HEBER PUBLIC UTILITY DISTRICT

REPORT TO BOARD OF DIRECTORS

MEETING DATE: February 17. 2022

FROM: Laura Fischer, General Manager

SUBJECT: Review and Adopt the Water and Sewer Master Plan as Prepared by Michael Baker Inc.

ISSUE:
Shall the HPUD Board review and adopt the Water and Sewer Master Plan.

GENERAL MANAGER'S RECOMMENDATION:
It is recommended that the Board of Directors review and adopt the water and Sewer Master Plan

FISCAL IMPACT: None. This project was funded by a grant through the State Water Management Plan and managed by the County of Imperial.

BACKGROUND:
In 2019 the District entered into an agreement with the County of Imperial for the purpose of completing a water and sewer master plan for the HPUD. The County contracted with Michael Baker Inc. to complete the Master Plan. The objectives of the water and sewer master plan are:

1) To asses the District's water and sewer infrastructure's ability top adequately serve the current demands of the district,
2) 2) to provide a systematic plan to expand the District's water and sewer infrastructure,
3) 3) to address any identified deficiencies and capital costs to remediate deficiencies,
4) 4) to provide a systematic plan to expand the District's water infrastructure to meet future needs of the areas planned to be served by the District in a manner that won't result in a financial burden to our disadvantaged community, and
5) 5) to provide the District with a valuable tool to seek future funding opportunities for pre-construction engineering activities including design costs to improve the water and sewer systems.

CONCLUSION:
As the Water and Sewer Master Plan has been completed and has been reviewed by the District's engineers, staff recommends the Board review and adopt the Water and Sewer Master Plan.

Respectfully Submitted,

Laura Fischer,
General Manager

Attachments: Water and Sewer Master Plan

Michael Baker INTERNATIONAL

We Make a Difference

LETTER OF TRANSMITTAL

TO:	Heber Public Utility District 1078 Dogwood Rd., Ste 103 Heber, CA 92249	DATE:	January 28, 2022
		JOB NO:	177399
		REFERENCE:	HPUD Master Plans
		DESCRIPTION:	Final Plans
ATTN:	Laura Fischer c: Juny Marmoleo and David Hernandez		

SENT TO YOU VIA: ☐ Mail ☐ Blueprinter ☐ Overnight Delivery (Carrier) ______

☒ E-Mail ☐ Your Pick-Up ☐ Michael Baker Messenger ☐ Other Courier ______

No. of Copies	No. of Originals	DESCRIPTION
1	pdf	Updated Water and Sewer Master Plans [20220128_HPUD_Master_Plan.pdf]
1	pdf	Responses to comments [Master Plan Comments 09-28-2021MbiRsp.pdf]

SENT FOR YOUR: ☐ Approval ☐ Review ☐ Comments ☒ Per Your Request

☐ Files ☐ Signature ☒ Use ☐ Information ☐ ______

REMARKS:
Note that meter data received by email on Thursday, September 30, 2021 2:34 PM imported points with the correct coordinates. The proposed effort to integrate and update the GIS was not approved. Therefore this integration has not been completed.

Appendices are unchanged from 20210619_DrftWsmpSbmttl.zip (401,784 kb). These files include the electronic Appendices A through D, GIS, and model data.

Please review and call with comments 858.810.1403. We stand ready to assist further at HPUD request.

MICHAEL BAKER INTERNATIONAL

BY: *Carlos Mendoza*
Project Manager
Water Resources Development

COPIES TO: File

2021 Water and Sewer Master Plan

Prepared for

Heber Public Utility District

Prepared by

Michael Baker International

9755 Clairemont Mesa Boulevard

San Diego, California 92124

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JN 177399

January 2022

By or under the direction of:

Carlos D. Mendoza, PE

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Abbreviation and Acronyms

Below is a list of commonly used abbreviations and acronyms found in this study. As a convention, the first appearance is spelled out followed thereafter by its abbreviation or acronym.

ACP	asbestos cement pipe
ADD	average day demand
ADWF	average dry weather flow
APT	high density residential customers
CCTV	closed-circuit television
CIP	capital improvement program
COM	commercial customers
DU	dwelling unit
fps	feet per second
FY	fiscal year
GGE	greenhouse gas emissions
GPD	gallons per day
gpm	gallons per minutes
HDPE	high density polyethylene
HPUD	Heber Public Utility District
HPUD	horsepower
I&I	inflow and infiltration
IDD	Imperial Irrigation District
IND	industrial customers
LS	lump sum
MDD	maximum day demand
MGD	millions of gallons per day
MGD	millions of gallons
NAD 83	North American Datum of 1983
PF	peaking factor
PHD	peak hour demand
psi	pound per square inch
PUB	public sector customers
PVC	polyvinyl chloride pipe
PWWF	peak wet weather flow
RAS	return activated sludge
RES	low and medium density residential customers
SFR	single family residential
SFR	square feet
SOI	sphere of influence
UV	ultra-violet light
WTP	water treatment plant
WWTP	wastewater treatment plant

Executive Summary

Background

Heber is an unincorporated community of approximately nine square-mile area located in Imperial County approximately 225 miles southeast of Los Angeles.

The Heber Public Utility District (HPUD or District) was formed in 1931 under the Public Utility Act of 1921. HPUD was given the authority to function as a legal entity with powers similar to those of a city administrative body.

The current population served by the District is estimated at 6,000 and is expected to double by 2040.

HPUD owns and operates a water system and a wastewater system, which are the focus of this study. The planning horizon for the study is 20 years through 2040.

The water system includes a water treatment plant with a capacity of 4.0 million gallons per day (MGD) and approximately 24 miles of distribution pipelines ranging in diameter from 4 inches to 20 inches.

Water wastewater system include a wastewater treatment plant with a capacity of 1.2 MGD, six sewage lift stations, and approximately 24 miles of gravity mains ranging in diameter from 4 inches to 20 inches.

Water System Analysis

The water system was analyzed for supply, storage, pumping and pipeline capacity using evaluation criteria developed specifically for the District's needs. A computer model of the water distribution system was constructed using InfoWater software by Innovyze. The water model was instrumental in predicting the capacity and performance of the water distribution system to assure the established level of service is achieved.

Analysis revealed that existing supply, storage and pumping capacity are sufficient to achieve the desired level of service through 2040.

One pipeline serving commercial land use on the northeast corner of Fawcett Road and Heffernan Avenue was found to be undersized to deliver fire flow under future conditions.

The water treatment plant was visually inspected and operators interviewed to determine whether improvements to equipment are needed. The following performance, condition, operational capacity, redundancy and safety issues were noted:

- Aging asbestos cement pipe in the distribution system
- Worn HDPE lining for Settling Basin 2
- Cracks in Settling Basins 1 and 3
- Corrosion on exterior of all three tanks
- Damaged chemical storage tank

- Undersized and cracked backwash basin
- Deterioration of finished water pump 2
- Leaking static mixer facility
- Insufficient exterior lighting

Wastewater System Analysis

The wastewater system was analyzed for treatment and collection capacity using evaluation criteria developed specifically for the District's needs. A computer model of the wastewater collection system was constructed using InfoSewer software by Innovyze. The sewer model was instrumental in predicting the capacity and performance of the collection system to assure the established level of service is achieved.

Analysis revealed that existing treatment and collection capacity are sufficient to achieve the desired level of service through 2040.

The wastewater treatment plant was visually inspected and operators interviewed to determine whether improvements to equipment are needed. The following performance, condition, operational capacity, redundancy and safety issues were noted:

- Excessive corrosion from hydrogen sulfide gas
- Unsafe conditions related to aerator maintenance
- Insufficient laboratory space
- Insufficient redundancy in UV disinfectionn
- Need for clarifier sprayers
- Insufficient sludge basin operational capacity
- Insufficient redundancy in sludge return conveyance
- Insufficient redundancy in primary treatment

It is noted that hydraulic and PLC upgrades were completed after these deficiencies were noted.

Recommendations

A series of solutions were developed to address the issues revealed through analysis. Preferred solutions were further developed into capital projects. A method for prioritizing the capital projects was developed and applied. The prioritization process considers the following parameters:

- Impact to level of service
- Perceived urgency
- Likelihood of failure
- Consequence of failure
- Safety

Below is a prioritized list of recommended capital projects and their estimated costs in 2020 dollars, for a total present value $9,259,000. It is noted that the California Department of General Services Construction Cost Index (CA DGS CCI) from from January 2022 / 2020 is 8151 / 6995 = 1.165, a 16.5% increase.

Rank	Project Title	Cost
1	Improve Odor and Corrosion Control	$73,000
2	Replace Sagging Sewer Trunkline	$67,000
3	Recoat 10 Manholes	$100,000
4	Replace Pump 2	$37,000
5	Repair Leaking Static Mixer Facility	$236,000
6	Improve Finished Water Meter	$34,000
7	Replace Chemical Storage Tank	$52,000
8	Improve Sludge Return Train Connectivity	$58,000
9	Replace WTP Maintenance Building	$106,000
10	Install Backup Bar Screen and Grinder	$49,000
11	Improve Onsite Laboratory at WWTP	$66,000
12	WTP Lighting	$44,000
13	Fawcett Road Pipeline	$609,000
14	Replace Aging ACP	$4,976,000
15	Improve Wastewater Treatment to Tertiary Standards	$298,000
16	Upgrade UV Disinfection Controls	$15,000
17	Construct Concrete Settling Basin 2	$637,000
18	Install Sewer Lift Station in Northwest Quadrant to Support Development	$748,000
19	Install Sprayers on Clarifiers	$15,000
20	Replace Aerators with Safer and More Cost-Effective Technology	$298,000
21	Construct Additional Sludge Bed	$58,000
22	Repair Cracks in Settling Basins 1 and 3	$26,000
23	WTP Backwash Basin Improvement	$98,000
24	Paint Finished Water Tanks	$559,000

Per a cursory analysis of the District's financial condition and projected revenues, the District will generate sufficient capital through its current rate and fee structures to fund the above capital improvement program within the 20-year horizon of this study.

Chapter 1 – Introduction

1.1 – Purpose

The purpose of this Water and Sewer Master Plan is to assist the District in identifying and implementing capital investments to assure it can achieve an established level of service. A master plan represents a snapshot in time of our understanding of the systems' capacity and performance, a methodology for determining level of service, and recommendation to achieve that level of service.

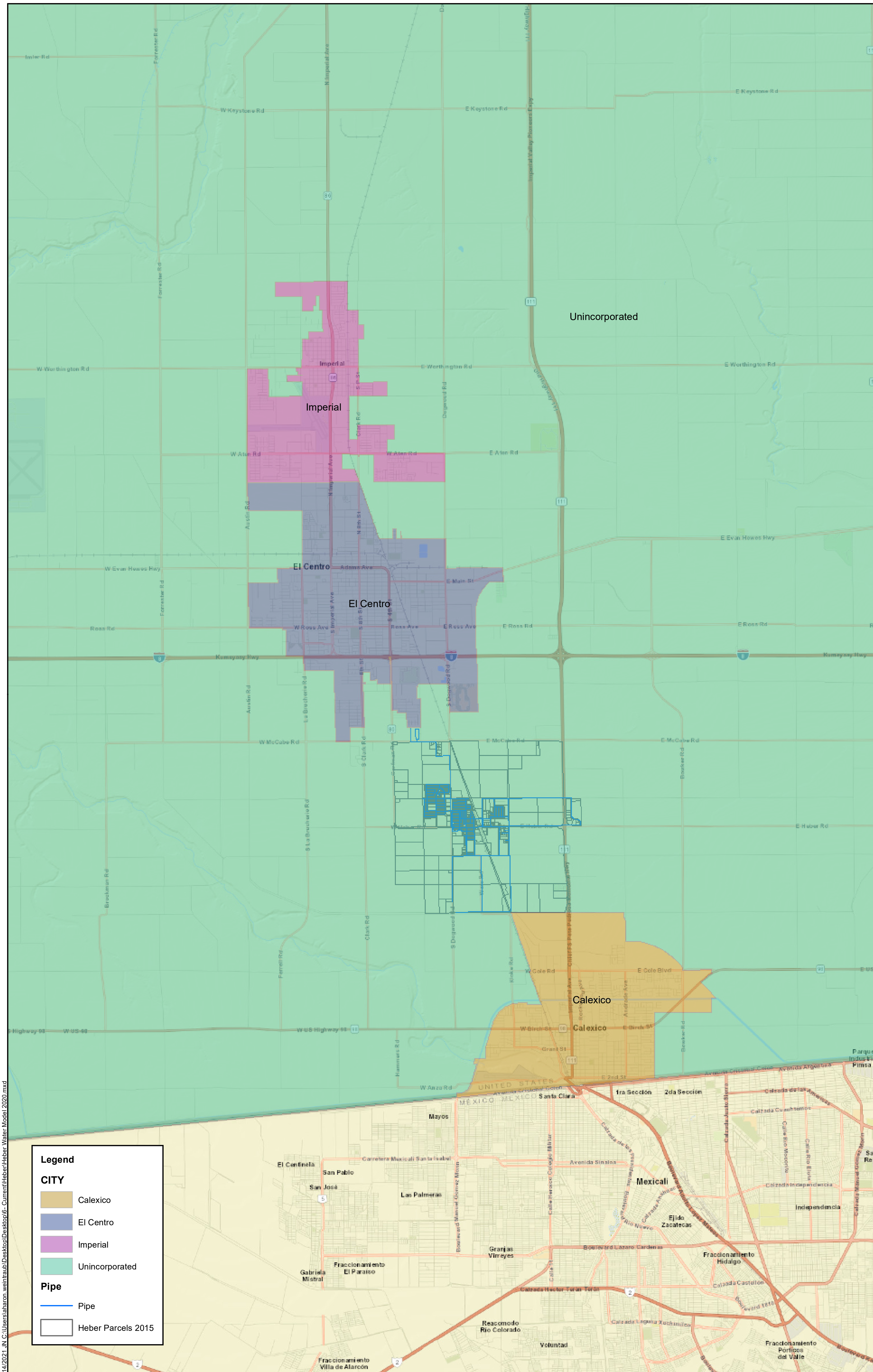
1.2 – Planning Horizon

This Water and Sewer Master Plan considers 2020 as existing conditions and 2040 as future conditions.

1.3 – Planning Area

HPUD provides water and sewer service within the service area boundary shown in Figure 1.1.

As the community grows, the service area will expand to include future customers located within the sphere of influence.



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Source:

CITY OF HEBER

HPUD Sphere of Influence

April 2021 by AW

1.4 – Report Organization

The study is organized in a logical progression, as follows:

Informational Chapters

Chapter 1 – Introduction

Chapter 2 – Population and Land Use

Chapter 3 – Loading Analysis

Chapter 4 – Existing Water System

Chapter 5 – Existing Sewer System

Chapter 6 – Evaluation Criteria

These chapters represent our understanding of existing and projected conditions and establish the basis for subsequent analysis.

Analytical Chapters

Chapter 7 – Water System Hydraulic Model

Chapter 8 – Sewer System Hydraulic Model

Chapter 9 – Water System Analysis

Chapter 10 – Sewer System Analysis

These chapters present the tools and methodologies used in analysis and the results of their application.

Recommendation Chapters

Chapter 11 – Capital Improvement Program

Chapter 12 – Funding

These chapters present the recommended improvements to achieve the established level of service and the means of implementation.

1.5 – Acknowledgements

Michael Baker would like to acknowledge the important contributions to this master plan of the following individuals:

- Laura Fischer – HPUD General Manager
- David Hernandez, MPA – County of Imperial
- Francisco Rodriguez – HPUD Chief Operator
- Juny Marmolejo – The Holt Group, Inc.

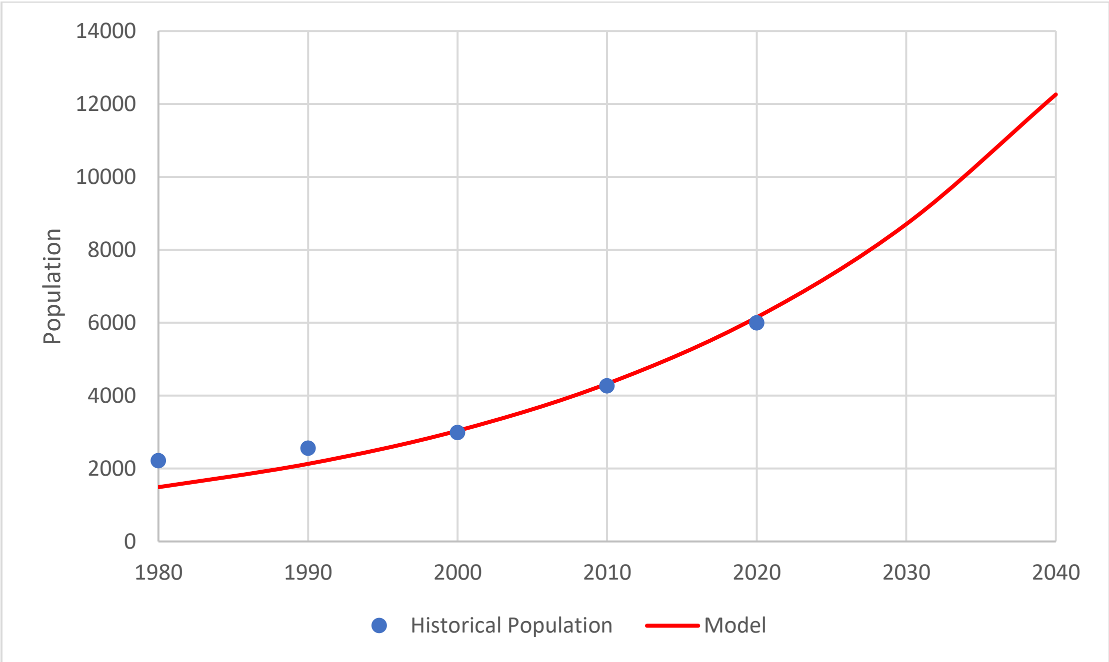
Chapter 2 – Population and Land Use

Population and land use are the primary parameters contributing to water demand and wastewater generation. The following subsections provide information on population and land use that are used in subsequent chapters to determine system loading and the impacts of growth.

2.1 – Existing and Projected Population

Figure 2.1 provides an understanding of historical and projected population for the HPUD Sphere of Influence based on historical US Census data.

Figure 2.1 – Historical and Projected Population

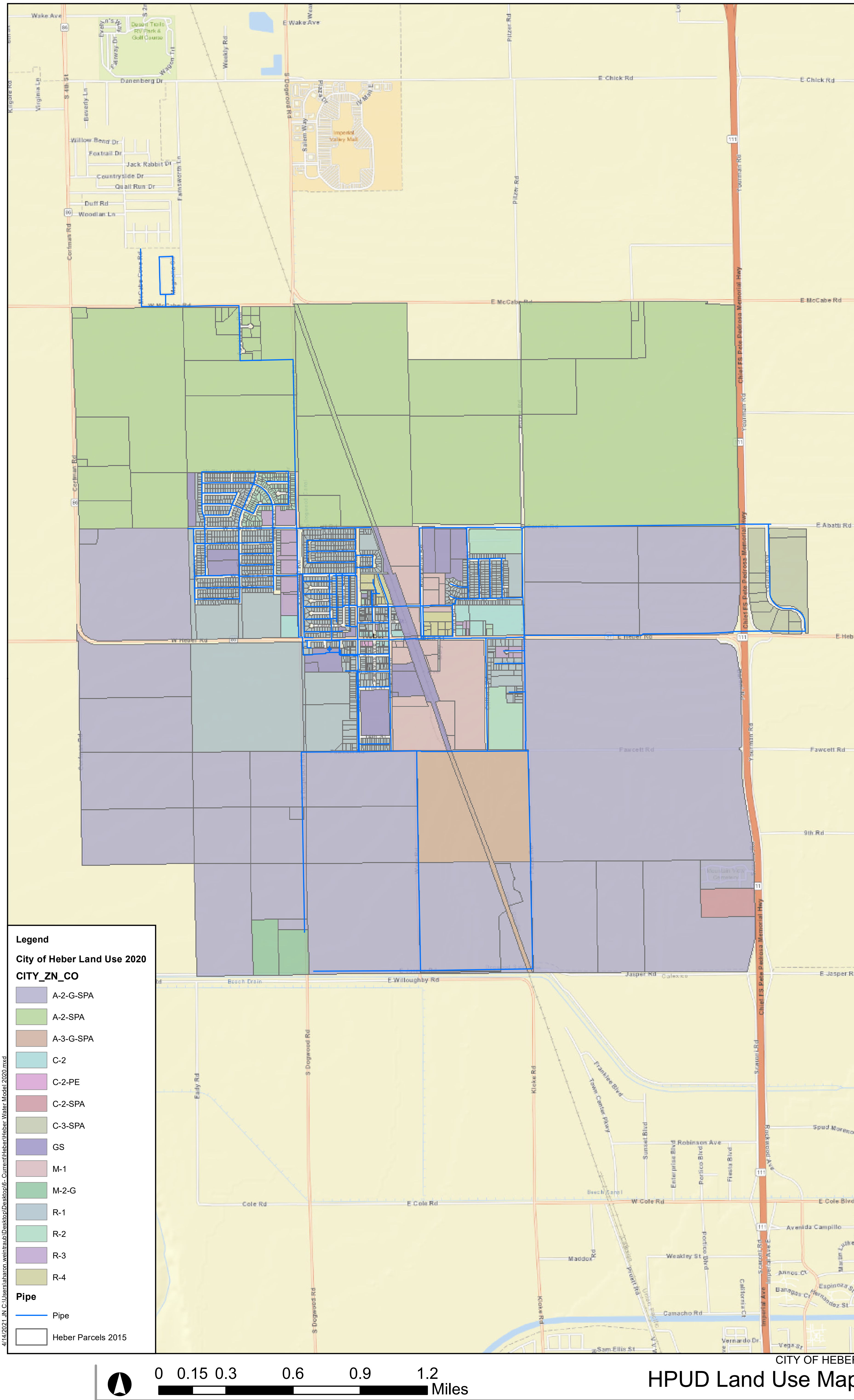


$$\frac{P_{max}}{1 + e^{-ct}} = \frac{215{,}500}{1 + e^{-0.036(year-2118)}}$$

The model is a best fit logistics curve based on historical and estimated population data from the US Census.

2.2 – Land Use Analysis

Figure 2.2 shows land use designations within the Heber Sphere of Influence.



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CITY OF HEBER

HPUD Land Use Map

April 2021 by AW

Table 2.1 provides a summary of land use within the HPUD Sphere of Influence broken down by zoning code[1].

Table 2.1 – Land Use Summary

Zoning Code	Description	Total Area (acres)
A-2	General Agriculture	80.00
A-2-G-SPA	General Agriculture	2,120.63
A-2-SPA	General Agriculture	1,710.03
A-3-G-SPA	Heavy Agriculture	165.81
C-2	General Commercial	33.13
C-2-PE	General Commercial	0.88
C-2-SPA	General Commercial	19.43
C-3-SPA	Highway Commercial District	70.11
GS	Government/Special Public Zone	111.30
G-S	Government/Special Public Zone	73.37
M-1	Light Industrial	146.19
M-2-G	Medium Industrial	35.85
R-1	Low Density Residential	477.89
R-2	Medium Density Residential	60.13
R-3	High Density Residential	29.76
R-4	Mobile Home Park	16.46
Total		5,150.96

[1] City zone codes for multiple jurisdictions were compiled by the Southern California Association of Governments (SCAG) into their land use database. Of the available land use designations, the zoning codes provide the most accurate assessment of current and near-term land uses within the HPUD Sphere of Influence.

The zoning codes shown in Table 2.1 were related to HPUD water customer classes as shown in Table 2.2.

