinafter described, is needed to serve a portion of CSA 71; and

WHEREAS, NORSD has determined that it is in NORSD's best interest to relocate its wastewater treatment plant and disposal facilities from its present location to a site farther to the west and remote from present or planned development; and,

WHEREAS, SHAFTER has determined that its present wastewater treatment plant and disposal facilities need to be replaced in a new location remote from present and planned future development; and,

WHEREAS, under the provisions of California Government Code sections 6500 through 6583, and California Health and Safety Code sections 6512, 6515, 6520.3, and 6522, NORSD, COUNTY, and SHAFTER may join in a Joint Exercise of Powers Agreement, hereinafter referred to as "JPA" or "Agreement",

THEREFORE, NORSD, COUNTY, and SHAFTER have determined that it is in their best interest to enter into this JPA to plan, design, construct, operate and maintain sewerage improvements to meet sewer needs of all of the parties to this JPA.

SECTION 1: PROJECT FACILITIES:

The sewerage facilities, hereinafter referred to as "Project facility (ies)", covered by this JPA include trunk sewers, a wastewater treatment plant, and treated wastewater disposal facilities. The approximate alignments of the trunk sewers and the locations of the wastewater treatment plant and disposal areas are shown on Exhibit "A" attached hereto. The alignments and locations shown are preliminary and subject to change.

NORRIS/SEVENTH STANDARD SEWER:

The NORRIS/SEVENTH STANDARD SEWER will extend from NORSD's present wastewater treatment plant to the site of the wastewater treatment plant proposed herein. That portion of the NORRIS/SEVENTH STANDARD SEWER located west of Jenkins Road is part of the project facilities.

SHAFTER SEWER:

The SHAFTER SEWER will extend from Shafter's present wastewater treatment plant to a point of connection with the NORRIS/SEVENTH STANDARD SEWER. The SHAFTER SEWER is not part of the project facilities.

SECTION 2: PROJECT CONSTRUCTION PHASING:

It has been determined by each of the three parties to this agreement that the project facilities be constructed and placed into operation as quickly as possible. Due to financial limitations, it is the parties intent that the improvements be constructed in two or more phases. The goal for completion of construction of the NORRIS/SEVENTH STANDARD SEWER is January 1, 1991.

The wastewater treatment plant and disposal facilities may be constructed in one or more phases depending on the flows to be treated and the financing available. The goal for completion of construction of the first phase of the wastewater treatment plant is January 1, 2000.

If the first phase of the wastewater treatment plant is not constructed and operational by January 1, 2010, the COUNTY may request that NORSD return the amount of money which the COUNTY paid, for the construction of the NORRIS/SEVENTH STANDARD SEWER pursuant to this JPA, including but not limited to the initial $2,500,000

payment, plus the amount of interest that that money would have earned if it had been invested by the Kern County Treasurer. Upon such request, NORSD shall remit the amount requested to COUNTY.

If the first phase of the wastewater treatment plant is not constructed and operational by January 1, 2000, SHAFTER may request that NORSD return the amount of money which SHAFTER paid, for the construction of the NORRIS/SEVENTH STANDARD SEWER pursuant to this JPA, plus the amount of interest that that money would have earned if it had been invested by the Kern County Treasurer. Upon such request, NORSD shall remit the amount requested to SHAFTER.

SECTION 3: CAPACITY RIGHTS:

NORRIS/SEVENTH STANDARD SEWER:

Except as noted below, ownership of the NORRIS/SEVENTH STANDARD SEWER shall be vested solely in NORSD. Both SHAFTER and COUNTY shall have capacity rights in the NORRIS/SEVENTH STANDARD SEWER in the amounts indicated below. Those capacity rights are based on the total costs to be paid by SHAFTER and COUNTY for each "reach" of the NORRIS /SEVENTH STANDARD SEWER.

A "reach" is an identifiable portion of the sewer.

"Total Cost" shall include all costs associated with a reach, including, but not limited to, construction contract costs (including change orders), right-of-way costs, land costs, legal costs, administrative costs, financing costs (including interest), insurance costs and engineering costs.

"Capacity Right" is the share of the actual capacity of the sewer after the sewer is placed in service.

For the reach of the NORRIS/SEVENTH STANDARD SEWER from the SHAFTER sewer westerly, the capacity rights and total costs shall be allocated as follows:

NORSD = 1/2 (est. 6 mgd)

CSA 71 = 1/4 (est. 3 mgd)

SHAFTER = 1/4 (est. 3 mgd)

For the reach of the NORRIS/SEVENTH STANDARD SEWER from the SHAFTER SEWER easterly to Jenkins Road, the capacity rights and total costs shall be allocated as follows:

NORSD = 2/3 (est. 6 mgd)

CSA 71 = 1/3 (est. 3 mgd)

For the reach of the NORRIS/SEVENTH STANDARD SEWER easterly of Jenkins Road, the capacity rights and total costs shall be allocated entirely to NORSD.

SHAFTER SEWER:

The SHAFTER SEWER shall be owned solely by Shafter. The entire capacity of this sewer shall likewise be owned solely by Shafter.

WASTEWATER TREATMENT PLANT AND DISPOSAL FACILITIES:

The wastewater treatment plant and disposal facilities will be jointly owned by NORSD and Shafter. Ownership, and capacity in the facilities, shall be vested in NORSD and Shafter in direct proportion to the fraction of the total cost of the treatment and disposal facilities paid for by each. "Total Cost" shall include all costs associated with the wastewater treatment plant and disposal facilities, including, but not limited to, construction contract costs (including change orders), right-of-way costs, land costs, legal costs, administrative costs, financing costs (including interest), insurance costs and engineering costs. Capacity rights owned by NORSD and SHAFTER shall be based on the total actual capacity of the wastewater treatment plant and disposal facilities. As between NORSD and SHAFTER, the capacity rights for the wastewater treatment plant and disposal facilities which are used by or reserved for COUNTY shall be considered as being included in the ownership and capacity rights vested in NORSD.

COUNTY shall be permitted to use wastewater treatment plant capacity upon payment of a Connection Fee as each sewer user in CSA 71 is connected to the public sewer herein described. The connection fees

to be paid to NORSD shall be in the same amount as NORSD charges to equivalent sewer users in its own District for the purchase of capacity in the wastewater treatment plant and disposal facilities which are the subject of this JPA. The connection fees to be paid to NORSD for sewer users in CSA 71 shall not include any other amounts, including, but not limited to, the amount which NORSD charges for purchase of capacity in the sewer trunk or sewer collection system. It shall be the responsibility of NORSD to maintain adequate reserve capacity in the wastewater treatment plant for users in CSA 71. However, it shall be the responsibility of COUNTY to monitor and control the rate at which new sewer connections are made so as to allow NORSD adequate response time in which to expand the wastewater treatment plant capacity accordingly.

TRANSFER OF CAPACITY RIGHTS:

With respect to the NORRIS/SEVENTH STANDARD SEWER, the capacity rights of NORSD, Shafter, and COUNTY are as previously defined in this Section.

With respect to the treatment and disposal facilities, each party to this JPA will negotiate in good faith prior to initial design and construction as to what capacity it wishes to have.

It is probable that at sometime in the future one or more of the parties to this JPA may find that it (they) have excess capacity in the sewer, treatment plant, or disposal facility. In such an event, the party with the excess capacity may transfer its excess capacity, or capacities, to one of the other parties to this JPA provided the other party agrees to accept the transfer. Such transfer may be permanent or for a limited period of time.

SECTION 4: CONSTRUCTION OF WASTEWATER TREATMENT PLANT AND DISPOSAL FACILITIES:

NORSD or Shafter may construct or expand treatment plant and disposal facilities as they determine are necessary to meet their needs. Either party can expand the treatment plant and/or disposal facilities at no cost to the other. It is the intent of this JPA that any such construction be a cooperative, joint effort of NORSD and SHAFTER. However, it may occur that only one of the parties desires to construct or expand the facilities. In such a case, the non-participating party shall cooperate with the party proposing the construction. Construction of improvements shall be done in such a manner so as not to interfere with the safe and continuous operation of any existing facilities.

SECTION 5: TECHNICAL ADVISORY COMMITTEE:

Of the three Parties to this Joint Powers Agreement, NORSD shall be the lead agency and have responsibility and authority for operating and maintaining the NORRIS/SEVENTH STANDARD SEWER and the wastewater treatment and disposal facilities. To facilitate planning and design, and for later administration, there shall be formed, upon execution of this Agreement, a Technical Advisory Committee (TAC) consisting of at least one member from each Party to this Agreement. The NORSD representative will assume the chairmanship of the TAC and the SHAFTER representative will serve as secretary. The primary purpose of the TAC is to review, discuss and evaluate the ongoing impact of the Joint Powers Agreement on the respective parties and make recommendations to NORSD, and to the parties' respective governing bodies. Secondarily, the TAC shall assist NORSD in formulating and implementing such matters as sewer use ordinances, rate structures and future expansion of facilities. The chairman shall keep members informed of important project events and shall convene meetings when so requested by any of the Parties to this Agreement. The secretary shall keep minutes of the major discussion items for the TAC meetings and distribute those minutes to the Parties.

SECTION 6 - FINANCING CONSTRUCTION

The construction cost of the NORRIS/SEVENTH STANDARD SEWER, presently proposed to be in operation by January 1, 1991, is approximately $15 million. The County of Kern has allocated to CSA 71 the sum of

$2,500,000 for constructing the sewer. NORSD has on hand a like or greater sum to fund construction of the sewer. Shafter's share of the sewer is estimated to be $1,000,000. The remainder of NORSD's share required for construction of the sewer will be obtained by debt financing. NORSD will arrange for said debt financing used to implement the construction of the NORRIS/SEVENTH STANDARD SEWER. Within 30 days of the date of execution of this Agreement, COUNTY shall contribute $2,500,000 to NORSD as an initial payment toward CSA 71's share of the total cost of that portion of the sewer in which CSA 71 has capacity rights. If NORSD fails to obtain sufficient financing within three (3) years following the execution of the JPA to construct the NORRIS/Seventh STANDARD SEWER, NORSD shall upon the request of the County return the $2,500,000 initial payment to COUNTY plus the amount of interest the $2,500,000 would have earned if it had been invested by the Kern County Treasurer.

After the commencement of the construction of the NORRIS/SEVENTH STANDARD SEWER, COUNTY shall pay NORSD COUNTY'S share of the total costs of the sewer as allocated pursuant to Section 3 of this JPA less the sum of the $2,500,000 initial payment plus the amount of interest the $2,500,000 would have earned if it had been invested by the Kern County Treasurer. COUNTY shall pay this difference over a period of time, not to exceed ten (10) years, as provided below for "advanced fund". COUNTY, in its sole discretion, can at any time prepay the amount due without penalty.

COUNTY has appropriated the initial payment of $2,500,000 noted above for the construction of the NORRIS/SEVENTH STANDARD SEWER. Prior to paying any of COUNTY'S other financial obligations under this JPA, the Board of Supervisors of County must appropriate sufficient funds to meet those obligations. Accordingly, notwithstanding any other term or condition of this JPA, if the Board of Supervisors of COUNTY fails to appropriate sufficient funds to meet any of its financial obligations under this JPA, COUNTY shall not be obligated to meet those obligations and shall not pay any penalties or incur any liability or expense as a result of the Board of Supervisor's failure to appropriate sufficient funds. However, shall the Board of Supervisors not appropriate sufficient funds to reimburse NORSD for services provided under the terms of this agreement, NORSD reserves the right to discontinue services not paid for.

The treatment plant and disposal facilities shall be built as required and as financing becomes available. As with the NORRIS/SEVENTH STANDARD SEWER, NORSD may arrange for any debt financing used to fund construction of the treatment plant and disposal facilities. However, Shafter, at its election, may fund its share of any portion of these facilities through methods separate from NORSD and/or COUNTY.

It is anticipated that construction of a significant portion of the project facilities will be funded with monies received from the sale of NORSD's present treatment plant and disposal site. NORSD's

present site will be finally totally disposed of after the proposed wastewater treatment plant and disposal facilities specified herein become available to treat and dispose NORSD's wastewater flows.

The cost of abandonment of NORSD's present facilities, or any expense related to the NORSD's presently owned property, shall be borne solely by NORSD. Any income or revenue from the sale of NORSD's property shall be considered solely the income or revenue of NORSD although such income or revenue may be used, at the sole discretion of NORSD, to fund construction of the project facilities described herein.

If funds from one party to this JPA are used to fund the construction or operation and maintenance of facilities that benefit one or both of the other parties to this agreement, then such "advanced funds" shall be repaid by the benefiting party, or parties, to the party advancing the "advanced funds". The total repaid shall include the cost of the funds borrowed or otherwise advanced.

When funds are advanced from cash on hand, the amount repaid shall be equal to the principal sum advanced plus the interest that would have been earned had the funds been allowed to accumulate in an interest bearing account. The interest rates that would have been earned had the funds been invested with the Kern County Treasurer will be used to calculate the amount of interest due the advancing party.

SECTION 7 - NORSD TO ACT AS OPERATING ENTITY

NORSD shall administer, operate and maintain the project facilities, and administer and supervise the construction and installation of the project facilities, subject to the terms and conditions of this JPA. NORSD expressly accepts responsibility and liability for any operation or maintenance task necessary to maintain the project facilities in an operational condition. NORSD shall perform all of its obligations under this JPA in a reasonable, competent, and diligent manner and shall comply with all laws and regulations pertaining to the project facilities.

NORSD shall prepare preliminary and final JPA budgets for the year following execution of this agreement and every year thereafter for review by the three Parties to this agreement. The preliminary budget shall be submitted to Shafter and COUNTY no later than the 1st day of February prior to the fiscal year and the proposed final budget shall be submitted no later than three weeks prior to the start of budget hearings of any of the three Parties. Included in the budget submissions shall be estimates of O&M and capital charges to each Party. Where Equivalent Single Family Dwellings (ESFD), or other such factors, are used as a basis for charges, the current ESFD for each Party shall be included in the budget submissions. Any party to this agreement with objections to the final budget may seek resolution of the disagreement pursuant to the arbitration conditions of this agreement.

NORSD shall have the authority and the right to meet budgeted O&M expenses without further approval or concurrence by COUNTY or SHAFTER. NORSD agrees to abide by financial policies and procedures generally applicable to sanitary districts of similar size and operation.

For purposes of this agreement, "Year" shall be defined as a fiscal year beginning on the 1st day of July.

In the event of an emergency requiring immediate action to rectify a condition endangering the public health and safety, or damage to the project facilities, NORSD may incur unbudgeted expenses on behalf of the three parties to this JPA. In the event of such an emergency, reasonable effort will be made to obtain the approval of the TAC committee members prior to taking action. NORSD's spending authority in an emergency shall be limited to $25,000 per incident unless approved otherwise by the participants' governing bodies, except where the Health and Safety Code or Government Code of the State of California allow or require some other limit.

Quarterly, at the start of each quarter of each fiscal year, NORSD shall present a billing to each Party for one-fourth (1/4) of each respective Party's share of the annual budget. Said billing may be paid monthly, due the 1st of each month. Upon receipt of the audit for a given fiscal year, NORSD shall reconcile payments made as

compared to actual expenditures and shall make whatever added billing or credit is indicated by the reconciliation. Such payments to NORSD shall be made within 45 days of the billing by NORSD if paid quarterly or 20 days if paid monthly. Payments made thereafter or reimbursement of disputed payments under this agreement shall include interest payments at the rate of 8 percent per annum for the period of late payment or dispute. Upon notification in writing to NORSD of a dispute concerning the amount of payment by a party hereto, scheduled payments shall be made to NORSD pending settlement of the dispute.

NORSD agrees to indemnify and to hold COUNTY and SHAFTER and their agents, officers, directors, servants, employees and each of them, harmless from and against all liability or claims for loss or damage to property to whomever belonging or injury to or death of any person proximately caused in whole or in part by any negligence of NORSD or its agents, officers, directors, servants or employees, and each of them, in connection with the rights and duties granted in this agreement to NORSD or in connection with the operation and or maintenance of NORSD's separate sewerage systems.

COUNTY agrees to indemnify and to hold NORSD and SHAFTER and their agents, officers, directors, servants, employees and each of them, harmless from and against all liability or claims for loss or damage to property to whomever belonging or injury to or death of any person

proximately caused in whole or in part by any negligence of COUNTY or its agents, officers, directors, servants or employees, and each of them, in connection with the rights and duties granted in this agreement to COUNTY or in connection with operation and or maintenance of COUNTY's separate sewerage systems.

SHAFTER agrees to indemnify and to hold COUNTY and NORSD and their agents, officers, directors, servants, employees and each of them, harmless from and against all liability or claims for loss or damage to property to whomever belonging or injury to or death of any person proximately caused in whole or in part by any negligence of SHAFTER or its agents, officers, directors, servants or employees, and each of them, in connection with the rights and duties granted in this agreement to SHAFTER or in connection with operation and or maintenance of SHAFTER's separate sewerage systems.

NORSD shall maintain sufficient insurance against loss or damage to the project facilities as is customarily maintained with respect to such facilities in the State of California. In addition, NORSD shall maintain sufficient workers' compensation and public liability insurance as is customarily maintained with respect to such facilities in the State of California. Said public liability insurance shall name COUNTY and SHAFTER and their respective officers, officials and employees as additional named insureds and shall insure NORSD for its contractual obligations under this JPA.

All insurance under this JPA shall be underwritten by responsible insurers authorized to do business in the State of California.

No party to this agreement or any officer or employee thereof, shall be responsible for any damage or liability by reasons of anything done or omitted to be done by another party to this agreement, or any officer or employee thereof, in connection with any work, authority or jurisdiction delegated to another party under this agreement.

SECTION 8 - OPERATION AND MAINTENANCE COST ALLOCATION

The O&M costs will be allocated to NORSD, COUNTY, and SHAFTER annually on the following basis for each separate and identifiable facility, ie., sewer, treatment plant and disposal facilities.

FIXED COSTS - fixed costs are those costs not directly related to flow including, but not limited to:

1. Liability and property insurance
2. Repairs to project facilities
3. Replacement

It is probable that some part, or parts, of the project facilities will begin operation part way through a calendar year. In such an instance, an estimate will be made as to the "startup" date of the new facility and the "fixed costs" for the new facility allocated to

the entities (NORSD, COUNTY, or SHAFTER) that will own capacity in the new facility. The calculation will be based on the fraction of the calendar year the new facility will be in operation and the estimated "fixed costs" for that fraction of the fiscal year the new facility will be in operation.

Fixed costs shall be allocated to each party based on their capacity rights in each of the facilities.

With respect to the fixed costs for the NORRIS/SEVENTH STANDARD SEWER which are not specifically related to a particular "reach" (e.g. liability and property insurance and cost of annual audits), such fixed costs shall be allocated to each "reach" identified in Section 3 of this JPA based on the length of each "reach". The parties will bear the fixed costs for each "reach" based on the allocated capacity rights defined in Section 3 of this JPA.

VARIABLE COSTS - Variable costs are those directly related to flow including, but not limited to:

1. Power for operations (variable component)
2. Chemicals
3. Labor

Variable costs shall be allocated to each party based on their prorata share of the solids-weighted flow conveyed, treated, or disposed of, as applicable, by each of the several project facilities. Testing of each parties' flow shall be done to determine the percentage of solids to be disposed of and charged accordingly.

To facilitate O&M variable cost allocation among NORSD, COUNTY, and SHAFTER, there shall be three flow meters installed at any or all of the following locations (see Exhibit A):

1. At Jenkins Road on the NORRIS/SEVENTH STANDARD SEWER (Meter No. 1);
2. In the Shafter Sewer where it connects to the NORRIS/SEVENTH STANDARD SEWER (Meter No. 2);
3. At the headworks to the proposed wastewater treatment plant (Meter No. 3).

The flows upon which the O&M costs shall be allocated to NORSD, COUNTY, and SHAFTER shall be calculated as follows:

1. NORSD - the flow measured by Meter No. 1;
2. SHAFTER - the flow measured by Meter No. 2;
3. CSA 71 - the flow measured by Meter No. 3 less the sum of the flows measured by Meter Nos. 1 and 2. However, COUNTY shall have the option of submitting actual flow measurements

of CSA 71 flow for use by the TAC to calculate flow distribution.

It is the intent of the parties that the O&M costs be allocated based on the actual flows generated by the respective parties.

The total O&M cost to be paid by each party to this JPA shall be the sum of the fixed and variable O&M costs.

SECTION 9 - FINANCIAL ACCOUNTING

NORSD, as the "operating entity" (refer to Section 7), shall establish separate accounts for capital and O&M costs associated with the project facilities. The accounts and procedures followed in administering the accounts shall conform to the recommendations of the State of California's UNIFORM SYSTEM OF ACCOUNTS FOR WASTE DISPOSAL DISTRICTS.

Within six months after the end of NORSD's fiscal year, the financial accounts referred to in the preceding paragraph shall be audited by an accounting firm independent of and acceptable to each of the three parties to this JPA. The audit shall establish whether or not expenses and revenues have been properly allocated to each party and shall cover both capital expenditures, if any, and O&M costs. The

audit shall be submitted to the governing bodies of NORSD, COUNTY, and SHAFTER for acceptance and filing.

The cost of the annual audits shall be allocated amongst NORSD, COUNTY and SHAFTER as a "fixed cost" as described in Section 8.

SECTION 10 - TRANSFER OF RIGHTS AND RESPONSIBILITIES

Any party to this JPA may assign its rights and delegate its duties to another political entity. Such assignment and delegation shall be "in toto" only and the political entity to which the transfer is made shall be bound by this JPA in its entirety including any amendments thereto, and all policies, ordinances, rules, and regulations applicable to the facilities covered under this JPA. Where, because of annexation, only a portion of the service area of a Party herein is transferred to another political entity, that other political entity shall not thereupon become a Party to this JPA but, rather, shall achieve representation through the original political entity that is a signatory to this agreement.

SECTION 11 - SEWER USE MODEL ORDINANCE

The TAC shall develop a Sewer Use Model Ordinance, hereinafter called ORDINANCE, for adoption by each party's "governing body". Following approval by the governing bodies of NORSD, COUNTY, and SHAFTER, of separate sewer ordinances which meet or exceed the requirements of

the ORDINANCE, the conditions within the ORDINANCE shall be applied to all dischargers whose wastewater flows into the project facilities. The ORDINANCE shall establish acceptable discharge standards and appropriate surcharges for the commercial/industrial users and any other items as are customarily included in such ordinances.

After adoption, the ORDINANCE may only be modified with unanimous consent of the parties to this JPA.

SECTION 12 - NON-PROJECT FACILITIES

NORSD, COUNTY, and SHAFTER shall each separately operate and maintain their sewerage facilities which connect to but are not a part of the PROJECT FACILITIES. However, this requirement shall not prevent by separate agreement one or more of the parties to this JPA from contracting for maintenance and operation of their separate facilities.

SECTION 13 - LIQUIDATION, EXPANSION, AND REPLACEMENT OF PROJECT FACILITIES:

If any portion of the PROJECT FACILITIES is sold, the revenues from such sale shall be distributed to the parties to this JPA in proportion to each Party's share of the capacity of the facility

sold. For purposes of this Section, COUNTY shall be considered to have a share of capacity and capacity rights in the facility for any such capacity for which COUNTY has paid through direct payment, connection fees or other means.

If PROJECT FACILITIES are expanded, the capital cost of such expansion shall be borne by the entities which will own capacity in the expansion in proportion to each entities' capacity rights in the expansion.

If any PROJECT FACILITY is replaced or bettered, the capital cost of such replacement or betterment shall be borne by the parties to this JPA in proportion to each entities' capacity right in the facility replaced or bettered. The residual value of the replaced or bettered facility to each entity shall be mutually agreed to and proportionately applied to the capital cost of said replacement or betterment. Residual value shall include but not be limited to the remaining useful life of said facility.

SECTION 14 - DEPRECIATION OF PROJECT FACILITIES

Depreciation of fixed assets is a recognized and legitimate O&M expense and shall be included in the preparation of the annual O&M budget. However, because of the varying requirements of the Parties, depreciation and any construction reserve fund shall be the responsibility of each individual Party and not of the JPA.

SECTION 15 - SETTLEMENT OF DISAGREEMENTS:

Any disagreements resulting from this agreement shall be submitted to nonbinding advisory arbitration pursuant to the rules of the American Arbitration Association.

