February 2021

Preliminary Engineering Report
Water System Performance Improvements 1

City of Truth or Consequences, New Mexico

WILSON
&COMPANY

discipline | intensity | collaboration | shared ownership | solutions

[THIS PAGE INTENTIONALLY LEFT BLANK]

Preliminary Engineering Report
Water System Performance Improvements 1
City of Truth or Consequences, New Mexico

Project No. 20-600-211-00

I, Mark A. Nasi, certify that I am a Licensed Professional Engineer, NMPE# 13076, and that this report was prepared by me or under my direction.

MARK A. NASI
NEW MEXICO
13076
LICENSED PROFESSIONAL ENGINEER

02/25/2021

Mark A. Nasi, PE

WILSON & COMPANY

[THIS PAGE INTENTIONALLY LEFT BLANK]

Contents

1 PROJECT PLANNING 8
1.1 Overview 8
1.2 Location 8
2 EXISTING CONDITIONS SUMMARY 9
2.1 Environmental Resources Present 9
2.2 Impact on Surrounding Areas 11
2.3 Population Trends 12
2.4 Community Engagement 19
3 EXISTING FACILITIES 19
3.1 Water System Overview & History 19
3.2 Condition 21
3.3 Financial Status of Existing Facilities 33
4 NEED FOR PROJECT 37
4.1 Water System - Health, Sanitation, and Security 37
5 ALTERNATIVES CONSIDERED 40
5.1 Water System Description 40
5.2 Water System Alternatives 42
6 SELECTION OF AN ALTERNATIVE 108
6.1 Life Cycle and Capital Cost Analysis 108
6.2 Non-Monetary Factors 109
7 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE) 121
7.1 Project Schedule 121
7.2 Total Project Cost Estimate 122
7.3 Annual Operation and Maintenance Cost/Budget 124
8 CONCLUSIONS AND RECOMMENDATIONS 127

LIST OF REPORT TABLES

Table 1: Population Data 13
Table 2: Projected Population of Sierra County (BBER) 14
Table 3: Projected Population of Sierra County and New Mexico (BBER) 14
Table 4: Growth Projection Scenarios for Project Planning Area 15
Table 5: Equivalent Dwelling Units 18
Table 6: System's Approximate Water Loss Percent 27
Table 7: Well Information 28
Table 8: Estimated Energy Consumption 33
Table 9: T or C Water System Five-Year Financial Data 35
Table 10: T or C Existing Debt 36
Table 11: Number of Water Connections (FY 2018/2019) 36
Table 12: 2009-2019 Annual Water System GPD/Connection 39
Table 13: Alternative I Cost Summary 46
Table 14: Alternative II Cost Summary 50
Table 15: Alternative III Cost Summary 55
Table 16: Alternative III-A Cost Summary 60
Table 17: Alternative III B Cost Summary 65
Table 18: Alternative III C Cost Summary 69
Table 19: Alternative IV Cost Summary 74
Table 20: Alternative V Cost Summary 79
Table 21: Alternative VI Cost Summary 84
Table 22: Alternative VII Cost Summary 89
Table 23: Alternative VIII Cost Summary 94
Table 24: Alternative IX Cost Summary 97
Table 25: Alternative X Cost Summary 100
Table 26: Alternative XI Cost Summary 103
Table 27: Alternative XII Cost Summary 106
Table 29: Water Reduction and Cost savings 110
Table 30: Operation and maintenance cost 110
Table 31: Non-Monetary Factors Scoring 120

Table 32 : Project Schedule 121
Table 33: Alternative III A- System High Pressure Solutions 122
Table 34: Full System O&M Cost Analysis 124
Table 35: Alternative III-A O&M Estimate 124
Table 36: Loan Scenarios 126
Table 37 : Short lived Asset Summary 126

LIST OF FIGURES

Figure 1: Vicinity Map 9
Figure 2 Population Data T or C and Sierra County 13
Figure 3: Projected Population of Sierra County (BBER) 14
Figure 4: Growth Projection Scenarios for Project Planning Area 16
Figure 5: Identified Growth Area 17
Figure 6: Existing System Layout 20
Figure 7: City Overview Layout 22
Figure 8: City Overview Layout W/ Airport 23
Figure 9: Existing Pipe Material 25
Figure 10: 2019 Monthly GPD/Connection 40
Figure 11: Alternative II Complete System upgrade 51
Figure 12: Alternative III System Performance Upgrade 56
Figure 13: III-A System High Pressure Solutions 61
Figure 14: III-B System Redundancy and Hydraulic Enhancements 66
Figure 15: III-C Additional Hydraulic Performance Enhancements 70
Figure 16: Alternative IV North Side 75
Figure 17: Alternative V East Side 80
Figure 18: Alternative VI West Side 85
Figure 19: Alternative VII Downtown 90
Figure 20: Alternative VIII Williamsburg 95
Figure 21: Airport Alternative IX Pressure Tank Replacement 98
Figure 22: Airport Alternative X New Ground Water Storage Tank without Fire Flow . 101
Figure 23: Airport Alternative XI New Ground Water Storage Tank with Fire Flow 104

Figure 24: Airport Alternative XII VFD Well Pump 107
Table 28 : Cost Estimate Summary 109

LIST OF EXHIBITS

EXHIBIT 101: CITY OF T OR C LAND COVERAGE

EXHIBIT 102: CITY OF T OR C LAND COVERAGE AIRPORT

EXHIBIT 103: FOREST LOCATION

EXHIBIT 104: HISTORICAL PLACES

EXHIBIT 105: FLOOD HAZARDS

EXHIBIT 106: WETLANDS

EXHIBIT 107: EXISTING PIPE DIAMETER

EXHIBIT 108: AIRPORT OVERVIEW

EXHIBIT 109: AIRPORT OVERVIEW 2

EXHIBIT 110: SYSTEM COMPLETION OVERVIEW

EXHIBIT 111: EXISTING SYSTEM OVERVIEW USDA TOPOGRAPHIC MAP

LIST OF APPENDICES

APPENDIX 1: ENVIRONMENTAL RESOURCES

APPENDIX 2: WATER SYSTEM FINANCIAL INFORMATION

APPENDIX 3: MUNICIPAL AIPORT

APPENDIX 4: CONSTRUCTION COST LINE ITEMS

APPENDIX 5: OPERATION AND MAINTENANCE

APPENDIX 6: EXHIBITS

APPENDIX 7: SHORT LIVE ASSET RESERVE

APPENDIX 8: WATER LOSSES

APPENDIX 9: FIRE HYDRANT BREAKDOWN

APPENDIX 10: NMED WATER SYSTEM VIOLATIONS

APPENDIX 11: ASSET MANAGEMENT PLANT –SMITHS ENGINEERING

APPENDIX 12: WATER RATES

1 PROJECT PLANNING

1.1 Overview

The City of Truth or Consequences (T or C) is in need of replacements to the water distribution system due to deterioration. Approximately 57% of the existing system is over 50-years old and has high system pressures with transient events that have led to extensive line breakages, which make operation and maintenance continuous and costly. Although the City has multiple wells, they are unable to move water between zones when a break or booster station failure occurs, creating a lack of system redundancy. **The Preliminary Engineering Report (PER) investigates the viability of fifteen water system alternatives to meet the demands of current and future water needs, within the area defined in Figure 7 by increasing the water supply redundancy, controlling the water pressure problems, and addressing the aging water distribution system.**

The City's water system has six supply wells all located at the southwest end of the system. . The system also has two booster stations, one designated as the "Cook St." booster station, and the other designated as the "Morgan St." booster station. Water coming out from the south part of the city is stored and boosted from the "Cook St." Facility to the "Morgan St" Facility, a second boost from "Morgan St." Facility to the Upper tanks on Cemetery road is needed to feed the entire water system. Based on the existing water system design, there is a current lack of redundancy of water supply for the northern area; given the case of either the Cook St. booster station or Morgan St. booster station fails. No treatment of the water is done beyond chlorine disinfection, as it is not necessary for these wells. The City's distribution system is in poor condition including water meters and fire hydrants that are need of immediate replacement. The city also operates a small water system at the airport that is not chlorinated, pressure tanks are not functioning, and historical buildings are in need of drastic repair, along with the well head not being properly protected.

This report was prepared in accordance with the requirements of USDA Rural Utilities Service Bulletin 1780-2, "Preliminary Engineering Reports for the Water and Waste Disposal Program" (4/4/13). The report addresses the City of T or C water distribution system.

1.2 Location

The City of Truth or Consequences (T or C), shown in **Figure 1** is in Sierra County in the southwestern part of New Mexico (NM), about 75 miles northwest of Las Cruces. T or C is the center of governmental and commercial activity in Sierra County. T or C is located at Latitude

33º8'1" N and Longitude 107º15'10" W. The City is at an elevation of 4,242 feet above mean sea level. The most populated nearby NM cities include Las Cruces (75 miles to the southeast) and Socorro (75 miles to the northeast).

The Village of Williamsburg neighbors to the Westside of T or C, and the City of T or C's water system serves the Village of Williamsburg. The southern, developed portion of T or C contains the entirety of the existing water system. Most of the northern portion of the T or C system included within the City Limits was recently acquired through annexation in 2003 and 2008. Additionally, the existing Municipal Airport Water System located near Truth or Consequences, was added under jurisdiction of the T or C Water Utility in 2018.

Figure 1: Vicinity Map

2 EXISTING CONDITIONS SUMMARY

2.1 Environmental Resources Present

An Environmental Report has not been prepared for this project. An Environmental Report will be completed at a future date contingent upon the specific funding agency requirements for the final project scope and selected final project alternative. This section of the Preliminary Engineering Report (PER) presents the required assessments of the "environmental resources present" in the study area. Important land resources surrounding and within the City include National Forest

Land, Farmland, Stream crossings, and Cultural Resources. As the water system is already existing, no impact on any of the aforementioned environmental resources is present. Important water resources within the City's existing service area include floodplain associated with the Rio Grande. Below is a brief summary of the environmental resources present.

2.1.1 Farmland

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Resource Report (**Appendix 1**), approximately 69% of the soil composition within the City and surrounding area is classified as "Not Prime Farmland" and 26% is classified as "Farmland of Statewide Importance". Although only 26% of soils in the area are considered favorable for farming purposes, the proposed improvements are focused within already developed areas replacing existing infrastructure. Therefore, no impacts to farmland are anticipated by the proposed improvements. See **Exhibit 101** in **Appendix 1** for the USGS land cover map.

2.1.2 Forest Land

The City of Truth or Consequences is located more than 10 miles away from any forest lands, with the Cibola National Forrest being the closest roughly 20 miles north-west of the project. On the opposite side about a mile east, sits the Elephant Butte Reservoir State Park, directly south, adjacent to Williamsburg, is the Caballo Lake State Park. These lands are not directly impacted by the recommended improvements to the project area. Any other monuments or forests are greater than 20 miles away in any direction. See **Exhibit 103** in **Appendix 1** for the US forest service map.

2.1.3 Historic and Cultural Resources

Few historic sites were identified within or near the project area as listed in the New Mexico Historic Preservation Division (NMHPD) as shown on **Exhibit 104.** Direct impacts to historic built environment resources are not anticipated if low vibratory equipment is used near eligible or listed properties. Visual impacts are not anticipated due to the nature of the project being subsurface. Several archeological sites have been identified outside and adjacent to the project area, LA 1119, LA 49016, LA49030, LA50548, LA517, Chambers Canyon Site (LA 49028), Horse Island Site (LA48996), Kettle Top Butte Site (LA48995), Longbottom Canyon Site (LA49033), Monticello Point Archeological District, Palomas Narrows North (LA38755), and Palomas Narrows South (LA49007). These archeological sites are not available in the state database and further research is recommended, which may include a site update. The proposed improvements recommended by this PER will take place within previously disturbed areas and existing public rights-of-way and will have no effect on these properties.

2.1.4 Range Land

According to USGS, there are public lands in the T or C area used for ranching, grazing, mining, hunting, and fishing. The land use for this project in Truth or Consequences is residential, therefore there will be no negative impacts to any rangeland from recommended improvements to the project area. See **Exhibits** (**101-102**) in **Appendix 1** for the USGS land cover map.

2.1.5 Wetlands and Flood Plains

According to the Federal Emergency Management Agency's (FEMA) National Flood Hazard Layer (NFHL), significant areas of Truth or Consequences are within Zone A and AE (**Appendix 1- Exhibits 105 -106**). Zone A is designated as an area with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. This is due to the Rio Grande flowing through the southern and eastern end of the City. Erosion and sediment control plans will be set strictly in place to prevent construction activities from affecting the nearby Rio Grande.

2.1.6 Endangered Species

The ecological findings derived by the Biota Information System of New Mexico (BISON-M), provide a list of possible endangered and threatened species present in Sierra County. This list consists of 25 species, (See **Appendix 1**). According the U.S. Fish and Wildlife IPaC Resource list, the area of disturbance for any proposed construction for the City of Truth or Consequences does not contain any critical habitats. As the water system is already existing in developed areas, no impact is anticipated on any of these species or areas listed. Both lists are included in **Appendix 1**.

2.2 Impact on Surrounding Areas

2.2.1 Air Quality

Construction phase services would have a minor, temporary impact on local air quality. This would be mostly attributable to fugitive particulate matter ($PM_{2.5}$, PM_{10}) emissions resulting from the following activities:

- Construction and excavation activities such as grading and trenching.
- Dust track-out onto existing paved roads from construction areas.
- Processing and/or stockpiling of materials on-site prior to their use in the construction process.

During permanent operations, no anticipated source of significant air emissions would result. Due to the nature of the project, and since there are no new permanent stationary points of air emissions associated with the planned project activities, adverse air quality is not anticipated for the proposed improvements described herein. Emissions from project construction are anticipated to be minimal and would not jeopardize ambient air quality standards for any of the criteria pollutants. In addition, due to the topography and distance from the project site to the City Proper, the prevailing wind directions and the minimal air emissions anticipated, there are no air impacts anticipated to adjacent property land receptors. Mitigation of construction phase particulate emissions is proposed below.

- Standard management practices for dust abatement is recommended to include water spray and/or moisture addition within proposed grading and/or trenching areas, periodic watering of stockpiles, moisture addition for aggregate processing equipment, and control of vehicle track out of dust and/or mud from non-paved onto paved areas.
- Alternatively, periodic sweeping and/or washing of areas subject to track out can be implemented. In addition, transport trucks carrying import or export soils and/or construction debris materials should be covered with a tarp.

2.2.2 Noise

Noise levels during construction will be intermittent and the result of construction equipment. To mitigate effects of noise levels, construction will take place during normal daytime hours. Once construction is completed, no additional noise levels are anticipated. If required, appropriate sound attenuation will be recommended to mitigate noise levels. Noise levels from proposed alternatives are expected to remain at current levels.

2.3 Population Trends

Table 1 below provides the 1970 thru 2010 US Census data for the City of Truth or Consequences as well as Sierra County. 2016 and 2018 data for both County and City are taken from annual population estimates also provided by the US Census due to census 2020 is in current development. **Figure 2** is a graphic representation of **Table 1** with projected populations from 2011 thru 2018.

Table 1: Population Data

Year of Census	T or C [1]	Sierra County [1]
1970	6,221	9,912
1980	5,219	8,454
1990	4,656	7,189
2000	7,289	13,270
2010	6,942	12,030
2016	6,444	11,191
2018	6,278	10,968

[1] Source: U.S .Census.

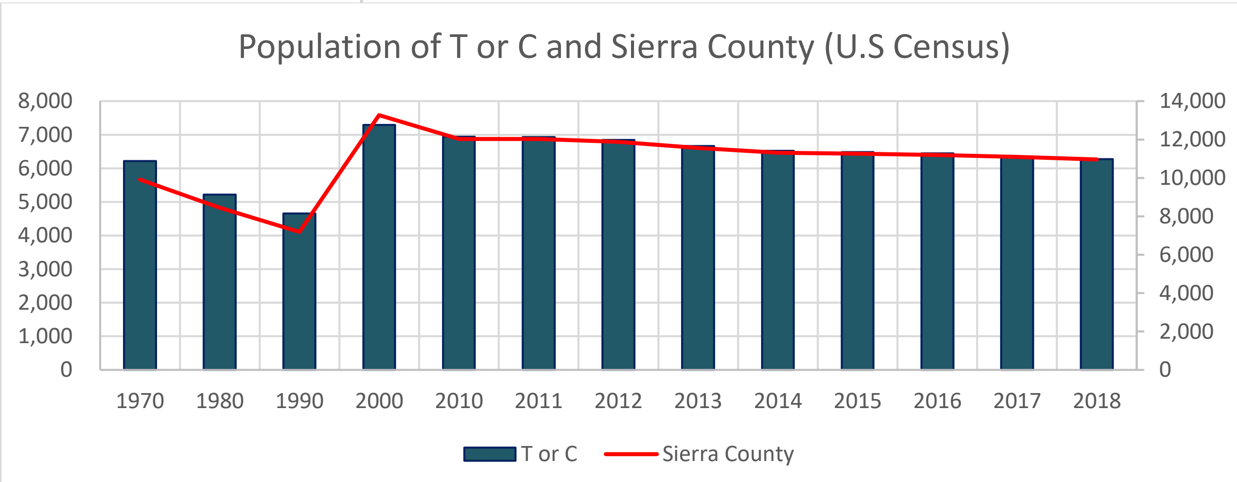


Figure 2 Population Data T or C and Sierra County

According to the US Census, the population of T or C grew from 6,221 people in the year 1970 to 7,289 people in the year 2000. Over this 30-year period, T or C's annual percent growth rate was approximately 0.33%. Growth experienced during this period can be attributed primarily to a large number of retirees that moved to the area. The 2010 Census originally reported the population of T or C as 7,289 but was revised in September 2010 to report the July 1, 2009 population as 6,942. For both T or C and Williamsburg, The decline in the recorded population during the decade can most likely be attributed to several factors: 1) Overall negative economic state of the nation in the second half of the decade, 2) downturn in the local economy caused by drought conditions in recent years and a related decrease in recreational tourist opportunities, and 3) the demographics of the two communities, where almost 30% of the population over 65 years of age.

The potential overall growth of Sierra County and its impact on the Project Planning Area also needs to be considered. As of July 1, 2010, the communities of T or C, Williamsburg, and Elephant Butte, which is located less than a mile northeast of T or C, made up 70% of the Sierra County population. It is reasonable to assume that the future growth rate of the communities in the Project Planning Area will be similar to the overall projected growth rate of Sierra County. The projected populations and growth rates of Sierra County for the years of 2010 to 2040 as determined by the Bureau of Business and Economic Research (BBER), are contained below in **Table 2.**

Table 2: Projected Population of Sierra County (BBER)

Year	*2010	*2015	2020	2030	2040
Population	11,988	12,020	12,048	12,218	12,737

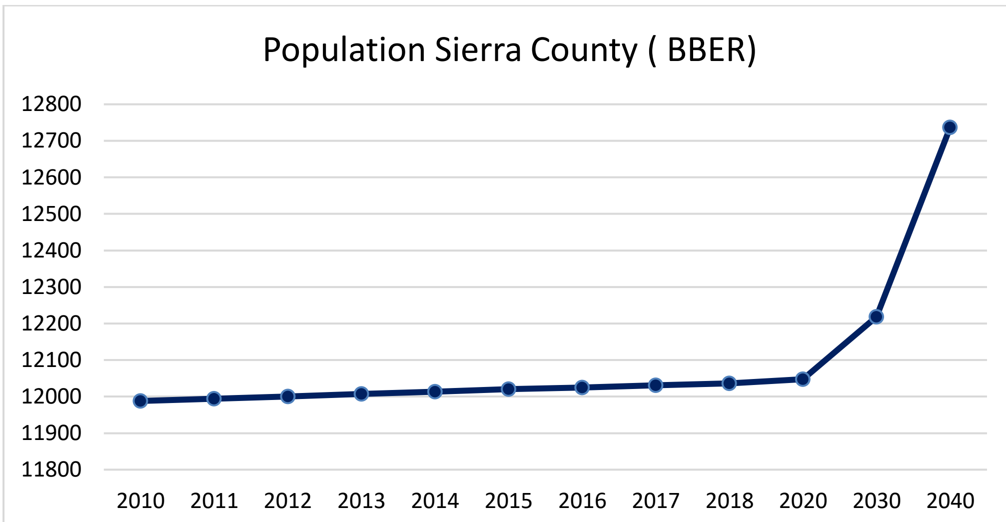


Figure 3: Projected Population of Sierra County (BBER)

Table 3: Projected Population of Sierra County and New Mexico (BBER)

Geographic Area	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030	2030-2040
New Mexico	1.87	1.72	1.5	1.28	1.13	1.04
Sierra County	0.17	0.27	0.23	1.00	0.39	4.07

As **Table 1**, **Table 2**, and **Figure 3** indicate, the more recent projections on population growth from 2010 for the communities in the Project Planning Area are less aggressive than the projections from just a few years earlier. As shown in **Table 3**, the highest projected annual growth rate for Sierra County, over the next 25 years, is 4.07 %, occurring from 2030-2040. T or C itself experienced 1.61% average annual growth in the 1990s, an annual growth rate more than 2.5 times greater than what is currently projected for Sierra County, and is similar to what is currently projected For the State of New Mexico as a whole. Evidently, there is a wide range of population projections that have been made over the last ten years for Sierra County and the T or C area. Taking into account the available population data, three growth scenarios for the Project Planning Area through the year 2040 have been determined for comparison. Each of the growth scenarios represents growth of communities in the Project Planning Area at an average annual growth rate. The growth scenarios are as follows:

1. Linear Growth Scenario: Growth at an average annual rate of 0.033%. This scenario represents the growth in the Project Planning Area that would be expected to occur if future growth follows the pattern of what is projected for Sierra County for the period of 1970-2000 by the US Census.

2. **Low Growth Scenario** Growth at an average annual rate of 0.23%. This scenario represents the growth in the Project Planning Area that would be expected to occur if future growth follows the pattern of what is projected for Sierra County for the period of 2015-2020 by BBER.

3. **High Growth Scenario** Growth at an average annual rate of 1%. This scenario represents the growth in the Project Planning Area that would be expected to occur if future growth follows the pattern of what is projected for Sierra County for the period of 2020-2025 by BBER.

The population data for these growth scenarios and are shown in **Table 4** and in **Figure 4**. All of the population growth scenarios start with a total population for the Project Planning Area of 6,372 in 2010, which is based on the populations of T or C and Williamsburg reported July 1, 2010 by the US Census (see **Table 1**).

Table 4: Growth Projection Scenarios for Project Planning Area

Year	Linear Growth Scenario (0.033% Annual Growth)	Low Growth Scenario (0.23% Annual Growth)	High Growth Scenario (1.0% Annual Growth)
2010	6,953	7,022	7,289
2015	6,965	7,102	7,636
2020	6,976	7,181	7,983
2025	6,988	7,261	8,330
2030	6,999	7,341	8,678
2035	7,011	7,421	9,025
2040	7,022	7,501	9,372

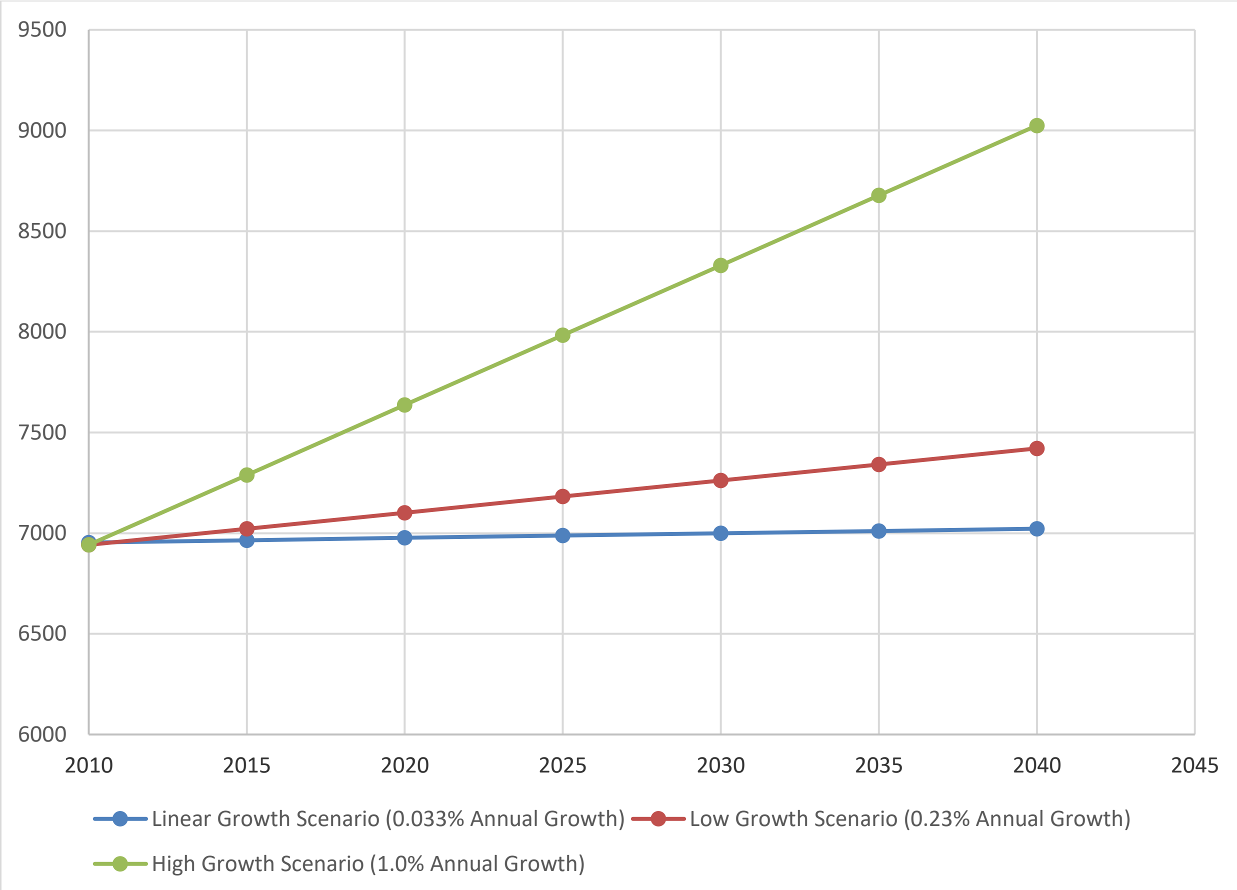


Figure 4: Growth Projection Scenarios for Project Planning Area

Comparison of the growth scenarios shows a very large difference between the High Growth and the Linear Growth scenarios. There is a risk that use of either one of these scenarios to predict future growth could result in significant over-sizing or under-sizing of new infrastructure, which must be avoided. Although recent population data suggests a decline in the future, BBER is projecting positive growth.

According to T or C officials and the current T or C Comprehensive Plan (2004), there are 4 areas where growth is expected in T or C and Williamsburg. The locations of these areas are in general agreement with a map of expected, future land use presented in the T or C Comprehensive Plan. None of the expected development is currently on-going or “on the books” to be done in the near future. All of these growth areas will generate water demand from the existing system. The identified growth areas are shown on **Figure 5** and are as follows:

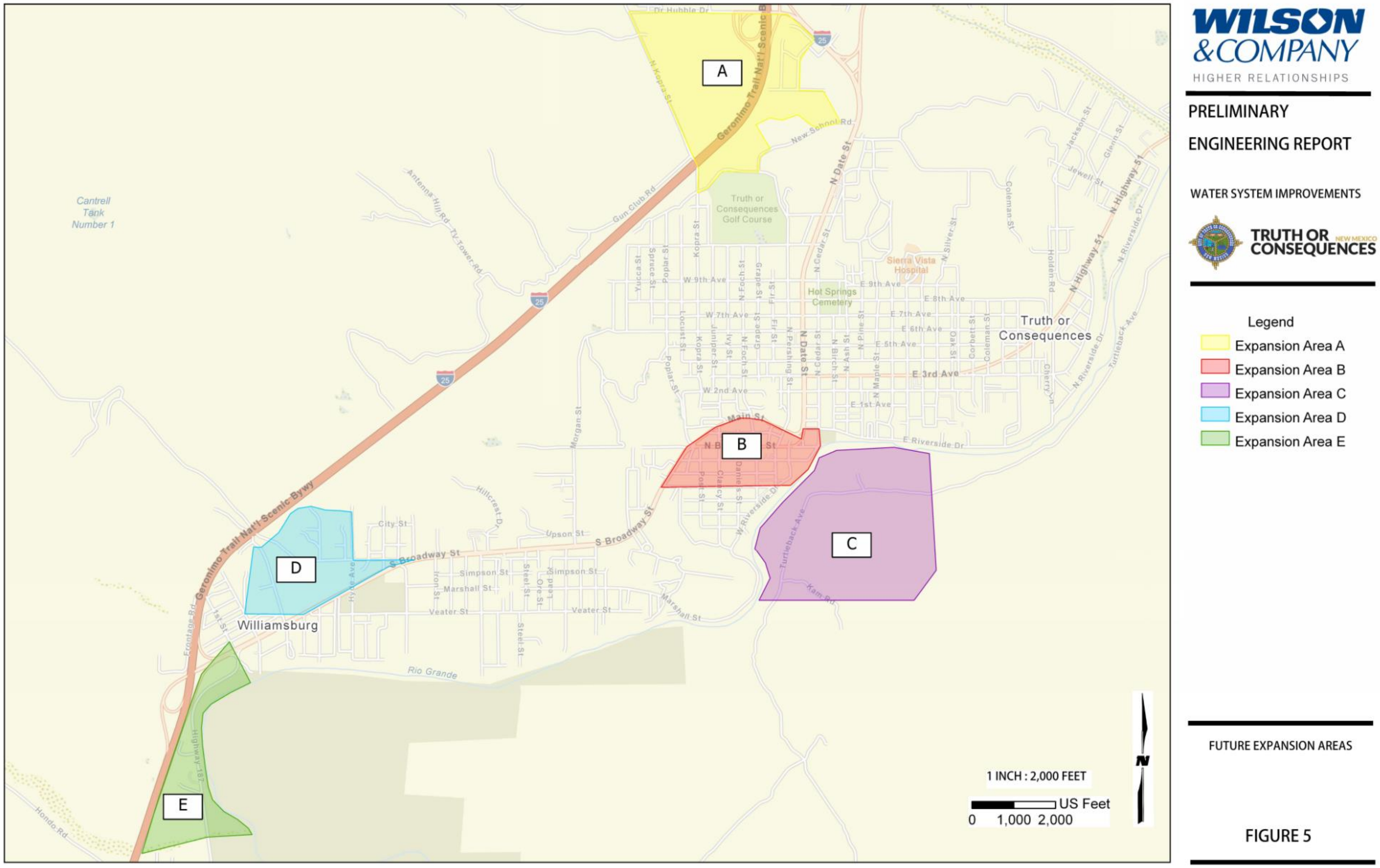


Figure 5: Identified Growth Area

a) In the area west of N. Date Street, in the vicinity of I-25, behind the Wal-Mart complex, there are preliminary plans for construction of a new hotel with approximately 115 rooms.
b) In the vicinity of Turtleback Avenue (east of West Riverside Dr. and south of East Riverside Rd. across the Rio Grande), preliminary plans are in place for a new housing development. Preliminary site utility design/layout has been implemented, but no construction has occurred or is imminent.
c) Development of a Business/Industrial Park along Broadway in the area south of Cook St. Is discussed in the 2004 T or C Comprehensive Plan.
d) In the area to the south of Williamsburg near I-25 and highway 187 along the Rio Grande, the 2004 T or C Comprehensive Plan discusses future development of this area.

Based on our understanding from T or C governance utilities officials, and the planned growth area discussed above, use of a 1% average annual growth rate seems most appropriate to predict future growth of the communities in the Project Planning Area. Application of the 1% average annual growth rate will result in a practical design for new water system improvements that also incorporate the short-term realities of economic growth. Therefore, for the purposes of planning improvements to the T or C water system, the High Growth Scenario of 1% average annual growth until the year 2040 will be used to project population growth in the Project Planning Area. As shown in **Table 4** and **Figure 4**, the resulting projected population of the Project Planning Area in 2040 is approximately 9,372.

The anticipated equivalent dwelling units anticipated for the next 20 years are as shown in **Table 5.**

Table 5: Equivalent Dwelling Units

Year	Number of Connections	Water Income	Residential Connections	Commercial/ Connections	Daily Demand (GPD)	Residential GPD	EDUs
2020	3,009	$1,057,195	3,009	485	919,208	212	4,336
2021	3,039	$1,425,357	3,039	490	928,400	212	4,379
2023	3,100	$1,512,161	3,100	500	947,024	212	4,467
2025	3,162	$1,542,555	3,162	510	965,993	212	4,557
2030	3,324	$1,621,241	3,324	536	1,015,418	212	4,790
2040	3,672	$1,790,859	3,672	592	1,121,703	212	5,291

2.4 Community Engagement

The City of *T or C* has an established community involvement process built into the basic workings of the overall City management. City infrastructure issues, including those of the Water System, are routinely discussed in two public forums, the Public Utility Advisory Board (PUAB) Meetings and the City Commission Meetings. The PUAB Meetings occur once a month and the City Commission Meetings occur twice a month. The City will give public notice and hold a public meeting to inform the citizens about the project in accordance with the requirements of RD Instruction 1780.

3 EXISTING FACILITIES

3.1 Water System Overview & History

The distribution pipe network of the existing City's water system has components that date back to at least the 1930s, as evidenced by Work Projects Administration (WPA) emblems associated with waterline infrastructure around the City. The components of the distribution system were put in incrementally from the 1930s through the 2000s as the City expanded. Overall, many of the components that make up the Water System are old (more than 50 years in age), specifically the waterline pipes of the distribution system and several of the groundwater supply wells and their associated pumping systems. The current system is fed by several wells located in the southwest portion of the City. The wells are used to fill the Cook Street storage tank. From the Cooks Street storage tank, and by using its booster station, water is pumped into Morgan Street storage tank. The Morgan Street booster pump station, then pumps the water into the upper tanks located at Cemetery Road to feed the City's water distribution system. (**See Figure 6**)

In addition to the current pipe network system, in 2018 the City added the Municipal Airport water system, which dates back to at least the 1930's. The components of the system were located within buildings that have historical importance and must be preserved from any damage. The system is currently fed by a well located near the historical buildings. The distribution components at the airport are beyond their useful life and in need for replacement. (See **Exhibit 109** in **Appendix 6**)

The following summarizes the history and condition of the Water System components by category.

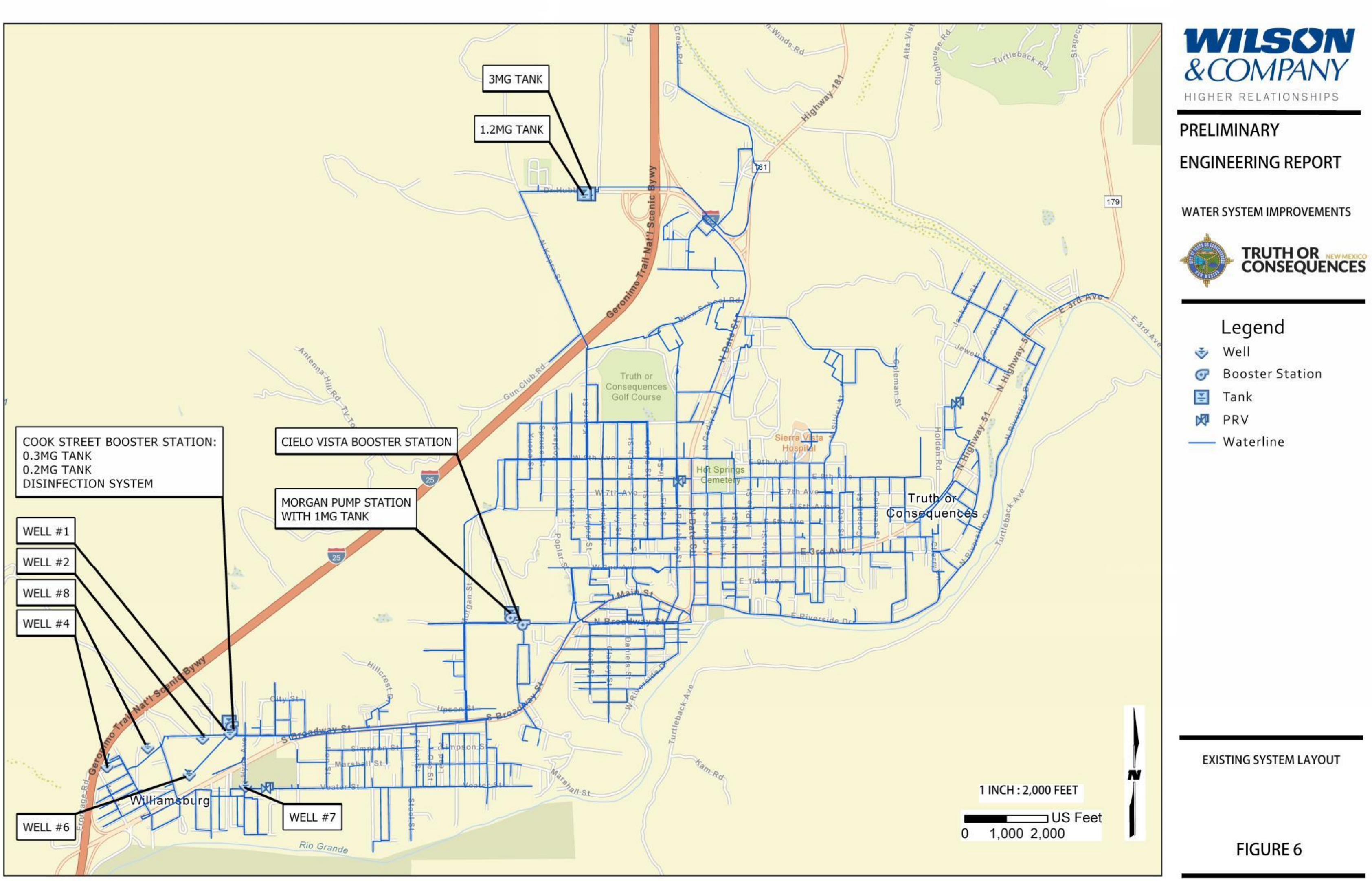


Figure 6: Existing System Layout

3.2 Condition

The City of T or C's Public Water System ID is NM 3514327. **Figure 7** for system layout

The city of T or C's Municipal Airport Water System ID is NM 3501427. **Figure 8** for system location

"The Asset Management Plan City of Truth or Consequences" for the existing water system was prepared by Smith Engineering in 2014, revised (2017). Created an inventory of all the water system components with details on capacity, material, age, etc. and assessed the condition of the components based on age (remaining useful life), field investigations, and operator interviews, and water usage.

The Municipal Airport water system was recently activated as a public water system, its inventory of all water system components with details on material, capacity and condition were assessed as part of the PER and per sanitary survey report (**See Appendix 3**) by field investigations, operator interviews, and site visits. The following report section summarizes the condition, capacity/adequacy, and prioritizes replacement of the water system components, organized by component category.

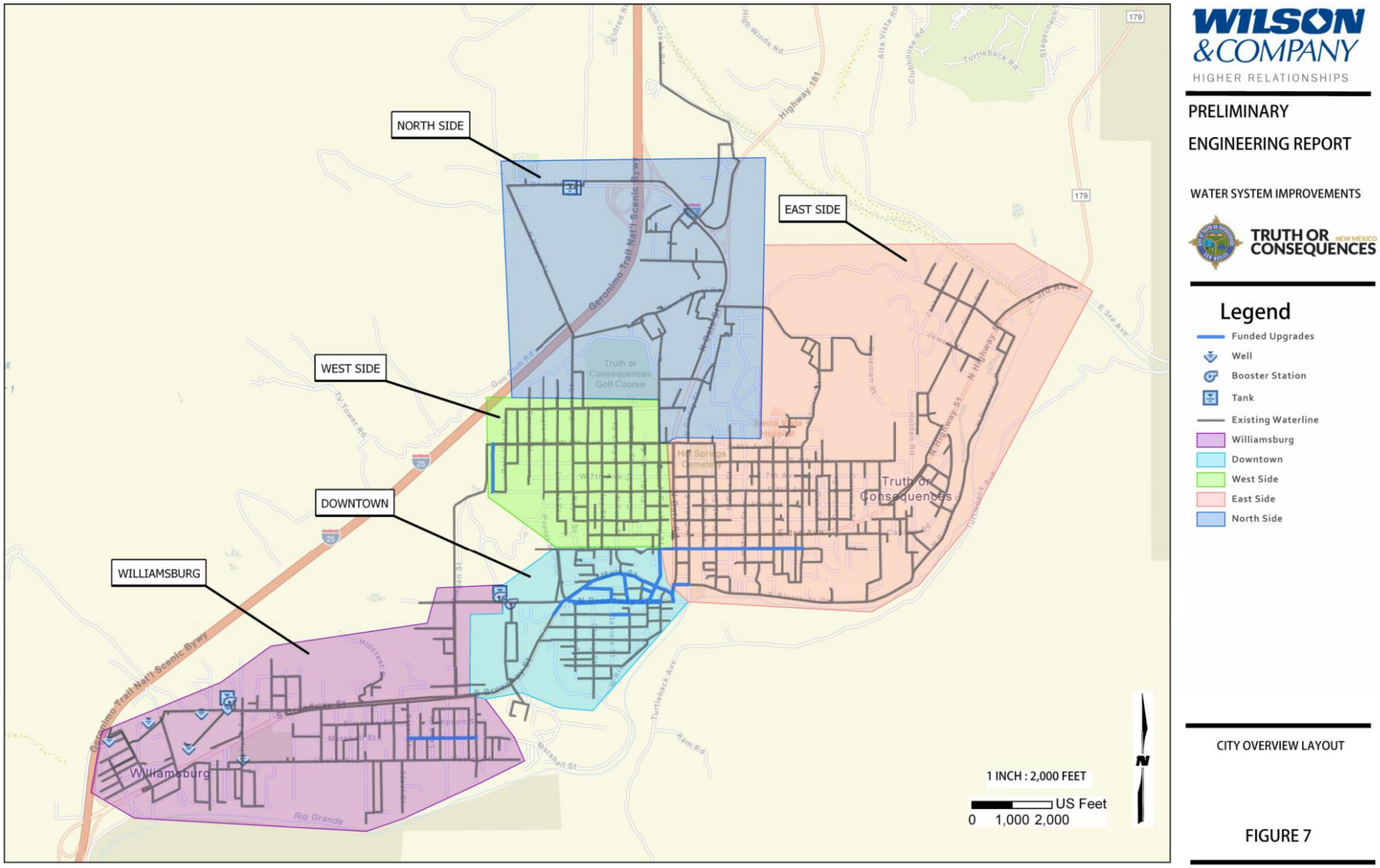


Figure 7: City Overview Layout

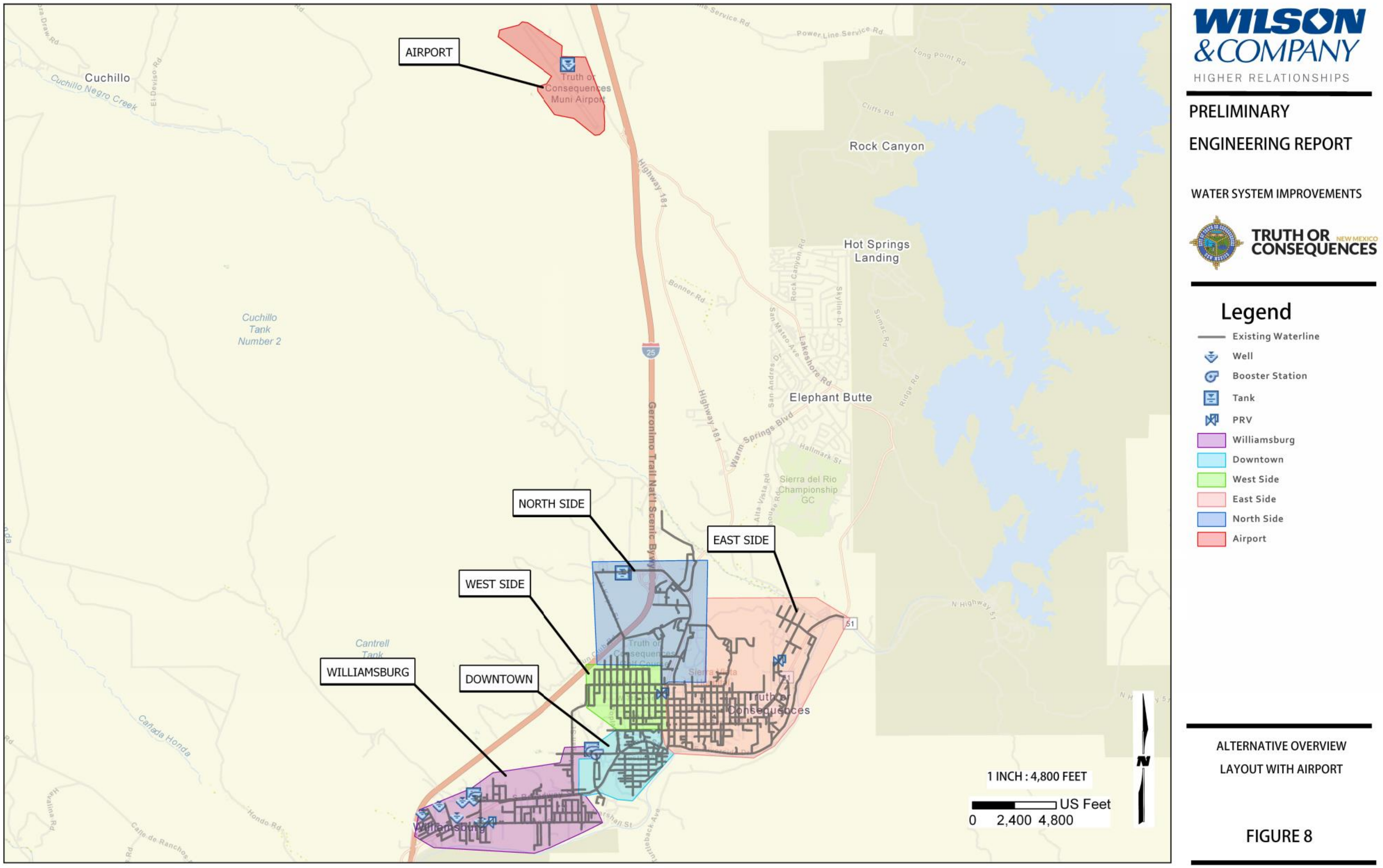


Figure 8: City Overview Layout W/ Airport

3.2.1 Distribution:

The existing water distribution type consists of waterline pipes, valves, Pressure Reducing Valves (PRV's), hydrants, Air Release Valve (ARV), and meters. Most of the overall water system components within the distribution system vary greatly in condition, primarily as a function of age and material. Many of the distribution system waterlines are considered to be beyond their expected useful life due to age and are considered to be in poor condition. As a result, these old waterlines are leaking significant amounts of water, increasing the overall operation and maintenance cost as well as decrease the overall energy efficiency of the system due to the need for more pumping.

The Water System GIS Inventory database contains records related to the distribution system. Currently, the distribution system provides water to a service area greater than five square miles including 3,538 water meters thorough the City. The City's Asset Management Plan shows that 239,046 linear feet (45.3 miles) of pipeline (approximately 57% of the system) consist of Asbestos Cement (AC), Cast Iron (CI) and Ductile Iron (DI) pipe.

The oldest pipe in the system is asbestos cement (AC) installed primary in the 1930s and again in the 1960s, representing approximately 28% of the distribution system. About 9% of the system is cast iron pipe (CI) that was installed primary in the 1940s and again in the 1970's which causes discoloration of the water system in certain areas of the City. Discoloration is not aesthetically pleasing to customers. 60% of waterline pipe is made of PVC, either schedule 40 or C900, installed throughout the 1970s to the 2000s. The schedule 40, which is a thin wall pipe is susceptible to breakage under pressure surges that are prevalent in the water system. Approximately 47% of the waterlines in the City are older than 50 years old, 59 % of the system is older than 40 years old and almost 77% of the City's waterline system is older than 30 years old. **Figure 9** shows the existing pipe material thorough the City.

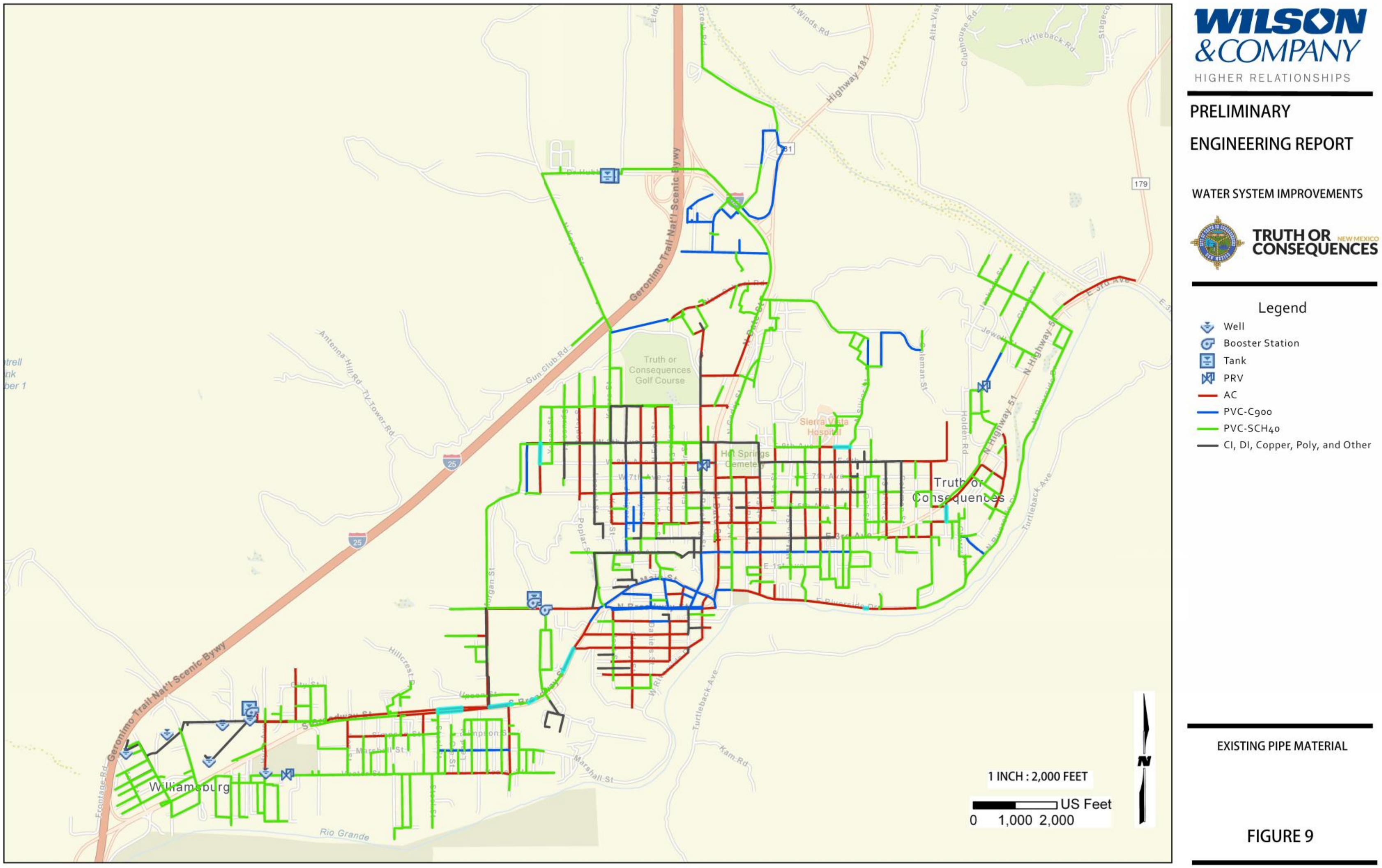


Figure 9: Existing Pipe Material

In 1930 the Initial waterline design for the City of Truth or Consequences satisfied fire flow requirements. Over the course of time, the expansion of the system and the addition of water service connections, coupled with changes in industry fire flow requirements, these requirements are no longer met. Presently, over 33.5% of the current system is under 6 Inch diameter trunk lines that cannot provide adequate pressure under peak demands and fire flow within some of the areas of the City.

The current pumping system arrangement does not have a dedicated transmission line, but instead utilizes the existing aging distribution pipelines to pump water from the Cook Street water storage facility to the Morgan Street water storage facility. The pressure fluctuation is approximately a 30-psi increase in the distribution system when the Cook Street booster pumps are running. The peak pressure surges are causing line breakages in the "Williamsburg" area since it is fed from this zone.

Current reports have shown that the implementation of the tank located in Cemetery Road has increase the water pressure of the system on the "West" area of the City, resulting in waterline breakages and blowouts in these areas. Water breaks are mostly seen when the storage tank is at full capacity. As a precaution, and to minimize waterline repairs, the City decided to only use the water storage tank at half capacity.

Operator interviews, City records, and show existing reports for the year of 2019 indicate 260 water breakages on the City's water system, due to high pressure surges in mostly the "West" and "Williamsburg" areas. Breakages with an average cost of $1,000 dollars per break including the cost of manpower, materials, fuel, other city resources, road repairs, equipment and water/water loss. The total repair cost for the breaks in 2019 are broken down by; 1) manpower, materials, and fuel is 53% ($137,800.00) from the water utility budget. 2) other city resources and road repairs is 29% ($75,400.00) from other City budgets. 3) equipment and water/water loss is 18% ($46,800.00) which are inherent costs for perspective, such as and equipment hourly rate and the cost of water/water losses because of the break. These equipment and water/water loss cost do not come out of any of the city's budget but are inherent cost of a waterline break. Thus, the actual cost to the City's water operation and maintenance expenses has an approximate value of $137,800.00 in 2019, which came from salaries/benefits, repair/maintenance, and supplies.

Water breakages in the City have been a noticeable issue due to added monetary expenses as well as water leakages within the piping system. In addition, a water Mass Balance calculation of years 2016-2019 was completed to estimate the System's approximate water loss percent to estimate condition of the existing water system.

Table 6: System's Approximate Water Loss Percent

Year	Total Water Production (Gallons)	Total Water Consumption (Gallons)	Difference (Gallons)	Water loss Percent
2016	421,281,718	316,158,000	105,123,718	25%
2017	425,646,000	316,963,000	108,683,000	26%
2018	443,881,000	302,863,000	141,018,000	32%
2019	454,209,000	326,675,000	127,534,000	28%

As is shown in the above **Table 6**, the water system in 2016 had a loss of 25%and in 2019 that loss percentage increased by almost 3%. The current year of 2019 report had 260 water breakages that can foreseeably increase the water leakage in the years to come.

3.2.2 Fire Hydrant:

The existing fire hydrant system was installed between 1960's and 2000's. A 2013 report IMS by Hurco Technologies Inc. for the City of Truth or consequences fire department presents some flaws concerning residual pressures, age, and fire flow requirements. The system is currently represented by 7.8% of the hydrants are older than 50 years, 20% of the hydrants are older than 40 years, and 35 % of the hydrants are older than 30 years. A big portion of the system is reaching its useful life.

Additionally, Emergency Services Administrator/Sierra county Fire Marshall and the National Fire Protection Association (NFPA) codes, the municipal fire flow should be at least 1,500-gpm with a residual adjacent pressure not less than 20-psi. A report provided by the City's Fire Marshall Indicate 5.36% of the fire hydrants are running with a fire flow below 1500 GPM, and 46% of the hydrants have fire flow below 20 psi. The deficiency of pressure on the fire hydrants also can be affected because 33.5% of the waterline in the City is under 6 Inch diameter. Other minimal diameter trunk lines throughout the City cannot meet the requirement. For further hydrant breakdown report see **Appendix 9,** Additional Fire Hydrant testing report available upon request.

3.2.3 Water Meter:

Truth or Consequences distribution system currently provides water service to 3,538 active water meters. Current field investigations, and operator interviews indicate that meters are approximately older than 30-40 years old exceeding their useful life. Meter changes are randomized and replaced on an as needed basis. Furthermore, water meter are currently read manually which increases the operation and maintenance cost for the City.

3.2.4 Wells:

The existing water supply for the T or C water system is entirely from six wells located in the southwest portion the system. At present, all the groundwater supply wells are producing consistently except for Well No. 4, and Well No. 8 which are currently off-line. The combined production capacity of the wells is adequate to meet the anticipated current demands and the wells are suitable for continued use.

Table 7: Well Information

WELL NO.	WATER WATCH ID	ELEVATIONS	WATER PUMP RATE (GPM)	WELL DIAMETER (IN.)	DEPTH OF WELL (FT.)	DEPTH OF THE WATER INSIDE (FT.)
1	HS 001151	4248	475	20	400	38
2	VHS 00011 or HS 00011-S	4248	350	12.75	405	43
4*	HS-0011-S-5/HS-00019	4269	200	10	355	0
6	HS 01059	4244	575	12.75	414	52
7	HS 01059	4237	725	12 to 18	431	69
8*	HS 00011-S-9	4264	725	12 to 18	367	5

** wells currently offline*

**Drinking Water watch website #NM3514327*

Well No. 2 and Well No. 4 are the oldest wells in the system, installed in 1945 and 1958, respectively. Well No. 6 is the next oldest well, installed in 1976. The other three wells were all installed in the 1990's and are relatively new. Well No. 4 and Well No. 8 are out of service. City's water maintenance group stated that Well No. 4 had lower pumping rates than expected and its running cost was exceeding the budget. Additionally, Well No. 8 casing slipped causing the well to be inoperable Well No. 8 it is planned to be evaluated and repaired in 2020, if possible.

The Initial design for the water system of the City of T or C met the terms with the water supply based on the City's location and low expansion. But during the course of time, the expansion and escalation in water service connections in different areas of the City has changed the initial requirement. The system currently has a total of six wells, all of them located on the southwest portion of the City. The location of these wells determines the pumping system design to transfer water to three different tanks from the southern part (Cook Street), to the middle part (Morgan

Street), and to the north part (Cemetery Road). The water transfer between the three zones does not allow for water supply redundancy and increases the failure potential for long water outages in the future.

3.2.5 Pump System:

Pump systems include the following: pumps, motors, manifolds/valves, flow meters, and all associated electrical components. There are essentially two distinct pump systems, separate from the well submersible pumps, currently used to transfer water from the supply wells to the storage tanks and distribution throughout the water system. The two distinct pump systems are the following:

1. Cook Street Treatment Facility Pump Station
2. Morgan Booster Station

The Cook Street Facility was constructed in 1996 and has two 250-Hp centrifugal pumps. To address water-hammer issues, a new soft-start system and a new electrical system for the two original pumps was installed in early 2014.

The Morgan Booster Station was constructed in 2007. The transfer switch for the electrical system of Morgan Booster Station was replaced in 2013. Replacement of various gauges, valves, and flow meters, as well as motor repairs/modifications, have occurred for multiple pumps systems throughout the years the water system has been operating. Other than what has been previously mentioned, no major pump system replacements have occurred. Morgan Street pumps have failed but the system will be upgraded in 2021.

The individual pump systems of the overall water system all have adequate capacity to provide the expected level of service and were designed in a manner which allows them to be suitable for continued use in the future. In general, the pump systems operate in an energy-efficient manner with the exception of the large booster pumps at the Cook Street Treatment Facility Pump Station. The current operations at the Cook Street Pump Station result in frequent start/stop cycles of the large 250 HP pumps due net flow of the facility and the small volume of on-site storage.

The City currently has a project that includes improvements to the Cook Street Facility and waterlines in the Downtown area. The Cook Street improvements will double the on-site storage and equip the existing 250HP booster pumps with new VFD controllers to run the pumps between 1,000 GPM and 3,000 GPM (full capacity). This will extend the run times of the pumps and reduce the head loss in the water system when the pumps are running at a lower capacity, instead of when the pumps are running 3,000 GPM (full capacity), with a total dynamic head of 192.3 TDH (a pressure differential of 30 PSI). The total dynamic head when the pumps are running at 1,000 GPM is estimated to be 134.6 TDH (a differential pressure of 5 psi). Improvements for the existing system also include the replacement of Cla-Val Valves with micro switches, Hydraulic Check Valves, concrete repair, new electric heater, and a new Digital Mag Flow meter on the booster station outlet.

3.2.6 Well Pumps:

Corresponding to the oldest well, the oldest pump system is the one for Well No.1 and No. 2, originally installed in 1945. The existing pumps system for Well No.1 and No. 2 is not thought to be the original system from the 1940's, but rather a newer system installed in the 1980's and 1960's respectively. Due to age, the original pump system for Well No. 4 was replaced in 2001 with the current pump system. Similarly, the pump system for Well No. 6 was replaced in 1999 with the current pump system. The existing pump systems for Wells No. 7 and No. 8 were installed new as part of the same project in 1999.

The individual pump systems of the overall water system all have adequate capacity to provide the expected level of service and were designed in a manner which allows them to be suitable for continued use in the future.

3.2.7 Water system SCADA:

Operation of the different pump systems and storage tanks that make up the existing water system is coordinated and controlled using a Supervisory Control and Data Acquisition (SCADA) system with the master control computer located at the T or C WWTP. The hardware and software of the system was initially installed in 1997. Since installation, the SCADA software and computer have been upgraded several times. In contrast, all the existing communication remote terminal units (RTUs), located throughout the Water System at the various pump system and storage tanks sites, are the original units from 1997. The City currently has a project to upgrade the SCADA system in 2022. The plan is to upgrade and incorporate in-to the new WWTP SCADA/HMI system to be fully compatible with the same equipment used for the WWTP system. RTU's will be replaced/upgraded at all locations.

3.2.8 Disinfection System:

The existing disinfection system is a gas-chlorination system, located at the Cook Street Facility. The chlorination system, including all associated piping, equipment, and fiberglass housing (shed) was installed in 1996, at the same time the rest of the facility was constructed. This system is old and beyond its expected useful life. The City is currently replacing the gas chlorination system in its entirety with the Cook Street Facility Improvements project.

3.2.9 Buildings:

The existing T or C water system includes various buildings, primarily used to house pump systems. The water system buildings are as follows:

1. Cook Street Treatment Facility Pump Station Building
2. Cook Street Treatment Facility Storage Building
3. Morgan Street Booster Station

Another existing old building is the one that used to be the Pershing Pump House, estimated to have been constructed in 1945. This building no longer contains pumps but is used to house a critical pressure-reducing valve that separates the upper pressure zone of the water system from the lower pressure zone.

The existing Cook St. Treatment Facility Pump Station Building was constructed in 1996. The existing Storage Building located at the Cook St. Facility site predates the facility and is much older, estimated to have been constructed in the mid-1970s.

The Well pump houses for Wells No. 6, No. 7, and No. 8 were all constructed in 1999 as part of the same project as the pump upgrades. As a result, these building are some of the newest existing buildings of the water system.

The Morgan Booster Pump is the newest building in the water system. This building was constructed in 2007 as part of the overall Morgan Booster Station project in which the pump system, including electrical components and the back-up generator, were installed.

3.2.10 Storage Tank

The existing water system includes the following four operational storage tanks:

1. 0.2 MG Storage Tank, located at Cook Street Treatment Facility
2. 1.2 MG Storage Tank, located on Cemetery Road
3. 3.0 MG Storage Tank, located on Cemetery Road

4. 3.0 MG Storage Tank, located next to Morgan Booster Station

The oldest operational storage tank is the 3.0 MG tank located on Cemetery Road, which was originally constructed in 1978 to provide storage and pressure for the upper distribution zone of the water system. Due to age and corrosion, the tank underwent major rehabilitation and repair including sandblasting, re-priming/repainting, new hatches, access ladders, and cathodic protection in 2013.

The 0.2 MG storage tank located at Cook Street Treatment Facility was constructed at the same time as the rest of the facility, in 1996, and is used to store and transfer chlorinated water to the distribution system and the Morgan storage tank. Due to age, the tank underwent minor repairs in 2012, including new hatches, access ladders and cathodic protection.

The newest operational storage tanks are the 1.2 MG tank located on Cemetery Road and the 3.0 MG tank located next at the Morgan Booster Pump Station, both of which were constructed in 2004. The 1.2 MG tank was added to the water system to provide additional storage and a back-up tank for the upper distribution zone and sits next to older 3.0 MG tank. The newest 3.0 MG tank at the Morgan Street site was added to the water system to provide storage and pressure for the lower distribution zone.

All of the storage tanks have been rehabilitated or installed as new within the last ten years and are in excellent condition. As a result, none of the storage tanks have been scheduled for significant repair or rehabilitation in the next 10 years.

All the storage tanks have been designed with the proper capacity to be suitable for many more years of use, except for the 0.200 MG storage transfer tank at the Cook Street Treatment Facility. The capacity of the tank appears to be undersized resulting in excessive start/stop cycles of the booster pumps that operate with the tank. Improvements to the Cook Street Facility equipment and operations are presently under design and scheduled to be constructed in 2022. In addition to the pump improvements previously discussed, a new additional ground 300,000-gallon steel water storage tank is planned at the Cook Street Booster Station site on year 2022. This tank is to increase the storage capacity at the site to reduce the pump on/off cycles of the booster pumps and increase the run time of the booster pumps. And will extend the life of the existing booster pumps

3.2.11 Municipal Airport Water System:

The existing Municipal Airport Water System was recently added under jurisdiction of the T or C Water Utility and must comply with all the relevant rules and regulations for the public water system. The Municipal Airport water system has been classified as a Non-Community water system with a transient population of 40. Current field investigations, and operator interviews indicates the system is located in an estimate of three Historical buildings. Inside of these historical buildings there are different parts of the existing water system including water pump, vault, control room, pressure gage, meter valve, electrical system, and pressure storage tank. The system is currently presenting a pressure issues, electrical outages, as well as pressure tank bladder issues. (See **Exhibit 109** in **Appendix 6**)

The system is currently in poor conditions and it needs a replacement and the installation of a storage tank to prevent water pumps burnout. The City expressed the importance of preserving these buildings because of its historical status.

3.3 Financial Status of Existing Facilities

3.3.1 Current Energy Consumption

The current energy consumption for the T or C water system is shown the City's FY 19/20 Budget under the Utilities Line item. It is our understanding that electrical power is the only item under utilities. While specific consumption is not known, the total water system consumption can be back calculated using an average rate of $0.07/kWh. The estimated energy consumption is as follows in **Table 8**:

Table 8: Estimated Energy Consumption

FY	Budget	Rate($/kWh)	Est. QTY(kWh)
13/14	$138,833.00	$0.07	198,329
14/15	$124,941.00	$0.07	1,784,871
15/16	$107,944.00	$0.07	1,542,057
16/17	$98,141.00	$0.07	1,402,014
17/18	$91,277.00	$0.07	1,303,243
18/19	$131,825.00	$0.07	1,883,243
19/20	$95,000.00	$0.07	1,357,143
AVG	**$112,565.86**		**1,352,986**

3.3.2 Existing Asset Management Plan

The Asset management Plan for the existing water system of the City of Truth or Consequences was prepared by Smith Engineering in 2014, revised (2017). (See **Appendix 11)**

3.3.3 Revenue

The current source of revenue is from utility billings provided by the City of T or C's residents for water system services. The utility rate structure is broken out below in **Table 9** as provided by the City's database.

3.3.4 Operations and Maintenance Cost

Table 9 Shows the operating revenue and operating expenses of the T or C Water System for FY 2011/12 through FY 2019/20. As of December 2019, the water system generates revenue from a total of 43 governmental connections, 485 commercial connections, 1 industrial connection, and 3009 residential connections. As indicated in **Table 9**, from FY 2017/18 to FY 2018/19, the annual water system revenue was very consistent as were the annual operating expenses. In general, the T or C Water System generates adequate annual revenue to cover what is included in its current operating expenses.

Table 9: T or C Water System Five-Year Financial Data

	Item	2015-16	2016-17	2017-18	2018-19	2019-20	projection 2020-2021*
Operating Revenue	Revenue from Water Utility Service connections	$72,952	$1,006,193	$955,250	$945,330	$1,057,195	$1,404,617
	Revenue from Other Water System services	$0	$298	$0	$3,706	$0	$20,740
	TOTAL REVENUE	**$72,952**	**$1,006,491**	**$955,250**	**$949,036**	**$1,057,195**	**$1,425,357**
	Item	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**projection 2020-2021**
Operating Expenses	Salaries/Benefits	$242,237	$207,723	$281,860	$272,138	$277,130	$282,130
	Supplies	$14,746	$13,189	$18,126	$35,933	$24,700	$24,700
	Office	$76	$2,114	$1,812	$1,529	$3,500	$3,500
	Testing	$0	$0	$89	$3,743	$2,000	$2,000
	Repair/Maintenance	$104,081	$92,701	$59,214	$44,430	$91,000	$91,000
	Tax	$44,902	$42,302	$42,905	$42,587	$44,000	$44,000
	Utilities	$109,449	$99,672	$92,736	$133,268	$96,000	$96,000
	Professional Fees	$4,215	$12,950	$53,278	$30,434	$22,350	$22,350
	Equipment (Incl. Rental)	$3,426	$3,313	$3,593	$3,880	$3,000	$3,000
	Accounting	$37,691	$49,307	$51,792	$50,765	$58,958	$58,958
	Employee Training	$0	$0	$0	$4,564	$4,000	$4,000
	Non-Capital Equipment	$12,294	$12,676	$12,880	$13,632	$10,000	$4,000
	water Conservation	$715	$1,461	$1,385	$550	$4,000	$10,000
	Miscellaneous	$0	$0	$2,098	$0	$0	$0
	Capital outlay-Machinery & Equipment	$28,500	$0	$79,000	$48,938	$103,000	$85,820
	TOTAL OPERATING EXPENSES	**$602,332**	**$537,408**	**$700,768**	**$686,391**	**$743,638**	**$731,458**

Reconciled amount from T or C utilities department
**Projection 2020-2021 accounts new water rates effective as in July 1 2020*

3.3.5 Planned Capital Improvements

Other capital improvements the City of T or C plans to undergo include enhancements to the entire downtown area as described in the City of Truth or Consequences Downtown Master Plan. As the economy of T or C is driven primarily by tourism, recreation, and the business' which support the retirement communities, the upgrades set out by the master plan will create a more inviting and attractive destination for visitors as well as residents. Ensuring that the water system is upgraded prior to additional downtown improvements is vital.

3.3.6 Existing Debt

At present, the water system also has outstanding debt in the form of nine loans, which are shown below in **Table 10.** The total of the nine annual loan repayment amounts is approximately $520,281.

Table 10: T or C Existing Debt

Owed To	Purpose	Balance Owed	Maturity Date	Annual Payment	Annual Reserve	Outstanding Balance Sept 2020	Interest Rate
NMFA (TorC2)	Water Tank Loan	$1,841,089	2021	$120,260	N/A	$224,495	2.00%
NMFA TorC17/WTB-229)	Ground Storage	$256,000	2032	$13,138	N/A	$13,138	2.50%
NMFA (TorC18)	Ground Storage	$165,741	2032	$8,287	$8,200	$99,445	0.00%
NMFA (TorC19)	Water Rev Bonds (95,96,98)	$1,424,865	2033	$91,185	$91,500	$949,380	2.90%
NMFA (TorC22/WTB-292)	Water PER/AMP	$64,000	2033	$3,380	N/A	$43,185	0.00%
NMED Loan 95-16	Improvements to system	$504,483	2022	$33,909	N/A	$64,884	3.00%
NMFA DW-4794	High Risk Waterline Replacement	$620,543	2041	$31,866	N/A	$620,543	2.50%
CIF-4927	Water System PER	$9,000	2041	$450	N/A	$9,000	0.00%
NMFA (WPF-5089)	Booster System Improvements Loan	$264,155	2042	$13,208	N/A	$264,155	2.50%
USDA *	MSD Project	$5,487,000	2059	$204,598	$204,598	$5,487,000	2.13%
	TOTAL	**$10,636,876**		**$520,281**	**$304,298**		

**Loan to be closed in June 2021*

3.3.7 Water Connections

The below **Table 11** provides a tabulation of water connections for the fiscal year 2019/2020 as provided by the City of T or C's Billed Consumption reports.

Table 11: Number of Water Connections (FY 2018/2019)

T or C Water Connections	
Type	Connections
Residential	2769
Commercial	467
City	43
Industrial	1
Williamsburg Water Connection	
Type	Connections
Residential	240
Commercial	18
TOTAL	3538

3.3.8 Water/Energy/Waste Audits

Per the request from the Office of the State Engineer a water audit was necessary for the Water Conservation Plan Verification. An audit was performed on the water system providing 33-percent of losses in the existing water system for the years 2015 and 2016. In order to compare performance of previous years a water system a Mass Balance calculation of 2016-2018 was completed estimating an average of 38-percent of losses. Percent losses have increased during the past three years approximately 5-percent, this five percent could be a result of the poor conditions of the system.

4 NEED FOR PROJECT

4.1 Water System - Health, Sanitation, and Security

The need for the project is due to aging infrastructure inadequate pipe sizes to provide consistent water pressure and adequate fire flow throw-out the City along with addressing reasonable growth discussed within the following sections

4.1.1 Health, Sanitation, Security issues

The health and safety of the citizens of T or C is of great importance when considering future community growth and development. At present, the City Water System is not in compliance with the water quality regulations of the NMED Drinking Water Bureau and has nine compliance issues in recent years of 2018/2019 (See **Appendix 10**). All the critical components of the system responsible for the delivery of good quality, and properly disinfected water to consumers are currently in poor working condition but is being update in 2020 and have appropriate security (fences, lights, etc.).

As another means to protect the health and safety of the public, efforts should be made to ensure proper fire flow capacity in areas of the City that are planned to have new development redevelopment, or scheduled waterline replacement. Since the City is planning to redevelop critical areas in the very near future, the associated planned improvements to waterlines in these areas should be done in a manner to provide proper fire flow to protect the public.

The area on the west side of the City is fed by the Cemetery Road Tank that is prone to water line breaks when the tank is full. This situation produces a health and safety issues, as there is not a continuous supply capacity for on this specific area. Break on the pipes affects not only households but also critical facilities such as high school and hospitals.

During the year 2019, existing reports indicated 260 waterline breakages on the city's water system, most of which are located on the "East," "west," "Williamsburg," and "Downtown" areas of the city. These continuous breakages represent a health and sanitation issue within the city's residents due to water outages that usually range from 4-6 hours while the city crew makes the repairs. An average of 20 -30 residents are affected per each water line repair.

4.1.2 Aging Infrastructure

Aging water infrastructure is the main justification for this project. The condition of the aging infrastructure is corroborated by information provided to Wilson & Company from system operators, and the condition assessment as included in the Water System GIS Inventory database that contains records related to the distribution system. The City intends to redevelop a significant portion of the main transmission lines to provide accurate water distribution flow and prevent high pressures around the city. The development of the “System Performance Upgrade “area includes many planned improvements to infrastructure. Primary elements of infrastructure to be improved are waterlines, valves, fire hydrants, PRV’s, and improved redundancy of water supply to critical storage tanks.

Water system mass balance calculations from years 2016, 2017, 2018 and 2019 show loses of 25%, 26%, 32% and 28% respectively in the system. This can be attributed to water line breaks throughout the system. The high number of breaks results in emergency repairs and high maintenance costs. The increase consequence of failure also adds to the high cost.

Additionally, the existing reports for the year of 2019 shows the system had 260 water breakages attributed to high pressures in the system and mostly occurred in the “Williamsburg” area. Breakages with an average cost of $1,000 dollars per break including the cost of manpower, materials, fuel, other city resources, road repairs, equipment, and water/water loss. The total repair cost for the breaks in 2019 are broken down by; 1) manpower, materials, and fuel is 53% ($137,800.00) from the water utility budget. 2) other city resources and road repairs is 29% ($75,400.00) from other City budgets. 3) equipment and water/water loss is 18% ($46,800.00) which are inherent costs for perspective, such as and equipment hourly rate and the cost of water/water losses because of the break. These equipment and water/water loss cost do not come out of any of the city’s budget but are inherent cost of a waterline break. Thus, the actual cost to the City’s water operation and maintenance expenses has an approximate value of $137,800.00 in 2019, which came from salaries/benefits, repair/maintenance, and supplies.

The Municipal Airport Water System operated by the City does not have a chlorination system, the pressure tanks are not functioning, existing well head is not properly protected, and the historical buildings are in need improvements due its aging and poor condition.

4.1.3 Reasonable Growth

The water system needs to have adequate water supply to meet consumer demand and the ability to distribute safe water to all the end-users of the system. As a result, appropriate improvements to the overall system need to be made to ensure efficient system performance.

Table 12: 2009-2019 Annual Water System GPD/Connection

Year	System GPCD
2009	NA
2010	142
2011	170
2012	195
2013	205
2014	203
2015	189
2017	200
2019	212
Average	**190**

Anticipated future water demand on the overall water system can be estimated by combining historical water usage data, and population projections. As discussed in this report, the future population of the project planning area in 2040 is estimated to be 9,372. Evaluation of recent historical water system production records show a water demand of Gallons per day per connection (GPD) of 212.**Table 12**. A water audit completed in 2014 shows the monthly peaking factor to be 1.71.

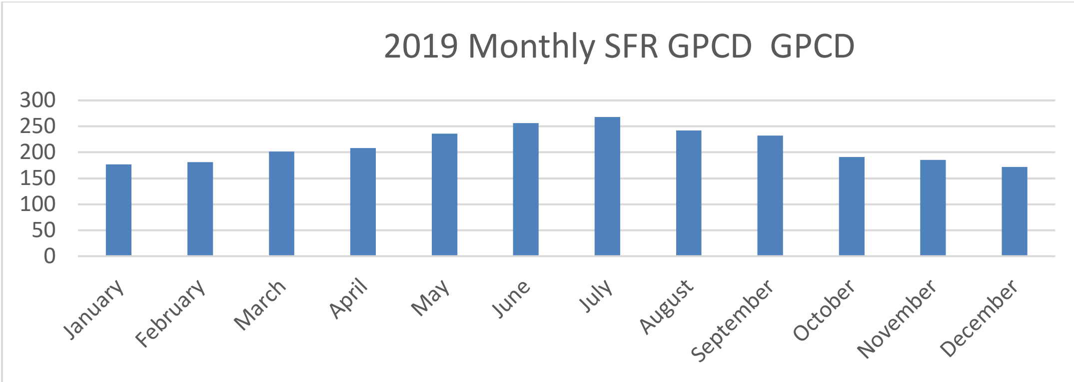


Figure 10: 2019 Monthly GPD/Connection

5 ALTERNATIVES CONSIDERED

5.1 Water System Description

Eleven alternatives are considered in this PER to address the aging infrastructure, material type, pressure problems, and water supply redundancy in the City's water system. There are four additional alternatives considered for the Municipal Airport Water system.

5.1.1 Design Criteria

To determine the best approach for water line rehabilitation, three methods were evaluated in this report. Although there are several methods of water line rehabilitation, several were determined to be infeasible and are not considered. The following methods were eliminated prior to full evaluation:

- Pipe Bursting: Pipe bursting option allows water main installation without roadway disruption, however the service interruption caused would be unacceptable and customers would be without water for long periods while the Contractor is, pipe bursting, resorting water service to the main and re-connecting service lines. Pipe Bursting Is more cost effective on transmission lines that run point to point with minimal connections but becomes expensive and evasive when considered on distribution lines. Pipe bursting works best when the existing line can be taken out of service with minimal impact.
- Horizontal Directional Drilling: Allows for the water main to be installed with minimal disruption to roadways, traffic, and other infrastructure. However, on lines with a large number of services it requires excavation to reconnect services and lateral line connections. Horizontal directional drilling is more cost effective on transmission lines that

run point to point with minimal connections but becomes expensive and evasive when considered on distribution lines.

5.1.2 System Design:

The City's water system has an urgent need for replacement of the critical water system components in within the City. Much of the City's water system infrastructure is beyond its useful life, increasing probability for failure.

The existing system does not have a preliminary model to determine if sufficient pressure is available within the project limits as defined in **Figure 7 and Figure 8.** It is recommended that a hydraulic water model be developed during the design stages of the project to estimate system's capacity and evaluate current and future new pipeline size requirements to meet the community needs.

5.1.3 Contingencies:

Contingencies have been set at 10% for the purposes of this project. Unknown subsurface conditions and shallow groundwater table can impact project costs and are not possible to estimate at this stage without geotechnical investigation. A portion of the replacement area are located near Rio Grande River. As underground conditions are better evaluated, the contingency will be lowered to match the amount of uncertainty.

5.1.4 Cost Evaluation Methodology:

The costs for system replacement are based on historical bid data received by Wilson & Company on projects of similar size, nature, and location. Costs for the system have been supplemented by information from vendors and equipment manufacturers. Dewatering was particularly difficult to evaluate for this PER, as underground conditions are not known. For the purposes if this report it is assumed that the first 2 feet of any trenching does not contain water, as the project is within previously excavated roadways. Below the first 2 feet, 60% of excavation in the "Downtown", southern portion of the "East" side, and "Williamsburg" is assumed to contain groundwater, and for the remaining areas Below the first 2 feet, 5% of excavation "North", "West" side

Operation and maintenance cost for the water line is not accounted for in this PER, as there is no additional cost that the City of T or C would realistically experience; new water lines will decrease O&M costs due to less frequent line breaks.

Costs for water losses are assumed to be equal to the cost per gallon that the City charges its customers. The cost charged to customers represents the amount that the City pays to get the water out of the ground and to the customer.

5.2 Water System Alternatives

The following Alternatives I thru VIII are considered in this report to address system issues with reliability, aging in the system, high pressure issues, and redundant water supply in the City's water system.

The alternatives IX thru XII additionally include the current Municipal Airport Water System infrastructure which is in poor conditions beyond its useful life and in need for replacement.

Alternative I: No action

Alternative II: (Full Replacement). Complete waterline replacement including "System Performance Upgrade", "North", "East", "West", "Downtown", and "Williamsburg" areas of the City, additional water supply wells near the cemetery road tanks in the northern portion of the city, and replacement of all water meters within the City (See **Figure 11**).

Alternative III: (System performance upgrade). Waterline replacement and installation of water meter pertaining to region characterized as "System Performance Upgrade" which entails the transmission water transmission lines throughout the city with the addition of a water supply wells near the northern tanks (See **Figure 12**).

Alternative III-A: (System High Pressure Solution). Waterline replacement and installation of water meter pertaining to the region characterized as "System High Pressure Solution", which entails the water transmission lines including pressure relief valves (PRV) throughout the city. (See **Figure 13**)

Alternative III-B: (System Redundancy and Hydraulic Performance Enhancements). Waterline replacement and installation of water meter pertaining to region characterized as "System Redundancy and Hydraulic Performance Enhancements", which entails the upsizing transmission water transmission lines located in the "East" and "Williamsburg" areas with the addition of a water supply wells near the northern tanks (See **Figure 14**).

Alternative III-C: (Additional Hydraulic Performance Enhancements). Waterline replacement and installation of water meter pertaining to region characterized as "Additional Hydraulic Performance Enhancements", which entails upsizing the remaining transmission water transmission lines located in the "East", "North" and "Williamsburg" areas of the city to meet the remaining requirements of alternative III "System Performance Upgrade".(See **Figure 15**).

Alternative IV: (North Side). Waterline replacement and installation of water meter pertaining to region characterized as "North Side" with an addition of water supply wells near the northern tanks. (See **Figure 16**).

Alternative V: (East Side). Waterline replacement and installation of water meter pertaining to the region characterized as "East Side" with the addition of water supply wells near the northern tanks (See **Figure 17**).

Alternative VI: (West Side). Waterline replacement and installation of water meter pertaining to the region characterized as "West Side" with the addition of water supply wells near the northern tanks (See **Figure 18**)

Alternative VII: (Downtown). Waterline replacement and installation of water meter pertaining to region characterized as "Downtown" with the addition of water supply wells near the northern tanks (See **Figure 19**).

Alternative VIII: (Williamsburg). Waterline replacement and installation of water meter pertaining to region characterized as "Williamsburg" with the addition of water supply wells near the northern tanks (See **Figure 20**)

Alternative IX: (Airport Improvements).Replacement of the complete water system with a new building that will enclose two 200-gallon pressure storage tanks, chlorination system, and control panel (See **Figure 21**).

Alternative X: (Airport Improvements without fire flow). Replacement of the complete water system with a new building that will enclose a chlorination system, variable speed booster pack and control panel with an additional 7.2-thousand-gallon steel storage tank. (See **Figure 22**)

Alternative XI: (Airport Improvements with fire flow).Replacement of complete water system with a new building that will enclose a chlorination system, variable speed booster pack, fire booster pump, and control panel with an additional 200 thousand gallon steel storage tank and an additional 8 Inch waterline replacement. (See **Figure 23**)

Alternative XII: (Airport Improvements). Replacement of the complete water system with a new building that will enclose one 30-gallon pressure storage tank, chlorination system, control panel and a 50 GPM variable speed pump.(See **Figure 24**).

Alternative I to VIII all consider replacement of service connections and distribution piping within the city area due to aging infrastructure, material, and pressure problems. Replacement for each alternative requires service line trenching. Alternatives IX to XII all consider replacement of the control, storage, and water system within the Municipal Airport due to aging infrastructure and pressure problems.

5.2.1 Alternative I: No Action

5.2.1.1 Description

This alternative involves taking no action and leaving the existing system as-is. The system will be patched/fixed as problems are encountered.

Leaving the system as-is creates potential for service disruptions for the existing residents when line breaks need to be repaired, potential for water contamination, as well as financial loss to the City due to line repairs. The estimated cost of water losses in this area has been included in the cost evaluation below.

As evaluated in the "existing facilities" portion of this report the existing system in in poor condition and in need of frequent repairs. As the city does not keep exact records of repair costs it is not easy to quantify the exact amount spent on repairs. Per the City approximately 260 system repairs are required yearly in this area. The per-repair cost has been estimated to be one thousand dollars. A yearly cost for repairs, inflated at 2.25% discount rate, has been used to calculate the present cost for maintaining the system within the 20-year evaluation period.

5.2.1.2 Water and Energy Efficiency

This alternative is the least water/energy efficient option of the eight considered in this report. As stated previously the amount of lost water in this portion of the network is estimated at ~120 Million gallons per year. This amount of water represents $211,032 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.1.3 Green Infrastructure

As the current system is in poor condition, 120 Million gallons of water are estimated to be lost per year in this portion of the system (See **Appendix 8**) as water conservation is of the highest priority in New Mexico due to limited water supply, it is essential that these large losses be minimized.

5.2.1.4 Land Requirements

No additional land requirements are necessary for this alternative, all existing infrastructure is to remain as-is.

5.2.1.5 Potential Construction Problems

Since the existing system has the potential for a line break at any time, the City must be ready to repair line breaks and orchestrate road closures at any time. This can lead to business disruptions, traffic disruptions, and other service issues that cannot be anticipated.

5.2.1.6 Resiliency and Operational Simplicity

This is the least operator friendly alternative, as it involves the potential for unscheduled line breakages. The system will become more unreliable as time passes and components surpass their operational life expectancy.

5.2.1.7 Cost Estimates

This alternative has no capital costs associated with it.

5.2.1.8 Alternative Pros/Cons

ADVANTAGES:

- This option has no capital cost

DISADVANTAGES:

- This option continues the safety issues (in the form of infiltration and lack of fire flow)
- This option continues to waste large amounts of water
- This option does not solve the high pressures that causes the aging infrastructure to break more often
- This option continues to create service outages for residents
- This option continues the constant line break repairs

5.2.1.9 Cost Summary

Table 13: Alternative I Cost Summary

Alternative I-No Action		
20 Yrs O&M PW	$	11,871,223
Construction Cost	$	-
Non-Construction Cost	$	-
Total	$	11,871,223

The annual 2020 Operation and maintenance is $743,638 see breakdown provided in **Appendix 5**

5.2.2 Alternative II: Complete Water System Replacement

5.2.2.1 Description

Alternative II involves replacing 57 percent of the existing waterlines within the city with new pipeline equal or less than 6 inches PVC C-900 DR-18. This alternative will replace 96.6 percent of pipe over 30 years old. All waterlines in this alternative are replaced via open trench by placing the new line and abandon in place the existing waterline except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information, upsizing the existing water line to a 6, 810, 12, and 14 inch will significantly increase available pressure in the city as well as provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12’ of pavement removal, and removal off any, sidewalk or curb and gutter as needed. If a water meter is found in the existing roadway and is to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW’s via bore and jack.

The proposed water well will be located on Cemetery Road**,** the system currently has six wells all of them located on the southern part of the City, and the current water system design uses two pumping stations to feed the water storage tanks on the north part of the city. A new well located on the north end of the City will provide reliable water production back up and prevent water outages, if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City’s existing wells fail due to age.

5.2.2.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the “Existing Facilities” portion of this report, it has been determined that most of the pipes within the City should be replaced in their entirety. **Figure 11** shows this alternative’s recommendations. Existing flow capacity has been determined to generally be not sufficient per pipe pressure fluctuation during peak flow periods as well as not meeting the fire flow requirement in multiple areas of the city. **Exhibit 110** in **Appendix 6** shows the complete system by pipe size. Increasing pipe size as needed within the neighborhoods is recommended at this time. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6-Inch or greater, dewatering will be necessary as described in the previous “Cost Evaluation Methodology” section via open trench.

Six additional Pressure Reducing Valves (PRV) are recommended to be installed within the system on the northern and south part of the city to avoid high pressure peaks which results in waterline breaks within the City’s neighborhoods. These new PRV’s will also allow the City to use the full volume of the Cemetery road tanks, which are currently operating at 50% so to minimize the high pressure in the west side area that cause a majority of the waterline breaks.

5.2.2.3 Replacement of City Water Meters

Due to aging inaccurate meter readings and manually reading record described in the “Existing Facilities” portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years, exceeding their useful life. This provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City’s billing system. The new meter shall be automatic radio read meters integrated into the city’s electrical billing system. This will reduce the manpower needed to reading the meters, which will reduce the labor cost on the water system.

5.2.2.4 Construction of Water Well Northern Area

Presently there is a dependence of Cook Street and Morgan Street Booster stations to provide water to the northern area of the City. Water production back up in the northern area of the city is non-existent making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells all of them located on the southern part of the City; most of fall past or are near their end of useful life. A new well located in the north will provide reliable water production back up and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable back up water supply to this area and the rest of the city if needed under emergency situation.

5.2.2.5 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump,the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 116 Million gallons per year. This amount of water represents $203,857 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.2.6 Green Infrastructure

This alternative will reduce water losses by approximately 116 Million gallons per year that occurs through line breaks within the current system, which is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.2.7 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.2.8 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road, Crossings will either require extensive closures, or more likely will require directional. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Dewatering quantities are another large potential concern for this alternative, a large proportion of these main transmission lines run parallel with the Rio Grande which indicate a shallow water table. Existing water levels on excavation trenches cannot be quantified until further examination. As explained in the “existing system” part of this report, waterlines replaced within the southern portion of the “East Side” and “Downtown” areas will have 60 percent dewatering of the trench in other areas of the city 5 percent dewatering will be assumed.