Table 2.2 – Relationship between Zoning Code and HPUD Customer Class

Zoning Code	Description	HPUD Customer Class
A-2	General Agriculture	N/A
A-2-G-SPA	General Agriculture	
A-2-SPA	General Agriculture	
A-3-G-SPA	Heavy Agriculture	
C-2	General Commercial	COM
C-2-PE	General Commercial	
C-2-SPA	General Commercial	
C-3-SPA	Highway Commercial District	
GS	Government/Special Public Zone	PUB
G-S	Government/Special Public Zone	
M-1	Light Industrial	IND
M-2-G	Medium Industrial	
R-1	Low Density Residential	RES
R-2	Medium Density Residential	
R-3	High Density Residential	APT
R-4	Mobile Home Park	

COM = Commercial

PUB = Public Facilities

IND = Industrial

RES = Low and Medium Density Single Family Residential

APT = High Density Residential and Mobile Homes

Figure 2.3 shows parcels being served by HPUD by customer class and occupancy.

Figure 2.3 – Occupancy Map

[Insert Occupancy Map]
GIS:
Service Area Boundary
Sphere of Influence Boundary
Group and color parcels by combination of Cust Class and Occupancy:

Customer Class	**Color**	**Cust_Class**	**Occupancy**
APT Occupied	Orange	APT	O
COM Occupied	Blue	COM	O
IND Occupied	Purple	IND	O
PUB Occupied	Green	PUB	O
RES within SOI Occupied	Yellow	RES	O
RES North of McCabe	Red	OUT	O
APT Vacant	Light Orange	APT	V
COM Vacant	Light Blue	COM	V
IND Vacant	Light Purple	IND	V
PUB Vacant	Light Green	PUB	V
RES Vacant	Light Yellow	RES	V
Not Served	Gray	OUT	X

Table 2.3 provides a summary of land use within the HPUD Sphere of Influence in terms of occupancy. Occupied areas are currently receiving municipal services from HPUD and vacant areas represent future growth.

Table 2.3 – Land Use Summary by Occupancy

Zoning Code	Description	Occupied Area (acres)	Vacant Area (acres)
A-2	General Agriculture	0.00	80.00
A-2-G-SPA	General Agriculture	0.00	2120.63
A-2-SPA	General Agriculture	0.00	1710.03
A-3-G-SPA	Heavy Agriculture	0.00	165.81
C-2	General Commercial	32.08	1.05
C-2-PE	General Commercial	0.88	0.00
C-2-SPA	General Commercial	19.43	0.00
C-3-SPA	Highway Commercial District	70.11	0.00
GS	Government/Special Public Zone	75.41	35.88
G-S	Government/Special Public Zone	73.37	0.00
M-1	Light Industrial	128.13	18.05
M-2-G	Medium Industrial	35.85	0.00
R-1	Low Density Residential	215.32	262.57
R-2	Medium Density Residential	19.49	40.64
R-3	High Density Residential	15.27	14.49
R-4	Mobile Home Park	15.49	0.97
Total		700.83	4450.13

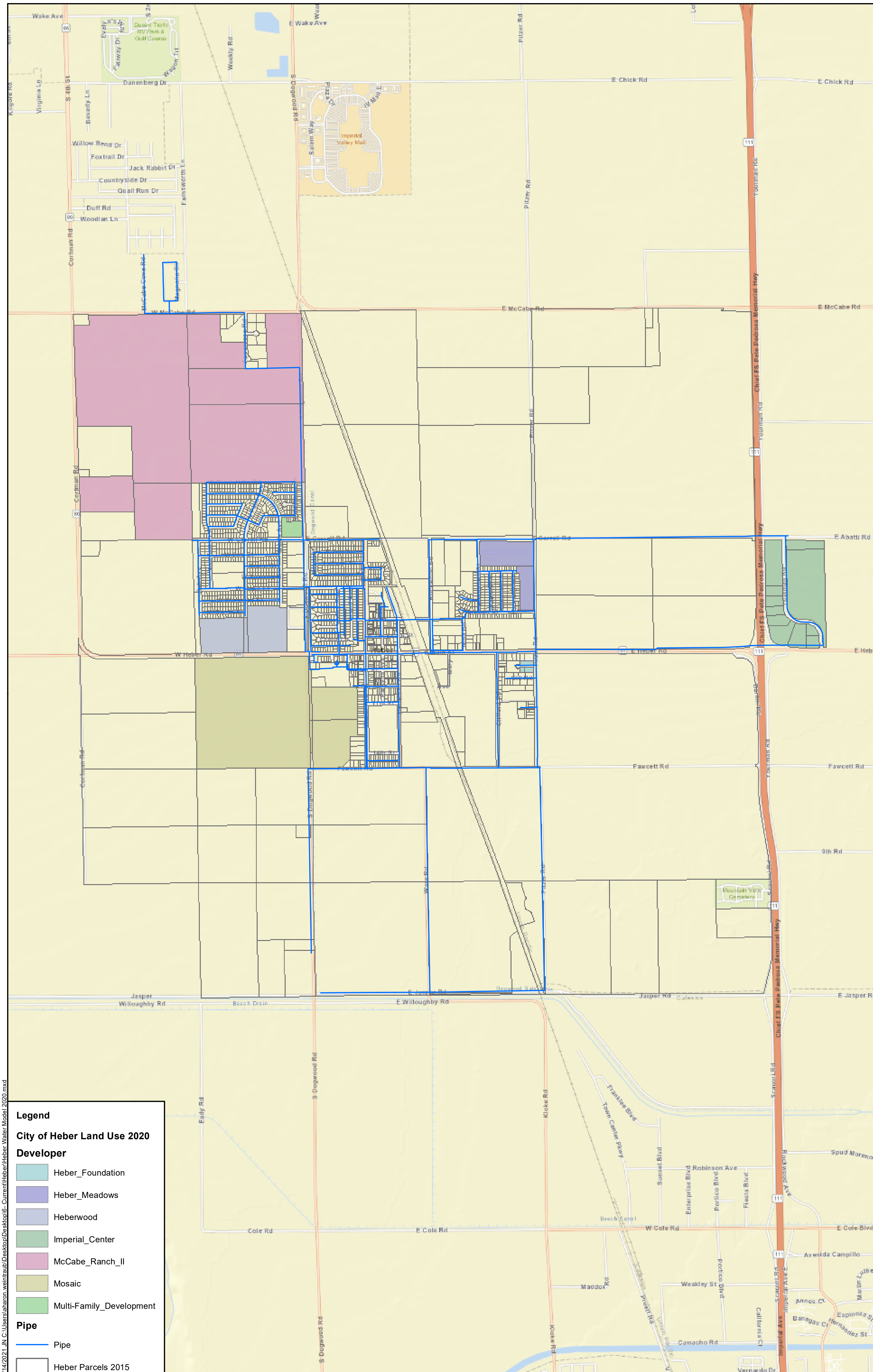
2.3 – Impact of Development

Figure 2.4 shows areas of known development, per the Service Area Plan.

Table 2.4 provides a summary of known development by area, per the Service Area Plan.

Table 2.4 – Summary of Known Development

Development	Area (acres)
McCabe_Ranch_II	469.17
Heberwood	42.62
Mosaic	198.34
Multi-Famliy_Development	4.15
Heber_Meadows	23.96
Heber_Foundation	1.62
Imperial_Center	70.11



0 0.15 0.3 0.6 0.9 1.2 Miles

Source:

CITY OF HEBER

HPUD Areas of Known Development

April 2021 by AW

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Chapter 3 – Loading Analysis

This chapter provides an understanding of water demand and wastewater generation loading for use in hydraulic modeling and analysis of system capacity.

3.1 – Existing and Projected Water Demand

The subsections that follow provide an analysis of water demand under existing and future conditions.

3.1.1 – Historical Data

Figure 3.1 shows monthly water production in units of millions of gallons per day for calendar years 2017, 2018 and 2019.

Figure 3.1 – Historical Water Production

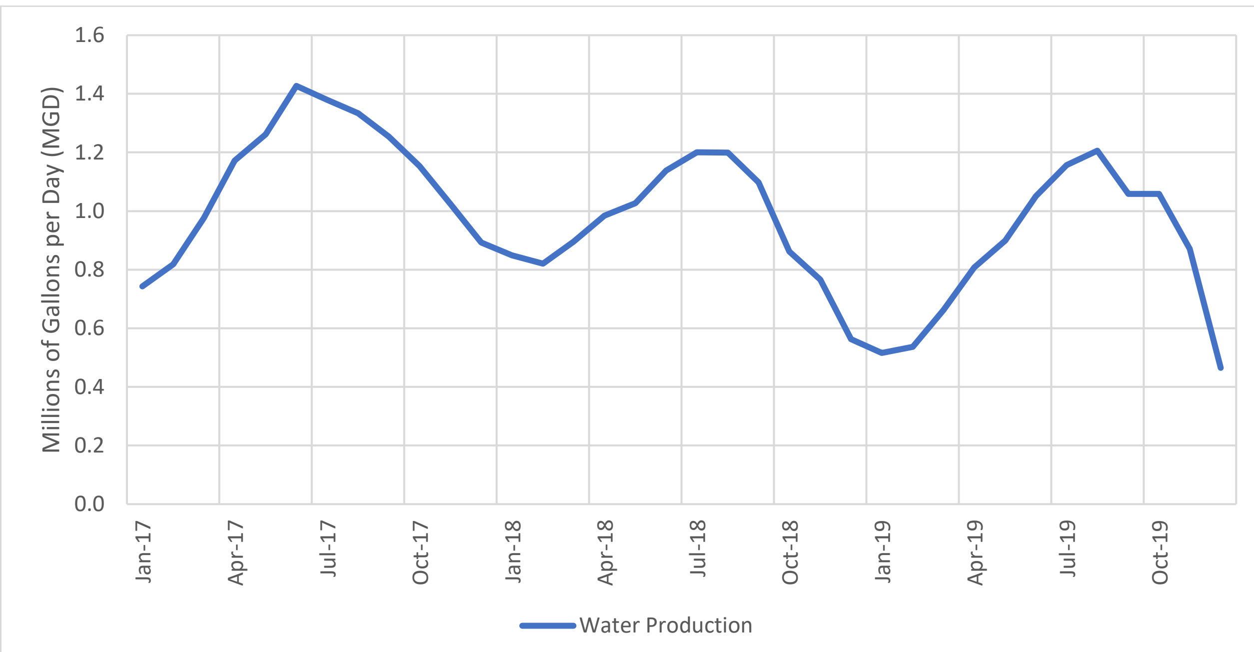


Figure 3.1 shows a repeating seasonal pattern with high demand in the summer and low demand in the winter which coincides with changes in irrigation demand. There also appears to be a trend toward water use reduction. Note that HPUD staff are skeptical about the accuracy of the meter used to record pumping into the distribution system; however, water sales tend to support this trend which suggests either an effective water conservation program or lower water use in response to recent economic trends.

Table 3.1 shows the volume of annual water sales recorded by customer meters for fiscal years 2016, 2017 and 2018.

Table 3.1 – Water Billing Totals by Customer Class in Gallons per Year

Customer Class	FY2016	FY2017	FY2018	Average
APT	19,360,487	18,733,407	18,998,036	19,030,643
COM	6,140,317	6,108,510	5,432,023	5,893,617
IND	15,205,492	10,716,441	12,187,012	12,702,982
PUB	45,266,356	45,695,833	39,699,519	43,553,903
RES	194,149,440	212,087,314	215,612,441	207,283,065
Total	280,122,092	293,341,505	291,929,031	288,464,209

The data sets shown in Figure 3.1 (production) and Table 3.1 (sales) overlap for the period July 2017 to June 2019. Table 3.2 provides a calculation of water loss for the overlapping period.

Table 3.2 – Calculation of Water Loss in Millions of Gallons per Year

Period	FY2017	FY2018
Total Produced	388.564	309.622
Total Billed	293.342	291.929
Losses	95.222	17.693
Loss Percentage	24.5%	5.7%

The change in water loss from FY 2017 to FY 2018 is unusually high, while the change in billing is negligible. This suggests the meter at the water treatment plant may not be providing accurate production data.

3.1.2 – Water Demand Analysis Methodology

Demand for 2020 is considered the three-year average billing total plus 20%. This total is broken down by customer class Table 3.3.

Table 3.3 – 2020 Demand by Customer Class in Gallons per Year

Customer Class	Billing	Losses (20% of Billing)	Demand (Billing + Losses)
APT	19,030,643	3,806,129	22,836,772
COM	5,893,617	1,178,723	7,072,340
IND	12,702,982	2,540,596	15,243,578
PUB	43,553,903	8,710,781	52,264,683
RES	207,283,065	41,456,613	248,739,678
Total	288,464,209	57,692,842	346,157,051

The total demand is equivalent to an Average Day Demand of 658.59 gallons per minute or 0.948 millions of gallons per day.

3.1.3 – Water Demand Factors

Demand Factors are used to allocate demand to the water model and to calculate future demand associated with known development.

Using area totals from Table 2.1, customer class relationships from Table 2.2 and demand totals from Table 3.3, area based demand factors are tabulated and presented in Table 3.4.

Table 3.4 – Area Demand Factors

Customer Class	Demand (MG per Year)	Area (Acres)	Area Demand Factor[2] (GPM per Acre)
APT	22,836,772	30.76	1.42
COM	7,072,340	71.50	0.19
IND	15,243,578	163.98	0.18
PUB	52,264,683	148.78	0.67
RES	248,739,678	538.02	0.85

There was sufficient data to generate unit demand factors for single family residential units. By observation, single family residential units within the HPUD Sphere of Influence are generally the same size; however, HPUD serves 19 single family residential customers northwest of the intersection of Farnsworth Lane and McCabe Road with larger lots and more irrigable area. Table 3.5 provide a summary of unit demand factors for single family residential dwelling units.

Table 3.5 – Single Family Residential Unit Demand Factors

Sub-Class	Units	Acres (Acres)	Demand[3] (MG per Year)	Unit Demand Factor[4] (GPM per Dwelling Unit)
RES within SOI	1410	538.02	40,152,093	0.33
RES North of McCabe	19	17.48	1,304,520	0.79

[2] The Area Demand Factor is Total Area divided by Total Demand for each Customer Class then converted to units of gallons per minute per acre.

[3] Total Demand for the RES Customer Class was distributed proportionally by area of each sub-class.

[4] The Unit Demand Factor is Total Area divided by Total Units for each single family residential sub-class then converted to units of gallons per minute per dwelling unit.

3.1.4 – Future Water Demand

Based on land use and dwelling unit details provided in the Service Area Plan, water demand for new development was calculated as shown in Table 3.6.

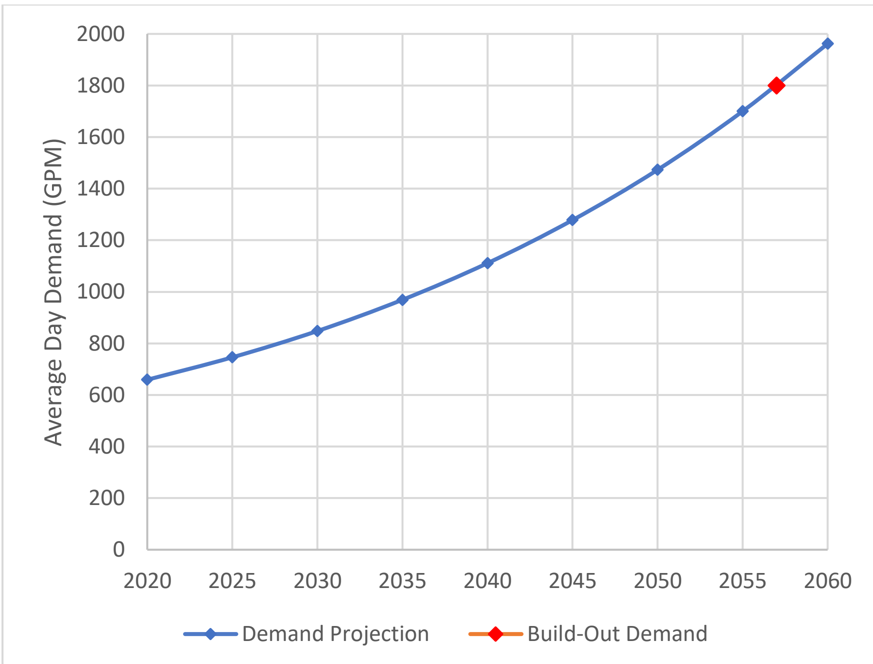
Table 3.6 – Water Demand for New Development

Customer Class	RES (DUs)	APT (Acres)	COM (Acres)	PUB (Acres)	Demand (GPM)
Demand Factor	**0.33 (GPM/DU)**	**1.42 (GPM/acre)**	**0.19 (GPM/acre)**	**0.67 (GPM/acre)**	
McCabe_Ranch_II	1582	35.9	11.0	51.6	609.70
Heberwood	208	0.0	9.0	0.0	70.35
Mosaic	1154	0.0	2.7	40.7	408.60
Multi-Famliy_Development	0	4.1	0.0	0.0	5.89
Heber_Meadows	105	0.0	0.0	0.0	34.65
Heber_Foundation	0	1.6	0.0	0.0	2.29
Imperial_Center	0	0.0	55.4	0.0	10.53
Total	3049	41.7	78.1	92.3	1142.01

Build-out of known development is estimated to increase Average Day Demand by 1,142 GPM.

Per the Service Area Plan, the average household size is 3.91 persons per household. At build-out of known development, 3,049 single family dwelling units and an estimated 882 multi-family dwelling will be added for a population increase of 15,370. This a per capita demand increases of 0.074 GPM per person. Applying the per capita demand increase to the population model shown in Figure 2.1 gives the demand projection shown in Figure 3.2. Build-out of known development is estimated to occur in 2057 at an Average Day Demand of 1,800 GPM.

Figure 3.2 – Water Demand Projection



3.1.5 – Water Demand Variation

Based on review of monthly production records, the Peaking Factor for Maximum Day Demand is estimated at 1.6 times the Average Day Demand.

Based on industry standards, the Peaking Factor for Peak Hour Demand is set at 2 times the Maximum Day Demand.

Table 3.7 provides a summary of existing and future water demand variation applying the Peaking Factors described above.

Table 3.7 – Existing and Future Water Demand Variation

Year	ADD (GPM)	MDD (GPM)	PHD (GPM)
2020	659	1,054	2,108
2040	1,111	1,778	3,556

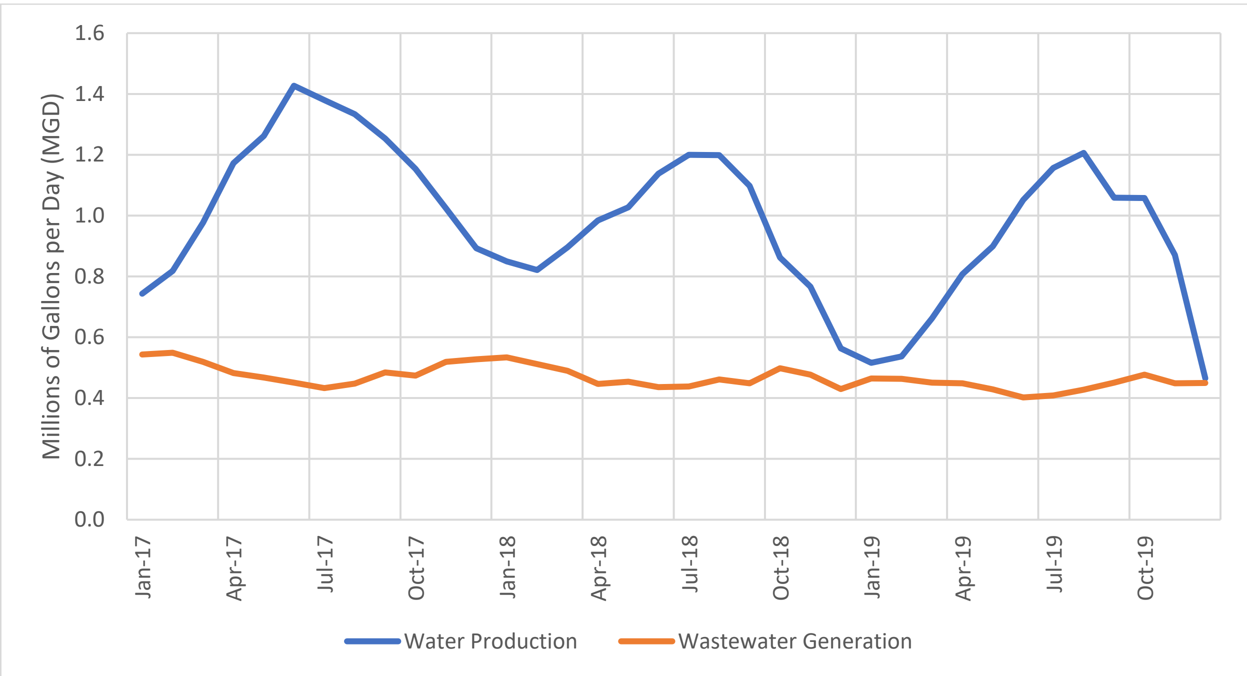
3.2 – Existing and Projected Wastewater Generation

The subsections that follow provide an analysis of wastewater generation under existing and future conditions.

3.2.1 – Historical Data

Figure 3.3 shows water production and influent at the wastewater treatment plant for calendar years 2017, 2018 and 2019.

Figure 3.3 – Historical Water Production and Wastewater Generation



This figure demonstrates the volume of water demand that is converted into wastewater. In general, the volume between the two curves represents outdoor water use and certain water losses (e.g. leaks, meter inaccuracies, unmetered uses). The three-year average wastewater generation rate is 0.468 MGD.

3.2.2 – Wastewater Generation Analysis Methodology

Water demand for each Customer Class is provided in Table 3.3. Influent at the wastewater treatment plant is fairly constant at 0.468 MGD. Table 3.8 provides a calibration that sets the percentage of water demand that is converted to wastewater by each customer class.

Table 3.8 – Wastewater Generation Calibration

Customer Class	Water Demand (MGD)	Conversion Percentage	Wastewater Generation (MGD)
APT	0.0626	82%	0.0513
COM	0.0194	90%	0.0175
IND	0.0418	90%	0.0376
PUB	0.1432	45%	0.0644
RES within SOI	0.6600	45%	0.2970
RES North of McCabe	0.0214	0%	0.0000
Total	0.9484		0.4678

Note that residential water customers north of McCabe Road are not connected to the wastewater collection system, and therefore do not contribute to wastewater influent at the treatment plant.

3.2.3 – Wastewater Generation Factors

Using area totals from Table 2.1 and wastewater generation totals from Table 3.8, area based generation factors are tabulated and presented in Table 3.9.

Table 3.9 – Area Wastewater Generation Factors

Customer Class	Area (Acres)	Wastewater Generation (MGD)	Area Generation Factor (GPD/Acre)
APT	30.76	0.0513	1668
COM	71.50	0.0174	244
IND	163.98	0.0376	229
PUB	148.78	0.0644	433
RES	538.02	0.2970	552

For single family residential dwelling unit, a unit generation factor is calculated at 211 gallons per day per dwelling unit:

$$\left(\frac{0.2970\ million\ gallons}{day}\right)\left(\frac{1}{1{,}410\ SFR\ dwelling\ uinits}\right) \cong 211\ GPD\ per\ DU$$

3.2.4 – Future Wastewater Generation

Based on land use and dwelling unit details provided in the Service Area Plan, wastewater generation for new development was calculated as shown in Table 3.10.