SECTION 16 - SEVERABILITY:

If any section, subsection, sentence, clause, phrase or word of this agreement, or the application thereof, to any party, or to any other person or circumstance, is for any reason held invalid, it shall be deemed severable and the validity of the remainder of the agreement or the application of such provision to the other party, parties, or to any other persons or circumstance shall not be affected thereby. Each Party hereby declares that it would have entered into this agreement and each section, subsection, sentence, clause, phrase and work thereof irrespective of the fact that one or more section, subsection, sentence, clause, phrase or word, or the application

thereof to either or several Parties or any other person or circumstance be, is or was held invalid.

SECTION 17 - AMENDMENTS AND SUPPLEMENTS:

This contract is an integrated agreement containing the entire agreement between these contracting parties. This agreement may only be modified, amended, rescinded, terminated, or supplemented by a duly executed written agreement which is authorized by the governing bodies of the respective Parties hereto.

This JPA shall continue in effect until it is rescinded or terminated by the parties hereto.

SECTION 18 - NOTICES:

Any notices to be given by either party to the other may be effected either by personal delivery in writing to the addresses noted below or by mail, registered or certified, postage pre-paid with return receipt requested, to the addresses noted below. Each party may change addresses only by written notice in accordance with this section. Notices delivered personally shall be deemed communicated as of the day of actual receipt; mailed notices shall be deemed communicated as of the day of mailing.

NORSD:	5001 Olive Dr.	SHAFTER:	320 James	COUNTY:	2700 M Suit 500
	Bakersfield		Shafter		Bakersfield
	93308		93263		93301

SECTION 19 - ATTORNEYS FEES AND COSTS:

IF any action at law or in equity is necessary to enforce or interpret the terms of this agreement, or if the arbitration provisions of this agreement noted above are invoked, the prevailing party shall be entitled to reasonable attorneys fees, costs, and necessary disbursements in addition to any other relief to which that party may be entitled. This provision shall be construed as applicable to this entire agreement.

SECTION 20 - PARTIAL INVALIDITY:

If any provision of this agreement is held by a court of competent jurisdiction or by an arbitrator to be invalid, void, or unenforceable, the remaining provisions shall nevertheless continue in full force without being impaired or invalidated in any way. This agreement shall be interpreted according to the laws of the State of California.

IN WITNESS THEREOF, the parties to this JPA have executed this agreement on _____, 1990.

CITY OF SHAFTER:

APPROVED AS TO FORM:

By John Brown S/S

City Attorney

APPROVED AS TO CONTENT:

By _____
John D. Guinn
Public Works Director

By _____
Cathy L. Prout
Mayor

COUNTY OF KERN:

APPROVED AS TO FORM:

By _____

Deputy-County Counsel

APPROVED AS TO CONTENT:

By _____

Director of Public Works

By _____

Chairman Board of Supervisors

NORTH OF RIVER SANITARY DISTRICT:

APPROVED AS TO FORM:

By _____

District's Attorney

APPROVED AS TO CONTENT:

By _____

General Manager

By _____

President

APPENDIX D

HYDRAULIC MODELING

Appendix D

Hydraulic Modeling

This appendix contains information intended to document the hydraulic model flow allocation, and the output results of the existing and future modeled system.

Table 1 of this appendix documents the flows and land uses that were assigned in the hydraulic model, and is organized by sewer subbasin. The sewer flows were developed by applying the land use coefficients documented in the criteria table to the respective land use classifications contained in each subbasin as summarized on Table 1. The flows summarized on Table 1 were allocated to the manholes in the range indicated. Please note that the allocation for each subbasin were distributed to specific manholes within that range based on geographical proximity, which included engineer's judgement.

Additionally, this appendix contains Tables 2-21 as follows:

- Manhole loading (input files)
- Pipe analysis summary (output files)

The following organization was used for Tables 2-21 and include NORSD and City of Bakersfield sewer trunks:

- NORSD Area A Trunk
- NORSD Area B Trunk
- City of Bakersfield Area Allen Road Trunk
- City of Bakersfield Area Brimhall-Mohawk Trunk
- City of Bakersfield Area Buena Vista Trunk
- City of Bakersfield Area El Toro Viejo Trunk
- City of Bakersfield Area Stockdale-Nord Trunk

Finally, the appendix documents the peak and average flows (Table 22) at the terminus of the hydraulic modeling extents. These locations were along the trunk systems, and are found at the CSA-71 boundaries with NORSD and the City of Bakersfield.

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range	
				Upstream	Downstream
1	HMR	66.3	0.259	MH-25	MH-15
1	LMR	176.9	0.396		
1	GC	19.9	0.034		
1	R-IA	4.3	0.000		
1	LR	102.7	0.209		
1	SR	162.8	0.182		
1	PS	65.8	0.110		
2	COM	57.0	0.096	MH-357	MH-341
2	IND	7.8	0.003		
2	P	0.2	0.000		
2	MSI	141.4	0.056		
3	HR	38.3	0.249	3	1
4	SR	157.7	0.177	MH-1124	MH-B57
4	GC	2.5	0.004		
4	LMR	150.9	0.338		
4	R-IA	169.2	0.000		
4	UER	258.9	0.145		
4	RR	40.3	0.005		
4	ER	114.0	0.032		
4	SI	6.0	0.010		
7	LR	47.9	0.097	4	1
9	MSI	220.0	0.088	MH-365	MH-364
10	LR	25.3	0.051	MH-483	MH-411
10	SR	21.8	0.024		
10	LMR	64.0	0.143		
10	MUC	0.2	0.000		
10	MC	51.0	0.086		
10	P	2.4	0.004		
10	GC	17.6	0.030		
10	PS	21.8	0.037		
10	OC	4.4	0.007		
12	MSI	407.7	0.162	MH-1300	MH-358
12	LR	47.3	0.096		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
12	LMR	62.4	0.140		
12	SR	73.7	0.083		
12	GC	6.1	0.010		
12	HMR	12.1	0.047		
12	LI	0.4	0.001		
12	OS-P	0.4	0.000		
13	MSI	249.2	0.099	MH-362	MH-361
15	GC	34.1	0.057	MH-461	MH-432
15	HMR	38.1	0.149		
15	LI	17.3	0.029		
15	OS-P	8.9	0.000		
15	PS	12.0	0.020		
15	LR	24.2	0.049		
15	OC	0.0	0.000		
15	MSI	0.4	0.000		
16	LR	69.2	0.141	MH-103	MH-102
16	GC	7.6	0.013		
17	UER	82.8	0.046	MH-152	MH-149
17	ER	0.6	0.000		
17	GC	38.7	0.065		
17	SR	90.5	0.101		
17	LR	81.6	0.166		
17	OS	0.0	0.000		
17	LMR	11.0	0.025		
17	HMR	0.0	0.000		
17	HR	0.3	0.002		
19	LR	2.1	0.004	MH-411	MH-315
19	P	134.1	0.225		
19	SI	1.3	0.002		
19	MUC	126.8	0.213		
19	MSI	1.9	0.001		
19	HMR	3.5	0.014		
22	MSI	616.7	0.245	MH-341	MH-325B

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
24	ER	222.0	0.062	MH-1028	MH-1324
24	SR	76.4	0.086		
24	UER	1.5	0.001		
24	R-MP	20.2	0.000		
24	RR	294.3	0.033		
25	MSI	70.6	0.028	MH-364	MH-363
25	HC	27.9	0.047		
26	PS	46.0	0.077	MH-429	MH-426
26	OS-P	25.2	0.000		
26	GC	13.2	0.022		
27	MSI	206.3	0.082	MH-358	MH-321
27	GC	66.9	0.112		
27	P	4.2	0.007		
27	MUC	1.6	0.003		
28	MSI	63.4	0.025	MH-360	MH-360
29	LMR	11.2	0.025		
29	OC	8.0	0.013		
29	HMR	28.2	0.110		
30	SR	292.9	0.328	MH-51	MH-37
30	GC	0.7	0.001		
30	LMR/LR	14.3	0.032		
30	OS-P	1.0	0.000		
30	PS	1.1	0.002		
31	MC	0.0	0.000	MH-1302	MH-358
31	MUC	1.7	0.003		
31	MSI	203.5	0.081		
31	GC	0.4	0.001		
32	SI	67.8	0.114	MH-1090	MH-1074
32	SR	218.9	0.245		
32	UER	244.6	0.137		
32	LI	34.2	0.057		
32	OC	4.3	0.007		
32	ER	57.4	0.016		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
32	RR	192.3	0.022		
32	GC	19.8	0.033		
32	LMR	13.4	0.030		
32	P	10.4	0.017		
32	OS-P	8.0	0.000		
33	UER	72.7	0.041	MH-1050	MH-1052
33	SR	131.3	0.147		
34	HMR	7.6	0.030	MH-284	MH-222
34	SR	191.8	0.215		
35	GC	30.0	0.050	MH-1292	MH-1436
35	ER	58.4	0.016		
35	HMR	16.0	0.062		
35	LMR/LR	42.3	0.095		
35	SR	91.4	0.102		
35	OS-P	10.1	0.000		
35	PS	9.5	0.016		
35	LR	48.3	0.098		
35	OC	0.5	0.001		
35	SI	18.4	0.031		
36	MSI	43.7	0.017	MH-320	MH-310
36	LR	206.6	0.420		
36	OS-P	11.3	0.000		
36	HR	9.6	0.062		
36	GC	51.8	0.087		
36	LMR	15.7	0.035		
36	ER	6.9	0.002		
36	LI	8.7	0.015		
36	MUC	4.9	0.008		
36	HMR	18.1	0.071		
37	LR	2.7	0.005	MH-310	MH-218A
37	OS-P	0.5	0.000		
37	ER	0.0	0.000		
37	LMR	13.0	0.029		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
37	SR	113.9	0.128		
37	GC	9.2	0.015		
37	OC	8.9	0.015		
38	GC	11.2	0.019	MH-221	MH-149
38	UER	118.5	0.066		
38	OS	40.6	0.000		
38	SR	145.7	0.163		
38	LR	304.6	0.619		
38	OS-P	1.1	0.000		
38	PS	47.8	0.080		
38	ER	8.7	0.002		
38	OC	22.1	0.037		
38	LMR	0.0	0.000		
39	ER	0.1	0.000	MH-1016	MH-1452
39	RR	0.0	0.000		
39	GC	6.7	0.011		
39	SR	223.9	0.251		
40	SR	46.3	0.052	MH-423	MH-411
40	LMR	36.8	0.082		
40	MC	3.3	0.005		
40	MUC	63.6	0.107		
40	GC	12.0	0.020		
41	UER	190.7	0.107	MH-148A	MH-147
41	LI	64.7	0.109		
41	OC	1.6	0.003		
41	ER	0.7	0.000		
41	HMR	5.9	0.023		
41	SR	23.9	0.027		
41	GC	17.3	0.029		
41	LMR	2.2	0.005		
42	LR	203.7	0.414	MH-478	MH-432
42	SR	406.5	0.455		
42	OS-P	5.0	0.000		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
42	GC	15.9	0.027		
42	P	28.3	0.048		
42	PS	10.7	0.018		
42	HMR	12.2	0.048		
43	LR	267.7	0.544	MH-310	MH-206
43	OS-P	18.9	0.000		
43	LMR	47.8	0.107		
43	GC	2.7	0.004		
44	UER	210.5	0.118	MH-147	MH-120
44	HMR	0.6	0.002		
44	GC	19.9	0.033		
44	PS	38.4	0.065		
44	ER	60.1	0.017		
44	SR	0.2	0.000		
45	HMR	32.4	0.127	MH-499	MH-429
45	LMR	41.2	0.092		
45	LR	208.0	0.423		
45	SR	90.7	0.102		
45	OS-P	148.2	0.000		
45	PS	8.7	0.015		
45	GC	22.6	0.038		
45	ER	14.1	0.004		
46	LR	245.4	0.499	MH-275	MH-264
46	LMR	31.2	0.070		
46	GC	33.9	0.057		
46	OS-P	79.3	0.000		
46	OC	6.4	0.011		
47	SR	57.8	0.065	MH-1040	MH-1038
47	UER	93.2	0.052		
47	RR	3.7	0.000		
48	SR	334.7	0.375	MH-507	MH-499
48	PS	17.1	0.029		
48	OS-P	7.1	0.000		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Manhole Allocation Range Downstream
48	GC	39.6	0.067		
48	HMR	18.5	0.072		
48	LR	31.6	0.064		
49	RR	62.1	0.007	MH-176	MH-174
49	UER	119.3	0.067		
49	ER	205.4	0.058		
49	SR	42.6	0.048		
49	OS	0.9	0.000		
49	LR	39.9	0.081		
49	GC	0.0	0.000		
50	HR	51.4	0.334	5	6
51	NJ	0.4	0.000	MH-241	MH-230
51	PS	0.3	0.000		
51	SR	338.3	0.379		
51	HMR	4.0	0.016		
51	GC	85.1	0.143		
51	LMR/LR	8.6	0.019		
51	LR	46.2	0.094		
51	LMR	11.4	0.025		
51	LI	16.2	0.027		
51	OC	6.6	0.011		
52	RR	36.2	0.004	MH-1272	MH-65
52	GC	136.6	0.229		
52	LMR	41.5	0.093		
52	R-IA	58.9	0.000		
52	LR	188.2	0.383		
52	SR	303.4	0.340		
52	ER	34.3	0.010		
53	GC	50.6	0.085	MH-1412	MH-A44
53	LMR	37.4	0.084		
53	SR	285.5	0.320		
53	RR	66.1	0.007		
53	LR	118.3	0.241		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Manhole Allocation Range Downstream
53	R-IA	44.8	0.000		
54	LR	184.0	0.374	MH-1268	MH-1288
54	SI	199.3	0.335		
54	GC	79.3	0.133		
55	LR	120.3	0.245	MH-37	MH-28
55	SR	250.9	0.281		
55	PS	13.7	0.023		
55	OS-P	6.8	0.000		
55	R-IA	68.4	0.000		
55	ER	1.6	0.000		
56	R-IA	139.1	0.000	MH-252	MH-243
56	GC	14.0	0.024		
56	RR	20.2	0.002		
56	LI	0.3	0.000		
56	HI	75.5	0.127		
56	SR	1.3	0.001		
56	HMR	34.8	0.136		
56	LR	388.5	0.790		
56	OS-P	38.3	0.000		
56	PS	21.4	0.036		
56	LMR	14.4	0.032		
57	UER	20.7	0.012	MH-1486	MH-1054
57	GC	26.1	0.044		
57	HMR	47.2	0.184		
57	SR	102.9	0.115		
57	LMR	0.0	0.000		
58	SR	241.9	0.271	MH-132	MH-115
58	RR	73.1	0.008		
58	OS	2.4	0.000		
58	ER	4.5	0.001		
58	OS-P	9.2	0.000		
58	PS	9.1	0.015		
58	UER	78.0	0.044		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
58	GC	14.6	0.025		
59	LMR	33.0	0.074	MH-1414	MH-1432
59	SR	346.6	0.388		
59	GC	29.0	0.049		
59	RR	48.5	0.005		
59	R-MP	175.8	0.000		
60	HMR	70.4	0.275	MH-28	MH-15
60	LMR	247.7	0.555		
60	GC	11.4	0.019		
60	R-IA	158.0	0.000		
60	SR	35.9	0.040		
60	LR	284.2	0.578		
60	PS	19.1	0.032		
61	LI	1.7	0.003	MH-1410	MH-1276
61	GC	0.9	0.001		
61	HMR	41.6	0.162		
61	LMR	574.2	1.286		
62	R-IA	154.7	0.000	MH-1256	MH-1458
62	SR	618.9	0.693		
62	LMR	693.6	1.554		
62	GC	17.2	0.029		
62	HMR	33.5	0.131		
62	R-MP	9.8	0.000		
63	LR	353.5	0.719	MH-254B	MH-243
63	SR	2.0	0.002		
63	PS	9.4	0.016		
63	OS-P	10.4	0.000		
63	HMR	0.1	0.000		
63	GC	11.7	0.020		
64	RR	0.1	0.000	MH-152	MH-10
64	LMR	7.6	0.017		
64	HMR	22.7	0.089		
64	SI	261.7	0.440		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
64	LI	446.7	0.750		
64	GC	25.2	0.042		
65	UER	56.1	0.031	MH-1066	MH-1034
65	HMR	5.9	0.023		
65	SR	10.4	0.012		
65	RR	9.3	0.001		
66	SR	149.1	0.167	MH-1254	MH-1230
66	LMR	305.6	0.684		
66	R-MP	2.9	0.000		
66	R-IA	155.3	0.000		
66	ER	169.6	0.047		
67	R-IA	39.1	0.000	MH-10	MH-5
67	RR	3.7	0.000		
67	SR	468.2	0.524		
67	LMR	188.6	0.423		
67	HMR	31.6	0.123		
68	UER	289.1	0.162	MH-1416	MH-165
68	GC	39.3	0.066		
68	ER	483.2	0.135		
68	RR	234.0	0.026		
68	SR	0.0	0.000		
69	LR	20.4	0.041		
70	ER	1.0	0.000	MH-1002	MH-181
70	RR	0.5	0.000		
70	SR	105.6	0.118		
71	R-IA	153.2	0.000	MH-1094	MH-60
71	OS	5.1	0.000		
71	SI	0.3	0.001		
71	SR	117.4	0.132		
71	GC	0.3	0.000		
71	LMR	3.7	0.008		
72	HI	152.1	0.256	MH-1268	MH-3
72	SI	153.1	0.257		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range Upstream	Downstream
72	R-IA	631.1	0.000		
72	ER	62.7	0.018		
72	LR	591.0	1.201		
72	LMR	50.5	0.113		
72	MC	10.7	0.018		
72	PS	0.0	0.000		
72	RR	19.7	0.002		
73	LMR	320.6	0.718	MH-B57	MH-13
73	HMR	102.3	0.399		
73	GC	209.0	0.351		
73	OC	106.9	0.180		
73	R-IA	610.0	0.000		
74	LI	1.3	0.002	MH-242	MH-230
74	SI	3.7	0.006		
74	SR	201.7	0.226		
74	NJ	9.9	0.000		
74	PS	9.6	0.016		
74	HMR	31.2	0.122		
74	LMR	14.3	0.032		
74	UER	0.1	0.000		
74	OS-P	0.1	0.000		
75	LMR	138.7	0.311	MH-1264	MH-1252
75	R-IA	429.9	0.000		
75	GC	20.1	0.034		
75	SR	242.9	0.272		
75	RR	41.5	0.005		
75	ER	187.8	0.053		
75	R-MP	181.4	0.000		
75	UER	0.3	0.000		
76	LR	5.1	0.010	MH-1192	MH-1192
76	GC	0.0	0.000		
76	HMR	0.2	0.001		
76	HR	0.0	0.000		

Table 1 Flow and Land Use Summary, by Subbasin

Subbasin	Land Use Designation	Area (ac)	Average Flow (mgd)	Manhole Allocation Range	
				Upstream	Downstream
77	GC	5.7	0.010	8	MH-1192
77	HMR	23.3	0.091		
77	HR	1.7	0.011		
78	OC	40.2	0.068	15	17
79	R-IA	2.1	0.000		
79	SR	4.2	0.005		
79	LMR	0.0	0.000		
79	R-MP	9.5	0.000		
79	ER	367.3	0.103		
80	R-MP	3.1	0.000	7	6
80	LR	74.3	0.151		
81	GC	10.7	0.018	16	18
82	OC	5.3	0.009		
82	LMR	45.8	0.103		
82	GC	10.4	0.018		
83	R-IA	0.0	0.000	14	12
83	LR	134.0	0.272		
83	R-MP	4.2	0.000		
84	SR	55.1	0.062	MH-1196	MH-1196
84	UER	88.4	0.050		
84	GC	19.6	0.033		
84	P	8.2	0.014		
85	SR	121.6	0.136	MH-1320	MH-1312
86	RR	99.2	0.011	MH-165	MH-1334
87	RR	149.6	0.017	MH-1334	MH-1324

Table 2 Manhole Loading - Area A Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-55	0.14	0.26
MH-47	0.06	0.11
MH-A44	0.48	0.87
MH-39	0.00	0.00
MH-56	0.00	0.00
MH-48	0.00	0.00
MH-65	0.27	0.48
MH-57[1]	7.29	13.13
MH-49	0.03	0.06
MH-A8	0.14	0.25
MH-58	0.00	0.00
MH-59	0.00	0.00
MH-10	0.31	0.55
MH-20	0.19	0.34
MH-12	0.00	0.00
MH-A57	0.06	0.10
MH-21	0.58	1.04
MH-13	0.54	0.97
MH-40	0.06	0.11
MH-22	0.00	0.00
MH-14	0.27	0.48
MH-41	0.00	0.00
MH-23	0.38	0.69
MH-50	0.00	0.00
MH-15	0.00	0.00
MH-51	0.03	0.06
MH-16	0.38	0.69
MH-33	0.33	0.59
MH-60	0.05	0.09
MH-25	0.19	0.34
MH-42	0.00	0.00
MH-52	0.00	0.00
MH-17	0.00	0.00
MH-A1	0.55	0.99

Table 2 Manhole Loading - Area A Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-34	0.00	0.00
MH-61	0.02	0.04
MH-43	0.06	0.11
MH-53	0.16	0.29
MH-18	0.00	0.00
MH-A2	0.55	0.99
MH-35	0.00	0.00
MH-62	0.02	0.04
MH-44	0.00	0.00
MH-36	0.11	0.20
MH-63	0.00	0.00
MH-28	0.40	0.72
MH-45	0.15	0.26
MH-A4	0.14	0.25
MH-37	0.06	0.11
MH-54	0.14	0.26
MH-19	0.58	1.04
MH-64	0.00	0.00
MH-46	0.08	0.15
MH-38	0.00	0.00
MH-B57	0.14	0.26
MH-B59	0.07	0.13
MH-1094	0.02	0.04
MH-1096	0.02	0.04
MH-1098	0.03	0.06
MH-1100	0.00	0.00
MH-1108	0.07	0.13
MH-1110	0.07	0.13
MH-1112	0.07	0.13
MH-1114	0.07	0.13
MH-1118	0.00	0.00
MH-1120	0.00	0.00
MH-1122	0.07	0.13
MH-1124	0.07	0.13

Table 2 Manhole Loading - Area A Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-1130	0.20	0.36
MH-1132	0.28	0.50
MH-1142	0.03	0.06
MH-1144	0.03	0.06
MH-1146	0.00	0.00
MH-1288	0.34	0.61
MH-1348	0.38	0.68
MH-1406	0.20	0.36
MH-1408	0.00	0.00
MH-1426	0.00	0.00
MH-1428	0.03	0.06
MH-1430	0.00	0.00
MH-1268	0.33	0.59
MH-1270	0.92	1.65
MH-1272	0.58	1.04
MH-1274	0.29	0.52
MH-1278	0.13	0.23
MH-1282	0.14	0.25
MH-1298	0.36	0.65
MH-1404	0.25	0.45
MH-1410	0.63	1.13
MH-1418	0.29	0.52
MH-1432	0.00	0.00

Note:

1. Loading based on City of Oildale buildout ESFDUs as extracted from "2013 North of River Sanitary District No. 1 Master Sewer Plan"