5.2.2.9 Resiliency and Operational Simplicity

The only regular maintenance items for this alternative are the new water well pumping station, and PRV‘s, which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.2.10 Alternative Pros/Cons

ADVANTAGES:

- This option fixes safety issues (in the form of infiltration and lack of fire flow)
- This option eliminates high pressures issues that caused the aging infrastructure to break more often
- This option conserves largest amounts of water
- This option eliminates service outages for residents
- This option improves the backup and redundancy of the water system
- This option improves approximately 97 percent of the aging water system

DISADVANTAGES:

- This option has the highest capital cost and it is out of the City's budget
- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option does will modify billing rates

5.2.2.11 Cost Summary

Table 14: Alternative II Cost Summary

Alternative II- Complete System		
20 Yrs O&M PW	$	9,325,812
Construction Cost	$	88,435,392
Non-Construction Cost	$	14,137,544
Total	$	111,898,748

The annual 2020 Operation and maintenance is $584,188. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4.**

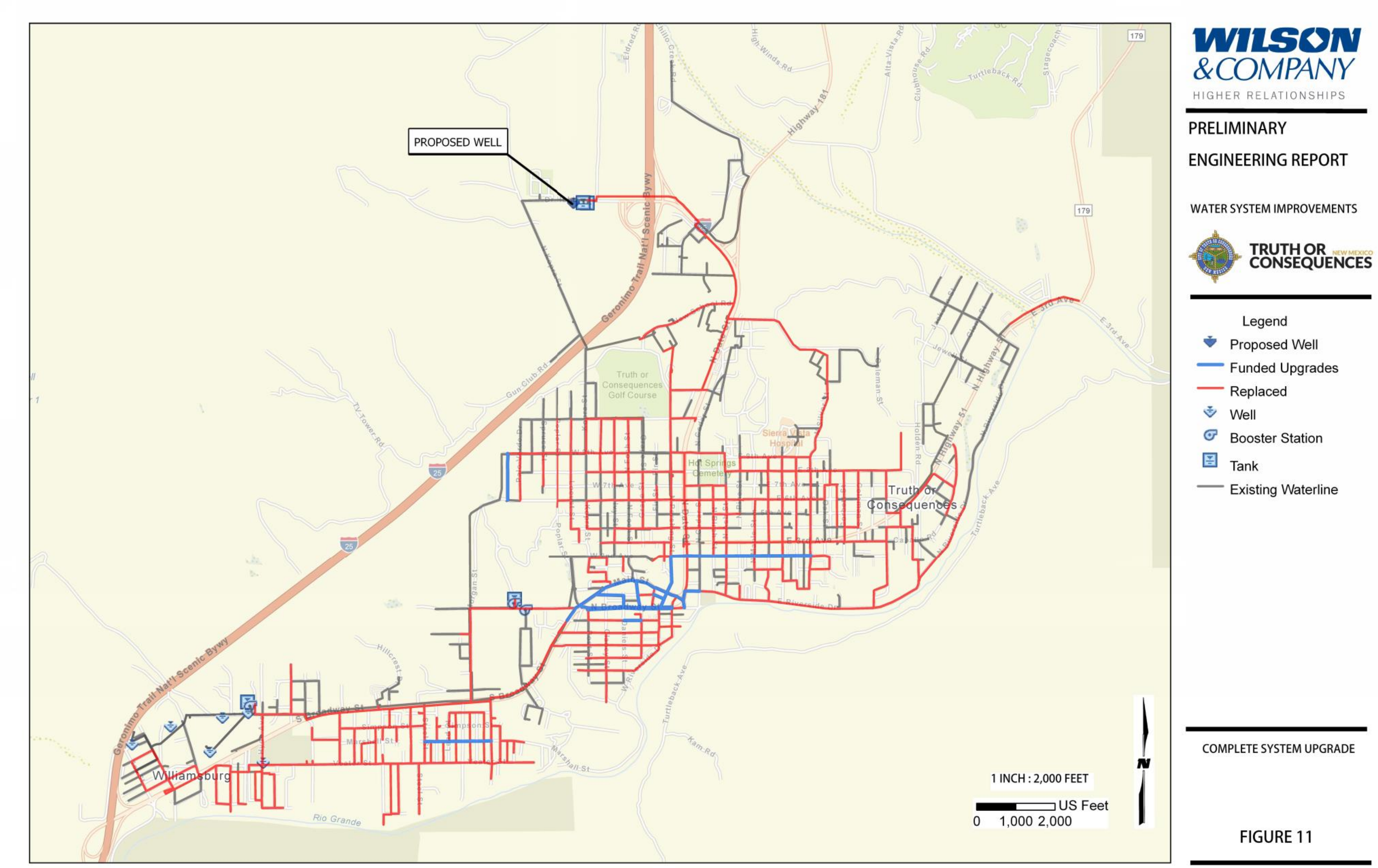


Figure 11: Alternative II Complete System upgrade

5.2.3 Alternative III: System Performance Upgrade

5.2.3.1 Description

Alternative III involves replacing 11.3 percent of the existing waterlines within the city with new pipeline equal to, or greater than, 6-inch PVC C-900 DR-18. This alternative will replace 37.8 percent of pipe this is over 30 years old. This replacement also upgrades around 15 percent of the Asbestos Cement (AC), Cast iron (CI), and Ductile Iron (DI) material in the existing system. All waterlines in this alternative are replaced via open trench by placing the new line parallel to the existing and abandoning the existing water line in place except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing water line to 8, 10, 12, and 14 inch will significantly adjust available pressure in the City, as well as provide for better fire flow capacity important areas such as the City's hospital and high school. This alternative significantly increases available pressure in the City and provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal and removal for any sidewalk or curb and gutter as needed. If a water meter is found in the existing roadway it is to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via jack and bore construction methods.

The proposed water well will be located on Cemetery Road. The system currently has six wells, all of them located on the south part of the city near "Williamsburg". Additionally, the existing water system uses two pumping stations to feed the water storage tanks on the north part of the city. A new well located in the north will provide reliable water production back up and prevent water outages if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City's existing wells fail due to their age.

5.2.3.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report, infrastructure defined as "System Performance Upgrade" (See **Figure 12**) should be replaced. Since these particular waterlines are also known as the main transmission lines, their primary purpose is to ensure that water transmission runs from Cook Street Booster station to Morgan Street Booster station to finally provide water flow to multiple areas of the city. By replacing these particular lines, the water system will reduce the 30 psi pressure fluctuation in the system, mostly in the "Williamsburg" and "East" areas.

The existing flow capacity has been determined to be insufficient due to several breakages reports and the inability to meet fire flow requirement. All pipes are assumed to be replaced with PVC C-900 DR18, sizes 6 Inch greater. Dewatering of groundwater is a consideration in this alternative as described in the previous “Cost Evaluation Methodology” section via open trench.

Six Additional Pressure Reducing Valves (PRV) are recommended to be installed within the system on the northern and south parts of the city. This is to avoid high pressure peaks which results in water breaks within the city’s neighborhoods.

5.2.3.3 Replacement of City Water Meters

Due to aging, inaccurate meter readings and manually reading record described in the “Existing Facilities” portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years exceeding their useful life. This provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City’s billing system. The new meters shall be automatic radio read meters integrated into the city’s electrical billing system. This will reduce the manpower needed to read the meters, which will reduce the labor cost on the system.

5.2.3.4 Construction of Water Well Northern Area

Presently there is a dependence on the Cook Street and Morgan Street Booster stations to provide water to the northern area of the City. Back up water production in the northern area of the City is non-existent, making the distribution system open for failure if any of the booster stations don’t work as desired. The system has six wells all of them located on the southern part of the city, most of which fall on are near their end of useful life. A new well located in the north will provide reliable backup water production and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable backup water supply to this area and the rest of the city if needed under an emergency situation.

5.2.3.5 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 45 Million gallons per year. This amount of water represents $79,770 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.3.6 Green Infrastructure

This alternative will reduce water losses by approximately 45 Million gallons per year due to line breaks, which is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.3.7 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued, the owner of this land will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.3.8 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road, Crossings will either require extensive closures, or more likely will require directional drilling. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Dewatering quantities are another large potential concern for this alternative. A large proportion of these main transmission’s lines run parallel with the Rio Grande, which indicate a shallow water table. Existing water levels in excavation trenches cannot be quantified until further examination. As explained in the “existing system” part of this report waterlines replaced within the southern portion of the “East Side” and “Downtown” areas will have 60 percent dewatering of the trench. In other areas of the city 5 percent dewatering will be assumed.

5.2.3.9 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative are the new water well pump, and the PRV‘s which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.3.10 Alternative Pros/Cons

ADVANTAGES:

- This option fixes a majority of the safety issues (in the form of infiltration and lack of fire flow)
- This option eliminates high pressures issues that caused the aging infrastructure to break more often
- This option conserves a large percentage of water, close to half the water losses
- This option extremely reduces service outages for residents
- This option improves the backup and redundancy to the water system
- This option improves approximately 13 percent of the existing water system
- This option improves approximately 38 percent of the aging water system
- This option doesn't produce any changes on billing charges

DISADVANTAGES:

- This option doesn't have a capital cost that is within the City's budget
- This option has a large dewatering cost for the areas near the Rio Grande
- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone

5.2.3.11 Cost Summary

Table 15: Alternative III Cost Summary

Alternative III- System Performance Update	
20 Yrs O&M PW	$10,989,446
Construction Cost	$21,701,685
Non-Construction Cost	$4,093,148
Total	$36,784,279

The annual 2020 Operation and maintenance is $688,402. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4.**

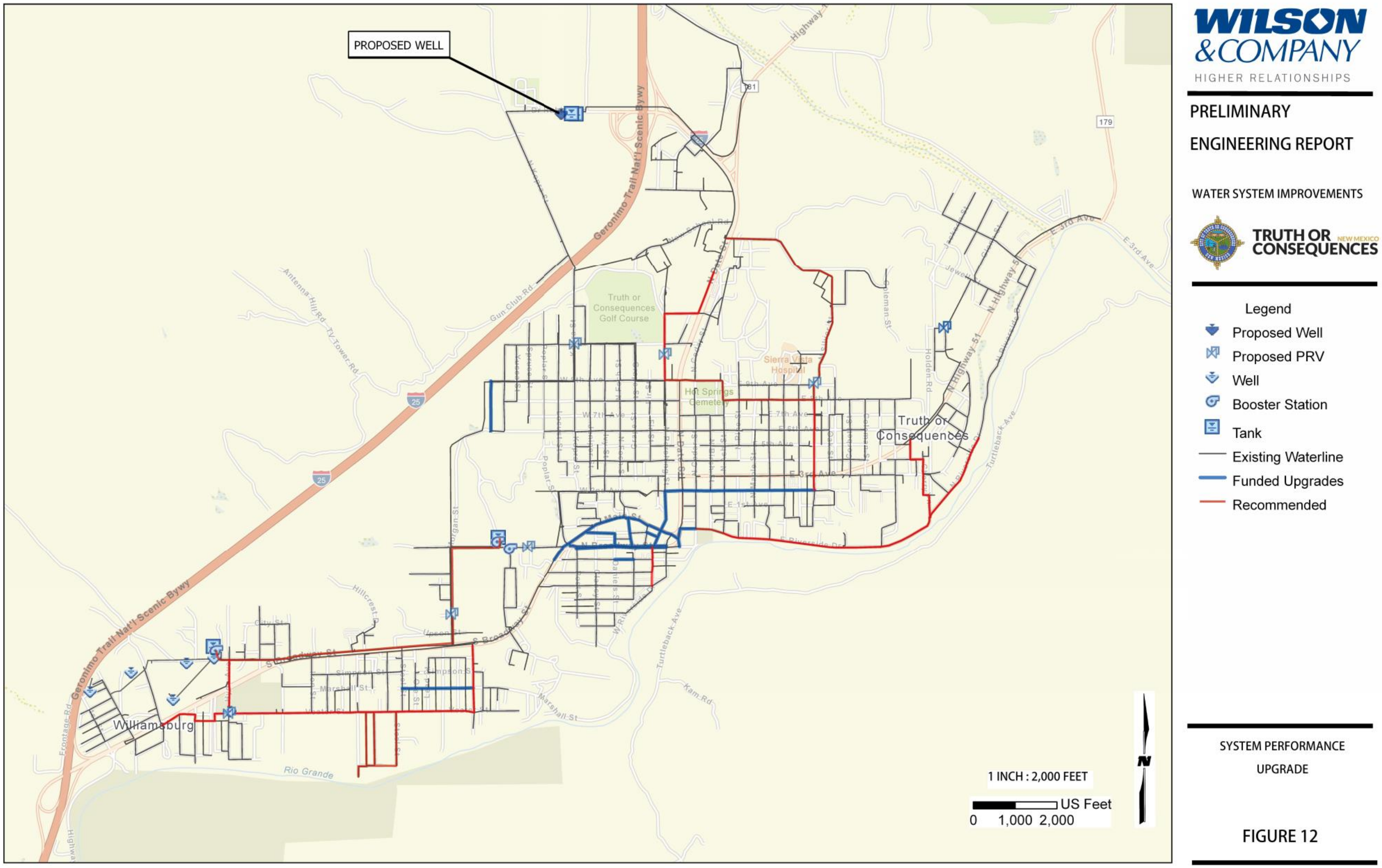


Figure 12: Alternative III System Performance Upgrade

5.2.4 Alternative III-A: System High Pressure Solution

5.2.4.1 Description

Alternative III-A addresses the high-pressure issues in the “West” and “Williamsburg” areas by replacing the Cook St. to Morgan St. main transmission line and installing main lines PRV to eliminate high pressures issues within the City’s water system. This involves replacing 6.2 percent of the existing waterlines within the city that are 6 inches or less diameter, with new pipeline PVC C-900 DR -18 pipelines 6 inches or greater. This alternative will replace 26.7 percent of pipe over 30 years old, this replacement also upgrades around 16.9 percent of the Asbestos Cement (AC), Cast iron (CI), and Ductile Iron (DI) material in the existing system. All waterlines in this alternative are replaced via open trench by placing the new line parallel to the existing and abandoning the existing waterline in place; except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information, upsizing the existing water line to an6, 8, 10, and 12, inch will significantly adjust available pressure in the City as well as provide for better fire flow capacity including important areas such as the City’s hospital and a City’s high school. This alternative significantly increases available pressure in the City and provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12’ of pavement removal, and removal of any side walk or, curb and gutter if a water meter is found in the existing roadway and needs to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW’s via jack and bore construction methods.

5.2.4.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the “Existing Facilities” portion of this report, infrastructure defined as “System High Pressure Solutions” (**Figure 13**) should be replaced. Since these four particular waterlines are also known as the main transmission lines, their primary purpose is to ensure that water transmission runs from Cook Street Booster station to Morgan Street Booster station to finally provide water flow to multiple areas of the city. By replacing these particular lines, the water system will reduce the 30 psi pressure fluctuation in the system, mostly in the “Williamsburg” and “East” areas

Waterlines replacements locating on the “North” area feeding the City’s high school and hospital, Upsizing a main cast iron waterline located on portions of East 8th and East 9th Streets in the “East” side of the city, and additionally replacing and looping an area in the “Williamsburg” area will also prevent pressure fluctuation in the system and mostly in the “Williamsburg” and “East” areas and will ensure water quality for the “Williamsburg” area.

The existing flow capacity has been determined to be insufficient due to several breakages reports and the inability to meet fire flow requirement. All pipes are assumed to be replaced with PVC C-900 DR18, sizes with 6 Inch or greater. Dewatering of groundwater is a consideration in this alternative as described in the previous “Cost Evaluation Methodology” section via open trench.

Six Additional Pressure Reducing Valves (PRV) are recommended to be installed within system on the northern and south part of the city. This is to avoid high pressure peaks which results in water breaks within the city’s neighborhoods.

5.2.4.3 Replacement of City Water Meters

Due to aging, inaccurate meter readings and manually reading record described in the “Existing Facilities” portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years, exceeding their useful life. This provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City’s billing system. The new meters shall be automatic radio read meters integrated into the city’s electrical billing system. This will reduce the manpower needed to read the meters, which will reduce the labor cost on the system.

5.2.4.4 Water and Energy Efficiency

The amount of lost water in this portion of the system is estimated at ~ 32 Million gallons per year. This amount of water represents $56,346 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.4.5 Green Infrastructure

This alternative will reduce water losses by approximately 32 Million gallons per year due to line breaks, which is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.4.6 Land Requirements

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.4.7 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road. Crossings will either require extensive closures, or more likely, will require directional drilling. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Dewatering quantities are another large potential concern for this alternative. A large proportion of these main transmission's lines run parallel with the Rio Grande, which indicate a shallow water table. Existing water levels in excavation trenches cannot be quantified until further examination. As explained in the "existing system" part of this report, waterlines replaced within the southern portion of the "East Side"" and "Williamsburg" areas will have 60 percent dewatering of the trench. In other areas of the city 5 percent dewatering will be assumed.

5.2.4.8 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative are the PRV 's which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.4.9 Alternative Pros/Cons

ADVANTAGES:

- This option has a capital cost that is within the City's budget
- This option fixes a large percentage of the safety issues (in the form of infiltration and lack of fire flow)
- This option eliminates high pressures issues that caused the aging infrastructure to break more often.
- This option conserves a large percentage of water, close to a third of the water losses
- This option extremely reduces service outages for residents
- This option improves approximately 6.2 percent of the existing water system
- This option improves approximately 27 percent of the aging water system
- This option doesn't produce any changes on billing charges

DISADVANTAGES:

- This option has a large dewatering cost for the "East" and "Williamsburg" areas near the Rio Grande
- This option requires a large amount of NMDOT crossing permits
- This option doesn't improve the backup and redundancy to the water system

5.2.4.10 Cost Summary

Table 16: Alternative III-A Cost Summary

Alternative III A- System High Pressure Solution	
20 Yrs O&M PW	$11,115,798
Construction Cost	$6,208,432
Non-Construction Cost	$1,321,898
Total	$18,646,128

The annual 2020 Operation and maintenance is $696,317. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4.**

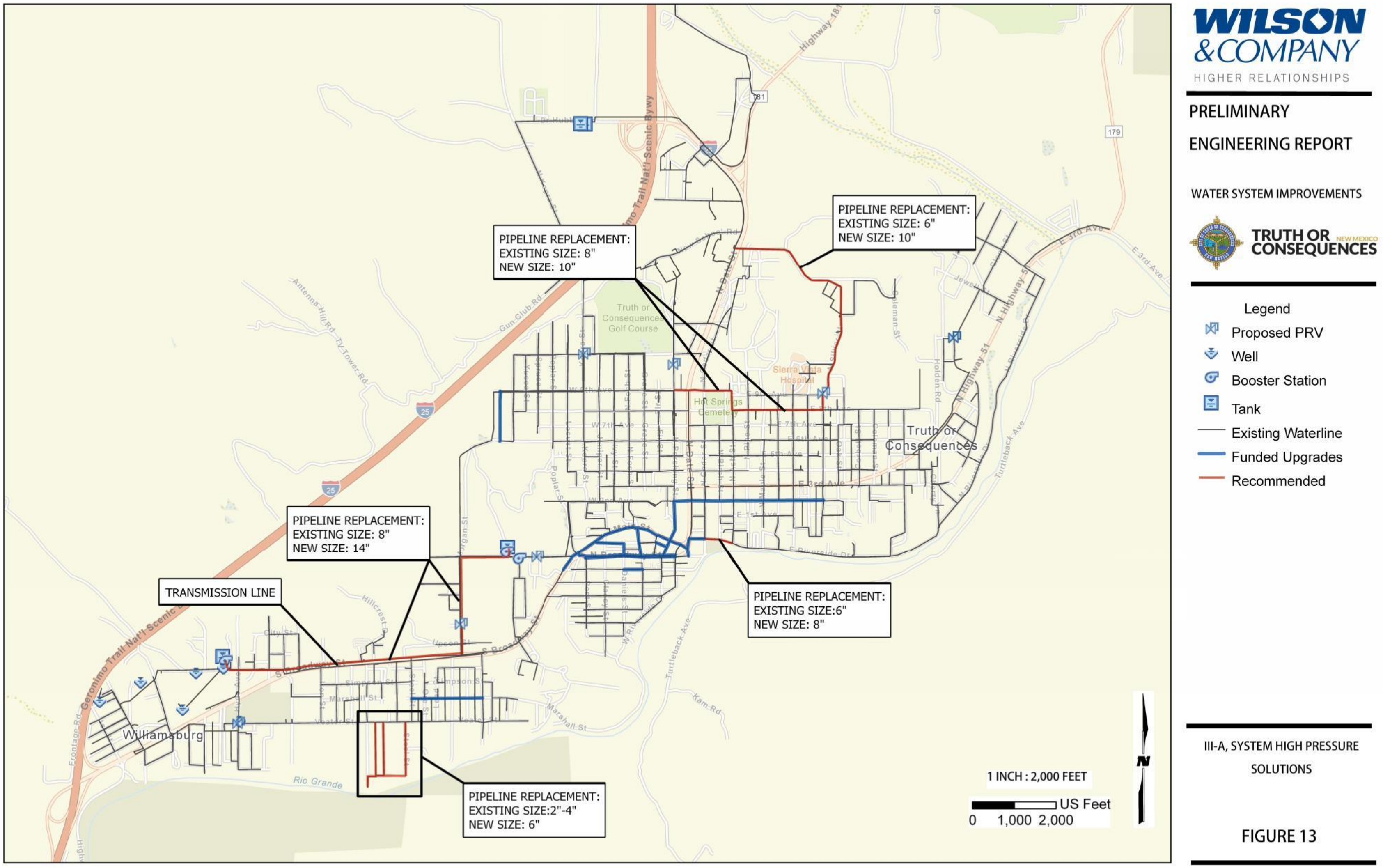


Figure 13: III-A System High Pressure Solutions

5.2.5 Alternative III-B: System Redundancy and Hydraulic Performance Enhancements

5.2.5.1 Description

Alternative III-B improves the system hydraulics by replacing and upgrading main distribution lines to increase the efficiency of the water distribution throughout the City's. This involves replacing 3.6 percent of the existing waterlines within the city with new pipeline equal to or greater than, 6-inch PVC C-900 DR-18. This alternative will replace 6.3percent of pipe over 30 years old, this replacement also upgrades around 4.7 percent of the Asbestos Cement (AC), Cast iron (CI), and Ductile Iron (DI) materials in the existing system. All waterlines in this alternative are replaced via open trench by placing the new line parallel to the existing and abandoning the existing water line in place except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing water line to an 8, and 10 inch will significantly adjust available pressure in the City as well as provide for better fire flow capacity throughout the City. This alternative significantly increases available pressure in the City and provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal, and removal for any side walk and curb and gutter if a water meter is found in the existing roadway it is to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via jack and bore construction methods.

The proposed water well will be located on Cemetery Road. The system currently has six wells all of them located on the south part of the city near "Williamsburg". Additionally, the existing water system uses two pumping stations to feed the water storage tanks on the north part of the city. A new well located in the north will provide reliable water production back up and prevent water outages if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City's existing wells fail due to their age.

5.2.5.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report, infrastructure defined as "System Redundancy and Hydraulic Performance Enhancements" (See **Figure 14**) should be replaced. Since these particular waterlines located in the "East" and "Williamsburg" areas will continue to help with pressure issues and improving fire flow requirements throughout the city,.

The existing flow capacity has been determined to be insufficient due to several breakage reports and the inability to meet fire flow requirement. All pipes are assumed to be replaced with PVC C-

900 DR18, sizes 6 Inch or greater. Dewatering of groundwater is a consideration in this alternative as described in the previous “Cost Evaluation Methodology” section via open trench.

5.2.5.3 Replacement of City Water Meters

Due to aging, inaccurate meter readings and manually reading record described in the “Existing Facilities” portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years, exceeding their useful life. This provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City’s billing system. The new meter shall be automatic radio read meters integrated into the city’s electrical billing system. This will reduce the manpower for reading the meters manually, which reduce the labor cost on the system.

5.2.5.4 Construction of Water Well Northern Area

Presently there is a dependence on the Cook Street and Morgan Street Booster stations to provide water to the northern area of the City. Back up water production in the northern area of the City is non-existent making the distribution system open for failure if any of the booster stations don’t work as desired. The system has six wells, all of them located on the southern part of the city, most of which fall on are near their end of useful life. A new well located on the north will provide reliable backup water production and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable backup water supply to this area and the rest of the city if needed under an emergency situation.

5.2.5.5 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 7 Million gallons per year. This amount of water represents $13,295 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.5.6 Green Infrastructure

This alternative will reduce water losses by approximately 7Million gallons per year due to line breaks, which is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.5.7 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner of this land will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.5.8 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road. Crossings will either require extensive closures, or more likely will require directional drilling. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Dewatering quantities are another large potential concern for this alternative. A large proportion of these main transmissions lines run parallel with the Rio Grande which indicate a shallow water table. Existing water levels in excavation trenches cannot be quantified until further examination. As explained in the “existing system” part of this report, waterlines replaced within the southern portion of the “East Side” area will have 60 percent dewatering of the trench. In areas of the city 5 percent dewatering will be assumed.

5.2.5.9 Resiliency and Operational Simplicity

The only regular maintenance items for this alternative are the new water well pump which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.5.10 Alternative Pros/Cons

ADVANTAGES:

- This option has a capital cost that is within the City's budget
- This option fixes a majority of the safety issues (in the form of infiltration and lack of fire flow)
- This option continues to eliminate high pressures issues
- This option supplements the conservation of a large percentage of water, close to half water losses
- This option reduces service outages for residents, due to the supply and distribution system redundancy
- This option improves the backup and redundancy to the water system
- This option improves approximately 4 percent of the existing water system
- This option improves approximately 4.7 percent of the aging water system
- This option doesn't produce any changes on billing charges

DISADVANTAGES:

- This option has a large dewatering cost for the "East" area near the Rio Grande
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone

5.2.5.11 Cost Summary

Table 17: Alternative III B Cost Summary

Alternative III B- System Redundancy and Hydraulic Performance Enhancements	
20 Yrs O&M PW	$11,880,678
Construction Cost	$8,253,588
Non-Construction Cost	$1,590,443
Total	$21,724,709

The annual 2020 Operation and maintenance is $744,230. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

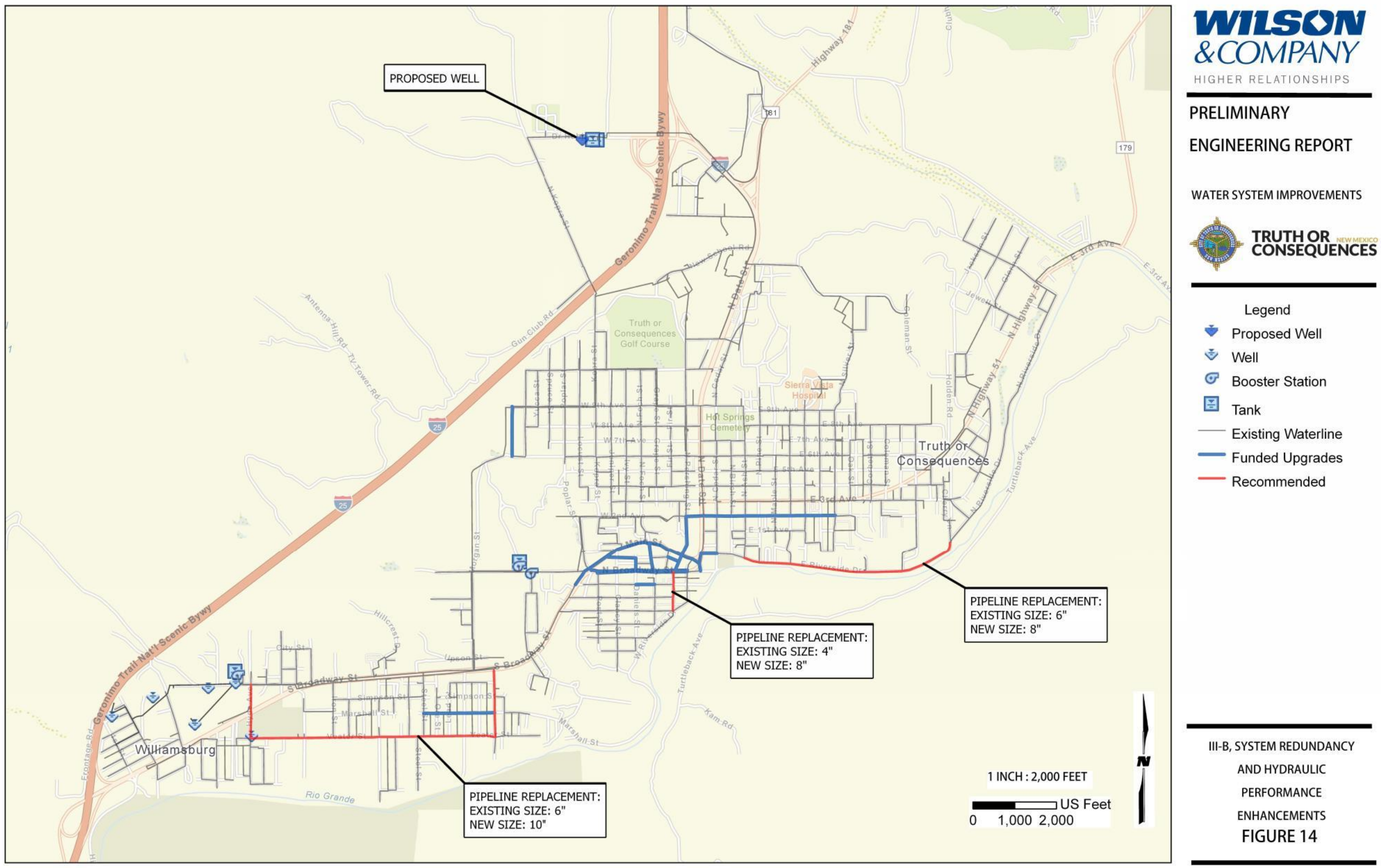


Figure 14: III-B System Redundancy and Hydraulic Enhancements

5.2.6 Alternative III-C: Additional Hydraulic Performance Enhancements

5.2.6.1 Description

Alternative III-C completes the "System Performance Upgrade" alternative to ensure proper water distribution and pressure throughout the City's water system. This involves replacing 2.9 percent of the existing waterlines within the city with new pipeline equal to or greater than 6-inch PVC C-900 DR-18. This alternative will replace 5.2 percent of pipe this is over 30 years old. This replacement also upgrades around 2.9 percent of the Asbestos Cement (AC), Cast iron (CI), and Ductile Iron (DI) material in the existing system. All waterlines in this alternative are replaced via open trench by placing the new line parallel to the existing and abandoning the existing water line in place except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing water line to an 8, 10, and 12 inch will significantly adjust available pressure in the City, as well as provide for better fire flow capacity throughout the City. This alternative significantly increases available pressure in the City and provides for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal, and removal for any sidewalk or curb and gutter as needed. If a water meter is found in the existing roadway it is to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via jack and bore construction methods.

5.2.6.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report, infrastructure defined as "Additional Hydraulic Performance Enhancements" (See **Figure 15**) should be replaced Since these particular waterlines located in the "East", "Williamsburg" and " North" areas will complete to help with pressure issues and improving fire flow requirements throughout the city.

The existing flow capacity has been determined to be insufficient due to several breakage reports and the inability to meet fire flow requirement. All pipes are assumed to be replaced with PVC C-900 DR18, sizes with 6 Inch or greater. Dewatering of groundwater is a consideration in this alternative as described in the previous "Cost Evaluation Methodology" section via open trench.

5.2.6.3 Replacement of City Water Meters

Due to aging, inaccurate meter readings and manually reading record described in the "Existing Facilities" portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years exceeding their useful life. This provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City's billing system. The new meters shall be automatic radio read meters integrated into the city's electrical billing system. This will reduce the manpower needed to read the meters, which will reduce the labor cost on the system.

5.2.6.4 Water and Energy Efficiency

The amount of lost water in this portion of the system is estimated at ~ 6 Million gallons per year. This amount of water represents $10,974 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.6.5 Green Infrastructure

This alternative will reduce water losses by approximately 6 Million gallons per year due to line breaks, which is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.6.6 Land Requirements

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.6.7 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road, which will either require extensive closures, or more likely, will require directional drilling. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Dewatering quantities are another large potential concern for this alternative. A large proportion of these main transmission's lines run parallel with the Rio Grande which indicate a shallow water table. Existing water levels in excavation trenches cannot be quantified until further examination. As explained in the "existing system" part of this report waterlines replaced within the southern portion of the "East Side" area will have a 60 percent dewatering of the trench. In other areas of the city 5 percent dewatering will be assumed.

5.2.6.8 Resiliency and Operational Simplicity

No additional Maintenance item are added in this alternative. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.6.9 Alternative Pros/Cons

ADVANTAGES:

- This option has a capital cost that is within the City's budget
- This option fixes a majority of the safety issues (in the form of infiltration and lack of fire flow)
- This option intensifies the elimination of pressures issues.
- This option concludes the conservation of a large percentage of water, close to half water losses
- This option continues to reduce service outages for residents, due to distribution system redundancy
- This option improves approximately 3 percent of the existing water system
- This option improves approximately 3 percent of the aging water system
- This option doesn't produce any changes on billing charges

DISADVANTAGES:

- This option has a large dewatering cost for the "East" area near the Rio Grande
- This option requires a significant amount of NMDOT crossing permits

5.2.6.10 Cost Summary

Table 18: Alternative III C Cost Summary

Alternative III C- Additional Hydraulic Performance Enhancements	
20 Yrs O&M PW	$11,724,099
Construction Cost	$5,280,984
Non-Construction Cost	$989,461
Total	$17,994,544

The annual 2020 Operation and maintenance is $734,422. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4.**

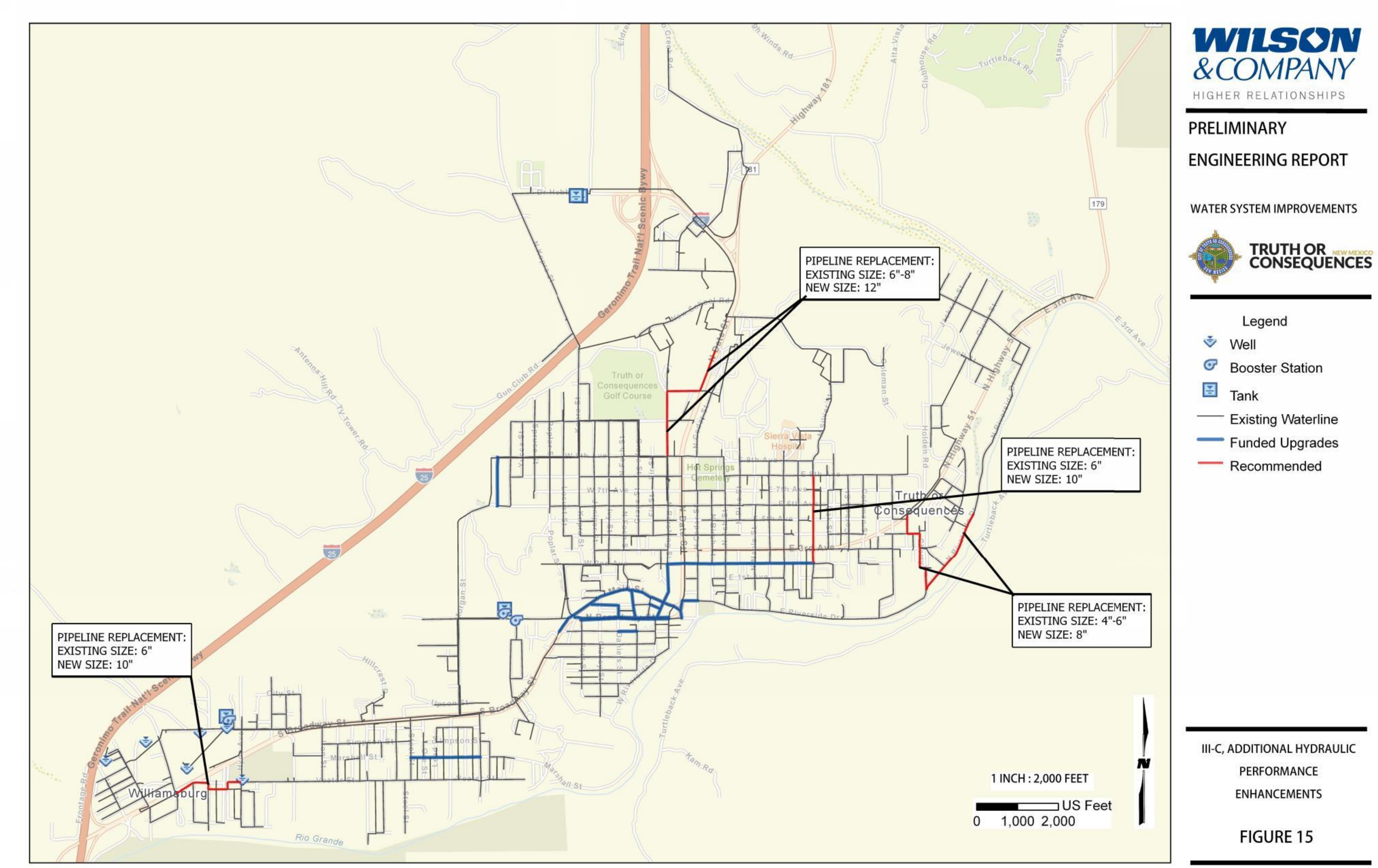


Figure 15: III-C Additional Hydraulic Performance Enhancements

5.2.7 Alternative IV: North Side Replacement

5.2.7.1 Description

Alternative IV involves replacing 2.9 percent of the existing waterlines within the city that are 6 inches or less in diameter, with the new PVC C-900 DR-18. This alternative will replace 5.1 percent of pipe over 30 years old. All waterlines in this alternative are replaced via open trench by constructing the new waterline parallel to the existing, then abandoning the existing waterline in place; except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information, by upsizing the existing water line to 6, 8, 12, and 14-inch diameter. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal and removal for sidewalk or, curb and gutter as needed. If an existing water meter is found in the existing road, it is to be replaced. This alternative includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via jack and bore construction methods.

The proposed water well will be located on Cemetery Road, the system currently has six wells, all of them located on the southern part of the City. The current water system uses two pumping stations to feed the water storage tanks on the north part of the City. A new well located in the north will provide reliable back up water production back up and prevent water outages if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City's existing wells finally fail due to their age.

5.2.7.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" the portion of this report defined as "North Side" (See **Figure 16**) should be replaced. Existing flow capacity has been determined to be generally insufficient, per pipe pressure fluctuation during peak flow periods and not meeting fire flow requirements on multiple areas of the city. Pipe size increases within the neighborhoods are recommended to address flow and pressure issues. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6 Inch or greater. Dewatering as described in the previous "Cost Evaluation Methodology" section via open trench.

5.2.7.3 Replacement of City Water Meters

Due to aging meters, inaccurate meter readings, and manually reading record described in the "Existing Facilities" portion of this report, it has been determined that all of the water meters should be replaced in their entirely. Many of the water meters are currently older than 40 years exceeding their useful life, older meters may be providing incorrect data regarding water usage, and water loss percentages and also having a negative impact on the City's billing system.

5.2.7.4 Construction of Water Well Northern Area

Presently there is a dependence on Cook Street and Morgan Street Booster stations to provide, a backup source of water in the northern area of the City. Backup water production in the northern area of the City is non-existent, making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells, all of them located in the southern part of the City, most of which are near their end of useful life. A new well located in the north will provide reliable backup water production and prevent water outages

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable back up water supply to this area and the rest of the city if needed under an emergency situation.

5.2.7.5 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 6 Million gallons per year. This amount of water represents $10,763 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.7.6 Green Infrastructure

This alternative will reduce water losses by approximately 6 Million gallons per year due to 15 within this area reported by the city officials. This is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.7.7 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.7.8 Potential Construction Problems

The largest potential for construction problems in this alternative lies in the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within n NMDOT owned road. Construction will either require extensive closures, or more likely directional drilling for the new service lines. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Groundwater dewatering is another large potential concern for this alternative. A large portion of these main transmission lines run parallel with the Rio Grande, which contributes to a shallow groundwater table in this area. This alternative will assume 5 percent dewatering in areas that are not near the Rio Grande.

5.2.7.9 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative is the new water well pump, which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.7.10 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues on the North Side (in the form of leakage and lack of fire flow)
- This option eliminates high pressures issues that caused the aging infrastructure to break more often
- This option improves water supply to the water system
- This option improves approximately 3 percent of the existing water system
- This option improves approximately 5 percent of the aging water system

DISADVANTAGES:

- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option doesn’t reduce a large amount of water losses
- This option doesn’t reduce pressure peaks in the system that causes the water breaks
- This option doesn’t prevent service outages for residents

5.2.7.11 Cost Summary

Table 19: Alternative IV Cost Summary

Alternative IV- North Side	
20 Yrs O&M PW	$11,914,630
Construction Cost	$7,372,834
Non-Construction Cost	$1,499,712
Total	$20,787,176

The annual 2020 Operation and maintenance is $746,357. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

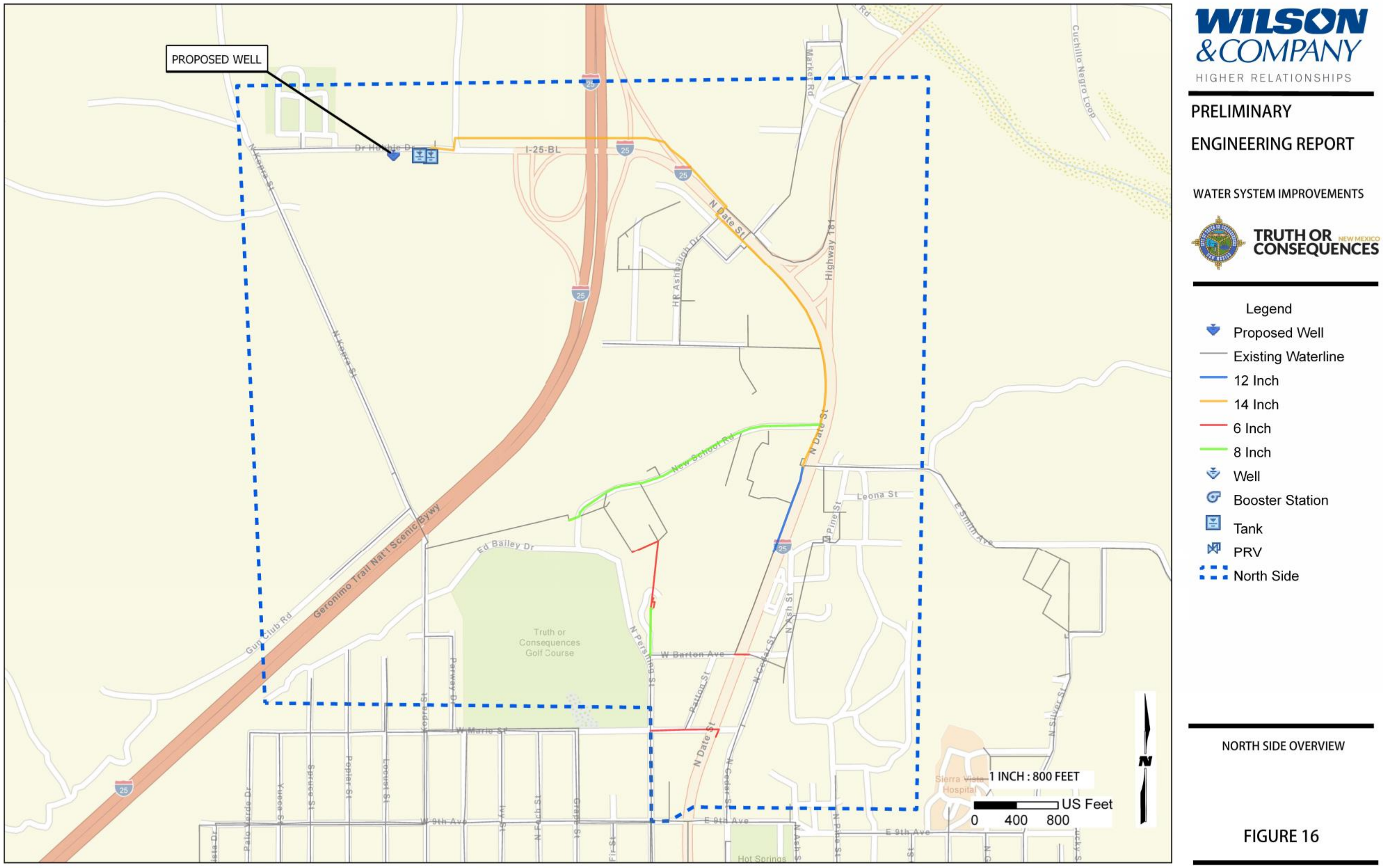


Figure 16: Alternative IV North Side

5.2.8 Alternative V: East Side Replacement

5.2.8.1 Description

Alternative V involves replacing 13.1 percent of the existing waterlines within the City, that are equal or less than 6 inch, with new PVC C-900 DR-18. This alternative will replace 23.2 percent of pipe that is over 30 years old. All waterlines in this alternative are replaced via open trench by placing the new line parallel to the existing and abandoning the existing waterline in place; except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing water line to a 6, and 8-inch diameter will significantly adjust available pressure in the east side of the city as well as provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal, and an additional removal for any sidewalk or curb and gutter as needed. If a water meter is to be found in the existing road, it will be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via jack and bore.

The proposed water well will be located on Cemetery Road. The system currently has six wells all of them located on the southern part of the city. Additionally. The current water system uses two pumping stations to fill the water storage tanks in the north part of the City. A new well located in the north will provide reliable backup water production and prevent water outages if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City's existing wells fail due to their age.

5.2.8.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report defined as "East Side" (See **Figure 17**) should be replaced. Existing flow capacity has been determined to be insufficient due to pressure fluctuation during peak flow periods. The available fire flow does not meet NFPA fire flow requirements on multiple areas of the city. Increasing the pipe diameter within the neighborhoods is recommended at this time. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6 Inch or greater. Dewatering required as described in the previous "Cost Evaluation Methodology" section via open trench.

5.2.8.3 Replacement of City Water Meters

Due to aging meters that may be inaccurate and/or require manually reading described in the "Existing Facilities" portion of this report, it is been recommended that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years and exceed their expected useful life, which provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City's billing system.

5.2.8.4 Construction of Water Well Northern Area

Presently there is a dependence/reliability issue from the Cook Street and Morgan Street Booster stations to provide, to the northern area of the City. Water supply redundant in the northern area of the City is non-existent making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells all of them located on the southern part of the City. Most of the wells are past, or near their end of useful life. A new well located in the northern area will provide reliable water supply to the Cemetery Tanks, prevent water outages and provide a back-up supply for the rest of the City under an emergency situation.

5.2.8.5 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 27 Million gallons per year. This amount of water represents $48,875 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.8.6 Green Infrastructure

This alternative will reduce water losses by approximately 27 Million gallons per year due to 90 within this area reported by the city officials. This is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.8.7 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.8.8 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 which will require service lines crossing all lanes within an NMDOT owned road. This, will either require extensive closures, or more likely directional drilling for the new service lines. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Groundwater dewatering is another large potential concern for this alternative. A large proportion of these main transmissions lines run parallel with the Rio Grande, which is expected to have a shallow groundwater table. However, existing water levels on excavation trenches cannot be quantified until further exploratory borings are conducted as part of the design effort. As explained in the "existing system" part of this report waterlines replaced within the southern-most portion of the East Side Area will require an estimated 60 percent dewatering of the construction trench. In other areas a 5 percent dewatering will be assumed.

5.2.8.9 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative is the new water well house, which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.8.10 Alternative Pros/Cons

ADVANTAGES:

- This option has a capital cost that is within the City's budget
- This option fixes safety issues on the East Side (in the form of leakage and lack of fire flow)
- This option improves water supply to the water system
- This option improves approximately 13 percent of the existing water system
- This option improves approximately 23 percent of the aging water system

DISADVANTAGES:

- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option doesn't reduce a large amount of water losses
- This option doesn't reduce pressure peaks in the system that causes the water breaks
- This option doesn't prevent service outages for residents

This option has a high dewatering cost for the areas near the Rio Grande

5.2.8.11 Cost Summary

Table 20: Alternative V Cost Summary

Alternative V- East Side	
20 Yrs O&M PW	$11,402,777
Construction Cost	$21,132,888
Non-Construction Cost	$3,990,200
Total	$36,525,865

The annual 2020 Operation and maintenance is $714,294. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

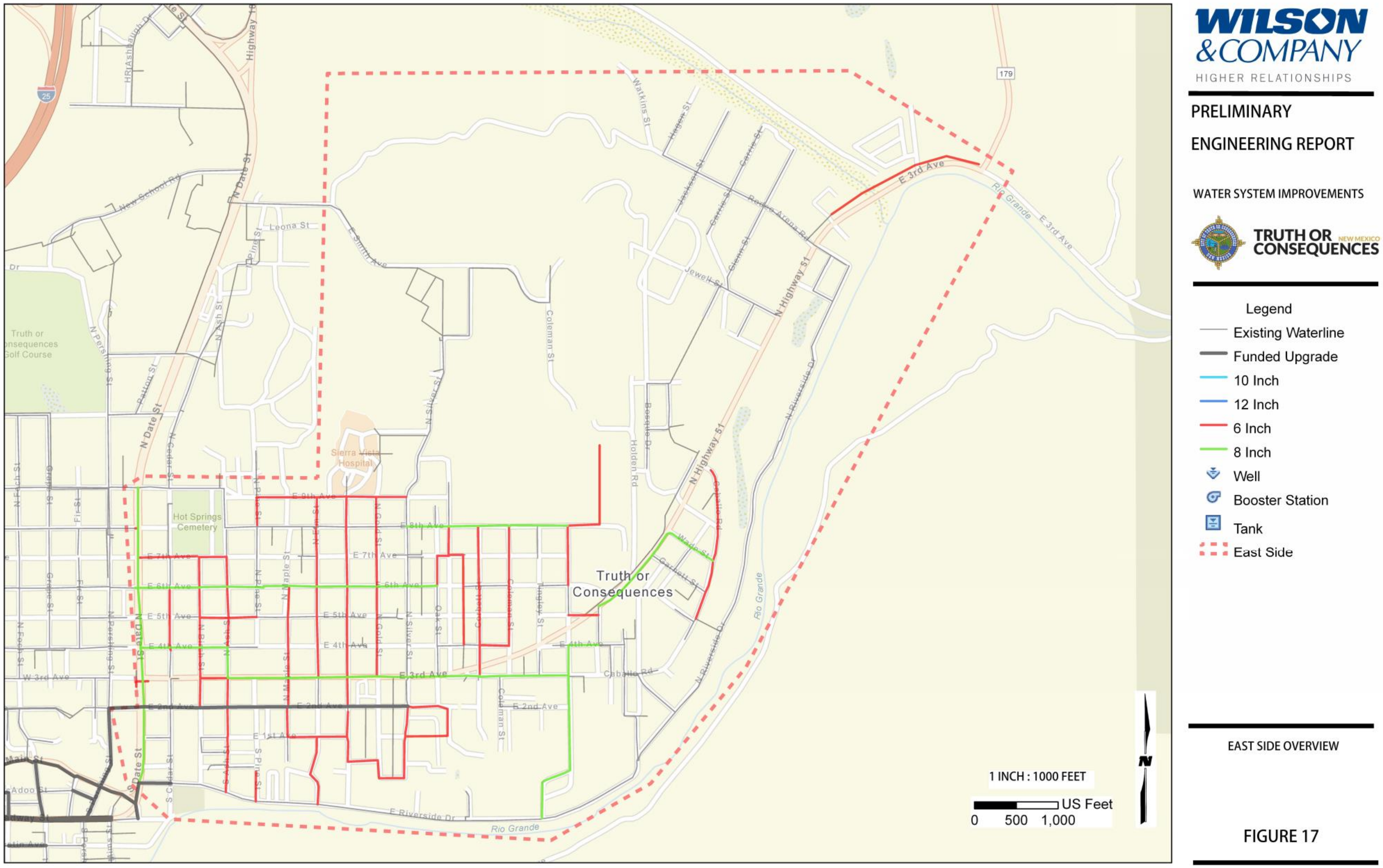


Figure 17: Alternative V East Side

5.2.9 *Alternative VI: West Side Replacement*

5.2.9.1 Description

Alternative VI involves replacing 7.9 percent of the existing waterlines that are 6 inches or less with PVC C-900 DR-18. This alternative will replace 14.1 percent of pipe over 30 years old. All waterlines in this alternative include pipelines segments with breakages due to high pressure fluctuations. These waterlines are planned to be replaced via open trench by placing the new line parallel to the existing waterline and then abandoning the existing waterline in place except where noted otherwise. Areas in the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing waterline to 6, and 8 inches in diameter will significantly increase available pressure in the west of the city and provide for better fire flow capacity. The new water line is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal and additional removal for any sidewalk and/or curb and gutter as needed. If an existing water meter is to be found in the existing roadway, it will be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any DOT ROW's via bore and jack.

The proposed water well will be located on Cemetery Road), the system currently has six wells, all of them located on the southern part of the City. Additionally, the existing water system uses two pump stations to fill the Cemetery Road water storage tanks in the north part of the City. A new well located in the north area will provide a reliable water supply and prevent water outages for this area. If any of the southern wells or booster stations fail. A northern well would also provide a redundant water supply to the rest of the City's water system.

5.2.9.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report defined as "West Side" (See **Figure 18**) should be replaced. Existing flow capacity has been determined to be insufficient for providing pressure and required fire flow to multiple areas of the City. Increasing the pipe size within the neighborhoods is recommended at this time. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6 Inch or great with, dewatering as described in the previous "Cost Evaluation Methodology" section via open trench.

5.2.9.3 Replacement of City Water Meters

Due to aging meters that may be inaccurate and/or require manually reading described in the "Existing Facilities" portion of this report, it is been recommended that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years and exceed their expected useful life, which provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City's billing system. Construction of Water Well Northern Area

Presently there is a dependence on Cook Street and Morgan Street Booster stations to provide water to the northern area of the City. Backup water production in the northern area of the City is non-existent, making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells, all of them located on the southern part of the City, most of which are near their end of useful life, a new well located in the north will provide reliable water production and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the tanks located on Cemetery Road. This new water source, when connected to the new Cemetery tanks, will provide a reliable and consistent water supply to this area and the rest of the City if needed under an emergency situation.

5.2.9.4 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 16 Million gallons per year. This amount of water represents $29,713 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.9.5 Green Infrastructure

This alternative will reduce water losses by approximately 16 Million gallons per year due to 30-line breaks within this area reported by the city officials. This is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.9.6 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.9.7 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on the east side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road. This will either require extensive closures, or more likely, directional drilling for the new service lines. It is assumed that horizontal directional drilling will be required, and a bid item has been included in the cost estimate for this portion of the alternative.

Groundwater dewatering is another large potential concern for this alternative. A large portion of these main transmission lines run parallel with the Rio Grande, which has a shallow groundwater table in this area. This alternative will assume 5 percent dewatering since it isn’t near the Rio Grande.

5.2.9.8 Resiliency and Operational Simplicity

The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.9.9 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues on the West Side (in the form of leakage and lack of fire flow)
- This option minimizes the high pressures issues that caused the line breaks, since the aging infrastructure is replaced in this area
- This option improves water supply to the water system
- This option improves only approximately 8 percent of the existing water system
- This option improves approximately 14 percent of the aging water system

DISADVANTAGES:

- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option doesn't reduce a large amount of water losses
- This option doesn't reduce pressure peaks in the system that causes the water breaks
- This option doesn't prevent service outages for residents

5.2.9.10 Cost Summary

Table 21: Alternative VI Cost Summary

Alternative VI- West Side	
20 Yrs O&M PW	$11,660,118
Construction Cost	$13,021,208
Non-Construction Cost	$2,522,034
Total	$27,203,360

The annual 2020 Operation and maintenance is $730,414. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4.**

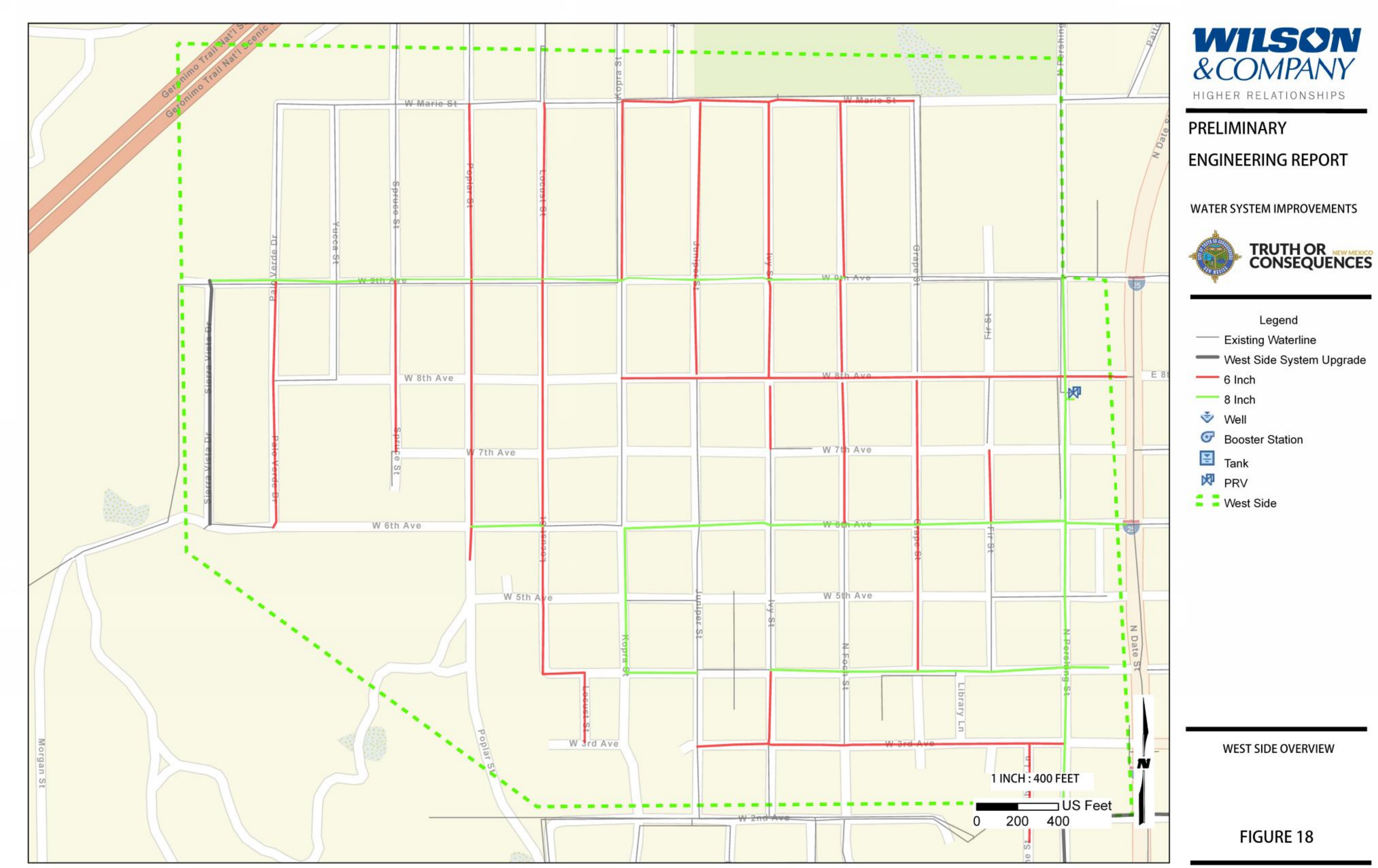


Figure 18: Alternative VI West Side

5.2.10 Alternative VII: Downtown Replacement

5.2.10.1 Description

Alternative VII involves replacing 6.8 percent of the existing waterlines within the city that are equal or less than, 6 inches with new PVC C-900 DR-18 waterlines. This alternative will replace 12 percent of pipe over 30 years old. All waterlines in this alternative are located on the most populated area of the city, with high business developments. It is planned to be replaced via open trench, placing the new line and abandoning in place the existing waterline; except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing waterlines to 6, 8, 10, and 12-inch diameter waterlines will significantly adjust available pressure in the Downtown area of the City as well as provide improved fire flow capacity. The new waterline is assumed to be installed in the shoulder of the road, with 6-12' of pavement removal and additional removal for any sidewalk or curb and gutter. If an existing water meter is found in the existing road, it is to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any NMDOT ROW's via bore and jack.

The proposed water well will be located on Cemetery Road. The system currently has six wells, all of them located on the southern part of the City. The current water system uses two pump stations to fill the Cemetery Road water storage tanks in the northern part of the City. A new well located in the northern area will provide a reliable water supply to this area and prevent water outages. If any of the southern wells or booster stations fail, it would also provide a redundant water supply to the remainder of the City.

5.2.10.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report defined as "Downtown" (See **Figure 19)** should be replaced. Existing flow capacity has been determined to be insufficient due to pipe pressure fluctuations during peak flow periods and not meeting the fire flow requirement in multiple areas of the City. Increasing pipe size within the neighborhoods are recommended at this time. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6 Inch or greater. Dewatering considerations are described in the previous "Cost Evaluation Methodology" section via open trench.

5.2.10.3 Replacement of City Water Meters

Due to aging meters that may be inaccurate and/or require manually reading described in the “Existing Facilities” portion of this report, it is been recommended that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years and exceed their expected useful life, which provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City’s billing system. Construction of Water Well Northern

Presently there is a dependence on Cook Street and Morgan Street Booster stations to provide, a backup source of water in the northern area of the City. Backup water production in the northern area of the City is non-existent, making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells all of them located on the southern part of the City, most of which are near their end of useful life. A new well located in the north will provide reliable water production and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable back up water supply to this area and the rest of the city if needed under an emergency situation.

5.2.10.4 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~14 Million gallons per year. This amount of water represents $25,366 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.10.5 Green Infrastructure

This alternative will reduce water losses by approximately 14 Million gallons per year due to 35, line breaks within this area reported by the city officials. This is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.10.6 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.10.7 Potential Construction Problems

The largest potential for construction problems in this alternative lies in the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road. This will either require extensive closures, or more likely, directional drilling for the new service lines. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Groundwater dewatering is another large potential concern for this alternative. A large portion of these main transmission's lines run parallel with the Rio Grande which has a shallow groundwater table. As explained in the "existing system" part of this report waterlines replaced within the southern portion of the Downtown area will have a 60 percent dewatering of the trench. If located in other areas a 5 percent dewatering will be assumed.

5.2.10.8 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative is the new water well which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.10.9 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues in the Downtown area (in the form of leakage and lack of fire flow)
- This option improves water supply to the water system
- This option improves approximately 7 percent of the existing water system
- This option improves approximately 12 percent of the aging water system

DISADVANTAGES:

- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option doesn't reduce a large amount of water losses
- This option doesn't reduce pressure peaks in the system that causes the water breaks
- This option doesn't prevent service outages for residents
- This option has a high dewatering cost

5.2.10.10 Cost Summary

Table 22: Alternative VII Cost Summary

Alternative VII- Downtown	
20 Yrs O&M PW	$11,719,281
Construction Cost	$12,157,023
Non-Construction Cost	$2,365,623
Total	$26,241,927

The annual 2020 Operation and maintenance is $734,120. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

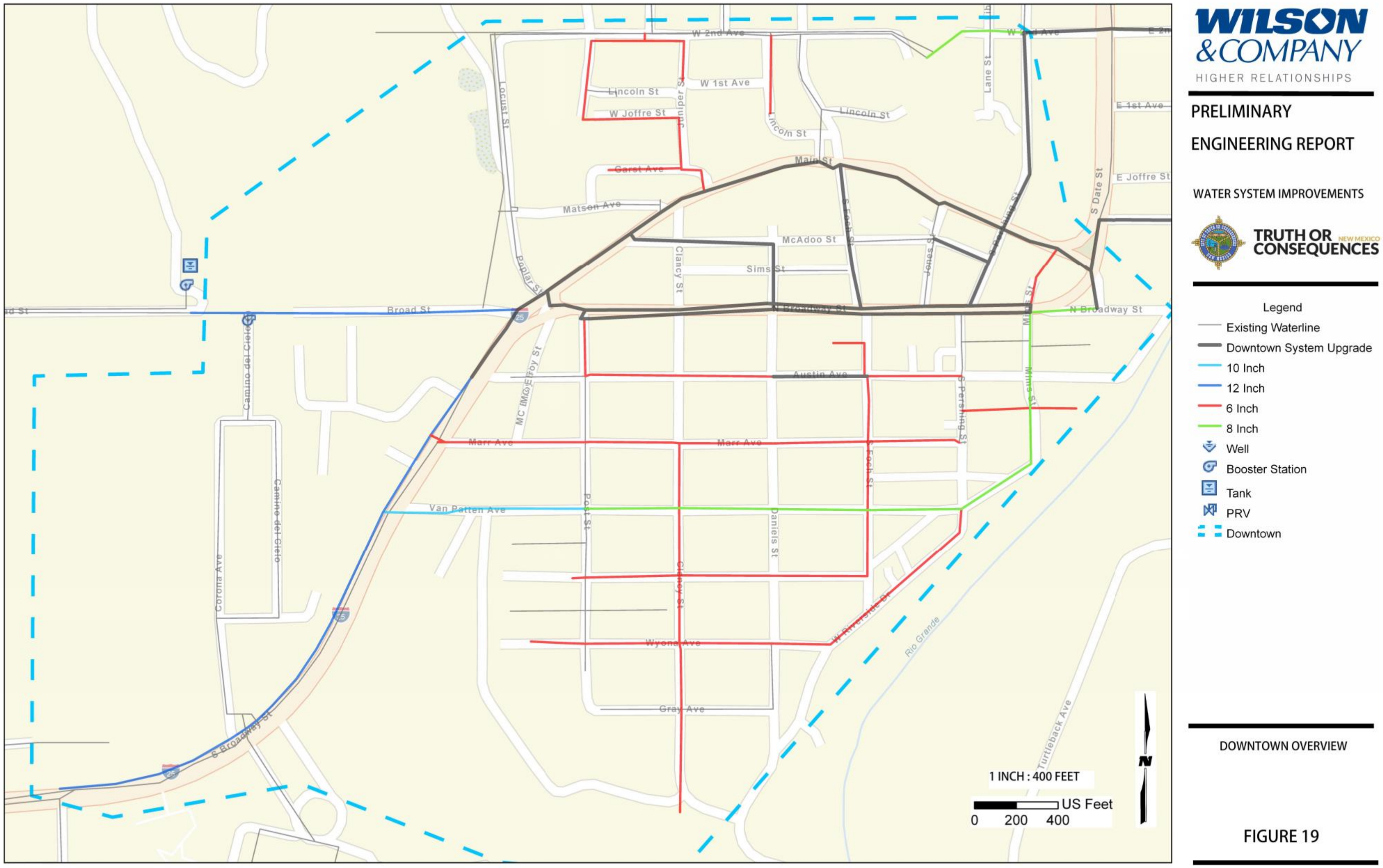


Figure 19: Alternative VII Downtown

5.2.11 Alternative VIII: Williamsburg Replacement

5.2.11.1 Description

Alternative VIII involves replacing 12.5 percent of the existing waterlines within new pipeline equal or less than 6 inches with new PVC C-900 DR-18 pipeline. This alternative will replace 22 percent of pipe over 30 years old. All waterlines in this alternative present a high-pressure breakages along record along Veater St. This alternative will be replaced via open trench by placing the new line and abandoning in place the existing waterline except where noted otherwise. Areas of the City of Truth or Consequences were evaluated based on current GIS information. Upsizing the existing water lines to be 6, 8, and 14-inch diameters will significantly adjust available pressure in the Downtown area and provide for better fire flow capacity. The new waterlines are assumed to be installed in the shoulder of the road, with 6-12' of pavement removal and an additional removal for any sidewalk or curb and gutter as needed. If an existing water meter is found in the existing road, it will need to be replaced. This portion of line repairs also includes the replacement of the existing casing and crossing pipe underneath any DOT ROW's via bore and jack.

The proposed water well will be located on Cemetery Road. The system currently has six wells all of them located on the southern part of the city. The existing water system uses two pumping stations to feed the water storage tanks on the north part of the city. A new well located in the north will provide reliable water production and prevent water outages if any of the southern wells or booster stations fail. It would also provide an additional water source when one of City's existing wells fail due to their age.

5.2.11.2 Replacement of City Water Lines

Due to extensive leaks and pipe breaks as described in the "Existing Facilities" portion of this report and defined as "Williamsburg" (See **Figure 20)** should be replaced. Existing flow capacity has been determined to generally be not sufficient per pipe pressure fluctuations during peak flow periods, as well as not meeting the fire flow requirement on multiple areas of the city. Increasing the pipe size within the neighborhoods is recommended at this time. All pipes are assumed to be replaced with PVC C-900 DR18 with sizes 6 Inch or greater via open trench, with dewatering as described in the previous "Cost Evaluation Methodology" section.

5.2.11.3 Replacement of City Water Meters

Due to aging meters that may be inaccurate and/or require manually reading described in the "Existing Facilities" portion of this report, it is been recommended that all of the water meters should be replaced in their entirely. Water meters are currently older than 40 years and exceed their expected useful life, which provides incorrect data regarding water usage, water loss percentages and has a negative impact on the City's billing system. Construction of Water Well Northern Area.

Presently there is a dependence on Cook Street and Morgan Street Booster stations to provide, a backup source of water in the northern area of the City. Backup water production in the northern area of the City is non-existent making the distribution system open for failure if either of the booster stations do not work as desired. Currently the system has six wells all of them located on the southern part of the City, most of which are near their end of useful life, a new well located in the north will provide reliable water production and prevent water outages.

Additionally, most of the water system users in this northern area are currently connected to the northern tanks located on Cemetery Road. This new water source, when connected to the Upper tanks located on Cemetery Road, will provide a reliable backup supply to this area and the rest of the city if needed under an emergency situation.

5.2.11.4 Water and Energy Efficiency

This alternative will cost approximately $12,000 additional per year in electricity costs due to the new well pump, the addition of a new well will reduce the cost of boosting the water from the southern part of the City to the north tanks, which could counter the O&M cost of this improvement. The amount of lost water in this portion of the system is estimated at ~ 26 Million gallons per year. This amount of water represents $46,849 in lost revenue per year, at the rate the city charges per gallon of water.

5.2.11.5 Green Infrastructure

This alternative will reduce water losses by approximately 26 Million gallons per year due to 90-line breaks within this area reported by the city officials. This is an essential consideration in New Mexico with limited water supply available. See **Appendix 8** for justification on water loss numbers.

5.2.11.6 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new water well. A small easement may need to be purchased by the City in order to build this water well. If the land is privately owned, and if this option is pursued the owner will need to be determined.

No additional land requirements are anticipated for the replacement of the water lines, as all new water lines are within existing right-of-way.

5.2.11.7 Potential Construction Problems

The largest potential for construction problems in this alternative lies on the neighborhoods located on each side of I-25 business route which will require service lines crossing all lanes within an NMDOT owned road. This will either require extensive closures, or more likely, directional drilling for the new service lines. It is assumed that drilling will be required, and a bid item for drilling has been included in the cost estimate for this portion of the alternative.

Groundwater dewatering is another large potential concern for this alternative. A large portion of these main transmission's lines run parallel with the Rio Grande which has a shallow groundwater table in this area. This alternative will assume 5 percent dewatering since it isn't near the Rio Grande.

5.2.11.8 Resiliency and Operational Simplicity

The only regular maintenance item for this alternative is the new water well pump which will require periodic maintenance as recommended by the manufacturer. The new pipelines and water meter replacements are anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.11.9 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues in the Williamsburg area (in the form of infiltration and lack of fire flow)
- This option improves the back up and redundancy to the water system
- This option improves approximately 11 percent of the water system
- This option improves approximately 22 percent of the aging water system

DISADVANTAGES:

- This option requires a large amount of NMDOT crossing permits
- This option has additional O&M for the new well, but pumping cost will be countered by not boosting the water twice to this upper zone
- This option doesn't reduce a large amount of water losses
- This option doesn't reduce pressure peaks in the system that causes the water breaks
- This option doesn't prevent service outages for residents

5.2.11.10 Cost Summary

Table 23: Alternative VIII Cost Summary

Alternative VIII- Williamsburg	
20 Yrs O&M PW	$11,430,818
Construction Cost	$18,538,532
Non-Construction Cost	$3,520,636
Total	$33,489,986

The annual 2020 Operation and maintenance is $716,050. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

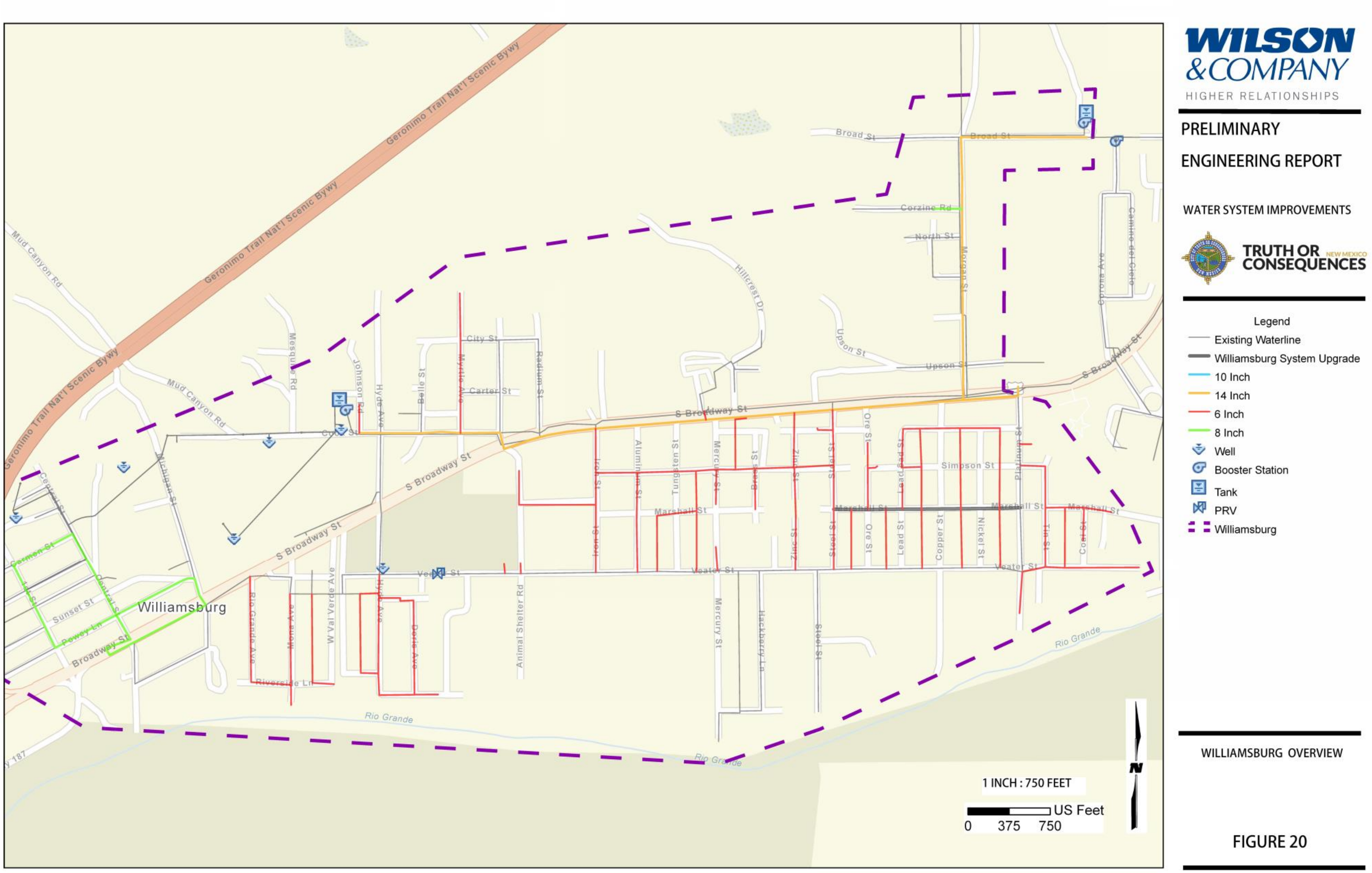


Figure 20: Alternative VIII Williamsburg

5.2.12 Alternative IX: Pressure Tank Replacement

5.2.12.1 Description

Alternative IX will consist of installing a new water system, with a building located near the existing water well which will; enclose two 200-gallon capacity pressure tanks, a chlorination system, and a control panel at the municipal airport. The existing well will include a new 8 Inch sanitary pitiless seal unit to protect the wellhead from contamination (surface water, debris, insects, vermin and other contaminants).

5.2.12.2 Design Layout Map

A map illustrating the schematic design layout of Alternative IX is shown in **Figure 21.** The new pressure tanks will be on the south-west side of the building. As show in the design layout a new waterline will be connected to the well. Isolation valves will be installed with the new inlets and outlets piping to allow the new tank to be isolated for maintenance and repairs. In addition, the chlorination system and control panels will be design and located within the building and comply with health and safety requirements.

5.2.12.3 Green Infrastructure

This alternative is not expected to have any environmental impacts. This is because the new pressure tanks will be located within the existing boundaries of the new building. Installation of this system will not add any further impact on endangered species, flood plains, wetlands, historical or archaeological sites due that existing buildings will not be affected by this upgrade.

5.2.12.4 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new building and fence of 30’ by 45’.

5.2.12.5 Potential Construction Problems

Construction of Alternative IX is not expected to have any significant problems. There are no known utilities in the direct vicinity of the proposed locations of the new building and its associated pipeline.

5.2.12.6 Resiliency and Operational Simplicity

Installation and future operation of the new pressure tank is anticipated to have a beneficial impact on the system because it will provide redundancy to the system and will allow for more energy efficient use of the well pump. No interruption in the delivery of chlorinated water to distribution system means there is a much smaller chance of water consumers ingesting water that has not been properly disinfected. The new water system replacements are anticipated to greatly reduce the operations costs associate with repairs of the failing system.

5.2.12.7 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues at the Municipal airport of no chlorination and lack of secure building for the facilities
- This option prevents service outages for the airport buildings

DISADVANTAGES:

- This option has additional O&M for the new chlorination system
- This option doesn't provide enough to back up water storage to the water system if power outage occurs
- This option only addresses a small transient population
- This option doesn't repair the small existing distribution system

5.2.12.8 Cost Summary

Table 24: Alternative IX Cost Summary

Alternative IX-Airport 1	
20 Yrs O&M PW	$33,305
Construction Cost	$342,862
Non-Construction Cost	$90,328
Total	$466,495

The annual 2020 Operation and maintenance is $2,086. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

Figure 21: Airport Alternative IX Pressure Tank Replacement

5.2.13 Alternative X: Airport Improvements – New ground water storage tank without fire flow

5.2.13.1 Description

Alternative X will consist of installing a new Municipal Airport water System with a new building located near the existing water well. The building will enclose a chlorination system, Variable speed booster system and a control panel. A new 7,200 gallons steel storage tank will be located near the building. The existing well will include a new 8 Inch sanitary pitiless seal unit to protect the wellhead from contamination (surface water, debris, insects, vermin and other contaminants).

5.2.13.2 Design Layout Map

A map illustrating the schematic design layout of Alternative X is shown in **Figure 22.** The new steel storage tank will be nearby the new building. As show in the design layout, a new water system will be connected to the well. Isolation valves will be installed with the new inlets and outlets piping to allow the new tank to be isolated for maintenance and repairs. In addition, chlorination system, booster system, and control panels will be design and located within the building following hazards protocols.

5.2.13.3 Green Infrastructure

This alternative is not expected to have any environmental impacts. This is because the new storage tanks will be located within the existing boundaries of the existing system. Installation of this system will not add any further impact on endangered species, flood plains, wetlands, historical or archaeological sites since the existing buildings will not be affected by this upgrade.

5.2.13.4 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new storage tank, building, and fence of 30’ by 80’.

5.2.13.5 Potential Construction Problems

Construction of Alternative X is not expected to have any significant problems. There are no known utilities in the direct vicinity of the proposed location of the new building and its associated pipeline.

5.2.13.6 Resiliency and Operational Simplicity

Installation and future operation of the new tank is anticipated to have a beneficial impact on the environment because it will provide a 3-day storage in the system and will allow for more energy efficient use of the new water pump. No interruption in the delivery of chlorinated water to distribution means there is a much smaller chance of water consumers ingesting water that has not been properly disinfected. The new water system replacements is anticipated to greatly reduce the operations costs associated with the failing system.

5.2.13.7 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues at the Municipal Airport of no chlorination and lack of secure building for the facilities
- This option improves the water storage requirement and reliability of water supply if a power outage occurs
- This option prevents service outages for the airport buildings.

DISADVANTAGES:

- This option has additional O&M for the new chlorination system, booster pumps, and storage tank
- This option only addresses a small transient population
- This option doesn't repair the small existing distribution system

5.2.13.8 Cost Summary

Table 25: Alternative X Cost Summary

Alternative X-Airport 2	
20 Yrs O&M PW	$33,305
Construction Cost	$447,772
Non-Construction Cost	$107,461
Total	$588,538

The annual 2020 Operation and maintenance is $2,086. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

Figure 22: Airport Alternative X New Ground Water Storage Tank without Fire Flow

5.2.14 Alternative XI: Airport Improvements- with Fire flow

5.2.14.1 Description

Alternative XI will consist of installing a new Municipal Airport water System with a new building located near the existing water well. The building will enclose a chlorination system, variable speed booster system, a 1,600 GPM fire pump, and a control panel. A new 190,000-gallon steel storage tank will be constructed near the building. The existing well will include a new 8 Inch sanitary pitiless seal unit to protect the wellhead from contamination (surface water, debris, insects, vermin and other contaminants).

5.2.14.2 Design Layout Map

A map illustrating the schematic design layout of Alternative XI is shown in **Figure 23.** The new steel storage tank will be located near the new building. As shown in the design layout, a new waterline will be connected to the outlet of the water well. Isolation valves will be installed with the new inlet and outlet piping to allow the new tank to be isolated for maintenance and repairs. The chlorination system, booster system, and control panels will be designed and located within the building complying with health and safety requirements.

5.2.14.3 Green Infrastructure

This alternative is not expected to have any environmental impacts. This is because the new storage tanks will be located within the existing boundaries of the existing system. Installation of this system will not add any further impact on endangered species, flood plains, wetlands, historical and archaeological sites due that existing buildings will not be affected by this upgrade.

5.2.14.4 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new storage building and fence of 30’ by 90’.

5.2.14.5 Potential Construction Problems

Construction of Alternative XI is not expected to have any significant problems. There are no known utilities in the direct vicinity of the proposed locations of the new building and its associated pipeline.

5.2.14.6 Resiliency and Operational Simplicity

Installation and future operation of the new tank is anticipated to have a beneficial impact on the environment because it will provide a three day redundancy in the system, comply with fire flow requirements, and will allow for more energy efficient use of the new water pump. No interruption in the delivery of chlorinated water to distribution means there is a much smaller chance of water consumers ingesting water that has not been properly disinfected. The new water system replacements is anticipated to greatly reduce the operations costs associated with pipe repairs in this area.

5.2.14.7 Alternative Pros/Cons

ADVANTAGES:

- This option fixes safety issues at the Municipal Airport of no chlorination and lack of secure building for the facilities
- This option improves the water storage requirement and reliability of water supply if a power outage occurs
- This option complies with fire flow requirement
- This option prevents service outages for the airport buildings.
- This option repairs the small existing distribution system to meet fire flow requirements

DISADVANTAGES:

- This option has a high capital cost
- This option has additional O&M for the new chlorination system, booster pumps, fire flow pump, and storage tank
- This option only addresses a small transient population

5.2.14.8 Cost Summary

Table 26: Alternative XI Cost Summary

Alternative XI-Airport 3	
20 Yrs O&M PW	$647,893
Construction Cost	$1,850,550
Non-Construction Cost	$336,534
Total	$2,834,977

The annual 2020 Operation and maintenance is $40,585. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

Figure 23: Airport Alternative XI New Ground Water Storage Tank with Fire Flow

5.2.15 Alternative XII: Airport Improvements – VFD Well pump

5.2.15.1 Description

Alternative IX consist of installing a new water system with a building located near the existing water well at the municipal airport. The building will house one 30 gpm capacity pressure tank, a chlorination system, 50 gpm variable speed pumps, and a control panel. The existing well will include a new 8 Inch sanitary pitiless seal unit to protect the wellhead from contamination (surface water, debris, insects, vermin and other contaminants).

5.2.15.2 Design Layout Map

A map illustrating the schematic design layout of Alternative XII is shown in **Figure 24.** The new pressure tanks will be on the south-west side of the building. As show in the design layout a new waterline will be connected to the outlet of the water well. Isolation valves will be installed with the new inlet and outlet piping to allow the new tank to be isolated for maintenance and repairs. In addition, the chlorination system, control panels, and VFD will be design and located within the building meeting health and safety requirements.

5.2.15.3 Green Infrastructure

This alternative is not expected to have any environmental impacts. This is because the new pressure tank will be located within the existing boundaries of the new building. Installation of this system will not add any further impact on endangered species, flood plains, wetlands, historical or archaeological sites due that existing buildings will not be affected by this upgrade.

5.2.15.4 Land Requirements

Minimal additional land requirements are anticipated for the installation of the new building and fence of 30’ by 45’.

5.2.15.5 Potential Construction Problems

Construction of Alternative XII is not expected to have any significant problems. There are no known utilities in the direct vicinity of the proposed locations of the new building and its associated pipeline.

5.2.15.6 Resiliency and Operational Simplicity

Installation and future operation of the new pressure tank is anticipated to have a beneficial impact on the system because it will allow for more energy efficient use of the well pump. No interruption in the delivery of chlorinated water to distribution means there is a much smaller chance of water consumers ingesting water that has not been properly disinfected. The new water system replacements is anticipated to greatly reduce the operations costs associate repairs of the failing system.

5.2.15.7 Alternative Pros/Cons

ADVANTAGES:

- This option has a low capital cost
- This option fixes safety issues at the Municipal Airport of no chlorination and lack secure building for the facilities
- This option reduces service outages for the airport buildings

DISADVANTAGES:

- This option has additional O&M for the new chlorination system and well pump VFD
- This option doesn't provide enough to back up water storage to the water system if power outage occurs
- This option only addresses a small transient population
- This option doesn't repair the small existing distribution system

5.2.15.8 Cost Summary

Table 27: Alternative XII Cost Summary

Alternative XII -Airport 4	
20 Yrs O&M PW	$38,021
Construction Cost	$393,623
Non-Construction Cost	$98,618
Total	$530,262

The annual 2020 Operation and maintenance is $2,382. See the breakdown of Annual Operation and Maintenance cost is provided in **Appendix 5** and full construction and non-construction cost breakdown is in **Appendix 4**.

Figure 24: Airport Alternative XII VFD Well Pump

6 SELECTION OF AN ALTERNATIVE

6.1 Life Cycle and Capital Cost Analysis

When analyzing project alternatives, different avenues for selecting the best project must be evaluated. In selecting the most feasible and functional project for the water system, two features were considered. The first is a life cycle cost analysis (LCCA) which was developed as a tool to assist asset managers with decisions solely based off monetary value. Other non-monetary factors help analyze and selecting an alternative are listed in the section below.

6.1.1 Capital & Life Cycle Cost Summary

All alternatives were evaluated on a lifecycle cost basis with estimated future maintenance, electricity, and water losses accounted for. All alternatives use a 2.25% (2 years) discount rate, to calculate future and present values. All alternatives are evaluated for a 20-year period and the total net present value for this period is calculated.

Present worth is the future value, capital and annual O&M costs, of a project for its entire operational or design life discounted to reflect its current value. It is a useful tool for comparing cash flows that don't necessarily occur at the same time. When developing the present worth of each alternative, a 2.25% Real Interest Rate was used for 20 years based on Discount Rates for Cost-Effectiveness, Lease Purchase, Related Analysis, and OMB Circular No. A-94 (US Office of Management and Budget).

The present worth of the annual O&M costs is calculated using the equation below

$$\boldsymbol{PV} = A * \frac{(1+i)^n - 1}{i(1+i)^n}$$

PV: Present Value

A: Annual Cost (O&M costs)

I: Real Interest Rate: 2.25*%*

N: number of years: *20 years*

The Net Present Value was calculated as the sum of the Capital Cost plus the present worth of the uniform series of annual O&M (USPW (O&M)).

Evaluation of the T or C water system Alternatives I through VIII, the Capital Costs for Alternative II is the highest and the Annual O&M Costs for Alternative II is the highest Alternative I has the lowest Capital Costs and Annual O&M Costs, as one would expect resulting in a Net Present Value less than the other eight alternatives.

Alternatives I through XII presented herein are comprised of installing new facilities in addition to upgrading the existing facilities. As such the existing equipment, tanks, pumps, PRV, piping, buildings, valves, and appurtenances, will remain in service through the end of their useful life. Therefore, the salvage value for alternatives I through XII is $0.

Table 28 : Cost Estimate Summary

	Annual O&M Present Worth 20 Yrs	Capital Cost	Net Present Value	2020 Annual O&M Cost
Alternative I- No Action	$11,871,223	$0	$11,871,223	$743,638
Alternative II- Complete System*	$9,325,812	$102,572,936	$111,898,748	$584,188
Alternative III- System Performance Update*	$10,989,446	$25,794,833	$36,784,279	$688,402
Alternative III A- System High Pressure Solutions	$11,115,798	$7,530,330	$18,646,128	$696,317
Alternative III B- System Redundancy and Hydraulic Performance Enhancements *	$11,880,678	$9,844,031	$21,724,709	$744,230
Alternative III C- Additional Hydraulic Performance Enhancements	$11,724,099	$6,270,445	$17,994,544	$734,422
Alternative IV- North Side*	$11,914,630	$8,872,546	$20,787,176	$746,357
Alternative V- East Side*	$11,402,777	$25,123,088	$36,525,865	$714,294
Alternative VI- West Side*	$11,660,118	$15,543,242	$27,203,360	$730,414
Alternative VII- Downtown*	$11,719,281	$14,522,646	$26,241,927	$734,120
Alternative VIII- Williamsburg*	$11,430,818	$22,059,168	$33,489,986	$716,050
Alternative IX-Airport 1 - Pressure tank Replacement **	$33,305	$433,190	$466,495	$2,086
Alternative X-Airport 2- Without Fire Flow**	$33,305	$555,233	$588,538	$2,086
Alternative XI-Airport 3-With Fire Flow**	$647,893	$2,187,084	$2,834,977	$40,585
Alternative XII-Airport 4-VFD Well Pump**	$38,021	$492,241	$530,262	$2,382

*Alternative includes new well

***Alternative 9-13 the airport system is newly acquired, so the O&M cost for these alternatives will be added to additional O&M cost to the city's O&M budget.*

6.2 Non-Monetary Factors

It is important to not only evaluate alternatives on a cost basis; all alternatives are also evaluated on a Non-Monetary basis. All alternatives are scored based on six factors, then given a total score based on the sum of all weighted factors. The Scores and Score Weights are as explained below:

6.2.1 Score Weights

- <u>Environmental Impacts:</u> **(Score Weight: 5)** This factor was given high importance, as environmental safety and water conservation is a large concern for long-term sustainability. **Table 29** is a summary of the T or C water system alternatives**.**

Table 29: Water Reduction and Cost savings

	Water Losses (G)	Monetary Losses
Alternative I - No Action	120,589,680	$ 211,032
Alternative II - Complete System	116,489,630	$ 203,857
Alternative III - System Performance Update	45,582,899	$ 79,770
Alternative III A- System High Pressure Solutions	32,197,444	$ 56,346
Alternative III B- System Redundancy and Hydraulic Performance Enhancements)	7,597,150	$ 13,295
Alternative III C- Additional Hydraulic Performance Enhancements	6,270,663	$ 10,974
Alternative IV - North Side	6,150,074	$ 10,763
Alternative V - East Side	27,928,570	$ 48,875
Alternative VI - West Side	16,979,027	$ 29,713
Alternative VII - Downtown	14,494,879	$ 25,366
Alternative VIII - Williamsburg	26,770,909	$ 46,849

- Operation and Maintenance: **(Score Weight: 2)** This factor was given a low importance, operation and maintenance cost is relatively low for distribution system infrastructure. **Table 30** summarizes all the alternative's O&M cost.

Table 30: Operation and maintenance cost

	2020 Annual O&M Cost	2021 Annual O&M Cost	2023 Annual O&M Cost
Alternative I- No Action	$743,638	$760,370	$794,971
Alternative II- Complete System	$584,188	$597,332	$624,515
Alternative III- System Performance Update	$688,402	$703,891	$735,922
Alternative III A- System High Pressure Solutions	$696,317	$711,984	$744,383
Alternative III B- System Redundancy and Hydraulic Performance Enhancements)	$744,230	$760,975	$795,605
Alternative III C- Additional Hydraulic Performance Enhancements	$734,422	$750,946	$785,119
Alternative IV- North Side	$746,357	$763,150	$797,878
Alternative V- East Side	$714,294	$730,365	$763,601
Alternative VI- West Side	$730,414	$746,848	$780,834
Alternative VII- Downtown	$734,120	$750,638	$784,796
Alternative VIII- Williamsburg	$716,050	$732,161	$765,479
Alternative IX-Airport 1 - Pressure tank Replacement	$2,086	$2,133	$2,230
Alternative X-Airport 2- Without Fire Flow	$2,086	$2,133	$2,230
Alternative XI-Airport 3-With Fire Flow	$40,585	$41,499	$43,387
Alternative XII-Airport 4-VFD Well Pump	$2,382	$2,435	$2,546

** 2023 annual O&M Cost is projected at the estimated project completion.*

- Constructability: **(Score Weight: 4)** This factor was given a high score, as constructability in this area can potentially have a high construction cost for dewatering.