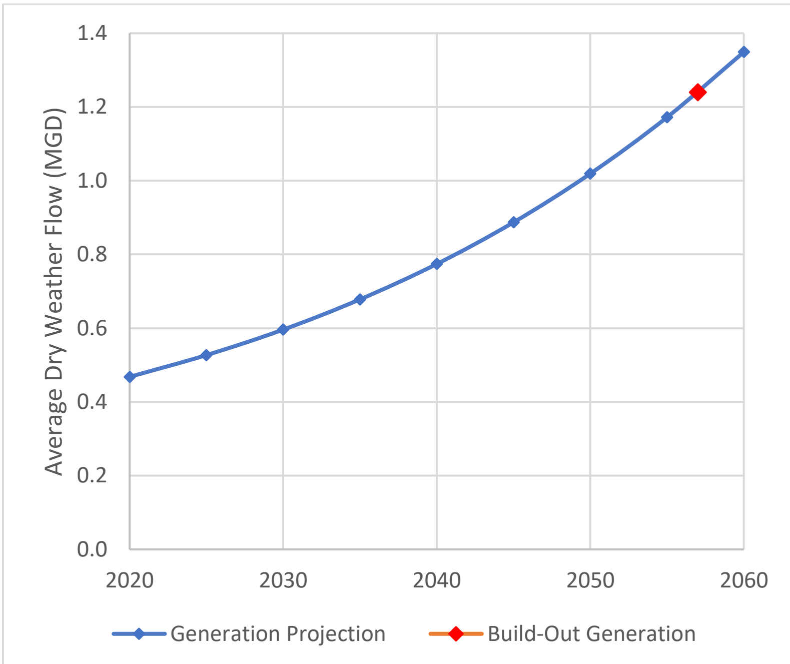
Table 3.10 – Wastewater Generation for New Development

Customer Class	RES (DUs)	APT (Acres)	COM (Acres)	PUB (Acres)	Generation (MGD)
Generation Factor	**211 (GPD/DU)**	**1,668 (GPD/acre)**	**244 (GPD/acre)**	**433 (GPD/acre)**	
McCabe_Ranch_II	1582	35.9	11.0	51.6	0.4187
Heberwood	208	0.0	9.0	0.0	0.0461
Mosaic	1154	0.0	2.7	40.7	0.2618
Multi-Famliy_Development	0	4.1	0.0	0.0	0.0069
Heber_Meadows	105	0.0	0.0	0.0	0.0222
Heber_Foundation	0	1.6	0.0	0.0	0.0027
Imperial_Center	0	0.0	55.4	0.0	0.0135
Total	3049	41.7	78.1	92.3	0.7719

Build-out of known development is estimated to increase Average Dry Weather Flow by 0.7719 MGD.

Per the Service Area Plan, the average household size 3.91 persons per household. At build-out of known development, 3,049 single family dwelling units and an estimated 882 multi-family dwelling will be added for a population increase of 15,370. This a per capita generation increase of 50 GPD per person. Applying the per capita demand increase to the population model shown in Figure 2.1 gives the wastewater generation projection shown in Figure 3.4. Build-out of known development is estimated to occur in 2057 at an Average Dry Weather Flow of 1.24 MGD.

Figure 3.4 – Wastewater Generation Projection

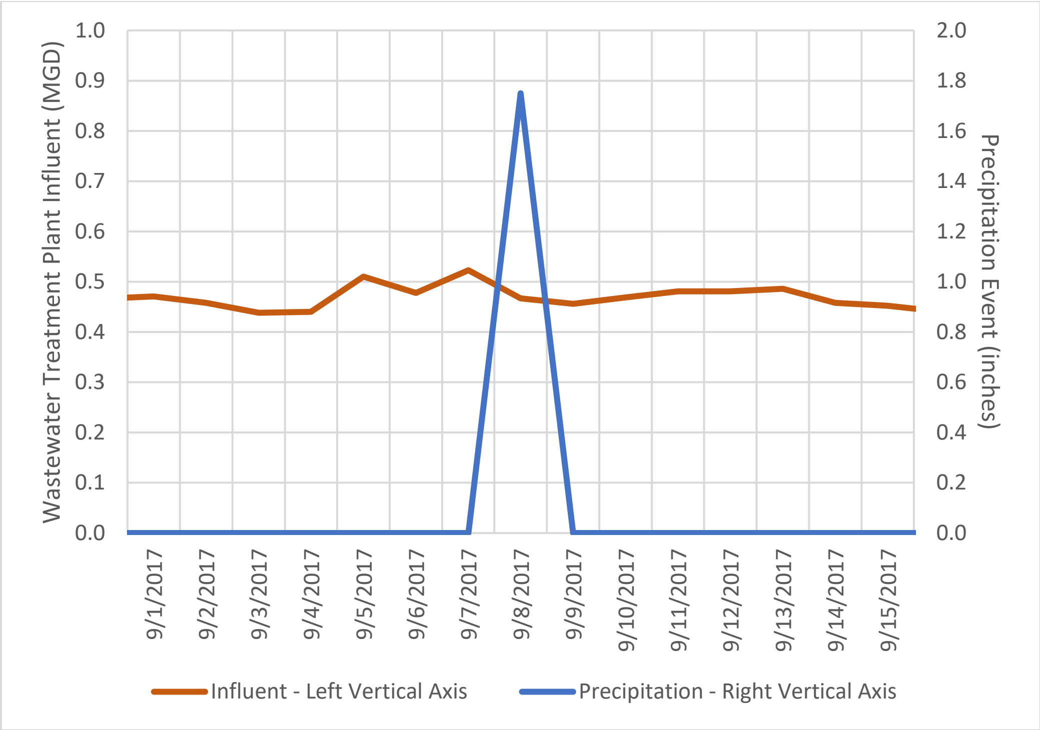


3.2.5 – Wastewater Generation Variation

Daily wastewater treatment plant influent data for calendar year 2017 were examined for variation. From this data set, the daily peak was calculated at 1.38 times the average wastewater treatment plant influent.

There was a large rain event on September 8, 2017, but no notable increase to influent, as shown in Figure 3.5.

Figure 3.5 – Inflow and Infiltration Response



This implies the collection system is not measurably impacted by inflow and infiltration (I&I).

Extensive field testing was done for preparation of the City of El Centro Sewer Master Plan[5], immediately north the HPUD service area. The wastewater generation variation that follows has been adapted from the City of El Centro Sewer Master Plan to be consistent with HPUD wastewater treatment plant influent data.

Peak Wet Weather Flow (PWWF) Peaking Factor: 1.5

Table 3.11 provides a summary of existing and future wastewater generation variation applying a Peaking Factor of 1.5.

Table 3.11 – Existing and Future Wastewater Generation Variation

Year	ADWF (MGD)	PWWF (MGD)
2020	0.468	0.702
2040	0.774	1.161

[5] City of El Centro Sewer Master Plan. (March, 2008). http://www.cityofelcentro.org/userfiles/COEC%20SEWER%20Master%20Plan%200308(1).pdf

Figure 3.6 and Figure 3.7 show diurnal variation for residential and non-residential wastewater generation, respectively.

Figure 3.6 – Residential Diurnal Variation from PWWF

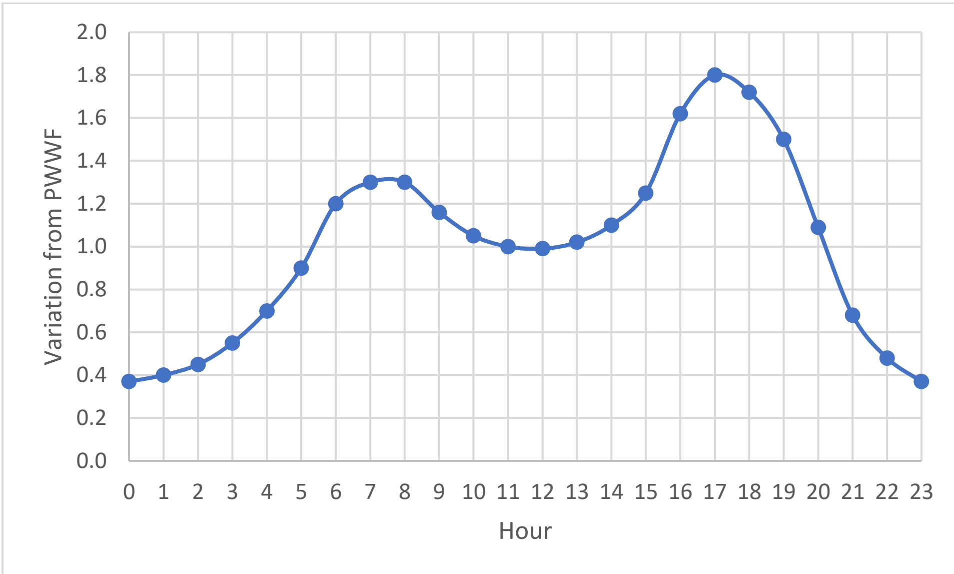
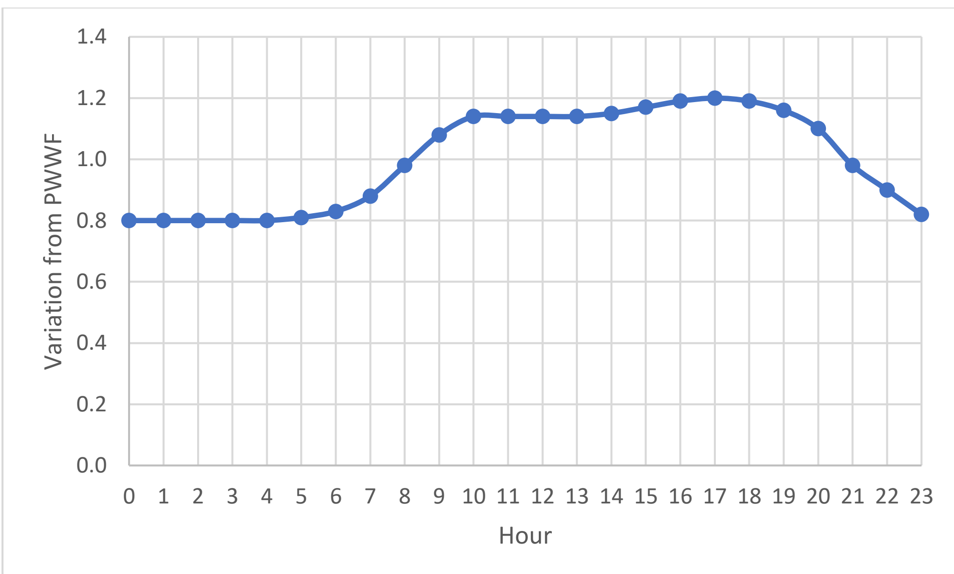


Figure 3.7 – Non-Residential Diurnal Variation from PWWF



These diurnal curves are applied to the sewer model loading to calculate accumulation and attenuation of flows in the collection system.

Chapter 4 – Existing Water System

4.1 – Inventory

The following subsections provide a general over of the inventory of infrastructure associated with the water system.

4.1.1 – Distribution System

Table 4.1 provides a summary of the water pipes in the distribution system, per the HPUD 2017 Service Area Plan.

Table 4.1 – Summary of Water Pipes

Diameter (inches)	Length (feet)	Material
4	8,500	ACP
6	5,080	ACP
8	64,800	PVC
10	10,130	PVC
12	35,000	PVC
18	1,000	PVC
20	2,450	PVC
Total	126,960	

4.1.2 – Water Treatment Plant

Process components of the water treatment plant:

- Raw Water Transmission Pipelines
- Two (2) 18-inch Inline Static Mixers
- Three (3) Raw Water Pre-sedimentation Basins
    - Basin 1 – 2.82 MG (concrete-lined)
    - Basin 2 – 2.21 MG (HDPE-lined)
    - Basin 3 – 2.79 MG (concrete-lined)
- Three (3) Clarifier | Filter Units @ 2 MGD each
- Two (2) Filter Backwash Settling Basins with decanting pump station
- Sodium Hypochlorite Disinfection System

4.1.3 – Pumps

Table 4.2 provides a summary of the pump stations involved in water treatment and distribution.

Table 4.2 – Pump Station Summary

Location	No. of Pumps	Type	Design Flow (GPM)	Design Head (feet)	HP
Raw Water Pump Station	3	Vertical Turbine	1400	50	22.3
Finish Water Transfer Pump Station	3	Vertical Turbine	1400	50	25
High Service Pump Station	4	Centrifugal	1500	150	100
Clarifier/Filter Units Backwash Pump Station	2	Centrifugal	5600	27	50
Backwash Decant Pump Station	2	Submersible	241	13	3

4.1.4 – Storage

Table 4.3 provides a summary of finished water storage capacity.

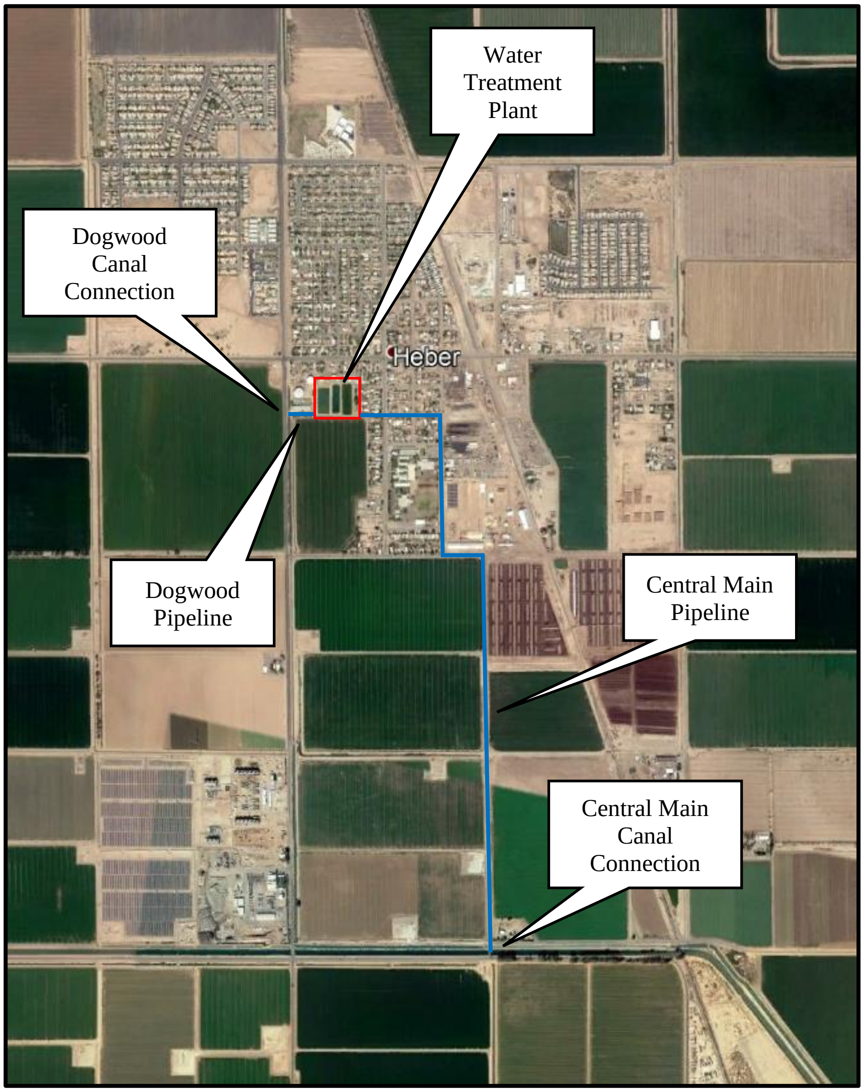
Table 4.3 – Finished Water Storage

Tank No.	Volume (MG)
1	0.75
2	1.7
3	3.0

4.2 – Source of Supply

For redundancy, HPUD has two sources of raw surface water supply from the Imperial Irrigation District (IID): the Dogwood Canal and the Central Main Canal. Water flows by gravity to the static mixer facility controlled by sluice gates.

Figure 4.1 – Raw Surface Water Connections



4.3 – Treatment Process

Figure 4.2 is a schematic of the water treatment process showing the major systems.

Figure 4.2 – Water Treatment Schematic

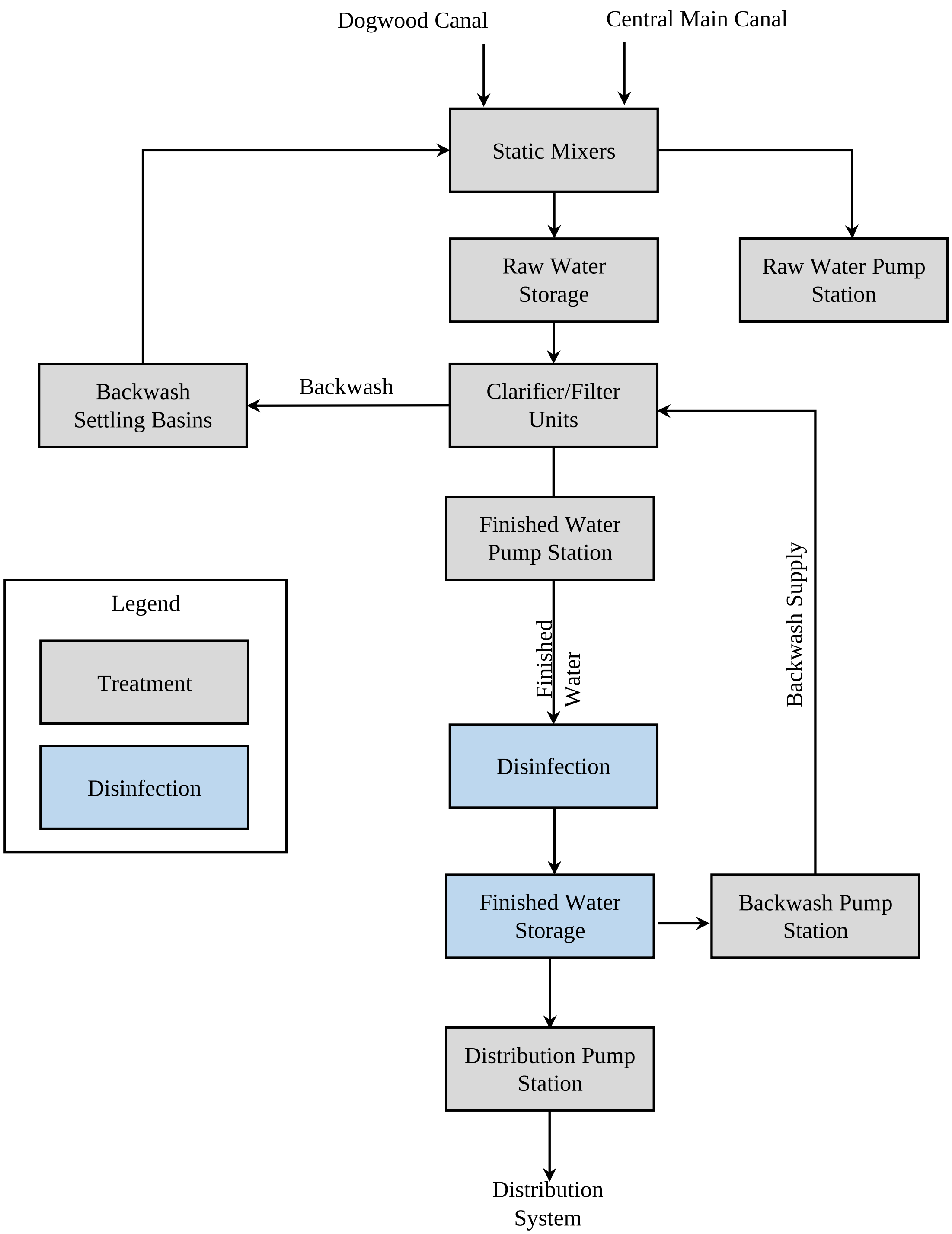
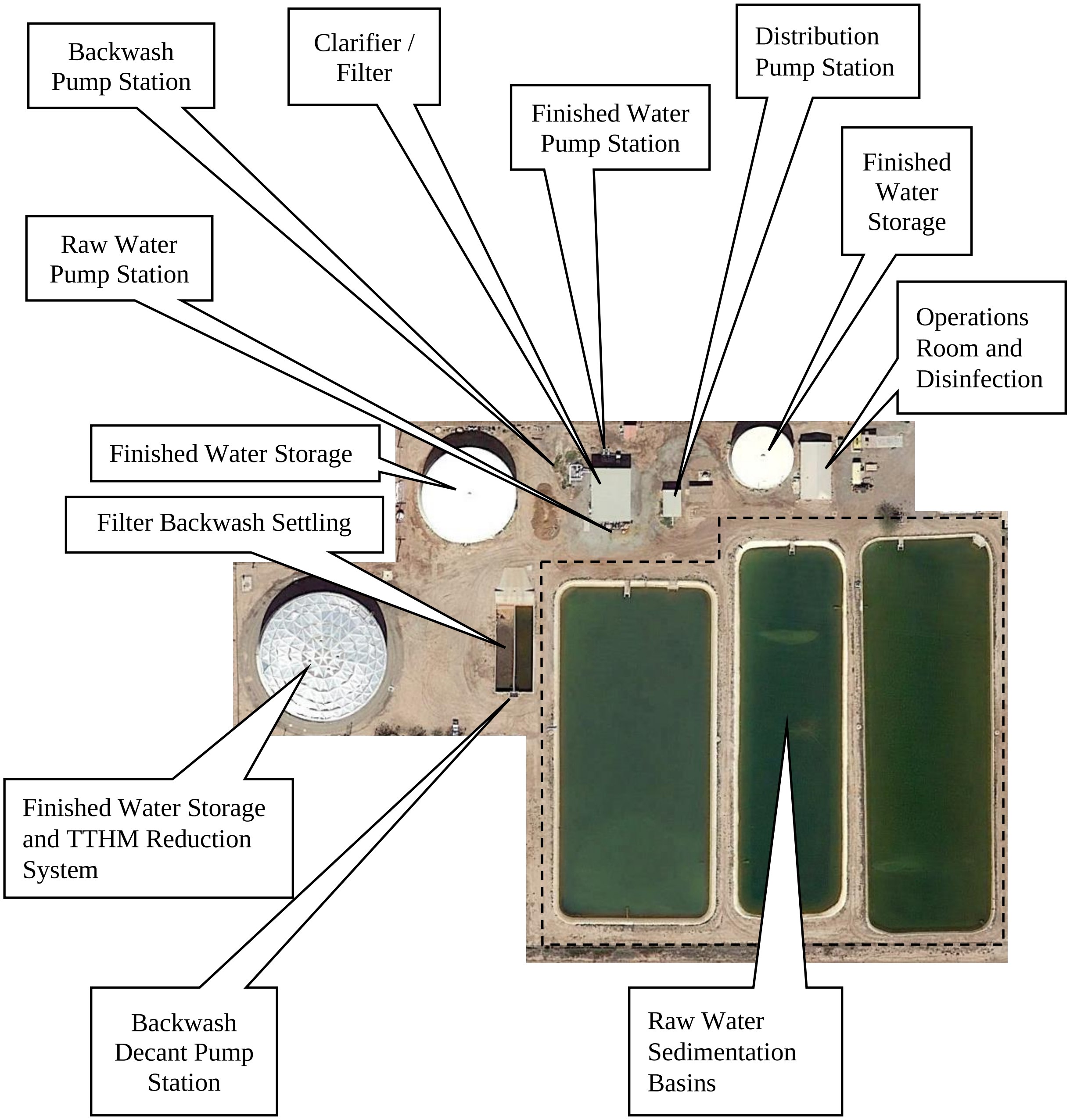


Figure 4.3 is an aerial view of the water treatment plant with the major systems labeled.

Figure 4.3 – Aerial View of Water Treatment Plant



Chapter 5 – Existing Sewer System

The following subsections provide a general over of the inventory of infrastructure associated with the sewer system.

5.1 – Inventory

The sewer system consists of a collection system and a wastewater treatment plant. The subsections that follow describe those components.

5.1.1 – Collection System

The collection system includes approximately 22 miles of sewer gravity pipes and six lift stations.

5.1.1.1 – Pipelines

Table 5.1 provides a summary of existing sewer gravity pipes in the collection system, per the Sewer Model.

Table 5.1 – Summary of Sewer Pipes by Diameter

Diameter (inches)	Length (feet)
4	169
6	23,168
8	61,065
10	999
12	13,338
24	4,027
30	11,146
Total	113,912

5.1.1.2 – Manholes

The wastewater collection system includes 313 manholes.