Table 3 Pipe Flows - Area A Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-B59	MH-B59	MH-B57	Existing	15	0.0010	2,650	0.013	0.50	0.90	1.35	0.53	0.74	0.42	0.59
P-1108	MH-B57	MH-A4	Existing	18	0.0008	2,640	0.013	0.64	1.15	1.97	0.59	0.82	0.39	0.55
P-A4	MH-A4	MH-1132	Existing	21	0.0006	2,653	0.013	0.91	1.64	2.62	0.71	1.01	0.41	0.58
P-1110	MH-1132	MH-A2	Existing	24	0.0007	2,644	0.013	1.19	2.14	3.89	0.76	1.06	0.38	0.53
P-A2	MH-A2	MH-A1	Existing	30	0.0005	2,663	0.013	1.74	3.13	5.69	0.95	1.32	0.38	0.53
P-A1	MH-A1	MH-13	Existing	30	0.0004	2,528	0.013	2.29	4.12	5.37	1.14	1.64	0.46	0.66
P-A8	MH-A8	MH-A4	Existing	15	0.0023	2,581	0.013	0.14	0.25	1.99	0.22	0.30	0.18	0.24
P-A44	MH-A44	MH-23	Existing	18	0.0012	2,639	0.013	0.48	0.87	2.36	0.46	0.63	0.31	0.42
P-A57	MH-A57	MH-65	Existing	12	0.0022	2,692	0.013	0.06	0.10	1.07	0.15	0.21	0.15	0.21
P-64	MH-65	MH-64	Existing	21	0.0012	1,387	0.013	0.52	0.94	4.21	0.42	0.56	0.24	0.32
P-63	MH-64	MH-63	Existing	21	0.0012	752	0.013	0.52	0.94	4.20	0.42	0.56	0.24	0.32
P-62	MH-63	MH-33	Existing	21	0.0012	534	0.013	0.52	0.94	4.20	0.42	0.56	0.24	0.32
P-61	MH-62	MH-61	Existing	15	0.0024	1,401	0.013	0.09	0.15	2.04	0.17	0.23	0.14	0.19
P-60	MH-61	MH-60	Existing	15	0.0012	2,325	0.013	0.11	0.19	1.42	0.23	0.31	0.19	0.25
P-59	MH-60	MH-59	Existing	18	0.0008	1,773	0.013	0.16	0.28	1.95	0.29	0.38	0.19	0.26
P-58	MH-59	MH-58	Existing	18	0.0008	1,780	0.013	0.16	0.28	1.95	0.29	0.38	0.19	0.26
P-57	MH-58	MH-15	Existing	18	0.0008	462	0.013	0.16	0.28	1.90	0.29	0.39	0.19	0.26
P-56	MH-57	MH-56	Existing	21	0.0522	128	0.013	7.29	13.13	23.46	0.67	0.94	0.38	0.54
P-55	MH-56	MH-55	Existing	33	0.0012	1,056	0.013	7.29	13.13	11.89	1.56	2.75	0.57	1.00
P-54	MH-55	MH-54	Existing	33	0.0012	1,168	0.013	7.44	13.39	11.87	1.58	2.75	0.57	1.00
P-53	MH-54	MH-53	Existing	33	0.0012	696	0.013	7.58	13.64	11.83	1.60	2.75	0.58	1.00
P-52	MH-53	MH-52	Existing	33	0.0012	1,104	0.013	7.74	13.93	11.85	1.62	2.75	0.59	1.00
P-51	MH-52	MH-51	Existing	33	0.0012	588	0.013	7.74	13.93	11.91	1.62	2.75	0.59	1.00
P-50	MH-51	MH-50	Existing	33	0.0024	668	0.013	7.77	13.98	16.61	1.32	1.93	0.48	0.70
P-49	MH-50	MH-49	Existing	33	0.0023	592	0.013	7.77	13.98	16.49	1.33	1.95	0.48	0.71
P-48	MH-49	MH-48	Existing	33	0.0023	371	0.013	7.80	14.04	16.41	1.34	1.96	0.49	0.71
P-47	MH-48	MH-47	Existing	33	0.0023	653	0.013	7.80	14.04	16.48	1.33	1.95	0.48	0.71
P-46	MH-47	MH-46	Existing	33	0.0023	604	0.013	7.86	14.15	16.38	1.34	1.97	0.49	0.72
P-45	MH-46	MH-45	Existing	33	0.0023	1,077	0.013	7.95	14.30	16.45	1.35	1.98	0.49	0.72
P-44	MH-45	MH-44	Existing	33	0.0028	326	0.013	8.09	14.56	18.11	1.29	1.87	0.47	0.68
P-43	MH-44	MH-43	Existing	33	0.0028	1,187	0.013	8.09	14.56	18.15	1.29	1.86	0.47	0.68
P-42	MH-43	MH-42	Existing	33	0.0012	1,069	0.013	8.15	14.67	11.67	1.69	2.75	0.62	1.00
P-41	MH-42	MH-41	Existing	33	0.0034	522	0.013	8.15	14.67	19.85	1.23	1.76	0.45	0.64

Table 3 Pipe Flows - Area A Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-40	MH-41	MH-40	Existing	33	0.0056	531	0.013	8.15	14.67	25.59	1.07	1.49	0.39	0.54
P-39	MH-40	MH-39	Existing	33	0.0027	530	0.013	8.21	14.78	17.93	1.31	1.90	0.48	0.69
P-38	MH-39	MH-38	Existing	33	0.0030	1,037	0.013	8.21	14.78	18.92	1.27	1.83	0.46	0.67
P-37	MH-38	MH-37	Existing	36	0.0025	24	0.013	8.21	14.78	21.62	1.28	1.82	0.43	0.61
P-36	MH-37	MH-36	Existing	36	0.0023	1,202	0.013	8.99	16.18	20.71	1.38	2.00	0.46	0.67
P-35	MH-36	MH-35	Existing	36	0.0023	2,390	0.013	9.10	16.38	20.77	1.39	2.01	0.46	0.67
P-34	MH-35	MH-34	Existing	36	0.0023	592	0.013	9.10	16.38	20.87	1.39	2.00	0.46	0.67
P-33	MH-34	MH-33	Existing	36	0.0023	1,158	0.013	9.10	16.38	20.68	1.39	2.02	0.46	0.67
P-32	MH-33	MH-32	Existing	36	0.0023	590	0.013	9.95	17.91	20.68	1.47	2.16	0.49	0.72
P-31	MH-32	MH-31	Existing	36	0.0023	602	0.013	9.95	17.91	20.70	1.47	2.16	0.49	0.72
P-30	MH-31	MH-30	Existing	36	0.0023	822	0.013	9.95	17.91	20.78	1.46	2.15	0.49	0.72
P-29	MH-30	MH-29	Existing	36	0.0234	164	0.013	9.95	17.91	66.16	0.79	1.07	0.26	0.36
P-28	MH-29	MH-28	Existing	36	0.0025	483	0.013	9.95	17.91	21.80	1.42	2.07	0.47	0.69
P-27	MH-28	MH-27	Existing	36	0.0021	584	0.013	10.35	18.63	19.59	1.55	2.34	0.52	0.78
P-26	MH-27	MH-26	Existing	36	0.0019	246	0.013	10.35	18.63	18.69	1.60	2.45	0.53	0.82
P-25	MH-26	MH-25	Existing	36	0.0020	1,903	0.013	10.35	18.63	19.32	1.56	2.37	0.52	0.79
P-24	MH-25	MH-24	Existing	36	0.0023	612	0.013	10.54	18.97	20.53	1.52	2.28	0.51	0.76
P-23	MH-24	MH-23	Existing	36	0.0020	2,028	0.013	10.54	18.97	19.53	1.57	2.39	0.52	0.80
P-22	MH-23	MH-22	Existing	36	0.0026	2,163	0.013	11.60	20.88	21.84	1.56	2.35	0.52	0.78
P-21	MH-22	MH-21	Existing	36	0.0023	503	0.013	11.60	20.88	20.85	1.60	3.00	0.53	1.00
P-20	MH-21	MH-20	Existing	36	0.0024	2,633	0.013	12.18	21.92	21.16	1.63	3.00	0.54	1.00
P-19	MH-20	MH-19	Existing	36	0.0022	2,633	0.013	12.37	22.26	20.25	1.69	3.00	0.56	1.00
P-18	MH-19	MH-18	Existing	36	0.0051	379	0.013	12.95	23.30	36.55	1.23	1.74	0.41	0.58
P-17	MH-18	MH-17	Existing	42	0.0009	1,460	0.013	12.95	23.30	23.17	1.87	3.50	0.53	1.00
P-16	MH-17	MH-16	Existing	42	0.0009	728	0.013	12.95	23.30	22.67	1.90	3.50	0.54	1.00
P-15	MH-16	MH-15	Existing	42	0.0048	255	0.013	13.33	23.99	53.54	1.19	1.64	0.34	0.47
P-14	MH-15	MH-14	Existing	42	0.0008	3,718	0.013	13.48	24.27	18.34	2.23	3.50	0.64	1.00
P-13	MH-14	MH-13	Existing	42	0.0008	3,631	0.013	13.75	24.75	18.55	2.24	3.50	0.64	1.00
P-12	MH-13	MH-12	Existing	42	0.0008	2,464	0.013	16.57	29.83	18.39	2.60	3.50	0.74	1.00
P-11	MH-12	MH-11	Existing	42	0.0009	1,211	0.013	16.57	29.83	19.74	2.46	3.50	0.70	1.00
P-10	MH-11	MH-10	Existing	42	0.0009	199	0.013	16.57	29.83	19.63	2.47	3.50	0.71	1.00
P-1124	MH-1144	MH-1146	Existing	8	0.0024	802	0.013	0.03	0.06	0.38	0.13	0.17	0.19	0.26
P-1122	MH-1146	MH-1430	Existing	12	0.0014	458	0.013	0.03	0.06	0.86	0.13	0.17	0.13	0.17

Table 3 Pipe Flows - Area A Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1670	MH-1430	MH-1142	Existing	12	0.0014	1,047	0.013	0.03	0.06	0.87	0.13	0.17	0.13	0.17
P-1120	MH-1142	MH-62	Existing	15	0.0000	1,374	0.013	0.06	0.11	0.13	0.60	0.88	0.48	0.70
P-1624	MH-1408	MH-65	Existing	21	0.0008	2,592	0.013	0.00	0.00	2.90	0.00	0.00	0.00	0.00
P-1616	MH-1406	MH-65	Existing	27	0.0008	6,623	0.013	0.20	0.36	5.68	0.29	0.38	0.13	0.17
P-1618	MH-1272	MH-1406	Existing	15	0.0013	1,346	0.013	0.58	1.04	1.78	0.49	0.69	0.39	0.55
P-1436	MH-1288	MH-37	Existing	18	0.0018	1,961	0.013	0.34	0.61	3.37	0.32	0.43	0.21	0.29
P-1102	MH-1130	MH-23	Existing	12	0.0024	1,369	0.013	0.20	0.36	1.12	0.29	0.39	0.29	0.39
P-1096	MH-1122	MH-1118	Existing	15	0.0009	1,214	0.013	0.07	0.13	1.25	0.20	0.27	0.16	0.22
P-1098	MH-1124	MH-1120	Existing	15	0.0009	1,385	0.013	0.07	0.13	1.24	0.20	0.27	0.16	0.22
P-1094	MH-1120	MH-1118	Existing	15	0.0010	935	0.013	0.07	0.13	1.31	0.20	0.26	0.16	0.21
P-1092	MH-1118	MH-B59	Existing	15	0.0005	851	0.013	0.14	0.26	0.96	0.32	0.44	0.26	0.35
P-1090	MH-1114	MH-1112	Existing	8	0.0024	1,113	0.013	0.07	0.13	0.39	0.19	0.26	0.29	0.40
P-1088	MH-1108	MH-1110	Existing	8	0.0024	1,113	0.013	0.07	0.13	0.39	0.19	0.26	0.29	0.40
P-1106	MH-1110	MH-1112	Existing	15	0.0010	655	0.013	0.14	0.26	1.31	0.28	0.38	0.22	0.30
P-1104	MH-1112	MH-B59	Existing	15	0.0011	3,316	0.013	0.28	0.51	1.37	0.39	0.53	0.31	0.42

Table 4 Pipe Flows - Area A Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-B59	MH-B59	MH-B57	Existing	15	0.0010	2,650	0.013	0.50	0.90	1.35	0.53	0.74	0.42	0.59
P-1108	MH-B57	MH-A4	Existing	18	0.0008	2,640	0.013	0.64	1.15	1.97	0.59	0.82	0.39	0.55
P-A4	MH-A4	MH-1132	Existing	21	0.0006	2,653	0.013	0.91	1.64	2.62	0.71	1.01	0.41	0.58
P-1110	MH-1132	MH-A2	Existing	24	0.0007	2,644	0.013	1.19	2.14	3.89	0.76	1.06	0.38	0.53
P-A2	MH-A2	MH-A1	Existing	30	0.0005	2,663	0.013	1.74	3.13	5.69	0.95	1.32	0.38	0.53
P-A1	MH-A1	MH-13	Existing	30	0.0004	2,528	0.013	2.29	4.12	5.37	1.14	1.64	0.46	0.66
P-A8	MH-A8	MH-A4	Existing	15	0.0023	2,581	0.013	0.14	0.25	1.99	0.22	0.30	0.18	0.24
P-A44	MH-A44	MH-23	Existing	18	0.0012	2,639	0.013	1.22	2.20	2.36	0.77	1.15	0.51	0.76
P-A57	MH-A57	MH-65	Existing	12	0.0022	2,692	0.013	0.06	0.10	1.07	0.15	0.21	0.15	0.21
P-64	MH-65	MH-64	Existing	21	0.0012	1,387	0.013	2.02	3.63	4.21	0.85	1.25	0.49	0.72
P-63	MH-64	MH-63	Existing	21	0.0012	752	0.013	2.02	3.63	4.20	0.86	1.26	0.49	0.72
P-62	MH-63	MH-33	Existing	21	0.0012	534	0.013	2.02	3.63	4.20	0.86	1.26	0.49	0.72
P-61	MH-62	MH-61	Existing	15	0.0024	1,401	0.013	0.15	0.27	2.04	0.23	0.30	0.18	0.24
P-60	MH-61	MH-60	Existing	15	0.0012	2,325	0.013	0.22	0.39	1.42	0.33	0.45	0.26	0.36
P-59	MH-60	MH-59	Existing	18	0.0008	1,773	0.013	0.26	0.47	1.95	0.37	0.50	0.25	0.34
P-58	MH-59	MH-58	Existing	18	0.0008	1,780	0.013	0.26	0.47	1.95	0.37	0.50	0.25	0.34
P-57	MH-58	MH-15	Existing	18	0.0008	462	0.013	0.26	0.47	1.90	0.38	0.51	0.25	0.34
P-56	MH-57	MH-56	Existing	21	0.0522	128	0.013	7.29	13.13	23.46	0.67	0.94	0.38	0.54
P-55	MH-56	MH-55	Existing	33	0.0012	1,056	0.013	7.11	11.61	11.89	1.53	2.20	0.56	0.80
P-1560	MH-56	MH-55	Future	15	0.0011	1,118	0.011	0.18	1.52	1.64	0.28	0.95	0.23	0.76
P-54	MH-55	MH-54	Existing	33	0.0012	1,168	0.013	7.27	11.81	11.87	1.56	2.24	0.57	0.82
P-1544	MH-55	MH-54	Future	15	0.0012	1,212	0.011	0.17	1.58	1.70	0.27	0.95	0.21	0.76
P-53	MH-54	MH-53	Existing	33	0.0012	696	0.013	7.34	11.67	11.83	1.57	2.22	0.57	0.81
P-1546	MH-54	MH-53	Future	18	0.0011	731	0.011	0.24	1.97	2.66	0.31	0.96	0.21	0.64
P-52	MH-53	MH-52	Existing	33	0.0012	1,104	0.013	7.49	11.69	11.85	1.59	2.22	0.58	0.81
P-1550	MH-53	MH-52	Future	21	0.0011	1,135	0.011	0.25	2.24	4.03	0.30	0.93	0.17	0.53
P-51	MH-52	MH-51	Existing	33	0.0012	588	0.013	7.44	11.63	11.91	1.57	2.20	0.57	0.80
P-1548	MH-52	MH-51	Future	21	0.0011	625	0.011	0.30	2.30	4.03	0.32	0.95	0.19	0.54
P-50	MH-51	MH-50	Existing	33	0.0024	668	0.013	7.77	13.98	16.61	1.32	1.93	0.48	0.70
P-49	MH-50	MH-49	Existing	33	0.0023	592	0.013	7.77	13.98	16.49	1.33	1.95	0.48	0.71
P-48	MH-49	MH-48	Existing	33	0.0023	371	0.013	7.80	14.04	16.41	1.34	1.96	0.49	0.71
P-47	MH-48	MH-47	Existing	33	0.0023	653	0.013	7.80	14.04	16.48	1.33	1.95	0.48	0.71
P-46	MH-47	MH-46	Existing	33	0.0023	604	0.013	7.86	14.15	16.38	1.34	1.97	0.49	0.72

Table 4 Pipe Flows - Area A Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-45	MH-46	MH-45	Existing	33	0.0023	1,077	0.013	7.95	14.30	16.45	1.35	1.98	0.49	0.72
P-44	MH-45	MH-44	Existing	33	0.0028	326	0.013	8.38	15.08	18.11	1.31	1.92	0.48	0.70
P-1790	MH-44	MH-43	Future	33	0.0023	1,243	0.011	8.38	15.08	19.32	1.27	1.83	0.46	0.67
P-1792	MH-43	MH-42	Future	33	0.0020	1,122	0.011	8.44	15.19	18.10	1.32	1.93	0.48	0.70
P-1794	MH-42	MH-41	Future	33	0.0023	549	0.011	8.44	15.19	19.32	1.27	1.84	0.46	0.67
P-40	MH-41	MH-40	Existing	33	0.0056	531	0.013	8.44	15.19	25.59	1.09	1.53	0.40	0.56
P-39	MH-40	MH-39	Existing	33	0.0027	530	0.013	8.50	15.30	17.93	1.33	1.95	0.49	0.71
P-38	MH-39	MH-38	Existing	33	0.0030	1,037	0.013	8.50	15.30	18.92	1.29	1.88	0.47	0.68
P-37	MH-38	MH-37	Existing	36	0.0025	24	0.013	8.50	15.30	21.62	1.31	1.86	0.44	0.62
P-36	MH-37	MH-36	Existing	36	0.0023	1,202	0.013	9.61	17.29	20.71	1.44	2.10	0.48	0.70
P-35	MH-36	MH-35	Existing	36	0.0023	2,390	0.013	9.72	17.49	20.77	1.44	2.11	0.48	0.70
P-34	MH-35	MH-34	Existing	36	0.0023	592	0.013	9.72	17.49	20.87	1.44	2.10	0.48	0.70
P-33	MH-34	MH-33	Existing	36	0.0023	1,158	0.013	9.72	17.49	20.68	1.45	2.12	0.48	0.71
P-1718	MH-33	MH-28	Future	42	0.0036	2,705	0.011	12.06	21.72	46.28	1.22	1.69	0.35	0.48
P-1716	MH-28	MH-25	Future	42	0.0020	2,793	0.011	12.46	22.43	34.07	1.47	2.07	0.42	0.59
P-1714	MH-25	MH-23	Future	42	0.0019	2,698	0.011	12.65	22.77	33.24	1.50	2.13	0.43	0.61
P-1712	MH-23	MH-22	Future	42	0.0024	2,258	0.011	14.45	26.01	38.10	1.49	2.12	0.43	0.61
P-1710	MH-22	MH-21	Future	42	0.0012	567	0.011	14.45	26.01	26.50	1.84	2.81	0.53	0.80
P-1708	MH-21	MH-20	Future	42	0.0023	2,704	0.011	15.65	28.17	37.22	1.58	2.28	0.45	0.65
P-1706	MH-20	MH-19	Future	42	0.0021	2,709	0.011	15.84	28.51	35.59	1.64	2.37	0.47	0.68
P-1800	MH-19	MH-18	Future	48	0.0013	436	0.011	17.05	30.69	39.78	1.83	2.64	0.46	0.66
P-1802	MH-18	MH-17	Future	48	0.0013	1,532	0.011	17.05	30.69	39.15	1.85	2.67	0.46	0.67
P-1804	MH-17	MH-16	Future	48	0.0011	768	0.011	17.05	30.69	36.38	1.93	2.82	0.48	0.70
P-1806	MH-16	MH-15	Future	48	0.0044	279	0.011	17.79	32.03	73.10	1.34	1.85	0.34	0.46
P-1704	MH-15	MH-14	Future	54	0.0008	3,824	0.011	18.06	32.50	41.76	2.07	2.98	0.46	0.66
P-1424	MH-1274	MH-1278	Future	15	0.0013	2,116	0.011	0.49	0.89	1.78	0.45	0.62	0.36	0.50
P-1628	MH-1278	MH-1432	Future	15	0.0021	4,234	0.011	0.62	1.12	2.28	0.45	0.62	0.36	0.50
P-1674	MH-1432	MH-21	Future	15	0.0034	2,661	0.011	0.62	1.12	2.87	0.40	0.54	0.32	0.43
P-1668	MH-1428	MH-1426	Existing	10	0.0022	608	0.013	0.06	0.11	0.66	0.17	0.23	0.21	0.28
P-1672	MH-1426	MH-1430	Future	10	0.0019	738	0.013	0.06	0.11	0.61	0.18	0.24	0.22	0.29
P-1652	MH-1418	MH-45	Future	12	0.0066	2,665	0.013	0.29	0.52	1.88	0.27	0.36	0.27	0.36
P-1644	MH-1410	MH-19	Future	15	0.0013	7,948	0.011	0.63	1.13	1.78	0.51	0.72	0.41	0.58
P-1624	MH-1408	MH-65	Existing	21	0.0008	2,592	0.013	0.92	1.65	2.90	0.68	0.95	0.39	0.54

Table 4 Pipe Flows - Area A Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1616	MH-1406	MH-65	Existing	27	0.0008	6,623	0.013	0.78	1.40	5.68	0.56	0.76	0.25	0.34
P-1620	MH-1404	MH-A44	Future	18	0.0020	2,666	0.011	0.74	1.33	3.60	0.46	0.63	0.31	0.42
P-1702	MH-14	MH-13	Future	54	0.0008	3,681	0.011	18.32	32.98	42.56	2.06	2.98	0.46	0.66
P-1434	MH-1348	MH-1288	Future	12	0.0050	3,346	0.013	0.71	1.27	1.66	0.45	1.27	0.45	0.65
P-1436	MH-1288	MH-37	Existing	18	0.0013	1,962	0.013	1.04	1.88	3.37	0.57	0.80	0.38	0.53
P-1700	MH-13	MH-12	Future	54	0.0008	2,541	0.011	21.15	38.06	41.94	2.26	3.36	0.50	0.75
P-1630	MH-1298	MH-16	Future	18	0.0011	5,333	0.011	0.36	0.65	2.67	0.37	0.51	0.25	0.34
P-1614	MH-1282	MH-1404	Future	12	0.0020	2,630	0.013	0.49	0.88	1.03	0.48	0.71	0.48	0.71
P-1618	MH-1272	MH-1406	Existing	15	0.0013	1,346	0.013	0.58	1.04	1.78	0.49	0.69	0.39	0.55
P-1626	MH-1270	MH-1408	Future	15	0.0020	2,587	0.011	0.92	1.65	1.87	0.62	0.91	0.49	0.73
P-1622	MH-1268	MH-1348	Future	12	0.0052	2,561	0.013	0.33	0.59	1.66	0.30	0.41	0.30	0.41
P-1698	MH-12	MH-10	Future	54	0.0007	1,541	0.011	21.15	38.06	40.79	2.30	3.44	0.51	0.77
P-1124	MH-1144	MH-1146	Existing	8	0.0024	802	0.013	0.03	0.06	0.38	0.13	0.17	0.19	0.26
P-1122	MH-1146	MH-1430	Existing	12	0.0014	458	0.013	0.03	0.06	0.86	0.13	0.17	0.13	0.17
P-1670	MH-1430	MH-1142	Existing	12	0.0014	1,047	0.013	0.09	0.17	0.87	0.22	0.30	0.22	0.30
P-1120	MH-1142	MH-62	Existing	15	0.0000	1,374	0.013	0.12	0.22	0.13	0.96	1.25	0.77	1.00
P-1102	MH-1130	MH-23	Existing	12	0.0024	1,369	0.013	0.20	0.36	1.12	0.29	0.39	0.29	0.39
P-1096	MH-1122	MH-1118	Existing	15	0.0009	1,214	0.013	0.07	0.13	1.25	0.20	0.27	0.16	0.22
P-1098	MH-1124	MH-1120	Existing	15	0.0009	1,385	0.013	0.07	0.13	1.24	0.20	0.27	0.16	0.22
P-1094	MH-1120	MH-1118	Existing	15	0.0010	935	0.013	0.07	0.13	1.31	0.20	0.26	0.16	0.21
P-1092	MH-1118	MH-B59	Existing	15	0.0005	851	0.013	0.14	0.26	0.96	0.32	0.44	0.26	0.35
P-1090	MH-1114	MH-1112	Existing	8	0.0024	1,113	0.013	0.07	0.13	0.39	0.19	0.26	0.29	0.40
P-1088	MH-1108	MH-1110	Existing	8	0.0024	1,113	0.013	0.07	0.13	0.39	0.19	0.26	0.29	0.40
P-1106	MH-1110	MH-1112	Existing	15	0.0010	655	0.013	0.14	0.26	1.31	0.28	0.38	0.22	0.30
P-1104	MH-1112	MH-B59	Existing	15	0.0011	3,316	0.013	0.28	0.51	1.37	0.39	0.53	0.31	0.42
P-1086	MH-1098	MH-1100	Existing	8	0.0027	421	0.013	0.03	0.06	0.41	0.12	0.17	0.19	0.25
P-1082	MH-1100	MH-1428	Existing	8	0.0038	418	0.013	0.03	0.06	0.48	0.12	0.15	0.17	0.23
P-1076	MH-1094	MH-1096	Existing	8	0.0026	916	0.013	0.02	0.04	0.40	0.11	0.15	0.16	0.22
P-1496	MH-1096	MH-61	Future	10	0.0025	3,601	0.013	0.05	0.08	0.71	0.14	0.19	0.17	0.23