- Capital Cost: **(Score Weight: 5)** This factor was given a high score as securing funding is the most important step to getting a project started.
- Public Safety: **(Score Weight: 5)** This was given a high score; public safety is always a major concern.
- Disruption of Service: **(Score Weight: 4)** This factor was given a slightly lower score because temporary service outages can be endured. However, long term service disruption is unacceptable.

6.2.2 Alternate I: No Action

Scores for Alternate I are justified as follows:

- Environmental Impacts: **(Score: 1)** This alternative was given a low environmental score, as taking no action will not mitigate leaks, and make any water conservation problems worse.
- Operation and Maintenance: **(Score: 2)** This alternative was given a low score for ease of maintenance; this alternative requires a large amount of maintenance due to frequent line breaks in the areas which will require constant repairs.
- Constructability: **(Score: 5)** This alternative was given a high constructability score, as no construction is required.
- Capital Cost: **(Score: 5)** This alternative is no cost and was given a high Capital Cost score.
- Public Safety: **(Score: 2)** This alternative puts existing customers at risk of water outages as well as the possibility of contamination due to line breaks and was given a low public safety score.
- Disruption of Service: **(Score: 2)** This alternative puts customers at a high risk of outages and was given a low score for service disruption.

6.2.3 Alternate II: Complete Water Replacement

Scores for Alternate II are justified as follows:

- Environmental Impacts: **(Score: 5)** This option will reduce leaks and aid in water conservation, construction takes place in previously disturbed areas and should have minimal impact.
- Operation and Maintenance: **(Score: 5)** This option will greatly improve operation and maintenance (O&M) compared to the existing system by replacing the old infrastructure.

- Constructability: **(Score: 1)** This option is within existing right-of-way, and it is assumed that trenching dewatering will be extensive on the East area and Downtown area. Extensive geotechnical investigations are highly recommended prior to construction. four points were deducted for the difficulty of installing service lines on these previously mention areas. Points were deducted because of the longevity of the construction phase.
- Capital Cost: **(Score: 1)** This is the most expensive option and was given a low score for initial capital cost.
- Public Safety: **(Score: 5)** This alternative will greatly reduce the risk of contamination due to line breaks, repairs and water redundancy for the water system.
- Disruption of Service: **(Score: 3)** This option will greatly diminish the amount of service disruptions but will create a long temporary disruption during construction.

6.2.4 Alternate III: System Performance Upgrade

Scores for Alternate III are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will address flow and pressure surges that are prevalent in the water system, it will reduce leaks and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. A point was deducted compared to Alternative II because it doesn't assess the aging waterline replacement within the neighborhoods.
- Operation and Maintenance: **(Score: 4)** This option will greatly improve operation and maintenance compared to the existing system. A point was deducted as since the aging infrastructure that causes the breaks is not being replaced.
- Constructability: **(Score: 3)** This is the most constructible option; a small percentage of service lines are to be installed where shallow groundwater table has lower probability to impact the construction.
- Capital Cost: **(Score: 1)** This option was given a low score due to high initial capital cost which exceeds the city's budget.
- Public Safety: **(Score: 4)** This alternative will greatly reduce the risk of contamination due to reduction in pressure surges which reduces line breaks and repairs of the aging infrastructure.
- Disruption of Service: **(Score: 4)** This option will greatly diminish the amount of service disruptions but will create a temporary disruption during construction.

6.2.5 Alternate III-A: System High Pressure Solutions

Scores for Alternate III-A are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will address flow and pressure surges that are prevalent in the transmission line from Cook Street to Morgan booster Station in water system, it will reduce leaks and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. A point was deducted compared to Alternative II because it doesn't assess the aging waterline replacement within the neighborhoods.
- Operation and Maintenance: **(Score: 3)** This option will greatly improve operation and maintenance compared to the existing system. Two points were deducted as since the aging infrastructure that causes the breaks is not being replaced.
- Constructability: **(Score: 4)** This is the most constructible option, as a low percentage of service lines are to be installed where shallow groundwater table has lower probability to impact the construction.
- Capital Cost: **(Score: 4)** This option was given a relatively high score due to high initial capital cost but still the cost doesn't exceed the city's budget.
- Public Safety: **(Score: 4)** This alternative will greatly reduce the risk of contamination due to reduction in pressure surges which reduces line breaks and repairs of the aging infrastructure.
- Disruption of Service: **(Score: 4)** This option will greatly diminish the amount of service disruptions due to waterline breakages caused by pressure surges but will create a temporary disruption during construction.

6.2.6 Alternate III-B: System Redundancy and Hydraulic Performance Enhancements

Scores for Alternate III-B are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will address flow and pressure surges that are prevalent in the "Williamsburg" area of the water system, it will reduce leaks and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. A point was deducted compared to Alternative II because it doesn't assess the aging waterline replacement within the neighborhoods.
- Operation and Maintenance: **(Score: 3)** This option will greatly improve operation and maintenance compared to the existing system. Two points were deducted as since the aging infrastructure that causes the breaks is not being replaced.

- Constructability: **(Score: 3)** This option supplements and address pressure issues in the system, two points were deducted as major service lines are to be installed where shallow groundwater table has higher probability to impact the construction.
- Capital Cost: **(Score: 4)** This option was given a relatively high score due to high initial capital cost but still the cost doesn't exceed the city's budget.
- Public Safety: **(Score: 4)** This alternative will greatly reduce the risk of contamination due to reduction in pressure surges which reduces line breaks and repairs of the aging infrastructure.
- Disruption of Service: **(Score: 4)** This option will greatly diminish the amount of service disruptions due to waterline breakages in the "Williamsburg" area caused by pressure surges but will create a temporary disruption during construction.

6.2.7 Alternate III-C: Additional Hydraulic Performance Enhancements

Scores for Alternate III-C are justified as follows:

- Environmental Impacts: **(Score: 3)** This option will address part of the flow and pressure surges that are in the water system, it will reduce leaks and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. Two points were deducted compared to Alternative III-A because it doesn't assess the aging waterline replacement within the neighborhoods and entails small speeded areas within the city.
- Operation and Maintenance: **(Score: 4)** This option will greatly improve operation and maintenance compared to the existing system. A point was deducted as since the aging infrastructure that causes the breaks is not being replaced.
- Constructability: **(Score: 3)** This option has a small percentage of service lines are to be installed where shallow groundwater table has lower probability to impact the construction.
- Capital Cost: **(Score: 4)** This option was given a relatively high score due to high initial capital cost but still the cost doesn't exceed the city's budget.
- Public Safety: **(Score: 4)** This alternative will greatly reduce the risk of contamination due to reduction in pressure surges which reduces line breaks and repairs of the aging infrastructure.
- Disruption of Service: **(Score: 4)** This option will greatly diminish the amount of service disruptions, but will create a temporary disruption during construction

6.2.8 Alternate IV: North Side

Scores for Alternate IV are justified as follows:

- Environmental Impacts: **(Score: 2)** This option will address flow, reduce leaks, and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. three points were deducted due to the small percentage of pipeline replacements compared to other alternatives and compared to alternative III because it doesn't assess pressure surges within the water system.
- Operation and Maintenance: **(Score: 2)** This option will improve a small part of the operation and maintenance compared to the existing system, but it doesn't address the remaining issues of the water system.
- Constructability: **(Score: 5)** This alternative was given a relative high score, as no service lines are to be installed where shallow groundwater table that lowers the probability to impact the constructability.
- Capital Cost: **(Score: 4)** This option was given a relatively high score due to low initial capital cost.
- Public Safety: **(Score: 2)** This alternative will greatly reduce the risk of contamination due to line breaks to the specific area but does not address rest of the existing aging infrastructure.
- Disruption of Service: **(Score: 2)** This option will reduce the amount of service disruptions but will create a temporary disruption during construction. Three points were deducted due to trench dewatering possibly extending the period of disruption while in construction.

6.2.9 Alternate V: East Side

Scores for Alternate V are justified as follows:

- Environmental Impacts: **(Score: 2)** This option will address flow, reduce leaks, and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. Three points were deducted compared to alternative III because it doesn't assess pressure surges within the water system.
- Operation and Maintenance: **(Score: 2)** This option will improve operation and maintenance compared to the existing system but doesn't address the remaining part of the water system or resolves pressure issues.

- Constructability: **(Score: 3)** This alternative was given a relative low score, as almost 60 percent of the service lines will require extensive trenching dewatering. Broad geotechnical investigations are highly recommended prior to construction.
- Capital Cost: **(Score: 2)** This option was given a relatively low score due to high initial capital cost.
- Public Safety: **(Score: 2)** This alternative will greatly reduce the risk of contamination due to line breaks, repairs, and water redundancy in the East area only.
- Disruption of Service: **(Score: 2)** This option will reduce the amount of service disruptions but will create a temporary disruption during construction. Three points were deducted due to trench dewatering possibly extending the period of disruption while in construction.

6.2.10 Alternate VI: West Side

Scores for Alternate VI are justified as follows:

- Environmental Impacts: **(Score: 3)** This option will address flow, reduce leaks, and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. Two points were deducted compared to alternative III because it doesn't assess pressure surges within the water system.
- Operation and Maintenance: **(Score: 3)** This option will improve operation and maintenance compared to the existing system, but it doesn't address the remaining issues of the water system.
- Constructability: **(Score: 4)** This alternative was given a relative high score, as no service lines are to be installed where shallow groundwater table that lowers the probability to impact the constructability.
- Capital Cost: **(Score: 3)** This option was given a medium score due to high initial capital cost, but the cost still doesn't exceed the city's budget.
- Public Safety: **(Score: 3)** This alternative will greatly reduce the risk of contamination due to line breaks, repairs, water redundancy, and addresses aging infrastructure in the West area only. This helps mitigate the issues with the high-pressure surges in this area.
- Disruption of Service: **(Score: 3)** This option will reduce the amount of service disruptions but will create a temporary disruption during construction.

6.2.11 Alternate VII: Downtown

Scores for Alternate VII are justified as follows:

- Environmental Impacts: **(Score: 2)** This option will address flow, reduce leaks, and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. Three points were deducted compared to alternative III because it doesn't assess pressure surges within the water system.
- Operation and Maintenance: **(Score: 2)** this option will improve operation and maintenance compared to the existing system, but it doesn't address the remaining issues of the water system or resolves pressure issues.
- Constructability: **(Score: 2)** This alternative was given a low score, as almost 90 percent of the service lines will require extensive trenching dewatering. Broad geotechnical investigations are highly recommended prior to construction.
- Capital Cost: **(Score: 3)** This option was given a medium score due to high initial capital cost, but the cost doesn't exceed the city's budget.
- Public Safety: **(Score: 3)** This alternative will greatly reduce the risk of contamination due to line breaks, repairs and water redundancy in the Downtown area. This area is one of the busiest areas of the city.
- Disruption of Service: **(Score: 2)** This option will reduce the amount of service disruptions but will create a temporary disruption during construction. Three points were deducted due to trench dewatering possibly extending the period of disruption during construction.

6.2.12 Alternate VIII: Williamsburg

Scores for Alternate VIII are justified as follows:

- Environmental Impacts: **(Score: 3)** This option will address flow reduce leaks, and aid in water conservation. Construction takes place in previously disturbed areas and should have minimal impact. Two points were deducted compared to alternative III because it doesn't assess pressure surges within the water system.
- Operation and Maintenance: **(Score: 3)** This option will improve operation and maintenance compared to the existing system, but it doesn't address the remaining part of the water system or resolves pressure issues.
- Constructability: **(Score: 4)** This alternative was given a relative high score, as no service lines are to be installed where shallow groundwater table that lowers the probability to impact the constructability.

- Capital Cost: **(Score: 2)** This option was given a relative low score due to high initial capital which is out of the city's budget.
- Public Safety: **(Score: 3)** This alternative will greatly reduce the risk of contamination due to line breaks, repairs, water redundancy, and addresses aging infrastructure in the Williamsburg area only. This helps mitigate the issues with the high-pressure surges in this area.
- Disruption of Service: **(Score: 3)** This option will reduce the amount of service disruptions but will create a temporary disruption during construction.

6.2.13 Alternate IX: Airport Improvements Pressure Tank Replacement

Scores for Alternate IX are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will reduce leaks and aid in water conservation, construction takes place in a undisturbed areas owned by the city and should have small impact due to the size of required building.
- Operation and Maintenance: **(Score: 3)** This option will significantly improve operation and maintenance compared to the existing system. Two points were deducted per absence replacement of the existing waterlines.
- Constructability: **(Score: 4)** This option was given a relatively high constructability scored due to no additional land requirements are anticipated for the installation of the new building and fence.
- Capital Cost: **(Score: 5)** This option was given a relatively high score due to low initial capital cost (common with Alternative XIII due to similar cost).
- Public Safety: **(Score: 2)** This alternative will reduce the risk of contamination due to line breaks and repairs as well as provide constant flow. Three points were deducted compared to Alternative XI due to not complying with fire flow requirements.
  Disruption of Service: **(Score: 2)** This option will greatly reduce the amount of service disruptions but will create a temporary disruption during construction.

6.2.14 Alternate X: Airport Improvements without Fire Flow

Scores for Alternate X are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will reduce leaks and aid in water conservation, construction takes place in a undisturbed areas owned by the city and should have small impact due to size of the required tank and building.

- Operation and Maintenance: **(Score: 4)** This option will significantly improve operation and maintenance compared to the existing system. A point was deducted per absence replacement of the existing waterlines.
- Constructability: **(Score: 4)** This option was given a relatively high constructability scored due to no additional land requirements are anticipated for the installation of the new storage tank, building, and fence.
- Capital Cost: **(Score: 3)** This option was given a neutral score due to higher initial capital cost than alternative IX and XII.
- Public Safety: **(Score: 3)** This alternative will reduce the risk of contamination due to line breaks and repairs as well as provide constant flow. Two points were deducted compared to Alternative XI due to not complying with fire flow requirements.

  Disruption of Service: **(Score: 4)** This option will greatly diminish the amount of service disruptions but will create a temporary disruption during construction.

6.2.15 Alternate XI: Airport Improvements with Fire Flow

Scores for Alternate XI are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will reduce leaks and aid in water conservation, construction takes place in a undisturbed areas owned by the city and should have small impact due to size of the required tank and building .
- Operation and Maintenance: **(Score: 4)** This option will significantly improve operation and maintenance compared to the existing system. A point was deducted due to additional maintenance of the fire pump system.
- Constructability: **(Score: 4)** This option was given a relatively high constructability scored due to no additional land requirements are anticipated for the installation of the new storage tank, building, and fence.
- Capital Cost: **(Score: 2)** This option was given a relatively low due to higher initial capital cost.
- Public Safety: **(Score: 5)** This alternative will reduce the risk of contamination due to line breaks and repairs as well as provide constant flow. This alternative complies with fire flow requirement.

  Disruption of Service: **(Score: 5)** This option will greatly diminish the amount of service disruptions but will create a temporary disruption during construction.

6.2.16 Alternate XII: Airport Improvements –VFD Well Pump

Scores for Alternate XII are justified as follows:

- Environmental Impacts: **(Score: 4)** This option will reduce leaks and aid in water conservation, construction takes place in a undisturbed areas owned by the city and should have small impact due to the size of required building.
- Operation and Maintenance: **(Score: 3)** This option will significantly improve operation and maintenance compared to the existing system. Two points were deducted per absence replacement of the existing waterlines.
- Constructability: **(Score: 4)** This option was given a relatively high constructability scored due to no additional land requirements are anticipated for the installation of the new building and fence.
- Capital Cost: **(Score: 5)** This option was given a relatively high score due to low initial capital cost (common with Alternative IX due to similar cost).
- Public Safety: **(Score: 1)** This alternative will reduce the risk of contamination due to line breaks and repairs as well as provide constant flow. Four points were deducted compared to Alternative IX due to not complying with fire flow requirements as well as not providing redundancy.

  Disruption of Service: **(Score: 2)** This option will greatly diminish the amount of service disruptions, but will create a temporary disruption during construction

6.2.17 Non-Monetary Evaluation

Based on **Table 31** below, Alternative III is the recommended option on a non-cost basis.

Table 31: Non-Monetary Factors Scoring

	WEIGHT FACTOR	Weighted Score														
		I	II	III	IIIA	IIIB	IIIC	IV	V	VI	VII	VIII	IX	X	XI	XII
ENVIRONMENTAL IMPACTS	5	5	25	20	20	20	15	10	10	15	10	15	20	20	20	20
OPERATION & MAINTENANCE	2	4	10	8	6	6	8	4	4	6	4	6	6	8	8	6
CONSTRUCTABILITY	4	20	4	12	16	12	12	20	12	16	8	16	16	16	16	16
CAPITAL COST	5	25	5	5	20	20	20	20	10	15	15	10	25	15	10	25
PUBLIC SAFETY	5	10	25	20	20	20	20	10	10	15	15	15	10	15	25	5
DISRUPTION SERVICE	4	8	12	16	16	16	16	8	8	12	8	12	8	16	20	8
TOTAL		**72**	**81**	**81**	**98**	**94**	**91**	**72**	**54**	**79**	**60**	**74**	**85**	**90**	**99**	**80**

"I= No Action; II=Complete System; III= System Performance; IV=North Side; V=East Side; VI= West Side; VII= Downtown; VIII= Williamsburg; IX= Airport - Pressure Tank Replacement; X= Airport Without Fire Flow; XI= Airport With Fire flow; XI= Airport VFD Well Pump

7 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

Based on the above analysis, the recommended alternative for construction is Alternative IIIA - System High Pressure Solutions (See **Figure 13**). This alternative scored the highest in non-cost factors, due to the greater impact on the relieving pressure fluctuation problems within the system. This will ensure appropriate water transmission from the southern area from Cook Street to the Morgan Street booster station, and address aging infrastructure on key water transmission and distribution lines.

It is recommended in the near future that Alternatives III-B and III-C become completed when funding becomes available to successfully manage and address pressure issues within the city. These two alternatives address the remaining 11.5% of the pressure issues within main transmission lines in the water system. Both alternatives will provide water redundancy in the "North" area as well as continue to help with pressure issues and improving fire flow requirements throughout the City.

7.1 Project Schedule

The below preliminary schedule is provided pending PER approval.

Table 32 : Project Schedule

Milestones	Start	Finish
PER & Environmental Review & Approval	8/1/2020	9/1/2020
Funding Application & Approval	1/1/2021	5/1/2021
Engineering Services	7/1/2021	6/31/2022
Final Design Approval	7/1/2022	9/1/2022
Bidding Phase	9/1/2022	11/1/2022
Construction Phase	11/2/2022	11/2/2026
Project Closeout	11/3/2026	1/1/2026

7.2 Total Project Cost Estimate

Table 33: Alternative III A- System High Pressure Solutions

Alternative III A- System High Pressure Solution					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$194,215.79	$194,215.79
2	Traffic Control **(3.43% of General Cost)**	LS	1	$310,745.27	$310,745.27
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$84,289.65	$84,289.65
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$135,951.05	$135,951.05
5	Materials Testing **(0.2% of General Cost)**	LS	1	$77,686.32	$77,686.32
6	Subsurface Utility Locating	LS	1	$10,670.76	$10,670.76
7	Utility Relocation	LS	1	$10,670.76	$10,670.76
8	AC Pipe Removal and Disposal	LS	1	$7,554.90	$7,554.90
Waterline					
8	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	5,500	$28.78	$158,290.00
9	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	671	$35.70	$23,954.70
10	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	9,797	$36.50	$357,590.50
11	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	9,862	$42.30	$417,162.60
12	14"Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF		$50.77	$0.00
13	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	647	$220.00	$142,340.00
14	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	32	$3,500.00	$111,776.00
15	6" Gate Valves w/ Valve Can, CIP	EA	19	$935.00	$17,765.00
16	8" Gate Valves w/ Valve Can, CIP	EA	56	$1,205.00	$67,204.57
17	10" Gate Valves w/ Valve Can, CIP	EA	54	$2,500.00	$135,704.65
18	12" Gate Valves w/ Valve Can, CIP	EA	4	$3,263.00	$12,871.88
19	14" Gate Valves w/ Valve Can, CIP	EA		$4,000.00	$0.00
20	Furnish and Install 6"x2"” PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	6	$80,000.00	$480,000.00
21	Pressurized waterline connections, CIP	EA	36	$1,184.22	$43,014.43
22	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	12,001	$3.00	$36,001.69
23	Joint Restraints, CIP	EA	510	$77.75	$39,667.94

ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
24	1" Water Service, New single connection to existing watermain, cip. SD 2362	EA	95	$1,329.00	$126,255.00
25	Water Meter Box Remove & Replace	EA	95	$1,000.00	$95,000.00
26	Dewatering of Trench, CIP	LF	4,686	$53.00	$248,334.15
25	Valve/Pipeline abandonment	LS	1	$46,150.34	$46,150.34
26	Hydrant removal and abandonment	LS	1	$13,524.90	$13,524.90
Roadway					
27	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	8,394	$42.00	$352,562.00
28	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	8,394	$62.00	$520,448.67
29	Excavate and Dispose of Unsuitable Material, CIP	CY	12,342	$15.00	$185,130.00
30	Import of Engineered Fill	CY	12,342	$15.00	$185,130.00
31	Geogrid Base Roadway Reinforcement	SY	8,394	$5.50	$46,168.83
32	Remove and replace Curb and Gutter @ Services, CIP	LF	380	$25.00	$9,500.00
33	Remove and replace Sidewalk @ Services, CIP	CY	266	$48.00	$12,768.00
				Construction Cost Subtotal:	$4,716,100.35
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$4,930,683.00
				Contingency - 10%:	$493,068.00
				NMGRT @ 8.5%:	$461,019.00
				Interim Finance Interest:	$323,662.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$6,208,432.00
ENGINEERING SERVICES					
34	Bridge Loan @ 5.5%	LS	1	$56,899.00	$56,899.00
35	Preliminary Engineering Report-PER	LS	1	$35,000.00	$35,000.00
36	Environmental w/ Report	LS	1	$12,000.00	$12,000.00
37	Additional Engineering - Data Collection*	LS	1	$108,475.00	$108,475.00
38	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
39	Engineering Design Services	LS	1	$542,375.00	$542,375.00
40	Engineering - Bid Phase	LS	1	$12,475.00	$12,475.00
41	Engineering - Construction Inspection	LS	1	$235,270.00	$235,270.00
42	Engineering - Construction Management	LS	1	$75,933.00	$75,933.00
				Engineering Services Subtotal:	$1,138,427.00
				NMGRT @ 7.875%:	$89,651.00
				Engineering Total:	$1,228,078.00

ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
FINANCING SERVICES					
43	Loan Origination Fee	LS	1	$55,470.00	$55,470.00
				Financing Services Subtotal:	$55,470.00
				Financing NMGRT @ 8.5%:	$4,715.00
				Legal Services Total:	$60,185.00
LEGAL SERVICES					
44	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
45	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$7,530,330**

7.3 Annual Operation and Maintenance Cost/Budget

See **Table 35** for the total O&M cost estimate for the selected alternative. The O&M costs have also been evaluated as compared to the overall system costs. As seen **Table 34** the impacts to the complete System's O&M costs are significantly reduced by choosing Alternative III.

Table 34: Full System O&M Cost Analysis

FULL SYSTEM ANNUAL O&M COST			
	2020	**2021**	**2023**
O&M Cost for No Action Alternative	$ 743,638	$ 760,370	$ 794,971
O&M Cost for Selected Alternative	$ 696,317	$ 711,984	$ 744,383
O&M Cost Net Change	-$47,321	-$48,386	-$50,588
Total O&M Cost W/ Selected Alternative "System Performance Upgrade"	$ 696,317	$ 711,984	$ 744,383

Table 35: Alternative III-A O&M Estimate

O&M Alternative III A- System High Pressure Solutions
WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$101,007
Water Losses	$28,905
O&M	$566,404

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$103,280.07	$105,603.87	$107,979.96	$110,409.50	$112,893.72
Water Loss:	$29,555.32	$30,220.32	$30,900.28	$31,595.53	$32,306.43
O&M	$579,148.31	$592,179.15	$605,503.18	$619,127.00	$633,057.36
Future Value	**$711,983.70**	**$728,003.34**	**$744,383.41**	**$761,132.04**	**$778,257.51**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**
	$15,667.12				

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$115,433.83	$118,031.09	$120,686.79	$123,402.24	$126,178.79
Water Loss:	$33,033.33	$33,776.58	$34,536.55	$35,313.62	$36,108.18
O&M	$647,301.15	$661,865.43	$676,757.40	$691,984.44	$707,554.09
Future Value	**$795,768.30**	**$813,673.09**	**$831,980.73**	**$850,700.30**	**$869,841.06**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$129,017.81	$131,920.71	$134,888.93	$137,923.93	$141,027.22
Water Loss:	$36,920.61	$37,751.33	$38,600.73	$39,469.25	$40,357.31
O&M	$723,474.06	$739,752.22	$756,396.65	$773,415.57	$790,817.42
Future Value	**$889,412.48**	**$909,424.26**	**$929,886.31**	**$950,808.75**	**$972,201.95**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$144,200.33	$147,444.84	$150,762.35	$154,154.50	$157,622.98
Water Loss:	$41,265.35	$42,193.82	$43,143.18	$44,113.90	$45,106.46
O&M	$808,610.81	$826,804.56	$845,407.66	$864,429.33	$883,878.99
Future Value	**$994,076.49**	**$1,016,443.21**	**$1,039,313.18**	**$1,062,697.73**	**$1,086,608.43**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**
				Total Lifetime Maintenance Cost (20 years):	**$ 17,736,596**
				Total Lifetime Maintenance Cost (present value):	**$ 11,115,798**
				ANNUAL TOTAL O&M ALT III-A	**$696,317**

7.3.1 Debt Repayment and Debt Service Reserve

The debt repayment will vary based on the loan to grant ratio that the City receives. Below a 25%/75% loan/grant ratio is assumed for the purposes of this report **Table 36.** An interest rate of 3% and a 40-year term was also assumed for the purposes of this report per USDA loan terms.

Table 36: Loan Scenarios

LOAN SCENARIOS	RATIO 25:75	RATIO 57:43
Project Cost	$ 7,530,330	$ 7,530,330
Estimated Loan Cost (25 % and 57%)	$ 1,882,583	$ 4,292,288
Estimated Interest Rate & Term	3%	3%
Estimated Annual Loan Payment	$ 81,445	$ 185,695
Estimated Reserve (10% Annual Payment)	$ 8,144	$ 18,569
Number of Connections	$ 3,538	$ 3,538
Estimated Annual Cost Per Connection	$ 23.02	$ 52.49
Estimated Montly Cost Per Connection	$ 1.92	$ 4.37

7.3.2 Short-Lived Asset Reserve

Short lived assets are the system assets that are expected to need replacement or frequent maintenance. Based on the information provided by the City's Asset Management Plan, the assets as shown in **Table 37** Summary table below identified to be the most likely assets in need of short-term replacement.

Table 37 : Short lived Asset Summary

	Estimated Life Cycle	
	1-5 years	6-10 years
Subtotal of Short-Lived Assets (per period)	$ 97,530.00	$ 1,628,407.06
Subtotal of Short-Lived Assets (per year)	$ 19,506.00	$ 162,840.71
Subtotal of Short-Lived Assets (per month)	$ 1,625.50	$ 13,570.06
Total of Short-Lived Assets (1-10 years)	**$ 1,725,937**	
Total Annual Reserve Deposit, Short-Lived Assets (1-10 years, per year)	**$ 182,347**	
Total Monthly Reserve Deposit, Short-Lived Assets (1-10 years, per month)	**$ 15,196**	

8 CONCLUSIONS AND RECOMMENDATIONS

The city of Truth or Consequences currently presents a significant amount of water losses due to pipe breakage as well as a substantial yearly expense for wasted water. The system has components dating as far back as the 1930’s to 1940’s, as no significant work has been done in the area. Based upon the analysis conducted in this PER and following funding agencies guidelines, it is recommended that the City of Truth or Consequences immediately pursue funding for the Alternative III-A System High Pressure Solution. It will mitigate significant pressure issues in the city and ensure proper water transmission between booster stations. The recommended alternative has accounted for the capital costs required, the ease of maintenance, public safety, and environmental considerations. Alternative III-A has a relatively a lower capital cost compared to some of the alternatives, but it is still recommended due to the greater benefit to the public, as well as ease of maintenance and O&M cost. The “System High Pressure Solution” it is supplemented by two more projects which entails both alternatives III-B and III-C to obtain a progressed benefit from each project without disrupting the performance of the water system as well as obtain the best outcomes for the benefit of the community.

Although Alternative XI Airport Improvements with fire flow is the most viable alternative to upgrade the airport water system since it provides fire flow in the area as well as a three day water storage backup for the system, it is not recommended that the City of Truth or Consequences pursue funding for this section of the project. It doesn’t do any benefit to the City’s community and it doesn’t affect the City’s water system performance.

APPENDIX 1- ENVIRONMENTAL RESOURCES

TABLE OF CONTENT:

- EXHIBIT 101: CITY OF T OR C LAND COVERAGE
- EXHIBIT 102: CITY OF T OR C LAND COVERAGE AIRPORT
- EXHIBIT 103: FOREST LOCATION
- EXHIBIT 104: HISTORICAL PLACES
- EXHIBIT 105: FLOOD HAZARDS
- EXHIBIT 106: WETLANDS
- SPECIES OF GREATEST CONSERVATION NEED AND FEDERAL OR STAT THREATENED/ENDANGERED – SIERRA COUNTY
- IPAC RESOURCE LIST
- SOIL MAP

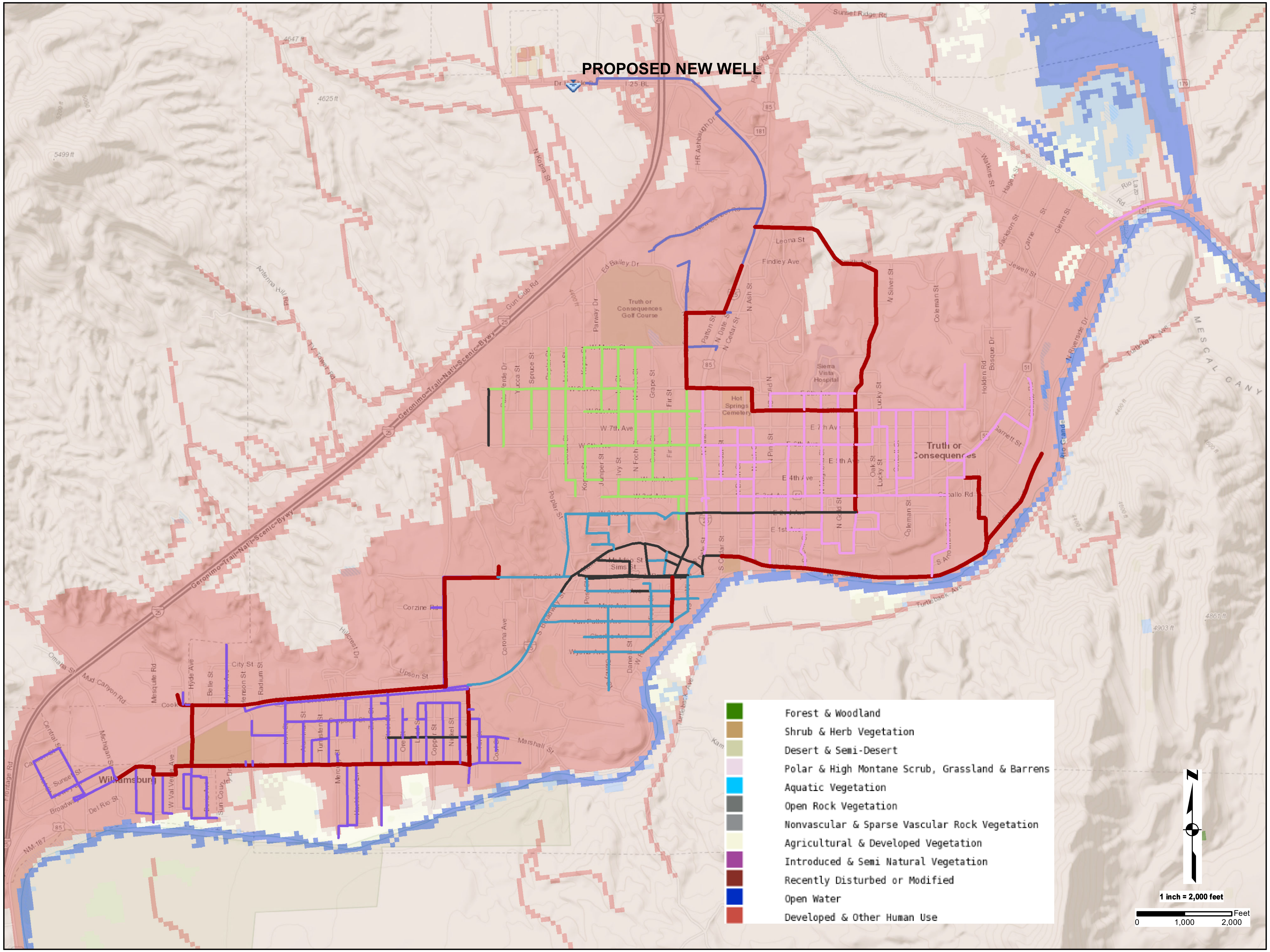
[THIS PAGE INTENTIONALLY LEFT BLANK]

WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO

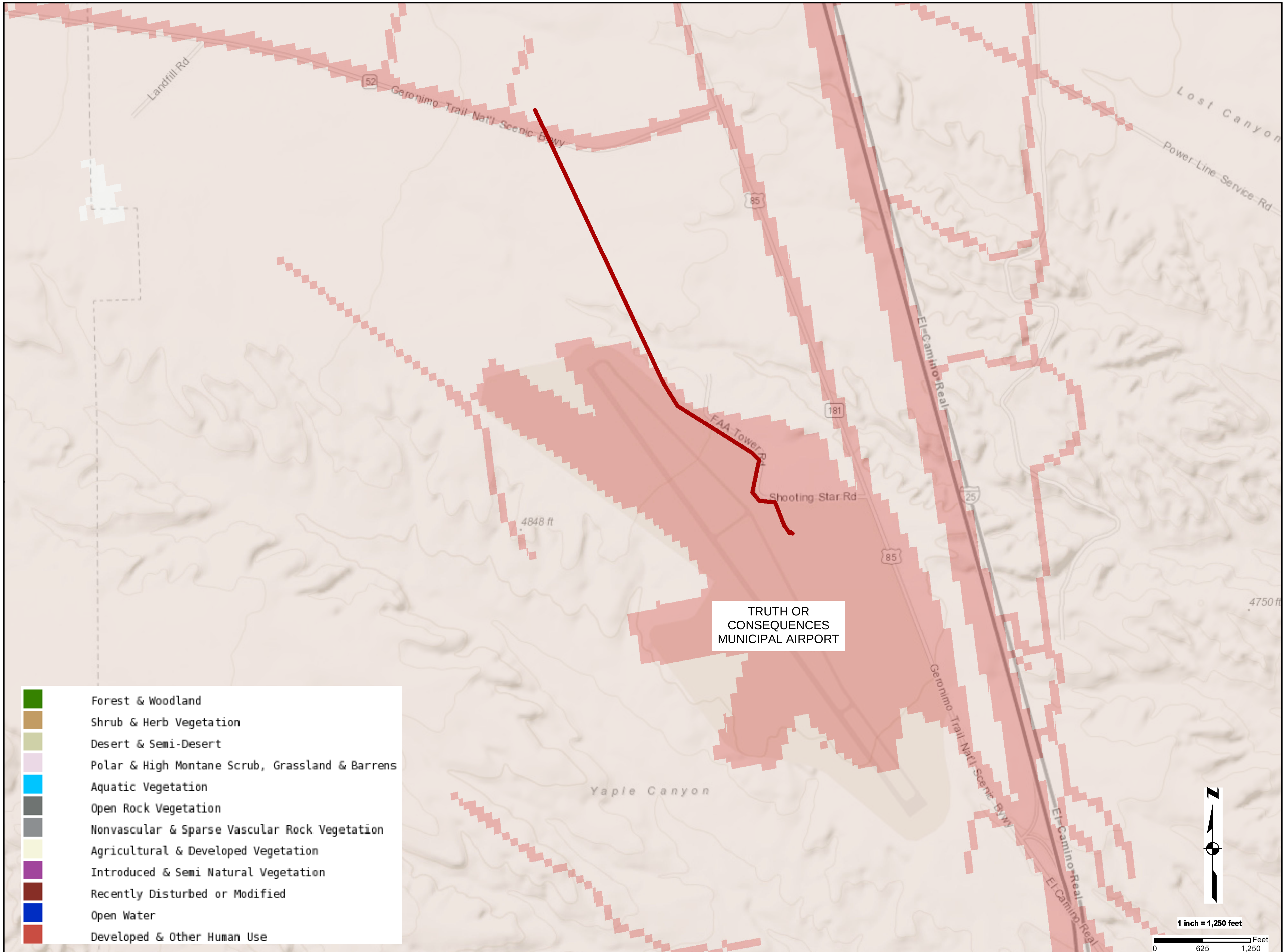


Legend

- CURRENT
- System Performance Upgrade
- Williamsburg
- Downtown
- East Side
- West Side
- North Side

CITY OF T OR C LAND COVERAGE

EXHIBIT 101



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY
ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

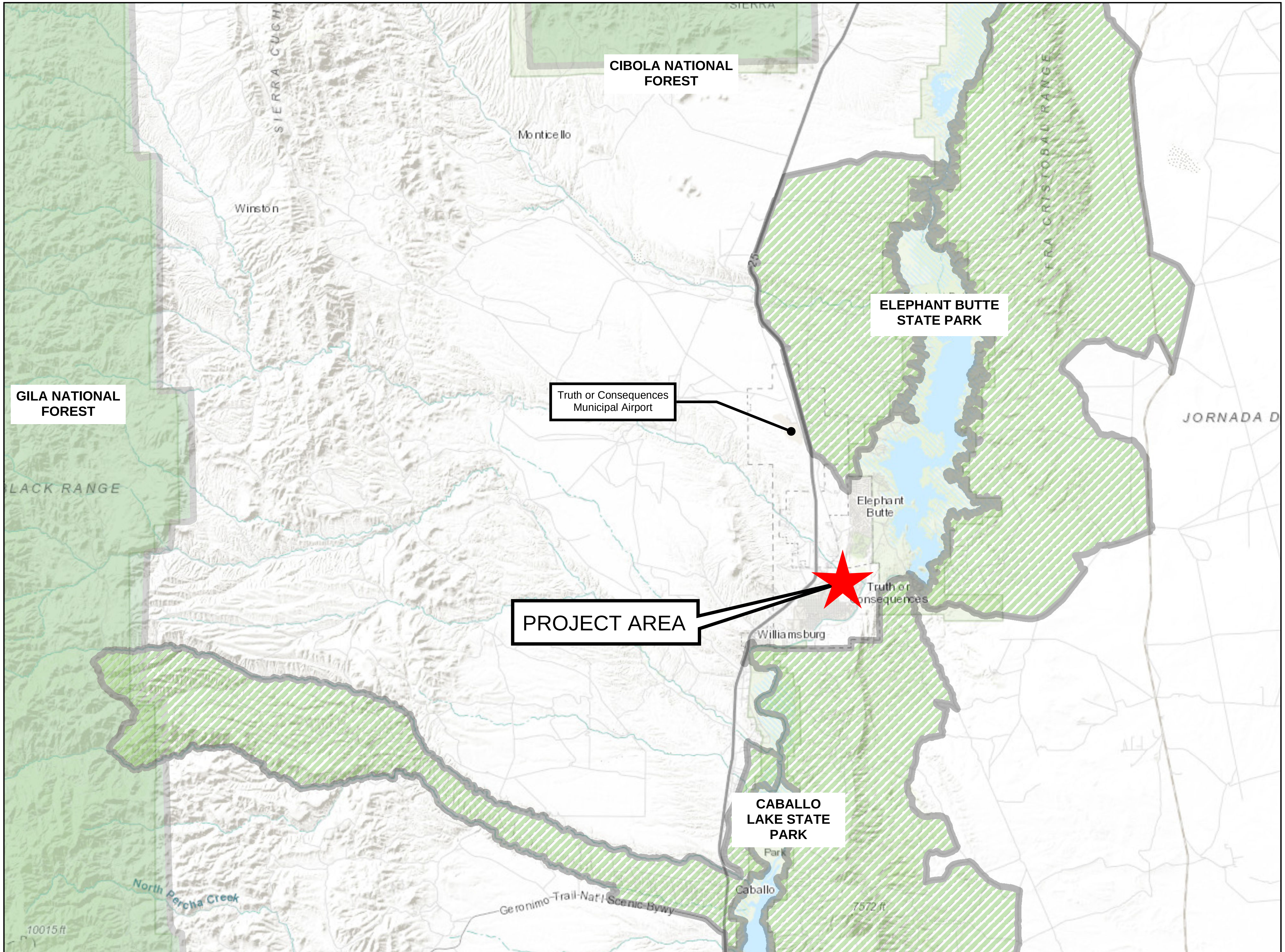
TRUTH OR CONSEQUENCES NEW MEXICO

Legend

- CURRENT
- System Performance Upgrade
- Williamsburg
- Downtown
- East Side
- West Side
- North Side

T OR C AIRPORT LAND COVERAGE

EXHIBIT 102



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

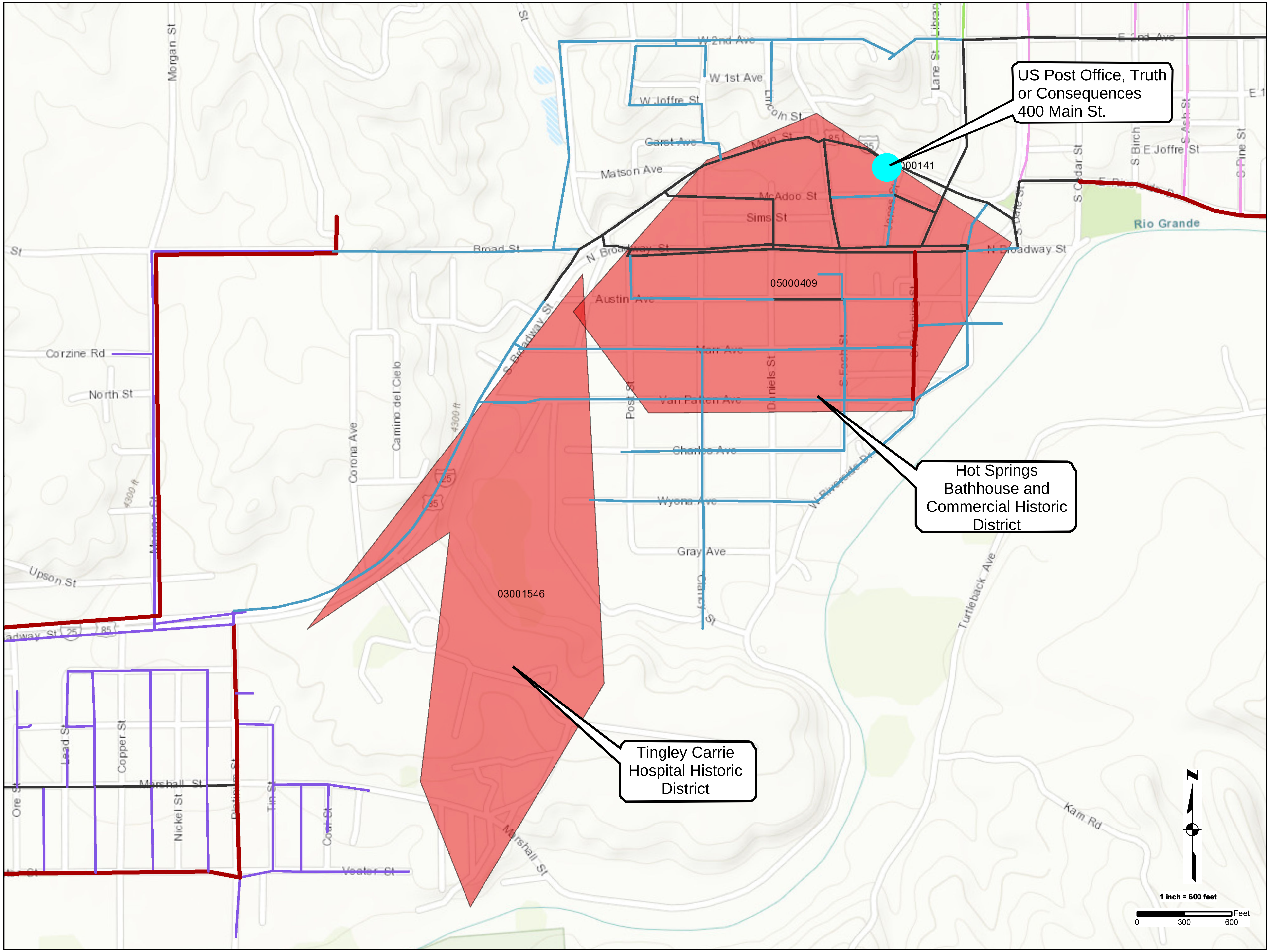
TRUTH OR CONSEQUENCES NEW MEXICO

Legend

- National Forests
- State Parks
- National Parks

FOREST LOCATION

EXHIBIT 103



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO

Legend

- National Register of Historic Places Points
- National Register of Historic Places Polygons
- CURRENT
- System Performance Upgrade
- Williamsburg
- Downtown
- East Side
- West Side
- North Side

HISTORICAL PLACES

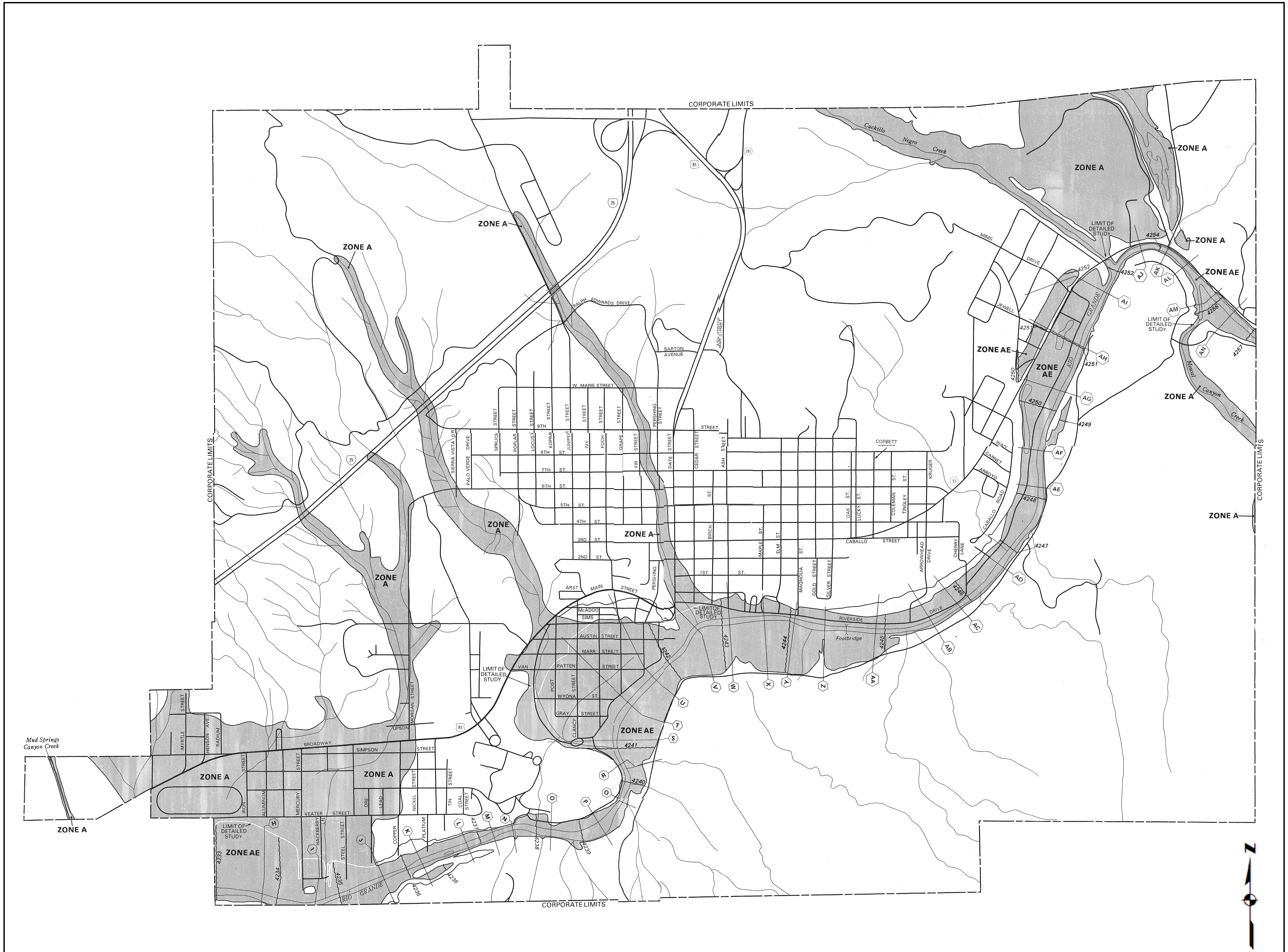
EXHIBIT 104

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO



Legend

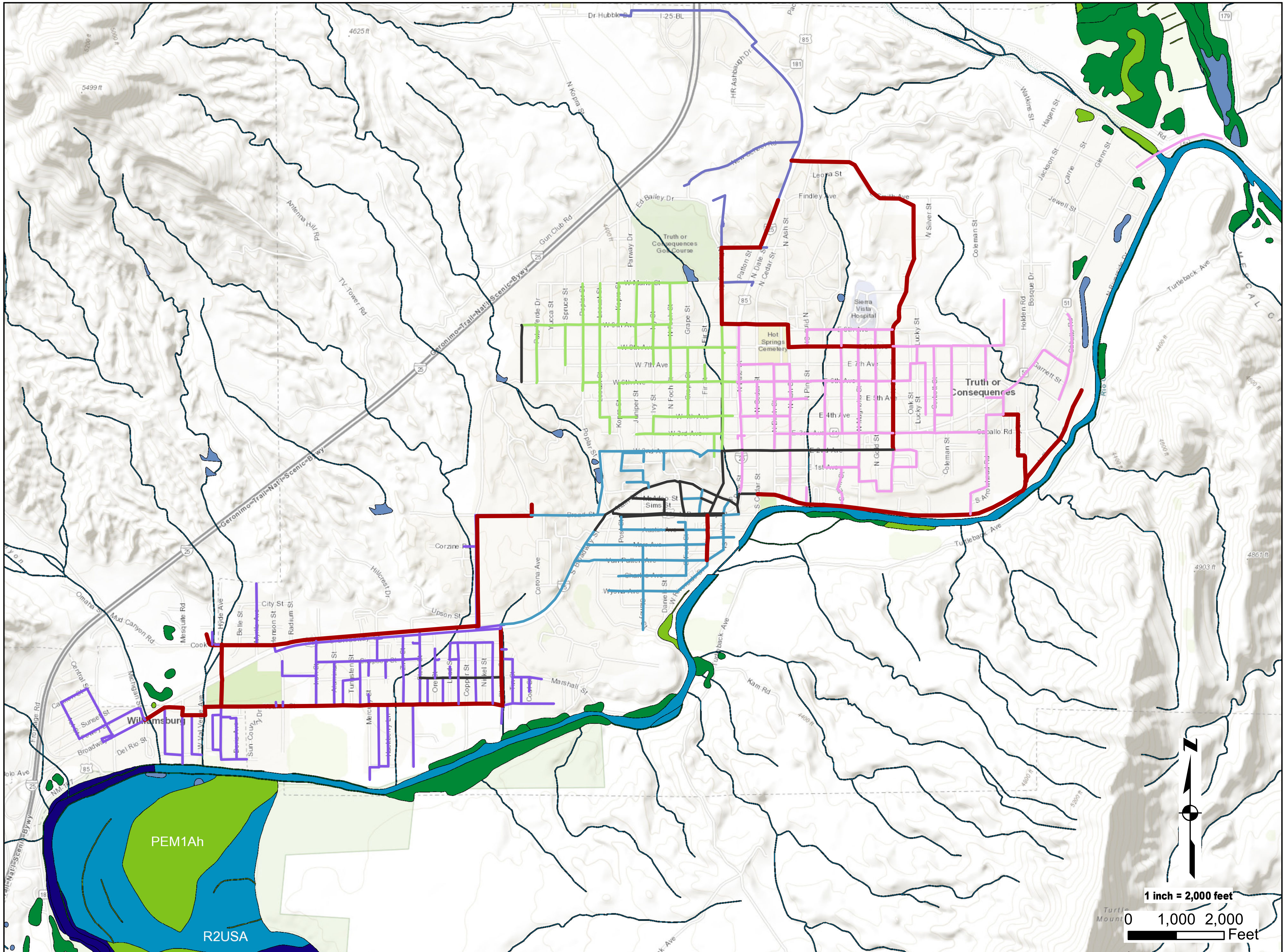
	SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.
	FLOODWAY AREAS IN ZONE AE
	OTHER FLOOD AREAS
ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
	OTHER AREAS
ZONE X	Areas determined to be outside 500-year flood plain.
ZONE D	Areas in which flood hazards are undetermined.

	Flood Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513	Base Flood Elevation Line; Elevation in Feet*
D — D	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone*
$RM7_X$	Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

FLOOD HAZARDS

EXHIBIT 105



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO

Legend

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine
- CURRENT
- System Performance Upgrade
- Williamsburg
- Downtown
- East Side
- West Side
- North Side

WETLANDS

EXHIBIT 106

SPECIES OF GREATEST CONSERVATION NEED AND FEDERAL OR STATE THREATENED/ENDANGERED – SIERRA COUNTY

Species of Greatest Conservation Need and Federal or State Threatened/Endangered
Sierra

Taxonomic Group	# Species	Taxonomic Group	# Species
Amphibians	1	Birds	19
Fish	2	Mammals	2
Molluscs	1		

TOTAL SPECIES: 25

Common Name	Scientific Name	NMGF	US FWS	Critical Habitat	SGCN	Photo
Mexican Gray Wolf	Canis lupus baileyi	E	E		Y	View
Penasco Least Chipmunk	Neotamias minimus atristriatus	E	C		Y	View
Common Ground Dove	Columbina passerina	E			Y	View
Yellow-billed Cuckoo (western pop)	Coccyzus americanus occidentalis		T		Y	View
Lucifer Hummingbird	Calothorax lucifer	T			Y	View
Costa's Hummingbird	Calypte costae	T			Y	View
Broad-billed Hummingbird	Cynanthus latirostris	T			Y	View
Least Tern	Sternula antillarum	E	E		Y	View
Neotropic Cormorant	Phalacrocorax brasilianus	T			Y	View
Bald Eagle	Haliaeetus leucocephalus	T			Y	View
Common Black Hawk	Buteogallus anthracinus	T			Y	View
Mexican Spotted Owl	Strix occidentalis lucida		T	Y	Y	View
Elegant Trogon	Trogon elegans	E			Y	View
Aplomado Falcon	Falco femoralis	E	E		Y	View
Peregrine Falcon	Falco peregrinus	T			Y	View
Thick-billed Kingbird	Tyrannus crassirostris	E			Y	View
Southwestern Willow Flycatcher	Empidonax traillii extimus	E	E	Y	Y	View
Bell's Vireo	Vireo bellii	T			Y	View
Gray Vireo	Vireo vicinior	T			Y	View
Baird's Sparrow	Centronyx bairdii	T			Y	View
Varied Bunting	Passerina versicolor	T			Y	View
Chiricahua Leopard Frog	Lithobates chiricahuensis		T	Y	Y	View
Gila Trout	Oncorhynchus gilae	T	T		Y	View
White Sands Pupfish	Cyprinodon tularosa	T			Y	No Photo

Species of Greatest Conservation Need and Federal or State Threatened/Endangered

Sierra

Common Name	Scientific Name	NMGF	US FWS	Critical Habitat	SGCN	Photo
Mineral Creek Mountainsnail	Oreohelix pilsbryi	T			Y	No Photo

[THIS PAGE INTENTIONALLY LEFT BLANK]

IPAC RESOURCE LIST

IPaC **U.S. Fish & Wildlife Service**

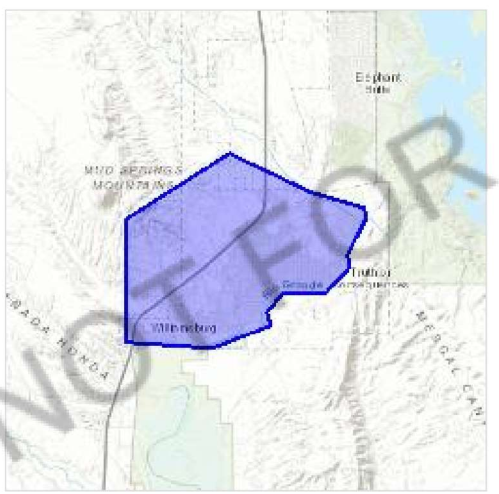
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Sierra County, New Mexico



Local office

New Mexico Ecological Services Field Office

(505) 346-2525
(505) 346-2542

2105 Osuna Road Ne
Albuquerque, NM 87113-1001

http://www.fws.gov/southwest/es/NewMexico/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Mexican Wolf *Canis lupus baileyi* EXPN
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/3916

Birds

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8196	Threatened
Northern Aplomado Falcon *Falco femoralis septentrionalis* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1923	EXPN
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Narrow-headed Gartersnake *Thamnophis rufipunctatus* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2204	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *Rana chiricahuensis* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

NAME	STATUS

Gila Trout *Oncorhynchus gilae* — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/781

Rio Grande Silvery Minnow *Hybognathus amarus* — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/1391

Flowering Plants

NAME	STATUS
Todsen's Pennyroyal *Hedeoma todsenii* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1081	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Jul 31
Black Throated Sparrow Amphispiza bilineata This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 15 to Sep 5
Black-chinned Sparrow Spizella atrogularis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31

Chestnut-collared Longspur Calcarius ornatus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Black-hawk Buteogallus anthracinus — Breeds Apr 1 to Sep 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Grace's Warbler Dendroica graciae — Breeds May 20 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lark Bunting Calamospiza melanocorys — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Virginia's Warbler Vermivora virginiae — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9441

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

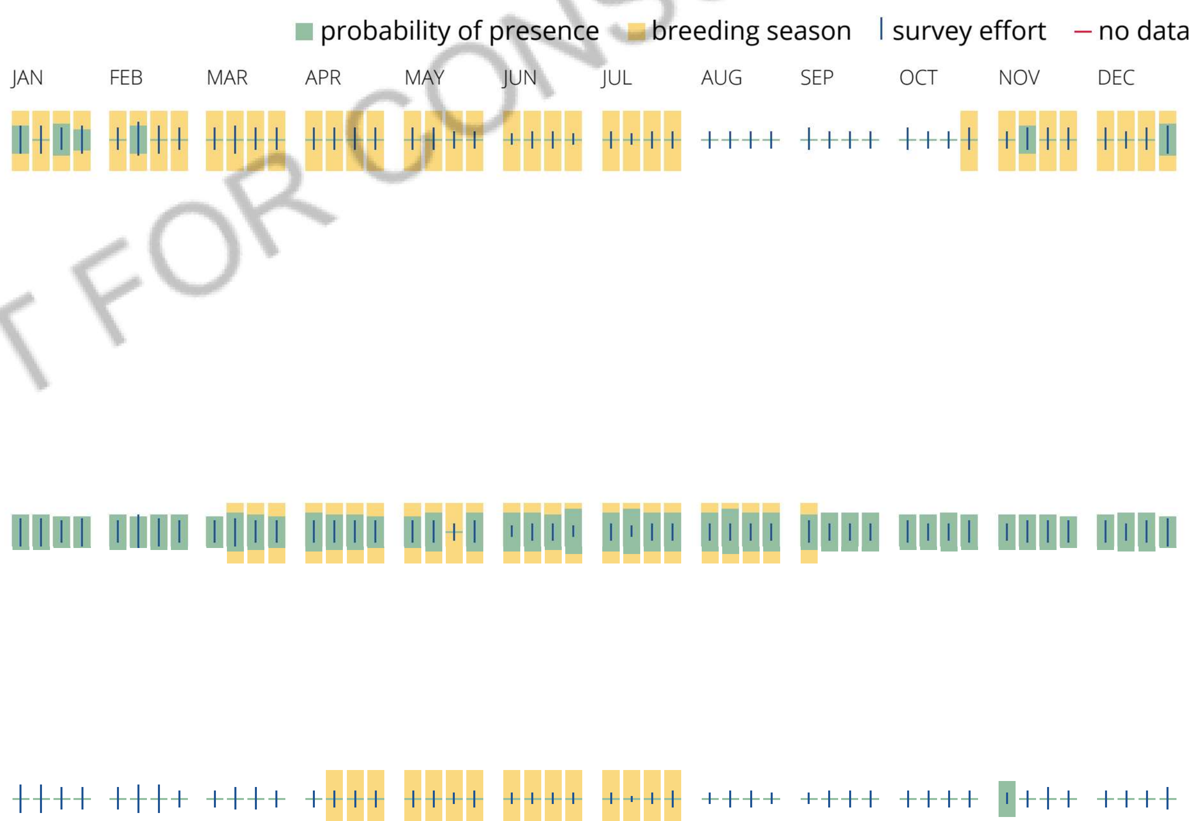
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

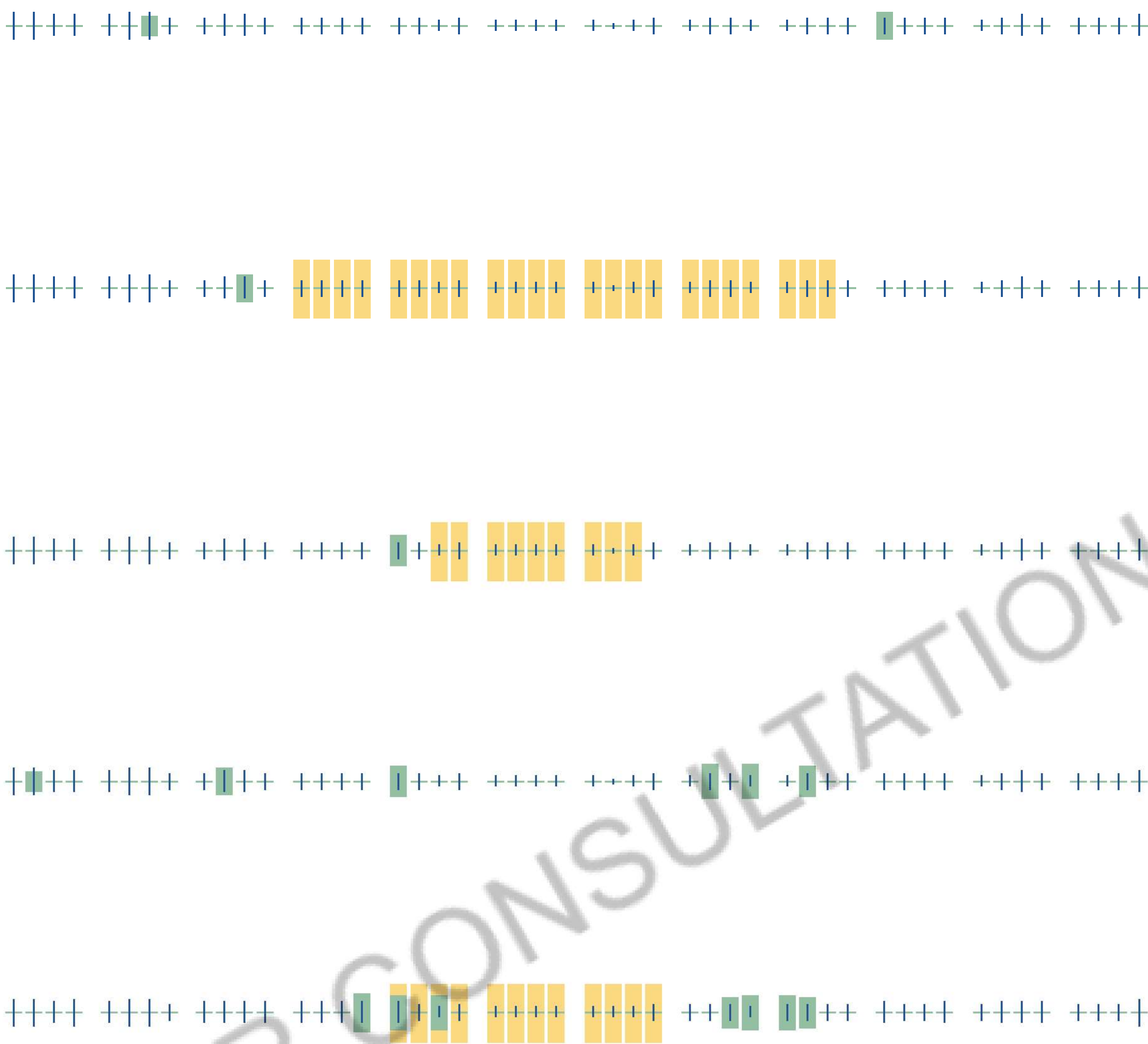


SPECIES

Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Black Throated Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Black-chinned Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Chestnut-collared Longspur
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Common Black-hawk
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Grace's Warbler
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Lark Bunting
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Virginia's Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
- PEM1Ah
- PEM1A
- PEM1C
- PEM1F

FRESHWATER FORESTED/SHRUB WETLAND
- PSS2A
- PSS2Ah
- PFO1A
- PSS2Ax

FRESHWATER POND
- PUBF
- PUBHx
- PUSC
- PUBFh
- PUSAh

LAKE
- L1UBHh
- L2USAh

RIVERINE
- R4SBC
- R2USA
- R2UBH
- R4SBA
- R4SBAx
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

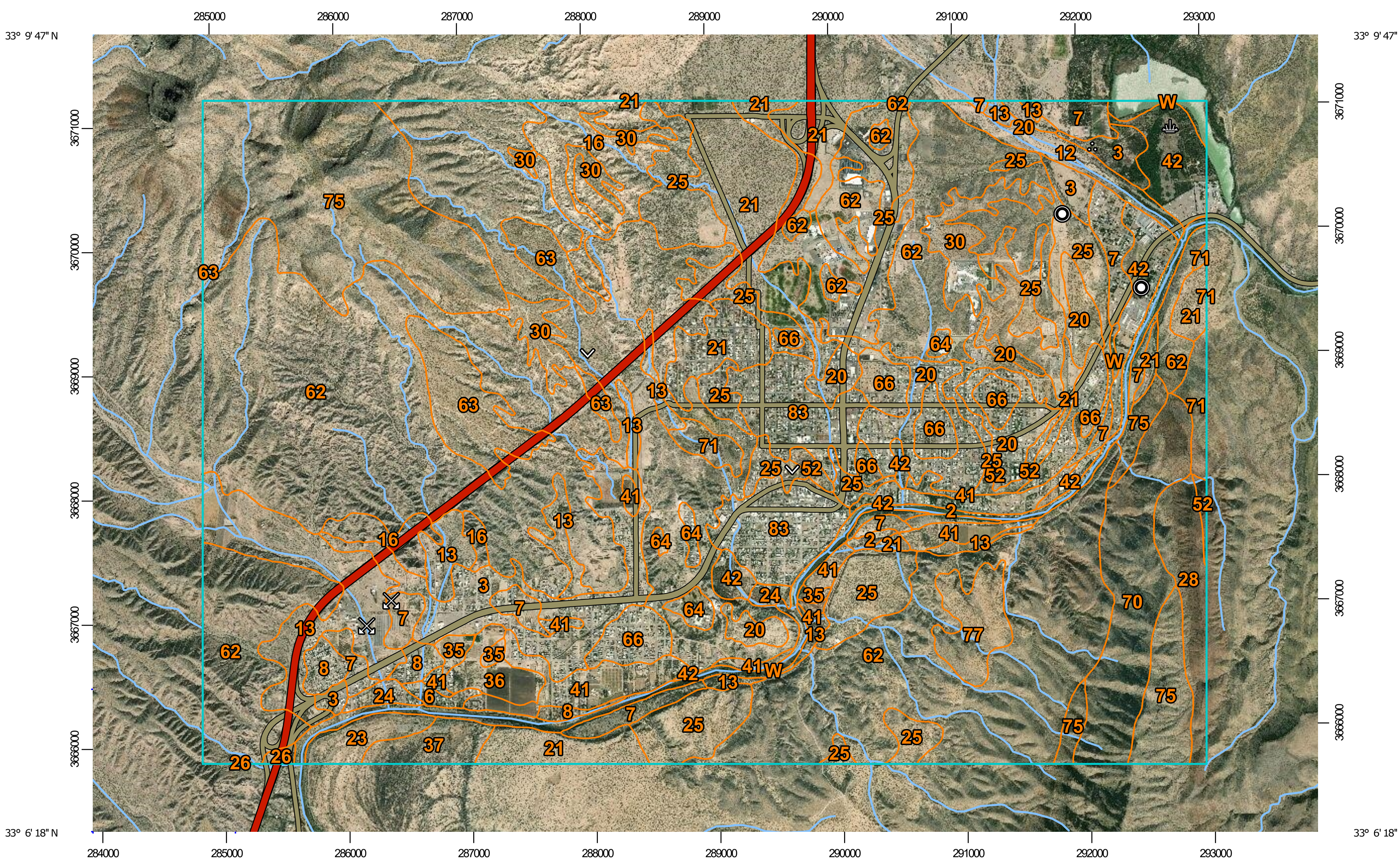
[THIS PAGE INTENTIONALLY LEFT BLANK]

SOIL MAP

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map—Sierra County Area, New Mexico
(Custom Soil Resource Report)



Map Scale: 1:45,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 500 1000 2000 3000

Feet: 0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:48,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sierra County Area, New Mexico
Survey Area Data: Version 15, Sep 15, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Dec 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Agua silt loam, 0 to 2 percent slopes	19.8	0.2%
3	Agustin gravelly sandy loam, 1 to 9 percent slopes	347.4	3.2%
6	Anapra clay loam	16.9	0.2%
7	Anthony-Vinton fine sandy loam	234.2	2.2%
8	Anthony-Vinton loams, 0 to 1 percent slopes	64.0	0.6%
12	Arizo-Riverwash complex, 1 to 3 percent slopes	81.1	0.8%
13	Arizo and Canutio soils, gently sloping	439.1	4.1%
16	Badland-Nickel complex, extremely steep	255.3	2.4%
20	Bluepoint loamy sand, 0 to 5 percent slopes	322.2	3.0%
21	Bluepoint loamy fine sand, moderately rolling	567.1	5.3%
23	Brazito loamy fine sand, gently sloping	59.0	0.5%
24	Brazito very fine sandy loam	34.1	0.3%
25	Caliza-Bluepoint-Yturbide association, very steep	970.8	9.0%
26	Canutio-Pajarito association, moderately rolling	7.9	0.1%
28	Courthouse-Rock outcrop association, very steep	126.8	1.2%
30	Delnorte-Cave-Tencee complex, moderately rolling	193.7	1.8%
35	Glendale loam	28.0	0.3%
36	Glendale clay loam, 0 to 1 percent slopes	61.0	0.6%
37	Glendale-Gila complex, nearly level	66.4	0.6%
41	Harkey loam	248.2	2.3%
42	Harkey loam, saline and alkali	246.0	2.3%
52	Lozier-Rock outcrop association, hilly	26.1	0.2%
62	Nickel very gravelly fine sandy loam, very steep	3,986.5	37.1%
63	Nickel-Chamberino association, gently sloping	221.4	2.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
64	Nickel-Tencee-Delnorte complex, moderately sloping	44.3	0.4%
66	Pajarito fine sandy loam	240.9	2.2%
70	Rock outcrop, extremely steep	313.4	2.9%
71	Rock outcrop-Courthouse complex, extremely steep	78.0	0.7%
75	Rock outcrop-Torriorthents association, extremely steep	834.4	7.8%
77	Simona loamy fine sand, gently sloping	99.2	0.9%
83	Urban land	319.8	3.0%
W	Water	196.6	1.8%
Totals for Area of Interest		**10,749.7**	**100.0%**

Sierra County Area, New Mexico

3—Agustin gravelly sandy loam, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 1wss
Elevation: 4,100 to 5,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Agustin and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agustin

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 6 inches: gravelly sandy loam
H2 - 6 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit:

Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Canutio

Percent of map unit:
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

6—Anapra clay loam

Map Unit Setting

National map unit symbol: 1wtz
Elevation: 4,050 to 5,200 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Anapra and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Anapra

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 29 inches: clay loam
H2 - 29 to 60 inches: stratified sand to loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Minor Components

Vinton

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Glendale

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Harkey

Percent of map unit:
Ecological site: Clayey (R042XB023NM)
Hydric soil rating: No

Brazito

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Agua

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

7—Anthony-Vinton fine sandy loam

Map Unit Setting

National map unit symbol: 2sps4
Elevation: 4,100 to 4,350 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Anthony and similar soils: 50 percent
Vinton and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Anthony

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: fine sandy loam
H2 - 12 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Description of Vinton

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: fine sandy loam
H2 - 15 to 60 inches: loamy fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional

Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Minor Components

Harkey

Percent of map unit:
Ecological site: Loamy (R042XB014NM)
Hydric soil rating: No

Vinton

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Anthony

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

8—Anthony-Vinton loams, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tm52
Elevation: 3,740 to 4,980 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Anthony and similar soils: 50 percent
Vinton and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Anthony

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

Ap1 - 0 to 9 inches: loam
Ap2 - 9 to 17 inches: loam
C1 - 17 to 39 inches: fine sandy loam
C2 - 39 to 60 inches: loamy fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Description of Vinton

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

Ap - 0 to 14 inches: silt loam
C1 - 14 to 22 inches: fine sand
C2 - 22 to 45 inches: loamy fine sand
C3 - 45 to 50 inches: fine sand
C4 - 50 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 4 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Minor Components

Harkey

Percent of map unit:

Agua

Percent of map unit:
Hydric soil rating: No

13—Arizo and Canutio soils, gently sloping

Map Unit Setting

National map unit symbol: 1ws6
Elevation: 4,050 to 5,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Arizo and similar soils: 40 percent
Canutio and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arizo

Setting

Landform: Alluvial fans, flood plains
Landform position (three-dimensional): Rise, talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Mixed gravelly alluvium

Typical profile

H1 - 0 to 4 inches: very gravelly sandy loam
H2 - 4 to 60 inches: stratified sand to very gravelly loamy sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Description of Canutio

Setting

Landform: Alluvial fans, flood plains
Landform position (three-dimensional): Rise, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed gravelly alluvium

Typical profile

H1 - 0 to 4 inches: very gravelly sandy loam
H2 - 4 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Minor Components

Bluepoint

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Yturbide

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

23—Brazito loamy fine sand, gently sloping

Map Unit Setting

National map unit symbol: 1wsk
Elevation: 4,050 to 5,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Brazito and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazito

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 6 inches: loamy fine sand
H2 - 6 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Minor Components

Caliza

Percent of map unit:
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Glendale

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Arizo

Percent of map unit:
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Gila

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

24—Brazito very fine sandy loam

Map Unit Setting

National map unit symbol: 1wsl
Elevation: 4,050 to 5,200 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Brazito and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brazito

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 14 inches: very fine sandy loam
H2 - 14 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Minor Components

Vinton

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Agua

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Anthony

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

26—Canutio-Pajarito association, moderately rolling

Map Unit Setting

National map unit symbol: 1wsn
Elevation: 4,050 to 5,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Canutio and similar soils: 45 percent
Pajarito and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canutio

Setting

Landform: Ridges on alluvial fans
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, crest, side slope, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed gravelly alluvium

Typical profile

H1 - 0 to 4 inches: very gravelly sandy loam
H2 - 4 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 1 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Gravelly (R042XB010NM)

Hydric soil rating: No

Description of Pajarito

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 4 inches: gravelly sandy loam
H2 - 4 to 60 inches: loam

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)
Hydric soil rating: No

Minor Components

Glendale

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Bluepoint

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Yturbide

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

37—Glendale-Gila complex, nearly level

Map Unit Setting

National map unit symbol: 1wt1
Elevation: 4,050 to 5,300 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Glendale and similar soils: 40 percent
Gila and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glendale

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 3 inches: silty clay loam
H2 - 3 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Ecological site: Bottomland (R042XB018NM)

Hydric soil rating: No

Description of Gila

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 8 inches: very fine sandy loam
H2 - 8 to 60 inches: stratified gravelly sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Minor Components

Arizo

Percent of map unit:
Ecological site: Gravelly Sand (R042XB024NM)
Hydric soil rating: No

Brazito

Percent of map unit:
Ecological site: Deep Sand (R042XB011NM)
Hydric soil rating: No

Canutio

Percent of map unit:
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Vinton

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

41—Harkey loam

Map Unit Setting

National map unit symbol: 1wtb
Elevation: 4,100 to 5,000 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Harkey and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Harkey

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Loamy (R042XB014NM)
Hydric soil rating: No

Minor Components

Agua

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Anthony

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

Glendale

Percent of map unit:
Ecological site: Salty Bottomland (R042XB033NM)
Hydric soil rating: No

Vinton

Percent of map unit:
Ecological site: Bottomland (R042XB018NM)
Hydric soil rating: No

62—Nickel very gravelly fine sandy loam, very steep

Map Unit Setting

National map unit symbol: 1wv2
Elevation: 3,000 to 6,000 feet
Mean annual precipitation: 8 to 10 inches
Mean annual air temperature: 58 to 65 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Nickel and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nickel

Setting

Landform: Fan piedmonts
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed gravelly alluvium

Typical profile

H1 - 0 to 12 inches: very gravelly fine sandy loam
H2 - 12 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 10 to 65 percent

Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Minor Components

Badlands
Percent of map unit:
Hydric soil rating: No

Chamberino
Percent of map unit:
Ecological site: Gravelly (R042XB010NM)
Hydric soil rating: No

Eba
Percent of map unit:
Ecological site: Gravelly Loam (R042XB035NM)
Hydric soil rating: No

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

APPENDIX 2- WATER SYSTEM FINANCIAL INFORMATION

TABLE OF CONTENT:

- WATER SYSTEM FINANCIAL INFORMATION REPORT CITY OF TRUTH OR CONSEQUENCES

CITY OF TRUTH OR CONSEQUENCES BUDGET FOR FISCAL YEAR 7/1/19 TO 6/30/20

504 WATER DIVISION

		2013-2014 Actual	2014-15 Actual	2015-16 Actual	2016-17 Actual	2017-18 Actual	2018-19 Actual	2019-20 Final	% Change	
REVENUES										
504-3803-30153	GROSS RECEIPTS-WA	37,593	38,940	5,533	41,029	39,667	39,327	49,355	25%	
504-3803-34523	UTILITY SERVICES	877,635	893,992	56,768	950,421	897,364	884,756	987,100	12%	928,994
504-3803-34533	UTILITY SERVICES CONNECTIONS	12,370	12,275	9,744	11,810	13,092	11,637	14,400	24%	
504-3803-35543	NON-PAYMENT PENALTIES	1,041	1,862	907	540	2,097	2,937	2,300	-22%	
504-3803-34553	WATER TAP FEES	3,937	6,042	-	2,095	3,030	2,967	4,040	36%	
504-3803-34773	MERCHANDISE & JOBBING	700	50	-	298	-	3,093			
504-3803-37380	MISC.	1,680	3,993	-	-	-	613			
	TOTAL REVENUE	**934,957**	**957,153**	**72,952**	**1,006,193**	**955,250**	**945,330**	**1,057,195**	12%	
TRANSFERS IN (OUT)										
504-3803-	IN							276,341		
504-3803-49930	OUT	(288,037)	(247,624)	(297,827)	(308,773)	(510,573)	(322,318)	(398,511)		
	TOTAL TRANSFERS	**(288,037)**	**(247,624)**	**(297,831)**	**(308,773)**	**(510,573)**	**(322,318)**	**(122,170)**		
PERSONNEL EXPENSES										
504-3803-40110	FULL TIME WAGES	216,565	182,617	170,369	136,248	180,932	176,514	167,211	-5%	
504-3803-40125	OVERTIME WAGES	19,234	17,808	17,461	23,934	23,206	25,224	15,000	-41%	
504-3803-40135	STANDBY WAGES	6,608	6,036	1,150	2,764	4,638	7,230	4,950	-32%	
504-3803-	DELAYED COMPENSATION	279	1,983	565	-	-	-		#DIV/0!	
504-3803-41205	FICA - REGULAR	14,448	14,781	11,629	9,990	12,542	12,681	11,604	-8%	
504-3803-41210	FICA - MEDICARE	3,379	3,457	2,720	2,336	2,933	2,966	2,714	-9%	
504-3803-41215	PERA	19,721	17,017	14,001	12,250	16,729	15,070	16,314	8%	
504-3803-41225	HEALTH INSURANCE	39,166	24,979	9,590	8,523	26,266	21,103	43,094	104%	
504-3803-41226	RETIREE INSURANCE	6,485	5,197	4,490	3,829	5,071	4,802	5,016	4%	
504-3803-41235	UNEMPLOYMENT INS.	3,984	215	1,058	379	-	-	1,250	#DIV/0!	
504-3803-41240	WORKER'S COMP. ASSESSMENT	71	58	44	39	41	37	70	89%	
504-3803-41785	WORKERS' COMP PREMIUMS	6,476	8,971	9,725	7,431	9,502	6,511	9,906	52%	
TOTAL PERSONNEL EXPENSES		**336,418**	**283,116**	**242,802**	**207,723**	**281,860**	**272,138**	**277,130**	2%	

CITY OF TRUTH OR CONSEQUENCES BUDGET FOR FISCAL YEAR 7/1/19 TO 6/30/20

38-03 WATER DIVISION		2013-2014 Actual	2014-15 Actual	2015-16 Actual	2016-17 Actual	2017-18 Actual	2018-19 Actual	2019-20 Final	% Change
EXPENDITURES									
504-3803-42305	MILEAGE REIMB.	-	-	-	292	685	131	1,000	663%
504-3803-42310	PER DIEM	1,829	874	785	1,659	2,438	1,117	3,300	195%
504-3803-43316	FUEL	10,760	8,355	6,471	5,682	7,650	6,844	8,000	17%
504-3803-43317	DIESEL FUEL	9,459	6,249	4,677	4,487	6,646	9,262	7,200	-22%
504-3803-47415	SYSTEM MAINT.	77,170	67,071	62,982	65,008	44,393	34,270	75,000	119%
504-3803-47420	MAINT. VEHICLE	5,704	2,731	25,445	14,501	9,717	4,399	6,000	36%
504-3803-47421	MAINT. EQUIPMENT	-	212	9,981	13,192	2,649	3,580	4,000	12%
504-3803-47425	OTHER MAINT./WATER METERS	5,108	2,585	5,673	-	2,455	2,241	6,000	168%
504-3803-48598	PROFESSIONAL SERVICES	-	-	4,215	12,950	52,918	30,434	22,350	-27%
504-3803-48599	PROFESSIONAL SERVICES	-	-	-	-	630	-	-	#DIV/0!
504-3803-44605	CHEMICALS/LABORATORY TESTING	-	-	-	-	89	3,743	2,000	-47%
504-3803-44606	OFFICE SUPPLIES	493	1,087	76	2,114	975	878	3,000	242%
504-3803-44607	FIELD SUPPLIES	2,711	436	2,268	1,258	2,089	18,476	8,000	-57%
504-3803-44613	NON-CAPITAL EQUIPMENT	-	-	-	-	-	4,564	4,000	-12%
504-3803-44615	SAFETY EQUIPMENT	5,010	1,906	3,426	3,313	3,593	3,880	3,000	-23%
504-3803-42620	UNIFORM/LINEN	2,548	1,768	1,330	1,762	1,741	1,351	1,500	11%
504-3803-42720	EMPLOYEE TRAINING	2,046	1,218	715	1,461	1,385	550	4,000	627%
504-3803-45555	MISC EXPENSE	-	-	-	-	2,098	-	-	#DIV/0!
504-3803-46731	PROPERTY LIABILITY INSURANCE	8,284	9,084	8,445	8,165	8,538	9,936	10,600	7%
504-3803-46732	GENERAL LIABILITY INSURANCE	19,786	19,620	19,392	19,194	19,545	20,488	24,100	18%
504-3803-46733	VEHICLE INSURANCE	7,358	7,920	8,027	8,411	11,460	8,876	9,958	12%
504-3803-43770	DUES & SUBSCRIPTIONS	-	661	1,042	11,586	9,126	10,217	10,000	-2%
504-3803-43775	TELEPHONE	962	1,264	1,455	1,531	1,509	1,443	1,000	-31%
504-3803-43780	UTILITIES	138,833	124,941	107,994	98,141	91,227	131,825	95,000	-28%
504-3803-46794	GOVT GRT	38,717	38,554	43,208	39,673	40,005	39,598	41,000	4%
504-3803-45796	FRANCHISE TAX	1,682	1,694	1,694	2,629	2,900	2,989	3,000	0%
504-3803-43797	WATER CONSERVATION	13,078	11,720	12,294	12,676	12,880	13,632	10,000	-27%
504-3803-43740	PRINTING/PUBLISHING	-	-	-	-	837	651	500	-23%
TOTAL OPERATING EXPENSES		**351,536**	**309,949**	**331,594**	**329,683**	**340,178**	**365,375**	**363,508**	**-1%**
CAPITAL OUTLAY									
504-3803-80810	CAPITAL EQUIPMENT/MACHINERY	55,565	23,748	28,500	-	79,000	48,938	103,000	110%
					-				
TOTAL CAPITAL OUTLAY		**55,565**	**23,748**	**28,500**	**-**	**79,000**	**48,938**	**103,000**	**110%**
	TOTAL EXPENDITURES	**743,518**	**616,813**	**602,896**	**537,406**	**701,038**	**686,451**	**743,638**	**8%**
	NET INCOME	**(96,598)**	**92,717**	**(827,772)**	**160,014**	**(256,361)**	**(63,439)**	**191,387**	**-402%**
TRANSFERS OUT									
101	General Fund	(120,000.00)	(100,000.00)	(100,000.00)	(100,000.00)	(100,000.00)	(75,000.00)	(50,000.00)	
301	W/WW Effluent Fund		(2.00)	(2.00)	(2.00)	-	-		
502	Jt. Utility Office Support	(27,261.00)	(24,000.00)	(33,000.00)	(44,400.00)	(86,200.00)	(82,130.00)	(59,740.00)	
306	Capital Improvement Jt. Utility Per Code	(115,000.00)	(125,000.00)	(141,159.00)	(141,159.00)	(141,159.00)	(141,974.00)	(23,787.00)	
306	Capital Improvement Jt. Utility Debt Service	(23,276.00)	(21,124.00)	(21,168.00)	(20,714.00)	(20,714.00)	(20,714.00)	(254,984.00)	
313	R&R Water Fund		(2.00)	(2.00)	(2.00)	-	-	-	
314	CDBG	-	-	-	-	(160,000.00)	-	-	
316	Emergency Repair Fund	(2,500.00)	(2,500.00)	(2,500.00)	(2,500.00)	(2,500.00)	(2,500.00)	(10,000.00)	
		(288,037)	**(272,628)**	**(297,831)**	**(308,777)**	**(510,573)**	**(322,318)**	**(398,511)**	

CITY OF TRUTH OR CONSEQUENCES BUDGET FOR FISCAL YEAR 7/1/19 TO 6/30/20

Enterprise Funds Recap	Fiscal Year 2013-14 Actual	Fiscal Year 2014-15 Actual	Fiscal Year 2015-16 Actual	Fiscal Year 2016-17 Final	Fiscal Year 2016-17 Final	Fiscal Year 2018-19 Actual	Fiscal Year 2019-20 Final	% Change Last FY
504 Water Division								
Revenues	$ 934,957	$ 957,153	$ 72,952	$ 1,006,193	$ 955,250	$ 945,330	$ 1,057,195	12%
Total Revenues	**$ 934,957**	**$ 957,153**	**$ 72,952**	**$ 1,006,193**	**$ 955,250**	**$ 945,330**	**$ 1,057,195**	12%
Transfers: IN (OUT)	$ (288,037)	$ (247,624)	$ (297,827)	$ (308,773)	$ (510,573)	$ (322,318)	$ (122,170)	-62%
Expenditures								
Personnel Services	$ 336,418	$ 283,116	$ 242,802	$ 207,723	$ 281,860	$ 272,138	$ 277,130	2%
Operating Expense	$ 351,536	$ 309,949	$ 331,594	$ 329,683	$ 340,178	$ 365,375	$ 363,508	-1%
Capital Outlay	$ 55,565	$ 23,748	$ 28,500	$ -	$ 79,000	$ 48,938	$ 103,000	110%
Total Expenditures	**$ 743,519**	**$ 616,813**	**$ 602,896**	**$ 537,406**	**$ 701,038**	**$ 686,451**	**$ 743,638**	8%
505 Solid Waste Division								
Revenues	$ 1,249,276	$ 1,241,653	$ 1,177,548	$ 1,394,707	$ 1,453,594	$ 1,525,765	$ 2,147,200	41%
Total Revenues	**$ 1,249,276**	**$ 1,241,653**	**$ 1,177,548**	**$ 1,394,707**	**$ 1,453,594**	**$ 1,525,765**	**$ 2,147,200**	41%
Transfers: IN (OUT)	$ (178,569)	$ (194,319)	$ (179,034)	$ (189,314)	$ (213,114)	$ (218,710)	$ (400,901)	83%
Expenditures								
Personnel Services	$ 575,309	$ 436,829	$ 428,140	$ 468,949	$ 506,028	$ 510,070	$ 631,930	24%
Operating Expense	$ 449,998	$ 504,959	$ 468,366	$ 555,006	$ 535,784	$ 609,091	$ 1,098,171	80%
Capital Outlay	$ -	$ 21,346	$ -	$ 74,021	$ 27,232	$ 40,121	$ 201,209	402%
Total Expenditures	**$ 1,025,307**	**$ 963,134**	**$ 896,506**	**$ 1,097,976**	**$ 1,069,044**	**$ 1,159,282**	**$ 1,931,310**	67%
506 Waste Water Division								
Revenues	$ 702,329	$ 746,677	$ 882,012	$ 1,064,404	$ 1,035,164	$ 1,107,661	$ 1,153,300	4%
Total Revenues	**$ 702,329**	**$ 746,677**	**$ 882,012**	**$ 1,064,404**	**$ 1,035,164**	**$ 1,107,661**	**$ 1,153,300**	4%
Transfers: IN (OUT)	$ 40,027	$ (14,064)	$ (146,763)	$ (187,333)	$ 41,129	$ (214,801)	$ (238,902)	11%
Expenditures								
Personnel Services	$ 325,599	$ 340,992	$ 340,747	$ 333,565	$ 292,170	$ 273,938	$ 320,628	17%
Operating Expense	$ 402,568	$ 409,812	$ 342,183	$ 329,368	$ 587,817	$ 446,162	$ 447,053	0%
Capital Outlay	$ 65,020	$ 32,181	$ -	$ -	$ 115,622	$ 110,038	$ 135,000	23%
Total Expenditures	**$ 793,187**	**$ 782,985**	**$ 682,930**	**$ 662,933**	**$ 995,609**	**$ 830,138**	**$ 902,681**	9%

APPENDIX 3- MUNICIPAL AIRPORT

TABLE OF CONTENT:

- TRUTH OR CONSEQUENCES MUICIPAL AIRPORT ACTIVATION AS A PUBLIC WATER SYSTEM
- 2019 SANITARY SURVEY REPORT T OR C MUNICIPAL AIRPORT ACTION PLAN
- SAMPLING TESTING – MUNICIPAL AIRPORT
- 2019 SANITARY SURVEY REPORT

[THIS PAGE INTENTIONALLY LEFT BLANK]

TRUTH OR CONSEQUENCES MUICIPAL AIRPORT ACTIVATION AS A PUBLIC WATER SYSTEM

WILSON
&COMPANY

NEW MEXICO
ENVIRONMENT DEPARTMENT
Drinking Water Bureau
2301 Entrada Del Sol
Tel. 575-915-1113• Fax 575-526-6162
Toll Free 1-877-654-8720
www.nmenv.state.nm.us

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lt. Governor

BUTCH TONGATE
Cabinet Secretary
J.C. BORREGO
Deputy Secretary

August 27, 2018

Juan Fuentes-City Manager
Truth or Consequences Municipal Airport; NM3501427
505 Sims
Truth or Consequences, NM 87901

Subject: Truth or Consequences Municipal Airport Activation as a Public Water System; #NM3501427

Mr. Juan Fuentes,

The New Mexico Environment Department Drinking Water Bureau (NMED-DWB) has determined that the Truth or Consequences Municipal Airport water system located near Truth or Consequences, NM requires monitoring as a Public Water System (PWS). The Truth or Consequences Municipal Airport water system has been classified as a Non-Community water system with a transient population of 40. As a result of this determination of PWS status, the Truth or Consequences Municipal Airport must comply with all relevant rules and regulations for public water systems in 40 CFR 141 and 20.7.10 NMAC. Some of the initial requirements that you should immediately begin working on are as follows:

The Truth or Consequences Municipal Airport water system is required to employ a certified operator with a minimum of a Small Water Certification. You can obtain operator certification information at the following link: https://www.env.nm.gov/drinking_water/dwb-utility-operator-certification-program/

Pursuant to Section 20.7.10.100 NMAC [incorporating 40 CFR Section 141.853(a)(1)], The Truth or Consequences Municipal Airport water system must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that is representative of water throughout the distribution system. You can obtain a sample plan template at https://www.env.nm.gov/dwb/RTCR.htm Microbiological samples are required to be collected by your certified operator according to an approved sample siting plan. Your plan will need to be provided to NMED-DWB for review and approval before samples can be used for compliance determination. Your first microbiological sample to be used for compliance is due in October 2018. The Truth or Consequences Municipal Airport water system is required to collect one microbiological sample per month and provide analytical results to NMED each month.