5.1.1.3 – Lift Stations

Table 5.2 – List Station Summary

No.	Location	No. of Pumps	Design Flow (GPM)	Design Head (feet)
1	6th Street & Grand Avenue	2	300	20
2	9th Street & Parkyns Avenue	2	300	20
3	Fawcett Road & Dogwood Road	2	300	20
4	Fawcett Road & Ware Road	2	300	20
5	Correll Road & Rockwood Avenue	2	500	47
6	Fawcett Road & Pitzer Road	2	300	20

5.1.2 – Wastewater Treatment Plant

The following subsections describe the infrastructure at the wastewater treatment plant.

5.1.2.1 – Primary Treatment

Influent Pump Station

- Wet well
- Three (3) submersible pumps
- Pressure transmitter / float control system

Influent Channel Facility

- Two (2) comminutors
- Bar Screen
- Parshall Flume Meter
- Influent Sampler

Headworks Facility

- Two (2) rotary drum screens (with screening washer unit and grit trap)
- Grit clarifier
- Splitter box

5.1.2.2 – Secondary Treatment

Aerators

- Two (2) STM Aerator Units
- Two (2) anoxic tanks with submersible mixer
- Splitter box

Two (2) Oxidation Ditches

- Racetrack figured channel
- Rotor aerator
- Effluent weir

Two (2) Secondary Clarifiers

Sludge Pumps

- Two (2) return activated sludge pumps
- Two (2) waste activated sludge pumps

Sludge Digester Facility

- Two (2) digesters (with aerator mixer)
- Digester pump station

Two (2) Sludge Dewatering Units (with screw press, polymer feed system, flocculation reactor, screw conveyor)

Thirteen (13) Sludge Drying Beds

Solids Handling Building

Emergency Overflow Basin

5.1.2.3 – Disinfection

Ultraviolet Disinfection System

- Two (2) sets of four (4) banks of six (6) UV disinfection lamp assemblies
- Power distribution center
- Hydraulic system center

5.2 – Treatment Process

The wastewater treatment plant has a current design and permitted capacity of 1.2 MGD.

Figure 5.1 is a schematic of the wastewater treatment process showing the major system components.

Figure 5.1 – Wastewater Treatment Schematic

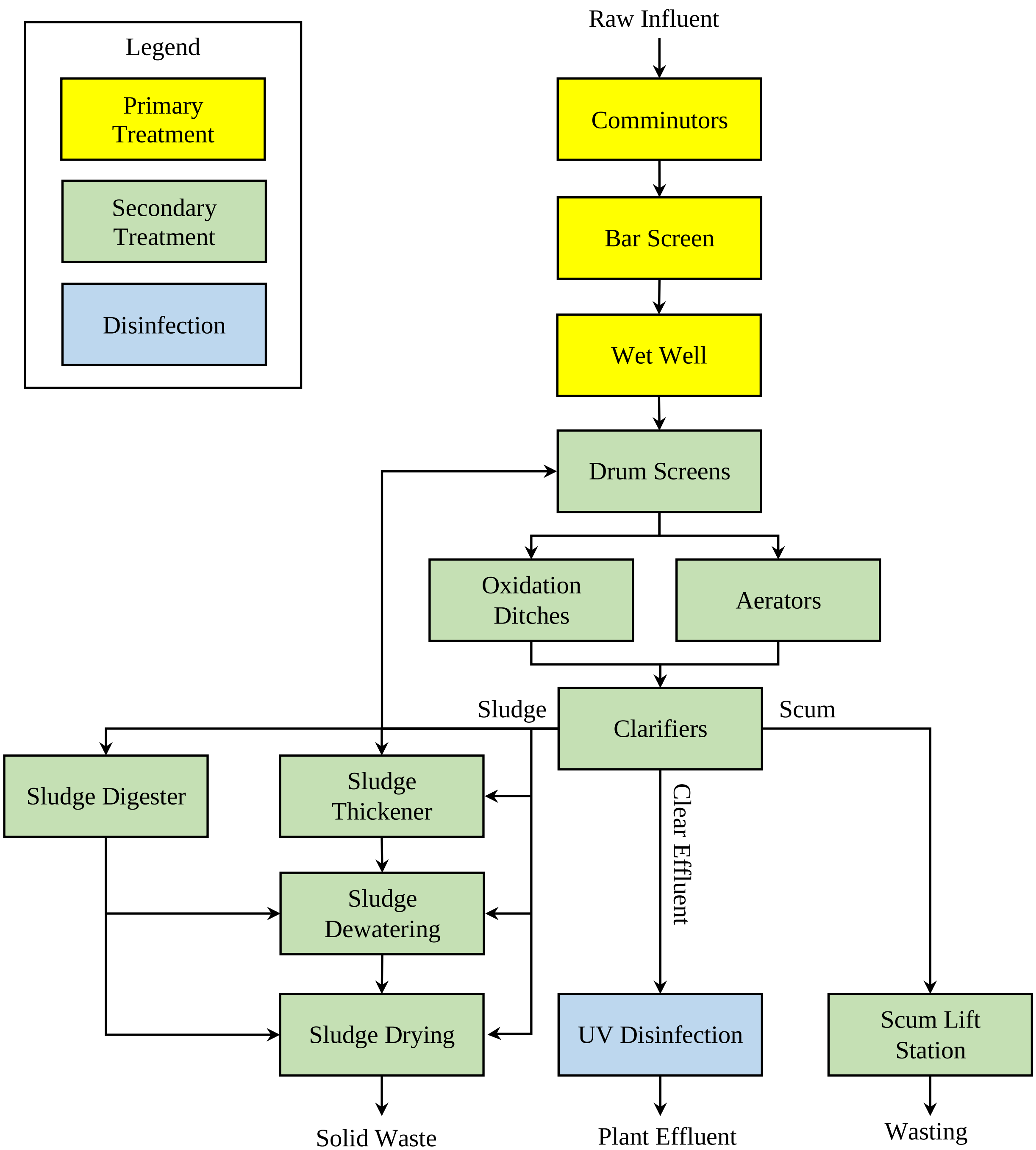
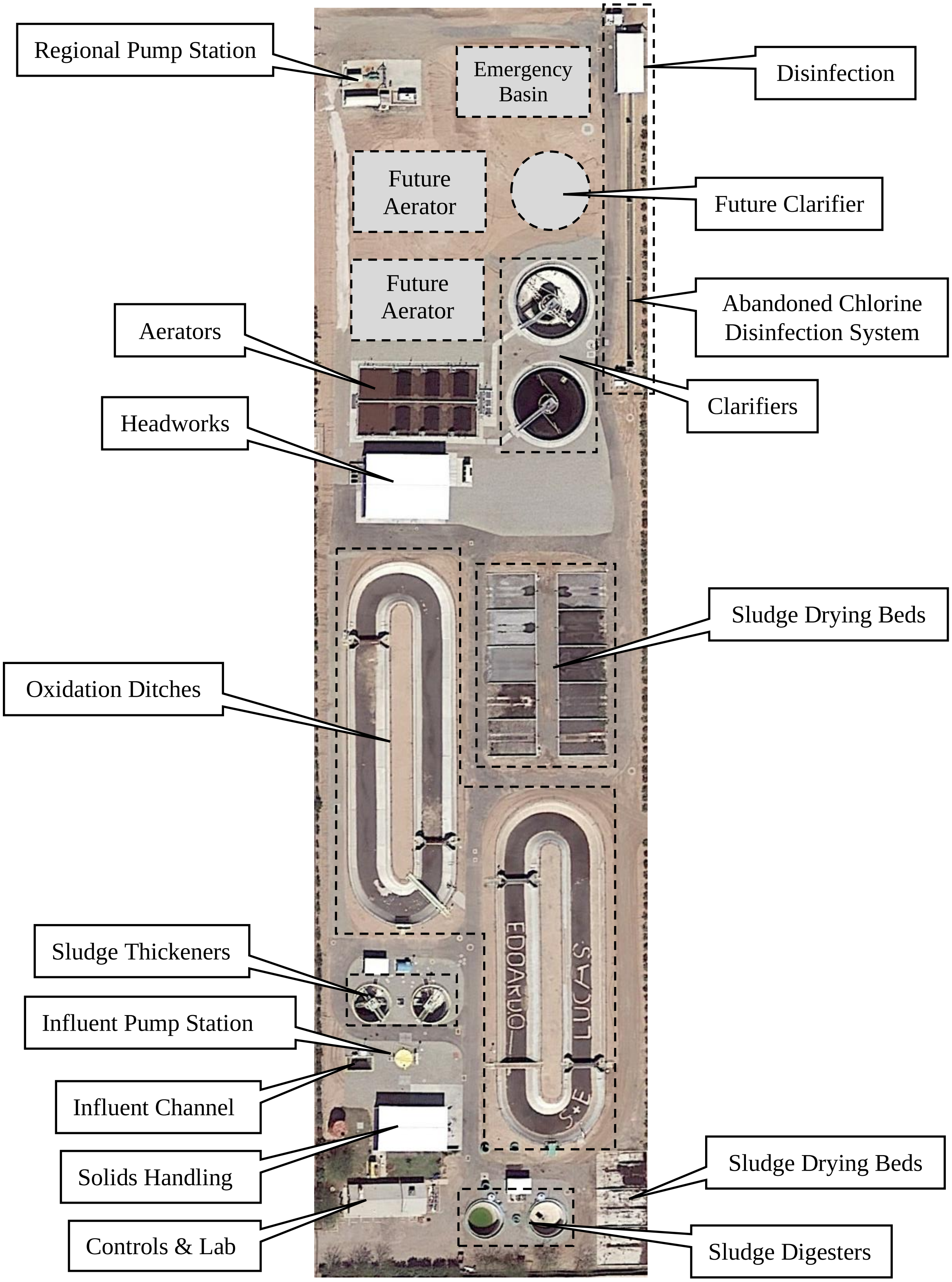


Figure 5.2 is an aerial view of the wastewater treatment plant with the major system components labeled.

Figure 5.2 – Aerial of Wastewater Treatment Plant



Chapter 6 – Evaluation Criteria

This chapter sets the design standards for review of the water and sewer systems capacities.

6.1 – Water System Design Criteria

The water system design criteria provide methods for evaluating the capacities of supply, pumping, storage and pipe performance required to satisfy customer level of service.

6.1.1 – Demand Variation

Demand varies seasonally and daily. The water system must be designed to accommodate these variations based on their function to assure continuous uninterrupted service. The following definitions of demand variation provide a basis for determining the appropriate level of service.

Average Day Demand

Average Day Demand (ADD) is the expected annual demand.

Maximum Day Demand

Maximum Day Demand (MDD) is the highest demand expected in a single day. ADD and MDD are related by a peaking factor:

$$PF_{MDD} = \frac{MDD}{ADD} = 1.6$$

Peak Hour Demand

Peak Hour Demand (PHD) is the highest expected instantaneous demand. MDD and PHD are related by a peaking factor:

$$PF_{PHD} = \frac{PHD}{MDD} = 2.0$$

Fire Flow Demand

For planning purposes, targets for fire flow demand are based on land use as shown in Table 6.1.

Table 6.1 – Fire Flow Demand by Land Use

Land Use	Flow (GPM)	Duration (hours)
Residential	1,200	2
Commercial	2,000	2
Industrial	2,500	3

6.1.2 – Supply

MDD with largest single source offline

6.1.3 – Pumping

Since the District's distribution system has no elevated storage to assist in accommodating variations in demand throughout the day, all demand conditions must be satisfied by the high service booster pump station (Distribution Pump Station):

- PHD at a system pressure of 40 psi and with largest single unit offline
- MDD plus fire flow at a residual pressure of 20 psi and with largest single unit offline

6.1.4 – Storage

Sum of emergency, operational and fire storage

- Emergency storage: 6 days of ADD
- Operational storage: 25% of one day of MDD
- Fire storage: single largest fire event

6.1.5 – Pressure

Minimum system pressure under normal conditions: 40 psi

Minimum residual pressure under fire flow conditions: 20 psi

6.1.6 – Pipe Velocity

Maximum pipe velocity under normal conditions: 7 feet per second

Maximum pipe velocity under fire flow conditions: 15 feet per second

6.2 – Sewer System Design Criteria

The sewer system design criteria provide methods for evaluating the capacities of treatment and pipe performance required to satisfy customer level of service.

6.2.1 – Wastewater Generation Variation

Wastewater generation impacting system loading varies seasonally, daily and hourly. The sewer system must be designed to accommodate these variations based on their function to assure continuous uninterrupted service. The following definitions of flow variation provide a basis for determining the appropriate level of service.

Average Dry Weather Flow (ADWF) is the expected annual wastewater generation.

Peak Wet Weather Flow (PWWF) is the highest wastewater generation expected in a single day and represents the sum of domestic wastewater generation and Inflow & Infiltration due to precipitation. ADWF and PWWF are related by a peaking factor:

$$PF_{PWWF} = \frac{PWWF}{ADWF} = 1.5$$

Wastewater generation at the customer level varies throughout the course of the day, and flow varies as a function of accumulation and attenuation. The diurnal curves shown in Figure 3.6 and Figure 3.7 describe how wastewater generation varies over the course of the day. The sewer model is programmed to calculate accumulation and attenuation based on loading and diurnal variation.

6.2.2 – Treatment

Design capacity must meet PWWF

6.2.3 – Gravity Flow Formula

Gravity flow in a pipe is calculated using Manning's Equation:

$$v = \left(\frac{1.486}{n}\right) R_h^{2/3} S^{1/2}$$

Where:

v is velocity in feet per second

n is Manning's roughness coefficient (unitless)

R_h is the hydraulic radius in feet

S is the slope or gradient of the pipe (unitless)

6.2.4 – Maximum Pipe Velocity

10 feet per second

Note: In very flat terrain like Heber, maximum velocity is rarely a governing factor in design.

6.2.5 – Minimum Pipe Velocity

2 feet per second average dry weather flow

6.2.6 – Maximum Depth to Diameter Ratio

Table 6.2 – Maximum Depth to Diameter Ratios by Pipe Diameter

Range of Diameters	Ratio
10 inches and less	0.50
12 inches to 18 inches	0.67
21 inches and more	0.75

Chapter 7 – Water System Hydraulic Model

7.1 – Development

The water system hydraulic model (Water Model) is a computer simulation of the water distribution system capable of calculating the flow in each pipe and the pressure at each node. A node is the end of a pipe and may serve a variety of functions including a location for demand allocation, dead-end, a connection to another pipe or pipes, a pump, a tank or a valve. The Water Model was developed using InfoWater software by Innovyze. The Water Model is comprised of a fixed database and a variable database. The fixed database represents physical assets including pipes, pumps, tanks and control valves. The variable database represents loading and controls. Loading refers to allocation of water demand based on billing records and customer locations, and controls refers to operational settings of the pump station and controls valves which respond to customer needs.

7.1.1 – Development of the Fixed Database

The development process for the fixed database incorporated the following data sources:

TOPO2004

This file is a topographical survey of the vicinity of the Township of Heber. It provides an elevation reference to all surface points within the service area.

Water Atlas Township of Heber (July 2011)

This document is a detailed map of the water system showing pipes, valves, laterals, appurtenances, and the water treatment plant which includes tanks, pumps, controls, electrical and control valves.

CADD File for the Existing System

This file is a map of the existing water system as shown in Exhibit 4-F of the HPUD 2017 Service Area Plan. The map includes the alignment, connectivity and diameter of pipelines and the location of the water treatment plant.

Through an iterative process, the Water Model was digitized from the data sources above. To align with future engineering efforts utilizing this master plan, the Water Model was constructed referencing the North American Datum of 1983 (NAD 83), California State Planes, Zone 6, which is commonly used throughout the Imperial Valley for surveying and mapping.

The Water Model was validated by assuring all pipes flowed as indicated per information available in the HPUD Service Area Plan.

7.1.2 – Development of the Variable Database

Water demand factors developed in Section 3.1.3 were applied to each occupied parcel in the service area, and then allocated spatially to the nearest demand node. Fire flows were allocated to all hydrant nodes per land use designation. This method assures that occupancy, density and land use are accurately represented in the demand allocation.

The pump station was programmed to respond to system demand and the control valve was set to discharge flow to the system at a constant downstream pressure of 52 psi.

Table 7.1 provides a breakdown of water customers and the average water demand allocated to the Water Model for each land use category.

Table 7.1 – Summary of Water Customers

Land Use	Occupied Parcels	Area (Acres)	Allocation (GPM)
APT	36	30.76	43.8
COM	41	71.50	13.8
IND	22	163.98	29.6
PUB	23	148.78	99.8
RES	1,429	555.50	480.3
Total	1,551	970.52	667.3

7.2 – Preprogrammed Simulations

For ease of application, updating and use for future engineering studies, the Water Model was preprogrammed with a standard set of simulations aimed at evaluating the response of the water distribution system against design criteria.

The Water Model is programmed with six preset scenarios:

Existing Average Day Demand

This scenario is used to determine whether maximum system pressure constraints are achieved under existing conditions.

Existing Peak Hour Demand

This scenario is used to determine whether maximum pipe velocity and minimum system pressure constraints are achieved under existing conditions.

Existing Maximum Day Demand plus Fire Flow

This scenario is used to determine the availability of fire flow at the allowable residual pressure under existing conditions.

Future Average Day Demand

This scenario is used to determine whether maximum system pressure constraints are achieved under future conditions.

Future Peak Hour Demand

This scenario is used to determine whether maximum pipe velocity and minimum system pressure constraints are achieved under future conditions.

Future Maximum Day Demand plus Fire Flow

This scenario is used to determine the availability of fire flow at the allowable residual pressure under future conditions.

7.3 – Water Model Statistics

The Water Model consists of the element totals shown in Table 8.2.

Table 7.2 – Water Model Elements

Model Element	Quantity
Pipes	530
Nodes	451
Pumps	2
Tanks	1
Control Valves	1

Note that the pump station and storage tanks were simplified for modeling purposes. A single tank with the equivalent volume of the sum of Tank 1, Tank 2 and Tank 3 represents production and storage. The two pumps represent the system's available firm capacity.

Table 8.3 provides a summary of the length of pipe by diameter in the Water Model.

Table 7.3 – Modeled Water Pipes by Diameter

Diameter (inches)	Length (feet)
8	98,475
10	2,676
12	50,786
18	5,829
20	3,740
Total	161,506

The total length of pipe is approximately 30.6 miles.

Chapter 8 – Sewer System Hydraulic Model

8.1 – Development

The sewer system hydraulic model (Sewer Model) is a computer simulation of the wastewater collection system capable of calculating the flow and depth of wastewater in each pipe. The Sewer Model was developed using InfoSewer software by Innovyze. The Sewer Model is comprised of a fixed database and a variable database. The fixed database represents physical assets including manholes, gravity pipes, lift stations (i.e. each station includes a sump, a set of pumps, and a force main) and the outfall (i.e. the intake for the wastewater treatment plant). The variable database represents loading and controls. Loading refers to allocation of sewer flows based on customer wastewater generation and locations, and controls refers to operational settings of the lift stations which respond to customer needs.

8.1.1 – Development of the Fixed Database

The development process for the fixed database incorporated the following data sources:

TOPO2004

This file is a topographical survey of the vicinity of the Township of Heber. It provides an elevation reference to all surface points within the service area.

CADD File for the Existing System

This file is a map of the existing sewer system as shown in Exhibit 4-C of the HPUD 2017 Service Area Plan. The map includes the alignment, connectivity and diameter of pipelines; the locations of lifts stations; and the location of the wastewater treatment plant.

Rim Survey

This file is a map of all sewer manholes in the service area including designation, location and elevation of the rim.

Invert Survey

This is a dataset of measurements taken in the field related to key manholes to support the Sewer Model development process. The dataset includes photos of the exterior and interior of the key manholes, observations of condition and flow direction, and measurements from the rim of the manhole to the base and to the inverts of all pipes terminating at the manhole.

Through an iterative process, the Sewer Model was digitized from the data sources above. To align with future engineering efforts utilizing this master plan, the Sewer Model was constructed referencing the North American Datum of 1983 (NAD 83), California State Planes, Zone 6, which is commonly used throughout the Imperial Valley for surveying and mapping.

The Sewer Model was validated by assuring all gravity pipes flowed as indicated per information available in the HPUD Service Area Plan.

8.1.2 – Development of the Variable Database

Wastewater generation factors developed in Section 3.2.3 were applied to each occupied parcel in service area, and then allocated spatially to the nearest loading manhole to create a composite flow. The flows associated with contributing parcels for each manhole were further segregated by land use type and an appropriate diurnal pattern applied, as described in Section 3.2.5. This method assures that occupancy, density and land use are represented in the flow allocation.

Table 8.1 provides a breakdown of sewer customers and the average wastewater flows allocated to the Sewer Model for each land use category.

Table 8.1 – Summary of Water Customers

Land Use	Occupied Parcels	Area (Acres)	Allocation (GPD)
APT	36	30.76	51,327
COM	41	71.50	17,465
IND	22	163.98	37,562
PUB	23	148.78	64,432
RES	1,410	538.02	297,510
Total	1,532	953.04	468,296

Lift stations were programmed to respond to sump depth for a conservative operating volume.

Note that no evidence of a spike in flows due to inflow and infiltration was found in the historical record of wastewater treatment plant influent data. Consequently, inflow and infiltration were not included in the loading calculation.

8.2 – Preprogrammed Simulations

For ease of application, updating and use for future engineering studies, the Sewer Model was preprogrammed with a standard set of simulations aimed at evaluating the response of the wastewater collection system against design criteria.

The Sewer Model is programmed with four preset scenarios:

Existing Average Flow

This scenario is used to determine whether minimum pipe velocity targets are achieved under existing conditions.

Existing Peak Flow

This scenario is used to determine whether maximum pipe velocity targets and maximum depth to diameter ratios are achieved under existing conditions.

Future Average Flow

This scenario is used to determine whether minimum pipe velocity targets are achieved under future conditions.

Future Peak Flow

This scenario is used to determine whether maximum pipe velocity targets and maximum depth to diameter ratios are achieved under future conditions.

8.3 – Sewer Model Statistics

The Sewer Model consists of the element total shown in Table 8.2.

Table 8.2 – Sewer Model Elements

Model Element	Quantity
Pipes	326
Manholes	313
Lift Stations	6
Outfall	1

Note that each lift station contains a sump, a pump and a force main.

Table 8.3 provides a summary of the length of pipe by diameter in the Sewer Model.

Table 8.3 – Modeled Sewer Pipes by Diameter

Diameter (inches)	Length (feet)
4	169
6	23,168
8	61,065
10	999
12	13,338
24	4,027
30	11,146
Total	113,912

The total length of pipe is approximately 22.6 miles.

Chapter 9 – Water System Analysis

This chapter presents application of the water system design criteria based on existing and future loading.

9.1 – Supply Analysis

9.1.1 – Supply Design Criteria

Per Design Criteria, there must be sufficiency supply to satisfy MDD with the largest single source offline.

9.1.2 – Supply Capacity

The water treatment plant has an approved capacity of 4.0 million gallons per day (2,780 gpm):

$$\left(\frac{4{,}000{,}000\ gallons}{day}\right)\left(\frac{day}{24 \times 60\ minutes}\right) \cong 2{,}780\ gpm$$

The water treatment plant is fed by two surface water connections with IID, each capable of supplying the District independently.

The Main Central Canal connection has a permitted capacity of 6 MGD (4,170 gpm) which exceeds the plant capacity, and the Dogwood Canal has a permitted capacity of 2 MGD (1,390 gpm) which is half of the plant capacity.

As approved by DDW, the Central Main Canal was approved as a canal system that is not taken out of service. Of note is that the Dogwood Canal is served by the Central Main Canal, which means that the Dogwood Canal would go out of service if the Central Main Canal goes out of service.

9.1.3 – Supply Requirements

The existing and future supply requirements are shown in Table 9.1.

Table 9.1 – Supply Requirements

Condition	MDD (GPM)
Existing	1,054
Future	1,778

9.1.4 – Comparison of Storage Capacity and Requirements

As shown in Table 9.2, there is sufficient supply capacity to satisfy existing requirements; however, there is a future surplus capacity of 2,39 using the 6 MGD valve..