Table 5 Manhole Loading - Area B Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-6	0.10	0.18
MH-3	0.00	0.00
MH-7	0.07	0.13
MH-8	0.00	0.00
MH-4	0.00	0.00
MH-5	0.23	0.41
MH-1208	0.00	0.00
MH-1210	0.09	0.16
MH-1212	0.03	0.05
MH-1220	0.40	0.72
MH-1222	0.09	0.16
MH-1228	0.40	0.72
MH-1230	0.18	0.32
MH-1234	0.03	0.05
MH-1236	0.00	0.00
MH-1238	0.27	0.48
MH-1240	0.40	0.72
MH-1242	0.18	0.32
MH-1244	0.03	0.05
MH-1246	0.03	0.05
MH-1248	0.15	0.27
MH-1252	0.08	0.14
MH-1254	0.15	0.27
MH-1256	0.18	0.32
MH-1258	0.40	0.72
MH-1262	0.08	0.14
MH-1264	0.10	0.18
MH-1318	0.08	0.14
MH-1378	0.03	0.06
MH-1380	0.03	0.05
MH-1382	0.03	0.05
MH-1384	0.03	0.05
MH-1398	0.01	0.01
MH-1442	0.00	0.00

Table 5 Manhole Loading - Area B Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-1454	0.07	0.13
MH-1456	0.00	0.00
MH-1458	0.15	0.27
MH-1460	0.00	0.00
MH-1462	0.09	0.16
MH-1464	0.34	0.61
MH-1466	0.25	0.45
MH-1470	0.00	0.00
MH-1474	0.00	0.00
MH-1476	0.00	0.00
MH-1478	0.00	0.00
MH-1480	0.00	0.00
MH-1482	0.01	0.02
MH-1484	0.00	0.00
MH-1490	0.01	0.03
MH-1492	0.01	0.03
MH-1494	0.01	0.03
MH-1496	0.01	0.03
MH-1498	0.01	0.03
MH-1500	0.01	0.03
MH-1502	0.01	0.02
MH-1506	0.01	0.03

Table 6 Pipe Flows - Area B Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-8	MH-9	MH-8	Existing	42	0.0009	591	0.013	16.88	30.39	19.71	2.49	3.50	0.71	1.00
P-7	MH-8	MH-7	Existing	42	0.0009	2,511	0.013	16.88	30.39	19.12	2.56	3.50	0.73	1.00
P-6	MH-7	MH-6	Existing	42	0.0009	2,894	0.013	16.95	30.51	23.54	2.20	3.50	0.63	1.00
P-5	MH-6	MH-5	Existing	42	0.0010	2,598	0.013	17.05	30.69	20.86	2.41	3.50	0.69	1.00
P-4	MH-5	MH-4	Existing	48	0.0007	2,698	0.013	17.28	31.10	25.03	2.44	4.00	0.61	1.00
P-3	MH-4	MH-3	Existing	48	0.0006	2,528	0.013	17.28	31.10	23.27	2.57	4.00	0.64	1.00
P-2	MH-3	MH-2	Existing	48	0.0006	108	0.013	17.28	31.10	23.65	2.54	4.00	0.63	1.00
P-1	MH-2	MH-1216	Existing	48	0.0007	2,752	0.013	17.28	31.10	23.74	2.53	4.00	0.63	1.00
P-9	MH-10	MH-9	Existing	42	0.0009	1,804	0.013	16.88	30.39	19.54	2.51	3.50	0.72	1.00

Table 7 Pipe Flows - Area B Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1696	MH-8	MH-7	Future	60	0.0008	2,732	0.011	24.26	43.67	58.12	2.25	3.24	0.45	0.65
P-1694	MH-7	MH-6	Future	60	0.0008	3,067	0.011	24.35	43.82	56.14	2.30	3.32	0.46	0.67
P-1824	MH-6	MH-5	Future	60	0.0009	2,774	0.011	25.86	46.55	59.04	2.32	3.35	0.46	0.67
P-1834	MH-5	MH-4	Future	60	0.0008	2,869	0.011	26.10	46.98	56.36	2.39	3.49	0.48	0.70
P-1692	MH-4	MH-3	Future	60	0.0007	2,720	0.011	26.88	48.38	51.46	2.57	3.85	0.51	0.77
P-1690	MH-3	MH-1216	Future	60	0.0009	3,022	0.011	26.89	48.41	61.26	2.32	3.35	0.46	0.67
P-1876	MH-1506	MH-1216	Future	12	0.0020	2,593	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1872	MH-1502	MH-1384	Future	10	0.0025	2,652	0.013	0.01	0.02	0.71	0.08	0.10	0.09	0.12
P-1870	MH-1500	MH-8	Future	12	0.0020	2,570	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1868	MH-1498	MH-7	Future	12	0.0020	2,608	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1866	MH-1496	MH-6	Future	12	0.0020	2,583	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1864	MH-1494	MH-5	Future	12	0.0020	2,607	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1860	MH-1492	MH-3	Future	12	0.0020	2,630	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1862	MH-1490	MH-4	Future	12	0.0020	2,629	0.013	0.01	0.03	1.03	0.08	0.11	0.08	0.11
P-1852	MH-1482	MH-1476	Future	12	0.0020	2,754	0.013	0.01	0.02	1.03	0.08	0.10	0.08	0.10
P-1850	MH-1480	MH-1474	Future	12	0.0020	2,763	0.013	0.00	0.00	1.03	0.00	0.00	0.00	0.00
P-1854	MH-1484	MH-1478	Future	12	0.0020	2,685	0.013	0.00	0.00	1.03	0.00	0.00	0.00	0.00
P-1848	MH-1478	MH-1476	Future	18	0.0011	2,591	0.011	0.12	0.22	2.67	0.22	0.29	0.15	0.19
P-1846	MH-1476	MH-1474	Future	18	0.0011	2,708	0.011	0.13	0.24	2.67	0.23	0.31	0.15	0.20
P-1844	MH-1474	MH-1470	Future	21	0.0009	2,643	0.011	0.13	0.24	3.64	0.23	0.31	0.13	0.17
P-1838	MH-1470	MH-1216	Future	24	0.0008	2,622	0.011	0.14	0.25	4.90	0.23	0.31	0.12	0.15
P-1830	MH-1466	MH-1236	Future	12	0.0018	2,698	0.013	0.25	0.45	0.98	0.34	0.48	0.34	0.48
P-1828	MH-1464	MH-1208	Future	12	0.0020	2,626	0.013	0.34	0.61	1.03	0.39	0.55	0.39	0.55
P-1380	MH-1462	MH-1210	Future	12	0.0030	2,708	0.013	0.09	0.16	1.25	0.18	0.24	0.18	0.24
P-1366	MH-1460	MH-1210	Future	15	0.0013	2,637	0.011	0.00	0.00	1.78	0.00	0.00	0.00	0.00
P-1396	MH-1456	MH-1234	Future	15	0.0028	2,650	0.011	0.03	0.05	2.62	0.09	0.12	0.07	0.10
P-1682	MH-1454	MH-1458	Future	12	0.0025	2,674	0.013	0.07	0.13	1.16	0.17	0.22	0.17	0.22
P-1604	MH-1398	MH-1470	Future	12	0.0020	2,784	0.013	0.01	0.01	1.04	0.05	0.07	0.05	0.07
P-1566	MH-1380	MH-1382	Future	10	0.0025	2,629	0.013	0.03	0.05	0.71	0.11	0.14	0.13	0.17
P-1568	MH-1382	MH-1384	Future	12	0.0020	2,648	0.013	0.05	0.09	1.03	0.15	0.20	0.15	0.20
P-1570	MH-1384	9026	Future	12	0.0020	2,668	0.013	0.09	0.16	1.03	0.20	0.27	0.20	0.27
P-1572	MH-1378	9026	Future	10	0.0025	2,644	0.013	0.03	0.06	0.71	0.12	0.16	0.15	0.19
P-1400	MH-1264	MH-1318	Future	12	0.0020	2,654	0.013	0.10	0.18	1.03	0.21	0.29	0.21	0.29

Table 7 Pipe Flows - Area B Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1472	MH-1318	MH-1248	Future	15	0.0013	2,634	0.011	0.18	0.32	1.78	0.27	0.36	0.21	0.29
P-1404	MH-1248	MH-1252	Future	15	0.0013	2,620	0.011	0.40	0.72	1.79	0.40	0.55	0.32	0.44
P-1808	MH-1252	9034	Future	15	0.0013	2,658	0.011	0.63	1.13	1.79	0.51	0.72	0.41	0.58
P-1394	MH-1254	MH-1252	Future	12	0.0020	2,711	0.013	0.15	0.27	1.03	0.26	0.35	0.26	0.35
P-1402	MH-1262	MH-1248	Future	12	0.0020	2,630	0.013	0.08	0.14	1.03	0.18	0.24	0.18	0.24
P-1410	MH-1258	MH-1240	Future	12	0.0020	2,642	0.013	0.40	0.72	1.04	0.43	0.61	0.43	0.61
P-1406	MH-1256	9034	Future	12	0.0020	2,601	0.013	0.18	0.32	1.03	0.28	0.39	0.28	0.39
P-1384	MH-1246	MH-1456	Future	12	0.0019	2,684	0.013	0.03	0.05	1.01	0.11	0.15	0.11	0.15
P-1390	MH-1244	MH-1234	Future	12	0.0020	2,718	0.013	0.03	0.05	1.03	0.11	0.15	0.11	0.15
P-1810	MH-1242	MH-1240	Future	18	0.0011	2,621	0.011	0.99	1.78	2.70	0.63	0.89	0.42	0.59
P-1812	MH-1240	MH-1442	Future	21	0.0009	2,871	0.011	1.79	3.22	3.65	0.87	1.28	0.49	0.73
P-1814	MH-1442	MH-8	Future	24	0.0008	2,406	0.011	2.06	3.70	4.89	0.91	1.30	0.45	0.65
P-1464	MH-1238	MH-1442	Future	12	0.0020	2,547	0.013	0.27	0.48	1.03	0.35	0.48	0.35	0.48
P-1408	MH-1234	9032	Future	15	0.0013	2,656	0.011	0.11	0.19	1.78	0.21	0.28	0.17	0.22
P-1382	MH-1230	9032	Future	12	0.0020	2,701	0.013	0.18	0.32	1.03	0.28	0.39	0.28	0.39
P-1376	MH-1228	MH-1220	Future	12	0.0020	2,674	0.013	0.40	0.72	1.03	0.43	0.62	0.43	0.62
P-1412	MH-1222	MH-1220	Future	15	0.0013	2,608	0.011	0.38	0.68	1.78	0.39	0.54	0.31	0.43
P-1818	MH-1220	MH-1458	Future	18	0.0011	2,818	0.011	1.18	2.12	2.67	0.70	1.01	0.47	0.67
P-1820	MH-1458	MH-6	Future	24	0.0008	2,487	0.011	1.40	2.52	4.90	0.73	1.02	0.37	0.51
P-1392	MH-1212	MH-1234	Future	12	0.0020	2,564	0.013	0.03	0.05	1.03	0.11	0.15	0.11	0.15
P-1362	MH-1210	MH-1208	Future	18	0.0011	2,670	0.011	0.18	0.32	2.67	0.26	0.35	0.18	0.24
P-1364	MH-1208	MH-1236	Future	21	0.0002	2,905	0.011	0.52	0.93	1.54	0.70	0.98	0.40	0.56
P-1374	MH-1236	MH-4	Future	21	0.0009	2,384	0.011	0.77	1.38	3.64	0.55	0.75	0.31	0.43
P-1826	MH-10	MH-8	Future	54	0.0008	2,591	0.011	22.19	39.94	41.85	2.33	3.52	0.52	0.78

Table 8 Manhole Loading - Allen Road Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-151	0.14	0.24
MH-148B	0.77	1.38
MH-143	0.00	0.00
MH-128	0.00	0.00
MH-133	0.00	0.00
MH-127	0.00	0.00
MH-119	0.00	0.00
MH-132	0.00	0.00
MH-126	0.07	0.13
MH-124	0.00	0.00
MH-118	0.17	0.30
MH-131	0.00	0.00
MH-125	0.00	0.00
MH-148A	0.15	0.27
MH-123	0.07	0.13
MH-117	0.00	0.00
MH-130	0.00	0.00
MH-115	0.17	0.30
MH-109	0.00	0.00
MH-122	0.00	0.00
MH-116	0.00	0.00
MH-114	0.00	0.00
MH-108	0.17	0.30
MH-121	0.00	0.00
MH-106	0.17	0.30
MH-113	0.00	0.00
MH-107	0.00	0.00
MH-120	0.08	0.14
MH-149	0.30	0.54
MH-105	0.00	0.00
MH-112	0.00	0.00
MH-104	0.00	0.00
MH-111	0.17	0.30
MH-147	0.23	0.41

Table 8 Manhole Loading - Allen Road Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-103	0.08	0.14
MH-110	0.00	0.00
MH-146	0.00	0.00
MH-102	0.08	0.14
MH-145	0.08	0.14
MH-152	0.14	0.24
MH-150	0.00	0.00
MH-144	0.00	0.00
MH-129	0.07	0.13
MH-276	0.31	0.55
MH-1004	0.05	0.09
MH-1006	0.00	0.00
MH-1008	0.00	0.00
MH-1010	0.00	0.00
MH-1012	0.00	0.00
MH-1014	0.05	0.09
MH-1016	0.05	0.09
MH-1018	0.05	0.09
MH-1022	0.00	0.00
MH-1024	0.00	0.00
MH-1026	0.05	0.09
MH-1030	0.02	0.04
MH-1032	0.07	0.12
MH-1034	0.00	0.00
MH-1036	0.02	0.04
MH-1038	0.00	0.00
MH-1040	0.02	0.04
MH-1042	0.00	0.00
MH-1044	0.02	0.04
MH-1046	0.00	0.00
MH-1048	0.00	0.00
MH-1050	0.09	0.17
MH-1052	0.09	0.17
MH-1054	0.17	0.30

Table 8 Manhole Loading - Allen Road Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-1056	0.11	0.21
MH-1058	0.03	0.06
MH-1060	0.02	0.03
MH-1062	0.07	0.13
MH-1064	0.07	0.13
MH-1066	0.02	0.03
MH-1068	0.12	0.21
MH-1070	0.03	0.06
MH-1072	0.06	0.11
MH-1074	0.06	0.11
MH-1076	0.03	0.06
MH-1078	0.00	0.00
MH-1080	0.06	0.11
MH-1082	0.03	0.06
MH-1084	0.03	0.06
MH-1086	0.03	0.06
MH-1088	0.00	0.00
MH-1090	0.03	0.06
MH-1092	0.00	0.00
MH-1134	0.00	0.00
MH-1352	0.00	0.00
MH-1452	0.00	0.00
MH-1182	0.03	0.06
MH-1184	0.03	0.06
MH-1186	0.03	0.06
MH-1204	0.03	0.06
MH-1350	0.00	0.00
MH-1486	0.11	0.21

Table 9 Pipe Flows - Allen Road Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-152	MH-152	MH-151	Existing	24	0.0008	3,556	0.013	0.14	0.24	4.19	0.25	0.33	0.12	0.16
P-151	MH-151	MH-150	Existing	24	0.0008	522	0.013	0.27	0.49	4.16	0.35	0.46	0.17	0.23
P-150	MH-150	MH-149	Existing	24	0.0008	1,162	0.013	0.27	0.49	4.08	0.35	0.47	0.17	0.23
P-1468	MH-149	MH-103	Existing	36	0.0012	123	0.013	3.34	6.01	15.12	0.96	1.32	0.32	0.44
P-148	MH-148B	MH-276	Existing	15	0.0013	2,628	0.013	0.77	1.38	1.51	0.63	0.94	0.51	0.75
P-1126	MH-276	MH-148A	Existing	18	0.0011	1,886	0.013	1.07	1.93	2.26	0.73	1.07	0.49	0.71
P-147	MH-148A	MH-147	Existing	18	0.0011	4,543	0.013	1.23	2.21	2.26	0.79	1.20	0.53	0.80
P-146	MH-147	MH-146	Existing	15	0.0005	462	0.013	1.45	2.62	0.89	1.25	1.25	1.00	1.00
P-145	MH-146	MH-145	Existing	15	0.0010	597	0.013	1.45	2.62	1.33	1.25	1.25	1.00	1.00
P-144	MH-145	MH-144	Existing	15	0.0010	539	0.013	1.53	2.76	1.33	1.25	1.25	1.00	1.00
P-143	MH-144	MH-143	Existing	15	0.0010	526	0.013	1.53	2.76	1.34	1.25	1.25	1.00	1.00
P-142	MH-143	MH-120	Existing	15	0.0010	532	0.013	1.53	2.76	1.32	1.25	1.25	1.00	1.00
P-1500	MH-1352	9010	Existing	21	0.0009	1,311	0.013	0.00	0.00	3.08	0.00	0.00	0.00	0.00
P-132	MH-133	MH-132	Existing	18	0.0023	299	0.013	0.00	0.00	3.89	0.00	0.00	0.00	0.00
P-131	MH-132	MH-131	Existing	18	0.0021	334	0.013	0.00	0.00	3.68	0.00	0.00	0.00	0.00
P-130	MH-131	MH-130	Existing	18	0.0045	24	0.013	0.00	0.00	5.41	0.00	0.00	0.00	0.00
P-129	MH-130	MH-129	Existing	18	0.0047	283	0.013	0.00	0.00	5.51	0.00	0.00	0.00	0.00
P-128	MH-129	MH-128	Existing	18	0.0013	454	0.013	0.07	0.13	2.90	0.16	0.22	0.11	0.15
P-127	MH-128	MH-127	Existing	18	0.0011	529	0.013	0.07	0.13	2.69	0.17	0.23	0.11	0.15
P-126	MH-127	MH-126	Existing	18	0.0011	646	0.013	0.07	0.13	2.69	0.17	0.23	0.11	0.15
P-125	MH-126	MH-125	Existing	18	0.0013	157	0.013	0.15	0.26	2.87	0.23	0.31	0.15	0.20
P-124	MH-125	MH-124	Existing	18	0.0011	598	0.013	0.15	0.26	2.71	0.24	0.32	0.16	0.21
P-123	MH-124	MH-123	Existing	18	0.0011	599	0.013	0.15	0.26	2.69	0.24	0.32	0.16	0.21
P-122	MH-123	MH-122	Existing	18	0.0011	410	0.013	0.22	0.39	2.72	0.29	0.39	0.19	0.26
P-121	MH-122	MH-121	Existing	18	0.0011	475	0.013	0.22	0.39	2.71	0.29	0.39	0.19	0.26
P-120	MH-121	MH-115	Existing	18	0.0011	475	0.013	0.22	0.39	2.71	0.29	0.39	0.19	0.26
P-119	MH-120	MH-119	Existing	18	0.0010	536	0.013	1.73	3.11	2.14	1.02	1.50	0.68	1.00
P-118	MH-119	MH-118	Existing	18	0.0010	530	0.013	1.73	3.11	2.15	1.02	1.50	0.68	1.00
P-117	MH-118	MH-117	Existing	18	0.0010	525	0.013	1.89	3.40	2.16	1.09	1.50	0.72	1.00
P-116	MH-117	MH-116	Existing	18	0.0010	526	0.013	1.89	3.40	2.14	1.10	1.50	0.73	1.00
P-115	MH-116	MH-115	Existing	18	0.0100	519	0.013	1.89	3.40	6.81	0.54	0.75	0.36	0.50
P-114	MH-115	MH-114	Existing	21	0.0032	81	0.013	2.28	4.10	6.87	0.69	0.97	0.40	0.56
P-113	MH-114	MH-113	Existing	36	0.0002	304	0.013	2.28	4.10	5.55	1.34	1.92	0.45	0.64

Table 9 Pipe Flows - Allen Road Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-112	MH-113	MH-112	Existing	36	0.0004	340	0.013	2.28	4.10	9.08	1.02	1.41	0.34	0.47
P-111	MH-112	MH-111	Existing	36	0.0005	593	0.013	2.28	4.10	9.23	1.02	1.40	0.34	0.47
P-110	MH-111	MH-110	Existing	36	0.0004	589	0.013	2.44	4.39	9.08	1.06	1.47	0.35	0.49
P-109	MH-110	MH-109	Existing	36	0.0005	589	0.013	2.44	4.39	9.26	1.05	1.46	0.35	0.49
P-108	MH-109	MH-108	Existing	36	0.0004	589	0.013	2.44	4.39	9.08	1.06	1.47	0.35	0.49
P-107	MH-108	MH-107	Existing	36	0.0005	589	0.013	2.61	4.69	9.25	1.09	1.51	0.36	0.50
P-106	MH-107	MH-106	Existing	36	0.0005	436	0.013	2.61	4.69	9.26	1.09	1.51	0.36	0.50
P-1054	MH-1068	MH-120	Existing	12	0.0014	827	0.013	0.12	0.21	0.85	0.25	0.34	0.25	0.34
P-105	MH-106	MH-105	Existing	36	0.0004	436	0.013	2.77	4.99	9.03	1.14	1.59	0.38	0.53
P-104	MH-105	MH-104	Existing	36	0.0005	618	0.013	2.77	4.99	9.20	1.13	1.57	0.38	0.52
P-103	MH-104	MH-149	Existing	36	0.0007	207	0.013	2.77	4.99	11.63	1.00	1.37	0.33	0.46
P-102	MH-103	MH-102	Existing	42	0.0004	499	0.013	3.42	6.15	12.38	1.26	1.74	0.36	0.50
P-101	MH-102	MH-1314	Existing	42	0.0003	508	0.013	3.49	6.29	11.93	1.30	1.81	0.37	0.52