Pursuant to Section 20.7.10.100 NMAC [incorporating 40 CFR Section 141.403(a)(4)], the Truth or Consequences Municipal Airport water system is required to develop a written Operation and Maintenance (O&M) Plan. You can obtain an O&M Plan template at https://www.env.nm.gov/dwb/forms/index.htm The O&M Plan will need to be provided to NMED-DWB for review.

The Truth or Consequences Municipal Airport water system is required to retain the records associated with the water system for the following periods of time:

- Bacteriological samples – 5 years
- Nitrate samples – 10 years
- Records of action taken to correct violations – 3 years after last action
- Reports, correspondence, communication and sanitary surveys - 10 years
- Variance granted to the system – 5 years following the expiration of the variance

If you have any questions regarding the activation of your system, please contact your assigned Compliance Officer Aaron Beckworth in the Silver City office at 575-956-1552 or by email at aaron.beckworth@state.nm.us.

Sincerely,

B Garcia

Brandi Garcia, Compliance Supervisor
Drinking Water Bureau
Water Protection Division

cc: Joe Martinez-PWSS Manager (electronic)
Aaron Beckworth-Compliance Officer (electronic)
Silver City Field Office
Electronic File System

2019 SANITARY SURVEY REPORT T OR C MUNICIPAL AIRPORT ACTION PLAN

WILSON
&COMPANY

Sandra Whitehead
Mayor

Kathy Clark
Mayor Pro-Tem

Rolf Hechler
Commissioner

Paul Baca
Commissioner

George Szigeti
Commissioner

Morris Madrid
City Manager

505 Sims St.
Truth or Consequences, New Mexico 87901
P: 575-894-6673 ♦ F: 575-894-7767
www.torcnm.org

Notification Sent via Email

March 8, 2019

Aaron Beckworth, Compliance Officer
Drinking Water Bureau
Water Protection Division
3082 32nd Street Bypass, Suite D
Silver City, NM 88061

RE: 2019 Sanitary Survey Report
T or C Municipal Airport Action Plan

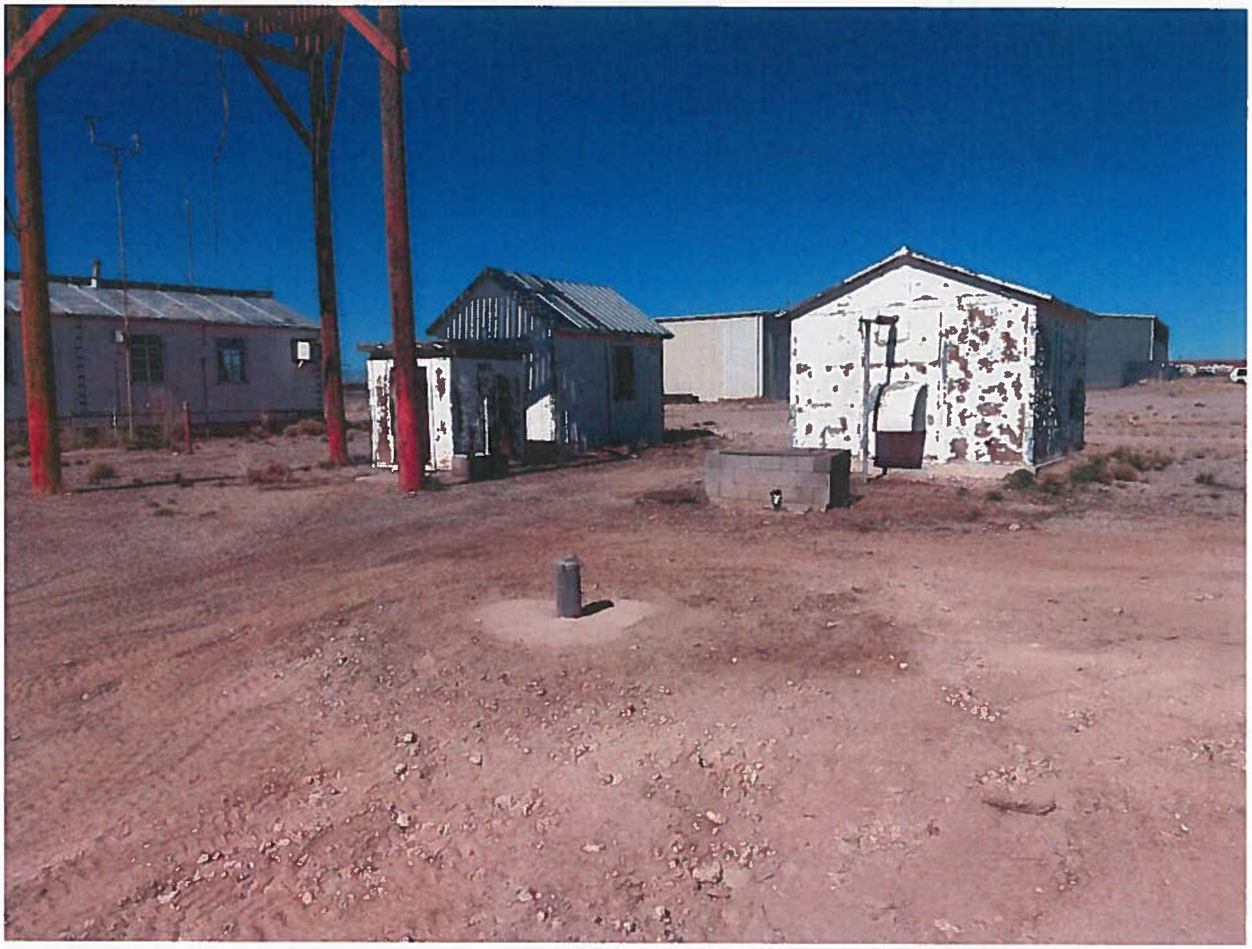
Good Afternoon Mr. Beckworth,

Please accept this letter as a formal action plan as noted and required in the T or C Municipal Airport Sanitary Survey Report 2019. The City is diligently working to correct all violations. Please see references below:

1. **(004C) System Management - Inadequate or lack of an operations and maintenance plan or necessary operational policies.** The City is in the process of revising the operations and maintenance plan for the City Water Department to include operations and maintenance of the Airport Water System. This will also include an update to the City Water Department Emergency Response Plan to include the Airport Water System.

2. **(001E) System Management - Poor housekeeping of system facilities.**
The City of T or C Water Department has a work order to disconnect and remove the sand separator and water softener and then Airport personnel will address housekeeping issues within that building. Water Department will install and bury new PVC pipe as directed. Maintenance of this will be part of the O & M Plan.

3. **(001L) Source - Wellhead is not secured from the elements or intrusion or is susceptible to flooding.**
As shown in the attached picture, the Airport Personnel has begun the ground maintenance and cleanup around the well casing and exposing the concrete pad. Water will be diverted away from the well head area and a proper containment shelter will be constructed preventing potential contaminants and damage from enter the well and/or aquifer.



If you have any questions or concerns, or need additional information, please contact me at 575-894-6673.

Sincerely,

Morris Madrid – City Manager
Truth or Consequences
505 Sims Street T or C, NM 87901
575-894-6673
mmadrid@torcnm.org

SAMPLING TESTING – MUNICIPAL AIRPORT

From:	Beckworth, Aaron, NMENV
To:	Navarro, Jesus
Cc:	Traci Burnette
Subject:	RE: [EXT] Airport
Date:	Friday, January 18, 2019 11:20:00 AM

Jesus,

One bac-t sample per month for the airport. The sampling sites have been uploaded to the SDWIS database, so everything is in order. I am expecting to see a sample from the **RT001** location before the end of the month.

No lead and copper sampling required for the airport.

Thank you,
Aaron

Water System Detail Information			
Water System No.:	NM3501427	Federal Type:	NC
Water System Name:	TRUTH OR CONSEQUENCES MUNICIPAL AIRPORT	Federal Source:	GW
Principal County Served:	SIERRA	System Status:	A

Routine TCR Sample Schedules		
Begin/End Date	Seasonal Period	Requirements
10-01-2018 - Continuous	1/1 - 12/31	1 RT/MN

Water System Sampling Points						
Facility ID	Facility Name	Fac Type Code	Smpl Pt ID Type Code Status	Location	Designations	
					Type	Begin/End Date
01427000	DIST	DS	RP001D - DS - A	PUBLIC RESTROOMS		
01427000	DIST	DS	RP001O - DS - A	TERMINAL BUILDING		
01427000	DIST	DS	RP001U - DS - A	MECHANICAL ROOM		
01427000	DIST	DS	RP002D - DS - A	TRAILER HOME		
01427000	DIST	DS	RP002O - DS - A	PUBLIC RESTROOMS		
01427000	DIST	DS	RP002U - DS - A	TERMINAL BUILDING		

01427000	DIST	DS	RP003D - DS - A	LAFONT HANGER	
01427000	DIST	DS	RP003O - DS - A	TRAILER HOME	
01427000	DIST	DS	RP003U - DS - A	PUBLIC RESTROOMS	
01427000	DIST	DS	RP004D - DS - A	AUGE HANGER	
01427000	DIST	DS	RP004O - DS - A	LAFONT HANGER	
01427000	DIST	DS	RP004U - DS - A	TRAILER HOME	
01427000	DIST	DS	RT001 - DS - A	TERMINAL BUILDING	
01427000	DIST	DS	RT002 - DS - A	PUBLIC RESTROOMS	
01427000	DIST	DS	RT003 - DS - A	TRAILER HOME	
01427000	DIST	DS	RT004 - DS - A	LAFONT HANGER	
01427000	DIST	DS	SP014270001 - DS - A	DIST	
01427001	AIRPORT WELL #1	WL	SP014270011 - EP - A	AIRPORT WELL #1	

From: Navarro, Jesus <jnavarro@torcnm.org>
Sent: Friday, January 18, 2019 11:15 AM
To: Beckworth, Aaron, NMENV <Aaron.Beckworth@state.nm.us>
Cc: Traci Burnette <tburnette@torcnm.org>
Subject: [EXT] Airport

Good Morning Aaron Beckworth just so we don't drop the ball on the airport I would like to know as far as the Bac-t samples for the airport its one sample a month and is the airport going to be required to be test for led and copper or its not do to it being none community can you please let me know so we could be able to get everything we need to get thank you have a nice day

[THIS PAGE INTENTIONALLY LEFT BLANK]

2019 SANITARY SURVEY REPORT

MICHELLE LUJAN GRISHAM
Governor

HOWIE C. MORALES
Lt. Governor

State of New Mexico
ENVIRONMENT DEPARTMENT

Drinking Water Bureau
3082 32nd Street Bypass, Suite D
Silver City, NM 88061
Tel. 575-388-1934 • Fax 575-388-3258
www.env.nm.gov/drinking_water/

JAMES C. KENNEY
Cabinet Secretary Designate

JENNIFER J. PRUETT
Deputy Secretary

Notification Sent via Email

February 14, 2019

Morris Madrid
Truth or Consequences Municipal Airport, NM3501427
505 Sims St
Truth or Consequences, NM 87901

RE: 2019 Sanitary Survey Report

Dear Mr. Madrid,

Enclosed is a report documenting the recent sanitary survey for the Truth or Consequences Municipal Airport water system, completed on January 15, 2019 by Aaron Beckworth of the New Mexico Environment Department, Drinking Water Bureau (DWB). During the survey, three significant deficiencies were identified.

Upon receipt of this report, the Truth or Consequences Municipal Airport must consult with the DWB within 30 days of the date of this letter for all significant deficiencies (i.e., provide written documentation to DWB within 30 days of receipt of this letter stating how and when each significant deficiency will be corrected). Failure to consult with DWB within 30 days on all significant deficiencies will result in a violation of NMAC 20.7.10.100 incorporating 40 CFR Part 141 Subpart S.

Additionally, the Truth or Consequences Municipal Airport must take corrective action on all significant deficiencies and provide compliance documentation that is acceptable to DWB no later than 120 days of the date of this letter OR be in compliance with a DWB approved schedule and plan for correcting these deficiencies within 120 days of the date of this letter. Failure to correct and provide documentation of significant deficiency corrections no later than 120 days of the date of this letter will result in a treatment technique violation of NMAC 20.7.10.100 incorporating 40 CFR Part 141 Subpart S.

If you have any questions or need additional clarification concerning this report, please contact me in the Silver City office at 575-388-1934 or by e-mail at Aaron.Beckworth@state.nm.us.

Respectfully,

Aaron Beckworth

Aaron Beckworth, Compliance Officer
Drinking Water Bureau
Water Protection Division

cc: Brandi Garcia, Southern Region Supervisor
Silver City Area Office File
Electronic Central File

NMED
New Mexico Environment Department

SANITARY SURVEY REPORT

For

Truth or Consequences Municipal Airport
NM3501427

Este informe contiene información importante acerca de su agua potable.
Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.

Prepared by: Aaron Beckworth

New Mexico Environment Department
Drinking Water Bureau
Silver City Field Office
3082 32nd Street Bypass, Suite D
Silver City, NM 88061

State of New Mexico
Environment Department
Water Protection Division
Drinking Water Bureau

RECORD OF INSPECTION

This sanitary survey report fulfills the requirements of New Mexico Administrative Code 20.7.10.100 incorporating 40 Code of Federal Regulations 141.21(d)(2) and 142.16(o)(2) for completing a State approved survey.

Aaron Beckworth

NMED APPROVING AUTHORITY: ______________________ Date: 2/14/2019

Aaron Beckworth, Compliance Officer

Introduction

A sanitary survey enables the New Mexico Environment Department, Drinking Water Bureau (DWB) to provide a comprehensive and accurate review of the components of a water system, to assess the operating condition and adequacy of the water system, and to determine if past recommendations have been implemented effectively. The sanitary survey encompasses eight specific elements that are evaluated during the survey. Those eight elements are listed below.

- Source (protection, physical components, and condition)
- Treatment
- Distribution system
- Finished water storage
- Pumps, pump facilities, and controls
- Monitoring, reporting, and data verification
- System management, and operation
- Operator compliance with State requirements

Each element may not be specifically mentioned within this report; however, a significant deficiency or recommendation will be noted if any issues are discovered with any of these eight (8) elements.

As part of the sanitary survey a site inspection of the Truth or Consequences Municipal Airport water system was conducted on January 15, 2019 by DWB Compliance Officer Aaron Beckworth, accompanied by DWB Community Services Coordinator Michael Montoya, Truth or Consequences Grant Coordinator Traci Burnett, the water system operator, Jesus Navarro, and Jeff Dornbush, consultant and member of the Public Utility Advisory Board. In addition to the site inspection, a review of various operational and managerial documents, and DWB compliance files for the water system was conducted.

System Description

The Truth or Consequences Municipal Airport water system is classified as a transient non-community water system according to the New Mexico Drinking Water Regulations 20.7.10 NMAC. The water system consists of one well, two pressure tanks, and a distribution system with 5 service connections.

Survey Findings

Sanitary surveys serve as a proactive public health measure and can provide important information on a water system's design and operations, can identify minor and significant deficiencies for correction before they become major problems, and can improve overall system compliance.

Significant Deficiencies

A significant deficiency is defined as any deficiency that is causing or has the potential to cause a threat to public health [New Mexico Administrative Code (NMAC) 20.7.10.100 incorporating 40 Code of Federal Regulations (CFR) §141.403(a)(4)]. Water systems must consult with the DWB within 30 days and take corrective action for any significant deficiencies found during the sanitary survey no later than 120 days after receiving written notification of such deficiencies, or be in compliance with a DWB-approved schedule and plan for correcting these deficiencies within the same 120-day period [NMAC 20.7.10.100 incorporating 40 CFR §141.403(a)(4) and §141.403(a)(5)]. Failure to remedy any significant deficiency will result in a treatment technique violation of NMAC 20.7.10.100 incorporating 40 CFR Part 141 Subpart S.

A total of three significant deficiencies were identified during the survey.

1. ***Deficiency:*** **(004C)** System Management - Inadequate or lack of an operations and maintenance plan or necessary operational policies.

   Regulatory Citation: NMAC 20.7.10.100, incorporating 40 CFR Part 141.403(a)(4)

   Concern/Description: An operation and maintenance plan is an essential part of any water system. The plan should summarize the actions required for cost effective, efficient, safe and reliable operation of the water system. An adequate plan should allow for a flawless transition from one operator to the next. Lacking a written plan could result in insufficient operation and maintenance of the water system as well as prolonged water outages during emergency situations.

   Corrective Action: Truth or Consequences Municipal Airport must prepare and implement an operation and maintenance plan. A template has been developed to aid in the preparation of a written plan and can be located on the Technical Assistance page of the DWB website.

2. ***Deficiency:*** **(001E)** System Management - Poor housekeeping of system facilities.

   Regulatory Citation: NMAC 20.7.10.400, GENERAL OPERATING REQUIREMENTS, Paragraph B. Security and protection of a public water system.
   "Any part or component of a public water system including but not limited to spring junction boxes, well houses, storage reservoirs, collection devices, pump facilities, and treatment facilities shall be constructed, operated and maintained to prevent:
   (1) unauthorized entry to the water supply;
   (2) flooding of the water supply; and
   (3) contamination of, the water supply."

   Concern/Description: Poor housekeeping can result in safety hazards, inability to access critical facilities, failure of system components, and possible introduction of contaminants into the water supply.

   Corrective Action: Truth or Consequences Municipal Airport must remove unused piping and equipment, such as the sand separator and water softener; replace deteriorated PVC pipe; properly bury and/or protect newly installed PVC pipe from direct exposure to sunlight; and maintain system facilities as part of an operation and maintenance plan.

3. ***Deficiency:*** **(001L)** Source - Wellhead is not secured from the elements or intrusion or is susceptible to flooding.

   Regulatory Citation: NMAC 20.7.10.400, GENERAL OPERATING REQUIREMENTS, Paragraph C. Protection of a public water system well.

"A ground water supply well serving a public water system shall have a sanitary seal installed at the wellhead to protect against entry of storm water and other non-potable fluids or foreign materials and against access by insects, rodents, birds or other vermin. All vents installed in the well casing shall be protected against entrance of foreign material and flooding. If the well is completed in a subsurface vault, the casing shall extend above the potential flooding height. All cracks, joints or other openings at the wellhead and all penetrations to the casing at or near the ground surface shall be tightly sealed with an impermeable material."

Concern/Description: Properly protected wellheads prevent contaminated water, insects, vermin, or other potential contaminants from entering the well and/or aquifer. Facilities that are susceptible to flooding have an increased potential for contamination by surface water.

Corrective Action: Truth or Consequences Municipal Airport must remove the dirt mounted up around the well casing and verify the existence of a properly constructed concrete pad surrounding the wellhead as part of the required sanitary seal.

Conclusion

A sanitary survey of the Truth or Consequences Municipal Airport water system was conducted on January 15, 2019. Based upon the onsite inspection and review of various operational and managerial documents, and DWB compliance files, a total of three significant deficiencies were identified. Truth or Consequences Municipal Airport must comply with the each of the following requirements.

- Upon receipt of this report, Truth or Consequences Municipal Airport must consult with the DWB within 30 days for all significant deficiencies (i.e., provide written documentation to the DWB within 30 days of receipt of this report stating how and when each significant deficiency will be addressed).

- Truth or Consequences Municipal Airport must take corrective action on all significant deficiencies and provide compliance documentation that is acceptable to the DWB no later than 120 days after receiving written notification of such deficiencies or be in compliance with an approved schedule and plan for correcting these deficiencies within the same 120-day period.

- In addition, Truth or Consequences Municipal Airport must provide written documentation to the DWB within 30 days of completing corrective action for each significant deficiency.

- Failure to correct any significant deficiency in accordance with the previous bullet will result in a treatment technique violation of NMAC 20.7.10.100 incorporating 40 CFR Part 141 Subpart S.

If you have any questions or need additional clarification concerning this report, please call 575-388-1934 or e-mail Aaron.Beckworth@state.nm.us.

[THIS PAGE INTENTIONALLY LEFT BLANK]

APPENDIX 4- CONSTRUCTION AND NON-CONSTRUCTION DETAIL COST ESTIMATE

TABLE OF CONTENT:

- ALTERNATIVE II - COMPLETE SYSTEM
- ALTERNATIVE III – SYSTEM PERFORMANCE UPGRADE
- ALTERNATIVE III – A SYSTEM HIGH PRESSURE SOLUTION
- ALTERNATIVE III – B SYSTEM REDUNDANCY AND HYDRAULIC ENHANCEMENTS
- ALTERNATIVE III – C ADDITIONAL HYDRAULIC PERFROMANCE ENHACNECMENT
- ALTERNATIVE IV – NORTH AREA
- ALTRENATIVE V – EAST AREA
- ALTERNATIVE VI – WEST AREA
- ALTRENATIVE VII – DOWNTOWN AREA
- ALTERNATIVE VIII – WILLIAMSBURG AREA
- ALTERNATIVE IX – AIRPORT 1 PRESSURE TANK REPLACEMENT
- ALTERNATIVE X – AIRPORT 2 WITHOUT FIRE FLOW
- ALTERNATIVE XI – AIRPORT 3 WITH FIRE FLOW
- AIRPORT XII – AIRPORT 4 VFD WELL PUMP

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE II - COMPLETE SYSTEM

Alternative II - Complete System					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$2,602,278.11	$2,602,278.11
2	Traffic Control **(3.43% of General Cost)**	LS	1	$4,163,644.97	$4,163,644.97
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$1,129,388.70	$1,129,388.70
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$1,821,594.68	$1,821,594.68
5	Materials Testing **(0.2% of General Cost)**	LS	1	$1,040,911.24	$1,040,911.24
6	Subsurface Utility Locating	LS	1	$95,275.00	$95,275.00
7	Utility Relocation	LS	1	$95,275.00	$95,275.00
8	AC Pipe Removal and Disposal	LS	1	$67,454.70	$67,454.70
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	106,343	$28.78	$3,060,551.54
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	54,966	$35.70	$1,962,286.20
11	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	23,367	$36.50	$852,895.50
12	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	18,724	$37.30	$698,405.20
13	14"Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	15,949	$50.77	$809,730.73
14	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	5,784	$220.00	$1,272,480.00
15	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	409	$3,500.00	$1,431,563.00
16	6" Gate Valves w/ Valve Can, CIP	EA	881	$935.00	$823,893.08
17	8" Gate Valves w/ Valve Can, CIP	EA	1,827	$1,205.00	$2,202,026.17
18	10" Gate Valves w/ Valve Can, CIP	EA	294	$2,500.00	$734,435.39
19	12" Gate Valves w/ Valve Can, CIP	EA	132	$3,263.00	$429,339.84
20	14" Gate Valves w/ Valve Can, CIP	EA	18	$4,000.00	$73,838.40
21	Furnish and Install 1-inch Single Body Combination Air Valve w/ Traffic Rated Vault on new waterline, (including all materials, labor, excavation, rock excavation, backfill and site restoration), CIP	EA	5	$8,000.00	$40,000.00
22	Furnish and Install 6”x2" PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	1	$60,000.00	$60,000.00
23	Furnish and Install 10”x4" PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	6	$80,000.00	$480,000.00
24	Pressurized waterline connections, CIP	EA	727	$1,184.22	$861,378.24
25	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	258,670	$3.00	$776,010.14
26	Joint Restraints, CIP	EA	11,703	$77.75	$909,912.45
27	1" Water Service, New single connection to existing watermain, cip. SD 2362	EA	3,139	$1,329.00	$4,171,731.00
28	Water Meter Box Remove & Replace	EA	3,139	$1,000.00	$3,139,000.00
29	Dewatering of Trench, CIP	LF	44,850	$53.00	$2,377,062.19
30	Valve/Pipeline abandoment	LS	1	1,093,878.88	$1,093,878.88
31	Hydrant removal and abandonment	LS	1	173,219.12	$173,219.12
Water Well					
32	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
33	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
34	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
35	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
36	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
37	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
38	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
39	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
43	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	74,949.67	$42.00	$3,147,886.00
44	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	74,949.67	$62.00	$4,646,879.33
45	Excavate and Dispose of Unsuitable Material, CIP	CY	449,698	$15.00	$6,745,470.00
46	Import of Engineered Fill	CY	449,698	$15.00	$6,745,470.00
47	Geogrid Base Roadway Reinforcement	SY	74,950	$5.50	$412,223.17
48	Remove and replace Curb and Gutter @ Services, CIP	LF	12,556	$25.00	$313,900.00
49	Remove and replace Sidewalk @ Services, CIP	CY	8,789	$48.00	$421,881.60

				Construction Cost Subtotal:	$63,061,384.59
				5-YR Inflation @ 11.375% + Construction Cost Subtotal:	$70,234,617.00
				Contingency - 10%:	$7,023,462.00
				NMGRT @8.5%:	$6,566,937.00
				Interim Finance Interest:	$4,610,376.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$88,435,392.00
ENGINEERING SERVICES					
50	Bridge Loan @ 5.5%	LS	1	$636,481.00	$636,481.00
51	Additional Engineering - Data Collection*	LS	1	$927,097.00	$927,097.00
52	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
53	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
54	Engineering Design Services	LS	1	$7,725,808.00	$7,725,808.00
55	Engineering - Bid Phase	LS	1	$177,694.00	$177,694.00
56	Engineering - Construction Inspection	LS	1	$1,545,162.00	$1,545,162.00
57	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
58	Engineering - Construction Management	LS	1	$1,081,613.00	$1,081,613.00
				Engineering Services Subtotal:	$12,208,855.00
				NMGRT @ 8.5%:	$1,037,753.00
				Engineering Total:	$13,246,608.00
FINANCING SERVICES					
59	Loan Origination Fee	LS	1	$790,139.00	$790,139.00
				Financing Services Subtotal:	$790,139.00
				Financing NMGRT @8.5%:	$67,162.00
				Legal Services Total:	$857,301.00
LEGAL SERVICES					
60	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
61	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$102,572,936**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE III – SYSTEM PERFORMANCE UPGRADE

Alternative III - System Performance Update					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$680,549.74	$680,549.74
2	Traffic Control **(3.43% of General Cost)**	LS	1	$1,088,879.58	$1,088,879.58
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$295,358.59	$295,358.59
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$476,384.82	$476,384.82
5	Materials Testing **(0.2% of General Cost)**	LS	1	$272,219.89	$272,219.89
6	Subsurface Utility Locating	LS	1	$22,461.02	$22,461.02
7	Utility Relocation	LS	1	$22,461.02	$22,461.02
8	AC Pipe Removal and Disposal	LS	1	$15,902.40	$15,902.40
Waterline					
9	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	11,796	$35.70	$421,117.20
10	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	22,393	$36.50	$817,344.50
11	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	13,319	$42.30	$563,393.70
12	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	947	$220.00	$208,340.00
13	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	79	$3,500.00	$277,823.00
14	6" Gate Valves w/ Valve Can, CIP	EA	45	$935.00	$42,075.00
15	8" Gate Valves w/ Valve Can, CIP	EA	980	$1,205.00	$1,181,438.34
16	10" Gate Valves w/ Valve Can, CIP	EA	124	$2,500.00	$310,180.07
17	12" Gate Valves w/ Valve Can, CIP	EA	5	$3,263.00	$17,383.96
18	Furnish and Install 6"x2"" PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	6	$80,000.00	$480,000.00
19	Pressurized waterline connections, CIP	EA	315	$1,184.22	$373,502.07
20	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	104,203	$3.00	$312,609.15
21	Joint Restraints, CIP	EA	4,430	$77.75	$344,443.85
22	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	285	$1,329.00	$378,765.00
23	Water Meter Box Remove & Replace	EA	285	$1,000.00	$285,000.00
24	Dewatering of Trench, CIP	LF	12,163	$53.00	$644,649.60
25	Valve/Pipeline abandonment	LS	1	$400,731.69	$400,731.69
26	Hydrant removal and abandonment	LS	1	$33,616.58	$33,616.58
Water Well					
27	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
28	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
29	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
30	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
31	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
32	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
33	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
34	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
35	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	17,669	$42.00	$742,112.00
45	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	17,669	$62.00	$1,095,498.67
46	Excavate and Dispose of Unsuitable Material, CIP	CY	106,016	$15.00	$1,590,240.00
47	Import of Engineered Fill	CY	106,016	$15.00	$1,590,240.00
48	Geogrid Base Roadway Reinforcement	SY	17,669	$5.50	$97,181.33
49	Remove and replace Curb and Gutter @ Services, CIP	LF	1,140	$25.00	$28,500.00
50	Remove and replace Sidewalk @ Services, CIP	CY	798	$48.00	$38,304.00
				Construction Cost Subtotal:	$16,485,211.76
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$17,235,289.00
				Contingency - 10%:	$1,723,529.00
				NMGRT @ 8.5%:	$1,611,500.00
				Interim Finance Interest:	$1,131,367.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$21,701,685.00

ENGINEERING SERVICES					
51	Bridge Loan @ 5.5%	LS	1	$184,945.00	$184,945.00
52	Additional Engineering - Data Collection*	LS	1	$379,176.00	$379,176.00
53	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
54	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
55	Engineering Design Services	LS	1	$1,895,882.00	$1,895,882.00
56	Engineering - Bid Phase	LS	1	$43,605.00	$43,605.00
57	Engineering - Construction Inspection	LS	1	$663,559.00	$663,559.00
58	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
59	Engineering - Construction Management	LS	1	$265,423.00	$265,423.00
				Engineering Services Subtotal:	$3,547,590.00
				NMGRT @8.50%:	$301,545.00
				Engineering Total:	$3,849,135.00
FINANCING SERVICES					
60	Loan Origination Fee	LS	1	$193,897.00	$193,897.00
				Financing Services Subtotal:	$193,897.00
				Financing NMGRT @ 8.5%:	$16,481.00
				Legal Services Total:	$210,378.00
LEGAL SERVICES					
61	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
62	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$25,794,833**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE III – A SYSTEM HIGH PRESSURE SOLUTION

Alternative III A- System High Pressure Solution					
Open Trench Waterline					
ITEMS LIST		**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$194,215.79	$194,215.79
2	Traffic Control **(3.43% of General Cost)**	LS	1	$310,745.27	$310,745.27
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$84,289.65	$84,289.65
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$135,951.05	$135,951.05
5	Materials Testing **(0.2% of General Cost)**	LS	1	$77,686.32	$77,686.32
6	Subsurface Utility Locating	LS	1	$10,670.76	$10,670.76
7	Utility Relocation	LS	1	$10,670.76	$10,670.76
8	AC Pipe Removal and Disposal	LS	1	$7,554.90	$7,554.90
Waterline					
8	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	5,500	$28.78	$158,290.00
9	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	671	$35.70	$23,954.70
10	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	9,797	$36.50	$357,590.50
11	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	9,862	$42.30	$417,162.60
12	14"Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF		$50.77	$0.00
13	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	647	$220.00	$142,340.00
14	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	32	$3,500.00	$111,776.00
15	6" Gate Valves w/ Valve Can, CIP	EA	19	$935.00	$17,765.00
16	8" Gate Valves w/ Valve Can, CIP	EA	56	$1,205.00	$67,204.57
17	10" Gate Valves w/ Valve Can, CIP	EA	54	$2,500.00	$135,704.65
18	12" Gate Valves w/ Valve Can, CIP	EA	4	$3,263.00	$12,871.88
19	14" Gate Valves w/ Valve Can, CIP	EA		$4,000.00	$0.00
20	Furnish and Install 6"x2"" PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	6	$80,000.00	$480,000.00
21	Pressurized waterline connections, CIP	EA	36	$1,184.22	$43,014.43
22	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	12,001	$3.00	$36,001.69
23	Joint Restraints, CIP	EA	510	$77.75	$39,667.94
ITEMS LIST		**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
24	1" Water Service, New single connection to existing watermain, cip. SD 2362	EA	95	$1,329.00	$126,255.00
25	Water Meter Box Remove & Replace	EA	95	$1,000.00	$95,000.00
26	Dewatering of Trench, CIP	LF	4,686	$53.00	$248,334.15
25	Valve/Pipeline abandonment	LS	1	$46,150.34	$46,150.34
26	Hydrant removal and abandonment	LS	1	$13,524.90	$13,524.90
Roadway					
27	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	8,394	$42.00	$352,562.00
28	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	8,394	$62.00	$520,448.67
29	Excavate and Dispose of Unsuitable Material, CIP	CY	12,342	$15.00	$185,130.00
30	Import of Engineered Fill	CY	12,342	$15.00	$185,130.00
31	Geogrid Base Roadway Reinforcement	SY	8,394	$5.50	$46,168.83
32	Remove and replace Curb and Gutter @ Services, CIP	LF	380	$25.00	$9,500.00
33	Remove and replace Sidewalk @ Services, CIP	CY	266	$48.00	$12,768.00
				Construction Cost Subtotal:	$4,716,100.35
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$4,930,683.00
				Contingency - 10%:	$493,068.00
				NMGRT @ 8.5%:	$461,019.00
				Interim Finance Interest:	$323,662.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$6,208,432.00

ENGINEERING SERVICES					
34	Bridge Loan @ 5.5%	LS	1	$56,899.00	$56,899.00
35	Preliminary Engineering Report-PER	LS	1	$35,000.00	$35,000.00
36	Environmental w/ Report	LS	1	$12,000.00	$12,000.00
37	Additional Engineering - Data Collection*	LS	1	$108,475.00	$108,475.00
38	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
39	Engineering Design Services	LS	1	$542,375.00	$542,375.00
40	Engineering - Bid Phase	LS	1	$12,475.00	$12,475.00
41	Engineering - Construction Inspection	LS	1	$235,270.00	$235,270.00
42	Engineering - Construction Management	LS	1	$75,933.00	$75,933.00
				Engineering Services Subtotal:	$1,138,427.00
				NMGRT @ 7.875%:	$89,651.00
				Engineering Total:	$1,228,078.00
	ITEMS LIST	**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
FINANCING SERVICES					
43	Loan Origination Fee	LS	1	$55,470.00	$55,470.00
				Financing Services Subtotal:	$55,470.00
				Financing NMGRT @ 8.5%:	$4,715.00
				Legal Services Total:	$60,185.00
LEGAL SERVICES					
44	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
45	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$7,530,330**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE III – B SYSTEM REDUNDANCY AND HYDRAULIC ENHANCEMENTS

Alternative III-B System Redundancy and Hydraulic Performance Enhancements					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$259,088.50	$259,088.50
2	Traffic Control **(3.43% of General Cost)**	LS	1	$414,541.60	$414,541.60
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$112,444.41	$112,444.41
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$181,361.95	$181,361.95
5	Materials Testing **(0.2% of General Cost)**	LS	1	$103,635.40	$103,635.40
6	Subsurface Utility Locating	LS	1	$6,209.75	$6,209.75
7	Utility Relocation	LS	1	$6,209.75	$6,209.75
8	AC Pipe Removal and Disposal	LS	1	$4,396.50	$4,396.50
Waterline					
9	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	6181	$35.70	$220,661.70
10	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	8774	$36.50	$320,251.00
11	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	300	$220.00	$66,000.00
12	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	30	$3,500.00	$104,685.00
13	6" Gate Valves w/ Valve Can, CIP	EA	13	$935.00	$12,155.00
14	8" Gate Valves w/ Valve Can, CIP	EA	514	$1,205.00	$619,063.27
15	10" Gate Valves w/ Valve Can, CIP	EA	49	$2,500.00	$121,534.41
16	Pressurized waterline connections, CIP	EA	157	$1,184.22	$186,083.50
17	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	51915	$3.00	$155,745.87
18	Joint Restraints, CIP	EA	2207	$77.75	$171,606.33
19	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	70	$1,329.00	$93,030.00
20	Water Meter Box Remove & Replace	EA	70	$1,000.00	$70,000.00
21	Dewatering of Trench, CIP	LF	4147	$53.00	$219,806.90
22	Valve/Pipeline abandonment	LS	1	$199,649.65	$199,649.65
23	Hydrant removal and abandonment	LS	1	$12,666.89	$12,666.89
Water Well					
24	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
25	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
26	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
27	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
28	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
29	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
30	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
31	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
32	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	4885	$42.00	$205,170.00
33	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	4885	$62.00	$302,870.00
34	Excavate and Dispose of Unsuitable Material, CIP	CY	29310	$15.00	$439,650.00
35	Import of Engineered Fill	CY	29310	$15.00	$439,650.00
36	Geogrid Base Roadway Reinforcement	SY	4885	$5.50	$26,867.50
37	Remove and replace Curb and Gutter @ Services, CIP	LF	280	$25.00	$7,000.00
38	Remove and replace Sidewalk @ Services, CIP	CY	196	$48.00	$9,408.00
				Construction Cost Subtotal:	$6,269,657.86
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$6,554,927.00
				Contingency - 10%:	$655,493.00
				NMGRT @ 8.5%:	$612,886.00
				Interim Finance Interest:	$430,282.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$8,253,588.00

ENGINEERING SERVICES					
39	Bridge Loan @ 5.5%	LS	1	$70,958.00	$70,958.00
40	Additional Engineering - Data Collection*	LS	1	$144,208.00	$144,208.00
41	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
42	Engineering Design Services	LS	1	$721,042.00	$721,042.00
43	Engineering - Bid Phase	LS	1	$16,584.00	$16,584.00
44	Engineering - Construction Inspection	LS	1	$252,365.00	$252,365.00
45	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
46	Engineering - Construction Management	LS	1	$100,946.00	$100,946.00
				Engineering Services Subtotal:	$1,361,103.00
				NMGRT @ 8.5%:	$115,694.00
				Engineering Total:	$1,476,797.00
FINANCING SERVICES					
47	Loan Origination Fee	LS	1	$73,743.00	$73,743.00
				Financing Services Subtotal:	$73,743.00
				Financing NMGRT @ 8.5%:	$6,268.00
				Legal Services Total:	$80,011.00
LEGAL SERVICES					
48	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
49	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$9,844,031**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE III – C ADDITIONAL HYDRAULIC PERFROMANCE ENHACNECMENT

Alternative III-C Additional Hydraulic Performance Enhancements					
Open Trench Waterline					
ITEMS LIST		**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$165,640.17	$165,640.17
2	Traffic Control **(3.43% of General Cost)**	LS	1	$265,024.27	$265,024.27
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$71,887.83	$71,887.83
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$115,948.12	$115,948.12
5	Materials Testing **(0.2% of General Cost)**	LS	1	$66,256.07	$66,256.07
6	Subsurface Utility Locating	LS	1	$5,179.24	$5,179.24
7	Utility Relocation	LS	1	$5,179.24	$5,179.24
8	AC Pipe Removal and Disposal	LS	1	$3,666.90	$3,666.90
Waterline					
9	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	4,944	$35.70	$176,500.80
10	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	3,822	$36.50	$139,503.00
11	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	3,457	$42.30	$146,231.10
15	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	18	$3,500.00	$61,362.00
16	6" Gate Valves w/ Valve Can, CIP	EA	13	$935.00	$12,155.00
17	8" Gate Valves w/ Valve Can, CIP	EA	411	$1,205.00	$495,170.49
18	10" Gate Valves w/ Valve Can, CIP	EA	21	$2,500.00	$52,941.02
19	12" Gate Valves w/ Valve Can, CIP	EA	1	$3,263.00	$4,512.08
24	Pressurized waterline connections, CIP	EA	122	$1,184.22	$144,404.14
25	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	40,287	$3.00	$120,861.59
26	Joint Restraints, CIP	EA	1,713	$77.75	$133,169.59
27	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	120	$1,329.00	$159,480.00
28	Water Meter Box Remove & Replace	EA	120	$1,000.00	$120,000.00
29	Dewatering of Trench, CIP	LF	3,330	$53.00	$176,508.55
30	Valve/Pipeline abandonment	LS	1	$154,931.71	$154,931.71
31	Hydrant removal and abandonment	LS	1	$7,424.80	$7,424.80
Roadway					
32	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	4,074	$42.00	$171,122.00
33	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	4,074	$62.00	$252,608.67
34	Excavate and Dispose of Unsuitable Material, CIP	CY	24,446	$15.00	$366,690.00
35	Import of Engineered Fill	CY	24,446	$15.00	$366,690.00
36	Geogrid Base Roadway Reinforcement	SY	4,074	$5.50	$22,408.83
37	Remove and replace Curb and Gutter @ Services, CIP	LF	480	$25.00	$12,000.00
38	Remove and replace Sidewalk @ Services, CIP	CY	336	$48.00	$16,128.00
				Construction Cost Subtotal:	$4,011,585.20
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$4,194,112.00
				Contingency - 10%:	$419,411.00
				NMGRT @ 8.5%:	$392,149.00
				Interim Finance Interest:	$275,312.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$5,280,984.00

ENGINEERING SERVICES					
39	Bridge Loan @ 5.5%	LS	1	$43,466.00	$43,466.00
40	Additional Engineering - Data Collection*	LS	1	$92,270.00	$92,270.00
41	Engineering Design Services	LS	1	$461,352.00	$461,352.00
42	Engineering - Bid Phase	LS	1	$10,611.00	$10,611.00
43	Engineering - Construction Inspection	LS	1	$161,473.00	$161,473.00
44	Engineering - Construction Management	LS	1	$64,589.00	$64,589.00
				Engineering Services Subtotal:	$833,761.00
				NMGRT @ 8.5%:	$70,870.00
				Engineering Total:	$904,631.00
FINANCING SERVICES					
45	Loan Origination Fee	LS	1	$47,184.00	$47,184.00
				Financing Services Subtotal:	$47,184.00
				Financing NMGRT @ 8.5%:	$4,011.00
				Legal Services Total:	$51,195.00
LEGAL SERVICES					
46	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
47	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$6,270,445**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE IV – NORTH AREA

Alternative IV - North Side					
Open Trench Waterline					
ITEMS LIST		**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$231,489.60	$231,489.60
2	Traffic Control **(3.43% of General Cost)**	LS	1	$370,383.35	$370,383.35
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$100,466.48	$100,466.48
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$162,042.72	$162,042.72
5	Materials Testing **(0.2% of General Cost)**	LS	1	$92,595.84	$92,595.84
6	Subsurface Utility Locating	LS	1	$5,111.44	$5,111.44
7	Utility Relocation	LS	1	$5,111.44	$5,111.44
8	AC Pipe Removal and Disposal	LS	1	$3,618.90	$3,618.90
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	1,927	$28.78	$55,459.06
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	3,115	$35.70	$111,205.50
11	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	872	$37.30	$32,525.60
12	14"Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	6,149	$50.77	$312,184.73
13	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	535	$220.00	$117,766.00
14	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	10	$3,500.00	$35,294.00
15	6" Gate Valves w/ Valve Can, CIP	EA	128	$935.00	$119,680.00
16	8" Gate Valves w/ Valve Can, CIP	EA	433	$1,205.00	$521,329.86
17	10" Gate Valves w/ Valve Can, CIP	EA	2	$2,500.00	$5,000.00
18	12" Gate Valves w/ Valve Can, CIP	EA	2	$3,263.00	$8,025.67
19	14" Gate Valves w/ Valve Can, CIP	EA	2	$4,000.00	$9,838.40
20	Pressurized waterline connections, CIP	EA	167	$1,184.22	$197,680.48
21	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	67,272	$3.00	$201,816.98
22	Joint Restraints, CIP	EA	1,793	$77.75	$139,382.74
23	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	73	$1,329.00	$97,017.00
24	Water Meter Box Remove & Replace	EA	73	$1,000.00	$73,000.00
25	Dewatering of Trench, CIP	LF	603	$53.00	$31,966.95
26	Valve/Pipeline abandonment	LS	1	$196,942.66	$196,942.66
27	Hydrant removal and abandonment	LS	1	$4,270.57	$4,270.57
Water Well					
28	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
29	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
30	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
31	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
32	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
33	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
34	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
35	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
36	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	4,021	$42.00	$168,882.00
37	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	4,021	$62.00	$249,302.00
38	Excavate and Dispose of Unsuitable Material, CIP	CY	24,126	$15.00	$361,890.00
39	Import of Engineered Fill	CY	24,126	$15.00	$361,890.00
40	Geogrid Base Roadway Reinforcement	SY	4,021	$5.50	$22,115.50
41	Remove and replace Curb and Gutter @ Services, CIP	LF	292	$25.00	$7,300.00
42	Remove and replace Sidewalk @ Services, CIP	CY	204	$48.00	$9,811.20

				Construction Cost Subtotal:	$5,600,611.68
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$5,855,440.00
				Contingency - 10%:	$585,544.00
				NMGRT @ 8.5%:	$547,484.00
				Interim Finance Interest:	$384,366.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$7,372,834.00
ENGINEERING SERVICES					
43	Bridge Loan @ 5.5%	LS	1	$67,009.00	$67,009.00
44	Additional Engineering - Data Collection*	LS	1	$128,820.00	$128,820.00
45	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
46	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
47	Engineering Design Services	LS	1	$644,098.00	$644,098.00
48	Engineering - Bid Phase	LS	1	$14,814.00	$14,814.00
49	Engineering - Construction Inspection	LS	1	$225,434.00	$225,434.00
50	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
51	Engineering - Construction Management	LS	1	$90,174.00	$90,174.00
				Engineering Services Subtotal:	$1,285,349.00
				NMGRT @ 8.5%:	$109,255.00
				Engineering Total:	$1,394,604.00
FINANCING SERVICES					
52	Loan Origination Fee	LS	1	$65,874.00	$65,874.00
				Financing Services Subtotal:	$65,874.00
				Financing NMGRT @ 8.5%:	$5,599.00
				Legal Services Total:	$71,473.00
LEGAL SERVICES					
53	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
54	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$8,872,546**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTRENATIVE V – EAST AREA

Alternative V - East Side					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$662,571.27	$662,571.27
2	Traffic Control **(3.43% of General Cost)**	LS	1	$1,060,114.03	$1,060,114.03
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$287,555.93	$287,555.93
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$463,799.89	$463,799.89
5	Materials Testing **(0.2% of General Cost)**	LS	1	$265,028.51	$265,028.51
6	Subsurface Utility Locating	LS	1	$23,132.20	$23,132.20
7	Utility Relocation	LS	1	$23,132.20	$23,132.20
8	AC Pipe Removal and Disposal	LS	1	$16,377.60	$16,377.60
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	35,430	$28.78	$1,019,675.40
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	19,162	$35.70	$684,083.40
12	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	804	$220.00	$176,792.00
13	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	109	$3,500.00	$382,144.00
13	6" Gate Valves w/ Valve Can, CIP	EA	219	$935.00	$204,794.43
14	8" Gate Valves w/ Valve Can, CIP	EA	140	$1,205.00	$168,367.15
14	10" Gate Valves w/ Valve Can, CIP	EA	33	$2,500.00	$82,500.00
15	12" Gate Valves w/ Valve Can, CIP	EA	2	$3,263.00	$6,526.00
16	Furnish and Install 6” PRV Assembly (including PRV, vault, excavation, labor and all required appurtenances for a complete installation)	EA	1	$44,000.00	$44,000.00
17	Pressurized waterline connections, CIP	EA	71	$1,184.22	$83,593.11
18	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	21,965	$3.00	$65,896.10
19	Joint Restraints, CIP	EA	1,517	$77.75	$117,912.88
20	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	1,128	$1,329.00	$1,499,112.00
21	Water Meter Box Remove & Replace	EA	1,128	$1,000.00	$1,128,000.00
22	Dewatering of Trench, CIP	LF	13,102	$53.00	$694,410.24
23	Valve/Pipeline abandonment	LS	1	$136,633.07	$136,633.07
24	Hydrant removal and abandonment	LS	1	$46,239.42	$46,239.42
Water Well					
25	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
26	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
27	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
28	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
29	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
30	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, CIP.	LF	200	$25.00	$5,000.00
31	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
32	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
33	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	18,197	$42.00	$764,288.00
34	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	18,197	$62.00	$1,128,234.67
35	Excavate and Dispose of Unsuitable Material, CIP	CY	109,184	$15.00	$1,637,760.00
36	Import of Engineered Fill	CY	109,184	$15.00	$1,637,760.00
37	Geogrid Base Roadway Reinforcement	SY	18,197	$5.50	$100,085.33
38	Remove and replace Curb and Gutter @ Services, CIP	LF	4,512	$25.00	$112,800.00
39	Remove and replace Sidewalk @ Services, CIP	CY	3,158	$48.00	$151,603.20

				Construction Cost Subtotal:	$16,053,137.04
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$16,783,555.00
				Contingency - 10%:	$1,678,356.00
				NMGRT @ 8.5%:	$1,569,262.00
				Interim Finance Interest:	$1,101,715.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$21,132,888.00
	ENGINEERING SERVICES				
40	Bridge Loan @ 5.5%	LS	1	$180,264.00	$180,264.00
41	Additional Engineering - Data Collection*	LS	1	$369,238.00	$369,238.00
42	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
43	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
44	Engineering Design Services	LS	1	$1,846,191.00	$1,846,191.00
45	Engineering - Bid Phase	LS	1	$42,462.00	$42,462.00
46	Engineering - Construction Inspection	LS	1	$646,167.00	$646,167.00
47	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
48	Engineering - Construction Management	LS	1	$258,467.00	$258,467.00
				Engineering Services Subtotal:	$3,457,789.00
				NMGRT @ 8.5%:	$293,912.00
				Engineering Total:	$3,751,701.00
	FINANCING SERVICES				
49	Loan Origination Fee	LS	1	$188,815.00	$188,815.00
				Financing Services Subtotal:	$188,815.00
				Financing NMGRT @ 8.5%:	$16,049.00
				Legal Services Total:	$204,864.00
	LEGAL SERVICES				
50	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
51	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$25,123,088**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE VI – WEST AREA

Alternative VI - West Side					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$408,264.73	$408,264.73
2	Traffic Control **(3.43% of General Cost)**	LS	1	$653,223.57	$653,223.57
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$177,186.89	$177,186.89
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$285,785.31	$285,785.31
5	Materials Testing **(0.2% of General Cost)**	LS	1	$163,305.89	$163,305.89
6	Subsurface Utility Locating	LS	1	$14,112.29	$14,112.29
7	Utility Relocation	LS	1	$14,112.29	$14,112.29
8	AC Pipe Removal and Disposal	LS	1	$9,991.50	$9,991.50
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	21,979	$28.78	$632,555.62
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	11,326	$35.70	$404,338.20
11	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	67	$3,500.00	$233,135.00
12	6" Gate Valves w/ Valve Can, CIP	EA	192	$935.00	$179,699.87
13	8" Gate Valves w/ Valve Can, CIP	EA	206	$1,205.00	$248,777.20
14	12" Gate Valves w/ Valve Can, CIP	EA	4	$3,263.00	$13,052.00
16	Pressurized waterline connections, CIP	EA	73	$1,184.22	$86,456.74
17	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	22,157	$3.00	$66,469.86
18	Joint Restraints, CIP	EA	1,571	$77.75	$122,126.88
19	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	597	$1,329.00	$793,413.00
20	Water Meter Box Remove & Replace	EA	597	$1,000.00	$597,000.00
21	Dewatering of Trench, CIP	LF	1,665	$53.00	$88,258.25
22	Valve/Pipeline abandonment	LS	1	$139,718.33	$139,718.33
23	Hydrant removal and abandonment	LS	1	$28,209.34	$28,209.34
Water Well					
24	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
25	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
26	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
27	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
28	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
29	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
30	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
31	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
32	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	11,102	$42.00	$466,270.00
33	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	11,102	$62.00	$688,303.33
34	Excavate and Dispose of Unsuitable Material, CIP	CY	66,610	$15.00	$999,150.00
35	Import of Engineered Fill	CY	66,610	$15.00	$999,150.00
36	Geogrid Base Roadway Reinforcement	SY	11,102	$5.50	$61,059.17
37	Remove and replace Curb and Gutter @ Services, CIP	LF	2,388	$25.00	$59,700.00
38	Remove and replace Sidewalk @ Services, CIP	CY	1672	$48.00	$80,236.80
				Construction Cost Subtotal:	$9,891,277.05
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$10,341,330.00
				Contingency - 10%:	$1,034,133.00
				NMGRT @ 8.5%:	$966,914.00
				Interim Finance Interest:	$678,831.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$13,021,208.00

ENGINEERING SERVICES					
39	Bridge Loan @ 5.5%	LS	1	$113,499.00	$113,499.00
40	Additional Engineering - Data Collection*	LS	1	$227,509.00	$227,509.00
41	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
42	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
43	Engineering Design Services	LS	1	$1,137,546.00	$1,137,546.00
44	Engineering - Bid Phase	LS	1	$26,164.00	$26,164.00
45	Engineering - Construction Inspection	LS	1	$398,141.00	$398,141.00
46	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
47	Engineering - Construction Management	LS	1	$159,256.00	$159,256.00
				Engineering Services Subtotal:	$2,177,115.00
				NMGRT @ 8.5%:	$185,055.00
				Engineering Total:	$2,362,170.00
FINANCING SERVICES					
48	Loan Origination Fee	LS	1	$116,340.00	$116,340.00
				Financing Services Subtotal:	$116,340.00
				Financing NMGRT @ 8.5%:	$9,889.00
				Legal Services Total:	$126,229.00
LEGAL SERVICES					
49	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
50	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$15,543,242**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTRENATIVE VII – DOWNTOWN AREA

Alternative VII - Downtown					
Open Trench Waterline					
ITEMS LIST		**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$381,999.53	$381,999.53
2	Traffic Control **(3.43% of General Cost)**	LS	1	$611,199.25	$611,199.25
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$152,799.81	$152,799.81
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$267,399.67	$267,399.67
5	Materials Testing **(0.2% of General Cost)**	LS	1	$152,799.81	$152,799.81
6	Subsurface Utility Locating	LS	1	$10,572.03	$10,572.03
7	Utility Relocation	LS	1	$10,572.03	$10,572.03
8	AC Pipe Removal and Disposal	LS	1	$7,485.00	$7,485.00
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	15,694	$28.78	$451,673.32
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	3,749	$35.70	$133,839.30
11	10" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	974	$36.50	$35,551.00
12	12" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	4,533	$37.30	$169,080.90
13	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	431	$220.00	$94,886.00
14	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	50	$3,500.00	$174,650.00
15	6" Gate Valves w/ Valve Can, CIP	EA	99	$935.00	$92,471.59
16	8" Gate Valves w/ Valve Can, CIP	EA	37	$1,205.00	$44,299.76
17	10" Gate Valves w/ Valve Can, CIP	EA	135	$2,500.00	$336,755.32
18	12" Gate Valves w/ Valve Can, CIP	EA	90	$3,263.00	$292,988.21
19	14" Gate Valves w/ Valve Can, CIP	EA	2	$4,000.00	$8,000.00
20	Pressurized waterline connections, CIP	EA	63	$1,184.22	$74,691.37
21	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	24,151	$3.00	$72,451.66
22	Joint Restraints, CIP	EA	1,280	$77.75	$99,500.99
23	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	403	$1,329.00	$535,587.00
24	Water Meter Box Remove & Replace	EA	403	$1,000.00	$403,000.00
25	Dewatering of Trench, CIP	LF	14,970	$53.00	$793,410.00
26	Valve/Pipeline abandonment	LS	1	$125,668.33	$125,668.33
27	Hydrant removal and abandonment	LS	1	$21,132.65	$21,132.65
Water Well					
28	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50,000.00	$50,000.00
29	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
30	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
31	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
32	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
33	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
34	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
35	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
36	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	8,317	$42.00	$349,300.00
	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	8,317	$62.00	$515,633.33
37	Excavate and Dispose of Unsuitable Material, CIP	CY	49,900	$15.00	$748,500.00
38	Import of Engineered Fill	CY	49,900	$15.00	$748,500.00
39	Geogrid Base Roadway Reinforcement	SY	8,317	$5.50	$45,741.67
40	Remove and replace Curb and Gutter @ Services, CIP	LF	1,612	$25.00	$40,300.00
41	Remove and replace Sidewalk @ Services, CIP	CY	1,128	$48.00	$54,163.20

				Construction Cost Subtotal:	$9,234,817.72
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$9,655,002.00
				Contingency - 10%:	$965,500.00
				NMGRT @ 8.5%:	$902,743.00
				Interim Finance Interest:	$633,778.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$12,157,023.00
		ENGINEERING SERVICES			
42	Bridge Loan @ 5.5%	LS	1	$106,386.00	$106,386.00
43	Additional Engineering - Data Collection*	LS	1	$212,410.00	$212,410.00
44	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
45	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
46	Engineering Design Services	LS	1	$1,062,050.00	$1,062,050.00
47	Engineering - Bid Phase	LS	1	$24,427.00	$24,427.00
48	Engineering - Construction Inspection	LS	1	$371,718.00	$371,718.00
49	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
50	Engineering - Construction Management	LS	1	$148,687.00	$148,687.00
				Engineering Services Subtotal:	$2,040,678.00
				NMGRT @ 8.5%:	$173,458.00
				Engineering Total:	$2,214,136.00
		FINANCING SERVICES			
51	Loan Origination Fee	LS	1	$108,619.00	$108,619.00
				Financing Services Subtotal:	$108,619.00
				Financing NMGRT @ 8.5%:	$9,233.00
				Legal Services Total:	$117,852.00
		LEGAL SERVICES			
52	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
53	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$14,522,646**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE VIII – WILLIAMSBURG AREA

Alternative VIII - Williamsburg					
Open Trench Waterline					
ITEMS LIST		UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$582,097.11	$582,097.11
2	Traffic Control **(3.43% of General Cost)**	LS	1	$931,355.37	$931,355.37
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$232,838.84	$232,838.84
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$407,467.98	$407,467.98
5	Materials Testing **(0.2% of General Cost)**	LS	1	$232,838.84	$232,838.84
6	Subsurface Utility Locating	LS	1	$19,886.02	$19,886.02
7	Utility Relocation	LS	1	$19,886.02	$19,886.02
8	AC Pipe Removal and Disposal	LS	1	$14,079.30	$14,079.30
Waterline					
9	6" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	31,313	$28.78	$901,188.14
10	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	5,818	$35.70	$207,702.60
11	14"Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	9,800	$50.77	$497,546.00
12	Jack and Bore w/ 18-inch Casing pipe, CIP	LF	3,067	$220.00	$674,696.00
13	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	94	$3,500.00	$328,517.00
14	6" Gate Valves w/ Valve Can, CIP	EA	198	$935.00	$185,172.19
15	8" Gate Valves w/ Valve Can, CIP	EA	31	$1,205.00	$37,813.86
17	12" Gate Valves w/ Valve Can, CIP	EA	28	$3,263.00	$91,364.00
18	14" Gate Valves w/ Valve Can, CIP	EA	14	$4,000.00	$56,000.00
19	Pressurized waterline connections, CIP	EA	38	$1,184.22	$45,454.47
20	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	18,922	$3.00	$56,766.40
21	Joint Restraints, CIP	EA	1,113	$77.75	$86,545.12
22	1" Water Service, New single connection to existing watermian, cip. SD 2362	EA	653	$1,329.00	$867,837.00
23	Water Meter Box Remove & Replace	EA	653	$1,000.00	$653,000.00
24	Dewatering of Trench, CIP	LF	2,347	$53.00	$124,367.15
25	Valve/Pipeline abandonment	LS	1	$94,184.80	$94,184.80
26	Hydrant removal and abandonment	LS	1	$39,750.56	$39,750.56
Water Well					
27	Furnish and Install 40 HP Pump, duty point of 500 GPM at 110 PSI, CIP. With drop pipe/cable/pit less CIP	EA	1	$50.00	$50.00
28	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
29	Building 24X30 - Complete w/ Electrical and Plumbing	SQFT	720	$425.00	$306,000.00
30	12" Steel Cased Potable Water Well - Drilling Complete	LF	674	$900.00	$606,600.00
31	Furnish and install new gas- chlorination disinfection system, CIP.	EA	1	$165,000.00	$165,000.00
32	8" Waterline Pipe excl. fitting, (std. spec.sec 801), icl. Trench, & compacted backfill, to 6' depth, cip.	LF	200	$25.00	$5,000.00
33	8" Gate Valve, cip SD 2333	EA	3	$1,205.00	$3,615.00
34	6" Service Stub-Out w/ 6" Gate Valve, 100'	EA	2	$6,000.00	$12,000.00
Roadway					
35	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	20,858	$42.00	$876,045.33
36	Asphalt Roadway, Remove, Dispose and Replace with SP III, 6" Thick for Arerial Streets, include Subgrade Prep, CIP	SY	20,858	$62.00	$1,293,209.78
36	Excavate and Dispose of Unsuitable Material, CIP	CY	104,291	$15.00	$1,564,366.67
37	Import of Engineered Fill	CY	104,291	$15.00	$1,564,366.67
38	Geogrid Base Roadway Reinforcement	SY	20,858	$5.50	$114,720.22
39	Remove and replace Curb and Gutter @ Services, CIP	LF	2,612	$25.00	$65,300.00
40	Remove and replace Sidewalk @ Services, CIP	CY	1,828	$48.00	$87,763.20
				Construction Cost Subtotal:	$14,082,391.62
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$14,723,140.00
				Contingency - 10%:	$1,472,314.00
				NMGRT @ 8.5%:	$1,376,614.00
				Interim Finance Interest:	$966,464.00
				TOTAL ESTIMATED CONSTRUCTION COST:	$18,538,532.00

ENGINEERING SERVICES					
41	Bridge Loan @ 5.5%	LS	1	$158,910.00	$158,910.00
42	Additional Engineering - Data Collection*	LS	1	$323,909.00	$323,909.00
43	Additional Engineering - Computer hydraulic model and calibration*	LS	1	$60,000.00	$60,000.00
44	Additional Engineering - Hydrogeology Well siting study *	LS	1	$35,000.00	$35,000.00
45	Engineering Design Services	LS	1	$1,619,545.00	$1,619,545.00
46	Engineering - Bid Phase	LS	1	$37,250.00	$37,250.00
47	Engineering - Construction Inspection	LS	1	$566,841.00	$566,841.00
48	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
49	Engineering - Construction Management	LS	1	$226,736.00	$226,736.00
				Engineering Services Subtotal:	$3,048,191.00
				NMGRT @ 8.5%:	$259,096.00
				Engineering Total:	$3,307,287.00
FINANCING SERVICES					
50	Loan Origination Fee	LS	1	$165,635.00	$165,635.00
				Financing Services Subtotal:	$165,635.00
				Financing NMGRT @ 8.5%:	$14,079.00
				Legal Services Total:	$179,714.00
LEGAL SERVICES					
51	Legal Fees - Project Attorney	LS	1	$10,000.00	$10,000.00
52	Legal Fees - Bond Counsel	LS	1	$21,000.00	$21,000.00
				Legal Services Subtotal:	$31,000.00
				Legal NMGRT @ 8.5%:	$2,635.00
				Legal Services Total:	$33,635.00
				GRAND TOTAL:	**$22,059,168**

[THIS PAGE INTENTIONALLY LEFT BLANK]

ALTERNATIVE IX – AIRPORT 1 PRESSURE TANK REPLACEMENT

Item #	ITEMS LIST	UNITS	QTY	UNIT COST	EXTEND COST
	Alternative IX - Airport 1 Pessure Tank Replacement				
	General				
1	Mob/Demob. **(5% of General Cost)**	LS	1	$10,392.00	$10,392.00
2	Traffic Control **(3.43% of General Cost)**	LS	1	$16,627.20	$16,627.20
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$4,156.80	$4,156.80
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$7,274.40	$7,274.40
5	Materials Testing **(0.2% of General Cost)**	LS	1	$4,156.80	$4,156.80
6	Subsurface Utility Locating	LS	1	$5,000.00	$5,000.00
7	Utility Relocation	LS	1	$5,000.00	$5,000.00
	Airport Water system				
8	Site Grading/Excavation	CY	60	$100.00	$6,000.00
9	6-Inch Gravel Pad, Including Subgrade Prep, Installed	SY	12	$120.00	$1,440.00
10	Furnish and Install 200 Gallon Pressure Tank	LS	2	$8,000.00	$16,000.00
11	Furnish and Install 4 inch DIP, Including Trenching and Compacted Backfill, per APWA Standard Spec.801 CIP.	LF	100	$90.00	$9,000.00
12	Furnish and Install new chlorinaiton disinfection systemr CIP	EA	1	$8,000.00	$8,000.00
13	Connect to existing well , CIP.	EA	1	$6,000.00	$6,000.00
14	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
15	Chain Link Fence, incl. All attachments, hwardware & anchor posts. CIP	LF	200	$35.00	$7,000.00
16	Ductile Iron MJ fittings, class 250,8" forceman, INCL. Joining Material	LB	2,000	$4.20	$8,400.00
17	Furnish and install Building 12' by 30'	SQ-FT	360	$300.00	$108,000.00
18	well sanitary seal pitless unit 8-inch W/ concrete slab	EA	1	$8,000.00	$8,000.00
				Construction Cost Subtotal:	$260,447.20
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$272,298.00
				Contingency - 10%:	$27,230.00
				NMGRT @ 8.5%:	$25,460.00
				Interim Finance Interest:	$17,874.00
				TOTAL ESTIMATED CONSTRUCTION COST:	**$342,862.00**
	ENGINEERING SERVICES				
19	Bridge Loan @ 5.5%	LS	1	$4,340.00	$4,340.00
20	Additional Engineering - Data Collection*	LS	1	$3,594.00	$3,594.00
21	Additional Engineering - Geotech	LS	1	$10,000.00	$10,000.00
22	Engineering Design Services	LS	1	$29,953.00	$29,953.00
23	Engineering - Bid Phase	LS	1	$689.00	$689.00
24	Engineering - Construction Inspection	LS	1	$10,483.00	$10,483.00
25	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
26	Saw cut, remove, and dispose of existing asphalt, CIP	LS	1	$4,193.00	$4,193.00
				Engineering Services Subtotal:	$83,252.00
				NMGRT @ 8.5%:	$7,076.00
				Engineering Total:	**$90,328.00**
				TOTAL ESTIMATED COST:	**$433,190.00**

ALTERNATIVE X – AIRPORT 2 WITHOUT FIRE FLOW

Alternative X - Airport 2 Without Fire Flow					
Item #	**ITEMS LIST**	**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$13,795.00	$13,795
2	Traffic Control **(3.43% of General Cost)**	LS	1	$22,072.00	$22,072
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$5,518.00	$5,518
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$9,656.50	$9,657
5	Materials Testing **(0.2% of General Cost)**	LS	1	$3,198.00	$3,198
6	Subsurface Utility Locating	LS	1	$5,000.00	$5,000
7	Utility Relocation	LS	1	$5,000.00	$5,000
Airport Water system					
8	Site Grading/Excavation	CY	60	$100.00	$6,000.00
9	Engineered Fill/Subgrade Prep for Tank Foundation, Including Compaction/Testing	CY	8	$120.00	$960.00
10	6-Inch Gravel Pad, Including Subgrade Prep, Installed	SY	12	$200.00	$2,400.00
11	Furnish and Install 7200 Gallon Welded Steel Tank, AWWA D100-11 CIP.	GAL	7,200	$3.20	$23,040.00
12	Tank Foundation Installed	LS	1	$6,000.00	$6,000.00
13	Furnish and Install Cathodic Protection/Level Monitor for Tank, CIP	LS	1	$12,000.00	$12,000.00
14	Furnish and Install 4 inch DIP, Including Trenching and Compacted Backfill, per APWA Standard Spec.801 CIP.	LF	100	$90.00	$9,000.00
15	Furnish and Install new chlorinaiton disinfection systemr CIP	EA	1	$8,000.00	$8,000.00
16	Chain Link Fence, incl. All attachments, hwardware & anchor posts. CIP	LF	200	$35.00	$7,000.00
17	2-50 GPM Variable speed Booster pack	EA	1	$45,000.00	$45,000.00
18	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$30,000.00	$30,000.00
19	Ductile Iron MJ fittings, class 250,8" forceman, INCL. Joining Material	LB	2,500	$4.20	$10,500.00
20	Furnish and install Building 12' by 30'	SQ-FT	360	$300.00	$108,000.00
21	well sanitary seal pitless unit 8-inch W/ concrete slab	EA	1	$8,000.00	$8,000.00
				Construction Cost Subtotal:	$340,139.50
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$355,616.00
				Contingency - 10%:	$35,562.00
				NMGRT @ 8.5%:	$33,250.00
				Interim Finance Interest:	$23,344.00
				TOTAL ESTIMATED CONSTRUCTION COST:	**$447,772**
ENGINEERING SERVICES					
22	Bridge Loan @ 5.5%	LS	1	$5,163.00	$5,163.00
23	Additional Engineering- Data Collection*	LS	1	$4,694.00	$4,694.00
24	Additional Engineering - Geotech	LS	1	$10,000.00	$10,000.00
25	Engineering Design Services	LS	1	$39,118.00	$39,118.00
26	Saw cut, remove, and dispose of existing asphalt, CIP	LS	1	$900.00	$900.00
27	Engineering - Construction Inspection	LS	1	$13,691.00	$13,691.00
28	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
29	Engineering - Construction Management	LS	1	$5,476.00	$5,476.00
				Engineering Services Subtotal:	$99,042.00
				NMGRT @ 8.5%:	$8,419.00
				Engineering Total:	**$107,461.00**
				TOTAL ESTIMATED COST:	**$555,233.00**

ALTERNATIVE XI – AIRPORT 3 WITH FIRE FLOW

Alternative XI - Airport 3 With Fire Flow					
Item #	**ITEMS LIST**	**UNITS**	**QTY**	**UNIT COST**	**EXTEND COST**
	General				
1	Mob/Demob. **(5% of General Cost)**	LS	1	$57,914.12	$57,914.12
2	Traffic Control **(3.43% of General Cost)**	LS	1	$92,662.59	$92,662.59
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$23,165.65	$23,165.65
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$40,539.88	$40,539.88
5	Materials Testing **(0.2% of General Cost)**	LS	1	$23,165.65	$23,165.65
6	Subsurface Utility Locating	LS	1	$5,000.00	$5,000.00
7	Utility Relocation	LS	1	$5,000.00	$5,000.00
	Airport Water system				
8	Site Grading/Excavation	CY	181	$10.00	$1,810.00
9	Engineered Fill/Subgrade Prep for Tank Foundation, Including Compction and Testing	CY	84	$12.00	$1,008.00
10	6-Inch Gravel Pad, Including Subgrade Prep, Installed	SY	125	$20.00	$2,500.00
11	Furnish and Install 200.000 Gallon Welded Steel Tank, AWWA D100-11 CIP.	GAL	200,000	$1.75	$350,000.00
12	Tank Foundation Installed	LS	1	$45,000.00	$45,000.00
13	Furnish and Install Cathodic Protection/Level Monitor for Tank, CIP	LS	1	$24,000.00	$24,000.00
14	Furnish and Install 8 inch DIP, Including Trenching and Compacted Backfill, per APWA Standard Spec.801 CIP.	LF	140	$120.00	$16,800.00
15	Furnish and Install new chlorinaiton disinfection systemr CIP	EA	1	$8,000.00	$8,000.00
16	Chain Link Fence, incl. All attachments, hwardware & anchor posts. CIP	LF	720	$35.00	$25,200.00
17	2-50 GPM Variable Speed Booster pack	EA	1	$45,000.00	$45,000.00
18	Furnish and Install Electrical/Control Panel for Booster/Well Pumps and NEMA 12 Enclosure, Complete in Place	EA	1	$30,000.00	$30,000.00
19	Ductile Iron MJ fittings, class 250,8" forceman, INCL. Joining Material	LB	3,500	$4.20	$14,700.00
20	Fire Booster Pump 1500GPM	EA	1	$60,000.00	$60,000.00
21	Furnish and install Building 12' by 30'	SQ-FT	360	$300.00	$108,000.00
22	8" Waterline C-900 DR-18 PVC Pipe Installed With Trenching and Backfill	LF	2,549	$35.70	$90,999.30
23	4-1/2' Fire Hydrant w/ piping valves, and connection	EA	5	$3,500.00	$17,500.00
24	8" Gate Valves w/ Valve Can, CIP	EA	15	$1,205.00	$18,075.00
25	Ductile Iron MJ Fittings, All Sizes, Class 25, CIP	LB	2,270	$3.00	$6,810.00
	Roadway				
26	Asphalt Roadway, Remove, Dispose and Replace with SP III, 3" Thick for Residential Streets, include Subgrade Prep, CIP	SY	1,699	$50.00	$84,966.67
27	Excavate and Dispose of Unsuitable Material, CIP	CY	5,098	$15.00	$76,470.00
28	Import of Engineered Fill	CY	5,098	$15.00	$76,470.00
29	Geogrid Base Roadway Reinforcement	SY	850	$5.50	$4,673.17
32	Saw cut, remove, and dispose of existing asphalt, CIP	SY	1,699	$4.10	$6,967.27
33	Subgrade Prep,	SY	1,699	$2.50	$4,248.33
34	6" Aggregate Base Course, CIP	SY	1,699	$7.00	$11,895.33
35	Asphalt Paving, 2-3" Lifts, w/ machine laydown, CIP	SY	1,699	$16.00	$27,189.33
				Construction Cost Subtotal:	$1,405,730.29
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$1,469,691.00
				Contingency - 10%:	$146,969.00
				NMGRT @ 8.5%:	$137,416.00
				Interim Finance Interest:	$96,474.00
				TOTAL ESTIMATED CONSTRUCTION COST:	**$1,850,550.00**
	ENGINEERING SERVICES				
36	Bridge Loan @ 5.5%	LS	1	$16,170.00	$16,170.00
37	Additional Engineering - Data Collection*	LS	1	$19,400.00	$19,400.00
38	Additional Engineering - Geotech	LS	1	$10,000.00	$10,000.00
39	Engineering Design Services	LS	1	$161,666.00	$161,666.00
40	Engineering - Bid Phase	LS	1	$3,718.00	$3,718.00
41	Engineering - Construction Inspection	LS	1	$56,583.00	$56,583.00
42	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
43	Engineering - Construction Management	LS	1	$22,633.00	$22,633.00
				Engineering Services Subtotal:	$310,170.00
				NMGRT @ 8.5%:	$26,364.00
				Engineering Total:	**$336,534.00**
				TOTAL ESTIMATED COST:	**$2,187,084.00**

AIRPORT XII – AIRPORT 4 VFD WELL PUMP

Alternative XII - Airport 4 VFD Well Pump					
Item #	ITEMS LIST	UNITS	QTY	UNIT COST	EXTEND COST
General					
1	Mob/Demob. **(5% of General Cost)**	LS	1	$11,992.00	$11,992.00
2	Traffic Control **(3.43% of General Cost)**	LS	1	$19,187.20	$19,187.20
3	Construction Survey/Staking **(2.17% of General Cost)**	LS	1	$4,796.80	$4,796.80
4	SWPPP Preparation, Implementation, and Inspection **(1% of General Cost)**	LS	1	$8,394.40	$8,394.40
5	Materials Testing **(0.2% of General Cost)**	LS	1	$4,796.80	$4,796.80
6	Subsurface Utility Locating	LS	1	$5,000.00	$5,000.00
7	Utility Relocation	LS	1	$5,000.00	$5,000.00
Airport Water system					
8	Site Grading/Excavation	CY	60	$100.00	$6,000.00
9	6-Inch Gravel Pad, Including Subgrade Prep, Installed	SY	12	$120.00	$1,440.00
10	Furnish and Install 30 Gallon Pressure Tank	LS	1	$2,000.00	$2,000.00
11	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, and NEMA 12 Enclosure, CIP	EA	1	$18,000.00	$18,000.00
12	2-50 GPM Variable Speed Booster pack W/VFD	EA	1	$28,000.00	$28,000.00
13	Furnish and Install new chlorinaiton disinfection systemr CIP	EA	1	$8,000.00	$8,000.00
14	Furnish and Install Electrical/Control Panel for Booster/Well Pumps, Including Well VFD and NEMA 12 Enclosure, CIP	EA	1	$45,000.00	$45,000.00
15	Chain Link Fence, incl. All attachments, hwardware & anchor posts. CIP	LF	200	$35.00	$7,000.00
16	Ductile Iron MJ fittings, class 250,8" forceman, INCL. Joining Material	LB	2,000	$4.20	$8,400.00
17	Furnish and install Building 12' by 30'	SQ-FT	360	$300.00	$108,000.00
18	well sanitary seal pitless unit 8-inch W/ concrete slab	EA	1	$8,000.00	$8,000.00
				Construction Cost Subtotal:	$299,007.20
				2-YR Inflation @ 4.55% + Construction Cost Subtotal:	$312,612.00
				Contingency - 10%:	$31,261.00
				NMGRT @ 8.5%:	$29,229.00
				Interim Finance Interest:	$20,521.00
				TOTAL ESTIMATED CONSTRUCTION COST:	**$393,623.00**
ENGINEERING SERVICES					
19	Bridge Loan @ 5.5%	LS	1	$4,738.00	$4,738.00
20	Additional Engineering - Data Collection*	LS	1	$4,126.00	$4,126.00
21	Additional Engineering - Geotech	LS	1	$10,000.00	$10,000.00
22	Engineering Design Services	LS	1	$34,387.00	$34,387.00
23	Engineering - Bid Phase	LS	1	$791.00	$791.00
24	Engineering - Construction Inspection	LS	1	$12,036.00	$12,036.00
25	Engineering-Well Construction Oversight	LS	1	$20,000.00	$20,000.00
26	Saw cut, remove, and dispose of existing asphalt, CIP	LS	1	$4,814.00	$4,814.00
				Engineering Services Subtotal:	$90,892.00
				NMGRT @ 8.5%:	$7,726.00
				Engineering Total:	**$98,618.00**
				TOTAL ESTIMATED COST:	**$492,241.00**

APPENDIX 5- OPERATION AND MAINTENANACE

TABLE OF CONTENT:

- ALTERNATIVE II - COMPLETE SYSTEM
- ALTERNATIVE III – SYSTEM PERFORMANCE UPGRADE
- ALTERNATIVE III – A SYSTEM HIGH PRESSURE SOLUTION
- ALTERNATIVE III – B SYSTEM REDUNDANCY AND HYDRAULIC ENHANCEMENTS
- ALTERNATIVE III – C ADDITIONAL HYDRAULIC PERFROMANCE ENHACNECMENT
- ALTERNATIVE IV – NORTH AREA
- ALTRENATIVE V – EAST AREA
- ALTERNATIVE VI – WEST AREA
- ALTRENATIVE VII – DOWNTOWN AREA
- ALTERNATIVE VIII – WILLIAMSBURG AREA
- ALTERNATIVE IX – AIRPORT 1 PRESSURE TANK REPLACEMENT
- ALTERNATIVE X – AIRPORT 2 WITHOUT FIRE FLOW
- ALTERNATIVE XI – AIRPORT 3 WITH FIRE FLOW
- AIRPORT XII – AIRPORT 4 VFD WELL PUMP

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative I - Do Nothing

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 137,800
Power cost due to Water Losses	$ 39,434
O&M	$ 566,404

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 140,900.50	$ 144,070.76	$ 147,312.35	$ 150,626.88	$ 154,015.99
Water Loss:	$ 40,321.04	$ 41,228.27	$ 42,155.90	$ 43,104.41	$ 44,074.26
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Future Value	**$ 760,369.86**	**$ 777,478.18**	**$ 794,971.44**	**$ 812,858.29**	**$ 831,147.60**
Net Present Value:	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 157,481.35	$ 161,024.68	$ 164,647.73	$ 168,352.31	$ 172,140.23
Water Loss:	$ 45,065.93	$ 46,079.91	$ 47,116.71	$ 48,176.84	$ 49,260.82
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Future Value	**$ 849,848.43**	**$ 868,970.02**	**$ 888,521.84**	**$ 908,513.58**	**$ 928,955.14**
Net Present Value:	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 176,013.39	$ 179,973.69	$ 184,023.10	$ 188,163.62	$ 192,397.30
Water Loss:	$ 50,369.19	$ 51,502.49	$ 52,661.30	$ 53,846.18	$ 55,057.72
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Future Value	**$ 949,856.63**	**$ 971,228.40**	**$ 993,081.04**	**$ 1,015,425.36**	**$ 1,038,272.44**
Net Present Value:	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 196,726.24	$ 201,152.58	$ 205,678.51	$ 210,306.28	$ 215,038.17
Water Loss:	$ 56,296.52	$ 57,563.19	$ 58,858.36	$ 60,182.67	$ 61,536.78
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Future Value	**$ 1,061,633.57**	**$ 1,085,520.32**	**$ 1,109,944.53**	**$ 1,134,918.28**	**$ 1,160,453.94**
Net Present Value:	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**	**$ 743,638.00**
Total Lifetime Maintenance Cost (20 years):					**$ 18,941,969**
Total Lifetime Maintenance Cost (present value):					**$ 11,871,223**
ANNUAL TOTAL O&M ALT I					**$ 743,638**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative II - Complete System

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 4,685
Water Losses	$ 1,341
O&M	$ 566,404
Well Equipment	$ 11,758

Year:	1	2	3	4	5
Repair Costs:	$ 4,790.62	$ 4,898.41	$ 5,008.62	$ 5,121.31	$ 5,236.54
Water Loss:	$ 1,370.92	$ 1,401.76	$ 1,433.30	$ 1,465.55	$ 1,498.52
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well Equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	**$ 597,332.40**	**$ 610,772.38**	**$ 624,514.76**	**$ 638,566.34**	**$ 652,934.08**
Net Present Value:	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**

Year:	6	7	8	9	10
Repair Costs:	$ 5,354.37	$ 5,474.84	$ 5,598.02	$ 5,723.98	$ 5,852.77
Water Loss:	$ 1,532.24	$ 1,566.72	$ 1,601.97	$ 1,638.01	$ 1,674.87
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well Equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	**$ 667,625.10**	**$ 682,646.66**	**$ 698,006.21**	**$ 713,711.35**	**$ 729,769.86**
Net Present Value:	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**

Year:	11	12	13	14	15
Repair Costs:	$ 5,984.46	$ 6,119.11	$ 6,256.79	$ 6,397.56	$ 6,541.51
Water Loss:	$ 1,712.55	$ 1,751.08	$ 1,790.48	$ 1,830.77	$ 1,871.96
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well Equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	**$ 746,189.68**	**$ 762,978.95**	**$ 780,145.97**	**$ 797,699.26**	**$ 815,647.49**
Net Present Value:	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**

Year:	16	17	18	19	20
Repair Costs:	$ 6,688.69	$ 6,839.19	$ 6,993.07	$ 7,150.41	$ 7,311.30
Water Loss:	$ 1,914.08	$ 1,957.15	$ 2,001.18	$ 2,046.21	$ 2,092.25
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well Equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	**$ 833,999.56**	**$ 852,764.55**	**$ 871,951.75**	**$ 891,570.67**	**$ 911,631.01**
Net Present Value:	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**	**$ 584,188.17**
				Total Lifetime Maintenance Cost (20 years):	**$ 14,880,458**
				Total Lifetime Maintenance Cost (present value):	**$ 9,325,812**
				ANNUAL TOTAL O&M ALT II	**$ 584,188**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative III - System Performance Upgrade

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 85,712
Water Losses	$ 24,528
O&M	$ 566,404
Well Equipment	$ 11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$87,640.11	$89,612.01	$91,628.28	$93,689.92	$95,797.94
Water Loss:	$25,079.69	$25,643.98	$26,220.97	$26,810.94	$27,414.19
O&M	$579,148.31	$592,179.15	$605,503.18	$619,127.00	$633,057.36
Well Equipment	$12,022.56	$12,293.06	$12,569.66	$12,852.47	$13,141.65
Future Value	**$703,890.67**	**$719,728.21**	**$735,922.09**	**$752,480.34**	**$769,411.15**
Net Present Value:	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$97,953.40	$100,157.35	$102,410.89	$104,715.13	$107,071.22
Water Loss:	$28,031.01	$28,661.71	$29,306.59	$29,965.99	$30,640.23
O&M	$647,301.15	$661,865.43	$676,757.40	$691,984.44	$707,554.09
Well Equipment	$13,437.34	$13,739.68	$14,048.82	$14,364.92	$14,688.13
Future Value	**$786,722.90**	**$804,424.16**	**$822,523.71**	**$841,030.49**	**$859,953.67**
Net Present Value:	**$688,401.63**	**$110,239.41**	**$110,239.41**	**$110,239.41**	**$110,239.41**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$109,480.33	$111,943.63	$114,462.37	$117,037.77	$119,671.12
Water Loss:	$31,329.63	$32,034.55	$32,755.33	$33,492.32	$34,245.90
O&M	$723,474.06	$739,752.22	$756,396.65	$773,415.57	$790,817.42
Well Equipment	$15,018.62	$15,356.54	$15,702.06	$16,055.35	$16,416.60
Future Value	**$879,302.63**	**$899,086.94**	**$919,316.40**	**$940,001.02**	**$961,151.04**
Net Present Value:	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$122,363.72	$125,116.90	$127,932.03	$130,810.50	$133,753.74
Water Loss:	$35,016.43	$35,804.30	$36,609.90	$37,433.62	$38,275.88
O&M	$808,610.81	$826,804.56	$845,407.66	$864,429.33	$883,878.99
Well Equipment	$16,785.97	$17,163.66	$17,549.84	$17,944.71	$18,348.47
Future Value	**$982,776.94**	**$1,004,889.42**	**$1,027,499.43**	**$1,050,618.17**	**$1,074,257.08**
Net Present Value:	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**	**$688,401.63**
Total Lifetime Maintenance Cost (20 years):					**$ 17,534,986**
Total Lifetime Maintenance Cost (present value):					**$ 10,989,446**
ANNUAL TOTAL O&M ALT III					**$ 688,402**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative III A- System High Pressure Solutions

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$101,007
Water Losses	$28,905
O&M	$566,404

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$103,280.07	$105,603.87	$107,979.96	$110,409.50	$112,893.72
Water Loss:	$29,555.32	$30,220.32	$30,900.28	$31,595.53	$32,306.43
O&M	$579,148.31	$592,179.15	$605,503.18	$619,127.00	$633,057.36
Future Value	**$711,983.70**	**$728,003.34**	**$744,383.41**	**$761,132.04**	**$778,257.51**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**
	$15,667.12				

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$115,433.83	$118,031.09	$120,686.79	$123,402.24	$126,178.79
Water Loss:	$33,033.33	$33,776.58	$34,536.55	$35,313.62	$36,108.18
O&M	$647,301.15	$661,865.43	$676,757.40	$691,984.44	$707,554.09
Future Value	**$795,768.30**	**$813,673.09**	**$831,980.73**	**$850,700.30**	**$869,841.06**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$129,017.81	$131,920.71	$134,888.93	$137,923.93	$141,027.22
Water Loss:	$36,920.61	$37,751.33	$38,600.73	$39,469.25	$40,357.31
O&M	$723,474.06	$739,752.22	$756,396.65	$773,415.57	$790,817.42
Future Value	**$889,412.48**	**$909,424.26**	**$929,886.31**	**$950,808.75**	**$972,201.95**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$144,200.33	$147,444.84	$150,762.35	$154,154.50	$157,622.98
Water Loss:	$41,265.35	$42,193.82	$43,143.18	$44,113.90	$45,106.46
O&M	$808,610.81	$826,804.56	$845,407.66	$864,429.33	$883,878.99
Future Value	**$994,076.49**	**$1,016,443.21**	**$1,039,313.18**	**$1,062,697.73**	**$1,086,608.43**
Net Present Value:	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**	**$696,316.58**
				Total Lifetime Maintenance Cost (20 years):	**$ 17,736,596**
				Total Lifetime Maintenance Cost (present value):	**$ 11,115,798**
				ANNUAL TOTAL O&M ALT III-A	**$696,317**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative III B- System Redundancy and Hydraulic Performance Enhancements

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$129,119
Water Losses	$36,949
O&M	$566,404
Well equipment	$11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$132,023.77	$134,994.30	$138,031.68	$141,137.39	$144,312.98
Water Loss:	$37,780.82	$38,630.89	$39,500.08	$40,388.83	$41,297.58
O&M	$579,148.31	$592,179.15	$605,503.18	$619,127.00	$633,057.36
Well Equipment	$12,022.56	$12,293.06	$12,569.66	$12,852.47	$13,141.65
Future Value	**$760,975.45**	**$778,097.40**	**$795,604.59**	**$813,505.70**	**$831,809.57**
Net Present Value:	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$147,560.02	$150,880.12	$154,274.92	$157,746.11	$161,295.40
Water Loss:	$42,226.78	$43,176.88	$44,148.36	$45,141.70	$46,157.39
O&M	$647,301.15	$661,865.43	$676,757.40	$691,984.44	$707,554.09
Well Equipment	$13,437.34	$13,739.68	$14,048.82	$14,364.92	$14,688.13
Future Value	**$850,525.29**	**$869,662.11**	**$889,229.51**	**$909,237.17**	**$929,695.01**
Net Present Value:	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$164,924.54	$168,635.35	$172,429.64	$176,309.31	$180,276.27
Water Loss:	$47,195.93	$48,257.84	$49,343.64	$50,453.87	$51,589.08
O&M	$723,474.06	$739,752.22	$756,396.65	$773,415.57	$790,817.42
Well Equipment	$15,018.62	$15,356.54	$15,702.06	$16,055.35	$16,416.60
Future Value	**$950,613.14**	**$972,001.94**	**$993,871.98**	**$1,016,234.10**	**$1,039,099.37**
Net Present Value:	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$184,332.48	$188,479.96	$192,720.76	$197,056.98	$201,490.76
Water Loss:	$52,749.83	$53,936.71	$55,150.28	$56,391.16	$57,659.96
O&M	$808,610.81	$826,804.56	$845,407.66	$864,429.33	$883,878.99
Well Equipment	$16,785.97	$17,163.66	$17,549.84	$17,944.71	$18,348.47
Future Value	**$1,062,479.11**	**$1,086,384.88**	**$1,110,828.54**	**$1,135,822.19**	**$1,161,378.19**
Net Present Value:	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**	**$744,230.27**
				Total Lifetime Maintenance Cost (20 years):	**$ 18,957,055**
				Total Lifetime Maintenance Cost (present value):	**$ 11,880,678**
				ANNUAL TOTAL O&M ALT III-B	**$744,230**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative III C- Additional Hydraulic Performance Enhancements

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$130,634
Water Losses	$37,383
O&M	$566,404

Year:	1	2	3	4	5
Repair Costs:	$133,573.67	$136,579.08	$139,652.11	$142,794.28	$146,007.15
Water Loss:	$38,224.35	$39,084.40	$39,963.80	$40,862.98	$41,782.40
O&M	$579,148.31	$592,179.15	$605,503.18	$619,127.00	$633,057.36
Future Value	**$750,946.33**	**$767,842.63**	**$785,119.09**	**$802,784.27**	**$820,846.91**
Net Present Value:	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**

Year:	6	7	8	9	10
Repair Costs:	$149,292.32	$152,651.39	$156,086.05	$159,597.99	$163,188.94
Water Loss:	$42,722.50	$43,683.76	$44,666.64	$45,671.64	$46,699.25
O&M	$647,301.15	$661,865.43	$676,757.40	$691,984.44	$707,554.09
Future Value	**$839,315.97**	**$858,200.58**	**$877,510.09**	**$897,254.07**	**$917,442.28**
Net Present Value:	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**