Table 9.2 – Supply Surplus

Condition	Capacity (GPM)	Requirements (GPM)	Surplus (GPM)
Existing	4,170	1,054	3,116
Future	4,170	1,778	2,392

.

9.2 – Storage Analysis

9.2.1 – Storage Design Criteria

Per design criteria, the storage requirement is the sum of emergency, operational and fire storage:

- Emergency storage: 6 days of ADD
- Operational storage: 25% of one day of MDD
- Fire storage: single largest fire event

$$(flow)(duration) = \left(\frac{2{,}500\ gallons}{minute}\right)(3 \times 60\ minutes) = 450{,}000\ gallons$$

Emergency storage refers to a planned temporary shutdown of the Main Central Canal and the Dogwood Canal for maintenance and inspection. Under these circumstances, the District will have to meet its customers' demands from water storage at the water treatment plant. For planning purposes, the District will be informed in advance of the planned shutdown and fill its tanks and settling basins just prior to the shutdown. As a result, the cumulative volume of the tanks and settling basins is available to meet the emergency storage requirement. Generally, planned shutdowns are scheduled during the winter when demand is low; however, the District must be prepared for a planned shutdown at any time.

Operational storage refers to the volume required to reconcile the variation between production and demand. Generally, production is constant, but demand varies over the course of the day.

Fire storage refers to the single largest fire flow event the District should be prepared to support. In this case, a 3-hour industrial fire flow event at 2,500 gpm is the largest:

$$(flow)(duration) = \left(\frac{2{,}500\ gallons}{minute}\right)(3 \times 60\ minutes) = 450{,}000\ gallons$$

9.2.2 – Storage Capacity

Total available storage is 12.72 million gallons, as shown in Table 9.3.

Table 9.3 – Total Available Storage

Storage Unit	Volume (MG)
Tank 1	0.75
Tank 2	1.70
Tank 3	3.00
Settling Basin 1	2.28
Settling Basin 2	2.21
Settling Basin 3	2.78
Total	12.72

9.2.3 – Storage Requirement

The existing and future storage requirements are shown in Table 9.4.

Table 9.4 – Storage Requirements

Condition	Emergency Storage (MG)	Operational Storage (MG)	Fire Storage (MG)	Total Storage (MG)
Existing	5.69	0.38	0.45	6.52
Future	9.60	0.64	0.45	10.69

9.2.4 – Comparison of Storage Capacity and Requirements

There is sufficient storage capacity to satisfy existing and future requirements, as shown in Table 9.5.

Table 9.5 – Storage Surplus

Condition	Capacity (MG)	Requirements (MG)	Surplus (MG)
Existing	12.72	6.52	6.20
Future	12.72	10.69	2.03

9.3 – Pumping Analysis

9.3.1 – Pumping Design Criteria

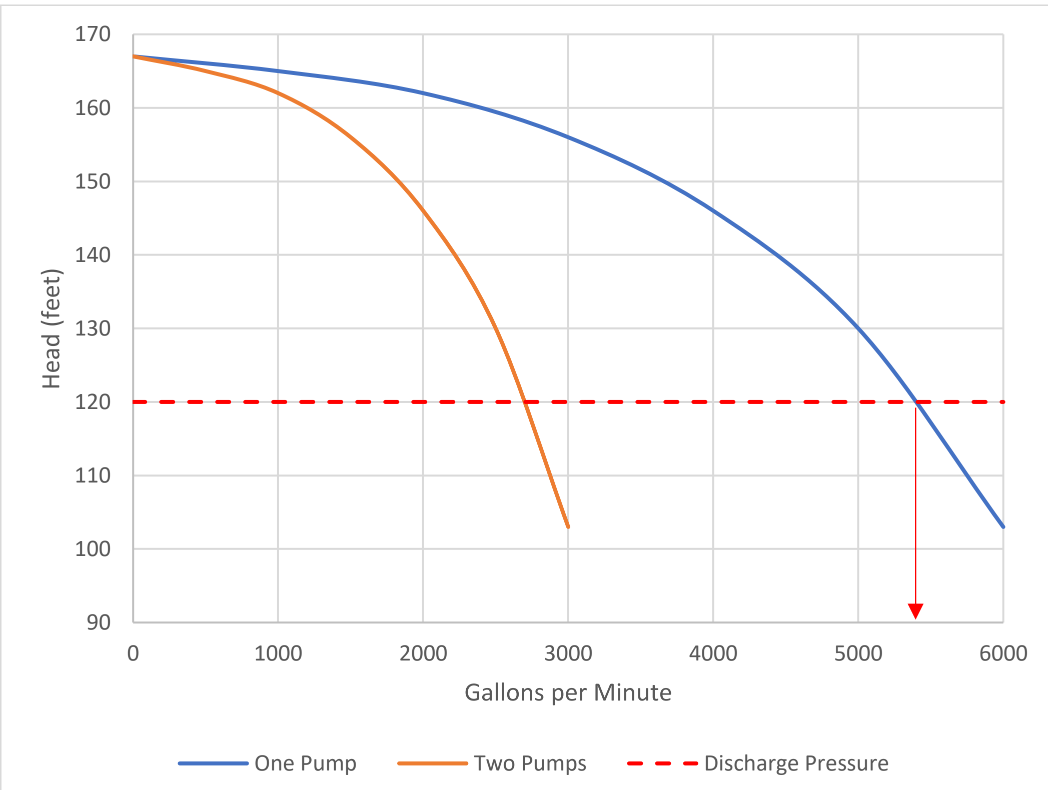
Since the District's distribution system has no elevated storage to assist in accommodating variations in demand throughout the day, all demand conditions must be satisfied by the high service pump station:

- PHD at a system pressure of 40 psi and with largest single unit offline
- MDD plus fire flow at a residual pressure of 20 psi and with largest single unit offline

9.3.2 – Pumping Capacity

Per pump design specifications in the Operations Plan, a system operating pressure of 52 psi (120 feet), and tanks half full, the pump station is estimated to perform as shown in Figure 9.1.

Figure 9.1 – Calculated Pump Performance



With two pumps in operation, the pump station has a capacity of 5,300 gpm at a discharge pressure of 52 psi.

9.3.3 – Pumping Requirements

The existing and future pumping requirements are shown in Table 9.6.

Table 9.6 – Pumping Requirements

Conditions	MDD + Fire Flow (GPM)	PHD (GPM)
Existing	3,554	2,108
Future	4,278	3,556

MMD + Fire Flow is the governing pumping requirement.

9.3.4 – Comparison of Pumping Capacity and Requirements

There is sufficient pumping capacity to satisfy existing and future requirements, as shown in Table 9.7.

Table 9.7 – Pumping Surplus

Condition	Capacity (GPM)	Requirements (GPM)	Surplus (GPM)
Existing	5,300	3,554	1,746
Future	5,300	4,278	1,022

9.4 – Pipeline Analysis

9.4.1 – Pipeline Design Criteria

Pipeline design in coordination with pumping capacity must satisfy both system pressure and pipe velocity criteria.

System Pressure Criteria

- Minimum system pressure under normal conditions: 40 psi
- Minimum residual pressure under fire flow conditions: 20 psi

Pipe Velocity Criteria

- Maximum pipe velocity under normal conditions: 7 feet per second
- Maximum pipe velocity under fire flow conditions: 15 feet per second

9.4.2 – Existing Conditions

Two hydraulic simulations were run using the Water Model to compare design criteria requirements to pipeline capacity under existing conditions.

The first simulation tested for low system pressure and high pipe velocity. The criterion for minimum system pressure is 40 psi. The criterion for maximum pipe velocity under normal operating conditions is 7 feet per second. The Water Model was run under Peak Hour Demand conditions.

All parts of the system meet the minimum system pressure requirements. No pipes have a velocity higher than 7 feet per second.

The second simulation tested for residual pressure under fire flow conditions. The criterion for residual pressure under fire flow is 20 psi. The Water Model was run under Maximum Day Demand plus Fire Flow conditions.

All parts of the system meet residual pressure requirements under fire flow conditions.

9.4.3 – Future Conditions

Two hydraulic simulations were run using the Water Model to compare design criteria requirements to pipeline capacity under future conditions.

The first simulation tested for low system pressure and high pipe velocity. The criterion for minimum system pressure is 40 psi. The criterion for maximum pipe velocity under normal operating conditions is 7 feet per second. The Water Model was run under Peak Hour Demand conditions.

All parts of the system meet the minimum system pressure requirements. No pipes have a velocity higher than 7 feet per second.

The second simulation tested for residual pressure under fire flow conditions. The criterion for residual pressure under fire flow is 20 psi. The Water Model was run under Maximum Day Demand plus Fire Flow conditions.

One location was found to be deficient under future conditions. Hydrants serving the commercial property on the northeast corner of Fawcett Road and Heffernan Avenue will not be able to meet the 20 psi residual pressure requirement under future fire flow conditions.

No other hydraulic capacity issues involving pipelines were uncovered during modeling.

9.5 – Condition Assessment

A site visit of the water treatment plant and interviews with plant operators revealed the following performance, condition, operational capacity, redundancy and safety issues:

- Aging asbestos cement pipe in the distribution system
- Worn fabric lining for Settling Basin 2
- Cracks in Settling Basins 1 and 3
- Corrosion on exterior of tank #2
- Damaged chemical storage tank
- Undersized and cracked backwash basin
- Pump deterioration of Filter Pump 2
- Leaking static mixer facility
- Insufficient exterior lighting

Chapter 10 – Sewer System Analysis

This chapter presents application of the sewer system design criteria based on existing and future loading.

10.1 – Treatment Capacity Analysis

10.1.1 – Treatment Design Criteria

Per Design Criteria, there must be sufficiency treatment capacity to satisfy PWWF.

10.1.2 – Treatment Capacity

Per the Operations Plan, the design treatment capacity of the wastewater treatment plant is 1.2 million gallons per day.

10.1.3 – Treatment Requirements

The existing and future treatment requirements are shown in Table 10.1.

Table 10.1 – Treatment Requirements

Year	PWWF (MGD)
Existing	0.702
Future	1.161

10.1.4 – Comparison of Treatment Capacity and Requirements

There is sufficient treatment capacity to satisfy existing and future requirements, as shown in Table 10.2.

Table 10.2 – Treatment Surplus

Condition	Capacity (MGD)	Requirements (MGD)	Surplus (MGD)
Existing	1.200	0.702	0.498
Future	1.200	1.161	0.039

10.2 – Collection System Capacity Analysis

10.2.1 – Collection System Design Criteria

Maximum Pipe Velocity

- 10 feet per second

Minimum Pipe Velocity

- 2 feet per second under average dry weather flow

Maximum Depth to Diameter Ratio

- Varies by pipe diameter, as shown in Table 6.2.

10.2.2 – Existing Conditions

Two hydraulic simulations were run using the Sewer Model to compare design criteria requirements to pipeline capacity under existing conditions.

The first simulation tested for minimum pipe velocity. The criterion for minimum pipe velocity is 2 fps. The Sewer Model was run under Average Dry Weather Flow conditions to test for this criterion. Deficiencies in minimum pipe velocity occur throughout the collection system. It is likely the system was designed to accommodate a higher wastewater generation rate than presently exists. This may be the result of the implementation of aggressive water conservation measures over the last two decades. Municipal wastewater has two parameters: a hydraulic loading component and a biological loading component. The trend is toward lower hydraulic loading due to water conservation and higher biological loading due to population growth. There is no practical method to improve minimum pipe velocity in an existing system other than redesign and replacement. Note also that the flat terrain exacerbates the problem. The best solution is more frequent pipe flushing and pipe cleaning as needed to prevent the accumulation of solids that may lead to a blockage and overflow.

The second simulation tested for maximum pipe velocity and maximum depth to diameter ratio. The Sewer Model was run under Peak Wet Weather Flow conditions to test for these criteria.

All parts of the system meet maximum pipe velocity and maximum depth to diameter ratio requirements under Peak Wet Weather Flow conditions.

10.2.3 – Future Conditions

Two hydraulic simulations were run using the Sewer Model to compare design criteria requirements to pipeline capacity under future conditions.

The first simulation tested for minimum pipe velocity. The criterion for minimum pipe velocity is 2 fps. The Sewer Model was run under Average Dry Weather Flow conditions to test for this criterion. Deficiencies in minimum pipe velocity occur throughout the collection system. As discussed in the previous subsection, more frequent pipe flushing and pipe cleaning are recommended to deal with these deficiencies.

The second simulation tested for maximum pipe velocity and maximum depth to diameter ratio. The Sewer Model was run under Peak Wet Weather Flow conditions to test for these criteria.

All parts of the system meet maximum pipe velocity and maximum depth to diameter ratio requirements under Peak Wet Weather Flow conditions.

10.3 – Condition Assessment

A site visit of the wastewater treatment plant and interviews with plant operators revealed the following performance, condition, operational capacity, redundancy and safety issues. These were identified at the time of inspection. Operational solutions to some deficiencies may be in progress:

- Excessive corrosion from hydrogen sulfide gas
- PLC and SCADA system are obsolete
- Unsafe conditions related to aerator maintenance
- Insufficient laboratory space
- Insufficient redundancy in UV disinfection.
- Need for clarifier sprayers
- Insufficient sludge basin operational capacity
- Insufficient redundancy in sludge return conveyance
- Insufficient redundancy in primary treatment with a need for communitor for regional lift station.

Chapter 11 – Capital Improvement Program

This chapter lays out the projects recommended to maintain the viability of the water and sewer systems for the next 20 years, assumptions and methods for determining planning level cost estimates, a method for project prioritization, and an implementation strategy.

11.1 – Prioritization Methodology and Application

Capital projects are prioritized based on the following criteria:

- Impact to level of service
- Perceived urgency
- Likelihood of failure
- Consequence of failure
- Safety

Methodology

- Each criterion was assigned a weight between 1 and 10, based on the engineer's opinion.
- Each proposed capital project was rated against each criterion with a score between zero and 10, based on the engineer's opinion.
- The sum of the scores times the weights gives the weighted score.
- The projects were ranked from highest weighted score to lowest weighted score, and projects with conditional circumstances were noted.

Table 11.1 provides a summary of the ranking process.

Table 11.1 – Prioritization Matrix

Criteria	Impact to level of service	Perceived urgency	Likelihood of failure	Consequence of failure	Safety	Weighted Scoring	Ranking
Weight	**10**	**10**	**5**	**5**	**5**		
Improve Odor and Corrosion Control	10	10	10	10	10	350	1
Replace Sagging Sewer Trunkline	10	10	10	5	5	300	2
Replace Sinking Manholes	10	10	10	5	5	300	3
Replace Finished Water Pump 2	10	8	10	10	0	280	4
Repair Leaking Static Mixer Facility	10	8	8	10	0	270	5
Replace Aging ACP	10	10	10	3	5	260	6
Improve Finished Water Meter	10	6	10	1	0	215	7
Replace Chemical Storage Tank	0	10	10	2	10	210	8
Improve Sludge Return Train Connectivity	3	8	10	10	0	210	9
Replace WTP Maintenance Building	5	4	10	1	10	195	10
Install Backup Bar Screen and Grinder	3	7	8	10	0	190	11
Improve Onsite Laboratory at WWTP	10	3	3	5	2	180	12
WTP Lighting	3	2	8	6	10	170	13
Fawcett Road Pipeline	8	1	1	7	8	170	Conditional
Improve Wastewater Treatment to Tertiary Standards	4	4	1	10	4	155	Conditional
Upgrade UV Disinfection Controls	2	8	3	7	0	150	14
Construct Concrete Settling Basin 2	0	8	7	2	0	125	15
Install Sewer Lift Station in Northwest Quadrant	10	1	1	1	0	120	Conditional
Install Sprayers on Clarifiers	2	8	1	1	0	110	16
Replace Aerators with Safer, More Cost-Effective Option	1	2	1	3	10	100	17
Construct Additional Sludge Bed	0	4	4	8	0	100	18
Repair Cracks in Settling Basins 1 and 3	0	3	6	3	2	85	19
WTP Backwash Basin Improvement	0	2	5	3	3	75	20
Paint Finished Water Tanks	0	5	2	2	0	70	21

11.2 – Cost Assumptions

Total project cost is the sum of the following:

- Materials and Labor (estimated per project requirements)
- Design and Planning (20% of Materials and Labor)
- Construction Management (10% of Materials and Labor)
- Contingencies (10% of Materials and Labor)
- Administrative (5% of Materials and Labor)

Unit costs used to estimate Materials and Labor are shown in Table 11.2.

Table 11.2 – Unit Costs

Item	Cost	Unit
8-inch water pipe	240	lineal foot
10-inch water pipe	260	lineal foot
12-inch water pipe	300	lineal foot
18-inch water pipe	450	lineal foot
20-inch water pipe	550	lineal foot
4-inch sewer forcemain	50	lineal foot
Concrete Slab	8	square foot
Concrete Repair	15	lineal foot
Water Tank Paint	6.5	square foot
Structure/Building	20	square foot
Structure/Building Demolition	5	square foot
8-inch Actuated Valve	4000	each
Exterior Light	1000	each
Manhole Replacement	5000	each
Manhole Repair/Recoating	1000	each

Annual Life Cycle costs are estimated as total project cost discounted at 3.75% for the average service life of the project. Average service life is allocated by project type.

Annual Operations and Maintenances costs are estimated as a percentage of total project cost plus the estimated cost of energy, chemicals or similar commodities.

Table 11.3 provide a summary of average life cycles and allocations for operations and maintenance.

Table 11.3 – Life Cycle and O&M Parameters

Project Type	Average Life Cycle (years)	O&M
Distribution/Collection	60	0.5%
Treatment	30	3%
Mechanical	15	5%
Structural	40	2%
Paint	15	1%

11.3 – Water Projects for Existing Conditions

In the subsections that follow, the water projects for existing conditions listed below are described in detail:

- Replace Aging ACP
- Construct Concrete Settling Basin 2
- Paint Finished Water Tanks
- Replace Chemical Storage Tank
- WTP Backwash Basin Improvement
- Replace Finished Water Pump 2
- Replace WTP Maintenance Building
- Improve Finished Water Meter
- Repair Cracks in Settling Basins 1 and 3
- Repair Leaking Static Mixer Facility
- WTP Lighting

11.3.1 – Replace Aging ACP

Description

Phased replacement of 13,580 feet of aging asbestos cement pipe.

Ranking

Number 6 of 21with a score of 260 points out of 350

Need

Obsolete infrastructure.

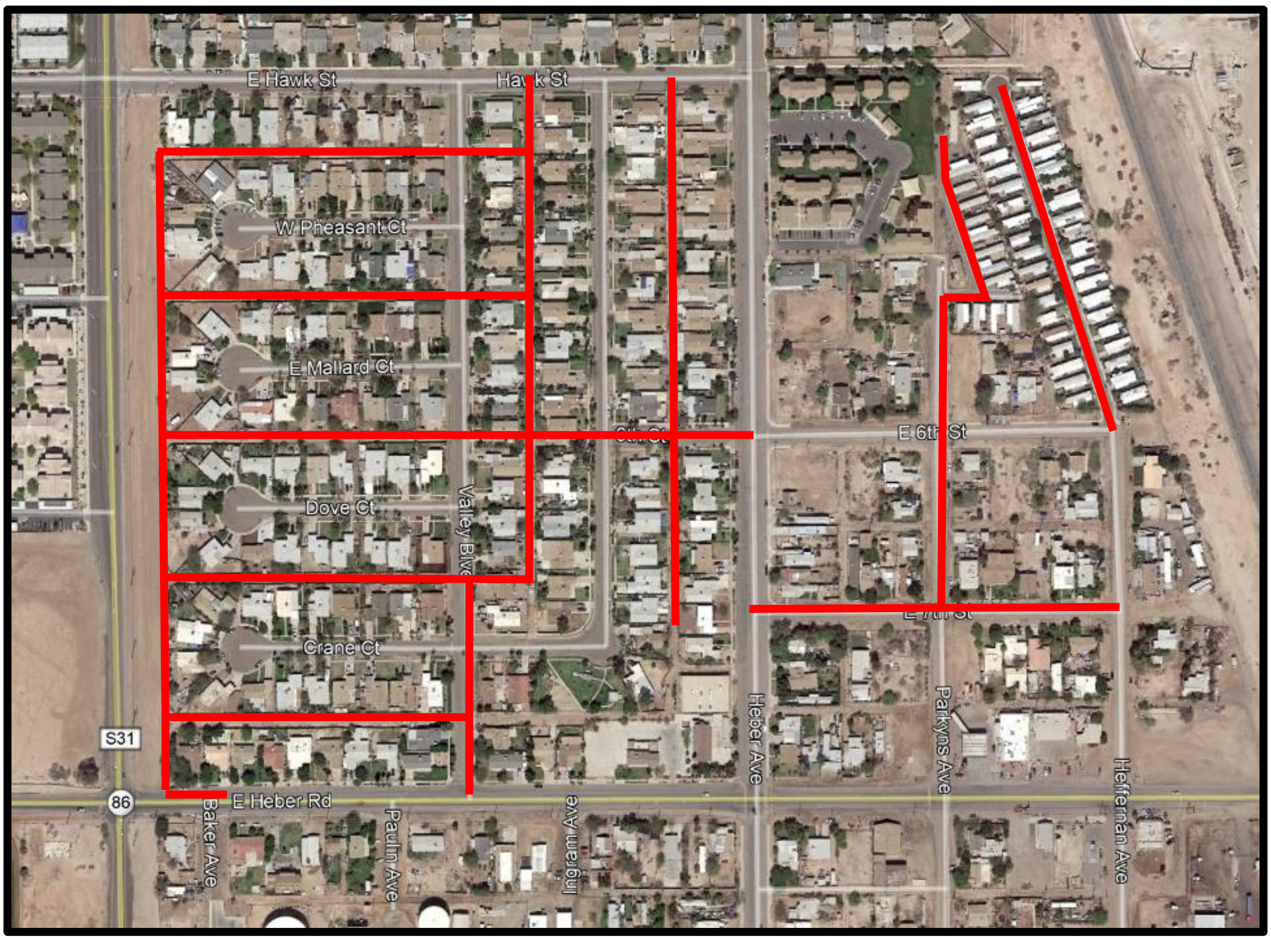
The District's existing asbestos cement pipe has exceeded its average life cycle. The pipes are aging and require frequent repair. The pipe material is obsolete and presents a health hazard and environmental hazard when cut to make repairs.

There may be an advantage to realignment in some areas to improve access to fire hydrants.

Alternatives Considered

Replace individual pipes after catastrophic failure.

Location



Justification

Repair of aging asbestos water pipe creates a potential health issue for maintenance and operations crews. Although scheduled repairs and maintenance can be conducted under controlled conditions with appropriate safety precautions, emergency repairs may expose crews to particulate when damaged pipes are cut.

Asbestos pipe is obsolete. Existing asbestos pipe in the water distribution system has exceeded the average life cycle. Asbestos pipe failure increases dramatically with age.

Replacement of aging leaking pipes and appurtenances will reduce water loss due to leaks.

Eliminating asbestos cement pipe from the District's inventory will improve inventory management and reduce maintenance costs.

Realigning certain pipes will improve accessibility. This facilitates repairs and reduced disputes with landowners whose property overlies the existing alignments.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
8-inch pipe	13,580	feet	$240	$3,259,000
Lateral relocation (replumb)	173	each	$1,000	$173,000
Design and Planning				$686,000
Construction Management				$343,000
Contingencies				$343,000
Administrative				$172,000
Total Cost				$4,976,000

Annual O&M	$24,000

Life Cycle	$210,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [x] Biological Resources
- [x] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [x] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, biological resources, cultural resources, GGE, noise and tribal cultural resources when mitigated.

11.3.2 – Construct Concrete Settling Basin 2

Description

Replace existing fabric-lined Settling Basin 2 with a new 48,000-square-foot concrete-lined settling basin.

Ranking

Number 15 of 21with a score of 125 points out of 350

Need

Operational constraint.