Table 10 Pipe Flows - Allen Road Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1764	MH-152	MH-151	Future	33	0.0008	3,594	0.011	2.98	5.37	11.51	0.96	1.32	0.35	0.48
P-1762	MH-151	MH-150	Future	33	0.0007	579	0.011	3.12	5.61	10.91	1.01	1.40	0.37	0.51
P-1760	MH-150	MH-149	Future	33	0.0007	1,212	0.011	3.12	5.61	11.04	1.00	1.39	0.36	0.51
P-1468	MH-149	MH-103	Existing	36	0.0012	123	0.013	7.90	14.22	15.12	1.54	2.31	0.51	0.77
P-148	MH-148B	MH-276	Existing	15	0.0013	2,628	0.013	0.77	1.38	1.51	0.63	0.94	0.51	0.75
P-1126	MH-276	MH-148A	Existing	18	0.0011	1,886	0.013	1.07	1.93	2.26	0.73	1.07	0.49	0.71
P-147	MH-148A	MH-147	Existing	18	0.0011	4,543	0.013	1.23	2.21	2.26	0.79	1.20	0.53	0.80
P-1720	MH-147	MH-146	Future	18	0.0010	495	0.011	1.45	2.62	2.58	0.81	1.50	0.54	1.00
P-1722	MH-146	MH-145	Future	18	0.0009	649	0.011	1.45	2.62	2.45	0.83	1.50	0.56	1.00
P-1724	MH-145	MH-144	Future	18	0.0009	599	0.011	1.53	2.76	2.42	0.87	1.50	0.58	1.00
P-1726	MH-144	MH-143	Future	18	0.0009	603	0.011	1.53	2.76	2.41	0.87	1.50	0.58	1.00
P-1728	MH-143	MH-120	Future	18	0.0005	617	0.011	1.53	2.76	1.86	1.04	1.50	0.69	1.00
P-1350	MH-1486	9014	Future	10	0.0020	3,984	0.011	0.27	0.48	0.75	0.35	0.49	0.41	0.58
P-1766	MH-1352	9010	Future	27	0.0009	1,370	0.011	2.85	5.13	6.96	1.00	1.44	0.45	0.64
P-1842	MH-1350	9012	Future	15	0.0011	2,586	0.011	0.45	0.81	1.63	0.45	0.62	0.36	0.50
P-1730	MH-133	MH-132	Future	24	0.0022	319	0.011	1.71	3.08	8.12	0.62	0.85	0.31	0.43
P-1732	MH-132	MH-131	Future	24	0.0020	350	0.011	1.71	3.08	7.74	0.64	0.88	0.32	0.44
P-1734	MH-131	MH-130	Future	24	0.0025	45	0.011	1.71	3.08	8.60	0.61	0.83	0.30	0.41
P-1736	MH-130	MH-129	Future	24	0.0046	292	0.011	1.71	3.08	11.70	0.52	0.70	0.26	0.35
P-1738	MH-129	MH-128	Future	24	0.0012	481	0.011	1.79	3.21	6.07	0.74	1.03	0.37	0.52
P-1740	MH-128	MH-127	Future	24	0.0010	563	0.011	1.79	3.21	5.61	0.78	1.09	0.39	0.54
P-1742	MH-127	MH-126	Future	24	0.0011	681	0.011	1.79	3.21	5.63	0.77	1.08	0.39	0.54
P-1744	MH-126	MH-125	Future	24	0.0011	178	0.011	1.86	3.34	5.82	0.78	1.09	0.39	0.54
P-1746	MH-125	MH-124	Future	24	0.0011	627	0.011	1.86	3.34	5.71	0.79	1.10	0.39	0.55
P-1748	MH-124	MH-123	Future	24	0.0011	629	0.011	1.86	3.34	5.65	0.79	1.11	0.40	0.55
P-1750	MH-123	MH-122	Future	24	0.0011	437	0.011	1.93	3.48	5.68	0.80	1.13	0.40	0.57
P-1752	MH-122	MH-121	Future	24	0.0011	507	0.011	1.93	3.48	5.66	0.81	1.13	0.40	0.57
P-1754	MH-121	MH-115	Future	24	0.0011	506	0.011	1.93	3.48	5.66	0.81	1.13	0.40	0.57
P-119	MH-120	MH-119	Existing	18	0.0010	536	0.013	1.73	3.11	2.14	1.02	1.50	0.68	1.00
P-118	MH-119	MH-118	Existing	18	0.0010	530	0.013	1.73	3.11	2.15	1.02	1.50	0.68	1.00
P-1314	MH-1184	MH-1186	Future	10	0.0025	2,651	0.013	0.09	0.17	0.71	0.20	0.28	0.24	0.33
P-1316	MH-1186	MH-1074	Future	12	0.0020	770	0.013	0.16	0.28	1.03	0.26	0.36	0.26	0.36
P-1356	MH-1204	MH-1186	Future	8	0.0025	989	0.013	0.03	0.06	0.39	0.13	0.17	0.19	0.26

Table 10 Pipe Flows - Allen Road Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1312	MH-1182	MH-1184	Future	10	0.0015	991	0.013	0.06	0.11	0.55	0.19	0.26	0.23	0.31
P-117	MH-118	MH-117	Existing	18	0.0010	525	0.013	1.89	3.40	2.16	1.09	1.50	0.72	1.00
P-116	MH-117	MH-116	Existing	18	0.0010	526	0.013	1.89	3.40	2.14	1.10	1.50	0.73	1.00
P-115	MH-116	MH-115	Existing	18	0.0100	519	0.013	1.89	3.40	6.81	0.54	0.75	0.36	0.50
P-1756	MH-115	MH-114	Future	36	0.0007	106	0.011	3.99	7.18	13.12	1.14	1.58	0.38	0.53
P-1758	MH-114	MH-113	Future	36	0.0009	327	0.011	3.99	7.18	15.21	1.05	1.45	0.35	0.48
P-112	MH-113	MH-112	Existing	36	0.0004	340	0.013	3.99	7.18	9.08	1.39	2.01	0.46	0.67
P-111	MH-112	MH-111	Existing	36	0.0005	593	0.013	3.99	7.18	9.23	1.38	1.99	0.46	0.66
P-110	MH-111	MH-110	Existing	36	0.0004	589	0.013	4.15	7.47	9.08	1.42	2.07	0.48	0.69
P-109	MH-110	MH-109	Existing	36	0.0005	589	0.013	4.15	7.47	9.26	1.41	2.04	0.47	0.68
P-108	MH-109	MH-108	Existing	36	0.0004	589	0.013	4.15	7.47	9.08	1.42	2.07	0.48	0.69
P-107	MH-108	MH-107	Existing	36	0.0005	589	0.013	4.32	7.77	9.25	1.44	2.11	0.48	0.70
P-106	MH-107	MH-106	Existing	36	0.0005	436	0.013	4.32	7.77	9.26	1.44	2.10	0.48	0.70
P-105	MH-106	MH-105	Existing	36	0.0004	436	0.013	4.48	8.07	9.03	1.49	2.21	0.50	0.74
P-104	MH-105	MH-104	Existing	36	0.0005	618	0.013	4.48	8.07	9.20	1.48	2.18	0.49	0.73
P-103	MH-104	MH-149	Existing	36	0.0007	207	0.013	4.48	8.07	11.63	1.29	1.84	0.43	0.61
P-1074	MH-1090	MH-1092	Existing	10	0.0016	1,097	0.013	0.03	0.06	0.57	0.13	0.18	0.16	0.21
P-1360	MH-1092	MH-1182	Future	10	0.0025	1,539	0.013	0.03	0.06	0.71	0.12	0.16	0.14	0.19
P-1070	MH-1086	MH-1088	Existing	8	0.0016	1,031	0.013	0.03	0.06	0.31	0.14	0.19	0.21	0.29
P-1112	MH-1088	MH-1080	Existing	8	0.0022	653	0.013	0.03	0.06	0.37	0.13	0.18	0.20	0.26
P-1068	MH-1084	MH-1080	Existing	8	0.0020	1,028	0.013	0.03	0.06	0.35	0.13	0.18	0.20	0.27
P-1066	MH-1080	MH-1082	Existing	8	0.0020	1,117	0.013	0.12	0.22	0.35	0.28	0.39	0.41	0.58
P-1114	MH-1134	MH-1080	Existing	8	0.0022	608	0.013	0.00	0.00	0.37	0.00	0.00	0.00	0.00
P-1856	MH-1082	MH-1486	Future	8	0.0035	1,510	0.013	0.16	0.28	0.47	0.27	0.37	0.40	0.56
P-1064	MH-1078	MH-1074	Existing	12	0.0015	400	0.013	0.00	0.00	0.89	0.00	0.00	0.00	0.00
P-1058	MH-1076	MH-1072	Existing	10	0.0016	809	0.013	0.03	0.06	0.56	0.13	0.18	0.16	0.21
P-1318	MH-1074	9014	Future	12	0.0020	901	0.013	0.34	0.61	1.04	0.40	0.55	0.40	0.55
P-1060	MH-1072	MH-1074	Existing	10	0.0016	1,267	0.013	0.12	0.22	0.57	0.26	0.36	0.32	0.43
P-1056	MH-1070	MH-1072	Existing	10	0.0014	1,374	0.013	0.03	0.06	0.53	0.14	0.18	0.16	0.22
P-1054	MH-1068	MH-120	Existing	12	0.0014	827	0.013	0.12	0.21	0.85	0.25	0.34	0.25	0.34
P-1322	MH-1066	MH-1058	Future	8	0.0100	1,275	0.013	0.09	0.16	0.78	0.15	0.21	0.23	0.31
P-1052	MH-1064	MH-1066	Existing	8	0.0008	620	0.013	0.07	0.13	0.22	0.27	0.38	0.40	0.56
P-1050	MH-1062	MH-1058	Existing	8	0.0017	620	0.013	0.07	0.13	0.32	0.22	0.30	0.32	0.44

Table 10 Pipe Flows - Allen Road Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1048	MH-1060	MH-1058	Existing	8	0.0037	633	0.013	0.02	0.03	0.48	0.09	0.11	0.13	0.17
P-1324	MH-1058	MH-1034	Future	8	0.0034	944	0.013	0.21	0.39	0.46	0.32	0.47	0.48	0.71
P-1046	MH-1056	MH-1054	Existing	18	0.0012	1,270	0.013	0.72	1.30	2.33	0.57	0.80	0.38	0.53
P-1320	MH-1054	MH-1034	Future	18	0.0013	1,320	0.011	0.89	1.60	2.92	0.57	0.79	0.38	0.53
P-1344	MH-1052	9006	Future	12	0.0011	2,642	0.013	0.19	0.34	0.76	0.34	0.47	0.34	0.47
P-1044	MH-1050	MH-1052	Existing	10	0.0027	2,138	0.013	0.09	0.17	0.74	0.20	0.27	0.24	0.32
P-1034	MH-1040	MH-1042	Existing	10	0.0014	524	0.013	0.02	0.04	0.54	0.12	0.16	0.14	0.19
P-1036	MH-1042	MH-1044	Existing	10	0.0013	303	0.013	0.02	0.04	0.52	0.12	0.16	0.14	0.19
P-1038	MH-1044	MH-1046	Existing	10	0.0014	562	0.013	0.05	0.08	0.53	0.17	0.22	0.20	0.27
P-1040	MH-1046	MH-1048	Existing	10	0.0017	337	0.013	0.05	0.08	0.59	0.16	0.21	0.19	0.25
P-1042	MH-1048	MH-1036	Existing	10	0.0013	221	0.013	0.05	0.08	0.51	0.17	0.23	0.20	0.27
P-1504	MH-1034	MH-1038	Future	18	0.0011	1,615	0.011	1.10	1.99	2.67	0.67	0.96	0.45	0.64
P-1032	MH-1032	MH-1038	Existing	12	0.0011	146	0.013	0.16	0.29	0.77	0.31	0.43	0.31	0.43
P-1326	MH-1038	9012	Future	18	0.0012	1,048	0.011	1.26	2.28	2.79	0.71	1.03	0.47	0.69
P-1030	MH-1036	MH-1032	Existing	12	0.0012	810	0.013	0.07	0.12	0.81	0.20	0.26	0.20	0.26
P-1026	MH-1030	MH-1032	Existing	8	0.0023	1,165	0.013	0.02	0.04	0.38	0.11	0.15	0.17	0.22
P-102	MH-103	MH-102	Existing	42	0.0004	499	0.013	7.98	14.36	12.38	2.04	3.50	0.58	1.00
P-101	MH-102	MH-1314	Existing	42	0.0003	508	0.013	8.05	14.50	11.93	2.11	3.50	0.60	1.00
P-1018	MH-1026	MH-1024	Existing	10	0.0029	395	0.013	0.05	0.09	0.77	0.15	0.20	0.18	0.24
P-1020	MH-1024	MH-1022	Existing	10	0.0012	520	0.013	0.05	0.09	0.50	0.18	0.24	0.22	0.29
P-1022	MH-1022	MH-1018	Existing	10	0.0033	260	0.013	0.05	0.09	0.81	0.14	0.19	0.17	0.23
P-1016	MH-1018	MH-1452	Existing	12	0.0021	907	0.013	0.26	0.47	1.07	0.34	0.46	0.34	0.46
P-1002	MH-1004	MH-1006	Existing	10	0.0020	395	0.013	0.05	0.09	0.64	0.16	0.22	0.19	0.26
P-1004	MH-1006	MH-1008	Existing	10	0.0010	553	0.013	0.05	0.09	0.45	0.19	0.26	0.23	0.31
P-1006	MH-1008	MH-1010	Existing	10	0.0020	431	0.013	0.05	0.09	0.64	0.16	0.22	0.19	0.26
P-1008	MH-1010	MH-1012	Existing	10	0.0020	230	0.013	0.05	0.09	0.64	0.16	0.22	0.19	0.26
P-1010	MH-1012	MH-1014	Existing	10	0.0019	284	0.013	0.05	0.09	0.63	0.16	0.22	0.20	0.26
P-1012	MH-1016	MH-1014	Existing	12	0.0010	775	0.013	0.05	0.09	0.72	0.18	0.24	0.18	0.24
P-1014	MH-1014	MH-1018	Existing	12	0.0017	966	0.013	0.16	0.28	0.95	0.27	0.37	0.27	0.37

Table 11 Manhole Loading - Brimhall-Mohawk Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-348	0.00	0.00
MH-326	0.00	0.00
MH-332	0.00	0.00
MH-345	0.03	0.06
MH-351	0.00	0.00
MH-308	0.00	0.00
MH-314	0.00	0.00
MH-320	0.00	0.00
MH-349	0.03	0.06
MH-355	0.00	0.00
MH-327	0.00	0.00
MH-333	0.00	0.00
MH-302	0.00	0.00
MH-346	0.00	0.00
MH-352	0.00	0.00
MH-325A	0.00	0.00
MH-309	0.07	0.12
MH-315	0.28	0.51
MH-321	0.07	0.12
MH-356	0.00	0.00
MH-325B	0.11	0.20
MH-328	0.04	0.07
MH-334	0.04	0.07
MH-340	0.04	0.07
MH-303	0.00	0.00
MH-353	0.03	0.06
MH-338	0.00	0.00
MH-316	0.00	0.00
MH-322	0.00	0.00
MH-357	0.03	0.06
MH-335	0.00	0.00
MH-341	0.00	0.00
MH-304	0.00	0.00
MH-310	0.00	0.00

Table 11 Manhole Loading - Brimhall-Mohawk Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-354	0.00	0.00
MH-339	0.00	0.00
MH-317	0.00	0.00
MH-323	0.00	0.00
MH-336	0.00	0.00
MH-342	0.03	0.06
MH-305	0.07	0.12
MH-311	0.17	0.30
MH-330	0.00	0.00
MH-318	0.17	0.30
MH-324	0.07	0.12
MH-337	0.04	0.07
MH-343	0.00	0.00
MH-306	0.00	0.00
MH-312	0.00	0.00
MH-347	0.00	0.00
MH-331	0.04	0.07
MH-319	0.00	0.00
MH-344	0.00	0.00
MH-350	0.00	0.00
MH-329	0.00	0.00
MH-307	0.00	0.00
MH-313	0.17	0.30
MH-363	0.04	0.07
MH-360	0.03	0.05
MH-358	0.23	0.41
MH-364	0.08	0.15
MH-361	0.05	0.09
MH-365	0.04	0.08
MH-362	0.05	0.09
MH-1302	0.11	0.20

Table 12 Pipe Flows - Brimhall-Mohawk Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-356	MH-357	MH-356	Existing	15	0.0068	25	0.013	0.03	0.06	3.45	0.08	0.11	0.07	0.09
P-355	MH-356	MH-355	Existing	15	0.0028	476	0.013	0.03	0.06	2.22	0.10	0.14	0.08	0.11
P-354	MH-355	MH-354	Existing	15	0.0027	63	0.013	0.03	0.06	2.18	0.10	0.14	0.08	0.11
P-353	MH-354	MH-353	Existing	15	0.0028	230	0.013	0.03	0.06	2.23	0.10	0.14	0.08	0.11
P-352	MH-353	MH-352	Existing	15	0.0028	188	0.013	0.06	0.11	2.20	0.14	0.19	0.12	0.15
P-351	MH-352	MH-351	Existing	15	0.0028	319	0.013	0.06	0.11	2.20	0.14	0.19	0.12	0.15
P-350	MH-351	MH-350	Existing	15	0.0028	403	0.013	0.06	0.11	2.23	0.14	0.19	0.12	0.15
P-349	MH-350	MH-349	Existing	15	0.0033	404	0.013	0.06	0.11	2.42	0.14	0.18	0.11	0.15
P-348	MH-349	MH-348	Existing	18	0.0011	638	0.013	0.09	0.17	2.26	0.21	0.28	0.14	0.18
P-347	MH-348	MH-347	Existing	18	0.0011	600	0.013	0.09	0.17	2.26	0.21	0.28	0.14	0.18
P-346	MH-347	MH-346	Existing	18	0.0011	600	0.013	0.09	0.17	2.26	0.21	0.28	0.14	0.18
P-345	MH-346	MH-345	Existing	18	0.0011	499	0.013	0.09	0.17	2.28	0.21	0.28	0.14	0.18
P-344	MH-345	MH-344	Existing	18	0.0011	492	0.013	0.12	0.22	2.28	0.24	0.32	0.16	0.21
P-343	MH-344	MH-343	Existing	18	0.0011	600	0.013	0.12	0.22	2.26	0.24	0.32	0.16	0.21
P-342	MH-343	MH-342	Existing	18	0.0011	600	0.013	0.12	0.22	2.26	0.24	0.32	0.16	0.21
P-341	MH-342	MH-341	Existing	18	0.0011	600	0.013	0.16	0.28	2.26	0.27	0.36	0.18	0.24
P-340	MH-341	MH-340	Existing	18	0.0011	501	0.013	0.16	0.28	2.26	0.27	0.36	0.18	0.24
P-339	MH-340	MH-339	Existing	18	0.0011	500	0.013	0.20	0.35	2.26	0.30	0.40	0.20	0.27
P-338	MH-339	MH-338	Existing	18	0.0011	461	0.013	0.20	0.35	2.24	0.30	0.40	0.20	0.27
P-337	MH-338	MH-337	Existing	18	0.0012	426	0.013	0.20	0.35	2.38	0.29	0.39	0.19	0.26
P-336	MH-337	MH-336	Existing	18	0.0011	468	0.013	0.24	0.43	2.25	0.33	0.44	0.22	0.30
P-335	MH-336	MH-335	Existing	18	0.0011	467	0.013	0.24	0.43	2.27	0.33	0.44	0.22	0.29
P-334	MH-335	MH-334	Existing	18	0.0011	475	0.013	0.24	0.43	2.25	0.33	0.44	0.22	0.30
P-333	MH-334	MH-333	Existing	18	0.0011	497	0.013	0.28	0.50	2.26	0.36	0.48	0.24	0.32
P-332	MH-333	MH-332	Existing	18	0.0011	535	0.013	0.28	0.50	2.26	0.36	0.48	0.24	0.32
P-331	MH-332	MH-331	Existing	18	0.0011	531	0.013	0.28	0.50	2.25	0.36	0.48	0.24	0.32
P-330	MH-331	MH-330	Existing	18	0.0011	531	0.013	0.32	0.57	2.27	0.38	0.51	0.25	0.34
P-329	MH-330	MH-329	Existing	18	0.0011	531	0.013	0.32	0.57	2.25	0.38	0.52	0.25	0.35
P-328	MH-329	MH-328	Existing	18	0.0011	572	0.013	0.32	0.57	2.26	0.38	0.52	0.25	0.34
P-327	MH-328	MH-327	Existing	18	0.0011	600	0.013	0.36	0.65	2.26	0.41	0.55	0.27	0.37
P-326	MH-327	MH-326	Existing	18	0.0011	607	0.013	0.36	0.65	2.24	0.41	0.55	0.27	0.37
P-325B	MH-326	MH-325B	Existing	18	0.0010	210	0.013	0.36	0.65	2.20	0.41	0.56	0.27	0.37
P-325A	MH-325B	MH-325A	Existing	18	0.0011	397	0.013	0.47	0.84	2.27	0.46	0.63	0.31	0.42

Table 12 Pipe Flows - Brimhall-Mohawk Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-324	MH-325A	MH-324	Existing	18	0.0011	600	0.013	0.47	0.84	2.26	0.46	0.64	0.31	0.42
P-323	MH-324	MH-323	Existing	18	0.0011	470	0.013	0.54	0.97	2.26	0.50	0.68	0.33	0.46
P-322	MH-323	MH-322	Existing	18	0.0014	258	0.013	0.54	0.97	2.51	0.47	0.65	0.31	0.43
P-321	MH-322	MH-321	Existing	18	0.0008	600	0.013	0.54	0.97	1.91	0.55	0.76	0.36	0.50
P-320	MH-321	MH-320	Existing	18	0.0014	600	0.013	0.61	1.09	2.50	0.50	0.69	0.34	0.46
P-319	MH-320	MH-319	Existing	18	0.0013	75	0.013	0.61	1.09	2.49	0.50	0.69	0.34	0.46
P-318	MH-319	MH-318	Existing	18	0.0014	600	0.013	0.61	1.09	2.50	0.50	0.69	0.34	0.46
P-317	MH-318	MH-317	Existing	18	0.0013	600	0.013	0.77	1.39	2.49	0.58	0.80	0.38	0.54
P-316	MH-317	MH-316	Existing	18	0.0014	600	0.013	0.77	1.39	2.50	0.57	0.80	0.38	0.53
P-315	MH-316	MH-315	Existing	18	0.0014	612	0.013	0.77	1.39	2.54	0.57	0.79	0.38	0.53
P-314	MH-315	MH-314	Existing	36	0.0006	610	0.013	4.30	7.75	10.21	1.36	1.95	0.45	0.65
P-313	MH-314	MH-313	Existing	36	0.0009	632	0.013	4.30	7.75	13.21	1.18	1.65	0.39	0.55
P-312	MH-313	MH-312	Existing	36	0.0008	635	0.013	4.47	8.05	11.88	1.28	1.81	0.43	0.60
P-311	MH-312	MH-311	Existing	36	0.0004	652	0.013	4.47	8.05	9.12	1.48	2.19	0.49	0.73
P-310	MH-311	MH-310	Existing	42	0.0002	383	0.013	4.64	8.35	8.82	1.80	2.72	0.52	0.78
P-309	MH-310	MH-309	Existing	42	0.0006	327	0.013	4.64	8.35	16.53	1.27	1.76	0.36	0.50
P-308	MH-309	MH-308	Existing	42	0.0006	100	0.013	4.71	8.47	16.00	1.30	1.81	0.37	0.52
P-307	MH-308	MH-307	Existing	42	0.0008	647	0.013	4.71	8.47	18.66	1.20	1.65	0.34	0.47
P-306	MH-307	MH-306	Existing	42	0.0008	655	0.013	4.71	8.47	18.90	1.19	1.64	0.34	0.47
P-305	MH-306	MH-305	Existing	42	0.0006	673	0.013	4.71	8.47	15.69	1.31	1.83	0.38	0.52
P-304	MH-305	MH-304	Existing	42	0.0005	664	0.013	4.77	8.59	15.19	1.35	1.88	0.39	0.54
P-303	MH-304	MH-303	Existing	42	0.0008	668	0.013	4.77	8.59	18.19	1.22	1.69	0.35	0.48
P-302	MH-303	MH-302	Existing	42	0.0008	667	0.013	4.77	8.59	17.86	1.24	1.71	0.35	0.49
P-301	MH-302	MH-218A	Existing	42	0.0005	667	0.013	4.77	8.59	15.15	1.35	1.89	0.39	0.54