Year:	11	12	13	14	15
Repair Costs:	$166,860.69	$170,615.06	$174,453.90	$178,379.11	$182,392.64
Water Loss:	$47,749.99	$48,824.36	$49,922.91	$51,046.18	$52,194.72
O&M	$723,474.06	$739,752.22	$756,396.65	$773,415.57	$790,817.42
Future Value	**$938,084.73**	**$959,191.64**	**$980,773.45**	**$1,002,840.86**	**$1,025,404.77**
Net Present Value:	**$734,421.84**	**$168,017.63**	**$168,017.63**	**$168,017.63**	**$168,017.63**

Year:	16	17	18	19	20
Repair Costs:	$186,496.47	$190,692.64	$194,983.23	$199,370.35	$203,856.18
Water Loss:	$53,369.10	$54,569.90	$55,797.72	$57,053.17	$58,336.87
O&M	$808,610.81	$826,804.56	$845,407.66	$864,429.33	$883,878.99
Future Value	**$1,048,476.38**	**$1,072,067.10**	**$1,096,188.61**	**$1,120,852.85**	**$1,146,072.04**
Net Present Value:	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**	**$734,421.84**
Total Lifetime Maintenance Cost (20 years):					**$ 18,707,215**
Total Lifetime Maintenance Cost (present value):					**$ 11,724,099**
ANNUAL TOTAL O&M ALT III-C					**$734,422**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative IV - North Side
WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 130,772
Water Losses	$ 37,423
O&M	$566,404
Well equipment	$11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 133,714.57	$ 136,723.15	$ 139,799.42	$ 142,944.91	$ 146,161.17
Water Loss:	$ 38,264.67	$ 39,125.63	$ 40,005.95	$ 40,906.09	$ 41,826.47
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	**$ 763,150.11**	**$ 780,320.99**	**$ 797,878.21**	**$ 815,830.47**	**$ 834,186.66**
Net Present Value:	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 149,449.80	$ 152,812.42	$ 156,250.70	$ 159,766.34	$ 163,361.08
Water Loss:	$ 42,767.57	$ 43,729.84	$ 44,713.76	$ 45,719.82	$ 46,748.52
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	**$ 852,955.86**	**$ 872,147.36**	**$ 891,770.68**	**$ 911,835.52**	**$ 932,351.82**
Net Present Value:	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 167,036.70	$ 170,795.03	$ 174,637.92	$ 178,567.27	$ 182,585.04
Water Loss:	$ 47,800.36	$ 48,875.87	$ 49,975.57	$ 51,100.02	$ 52,249.77
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	**$ 953,329.73**	**$ 974,779.65**	**$ 996,712.20**	**$ 1,019,138.22**	**$ 1,042,068.83**
Net Present Value:	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**	**$ 746,357.08**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 186,693.20	$ 190,893.80	$ 195,188.91	$ 199,580.66	$ 204,071.22
Water Loss:	$ 53,425.39	$ 54,627.46	$ 55,856.58	$ 57,113.36	$ 58,398.41
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	**$ 1,065,515.38**	**$ 1,089,489.47**	**$ 1,114,002.99**	**$ 1,139,068.05**	**$ 1,164,697.09**
Net Present Value:	**$ 746,357.08**	**$ 168,194.86**	**$ 168,194.86**	**$ 168,194.86**	**$ 168,194.86**
				Total Lifetime Maintenance Cost (20 years):	**$ 19,011,229**
				Total Lifetime Maintenance Cost (present value):	**$ 11,914,630**
				ANNUAL TOTAL O&M ALT IV	**$ 746,357**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative V - East Side

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 105,830
Water Losses	$ 30,301
O&M	$566,404
Well equipment	$11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 108,211.58	$ 110,646.34	$ 113,135.89	$ 115,681.44	$ 118,284.28
Water Loss:	$ 30,982.69	$ 31,679.80	$ 32,392.60	$ 33,121.43	$ 33,866.66
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	$ 730,365.14	$ 746,798.36	$ 763,601.32	$ 780,782.35	$ 798,349.95
Net Present Value:	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 120,945.67	$ 123,666.95	$ 126,449.46	$ 129,294.57	$ 132,203.70
Water Loss:	$ 34,628.66	$ 35,407.81	$ 36,204.48	$ 37,019.08	$ 37,852.01
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	$ 816,312.83	$ 834,679.86	$ 853,460.16	$ 872,663.01	$ 892,297.93
Net Present Value:	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**	**$ 714,293.54**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 135,178.28	$ 138,219.79	$ 141,329.74	$ 144,509.66	$ 147,761.12
Water Loss:	$ 38,703.68	$ 39,574.51	$ 40,464.94	$ 41,375.40	$ 42,306.35
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	$ 912,374.64	$ 932,903.07	$ 953,893.38	$ 975,355.99	$ 997,301.50
Net Present Value:	**$ 714,293.54**	**$ 136,131.32**	**$ 136,131.32**	**$ 136,131.32**	**$ 136,131.32**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 151,085.75	$ 154,485.18	$ 157,961.10	$ 161,515.22	$ 165,149.31
Water Loss:	$ 43,258.24	$ 44,231.55	$ 45,226.76	$ 46,244.36	$ 47,284.86
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	$ 1,019,740.78	$ 1,042,684.95	$ 1,066,145.36	$ 1,090,133.63	$ 1,114,661.63
Net Present Value:	**$ 714,293.54**	**$ 136,131.32**	**$ 136,131.32**	**$ 136,131.32**	**$ 136,131.32**
				Total Lifetime Maintenance Cost (20 years):	**$ 18,194,506**
				Total Lifetime Maintenance Cost (present value):	**$ 11,402,777**
				ANNUAL TOTAL O&M ALT V	**$ 714,294**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative VI - West Side

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 118,370
Water Losses	$ 33,882
O&M	$ 566,404
Well equipment	$ 11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 121,033.53	$ 123,756.78	$ 126,541.31	$ 129,388.49	$ 132,299.73
Water Loss:	$ 34,643.84	$ 35,423.33	$ 36,220.35	$ 37,035.31	$ 37,868.60
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	**$ 746,848.24**	**$ 763,652.32**	**$ 780,834.50**	**$ 798,403.28**	**$ 816,367.35**
Net Present Value:	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 135,276.48	$ 138,320.20	$ 141,432.40	$ 144,614.63	$ 147,868.46
Water Loss:	$ 38,720.65	$ 39,591.86	$ 40,482.68	$ 41,393.54	$ 42,324.89
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	**$ 834,735.61**	**$ 853,517.17**	**$ 872,721.30**	**$ 892,357.53**	**$ 912,435.58**
Net Present Value:	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 151,195.50	$ 154,597.40	$ 158,075.84	$ 161,632.55	$ 165,269.28
Water Loss:	$ 43,277.20	$ 44,250.94	$ 45,246.59	$ 46,264.64	$ 47,305.59
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	**$ 932,965.38**	**$ 953,957.10**	**$ 975,421.13**	**$ 997,368.11**	**$ 1,019,808.89**
Net Present Value:	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 168,987.84	$ 172,790.06	$ 176,677.84	$ 180,653.09	$ 184,717.79
Water Loss:	$ 48,369.97	$ 49,458.29	$ 50,571.10	$ 51,708.95	$ 52,872.40
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	$ 1,042,754.59	$ 1,066,216.57	$ 1,090,206.44	$ 1,114,736.09	$ 1,139,817.65
Net Present Value:	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**	**$ 730,413.92**
				Total Lifetime Maintenance Cost (20 years):	**$ 18,605,125**
				Total Lifetime Maintenance Cost (present value):	**$ 11,660,118**
				ANNUAL TOTAL O&M ALT VI	**$ 730,414**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative VII - Downtown

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 121,264
Water Losses	$ 34,694
O&M	$ 566,404
Well equipment	$ 11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 123,992.44	$ 126,782.27	$ 129,634.87	$ 132,551.66	$ 135,534.07
Water Loss:	$ 35,474.45	$ 36,272.63	$ 37,088.76	$ 37,923.26	$ 38,776.53
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	**$ 750,637.76**	**$ 767,527.11**	**$ 784,796.47**	**$ 802,454.39**	**$ 820,509.61**
Net Present Value:	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 138,583.58	$ 141,701.71	$ 144,890.00	$ 148,150.03	$ 151,483.40
Water Loss:	$ 39,649.01	$ 40,541.11	$ 41,453.28	$ 42,385.98	$ 43,339.67
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	**$ 838,971.08**	**$ 857,847.93**	**$ 877,149.51**	**$ 896,885.37**	**$ 917,065.29**
Net Present Value:	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 154,891.78	$ 158,376.85	$ 161,940.33	$ 165,583.98	$ 169,309.62
Water Loss:	$ 44,314.81	$ 45,311.89	$ 46,331.41	$ 47,373.87	$ 48,439.78
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	**$ 937,699.26**	**$ 958,797.50**	**$ 980,370.44**	**$ 1,002,428.77**	**$ 1,024,983.42**
Net Present Value:	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 173,119.09	$ 177,014.27	$ 180,997.09	$ 185,069.52	$ 189,233.59
Water Loss:	$ 49,529.67	$ 50,644.09	$ 51,783.58	$ 52,948.71	$ 54,140.06
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	**$ 1,048,045.55**	**$ 1,071,626.57**	**$ 1,095,738.17**	**$ 1,120,392.28**	**$ 1,145,601.11**
Net Present Value:	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**	**$ 734,120.06**
				Total Lifetime Maintenance Cost (20 years):	**$ 18,699,528**
				Total Lifetime Maintenance Cost (present value):	**$ 11,719,281**
				ANNUAL TOTAL O&M ALT VII	**$ 734,120**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative VIII - Wiliamsburg

WATERLINES

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 107,208
Water Losses	$ 30,679
O&M	$566,404
Well equipment	$11,758

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 109,620.59	$ 112,087.05	$ 114,609.01	$ 117,187.71	$ 119,824.44
Water Loss:	$ 31,369.77	$ 32,075.59	$ 32,797.29	$ 33,535.23	$ 34,289.77
O&M	$ 579,148.31	$ 592,179.15	$ 605,503.18	$ 619,127.00	$ 633,057.36
Well equipment	$ 12,022.56	$ 12,293.06	$ 12,569.66	$ 12,852.47	$ 13,141.65
Future Value	$ 732,161.23	$ 748,634.86	$ 765,479.14	$ 782,702.42	$ 800,313.22
Net Present Value:	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 122,520.49	$ 125,277.20	$ 128,095.93	$ 130,978.09	$ 133,925.10
Water Loss:	$ 35,061.29	$ 35,850.17	$ 36,656.80	$ 37,481.58	$ 38,324.92
O&M	$ 647,301.15	$ 661,865.43	$ 676,757.40	$ 691,984.44	$ 707,554.09
Well equipment	$ 13,437.34	$ 13,739.68	$ 14,048.82	$ 14,364.92	$ 14,688.13
Future Value	$ 695,799.78	$ 711,455.28	$ 727,463.02	$ 743,830.94	$ 760,567.14
Net Present Value:	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 136,938.42	$ 140,019.53	$ 143,169.97	$ 146,391.29	$ 149,685.10
Water Loss:	$ 39,187.23	$ 40,068.94	$ 40,970.49	$ 41,892.33	$ 42,834.90
O&M	$ 723,474.06	$ 739,752.22	$ 756,396.65	$ 773,415.57	$ 790,817.42
Well equipment	$ 15,018.62	$ 15,356.54	$ 15,702.06	$ 16,055.35	$ 16,416.60
Future Value	$ 914,618.31	$ 935,197.23	$ 956,239.16	$ 977,754.54	$ 999,754.02
Net Present Value:	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 153,053.01	$ 156,496.71	$ 160,017.88	$ 163,618.28	$ 167,299.69
Water Loss:	$ 43,798.69	$ 44,784.16	$ 45,791.80	$ 46,822.12	$ 47,875.62
O&M	$ 808,610.81	$ 826,804.56	$ 845,407.66	$ 864,429.33	$ 883,878.99
Well equipment	$ 16,785.97	$ 17,163.66	$ 17,549.84	$ 17,944.71	$ 18,348.47
Future Value	$ 1,022,248.49	$ 1,045,249.08	$ 1,068,767.18	$ 1,092,814.44	$ 1,117,402.77
Net Present Value:	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**	**$ 716,050.10**
				Total Lifetime Maintenance Cost (20 years):	**$ 17,598,452**
				Total Lifetime Maintenance Cost (present value):	**$ 11,430,818**
				ANNUAL TOTAL O&M ALT VIII	**$ 716,050**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative IX - Airport 1 Pressure Tank

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 1,200
Annual Running cost	$ 886
O&M	$ -

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 1,227.00	$ 1,254.61	$ 1,282.84	$ 1,311.70	$ 1,341.21
Running cost	$ 906.22	$ 926.61	$ 947.45	$ 968.77	$ 990.57
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,133.22**	**$ 2,181.21**	**$ 2,230.29**	**$ 2,280.47**	**$ 2,331.78**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 1,371.39	$ 1,402.25	$ 1,433.80	$ 1,466.06	$ 1,499.04
Running cost	$ 1,012.86	$ 1,035.65	$ 1,058.95	$ 1,082.77	$ 1,107.14
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,384.25**	**$ 2,437.89**	**$ 2,492.75**	**$ 2,548.83**	**$ 2,606.18**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 1,532.77	$ 1,567.26	$ 1,602.52	$ 1,638.58	$ 1,675.45
Running cost	$ 1,132.05	$ 1,157.52	$ 1,183.56	$ 1,210.19	$ 1,237.42
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,664.82**	**$ 2,724.78**	**$ 2,786.09**	**$ 2,848.77**	**$ 2,912.87**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 1,713.15	$ 1,751.69	$ 1,791.10	$ 1,831.40	$ 1,872.61
Running cost	$ 1,265.26	$ 1,293.73	$ 1,322.84	$ 1,352.61	$ 1,383.04
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	$ 2,978.41	$ 3,045.42	$ 3,113.95	$ 3,184.01	$ 3,255.65
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**
				Total Lifetime Maintenance Cost (20 years):	**$ 53,142**
				Total Lifetime Maintenance Cost (present value):	**$ 33,305**
				ANNUAL TOTAL O&M ALT IX	**$ 2,086**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative X - Airport 2 Without Fire Flow

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 1,200.00
Annual Running cost	$ 886
O&M	$ -

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 1,227.00	$ 1,254.61	$ 1,282.84	$ 1,311.70	$ 1,341.21
Running cost	$ 906.22	$ 926.61	$ 947.45	$ 968.77	$ 990.57
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,133.22**	**$ 2,181.21**	**$ 2,230.29**	**$ 2,280.47**	**$ 2,331.78**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 1,371.39	$ 1,402.25	$ 1,433.80	$ 1,466.06	$ 1,499.04
Running cost	$ 1,012.86	$ 1,035.65	$ 1,058.95	$ 1,082.77	$ 1,107.14
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,384.25**	**$ 2,437.89**	**$ 2,492.75**	**$ 2,548.83**	**$ 2,606.18**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 1,532.77	$ 1,567.26	$ 1,602.52	$ 1,638.58	$ 1,675.45
Running cost	$ 1,132.05	$ 1,157.52	$ 1,183.56	$ 1,210.19	$ 1,237.42
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,664.82**	**$ 2,724.78**	**$ 2,786.09**	**$ 2,848.77**	**$ 2,912.87**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 1,713.15	$ 1,751.69	$ 1,791.10	$ 1,831.40	$ 1,872.61
Running cost	$ 1,265.26	$ 1,293.73	$ 1,322.84	$ 1,352.61	$ 1,383.04
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,978.41**	**$ 3,045.42**	**$ 3,113.95**	**$ 3,184.01**	**$ 3,255.65**
Net Present Value:	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**	**$ 2,086.27**
				Total Lifetime Maintenance Cost (20 years):	**$ 53,142**
				Total Lifetime Maintenance Cost (present value):	**$ 33,305**
				ANNUAL TOTAL O&M ALT X	**$ 2,086.27**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative XI - Airport 3 With Fire Flow

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 2,791
Annual Running cost	$ 37,795
O&M	$ -

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 2,853.41	$ 2,917.61	$ 2,983.26	$ 3,050.38	$ 3,119.02
Running cost	$ 38,645.09	$ 39,514.61	$ 40,403.69	$ 41,312.77	$ 42,242.31
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 41,498.51**	**$ 42,432.22**	**$ 43,386.95**	**$ 44,363.16**	**$ 45,361.33**
Net Present Value:	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 3,189.20	$ 3,260.95	$ 3,334.32	$ 3,409.35	$ 3,486.06
Running cost	$ 43,192.76	$ 44,164.60	$ 45,158.30	$ 46,174.36	$ 47,213.29
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 46,381.96**	**$ 47,425.55**	**$ 48,492.63**	**$ 49,583.71**	**$ 50,699.34**
Net Present Value:	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 3,564.49	$ 3,644.69	$ 3,726.70	$ 3,810.55	$ 3,896.29
Running cost	$ 48,275.58	$ 49,361.79	$ 50,472.43	$ 51,608.05	$ 52,769.24
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 51,840.08**	**$ 53,006.48**	**$ 54,199.13**	**$ 55,418.61**	**$ 56,665.52**
Net Present Value:	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 3,983.95	$ 4,073.59	$ 4,165.25	$ 4,258.97	$ 4,354.79
Running cost	$ 53,956.54	$ 55,170.57	$ 56,411.90	$ 57,681.17	$ 58,979.00
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 57,940.50**	**$ 59,244.16**	**$ 60,577.15**	**$ 61,940.14**	**$ 63,333.79**
Net Present Value:	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**	**$ 40,585.34**
				Total Lifetime Maintenance Cost (20 years):	**$ 1,033,791**
				Total Lifetime Maintenance Cost (present value):	**$ 647,893**
				ANNUAL TOTAL O&M ALT XI	**$ 40,585**

[THIS PAGE INTENTIONALLY LEFT BLANK]

O&M Alternative XII- Airport 4 VFD Well Pump

Input Variables	
Discount Rate:	2.25%
Repair Costs:	$ 1,200
Annual Running cost	$ 1,182
O&M	$ -

Year:	**1**	**2**	**3**	**4**	**5**
Repair Costs:	$ 1,227.00	$ 1,254.61	$ 1,282.84	$ 1,311.70	$ 1,341.21
Running cost	$ 1,208.29	$ 1,235.47	$ 1,263.27	$ 1,291.70	$ 1,320.76
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,435.29**	**$ 2,490.08**	**$ 2,546.11**	**$ 2,603.40**	**$ 2,661.97**
Net Present Value:	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**

Year:	**6**	**7**	**8**	**9**	**10**
Repair Costs:	$ 1,371.39	$ 1,402.25	$ 1,433.80	$ 1,466.06	$ 1,499.04
Running cost	$ 1,350.48	$ 1,380.86	$ 1,411.93	$ 1,443.70	$ 1,476.18
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 2,721.87**	**$ 2,783.11**	**$ 2,845.73**	**$ 2,909.76**	**$ 2,975.23**
Net Present Value:	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**

Year:	**11**	**12**	**13**	**14**	**15**
Repair Costs:	$ 1,532.77	$ 1,567.26	$ 1,602.52	$ 1,638.58	$ 1,675.45
Running cost	$ 1,509.40	$ 1,543.36	$ 1,578.08	$ 1,613.59	$ 1,649.90
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 3,042.17**	**$ 3,110.62**	**$ 3,180.61**	**$ 3,252.17**	**$ 3,325.34**
Net Present Value:	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**

Year:	**16**	**17**	**18**	**19**	**20**
Repair Costs:	$ 1,713.15	$ 1,751.69	$ 1,791.10	$ 1,831.40	$ 1,872.61
Running cost	$ 1,687.02	$ 1,724.98	$ 1,763.79	$ 1,803.47	$ 1,844.05
O&M	$ -	$ -	$ -	$ -	$ -
Future Value	**$ 3,400.16**	**$ 3,476.67**	**$ 3,554.89**	**$ 3,634.88**	**$ 3,716.66**
Net Present Value:	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**	**$ 2,381.70**
				Total Lifetime Maintenance Cost (20 years):	**$ 60,667**
				Total Lifetime Maintenance Cost (present value):	**$ 38,021**
				ANNUAL TOTAL O&M ALT XII	**$ 2,382**

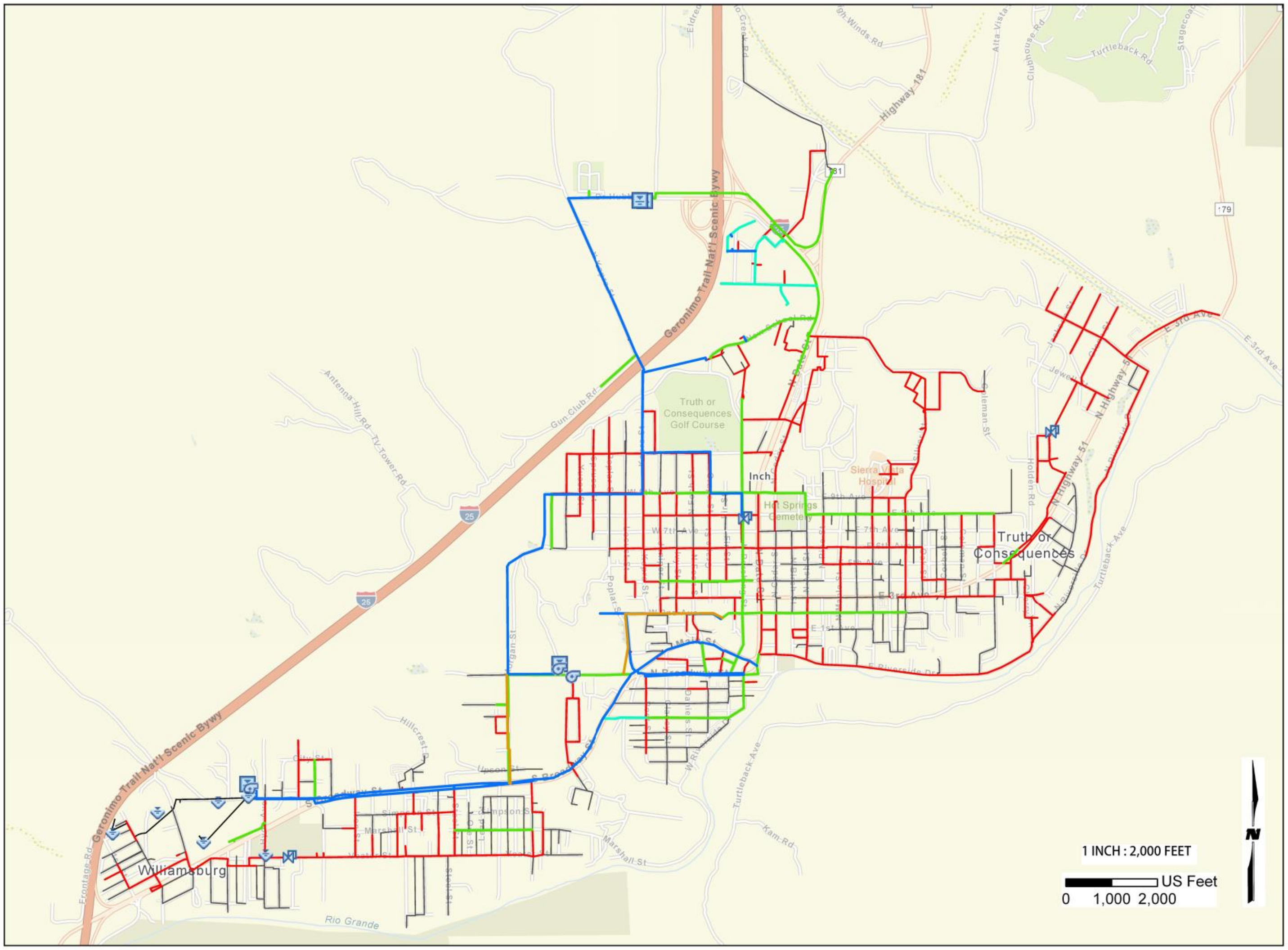
[THIS PAGE INTENTIONALLY LEFT BLANK]

APPENDIX 6- EXHIBITS

TABLE OF CONTENT:

- EXHIBIT 107: EXISTING PIPE DIAMETER
- EXHIBIT 108: AIRPORT OVERVIEW
- EXHIBIT 109: AIRPORT OVERVIEW 2
- EXHIBIT 110: SYSTEM COMPLETION OVERVIEW
- EXHIBIT 111: EXISTING SYSTEM OVERVIEW USDA TOPOGRAPHIC MAP

[THIS PAGE INTENTIONALLY LEFT BLANK]



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY
ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO

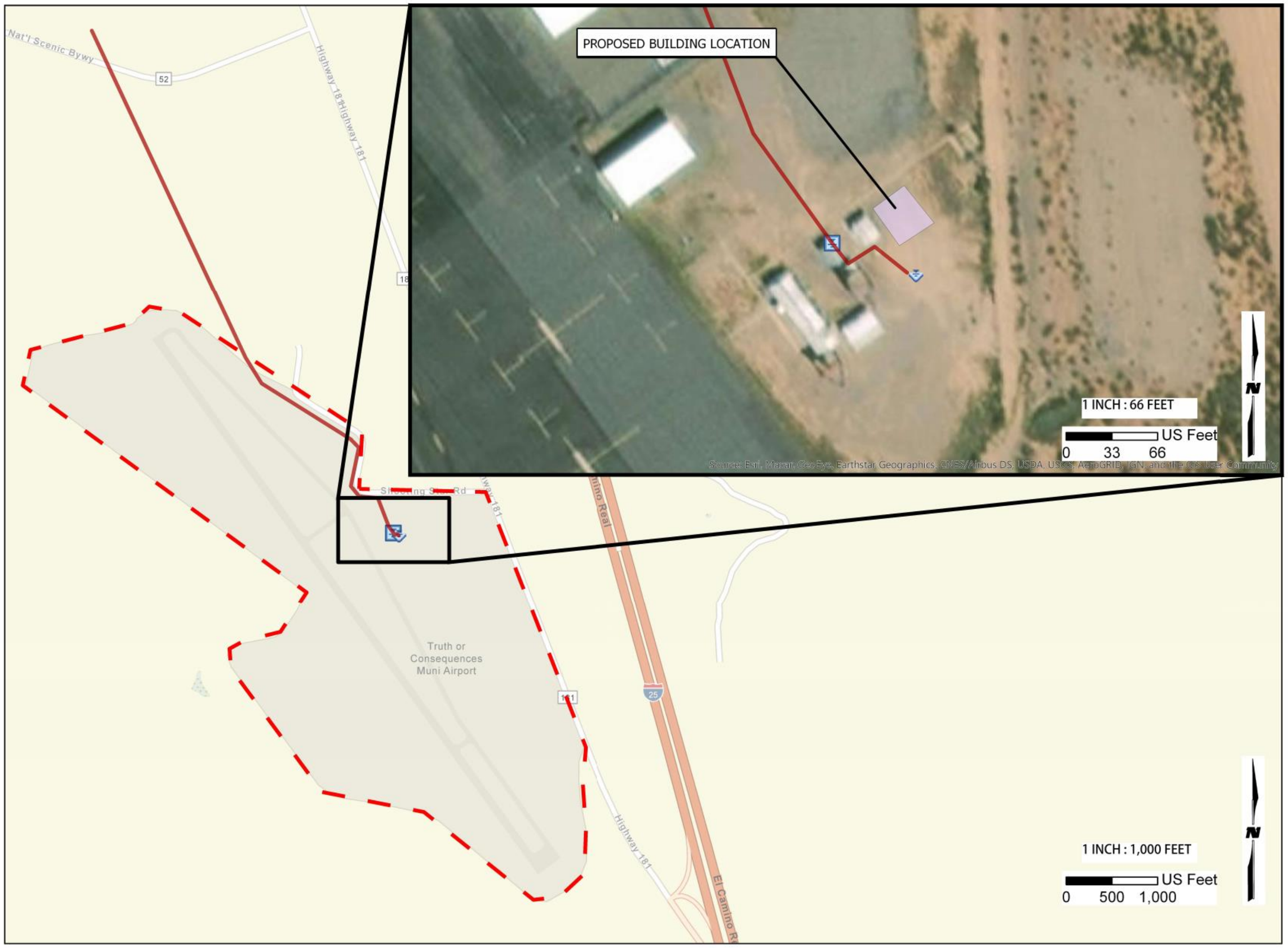
Legend

- Well
- Booster Station
- Tank
- PRV
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- <6 Inch

EXISTING PIPE DIAMETER

EXHIBIT 107

[THIS PAGE INTENTIONALLY LEFT BLANK]



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

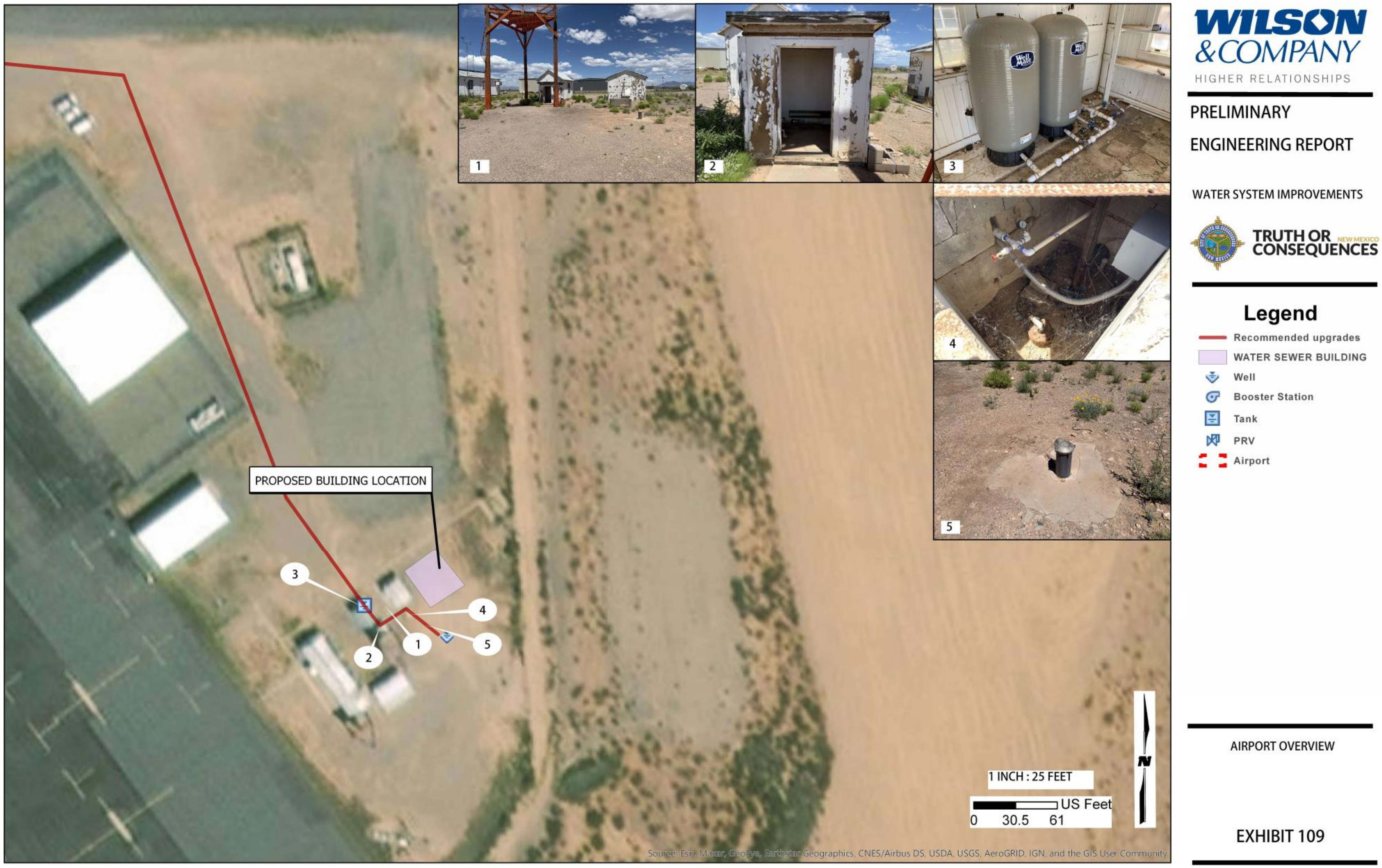
TRUTH OR CONSEQUENCES NEW MEXICO

Legend

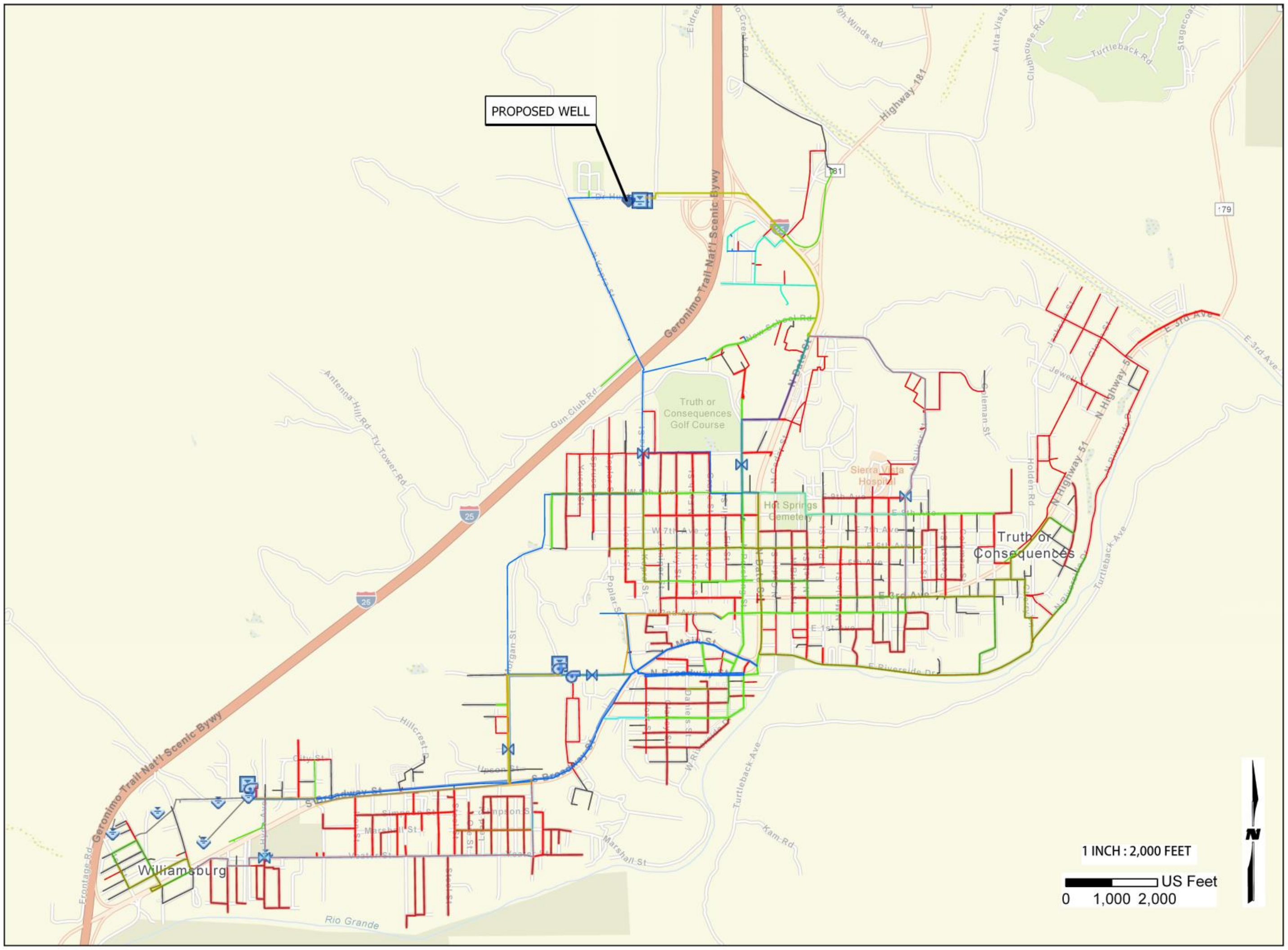
AIRPORT OVERVIEW

EXHIBIT 108

[THIS PAGE INTENTIONALLY LEFT BLANK]


1
2
3
4
5
PROPOSED BUILDING LOCATION
1 INCH : 25 FEET
0 30.5 61 US Feet
N
WILSON & COMPANY
HIGHER RELATIONSHIPS
PRELIMINARY
ENGINEERING REPORT
WATER SYSTEM IMPROVEMENTS
TRUTH OR CONSEQUENCES
NEW MEXICO
Legend
Recommended upgrades
WATER SEWER BUILDING
Well
Booster Station
Tank
PRV
Airport
AIRPORT OVERVIEW
EXHIBIT 109

[THIS PAGE INTENTIONALLY LEFT BLANK]



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY
ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

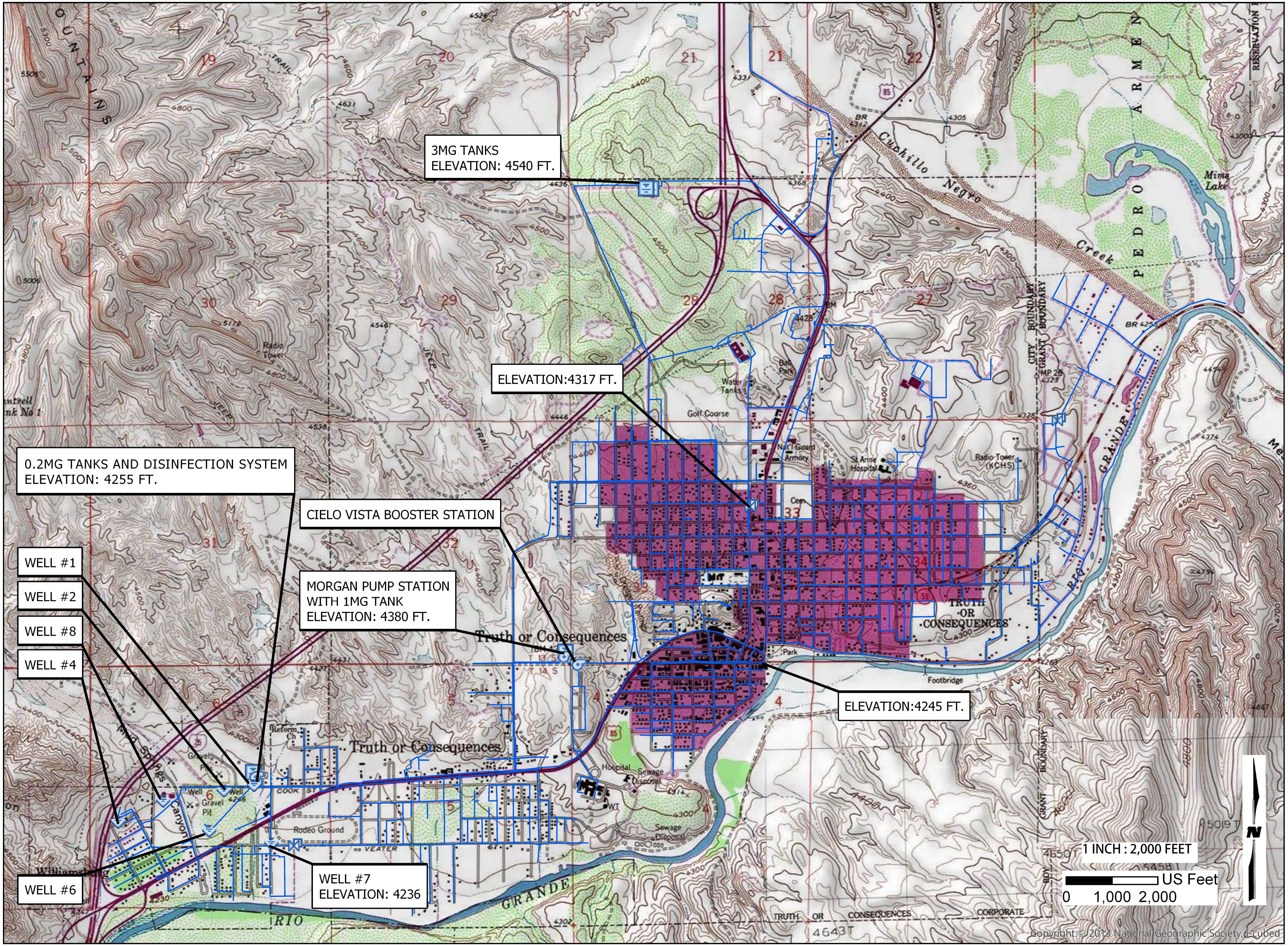
TRUTH OR CONSEQUENCES NEW MEXICO

Legend
- Proposed Well
- New PRV
- Well
- Booster Station
- Tank
- 6 Inch
- 8 Inch
- 10 Inch
- 12 Inch
- 14 Inch
- <6 Inch

SYSTEM COMPLETION
OVERVIEW

EXHIBIT 110

[THIS PAGE INTENTIONALLY LEFT BLANK]



WILSON & COMPANY
HIGHER RELATIONSHIPS

PRELIMINARY

ENGINEERING REPORT

WATER SYSTEM IMPROVEMENTS

TRUTH OR CONSEQUENCES NEW MEXICO

Legend
EXISTING SYSTEM
- Well
- Booster Station
- Tank
- PRV
- Waterline

EXISTING SYSTEM OVERVIEW
USDA TOPOGRAPHIC MAP

EXHIBIT 111

[THIS PAGE INTENTIONALLY LEFT BLANK]

APPENDIX 7- SHORT LIVE ASSET RESERVE

TABLE OF CONTENT:

- SHORT LIVE ASSET TABLE CITY OF TRUTH OR CONSEQUENCES

[THIS PAGE INTENTIONALLY LEFT BLANK]

Description	Estimated Life Cycle	
	1-5 years	6-10 years
Asset		
Cook Street TreatmentFacility Pump #2 Motor	$ 16,070.00	
Well #7 Pump Motor	$ 7,720.00	
Well #6 Pump Motor	$ 6,630.00	
Well #8 Pump Motor	$ 6,630.00	
Well #1 Pump Motor	$ 3,730.00	
Well #4 Pump Motor	$ 410.00	
Cielo Vista Pump Station Pump No. 2 Motor	$ 680.00	
Cielo Vista Pump Station Pump No. 1 Motor	$ 700.00	
Booster Pump Station No. 2 Pump No. 1 Motor	$ 7,690.00	
Cook St. Treatment Facility Pump No. 1 Motor	$ 16,070.00	
250 HP Booster Pump Motors x2	$ 31,200.00	
Well #2 Pump Motor		$ 3,310.00
Well #8 Pump		$ 27,580.00
Well #7 Pump		$ 39,510.00
Well #6 Pump		$ 39,510.00
Booster Pump Station #2 Pump		$ 7,690.00
Well #1 Pump		$ 12,420.00
Well #4 Pump		$ 33,910.00
Cielo Vista Pump Station Pump No. 1		$ 31,190.00
Cielo Vista Pump Station Pump No. 3		$ 10,400.00
Pershing Booster Pump Station No. 2, Pump No. 1*		$ -
Pershing Booster Pump StationNo. 2, Pump No. 2*		$ -
Cook St. Treatment Facility Flow Meter*		$ -
Well #2 Pump		$ 16,550.00
Well No. 2 Flow Meter*		$ -
Well No. 7 Flow Meter		$ 5,200.00
Well No. 8 Flow Meter		$ 5,200.00
Well No. 4 Flow Meter		$ 5,200.00
Well No. 6 Flow Meter		$ 5,200.00
Booster Pump Station No. 2 Flow Meter		$ 5,200.00
Well No. 1 Flow Meter*		$ -
Well No. 2 pump Electrical System*		$ -
Well No. 4 pump Electrical System		$ 47,480.00
Well No. 1 pump Electrical System*		$ -
Well No. 6 pump Electrical System		$ 69,860.00
Well No. 7 pump Electrical System		$ 67,820.00
Well No. 8 pump Electrical System		$ 69,860.00
Cielo Vista Pump Station Electrical System		$ 51,980.00
Pershing Booster pump Station No. 2 Electrical System*		$ -
Pershing Booster Pump Station No. 2 Back-up Generator*		$ -
Cook St Treatment Facility Electrical System*		$ -
SCADA System RTUs*		$ -
SCADA System Software		$ 38,600.00
Gas-Chlorination System*		$ -
250 HP Vertical Turbine Booster Pump x2		$ 249,500.00
Pump Control Panel/Soft Starter*		$ -
0.2 MG Electrical/Control System*		$ -
0.3 MG Electrical Control *		$ -
3.0 MG Steel Storage Tank on Morgan St.		$ 261,486.69
1.2 MG Steel Storage Tank on Cemetery Rd.		$ 156,892.01
3.0 MG Steel Storage Tank on Cemetery Rd.		$ 261,486.69
0.2 MG Steel Storage Tank		$ 26,148.67
0.3 MG Steel Storage Tank		$ 39,223.00
New Well Pump and Motor		$ 40,000.00
Subtotal of Short-Lived Assets (per period)	$ 97,530.00	$ 1,628,407.06
Subtotal of Short-Lived Assets (per year)	$ 19,506.00	$ 162,840.71
Subtotal of Short-Lived Assets (per month)	$ 1,625.50	$ 13,570.06
Total of Short-Lived Assets (1-10 years)	**$**	**1,725,937**
Total Annual Reserve Deposit, Short-Lived Assets (1-10 years, per year	**$**	**182,347**
Total Monthly Reserve Deposit, Short-Lived Assets (1-10 years, per month)	**$**	**15,196**

*Items addressed under previously funded, not constructed projects.

APPENDIX 8- WATER LOSSES

TABLE OF CONTENT:

- WATER LOSSES SUMMARY TABLE CITY OF TRUTH OR CONSEQUENCES

Summary of Water Losses

	Full System				Alternative II - Complete System			
Alternative %	-				96.60%			
Year	2016	2017	2018	2019	2016	2017	2018	2019
Losses (GAL)	105,123,718	108,683,000	141,018,000	127,534,000	101,549,512	104,987,778	136,223,388	123,197,844
Annual Losses	$ 183,967	$ 190,195	$ 246,782	$ 223,185	$ 177,712	$ 183,729	$ 238,391	$ 215,596
	Alternative III - System Performance Updgrade				**Alternative III A - System High pressure Soultion**			
Alternative %	37.80%				26.70%			
Year	2016	2017	2018	2019	2016	2017	2018	2019
Losses (GAL)	39,736,765	41,082,174	53,304,804	48,207,852	28,068,033	29,018,361	37,651,806	34,051,578
Annual Losses	$ 69,539	$ 71,894	$ 93,283	$ 84,364	$ 49,119	$ 50,782	$ 65,891	$ 59,590
	Alternative III B - System Redundancy and Hydraulic Performance Enhancements				**Alternative IIIC -Adiditonal Hydraulic Perfromance Enhancements**			
Alternative %	6.30%				5.20%			
Year	2016	2017	2018	2019	2016	2017	2018	2019
Losses (GAL)	6,622,794	6,847,029	8,884,134	8,034,642	5,466,433	5,651,516	7,332,936	6,631,768
Annual Losses	$ 11,590	$ 11,982	$ 15,547	$ 14,061	$ 9,566	$ 9,890	$ 12,833	$ 11,606
	Alternative IV - North Side				**Alternative V - East Side**			
Alternative %	5.10%				23.16%			
Year	2016	2017	2018	2019	2016	2017	2018	2019
Losses (GAL)	5,361,310	5,542,833	7,191,918	6,504,234	24,346,653	25,170,983	32,659,769	29,536,874
Annual Losses	$ 9,382	$ 9,700	$ 12,586	$ 11,382	$ 42,607	$ 44,049	$ 57,155	$ 51,690
	Alternative VI - West Side				**Alternative VII - Downtown**			
Alternative %	14.08%				12.02%			
Year	2016	2017	2018	2019	2016	2017	2018	2019
Losses (GAL)	14,801,419	15,302,566	19,855,334	17,956,787	12,635,871	13,063,697	16,950,364	15,329,587
Annual Losses	$ 25,902	$ 26,779	$ 34,747	$ 31,424	$ 22,113	$ 22,861	$ 29,663	$ 26,827
	Alternative VIII - Williamsburg							
Alternative %	22.20%							
Year	2016	2017	2018	2019				
Losses (GAL)	23,337,465	24,127,626	31,305,996	28,312,548				
Annual Losses	$ 40,841	$ 42,223	$ 54,785	$ 49,547				

APPENDIX 9- FIRE HYDRANT BREAKDOWN

CONTENT:

- FIRE HYDRANT SUMMARY TABLE AGE/PRESSURE CAPACITY BREAKDOWN
- FIRE FLOW HYDRANT TESTING REPORT (THIS PAGE REPORT IS NOT INCLUDED IN THIS APPENDIX, AVALIABLE PER REQUEST)

FIRE HYDRANT SUMMARY TABLE AGE/PRESSURE CAPACITY BREAKDOWN

Fire Hydrant Age Breakdown

Age (Years)	Number of Hydrants	Percentage of Total
> 50	25	7.8%
> 40	42	13.1%
> 30	45	14.0%
> 3	209	65.1%

Fire Hydrant Pressure Capacity Breakdown

Pressure Capacity (GPM)	Number of Hydrants	Percentage of Total
< 1500	16	5.3%
< 2500	123	40.5%
< 3500	152	50.0%
< 5700	13	4.3%

APPENDIX 10- NMED WATER SYSTEM VIOLATIONS

CONTENT:

- NMED WATER SYSTEM VIOLATIONS

New Mexico Environment Department	UOCP Operator Lookup	Drinking Water Program
County Map of NM	Water System Search	Help

Water System Detail Information

Water System No.:	NM3514327	Federal Type:	C
Water System Name:	TRUTH OR CONSEQUENCES	Federal Source:	GW
Principal County Served:	SIERRA	System Status:	A
Principal City Served:	TRUTH OR CONSEQUENCES	Activity Date:	06-01-1977

Group Violations

Fed Fiscal Year	Determ. Date	Violation Type	Violation Name	Analyte Group	Analyte Group Name
2017	11-18-2016	27	MONITORING, ROUTINE (DBP), MAJOR	DBP2	DBP STAGE 2
2016	11-03-2015	27	MONITORING, ROUTINE (DBP), MAJOR	DBP2	DBP STAGE 2
2006	11-30-2005	03	MONITORING, ROUTINE MAJOR	SOCS	OLD SOCS

Individual Violations

Violation No.	Determ. Date	Violation Type	Violation Name	Analyte Code	Analyte Name	RTC Exp.	RTC Imp.	RTC Other
2018-36616	02-09-2018	75	PUBLIC NOTICE RULE LINKED TO VIOLATION	7500	PUBLIC NOTICE	Y		
2017-36615	02-23-2017	52	FOLLOW-UP OR ROUTINE TAP M/R (LCR)	5000	LEAD & COPPER RULE	Y		
2017-36614	12-19-2016	72	CCR ADEQUACY/AVAILABILITY/CONTENT	7000	CONSUMER CONFIDENCE RULE	Y		
2017-36611	11-23-2016	3A	MONITORING, ROUTINE, MINOR (RTCR)	3014	E. COLI	Y		
2016-36610	08-03-2016	71	CCR REPORT	7000	CONSUMER CONFIDENCE RULE	Y		
2016-36609	07-20-2016	52	FOLLOW-UP OR ROUTINE TAP M/R (LCR)	5000	LEAD & COPPER RULE	Y		
2006-36606	06-12-2006	22	MCL (TCR), MONTHLY	3100	COLIFORM (TCR)	Y	Y	
2004-304	08-03-2004	51	INITIAL TAP SAMPLING (LCR)	5000	LEAD & COPPER RULE	Y		
2000-33400	10-10-2000	24	MONITORING (TCR), ROUTINE MINOR	3100	COLIFORM (TCR)	Y	Y	

* Denotes violation began in last 6 months but is currently eligible for implicit RTC.
RTC EXP denotes violation has any of the following enforcement actions: SOX, EOX.
RTC IMP denotes SWTR or TCR violation does not have a violation in the following 6 months.

New Mexico Environment Department	UOCP Operator Lookup	Drinking Water Program
County Map of NM	Water System Search	Help

Water System Detail Information

Water System No.:	NM3501427	Federal Type:	NC
Water System Name:	TRUTH OR CONSEQUENCES MUNICIPAL AIRPORT	Federal Source:	GW
Principal County Served:	SIERRA	System Status:	A
Principal City Served:	TRUTH OR CONSEQUENCES	Activity Date:	08-27-2018

Group Violations

Fed Fiscal Year	Determ. Date	Violation Type	Violation Name	Analyte Group	Analyte Group Name

Individual Violations

Violation No.	Determ. Date	Violation Type	Violation Name	Analyte Code	Analyte Name	RTC Exp.	RTC Imp.	RTC Other
2019-3	01-16-2019	3A	MONITORING, ROUTINE, MAJOR (RTCR)	3014	E. COLI	Y		
2019-2	12-18-2018	3A	MONITORING, ROUTINE, MAJOR (RTCR)	3014	E. COLI	Y		
2019-1	11-21-2018	3A	MONITORING, ROUTINE, MAJOR (RTCR)	3014	E. COLI	Y		

* Denotes violation began in last 6 months but is currently eligible for implicit RTC.
RTC EXP denotes violation has any of the following enforcement actions: SOX, EOX.
RTC IMP denotes SWTR or TCR violation does not have a violation in the following 6 months.
RTC Other denotes violation has any of the following enforcement actions:
EF&, EF/, EF9, EFK, EFL, EFQ, EFV, EO0, EO6, SF&, SF9, SFK, SFL, SFO, SFQ, SFV, SF0, SF6

APPENDIX 11- WATER SYSTEM ASSET MANAGEMENT PLAN

CONTENT:

- AMP- SMITH ENGINEERING

Water System Asset Management Plan

City of Truth or Consequences

PREPARED BY:

Smith Engineering Company
2201 San Pedro NE,
Building 4, Suite 200
Albuquerque, NM 87110
(505)884-0700
www.smithengineering.pro

November 2014
April 2015 (rev 1)
March 2017(rev 2)

Smith Project No. 116102

This page left intentionally blank

Revision History

VERSION	DATE	DETAILS OF CHANGE
1	NOVEMBER 2014	INITIAL
2	APRIL 2015	ADDRESSED NMED COMMENTS
3	MARCH 2017	UPDATE

THIS MANUAL IS A LIVING DOCUMENT, AND AS SUCH IT SHOULD BE ENHANCED THROUGHOUT THE LIFE OF THE WATER SYSTEM. THEREFORE, CHANGES IN ASSETS, OPERATIONAL CHARACTERISTICS, MAINTENANCE PROCEDURES, AND O&M DATA FOR BUILDINGS, EQUIPMENT, AND TREATMENT SYSTEMS SHOULD BE UPDATED AS EQUIPMENT/SYSTEMS ARE DEVELOPED, DELETED, MODIFIED AND/OR UPGRADED. THE MANUAL SHOULD ALSO BE ANNUALLY AND MODIFIED AS NECESSARY.

This page left intentionally blank

ASSET MANAGEMENT PLAN

WATER SYSTEM

CITY OF T OR C

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice in the state of New Mexico, is affixed below.

ALLENA FERNANDEZ
NEW MEXICO
20017
PROFESSIONAL ENGINEER

Allena Fernandez
6/15/17

Allena Fernandez, PE

This page left intentionally blank

SMITH ENGINEERING

Solutions for Today...

Vision for Tomorrow

March 15, 2017

Juan Fuentes
City Manager
505 Sims St.
City of T or C, New Mexico 87901

Re: City of Truth or Consequences Water System Asset Management Plan
SMITH# 116102

Dear Mr. Fuentes:

The Water System Asset Management Plan is a living document and requires periodic updating. This update includes reviewing the plan issued in 2015 for the following items:

1. ***Required metering of all diversions and users,***

A section indicating that the City's current municipal code requires all water usage (except for fire suppression usage) to be metered has been included. A copy of ordinance is included in Appendix D.

2. ***Asset inventory, noting current condition, mapped locations, anticipated useful life and value;***

All asset inventories, conditions, mapping, and useful life and value have been updated. The asset tables in the plan and the appendices have been updated.

3. ***Defined level of service required to meet state and federal regulations, customer demands, and long-term goals as applicable;***

The level of service for each asset category was reviewed and found meet current state and federal requirements. It also is meets current customer demands and the City's long term goals. There has been no change in the plan regarding this item.

4. ***Risk analysis of asset performance based on likelihood of failure and level of consequence, as applicable;***

The Probability analysis, the Consequence analysis and the Risk calculations have been updated.

5. ***Operations and maintenance strategic plan and a Capital Improvement Plan that addresses all costs for managing the asset, project or system over time; and***

The CIP has been updated to include costs for managing the assets for the next 10 years. TABLE 25A and B have been updated which provides a financial management plan for addressing the costs related to 10 year CIP.

6. Funding strategy for inclusion in Financial Plan.

Funding for the CIP includes loans, grants and increasing user rates. Two options have been reviewed and presented in this plan. These options include:

a. an increase in water user rates paired with a 100% loans and,
b. an increase in water user rates paired with a 50% loans and a 50% grants scenario.

If you have any questions regarding the data presented in this AMP update, please feel free to contact me.

Sincerely,

Smith Engineering Company

Allena Fernandez

Allena Fernandez, PE, VP
Engineer

Table of Contents

List of Figures and Tables xi
Background and Scope 1
Required Metering of all Diversions and Users 1
Current Rehabilitation and Replacement Program for the Water System 2
Water System Asset Management Plan 3
Inventory of assets 4
Data Collection 4
Water System GIS Model 4
Water System Assets Categories 5
Distribution System (Waterline Pipes, Valves, and Hydrants) 6
Wells 8
Pump Systems and Disinfection System 8
Buildings and Structures 9
Storage Tanks 10
Condition and Risk Assessments of Assets 11
Distribution System (Waterline Pipes, Valves, and Hydrants) – Condition and Risk Assessments 12
Functionality and Level of Service 12
Modes of Failure 13
Life Expectancy 13
Probability of Failure 14
Consequence of Failure 17
Risk of Failure 19
Wells – Condition and Risk Assessments 22
Functionality and Level of Service 22
Modes of Failure 22
Life Expectancy 22
Probability of Failure 23
Consequence of Failure 23
Risk of Failure 24
Pump Systems and Disinfection System – Condition and Risk Assessments 25
Functionality and Level of Service 25

Modes of Failure 26
Life Expectancy 27
Probability of Failure 27
Consequence of Failure 32
Risk of Failure 34
Buildings and Structures – Condition and Risk Assessments 36
Functionality and Level of Service 36
Modes of Failure 36
Life Expectancy 37
Probability of Failure 37
Consequence of Failure 38
Risk of Failure 39
Storage Tanks – Condition and Risk Assessments 41
Functionality and Level of Service 41
Modes of Failure 41
Life Expectancy 42
Probability of Failure 42
Consequence of Failure 43
Risk of Failure 44
Asset Financials and Capital Improvements Plan ***45***
Operation and Maintenance **45**
Asset Replacement Schedule **46**
Replacement of Water System Distribution System Assets (Waterlines, Valves, Meters, and Hydrants) **47**
Replacement of Well, Pump Systems, Disinfection System and Building/Structure Assets of the Water System **49**
10-Year CIP Scheduling and Budget for Comprehensive Replacement of Water System Assets **50**
Water System Budgeting Beyond 10 year CIP 59
Conclusions and recommendations ***60***
Additional Recommendations **61**
Water System Staffing 61
Water System Service Rate Study 61
Water System Data 61

Maintenance Practices ____ 62
Waterlines ____ 62
Water System Equipment ____ 62
Condition Assessment Practices ____ 63
Waterlines ____ 63
Water System Equipment ____ 63
Construction Practices ____ 63
APPENDICES ____ ***64***
Inventory, Risk Scoring, and Estimated Replacement Value/Current Value of Water System Distribution System (Waterlines, Valves, and Hydrants) Assets ____ **A**
Inventory, Risk Scoring, and Estimated Replacement Value/Current Value of Water System Well, Pump System, Buildings/Structures, and Storage Tank Assets ____ **B**
Water System Historical Financial Data, Existing Loan Information, and Energy Use Costs ____ **C**
Water Metering Requirements ____ **D**

LIST OF FIGURES AND TABLES

FIGURE 1: WATERLINE PIPE SIZES OF DISTRIBUTION SYSTEM 6
FIGURE 2: WATERLINE PIPE MATERIAL OF DISTRIBUTION SYSTEM 7
FIGURE 3: REMAINING USEFUL LIFE VS. AGE SCORE OF WATERLINE PIPE ASSETS 15
FIGURE 4: CALCULATION OF AGE SCORE FOR WATERLINE PIPE ASSETS 16
TABLE 1: CONDITION ASSESSMENT AND SCORING OF WATERLINE PIPE ASSETS 17
TABLE 2: CONSEQUENCE OF FAILURE SCORING OF WATERLINE PIPE ASSETS 18
FIGURE 5: WATERLINE PIPE ASSET RISK 2017 20
FIGURE 6: WATERLINE PIPE ASSET RISK MAP 21
TABLE 3: CONDITION ASSESSMENT AND SCORING OF WELL ASSETS 23
TABLE 4: CONSEQUENCE OF FAILURE SCORING OF WELL ASSETS 24
TABLE 5: RISK SCORING OF WELL ASSETS 25
TABLE 6: CONDITION ASSESSMENT AND SCORING OF PUMP SYSTEM ASSETS– PUMPS AND MOTORS 29
TABLE 7: CONDITION ASSESSMENT &SCORING OF PUMP SYSTEM ASSETS – MANIFOLDS & FLOW METERS 30
TABLE 8: CONDITION ASSESSMENT AND SCORING OF PUMP SYSTEM ASSETS – ELECTRICAL SYSTEMS 31
TABLE 9: CONDITION ASSESSMENT AND SCORING OF PUMP SYSTEM ASSETS – SCADA SYSTEM 31
TABLE 10: CONDITION ASSESSMENT AND SCORING OF DISINFECTION SYSTEM ASSET – GAS-CHLORINATION SYSTEM 32
TABLE 11: CONSEQUENCE OF FAILURE SCORING OF PUMP SYSTEM ASSETS 33
TABLE 12: RISK SCORING OF PUMP SYSTEMS ASSETS – PUMPS AND MOTORS 34
TABLE 13: RISK SCORING OF PUMP SYSTEMS ASSETS – MANIFOLDS AND FLOW METERS.. 35
TABLE 14: RISK SCORING OF PUMP SYSTEMS ASSETS – ELECTRICAL SYSTEMS 35
TABLE 15: RISK SCORING PUMP SYSTEM ASSETS – SCADA SYSTEM 36
TABLE 16: RISK SCORING OF DISINFECTION SYSTEM ASSET 36
TABLE 17: CONDITION ASSESSMENT AND SCORING OF BUILDING/STRUCTURE ASSETS 38
TABLE 18: CONSEQUENCE OF FAILURE SCORING OF BUILDING/STRUCTURE ASSETS 39
TABLE 19: RISK SCORING OF BUILDING/STRUCTURE ASSETS 40
TABLE 20: CONDITION ASSESSMENT AND SCORING OF STORAGE TANK ASSETS 43
TABLE 21: STORAGE TANK ASSETS CONSEQUENCE OF FAILURE SCORING 44
TABLE 22: STORAGE TANK ASSETS RISK SCORING (RANKING) 44

FIGURE 7: WATERLINE RISK IN 2025 WITH NO REPLACEMENT 48
FIGURE 8: WATERLINE RISK WITH ALL EXTREME RISK LEVEL (TOP 27%) REPLACED 49
TABLE 23: 10-YEAR CIP SCHEDULE AND BUDGET FOR COMPREHENSIVE REPLACEMENT OF WATER SYSTEM ASSETS 51
TABLE 23 CON'T: 10-YEAR CIP SCHEDULE AND BUDGET FOR COMPREHENSIVE REPLACEMENT OF WATER SYSTEM ASSETS 52
TABLE 24: EXISTING SERVICE RATE SCHEDULE FOR THE T OR C WATER SYSTEM 53
TABLE 25A: PROJECTED 10-YEAR WATER SYSTEM ANNUAL OPERATING BUDGET INCLUDING CIP (WITH DEBT REPAYMENT) 56
TABLE 25B: PROJECTED 10-YEAR WATER SYSTEM ANNUAL OPERATING BUDGET INCLUDING CIP (WITH DEBT REPAYMENT) 58

This page left intentionally blank

BACKGROUND AND SCOPE

The City of Truth or Consequences (the City) hired Smith Engineering Company (Smith) to prepare an Asset Management Plan (AMP) for their Municipal Potable Water System (Water System). The AMP addresses five fundamental questions regarding the management of the City Water System:

- What is the current state of the Water System's assets?
- What is the required level of service?
- Which assets are critical for performance?
- What are the best Capital Improvement Project (CIP) and Operation and maintenance (O&M) Strategies (Life-cycle Costs) for the Water System?
- What is the City's best long-term financing strategy for the Water System?

Determining the answers to these questions allows the City to make more informed planning decisions for the Water System and, in the long term, save money and provide a higher level of service.

The AMP addresses the issues by creating an inventory of the water system assets, with corresponding Geographic Information System (GIS) model, and developing a ranking system to prioritize the rehabilitation and replacement needs for the entire Water System. The ranking system is mathematically calculated based on condition and risk assessments of the assets.

The report describes how Smith and the City developed the AMP using asset management principles that include gathering data, preparing an asset inventory, performing condition and risk assessments on the assets, and preparing a 10-year CIP for the Municipal Potable Water System. Lastly, the report gives the City recommendations that can improve the water system asset management.

Asset management is growing in popularity as a tool for utilities to maximize capital value as well as O&M expenses. The process Smith developed for the AMP of the City Water System is straightforward and can (and should) be modified, enhanced, and expanded as additional or improved data become available.

REQUIRED METERING OF ALL DIVERSIONS AND USERS

The City's current municipal code requires all water consumption to be metered except for fire suppression. Appendix D has a letter indicating the water metering requirements and the current 2017 water rates.

Current Rehabilitation and Replacement Program for the Water System

There is currently very limited long term planning or replacement scheduling in regards to the existing components of the municipal potable Water System. Instead, the City bases the current Water System replacement and rehabilitation process on prioritization that comes from reacting to portions or components of the system that are in a state of failure.

At present, maintenance and replacement of the distribution system waterlines of the Water System is on an immediate-need basis, due to breaks or problems with pressure and/or flow. The current City practice is to replace or repair waterlines in the same general alignment as the existing pipe. In order to install new pipe or repair existing pipe located in paved streets, in most cases, the existing pavement is removed and then replaced with new pavement at the same thickness. At the time of waterline pipe replacement, the contractor or City Staff will typically replace all valves and service lines (to the meters) associated with the pipe, and replace and/or relocate meter boxes if needed. As of now, the City has not used the relatively new technology of trenchless waterline rehabilitation.

As is the case with the distribution waterlines, current repair and replacement of Water System equipment components such as wells, pumps, pump motors, check valves associated with pumps, flow meters, electrical and control systems, and pump system housing structures is on an immediate-need basis. For example, a pump motor is typically sent out for repairs after it has failed in the field and the associated pump will be inoperable until the motor repair is complete. In rare circumstances, replacement parts are available in storage at the time a component fails. However, in general, if a component of the Water System equipment fails, the equipment will be out of service until repair or replacement is completed.

WATER SYSTEM ASSET MANAGEMENT PLAN

To be an effective management and planning tool for the City Water System, the AMP must provide a clear understanding of the entire system based on a detailed analysis of all the individual components (assets) in the system. The primary intent of the AMP is to provide effective prioritization of replacement or rehabilitation of system assets, which requires the determination of the existing condition, functionality, and criticality of each asset. Smith, with the assistance of City staff, developed the Water System AMP using the following three steps:

1. The first step in developing the AMP was the creation of an inventory of the Water System assets. Smith created the inventory of the City Water System assets in the form of a Geographical Information System (GIS) model. The Water System GIS Model contains digital files that record all the information collected on the assets of the system.
2. The second step in developing the AMP was assessing the condition and risk of all the inventoried Water System assets to prioritize replacement or rehabilitation of the assets. Smith performed both condition assessments and risk assessments on each asset, resulting in the assignment of a numerical value, or Risk Score, to each asset. Smith used the Risk Score, or rank, assigned to each asset to determine the prioritization of replacement/rehabilitation for the assets.
3. The last step in developing the AMP was scheduling the replacement or rehabilitation of Water System assets based on the Risk Score ranking assigned to them (the higher the score, the higher the priority). Smith used the replacement/rehabilitation prioritization of the assets to produce a 10-year CIP for the Water System.

The following sections of this report discuss the three steps of the AMP in detail for all the Water System assets. To provide clarity and organization of asset details, the Inventory of Assets and Condition and Risk Assessments of Assets sections of this report are subdivided by Water System asset category (Waterlines, Wells, Storage Tanks, etc.). In some cases, the descriptions of condition scoring and risk scoring for certain asset categories may be somewhat redundant as the intent was to have the descriptions of each asset category stand independently and for consistency.

This AMP does not include evaluation of any of the water system owned by the Village of Williamsburg. The City of Truth of Consequences operates and maintains the water system of the Village of Williamsburg, but does not own any of those water system components. Therefore, the components of the water system serving the Village of

Williamsburg are not assets of the City of Truth of Consequences and, as such, were not evaluated or included in the asset inventory in this report.

INVENTORY OF ASSETS

DATA COLLECTION

Smith collected data for the Water System AMP from various information sources in the possession of the City with the assistance of City staff. The City provided a large portion of the data regarding water distribution pipes, valves, and hydrants to Smith in digital format as AutoDesk AutoCAD and ESRI ArcGIS files. Smith did not evaluate the accuracy of the data already provided in digital format and digital information on some of the Water System components, particularly the distribution system, is currently limited.

The data used in the AMP for the remainder of the Water System components (pumps, controls, electrical systems, wells, buildings, etc.) were collected by reviewing engineering plan sets, as-builts, past planning reports, and operation and maintenance manuals provided by the City and by performing field visits. All of the data collected to develop the AMP report was also used to create a companion Water System GIS Model.

WATER SYSTEM GIS MODEL

ESRI Geodatabase

Feature class

The Water System GIS Model consists of ~~Shapefiles~~, a vector data storage format, each ~~file~~ representing an individual feature (component) of the system, such as a waterline pipe, tank, or well. ~~Associated with the Shapefiles are~~ The database files that store the geographic locations and attributes of the Water System features ~~that~~ are represented ~~by the Shapefiles~~ as points, polylines, or ~~polygons~~. Attributes related to each feature, such as pipe diameter or material, are displayed in the GIS Model as Attribute Tables. The ~~Shapefiles of~~ pipes, hydrants, and valves in the Water System GIS Model are based on ~~existing Shapefiles~~ provided by the City + Wilson that were updated by comparing them to existing CAD files, old As-builts, the mapping used by the water utility, and conversations/interviews with City staff. ~~Shapefiles for~~ Other components of the Water System (i.e. wells, pumps systems, electrical systems, storage tanks, and buildings) were ~~created using the previously mentioned information sources~~ and added to the GIS Model.

Feature classes ~~Database~~ represent existing AutoCad Atlas PDF ~~Field Collection~~

collected in the field with a mobile application

Use EMail

Feature classes

Will Need to Add These

General information regarding the City is also included in the GIS Model. ~~Shapefil~~es of interstates and streets and locations of schools and hospitals are examples. Incorporating these data into the GIS Model is useful for giving a sense of location as well as determining consequences associated with the failure of a given Water System component.

The Water System GIS Model is an interactive digital inventory of the assets that the City can modify and update using ArcMap software and is the first of its kind for the City. Smith recommends that the City update their current GIS software to ArcMap 10.3 so as

Good

Quantum GIS
Global mapper

to be able to use the GIS Model, which was created using ArcMap 10.3, as effectively and easily as possible.

The operators/staff of the Water System will be able to keep all the mapping and asset information of the GIS Model current and accurate by frequently using the GIS software (on whichever computer it is installed) to access and edit the model. Once an asset of the Water System has been modified (i.e. replaced or rehabilitated), or if information on the asset has inaccuracies that need to be corrected, the operators of the system can update the GIS Model accordingly by using the ArcMap 10.3 software. The Attribute Table associated with the asset has information fields that can be edited to input the new information on the asset. If necessary, the geographic location ~~Shapefile that geographically~~ representing the asset in the GIS Model can also be edited and updated using the ArcMap 10.3 software. Hardcopies of the tables and maps showing the updates can be printed out from the model, if desired. Some step-by-step instructions for editing the Water System GIS Model are provided with the CD that contains the model. In addition, comprehensive guidance for using the ArcMap 10.3 software is in the user manual that is provide as part of the purchase of the software.

Development of the Water System asset inventory will continue to be an on-going process for the City beyond completion of the initial AMP and GIS Model. The Water System GIS Model is intended to be dynamic tool for the City and should be updated frequently with new data on the Water System assets to prioritize system management as accurately as possible.

Water System Assets Categories

The Water System Inventory of Assets contained in this report is divided up into the following five categories:

1. Distribution System (Waterline Pipes, Valves and Hydrants)
2. Wells
3. Pump Systems and Disinfection System
4. Buildings and Structures
5. Storage Tanks

The five categories of assets are discussed in detail on the following pages of the report. Information for all the assets in the five asset categories, including the estimated current values and replacement values for the assets, are contained in **APPENDIX A** and **APPENDIX B**. The estimates of the current value of the assets were based on remaining useful life of the assets. The estimates of the replacement value of the assets were based on the costs of replacing the assets using expected, current technology. In addition, the Attribute Tables in the Water System GIS Model for all assets have been modified to contain the estimated replacement values of the assets.

Distribution System (Waterline Pipes, Valves, and Hydrants)

At present the distribution system provides water to a service area greater than five square miles. The Water System GIS Model Inventory database contains 2065 records related to the distribution system network, summarized as follows:

1. 1070 records for the Waterline Pipes (total), representing 417,146 Lineal Feet (LF), or 79.0 miles, of distribution pipe.
2. 686 records for the Valves, representing 686 known valves.
3. 309 records for the Fire Hydrants, represent 309 known hydrants.

Majority of the distribution pipe is PVC (C900 and Schedule 40) (56%), followed by asbestos cement (AC) (29%), and cast iron (11%). Copper, poly, and ductile iron pipe make up the remaining 1% of distribution system. **FIGURE 1** and **FIGURE 2** are charts that show further detail on the size and material of the waterline pipes.

FIGURE 1: Waterline Pipe Sizes of Distribution System

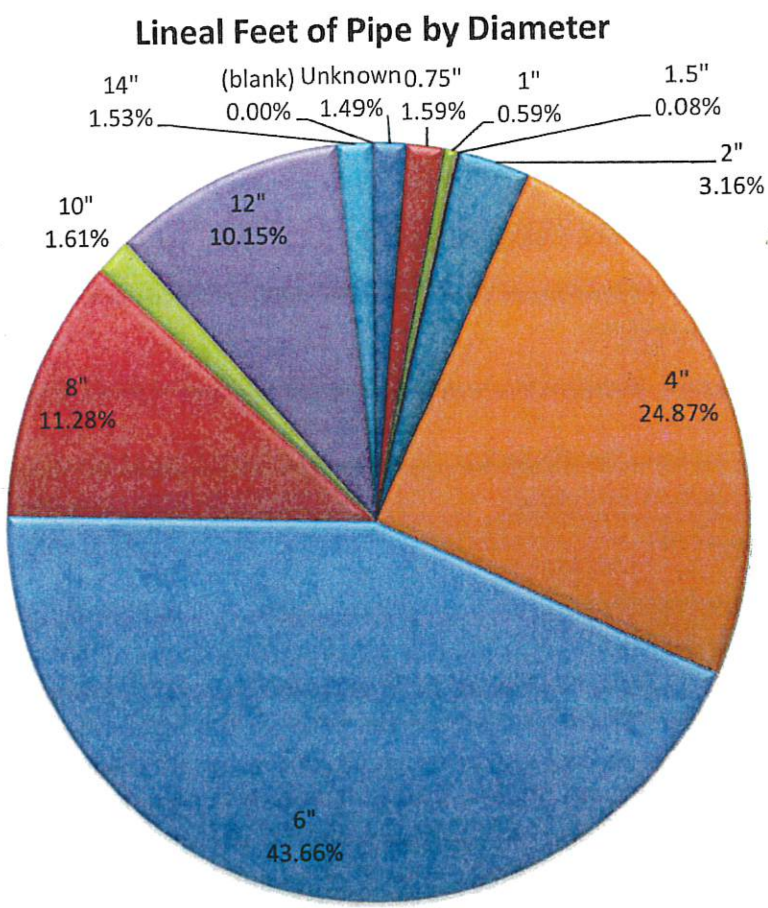


FIGURE 2: Waterline Pipe Material of Distribution System

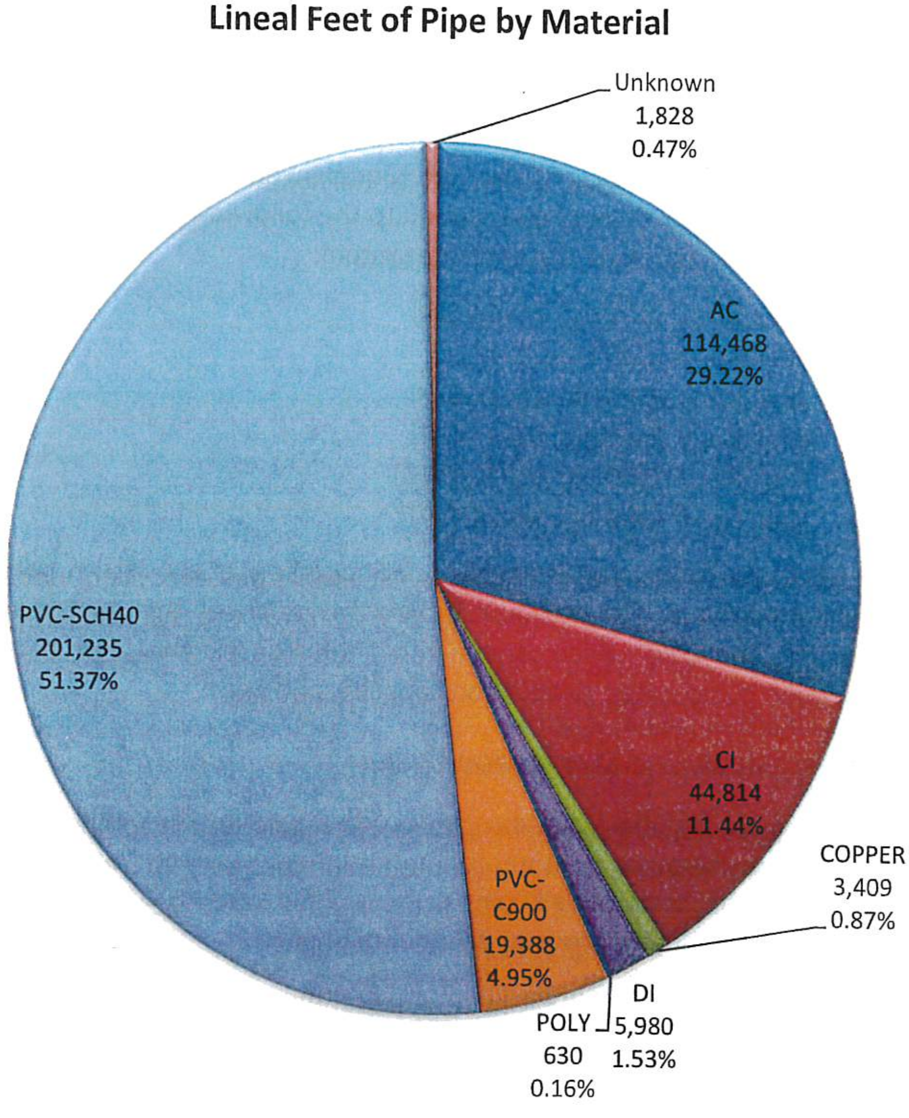


FIGURE 1 and FIGURE 2 reflect the data on the waterline assets compiled in the Water System GIS Model. Waterlines are represented in the GIS Model as Shapefiles made up of polylines and there is a database related to all the waterlines in the GIS Model, displayed in the model as an Attribute Table, which contains information on the characteristics of the pipes (size, material, age, etc).

The distribution system valves and fire hydrants are represented in the GIS Model inventory as Shapefiles that consist of nodes (points) and there are a databases and associated Attribute Tables in the model for the valve and hydrants. Information available on the valves of the distribution system is very limited with no direct information on the size or age for the vast majority of the valves. For this report, it is assumed that the valve diameter is the same as the diameter pipe to which it is connected and associated with in the GIS Model. There is information on the types and ages of the hydrants on the GIS Model. Hydrant installation dates range from 1962 to 2014, with about one third of the hydrants installed between 1990 and 1999.

Wells

The database of the Water System GIS Model Inventory contains six records for the six well assets. The six records correspond to the following groundwater supply wells currently used to provide water to the system:

- Well No. 1 (SEO No. HS-11-S-2)
- Well No. 2 (SEO No. HS-11)
- Well No. 4 (SEO No. HS-11-S-5)
- Well No. 6 (SEO No. HS-11-S-4)
- Well No. 7 (SEO No. HS-11-S-10)
- Well No. 8 (SEO No. HS-11-S-9)

The GIS Model represents the wells as a Shapefile that consists of nodes (points). There is a database file and an Attribute Table associated with the point Shapefile that represents the wells, which contain information on the characteristics of the wells such as location coordinates, production capacity, and age.

Pump Systems and Disinfection System

The GIS Model database contains 74 records regarding the components that make up the assets of the pump systems and the disinfection system used throughout the Water System. There are essentially nine distinct pump systems currently used in the system. The nine distinct pump systems are the following:

1. Cook St. Treatment Facility Pump Station
2. Booster Pump Station No. 2 (Morgan Pump Station)
3. Cielo Vista Booster Pump Station
4. Well No. 1 Pump System
5. Well No. 2 Pump System
6. Well No. 4 Pump System
7. Well No. 6 Pump System
8. Well No. 7 Pump System
9. Well No. 8 Pump System

The components of the nine pump systems are subdivided into smaller asset categories in the Water System GIS Model. The GIS Model represents the assets of the pump systems as six Shapefiles that consists of nodes (points). There is a database and an Attribute Table associated with each point Shapefile that represent the pump systems' assets, which contain information on the characteristics of the components such as location coordinates, equipment type and manufacturer, flow capacity, power usage, and age.

To allow practical asset management, the many components of a given pump system need to be divided up into simple categories that will each be defined as an asset. Based on historical replacement trends reported by operation staff and anticipated life expectancies for equipment, Smith defined pump asset categories for the purposes of this AMP. In the Water System Asset Inventory, each of the following components of a pump system is defined as an individual asset category:

1. Pump(s)
2. Pump Motor(s)
3. Pump Flow Meter(s)
4. Pump Manifold (piping, valves, gauges, and misc. components)
5. Pump Electrical Systems (power systems, control systems, and generators)
6. Supervisory Control And Data acquisition (SCADA) Components (software and Remote Terminal Units [RTUs])

Each one of the above categories has a Shapefile with associated database file and Attribute Table to represent it in the GIS Model.

There are also two horizontal split case pumps, with associated motors, currently in storage at the Wastewater Treatment Plant (WWTP), which are included as pump system assets in the inventory of the Water System. These pumps (and motors) used to be part of the Pershing Pump Station system, which is no longer in use as a pump system. The pumps of Pershing Pump Station were removed from the station in approximately 2012, leaving the piping manifold located at the station behind. The piping manifold, with the addition of a pressure-reducing valve (PRV), was repurposed to serve only as a pressure reducing station. The pressure reducing station is now used to separate the high and low pressure zones of the distribution system, making it a critical part of the Water System.

Buildings and Structures

The Water System GIS database contains 11 records relating the buildings and structures assets associated with the wells, pumps, and other components of the system. The Water System buildings and structures are as follows:

1. Cook St. Treatment Facility Pump Station Building
2. Cook St. Treatment Facility Chlorination System Shed
3. Cook St. Treatment Facility Storage Building
4. Booster Pump Station No. 2 (Morgan Pump Station) Building
5. Cielo Vista Booster Pump Station Housing
6. Well No. 1 Pump System Shade Structure
7. Well No. 2 Pump System Building
8. Well No. 4 Pump System Building

9. Well No. 6 Pump System Building
10. Well No. 7 Pump System Building
11. Well No. 8 Pump System Building

The GIS Model represents the building/structure assets as a Shapefile that consists of nodes (points). The database file and Attribute Table associated with the point Shapefile contain information on the assets such location coordinates, construction material, dimensions, and age.

Most of the buildings are CMU construction with wood and metal roofing. A few buildings are made of wood frame and stucco. The Chlorination System Shed and Cielo Vista Booster Pump Station Housing are fiberglass structures. The Well No. 1 Pump System Shade Structure is made of wood with a metal siding roof.

Storage Tanks

The database of Water System GIS Model Inventory contains records for five storage tank assets. The five records correspond to the following five storage tanks:

1. 0.2 MG Storage Tank, located at Cook St. Treatment Facility
2. 1.2 MG Storage Tank, located on Cemetery Rd.
3. 3.0 MG Storage Tank, located on Cemetery Rd.
4. 3.0 MG Storage Tank, located next to Booster Pump Station No. 2 (Morgan Pump Station)
5. 1.0 MG Storage Tank, located on a hill south of the Commission Chambers and Library

The GIS Model represents the storage tanks as a Shapefile that consists of nodes (points). The database file and Attribute Table associated with the storage tank Shapefile contain information on the characteristics of the tanks such as location coordinates, storage capacity, material, and age.

Four of the tanks are currently being used in the Water System. The 0.2 MG tank at the Cook St. Treatment Facility is used in conjunction with gas-chlorination disinfection system and pumps located at the Facility to store and distribute disinfected water to the rest of the Water System. The 1.2 MG and 3.0 MG tanks located on Cemetery Rd. store disinfected water and provide pressure for the northern portion of the distribution system.

The 3.0 MG tank located next to Booster Pump Station No. 2 stores disinfected water and provides pressure for the southern portion of the distribution system.

The remaining 1.0 MG tank inventoried in the GIS Model, located on a hill just south of the Commission Chambers and Library, was recently abandoned and is no longer used part of the water system. However, the tank remains a historical component of the City as it was original constructed in 1948. In addition, it has artistic and cultural value since there is a mural painted on it that can be seen from all around the City. Because the tank still has a value to the City it will continue to be considered one the assets of the water system and is part of the Inventory.

Condition and Risk Assessments of Assets

The next steps in the AMP are the Condition Assessment of the existing assets of the Water System Inventory and the subsequent Risk Assessment of the assets. The condition of an asset provides a measure of how likely it is to fail, which is a factor used to determine the overall risk associated with the failure of that asset. The ultimate result of the condition and risk assessments of the assets is a ranking system, based on a calculated Risk Score, that will allow the City to prioritize replacement or rehabilitation of the Water System assets in an appropriate, efficient, and cost-effective manner.

Condition assessment of the Water System assets includes the following steps:

1. Determining the functionality and associated required level of service for the asset;
2. Determining the modes of failures for each type of asset;
3. Assigning a life expectancy to the asset;
4. Determining additional factors that affect the condition of the asset; and finally
5. Assigning a Condition Score to the asset.

The Condition Score serves as a measure of the asset's probability of failure. The condition assessment process is different for each type of asset and, therefore, discussed separately, by asset category, in the following section of the report.

The assessment of overall risk for the Water System assets is a very important element of the AMP. Risk, in this application, is defined by the degree of probability of failure (Condition Score) and a measurement of consequence of failure. For each asset, the risk assessment assigns a value for the consequence of failure, the Consequence Score, based on social, environmental, and economic impacts. Subsequently, the Condition Score is multiplied by the Consequence Score to calculate the Risk Score. As with the condition assessment, risk assessment for each type of asset and is discussed separately, by asset category, in the following section of the report.

Distribution System (Waterline Pipes, Valves, and Hydrants) – Condition and Risk Assessments

Functionality and Level of Service

The Water System distribution network of waterlines, valves, and hydrants provides a means of distributing potable water throughout the City at sufficient system pressure and quantity for customer use and fire protection.

The level of service for the distribution system can be defined by the following three categories:

1) customer driven (taste, odor, pressure, minimal water outages),
2) regulatory (contaminate levels, pipe sizes and types[1]), and
3) management (operation and maintenance, including conservation efforts).

Prevention of waterline breaks and proper upkeep of valves and hydrants are the most obvious means to maintain the level of service of water distribution system. When a waterline breaks, service stops for some customers, and the pressure drops for other customers (reduced customer driven level of service). Waterline breaks also create a potential for contaminants to enter the pipe (reduced regulatory level of service). Inoperable valves and/or lack of valves create difficulty for operators to shutdown pipes for connections or repairs (reduction in management level of service). Inadequate flow and pressure due to waterline breaks and inoperable valves and hydrants prevent the system from providing proper fire protection.

Water and energy conservation are important elements of the management category of the level of service for the distribution system. Water and energy conservation can both be addressed at the same time by properly replacing leaking waterlines. Water conservation is addressed by replacing leaking waterlines. However, energy conservation is also addressed by replacing leaking waterline because the total amount of water pumped by the Water System decreases, thereby decreasing the energy used by the pump systems.

Recent evaluation of Water System records indicates that approximately 20% of the amount of water produced by the system is not accounted for by the amount of water sold by the system.[2] Some of this difference can be attributable to inaccuracies in the metering of the system and discrepancies in accounting, but the vast majority is believed to be the result of many leaking waterlines. Future implementation of water and energy conservation efforts must incorporate replacement of leaking waterlines. Systematic replacement of leaking waterlines in the distribution system will result in significant water and energy savings for the overall Water System. Estimated energy

---

[1] This study did not evaluate pipe capacity (flow or pressure) for the distribution system.
[2] 40-Year Water Development Plan (WHPacific, 2012).

cost savings are discussed in more detail in the Level of Service section of Pump Systems.

A reasonable energy conservation goal is to reduce the total water loss of the system (and associated extra energy use) to approximately 5% of the total production of the system within the next 10 years.

Modes of Failure

A waterline "failure" refers to when a waterline is broken causing property damage and water outage or an interruption in water service. The most frequent failures occur in the Schedule 40 PVC and cast iron piping. A common cause of mainline pipe failure for the City is by corrosion of metal (cast iron, ductile iron) pipes from contact with water. Metal water pipe initially fails at the weld or joint. This is due to small leaks from the pipe corroding the exterior unprotected surface. Corrosion of metal pipes could be mitigated using cathodic protection (techniques used to control corrosion of metal by making it the cathode and connecting the pipe with another more easily corroded metal to act as the anode of an electrochemical cell). However, after pipe installation, cathodic protection is not cost effective.

Waterline pipe failures also result from poor installation or the use improper materials during construction. PVC and AC (asbestos cement) water pipes typically fail from disturbance (road vibration, water hammer, hit during construction, poor bedding, and backfill, etc.). Pipes in several regions of town are known to have inadequate bedding or the wrong schedule (thickness) of PVC (Schedule 40 PVC is not the proper thickness to be used in water system distribution lines – see FIGURE 2). This has resulted in a higher than average number of breaks. Service lines typically fail near the corporation stop (connection to the main line). This is because the connection point is where the service line bends - creating uneven forces and failure.

In the event of a pipe break, water outages can be minimized by creating a looped system and strategically placing valves. Some portions of the distribution system are set-up in this manner. However, in many instances, when a waterline break occurs, the operators cannot close the necessary valves because they have not been "exercised" and are stuck open. When this occurs, the operators must enlarge the shut-off area, which affects more customers and increases the time that the water leak runs. This increases the amount of water lost, and potentially worsens the property damage. Implementation of a valve exercise program, and a valve replacement program could minimize damage and loss from waterline breaks.

Life Expectancy

The life expectancy or "design life" of an asset is the average number of years before replacement is necessary. Multiple factors will either reduce or extend the design life. The life expectancy of any asset can vary based on the quality of the product, quality of the installation, and operation and maintenance procedures. These factors are difficult to measure after installation. In general, the average expected useful life of a Water System distribution waterline pipe is 75 years, assuming correct installation, etc.