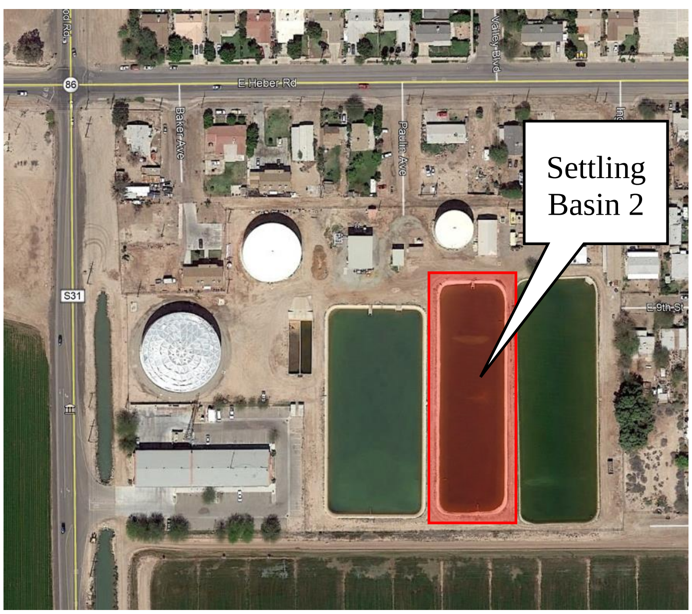
There are three settling basins serving the Water Treatment Plant. During periods of peak demand, all three settling basins are needed to achieve desired water quality standards and operational protocols. Therefore, removing Settling Basin 2 from operation is not an option.

Alternative Considered

Acquire low-impact cleaning equipment to remove sediment from Settling Basin 2 rather than using a backhoe. This alternative is not attractive because the fabric liner is already deteriorating.

Location

Water Treatment Plant



Justification

The fabric-liner in Settling Basin 2 is aging and vulnerable to tearing. There are existing tears in the fabric liner that contribute to water loss and saturation of the soil in the vicinity of the Water Treatment Plant. Soil saturation may weaken the integrity and stability of adjacent plant structural components, notable the Backwash Basin, Maintenance Shed and Static Mixing Facility.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Concrete	48000	SF	$8	$384,000
20-inch Piping	100	feet	$550	$55,000
Design and Planning				$88,000
Construction Management				$44,000
Contingencies				$44,000
Administrative				$22,000
Total Cost				$637,000

Annual O&M	$13,000

Life Cycle	$31,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.3 – Paint Finished Water Tanks

Description

Paint the exteriors of the three finished water tanks (approximately 50,000 square feet).

Ranking

Number 21 of 21with a score of 70 points out of 350

Need

Preventative maintenance.

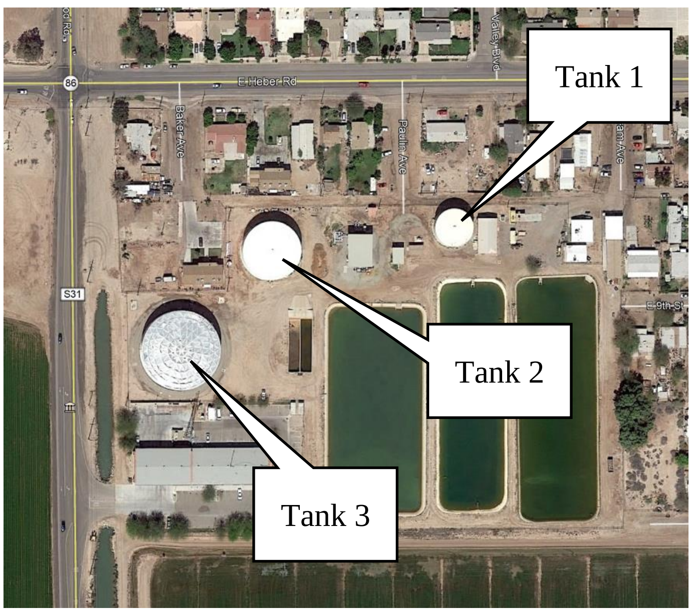
The exteriors of the three finished water tanks are showing initial signs of corrosion. Corrosion mitigation is the best method to protection the District’s investment in water storage.

Alternative Considered

Install cathodic protection on all tanks to reduce corrosion. This alternative may be considered as an enhancement to painting and a low-cost method to extend the service life of the steel tanks.

Location

Water Treatment Plant



Justification

Painting the exteriors of the finished water tanks will reduce corrosion and extend the useful of the life of the tanks.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Tank 1 (0.75 MG)	9,500	SF	$6.50	$62,000
Tank 2 (1.7 MG)	16,700	SF	$6.50	$109,000
Cathodic Protection	1	LS	$50,000	$50,000
Design and Planning				$77,000
Construction Management				$39,000
Contingencies				$39,000
Administrative				$19,000
Total Cost				$395,000

Annual O&M	$8,000

Life Cycle	$49,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [ ] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [ ] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Painting will result in less than significant temporary impacts to air quality when mitigated.

11.3.4 – Replace Chemical Storage Tank

Description

Replace 5,000-gallon chemical storage tank.

Ranking

Number 8 of 21with a score of 210 points out of 350

Need

Damaged infrastructure.

The chemical storage tank is double walled to protect against accidental release. The interior wall has failed.

Alterative Considered

It may be possible to drain and repair the interior of the chemical storage tank and return it to service for its remaining life cycle. This alternative is not attractive since the exterior tank wall has been exposed for a prolonged period.

Location

Water Treatment Plant

Justification

The District maintains redundant chemical storage to assure continuous service. The double walled design of the chemical storage tank provides protection against accidental and continues to function while the District arranges replacement or repair.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
New Chemical Storage Tank	1	each	$35,000.00	$35,000
Design and Planning				$7,000
Construction Management				$4,000
Contingencies				$4,000
Administrative				$2,000
Total Cost				$52,000

Annual O&M	$3,000

Life Cycle	$5,000

Environmental Impacts

Exempt.

Installation of equipment will result in no environmental impacts.

11.3.5 – WTP Backwash Basin Improvement

Description

Repair cracks in the existing backwash basins and install a third 50,000-gallon backwash basin for redundancy.

Ranking

Number 20 of 21with a score of 75 points out of 350

Need

Operational constraint and damaged infrastructure.

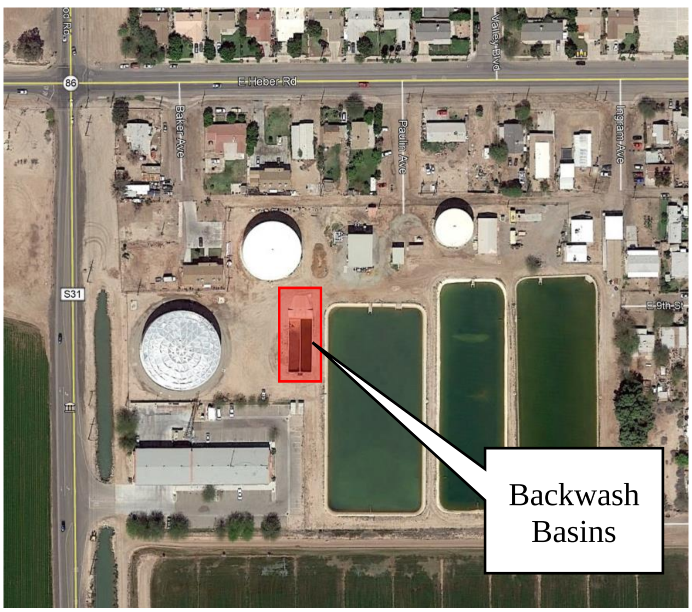
The backwash basins are in constant use. During periods of peak demand, addition capacity would improve operational efficiency.

Alterative Considered

Do nothing alternative.

Location

Water Treatment Plant



Justification

If left unchecked, cracks will continue to expand threatening the structural integrity of the backwash basin complex. There is sufficient space adjacent to the existing backwash basins for installation of a third backwash basin. With the addition of a third basin, maintenance of the backwash basin complex can be scheduled for greater efficiency.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Repairs	1	LS	$8,000	$8,000
Concrete	6,000	SF	$8	$48,000
20-inch Piping	30	feet	$550	$17,000
Design and Planning				$15,000
Construction Management				$7,000
Contingencies				$7,000
Administrative				$4,000
Total Cost				$98,000

Annual O&M	$2,000

Life Cycle	$5,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.6 – Replace Finished Water Pump 2

Description

Replace the existing Finished Water Pump 2 with a new 25-horsepower pump.

Ranking

Number 4 of 21with a score of 280 points out of 350

Need

Hydraulic deficiency.

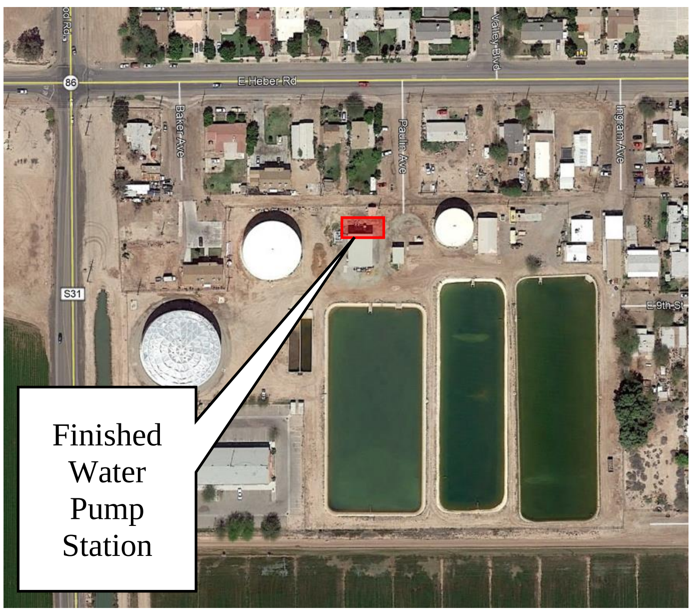
When the finished water pump station was last updated, Finished Water Pump 2 was still in working order and not replaced. Now, the pump capacity has deteriorated and can no longer function on par with the other newer pumps. For purposes of redundancy and to assure continuous service, three pumps of the same size are recommended for the station.

Alterative Considered

It may be possible to extend the service life of Finished Water Pump 2 by rewinding the motor. This alternative is not attractive since Finished Water Pump 2 has been previously rewound making the opportunity for improved service life minimal.

Location

Water Treatment Plant



Justification

Per design criteria, the finished water pump station is designed to operate under peak conditions with two pumps active and the third in reserve for redundancy. With a diminished capacity, finished water Pump 2 cannot achieve the design capacity of the station in the event one of the newer pumps is offline due to maintenance or repair.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Pump and Motor	1	LS	$25,000	$25,000
Design and Planning				$5,000
Construction Management				$3,000
Contingencies				$3,000
Administrative				$1,000
Total Cost				$37,000

Annual O&M	$10,000

Life Cycle	$3,000

Environmental Impacts: Exempt.

11.3.7 – Replace WTP Maintenance Building

Description

Demolition of existing 2,100 SF maintenance shed and construct a new 2,100 SF maintenance shed.

Ranking

Number 10 of 21with a score of 195 points out of 350

Need

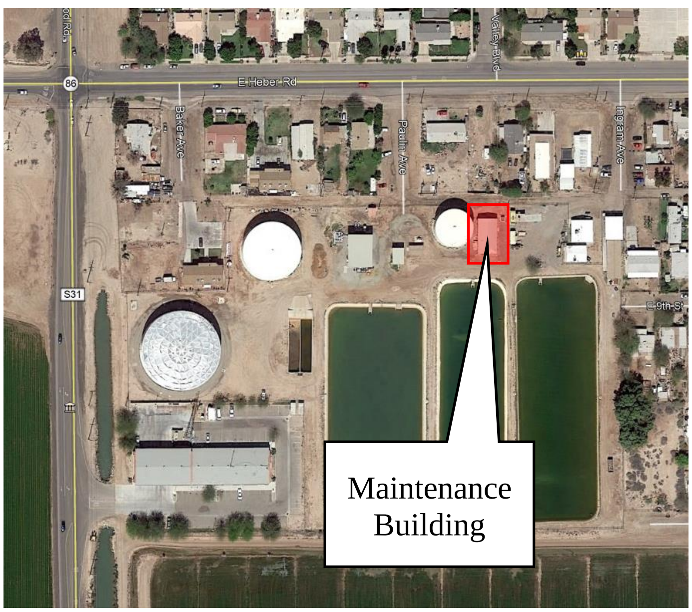
Safety.

The maintenance building is used daily for routine maintenance and repair of mechanical systems, meters and other facility component as well as storage for equipment and inventory.

Alterative Considered

Construct a combined District maintenance facility. This alternative is not attractive due to the increased costs of personnel, security, and property acquisition.

Location



Justification

Severe cracking in the foundation of the existing structure has compromised the integrity of the building. The electrical system is antiquated.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Demolition	2100	SF	$5	$11,000
New Structure	2100	SF	$20	$42,000
Electrical	1	LS	$20,000	$20,000
Design and Planning				$15,000
Construction Management				$7,000
Contingencies				$7,000
Administrative				$4,000
Total Cost				$106,000

Annual O&M	$5,000

Life Cycle	$5,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Demolition and construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.8 – Improve Finished Water Meter

Description

Install a bypass suitable for accurate metering of finished water.

Ranking

Number 6 of 21with a score of 215 points out of 350

Need

Monitoring and regulatory.

Accurate recording of finished water production is essential to manage production and reconcile system losses. Placement of the existing meter cannot achieve accurate readings due to excessive turbulence.

Alterative Considered

Metering of ancillary processes can provide an indirect calculation of finished water production. This alternative is not attractive since the accumulation of errors associated with the indirect calculation defeats the purpose of a direct calculation.

Ultrasonic metering.

Electromagnetic metering.

Location

Water Treatment Plant

Justification

Accuracy in metering of finished water production will improve operations and provide greater insight into water loss. Reconciliation of production and sales is required for the preparation of annual water audits. Water audits facilitate allocation of resources to reduce water loss by targeting the most likely causes of water loss.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
20-inch Pipe	40	feet	$550	$22,000
Meter Installation	1	LS	$2,000	$2,000
Design and Planning				$5,000
Construction Management				$2,000
Contingencies				$2,000
Administrative				$1,000
Total Cost				$34,000

Annual O&M	$2,000

Life Cycle	$3,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Installation of equipment will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.9 – Repair Cracks in Settling Basins 1 and 3

Description

Repair 1,600 lineal feet of cracks in Settling Basins 1 and 3.

Ranking

Number 19 of 21with a score of 85 points out of 350

Need

Damaged infrastructure.

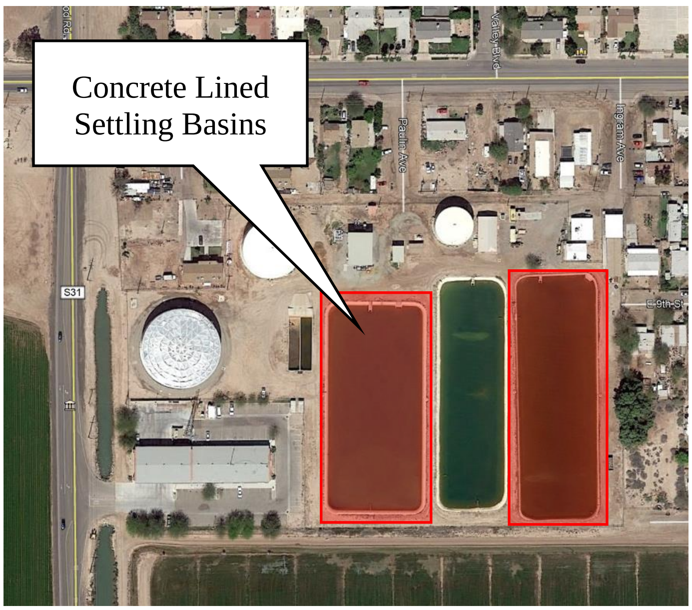
Cracks in the settling basins results in water loss and soil saturation within the plant.

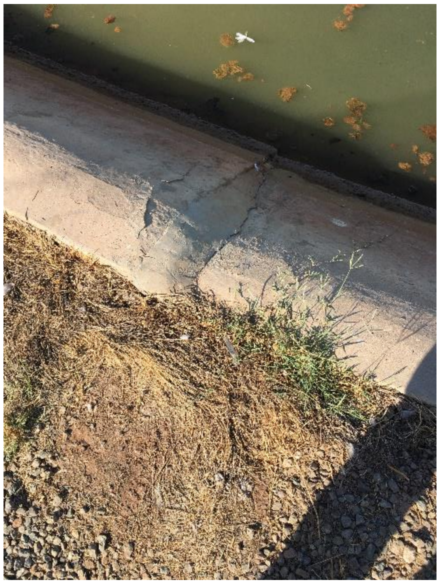
Alterative Considered

Do nothing alternative.

Location

Water Treatment Plant



Justification

Repairs will extend the service life of the basins and reduce water loss.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Repairs	1,600	LF	$15	$24,000
Design and Planning				$0
Construction Management				$0
Contingencies				$2,000
Administrative				$0
Total Cost				$26,000

Annual O&M	$0

Life Cycle	$0

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Repairs will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.10 – Repair Leaking Static Mixer Facility

Description

Repair leaking static mixer facility.

Ranking

Number 5 of 21with a score of 270 points out of 350

Need

Preventative maintenance.

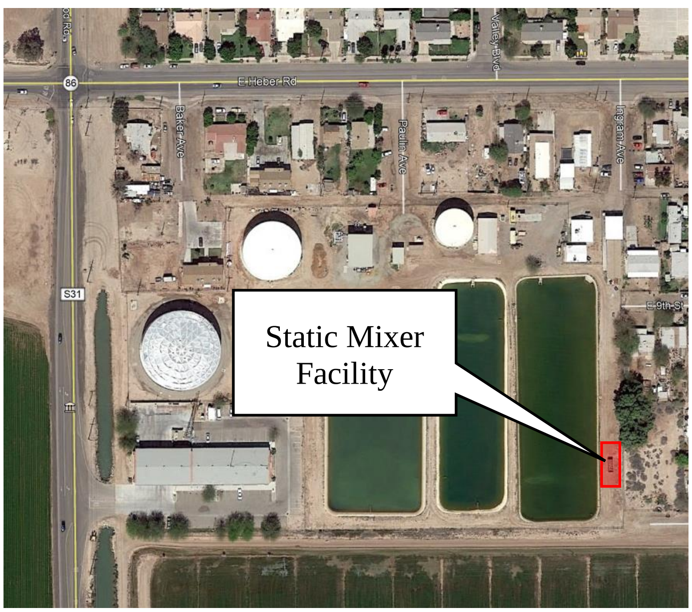
There is constant leaking at the pipe penetration inside the static mixer facility. The facility is located inside a large open below-ground concrete vault that gradually fills with water and must be periodically pumped with a small sump pump. The pipe exterior is constantly wet and showing signs of corrosion.

Alterative Considered

Do nothing alternative.

Location

Water Treatment Plant



Justification

The static mixer facility is an essential component that is in continuous use. The District has an interest in eliminating the leak to extend the service life of the facility.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Investigation	1	LS	$25,000	$25,000
Pipe Repair	500	feet	$275	$138,000
Design and Planning				$33,000
Construction Management				$16,000
Contingencies				$16,000
Administrative				$8,000
Total Cost				$236,000

Annual O&M	$7,000

Life Cycle	$13,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.3.11 – WTP Lighting

Description

Install 20 exterior lights at the water treatment plant for security and safety purposes.

Ranking

Number 13 of 21with a score of 170 points out of 350

Need

Safety.

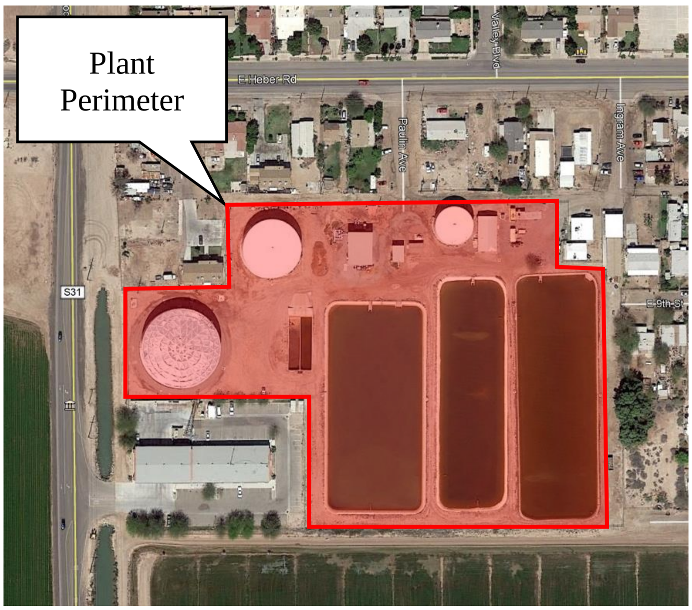
The water treatment plant is in continuous operation and frequently requires attention from operators during the night. The plant is essentially unlit and somewhat treacherous to navigate on foot in the dark.

Alterative Considered

Do nothing alternative.

Location

Water Treatment Plant



Justification

The District has an obligation to maintain a safe and secure facility.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Exterior Light	20	each	$1,000	$20,000
Electrical	1	LS	$10,000	$10,000
Design and Planning				$6,000
Construction Management				$3,000
Contingencies				$3,000
Administrative				$2,000
Total Cost				$44,000

Annual O&M	$5,000

Life Cycle	$3,000

Environmental Impacts

Exempt.

Installation of equipment will result in no environmental impacts.

11.4 – Water Projects for Future Conditions

In the subsection that follows, one water project for future conditions is described below in detail.

11.4.1 – Fawcett Road Pipeline

Description

Replace 1,400 feet of existing 8-inch pipe in Fawcett Road between Heber Avenue and Ware Road with new 12-inch pipe.

Ranking

This project is conditional. The deficiency will not occur until significant development has increased demand on the water system. Recommend revisiting in 10 years, or in coordination with planning for the McCabe Ranch Development. The project received a score of 170 points out of 350.

Need

Hydraulic deficiency.

8-inch pipe in the vicinity of Fawcett Road and Heffernan Avenue is undersized to support industrial fire flow.

Alterative Considered

Install 1,400 feet of parallel 8-inch pipe in Fawcett Road between Heber Avenue and Ware Road. This alternative is not attractive due to higher life cycle and maintenance costs associated with two pipelines rather than one.

Location

Fawcett Road between Heber Avenue and Ware Road

Justification

At build-out, there will be insufficient distribution capacity to meet maximum day demand plus fire flow for industrial land use at the require residual pressure of 20 psi in the vicinity of Fawcett Road and Heffernan Avenue.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
12-inch Pipe	1,400	feet	$300	$420,000
Design and Planning				$84,000
Construction Management				$42,000
Contingencies				$42,000
Administrative				$21,000
Total Cost				$609,000

Annual O&M	$3,000

Life Cycle	$26,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [X] Biological Resources
- [X] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [X] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Excavation and construction will result in less than significant temporary impacts to air quality, biological resources, cultural resources, GGE, noise and tribal cultural resources when mitigated.

11.5 – Sewer Projects for Existing Conditions

In the subsections that follow, the wastewater projects for existing conditions listed below are described in detail:

- Improve Headworks Odor and Corrosion Control
- Improve Wastewater Treatment to Tertiary Standards
- Replace Aerators with Safer and More Cost-Effective Technology
- Improve Onsite Laboratory at WWTP
- Upgrade UV Disinfection Controls
- Install Sprayers on Clarifiers
- Construct Additional Sludge Bed
- Improve Sludge Return Train Connectivity
- Install Backup Bar Screen and Grinder
- Replace Sagging Sewer Trunkline
- Recoat 10 Manholes

11.5.1 – Improve Odor and Corrosion Control

Description

Install pretreatment for hydrogen sulfide at the regional lift station. There should be sufficient pretreatment capacity for a flow rate of 1 MGD under peak conditions.

Ranking

Number 1 of 21with a score of 350 points out of 350

Need

Preventative maintenance / pretreatment.