Table 13 Pipe Flows - Brimhall-Mohawk Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-365	MH-365	MH-364	Future	12	0.0020	2,054	0.013	0.04	0.08	1.03	0.14	0.19	0.14	0.19
P-364	MH-364	MH-363	Future	12	0.0012	2,256	0.013	0.13	0.23	0.80	0.27	0.36	0.27	0.36
P-1454	MH-363	MH-349	Future	12	0.0013	2,073	0.013	0.16	0.29	0.83	0.30	0.41	0.30	0.41
P-362	MH-362	MH-361	Future	12	0.0014	3,555	0.013	0.05	0.09	0.88	0.16	0.22	0.16	0.22
P-1456	MH-361	MH-344	Future	12	0.0008	1,922	0.013	0.10	0.18	0.65	0.27	0.36	0.27	0.36
P-360	MH-360	MH-341	Future	12	0.0009	1,678	0.013	0.03	0.05	0.69	0.13	0.17	0.13	0.17
P-1522	MH-358	MH-325B	Future	12	0.0020	5,360	0.013	0.34	0.61	1.03	0.40	0.55	0.40	0.55
P-356	MH-357	MH-356	Existing	15	0.0068	25	0.013	0.03	0.06	3.45	0.08	0.11	0.07	0.09
P-355	MH-356	MH-355	Existing	15	0.0028	476	0.013	0.03	0.06	2.22	0.10	0.14	0.08	0.11
P-354	MH-355	MH-354	Existing	15	0.0027	63	0.013	0.03	0.06	2.18	0.10	0.14	0.08	0.11
P-353	MH-354	MH-353	Existing	15	0.0028	230	0.013	0.03	0.06	2.23	0.10	0.14	0.08	0.11
P-352	MH-353	MH-352	Existing	15	0.0028	188	0.013	0.06	0.11	2.20	0.14	0.19	0.12	0.15
P-351	MH-352	MH-351	Existing	15	0.0028	319	0.013	0.06	0.11	2.20	0.14	0.19	0.12	0.15
P-350	MH-351	MH-350	Existing	15	0.0028	403	0.013	0.06	0.11	2.23	0.14	0.19	0.12	0.15
P-349	MH-350	MH-349	Existing	15	0.0033	404	0.013	0.06	0.11	2.42	0.14	0.18	0.11	0.15
P-348	MH-349	MH-348	Existing	18	0.0011	638	0.013	0.26	0.46	2.26	0.34	0.46	0.23	0.31
P-347	MH-348	MH-347	Existing	18	0.0011	600	0.013	0.26	0.46	2.26	0.34	0.46	0.23	0.31
P-346	MH-347	MH-346	Existing	18	0.0011	600	0.013	0.26	0.46	2.26	0.34	0.46	0.23	0.31
P-345	MH-346	MH-345	Existing	18	0.0011	499	0.013	0.26	0.46	2.28	0.34	0.46	0.23	0.30
P-344	MH-345	MH-344	Existing	18	0.0011	492	0.013	0.29	0.52	2.28	0.36	0.49	0.24	0.32
P-343	MH-344	MH-343	Existing	18	0.0011	600	0.013	0.39	0.70	2.26	0.42	0.57	0.28	0.38
P-342	MH-343	MH-342	Existing	18	0.0011	600	0.013	0.39	0.70	2.26	0.42	0.57	0.28	0.38
P-341	MH-342	MH-341	Existing	18	0.0011	600	0.013	0.42	0.75	2.26	0.44	0.60	0.29	0.40
P-340	MH-341	MH-340	Existing	18	0.0011	501	0.013	0.44	0.80	2.26	0.45	0.62	0.30	0.41
P-339	MH-340	MH-339	Existing	18	0.0011	500	0.013	0.48	0.87	2.26	0.47	0.65	0.31	0.43
P-338	MH-339	MH-338	Existing	18	0.0011	461	0.013	0.48	0.87	2.24	0.47	0.65	0.32	0.43
P-337	MH-338	MH-337	Existing	18	0.0012	426	0.013	0.48	0.87	2.38	0.46	0.63	0.31	0.42
P-336	MH-337	MH-336	Existing	18	0.0011	468	0.013	0.52	0.94	2.25	0.49	0.68	0.33	0.45
P-335	MH-336	MH-335	Existing	18	0.0011	467	0.013	0.52	0.94	2.27	0.49	0.67	0.33	0.45
P-334	MH-335	MH-334	Existing	18	0.0011	475	0.013	0.52	0.94	2.25	0.49	0.68	0.33	0.45
P-333	MH-334	MH-333	Existing	18	0.0011	497	0.013	0.57	1.02	2.26	0.51	0.71	0.34	0.47
P-332	MH-333	MH-332	Existing	18	0.0011	535	0.013	0.57	1.02	2.26	0.51	0.71	0.34	0.47
P-331	MH-332	MH-331	Existing	18	0.0011	531	0.013	0.57	1.02	2.25	0.51	0.71	0.34	0.47

Table 13 Pipe Flows - Brimhall-Mohawk Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-330	MH-331	MH-330	Existing	18	0.0011	531	0.013	0.61	1.09	2.27	0.53	0.73	0.35	0.49
P-329	MH-330	MH-329	Existing	18	0.0011	531	0.013	0.61	1.09	2.25	0.53	0.74	0.36	0.49
P-328	MH-329	MH-328	Existing	18	0.0011	572	0.013	0.61	1.09	2.26	0.53	0.74	0.35	0.49
P-327	MH-328	MH-327	Existing	18	0.0011	600	0.013	0.65	1.17	2.26	0.55	0.76	0.37	0.51
P-326	MH-327	MH-326	Existing	18	0.0011	607	0.013	0.65	1.17	2.24	0.55	0.77	0.37	0.51
P-325B	MH-326	MH-325B	Existing	18	0.0010	210	0.013	0.65	1.17	2.20	0.56	0.78	0.37	0.52
P-325A	MH-325B	MH-325A	Existing	18	0.0011	397	0.013	1.10	1.97	2.27	0.74	1.08	0.49	0.72
P-324	MH-325A	MH-324	Existing	18	0.0011	600	0.013	1.10	1.97	2.26	0.74	1.09	0.49	0.72
P-323	MH-324	MH-323	Existing	18	0.0011	470	0.013	1.16	2.10	2.26	0.76	1.14	0.51	0.76
P-322	MH-323	MH-322	Existing	18	0.0014	258	0.013	1.16	2.10	2.51	0.72	1.05	0.48	0.70
P-321	MH-322	MH-321	Existing	18	0.0008	600	0.013	1.16	2.10	1.91	0.85	1.50	0.57	1.00
P-320	MH-321	MH-320	Existing	18	0.0014	600	0.013	1.23	2.22	2.50	0.74	1.10	0.50	0.73
P-319	MH-320	MH-319	Existing	18	0.0013	75	0.013	1.23	2.22	2.49	0.75	1.10	0.50	0.74
P-318	MH-319	MH-318	Existing	18	0.0014	600	0.013	1.23	2.22	2.50	0.74	1.10	0.50	0.73
P-317	MH-318	MH-317	Existing	18	0.0013	600	0.013	1.26	1.98	2.49	0.75	1.01	0.50	0.68
P-1552	MH-318	MH-316	Future	12	0.0020	1,216	0.013	0.15	0.54	1.03	0.25	0.51	0.25	0.51
P-316	MH-317	MH-316	Existing	18	0.0014	600	0.013	1.26	1.98	2.50	0.75	1.01	0.50	0.67
P-315	MH-316	MH-315	Existing	18	0.0014	612	0.013	1.40	2.52	2.54	0.80	1.22	0.53	0.81
P-314	MH-315	MH-314	Existing	36	0.0006	610	0.013	5.25	9.45	10.21	1.53	2.28	0.51	0.76
P-313	MH-314	MH-313	Existing	36	0.0009	632	0.013	5.25	9.45	13.21	1.32	1.88	0.44	0.63
P-312	MH-313	MH-312	Existing	36	0.0008	635	0.013	5.42	9.75	11.88	1.42	2.07	0.47	0.69
P-1770	MH-312	MH-311	Future	36	0.0004	684	0.011	5.42	9.75	10.52	1.53	2.28	0.51	0.76
P-1768	MH-311	MH-310	Future	42	0.0008	407	0.011	5.59	10.05	21.61	1.21	1.68	0.35	0.48
P-309	MH-310	MH-309	Existing	42	0.0006	327	0.013	5.59	10.05	16.53	1.40	1.97	0.40	0.56
P-308	MH-309	MH-308	Existing	42	0.0006	100	0.013	5.65	10.17	16.00	1.44	2.03	0.41	0.58
P-307	MH-308	MH-307	Existing	42	0.0008	647	0.013	5.65	10.17	18.66	1.32	1.84	0.38	0.53
P-306	MH-307	MH-306	Existing	42	0.0008	655	0.013	5.65	10.17	18.90	1.31	1.83	0.38	0.52
P-305	MH-306	MH-305	Existing	42	0.0006	673	0.013	5.65	10.17	15.69	1.45	2.05	0.42	0.59
P-304	MH-305	MH-304	Existing	42	0.0005	664	0.013	5.72	10.29	15.19	1.49	2.11	0.43	0.60
P-303	MH-304	MH-303	Existing	42	0.0008	668	0.013	5.72	10.29	18.19	1.35	1.88	0.39	0.54
P-302	MH-303	MH-302	Existing	42	0.0008	667	0.013	5.72	10.29	17.86	1.36	1.91	0.39	0.54
P-301	MH-302	MH-218A	Existing	42	0.0005	667	0.013	5.72	10.29	15.15	1.49	2.12	0.43	0.60
P-1450	MH-1302	MH-358	Future	12	0.0020	2,608	0.013	0.11	0.20	1.03	0.22	0.30	0.22	0.30

Table 14 Manhole Loading - Buena Vista Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-240	0.00	0.00
MH-243	0.08	0.15
MH-246	0.00	0.00
MH-249	0.00	0.00
MH-254A	0.00	0.00
MH-252	0.08	0.15
MH-258	0.08	0.15
MH-261	0.00	0.00
MH-264	0.00	0.00
MH-267	0.00	0.00
MH-270	0.00	0.00
MH-273	0.00	0.00
MH-279	0.00	0.00
MH-282	0.00	0.00
MH-245	0.08	0.15
MH-248	0.08	0.15
MH-242	0.00	0.00
MH-251	0.00	0.00
MH-254	0.08	0.15
MH-257	0.00	0.00
MH-260	0.00	0.00
MH-263	0.00	0.00
MH-266	0.00	0.00
MH-269	0.21	0.38
MH-272	0.00	0.00
MH-275	0.21	0.38
MH-278	0.00	0.00
MH-281	0.09	0.17
MH-241	0.12	0.21
MH-244	0.00	0.00
MH-247	0.00	0.00
MH-250	0.08	0.15
MH-253	0.00	0.00
MH-256	0.00	0.00

Table 14 Manhole Loading - Buena Vista Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-259	0.00	0.00
MH-262	0.00	0.00
MH-265	0.00	0.00
MH-268	0.00	0.00
MH-271	0.00	0.00
MH-274	0.00	0.00
MH-254B	0.17	0.30
MH-277	0.09	0.17
MH-280	0.00	0.00
MH-233	0.12	0.21
MH-210	0.16	0.30
MH-224	0.00	0.00
MH-215	0.00	0.00
MH-206	0.00	0.00
MH-218A	0.07	0.12
MH-236	0.12	0.21
MH-227	0.00	0.00
MH-231	0.00	0.00
MH-209	0.00	0.00
MH-222	0.08	0.14
MH-213	0.00	0.00
MH-239	0.00	0.00
MH-220	0.00	0.00
MH-234	0.00	0.00
MH-211	0.00	0.00
MH-225	0.00	0.00
MH-216	0.33	0.59
MH-207	0.00	0.00
MH-218B	0.00	0.00
MH-237	0.00	0.00
MH-228	0.00	0.00
MH-219	0.00	0.00
MH-232	0.00	0.00
MH-223	0.00	0.00

Table 14 Manhole Loading - Buena Vista Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-214	0.00	0.00
MH-205	0.00	0.00
MH-230	0.34	0.61
MH-221	0.00	0.00
MH-235	0.00	0.00
MH-212	0.33	0.59
MH-226	0.00	0.00
MH-217	0.00	0.00
MH-208	0.33	0.59
MH-238	0.12	0.21
MH-229	0.00	0.00
MH-1340	0.19	0.34
MH-1434	0.12	0.21
MH-1438	0.00	0.00
MH-1448	0.00	0.00
MH-283	0.08	0.14
MH-284	0.13	0.24
MH-1292	0.16	0.29
MH-1436	0.00	0.00

Table 15 Pipe Flows - Buena Vista Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-279	MH-1340	MH-282	Existing	10	0.0024	243	0.013	0.19	0.34	0.70	0.30	0.41	0.36	0.49
P-278	MH-282	MH-281	Existing	10	0.0025	307	0.013	0.19	0.34	0.71	0.29	0.41	0.35	0.49
P-277	MH-281	MH-280	Existing	10	0.0026	293	0.013	0.28	0.51	0.72	0.36	0.52	0.44	0.62
P-276	MH-280	MH-279	Existing	10	0.0006	333	0.013	0.28	0.51	0.34	0.58	0.83	0.70	1.00
P-275	MH-279	MH-278	Existing	10	0.0025	393	0.013	0.28	0.51	0.71	0.37	0.52	0.44	0.63
P-274	MH-278	MH-277	Existing	10	0.0026	393	0.013	0.28	0.51	0.72	0.36	0.52	0.44	0.62
P-273	MH-277	9036	Existing	10	0.0025	147	0.013	0.38	0.68	0.71	0.43	0.65	0.52	0.78
P-272	MH-275	MH-274	Existing	12	0.0020	400	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-271	MH-274	MH-273	Existing	12	0.0020	307	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-270	MH-273	MH-272	Existing	12	0.0020	167	0.013	0.21	0.38	1.04	0.31	0.42	0.31	0.42
P-269	MH-272	MH-271	Existing	12	0.0020	385	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-268	MH-271	MH-270	Existing	12	0.0020	221	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-267	MH-270	MH-269	Existing	12	0.0020	400	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-266	MH-269	MH-268	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-265	MH-268	MH-267	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-264	MH-267	MH-266	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-263	MH-266	MH-265	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-262	MH-265	MH-264	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-261	MH-264	MH-263	Existing	12	0.0020	374	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-260	MH-263	MH-262	Existing	12	0.0020	379	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-259	MH-262	MH-261	Existing	12	0.0020	385	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-258	MH-261	MH-260	Existing	12	0.0020	263	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-257	MH-260	MH-259	Existing	12	0.0020	264	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-256	MH-259	MH-258	Existing	12	0.0020	263	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-255	MH-258	MH-257	Existing	12	0.0020	299	0.013	0.51	0.91	1.03	0.50	0.74	0.50	0.74
P-254	MH-257	MH-256	Existing	12	0.0020	299	0.013	0.51	0.91	1.04	0.50	0.73	0.50	0.73
P-281	MH-256	9016	Existing	12	0.0023	91	0.013	0.51	0.91	1.11	0.48	0.69	0.48	0.69
P-254A	MH-254B	MH-254A	Existing	12	0.0033	2,087	0.013	0.17	0.30	1.33	0.24	0.33	0.24	0.33
P-253	MH-254A	MH-254	Existing	12	0.0020	300	0.013	0.17	0.30	1.03	0.27	0.37	0.27	0.37
P-252	MH-254	MH-253	Existing	12	0.0020	317	0.013	0.25	0.45	1.03	0.34	0.47	0.34	0.47
P-251	MH-253	MH-252	Existing	18	0.0011	310	0.013	0.25	0.45	2.29	0.34	0.45	0.22	0.30
P-250	MH-252	MH-251	Existing	18	0.0011	600	0.013	0.34	0.61	2.24	0.39	0.53	0.26	0.36
P-249	MH-251	MH-250	Existing	18	0.0011	547	0.013	0.34	0.61	2.26	0.39	0.53	0.26	0.35

Table 15 Pipe Flows - Buena Vista Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-248	MH-250	MH-249	Existing	18	0.0011	523	0.013	0.42	0.76	2.27	0.44	0.60	0.29	0.40
P-247	MH-249	MH-248	Existing	18	0.0011	670	0.013	0.42	0.76	2.26	0.44	0.60	0.29	0.40
P-246	MH-248	MH-247	Existing	21	0.0009	180	0.013	0.50	0.91	3.06	0.48	0.65	0.28	0.37
P-245	MH-247	MH-246	Existing	21	0.0009	563	0.013	0.50	0.91	3.09	0.48	0.65	0.27	0.37
P-244	MH-246	MH-245	Existing	21	0.0009	600	0.013	0.50	0.91	3.08	0.48	0.65	0.27	0.37
P-243	MH-245	MH-244	Existing	21	0.0009	537	0.013	0.59	1.06	3.07	0.52	0.71	0.30	0.41
P-242	MH-244	MH-243	Existing	21	0.0009	607	0.013	0.59	1.06	3.09	0.52	0.71	0.30	0.40
P-280	MH-243	9016	Existing	21	0.0011	66	0.013	0.67	1.21	3.33	0.53	0.73	0.31	0.42
P-241	MH-242	MH-241	Existing	24	0.0046	569	0.013	1.56	2.80	9.89	0.54	0.73	0.27	0.36
P-240	MH-241	MH-240	Existing	24	0.0006	579	0.013	1.68	3.02	3.55	0.97	1.42	0.48	0.71
P-239	MH-240	MH-239	Existing	24	0.0006	345	0.013	1.68	3.02	3.62	0.96	1.40	0.48	0.70
P-238	MH-239	MH-238	Existing	24	0.0006	355	0.013	1.68	3.02	3.57	0.96	1.41	0.48	0.71
P-237	MH-238	MH-237	Existing	24	0.0006	260	0.013	1.79	3.23	3.64	0.99	1.47	0.50	0.73
P-236	MH-237	MH-1448	Existing	24	0.0006	535	0.013	1.79	3.23	3.59	1.00	1.48	0.50	0.74
P-1772	MH-1448	MH-236	Existing	24	0.0188	18	0.013	1.79	3.23	20.08	0.40	0.54	0.20	0.27
P-235	MH-236	MH-235	Existing	24	0.0020	234	0.013	1.91	3.44	7.68	0.68	0.94	0.34	0.47
P-234	MH-235	MH-234	Existing	24	0.0012	600	0.013	1.91	3.44	5.96	0.78	1.09	0.39	0.55
P-233	MH-234	MH-233	Existing	24	0.0008	567	0.013	1.91	3.44	4.13	0.96	1.39	0.48	0.70
P-232	MH-233	MH-232	Existing	24	0.0008	334	0.013	2.03	3.65	4.17	0.98	1.45	0.49	0.73
P-231	MH-232	MH-231	Existing	24	0.0008	505	0.013	2.03	3.65	4.13	0.99	1.46	0.50	0.73
P-230	MH-231	MH-230	Existing	24	0.0008	242	0.013	2.03	3.65	4.10	0.99	1.47	0.50	0.74
P-229	MH-230	MH-229	Existing	24	0.0006	79	0.013	2.37	4.26	3.69	1.17	2.00	0.58	1.00
P-228	MH-229	MH-228	Existing	24	0.0007	175	0.013	2.37	4.26	4.00	1.11	2.00	0.55	1.00
P-227	MH-228	MH-227	Existing	27	0.0008	422	0.013	2.37	4.26	5.78	1.00	1.44	0.45	0.64
P-226	MH-227	MH-226	Existing	27	0.0008	316	0.013	2.37	4.26	5.76	1.01	1.44	0.45	0.64
P-225	MH-226	MH-225	Existing	27	0.0008	316	0.013	2.37	4.26	5.65	1.02	1.46	0.45	0.65
P-224	MH-225	MH-224	Existing	27	0.0008	595	0.013	2.37	4.26	5.64	1.02	1.46	0.45	0.65
P-223	MH-224	MH-223	Existing	27	0.0008	377	0.013	2.37	4.26	5.75	1.01	1.44	0.45	0.64
P-222	MH-223	MH-222	Existing	27	0.0008	525	0.013	2.37	4.26	5.68	1.01	1.46	0.45	0.65
P-221	MH-222	MH-221	Existing	30	0.0008	177	0.013	2.44	4.40	7.75	0.97	1.35	0.39	0.54
P-220	MH-221	MH-220	Existing	30	0.0008	600	0.013	2.44	4.40	7.52	0.98	1.37	0.39	0.55
P-219	MH-220	MH-219	Existing	30	0.0008	361	0.013	2.44	4.40	7.53	0.98	1.37	0.39	0.55
P-218B	MH-219	MH-218B	Existing	30	0.0008	1,456	0.013	2.44	4.40	7.54	0.98	1.37	0.39	0.55

Table 15 Pipe Flows - Buena Vista Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-218A	MH-218B	MH-218A	Existing	30	0.0008	101	0.013	2.44	4.40	7.50	0.98	1.38	0.39	0.55
P-217	MH-218A	MH-217	Existing	42	0.0014	22	0.013	7.28	13.10	23.95	1.32	1.85	0.38	0.53
P-216	MH-217	MH-216	Existing	42	0.0007	434	0.013	7.28	13.10	17.71	1.56	2.24	0.45	0.64
P-215	MH-216	MH-215	Existing	42	0.0008	494	0.013	7.61	13.69	18.08	1.58	2.28	0.45	0.65
P-214	MH-215	MH-214	Existing	42	0.0007	472	0.013	7.61	13.69	17.75	1.60	2.31	0.46	0.66
P-213	MH-214	MH-213	Existing	42	0.0008	611	0.013	7.61	13.69	17.90	1.59	2.29	0.46	0.66
P-212	MH-213	MH-212	Existing	42	0.0008	611	0.013	7.61	13.69	17.89	1.59	2.29	0.46	0.66
P-211	MH-212	MH-211	Existing	42	0.0007	623	0.013	7.94	14.29	17.72	1.64	2.38	0.47	0.68
P-210	MH-211	MH-210	Existing	42	0.0008	622	0.013	7.94	14.29	17.92	1.63	2.36	0.47	0.68
P-209	MH-210	MH-209	Existing	42	0.0008	345	0.013	8.10	14.58	17.89	1.65	2.40	0.47	0.69
P-208	MH-209	MH-208	Existing	42	0.0008	382	0.013	8.10	14.58	18.27	1.63	2.36	0.47	0.68
P-207	MH-208	MH-207	Existing	42	0.0008	80	0.013	8.43	15.17	17.85	1.69	2.48	0.48	0.71
P-206	MH-207	MH-206	Existing	42	0.0008	94	0.013	8.43	15.17	18.98	1.63	2.37	0.47	0.68
P-205	MH-206	MH-205	Existing	42	0.0014	7	0.013	8.43	15.17	24.81	1.41	1.98	0.40	0.57
P-204	MH-205	MH-1338	Existing	42	0.0009	1,351	0.013	8.43	15.17	19.35	1.62	2.33	0.46	0.67

Table 16 Pipe Flows - Buena Vista Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-284	MH-284	MH-283	Future	12	0.0027	1,788	0.013	0.13	0.24	1.19	0.23	0.31	0.23	0.31
P-283	MH-283	MH-222	Future	12	0.0024	1,894	0.013	0.21	0.38	1.13	0.29	0.40	0.29	0.40
P-279	MH-1340	MH-282	Existing	10	0.0024	243	0.013	0.19	0.34	0.70	0.30	0.41	0.36	0.49
P-278	MH-282	MH-281	Existing	10	0.0025	307	0.013	0.19	0.34	0.71	0.29	0.41	0.35	0.49
P-277	MH-281	MH-280	Existing	10	0.0026	293	0.013	0.28	0.51	0.72	0.36	0.52	0.44	0.62
P-276	MH-280	MH-279	Existing	10	0.0006	333	0.013	0.28	0.51	0.34	0.58	0.83	0.70	1.00
P-275	MH-279	MH-278	Existing	10	0.0025	393	0.013	0.28	0.51	0.71	0.37	0.52	0.44	0.63
P-274	MH-278	MH-277	Existing	10	0.0026	393	0.013	0.28	0.51	0.72	0.36	0.52	0.44	0.62
P-273	MH-277	9036	Existing	10	0.0025	147	0.013	0.38	0.68	0.71	0.43	0.65	0.52	0.78
P-272	MH-275	MH-274	Existing	12	0.0020	400	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-271	MH-274	MH-273	Existing	12	0.0020	307	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-270	MH-273	MH-272	Existing	12	0.0020	167	0.013	0.21	0.38	1.04	0.31	0.42	0.31	0.42
P-269	MH-272	MH-271	Existing	12	0.0020	385	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-268	MH-271	MH-270	Existing	12	0.0020	221	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-267	MH-270	MH-269	Existing	12	0.0020	400	0.013	0.21	0.38	1.03	0.31	0.42	0.31	0.42
P-266	MH-269	MH-268	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-265	MH-268	MH-267	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-264	MH-267	MH-266	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-263	MH-266	MH-265	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-262	MH-265	MH-264	Existing	12	0.0020	400	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-261	MH-264	MH-263	Existing	12	0.0020	374	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-260	MH-263	MH-262	Existing	12	0.0020	379	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-259	MH-262	MH-261	Existing	12	0.0020	385	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-258	MH-261	MH-260	Existing	12	0.0020	263	0.013	0.42	0.76	1.03	0.45	0.64	0.45	0.64
P-257	MH-260	MH-259	Existing	12	0.0020	264	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-256	MH-259	MH-258	Existing	12	0.0020	263	0.013	0.42	0.76	1.04	0.45	0.64	0.45	0.64
P-255	MH-258	MH-257	Existing	12	0.0020	299	0.013	0.51	0.91	1.03	0.50	0.74	0.50	0.74
P-254	MH-257	MH-256	Existing	12	0.0020	299	0.013	0.51	0.91	1.04	0.50	0.73	0.50	0.73
P-281	MH-256	9016	Existing	12	0.0023	91	0.013	0.51	0.91	1.11	0.48	0.69	0.48	0.69
P-254A	MH-254B	MH-254A	Existing	12	0.0033	2,087	0.013	0.17	0.30	1.33	0.24	0.33	0.24	0.33
P-253	MH-254A	MH-254	Existing	12	0.0020	300	0.013	0.17	0.30	1.03	0.27	0.37	0.27	0.37
P-252	MH-254	MH-253	Existing	12	0.0020	317	0.013	0.25	0.45	1.03	0.34	0.47	0.34	0.47
P-251	MH-253	MH-252	Existing	18	0.0011	310	0.013	0.25	0.45	2.29	0.34	0.45	0.22	0.30