Knowing the design life of the assets, in this case the pipes, is useful in estimating the remaining useful life of an asset and planning appropriately for its replacement. This analysis does not calculate the exact date of required replacement. Instead, the expected useful life is used to formulate a scoring curve as part of the probability of failure calculation. The closer the pipe is to the end of its useful life, the more likely it is to fail. This study applies an age vs. remaining useful life curve as part of the probability of failure assessment. Smith derived scoring formulas for various pipe types based on the appropriate age vs. remaining useful life curve. The scoring formulas are based on the average life of PVC waterline pipe being 50-years, the average life of cast iron pipe being 100-years[3], and the average life of all other waterline pipe material in the system being 70-years, as shown in FIGURE 4.

It should be noted that there was limited age data available for the distribution system. As-builts showing the year of pipe installation are available for only a few regions of the City. Most of the ages used in this AMP are based on historic trends in waterline pipe material, hydrant ages in the immediate surrounding area and on interviews conducted with operators.

Probability of Failure

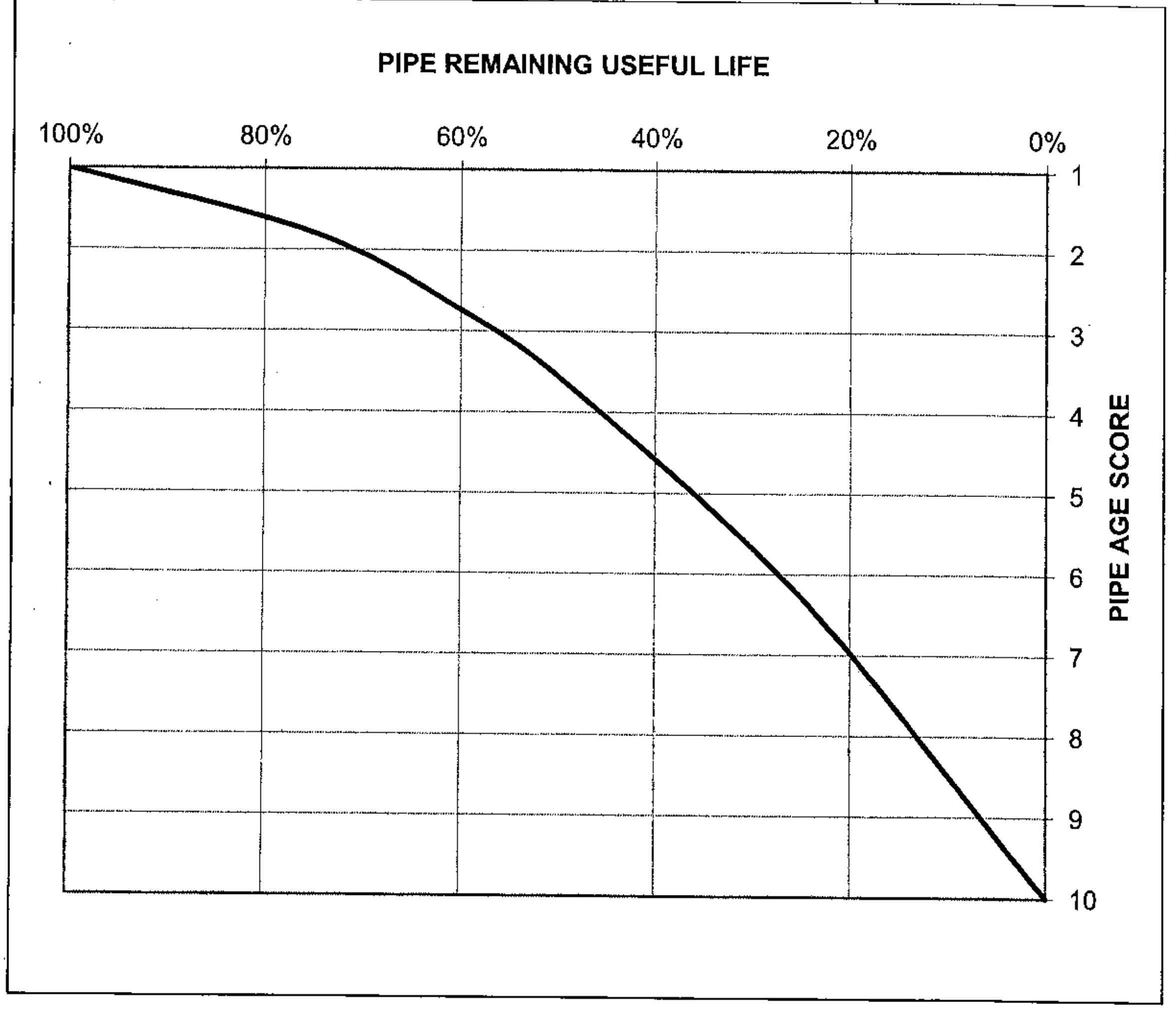
The condition of an asset is the major factor in determining the probability of failure. Since most waterline pipes are buried under pavement, visual condition assessment in the field is not possible. Due to the lack of field visit condition assessments for piping, Smith based the probability of waterline failure on pipe age and material, and input from operators during interviews. Smith used pipe age, material, and operator input to assign a value, the Condition Score, to the waterline assets which represents the probability of failure of the assets. Research and discussions with Water System operators revealed factors such as location of previous repairs, pipe age, pipe material, soil compaction, surface traffic, and previous customer complaints (pressure, odor, color, etc.) could increase the probability of waterline failure. However, some of the factors, such as customer complaints and soil compaction, had no usable existing data associated with them, so Smith eliminated them from the analysis. Factors, such as surface traffic, were eliminated from the condition scoring but are considered a consequence of failure.

The best data available that relates to failure probability is the age of the waterline pipe and the pipe material. Smith implemented an age scoring system of 1 to 10 points depending on the amount of pipe life utilized. A score of 10 is associated with a pipe

[3] "Dawn of the Replacement Era/Reinvesting in Drinking Water Infrastructure", AWWA, May 2001.

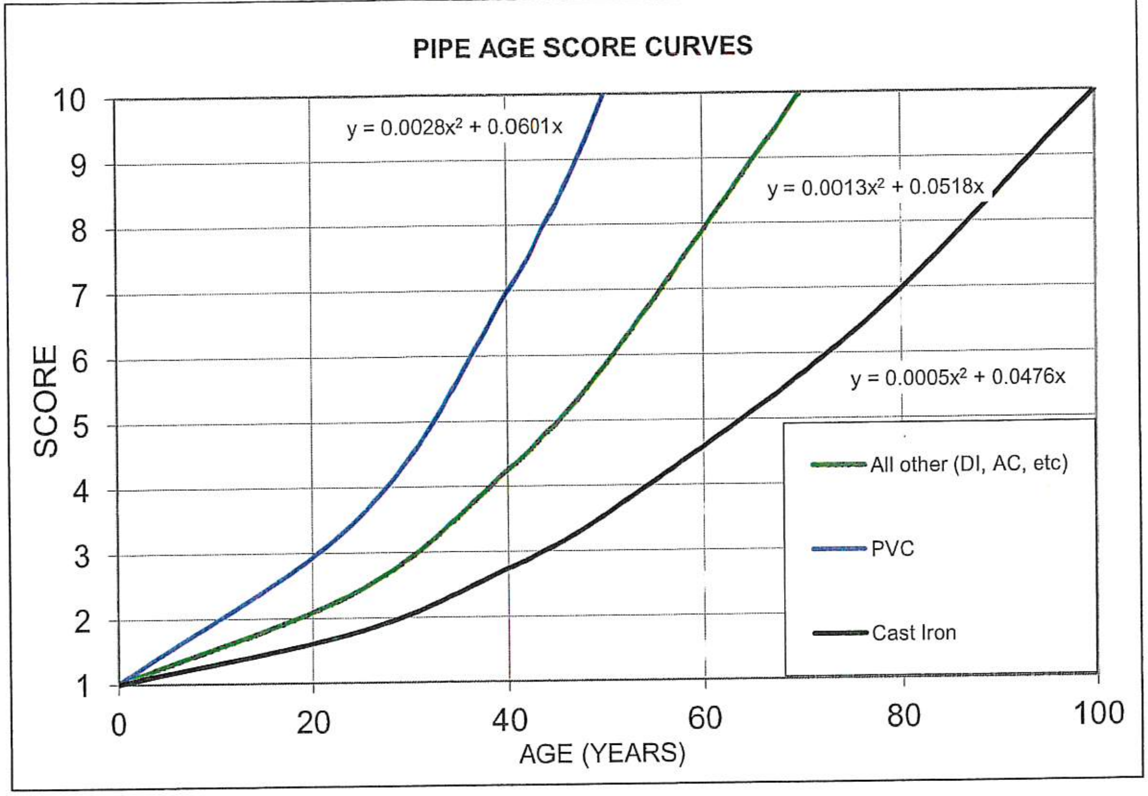
that has reached the end of it useful life; a score of 1 is associated with a pipe with 90-100% of its useful life remaining (see FIGURE 3). For waterline pipes that have ages beyond the useful life, calculated age scores are greater than 10 based on the use of the appropriate formula for pipe material as shown in FIGURE 4.

FIGURE 3: Remaining Useful Life vs. Age Score of Waterline Pipe Assets



Based on industry design standards and the experience of the City staff and others, Smith used the pipe life expectancies previously discussed combined with the approach to scoring shown in FIGURE 3 to produce the Age Score equations shown in FIGURE 4.

FIGURE 4: Calculation of Age Score for Waterline Pipe Assets



There are two components that make up the total Condition Score – the Age Score and the Operator Score. The Age Score value is based on the age curve appropriate for the pipe material (shown in **FIGURE 4**) and the pipe age. For this report, most ages are approximate due to limited documentation. Known ages are based on as-built documents. When as-builts are unavailable, pipe age is approximated based on one or more of the following:

1) Associated hydrant age, which are known and documented,
2) Known historical use of specific piping material[4],
3) Known date of construction of specific area – downtown has evidence of Work Projects Administration (WPA) work dated to approximately 1935; the elementary school was originally constructed in 1975; etc.,
4) Interview/discussions with City Staff regarding pipe age.

The Operator Score is additional points assigned to the Condition Score based on interviews with City Staff. Regions identified by operators that experience a high number of breaks and require frequent maintenance receive an Operator Score of 10. Pipes in these areas are predominantly Schedule 40 PVC and cast iron so there is also a likely correlation to pipe material and construction. Corrosive soil might be to blame for the decrease in useful life of cast iron; while insufficient pressure capacity (due to lack of

[4]"Buried No Longer: Confronting America's Water Infrastructure Challenge". AWWA

sufficient pipe thickness) and inadequate bedding are likely responsible for the decrease in useful life of Schedule 40 PVC pipe. Thus, all Schedule 40 PVC and all cast iron pipes of the entire distribution system were assigned an Operator Score of 5. TABLE 1 illustrates the condition scoring approach applied to the waterline pipes.

TABLE 1: Condition Assessment and Scoring of Waterline Pipe Assets

Criteria	Condition Score Pipe Material PVC	All Other (DI, AC, etc)	Cast Iron
Pipe Age			
Age = 100yrs	34.5	18.6	10.0
Age = 75yrs	20.3	11.2	6.3
Age = 50yrs	10.0	5.8	3.6
Age = 40yrs	7.0	4.2	2.7
Age = 25yrs	3.6	2.4	1.8
Age = 0yrs	1.0	1.0	1.0
Operator Interviews			
Specific Problem Areas*	10	10	10
Material Related Problems**	5	-	5

Age Score component of Condition Score is calculated from decay curves presented in Figure 4.

* Condition Score calculated by adding 10 points to Age Score for waterline pipes located in specific areas identified by operators as having a high number of maintenance issues.

** Condition Score calculated by adding 5 points to Age Score for all Schedule 40 PVC and Cast Iron waterline pipes based on operator input related to high number of maintenance issues.

Consequence of Failure

The probability of failure for a water pipe is calculated based on historical industry trends and the City's operators experience but overall, it is not a predictive calculation. However, formulating the consequences of a pipe failure is much more exact. For instance, we cannot predict exactly when a waterline pipe in a main arterial street will fail, but we are certain that when it does, the consequences (repair cost, disruption of traffic, etc.) will be greater than if it were a waterline in a residential street. In addition, we are certain that the cost of repair of the failure for this line is greater than the cost of replacement prior to failure.

Consequence scoring is based on a methodology, which includes social, environmental, and economic consequences of failure criteria. Items included in the scoring criteria were those for which GIS data was accessible and those that clearly had social, environmental, and/or economic impact as a result of failure. Examples of social consequence would be failures that affect high traffic areas or have an impact on public safety like those in a contaminated area or near schools or hospitals. Failures near populated areas could affect more customers as well as give the City a poor public image. Failures in a waterway could have an environmental impact. Economically, failures in higher traffic areas, more populated areas, and in environmentally sensitive areas all have increased repair and replacement costs.

TABLE 2 contains the different consequences of failure related the waterlines, associated Consequence Scores, and the factors that were considered in determining the values of the scores. A Consequence Score of 1 is considered the lowest consequence and a score of 5 is the highest. There is a consequence to any pipe failure; therefore, all pipe segments have a minimum consequence score of 1. The consequence of a water main pipe failure, for example, is given a higher score of 5 because of the impact on the overall system and the potential high cost of repair.

TABLE 2: Consequence of Failure Scoring of Waterline Pipe Assets

CONSEQUENCE	SOCIAL			ENVIRONMENTAL				ECONOMIC		SCORE
Criteria	Disruption of Service/ Access	Safety Impacts, internal and external	Public Image	Aesthetics	Permit Violation	Ecosystem	Sustainability	Level of Service, Reliability	High Repair/Restore Cost	
ALL PIPE										1
Water Main or Well Line							X			5
In Interstate										5
High Traffic Corridor (>1000 Average Daily Trips)										4
Moderate Traffic Corridor (<1000 Average Daily Trips)										3
Within 100 Ft. of Hospital										3
Crossing Waterway (River, Ditch, Arroyo, Wetland)						X				2
Within 100 ft. of Schools										2
Within 100 ft. of Business Center/ Commercial Zone										1

Risk of Failure

For a distribution waterline pipe asset, the overall risk of failure, or Risk Score, is the product of the Condition Score (probability of failure) and the Consequence Score (consequence of failure).

RISK = CONDITION SCORE X CONSEQUENCE SCORE

For example, if a pipe asset has a high Condition Score (10) and low Consequence Score (1), the Risk Score is 10 (10 x 1), which is considered a medium level of risk. If another pipe asset has a medium Condition Score (6), but a high Consequence Score (5), the Risk Score is 30 which is considered a high level of risk.

Risk Scores were calculated and assigned to all the waterline assets of the distribution system and are contained in APPENDIX A. Valve and hydrant assets associated with a given waterline asset are assigned the same Risk Score as the waterline pipe and are assumed to be replaced at the same time as the pipe. The Risk Scores for the waterline assets of the distribution system ranged from 1 to 168. The higher the Risk Score for an asset, the higher the risk of failure and, ultimately, the higher the priority of repair or replacement. Based on the Risk Scores assigned to them, the waterline assets have been categorized into one of four Risk Levels, as follows:

Low Risk Level – Risk Score range from 1 to ≤8
Medium Risk Level – Risk Score range from >8 to ≤12
High Risk Level – Risk Score range from >12 to ≤56
Extreme Risk Level – Risk Score range from >56 to ≤168

Assets in the Extreme Risk Level category are considered beyond an acceptable level of risk. Essentially, the City should replace or rehabilitate any waterline assets assigned to the Extreme Risk Level. As can be seen in the pie chart in FIGURE 5, 18.2% of the current system is considered “Extreme Risk”. The map in FIGURE 6 geographically shows the entire distribution system and the Risk Level associated with each waterline pipe asset. Asset risk levels, priority of replacement, and scheduling of replacement are discussed in detail in the Replacement Schedule section of the report.

FIGURE 5: Waterline Pipe Asset Risk 2017

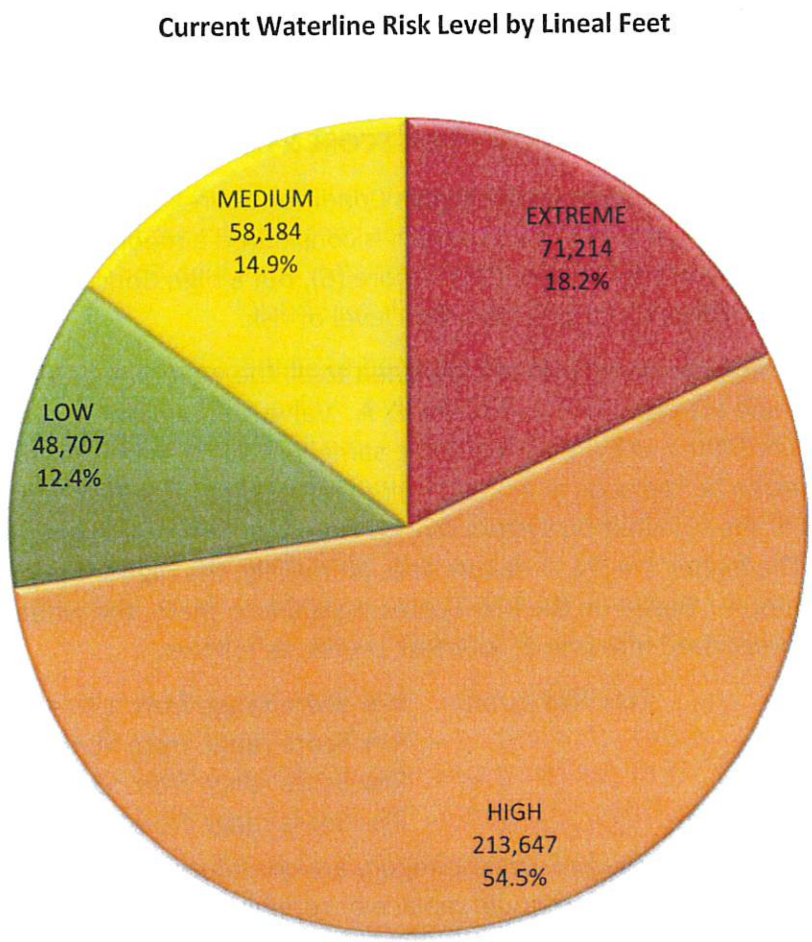
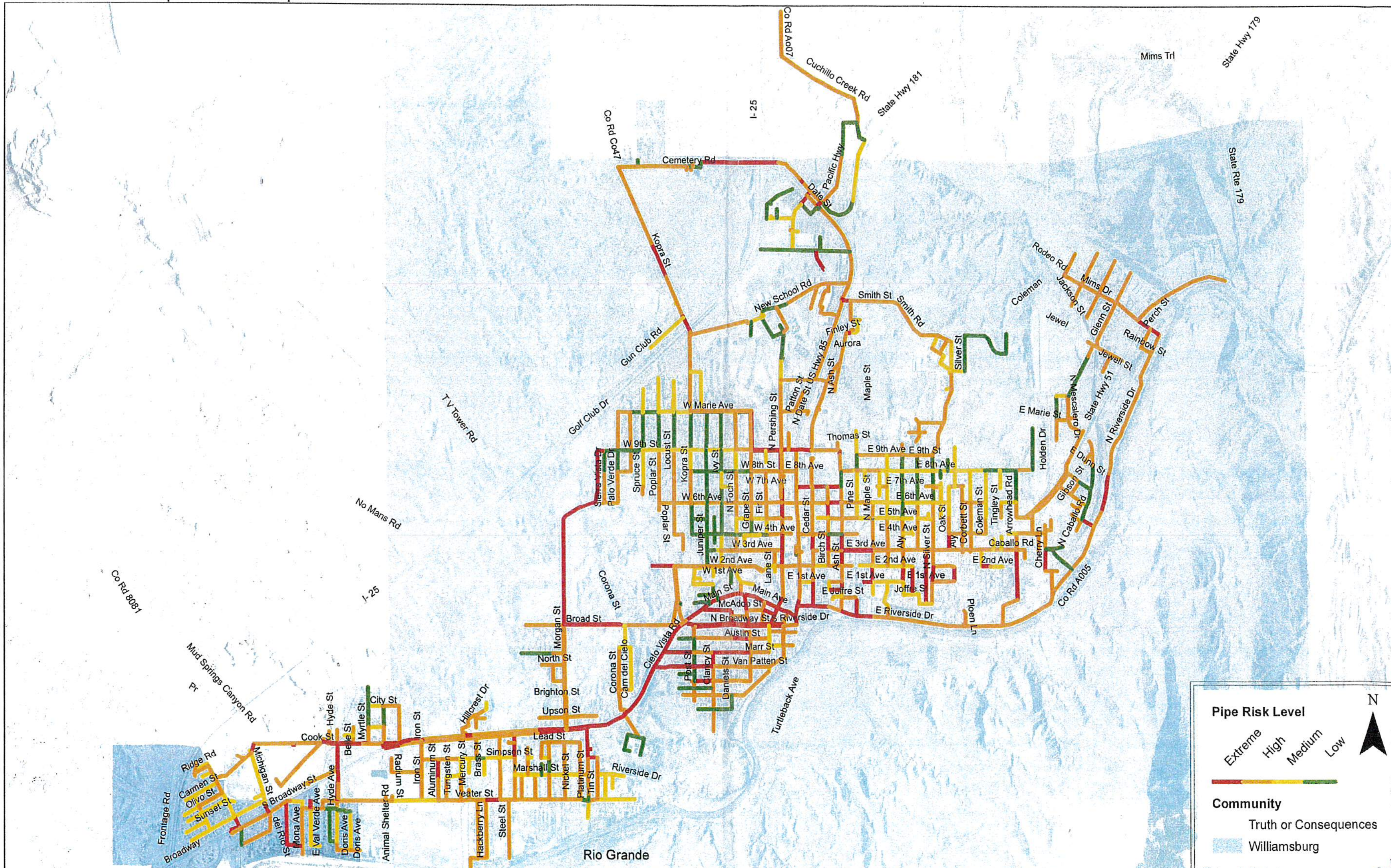


FIGURE 6: Waterline Pipe Asset Risk Map



Wells – Condition and Risk Assessments

Functionality and Level of Service

The groundwater wells are critical components that are the foundation of the Water System since they provide the water supply to the system. The level of service for water supply wells can be defined by the following three categories:

1) customer driven (production level, minimal water outages),
2) regulatory (contaminate levels, sustainability), and
3) management (operation and maintenance, including conservation efforts).

In the event a water supply well fails and cannot produce water for an extended amount of time, water supply demands increase on the other wells in the system (reduced management level of service). If multiple wells fail at the same time, the pressure and flow of the distribution system may be affected and service may be limited or even stopped for some customers, (reduced customer driven level of service). If the quality of the groundwater being drawn from a particular well becomes unsuitable, the well may need to be removed from service (reduced regulatory and management level of service).

Water and energy conservation are important elements of the management category of the level of service for the wells. As discussed in the Level of Service Section for the distribution system, water and energy conservation can both be addressed at the same time by properly replacing leaking waterlines. The majority of the water and energy conservation efforts associated with the wells will be addressed by replacing the leaking waterlines in the distribution system since the wells provide the water supply. Future implementation of the replacement of leaking waterlines will make the wells more sustainable as there will be less demand on them and pump systems associated with the wells will use less energy correspondingly. Estimated energy cost savings are discussed in more detail in the Level of Service section of Pump Systems.

Modes of Failure

A well "failure" refers to one of the following three scenarios:

1) a portion of the well breaks causing the well to stop producing water or,
2) the well has exhausted the supply of groundwater that it draws from and has "gone dry" or,
3) the quality of the groundwater in the well has diminished due to contamination and can no longer be reasonably treated to provide potable water.

Life Expectancy

The life expectancy of a well asset is the average number of years before replacement or significant rehabilitation is necessary. The life expectancy of a well is dependent on its construction and the sustainability of the supply of water it draws upon. In general, the typical life expectancy of a well asset used in this AMP is 25 years[5]. Smith estimated the remaining useful life for each of the well assets based on age information collected from the City. The estimated remaining useful life for each well asset is shown in TABLE 3.

Probability of Failure

The condition assessment of a well asset is very important for determining the probability of failure. As with waterline piping, visual condition assessment of a well is not possible because it is below the ground. Smith interviewed water system operators on the condition of the wells. According to operating staff, all wells are producing well and show no signs of operational problems. Since the operator comments did not indicate problems with the wells and visual inspection of the wells is not possible, the only factor used to assess condition was well age. All documented information on the well assets is contained in APPENDIX B.

Smith implemented a remaining useful life scoring system for the well assets based on a scale of 1 to 10 points. A score of 10 is associated with a well asset that has no remaining useful life; a score of 1 is associated with a well asset that has 90-100% of its useful life remaining. For assets older than their life expectancies, a scoring adjustment was applied by using a linear extrapolation of the typical life expectancy of 25 years. For example, a well that is 50 years old (200% of life expectancy) receives a score of 20 (2.0 x 10). Any additional points calculated as fractions were rounded to the nearest integer (whole number). TABLE 3 contains the Condition Scores for all the well assets, based on the calculated useful life scores.

TABLE 3: Condition Assessment and Scoring of Well Assets

Asset	Life Expectancy (Years)	Age (Years)[6]	Estimated Remaining Useful Life (Years)	Useful Life Score	Condition Score
Well No. 2	25	72	0	29	**29**
Well No. 4	25	59	0	24	**24**
Well No. 6	25	41	0	16	**16**
Well No. 1	25	27	0	11	**11**
Well No. 8	25	18	7	7	**7**
Well No. 7	25	2	23	1	**1**

Consequence of Failure

As is the case with waterline assets, the probability of failure (Condition Score) for a well asset is calculated based on an estimated life expectancy and, therefore, cannot be as

[5] Typical expected life of a well asset defined as 25 years based on expected life range in "Asset Management: A Handbook for Small Water Systems", United States Environmental Protection Agency, 2003.

[6] In 2017

precisely determined as the consequence of failure. All the wells are critical because they are the source of the water on which the rest of the system is based. However, if one well fails, the other wells can be pumped more to make up the difference in production temporarily. Therefore, the consequence of failure for each well is relatively high, with the individual consequence of failure score for each well defined by the production capacity of the well. As shown in TABLE 4, the higher the capacity of a well results in a higher the Consequence Score.

TABLE 4: Consequence of Failure Scoring of Well Assets

CONSEQUENCE	SOCIAL			ENVIRONMENTAL				ECONOMIC		SCORE
Criteria	Disruption of Service/ Access	Safety Impacts, Internal & External	Public Image	Aesthetics	Permit Violation	Ecosystem	Sustainability	Level Of Service, Reliability	High Repair/ Restore Cost	
Failure of Well No. 7 (*Production Capacity = 900 GPM)							X			6
Failure of Well No. 6 (*Production Capacity = 600 GPM)							X			5
Failure of Well No. 8 (*Production Capacity = 640 GPM)							X			5
Failure of Well No. 1 (*Production Capacity = 375 GPM)							X			4
Failure of Well No. 2 (*Production Capacity = 280 GPM)							X			3
Failure of Well No. 4 (*Production Capacity = 240 GPM)							X			3

*Production Capacity of each well is based on information provided in the 2007 NMED Drinking Water Bureau Sanitary Survey for the Truth or Consequence Water System

Risk of Failure

The risk of failure for a well asset, the Risk Score, is the product of the probability of failure (Condition Score) and the consequence of failure (Consequence Score). The Risk Score prioritizes, or ranks, the assets to appropriately plan and schedule replacement or rehabilitation as discussed in the Replacement Schedule Section of this report. Risk Scores for each of the well assets are shown in TABLE 5.

TABLE 5: Risk Scoring of Well Assets

Asset	Condition Score	Consequence Score	Risk Score
Well No. 2	28	3	**87**
Well No. 6	15	5	**80**
Well No. 4	22	3	**72**
Well No. 1	10	4	**44**
Well No. 8	6	5	**35**
Well No. 7	1	6	**6**

Pump Systems and Disinfection System – Condition and Risk Assessments

Functionality and Level of Service

The pumps systems are critical components of the Water System that provide the means to draw groundwater from the supply wells transfer it to the disinfection system and storage, and ultimately provide potable water to the end users of the system though the distribution network of waterlines. To provide the proper level of service, the pump systems need to work reliably and must provide the appropriate flow and pressure to meet demand requirements of the overall system. The level of service of the pump systems can be defined as the following category: management (operation and maintenance, including conservation efforts).

The gas-chlorination disinfection system is an extremely critical component of the overall Water System since it provides the means to disinfect the source groundwater so end users can safely consume it as potable water. To provide proper level of service, the gas-chlorination system must have capacity and reliability to properly disinfect the quantity of water required to meet the demand of all the end users of the system. The level of service of for the disinfection systems can be defined by the following two categories:

1) customer driven (taste, odor) and
2) regulatory (contaminant/pathogen levels).

Water and energy conservation are important elements of the management category of the level of service for the pump systems. Energy conservation in regards to the pump systems is particularly important as the pump systems consume most of the energy used by the overall Water System. As discussed in the Level of Service Section for the distribution system, water and energy conservation can both be addressed at the same time by properly replacing leaking waterlines. Majority of the water and energy conservation efforts associated with the pump systems will be addressed by replacing the leaking waterlines in the distribution system since all water used by the distribution system must be delivered by the pump systems. Future implementation of the replacement of leaking waterlines will decrease water demand resulting in less wear and tear on the pump systems and less energy use by the pump systems. Recent estimates of water loss in the Water System indicated it to be as high as 20% of the total water production of the system.[7] Based on an estimated average daily water production of 1.2 MG per day, daily and annual energy use estimates for the Water System pump systems were calculated, as well as estimated energy costs, and are contained in **APPENDIX C**. At present, the existing Water System is estimated to use approximately 1,082,000 kW-Hr of energy annually at a cost of approximately $117,000. If future waterline replacements in the system over the next ten years could reduce the water loss of the system to only 5%, the resulting annual energy savings would be approximately 162,300 kW-Hr, equating to approximately $17,500 in annual cost savings.

There can be additional energy conservation by managing the pump systems to ensure they are used as efficiently as possible. This usage rate is constant throughout the day, so there are no cost savings related to running Water System equipment at off-load times of day. However, the pump systems can be managed to run as efficiently as possible. This can be achieved by instructing operators to frequently check the manufacturer-provided information on the pumps (pump curves showing duty points) to ensure pumps are operating at the design flows and pressures. Often, a pump can achieve the performance desired by the system by not operating at an efficient point on the pump curve. Slight changes to pump operational conditions to use it in a more energy-efficient manner will save energy (and money) in the long run. In some cases, the existing pump may need to be replaced with or supported by another pump with characteristics more suitable for the application.

A reasonable energy conservation goal is to reduce the total water loss of the system (and associated extra energy use) to approximately 5% of the total production of the system within the next 10 years.

Modes of Failure

A pump system "failure" refers to a scenario in which the pumps can no longer supply water to the intended location at the necessary flow or pressure for appropriate use. Pump systems are typically very complicated and have many individual critical components; each of which can fail, resulting in the failure of the overall pump system. Pump system failures can be either mechanical (i.e. pump impellor, valves associated with pump manifold) or electrical (i.e. power system, pump control system) in nature. The pump system component that most commonly fails is the electric pump motor.

A chlorination disinfection system "failure" refers to a scenario in which the system can no longer provide the amount of chlorine necessary to properly disinfect the amount of water passing though it and meet regulatory standards. A gas-chlorination system can fail due to pump, control, electrical malfunctions, and/or depletion of the gas chlorine source.

---

[7] 40-Year Water Development Plan (WHPacific, 2012).

Life Expectancy

The life expectancy of pump system or disinfection system equipment is the average number of years before replacement of the equipment or significant rehabilitation is necessary. The life expectancies of critical pump system equipment components and disinfection equipment vary and therefore, need to be defined separately. The critical pump system equipment and chlorination disinfection equipment estimated life expectancies used in this AMP are as follows[8]:

1) Pumps (impellors, bearings, bowls, etc.):	15 years
2) Pump Motors:	8 years
3) Valves (check valves, isolation valves):	35 years
4) Flow Meters:	15 years
5) Electrical Systems:	15 years
6) SCADA Systems (HMIs, RTUs)	15 years
7) Chlorination Disinfection System	15 years

The estimated life expectancies listed above consider variables such quality of the product, quality of the installation, and operation and maintenance procedures.

Smith estimated the remaining useful life for each of the Water System pump system assets based on age information collected from the City. TABLES 6-10 show the estimated remaining useful life for each of the pump system assets.

Probability of Failure

As with the other Water System assets, the condition of a pump system or disinfection system asset is the major factor in determining the probability of failure. The primary measurement of condition is the estimated remaining useful life of the asset, based on age. Other aspects of the condition assessment of the pump system components and the disinfection system were visual inspection during field visits and input from the operators. Smith performed visual condition assessment on accessible pump system assets during multiple field investigations and documented the overall condition of the pump systems and any damage due to age or wear from operation. Some of the pump system equipment is underground and could not be field assessed. In cases where the equipment could not be field visited, estimated useful life and operator input were the only factors taken into account for condition assessment. All documented data on the pump system and disinfection system assets are contained in APPENDIX B.

Smith implemented a remaining useful life scoring system for the pump system components based on a scale of 1 to 10 points. A score of 10 is associated with an asset that has no remaining useful life; a score of 1 is associated with an asset with 90-100% of its useful life remaining. For assets older than their life expectancies, a scoring adjustment was applied based on a linear relationship extrapolated from the defined

---

[8] Typical life expectancies of pump system and chlorination equipment based on expected life ranges in "Asset Management: A Handbook for Small Water Systems", United States Environmental Protection Agency, 2003.

estimated life expectancies of each pump system component. For example, a pump motor that is 16 years old (200% of life expectancy) receives a score of 20 (2.0 x 10).

Smith also implemented a scoring system, to augment the useful life score, which considers damage observed during field visits and recommendations of operators. When significant damage to a pump system asset was observed during a field visit, 1-10 points were added to the useful life score of the asset, depending on the severity of the damage. Similarly, when a member of the operational staff made a recommendation regarding replacement or rehabilitation of a pump system asset, 1-10 points were added to the useful life score of the asset, depending on the urgency of the recommendation. If the results of the field inspection and operator input were positive, 0 points were added.

TABLES 6-10 contain the Condition Scores for all the pump system component assets and the disinfection system asset, separated by asset category, as determined from the condition assessment scoring system

TABLE 6: Condition Assessment and Scoring of Pump System Assets–Pumps and Motors

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
Well No. 2 Pump	15	72	0	48	6	4	**58**
Well No. 2 Pump Motor	8	32	0	40	4	3	**47**
Cook St. Treatment Facility Pump No. 2 Motor	8	21	0	26	3	2	**31**
Well No. 8 Pump	15	18	0	12	3	10	**25**
Well No. 7 Pump Motor	8	18	0	23	3	1	**27**
Well No. 6 Pump Motor	8	18	0	23	2	1	**26**
Well No. 8 Pump Motor	8	18	0	23	2	1	**26**
Well No. 1 Pump Motor	8	16	0	20	0	1	**21**
Well No. 4 Pump Motor	8	16	0	20	0	1	**21**
Cielo Vista Pump Station Pump No. 2 Motor	8	11	0	14	5	2	**21**
Cook St. Treatment Facility Pump No. 1	15	21	0	14	3	1	**18**
Cook St. Treatment Facility Pump No. 2	15	21	0	14	3	1	**18**
Cielo Vista Pump Station Pump No. 1 Motor	8	11	0	14	2	2	**18**
Well No. 7 Pump	15	18	0	12	3	1	**16**
Well No. 6 Pump	15	18	0	12	1	1	**14**
Booster Pump Station No. 2 Pump No. 1 Motor	8	10	0	13	2	1	**16**
Well No. 1 Pump	15	16	0	11	0	1	**12**
Well No. 4 Pump	15	16	0	11	0	1	**12**
Cielo Vista Pump Station Pump No. 1	15	11	4	7	2	2	**11**
Cielo Vista Pump Station Pump No. 2	15	11	4	7	2	2	**11**
Booster Pump Station No. 2 Pump No. 1	15	10	5	7	2	1	**10**
Booster Pump Station No. 2 Pump No. 2	15	10	5	7	2	1	**10**
Booster Pump Station No. 2 Pump No. 2 Motor	8	4	4	5	0	5	**10**
Cook St. Treatment Facility Pump No. 1 Motor	8	3	5	4	3	1	**8**

It should be noted that two pumps (and their motors) that were previously part of the Pershing Pump Station have been removed from service and are now in storage at the WWTP facility. Condition and risk assessments were not performed on these two sets of pumps and motors due to them not being in service. However, they are accounted for in the GIS Model inventory and have documented information contained in APPENDIX B.

TABLE 7: Condition Assessment &Scoring of Pump System Assets – Manifolds & Flow Meters

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
Pershing PRV Station Manifold	35	72	0	21	2	1	**24**
Cook St. Treatment Facility Flow Meter	12	21	0	18	4	4	**26**
Well No. 2 Pump Manifold*	35	38	0	11	7	4	**22**
Well No. 1 Pump Manifold	35	26	9	7	8	5	**20**
Well No. 4 Pump Manifold	35	38	0	11	6	4	**21**
Well No. 2 Flow Meter	12	17	0	14	2	1	**17**
Well No. 7 Flow Meter	12	18	0	15	1	0	**16**
Well No. 8 Flow Meter	12	18	0	15	1	0	**16**
Well No. 4 Flow Meter	12	13	0	11	3	1	**15**
Well No. 6 Flow Meter	12	18	0	15	0	0	**15**
Cook St. Treatment Facility Pump Manifold	35	21	14	6	3	2	**11**
Well No. 6 Pump Manifold	35	26	9	7	0	0	**7**
Well No. 7 Pump Manifold	35	26	9	7	0	0	**7**
Well No. 8 Pump Manifold	35	26	9	7	0	0	**7**
Booster Pump Station No. 2 Flow Meter	12	10	2	8	0	0	**8**
Cielo Vista Pump Station Manifold	35	10	25	3	3	1	**7**
Booster Pump Station No. 2 Pump Manifold	35	10	25	3	2	0	**5**
Well No. 1 Flow Meter	12	3	9	3	0	0	**3**

*Age used was an average: some components of the manifold are very old and some have been recently replaced.

TABLE 8: Condition Assessment and Scoring of Pump System Assets – Electrical Systems

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
Well No. 2 Pump Electrical System	15	42	0	28	4	1	**33**
Well No. 4 Pump Electrical System	15	32	0	21	3	1	**25**
Well No. 1 Pump Electrical System	15	26	0	17	5	3	**25**
Well No. 6 Pump Electrical System	15	18	0	12	1	0	**13**
Well No. 7 Pump Electrical System	15	18	0	12	1	0	**13**
Well No. 8 Pump Electrical System	15	18	0	12	1	0	**13**
Cielo Vista Pump Station Electrical System	15	11	4	7	1	0	**8**
Booster Pump Station No. 2 Electrical System	15	10	5	7	0	0	**7**
Booster Pump Station No. 2 Back-up Generator	15	10	5	7	0	0	**7**
Cook St. Treatment Facility Electrical System	15	4	11	3	1	0	**4**

It should be noted that the electrical system previously part of the old Pershing Pump Station (now out of service), which is still housed in the Pershing PRV building, has been abandoned and will ultimately be removed and disposed of. As a result, it is not considered an asset of the Water System and will not be addressed in this AMP.

TABLE 9: Condition Assessment and Scoring of Pump System Assets – SCADA System

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
SCADA System RTUs	15	20	0	13	10	10	**33**
SCADA System Software	15	16	0	11	10	10	**31**

TABLE 10: Condition Assessment and Scoring of Disinfection System Asset – Gas-Chlorination System

Asset	Life Expect-ancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
Gas-Chlorination System	15	21	0	14	2	2	18

Consequence of Failure

The consequences associated with the failure of pump systems are primarily the disruption in water distribution service resulting from the failure and the cost of repairing the pumping equipment quickly to resume service. All of the pump systems are critical for the distribution of potable water at the proper flow and pressure for customer use and for fire protection. Therefore, any pump system failure that results in loss of pumping output is of high consequence. Failure of a pump system electrical component or a critical manifold component has high consequence scoring because they result in the loss of function of the system. The pump systems for all the wells incorporate only one pump and associated motor so failure of one these components has moderate to high Consequence Score, which would be higher if the wells didn't provide some amount of redundancy to each other. The Cook St. Treatment facility, Booster Pump No.2 and Cielo Vista pump systems have more than one pump and, as a result, have some amount of redundancy built in. Should one pump fail in these systems there is not total loss of functionality which is reflected in the associated consequence scoring. TABLE 11 contains the consequence scores related to the different types of pump system failures with high scores correlated to the criticality of the particular pump systems.

There are potential health consequences associated with the failure of the gas-chlorination disinfection system. If properly disinfected water can't be distributed to end users, they may either get sick or go without proper water service, both of which high consequences of failure as shown in TABLE 11.

TABLE 11: Consequence of Failure Scoring of Pump System Assets

CONSEQUENCE	SOCIAL			ENVIRONMENTAL			ECONOMIC		SCORE
Criteria	Disruption of Service/ Access	Safety Impacts, Internal & External	Public Image	Aesthetics	Permit Violation	Sustainability	Level of Service, Reliability	High Repair/ Restore Cost	
Failure of Chlorination System, resulting in loss of ability to pump chlorinated water to entire distribution system.				X	X				12
Failure of Cook St. Treatment Facility Pump Electrical/Control System or critical manifold component, resulting in loss of ability to pump chlorinated water to entire distribution system.					X				14
Failure of Cook St. Treatment Facility Pump or Motor, resulting in only one pump available to pump chlorinated water to entire distribution system.					X				7
Failure of Booster Pump Station No. 2 (Morgan Pump Station) Pump Electrical/ Control System or critical manifold component, resulting in loss of ability to pump chlorinated water to Upper Zone of the distribution system.					X				10
Failure of Booster Pump Station No. 2 (Morgan Pump Station) Pump or Motor resulting in only one pump available to pump chlorinated water to the Upper Zone of the distribution system.					X				5
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 6						X			5
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 7						X			6
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 8						X			5
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 1						X			4
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 2						X			3
Failure of Pump System Pump/Motor/Elec./Control System/critical manifold component) of Well No. 4						X			3
Failure of Cielo Vista Booster Pump System (Pump/Motor/Electrical/Control System/critical manifold component				X		X			4
Failure of Pershing PRV critical manifold component, resulting in loss of pressure reducing capability between High and Low pressure zones of the distribution system.				X					8
Failure of any pump system flow meter					X				1
Failure of SCADA critical component									4

Risk of Failure

The risk of failure for a pump system or disinfection system asset is the product of the probability of failure (Condition Score) and the consequence of failure (Consequence Score). The Risk Score prioritizes, or ranks, the assets to appropriately plan and schedule replacement or rehabilitation as discussed in the Replacement Schedule section of this report. The Risk Score for each of the pump system assets and the disinfection system asset are shown in TABLES 12-16.

TABLE 12: Risk Scoring of Pump Systems Assets – Pumps and Motors

Asset	Condition Score	Consequence Score	Risk Score
Cook St. Treatment Facility Pump No. 2 Motor	31	7	**217**
Well No. 2 Pump	58	3	**174**
Well No. 7 Pump Motor	27	6	**162**
Well No. 2 Pump Motor	47	3	**141**
Well No. 6 Pump Motor	26	5	**130**
Well No. 8 Pump Motor	26	5	**130**
Cook St. Treatment Facility Pump No. 1	18	7	**126**
Cook St. Treatment Facility Pump No. 2	18	7	**126**
Well No. 8 Pump*	25	5	**125**
Well No. 7 Pump	16	6	**96**
Well No. 1 Pump Motor	21	4	**84**
Cielo Vista Pump Station Pump No. 2 Motor	21	4	**84**
Booster Pump Station No. 2 Pump No. 1 Motor	16	5	**80**
Cielo Vista Pump Station Pump No. 1 Motor	18	4	**72**
Well No. 6 Pump	14	5	**70**
Well No. 4 Pump Motor	21	3	**63**
Cook St. Treatment Facility Pump No. 1 Motor	8	7	**56**
Booster Pump Station No. 2 Pump No. 1	10	5	**50**
Booster Pump Station No. 2 Pump No. 2	10	5	**50**
Booster Pump Station No. 2 Pump No. 2 Motor	10	5	**50**
Well No. 1 Pump	12	4	**48**
Cielo Vista Pump Station Pump No. 1	11	4	**44**
Cielo Vista Pump Station Pump No. 2	11	4	**44**
Well No. 4 Pump	12	3	**36**

TABLE 13: Risk Scoring of Pump Systems Assets – Manifolds and Flow Meters

Asset	Condition Score	Consequence Score	Risk Score
Pershing PRV Station Manifold	24	8	192
Cook St. Treatment Facility Pump Manifold	11	14	154
Well No. 1 Pump Manifold	20	4	80
Well No. 2 Pump Manifold	22	3	66
Well No. 4 Pump Manifold	21	3	63
Booster Pump Station No. 2 Pump Manifold	5	10	50
Well No. 7 Pump Manifold	7	6	42
Well No. 6 Pump Manifold	7	5	35
Well No. 8 Pump Manifold	7	5	35
Cielo Vista Pump Station Manifold	7	4	28
Cook St. Treatment Facility Flow Meter	26	1	26
Well No. 2 Flow Meter	17	1	17
Well No. 7 Flow Meter	16	1	16
Well No. 8 Flow Meter	16	1	16
Well No. 6 Flow Meter	15	1	15
Well No. 4 Flow Meter	15	1	15
Booster Pump Station No. 2 Flow Meter	8	1	8
Well No. 1 Flow Meter	3	1	3

TABLE 14: Risk Scoring of Pump Systems Assets – Electrical Systems

Asset	Condition Score	Consequence Score	Risk Score
Well No. 1 Pump Electrical System	25	4	100
Well No. 2 Pump Electrical System	33	3	99
Well No. 7 Pump Electrical System	13	6	78
Well No. 4 Pump Electrical System	24	3	72
Booster Pump Station No. 2 Electrical System	7	10	70
Booster Pump Station No. 2 Back-up Generator	7	10	70
Well No. 6 Pump Electrical System	13	5	65
Well No. 8 Pump Electrical System	13	5	65
Cook St. Treatment Facility Electrical System	4	14	56
Cielo Vista Pump Station Electrical System	8	4	32

TABLE 15: Risk Scoring Pump System Assets – SCADA System

Asset	Condition Score	Consequence Score	Risk Score
SCADA System RTUs	33	4	132
SCADA System Software	31	4	124

TABLE 16: Risk Scoring of Disinfection System Asset

Asset	Condition Score	Consequence Score	Risk Score
Gas-Chlorination System	18	12	216

Buildings and Structures – Condition and Risk Assessments

Functionality and Level of Service

The level of service for the buildings/structures assets of the Water System refers to the ability of the buildings/structures to protect system equipment from damage due to weather and vandalism and thereby keep the system in good operational condition. Therefore, level of service is defined by three categories:

1) customer driven (protection of equipment to provide potable water with minimal water outages),
2) regulatory (protection of equipment to provide potable, uncontaminated water), and
3) management (protection of equipment and conservation of energy to minimize operation and maintenance costs).

Energy conservation is an important element of the management category of the level of service for the buildings and structures. Majority of the Water System energy consumption is done by the pump systems, but some energy is also used by the buildings, primary the Cook Street Treatment Facility Pump Building, Booster Pump Station No. 2 Building, and the Pump Buildings for Wells No. 6, No. 7, and No. 8. Water System operators currently implement conservation of energy when using these buildings by making sure to turn off lights and heating/cooling systems when leaving the buildings. Future energy conservation efforts in regards to the buildings will be implemented in the same manner.

Modes of Failure

A building or structure "failure" refers to a scenario in which the condition of the building does not allow the components of the Water System within the building to be operated in a reasonable manner. For example, if the roof of a building asset at a level of disrepair that allows rainwater into the building that could damage equipment or create a dangerous working environment for operators, the building asset would be considered in a state of failure. If buildings with important pump systems fail, there would be an interruption in service (reduced customer driven level of service). If the structure housing the gas-chlorination disinfection system failed and caused the system to stop disinfecting water, the water would not meet permit standards (reduced regulatory driven level of service).

Life Expectancy

The life expectancy of a building/structure asset is the average number of years before replacement or significant rehabilitation is necessary and is dependent on the manner in which it was constructed and the materials used to construct it. In general, the typical life expectancy of a building used in this AMP is 50 years[9]. Smith estimated the remaining useful life for each of the Water System building/structure assets based on age information collected from the City. The estimated remaining useful life for each of the building/structure assets are shown in TABLE 17.

Probability of Failure

As with the other assets of the Water System, the condition of a building/structure asset is the major factor in determining the probability of failure. The age of a building/structure and its remaining useful life is the primary measurement of condition. Since buildings and structures can be visually inspected, condition assessment based on field visits and operator input are also important measures of condition to be considered.

Smith implemented a remaining useful life scoring system based on a scale of 1 to 10 points. A score of 10 is associated with a building/structure that has no remaining useful life; a score of 1 is associated with a building/structure with 90-100% of its useful life remaining. For assets older than their life expectancies, a scoring adjustment was applied based on a linear relationship extrapolation from the typical life expectancy of 50 years. For example, a building that is 75 years old (150% of life expectancy) receives a score of 15 (10 x 1.5).

Smith performed condition assessment on all the assets during multiple field investigations and documented the overall condition of the building/structures and any damage due to age and exposure to weather. In addition, Smith interviewed water system operators on the conditions of the buildings/structures and documented the operator comments and recommendations regarding replacement or rehabilitation of buildings/structures. The documented notes from the field condition assessments and operator interviews for each building/structure are contained in APPENDIX B. In general, the buildings were in good condition with some notable exceptions.

---

9 Typical expected life of a building defined as 50 years based on expected life ranges in "Asset Management: A Handbook for Small Water Systems", United States Environmental Protection Agency, 2003.

Smith implemented a scoring system, to augment the useful life score, which considers asset condition observed during field visits and recommendations of Water System operation staff. Based on the condition of the building/structure asset observed during a field visit, 1-10 points were added to the useful life score of the asset, depending on the severity of the damage. Similarly, when a member of the operational staff made a recommendation regarding replacement or rehabilitation to a building/structure asset, 1-10 points were added to the useful life score of the asset, depending on the urgency of the recommendation. If the results of the field inspection and operator input were positive, 0 points were added.

TABLE 17 contains the Condition Scores for the building and structure assets of the Water System based on the condition assessment scoring system.

TABLE 17: Condition Assessment and Scoring of Building/Structure Assets

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
Pershing St. PRV Station Building	50	72	0	14	10	10	**34**
Well No. 4 Pump System Building	50	73	0	15	7	7	**29**
Well No. 2 Pump System Building	50	78	0	16	6	6	**28**
Well No. 1 Pump System Shade Structure	50	26	24	5	10	10	**25**
Cook St. Treat. Facility Storage Building	50	43	7	9	4	3	**16**
Gas-Chlorination System Fiberglass Shed	30	21	9	7	2	0	**9**
Cielo Vista Pump System Fiberglass Housing	30	11	19	4	2	0	**6**
Cook St. Treat. Facility Pump Building	50	21	29	4	1	0	**5**
Well No. 6 Pump System Building	50	18	32	4	0	0	**4**
Well No. 7 Pump System Building	50	18	32	4	0	0	**4**
Well No. 8 Pump System Building	50	18	32	4	0	0	**4**
Booster Pump Station No. 2 Building	50	10	40	2	0	0	**2**

Consequence of Failure

The function of an individual building or structure asset of the Water System is to protect the equipment housed within it. Therefore, the consequence of a building/structure failure, is defined as the same as the consequence of failure of the equipment housed inside as shown in TABLE 18. Several of the buildings/structures protect critical components of the Water System, such as the chlorination system, key pumping systems, and the PRV that controls the pressure between the high and low pressure zones of the system, thus, have high consequence of failure scoring.

TABLE 18: Consequence of Failure Scoring of Building/Structure Assets

CONSEQUENCES	SOCIAL			ENVIRONMENTAL			ECONOMIC		SCORE
Criteria	Disruption of Service/ Access	Safety Impacts, Internal & External	Public Image	Aesthetics	Permit Violation	Sustainability	Level of Service, Reliability	High Repair/ Restore Cost	
Failure of Chlorination System Structure, resulting in loss of ability to pump chlorinated water to entire distribution system.				X	X				12
Failure of Cook St. Treatment Facility Building critical component, resulting in loss of ability to pump chlorinated water to entire distribution system.					X				14
Failure of Booster Pump Station No. 2 Building critical component, resulting in loss of ability to pump chlorinated water to Upper Zone of the distribution system.					X				10
Failure of Pershing PRV Station Building, resulting in failure of PRV that separates High and Low Pressure Zones of Distribution System				X		X			8
Failure of Pump System Building critical component of Well No. 6						X			5
Failure of Pump System Building critical component of Well No. 7						X			6
Failure of Pump System Building critical component of Well No. 8						X			5
Failure of Pump System Shade Structure critical component of Well No. 1						X			4
Failure of Pump System Building critical component of Well No. 2						X			3
Failure of Pump System Building critical component of Well No. 4						X			3
Failure of Cielo Vista Booster Pump Station Housing				X					4
Failure of Cook St. Facility Storage Building									2

Risk of Failure

The risk of failure for a building/structure asset, the Risk Score, is the product of the probability of failure (Condition Score) and the consequence of failure (Consequence

Score). The Risk Score prioritizes, or ranks, the assets to appropriately plan and schedule replacement or rehabilitation as discussed in the Replacement Schedule section of this report. The Risk Scores assigned to each of the building and structure assets are shown in TABLE 19.

TABLE 19: Risk Scoring of Building/Structure Assets

Asset	Condition Score	Consequence Score	Risk Score
Pershing St. PRV Station Building	34	8	272
Gas-Chlorination System Fiberglass Shed	9	12	108
Well No. 1 Pump System Shade Structure	25	4	100
Well No. 4 Pump System Building	29	3	87
Well No. 2 Pump System Building	28	3	84
Cook St. Treat. Facility Pump Building	5	14	70
Cook St. Treat. Facility Storage Building	16	2	32
Cielo Vista Pump System Fiberglass Housing	6	4	24
Well No. 7 Pump System Building	4	6	24
Well No. 6 Pump System Building	4	5	20
Well No. 8 Pump System Building	4	5	20
Booster Pump Station No. 2 Building	2	10	20

It should be noted that the even though the Risk Score for the Cook St. Treatment Facility Pump Building is relatively high at 70, the building will not need to be replaced in the next ten years. In fact, the building still has an estimated useful life of 29 years and is in good condition. The Risk Score for the building is relatively high due to the criticality of the building and the pump system it houses (high Consequence Score).

Storage Tanks – Condition and Risk Assessments

Functionality and Level of Service

The storage tanks are extremely important parts of the Water System since they provide storage of potable water and create pressure and flow for proper distribution of water to customers and for fire protection. The level of service for water storage tanks can defined by three categories:

1) customer driven (water pressure and flow, minimal water outages),
2) regulatory (fire storage capacity[10]),
3) management (operation and maintenance, including water and energy conservation).

In the event a water storage tank fails, the pressure and flow drops for customers who are part of the pressure zone served by the tank and service may stop for some customers (reduced customer driven level of service). The loss of the function of the tank may significantly reduce the ability to conduct the normal water distribution operations (reduced management driven level of service).

Water and energy conservation are important elements of the management category of the level of service for the storage tanks. Conservation of both water and energy are accomplished by minimizing the amount of water loss from the tanks due to overflow. Avoiding tank overflow is achieved by properly coordinating the flow rate of water into the tank with the flow rate of water out of the tank so as not to exceed the capacity of the tank. The proper coordination of tank inlet and outlet flow rates also conserves the energy used by pumps, as well as the wear and tear on the pumps, by minimizing the number of times the pumps start up and shut-off (start/stops).

At present, the normal operation of the Water System tanks adequately conserves water and energy, with the exception of the 0.2 MG tank at the Cook Street Treatment Facility. Due to the relatively small volume of the tank and significant difference between the pumping flow rate in and the pumping flow rate out (flow rate out > flow rate in), operation of the tank sometimes results in water loss due to tank overflow and consistently results in an excessive number of pump start/stops. Future implementation water and energy conservation in regards to the Water System tanks should focus on improving the operation of the 0.2 MG tank at the Cook Street Treatment Facility. This most likely can be accomplished by either installing an addition tank to increase tank capacity or by modifying the pumps/pump flow rates associated with the existing tank.

Modes of Failure

A storage tank "failure" refers when a portion of the tank breaks rendering the tank incapable of storing water in a reasonable manner.

---

[10] This study did not evaluate pipe capacity (flow or pressure) for the distribution system.

Life Expectancy

The life expectancy of a storage tank asset is the average number of years before replacement or significant rehabilitation is necessary. The life expectancy of a steel tank is dependent on its construction and whether or not is has cathodic protection. In general, the typical life expectancy of a storage tank asset used in this AMP is 50 years[11]. Smith estimated the remaining useful life for each of the Water System storage tank assets based on age information collected from the City. The estimated remaining useful life of each building/structure assets are shown in TABLE 20.

Probability of Failure

The condition of a storage tank asset is the most important factor in determining the probability of failure. The estimated remaining useful life of a storage tank, based on its age, is the primary measurement of condition. However, since storage tanks can be visually inspected, condition assessment based on field visits and operator input are also important measures of condition taken into account.

Smith implemented a remaining useful life scoring system based on a scale of 1 to 10 points. A score of 10 is associated with a storage tank that has no remaining useful life; a score of 1 is associated with a storage tank with 90-100% of its useful life remaining. For assets older than their life expectancies, a scoring adjustment was applied by using a linear extrapolation based the typical life expectancy of 50 years. For example, a storage tank that is 75 years old (150% of life expectancy) receives a score of 15 (1.5 x10).

Smith performed visual condition assessment on the outer portions of the storage tank assets during multiple field investigations and documented the overall condition of the storage tanks and any damage due to age and operational wear. In addition, Smith interviewed water system operators on the conditions of the storage tanks and documented the operator comments and recommendations regarding replacement or rehabilitation of buildings/structures. The documented notes from the field condition assessments and operator interviews on the storage tanks are contained in APPENDIX B. Overall, the storage tanks were in good or very good condition.

Smith implemented a scoring system, to augment the useful life score, which takes into account asset condition observed during field visits and recommendations of Water System operation staff. Based on the condition of the storage tank asset observed during a field visit, 1-10 points were added to the useful life score of the asset, depending on the severity of the damage. Similarly, when a member of the operational staff made a recommendation regarding replacement or rehabilitation to a storage tank asset, 1-10 points were added to the useful life score of the asset, depending on the urgency of the recommendation. If the results of the field inspection and operator input were positive, 0 points were added.

---

[11] Typical expected life of a well asset defined as 25 years based on expected life range in "Asset Management: A Handbook for Small Water Systems", United States Environmental Protection Agency, 2003.

TABLE 20 contains the Condition Scores for the storage tank assets of the Water System based on the condition assessment scoring system.

TABLE 20: Condition Assessment and Scoring of Storage Tank Assets

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Field Visit Assessment Score	Operator Interview Score	Condition Score
3.0 MG Storage Tank next to Booster Pump Station No. 2	50	13	37	3	0	0	**3**
1.2 MG Storage Tank on Cemetery Rd.	50	13	37	3	0	0	**3**
3.0 MG Storage Tank on Cemetery Rd.	50	4	46	1	0	0	**1**
0.2 MG Storage Tank at Cook St. Facility	50	5	45	1	0	0	**1**

Consequence of Failure

The consequences of a storage tank failure are loss of proper storage capacity, pressure, and flow for portions of the system associated with the tank, which may result in the loss of service to some customers, as well as potential damage to the environment around the tank. In addition, repair or replacement of a storage tanks is very expensive. In general, the consequences of a storage tank failure are quite severe as indicated by the consequence scoring shown in TABLE 21. The Consequence Scores for the tanks of the upper zone are not as high as for the other two tanks because the two upper zone tanks provide some redundancy to each other.

TABLE 21: Storage Tank Assets Consequence of Failure Scoring

Criteria	SOCIAL			ENVIRONMENTAL				ECONOMIC		SCORE
	Disruption of Service/ Access	Safety Impacts, Internal & External	Public Image	Aesthetics	Permit Violation	Ecosystem	Sustainability	Level Of Service, Reliability	High Repair/ Restore Cost	
Failure of the 0.200 MG Cook St. Treatment Facility Tank, resulting in loss of ability to store and distribute chlorinated water to either the Upper or Lower Zones of the distribution system.				X	X	X	X			20
Failure of the 3.0 MG Lower Zone Tank, resulting in loss of ability to store and distribute chlorinated water to Lower Zone of the distribution system.				X	X	X	X			20
Failure of the 3.0 MG Upper Zone Tank, resulting in loss of ability to store and distribute chlorinated water to Upper Zone of the distribution system with proper pressure and quantity.				X	X	X	X			18
Failure of the 1.6 MG Upper Zone Tank, resulting in loss of ability to store and distribute chlorinated water to Upper Zone of the distribution system with proper pressure and quantity.				X	X	X	X			15

Risk of Failure

The risk of failure score for a storage tank asset, the Risk Score, is the product of the probability of failure (Condition Score) and the consequence of failure (Consequence Score). The Risk Score prioritizes, or ranks, the assets to appropriately plan and schedule replacement or rehabilitation as discussed in the Replacement Schedule section of this report. The Risk Scores for each of the storage tank assets are shown in TABLE 22. It should be noted that the low Risk Scores for the tank assets indicate that none of the tanks will need to be replaced in the next 10 years.

TABLE 22: Storage Tank Assets Risk Scoring (Ranking)

Asset	Condition Score	Consequence Score	Risk Score
3.0 MG Storage Tank next to Booster Pump Station No. 2	3	20	**60**
1.2 MG Storage Tank on Cemetery Rd.	3	15	**45**
0.2 MG Storage Tank at Cook St. Facility	1	20	**20**
3.0 MG Storage Tank on Cemetery Rd.	1	18	**18**

Asset Financials and Capital Improvements Plan

This AMP is intended to be a guide for improving the Water System by planning the most cost-effective use of the system assets. The Water System budget for future years needs to be developed by incorporating proper financial planning for continuing the operation and maintenance of the system while also funding the replacement of significant amounts of system assets. This section of the report outlines an approach to managing the financials of the Water System assets including a 10-year Capital Improvements Plan (CIP) for asset rehabilitation and replacement.

Operation and Maintenance

The approach to the operation and maintence of the different categories of Water System assets has an impact on the financials of the system. Depending on the nature of the asset, the most cost-effective approach to long-term use can vary from operating the asset until it fails (run to failure) to proactive replacement of the asset before it is expected to fail. Historically, the general approach to operation of the Water System assets was to run them to failure, the point when they stopped working and required emergency repair or replacement. This approach to asset maintence is generally referred to as Corrective Maintenance. Notable exceptions to this general approach were the planned rehabilitation and replacement of several storage tanks in the system, which were examples of Planned Maintenance. The Planned Maintenance approach was certainly more cost-effective (and safe) than running the tanks to failure.

This AMP recommends that the general approach to future operation and maintenance of all the Water System assets be to rehabilitate or replace assets prior to failure based on the Risk Scoring discussed in previous sections of this report. This approach is a combination of what are generally referred to as Planned Maintenance and Preventative Maintenance. Preventative maintenance of assets that can have their operational condition routinely checked and assessed, such as pumps, pump motors, buildings, and tanks is a cost-effective approach, allowing repair or rehabilitation to occur at a reasonable time and not as an emergency. Planned maintenance (scheduled rehabilitation or replacement) based on criticality is the most cost-effective approach with the vast majority of the Water System assets, in particular the waterline pipes, that can't be routinely assessed by operators.

To assist financial management decisions regarding Water System assets, the cost accounting of assets in this AMP and GIS Model includes the following cost components for an asset: initial cost, O&M costs (including minor repairs), and rehabilitation or replacement costs. However, for the vast majority of the assets, initial costs are not available and, as a result, are not a significant factor in the cost accounting of the assets.

Similarly, O&M costs for individual assets are not identifiable and therefore not available due to the current Water System tracking of annual O&M expenditures in an aggregate form. As a result, the primary cost components presently available for managing the assets are the estimated rehabilitation or replacement costs of the assets, which are contained in APPENDIX A and APPENDIX B and in the GIS Model Attribute Tables.

In the future, the cost accounting of Water System assets will be much more detailed and useful in assisting asset management. This is because the Water System staff will be able to use the GIS Model to track initial costs and O&M costs for individual assets much more effectively allowing these cost components to be significant factors in management decisions. As previously mentioned, the GIS Model of the Water System contains Attribute Tables for each of the different types of assets. There is an individual, separate Attribute Table following asset categories:

1) Distribution System (Waterline pipes, Valves, Meters, Hydrants) – "field assets"
2) Wells
3) Pump Systems (Pumps)
4) Pump Systems (Motors)
5) Pump Systems (Manifolds and Flow Meters)
6) Pump Systems (Electrical and control Systems)
7) Pump Systems (SCADA System)
8) Buildings and Structures
9) Storage Tanks

The Attribute Tables contain information on all the assets, including previous repair/rehab costs and replacement costs, which are tracked for each, individual asset separately. As part of regular future operation and maintenance practices, the Water System staff will be able to track the repairs to assets or replacement of assets by Work Order. Once a Work Order has been processed for an individual asset, the Attribute Table associated with the asset can be updated with the new data in the GIS Model using the ArcMap 10.3 software.

ASSET REPLACEMENT SCHEDULE

This AMP is intended to be a guide for a 10-year Capital Improvements Plan (CIP) for the replacement and rehabilitation of components of the City Water System. Based on the condition and risk assessment calculations described in previous sections, each asset of the Water System has a Risk Score assigned to it. As previously discussed, the Risk Score of an asset is a numeric value used to give the asset priority, or ranking, in the replacement and rehabilitation scheduling of the CIP. APPENDICES A and B contain information on the Water System assets used to determine Risks Scores. In addition to replacement and rehabilitation of Water System assets based on Risk Scores, the 10-year CIP also needs to take into account improvements to assets required for planned City growth and for improvement to conservation of water and energy.

The capacity of the overall Water System is essentially adequate for anticipated City growth over the next ten years. The wells, pump systems, buildings/structures, and storage tanks do not need to have increased capacity as part of the improvements of the 10-year CIP, only rehabilitation or replacement based on Risk Score. On the other hand, increases to capacity and energy efficiency should be addressed as part of replacing the waterline pipes of the distribution system in the 10-year CIP. In areas of planned growth or redevelopment, such as the Downtown area, slight upsizing of waterline pipe where necessary, such as replacing a 4-inch pipe with a new 6-inch pipe, should be done as part of the waterline pipe replacement process. As previously discussed, improvements to conservation of water and energy will be addressed by replacing waterline pipes that are presently leaking. The best way to address needed increases in Water System capacity and conservation is to systematically replace old leaking waterlines, prioritized by Risk Score, throughout the distribution system.

Replacement of Water System Distribution System Assets (Waterlines, Valves, Meters, and Hydrants)

The assets of the Water System distribution system have been categorized into one of four Risk Levels, based on the Risk Score assigned to the waterline pipe assets. The four Risk Levels for the assets are as follows:

Low Risk Level –	Risk Score range from 1 to ≤8
Medium Risk Level –	Risk Score range from >8 to ≤12
High Risk Level –	Risk Score range from >12 to ≤56
Extreme Risk Level –	Risk Score range from >56 to ≤168

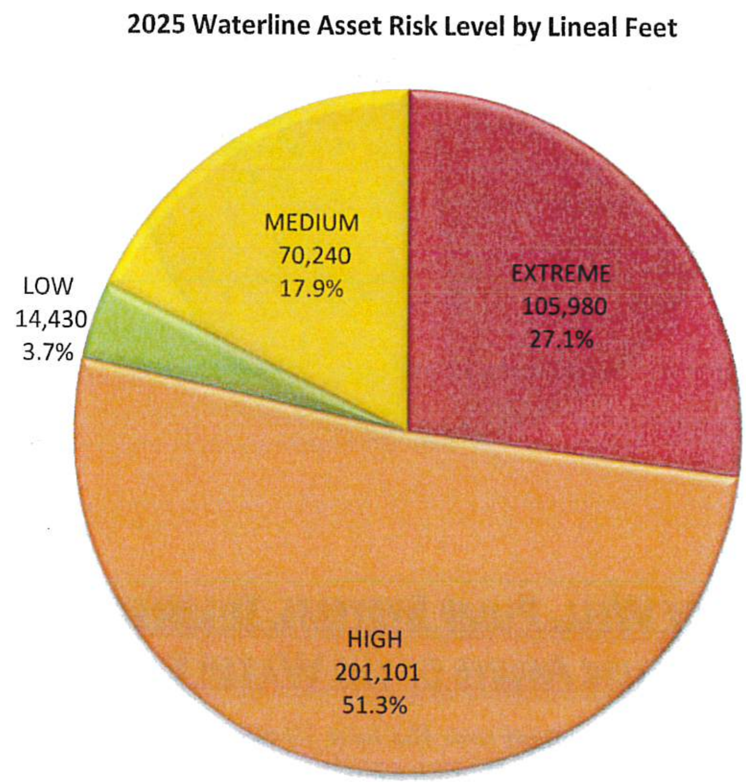
Ideally, the City should replace or rehabilitate Water System assets at a rate such that in by 2025, there will be no assets in the Extreme Risk Level remaining in the system. At the current spending rate, the City will not accomplish this goal.

In theory, each waterline should be replaced at the end of its estimated useful life to keep up with system maintenance dictated by the aging process of the pipes. Based on an average useful life of 75 years for the Water System distribution waterline pipes, this equates to an annual replacement rate of 1.3% of the waterlines assets, or about 5,000 feet. This means that replacing 1.3% of the system annually for the next 10 years would be the minimum amount to keep pace with the aging system. As previously discussed and shown in FIGURE 5, 18% of the existing distribution system has been assigned to the Extreme Risk Level. Due to continued aging, if no repair or replacement to the distribution waterlines is done over the next 10 years, the amount of the system that will be assigned to the Extreme Risk Level will increase to 27% by 2025 as shown in FIGURE 7.

Based on the risk analysis results, Smith recommends that the City target the replacement of all Extreme Risk Level waterline pipe assets over the next 10 years. This would include pipe that is already Extreme Risk and pipe that will become Extreme Risk by 2025 or approximately 105,800 lineal feet (LF) of waterlines. This equates to replacement of 2.7% of the existing system per year, or approximately 10,600 LF per year, at an estimated average cost of $185/LF[12.] This will require an annual replacement budget of approximately $1,970,000.

FIGURE 7 and FIGURE 8 illustrate the impact on waterline failure risk of two replacement scenarios, no replacement by 2025 and the recommended replacement of all Extreme Risk Level waterlines by 2025.

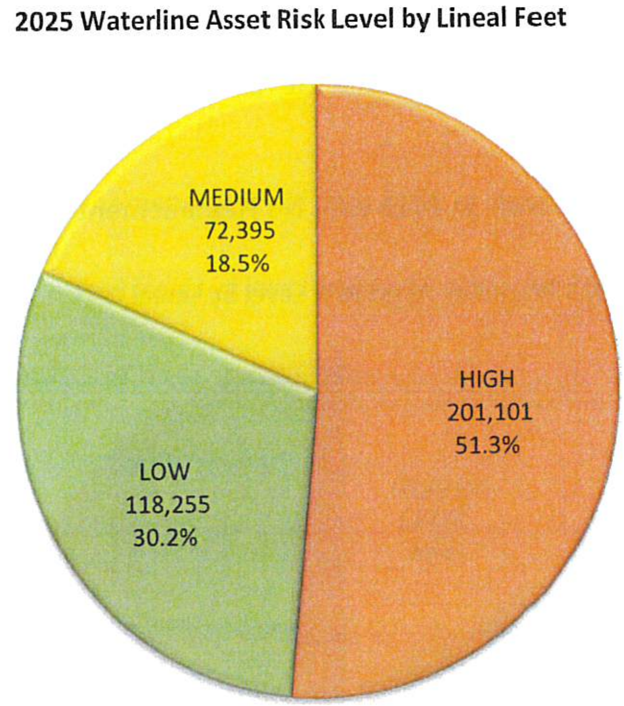
FIGURE 7: Waterline Risk in 2025 with No Replacement



---

[12] Cost is the average cost per LF based on waterlines sizes of 6", 8", 10", 12" and 14" and includes replacement of waterline pipe and associated service connections, meters, valves, hydrants, and pavement, as well as excavation and trench backfill.

FIGURE 8: Waterline Risk with all Extreme Risk Level (Top 27%) Replaced



Replacement of Well, Pump Systems, Disinfection System and Building/Structure Assets of the Water System

The vast majority of the CIP budget over the next 10 years will need to be dedicated to replacing large portions of the distribution system waterlines (and associated valves, meters, and hydrants). However, a portion of the 10-year CIP budget needs to be dedicated to the replacement of components from the other Water System asset categories of wells, pump systems, disinfection system, and buildings/structures. The Risk Scores calculated for the storage tank assets of the Water system indicate that none of the tanks will need to be scheduled for replacement in the next 10 years.

As discussed previously, Risk Scores were calculated and assigned to the well, pump system, disinfection system and building/structure assets of the Water System, all of which are contained in early sections of the report and in APPENDIX B. In general, assets that were assigned Risk Scores above 50 are considered to be beyond an acceptable level of risk and should be ideally replaced or repaired in the next 10 years. Based on the individual Risk Scores for the assets (the higher the score, the higher the priority) and special circumstance associated with certain assets, Smith generated a schedule and budget for replacing well, pump system, disinfection system and building/structure assets for each fiscal year for 10 years. The CIP replacement schedule and budget for these assets is shown in conjunction with the waterline asset replacement schedule and budget in TABLE 23. The amount of CIP spending per year was scheduled in a manner designed to keep cost as consistent year to year as possible taking into account a practical replacement approach to the components (i.e. similar equipment replaced together).

10-YEAR CIP SCHEDULING AND BUDGET FOR COMPREHENSIVE REPLACEMENT OF WATER SYSTEM ASSETS

Based on analysis of the Risk Scores assigned to all the Water System assets, Smith has created a comprehensive 10-year CIP Schedule and estimated budget for asset replacement. The assets scheduled for replacement in each fiscal year and the estimated CIP cost amount budgeted for each year are illustrated in TABLE 23. Over the next 10 years, Smith recommends that the City spend between approximately $2.3 million and $2.9 million annually to proactively manage the replacement and repair Water System assets. The CIP budget amounts contained in TABLE 23 are the amounts estimated each year to replace the aging components of the system, before they fail, and should be considered "Replacement Funds" and is a new element beyond the what is presently included in the existing annual Water System budgeting done by the City.

TABLE 23: 10-Year CIP Schedule and Budget for Comprehensive Replacement of Water System Assets

Year	Water System Asset	Risk Score	Estimated Cost
2018/ 2019	Waterline Asset Replacement (2.7% of Distribution System)	>56	$2,029,100
	New 250,000 Gallon Tank for Cook St. Treatment Facility	NA	$400,000
	Pershing St. PRV Station Building (Total Replacement)	272	$103,000
	Cook St. Treatment Facility Pump No. 2 Motor	196	$15,450
	Gas-Chlorination System	192	$154,500
	Gas-Chlorination System Fiberglass Shed	96	$10,300
	Pershing PRV Station Manifold	184	$20,600
	2018 Total CIP Amount		**$2,732,950**
[redacted]			
2020/ 2021	Waterline Asset Replacement (2.7% of Distribution System)	>56	$2,152,672
	Cook St. Treatment Facility Back-up Generator	NA	$240,400
	2020 Total CIP Amount		**$2,393,072**
[redacted]			
2022/ 2023	Waterline Asset Replacement (2.7% of Distribution System)	>56	$2,283,770
	Cook St. Treatment Facility Pump No. 2	112	$139,113
	Well No. 6 Pump Motor	110	$6,376
	Well No. 8 Pump Motor	110	$6,376
	2022 Total CIP Amount		**$2,435,635**
[redacted]			

TABLE 23 Con't: 10-Year CIP Schedule and Budget for Comprehensive Replacement of Water System Assets

Year	Water System Asset	Risk Score	Estimated Cost
2024/ 2025	Waterline Asset Replacement (2.7% of Distribution System)	>56	$2,422,852
	Well No. 2 Pump Electrical System	93	$43,046
	Well No. 2	84	$30,747
	Well No. 2 Pump System Building	81	$122,987
	Well No. 2 Pump Manifold	63	$18,448
	2024 Total CIP Amount		**$2,638,079**
[redacted]			
2026/ 2027	Waterline Asset Replacement (2.7% of Distribution System)	>56	$2,570,403
	Well No. 4 Pump System Building	84	$130,477
	Well No. 4 Pump Electrical System	69	$45,667
	Cielo Vista Pump Station Pump No. 2 Motor	68	$652
	Well No. 4	66	$32,619
	Well No. 7 Pump Electrical System	66	$65,239
	Well No. 4 Pump Manifold	60	$19,572
	Well No. 4 Pump Motor	51	$391
	2026 Total CIP Amount		**$2,865,021**
[redacted]			
	Total Estimated 10-Year CIP Budget		**$25,642,672**

Estimate Costs for replacement of Water system assets are based on a 3% inflation rate compounded annually. Inflation rate of 3% based on inflation rates over the past 10 years, as documented on www.usinflationrate.org, accessed 11-18-14.

Water System Budgeting

Implementation of the 10-Year CIP while continuing the normal operations and maintenance of the system will require very significant modifications to the Water System Annual Operating Budget. Smith recommends that an "Annual Replacement Fund" be set-up as part of the City's Water System Annual Operating Budget to provide funding specifically designated for the replacement of assets that have reached levels of unacceptable risk due to age. As shown in TABLE 23, funding of the recommended CIP will require an Annual Replacement Fund of between $2.3 million and $2.9 million for each of the next 10 years. To achieve the necessary amounts of annual funding, the Water System will need to generate large amounts of revenue internally through increases in service rates and externally by acquiring loans and grants from various funding agencies.

TABLE 24 shows the existing Rate Schedule of the T or C Water System. The annual revenue generated from the existing Water System service rate structure (schedule) is adequate for covering the current annual operation and maintenance expenses and outstanding debt repayment of the system, (see Water System Historical Data in APPENDIX C). However, the annual revenue generated by the Water System is only adequate when no revenue is contributed to a dedicated Annual Replacement Fund as will be required by the CIP. As a result, the existing rate structure of the Water System must be dramatically increased to provide revenue to pay for very large increases in budget expenses that will be incurred by implementing the CIP.

TABLE 24: Existing Utility Rate Schedule for the City of T or C Water System

Residential Rates - City of *T or C* and Village of Williamsburg	
Base Customer Charge (Minimum)	$8.15
Rate per 1000 gallons for Level 1 Usage (1-7,000 gallons)	$1.75
Rate per 1000 gallons for Level 2 Usage (7,001-30,000 gallons)	$1.93
Rate per 1000 gallons for Level 3 Usage (30,001-50,000 gallons)	$2.12
Rate per 1000 gallons for Level 4 Usage (Above 50,000 gallons)	$2.33
Commercial Rates - City of *T or C* and Village of Williamsburg	
Base Customer Charge (Minimum)	$8.15
Rate per 1000 gallons for Level 1 Usage (1-7,000 gallons)	$1.75
Rate per 1000 gallons for Level 2 Usage (7,001-30,000 gallons)	$1.93
Rate per 1000 gallons for Level 3 Usage (30,001-50,000 gallons)	$2.12
Rate per 1000 gallons for Level 4 Usage (Above 50,000 gallons)	$2.33
Industrial Rates - City of *T or C*	
Base Customer Charge (Minimum and for Usage 1-50,000 gallons)	$91.91
Rate per 1000 gallons for Level 2 Usage (50,001-100,000 gallons)	$1.84
Rate per 1000 gallons for Level 3 Usage (100,001-150,000 gallons)	$2.02
Rate per 1000 gallons for Level 4 Usage (Above 150,000 gallons)	$2.22

Water System Utility Rate Schedule http://www.torcnm.org/departments/finance/utilities - billing.php accessed 3/15/17

TABLE 25A shows the Projected 10-Year Water System Annual Operating Budget, including the 10-Year CIP recommended by this AMP. The table contains all the projected revenue and expenses of the Water System. Projected revenue is based on estimated increases in service connections, recommended service rate increases, and loans required for complete funding of the recommended 10-Year CIP (Phases 1-10) detailed in TABLE 23. Projected expenses are based on historical system financials taking into account future changes to the system, existing debt repayment, and additional debt repayment associated with the new loans that will be needed compensate for the estimated Water System annual service revenue shortfalls in funding the CIP.

Smith recommends a balanced funding approach that uses internal revenue from service rates in combination with external loans from funding programs to pay for the very large future annual expenses of the CIP. As shown in TABLE 25A, a large portion of future CIP funding is estimated as loans, at a total of approximately $17 million dollars spread out over 10 years. To keep down the future annual loan debt repayment amounts and to generate sufficient internal revenue to operate the Water System with no additional loans after addressing the EXTREME piping, the existing water utility service rates must be dramatically increased. Smith shows that the existing Water System service rates, at all base and usage levels must be increased initially by 50%, followed by 10% annual increases for six years then followed by 8.0% annual increases for the next four years. These recommended rate increases are based on the projected requirements of the CIP Annual Replacement Fund for taking into account anticipate funding from loans averaging approximately $1.7 million annually for those same years (see TABLE 25A).

There is the possibility that a significant portion of the external funding for the 10-Year CIP may come from grants or grant/loan combinations. For the purpose of comparison, a second version of the projected Annual Operating Budget was developed to take into account the impact of potential grant funding. The projected budget shown in TABLE 25B contains all the same information as the budget in TABLE 25A, except it considers 50% of the external revenue from funding programs to be in the form of grants instead of all external revenue being in the form of loans. Comparison of the two projected Annual Operating Budgets reveals significant benefits of 50% external revenue as grant funding. First of all, the total amount of loans taken out to fund the 10-Year CIP is estimated approximately $8.0 million rather than $17 million, resulting in annual loan repayments in the years of 2026/27 and beyond of approximately $450,000 rather than almost $1.0 million. Second, the recommended service revenue increases over the next 10 years are estimated to be significantly less. If 50% of the external revenue for funding the 10-Year CIP is accounted for as grants, the recommended Water System service rates increases are as follows: service rates at all base and usage levels, should be increased by 50% in FY 2016/17, followed by 8% annual increases from FY 2017/18 through FY 2022/23, followed by 6% annual increases from FY 2023/24 through FY 2025/26. It is important to note that, while the recommended rate increases when taking into account grants are less than if all the external revenue was in the form of loans, the rate increases are still dramatic and will be challenging to implement.

TABLE 25A: Projected 10-Year Water System Annual Operating Budget Including CIP (with Debt Repayment- 100% Loans)

FISCAL YEAR	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
T or C Residential Connections [1]	2604	2630	2657	2683	2710	2737	2765	2792	2820	2848	2877
T or C Commercial Connections[1]	593	599	605	611	617	623	629	635	642	648	655
T or C Governmental Connections	3	3	3	3	3	3	3	3	3	3	3
Willaimsburg Residential Connections [1]	249	251	254	256	259	262	264	267	270	272	275
Willaimsburg Commercial Connections [1]	22	23	23	23	23	24	24	24	24	25	25
Total Service Fee Revenue [2]	$1,516,721	$1,685,078	$1,872,121	$2,079,927	$2,310,798	$2,567,297	$2,852,267	$3,111,253	$3,393,755	$3,701,908	$ 3,738,927
Revenue from Other Services	$ 40,164	$ 40,566	$ 40,972	$ 41,381	$ 41,795	$ 42,213	$ 42,635	$ 43,061	$ 43,492	$ 43,927	$ 44,366
Funding - LOANS (100% of Shortfall)	$1,870,000	$2,280,000	$1,801,000	$1,816,000	$1,535,000	$1,430,000	$1,341,000	$1,290,000	$1,030,000	$1,040,000	$ -
Rollever from Previous Year	$ 10,640	$ 12,070	$ 5,516	$ 894	$ 363	$ 6,524	$ 7,891	$ 12,480	$ 7,198	$ 3,664	$ 901
OPERATING REVENUE (INCOME)	$3,437,525	$4,017,713	$3,719,609	$3,938,202	$3,887,956	$4,046,034	$4,243,793	$4,456,794	$4,474,445	$4,789,499	$ 3,784,194
Exist. Loan Debt Repayment [3]	$ 253,563	$ 253,563	$ 253,563	$ 253,563	$ 133,322	$ 99,413	$ 99,413	$ 99,413	$ 99,413	$ 99,413	$ 99,413
Exist. Loan Debt Service Reserve [4]	$ 25,356	$ 25,356	$ 25,356	$ 25,356	$ 13,332	$ 9,941	$ 9,941	$ 9,941	$ 9,941	$ 9,941	$ 9,941
New Water System Improvement Construction Projects - PHASES 1 -10 (Annual Replacement Fund) [5]	$2,307,458	$2,732,950	$2,307,458	$2,393,072	$2,352,313	$2,435,635	$2,523,033	$2,638,079	$2,571,543	$2,865,021	$ 1,500,000
New Loans Debt Repayment [6]	$ 105,726	$ 234,632	$ 336,456	$ 439,129	$ 525,914	$ 606,763	$ 682,580	$ 755,514	$ 813,748	$ 813,748	$ 813,748
New Loans Debt Service Reserve [4]	$ 10,573	$ 23,463	$ 33,646	$ 43,913	$ 52,591	$ 60,676	$ 68,258	$ 75,551	$ 81,375	$ 81,375	$ 81,375
Personnel/Admin [7]	$ 410,580	$ 422,897	$ 435,584	$ 448,651	$ 462,111	$ 475,974	$ 490,253	$ 504,961	$ 520,110	$ 535,713	$ 551,785
Maintenance/Repair [7]	$ 157,677	$ 162,408	$ 167,280	$ 172,298	$ 177,467	$ 182,791	$ 188,275	$ 193,923	$ 199,741	$ 205,733	$ 211,905
Supplies [7]	$ 10,109	$ 10,413	$ 10,725	$ 11,047	$ 11,378	$ 11,719	$ 12,071	$ 12,433	$ 12,806	$ 13,190	$ 13,586
Utility [8]	$ 144,414	$ 146,515	$ 148,647	$ 150,810	$ 153,004	$ 155,230	$ 157,489	$ 159,780	$ 162,105	$ 164,464	$ 166,857
OPERATING EXPENSES (with debt repayment)	$3,425,456	$4,012,197	$3,718,715	$3,937,839	$3,881,433	$4,038,143	$4,231,313	$4,449,596	$4,470,781	$4,788,598	$ 3,448,609
NET INCOME (LOSS) (with debt repayment)	$ 12,070	$ 5,516	$ 894	$ 363	$ 6,524	$ 7,891	$ 12,480	$ 7,198	$ 3,664	$ 901	$ 335,585

[1] Increases in connections are based on an annual population growth rate of 1% and the number existing connections as of October 2014.

[2] Service Fee Revenue is based on projected number of connections and the following increases to the Water Rate schedule shown in TABLE 24: 50% increase to all base and usage rates initially; 10% increase to all base and usage rates each year for 6 years; 8% annual increase to all base and usage rates for 3 years. Revenue is expected to grow at about 1% per year if rates remain the same.

[3] Annual repayment amount of all existing loan amount estimated as approx $287,716 based on recent loan information provided by City, contained in APPENDIX C.

[4] Debt Service Reserve defined as 10% of annual debt repayment requirement.

[5] The amount of each Water System Improvement Construction Project (Phases 1- 10) is based on the estimated annual costs 10-Year CIP, as shown in TABLE 23. Each Phase of the CIP represents the Annual Replacement Fund of the Water System

[6] Repayment of New Loan amounts assumed at 1.2% annualized over 20 years as per Appendix C of OMB Circular A-94.

[7] Expenses based on 5-Year Average of Water System Expenses from data provided by the City for FY 2009/10 through 2013/14, contained in APPENDIX C. Expenses for years after 2016/17 were calculated based on 2016/17 including 3% annual

[8] Power Expenses based on 5-Year Average of Water System Expenses from data provided by the City for FY 2009/10 through 2013/14, contained in APPENDIX C. Power Expenses for years after 2016/17 were calculated based on 2016/17 costs including 3% annual inflation rate and including an estimated 1.5% annual energy savings due to improved energy conservation based on replacement of leaking pipes.

TABLE 25B: Projected 10-Year Water System Annual Operating Budget Including CIP (with Debt Repayment- 50% Loans)

FISCAL YEAR	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
T or C Residential Connections [1]	2604	2630	2657	2683	2710	2737	2765	2792	2820	2848	2877
T or C Commercial Connections[1]	593	599	605	611	617	623	629	635	642	648	655
T or C Governmental Connections	3	3	3	3	3	3	3	3	3	3	3
Willaimsburg Residential.Connections [1]	249	251	254	256	259	262	264	267	270	272	275
Willaimsburg Commercial Connections [1]	22	23	23	23	23	24	24	24	24	25	25
Total Service Fee Revenue [2]	$1,516,721	$1,685,078	$1,872,121	$2,079,927	$2,310,798	$2,567,297	$2,852,267	$3,111,253	$3,393,755	$3,701,908	$ 3,738,927
Revenue from Other Services	$ 40,164	$ 40,566	$ 40,972	$ 41,381	$ 41,795	$ 42,213	$ 42,635	$ 43,061	$ 43,492	$ 43,927	$ 44,366
Funding - LOANS (50% of Shortfall)	$ 900,000	$1,080,000	$ 805,500	$ 778,000	$ 603,000	$ 527,500	$ 453,500	$ 405,500	$ 250,500	$ 246,000	$ -
Funding - GRANT (50% of Shortfall)	$ 900,000	$1,080,000	$ 805,500	$ 778,000	$ 603,000	$ 527,500	$ 453,500	$ 405,500	$ 250,500	$ 246,000	$ -
Rollever from Previous Year	$ 10,640	$ 2,395	$ 10,798	$ 13,043	$ 13,934	$ 10,479	$ 12,358	$ 13,655	$ 15,089	$ 16,749	$ 180
OPERATING REVENUE (INCOME)	$3,367,525	$3,888,039	$3,534,890	$3,690,351	$3,572,527	$3,674,989	$3,814,261	$3,978,969	$3,953,336	$4,254,584	$ 3,783,473
Exist. Loan Debt Repayment [3]	$ 253,563	$ 253,563	$ 253,563	$ 253,563	$ 133,322	$ 99,413	$ 99,413	$ 99,413	$ 99,413	$ 99,413	$ 99,413
Exist. Loan Debt Service Reserve [4]	$ 25,356	$ 25,356	$ 25,356	$ 25,356	$ 13,332	$ 9,941	$ 9,941	$ 9,941	$ 9,941	$ 9,941	$ 9,941
New Water System Improvement Construction Projects - PHASES 1 -10 (Annual Replacement Fund) [5]	$2,307,458	$2,732,950	$2,307,458	$2,393,072	$2,352,313	$2,435,635	$2,523,033	$2,638,079	$2,571,543	$2,865,021	$ 1,500,000
New Loans Debt Repayment [6]	$ 50,884	$ 111,945	$ 157,486	$ 201,472	$ 235,565	$ 265,388	$ 291,028	$ 313,954	$ 328,117	$ 328,117	$ 328,117
New Loans Debt Service Reserve [4]	$ 5,088	$ 11,194	$ 15,749	$ 20,147	$ 23,556	$ 26,539	$ 29,103	$ 31,395	$ 32,812	$ 32,812	$ 32,812
Personnel/Admin [7]	$ 410,580	$ 422,897	$ 435,584	$ 448,651	$ 462,111	$ 475,974	$ 490,253	$ 504,961	$ 520,110	$ 535,713	$ 551,785
Maintenance/Repair [7]	$ 157,677	$ 162,408	$ 167,280	$ 172,298	$ 177,467	$ 182,791	$ 188,275	$ 193,923	$ 199,741	$ 205,733	$ 211,905
Supplies [7]	$ 10,109	$ 10,413	$ 10,725	$ 11,047	$ 11,378	$ 11,719	$ 12,071	$ 12,433	$ 12,806	$ 13,190	$ 13,586
Utility [8]	$ 144,414	$ 146,515	$ 148,647	$ 150,810	$ 153,004	$ 155,230	$ 157,489	$ 159,780	$ 162,105	$ 164,464	$ 166,857
OPERATING EXPENSES (with debt repayment)	$3,365,130	$3,877,241	$3,521,848	$3,676,417	$3,562,048	$3,662,631	$3,800,606	$3,963,880	$3,936,587	$4,254,404	$ 2,914,415
NET INCOME (LOSS) (with debt repayment)	$ 2,395	$ 10,798	$ 13,043	$ 13,934	$ 10,479	$ 12,358	$ 13,655	$ 15,089	$ 16,749	$ 180	$ 869,058

[1] Increases in connections are based on an annual population growth rate of 1% and the number existing connections as of October 2014.