Hydrogen sulfide and other gases associated with septic conditions in the wastewater collection system are released at the headworks and damage electrical, mechanical, and structural components in the headworks building and electrical components throughout the wastewater treatment facility due to continuous exposure.

Gases and odor from the headworks may create a hazardous environment for operators.

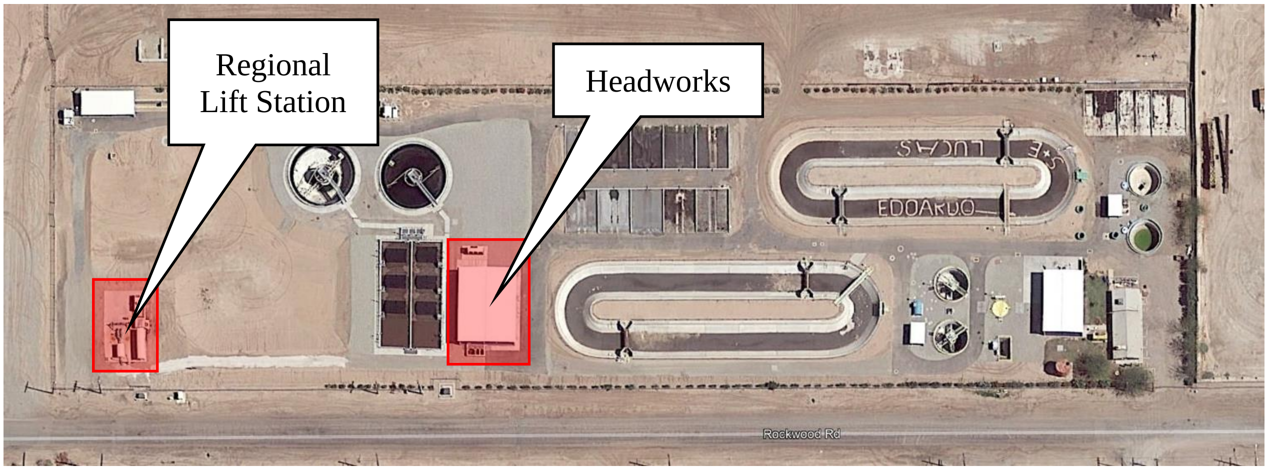
Customers in the vicinity of the wastewater treatment plant complain about excessive gases and odor from the headworks.

Alterative Considered

Improve ventilation of the headworks building. This alternative is not attractive as it does not neutralize hydrogen sulfide, it merely disperses it. This alternative has been tried and failed.

Location

Wastewater Treatment Plant



Justification

Corrosion due to exposure to hydrogen sulfide is impacting infrastructure throughout the wastewater treatment plant. Wiring in mechanical, electrical, controls and SCADA system components is particularly vulnerable to hydrogen sulfide corrosion causing it to fail prematurely. This reduces the average life cycle for wiring and increases maintenance and replacement costs. Critical system components including motors, operational controls, electrical supply, monitoring, alarms and ventilation may fail possibly leading to a service disruption and potentially resulting in a permitting violation.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Packaged Hydrogen Peroxide Pretreatment	1	LS	$50,000	$50,000
Design and Planning				$10,000
Construction Management				$5,000
Contingencies				$5,000
Administrative				$3,000
Total Cost				$73,000

Annual O&M	$9,000

Life Cycle	$6,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [x] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Installation of new equipment will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

The District will be required to obtain permit for handling hazardous chemicals.

The District may be required to update is discharge permit to reflect this additional treatment process.

11.5.2 – Improve Wastewater Treatment to Tertiary Standards

Description

Construct conventional granular filters for tertiary treatment at a peak capacity of 2.0 MGD.

Ranking

This project is conditional and discretionary. The project is driven by economics and improvements to water quality beyond the requirements of the current discharge permit. The project received a score of 155 points out of 350.

Need

Treatment upgrade / environmental.

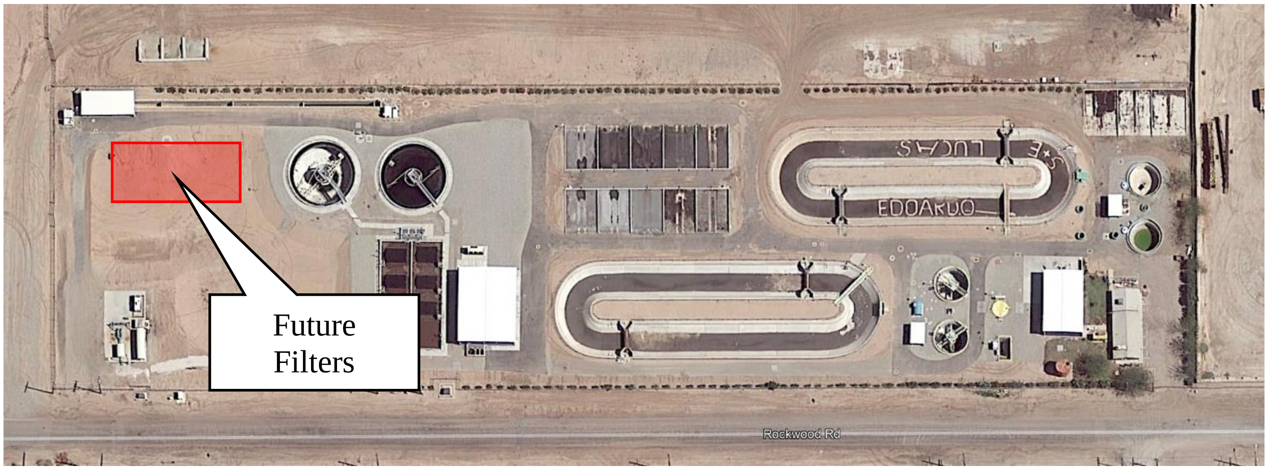
There is a local demand for tertiary treated recycled water in the energy production sector. Additional study may be required concerning storage and transmission.

Alterative Considered

Construct reverse osmosis tertiary filters. This alternative is not attractive because it is energy intensive. In addition, the primary benefit of reverse osmosis is its small footprint, however, there is adequate space at the existing wastewater treatment plant to accommodate the larger footprint for conventional treatment.

Location

Wastewater Treatment Plant



Justification

Improving effluent water quality to tertiary standards is consistent with state goals. Tertiary treated water is a commodity and potential revenue stream for the District.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Structural	1	LS	$100,000	$100,000
Piping	1	LS	$50,000	$50,000
Mechanical	1	LS	$25,000	$25,000
Electrical	1	LS	$20,000	$20,000
Controls	1	LS	$10,000	$10,000
Design and Planning				$41,000
Construction Management				$21,000
Contingencies				$21,000
Administrative				$10,000
Total Cost				$298,000

Annual O&M	$9,000

Life Cycle	$17,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [X] Biological Resources
- [X] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [X] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [X] Tribal Cultural Resources
- [X] Utilities & Service Systems
- [ ] Wildfire

Excavation and construction will result in less than significant temporary impacts to air quality, biological resources, cultural resources, GGE, noise and tribal cultural resources when mitigated.

A change in the use of effluent is anticipated to result in less than significant impact to hydrology and water quality following investigation.

The District will be required to amend its discharge permit detailing the new treatment process and associated water quality standards, sampling procedures and allowable uses of effluent.

The project will result in water reuse for energy production.

11.5.3 – Replace Aerators with Safer and More Cost-Effective Technology

Description

At the end of their service life, replace the existing STM Aerators with new diffused bubble aerators.

Ranking

Number 17 of 21with a score of 100 points out of 350

Need

Safety.

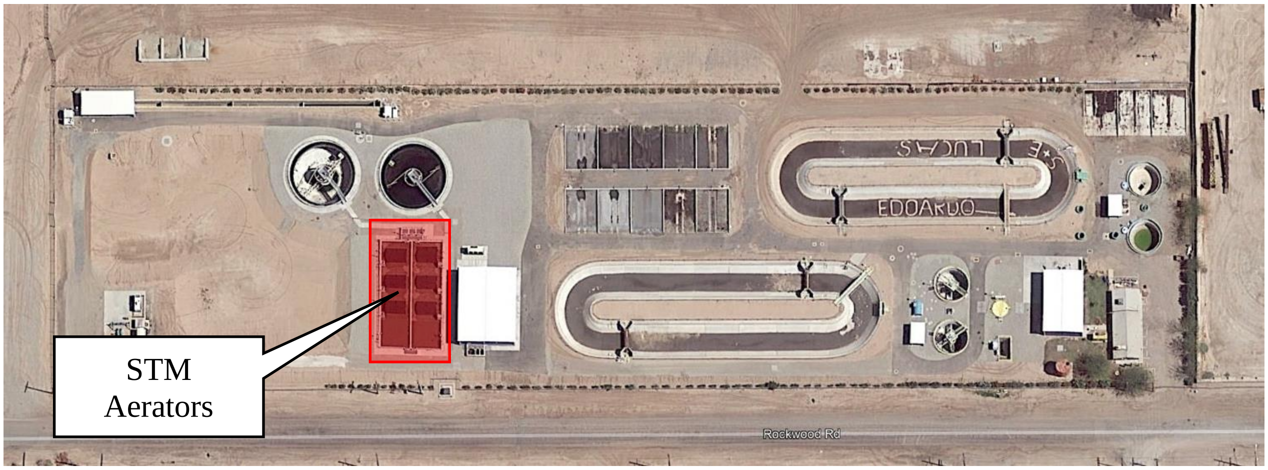
The existing aerators are challenging to maintain. Alternative technology is recommended to improve safety and cost effectiveness of maintenance.

Alterative Considered

Packed-tower aerators. This alternative is not attractive due to the potential for supplemental odor control requirements. Odor and corrosion control are a current concern involving the headworks and regional lift station, so exacerbating this issue is not in the District's interest.

Location

Wastewater Treatment Plant



Justification

There are multiple established technologies for aeration. Rather than replacing in kind at the end of the current aerators life cycle, replacement with a safer and lower maintenance system is desired.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Structural	1	LS	$100,000	$100,000
Piping	1	LS	$50,000	$50,000
Mechanical	1	LS	$25,000	$25,000
Electrical	1	LS	$20,000	$20,000
Controls	1	LS	$10,000	$10,000
Design and Planning				$41,000
Construction Management				$21,000
Contingencies				$21,000
Administrative				$10,000
Total Cost				$298,000

Annual O&M	$16,000

Life Cycle	$17,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Demolition and construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.4 – Improve Onsite Laboratory at WWTP

Description

Modernize a dedicated laboratory space for conducting routine analysis of samples from the various treatment processes.

Ranking

Number 12 of 21with a score of 180 points out of 350

Need

Monitoring and regulatory.

A modern laboratory will streamline regulatory and operational monitoring processes. The current facility lacks sufficient space to conduct more than one sampling analysis at a time, which can interfere management of operations. Limited space makes inventory management challenging. Ventilation in the laboratory is antiquated and there is concern that the lack of a controlled laboratory environment may impact sampling accuracy.

Alterative Considered

Outsourcing sampling. This alternative is not attractive due to the high volume of shipping and sample storage required to facilitate offsite laboratory protocols.

Location

Wastewater Treatment Plant

Justification

The responsibility to maintain accurate and timely records of regulatory and operational activity related to water quality sampling will only continue to increase with growth, changes in technology and permit requirements for operations, and discharge. Investing in a modern facility serves the interests of the District by giving operators the tools they need to run the wastewater treatment plant efficiently and effectively.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Modernized Structure	1000	SF	$20	$20,000
New Equipment	1	LS	$25,000	$25,000
Design and Planning				$9,000
Construction Management				$5,000
Contingencies				$5,000
Administrative				$2,000
Total Cost				$66,000

Annual O&M	$3,000

Life Cycle	$6,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.5 – Upgrade UV Disinfection Controls

Description

Upgrade automation for efficient transfer from one UV disinfection train to the other.

Ranking

Number 14 of 21with a score of 150 points out of 350

Need

Operational constraint.

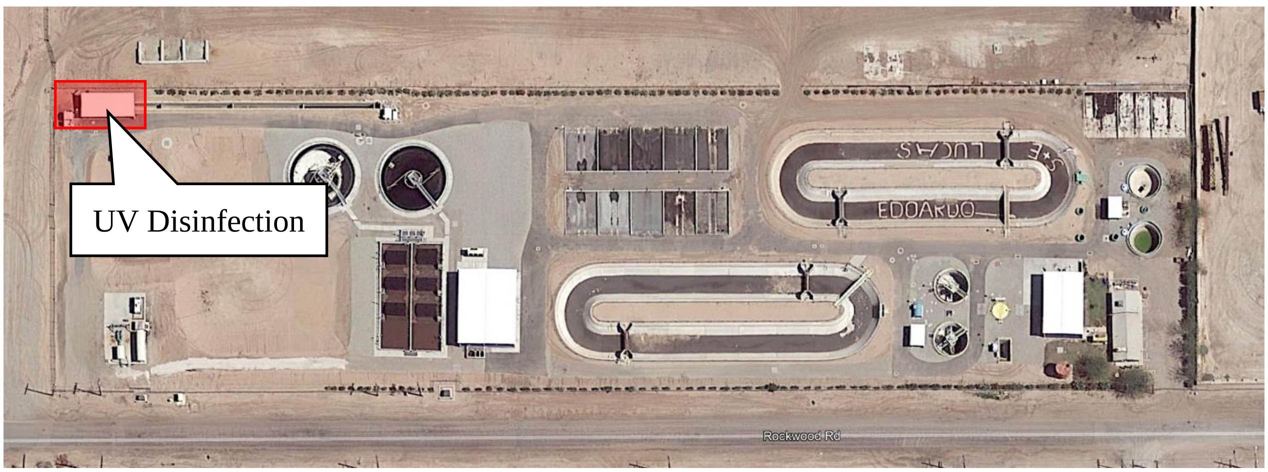
The existing UV system consists of two trains and requires manual transfer from one train to the other. Transfer is done periodically for operational and maintenance purposes. In the event of failure or emergency in the active train, transfer cannot be achieved in a timely manner creating the risk of releasing effluent that has not received UV treatment.

Alterative Considered

Investigate whether current design is under manufacturer warranty.

Location

Wastewater Treatment Plant



Justification

Automated transfer is the normal configuration for this equipment. Upgrade will bring equipment functionality up to industry standards.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Upgrade	1	LS	$10,000	$10,000
Design and Planning				$2,000
Construction Management				$1,000
Contingencies				$1,000
Administrative				$1,000
Total Cost				$15,000

Annual O&M	$1,000

Life Cycle	$1,000

Environmental Impacts

Exempt.

Equipment installation will result in no impacts.

11.5.6 – Install Sprayers on Clarifiers

Description

Install sprayers in Clarifier 2.

Ranking

Number 16 of 21with a score of 110 points out of 350

Need

Operational constraint.

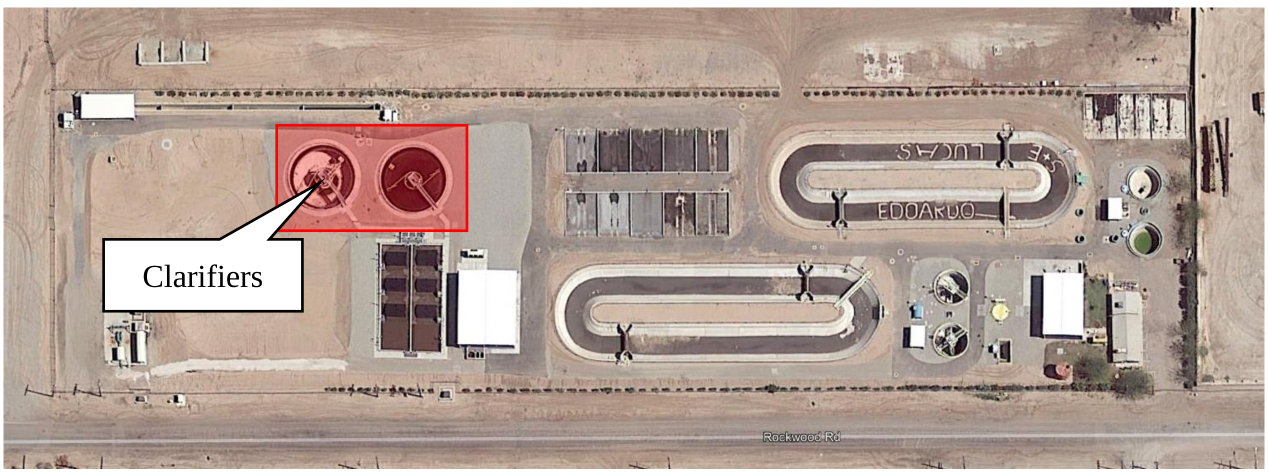
Sprayers keep equipment clean and improve water quality of effluent leaving the clarifier by removing residual floating surface sludge.

Alterative Considered

Skimmer. This alternative is not attractive because the mechanism is far more complex than needed to achieve the desired result.

Location

Wastewater Treatment Plant



Justification

Operators have already installed sprayers on Clarifier 1 with excellent results.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Sprayers	1	LS	$10,000	$10,000
Design and Planning				$2,000
Construction Management				$1,000
Contingencies				$1,000
Administrative				$1,000
Total Cost				$15,000

Annual O&M	$1,000

Life Cycle	$1,000

Environmental Impacts

Exempt.

Equipment installation will result in no environmental impacts.

11.5.7 – Construct Additional Sludge Bed

Description

Construct additional sludge bed.

Ranking

Number 18 of 21with a score of 100 points out of 350

Need

Operational constraint.

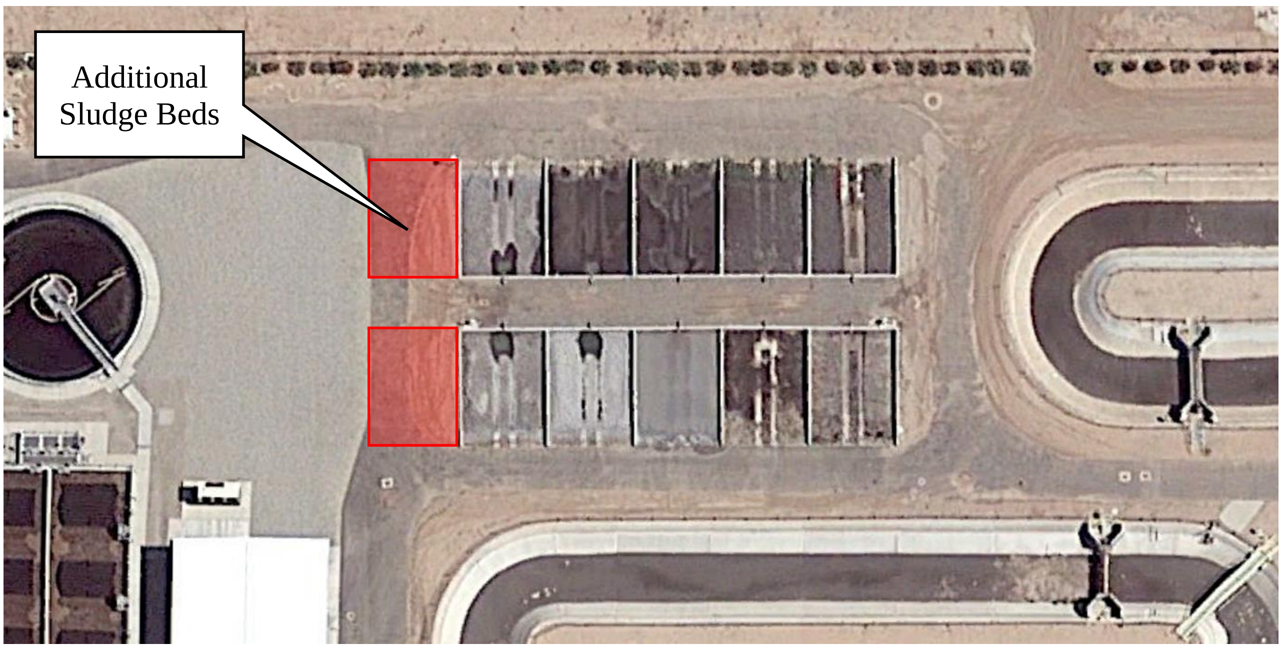
Additional sludge bed capacity will improve operational efficiency.

Alterative Considered

Sludge dryer. This alternative is not attractive due to the energy intensity of the machinery.

Location

Wastewater Treatment Plant



Justification

Provided there is adequate space, sludge beds are the most cost-effective method for drying and disposing of solid waste.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Concrete	3,000	SF	$8	$24,000
10-inch Piping	60	feet	$260	$16,000
Design and Planning				$8,000
Construction Management				$4,000
Contingencies				$4,000
Administrative				$2,000
Total Cost				$58,000

Annual O&M	$2,000

Life Cycle	$3,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.8 – Improve Sludge Return Train Connectivity

Description

Improve connectivity between the clarifiers and the headworks via the return activated sludge (RAS) pumps. Install a jumper between the RAS intake pipelines and five (5) actuated valves to direct flow from either clarifier to the headworks splitter box via either RAS pump.

Ranking

Number 8 of 21with a score of 210 points out of 350

Need

Operational constraint.

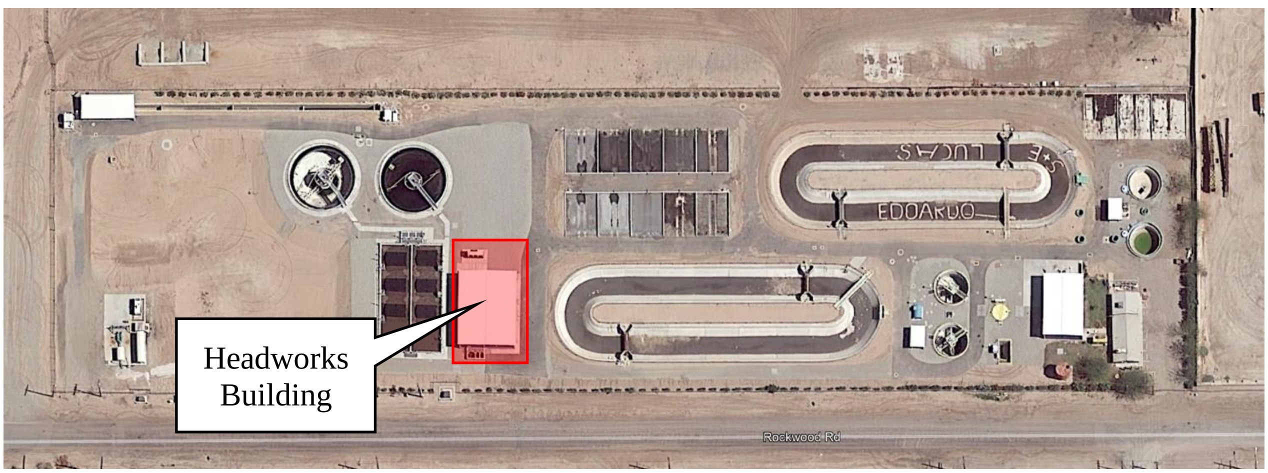
Currently, each clarifier has a dedicated RAS pump located in the headworks building. To improve operational control, the RAS pumps should be configured to take suction from either clarifier in an automated fashioned. This operational flexibility is particularly important for draining the clarifiers and will dramatically increase redundancy.

Alterative Considered

Do nothing alternative.

Location

Wastewater Treatment Plant



Justification

In the event of a RAS pump failure, activated sludge from the subject clarifier cannot be returned to the headworks. Sludge can still be sent to waste; however, this limitation creates operational challenges and eventually the clarifier must be taken offline until the dedicated RAS pump is repaired. The project will overcome the design deficiency by providing operational control over RAS regardless of which clarifier it originates in.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Piping	1	LS	$15,000	$15,000
8-inch Actuated Valve	5	each	$4,000	$20,000
Controls	1	LS	$5,000	$5,000
Design and Planning				$8,000
Construction Management				$4,000
Contingencies				$4,000
Administrative				$2,000
Total Cost				$58,000

Annual O&M	$3,000

Life Cycle	$5,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.9 – Install Backup Bar Screen and Grinder

Description

Install a backup bar screen and grinder in parallel with the existing bar screen and grinder to improve operational efficiency and redundancy and to protect equipment downstream of primary treatment from debris.