Table 16 Pipe Flows - Buena Vista Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-250	MH-252	MH-251	Existing	18	0.0011	600	0.013	0.34	0.61	2.24	0.39	0.53	0.26	0.36
P-249	MH-251	MH-250	Existing	18	0.0011	547	0.013	0.34	0.61	2.26	0.39	0.53	0.26	0.35
P-248	MH-250	MH-249	Existing	18	0.0011	523	0.013	0.42	0.76	2.27	0.44	0.60	0.29	0.40
P-247	MH-249	MH-248	Existing	18	0.0011	670	0.013	0.42	0.76	2.26	0.44	0.60	0.29	0.40
P-246	MH-248	MH-247	Existing	21	0.0009	180	0.013	0.50	0.91	3.06	0.48	0.65	0.28	0.37
P-245	MH-247	MH-246	Existing	21	0.0009	563	0.013	0.50	0.91	3.09	0.48	0.65	0.27	0.37
P-244	MH-246	MH-245	Existing	21	0.0009	600	0.013	0.50	0.91	3.08	0.48	0.65	0.27	0.37
P-243	MH-245	MH-244	Existing	21	0.0009	537	0.013	0.59	1.06	3.07	0.52	0.71	0.30	0.41
P-242	MH-244	MH-243	Existing	21	0.0009	607	0.013	0.59	1.06	3.09	0.52	0.71	0.30	0.40
P-280	MH-243	9016	Existing	21	0.0011	66	0.013	0.67	1.21	3.33	0.53	0.73	0.31	0.42
P-241	MH-242	MH-241	Existing	24	0.0046	569	0.013	1.56	2.80	9.89	0.54	0.73	0.27	0.36
P-240	MH-241	MH-240	Existing	24	0.0006	579	0.013	1.68	3.02	3.55	0.97	1.42	0.48	0.71
P-239	MH-240	MH-239	Existing	24	0.0006	345	0.013	1.68	3.02	3.62	0.96	1.40	0.48	0.70
P-238	MH-239	MH-238	Existing	24	0.0006	355	0.013	1.68	3.02	3.57	0.96	1.41	0.48	0.71
P-237	MH-238	MH-237	Existing	24	0.0006	260	0.013	1.79	3.23	3.64	0.99	1.47	0.50	0.73
P-236	MH-237	MH-1448	Existing	24	0.0006	535	0.013	1.79	3.23	3.59	1.00	1.48	0.50	0.74
P-1774	MH-1448	9030	Future	36	0.2008	4	0.011	1.79	3.23	228.93	0.19	0.25	0.06	0.08
P-1778	MH-236	MH-235	Future	24	0.0025	228	0.011	2.19	3.94	8.58	0.69	0.95	0.34	0.48
P-234	MH-235	MH-234	Existing	24	0.0012	600	0.013	1.10	1.98	5.96	0.58	0.79	0.29	0.40
P-1780	MH-235	MH-234	Future	24	0.0012	612	0.011	1.09	1.96	5.90	0.58	0.79	0.29	0.40
P-233	MH-234	MH-233	Existing	24	0.0008	567	0.013	2.19	3.94	4.13	1.04	1.56	0.52	0.78
P-232	MH-233	MH-232	Existing	24	0.0008	334	0.013	2.31	4.15	4.17	1.06	1.63	0.53	0.82
P-231	MH-232	MH-231	Existing	24	0.0008	505	0.013	2.31	4.15	4.13	1.07	2.00	0.54	1.00
P-230	MH-231	MH-230	Existing	24	0.0008	242	0.013	2.31	4.15	4.10	1.07	2.00	0.54	1.00
P-1782	MH-230	MH-229	Future	24	0.0005	99	0.011	2.65	4.76	3.89	1.21	2.00	0.61	1.00
P-1784	MH-229	MH-228	Future	24	0.0006	200	0.011	2.65	4.76	4.41	1.12	2.00	0.56	1.00
P-227	MH-228	MH-227	Existing	27	0.0008	422	0.013	2.65	4.76	5.78	1.07	1.56	0.48	0.69
P-226	MH-227	MH-226	Existing	27	0.0008	316	0.013	2.65	4.76	5.76	1.07	1.56	0.48	0.69
P-225	MH-226	MH-225	Existing	27	0.0008	316	0.013	2.65	4.76	5.65	1.08	1.58	0.48	0.70
P-224	MH-225	MH-224	Existing	27	0.0008	595	0.013	2.65	4.76	5.64	1.08	1.59	0.48	0.70
P-223	MH-224	MH-223	Existing	27	0.0008	377	0.013	2.65	4.76	5.75	1.07	1.56	0.48	0.69
P-222	MH-223	MH-222	Existing	27	0.0008	525	0.013	2.65	4.76	5.68	1.08	1.58	0.48	0.70
P-221	MH-222	MH-221	Existing	30	0.0008	177	0.013	2.93	5.28	7.75	1.07	1.51	0.43	0.61

Table 16 Pipe Flows - Buena Vista Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-220	MH-221	MH-220	Existing	30	0.0008	600	0.013	2.93	5.28	7.52	1.08	1.54	0.43	0.62
P-219	MH-220	MH-219	Existing	30	0.0008	361	0.013	2.93	5.28	7.53	1.08	1.54	0.43	0.62
P-218B	MH-219	MH-218B	Existing	30	0.0008	1,456	0.013	2.93	5.28	7.54	1.08	1.54	0.43	0.62
P-218A	MH-218B	MH-218A	Existing	30	0.0008	101	0.013	2.93	5.28	7.50	1.09	1.55	0.43	0.62
P-217	MH-218A	MH-217	Existing	42	0.0014	22	0.013	8.71	15.68	23.95	1.46	2.07	0.42	0.59
P-216	MH-217	MH-216	Existing	42	0.0007	434	0.013	8.71	15.68	17.71	1.73	2.56	0.50	0.73
P-215	MH-216	MH-215	Existing	42	0.0008	494	0.013	9.04	16.27	18.08	1.75	2.60	0.50	0.74
P-214	MH-215	MH-214	Existing	42	0.0007	472	0.013	9.04	16.27	17.75	1.77	2.64	0.51	0.75
P-213	MH-214	MH-213	Existing	42	0.0008	611	0.013	9.04	16.27	17.90	1.76	2.62	0.50	0.75
P-212	MH-213	MH-212	Existing	42	0.0008	611	0.013	9.04	16.27	17.89	1.76	2.62	0.50	0.75
P-211	MH-212	MH-211	Existing	42	0.0007	623	0.013	9.37	16.86	17.72	1.81	2.73	0.52	0.78
P-210	MH-211	MH-210	Existing	42	0.0008	622	0.013	9.37	16.86	17.92	1.80	2.70	0.51	0.77
P-209	MH-210	MH-209	Existing	42	0.0008	345	0.013	9.53	17.16	17.89	1.82	2.75	0.52	0.79
P-208	MH-209	MH-208	Existing	42	0.0008	382	0.013	9.53	17.16	18.27	1.80	2.70	0.51	0.77
P-207	MH-208	MH-207	Existing	42	0.0008	80	0.013	9.86	17.75	17.85	1.86	2.85	0.53	0.82
P-206	MH-207	MH-206	Existing	42	0.0008	94	0.013	9.86	17.75	18.98	1.79	2.68	0.51	0.77
P-205	MH-206	MH-205	Existing	42	0.0014	7	0.013	9.86	17.75	24.81	1.53	2.19	0.44	0.63
P-204	MH-205	MH-1338	Existing	42	0.0009	1,351	0.013	9.86	17.75	19.35	1.77	2.64	0.51	0.75
P-1440	MH-1292	MH-1436	Future	8	0.0035	2,681	0.013	0.16	0.29	0.46	0.27	0.38	0.41	0.57
P-1676	MH-1436	MH-1438	Future	8	0.0035	1,277	0.013	0.16	0.29	0.46	0.27	0.38	0.41	0.57
P-1678	MH-1438	MH-1434	Existing	8	0.0015	1,349	0.013	0.16	0.29	0.30	0.35	0.53	0.52	0.79
P-1438	MH-1434	9030	Future	12	0.0020	2,620	0.013	0.28	0.50	1.04	0.35	0.49	0.35	0.49

Table 17 Manhole Loading - El Toro Viejo Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-507	0.20	0.37
MH-506	0.00	0.00
MH-505	0.00	0.00
MH-504	0.00	0.00
MH-503	0.00	0.00
MH-502	0.00	0.00
MH-500	0.20	0.37
MH-501	0.00	0.00
MH-435	0.12	0.22
MH-407	0.00	0.00
MH-482	0.00	0.00
MH-454	0.00	0.00
MH-426	0.05	0.09
MH-473	0.00	0.00
MH-445	0.00	0.00
MH-417	0.00	0.00
MH-492	0.00	0.00
MH-464	0.00	0.00
MH-436	0.00	0.00
MH-408	0.11	0.20
MH-483	0.04	0.08
MH-455	0.07	0.13
MH-427	0.00	0.00
MH-474	0.00	0.00
MH-446	0.00	0.00
MH-418	0.04	0.08
MH-465	0.00	0.00
MH-437	0.00	0.00
MH-409	0.00	0.00
MH-456	0.00	0.00
MH-428	0.00	0.00
MH-447	0.04	0.08
MH-419	0.00	0.00
MH-493	0.00	0.00

Table 17 Manhole Loading - El Toro Viejo Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-438	0.12	0.22
MH-484	0.12	0.22
MH-457	0.00	0.00
MH-429	0.20	0.36
MH-475	0.00	0.00
MH-448	0.00	0.00
MH-494	0.00	0.00
MH-466	0.09	0.15
MH-439	0.00	0.00
MH-485	0.00	0.00
MH-410	0.00	0.00
MH-476	0.00	0.00
MH-495	0.00	0.00
MH-467	0.12	0.21
MH-420	0.04	0.08
MH-486	0.00	0.00
MH-458	0.00	0.00
MH-411	0.16	0.28
MH-477	0.00	0.00
MH-449	0.00	0.00
MH-430	0.03	0.05
MH-402	0.00	0.00
MH-496	0.00	0.00
MH-468	0.00	0.00
MH-421	0.00	0.00
MH-487	0.00	0.00
MH-459	0.00	0.00
MH-440	0.00	0.00
MH-412	0.00	0.00
MH-478	0.06	0.10
MH-431	0.00	0.00
MH-403	0.00	0.00
MH-497	0.00	0.00
MH-469	0.00	0.00

Table 17 Manhole Loading - El Toro Viejo Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-450	0.00	0.00
MH-422	0.09	0.16
MH-488	0.00	0.00
MH-441	0.00	0.00
MH-413	0.09	0.16
MH-479	0.00	0.00
MH-460	0.00	0.00
MH-432	0.22	0.39
MH-404	0.11	0.20
MH-498	0.12	0.22
MH-451	0.07	0.13
MH-423	0.21	0.38
MH-489	0.00	0.00
MH-470	0.00	0.00
MH-442	0.00	0.00
MH-414	0.00	0.00
MH-461	0.20	0.36
MH-433	0.00	0.00
MH-405	0.00	0.00
MH-499	0.00	0.00
MH-480	0.04	0.08
MH-452	0.00	0.00
MH-424	0.00	0.00
MH-471	0.00	0.00
MH-443	0.04	0.08
MH-415	0.04	0.08
MH-490	0.00	0.00
MH-462	0.00	0.00
MH-434	0.00	0.00
MH-406	0.00	0.00
MH-481	0.00	0.00
MH-453	0.00	0.00
MH-425	0.00	0.00
MH-472	0.06	0.10

Table 17 Manhole Loading - El Toro Viejo Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-444	0.00	0.00
MH-416	0.00	0.00
MH-491	0.12	0.22
MH-463	0.00	0.00
MH-1300	0.09	0.15
MH-1444	0.12	0.21
MH-1446	0.12	0.21

Table 18 Pipe Flows - El Toro Viejo Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-507	MH-507	MH-506	Existing	10	0.0028	532	0.013	0.20	0.37	0.75	0.30	0.41	0.36	0.49
P-506	MH-506	MH-505	Existing	10	0.0028	812	0.013	0.20	0.37	0.75	0.30	0.41	0.36	0.49
P-505	MH-505	MH-504	Existing	10	0.0027	1,211	0.013	0.20	0.37	0.74	0.30	0.41	0.36	0.50
P-504	MH-504	MH-503	Existing	12	0.0030	264	0.013	0.20	0.37	1.26	0.27	0.37	0.27	0.37
P-503	MH-503	MH-502	Existing	12	0.0025	553	0.013	0.20	0.37	1.16	0.28	0.39	0.28	0.39
P-502	MH-502	MH-501	Existing	12	0.0045	133	0.013	0.20	0.37	1.55	0.25	0.33	0.25	0.33
P-501	MH-501	MH-500	Existing	12	0.0018	432	0.013	0.20	0.37	0.97	0.31	0.43	0.31	0.43
P-500	MH-500	MH-499	Existing	12	0.0036	259	0.013	0.41	0.73	1.38	0.37	0.52	0.37	0.52
P-498	MH-499	MH-498	Existing	15	0.0004	336	0.013	0.41	0.73	0.85	0.61	0.89	0.49	0.71
P-497	MH-498	MH-497	Existing	15	0.0049	211	0.013	0.53	0.95	2.94	0.36	0.49	0.29	0.39
P-496	MH-497	MH-496	Existing	15	0.0023	307	0.013	0.53	0.95	2.00	0.44	0.61	0.35	0.49
P-495	MH-496	MH-495	Existing	15	0.0022	307	0.013	0.53	0.95	1.96	0.44	0.62	0.36	0.49
P-494	MH-495	MH-494	Existing	15	0.0022	495	0.013	0.53	0.95	1.96	0.44	0.61	0.35	0.49
P-493	MH-494	MH-493	Existing	15	0.0022	283	0.013	0.53	0.95	1.96	0.44	0.62	0.36	0.49
P-492	MH-493	MH-492	Existing	15	0.0022	360	0.013	0.53	0.95	1.96	0.44	0.61	0.36	0.49
P-491	MH-492	MH-484	Existing	15	0.0022	362	0.013	0.53	0.95	1.97	0.44	0.61	0.35	0.49
P-490	MH-491	MH-490	Existing	12	0.0119	198	0.013	0.12	0.22	2.52	0.15	0.20	0.15	0.20
P-489	MH-490	MH-489	Existing	12	0.0020	380	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-488	MH-489	MH-488	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-487	MH-488	MH-487	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-486	MH-487	MH-486	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-485	MH-486	MH-485	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-484	MH-485	MH-484	Existing	12	0.0014	401	0.013	0.12	0.22	0.86	0.25	0.34	0.25	0.34
P-483	MH-484	MH-440	Existing	18	0.0014	483	0.013	0.77	1.39	2.55	0.57	0.79	0.38	0.53
P-482	MH-483	MH-482	Existing	15	0.0011	264	0.013	0.04	0.08	1.39	0.15	0.20	0.12	0.16
P-481	MH-482	MH-481	Existing	15	0.0011	388	0.013	0.04	0.08	1.39	0.15	0.20	0.12	0.16
P-480	MH-481	MH-480	Existing	15	0.0011	327	0.013	0.04	0.08	1.41	0.15	0.20	0.12	0.16
P-479	MH-480	MH-479	Existing	15	0.0011	185	0.013	0.09	0.16	1.38	0.21	0.28	0.17	0.23
P-478	MH-479	MH-422	Existing	15	0.0011	286	0.013	0.09	0.16	1.38	0.21	0.28	0.17	0.23
P-477	MH-478	MH-477	Existing	12	0.0015	415	0.013	0.06	0.10	0.89	0.17	0.23	0.17	0.23
P-476	MH-477	MH-476	Existing	12	0.0016	389	0.013	0.06	0.10	0.92	0.17	0.23	0.17	0.23
P-475	MH-476	MH-475	Existing	12	0.0008	27	0.013	0.06	0.10	0.63	0.20	0.28	0.20	0.28
P-474	MH-475	MH-474	Existing	12	0.0020	167	0.013	0.06	0.10	1.03	0.16	0.22	0.16	0.22

Table 18 Pipe Flows - El Toro Viejo Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-473	MH-474	MH-473	Existing	12	0.0020	342	0.013	0.06	0.10	1.04	0.16	0.21	0.16	0.21
P-472	MH-473	MH-472	Existing	12	0.0020	350	0.013	0.06	0.10	1.03	0.16	0.22	0.16	0.22
P-471	MH-472	MH-471	Existing	12	0.0020	350	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-470	MH-471	MH-470	Existing	12	0.0020	380	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-469	MH-470	MH-469	Existing	12	0.0020	380	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-468	MH-469	MH-468	Existing	12	0.0020	350	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-467	MH-468	MH-467	Existing	12	0.0180	317	0.013	0.12	0.21	3.10	0.13	0.18	0.13	0.18
P-466	MH-467	MH-466	Existing	12	0.0292	84	0.013	0.23	0.42	3.94	0.17	0.22	0.17	0.22
P-465	MH-466	MH-465	Existing	15	0.0037	416	0.013	0.32	0.57	2.55	0.30	0.40	0.24	0.32
P-464	MH-465	MH-464	Existing	15	0.0037	541	0.013	0.32	0.57	2.54	0.30	0.40	0.24	0.32
P-463	MH-464	MH-463	Existing	15	0.0046	540	0.013	0.32	0.57	2.85	0.28	0.38	0.23	0.30
P-462	MH-463	MH-462	Existing	15	0.0058	278	0.013	0.32	0.57	3.18	0.27	0.36	0.21	0.29
P-461	MH-462	MH-461	Existing	15	0.0024	860	0.013	0.32	0.57	2.07	0.33	0.45	0.27	0.36
P-460	MH-461	MH-460	Existing	15	0.0037	442	0.013	0.52	0.93	2.54	0.38	0.52	0.31	0.42
P-459	MH-460	MH-459	Existing	15	0.0037	450	0.013	0.52	0.93	2.55	0.38	0.52	0.31	0.42
P-458	MH-459	MH-458	Existing	15	0.0037	416	0.013	0.52	0.93	2.55	0.38	0.52	0.31	0.42
P-457	MH-458	MH-457	Existing	15	0.0037	580	0.013	0.52	0.93	2.54	0.38	0.52	0.31	0.42
P-456	MH-457	MH-456	Existing	15	0.0037	414	0.013	0.52	0.93	2.55	0.38	0.52	0.31	0.42
P-455	MH-456	MH-432	Existing	15	0.0037	344	0.013	0.52	0.93	2.54	0.38	0.52	0.31	0.42
P-454	MH-455	MH-454	Existing	12	0.0030	310	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-453	MH-454	MH-453	Existing	12	0.0030	300	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-452	MH-453	MH-452	Existing	12	0.0030	350	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-451	MH-452	MH-451	Existing	12	0.0030	300	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-450	MH-451	MH-450	Existing	12	0.0030	350	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-449	MH-450	MH-449	Existing	12	0.0030	350	0.013	0.15	0.26	1.27	0.23	0.31	0.23	0.31
P-448	MH-449	MH-448	Existing	12	0.0030	350	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-447	MH-448	MH-432	Existing	12	0.0030	355	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-446	MH-447	MH-446	Existing	12	0.0017	339	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-445	MH-446	MH-445	Existing	12	0.0017	395	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-444	MH-445	MH-444	Existing	12	0.0017	390	0.013	0.04	0.08	0.96	0.14	0.19	0.14	0.19
P-443	MH-444	MH-443	Existing	12	0.0017	390	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-442	MH-443	MH-442	Existing	12	0.0017	390	0.013	0.09	0.16	0.95	0.20	0.27	0.20	0.27
P-441	MH-442	MH-441	Existing	12	0.0017	390	0.013	0.09	0.16	0.96	0.20	0.27	0.20	0.27

Table 18 Pipe Flows - El Toro Viejo Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-440	MH-441	MH-413	Existing	12	0.0017	390	0.013	0.09	0.16	0.95	0.20	0.27	0.20	0.27
P-439	MH-440	MH-439	Existing	18	0.0020	511	0.013	0.77	1.39	3.01	0.52	0.72	0.35	0.48
P-438	MH-439	MH-438	Existing	18	0.0014	647	0.013	0.77	1.39	2.57	0.56	0.79	0.38	0.52
P-437	MH-438	MH-437	Existing	18	0.0018	564	0.013	0.89	1.61	2.87	0.58	0.80	0.38	0.54
P-436	MH-437	MH-436	Existing	18	0.0019	604	0.013	0.89	1.61	2.95	0.57	0.79	0.38	0.53
P-435	MH-436	MH-435	Existing	18	0.0015	585	0.013	0.89	1.61	2.67	0.60	0.84	0.40	0.56
P-434	MH-435	MH-434	Existing	18	0.0017	587	0.013	1.01	1.82	2.77	0.63	0.89	0.42	0.59
P-433	MH-434	MH-433	Existing	18	0.0019	590	0.013	1.01	1.82	2.98	0.60	0.85	0.40	0.57
P-432	MH-433	MH-429	Existing	18	0.0018	547	0.013	1.01	1.82	2.87	0.62	0.87	0.41	0.58
P-431	MH-432	MH-431	Existing	21	0.0012	465	0.013	0.88	1.59	3.56	0.59	0.82	0.34	0.47
P-430	MH-431	MH-430	Existing	21	0.0019	551	0.013	0.88	1.59	4.51	0.53	0.72	0.30	0.41
P-429	MH-430	MH-429	Existing	21	0.0015	553	0.013	0.91	1.64	3.95	0.57	0.79	0.33	0.45
P-428	MH-429	MH-428	Existing	30	0.0014	484	0.013	2.12	3.82	9.81	0.79	1.08	0.32	0.43
P-427	MH-428	MH-427	Existing	30	0.0010	484	0.013	2.12	3.82	8.46	0.85	1.18	0.34	0.47
P-426	MH-427	MH-426	Existing	30	0.0007	485	0.013	2.12	3.82	7.04	0.94	1.31	0.38	0.53
P-425	MH-426	MH-425	Existing	30	0.0007	450	0.013	2.17	3.91	6.98	0.96	1.34	0.38	0.54
P-424	MH-425	MH-424	Existing	30	0.0007	360	0.013	2.17	3.91	7.00	0.96	1.34	0.38	0.53
P-423	MH-424	MH-423	Existing	30	0.0006	416	0.013	2.17	3.91	6.77	0.97	1.36	0.39	0.55
P-422	MH-423	MH-422	Existing	30	0.0008	471	0.013	2.39	4.30	7.35	0.98	1.37	0.39	0.55
P-421	MH-422	MH-421	Existing	30	0.0006	470	0.013	2.56	4.61	6.37	1.10	1.58	0.44	0.63
P-420	MH-421	MH-420	Existing	30	0.0011	389	0.013	2.56	4.61	8.73	0.93	1.29	0.37	0.52
P-419	MH-420	MH-419	Existing	30	0.0004	522	0.013	2.60	4.69	5.46	1.22	1.79	0.49	0.71
P-418	MH-419	MH-418	Existing	30	0.0007	522	0.013	2.60	4.69	6.98	1.06	1.50	0.42	0.60
P-417	MH-418	MH-417	Existing	30	0.0006	555	0.013	2.65	4.77	6.77	1.09	1.55	0.43	0.62
P-416	MH-417	MH-416	Existing	30	0.0009	400	0.013	2.65	4.77	7.86	1.00	1.41	0.40	0.56
P-415	MH-416	MH-415	Existing	30	0.0006	558	0.013	2.65	4.77	6.56	1.11	1.58	0.44	0.63
P-414	MH-415	MH-414	Existing	30	0.0006	567	0.013	2.69	4.84	6.70	1.10	1.58	0.44	0.63
P-413	MH-414	MH-413	Existing	30	0.0008	153	0.013	2.69	4.84	7.44	1.04	1.47	0.42	0.59
P-412	MH-413	MH-412	Existing	30	0.0008	418	0.013	2.86	5.16	7.58	1.07	1.51	0.43	0.61
P-411	MH-412	MH-411	Existing	30	0.0011	561	0.013	2.86	5.16	8.77	0.98	1.38	0.39	0.55
P-410	MH-411	MH-410	Existing	36	0.0004	657	0.013	3.02	5.44	8.60	1.23	1.73	0.41	0.58
P-409	MH-410	MH-409	Existing	36	0.0011	531	0.013	3.02	5.44	14.04	0.95	1.30	0.32	0.43
P-408	MH-409	MH-408	Existing	36	0.0002	531	0.013	3.02	5.44	6.50	1.44	2.10	0.48	0.70