[2] Service Fee Revenue is based on projected number of connections and the following increases to the Water Rate schedule shown in TABLE 24: 50% increase to all base and usage rates initially; 10% increase to all base and usage rates each year for 6 years; 8% annual increase to all base and usage rates for 3 years. Revenue is expected to grow at about 1% per year if rates remain the same.

[3] Annual repayment amount of all existing loan amount estimated as approx $287,716 based on recent loan information provided by City, contained in APPENDIX C.

[4] Debt Service Reserve defined as 10% of annual debt repayment requirement.

[5] The amount of each Water System Improvement Construction Project (Phases 1-10) is based on the estimated annual costs 10-Year CIP, as shown in TABLE 23. Each Phase of the CIP represents the Annual Replacement Fund of the Water System

[6] Repayment of New Loan amounts assumed at 1.2% annualized over 20 years as per Appendix C of OMB Circular A-94.

[7] Expenses based on 5-Year Average of Water System Expenses from data provided by the City for FY 2009/10 through 2013/14, contained in APPENDIX C. Expenses for years after 2016/17 were calculated based on 2016/17 including 3% annual

[8] Power Expenses based on 5-Year Average of Water System Expenses from data provided by the City for FY 2009/10 through 2013/14, contained in APPENDIX C. Power Expenses for years after 2016/17 were calculated based on 2016/17 costs including 3% annual inflation rate and including an estimated 1.5% annual energy savings due to improved energy conservation based on replacement of leaking pipes.

To fund the recommended 10-Year CIP, the Water System needs a well-planned funding strategy. To assure adequately financial preparation, the City should anticipate that all future external funding for the CIP will be in the form of loans. Any future grant funding would clearly be a benefit to the community, but should not be counted on as part of the Water System financial planning. The CIP prioritization shown in TABLE 23 and the recommended service rate increases and loans contained in TABLE 25A should be the basis for the Water System funding strategy. To implement the CIP effectively, service revenue rate increases and external sources of revenue (loans and grants) should be reviewed and updated annually. Ideally, review of funding to implement the CIP should occur each year at the time the overall cost accounting of the Annual Water System Budget is done.

Water System Budgeting Beyond 10 year CIP

The 10-year CIP budget recommended in this AMP represents the spending deemed necessary to replace all the assets of the Water System that are at unacceptable levels of risk with very high potential for failure. However, CIP efforts to keep the Water System in good operational condition will not end in ten years, but rather will continue for the life of the City. In future years, the City will still need to dedicate large amounts of revenue to the Annual Replacement Fund to continue replacing the aging Water System infrastructure at the rate necessary. In regards to the waterline assets, the City should plan to dedicate enough revenue in the Annual Replacement Fund to replace 1.3% of the waterline assets of the distribution system every year. In addition, there must also be revenue set aside in the fund for the replacement of other Water System equipment such as pumps, motors, electrical components, buildings, etc. Based on the same cost estimating approach used to determine the replacement costs contained in TABLE 23, the planned amount for the Annual Replacement Fund in years beyond the 10 years reviewed in the plan should be approximately $1.5 million. The annual revenue generated from the recommended service rate increases is expected to be sufficient to cover all annual operating expenses of the system..

CONCLUSIONS AND RECOMMENDATIONS

To develop this comprehensive plan for managing assets of the Water System, the five core components of asset management were evaluated in detail:

1. What is the current state of the Water System's assets?
2. What is the required level of service?
3. Which assets are critical for performance?
4. What are the best Capital Improvement Project (CIP) and Operation and maintenance (O&M) Strategies (Life-cycle Costs) for the Water System?
5. What is the City's best long-term financing strategy for the Water System?

Based on the Water System data assessed in this study, it can be concluded that due to the age and condition of many of the system assets, the City needs to dramatically increase CIP spending levels on replacement/rehabilitation of Water System assets to reduce the future risk of the overall system and maintain the desired level of service. This AMP recommends a 10-Year CIP that, when implemented, will significantly reduce the overall risk of the system's assets and will conserve water and energy by replacing leaking distribution waterline pipes.

To achieve an overall acceptable level of risk in the Water System while maintaining level of service, Smith recommends a total CIP budget of approximately $25.6 million to be implemented over the scheduled 10-year timeline as defined in TABLE 23. This total estimated amount of CIP spending is what is considered necessary to allow the City to proactively manage the replacement and repair of the aging Water System assets. Each year of recommended 10-year CIP budget should be considered by the City as Annual Replacement Funds, which are to be a new element of the Water System Annual Operation Budget in addition to the existing budget components currently used by the City to operate the system. In addition, each year of the 10-Year CIP should be considered a separate Phase and a milestone for measuring progress. Another measure of progress should be the annual accounting of the decrease in Water System water losses as each year of the CIP will replace more and more of the leaking pipes in the system. The beginning of every FY of the CIP should be planned to be a set time to review and update funding strategies, such as service rate increases and acquisition of external funding sources.

To implement the recommended 10-year CIP, it is clear the City will need to generate large amounts of revenue. To acquire the necessary revenue for the 10-year CIP, the City needs to consider using multiple revenue sources, both internal and external. Internally, the City needs to raise Water System service rates dramatically to generate more revenue from the Water System consumers. Smith recommends that the existing Water System service rates, at all base and usage levels, be increased by 50% initially followed by 10% annual increases for six years then followed by 8.0% annual increases for three years. These recommended rate increases are based on the projected requirements of the CIP Annual Replacement Fund, taking into account anticipate funding from loans averaging approximately $1.7 million annually for those same years (see TABLE 25A). Externally, the City should pursue multiple outside funding sources. The City could apply for funds from programs such as the Rural Infrastructure Program (RIP) through the New Mexico Environmental Department (NMED) Construction Programs Bureau (CPB), the New Mexico Finance Authority (NMFA) Water Trust Board, the NMFA Colonias Program, the Drinking Water State Revolving Fund, and the United States Department of Agriculture (USDA) Rural Development (RD) Colonias Program.

ADDITIONAL RECOMMENDATIONS

The ultimate goal of the Water System AMP is to reduce the risk associated with the system and maximize the resources of the City. Management of the existing Water System is especially challenging due to a high percent of the system being old and beyond its theoretical useful life. The following items are recommendations on how to improve the City's management of the Water System assets.

WATER SYSTEM STAFFING

The City should consider the Water System operational staff when planning for the future. If the City is to keep up with the demands of the large number of aging Water System assets, it will likely need to continue to increase the Water System staff. Based on the anticipated levels of maintenance and replacement that the assets of the Water System will require, Smith recommends that the City consider hiring at least one additional staff member.

WATER SYSTEM SERVICE RATE STUDY

As discussed throughout the report, the City will need to raise water utility rates periodically as part of managing the Water System assets. Keeping the service rates of the Water System at adequate levels will provide much needed revenue to support the Annual Replacement Fund. In addition to the rate analysis done in this AMP, Smith recommends that a rate study be done by another entity to help establish the appropriate periodic water rate increases required to manage the Water System properly in the future.

WATER SYSTEM DATA

Any plan is only as good as the data used to create it. The City should dedicate resources to improve record keeping procedures in regards to tracking details of repair or replacement work done on components of the Water System. Creation of this AMP report included the development of the Water System GIS Model, which can now serve as a digital database of information on all the assets of the system. As previously mentioned, future repairs and other improvements made to the system should be incorporated in the GIS Model by updating the information on the appropriate assets. There needs to be the development of an official procedure for coordination between the Water System staff and the Accounting Department for how future asset cost data is collected, recorded, and updated, by Work Order (Purchase Order). As part of developing this procedure, the City should track future capital improvement costs of the Water System Annual Replacement Fund separately from the standard operation and maintenance costs of the system. This will allow the City to predict more accurately the capital improvement spending for the Annual Replacement Fund.

MAINTENANCE PRACTICES

Water System asset failures can also be minimized through better maintenance practices. Smith recommends that the City develop a planned maintenance program for all the Water System assets. Unfortunately, the proper maintenance and replacement of aging infrastructure requires large amounts of labor. To implement the planned maintenance program, as well as to assist with the replacement of assets, Smith recommends the City consider hiring another staff member for the Water System.

Waterlines

Generally, the major damage from waterline breaks comes from the leaking water. By minimizing the time between the break and the waterline shut-off, the damage can be reduced. Well-placed, mapped and operable valves are the best way to improve water system shut-offs. The Water System GIS Model created with this AMP has the existing valve locations mapped. However, the City should consider implementing a waterline valve exercising and/or location verification program. This program could save the City money through lessening the damage caused by breaks, extending the life of the valves, and possibly reducing system head losses by discovering valves left closed. In addition, improvements to waterline leak-detection methods and practices can help prevent severe waterline failures and the high repair costs associated with them.

Water System Equipment

Smith recommends that the City employ maintenance scheduling for the various equipment components of the Water System based on maintenance information contained in the O&M manuals provided by the manufacturers of the equipment. A "Master Maintenance Schedule" could be assembled by drawing on the information contained in the individual manuals of each important piece of equipment. The new Master Maintenance Schedule could work hand-in-hand with the new Water System GIS Model. Planned maintenance scheduling information could be entered in to the equipment Attribute Tables of the GIS Model to provide guidance to the Water System operators so critical equipment can be maintained properly.

Condition Assessment Practices

Waterlines

As discussed throughout the report, a very important factor in the risk calculation for an asset is the probability of failure of the asset based on condition. Ideally, each waterline pipe scheduled for replacement should have a field inspection of visible appurtenances, and the City should have leak detection performed on the pipe to evaluate the condition. This is especially true for the pipes in the system that are very expensive to replace. These evaluations of condition are cost prohibitive for the entire distribution system, but can be cost effective for small portions of the distribution system selected for replacement or rehabilitation in a given year.

The City should consider purchasing equipment that will allow Water System Staff to perform condition assessment of waterlines themselves. Condition assessment should be done as part of the basic waterline replacement process, especially on pipes that will be expensive to replace. There are new types of condition assessment equipment available that are relatively inexpensive and easy to operate. For example, there is now acoustical testing equipment that uses sound waves to detect leaks and estimate the remaining wall thickness of pipes. This type of equipment could likely be suitable for use by the City in the future waterline replacement program and should be evaluated in detail.

Water System Equipment

Many of the assets of the Water System, such as pumps, motors, control panels and other electrical components, the disinfection system, and buildings/structures can have condition assessment performed on them as part of basic day-to-day operations and maintenance. The Water System Staff already does this by making close visual inspections of equipment and taking note of performance issues. The City should consider using a regimented and organized process for keeping track of issues observed during routine condition assessments. A standardized form could be put together and used to organize information during field assessments of equipment. This information could then be entered into the GIS Model of the Water System for tracking of asset condition over time.

Construction Practices

The best way to prevent future failure and extend the life of an asset is the use of proper products and methods during construction. The City often discovers, especially with waterlines, that the cause of a failure was poor construction. The City should continue to implement quality control procedures during design and construction and continue to evaluate new products (for new installations and rehabilitation) for better quality or more affordability.

APPENDICES

APPENDIX A

INVENTORY, RISK SCORING, AND ESTIMATED REPLACEMENT VALUE/CURRENT VALUE OF WATER SYSTEM DISTRIBUTION SYSTEM (WATERLINES, VALVES, AND HYDRANTS) ASSETS

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
941	ASH ST.	6	PVC-SCH40	1980	199.31	37	6.057	1980	11.0	16.057	176.63	EXTREME	0.05%	$ 26,217	$ 10,338
478	E. SEVENTH AVE.	4	AC	1960	330.01	57	7.176	1962	9.0	17.176	154.59	EXTREME	0.14%	$ 43,410	$ 12,258
409	BROADWAY ST.	12	AC	1935	601.52	82	12.989	1998	11.0	12.989	142.88	EXTREME	0.29%	$ 158,254	$ 158,254
592	DATE ST.	6	AC	1935	140.07	82	12.989	1995	11.0	12.989	142.88	EXTREME	0.32%	$ 18,424	$ 18,424
608	BROADWAY ST.	12	AC	1935	418.23	82	12.989	1998	11.0	12.989	142.88	EXTREME	0.43%	$ 110,031	$ 110,031
613	BROADWAY ST.	12	AC	1935	243.61	82	12.989	1998	11.0	12.989	142.88	EXTREME	0.49%	$ 64,090	$ 64,090
1009		10	AC	1935	946.33	82	12.989	2005	11.0	12.989	142.88	EXTREME	0.73%	$ 207,472	$ 207,472
346	N. CEDAR ST.	6	PVC-SCH40	1970	538.00	47	9.010	1973	10.0	14.010	140.10	EXTREME	0.87%	$ 70,769	$ 7,007
817		8	PVC-SCH40	1970	66.94	47	9.010	1971	7.0	19.010	133.07	EXTREME	0.89%	$ 11,740	$ 1,162
883	DATE ST.	8	PVC-SCH40	1971	129.28	46	8.689	1971	7.0	18.689	130.83	EXTREME	0.92%	$ 22,675	$ 2,972
483	BROADWAY ST.	4	AC	1935	470.26	82	12.989	1997	10.0	12.989	129.89	EXTREME	1.04%	$ 61,858	$ 61,858
590	BROADWAY ST.	6	AC	1935	217.42	82	12.989	1997	10.0	12.989	129.89	EXTREME	1.10%	$ 28,600	$ 28,600
765	MAIN ST.	6	AC	1935	278.48	82	12.989	1963	10.0	12.989	129.89	EXTREME	1.17%	$ 36,631	$ 36,631
394	COOK ST.	12	PVC-SCH40	1960	168.12	57	12.523	1969	7.0	17.523	122.66	EXTREME	1.21%	$ 44,232	$ 44,232
781	BROADWAY ST.	12	PVC-SCH40	1980	370.63	37	6.057	1969	11.0	11.057	121.63	EXTREME	1.31%	$ 97,508	$ 38,448
727	ASH ST.	6	AC	1935	175.83	82	12.989	1963	9.0	12.989	116.90	EXTREME	1.35%	$ 23,128	$ 23,128
359	DATE ST.	8	PVC-SCH40	1971	113.64	46	8.689	1971	6.0	18.689	112.14	EXTREME	1.38%	$ 19,931	$ 2,612
1011		12	PVC-SCH40	1980	590.23	37	6.057	1998	10.0	11.057	110.57	EXTREME	1.53%	$ 155,284	$ 61,230
647	PERSHING ST.	8	CI	1947	361.14	70	5.782	1981	7.0	15.782	110.47	EXTREME	1.62%	$ 63,340	$ 26,717
418		12	PVC-SCH40	1991	796.08	26	3.455	1991	13.0	8.455	109.92	EXTREME	1.83%	$ 209,441	$ 137,071
1006		6	AC	1935	275.01	82	12.989	1995	8.0	12.989	103.91	EXTREME	1.90%	$ 36,175	$ 36,175
477	E. SEVENTH AVE.	4	AC	1960	709.20	57	7.176	1962	6.0	17.176	103.06	EXTREME	2.08%	$ 93,288	$ 26,342
470	N. CEDAR ST.	2	PVC-SCH40	1970	322.28	47	9.010	1999	7.0	14.010	98.07	EXTREME	2.16%	$ 42,393	$ 4,197
981		10	PVC-SCH40	1970	45.90	47	9.010	1971	7.0	14.010	98.07	EXTREME	2.17%	$ 10,063	$ 996
1043		1	PVC-SCH40	1970	108.99	47	9.010	1984	7.0	14.010	98.07	EXTREME	2.20%	$ 14,337	$ 1,419
659	ASH ST.	8	CI	1947	105.00	70	5.782	1998	9.0	10.782	97.04	EXTREME	2.23%	$ 18,416	$ 7,768
287		6	PVC-SCH40	1971	255.62	46	8.689	1971	7.0	13.689	95.83	EXTREME	2.29%	$ 33,624	$ 4,407
980		10	PVC-SCH40	1971	466.94	46	8.689	1971	7.0	13.689	95.83	EXTREME	2.41%	$ 102,373	$ 13,417
380	BROADWAY ST.	12	PVC-SCH40	1990	149.43	27	3.664	1998	11.0	8.664	95.30	EXTREME	2.45%	$ 39,314	$ 24,910
402	STEEL ST.	12	PVC-SCH40	1990	70.81	27	3.664	1997	11.0	8.664	95.30	EXTREME	2.47%	$ 18,628	$ 11,803
780	BROADWAY ST.	12	PVC-SCH40	1990	483.37	27	3.664	1998	11.0	8.664	95.30	EXTREME	2.59%	$ 127,171	$ 80,577
403	BROADWAY ST.	12	AC	1960	1135.82	57	7.176	1969	13.0	7.176	93.29	EXTREME	2.88%	$ 298,822	$ 84,378

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
405	BROADWAY ST.	12	AC	1960	530.75	57	7.176	1969	13.0	7.176	93.29	EXTREME	3.02%	$ 139,636	$ 39,429
724	BROADWAY ST.	12	AC	1960	636.18	57	7.176	1969	13.0	7.176	93.29	EXTREME	3.18%	$ 167,373	$ 47,261
404	BROADWAY ST.	12	PVC-SCH40	2000	85.79	17	1.831	1969	13.0	6.831	88.80	EXTREME	3.20%	$ 22,570	$ 18,438
420		12	PVC-SCH40	1990	437.35	27	3.664	1991	10.0	8.664	86.64	EXTREME	3.31%	$ 115,063	$ 72,905
412		8	PVC-SCH40	1991	1839.78	26	3.455	1991	10.0	8.455	84.55	EXTREME	3.78%	$ 322,679	$ 211,180
13	ARROWHEAD RD.	4	PVC-SCH40	1970	1134.18	47	9.010	1976	6.0	14.010	84.06	EXTREME	4.07%	$ 149,190	$ 14,771
95	OAK ST.	4	PVC-SCH40	1970	321.52	47	9.010	1978	6.0	14.010	84.06	EXTREME	4.15%	$ 42,292	$ 4,187
199	CHERRY LN.	6	PVC-SCH40	1970	493.90	47	9.010	2013	6.0	14.010	84.06	EXTREME	4.28%	$ 64,967	$ 6,432
260	TIN ST.	6	PVC-SCH40	1970	229.25	47	9.010	1984	6.0	14.010	84.06	EXTREME	4.34%	$ 30,156	$ 2,986
448	VEATER ST.	6	PVC-SCH40	1970	330.05	47	9.010	1977	6.0	14.010	84.06	EXTREME	4.42%	$ 43,415	$ 4,299
709	E. SECOND AVE.	4	PVC-SCH40	1970	210.59	47	9.010	1979	6.0	14.010	84.06	EXTREME	4.48%	$ 27,702	$ 2,743
858	SILVER ST.	4	PVC-SCH40	1970	363.15	47	9.010	1978	6.0	14.010	84.06	EXTREME	4.57%	$ 47,769	$ 4,730
962		6	PVC-SCH40	1971	118.17	46	8.689	1971	6.0	13.689	82.14	EXTREME	4.60%	$ 15,544	$ 2,037
263	PLATINUM ST.	6	AC	1960	668.30	57	7.176	1984	11.0	7.176	78.94	EXTREME	4.77%	$ 87,908	$ 24,823
396	BROADWAY ST.	12	AC	1960	255.64	57	7.176	1969	11.0	7.176	78.94	EXTREME	4.83%	$ 67,256	$ 18,991
408	BROADWAY ST.	12	AC	1960	185.39	57	7.176	1969	11.0	7.176	78.94	EXTREME	4.88%	$ 48,774	$ 13,772
453	BROADWAY ST.	12	AC	1960	68.51	57	7.176	1969	11.0	7.176	78.94	EXTREME	4.90%	$ 18,023	$ 5,089
784	BROADWAY ST.	12	AC	1960	282.67	57	7.176	1969	11.0	7.176	78.94	EXTREME	4.97%	$ 74,367	$ 20,999
646	PERSHING ST.	8	CI	1947	375.47	70	5.782	1981	5.0	15.782	78.91	EXTREME	5.07%	$ 65,854	$ 27,777
648	PERSHING ST.	8	CI	1947	346.67	70	5.782	1970	5.0	15.782	78.91	EXTREME	5.16%	$ 60,803	$ 25,647
671	PERSHING ST.	8	CI	1947	362.71	70	5.782	1970	5.0	15.782	78.91	EXTREME	5.25%	$ 63,615	$ 26,833
134	N. CHARLIES LN.	4	PVC-SCH40	1990	330.00	27	3.664	1972	9.0	8.664	77.98	EXTREME	5.33%	$ 43,408	$ 27,504
202	JOFFRE ST.	6	PVC-SCH40	1990	311.85	27	3.664	1963	9.0	8.664	77.98	EXTREME	5.41%	$ 41,021	$ 25,991
389	W. NINTH AVE.	12	PVC-SCH40	1990	680.91	27	3.664	1994	9.0	8.664	77.98	EXTREME	5.59%	$ 179,141	$ 113,506
390	W. NINTH AVE.	12	PVC-SCH40	1990	28.96	27	3.664	1994	9.0	8.664	77.98	EXTREME	5.59%	$ 7,620	$ 4,828
391		12	PVC-SCH40	1990	880.61	27	3.664	1994	9.0	8.664	77.98	EXTREME	5.82%	$ 231,681	$ 146,795
484	AUSTIN AVE.	4	AC	1935	450.00	82	12.989	1993	6.0	12.989	77.93	EXTREME	5.93%	$ 59,194	$ 59,194
491	MARR AVE.	4	AC	1935	709.74	82	12.989	1998	6.0	12.989	77.93	EXTREME	6.11%	$ 93,360	$ 93,360
496	CLANCY ST.	4	AC	1935	309.39	82	12.989	1999	6.0	12.989	77.93	EXTREME	6.19%	$ 40,697	$ 40,697
561	RIVERSIDE DR.	6	AC	1935	380.02	82	12.989	1998	6.0	12.989	77.93	EXTREME	6.29%	$ 49,988	$ 49,988
563		6	AC	1935	182.48	82	12.989	1995	6.0	12.989	77.93	EXTREME	6.34%	$ 24,004	$ 24,004
611	MAIN ST.	8	AC	1935	193.60	82	12.989	1963	6.0	12.989	77.93	EXTREME	6.39%	$ 33,956	$ 33,956

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
628	PERSHING ST.	6	AC	1935	403.43	82	12.989	1995	6.0	12.989	77.93	EXTREME	6.49%	$ 53,067	$ 53,067
673	CHARLES AVE.	4	AC	1935	450.40	82	12.989	1978	6.0	12.989	77.93	EXTREME	6.60%	$ 59,245	$ 59,245
793	VAN PATTEN AVE	8	AC	1935	449.03	82	12.989	1999	6.0	12.989	77.93	EXTREME	6.72%	$ 78,755	$ 78,755
794	MARR AVE.	4	AC	1935	903.07	82	12.989	1993	6.0	12.989	77.93	EXTREME	6.95%	$ 118,790	$ 118,790
832	BIRCH ST.	4	AC	1935	325.25	82	12.989	1991	6.0	12.989	77.93	EXTREME	7.03%	$ 42,784	$ 42,784
841	BIRCH ST.	4	AC	1935	366.37	82	12.989	1981	6.0	12.989	77.93	EXTREME	7.13%	$ 48,192	$ 48,192
1003		6	AC	1935	1459.27	82	12.989	1984-1998	6.0	12.989	77.93	EXTREME	7.50%	$ 191,953	$ 191,953
1007		6	AC	1935	283.49	82	12.989	1995	6.0	12.989	77.93	EXTREME	7.57%	$ 37,290	$ 37,290
11	SILVER ST.	4	PVC-SCH40	1980	1115.30	37	6.057	1983	7.0	11.057	77.40	EXTREME	7.86%	$ 146,707	$ 57,848
369		8	PVC-SCH40	1980	30.44	37	6.057	1971	7.0	11.057	77.40	EXTREME	7.86%	$ 5,340	$ 2,105
917	ARENA DR.	6	PVC-SCH40	1994	486.92	23	2.864	1993	6.0	12.864	77.18	EXTREME	7.99%	$ 64,049	$ 45,709
1118	<Null>	6	CI	1958	201.66	59	4.549	<Null>	8.0	9.549	76.39	EXTREME	8.04%	$ 26,527	$ 14,460
398	BROADWAY ST.	12	PVC-SCH40	2000	104.48	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.07%	$ 27,487	$ 22,454
399	RADIUM ST.	12	PVC-SCH40	2000	35.82	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.07%	$ 9,425	$ 7,699
406	BROADWAY ST.	12	PVC-SCH40	2000	181.90	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.12%	$ 47,856	$ 39,094
407	BROADWAY ST.	12	PVC-SCH40	2000	225.38	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.18%	$ 59,295	$ 48,439
783	BROADWAY ST.	12	PVC-SCH40	2000	362.05	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.27%	$ 95,253	$ 77,813
785	COOK ST.	12	PVC-SCH40	2000	361.92	17	1.831	1969	11.0	6.831	75.14	EXTREME	8.36%	$ 95,217	$ 77,783
1014		12	PVC-SCH40	2000	5925.73	17	1.831	2005	11.0	6.831	75.14	EXTREME	9.88%	$ 1,559,002	$ 1,273,564
833	E. SIXTH AVE.	6	CI	1970	334.34	47	3.342	1991	9.0	8.342	75.08	EXTREME	9.96%	$ 43,979	$ 29,283
986	RIVERSIDE DR.	6	PVC-SCH40	1992	832.50	25	3.253	1991	9.0	8.253	74.27	EXTREME	10.17%	$ 109,507	$ 73,890
1130	<Null>	8	CI	1991	340.38	26	1.576	<Null>	11.0	6.576	72.33	EXTREME	10.26%	$ 59,699	$ 50,293
350	W. FOURTH AVE.	8	PVC-SCH40	1960	38.10	57	12.523	1998	4.0	17.523	70.09	EXTREME	10.27%	$ 6,683	$ 6,683
381	W. SECOND AVE.	12	PVC-SCH40	1990	567.80	27	3.664	1984	8.0	8.664	69.31	EXTREME	10.42%	$ 149,383	$ 94,651
629	PERSHING ST.	6	CI	1970	292.03	47	3.342	1995	5.0	13.342	66.71	EXTREME	10.49%	$ 38,414	$ 25,577
17	MAPLE ST.	4	PVC-SCH40	1980	369.09	37	6.057	1981	6.0	11.057	66.34	EXTREME	10.58%	$ 48,549	$ 19,144
111	MAGNOLIA ST.	4	PVC-SCH40	1980	601.29	37	6.057	1995	6.0	11.057	66.34	EXTREME	10.74%	$ 79,093	$ 31,187
138	OAK ST.	4	PVC-SCH40	1980	312.55	37	6.057	1986	6.0	11.057	66.34	EXTREME	10.82%	$ 41,113	$ 16,211
179	MAGNOLIA ST.	4	PVC-SCH40	1980	296.14	37	6.057	1995	6.0	11.057	66.34	EXTREME	10.89%	$ 38,955	$ 15,360
251	CORONA AVE.	6	PVC-SCH40	1980	124.32	37	6.057	2011	6.0	11.057	66.34	EXTREME	10.92%	$ 16,353	$ 6,448
997		2	PVC-SCH40	1980	249.20	37	6.057	1995	6.0	11.057	66.34	EXTREME	10.99%	$ 32,779	$ 12,925
1115		6	CI	1945	76.63	72	6.019	<Null>	6.0	11.019	66.12	EXTREME	11.01%	$ 10,080	$ 4,013

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
464	BROADWAY ST.	4	AC	1935	874.14	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.23%	$ 114,985	$ 114,985
485	DANIEL ST.	4	AC	1935	315.00	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.31%	$ 41,435	$ 41,435
510	BROADWAY ST.	4	AC	1935	429.84	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.42%	$ 56,541	$ 56,541
518	BROADWAY ST.	6	AC	1935	71.37	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.44%	$ 9,388	$ 9,388
531	BROADWAY ST.	6	AC	1935	418.80	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.55%	$ 55,089	$ 55,089
533	BROADWAY ST.	6	AC	1935	46.94	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.56%	$ 6,175	$ 6,175
541	ASH ST.	6	AC	1935	347.25	82	12.989	2009	5.0	12.989	64.94	EXTREME	11.65%	$ 45,678	$ 45,678
564	MIMS ST.	6	AC	1935	36.57	82	12.989	1963	5.0	12.989	64.94	EXTREME	11.66%	$ 4,810	$ 4,810
566	FOCH ST.	6	AC	1935	191.23	82	12.989	1991	5.0	12.989	64.94	EXTREME	11.70%	$ 25,154	$ 25,154
567	BROADWAY ST.	6	AC	1935	453.03	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.82%	$ 59,592	$ 59,592
587	BROADWAY ST.	6	AC	1935	450.00	82	12.989	1997	5.0	12.989	64.94	EXTREME	11.94%	$ 59,193	$ 59,193
589	BROADWAY ST.	6	AC	1935	301.83	82	12.989	1997	5.0	12.989	64.94	EXTREME	12.01%	$ 39,703	$ 39,703
591	FOCH ST.	6	AC	1935	371.16	82	12.989	1991	5.0	12.989	64.94	EXTREME	12.11%	$ 48,823	$ 48,823
595	MAIN ST.	8	AC	1935	485.10	82	12.989	2006	5.0	12.989	64.94	EXTREME	12.23%	$ 85,081	$ 85,081
599	MAIN ST.	6	AC	1935	236.30	82	12.989	1984	5.0	12.989	64.94	EXTREME	12.29%	$ 31,083	$ 31,083
609	MAIN ST.	6	AC	1935	279.33	82	12.989	1991	5.0	12.989	64.94	EXTREME	12.36%	$ 36,743	$ 36,743
766	BROADWAY ST.	6	AC	1935	293.40	82	12.989	1999	5.0	12.989	64.94	EXTREME	12.44%	$ 38,594	$ 38,594
767	BROADWAY ST.	4	AC	1935	329.50	82	12.989	1999	5.0	12.989	64.94	EXTREME	12.52%	$ 43,342	$ 43,342
776	MAIN ST.	8	AC	1935	111.42	82	12.989	1991	5.0	12.989	64.94	EXTREME	12.55%	$ 19,543	$ 19,543
777	MAIN ST.	8	AC	1935	548.62	82	12.989	2006	5.0	12.989	64.94	EXTREME	12.69%	$ 96,222	$ 96,222
779	BROADWAY ST.	6	AC	1935	172.96	82	12.989	1997	5.0	12.989	64.94	EXTREME	12.73%	$ 22,752	$ 22,752
797	MAIN ST.	6	AC	1935	335.22	82	12.989	1984	5.0	12.989	64.94	EXTREME	12.82%	$ 44,095	$ 44,095
818	RIVERSIDE DR.	6	AC	1935	357.88	82	12.989	1998	5.0	12.989	64.94	EXTREME	12.91%	$ 47,075	$ 47,075
839	ASH ST.	4	AC	1935	350.59	82	12.989	2009	5.0	12.989	64.94	EXTREME	13.00%	$ 46,116	$ 46,116
1015		4	AC	1935	700.12	82	12.989	1997	5.0	12.989	64.94	EXTREME	13.18%	$ 92,094	$ 92,094
1016		8	AC	1935	431.45	82	12.989	2006	5.0	12.989	64.94	EXTREME	13.29%	$ 75,672	$ 75,672
650	W. NINTH AVE.	8	CI	1947	351.16	70	5.782	2004	6.0	10.782	64.69	EXTREME	13.38%	$ 61,590	$ 25,979
759		8	CI	1947	371.01	70	5.782	2004	6.0	10.782	64.69	EXTREME	13.47%	$ 65,071	$ 27,447
606	COOK ST.	12	AC	1960	193.75	57	7.176	1969	9.0	7.176	64.59	EXTREME	13.52%	$ 50,974	$ 14,394
607	COOK ST.	12	AC	1960	612.06	57	7.176	1969	9.0	7.176	64.59	EXTREME	13.68%	$ 161,026	$ 45,469
717	COOK ST.	12	AC	1960	561.56	57	7.176	1969	9.0	7.176	64.59	EXTREME	13.82%	$ 147,740	$ 41,717
798	HYDE ST.	6	AC	1960	448.99	57	7.176	1998-1999	9.0	7.176	64.59	EXTREME	13.94%	$ 59,060	$ 16,677

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
918	ARENA DR.	6	PVC-SCH40	1994	112.65	23	2.864	1993	5.0	12.864	64.32	EXTREME	13.97%	$ 14,818	$ 10,575
55	ALUMINUM ST.	4	PVC-SCH40	1990	435.15	27	3.664	1995	7.0	8.664	60.65	EXTREME	14.08%	$ 57,240	$ 36,268
248	STEEL ST.	6	PVC-SCH40	1990	504.59	27	3.664	1997	7.0	8.664	60.65	EXTREME	14.21%	$ 66,374	$ 42,055
354	W. NINTH AVE.	8	PVC-SCH40	1990	712.41	27	3.664	1994	7.0	8.664	60.65	EXTREME	14.39%	$ 124,950	$ 79,170
387		12	PVC-SCH40	1990	63.28	27	3.664	1995	7.0	8.664	60.65	EXTREME	14.40%	$ 16,650	$ 10,549
388		12	PVC-SCH40	1990	551.42	27	3.664	1995	7.0	8.664	60.65	EXTREME	14.55%	$ 145,072	$ 91,919
452	BROADWAY ST.	12	PVC-SCH40	1990	154.41	27	3.664	1995	7.0	8.664	60.65	EXTREME	14.58%	$ 40,624	$ 25,740
950	ASH ST.	6	PVC-SCH40	1990	101.32	27	3.664	1995	7.0	8.664	60.65	EXTREME	14.61%	$ 13,328	$ 8,445
1128	<Null>	8	CI	1991	371.62	26	1.576	<Null>	9.0	6.576	59.18	EXTREME	14.71%	$ 65,178	$ 54,909
1129	<Null>	8	CI	1991	527.30	26	1.576	<Null>	9.0	6.576	59.18	EXTREME	14.84%	$ 92,484	$ 77,912
837	E. THIRD AVE.	4	CI	1970	724.86	47	3.342	2009	7.0	8.342	58.39	EXTREME	15.02%	$ 95,348	$ 63,486
854	W. THIRD AVE.	6	CI	1970	30.05	47	3.342	1997	7.0	8.342	58.39	EXTREME	15.03%	$ 3,953	$ 2,632
1013		14	DI	1970	2452.33	47	5.306	1995	11.0	5.306	58.37	EXTREME	15.66%	$ 752,719	$ 353,304
1114	<Null>	6	CI	1958	634.67	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	15.82%	$ 83,485	$ 45,508
1116	<Null>	6	CI	1958	841.28	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.04%	$ 110,662	$ 60,323
1117	<Null>	6	CI	1958	85.97	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.06%	$ 11,308	$ 6,164
1119	<Null>	6	CI	1958	808.76	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.26%	$ 106,385	$ 57,991
1120	<Null>	6	CI	1958	259.60	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.33%	$ 34,148	$ 18,614
1121		6	CI	1958	723.90	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.51%	$ 95,222	$ 51,906
1122		6	CI	1958	67.02	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.53%	$ 8,815	$ 4,805
1123	<Null>	6	CI	1958	256.58	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.60%	$ 33,750	$ 18,397
1124	<Null>	6	CI	1958	349.13	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.69%	$ 45,925	$ 25,034
1125	<Null>	6	CI	1958	674.48	59	4.549	<Null>	6.0	9.549	57.29	EXTREME	16.86%	$ 88,722	$ 48,363
130	E. NINTH AVE.	4	PVC-SCH40	1970	360.00	47	9.010	1971	3.0	19.010	57.03	EXTREME	16.95%	$ 47,355	$ 4,689
430	RIVERSIDE DR.	6	PVC-SCH40	1970	9.80	47	9.010	1976	4.0	14.010	56.04	EXTREME	16.95%	$ 1,289	$ 128
78	ORE ST.	4	PVC-SCH40	1970	547.98	47	9.010	2003	4.0	14.010	56.04	EXTREME	17.09%	$ 72,081	$ 7,137
120	W. SIXTH AVE.	4	PVC-SCH40	1970	310.47	47	9.010	1978	4.0	14.010	56.04	EXTREME	17.17%	$ 40,839	$ 4,043
121	W. SIXTH AVE.	4	PVC-SCH40	1970	37.96	47	9.010	1978	4.0	14.010	56.04	EXTREME	17.18%	$ 4,993	$ 494
235	VEATER ST.	6	PVC-SCH40	1970	190.38	47	9.010	2003	4.0	14.010	56.04	EXTREME	17.23%	$ 25,042	$ 2,479
236	VEATER ST.	6	PVC-SCH40	1970	190.00	47	9.010	2003	4.0	14.010	56.04	EXTREME	17.28%	$ 24,993	$ 2,475
243	STEEL ST.	6	PVC-SCH40	1970	554.00	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.42%	$ 72,873	$ 7,215
244	VEATER ST.	6	PVC-SCH40	1970	150.05	47	9.010	1977	4.0	14.010	56.04	EXTREME	17.46%	$ 19,738	$ 1,954

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
258	VEATER ST.	6	PVC-SCH40	1970	160.05	47	9.010	1977	4.0	14.010	56.04	EXTREME	17.50%	$ 21,053	$ 2,084
265	RIVERSIDE DR.	6	PVC-SCH40	1970	149.57	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.54%	$ 19,674	$ 1,948
266	RIVERSIDE DR.	6	PVC-SCH40	1970	327.79	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.62%	$ 43,118	$ 4,269
267	RIVERSIDE DR.	6	PVC-SCH40	1970	238.04	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.68%	$ 31,312	$ 3,100
268	RIVERSIDE DR.	6	PVC-SCH40	1970	321.50	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.76%	$ 42,290	$ 4,187
269	RIVERSIDE DR.	6	PVC-SCH40	1970	135.62	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.80%	$ 17,840	$ 1,766
270	RIVERSIDE DR.	6	PVC-SCH40	1970	37.65	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.81%	$ 4,952	$ 490
271	RIVERSIDE DR.	6	PVC-SCH40	1970	67.06	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.83%	$ 8,821	$ 873
272	RIVERSIDE DR.	6	PVC-SCH40	1970	41.31	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.84%	$ 5,434	$ 538
273	RIVERSIDE DR.	6	PVC-SCH40	1970	38.43	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.85%	$ 5,055	$ 501
274	RIVERSIDE DR.	6	PVC-SCH40	1970	66.37	47	9.010	1976	4.0	14.010	56.04	EXTREME	17.86%	$ 8,730	$ 864
279	CHERRY LN.	6	PVC-SCH40	1970	29.22	47	9.010	2013	4.0	14.010	56.04	EXTREME	17.87%	$ 3,844	$ 381
280	CHERRY LN.	6	PVC-SCH40	1970	251.82	47	9.010	2013	4.0	14.010	56.04	EXTREME	17.93%	$ 33,125	$ 3,280
449	VEATER ST.	6	PVC-SCH40	1970	200.01	47	9.010	1977	4.0	14.010	56.04	EXTREME	17.99%	$ 26,309	$ 2,605
634	W. THIRD AVE.	6	PVC-SCH40	1970	118.18	47	9.010	1997	4.0	14.010	56.04	EXTREME	18.02%	$ 15,545	$ 1,539
868	ARROWHEAD RD.	4	PVC-SCH40	1970	397.54	47	9.010	1976	4.0	14.010	56.04	EXTREME	18.12%	$ 52,293	$ 5,178
1104	MAGNOLIA ST.	6	PVC-SCH40	1970	239.40	47	9.010	2005	4.0	14.010	56.04	EXTREME	18.18%	$ 31,490	$ 3,118
250	VETERANS WY.	6	PVC-SCH40	1980	203.32	37	6.057	2011	5.0	11.057	55.28	HIGH	18.23%	$ 26,745	$ 10,546
309	N. CEDAR ST.	6	PVC-SCH40	1980	479.88	37	6.057	1983	5.0	11.057	55.28	HIGH	18.35%	$ 63,124	$ 24,890
283	E. THIRD AVE.	6	PVC-SCH40	2000	714.25	17	1.831	2009	8.0	6.831	54.65	HIGH	18.54%	$ 93,953	$ 76,751
649	PERSHING ST.	8	CI	1947	555.65	70	5.782	1995	5.0	10.782	53.91	HIGH	18.68%	$ 97,455	$ 41,106
658	E. NINTH AVE.	8	CI	1947	52.79	70	5.782	2004	5.0	10.782	53.91	HIGH	18.69%	$ 9,259	$ 3,906
820	E. NINTH AVE.	8	CI	1947	607.30	70	5.782	2004	5.0	10.782	53.91	HIGH	18.85%	$ 106,514	$ 44,927
755	W. THIRD AVE.	6	CI	1970	906.74	47	3.342	1997	4.0	13.342	53.37	HIGH	19.08%	$ 119,273	$ 79,415
892		14	DI	1970	38.51	47	5.306	1969	10.0	5.306	53.06	HIGH	19.09%	$ 11,819	$ 5,548
64	HILLCREST ST.	4	PVC-SCH40	1990	64.09	27	3.664	1995	6.0	8.664	51.98	HIGH	19.10%	$ 8,431	$ 5,342
65	HILLCREST ST.	4	PVC-SCH40	1990	180.10	27	3.664	1995	6.0	8.664	51.98	HIGH	19.15%	$ 23,690	$ 15,010
246	MERCURY ST.	6	PVC-SCH40	1990	457.45	27	3.664	1969	6.0	8.664	51.98	HIGH	19.27%	$ 60,173	$ 38,126
383	W. SECOND AVE.	12	PVC-SCH40	1990	918.09	27	3.664	1984	6.0	8.664	51.98	HIGH	19.50%	$ 241,539	$ 153,042
384	W. SECOND AVE.	12	PVC-SCH40	1990	222.65	27	3.664	1995	6.0	8.664	51.98	HIGH	19.56%	$ 58,578	$ 37,115
385	W. SECOND AVE.	12	PVC-SCH40	1990	16.29	27	3.664	1995	6.0	8.664	51.98	HIGH	19.56%	$ 4,286	$ 2,716
386	W. SECOND AVE.	12	PVC-SCH40	1990	203.83	27	3.664	1995	6.0	8.664	51.98	HIGH	19.61%	$ 53,625	$ 33,977

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
419		12	PVC-SCH40	1990	301.02	27	3.664	1991	6.0	8.664	51.98	HIGH	19.69%	$ 79,196	$ 50,180
421		12	PVC-SCH40	1990	35.88	27	3.664	1991	6.0	8.664	51.98	HIGH	19.70%	$ 9,441	$ 5,982
433		12	PVC-SCH40	1990	880.61	27	3.664	1997	6.0	8.664	51.98	HIGH	19.92%	$ 231,678	$ 146,794
436	W. SECOND AVE.	12	PVC-SCH40	1990	140.37	27	3.664	1995	6.0	8.664	51.98	HIGH	19.96%	$ 36,930	$ 23,399
437	W. SECOND AVE.	12	PVC-SCH40	1990	182.64	27	3.664	1984	6.0	8.664	51.98	HIGH	20.01%	$ 48,050	$ 30,445
683		12	PVC-SCH40	1990	635.69	27	3.664	1991	6.0	8.664	51.98	HIGH	20.17%	$ 167,245	$ 105,968
741	KOPRA ST.	12	PVC-SCH40	1990	905.34	27	3.664	1997	6.0	8.664	51.98	HIGH	20.40%	$ 238,186	$ 150,917
748	MARIE ST.	12	PVC-SCH40	1990	1464.78	27	3.664	2006	6.0	8.664	51.98	HIGH	20.77%	$ 385,368	$ 244,173
775	W. SECOND AVE.	12	PVC-SCH40	1990	436.09	27	3.664	1995	6.0	8.664	51.98	HIGH	20.88%	$ 114,730	$ 72,694
469	ASH ST.	4	AC	1935	320.95	82	12.989	2009	4.0	12.989	51.96	HIGH	20.97%	$ 42,218	$ 42,218
476	ASH ST.	4	AC	1935	357.33	82	12.989	2009	4.0	12.989	51.96	HIGH	21.06%	$ 47,003	$ 47,003
555	RIVERSIDE DR.	6	AC	1935	1157.07	82	12.989	1975-1978	4.0	12.989	51.96	HIGH	21.35%	$ 152,201	$ 152,201
556	RIVERSIDE DR.	6	AC	1935	270.46	82	12.989	1984	4.0	12.989	51.96	HIGH	21.42%	$ 35,576	$ 35,576
557	RIVERSIDE DR.	6	AC	1935	370.60	82	12.989	1984	4.0	12.989	51.96	HIGH	21.52%	$ 48,748	$ 48,748
581	RIVERSIDE DR.	6	AC	1935	575.90	82	12.989	1976	4.0	12.989	51.96	HIGH	21.66%	$ 75,754	$ 75,754
582	RIVERSIDE DR.	6	AC	1935	507.28	82	12.989	1995	4.0	12.989	51.96	HIGH	21.79%	$ 66,727	$ 66,727
583	RIVERSIDE DR.	6	AC	1935	114.59	82	12.989	1975	4.0	12.989	51.96	HIGH	21.82%	$ 15,074	$ 15,074
594	BROAD ST.	8	AC	1935	1420.00	82	12.989	1995	4.0	12.989	51.96	HIGH	22.19%	$ 249,054	$ 249,054
728	ASH ST.	6	AC	1935	477.88	82	12.989	1998	4.0	12.989	51.96	HIGH	22.31%	$ 62,861	$ 62,861
729	ASH ST.	6	AC	1935	365.63	82	12.989	1963	4.0	12.989	51.96	HIGH	22.40%	$ 48,095	$ 48,095
819	RIVERSIDE DR.	6	AC	1935	313.50	82	12.989	1998	4.0	12.989	51.96	HIGH	22.48%	$ 41,238	$ 41,238
834	ASH ST.	4	AC	1935	334.26	82	12.989	2009	4.0	12.989	51.96	HIGH	22.57%	$ 43,969	$ 43,969
845	BIRCH ST.	4	AC	1935	364.70	82	12.989	1991	4.0	12.989	51.96	HIGH	22.66%	$ 47,972	$ 47,972
410		12	PVC-SCH40	1991	1940.62	26	3.455	1991	6.0	8.455	50.73	HIGH	23.15%	$ 510,557	$ 334,139
411		12	PVC-SCH40	1991	212.90	26	3.455	1991	6.0	8.455	50.73	HIGH	23.21%	$ 56,013	$ 36,658
415		12	PVC-SCH40	1991	90.49	26	3.455	1991	6.0	8.455	50.73	HIGH	23.23%	$ 23,808	$ 15,581
417		12	PVC-SCH40	1991	875.09	26	3.455	1991	6.0	8.455	50.73	HIGH	23.46%	$ 230,229	$ 150,675
425		12	PVC-SCH40	1991	456.10	26	3.455	1991	6.0	8.455	50.73	HIGH	23.57%	$ 119,995	$ 78,532
1045		12	PVC-SCH40	1991	67.08	26	3.455	1991	6.0	8.455	50.73	HIGH	23.59%	$ 17,647	$ 11,549
1046		12	PVC-SCH40	1991	81.47	26	3.455	1991	6.0	8.455	50.73	HIGH	23.61%	$ 21,435	$ 14,028
56	SIMPSON ST.	4	AC	1960	533.37	57	7.176	1980	7.0	7.176	50.23	HIGH	23.75%	$ 70,160	$ 19,811
59	HACKBERRY LN.	4	AC	1960	502.10	57	7.176	1980	7.0	7.176	50.23	HIGH	23.87%	$ 66,046	$ 18,649

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
225	IRON ST.	6	AC	1960	290.03	57	7.176	1969-1995	7.0	7.176	50.23	HIGH	23.95%	$ 38,150	$ 10,773
392	BROADWAY ST.	12	AC	1960	972.14	57	7.176	1967	7.0	7.176	50.23	HIGH	24.20%	$ 255,761	$ 72,219
400	BROADWAY ST.	12	AC	1960	980.52	57	7.176	1969	7.0	7.176	50.23	HIGH	24.45%	$ 257,965	$ 72,842
401	BROADWAY ST.	12	AC	1960	299.79	57	7.176	1969	7.0	7.176	50.23	HIGH	24.52%	$ 78,873	$ 22,271
423	BROADWAY ST.	12	AC	1960	567.50	57	7.176	1969	7.0	7.176	50.23	HIGH	24.67%	$ 149,305	$ 42,159
424	BROADWAY ST.	12	AC	1960	563.25	57	7.176	1969	7.0	7.176	50.23	HIGH	24.81%	$ 148,185	$ 41,843
450	BROADWAY ST.	12	AC	1960	348.92	57	7.176	1969	7.0	7.176	50.23	HIGH	24.90%	$ 91,797	$ 25,921
474	E. FOURTH AVE.	4	AC	1960	360.00	57	7.176	1981	7.0	7.176	50.23	HIGH	24.99%	$ 47,355	$ 13,372
716	COOK ST.	12	AC	1960	192.64	57	7.176	1969	7.0	7.176	50.23	HIGH	25.04%	$ 50,681	$ 14,311
763	W. SIXTH AVE.	6	AC	1960	334.39	57	7.176	1970	7.0	7.176	50.23	HIGH	25.13%	$ 43,985	$ 12,420
874	BROADWAY ST.	12	AC	1960	350.14	57	7.176	1969	7.0	7.176	50.23	HIGH	25.22%	$ 92,117	$ 26,011
971		8	AC	1960	545.30	57	7.176	1999	7.0	7.176	50.23	HIGH	25.36%	$ 95,641	$ 27,006
540	MAPLE ST.	6	CI	1970	728.75	47	3.342	1971	6.0	8.342	50.05	HIGH	25.54%	$ 95,859	$ 63,826
855		6	CI	1970	315.42	47	3.342	2012	6.0	8.342	50.05	HIGH	25.62%	$ 41,490	$ 27,625
862	E. THIRD AVE.	4	CI	1970	339.57	47	3.342	1995	6.0	8.342	50.05	HIGH	25.71%	$ 44,667	$ 29,741
866	E. THIRD AVE.	4	CI	1970	344.85	47	3.342	1963	6.0	8.342	50.05	HIGH	25.80%	$ 45,361	$ 30,203
936	W. SIXTH AVE.	6	CI	1970	40.76	47	3.342	1991	6.0	8.342	50.05	HIGH	25.81%	$ 5,362	$ 3,570
1106		6	PVC-SCH40	1975	244.97	42	7.463	2012	4.0	12.463	49.85	HIGH	25.87%	$ 32,224	$ 8,174
1062		6	PVC-SCH40	1975	938.06	42	7.463	2012	4.0	12.463	49.85	HIGH	26.11%	$ 123,393	$ 31,300
1063		6	PVC-SCH40	1975	235.50	42	7.463	2012	4.0	12.463	49.85	HIGH	26.17%	$ 30,978	$ 7,858
1105		6	PVC-SCH40	1975	105.36	42	7.463	2012	4.0	12.463	49.85	HIGH	26.20%	$ 13,859	$ 3,515
707	RIVERSIDE DR.	4	PVC-SCH40	1992	501.93	25	3.253	2000	6.0	8.253	49.52	HIGH	26.32%	$ 66,024	$ 44,549
73	UPSON ST.	4	PVC-SCH40	2000	603.92	17	1.831	2001	7.0	6.831	47.82	HIGH	26.48%	$ 79,440	$ 64,895
393	BROADWAY ST.	12	PVC-SCH40	2000	1168.11	17	1.831	1969	7.0	6.831	47.82	HIGH	26.78%	$ 307,319	$ 251,052
395	COOK ST.	12	PVC-SCH40	2000	360.02	17	1.831	1969	7.0	6.831	47.82	HIGH	26.87%	$ 94,718	$ 77,376
397	COOK ST.	12	PVC-SCH40	2000	501.21	17	1.831	1969	7.0	6.831	47.82	HIGH	27.00%	$ 131,864	$ 107,721
782	BROADWAY ST.	12	PVC-SCH40	2000	520.01	17	1.831	1969	7.0	6.831	47.82	HIGH	27.13%	$ 136,809	$ 111,761
1012		2	PVC-SCH40	2000	739.11	17	1.831	2001	7.0	6.831	47.82	HIGH	27.32%	$ 97,222	$ 79,422
1032		2	PVC-SCH40	2000	730.88	17	1.831	1995	7.0	6.831	47.82	HIGH	27.50%	$ 96,140	$ 78,538
654	COOK ST.	12	CI	1980	86.48	37	2.446	1983	6.0	7.446	44.67	HIGH	27.53%	$ 22,752	$ 17,188
879	COOK ST.	12	CI	1980	36.12	37	2.446	1983	6.0	7.446	44.67	HIGH	27.54%	$ 9,503	$ 7,179
22	ELM ST.	4	PVC-SCH40	1980	212.47	37	6.057	1978-1984	4.0	11.057	44.23	HIGH	27.59%	$ 27,949	$ 11,020

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
117	E. FOURTH AVE.	4	PVC-SCH40	1980	359.49	37	6.057	1981	4.0	11.057	44.23	HIGH	27.68%	$ 47,287	$ 18,646
237	ZINC ST.	6	PVC-SCH40	1980	501.73	37	6.057	1980	4.0	11.057	44.23	HIGH	27.81%	$ 65,998	$ 26,024
694	W. SIXTH AVE.	6	CI	1945	360.19	72	6.019	1986	4.0	11.019	44.08	HIGH	27.90%	$ 47,379	$ 18,861
752	FOCH ST.	4	CI	1945	689.82	72	6.019	2006	4.0	11.019	44.08	HIGH	28.08%	$ 90,739	$ 36,122
190	FOCH ST.	6	PVC-SCH40	1990	250.20	27	3.664	1991	5.0	8.664	43.32	HIGH	28.14%	$ 32,911	$ 20,853
226	IRON ST.	6	PVC-SCH40	1990	622.97	27	3.664	1995	5.0	8.664	43.32	HIGH	28.30%	$ 81,946	$ 51,922
821	ASH ST.	4	PVC-SCH40	1990	172.08	27	3.664	2001	5.0	8.664	43.32	HIGH	28.34%	$ 22,635	$ 14,342
903	SMITH AVE.	6	PVC-SCH40	1990	131.22	27	3.664	1998	5.0	8.664	43.32	HIGH	28.38%	$ 17,261	$ 10,937
985		4	PVC-SCH40	1990	269.17	27	3.664	1991	5.0	8.664	43.32	HIGH	28.45%	$ 35,406	$ 22,434
636	LOCUST ST.	6	CI	1947	2484.63	70	5.782	1975	4.0	10.782	43.13	HIGH	29.08%	$ 326,829	$ 137,856
660	ASH ST.	8	CI	1947	363.14	70	5.782	1998	4.0	10.782	43.13	HIGH	29.17%	$ 63,691	$ 26,865
661	E. EIGHTH AVE.	8	CI	1947	339.73	70	5.782	1993	4.0	10.782	43.13	HIGH	29.26%	$ 59,584	$ 25,133
183	MAGNOLIA ST.	4	AC	1960	354.05	57	7.176	1995	6.0	7.176	43.06	HIGH	29.35%	$ 46,572	$ 13,151
468	ELM ST.	4	AC	1960	729.80	57	7.176	1963	6.0	7.176	43.06	HIGH	29.54%	$ 95,997	$ 27,107
482	GOLD ST.	4	AC	1960	15.66	57	7.176	1995	6.0	7.176	43.06	HIGH	29.54%	$ 2,060	$ 582
513	W. BARTON AVE.	6	AC	1960	141.18	57	7.176	1971	6.0	7.176	43.06	HIGH	29.58%	$ 18,571	$ 5,244
543	DATE ST.	6	AC	1960	486.00	57	7.176	1962	6.0	7.176	43.06	HIGH	29.70%	$ 63,928	$ 18,051
553	E. THIRD AVE.	6	AC	1960	16.88	57	7.176	2013	6.0	7.176	43.06	HIGH	29.71%	$ 2,220	$ 627
558	DATE ST.	6	AC	1960	610.51	57	7.176	1995	6.0	7.176	43.06	HIGH	29.86%	$ 80,306	$ 22,676
574	E. THIRD AVE.	6	AC	1960	154.62	57	7.176	1975	6.0	7.176	43.06	HIGH	29.90%	$ 20,339	$ 5,743
575	E. THIRD AVE.	6	AC	1960	61.26	57	7.176	1975	6.0	7.176	43.06	HIGH	29.92%	$ 8,058	$ 2,275
602	MORGAN ST.	8	AC	1960	271.18	57	7.176	1969	6.0	7.176	43.06	HIGH	29.99%	$ 47,563	$ 13,430
610	DATE ST.	6	AC	1960	362.00	57	7.176	1962	6.0	7.176	43.06	HIGH	30.08%	$ 47,617	$ 13,446
614	GOLD ST.	4	AC	1960	18.10	57	7.176	1995	6.0	7.176	43.06	HIGH	30.08%	$ 2,381	$ 672
684	MARIE ST.	6	AC	1960	327.58	57	7.176	1970	6.0	7.176	43.06	HIGH	30.17%	$ 43,090	$ 12,167
697	DATE ST.	6	AC	1960	444.69	57	7.176	1962	6.0	7.176	43.06	HIGH	30.28%	$ 58,494	$ 16,517
710	CORBETT ST.	6	AC	1960	338.95	57	7.176	2013	6.0	7.176	43.06	HIGH	30.37%	$ 44,585	$ 12,590
758	DATE ST.	6	AC	1960	358.00	57	7.176	1962	6.0	7.176	43.06	HIGH	30.46%	$ 47,092	$ 13,297
805	HYDE ST.	6	AC	1960	182.18	57	7.176	1998	6.0	7.176	43.06	HIGH	30.50%	$ 23,964	$ 6,767
808	IRON ST.	6	AC	1960	35.39	57	7.176	1969	6.0	7.176	43.06	HIGH	30.51%	$ 4,655	$ 1,315
838	ASH ST.	4	AC	1960	18.25	57	7.176	2009	6.0	7.176	43.06	HIGH	30.52%	$ 2,400	$ 678
848	DATE ST.	6	AC	1960	275.59	57	7.176	1962	6.0	7.176	43.06	HIGH	30.59%	$ 36,251	$ 10,236

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
856	DATE ST.	6	AC	1960	335.88	57	7.176	1998	6.0	7.176	43.06	HIGH	30.67%	$ 44,181	$ 12,476
861	E. THIRD AVE.	6	AC	1960	344.08	57	7.176	2013	6.0	7.176	43.06	HIGH	30.76%	$ 45,260	$ 12,780
863	MAGNOLIA ST.	4	AC	1960	721.01	57	7.176	1995	6.0	7.176	43.06	HIGH	30.95%	$ 94,842	$ 26,780
869	E. FIFTH AVE.	6	AC	1960	59.05	57	7.176	1993	6.0	7.176	43.06	HIGH	30.96%	$ 7,768	$ 2,193
891	BROADWAY ST.	12	AC	1960	273.97	57	7.176	1983	6.0	7.176	43.06	HIGH	31.03%	$ 72,079	$ 20,353
937	MAPLE ST.	6	AC	1960	38.29	57	7.176	1970	6.0	7.176	43.06	HIGH	31.04%	$ 5,037	$ 1,422
678		8	PVC-SCH40	1991	174.72	26	3.455	1991	5.0	8.455	42.28	HIGH	31.09%	$ 30,645	$ 20,056
242	STEEL ST.	6	PVC-SCH40	1970	401.00	47	9.010	1976	3.0	14.010	42.03	HIGH	31.19%	$ 52,748	$ 5,223
625	E. THIRD AVE.	4	CI	1970	329.04	47	3.342	2009	5.0	8.342	41.71	HIGH	31.27%	$ 43,282	$ 28,818
633	W. SECOND AVE.	6	CI	1970	78.51	47	3.342	2012	5.0	8.342	41.71	HIGH	31.29%	$ 10,327	$ 6,876
635	W. SIXTH AVE.	6	CI	1970	298.62	47	3.342	1970	5.0	8.342	41.71	HIGH	31.37%	$ 39,280	$ 26,154
643	E. SIXTH AVE.	6	CI	1970	354.69	47	3.342	1991	5.0	8.342	41.71	HIGH	31.46%	$ 46,656	$ 31,065
645	W. THIRD AVE.	6	CI	1970	143.37	47	3.342	1997	5.0	8.342	41.71	HIGH	31.50%	$ 18,858	$ 12,556
696	W. SIXTH AVE.	8	CI	1970	10.33	47	3.342	1970	5.0	8.342	41.71	HIGH	31.50%	$ 1,811	$ 1,206
831	E. SIXTH AVE.	6	CI	1970	338.99	47	3.342	1991	5.0	8.342	41.71	HIGH	31.58%	$ 44,591	$ 29,690
325	RIVERSIDE DR.	6	PVC-SCH40	1992	405.60	25	3.253	1991	5.0	8.253	41.26	HIGH	31.69%	$ 53,353	$ 36,000
703	RIVERSIDE DR.	6	PVC-SCH40	1992	649.03	25	3.253	1991	5.0	8.253	41.26	HIGH	31.85%	$ 85,374	$ 57,606
916	PERCH ST.	6	PVC-SCH40	1992	1063.83	25	3.253	1991	5.0	8.253	41.26	HIGH	32.13%	$ 139,936	$ 94,422
54	RADIUM ST.	4	PVC-SCH40	2000	857.06	17	1.831	2005-2009	6.0	6.831	40.99	HIGH	32.34%	$ 112,737	$ 92,096
284	E. THIRD AVE.	6	PVC-SCH40	2000	348.48	17	1.831	1963	6.0	6.831	40.99	HIGH	32.43%	$ 45,839	$ 37,446
382	W. SECOND AVE.	12	PVC-SCH40	2000	1303.41	17	1.831	2005	6.0	6.831	40.99	HIGH	32.77%	$ 342,914	$ 280,130
960		0	PVC-SCH40	2000	3530.33	17	1.831	2003	6.0	6.831	40.99	HIGH	33.67%	$ 464,380	$ 379,356
935	E. SIXTH AVE.	6	CI	1990	35.69	27	1.650	1995	6.0	6.650	39.90	HIGH	33.68%	$ 4,695	$ 3,920
1112	<Null>	8	CI	1991	1395.45	26	1.576	<Null>	6.0	6.576	39.45	HIGH	34.03%	$ 244,748	$ 206,185
1113	<Null>	8	CI	1991	183.08	26	1.576	<Null>	6.0	6.576	39.45	HIGH	34.08%	$ 32,110	$ 27,050
1126	<Null>	8	CI	1991	189.62	26	1.576	<Null>	6.0	6.576	39.45	HIGH	34.13%	$ 33,258	$ 28,018
1127	<Null>	8	CI	1991	354.47	26	1.576	<Null>	6.0	6.576	39.45	HIGH	34.22%	$ 62,170	$ 52,375
365	DATE ST.	8	PVC-SCH40	1970	137.95	47	9.010	1971	2.0	19.010	38.02	HIGH	34.25%	$ 24,196	$ 2,396
366	DATE ST.	8	PVC-SCH40	1970	159.95	47	9.010	1971	2.0	19.010	38.02	HIGH	34.29%	$ 28,054	$ 2,778
367	DATE ST.	8	PVC-SCH40	1970	95.40	47	9.010	1971	2.0	19.010	38.02	HIGH	34.32%	$ 16,732	$ 1,657
368	DATE ST.	8	PVC-SCH40	1970	296.37	47	9.010	1971	2.0	19.010	38.02	HIGH	34.39%	$ 51,981	$ 5,147
372	DATE ST.	8	PVC-SCH40	1970	142.98	47	9.010	1971	2.0	19.010	38.02	HIGH	34.43%	$ 25,078	$ 2,483

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
373	DATE ST.	8	PVC-SCH40	1970	261.09	47	9.010	1970	2.0	19.010	38.02	HIGH	34.50%	$ 45,793	$ 4,534
374	DATE ST.	8	PVC-SCH40	1970	229.10	47	9.010	1971	2.0	19.010	38.02	HIGH	34.56%	$ 40,183	$ 3,978
426	DATE ST.	8	PVC-SCH40	1970	238.99	47	9.010	1971	2.0	19.010	38.02	HIGH	34.62%	$ 41,916	$ 4,150
332	SILVER ST.	6	PVC-SCH40	1975	205.73	42	7.463	1975	3.0	12.463	37.39	HIGH	34.67%	$ 27,061	$ 6,864
333	SILVER ST.	6	PVC-SCH40	1975	107.72	42	7.463	1975	3.0	12.463	37.39	HIGH	34.70%	$ 14,170	$ 3,594
1052		6	PVC-SCH40	1975	350.10	42	7.463	1975	3.0	12.463	37.39	HIGH	34.79%	$ 46,052	$ 11,681
360	DATE ST.	8	PVC-SCH40	1971	413.69	46	8.689	1971	2.0	18.689	37.38	HIGH	34.89%	$ 72,557	$ 9,509
361	DATE ST.	8	PVC-SCH40	1971	443.93	46	8.689	1971	2.0	18.689	37.38	HIGH	35.00%	$ 77,861	$ 10,205
362	DATE ST.	8	PVC-SCH40	1971	196.69	46	8.689	1971	2.0	18.689	37.38	HIGH	35.05%	$ 34,497	$ 4,521
363	DATE ST.	8	PVC-SCH40	1971	153.89	46	8.689	1971	2.0	18.689	37.38	HIGH	35.09%	$ 26,991	$ 3,537
364	DATE ST.	8	PVC-SCH40	1971	105.88	46	8.689	1971	2.0	18.689	37.38	HIGH	35.12%	$ 18,570	$ 2,434
422	DATE ST.	8	PVC-SCH40	1971	241.05	46	8.689	1971	2.0	18.689	37.38	HIGH	35.18%	$ 42,278	$ 5,541
680	DATE ST.	8	PVC-SCH40	1971	35.53	46	8.689	1971	2.0	18.689	37.38	HIGH	35.19%	$ 6,232	$ 817
681	DATE ST.	8	PVC-SCH40	1971	372.36	46	8.689	1971	2.0	18.689	37.38	HIGH	35.29%	$ 65,308	$ 8,559
682	DATE ST.	8	PVC-SCH40	1971	336.94	46	8.689	1971	2.0	18.689	37.38	HIGH	35.37%	$ 59,097	$ 7,745
884	OLIVO ST.	4	PVC-SCH40	1971	103.85	46	8.689	1971	2.0	18.689	37.38	HIGH	35.40%	$ 13,661	$ 1,790
560	N. CEDAR ST.	6	AC	1960	6.92	57	7.176	1973	5.0	7.176	35.88	HIGH	35.40%	$ 911	$ 257
651	PERSHING ST.	8	AC	1960	869.06	57	7.176	1984	5.0	7.176	35.88	HIGH	35.62%	$ 152,424	$ 43,040
723	MORGAN ST.	8	AC	1960	816.15	57	7.176	1969	5.0	7.176	35.88	HIGH	35.83%	$ 143,144	$ 40,420
847	DATE ST.	6	AC	1960	303.35	57	7.176	1998	5.0	7.176	35.88	HIGH	35.91%	$ 39,903	$ 11,267
849	N. CEDAR ST.	4	AC	1960	29.55	57	7.176	1999	5.0	7.176	35.88	HIGH	35.92%	$ 3,886	$ 1,097
850	W. SIXTH AVE.	6	AC	1960	29.93	57	7.176	1970	5.0	7.176	35.88	HIGH	35.92%	$ 3,937	$ 1,112
857	DATE ST.	6	AC	1960	41.83	57	7.176	1998	5.0	7.176	35.88	HIGH	35.93%	$ 5,502	$ 1,554
899	DATE ST.	4	AC	1960	24.65	57	7.176	1998	5.0	7.176	35.88	HIGH	35.94%	$ 3,242	$ 916
900	DATE ST.	4	AC	1960	65.63	57	7.176	1998	5.0	7.176	35.88	HIGH	35.96%	$ 8,633	$ 2,438
901	DATE ST.	4	AC	1960	77.70	57	7.176	1998	5.0	7.176	35.88	HIGH	35.98%	$ 10,220	$ 2,886
6	W. FIFTH AVE.	4	PVC-SCH40	1990	32.81	27	3.664	1996	4.0	8.664	34.66	HIGH	35.99%	$ 4,316	$ 2,735
57	TUNGSTEN ST.	4	PVC-SCH40	1990	513.65	27	3.664	1995	4.0	8.664	34.66	HIGH	36.12%	$ 67,565	$ 42,810
63	STEEL ST.	4	PVC-SCH40	1990	1294.96	27	3.664	1993	4.0	8.664	34.66	HIGH	36.45%	$ 170,339	$ 107,928
193	FOCH ST.	6	PVC-SCH40	1990	363.00	27	3.664	1994	4.0	8.664	34.66	HIGH	36.54%	$ 47,749	$ 30,254
200	E. FIRST AVE.	6	PVC-SCH40	1990	320.00	27	3.664	1963	4.0	8.664	34.66	HIGH	36.62%	$ 42,093	$ 26,671
229	ALUMINUM ST.	6	PVC-SCH40	1990	477.98	27	3.664	1995	4.0	8.664	34.66	HIGH	36.74%	$ 62,874	$ 39,838

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
230	VEATER ST.	6	PVC-SCH40	1990	180.14	27	3.664	1994	4.0	8.664	34.66	HIGH	36.79%	$ 23,695	$ 15,013
231	TUNGSTEN ST.	6	PVC-SCH40	1990	563.00	27	3.664	1994	4.0	8.664	34.66	HIGH	36.93%	$ 74,057	$ 46,923
375	E. THIRD AVE.	6	PVC-SCH40	1990	321.13	27	3.664	1993	4.0	8.664	34.66	HIGH	37.02%	$ 42,241	$ 26,764
434	W. NINTH AVE.	6	PVC-SCH40	1990	3.26	27	3.664	1994	4.0	8.664	34.66	HIGH	37.02%	$ 429	$ 272
456	VEATER ST.	6	PVC-SCH40	1990	360.05	27	3.664	1994	4.0	8.664	34.66	HIGH	37.11%	$ 47,361	$ 30,008
619	FIR ST.	6	PVC-SCH40	1990	367.03	27	3.664	1997	4.0	8.664	34.66	HIGH	37.20%	$ 48,279	$ 30,590
686	W. NINTH AVE.	8	PVC-SCH40	1990	358.37	27	3.664	1994-1995	4.0	8.664	34.66	HIGH	37.29%	$ 62,854	$ 39,825
688	N. GRAPE ST.	6	PVC-SCH40	1990	464.93	27	3.664	1994	4.0	8.664	34.66	HIGH	37.41%	$ 61,156	$ 38,749
690	W. SIXTH AVE.	6	PVC-SCH40	1990	390.22	27	3.664	1993	4.0	8.664	34.66	HIGH	37.51%	$ 51,330	$ 32,523
756	N. GRAPE ST.	6	PVC-SCH40	1990	858.38	27	3.664	1994	4.0	8.664	34.66	HIGH	37.73%	$ 112,912	$ 71,542
810	ORE ST.	4	PVC-SCH40	1990	609.25	27	3.664	1976	4.0	8.664	34.66	HIGH	37.89%	$ 80,140	$ 50,778
812	KOPRA ST.	6	PVC-SCH40	1990	720.59	27	3.664	1984	4.0	8.664	34.66	HIGH	38.07%	$ 94,786	$ 60,058
1002		2	PVC-SCH40	1990	404.81	27	3.664	1995	4.0	8.664	34.66	HIGH	38.17%	$ 53,249	$ 33,739
1004		0.75	PVC-SCH40	1990	328.94	27	3.664	1998	4.0	8.664	34.66	HIGH	38.26%	$ 43,269	$ 27,415
1036		8	PVC-SCH40	1990	967.50	27	3.664	1998	4.0	8.664	34.66	HIGH	38.50%	$ 169,691	$ 107,518
511	DATE ST.	6	AC	1960	542.79	57	7.176	1970-1971	2.0	17.176	34.35	HIGH	38.64%	$ 71,399	$ 20,161
512	DATE ST.	6	AC	1960	514.32	57	7.176	1970-1971	2.0	17.176	34.35	HIGH	38.77%	$ 67,654	$ 19,103
1065		2	PVC-SCH40	2000	374.04	17	1.831	2004	5.0	6.831	34.15	HIGH	38.87%	$ 49,201	$ 40,193
262	MARSHALL ST.	6	CI	1970	188.52	47	3.342	1976	4.0	8.342	33.37	HIGH	38.92%	$ 24,797	$ 16,511
632	LANE ST.	6	CI	1970	354.32	47	3.342	1997	4.0	8.342	33.37	HIGH	39.01%	$ 46,607	$ 31,033
639	E. SECOND AVE.	6	CI	1970	227.21	47	3.342	2012	4.0	8.342	33.37	HIGH	39.07%	$ 29,887	$ 19,900
640	E. SECOND AVE.	6	CI	1970	330.07	47	3.342	2012	4.0	8.342	33.37	HIGH	39.15%	$ 43,418	$ 28,909
732	W. SECOND AVE.	6	CI	1970	342.99	47	3.342	2012	4.0	8.342	33.37	HIGH	39.24%	$ 45,116	$ 30,040
826	E. SIXTH AVE.	6	CI	1970	351.78	47	3.342	1988	4.0	8.342	33.37	HIGH	39.33%	$ 46,273	$ 30,810
676	POST ST.	6	PVC-SCH40	2010	446.04	7	0.558	2010-2011	6.0	5.558	33.35	HIGH	39.44%	$ 58,672	$ 55,399
240	ZINC ST.	6	PVC-SCH40	1980	440.51	37	6.057	1980	3.0	11.057	33.17	HIGH	39.55%	$ 57,945	$ 22,848
301	E. FIFTH AVE.	6	PVC-SCH40	1980	192.03	37	6.057	1981	3.0	11.057	33.17	HIGH	39.60%	$ 25,259	$ 9,960
698	E. SIXTH AVE.	6	PVC-SCH40	1980	308.43	37	6.057	1988	3.0	11.057	33.17	HIGH	39.68%	$ 40,571	$ 15,998
721	VEATER ST.	6	PVC-SCH40	1980	214.36	37	6.057	1981	3.0	11.057	33.17	HIGH	39.74%	$ 28,197	$ 11,118
275	RIVERSIDE DR.	6	PVC-SCH40	1992	719.39	25	3.253	2000	4.0	8.253	33.01	HIGH	39.92%	$ 94,629	$ 63,851
276	RIVERSIDE DR.	6	PVC-SCH40	1992	51.92	25	3.253	2000	4.0	8.253	33.01	HIGH	39.93%	$ 6,829	$ 4,608
278	RIVERSIDE DR.	6	PVC-SCH40	1992	21.21	25	3.253	2000	4.0	8.253	33.01	HIGH	39.94%	$ 2,790	$ 1,882

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
324	RIVERSIDE DR.	6	PVC-SCH40	1992	210.64	25	3.253	1991	4.0	8.253	33.01	HIGH	39.99%	$ 27,707	$ 18,696
326	RIVERSIDE DR.	6	PVC-SCH40	1992	171.94	25	3.253	1991	4.0	8.253	33.01	HIGH	40.04%	$ 22,617	$ 15,261
327	RIVERSIDE DR.	6	PVC-SCH40	1992	554.52	25	3.253	1991	4.0	8.253	33.01	HIGH	40.18%	$ 72,941	$ 49,217
704	RIVERSIDE DR.	4	PVC-SCH40	1992	390.74	25	3.253	1991	4.0	8.253	33.01	HIGH	40.28%	$ 51,397	$ 34,680
705	RIVERSIDE DR.	4	PVC-SCH40	1992	215.24	25	3.253	2000	4.0	8.253	33.01	HIGH	40.33%	$ 28,312	$ 19,104
706	RIVERSIDE DR.	4	PVC-SCH40	1992	326.42	25	3.253	2000	4.0	8.253	33.01	HIGH	40.42%	$ 42,937	$ 28,972
914	RIVERSIDE DR.	6	PVC-SCH40	1992	246.55	25	3.253	1991	4.0	8.253	33.01	HIGH	40.48%	$ 32,431	$ 21,883
915	RIVERSIDE DR.	6	PVC-SCH40	1992	190.37	25	3.253	1991	4.0	8.253	33.01	HIGH	40.53%	$ 25,041	$ 16,897
825	E. EIGHTH AVE.	8	CI	1947	535.79	70	5.782	1995	3.0	10.782	32.35	HIGH	40.66%	$ 93,972	$ 39,637
1061		6	PVC-SCH40	1980	1797.94	37	6.057	1980-1982	2.0	16.057	32.11	HIGH	41.12%	$ 236,501	$ 93,255
352	PERSHING ST.	8	CI	1947	346.07	70	5.782	1970	2.0	15.782	31.56	HIGH	41.21%	$ 60,698	$ 25,602
757	PERSHING ST.	8	CI	1947	248.10	70	5.782	1995	2.0	15.782	31.56	HIGH	41.28%	$ 43,515	$ 18,355
1057		12	PVC-C900	1990	1459.59	27	3.664	1989	8.0	3.664	29.31	HIGH	41.65%	$ 384,004	$ 243,309
261	PLATINUM ST.	4	AC	1960	385.00	57	7.176	1984	4.0	7.176	28.71	HIGH	41.75%	$ 50,643	$ 14,300
349	PLATINUM ST.	6	AC	1960	506.59	57	7.176	1981-1984	4.0	7.176	28.71	HIGH	41.88%	$ 66,637	$ 18,816
440	VEATER ST.	6	AC	1960	350.01	57	7.176	1981	4.0	7.176	28.71	HIGH	41.96%	$ 46,041	$ 13,001
445	VEATER ST.	6	AC	1960	320.00	57	7.176	2003	4.0	7.176	28.71	HIGH	42.05%	$ 42,093	$ 11,886
446	VEATER ST.	6	AC	1960	690.06	57	7.176	2003	4.0	7.176	28.71	HIGH	42.22%	$ 90,770	$ 25,631
463	POPLAR ST.	4	AC	1960	1538.32	57	7.176	1980	4.0	7.176	28.71	HIGH	42.62%	$ 202,351	$ 57,138
475	E. FIFTH AVE.	4	AC	1960	342.82	57	7.176	1981	4.0	7.176	28.71	HIGH	42.70%	$ 45,094	$ 12,733
508	ASH ST.	4	AC	1960	30.13	57	7.176	2009	4.0	7.176	28.71	HIGH	42.71%	$ 3,963	$ 1,119
521	W. SIXTH AVE.	6	AC	1960	365.71	57	7.176	1984	4.0	7.176	28.71	HIGH	42.80%	$ 48,105	$ 13,583
522	N. GRAPE ST.	6	AC	1960	701.05	57	7.176	1996	4.0	7.176	28.71	HIGH	42.98%	$ 92,217	$ 26,039
523	N. GRAPE ST.	6	AC	1960	363.00	57	7.176	1996	4.0	7.176	28.71	HIGH	43.08%	$ 47,749	$ 13,483
527	FOCH ST.	6	AC	1960	859.59	57	7.176	1995	4.0	7.176	28.71	HIGH	43.29%	$ 113,070	$ 31,928
572	E. THIRD AVE.	6	AC	1960	164.35	57	7.176	1975	4.0	7.176	28.71	HIGH	43.34%	$ 21,618	$ 6,104
580	RIVERSIDE DR.	6	AC	1960	7.67	57	7.176	1976	4.0	7.176	28.71	HIGH	43.34%	$ 1,008	$ 285
692	W. SIXTH AVE.	6	AC	1960	350.60	57	7.176	1993	4.0	7.176	28.71	HIGH	43.43%	$ 46,118	$ 13,022
695	W. SIXTH AVE.	6	AC	1960	360.00	57	7.176	1986	4.0	7.176	28.71	HIGH	43.52%	$ 47,354	$ 13,371
734	PALO VERDE ST.	4	AC	1960	720.96	57	7.176	1978	4.0	7.176	28.71	HIGH	43.70%	$ 94,835	$ 26,778
743	W. SIXTH AVE.	6	AC	1960	352.23	57	7.176	2004	4.0	7.176	28.71	HIGH	43.79%	$ 46,332	$ 13,083
760	W. SIXTH AVE.	6	AC	1960	358.33	57	7.176	1986	4.0	7.176	28.71	HIGH	43.89%	$ 47,135	$ 13,309

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
786	MORGAN ST.	8	AC	1960	652.18	57	7.176	1969	4.0	7.176	28.71	HIGH	44.05%	$ 114,386	$ 32,299
806	HYDE ST.	6	AC	1960	52.17	57	7.176	1998	4.0	7.176	28.71	HIGH	44.07%	$ 6,863	$ 1,938
807	HYDE ST.	6	AC	1960	414.26	57	7.176	1996-1998	4.0	7.176	28.71	HIGH	44.17%	$ 54,492	$ 15,387
842	E. FIFTH AVE.	4	AC	1960	337.48	57	7.176	1981	4.0	7.176	28.71	HIGH	44.26%	$ 44,392	$ 12,535
843	ASH ST.	4	AC	1960	41.03	57	7.176	2009	4.0	7.176	28.71	HIGH	44.27%	$ 5,397	$ 1,524
934	W. EIGHTH AVE.	6	AC	1960	1950.20	57	7.176	1984	4.0	7.176	28.71	HIGH	44.77%	$ 256,530	$ 72,436
114	E. SECOND AVE.	4	PVC-SCH40	1970	306.07	47	9.010	1978	2.0	14.010	28.02	HIGH	44.84%	$ 40,261	$ 3,986
131	LUCKY ST.	4	PVC-SCH40	1970	696.69	47	9.010	1978	2.0	14.010	28.02	HIGH	45.02%	$ 91,643	$ 9,074
133	CHERRY LN.	4	PVC-SCH40	1970	226.31	47	9.010	2013	2.0	14.010	28.02	HIGH	45.08%	$ 29,769	$ 2,947
139	LUCKY ST.	4	PVC-SCH40	1970	9.02	47	9.010	1978	2.0	14.010	28.02	HIGH	45.08%	$ 1,187	$ 117
144	E. FOURTH AVE.	4	PVC-SCH40	1970	136.66	47	9.010	2013	2.0	14.010	28.02	HIGH	45.12%	$ 17,976	$ 1,780
145	CHERRY LN.	4	PVC-SCH40	1970	71.94	47	9.010	2013	2.0	14.010	28.02	HIGH	45.13%	$ 9,463	$ 937
146		4	PVC-SCH40	1970	9.14	47	9.010	1975	2.0	14.010	28.02	HIGH	45.14%	$ 1,202	$ 119
147	E. FOURTH AVE.	4	PVC-SCH40	1970	139.56	47	9.010	1975	2.0	14.010	28.02	HIGH	45.17%	$ 18,357	$ 1,818
165	GARNETT ST.	4	PVC-SCH40	1970	314.86	47	9.010	1972-1975	2.0	14.010	28.02	HIGH	45.25%	$ 41,417	$ 4,101
166	SILVER ST.	4	PVC-SCH40	1970	53.98	47	9.010	1978	2.0	14.010	28.02	HIGH	45.27%	$ 7,100	$ 703
168	SILVER ST.	4	PVC-SCH40	1970	234.90	47	9.010	1978	2.0	14.010	28.02	HIGH	45.33%	$ 30,898	$ 3,059
174	CHERRY LN.	4	PVC-SCH40	1970	116.60	47	9.010	2013	2.0	14.010	28.02	HIGH	45.36%	$ 15,338	$ 1,519
177	E. SECOND AVE.	4	PVC-SCH40	1970	120.00	47	9.010	1978	2.0	14.010	28.02	HIGH	45.39%	$ 15,785	$ 1,563
178	SILVER ST.	4	PVC-SCH40	1970	72.69	47	9.010	1978	2.0	14.010	28.02	HIGH	45.41%	$ 9,561	$ 947
311	E. FOURTH AVE.	6	PVC-SCH40	1970	318.95	47	9.010	1978	2.0	14.010	28.02	HIGH	45.49%	$ 41,955	$ 4,154
315	E. FOURTH AVE.	6	PVC-SCH40	1970	290.48	47	9.010	1975	2.0	14.010	28.02	HIGH	45.56%	$ 38,210	$ 3,783
316	E. FOURTH AVE.	6	PVC-SCH40	1970	19.55	47	9.010	1975	2.0	14.010	28.02	HIGH	45.57%	$ 2,571	$ 255
427	LUCKY ST.	4	PVC-SCH40	1970	268.98	47	9.010	1978	2.0	14.010	28.02	HIGH	45.64%	$ 35,381	$ 3,503
1072		2	PVC-SCH40	1970	348.43	47	9.010	2012	2.0	14.010	28.02	HIGH	45.72%	$ 45,832	$ 4,538
1110		2	PVC-SCH40	1970	95.46	47	9.010	2012	2.0	14.010	28.02	HIGH	45.75%	$ 12,557	$ 1,243
357		8	PVC-SCH40	1971	371.60	46	8.689	1971	2.0	13.689	27.38	HIGH	45.84%	$ 65,176	$ 8,542
358		8	PVC-SCH40	1971	28.34	46	8.689	1971	2.0	13.689	27.38	HIGH	45.85%	$ 4,971	$ 651
378		8	PVC-SCH40	1971	11.86	46	8.689	1971	2.0	13.689	27.38	HIGH	45.85%	$ 2,080	$ 273
679		8	PVC-SCH40	1971	253.26	46	8.689	1971	2.0	13.689	27.38	HIGH	45.92%	$ 44,418	$ 5,821
882	DATE ST.	8	PVC-SCH40	1971	103.42	46	8.689	1971	2.0	13.689	27.38	HIGH	45.94%	$ 18,138	$ 2,377
79	LEAD ST.	4	PVC-SCH40	2000	549.43	17	1.831	2003	4.0	6.831	27.32	HIGH	46.08%	$ 72,272	$ 59,040

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
86	COPPER ST.	4	PVC-SCH40	2000	545.00	17	1.831	2003	4.0	6.831	27.32	HIGH	46.22%	$ 71,690	$ 58,564
228	VEATER ST.	6	PVC-SCH40	2000	144.53	17	1.831	2003	4.0	6.831	27.32	HIGH	46.26%	$ 19,011	$ 15,531
234	MERCURY ST.	6	PVC-SCH40	2000	224.20	17	1.831	2003	4.0	6.831	27.32	HIGH	46.32%	$ 29,492	$ 24,092
431	FOCH ST.	6	PVC-SCH40	2000	361.00	17	1.831	2009	4.0	6.831	27.32	HIGH	46.41%	$ 47,486	$ 38,792
720	NICKEL ST.	4	PVC-SCH40	2000	545.20	17	1.831	1981	4.0	6.831	27.32	HIGH	46.55%	$ 71,716	$ 58,585
802	VEATER ST.	6	PVC-SCH40	2000	611.60	17	1.831	2003	4.0	6.831	27.32	HIGH	46.71%	$ 80,449	$ 65,720
803		6	PVC-SCH40	2000	88.38	17	1.831	2003	4.0	6.831	27.32	HIGH	46.73%	$ 11,626	$ 9,498
804		6	PVC-SCH40	2000	94.60	17	1.831	2003	4.0	6.831	27.32	HIGH	46.75%	$ 12,443	$ 10,165
895	OCOTILLO ST.	6	PVC-SCH40	2000	274.08	17	1.831	2001	4.0	6.831	27.32	HIGH	46.82%	$ 36,053	$ 29,452
897	SIMPSON ST.	6	PVC-SCH40	2000	269.48	17	1.831	2001	4.0	6.831	27.32	HIGH	46.89%	$ 35,447	$ 28,957
1039		2	PVC-SCH40	2000	546.95	17	1.831	2003	4.0	6.831	27.32	HIGH	47.03%	$ 71,945	$ 58,773
630	PERSHING ST.	6	CI	1970	677.05	47	3.342	1981	2.0	13.342	26.68	HIGH	47.20%	$ 89,059	$ 59,298
620	FIR ST.	4	CI	1990	353.07	27	1.650	1996	4.0	6.650	26.60	HIGH	47.29%	$ 46,443	$ 38,781
670	W. NINTH AVE.	8	CI	1990	20.70	27	1.650	1995	4.0	6.650	26.60	HIGH	47.30%	$ 3,630	$ 3,031
8	FIR ST.	4	PVC-SCH40	1990	323.26	27	3.664	1995	3.0	8.664	25.99	HIGH	47.38%	$ 42,521	$ 26,942
593	BROAD ST.	8	AC	1935	703.07	82	12.989	1995	2.0	12.989	25.98	HIGH	47.56%	$ 123,311	$ 123,311
596	BROAD ST.	8	AC	1935	170.04	82	12.989	2006	2.0	12.989	25.98	HIGH	47.60%	$ 29,823	$ 29,823
598	BROAD ST.	8	AC	1935	590.30	82	12.989	1995	2.0	12.989	25.98	HIGH	47.75%	$ 103,533	$ 103,533
840	BIRCH ST.	4	AC	1935	353.74	82	12.989	2012	2.0	12.989	25.98	HIGH	47.85%	$ 46,532	$ 46,532
1093		14	DI	1980	3489.26	37	3.696	2005	7.0	3.696	25.87	HIGH	48.74%	$ 1,070,993	$ 675,122
919	ARENA DR.	6	PVC-SCH40	1994	577.26	23	2.864	1993	2.0	12.864	25.73	HIGH	48.88%	$ 75,933	$ 54,189
920	ARENA DR.	6	PVC-SCH40	1994	426.33	23	2.864	1993	2.0	12.864	25.73	HIGH	48.99%	$ 56,079	$ 40,021
929	GLENN ST.	6	PVC-SCH40	1994	459.09	23	2.864	1993	2.0	12.864	25.73	HIGH	49.11%	$ 60,388	$ 43,096
931	WINSTON ST.	6	PVC-SCH40	1994	650.13	23	2.864	1995	2.0	12.864	25.73	HIGH	49.28%	$ 85,518	$ 61,030
932	E. THIRD AVE.	6	PVC-SCH40	1994	664.36	23	2.864	1993	2.0	12.864	25.73	HIGH	49.44%	$ 87,390	$ 62,366
933	E. THIRD AVE.	6	PVC-SCH40	1994	421.12	23	2.864	1984	2.0	12.864	25.73	HIGH	49.55%	$ 55,394	$ 39,532
983		6	PVC-SCH40	1994	438.59	23	2.864	1994	2.0	12.864	25.73	HIGH	49.66%	$ 57,693	$ 41,172
1108		0	Unknown	1980	382.93	37	3.696		6.0	3.696	22.18	HIGH	49.76%	$ 50,371	$ 31,752
71	HILLCREST ST.	4	PVC-SCH40	1980	303.31	37	6.057	1995	2.0	11.057	22.11	HIGH	49.84%	$ 39,897	$ 15,732
76	CORONA AVE.	4	PVC-SCH40	1980	44.11	37	6.057	2011	2.0	11.057	22.11	HIGH	49.85%	$ 5,802	$ 2,288
82	LEAD ST.	4	PVC-SCH40	1980	351.73	37	6.057	1986	2.0	11.057	22.11	HIGH	49.94%	$ 46,267	$ 18,243
83	SIMPSON ST.	4	PVC-SCH40	1980	154.26	37	6.057	1986	2.0	11.057	22.11	HIGH	49.98%	$ 20,291	$ 8,001