Ranking

Number 10 of 21with a score of 190 points out of 350

Need

Operational constraint.

The existing bar screen and grinder are subject to blockage and must be cleaned periodically. When offline for maintenance, equipment downstream of primary treatment is vulnerable to debris that would normally be removed from the waste stream.

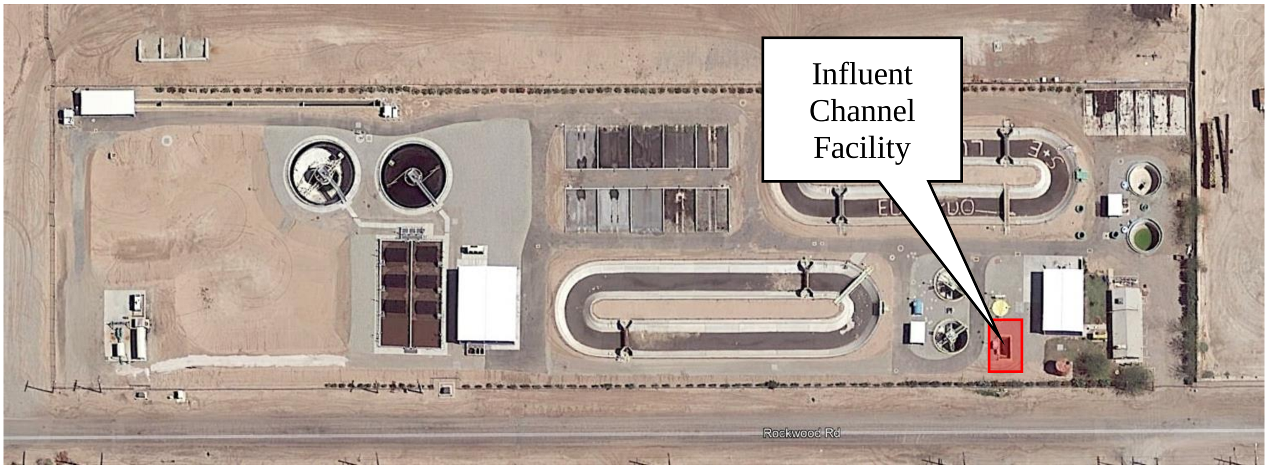
Alterative Considered

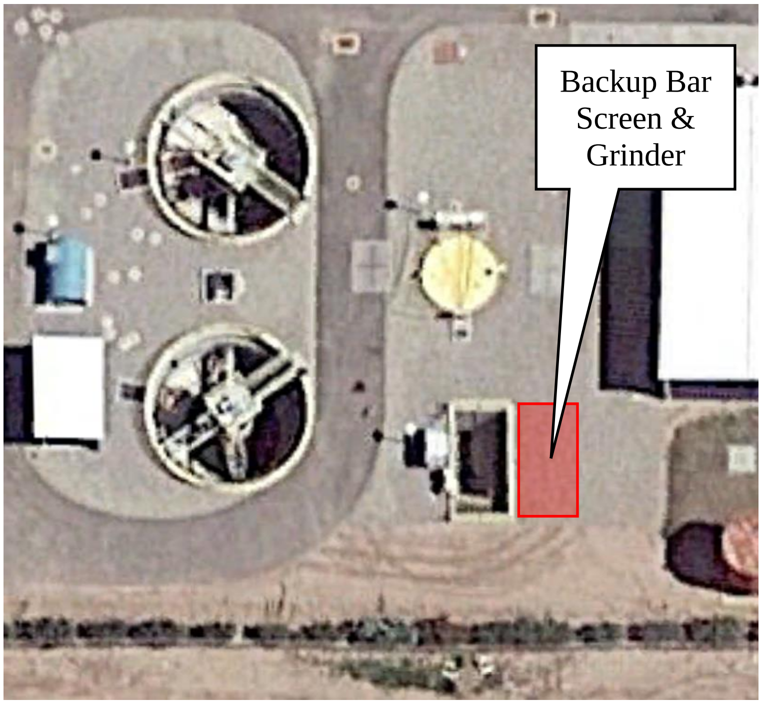
Do nothing alternative.

Location

Wastewater Treatment Plant

Bar screen and grinder are located in the influent channel facility.





Justification

The backup bar screen and grinder are necessary to assure continuous service when the existing bar screen and grinder are taken offline for maintenance.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Bar Screen	1	LS	$4,000	$4,000
Grinder	1	LS	$10,000	$10,000
Vault	1	LS	$12,000	$12,000
Piping	1	LS	$8,000	$8,000
Design and Planning				$7,000
Construction Management				$3,000
Contingencies				$3,000
Administrative				$2,000
Total Cost				$49,000

Annual O&M	$2,000

Life Cycle	$4,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [X] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [X] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [X] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.10 – Replace Sagging Sewer Trunkline

Description

Replace the manhole in the alley adjacent to Valley Boulevard between Dove Court and Mallard Court. Replace 170 feet of existing 8-inch pipeline with new 8-inch pipeline extending east from the manhole.

Ranking

Number 2 of 21with a score of 300 points out of 350

Need

Damaged infrastructure and hydraulic deficiency.

Sinking manholes are not structurally sound and may result is excessive egress and contamination of the local aquifer.

The pipeline is sagging restricting its capacity and making it vulnerable to overflow. Solids tend to accumulate at the low point in the pipe leading to blockage and requiring more frequent maintenance. This is a structural failure that cannot be corrected by spot repairs or relining.

Alterative Considered

Replace the sinking manhole and 770 feet of existing 8-inch pipeline with new 8-inch pipeline extending north to Hawk Street.

Location

Justification

The District has an obligation to prevent overflows. Replacement or realignment are the only practical alternatives to reduce the risk of overflow.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Manhole Replacement	1	LS	$5,000	$5,000
Pipe Replacement	170	feet	$240	$41,000
Design and Planning				$9,000
Construction Management				$5,000
Contingencies				$5,000
Administrative				$2,000
Total Cost				$67,000

Annual O&M	$1,000

Life Cycle	$3,000

Environmental Impacts

- [ ] Aesthetics
- [ ] Agricultural & Forest Services
- [x] Air Quality
- [ ] Biological Resources
- [ ] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [ ] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [ ] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [ ] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

Construction will result in less than significant temporary impacts to air quality, GGE and noise when mitigated.

11.5.11 – Recoat 10 Manholes

Description

Apply protective coatings to 10 manholes.

Ranking

Number 3 of 21with a score of 300 points out of 350

Need

Damaged infrastructure.

Uncoated manholes are vulnerable to deterioration and structural failure and may result is excessive egress and contamination of the local aquifer.

Alterative Considered

Do nothing alternative.

Location


Correll Rd
Heber Ave


E 6th St
E 7th St
Heber Ave
Parkyns Ave
E Heber Rd
86
E 9th St

Justification

The District has an obligation to prevent overflows and reduce egress. Manhole coatings are an effective method to improve the integrity of the collection system and to extend the service life of the manholes.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Manhole Coating	10	LS	$1,000	$10,000
Design and Planning				$2,000
Construction Management				$1,000
Contingencies				$1,000
Administrative				$1,000
Total Cost				$15,000

Annual O&M	$1,000

Life Cycle	$1,000

Environmental Impacts

Exempt.

11.6 – Sewer Projects for Future Conditions

In the subsection that follows, one wastewater project for future conditions is described below in detail.

11.6.1 – Install Sewer Lift Station in Northwest Quadrant to Support Development

Description

Install a new sewer lift station to serve the McCabe Ranch Development in the vicinity of W McCabe Road and Farnsworth Lane. Average flow is 0.45 MGD and peak flow is 0.70 MGD. Install 8,000 feet of force main between the lift station and the trunkline at the intersection of W Correll Road and N Oak Avenue.

Ranking

This project is conditional. The infrastructure described above (or equivalent) must be built and in operation prior to construction of new homes in the McCabe Ranch Development and should be closely coordinated with the developer.

The project received a score of 120 points out of 350.

Need

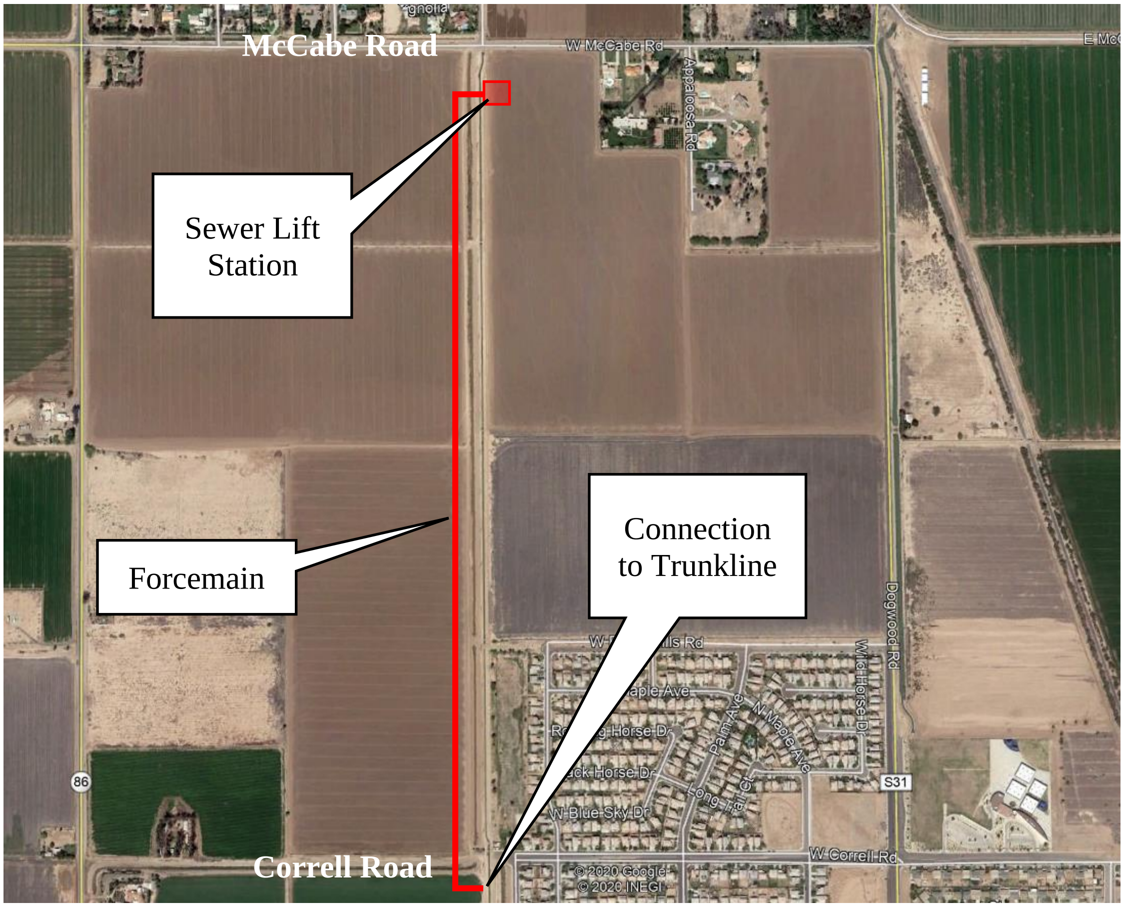
Hydraulic deficiency.

The McCabe Ranch Development is located down-gradient of the wastewater treatment plant; therefore, flow must be pumped to the primary trunkline in Correll Road where it will flow by gravity to the plant. This wastewater collection infrastructure must be in place prior to construction of new homes.

Alterative Considered

Cede customers to El Centro. This alternative is not attractive since the District service area is well established and includes the McCabe Ranch Development.

Location


McCabe Road
W McCabe Rd
Appaloosa Rd
Sewer Lift
Station
Forcemain
Connection
to Trunkline
Dogwood Rd
W Correll Rd
S31
86
Correll Road
©2020 Google
©2020 INEGI

Justification

The sewer lift station is required to support modest growth.

Cost Estimate

Item	Quantity	Unit	Unit Cost	Cost
Sewer Lift Station	1	LS	$100,000	$100,000
Forcemain	8000	feet	$50	$400,000
Electrical	1	LS	$10,000	$10,000
SCADA	1	LS	$5,000	$5,000
Design and Planning				$103,000
Construction Management				$52,000
Contingencies				$52,000
Administrative				$26,000
Total Cost				$748,000

Annual O&M	$42,000

Life Cycle	$66,000

Environmental Impacts

- [ ] Aesthetics
- [x] Agricultural & Forest Services
- [x] Air Quality
- [x] Biological Resources
- [x] Cultural Resources
- [ ] Energy
- [ ] Geology & Soils
- [x] Greenhouse Gas Emission
- [ ] Hazards & Hazardous Materials
- [ ] Hydrology & Water Quality
- [x] Land Use & Planning
- [ ] Mineral Resources
- [x] Noise
- [x] Population & Housing
- [ ] Public Services
- [ ] Recreation
- [ ] Transportation
- [x] Tribal Cultural Resources
- [ ] Utilities & Service Systems
- [ ] Wildfire

The project will convert current agricultural land use to utility land use in order to support the McCabe Ranch Development.

Excavation and construction will result in less than significant temporary impacts to air quality, biological resources, cultural resources, GGE, noise and tribal cultural resources when mitigated.

11.7 – Implementation Strategy

Assumptions

- Recommended projects will be funded over 20 years.
- Projects will be implemented by ranking.
- Longer duration projects are spread out over multiple years.
- Cost escalation for inflation is set at 2%.
- Conditional projects were included in the schedule with the understanding the timing of their implementation may change according appropriate triggers.
- The present values of expenditures for the first 10 years and the second 10 years are approximately equal.

Table 11.4 – CIP Implementation 2021-2030

Project	2020 Dollars	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Improve Odor and Corrosion Control	73000	74,000									
Replace Sagging Sewer Trunkline	67000		70,000								
Recoat Manholes	15000		16,000								
Replace Finished Water Pump 2	37000		38,000								
Repair Leaking Static Mixer Facility	236000			125,000	128,000						
Improve Finished Water Meter	34000			36,000							
Replace Chemical Storage Tank	52000				56,000						
Improve Sludge Return Train Connectivity	58000				63,000						
Replace WTP Maintenance Building	106000					117,000					
Install Backup Bar Screen and Grinder	49000					54,000					
Improve Onsite Laboratory at WWTP	66000					73,000					
WTP Lighting	44000					49,000					
Fawcett Road Pipeline	609000										
Replace Aging ACP	4976000						560,000	572,000	583,000	595,000	607,000
Improve Wastewater Treatment to Tertiary Standards	298000			158,000	161,000						
Upgrade UV Disinfection Controls	15000							17,000			
Construct Concrete Settling Basin 2	637000									761,000	
Install Sewer Lift Station in NW Quadrant	748000										
Install Sprayers on Clarifiers	15000										18,000
Replace Aerators with Safer More Cost-Effective Option	298000										
Construct Additional Sludge Bed	58000										
Repair Cracks in Settling Basins 1 and 3	26000										
WTP Backwash Basin Improvement	98000										
Paint Finished Water Tanks	559000										
Total Investment by Year		**74,000**	**124,000**	**319,000**	**408,000**	**293,000**	**560,000**	**589,000**	**583,000**	**1,356,000**	**625,000**

Three projects noted in green are developer-driven. The District may consider developer contributions to assist with financing.

Table 11.5 – CIP Implementation 2031-2040

Project	2020 Dollars	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Improve Odor and Corrosion Control	73000										
Replace Sagging Sewer Trunkline	67000										
Recoat Manholes	15000										
Replace Finished Water Pump 2	37000										
Repair Leaking Static Mixer Facility	236000										
Improve Finished Water Meter	34000										
Replace Chemical Storage Tank	52000										
Improve Sludge Return Train Connectivity	58000										
Replace WTP Maintenance Building	106000										
Install Backup Bar Screen and Grinder	49000										
Improve Onsite Laboratory at WWTP	66000										
WTP Lighting	44000										
Fawcett Road Pipeline	609000							426,000	435,000		
Replace Aging ACP	4976000	619,000	631,000	644,000	657,000	670,000					
Improve Wastewater Treatment to Tertiary Standards	298000										
Upgrade UV Disinfection Controls	15000										
Construct Concrete Settling Basin 2	637000										
Install Sewer Lift Station in NW Quadrant	748000	233,000	237,000	242,000	247,000						
Install Sprayers on Clarifiers	15000										
Replace Aerators with Safer More Cost-Effective Option	298000					201,000	205,000				
Construct Additional Sludge Bed	58000							81,000			
Repair Cracks in Settling Basins 1 and 3	26000								37,000		
WTP Backwash Basin Improvement	98000									143,000	
Paint Finished Water Tanks	559000									407,000	415,000
Total Investment by Year		**852,000**	**868,000**	**886,000**	**904,000**	**871,000**	**205,000**	**507,000**	**472,000**	**550,000**	**415,000**

Three projects noted in green are developer-driven. The District may consider developer contributions to assist with financing.

Chapter 12 – Funding

This chapter provides a cursory review of the financial status of the District, gaps in funding availability, and recommendations to maintain proper level of service.

12.1 – Review of Current Budgets

The water and wastewater budgets for FY 2015 through FY 2020 were reviewed in terms of surplus revenue available to fund capital projects.

Budgets were then forecasted through 2040 based on the following assumptions:

- Population growth follows the model shown in Figure 2.1 – Historical and Projected Population.
- Water revenue is $270 per capita per year (FY 2020 per capita water revenue escalated per the recommended rate increase in the 2017 Rate Study).
- Wastewater revenue is $231 per capita per year (FY 2020 per capita wastewater revenue escalated per the recommended rate increase in the 2017 Rate Study).
- Water and wastewater operating costs escalate at 2% annually.
- Water debt service is static at $329,000 per year through 2040.
- Wastewater debt service is static at $211,100 per year through 2040.

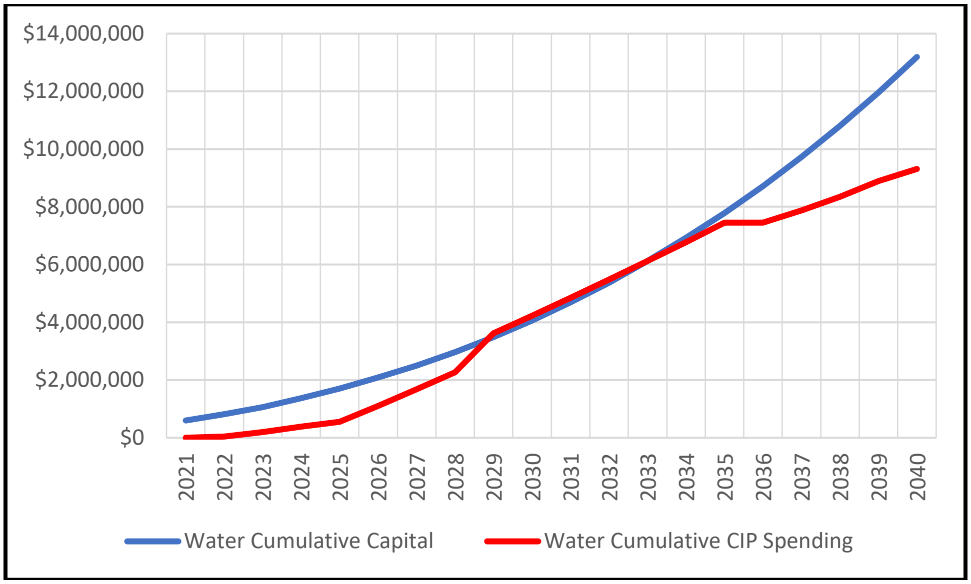
12.2 – Review of Current Funds

Per the FY 2020-21 budget, the water fund is $408,100 and the wastewater fund is $284,700.

12.3 – Identification of Funding Gaps

Figure 12.1 provides a comparison of projected cumulative surplus revenue available for water capital projects and the cumulative cost of implementing the water projects detailed in the CIP.

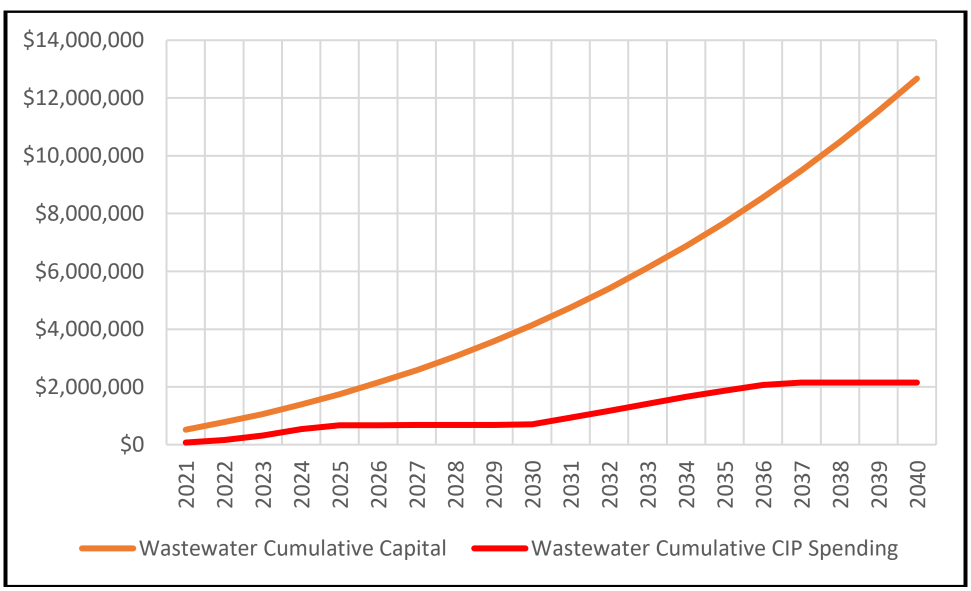
Figure 12.1 – Projected Water Capital and CIP Spending



Over the course of the planning horizon, the District will accumulate approximately $3.9 million more than needed to fund the water related capital projects in the CIP.

Figure 12.2 provides a comparison of projected cumulative surplus revenue available for wastewater capital projects and the cumulative cost of implementing the water projects detailed in the CIP.

Figure 12.2 – Projected Wastewater Capital and CIP Spending



Over the course of the planning horizon, the District will accumulate approximately $10.5 million more than needed to fund the wastewater related capital projects in the CIP.

12.4 – Recommended Actions

The cumulative capital shown in Figure 12.1 and Figure 12.2 must cover all water and wastewater expenses except operating costs and debt service. In addition, projected revenue surplus is based on a series of assumptions that must be periodically reviewed and updated to reflect current conditions. With this in mind, the District is encouraged to seek grant funding for eligible projects, to seek developer contributions for projects that benefit future customers, and to consider the following programs to further enhance efficiency and reduce losses:

Water Meter Replacement Program

Accurate customer meters ensure the District is collecting revenue for all water sold.

Leak Detection Program

Reducing water loss by identifying and repairing leaking pipes is a cost-effective method to conserve water without imposing constraints on customers or impacting revenue.

Operational Efficiency Audit

An audit of the District's operations will reveal opportunities to reduce waste and improve the level of service.

Capacity Fee Revision

Capacity fees should reflect all expenses associated with adding new customers to the system. These fees must be updated periodically to assure equity between existing and future ratepayers.

Debt Refinancing

Whenever economic conditions warrant, the District should use debt refinancing as a vehicle to lower the cost of capital.

Asset Management Planning

This master plan focuses primarily on capacity. As a result, the cost of maintenance is not included directly. A detailed life cycle cost analysis of all District assets and a comprehensive renewal program would assure a balanced approach to optimizing the combined costs of maintenance and replacement.

Appendix A – Field Data

Appendix B – Modeling Results

Appendix C – Water System Map

Appendix D – Sewer System Map