Table 18 Pipe Flows - El Toro Viejo Trunk - Existing

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-407	MH-408	MH-407	Existing	36	0.0006	599	0.013	3.13	5.64	10.60	1.12	1.56	0.37	0.52
P-406	MH-407	MH-406	Existing	36	0.0006	195	0.013	3.13	5.64	10.28	1.14	1.59	0.38	0.53
P-405	MH-406	MH-405	Existing	36	0.0018	152	0.013	3.13	5.64	18.23	0.84	1.15	0.28	0.38
P-404	MH-405	MH-404	Existing	36	0.0005	660	0.013	3.13	5.64	9.96	1.16	1.62	0.39	0.54
P-403	MH-404	MH-403	Existing	36	0.0007	652	0.013	3.25	5.85	11.10	1.11	1.55	0.37	0.52
P-402	MH-403	MH-402	Existing	36	0.0005	649	0.013	3.25	5.85	10.04	1.17	1.64	0.39	0.55
P-401	MH-402	MH-315	Existing	36	0.0008	667	0.013	3.25	5.85	12.30	1.05	1.46	0.35	0.49

Table 19 Pipe Flows - El Toro Viejo Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-507	MH-507	MH-506	Existing	10	0.0028	532	0.013	0.20	0.37	0.75	0.30	0.41	0.36	0.49
P-506	MH-506	MH-505	Existing	10	0.0028	812	0.013	0.20	0.37	0.75	0.30	0.41	0.36	0.49
P-505	MH-505	MH-504	Existing	10	0.0027	1,211	0.013	0.20	0.37	0.74	0.30	0.41	0.36	0.50
P-504	MH-504	MH-503	Existing	12	0.0030	264	0.013	0.20	0.37	1.26	0.27	0.37	0.27	0.37
P-503	MH-503	MH-502	Existing	12	0.0025	553	0.013	0.20	0.37	1.16	0.28	0.39	0.28	0.39
P-502	MH-502	MH-501	Existing	12	0.0045	133	0.013	0.20	0.37	1.55	0.25	0.33	0.25	0.33
P-501	MH-501	MH-500	Existing	12	0.0018	432	0.013	0.20	0.37	0.97	0.31	0.43	0.31	0.43
P-500	MH-500	MH-499	Existing	12	0.0036	259	0.013	0.41	0.73	1.38	0.37	0.52	0.37	0.52
P-498	MH-499	MH-498	Existing	15	0.0004	336	0.013	0.41	0.73	0.85	0.61	0.89	0.49	0.71
P-497	MH-498	MH-497	Existing	15	0.0049	211	0.013	0.53	0.95	2.94	0.36	0.49	0.29	0.39
P-496	MH-497	MH-496	Existing	15	0.0023	307	0.013	0.53	0.95	2.00	0.44	0.61	0.35	0.49
P-495	MH-496	MH-495	Existing	15	0.0022	307	0.013	0.53	0.95	1.96	0.44	0.62	0.36	0.49
P-494	MH-495	MH-494	Existing	15	0.0022	495	0.013	0.53	0.95	1.96	0.44	0.61	0.35	0.49
P-493	MH-494	MH-493	Existing	15	0.0022	283	0.013	0.53	0.95	1.96	0.44	0.62	0.36	0.49
P-492	MH-493	MH-492	Existing	15	0.0022	360	0.013	0.53	0.95	1.96	0.44	0.61	0.36	0.49
P-491	MH-492	MH-484	Existing	15	0.0022	362	0.013	0.53	0.95	1.97	0.44	0.61	0.35	0.49
P-490	MH-491	MH-490	Existing	12	0.0119	198	0.013	0.12	0.22	2.52	0.15	0.20	0.15	0.20
P-489	MH-490	MH-489	Existing	12	0.0020	380	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-488	MH-489	MH-488	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-487	MH-488	MH-487	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-486	MH-487	MH-486	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-485	MH-486	MH-485	Existing	12	0.0020	400	0.013	0.12	0.22	1.03	0.23	0.31	0.23	0.31
P-484	MH-485	MH-484	Existing	12	0.0014	401	0.013	0.12	0.22	0.86	0.25	0.34	0.25	0.34
P-483	MH-484	MH-440	Existing	18	0.0014	483	0.013	0.77	1.39	2.55	0.57	0.79	0.38	0.53
P-482	MH-483	MH-482	Existing	15	0.0011	264	0.013	0.04	0.08	1.39	0.15	0.20	0.12	0.16
P-481	MH-482	MH-481	Existing	15	0.0011	388	0.013	0.04	0.08	1.39	0.15	0.20	0.12	0.16
P-480	MH-481	MH-480	Existing	15	0.0011	327	0.013	0.04	0.08	1.41	0.15	0.20	0.12	0.16
P-479	MH-480	MH-479	Existing	15	0.0011	185	0.013	0.09	0.16	1.38	0.21	0.28	0.17	0.23
P-478	MH-479	MH-422	Existing	15	0.0011	286	0.013	0.09	0.16	1.38	0.21	0.28	0.17	0.23
P-477	MH-478	MH-477	Existing	12	0.0015	415	0.013	0.06	0.10	0.89	0.17	0.23	0.17	0.23
P-476	MH-477	MH-476	Existing	12	0.0016	389	0.013	0.06	0.10	0.92	0.17	0.23	0.17	0.23
P-475	MH-476	MH-475	Existing	12	0.0008	27	0.013	0.06	0.10	0.63	0.20	0.28	0.20	0.28
P-474	MH-475	MH-474	Existing	12	0.0020	167	0.013	0.06	0.10	1.03	0.16	0.22	0.16	0.22

Table 19 Pipe Flows - El Toro Viejo Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-473	MH-474	MH-473	Existing	12	0.0020	342	0.013	0.06	0.10	1.04	0.16	0.21	0.16	0.21
P-472	MH-473	MH-472	Existing	12	0.0020	350	0.013	0.06	0.10	1.03	0.16	0.22	0.16	0.22
P-471	MH-472	MH-471	Existing	12	0.0020	350	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-470	MH-471	MH-470	Existing	12	0.0020	380	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-469	MH-470	MH-469	Existing	12	0.0020	380	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-468	MH-469	MH-468	Existing	12	0.0020	350	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-467	MH-468	MH-467	Existing	12	0.0180	317	0.013	0.12	0.21	3.10	0.13	0.18	0.13	0.18
P-466	MH-467	MH-466	Existing	12	0.0292	84	0.013	0.23	0.42	3.94	0.17	0.22	0.17	0.22
P-465	MH-466	MH-465	Existing	15	0.0037	416	0.013	0.32	0.57	2.55	0.30	0.40	0.24	0.32
P-464	MH-465	MH-464	Existing	15	0.0037	541	0.013	0.32	0.57	2.54	0.30	0.40	0.24	0.32
P-463	MH-464	MH-463	Existing	15	0.0046	540	0.013	0.32	0.57	2.85	0.28	0.38	0.23	0.30
P-462	MH-463	MH-462	Existing	15	0.0058	278	0.013	0.32	0.57	3.18	0.27	0.36	0.21	0.29
P-461	MH-462	MH-461	Existing	15	0.0024	860	0.013	0.32	0.57	2.07	0.33	0.45	0.27	0.36
P-460	MH-461	MH-460	Existing	15	0.0037	442	0.013	0.72	1.29	2.54	0.46	0.63	0.36	0.51
P-459	MH-460	MH-459	Existing	15	0.0037	450	0.013	0.72	1.29	2.55	0.45	0.63	0.36	0.51
P-458	MH-459	MH-458	Existing	15	0.0037	416	0.013	0.72	1.29	2.55	0.45	0.63	0.36	0.51
P-457	MH-458	MH-457	Existing	15	0.0037	580	0.013	0.72	1.29	2.54	0.46	0.63	0.36	0.51
P-456	MH-457	MH-456	Existing	15	0.0037	414	0.013	0.72	1.29	2.55	0.45	0.63	0.36	0.50
P-455	MH-456	MH-432	Existing	15	0.0037	344	0.013	0.72	1.29	2.54	0.46	0.63	0.36	0.51
P-454	MH-455	MH-454	Existing	12	0.0030	310	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-453	MH-454	MH-453	Existing	12	0.0030	300	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-452	MH-453	MH-452	Existing	12	0.0030	350	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-451	MH-452	MH-451	Existing	12	0.0030	300	0.013	0.07	0.13	1.27	0.16	0.22	0.16	0.22
P-450	MH-451	MH-450	Existing	12	0.0030	350	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-449	MH-450	MH-449	Existing	12	0.0030	350	0.013	0.15	0.26	1.27	0.23	0.31	0.23	0.31
P-448	MH-449	MH-448	Existing	12	0.0030	350	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-447	MH-448	MH-432	Existing	12	0.0030	355	0.013	0.15	0.26	1.26	0.23	0.31	0.23	0.31
P-446	MH-447	MH-446	Existing	12	0.0017	339	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-445	MH-446	MH-445	Existing	12	0.0017	395	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-444	MH-445	MH-444	Existing	12	0.0017	390	0.013	0.04	0.08	0.96	0.14	0.19	0.14	0.19
P-443	MH-444	MH-443	Existing	12	0.0017	390	0.013	0.04	0.08	0.95	0.15	0.19	0.15	0.19
P-442	MH-443	MH-442	Existing	12	0.0017	390	0.013	0.09	0.16	0.95	0.20	0.27	0.20	0.27
P-441	MH-442	MH-441	Existing	12	0.0017	390	0.013	0.09	0.16	0.96	0.20	0.27	0.20	0.27

Table 19 Pipe Flows - El Toro Viejo Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-440	MH-441	MH-413	Existing	12	0.0017	390	0.013	0.09	0.16	0.95	0.20	0.27	0.20	0.27
P-439	MH-440	MH-439	Existing	18	0.0020	511	0.013	0.77	1.39	3.01	0.52	0.72	0.35	0.48
P-438	MH-439	MH-438	Existing	18	0.0014	647	0.013	0.77	1.39	2.57	0.56	0.79	0.38	0.52
P-437	MH-438	MH-437	Existing	18	0.0018	564	0.013	0.89	1.61	2.87	0.58	0.80	0.38	0.54
P-436	MH-437	MH-436	Existing	18	0.0019	604	0.013	0.89	1.61	2.95	0.57	0.79	0.38	0.53
P-435	MH-436	MH-435	Existing	18	0.0015	585	0.013	0.89	1.61	2.67	0.60	0.84	0.40	0.56
P-434	MH-435	MH-434	Existing	18	0.0017	587	0.013	1.01	1.82	2.77	0.63	0.89	0.42	0.59
P-433	MH-434	MH-433	Existing	18	0.0019	590	0.013	1.01	1.82	2.98	0.60	0.85	0.40	0.57
P-432	MH-433	MH-429	Existing	18	0.0018	547	0.013	1.01	1.82	2.87	0.62	0.87	0.41	0.58
P-1686	MH-1444	MH-432	Future	12	0.0049	2,835	0.013	0.12	0.21	1.61	0.18	0.24	0.18	0.24
P-431	MH-432	MH-431	Existing	21	0.0012	465	0.013	1.20	2.16	3.56	0.70	0.98	0.40	0.56
P-430	MH-431	MH-430	Existing	21	0.0019	551	0.013	1.20	2.16	4.51	0.62	0.85	0.35	0.49
P-429	MH-430	MH-429	Existing	21	0.0015	553	0.013	1.23	2.21	3.95	0.67	0.94	0.38	0.54
P-428	MH-429	MH-428	Existing	30	0.0014	484	0.013	2.44	4.39	9.81	0.85	1.17	0.34	0.47
P-427	MH-428	MH-427	Existing	30	0.0010	484	0.013	2.44	4.39	8.46	0.92	1.28	0.37	0.51
P-426	MH-427	MH-426	Existing	30	0.0007	485	0.013	2.44	4.39	7.04	1.02	1.43	0.41	0.57
P-425	MH-426	MH-425	Existing	30	0.0007	450	0.013	2.49	4.48	6.98	1.03	1.46	0.41	0.58
P-424	MH-425	MH-424	Existing	30	0.0007	360	0.013	2.49	4.48	7.00	1.03	1.45	0.41	0.58
P-423	MH-424	MH-423	Existing	30	0.0006	416	0.013	2.49	4.48	6.77	1.05	1.49	0.42	0.59
P-422	MH-423	MH-422	Existing	30	0.0008	471	0.013	2.70	4.87	7.35	1.05	1.49	0.42	0.59
P-421	MH-422	MH-421	Existing	30	0.0006	470	0.013	2.88	5.18	6.37	1.18	1.71	0.47	0.69
P-420	MH-421	MH-420	Existing	30	0.0011	389	0.013	2.88	5.18	8.73	0.99	1.39	0.40	0.55
P-419	MH-420	MH-419	Existing	30	0.0004	522	0.013	2.92	5.26	5.46	1.30	1.97	0.52	0.79
P-418	MH-419	MH-418	Existing	30	0.0007	522	0.013	2.92	5.26	6.98	1.13	1.62	0.45	0.65
P-417	MH-418	MH-417	Existing	30	0.0006	555	0.013	2.96	5.34	6.77	1.16	1.67	0.46	0.67
P-416	MH-417	MH-416	Existing	30	0.0009	400	0.013	2.96	5.34	7.86	1.06	1.51	0.43	0.60
P-415	MH-416	MH-415	Existing	30	0.0006	558	0.013	2.96	5.34	6.56	1.18	1.71	0.47	0.69
P-414	MH-415	MH-414	Existing	30	0.0006	567	0.013	3.01	5.41	6.70	1.18	1.71	0.47	0.68
P-413	MH-414	MH-413	Existing	30	0.0008	153	0.013	3.01	5.41	7.44	1.11	1.58	0.44	0.63
P-412	MH-413	MH-412	Existing	30	0.0008	418	0.013	3.18	5.73	7.58	1.13	1.62	0.45	0.65
P-411	MH-412	MH-411	Existing	30	0.0011	561	0.013	3.18	5.73	8.77	1.04	1.47	0.42	0.59
P-410	MH-411	MH-410	Existing	36	0.0004	657	0.013	3.34	6.01	8.60	1.30	1.85	0.43	0.62
P-409	MH-410	MH-409	Existing	36	0.0011	531	0.013	3.34	6.01	14.04	1.00	1.37	0.33	0.46

Table 19 Pipe Flows - El Toro Viejo Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-408	MH-409	MH-408	Existing	36	0.0002	531	0.013	3.34	6.01	6.50	1.52	2.28	0.51	0.76
P-407	MH-408	MH-407	Existing	36	0.0006	599	0.013	3.45	6.21	10.60	1.18	1.65	0.39	0.55
P-406	MH-407	MH-406	Existing	36	0.0006	195	0.013	3.45	6.21	10.28	1.20	1.68	0.40	0.56
P-405	MH-406	MH-405	Existing	36	0.0018	152	0.013	3.45	6.21	18.23	0.88	1.21	0.30	0.40
P-404	MH-405	MH-404	Existing	36	0.0005	660	0.013	3.45	6.21	9.96	1.22	1.72	0.41	0.57
P-403	MH-404	MH-403	Existing	36	0.0007	652	0.013	3.56	6.42	11.10	1.17	1.64	0.39	0.55
P-402	MH-403	MH-402	Existing	36	0.0005	649	0.013	3.56	6.42	10.04	1.24	1.74	0.41	0.58
P-401	MH-402	MH-315	Existing	36	0.0008	667	0.013	3.56	6.42	12.30	1.11	1.54	0.37	0.51
P-1688	MH-1446	MH-461	Future	12	0.0020	2,915	0.013	0.12	0.21	1.03	0.23	0.31	0.23	0.31
P-1448	MH-1300	MH-461	Future	12	0.0020	2,643	0.013	0.09	0.15	1.03	0.19	0.26	0.19	0.26

Table 20 Manhole Loading - Stockdale-Nord Trunk

ID	ADWF (mgd)	PDWF (mgd)
MH-174	0.16	0.29
MH-175	0.00	0.00
MH-1000	0.04	0.07
MH-1002	0.06	0.10
MH-1028	0.07	0.12
MH-1136	0.08	0.14
MH-1138	0.07	0.12
MH-1140	0.00	0.00
MH-1148	0.00	0.00
MH-1150	0.00	0.00
MH-176	0.07	0.12
MH-181	0.00	0.00
MH-165	0.08	0.14
MH-172	0.06	0.11
MH-179	0.05	0.09
MH-173	0.03	0.05
MH-180	0.08	0.14
MH-164	0.06	0.11
MH-178	0.03	0.05
1	0.12	0.22
2	0.05	0.09
3	0.12	0.22
4	0.05	0.09
5	0.11	0.20
6	0.34	0.61
7	0.04	0.07
8	0.02	0.03
9	0.03	0.05
11	0.04	0.07
12	0.10	0.18
13	0.03	0.06
14	0.18	0.33
15	0.02	0.04
16	0.01	0.02

Table 20 Manhole Loading - Stockdale-Nord Trunk

ID	ADWF (mgd)	PDWF (mgd)
17	0.05	0.08
18	0.01	0.02
19	0.02	0.03
MH-1192	0.01	0.02
MH-1196	0.24	0.43
MH-1312	0.03	0.06
MH-1320	0.03	0.06
MH-1324	0.17	0.30
MH-1330	0.00	0.01
MH-1334	0.01	0.01
MH-1396	0.00	0.01
MH-1416	0.10	0.18

Table 21 Pipe Flows - Stockdale-Nord Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-181	MH-181	MH-180	Future	12	0.0020	3,697	0.013	0.10	0.18	1.03	0.21	0.28	0.21	0.28
P-180	MH-180	9024	Existing	12	0.0020	1,588	0.013	0.18	0.32	1.04	0.28	0.38	0.28	0.38
P-179	MH-179	MH-178	Future	12	0.0020	1,328	0.013	0.05	0.09	1.03	0.15	0.20	0.15	0.20
P-178	MH-178	MH-165	Future	12	0.0020	2,654	0.013	0.08	0.14	1.03	0.19	0.25	0.19	0.25
P-165	MH-165	MH-1330	Future	18	0.0011	774	0.011	0.89	1.60	2.67	0.60	0.84	0.40	0.56
P-176	MH-176	MH-175	Future	10	0.0035	2,889	0.013	0.07	0.12	0.84	0.16	0.21	0.19	0.25
P-175	MH-175	MH-174	Existing	10	0.0016	2,397	0.013	0.07	0.12	0.57	0.19	0.26	0.23	0.31
P-174	MH-174	MH-173	Future	12	0.0020	1,251	0.013	0.29	0.52	1.03	0.36	0.50	0.36	0.50
P-173	MH-173	MH-172	Future	12	0.0020	1,128	0.013	0.32	0.58	1.03	0.38	0.53	0.38	0.53
P-172	MH-172	MH-164	Future	12	0.0020	3,117	0.013	0.38	0.68	1.03	0.42	0.60	0.42	0.60
P-164	MH-164	MH-1324	Future	18	0.0011	600	0.011	1.34	2.41	2.67	0.75	1.12	0.50	0.74
P-1476	MH-1324	9004	Future	18	0.0017	1,326	0.011	1.51	2.71	3.29	0.71	1.04	0.48	0.69
P-1602	MH-1396	MH-1312	Future	12	0.0020	2,658	0.013	0.00	0.01	1.03	0.05	0.06	0.05	0.06
P-1480	MH-1330	MH-1334	Future	18	0.0011	1,873	0.011	0.89	1.60	2.67	0.60	0.84	0.40	0.56
P-1482	MH-1334	MH-164	Future	18	0.0011	718	0.011	0.90	1.62	2.67	0.60	0.84	0.40	0.56
P-1474	MH-1320	MH-1312	Future	12	0.0020	2,635	0.013	0.03	0.06	1.03	0.12	0.17	0.12	0.17
P-1466	MH-1312	MH-165	Future	12	0.0020	2,649	0.013	0.07	0.13	1.03	0.18	0.24	0.18	0.24
P-1650	MH-1416	MH-1196	Future	12	0.0013	2,641	0.013	0.10	0.18	0.84	0.23	0.32	0.23	0.32
P-1342	MH-1196	MH-1140	Future	12	0.0016	2,151	0.013	0.34	0.61	0.92	0.42	0.59	0.42	0.59
P-1118	MH-1140	9024	Existing	12	0.0020	1,749	0.013	0.34	0.61	1.03	0.39	0.55	0.39	0.55
P-1116	MH-1136	MH-1138	Existing	18	0.0008	1,167	0.013	0.59	1.06	1.93	0.57	0.79	0.38	0.53
P-1338	MH-1138	MH-1148	Future	18	0.0011	762	0.011	0.66	1.18	2.67	0.51	0.70	0.34	0.47
P-1128	MH-1148	MH-1150	Existing	18	0.0010	290	0.013	0.66	1.18	2.19	0.56	0.79	0.38	0.52
P-1340	MH-1150	MH-165	Future	18	0.0011	372	0.011	0.66	1.18	2.67	0.51	0.70	0.34	0.47
P-1024	MH-1028	MH-174	Existing	10	0.0026	994	0.013	0.07	0.12	0.73	0.17	0.23	0.20	0.27
P-1000	MH-1002	MH-1000	Existing	10	0.0011	1,845	0.013	0.06	0.10	0.48	0.20	0.26	0.24	0.32
P-1498	MH-1000	MH-181	Future	10	0.0052	773	0.013	0.10	0.18	1.02	0.17	0.24	0.21	0.28
P-1272	19	9	Future	8	0.0043	941	0.013	0.02	0.03	0.52	0.08	0.10	0.12	0.16
P-1306	16	18	Future	8	0.0122	1,019	0.013	0.01	0.02	0.86	0.05	0.06	0.07	0.10
P-1302	15	17	Future	8	0.0101	1,462	0.013	0.02	0.04	0.79	0.08	0.10	0.12	0.16
P-1308	14	18	Future	8	0.0033	2,399	0.013	0.18	0.33	0.45	0.30	0.42	0.44	0.63
P-1298	13	12	Future	10	0.0019	1,180	0.013	0.03	0.06	0.62	0.13	0.17	0.15	0.21
P-1304	18	17	Future	21	0.0009	694	0.011	1.71	3.07	3.66	0.84	1.23	0.48	0.70

Table 21 Pipe Flows - Stockdale-Nord Trunk - Future

ID	From ID	To ID	Existing/ Future	Diameter (in)	Slope	Length (ft)	Manning's n	Flow, ADWF (mgd)	Flow, PDWF (mgd)	Full Flow (mgd)	Water Depth, ADWF (ft)	Water Depth, PDWF (ft)	d/D, ADWF	d/D, PDWF
P-1300	17	12	Future	21	0.0009	1,912	0.011	1.78	3.20	3.65	0.86	1.27	0.49	0.73
P-1296	12	11	Future	21	0.0011	1,880	0.011	1.91	3.43	4.03	0.85	1.24	0.48	0.71
P-1294	11	9002	Future	21	0.0011	624	0.011	1.95	3.50	4.03	0.86	1.26	0.49	0.72
P-1292	8	9	Future	10	0.0025	154	0.013	0.02	0.03	0.71	0.08	0.11	0.10	0.13
P-1290	9	9002	Future	10	0.0007	942	0.013	0.06	0.11	0.37	0.23	0.31	0.27	0.37
P-1286	7	6	Future	8	0.0034	1,990	0.013	0.04	0.07	0.46	0.13	0.18	0.20	0.26
P-1284	5	6	Future	8	0.0034	2,093	0.013	0.11	0.20	0.46	0.22	0.31	0.34	0.46
P-1280	4	2	Future	8	0.0036	1,967	0.013	0.05	0.09	0.47	0.15	0.20	0.22	0.29
P-1278	3	1	Future	8	0.0034	2,393	0.013	0.12	0.22	0.46	0.24	0.33	0.36	0.49
P-1288	MH-1192	6	Future	21	0.0010	642	0.011	2.02	3.63	3.83	0.90	1.36	0.52	0.78
P-1282	6	2	Future	27	0.0009	2,235	0.011	2.50	4.50	7.11	0.92	1.30	0.41	0.58
P-1276	2	1	Future	27	0.0009	304	0.011	2.60	4.68	7.20	0.94	1.32	0.42	0.59
P-1274	1	MH-1352	Future	27	0.0009	1,802	0.011	2.85	5.13	6.98	1.00	1.43	0.45	0.64

Table 22 Point of Connection Flows

Location	ADWF (mgd)	PDWF (mgd)
NORSD - Beech Ave and 7th Standard Road	27.05	48.68
City of Bakersfield - Allen Rd and Kern River	8.05	14.50
City of Bakersfield - Jewetta Ave and Kern River	9.86	17.75