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
132	COLEMAN ST.	4	PVC-SCH40	1980	346.78	37	6.057	1984	2.0	11.057	22.11	HIGH	50.07%	$ 45,616	$ 17,987
137	OAK ST.	4	PVC-SCH40	1980	34.79	37	6.057	1986	2.0	11.057	22.11	HIGH	50.08%	$ 4,577	$ 1,805
140	E. FOURTH AVE.	6	PVC-SCH40	1980	190.02	37	6.057	1984	2.0	11.057	22.11	HIGH	50.13%	$ 24,995	$ 9,856
141	E. FOURTH AVE.	4	PVC-SCH40	1980	29.98	37	6.057	1984	2.0	11.057	22.11	HIGH	50.13%	$ 3,944	$ 1,555
142	E. FOURTH AVE.	4	PVC-SCH40	1980	321.37	37	6.057	1984	2.0	11.057	22.11	HIGH	50.22%	$ 42,273	$ 16,669
143	LUCKY ST.	4	PVC-SCH40	1980	75.57	37	6.057	2013	2.0	11.057	22.11	HIGH	50.23%	$ 9,940	$ 3,919
161	TINGLEY ST.	4	PVC-SCH40	1980	350.37	37	6.057	1986	2.0	11.057	22.11	HIGH	50.32%	$ 46,088	$ 18,173
252	CORONA AVE.	6	PVC-SCH40	1980	73.41	37	6.057	2011	2.0	11.057	22.11	HIGH	50.34%	$ 9,657	$ 3,808
253	CORONA AVE.	6	PVC-SCH40	1980	461.20	37	6.057	2011	2.0	11.057	22.11	HIGH	50.46%	$ 60,666	$ 23,921
254	. CAMINO DE ME!	6	PVC-SCH40	1980	300.01	37	6.057	1980	2.0	11.057	22.11	HIGH	50.54%	$ 39,463	$ 15,561
257	CORONA AVE.	6	PVC-SCH40	1980	949.21	37	6.057	1980	2.0	11.057	22.11	HIGH	50.78%	$ 124,859	$ 49,233
286		6	PVC-SCH40	1980	1389.43	37	6.057	1971	2.0	11.057	22.11	HIGH	51.13%	$ 182,765	$ 72,066
305	N. CEDAR ST.	6	PVC-SCH40	1980	158.14	37	6.057	1991	2.0	11.057	22.11	HIGH	51.17%	$ 20,802	$ 8,202
306	N. CEDAR ST.	6	PVC-SCH40	1980	359.95	37	6.057	1983	2.0	11.057	22.11	HIGH	51.27%	$ 47,347	$ 18,670
307	N. CEDAR ST.	6	PVC-SCH40	1980	316.69	37	6.057	1983	2.0	11.057	22.11	HIGH	51.35%	$ 41,657	$ 16,426
308	N. CEDAR ST.	6	PVC-SCH40	1980	128.76	37	6.057	1983	2.0	11.057	22.11	HIGH	51.38%	$ 16,937	$ 6,678
310	OAK ST.	6	PVC-SCH40	1980	360.00	37	6.057	1986	2.0	11.057	22.11	HIGH	51.47%	$ 47,354	$ 18,672
312	CORBETT ST.	4	PVC-SCH40	1980	46.26	37	6.057	1989	2.0	11.057	22.11	HIGH	51.48%	$ 6,085	$ 2,399
328	E. THIRD AVE.	6	PVC-SCH40	1980	188.83	37	6.057	1983	2.0	11.057	22.11	HIGH	51.53%	$ 24,838	$ 9,794
331	CORBETT ST.	6	PVC-SCH40	1980	18.32	37	6.057	2013	2.0	11.057	22.11	HIGH	51.54%	$ 2,410	$ 950
342	N. CEDAR ST.	6	PVC-SCH40	1980	255.34	37	6.057	1991	2.0	11.057	22.11	HIGH	51.60%	$ 33,588	$ 13,244
347	CABALLO RD.	6	PVC-SCH40	1980	132.65	37	6.057	2013	2.0	11.057	22.11	HIGH	51.64%	$ 17,449	$ 6,880
353	PATTON ST.	2	PVC-SCH40	1980	504.25	37	6.057	1970	2.0	11.057	22.11	HIGH	51.76%	$ 66,329	$ 26,154
370		8	PVC-SCH40	1980	64.76	37	6.057	1971	2.0	11.057	22.11	HIGH	51.78%	$ 11,358	$ 4,479
371		8	PVC-SCH40	1980	27.43	37	6.057	1971	2.0	11.057	22.11	HIGH	51.79%	$ 4,811	$ 1,897
428	E. THIRD AVE.	6	PVC-SCH40	1980	697.05	37	6.057	2013	2.0	11.057	22.11	HIGH	51.97%	$ 91,690	$ 36,154
859	SILVER ST.	4	PVC-SCH40	1980	82.60	37	6.057	1983	2.0	11.057	22.11	HIGH	51.99%	$ 10,865	$ 4,284
906	E. SIXTH AVE.	4	PVC-SCH40	1980	360.04	37	6.057	1993	2.0	11.057	22.11	HIGH	52.08%	$ 47,360	$ 18,675
1058		1.5	PVC-SCH40	1980	294.91	37	6.057	1971	2.0	11.057	22.11	HIGH	52.15%	$ 38,792	$ 15,296
1070		2	PVC-SCH40	1980	361.74	37	6.057	1963	2.0	11.057	22.11	HIGH	52.25%	$ 47,584	$ 18,763
835		8	CI	1947	39.43	70	5.782	1995	2.0	10.782	21.56	HIGH	52.26%	$ 6,916	$ 2,917
876	PERSHING ST.	8	CI	1947	581.89	70	5.782	2003	2.0	10.782	21.56	HIGH	52.41%	$ 102,058	$ 43,048

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
486	E. EIGHTH AVE.	4	AC	1960	382.70	57	7.176	1989	3.0	7.176	21.53	HIGH	52.50%	$ 50,341	$ 14,215
525	W. EIGHTH AVE.	6	AC	1960	370.01	57	7.176	1995	3.0	7.176	21.53	HIGH	52.60%	$ 48,671	$ 13,743
542	MAPLE ST.	6	AC	1960	285.56	57	7.176	1988	3.0	7.176	21.53	HIGH	52.67%	$ 37,563	$ 10,607
893	MORGAN ST.	8	AC	1960	255.58	57	7.176	1969	3.0	7.176	21.53	HIGH	52.74%	$ 44,826	$ 12,658
1008		2	COPPER	1990	307.12	27	2.346	1993	9.0	2.346	21.12	HIGH	52.81%	$ 40,398	$ 30,920
15	BROAD ST.	4	PVC-SCH40	2000	880.10	17	1.831	2001	3.0	6.831	20.49	HIGH	53.04%	$ 115,768	$ 94,572
1056		6	PVC-SCH40	2000	656.62	17	1.831	2005	3.0	6.831	20.49	HIGH	53.21%	$ 86,371	$ 70,558
116	E. NINTH AVE.	4	PVC-SCH40	1970	154.24	47	9.010	1971	1.0	19.010	19.01	HIGH	53.25%	$ 20,289	$ 2,009
129	E. NINTH AVE.	4	PVC-SCH40	1970	360.00	47	9.010	1971	1.0	19.010	19.01	HIGH	53.34%	$ 47,355	$ 4,689
158	E. SEVENTH AVE.	4	PVC-SCH40	1970	174.82	47	9.010	1983	1.0	19.010	19.01	HIGH	53.38%	$ 22,995	$ 2,277
167	E. NINTH AVE.	4	PVC-SCH40	1970	190.01	47	9.010	2005	1.0	19.010	19.01	HIGH	53.43%	$ 24,994	$ 2,475
912	J. MESCALERO DR	6	PVC-SCH40	1989	521.78	28	3.878	1989	2.0	8.878	17.76	HIGH	53.56%	$ 68,636	$ 42,019
939		6	PVC-SCH40	1960	43.67	57	12.523	1988	1.0	17.523	17.52	HIGH	53.57%	$ 5,744	$ 5,744
1059		6	PVC-SCH40	1975	404.61	42	7.463	1983	1.0	17.463	17.46	HIGH	53.68%	$ 53,222	$ 13,500
1098		6	PVC-SCH40	1975	334.14	42	7.463	1975	1.0	17.463	17.46	HIGH	53.76%	$ 43,953	$ 11,149
320	SILVER ST.	6	PVC-SCH40	1975	45.88	42	7.463	2010	1.0	17.463	17.46	HIGH	53.78%	$ 6,035	$ 1,531
321	SILVER ST.	6	PVC-SCH40	1975	176.46	42	7.463	2010	1.0	17.463	17.46	HIGH	53.82%	$ 23,211	$ 5,888
322	SILVER ST.	6	PVC-SCH40	1975	232.49	42	7.463	2010	1.0	17.463	17.46	HIGH	53.88%	$ 30,582	$ 7,757
323	SILVER ST.	6	PVC-SCH40	1975	308.42	42	7.463	2010	1.0	17.463	17.46	HIGH	53.96%	$ 40,570	$ 10,291
330	SILVER ST.	6	PVC-SCH40	1975	545.53	42	7.463	2010	1.0	17.463	17.46	HIGH	54.10%	$ 71,758	$ 18,202
336	SILVER ST.	6	PVC-SCH40	1975	233.88	42	7.463	2010	1.0	17.463	17.46	HIGH	54.16%	$ 30,765	$ 7,804
344	SILVER ST.	6	PVC-SCH40	1975	398.77	42	7.463	2010	1.0	17.463	17.46	HIGH	54.26%	$ 52,454	$ 13,306
822		6	PVC-SCH40	1975	217.94	42	7.463	2010	1.0	17.463	17.46	HIGH	54.31%	$ 28,668	$ 7,272
7	W. FIFTH AVE.	4	PVC-SCH40	1990	206.13	27	3.664	1996	2.0	8.664	17.33	HIGH	54.37%	$ 27,114	$ 17,180
27	BELLE ST.	4	PVC-SCH40	1990	364.71	27	3.664	1969	2.0	8.664	17.33	HIGH	54.46%	$ 47,974	$ 30,397
66	HILLCREST ST.	4	PVC-SCH40	1990	159.94	27	3.664	1995	2.0	8.664	17.33	HIGH	54.50%	$ 21,039	$ 13,330
67	HILLCREST ST.	4	PVC-SCH40	1990	144.21	27	3.664	1995	2.0	8.664	17.33	HIGH	54.54%	$ 18,969	$ 12,019
68	HILLCREST ST.	4	PVC-SCH40	1990	182.24	27	3.664	1995	2.0	8.664	17.33	HIGH	54.58%	$ 23,972	$ 15,189
69	HILLCREST ST.	4	PVC-SCH40	1990	28.37	27	3.664	1995	2.0	8.664	17.33	HIGH	54.59%	$ 3,732	$ 2,365
70	HILLCREST ST.	2	PVC-SCH40	1990	210.00	27	3.664	1995	2.0	8.664	17.33	HIGH	54.65%	$ 27,624	$ 17,503
184	HILLCREST ST.	4	PVC-SCH40	1990	53.52	27	3.664	1995	2.0	8.664	17.33	HIGH	54.66%	$ 7,040	$ 4,461
249	HILLCREST ST.	6	PVC-SCH40	1990	29.32	27	3.664	1995	2.0	8.664	17.33	HIGH	54.67%	$ 3,856	$ 2,443

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
288	N. CEDAR ST.	6	PVC-SCH40	1990	277.11	27	3.664	1991	2.0	8.664	17.33	HIGH	54.74%	$ 36,451	$ 23,095
289	W. BARTON AVE.	6	PVC-SCH40	1990	72.03	27	3.664	1991	2.0	8.664	17.33	HIGH	54.76%	$ 9,474	$ 6,003
290	W. BARTON AVE.	6	PVC-SCH40	1990	80.70	27	3.664	1991	2.0	8.664	17.33	HIGH	54.78%	$ 10,615	$ 6,726
376	E. THIRD AVE.	8	PVC-SCH40	1990	165.31	27	3.664	1993	2.0	8.664	17.33	HIGH	54.82%	$ 28,994	$ 18,371
377	E. THIRD AVE.	8	PVC-SCH40	1990	271.11	27	3.664	1993	2.0	8.664	17.33	HIGH	54.89%	$ 47,549	$ 30,128
451	HILLCREST ST.	6	PVC-SCH40	1990	19.54	27	3.664	1995	2.0	8.664	17.33	HIGH	54.89%	$ 2,571	$ 1,629
853	W. FIFTH AVE.	4	PVC-SCH40	1990	326.49	27	3.664	1996	2.0	8.664	17.33	HIGH	54.98%	$ 42,946	$ 27,211
890	JOHNSON RD.	4	PVC-SCH40	1990	314.48	27	3.664	1998	2.0	8.664	17.33	HIGH	55.06%	$ 41,367	$ 26,211
940	SMITH AVE.	6	PVC-SCH40	1990	210.59	27	3.664	1991	2.0	8.664	17.33	HIGH	55.11%	$ 27,701	$ 17,551
942	LESLIE AVE.	6	PVC-SCH40	1990	437.16	27	3.664	1980	2.0	8.664	17.33	HIGH	55.22%	$ 57,504	$ 36,435
943	PINE ST.	6	PVC-SCH40	1990	212.67	27	3.664	1980	2.0	8.664	17.33	HIGH	55.28%	$ 27,975	$ 17,725
948	E. AURORA AVE.	6	PVC-SCH40	1990	62.48	27	3.664	1995	2.0	8.664	17.33	HIGH	55.29%	$ 8,218	$ 5,207
949	E. AURORA AVE.	6	PVC-SCH40	1990	58.46	27	3.664	1995	2.0	8.664	17.33	HIGH	55.31%	$ 7,689	$ 4,872
951	ASH ST.	6	PVC-SCH40	1990	1237.66	27	3.664	1991	2.0	8.664	17.33	HIGH	55.62%	$ 162,802	$ 103,153
952	NEW SCHOOL RD.	6	PVC-SCH40	1990	141.56	27	3.664	1991	2.0	8.664	17.33	HIGH	55.66%	$ 18,621	$ 11,798
976		6	PVC-SCH40	1990	535.86	27	3.664	1999	2.0	8.664	17.33	HIGH	55.80%	$ 70,487	$ 44,661
984		4	PVC-SCH40	1990	483.74	27	3.664	1991	2.0	8.664	17.33	HIGH	55.92%	$ 63,631	$ 40,317
1040		2	PVC-SCH40	1990	152.79	27	3.664	1997	2.0	8.664	17.33	HIGH	55.96%	$ 20,099	$ 12,735
1044		4	PVC-SCH40	1990	227.35	27	3.664	1995	2.0	8.664	17.33	HIGH	56.02%	$ 29,906	$ 18,949
1053		6	PVC-SCH40	1990	686.81	27	3.664	1999	2.0	8.664	17.33	HIGH	56.19%	$ 90,343	$ 57,242
1054		1	PVC-SCH40	1990	268.01	27	3.664	1972	2.0	8.664	17.33	HIGH	56.26%	$ 35,254	$ 22,337
1067		6	PVC-SCH40	1990	595.63	27	3.664	1996	2.0	8.664	17.33	HIGH	56.41%	$ 78,349	$ 49,643
1069		2	PVC-SCH40	1990	335.75	27	3.664	1999	2.0	8.664	17.33	HIGH	56.50%	$ 44,165	$ 27,983
1107	N. CEDAR ST.	6	PVC-SCH40	1990	263.07	27	3.664		2.0	8.664	17.33	HIGH	56.56%	$ 34,605	$ 21,926
546	E. NINTH AVE.	6	AC	1960	365.91	57	7.176	2005	1.0	17.176	17.18	HIGH	56.66%	$ 48,131	$ 13,591
585	E. NINTH AVE.	6	AC	1960	360.00	57	7.176	1976	1.0	17.176	17.18	HIGH	56.75%	$ 47,354	$ 13,371
908	pvc	6	PVC-SCH40	1991	177.03	26	3.455	1991	2.0	8.455	16.91	HIGH	56.80%	$ 23,286	$ 15,240
909	E HICARILLA DR.	6	PVC-SCH40	1991	260.28	26	3.455	1991	2.0	8.455	16.91	HIGH	56.86%	$ 34,238	$ 22,407
913	N BOSQUE DR	6	PVC-SCH40	1991	466.63	26	3.455	1991	2.0	8.455	16.91	HIGH	56.98%	$ 61,381	$ 40,171
1000		6	PVC-SCH40	1991	1703.44	26	3.455	1990-1991	2.0	8.455	16.91	HIGH	57.42%	$ 224,070	$ 146,645
1102		6	PVC-SCH40	1991	508.00	26	3.455	1990-1991	2.0	8.455	16.91	HIGH	57.55%	$ 66,823	$ 43,733
554	MAPLE ST.	6	CI	1970	335.33	47	3.342	1981	2.0	8.342	16.68	HIGH	57.63%	$ 44,110	$ 29,370

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
623	E. THIRD AVE.	4	CI	1970	358.79	47	3.342	1963	2.0	8.342	16.68	HIGH	57.72%	$ 47,195	$ 31,424
731	W. SECOND AVE.	8	CI	1970	162.22	47	3.342	2012	2.0	8.342	16.68	HIGH	57.76%	$ 28,451	$ 18,944
151	E. SEVENTH AVE.	4	PVC-SCH40	1980	140.00	37	6.057	1983	1.0	16.057	16.06	HIGH	57.80%	$ 18,416	$ 7,262
1060		6	PVC-SCH40	1980	204.05	37	6.057	1991	1.0	16.057	16.06	HIGH	57.85%	$ 26,840	$ 10,583
356	\. INTERCHANGE	6	PVC-SCH40	1996	509.12	21	2.497	1996-1998	2.0	7.497	14.99	HIGH	57.98%	$ 66,970	$ 50,248
1095	\. INTERCHANGE	6	PVC-SCH40	1996	655.44	21	2.497	1996-1998	2.0	7.497	14.99	HIGH	58.15%	$ 86,217	$ 64,689
48	SIMPSON ST.	4	AC	1960	380.01	57	7.176	1980	2.0	7.176	14.35	HIGH	58.25%	$ 49,987	$ 14,115
223	MYRTLE ST.	6	AC	1960	369.00	57	7.176	1997	2.0	7.176	14.35	HIGH	58.34%	$ 48,538	$ 13,706
351	W. FOURTH AVE.	8	AC	1960	330.59	57	7.176	1998	2.0	7.176	14.35	HIGH	58.42%	$ 57,983	$ 16,373
379	W. FOURTH AVE.	8	AC	1960	203.60	57	7.176	1998	2.0	7.176	14.35	HIGH	58.48%	$ 35,709	$ 10,083
454	IRON ST.	6	AC	1960	403.64	57	7.176	1969	2.0	7.176	14.35	HIGH	58.58%	$ 53,095	$ 14,992
471	N. CEDAR ST.	4	AC	1960	686.83	57	7.176	1999	2.0	7.176	14.35	HIGH	58.75%	$ 90,345	$ 25,511
472	N. CEDAR ST.	4	AC	1960	36.00	57	7.176	1999	2.0	7.176	14.35	HIGH	58.76%	$ 4,735	$ 1,337
473	E. FOURTH AVE.	4	AC	1960	313.24	57	7.176	1981	2.0	7.176	14.35	HIGH	58.84%	$ 41,204	$ 11,635
481	GOLD ST.	4	AC	1960	717.29	57	7.176	1995	2.0	7.176	14.35	HIGH	59.03%	$ 94,352	$ 26,642
503	CUCHILLO ST.	4	AC	1960	545.55	57	7.176	1972	2.0	7.176	14.35	HIGH	59.17%	$ 71,761	$ 20,263
504	WADE ST.	4	AC	1960	286.05	57	7.176	1972-1975	2.0	7.176	14.35	HIGH	59.24%	$ 37,627	$ 10,625
524	W. EIGHTH AVE.	6	AC	1960	314.31	57	7.176	1995	2.0	7.176	14.35	HIGH	59.32%	$ 41,344	$ 11,674
526	MARIE ST.	6	AC	1960	329.98	57	7.176	1970	2.0	7.176	14.35	HIGH	59.40%	$ 43,406	$ 12,256
534	MARIE ST.	6	AC	1960	78.12	57	7.176	1970	2.0	7.176	14.35	HIGH	59.42%	$ 10,276	$ 2,902
551	SILVER ST.	6	AC	1960	1025.09	57	7.176	1992	2.0	7.176	14.35	HIGH	59.69%	$ 134,840	$ 38,075
552	SILVER ST.	6	AC	1960	46.03	57	7.176	1992	2.0	7.176	14.35	HIGH	59.70%	$ 6,055	$ 1,710
559	N. CEDAR ST.	6	AC	1960	3.63	57	7.176	1998	2.0	7.176	14.35	HIGH	59.70%	$ 478	$ 135
562	DATE ST.	6	AC	1960	170.25	57	7.176	1995	2.0	7.176	14.35	HIGH	59.74%	$ 22,394	$ 6,324
568	CORBETT ST.	6	AC	1960	27.50	57	7.176	1989	2.0	7.176	14.35	HIGH	59.75%	$ 3,617	$ 1,021
571	CABALLO RD.	6	AC	1960	830.03	57	7.176	2013	2.0	7.176	14.35	HIGH	59.96%	$ 109,182	$ 30,830
573	E. THIRD AVE.	6	AC	1960	171.97	57	7.176	1975	2.0	7.176	14.35	HIGH	60.00%	$ 22,622	$ 6,388
576	E. THIRD AVE.	6	AC	1960	43.96	57	7.176	1975	2.0	7.176	14.35	HIGH	60.02%	$ 5,782	$ 1,633
577	E. FIFTH AVE.	6	AC	1960	63.39	57	7.176	1993	2.0	7.176	14.35	HIGH	60.03%	$ 8,338	$ 2,355
578	E. FOURTH AVE.	6	AC	1960	360.02	57	7.176	1975	2.0	7.176	14.35	HIGH	60.12%	$ 47,357	$ 13,372
579	ARROWHEAD RD.	6	AC	1960	361.00	57	7.176	1976	2.0	7.176	14.35	HIGH	60.22%	$ 47,486	$ 13,409
586	OSBORN LN.	6	AC	1960	356.86	57	7.176	1975	2.0	7.176	14.35	HIGH	60.31%	$ 46,941	$ 13,255

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
687	W. EIGHTH AVE.	6	AC	1960	360.00	57	7.176	1995	2.0	7.176	14.35	HIGH	60.40%	$ 47,355	$ 13,372
701	CORBETT ST.	4	AC	1960	710.03	57	7.176	1989	2.0	7.176	14.35	HIGH	60.58%	$ 93,398	$ 26,373
711	CABALLO RD.	6	AC	1960	250.32	57	7.176	2013	2.0	7.176	14.35	HIGH	60.64%	$ 32,927	$ 9,298
725	MORGAN ST.	8	AC	1960	260.00	57	7.176	1969	2.0	7.176	14.35	HIGH	60.71%	$ 45,601	$ 12,876
860	GOLD ST.	4	AC	1960	339.69	57	7.176	1995	2.0	7.176	14.35	HIGH	60.80%	$ 44,683	$ 12,617
870	E. FIFTH AVE.	6	AC	1960	106.02	57	7.176	1993	2.0	7.176	14.35	HIGH	60.82%	$ 13,946	$ 3,938
871	E. FIFTH AVE.	6	AC	1960	129.89	57	7.176	1993	2.0	7.176	14.35	HIGH	60.86%	$ 17,086	$ 4,825
877	W. BARTON AVE.	6	AC	1960	806.64	57	7.176	2003	2.0	7.176	14.35	HIGH	61.06%	$ 106,105	$ 29,961
880	HYDE ST.	6	AC	1960	184.51	57	7.176	1996-1998	2.0	7.176	14.35	HIGH	61.11%	$ 24,270	$ 6,853
972		8	AC	1960	124.37	57	7.176	1999	2.0	7.176	14.35	HIGH	61.14%	$ 21,813	$ 6,159
973		8	AC	1960	142.84	57	7.176	1999	2.0	7.176	14.35	HIGH	61.18%	$ 25,053	$ 7,074
974		8	AC	1960	128.31	57	7.176	1999	2.0	7.176	14.35	HIGH	61.21%	$ 22,504	$ 6,354
975		8	AC	1960	677.42	57	7.176	1992-1999	2.0	7.176	14.35	HIGH	61.38%	$ 118,813	$ 33,549
1001		6	AC	1960	801.81	57	7.176	1975	2.0	7.176	14.35	HIGH	61.59%	$ 105,470	$ 29,782
1087		0.75	COPPER	1990	245.17	27	2.346	1981	6.0	2.346	14.08	HIGH	61.65%	$ 32,250	$ 24,683
60	HACKBERRY LN.	4	PVC-SCH40	1970	1278.16	47	9.010	1977	1.0	14.010	14.01	HIGH	61.98%	$ 168,129	$ 16,646
61	:OTTONWOOD RD	4	PVC-SCH40	1970	196.62	47	9.010	1977	1.0	14.010	14.01	HIGH	62.03%	$ 25,863	$ 2,561
62	MERCURY ST.	4	PVC-SCH40	1970	1280.26	47	9.010	1977	1.0	14.010	14.01	HIGH	62.35%	$ 168,406	$ 16,674
97	ARROWHEAD RD.	4	PVC-SCH40	1970	78.01	47	9.010	1976	1.0	14.010	14.01	HIGH	62.37%	$ 10,262	$ 1,016
98	ARROWHEAD RD.	4	PVC-SCH40	1970	179.75	47	9.010	1976	1.0	14.010	14.01	HIGH	62.42%	$ 23,645	$ 2,341
99	ARROWHEAD RD.	4	PVC-SCH40	1970	92.82	47	9.010	1976	1.0	14.010	14.01	HIGH	62.44%	$ 12,210	$ 1,209
100	ARROWHEAD RD.	4	PVC-SCH40	1970	26.55	47	9.010	1976	1.0	14.010	14.01	HIGH	62.45%	$ 3,492	$ 346
101	ARROWHEAD RD.	4	PVC-SCH40	1970	31.44	47	9.010	1976	1.0	14.010	14.01	HIGH	62.46%	$ 4,136	$ 409
103	SILVER ST.	4	PVC-SCH40	1970	61.72	47	9.010	1978	1.0	14.010	14.01	HIGH	62.47%	$ 8,119	$ 804
104	SILVER ST.	4	PVC-SCH40	1970	439.95	47	9.010	1978	1.0	14.010	14.01	HIGH	62.59%	$ 57,871	$ 5,730
113	E. FIRST AVE.	4	PVC-SCH40	1970	160.14	47	9.010	1978	1.0	14.010	14.01	HIGH	62.63%	$ 21,065	$ 2,086
115	E. FIRST AVE.	4	PVC-SCH40	1970	126.66	47	9.010	1978	1.0	14.010	14.01	HIGH	62.66%	$ 16,661	$ 1,650
135	CABALLO RD.	4	PVC-SCH40	1970	41.30	47	9.010	1972	1.0	14.010	14.01	HIGH	62.67%	$ 5,433	$ 538
136	ARROYO ST.	4	PVC-SCH40	1970	136.30	47	9.010	1972	1.0	14.010	14.01	HIGH	62.71%	$ 17,928	$ 1,775
148	OSBORN LN.	4	PVC-SCH40	1970	349.29	47	9.010	1975	1.0	14.010	14.01	HIGH	62.79%	$ 45,946	$ 4,549
149	OSBORN LN.	4	PVC-SCH40	1970	40.05	47	9.010	1975	1.0	14.010	14.01	HIGH	62.80%	$ 5,268	$ 522
150	CABALLO RD.	4	PVC-SCH40	1970	239.24	47	9.010	1972	1.0	14.010	14.01	HIGH	62.87%	$ 31,470	$ 3,116

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
154	E. SIXTH AVE.	4	PVC-SCH40	1970	360.02	47	9.010	1971	1.0	14.010	14.01	HIGH	62.96%	$ 47,357	$ 4,689
155	E. SIXTH AVE.	4	PVC-SCH40	1970	187.08	47	9.010	1975	1.0	14.010	14.01	HIGH	63.01%	$ 24,608	$ 2,436
156	E. SEVENTH AVE.	4	PVC-SCH40	1970	23.97	47	9.010	1983	1.0	14.010	14.01	HIGH	63.01%	$ 3,153	$ 312
157	LUCKY ST.	4	PVC-SCH40	1970	380.10	47	9.010	1983	1.0	14.010	14.01	HIGH	63.11%	$ 49,998	$ 4,950
162	ARROYO ST.	4	PVC-SCH40	1970	131.94	47	9.010	1972	1.0	14.010	14.01	HIGH	63.14%	$ 17,356	$ 1,718
163	GARNETT ST.	4	PVC-SCH40	1970	458.75	47	9.010	1972-1975	1.0	14.010	14.01	HIGH	63.26%	$ 60,344	$ 5,975
164	GIBSON ST.	4	PVC-SCH40	1970	355.62	47	9.010	1972-1975	1.0	14.010	14.01	HIGH	63.35%	$ 46,779	$ 4,632
175	E. FIRST AVE.	4	PVC-SCH40	1970	218.12	47	9.010	1978	1.0	14.010	14.01	HIGH	63.41%	$ 28,691	$ 2,841
176	E. SECOND AVE.	4	PVC-SCH40	1970	55.90	47	9.010	1978	1.0	14.010	14.01	HIGH	63.42%	$ 7,354	$ 728
204	N. CEDAR ST.	6	PVC-SCH40	1970	364.38	47	9.010	1973	1.0	14.010	14.01	HIGH	63.51%	$ 47,930	$ 4,746
259	TIN ST.	6	PVC-SCH40	1970	546.00	47	9.010	1971	1.0	14.010	14.01	HIGH	63.65%	$ 71,821	$ 7,111
264	CHERRY LN.	6	PVC-SCH40	1970	274.55	47	9.010	2013	1.0	14.010	14.01	HIGH	63.72%	$ 36,114	$ 3,576
281	CHERRY LN.	6	PVC-SCH40	1970	217.34	47	9.010	2013	1.0	14.010	14.01	HIGH	63.78%	$ 28,588	$ 2,831
291	YUCCA ST.	6	PVC-SCH40	1970	478.00	47	9.010	1978	1.0	14.010	14.01	HIGH	63.90%	$ 62,876	$ 6,225
292	W. EIGHTH AVE.	6	PVC-SCH40	1970	310.03	47	9.010	1978	1.0	14.010	14.01	HIGH	63.98%	$ 40,781	$ 4,038
293	SIERRA VISTA DR.	6	PVC-SCH40	1970	727.17	47	9.010	1978	1.0	14.010	14.01	HIGH	64.17%	$ 95,652	$ 9,471
296	PALO VERDE ST.	6	PVC-SCH40	1970	864.90	47	9.010	1978	1.0	14.010	14.01	HIGH	64.39%	$ 113,769	$ 11,264
297	YUCCA ST.	6	PVC-SCH40	1970	868.06	47	9.010	1978	1.0	14.010	14.01	HIGH	64.61%	$ 114,184	$ 11,305
313	CHERRY LN.	6	PVC-SCH40	1970	69.25	47	9.010	2013	1.0	14.010	14.01	HIGH	64.63%	$ 9,109	$ 902
314	CHERRY LN.	6	PVC-SCH40	1970	288.52	47	9.010	2013	1.0	14.010	14.01	HIGH	64.70%	$ 37,952	$ 3,758
337	MARIE ST.	6	PVC-SCH40	1970	281.33	47	9.010	2013	1.0	14.010	14.01	HIGH	64.77%	$ 37,007	$ 3,664
439	TIN ST.	6	PVC-SCH40	1970	377.28	47	9.010	1971	1.0	14.010	14.01	HIGH	64.87%	$ 49,628	$ 4,914
447	VEATER ST.	6	PVC-SCH40	1970	190.00	47	9.010	1977	1.0	14.010	14.01	HIGH	64.92%	$ 24,993	$ 2,475
466	AUSTIN AVE.	4	PVC-SCH40	1970	329.03	47	9.010	1979	1.0	14.010	14.01	HIGH	65.00%	$ 43,281	$ 4,285
467	AUSTIN AVE.	6	PVC-SCH40	1970	287.23	47	9.010	1979	1.0	14.010	14.01	HIGH	65.07%	$ 37,782	$ 3,741
708	CHERRY LN.	6	PVC-SCH40	1970	108.35	47	9.010	2013	1.0	14.010	14.01	HIGH	65.10%	$ 14,252	$ 1,411
754	W. THIRD AVE.	6	PVC-SCH40	1970	254.21	47	9.010	1997	1.0	14.010	14.01	HIGH	65.17%	$ 33,439	$ 3,311
878	E. SECOND AVE.	4	PVC-SCH40	1970	20.44	47	9.010	1979	1.0	14.010	14.01	HIGH	65.17%	$ 2,689	$ 266
987		2	PVC-SCH40	1970	194.15	47	9.010	1972-1975	1.0	14.010	14.01	HIGH	65.22%	$ 25,539	$ 2,529
988		4	PVC-SCH40	1970	194.45	47	9.010	1972-1975	1.0	14.010	14.01	HIGH	65.27%	$ 25,578	$ 2,532
992		2	PVC-SCH40	1970	374.60	47	9.010	2013	1.0	14.010	14.01	HIGH	65.37%	$ 49,274	$ 4,879
1031		2	PVC-SCH40	1970	471.12	47	9.010	1977	1.0	14.010	14.01	HIGH	65.49%	$ 61,971	$ 6,136

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
1050		2	PVC-SCH40	1970	187.90	47	9.010	1971	1.0	14.010	14.01	HIGH	65.53%	$ 24,717	$ 2,447
1071		0.75	PVC-SCH40	1970	353.77	47	9.010	1997	1.0	14.010	14.01	HIGH	65.62%	$ 46,534	$ 4,607
127	E. SEVENTH AVE.	4	PVC-SCH40	1990	223.70	27	3.664	1995	1.0	13.664	13.66	HIGH	65.68%	$ 29,425	$ 18,644
1075		0.75	PVC-SCH40	1990	174.70	27	3.664	1999	1.0	13.664	13.66	HIGH	65.73%	$ 22,980	$ 14,560
1076		0.75	PVC-SCH40	1990	186.19	27	3.664	1999	1.0	13.664	13.66	HIGH	65.77%	$ 24,492	$ 15,518
52	HENSON ST.	8	PVC-SCH40	2000	367.00	17	1.831	2003	2.0	6.831	13.66	HIGH	65.87%	$ 64,368	$ 52,583
53	CITY ST.	6	PVC-SCH40	2000	360.11	17	1.831	2005-New	2.0	6.831	13.66	HIGH	65.96%	$ 47,369	$ 38,696
75	NORTH ST.	4	PVC-SCH40	2000	252.38	17	1.831	2001	2.0	6.831	13.66	HIGH	66.02%	$ 33,198	$ 27,120
84	NICKEL ST.	4	PVC-SCH40	2000	731.03	17	1.831	1986	2.0	6.831	13.66	HIGH	66.21%	$ 96,160	$ 78,554
85	LEAD ST.	4	PVC-SCH40	2000	348.34	17	1.831	1986	2.0	6.831	13.66	HIGH	66.30%	$ 45,820	$ 37,431
87	COPPER ST.	4	PVC-SCH40	2000	734.19	17	1.831	1986	2.0	6.831	13.66	HIGH	66.49%	$ 96,576	$ 78,894
187	SIMPSON ST.	4	PVC-SCH40	2000	365.90	17	1.831	1986	2.0	6.831	13.66	HIGH	66.58%	$ 48,131	$ 39,318
188	SIMPSON ST.	4	PVC-SCH40	2000	364.28	17	1.831	1986	2.0	6.831	13.66	HIGH	66.67%	$ 47,917	$ 39,144
224	MARSHALL ST.	6	PVC-SCH40	2000	285.06	17	1.831	1995	2.0	6.831	13.66	HIGH	66.75%	$ 37,496	$ 30,631
894	NORTH ST.	4	PVC-SCH40	2000	361.89	17	1.831	1969	2.0	6.831	13.66	HIGH	66.84%	$ 47,603	$ 38,888
896	BRIGHTON ST.	6	PVC-SCH40	2000	359.39	17	1.831	2001	2.0	6.831	13.66	HIGH	66.93%	$ 47,274	$ 38,619
1096		6	PVC-SCH40	2000	63.77	17	1.831	2006	2.0	6.831	13.66	HIGH	66.95%	$ 8,389	$ 6,853
836		8	CI	1990	39.40	27	1.650	1995	2.0	6.650	13.30	HIGH	66.96%	$ 6,911	$ 5,771
488	WYONA AVE.	4	AC	1935	450.01	82	12.989	1983	1.0	12.989	12.99	HIGH	67.07%	$ 59,194	$ 59,194
489	CHARLES AVE.	4	AC	1935	899.72	82	12.989	1978	1.0	12.989	12.99	HIGH	67.30%	$ 118,350	$ 118,350
490	WYONA AVE.	4	AC	1935	450.02	82	12.989	1983	1.0	12.989	12.99	HIGH	67.41%	$ 59,195	$ 59,195
492	GRAY ST.	4	AC	1935	489.18	82	12.989	1983	1.0	12.989	12.99	HIGH	67.54%	$ 64,347	$ 64,347
494	RIVERSIDE DR.	4	AC	1935	819.39	82	12.989	1983	1.0	12.989	12.99	HIGH	67.75%	$ 107,782	$ 107,782
495	CLANCY ST.	6	AC	1935	325.37	82	12.989	1983-1999	1.0	12.989	12.99	HIGH	67.83%	$ 42,800	$ 42,800
497	FOCH ST.	4	AC	1935	318.99	82	12.989	1970	1.0	12.989	12.99	HIGH	67.91%	$ 41,960	$ 41,960
499	MARR AVE.	4	AC	1935	32.39	82	12.989	1998	1.0	12.989	12.99	HIGH	67.92%	$ 4,261	$ 4,261
505	AUSTIN AVE.	4	AC	1935	450.00	82	12.989	1993	1.0	12.989	12.99	HIGH	68.04%	$ 59,193	$ 59,193
507	BIRCH ST.	4	AC	1935	359.00	82	12.989	1981	1.0	12.989	12.99	HIGH	68.13%	$ 47,223	$ 47,223
532	BROADWAY ST.	6	AC	1935	17.34	82	12.989	1997	1.0	12.989	12.99	HIGH	68.13%	$ 2,281	$ 2,281
535	MIMS ST.	6	AC	1935	172.77	82	12.989	1963	1.0	12.989	12.99	HIGH	68.18%	$ 22,727	$ 22,727
536	MIMS ST.	6	AC	1935	134.84	82	12.989	1963	1.0	12.989	12.99	HIGH	68.21%	$ 17,736	$ 17,736
537	MCADOO ST.	6	AC	1935	410.27	82	12.989	1991	1.0	12.989	12.99	HIGH	68.32%	$ 53,967	$ 53,967

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
538	JONES ST.	6	AC	1935	163.77	82	12.989	1984	1.0	12.989	12.99	HIGH	68.36%	$ 21,542	$ 21,542
539	FOCH ST.	6	AC	1935	137.46	82	12.989	1991	1.0	12.989	12.99	HIGH	68.39%	$ 18,082	$ 18,082
565	JONES ST.	6	AC	1935	166.30	82	12.989	1984	1.0	12.989	12.99	HIGH	68.44%	$ 21,875	$ 21,875
584	RIVERSIDE DR.	6	AC	1935	60.77	82	12.989	1975	1.0	12.989	12.99	HIGH	68.45%	$ 7,994	$ 7,994
588	BROADWAY ST.	6	AC	1935	32.41	82	12.989	1997	1.0	12.989	12.99	HIGH	68.46%	$ 4,263	$ 4,263
600	BROADWAY ST.	8	AC	1935	321.64	82	12.989	1995	1.0	12.989	12.99	HIGH	68.54%	$ 56,413	$ 56,413
603	MIMS ST.	8	AC	1935	265.69	82	12.989	1979	1.0	12.989	12.99	HIGH	68.61%	$ 46,600	$ 46,600
604	RIVERSIDE DR.	8	AC	1935	397.59	82	12.989	1970	1.0	12.989	12.99	HIGH	68.71%	$ 69,733	$ 69,733
605	VAN PATTEN AVE	8	AC	1935	448.78	82	12.989	1970	1.0	12.989	12.99	HIGH	68.83%	$ 78,712	$ 78,712
612	MIMS ST.	8	AC	1935	27.05	82	12.989	1979	1.0	12.989	12.99	HIGH	68.83%	$ 4,743	$ 4,743
674	CLANCY ST.	4	AC	1935	323.24	82	12.989	1983	1.0	12.989	12.99	HIGH	68.91%	$ 42,519	$ 42,519
675	CHARLES AVE.	4	AC	1935	61.77	82	12.989	1978	1.0	12.989	12.99	HIGH	68.93%	$ 8,125	$ 8,125
677	WYONA AVE.	4	AC	1935	265.55	82	12.989	1983	1.0	12.989	12.99	HIGH	69.00%	$ 34,931	$ 34,931
726	AUSTIN AVE.	4	AC	1935	901.30	82	12.989	1977	1.0	12.989	12.99	HIGH	69.23%	$ 118,557	$ 118,557
768	MIMS ST.	8	AC	1935	135.25	82	12.989	1979	1.0	12.989	12.99	HIGH	69.26%	$ 23,722	$ 23,722
771	FOCH ST.	4	AC	1935	311.82	82	12.989	1993	1.0	12.989	12.99	HIGH	69.34%	$ 41,017	$ 41,017
772	FOCH ST.	4	AC	1935	327.52	82	12.989	1970	1.0	12.989	12.99	HIGH	69.43%	$ 43,082	$ 43,082
773	MARR AVE.	4	AC	1935	440.30	82	12.989	1993	1.0	12.989	12.99	HIGH	69.54%	$ 57,917	$ 57,917
778	POST ST.	6	AC	1935	274.31	82	12.989	1977	1.0	12.989	12.99	HIGH	69.61%	$ 36,082	$ 36,082
789	VAN PATTEN AVE	8	AC	1935	902.30	82	12.989	1999	1.0	12.989	12.99	HIGH	69.84%	$ 158,255	$ 158,255
792	MARR AVE.	4	AC	1935	418.07	82	12.989	1998	1.0	12.989	12.99	HIGH	69.95%	$ 54,992	$ 54,992
795	WYONA AVE.	4	AC	1935	273.20	82	12.989	1983	1.0	12.989	12.99	HIGH	70.01%	$ 35,936	$ 35,936
796	CLANCY ST.	4	AC	1935	321.65	82	12.989	1983	1.0	12.989	12.99	HIGH	70.10%	$ 42,310	$ 42,310
800	JONES ST.	6	AC	1935	170.08	82	12.989	1984	1.0	12.989	12.99	HIGH	70.14%	$ 22,372	$ 22,372
814	MARR AVE.	4	AC	1935	220.54	82	12.989	1979	1.0	12.989	12.99	HIGH	70.20%	$ 29,010	$ 29,010
815		8	AC	1935	294.40	82	12.989	1979	1.0	12.989	12.99	HIGH	70.27%	$ 51,635	$ 51,635
844	BIRCH ST.	4	AC	1935	34.13	82	12.989	1981	1.0	12.989	12.99	HIGH	70.28%	$ 4,489	$ 4,489
921	ARENA DR.	6	PVC-SCH40	1994	551.75	23	2.864	1993	1.0	12.864	12.86	HIGH	70.42%	$ 72,577	$ 51,794
922	GLENN ST.	6	PVC-SCH40	1994	458.63	23	2.864	1993	1.0	12.864	12.86	HIGH	70.54%	$ 60,328	$ 43,053
923	CARRIE ST.	6	PVC-SCH40	1994	757.89	23	2.864	1993	1.0	12.864	12.86	HIGH	70.73%	$ 99,693	$ 71,146
924	CARRIE ST.	6	PVC-SCH40	1994	838.69	23	2.864	1993	1.0	12.864	12.86	HIGH	70.95%	$ 110,322	$ 78,731
925	JACKSON ST.	6	PVC-SCH40	1994	608.79	23	2.864	1993	1.0	12.864	12.86	HIGH	71.10%	$ 80,080	$ 57,149

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
926	JACKSON ST.	6	PVC-SCH40	1994	814.36	23	2.864	1993	1.0	12.864	12.86	HIGH	71.31%	$ 107,121	$ 76,447
927	HAGEN ST.	6	PVC-SCH40	1994	536.36	23	2.864	1993	1.0	12.864	12.86	HIGH	71.45%	$ 70,552	$ 50,350
928	GLENN ST.	6	PVC-SCH40	1994	562.32	23	2.864	1993	1.0	12.864	12.86	HIGH	71.59%	$ 73,968	$ 52,787
930	GLENN ST.	6	PVC-SCH40	1994	267.45	23	2.864	1995	1.0	12.864	12.86	HIGH	71.66%	$ 35,181	$ 25,107
1101		6	PVC-SCH40	1994	277.85	23	2.864	1994	1.0	12.864	12.86	HIGH	71.73%	$ 36,548	$ 26,083
964		10	PVC-C900	2000	1113.81	17	1.831	2006-2007	7.0	1.831	12.82	HIGH	72.01%	$ 244,191	$ 199,482
965		12	PVC-C900	2000	616.79	17	1.831	2011	7.0	1.831	12.82	HIGH	72.17%	$ 162,272	$ 132,562
966		12	PVC-C900	2000	42.77	17	1.831	2011	7.0	1.831	12.82	HIGH	72.18%	$ 11,252	$ 9,192
904	SMITH AVE.	6	PVC-SCH40	1975	319.08	42	7.463	1997	1.0	12.463	12.46	HIGH	72.26%	$ 41,972	$ 10,647
329	SILVER ST.	6	PVC-SCH40	1975	335.41	42	7.463	1975	1.0	12.463	12.46	HIGH	72.35%	$ 44,120	$ 11,191
334	SILVER ST.	6	PVC-SCH40	1975	186.02	42	7.463	1975	1.0	12.463	12.46	HIGH	72.40%	$ 24,468	$ 6,207
335	SILVER ST.	6	PVC-SCH40	1975	306.36	42	7.463	1975	1.0	12.463	12.46	HIGH	72.47%	$ 40,298	$ 10,222
160	LUCKY ST.	4	PVC-SCH40	1975	523.82	42	7.463	1983	1.0	12.463	12.46	HIGH	72.61%	$ 68,904	$ 17,478
317	E. AURORA AVE.	6	PVC-SCH40	1975	33.25	42	7.463	2010	1.0	12.463	12.46	HIGH	72.62%	$ 4,374	$ 1,109
318	E. AURORA AVE.	6	PVC-SCH40	1975	36.47	42	7.463	2010	1.0	12.463	12.46	HIGH	72.63%	$ 4,798	$ 1,217
319	E. AURORA AVE.	6	PVC-SCH40	1975	120.01	42	7.463	2010	1.0	12.463	12.46	HIGH	72.66%	$ 15,786	$ 4,004
1074		1	POLY	1990	226.87	27	2.346	1999	1.0	12.346	12.35	HIGH	72.71%	$ 29,843	$ 22,841
963		10	PVC-C900	2006	611.73	11	1.000	1971	12.0	1.000	12.00	MEDIUM	72.87%	$ 134,117	$ 120,706
970		10	PVC-C900	2006	2089.03	11	1.000	1971	12.0	1.000	12.00	MEDIUM	73.40%	$ 457,998	$ 412,203
128	PINE ST.	4	PVC-SCH40	2000	551.09	17	1.831	2006	1.0	11.831	11.83	MEDIUM	73.54%	$ 72,491	$ 59,218
1066		2	PVC-SCH40	2000	202.33	17	1.831	2005	1.0	11.831	11.83	MEDIUM	73.60%	$ 26,614	$ 21,741
1097		6	PVC-SCH40	2009	130.88	8	0.660	2006	2.0	5.660	11.32	MEDIUM	73.63%	$ 17,216	$ 16,080
12	COLEMAN ST.	4	PVC-SCH40	2010	366.88	7	0.558	2013	2.0	5.558	11.12	MEDIUM	73.72%	$ 48,259	$ 45,567
993		0.75	PVC-SCH40	2010	229.66	7	0.558	2013	2.0	5.558	11.12	MEDIUM	73.78%	$ 30,210	$ 28,524
994		0.75	PVC-SCH40	2010	294.19	7	0.558	2013	2.0	5.558	11.12	MEDIUM	73.86%	$ 38,698	$ 36,539
995		0.75	PVC-SCH40	2010	188.52	7	0.558	1975	2.0	5.558	11.12	MEDIUM	73.91%	$ 24,797	$ 23,414
9	LOCUST ST.	4	PVC-SCH40	1980	290.85	37	6.057	1984	1.0	11.057	11.06	MEDIUM	73.98%	$ 38,259	$ 15,086
10	MAGNOLIA ST.	4	PVC-SCH40	1980	63.17	37	6.057	1995	1.0	11.057	11.06	MEDIUM	74.00%	$ 8,309	$ 3,276
14	E. FIRST AVE.	4	PVC-SCH40	1980	322.92	37	6.057	1995	1.0	11.057	11.06	MEDIUM	74.08%	$ 42,477	$ 16,749
16	E. FIRST AVE.	4	PVC-SCH40	1980	27.53	37	6.057	1995	1.0	11.057	11.06	MEDIUM	74.09%	$ 3,621	$ 1,428
18	ELM ST.	4	PVC-SCH40	1980	186.51	37	6.057	1978-1984	1.0	11.057	11.06	MEDIUM	74.13%	$ 24,533	$ 9,674
19	ELM ST.	4	PVC-SCH40	1980	274.69	37	6.057	1978-1984	1.0	11.057	11.06	MEDIUM	74.20%	$ 36,133	$ 14,248

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
20	ELM ST.	4	PVC-SCH40	1980	122.73	37	6.057	1978-1984	1.0	11.057	11.06	MEDIUM	74.23%	$ 16,144	$ 6,366
21	ELM ST.	4	PVC-SCH40	1980	59.96	37	6.057	1978-1984	1.0	11.057	11.06	MEDIUM	74.25%	$ 7,887	$ 3,110
72	HILLCREST ST.	4	PVC-SCH40	1980	152.49	37	6.057	1981	1.0	11.057	11.06	MEDIUM	74.29%	$ 20,059	$ 7,909
77	CORONA AVE.	4	PVC-SCH40	1980	52.26	37	6.057	2011	1.0	11.057	11.06	MEDIUM	74.30%	$ 6,874	$ 2,710
81	LEAD ST.	4	PVC-SCH40	1980	180.48	37	6.057	1986	1.0	11.057	11.06	MEDIUM	74.35%	$ 23,740	$ 9,361
88	PLATINUM ST.	4	PVC-SCH40	1980	379.38	37	6.057	1981	1.0	11.057	11.06	MEDIUM	74.44%	$ 49,904	$ 19,678
89	VEATER ST.	4	PVC-SCH40	1980	177.48	37	6.057	1981-1984	1.0	11.057	11.06	MEDIUM	74.49%	$ 23,346	$ 9,206
90	COAL ST.	4	PVC-SCH40	1980	556.21	37	6.057	1971	1.0	11.057	11.06	MEDIUM	74.63%	$ 73,163	$ 28,849
91	MARSHALL ST.	4	PVC-SCH40	1980	172.77	37	6.057	1971	1.0	11.057	11.06	MEDIUM	74.68%	$ 22,726	$ 8,961
92	COAL ST.	4	PVC-SCH40	1980	301.69	37	6.057	1971	1.0	11.057	11.06	MEDIUM	74.75%	$ 39,684	$ 15,648
93	MARSHALL ST.	4	PVC-SCH40	1980	179.27	37	6.057	1971	1.0	11.057	11.06	MEDIUM	74.80%	$ 23,581	$ 9,298
96	E. SECOND AVE.	4	PVC-SCH40	1980	279.17	37	6.057	1988	1.0	11.057	11.06	MEDIUM	74.87%	$ 36,722	$ 14,480
105	TURTLEVIEW AVE	4	PVC-SCH40	1980	13.71	37	6.057	1983	1.0	11.057	11.06	MEDIUM	74.87%	$ 1,803	$ 711
106	TURTLEVIEW AVE	4	PVC-SCH40	1980	163.98	37	6.057	1978	1.0	11.057	11.06	MEDIUM	74.92%	$ 21,571	$ 8,505
107	TURTLEVIEW AVE	4	PVC-SCH40	1980	7.65	37	6.057	1978	1.0	11.057	11.06	MEDIUM	74.92%	$ 1,007	$ 397
108	GOLD ST.	4	PVC-SCH40	1980	207.70	37	6.057	1978	1.0	11.057	11.06	MEDIUM	74.97%	$ 27,321	$ 10,773
109	JOFFRE ST.	4	PVC-SCH40	1980	360.45	37	6.057	1995	1.0	11.057	11.06	MEDIUM	75.06%	$ 47,414	$ 18,696
110	MAGNOLIA ST.	4	PVC-SCH40	1980	239.29	37	6.057	1995	1.0	11.057	11.06	MEDIUM	75.12%	$ 31,477	$ 12,412
112	E. SECOND AVE.	4	PVC-SCH40	1980	215.29	37	6.057	1995	1.0	11.057	11.06	MEDIUM	75.18%	$ 28,319	$ 11,166
152	OAK ST.	6	PVC-SCH40	1980	360.00	37	6.057	1976	1.0	11.057	11.06	MEDIUM	75.27%	$ 47,354	$ 18,672
153	OAK ST.	4	PVC-SCH40	1980	360.00	37	6.057	1986	1.0	11.057	11.06	MEDIUM	75.36%	$ 47,354	$ 18,672
159	LUCKY ST.	4	PVC-SCH40	1980	348.55	37	6.057	1983	1.0	11.057	11.06	MEDIUM	75.45%	$ 45,848	$ 18,078
169	PERSHING ST.	6	PVC-SCH40	1980	353.30	37	6.057	1989	1.0	11.057	11.06	MEDIUM	75.54%	$ 46,473	$ 18,325
170	LOCUST ST.	4	PVC-SCH40	1980	278.10	37	6.057	1984-1990	1.0	11.057	11.06	MEDIUM	75.61%	$ 36,581	$ 14,424
173	E. SEVENTH AVE.	4	PVC-SCH40	1980	12.06	37	6.057	1983	1.0	11.057	11.06	MEDIUM	75.62%	$ 1,587	$ 626
180	MAPLE ST.	4	PVC-SCH40	1980	290.11	37	6.057	1981	1.0	11.057	11.06	MEDIUM	75.69%	$ 38,161	$ 15,047
181	E. FIRST AVE.	4	PVC-SCH40	1980	360.01	37	6.057	1995	1.0	11.057	11.06	MEDIUM	75.78%	$ 47,356	$ 18,673
182	TURTLEVIEW AVE	4	PVC-SCH40	1980	135.69	37	6.057	1978	1.0	11.057	11.06	MEDIUM	75.82%	$ 17,849	$ 7,038
189	VEATER ST.	4	PVC-SCH40	1980	683.02	37	6.057	1984	1.0	11.057	11.06	MEDIUM	75.99%	$ 89,844	$ 35,426
198	POPLAR ST.	6	PVC-SCH40	1980	433.42	37	6.057	1980	1.0	11.057	11.06	MEDIUM	76.10%	$ 57,012	$ 22,480
239	SIMPSON ST.	6	PVC-SCH40	1980	360.20	37	6.057	1980	1.0	11.057	11.06	MEDIUM	76.19%	$ 47,381	$ 18,683
241	SIMPSON ST.	6	PVC-SCH40	1980	360.50	37	6.057	1980	1.0	11.057	11.06	MEDIUM	76.28%	$ 47,420	$ 18,698

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
255	CAMINO DE CIELC	6	PVC-SCH40	1980	946.49	37	6.057	1980-1997	1.0	11.057	11.06	MEDIUM	76.53%	$ 124,502	$ 49,092
256	CAMINO DE CIELC	6	PVC-SCH40	1980	133.04	37	6.057	1980-1997	1.0	11.057	11.06	MEDIUM	76.56%	$ 17,500	$ 6,900
285	POPLAR ST.	6	PVC-SCH40	1980	359.66	37	6.057	1980	1.0	11.057	11.06	MEDIUM	76.65%	$ 47,310	$ 18,655
300	PINE ST.	6	PVC-SCH40	1980	314.47	37	6.057	1981	1.0	11.057	11.06	MEDIUM	76.73%	$ 41,365	$ 16,311
302	E. SIXTH AVE.	6	PVC-SCH40	1980	81.25	37	6.057	1988	1.0	11.057	11.06	MEDIUM	76.75%	$ 10,687	$ 4,214
303	E. SIXTH AVE.	6	PVC-SCH40	1980	16.68	37	6.057	1988	1.0	11.057	11.06	MEDIUM	76.76%	$ 2,194	$ 865
339	MARIE ST.	6	PVC-SCH40	1980	372.95	37	6.057	1984	1.0	11.057	11.06	MEDIUM	76.85%	$ 49,058	$ 19,344
340	MARIE ST.	6	PVC-SCH40	1980	16.47	37	6.057	1984	1.0	11.057	11.06	MEDIUM	76.86%	$ 2,167	$ 854
345	E. FIFTH AVE.	6	PVC-SCH40	1980	225.02	37	6.057	1981	1.0	11.057	11.06	MEDIUM	76.91%	$ 29,600	$ 11,671
348	CORONA AVE.	6	PVC-SCH40	1980	130.00	37	6.057	1980	1.0	11.057	11.06	MEDIUM	76.95%	$ 17,101	$ 6,743
429	E. FIFTH AVE.	6	PVC-SCH40	1980	303.06	37	6.057	1981	1.0	11.057	11.06	MEDIUM	77.02%	$ 39,865	$ 15,719
637	E. SECOND AVE.	6	PVC-SCH40	1980	17.06	37	6.057	1981	1.0	11.057	11.06	MEDIUM	77.03%	$ 2,245	$ 885
638	E. SECOND AVE.	6	PVC-SCH40	1980	298.82	37	6.057	1981	1.0	11.057	11.06	MEDIUM	77.11%	$ 39,307	$ 15,499
739	MARIE ST.	6	PVC-SCH40	1980	348.80	37	6.057	1984	1.0	11.057	11.06	MEDIUM	77.19%	$ 45,881	$ 18,091
761	PERSHING ST.	4	PVC-SCH40	1980	77.77	37	6.057		1.0	11.057	11.06	MEDIUM	77.21%	$ 10,230	$ 4,034
787	CORONA AVE.	6	PVC-SCH40	1980	512.27	37	6.057	1980	1.0	11.057	11.06	MEDIUM	77.35%	$ 67,384	$ 26,570
907	HOLDEN RD.	6	PVC-SCH40	1980	354.62	37	6.057	1986	1.0	11.057	11.06	MEDIUM	77.44%	$ 46,647	$ 18,393
953	E. FIFTH AVE.	6	PVC-SCH40	1980	136.82	37	6.057	1983	1.0	11.057	11.06	MEDIUM	77.47%	$ 17,997	$ 7,097
996		2	PVC-SCH40	1980	675.21	37	6.057	1981	1.0	11.057	11.06	MEDIUM	77.64%	$ 88,817	$ 35,021
1038		4	PVC-SCH40	1980	258.06	37	6.057	1971	1.0	11.057	11.06	MEDIUM	77.71%	$ 33,946	$ 13,385
1051		6	PVC-SCH40	1980	520.47	37	6.057	1980	1.0	11.057	11.06	MEDIUM	77.84%	$ 68,462	$ 26,995
1090		2	PVC-SCH40	1980	399.70	37	6.057	1983	1.0	11.057	11.06	MEDIUM	77.94%	$ 52,576	$ 20,731
958		8	PVC-C900	2000	1403.92	17	1.831	2003	6.0	1.831	10.99	MEDIUM	78.30%	$ 246,234	$ 201,151
569	CORBETT ST.	4	CI	1947	726.27	70	5.782	1989	1.0	10.782	10.78	MEDIUM	78.49%	$ 95,534	$ 40,296
621	FOCH ST.	4	CI	1947	455.42	70	5.782	1995	1.0	10.782	10.78	MEDIUM	78.60%	$ 59,906	$ 25,268
641	PERSHING ST.	6	CI	1947	40.42	70	5.782	2003	1.0	10.782	10.78	MEDIUM	78.61%	$ 5,317	$ 2,243
652	W. NINTH AVE.	8	CI	1947	350.05	70	5.782	1963	1.0	10.782	10.78	MEDIUM	78.70%	$ 61,396	$ 25,897
653	W. NINTH AVE.	8	CI	1947	363.97	70	5.782	2013	1.0	10.782	10.78	MEDIUM	78.80%	$ 63,837	$ 26,926
656	PERSHING ST.	8	CI	1947	446.69	70	5.782	2003	1.0	10.782	10.78	MEDIUM	78.91%	$ 78,344	$ 33,046
657	.PH EDWARDS PA	8	CI	1947	13.06	70	5.782	2003	1.0	10.782	10.78	MEDIUM	78.91%	$ 2,291	$ 966
662	E. EIGHTH AVE.	8	CI	1947	44.89	70	5.782	1993	1.0	10.782	10.78	MEDIUM	78.93%	$ 7,873	$ 3,321
663	E. EIGHTH AVE.	8	CI	1947	148.02	70	5.782	1995	1.0	10.782	10.78	MEDIUM	78.96%	$ 25,962	$ 10,951

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
664	E. EIGHTH AVE.	8	CI	1947	347.83	70	5.782	1989	1.0	10.782	10.78	MEDIUM	79.05%	$ 61,006	$ 25,732
666	E. EIGHTH AVE.	8	CI	1947	360.01	70	5.782	1981	1.0	10.782	10.78	MEDIUM	79.14%	$ 63,143	$ 26,634
667	E. EIGHTH AVE.	8	CI	1947	150.00	70	5.782	1993	1.0	10.782	10.78	MEDIUM	79.18%	$ 26,309	$ 11,097
668	E. EIGHTH AVE.	8	CI	1947	363.53	70	5.782	1981	1.0	10.782	10.78	MEDIUM	79.27%	$ 63,760	$ 26,894
712	E. EIGHTH AVE.	8	CI	1947	42.75	70	5.782	1995	1.0	10.782	10.78	MEDIUM	79.29%	$ 7,498	$ 3,162
713	E. EIGHTH AVE.	8	CI	1947	339.41	70	5.782	1995	1.0	10.782	10.78	MEDIUM	79.37%	$ 59,529	$ 25,109
715	W. NINTH AVE.	6	CI	1947	362.61	70	5.782	1963	1.0	10.782	10.78	MEDIUM	79.46%	$ 47,698	$ 20,119
736	W. NINTH AVE.	6	CI	1947	372.93	70	5.782	2013	1.0	10.782	10.78	MEDIUM	79.56%	$ 49,056	$ 20,692
737	W. NINTH AVE.	6	CI	1947	348.03	70	5.782	2013	1.0	10.782	10.78	MEDIUM	79.65%	$ 45,780	$ 19,310
738	W. NINTH AVE.	6	CI	1947	391.31	70	5.782	2013	1.0	10.782	10.78	MEDIUM	79.75%	$ 51,472	$ 21,711
813	SPRUCE ST.	6	CI	1947	842.61	70	5.782	1971	1.0	10.782	10.78	MEDIUM	79.96%	$ 110,837	$ 46,751
823	E. EIGHTH AVE.	8	CI	1947	356.48	70	5.782	1993	1.0	10.782	10.78	MEDIUM	80.05%	$ 62,524	$ 26,373
872	E. EIGHTH AVE.	8	CI	1947	349.28	70	5.782	1998	1.0	10.782	10.78	MEDIUM	80.14%	$ 61,260	$ 25,839
875	PERSHING ST.	8	CI	1947	142.67	70	5.782	2003	1.0	10.782	10.78	MEDIUM	80.18%	$ 25,024	$ 10,555
343	SILVER ST.	6	PVC-C900	2010	660.05	7	0.558	2010	1.0	10.558	10.56	MEDIUM	80.35%	$ 86,823	$ 81,979
644	COLEMAN ST.	6	CI	1950	719.00	67	5.434	1971	1.0	10.434	10.43	MEDIUM	80.53%	$ 94,577	$ 43,187
1103	IVY ST.	4	CI	1950	303.66	67	5.434	2005	1.0	10.434	10.43	MEDIUM	80.61%	$ 39,943	$ 18,239
1080		0.75	COPPER	1990	331.59	27	2.346	2009	4.0	2.346	9.39	MEDIUM	80.69%	$ 43,617	$ 33,383
94	MARR AVE.	4	CI	1960	323.96	57	4.338	1979	1.0	9.338	9.34	MEDIUM	80.78%	$ 42,614	$ 24,129
493	RIVERSIDE DR.	4	CI	1960	113.73	57	4.338	1983	1.0	9.338	9.34	MEDIUM	80.81%	$ 14,960	$ 8,471
498	PERSHING ST.	4	CI	1960	152.01	57	4.338	1993	1.0	9.338	9.34	MEDIUM	80.85%	$ 19,995	$ 11,322
769	PERSHING ST.	4	CI	1960	163.48	57	4.338	1993	1.0	9.338	9.34	MEDIUM	80.89%	$ 21,504	$ 12,176
770	PERSHING ST.	4	CI	1960	166.94	57	4.338	1993	1.0	9.338	9.34	MEDIUM	80.93%	$ 21,959	$ 12,434
816	PERSHING ST.	4	CI	1960	135.39	57	4.338	1993	1.0	9.338	9.34	MEDIUM	80.96%	$ 17,810	$ 10,084
911	E COCHISE WAY	6	PVC-SCH40	1989	277.00	28	3.878	1989	1.0	8.878	8.88	MEDIUM	81.03%	$ 36,437	$ 22,306
4	W. FIFTH AVE.	4	PVC-SCH40	1990	360.00	27	3.664	1996	1.0	8.664	8.66	MEDIUM	81.13%	$ 47,354	$ 30,004
5	W. FIFTH AVE.	4	PVC-SCH40	1990	360.03	27	3.664	1996	1.0	8.664	8.66	MEDIUM	81.22%	$ 47,359	$ 30,007
49	CITY ST.	6	PVC-SCH40	1990	350.02	27	3.664	1991	1.0	8.664	8.66	MEDIUM	81.31%	$ 46,042	$ 29,173
51	W. CARTER ST.	4	PVC-SCH40	1990	360.01	27	3.664	1997	1.0	8.664	8.66	MEDIUM	81.40%	$ 47,355	$ 30,005
58	TUNGSTEN ST.	4	PVC-SCH40	1990	364.88	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.49%	$ 47,997	$ 30,411
102	MAGNOLIA ST.	4	PVC-SCH40	1990	63.59	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.51%	$ 8,364	$ 5,300
118		4	PVC-SCH40	1990	33.39	27	3.664	1991	1.0	8.664	8.66	MEDIUM	81.52%	$ 4,392	$ 2,783

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
122	ELM ST.	4	PVC-SCH40	1990	343.36	27	3.664	1992	1.0	8.664	8.66	MEDIUM	81.61%	$ 45,166	$ 28,617
123	E. EIGHTH AVE.	4	PVC-SCH40	1990	22.21	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.61%	$ 2,921	$ 1,851
124	E. EIGHTH AVE.	4	PVC-SCH40	1990	21.70	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.62%	$ 2,855	$ 1,809
125	ELM ST.	4	PVC-SCH40	1990	341.12	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.70%	$ 44,871	$ 28,431
126	MAPLE ST.	4	PVC-SCH40	1990	357.61	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.79%	$ 47,040	$ 29,805
171	ELM ST.	4	PVC-SCH40	1990	35.29	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.80%	$ 4,642	$ 2,941
172	E. SEVENTH AVE.	4	PVC-SCH40	1990	11.50	27	3.664	1995	1.0	8.664	8.66	MEDIUM	81.81%	$ 1,512	$ 958
191	IVY ST.	6	PVC-SCH40	1990	357.64	27	3.664	1978	1.0	8.664	8.66	MEDIUM	81.90%	$ 47,044	$ 29,807
192	KOPRA ST.	6	PVC-SCH40	1990	477.41	27	3.664	1984	1.0	8.664	8.66	MEDIUM	82.02%	$ 62,798	$ 39,790
196	MARIE ST.	6	PVC-SCH40	1990	17.31	27	3.664	1984	1.0	8.664	8.66	MEDIUM	82.02%	$ 2,277	$ 1,443
197	MARIE ST.	6	PVC-SCH40	1990	306.05	27	3.664	2006	1.0	8.664	8.66	MEDIUM	82.10%	$ 40,258	$ 25,508
201	N. CEDAR ST.	6	PVC-SCH40	1990	179.54	27	3.664	1963	1.0	8.664	8.66	MEDIUM	82.15%	$ 23,617	$ 14,964
203	E. FIRST AVE.	6	PVC-SCH40	1990	286.76	27	3.664	1995	1.0	8.664	8.66	MEDIUM	82.22%	$ 37,720	$ 23,900
220	VEATER ST.	6	PVC-SCH40	1990	380.01	27	3.664	1995	1.0	8.664	8.66	MEDIUM	82.32%	$ 49,987	$ 31,672
227	VEATER ST.	6	PVC-SCH40	1990	690.07	27	3.664	1995-2003	1.0	8.664	8.66	MEDIUM	82.49%	$ 90,772	$ 57,514
232	SIMPSON ST.	6	PVC-SCH40	1990	187.39	27	3.664	1980	1.0	8.664	8.66	MEDIUM	82.54%	$ 24,649	$ 15,618
233	MERCURY ST.	6	PVC-SCH40	1990	317.08	27	3.664	1995	1.0	8.664	8.66	MEDIUM	82.62%	$ 41,709	$ 26,427
238	BRASS ST.	6	PVC-SCH40	1990	370.49	27	3.664	1995	1.0	8.664	8.66	MEDIUM	82.72%	$ 48,734	$ 30,879
245	SIMPSON ST.	6	PVC-SCH40	1990	173.55	27	3.664	1980	1.0	8.664	8.66	MEDIUM	82.76%	$ 22,829	$ 14,465
247	MERCURY ST.	6	PVC-SCH40	1990	101.73	27	3.664	1969	1.0	8.664	8.66	MEDIUM	82.79%	$ 13,381	$ 8,479
282	E. FIFTH AVE.	6	PVC-SCH40	1990	360.01	27	3.664	1995	1.0	8.664	8.66	MEDIUM	82.88%	$ 47,356	$ 30,005
299	MARIE ST.	6	PVC-SCH40	1990	26.87	27	3.664	2006	1.0	8.664	8.66	MEDIUM	82.89%	$ 3,535	$ 2,240
304	PINE ST.	6	PVC-SCH40	1990	730.98	27	3.664	1993	1.0	8.664	8.66	MEDIUM	83.07%	$ 96,153	$ 60,924
435	FOCH ST.	6	PVC-SCH40	1990	360.00	27	3.664	1994	1.0	8.664	8.66	MEDIUM	83.17%	$ 47,354	$ 30,004
455	TUNGSTEN ST.	6	PVC-SCH40	1990	363.60	27	3.664	1995	1.0	8.664	8.66	MEDIUM	83.26%	$ 47,827	$ 30,304
460	W. SECOND AVE.	4	PVC-SCH40	1990	210.04	27	3.664	1995	1.0	8.664	8.66	MEDIUM	83.31%	$ 27,629	$ 17,506
615	W. SECOND AVE.	4	PVC-SCH40	1990	360.09	27	3.664	1995	1.0	8.664	8.66	MEDIUM	83.40%	$ 47,367	$ 30,012
699	ELM ST.	4	PVC-SCH40	1990	363.14	27	3.664	1992	1.0	8.664	8.66	MEDIUM	83.50%	$ 47,768	$ 30,266
740	LOCUST ST.	4	PVC-SCH40	1990	429.55	27	3.664	1990	1.0	8.664	8.66	MEDIUM	83.61%	$ 56,504	$ 35,801
745	PARWAY DR.	6	PVC-SCH40	1990	913.23	27	3.664	1997	1.0	8.664	8.66	MEDIUM	83.84%	$ 120,127	$ 76,114
746		6	PVC-SCH40	1990	250.21	27	3.664	1997	1.0	8.664	8.66	MEDIUM	83.90%	$ 32,913	$ 20,854
774	LINCOLN AVE.	6	PVC-SCH40	1990	388.92	27	3.664	1991	1.0	8.664	8.66	MEDIUM	84.00%	$ 51,158	$ 32,414

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
824	ELM ST.	4	PVC-SCH40	1990	338.83	27	3.664	1995	1.0	8.664	8.66	MEDIUM	84.09%	$ 44,570	$ 28,240
851	FIR ST.	6	PVC-SCH40	1990	366.00	27	3.664	1998	1.0	8.664	8.66	MEDIUM	84.18%	$ 48,144	$ 30,504
867	ELM ST.	4	PVC-SCH40	1990	14.50	27	3.664	1992	1.0	8.664	8.66	MEDIUM	84.19%	$ 1,907	$ 1,208
944	PINE ST.	6	PVC-SCH40	1990	253.31	27	3.664	1995	1.0	8.664	8.66	MEDIUM	84.25%	$ 33,321	$ 21,112
945	E. AURORA AVE.	6	PVC-SCH40	1990	55.11	27	3.664	1995	1.0	8.664	8.66	MEDIUM	84.26%	$ 7,250	$ 4,593
946	E. AURORA AVE.	6	PVC-SCH40	1990	54.70	27	3.664	1995	1.0	8.664	8.66	MEDIUM	84.28%	$ 7,195	$ 4,559
947	E. AURORA AVE.	6	PVC-SCH40	1990	58.46	27	3.664	1995	1.0	8.664	8.66	MEDIUM	84.29%	$ 7,689	$ 4,872
979		8	PVC-SCH40	1990	1035.98	27	3.664	1991	1.0	8.664	8.66	MEDIUM	84.56%	$ 181,701	$ 115,128
998		2	PVC-SCH40	1990	301.46	27	3.664	1991	1.0	8.664	8.66	MEDIUM	84.64%	$ 39,654	$ 25,125
1005		0.75	PVC-SCH40	1990	262.91	27	3.664	1998	1.0	8.664	8.66	MEDIUM	84.70%	$ 34,583	$ 21,912
1020		0.75	PVC-SCH40	1990	459.22	27	3.664	1984	1.0	8.664	8.66	MEDIUM	84.82%	$ 60,406	$ 38,274
1021		1	PVC-SCH40	1990	166.54	27	3.664	1984	1.0	8.664	8.66	MEDIUM	84.86%	$ 21,907	$ 13,881
1022		2	PVC-SCH40	1990	1080.98	27	3.664	1984	1.0	8.664	8.66	MEDIUM	85.14%	$ 142,192	$ 90,094
1037		1	PVC-SCH40	1990	206.68	27	3.664	1969	1.0	8.664	8.66	MEDIUM	85.19%	$ 27,187	$ 17,226
1041		2	PVC-SCH40	1990	89.75	27	3.664	1976	1.0	8.664	8.66	MEDIUM	85.21%	$ 11,806	$ 7,480
1064		0.75	PVC-SCH40	1990	269.78	27	3.664	1994	1.0	8.664	8.66	MEDIUM	85.28%	$ 35,487	$ 22,485
1077		2	PVC-SCH40	1990	685.42	27	3.664	1986	1.0	8.664	8.66	MEDIUM	85.46%	$ 90,160	$ 57,126
1078		0.75	PVC-SCH40	1990	208.96	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.51%	$ 27,487	$ 17,416
1081		0.75	PVC-SCH40	1990	221.81	27	3.664	1993	1.0	8.664	8.66	MEDIUM	85.57%	$ 29,177	$ 18,487
1082		4	PVC-SCH40	1990	199.32	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.62%	$ 26,219	$ 16,612
1083		2	PVC-SCH40	1990	216.62	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.67%	$ 28,494	$ 18,054
1084		0.75	PVC-SCH40	1990	275.35	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.74%	$ 36,219	$ 22,949
1085		1	PVC-SCH40	1990	249.33	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.81%	$ 32,797	$ 20,780
1086		0.75	PVC-SCH40	1990	95.02	27	3.664	1995	1.0	8.664	8.66	MEDIUM	85.83%	$ 12,499	$ 7,920
1091		4	PVC-SCH40	1990	604.39	27	3.664	2009	1.0	8.664	8.66	MEDIUM	85.99%	$ 79,502	$ 50,373
355		8	PVC-SCH40	1991	146.72	26	3.455	1991	1.0	8.455	8.46	MEDIUM	86.02%	$ 25,733	$ 16,841
413		8	PVC-SCH40	1991	117.02	26	3.455	1991	1.0	8.455	8.46	MEDIUM	86.05%	$ 20,525	$ 13,433
414		8	PVC-SCH40	1991	216.84	26	3.455	1991	1.0	8.455	8.46	MEDIUM	86.11%	$ 38,032	$ 24,891
416		8	PVC-SCH40	1991	160.01	26	3.455	1991	1.0	8.455	8.46	MEDIUM	86.15%	$ 28,064	$ 18,367
910	N BOSQUE DR.	6	PVC-SCH40	1991	551.33	26	3.455	1999	1.0	8.455	8.46	MEDIUM	86.29%	$ 72,521	$ 47,462
442	MARSHALL ST.	6	CI	1970	159.05	47	3.342	1976	1.0	8.342	8.34	MEDIUM	86.33%	$ 20,921	$ 13,930
443	MARSHALL ST.	6	CI	1970	163.96	47	3.342	1976	1.0	8.342	8.34	MEDIUM	86.37%	$ 21,567	$ 14,360

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
444	MARSHALL ST.	6	CI	1970	325.63	47	3.342	1976	1.0	8.342	8.34	MEDIUM	86.46%	$ 42,833	$ 28,520
617	W. THIRD AVE.	4	CI	1970	166.43	47	3.342	1997	1.0	8.342	8.34	MEDIUM	86.50%	$ 21,893	$ 14,577
626	COLEMAN ST.	4	CI	1970	330.45	47	3.342	1971	1.0	8.342	8.34	MEDIUM	86.58%	$ 43,467	$ 28,942
631	LANE ST.	6	CI	1970	129.20	47	3.342	1997	1.0	8.342	8.34	MEDIUM	86.62%	$ 16,994	$ 11,315
669	E. SIXTH AVE.	6	CI	1970	360.76	47	3.342	1995	1.0	8.342	8.34	MEDIUM	86.71%	$ 47,454	$ 31,596
718	MARSHALL ST.	6	CI	1970	359.10	47	3.342	1976	1.0	8.342	8.34	MEDIUM	86.80%	$ 47,237	$ 31,452
719	MARSHALL ST.	6	CI	1970	352.54	47	3.342	1976	1.0	8.342	8.34	MEDIUM	86.89%	$ 46,373	$ 30,876
753	IVY ST.	6	CI	1970	351.47	47	3.342	1999	1.0	8.342	8.34	MEDIUM	86.98%	$ 46,232	$ 30,783
764		6	CI	1970	353.69	47	3.342	2012	1.0	8.342	8.34	MEDIUM	87.07%	$ 46,524	$ 30,977
809	MARSHALL ST.	6	CI	1970	151.37	47	3.342	1976	1.0	8.342	8.34	MEDIUM	87.11%	$ 19,912	$ 13,258
827	E. SIXTH AVE.	6	CI	1970	347.92	47	3.342	1992	1.0	8.342	8.34	MEDIUM	87.20%	$ 45,766	$ 30,472
828		6	CI	1970	360.27	47	3.342	1986	1.0	8.342	8.34	MEDIUM	87.29%	$ 47,390	$ 31,553
829	E. SIXTH AVE.	6	CI	1970	346.66	47	3.342	1992	1.0	8.342	8.34	MEDIUM	87.38%	$ 45,599	$ 30,361
830	E. SIXTH AVE.	6	CI	1970	355.78	47	3.342	1995	1.0	8.342	8.34	MEDIUM	87.47%	$ 46,799	$ 31,160
999		8	CI	1970	135.61	47	3.342	2012	1.0	8.342	8.34	MEDIUM	87.50%	$ 23,785	$ 15,837
1023		8	CI	1970	209.81	47	3.342	2012	1.0	8.342	8.34	MEDIUM	87.56%	$ 36,799	$ 24,502
277	RIVERSIDE DR.	6	PVC-SCH40	1992	41.19	25	3.253	2000	1.0	8.253	8.25	MEDIUM	87.57%	$ 5,418	$ 3,656
655	COOK ST.	8	CI	1980	50.19	37	2.446	1983	1.0	7.446	7.45	LOW	87.58%	$ 8,803	$ 6,650
665	E. EIGHTH AVE.	8	CI	1980	30.70	37	2.446	1989	1.0	7.446	7.45	LOW	87.59%	$ 5,384	$ 4,067
672	KRUGER ST.	8	CI	1980	24.84	37	2.446	1989	1.0	7.446	7.45	LOW	87.59%	$ 4,357	$ 3,291
750	JUNIPER ST.	6	CI	1980	458.18	37	2.446	1984	1.0	7.446	7.45	LOW	87.71%	$ 60,269	$ 45,529
194	MARIE ST.	6	AC	1960	360.01	57	7.176	2006	1.0	7.176	7.18	LOW	87.80%	$ 47,356	$ 13,372
221	MYRTLE ST.	6	AC	1960	430.38	57	7.176	1991	1.0	7.176	7.18	LOW	87.91%	$ 56,612	$ 15,986
222	MYRTLE ST.	6	AC	1960	474.00	57	7.176	1991-1997	1.0	7.176	7.18	LOW	88.03%	$ 62,350	$ 17,606
432	PALO VERDE ST.	4	AC	1960	490.89	57	7.176	1978	1.0	7.176	7.18	LOW	88.16%	$ 64,572	$ 18,233
441	VEATER ST.	6	AC	1960	203.58	57	7.176	1981	1.0	7.176	7.18	LOW	88.21%	$ 26,779	$ 7,561
459	W. SECOND AVE.	6	AC	1960	370.72	57	7.176	1995	1.0	7.176	7.18	LOW	88.31%	$ 48,765	$ 13,770
461	IVY ST.	4	AC	1960	872.00	57	7.176	1963	1.0	7.176	7.18	LOW	88.53%	$ 114,703	$ 32,389
462	LOCUST ST.	4	AC	1960	861.05	57	7.176	1984	1.0	7.176	7.18	LOW	88.75%	$ 113,263	$ 31,982
479	PINE ST.	4	AC	1960	20.11	57	7.176	1993	1.0	7.176	7.18	LOW	88.75%	$ 2,646	$ 747
480	PINE ST.	4	AC	1960	331.13	57	7.176	1993	1.0	7.176	7.18	LOW	88.84%	$ 43,557	$ 12,299
487	OSBORN LN.	4	AC	1960	942.94	57	7.176	1989	1.0	7.176	7.18	LOW	89.08%	$ 124,035	$ 35,024

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
500	CABALLO RD.	4	AC	1960	339.66	57	7.176	1972	1.0	7.176	7.18	LOW	89.16%	$ 44,679	$ 12,616
501	CABALLO RD.	4	AC	1960	215.91	57	7.176	1972	1.0	7.176	7.18	LOW	89.22%	$ 28,400	$ 8,019
502	DUNN ST.	4	AC	1960	257.77	57	7.176	1972	1.0	7.176	7.18	LOW	89.29%	$ 33,907	$ 9,574
506	BIRCH ST.	4	AC	1960	23.23	57	7.176	1962	1.0	7.176	7.18	LOW	89.29%	$ 3,056	$ 863
509	CABALLO RD.	4	AC	1960	94.82	57	7.176	1972	1.0	7.176	7.18	LOW	89.32%	$ 12,473	$ 3,522
514	PERSHING ST.	6	AC	1960	62.95	57	7.176	2003	1.0	7.176	7.18	LOW	89.33%	$ 8,281	$ 2,338
515	PERSHING ST.	6	AC	1960	53.67	57	7.176	2003	1.0	7.176	7.18	LOW	89.35%	$ 7,060	$ 1,993
516	PERSHING ST.	6	AC	1960	29.14	57	7.176	2003	1.0	7.176	7.18	LOW	89.35%	$ 3,834	$ 1,083
517	W. NINTH AVE.	6	AC	1960	324.08	57	7.176	2005	1.0	7.176	7.18	LOW	89.44%	$ 42,629	$ 12,037
519	N. GRAPE ST.	6	AC	1960	359.00	57	7.176	1996	1.0	7.176	7.18	LOW	89.53%	$ 47,223	$ 13,334
520	W. FOURTH AVE.	6	AC	1960	350.00	57	7.176	1993	1.0	7.176	7.18	LOW	89.62%	$ 46,039	$ 13,000
528	W. EIGHTH AVE.	6	AC	1960	720.06	57	7.176	2005	1.0	7.176	7.18	LOW	89.80%	$ 94,716	$ 26,745
529	W. EIGHTH AVE.	6	AC	1960	350.02	57	7.176	1998	1.0	7.176	7.18	LOW	89.89%	$ 46,042	$ 13,001
530	POPLAR ST.	6	AC	1960	858.53	57	7.176	2013	1.0	7.176	7.18	LOW	90.11%	$ 112,931	$ 31,888
544	SILVER ST.	6	AC	1960	351.40	57	7.176	1976	1.0	7.176	7.18	LOW	90.20%	$ 46,223	$ 13,052
545	GOLD ST.	6	AC	1960	355.00	57	7.176	1981	1.0	7.176	7.18	LOW	90.29%	$ 46,697	$ 13,186
547	MAGNOLIA ST.	6	AC	1960	363.27	57	7.176	2005	1.0	7.176	7.18	LOW	90.38%	$ 47,785	$ 13,493
548	MAGNOLIA ST.	6	AC	1960	689.17	57	7.176	1995	1.0	7.176	7.18	LOW	90.56%	$ 90,653	$ 25,598
549	GOLD ST.	6	AC	1960	694.13	57	7.176	1981	1.0	7.176	7.18	LOW	90.74%	$ 91,305	$ 25,782
550	SILVER ST.	6	AC	1960	35.80	57	7.176	1999	1.0	7.176	7.18	LOW	90.74%	$ 4,709	$ 1,330
570	KRUGER ST.	6	AC	1960	719.01	57	7.176	1993	1.0	7.176	7.18	LOW	90.93%	$ 94,578	$ 26,706
597	W. FOURTH AVE.	8	AC	1960	360.14	57	7.176	1999	1.0	7.176	7.18	LOW	91.02%	$ 63,165	$ 17,836
601	E. EIGHTH AVE.	8	AC	1960	681.01	57	7.176	1989	1.0	7.176	7.18	LOW	91.19%	$ 119,443	$ 33,727
642	W. NINTH AVE.	6	AC	1960	296.43	57	7.176	1978	1.0	7.176	7.18	LOW	91.27%	$ 38,992	$ 11,010
689	W. EIGHTH AVE.	6	AC	1960	360.00	57	7.176	1998	1.0	7.176	7.18	LOW	91.36%	$ 47,354	$ 13,371
700	SILVER ST.	6	AC	1960	689.31	57	7.176	1999	1.0	7.176	7.18	LOW	91.54%	$ 90,671	$ 25,603
702	WADE ST.	4	AC	1960	310.10	57	7.176	1972	1.0	7.176	7.18	LOW	91.62%	$ 40,790	$ 11,518
730	W. FOURTH AVE.	8	AC	1960	360.00	57	7.176	2009	1.0	7.176	7.18	LOW	91.71%	$ 63,141	$ 17,829
733	SIERRA VISTA DR.	4	AC	1960	449.44	57	7.176	2005	1.0	7.176	7.18	LOW	91.82%	$ 59,119	$ 16,693
735	W. NINTH AVE.	6	AC	1960	288.27	57	7.176	1978	1.0	7.176	7.18	LOW	91.90%	$ 37,920	$ 10,707
742	KOPRA ST.	6	AC	1960	709.21	57	7.176	1993	1.0	7.176	7.18	LOW	92.08%	$ 93,289	$ 26,342
751	IVY ST.	6	AC	1960	480.92	57	7.176	2005	1.0	7.176	7.18	LOW	92.20%	$ 63,260	$ 17,863

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
762	PERSHING ST.	6	AC	1960	863.79	57	7.176	2001-2005	1.0	7.176	7.18	LOW	92.42%	$ 113,623	$ 32,084
846	E. FOURTH AVE.	4	AC	1960	330.01	57	7.176	1981	1.0	7.176	7.18	LOW	92.51%	$ 43,410	$ 12,258
852	W. FOURTH AVE.	8	AC	1960	360.09	57	7.176	2009	1.0	7.176	7.18	LOW	92.60%	$ 63,157	$ 17,834
864	MAGNOLIA ST.	4	AC	1960	324.75	57	7.176	1995	1.0	7.176	7.18	LOW	92.68%	$ 42,718	$ 12,062
865		4	AC	1960	39.53	57	7.176	1995	1.0	7.176	7.18	LOW	92.69%	$ 5,200	$ 1,468
873	CABALLO RD.	4	AC	1960	388.46	57	7.176	1972	1.0	7.176	7.18	LOW	92.79%	$ 51,098	$ 14,429
881	PLATINUM ST.	6	AC	1960	82.76	57	7.176	1981	1.0	7.176	7.18	LOW	92.81%	$ 10,887	$ 3,074
898	DATE ST.	6	AC	1960	176.66	57	7.176	1980	1.0	7.176	7.18	LOW	92.86%	$ 23,238	$ 6,562
902	DATE ST.	4	AC	1960	63.02	57	7.176	1998	1.0	7.176	7.18	LOW	92.87%	$ 8,290	$ 2,341
905	KRUGER ST.	6	AC	1960	809.45	57	7.176	1997	1.0	7.176	7.18	LOW	93.08%	$ 106,474	$ 30,065
938	MAPLE ST.	6	AC	1960	45.44	57	7.176	1988	1.0	7.176	7.18	LOW	93.09%	$ 5,977	$ 1,688
977		8	AC	1960	195.55	57	7.176	1983	1.0	7.176	7.18	LOW	93.14%	$ 34,297	$ 9,684
978		8	AC	1960	218.22	57	7.176	1983	1.0	7.176	7.18	LOW	93.20%	$ 38,274	$ 10,807
1111		8	AC	1960	153.10	57	7.176	1983	1.0	7.176	7.18	LOW	93.23%	$ 26,853	$ 7,582
1	DATE ST.	6	PVC-SCH40	2000	33.02	17	1.831	2005	1.0	6.831	6.83	LOW	93.24%	$ 4,344	$ 3,549
2	W. SECOND AVE.	4	PVC-SCH40	2000	90.97	17	1.831	2005	1.0	6.831	6.83	LOW	93.27%	$ 11,966	$ 9,775
3	MATSON AVE.	4	PVC-SCH40	2000	28.38	17	1.831	2005	1.0	6.831	6.83	LOW	93.27%	$ 3,733	$ 3,050
50	HENSON ST.	8	PVC-SCH40	2000	476.10	17	1.831	2003	1.0	6.831	6.83	LOW	93.39%	$ 83,504	$ 68,215
74	CORZINE RD.	4	PVC-SCH40	2000	743.88	17	1.831	1969	1.0	6.831	6.83	LOW	93.58%	$ 97,850	$ 79,935
80	LEAD ST.	4	PVC-SCH40	2000	384.58	17	1.831	1986	1.0	6.831	6.83	LOW	93.68%	$ 50,588	$ 41,326
119	PERSHING ST.	4	PVC-SCH40	2000	513.95	17	1.831	1989	1.0	6.831	6.83	LOW	93.81%	$ 67,604	$ 55,227
438	W. SECOND AVE.	4	PVC-SCH40	2000	16.83	17	1.831	2005	1.0	6.831	6.83	LOW	93.82%	$ 2,214	$ 1,809
465	AUSTIN AVE.	4	PVC-SCH40	2000	360.03	17	1.831	1977	1.0	6.831	6.83	LOW	93.91%	$ 47,359	$ 38,688
627	W. THIRD AVE.	6	PVC-SCH40	2000	182.52	17	1.831	1997	1.0	6.831	6.83	LOW	93.96%	$ 24,009	$ 19,613
788	POST ST.	6	PVC-SCH40	2000	315.04	17	1.831	2009	1.0	6.831	6.83	LOW	94.04%	$ 41,440	$ 33,853
790	POST ST.	6	PVC-SCH40	2000	333.59	17	1.831	2005	1.0	6.831	6.83	LOW	94.12%	$ 43,881	$ 35,847
791	POST ST.	6	PVC-SCH40	2000	316.53	17	1.831	2005-2009	1.0	6.831	6.83	LOW	94.20%	$ 41,636	$ 34,013
954	CEDAR ST.	6	PVC-SCH40	2000	350.25	17	1.831	2000	1.0	6.831	6.83	LOW	94.29%	$ 46,072	$ 37,636
1042		2	PVC-SCH40	2000	236.32	17	1.831	1976	1.0	6.831	6.83	LOW	94.35%	$ 31,085	$ 25,394
1048		2	PVC-SCH40	2000	1138.88	17	1.831	2000	1.0	6.831	6.83	LOW	94.64%	$ 149,809	$ 122,380
1079		1	PVC-SCH40	2000	314.16	17	1.831	1983	1.0	6.831	6.83	LOW	94.72%	$ 41,325	$ 33,759
1100	COLEMAN	4	PVC-SCH40	2000	450.15	17	1.831	2010	1.0	6.831	6.83	LOW	94.84%	$ 59,212	$ 48,371

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
195	KOPRA ST.	6	CI	1990	880.61	27	1.650	1984	1.0	6.650	6.65	LOW	95.06%	$ 115,835	$ 96,726
338	MARIE ST.	6	CI	1990	245.64	27	1.650	1984	1.0	6.650	6.65	LOW	95.13%	$ 32,312	$ 26,982
341	MARIE ST.	6	CI	1990	45.31	27	1.650	2006	1.0	6.650	6.65	LOW	95.14%	$ 5,961	$ 4,977
685	MARIE ST.	6	CI	1990	335.35	27	1.650	2006	1.0	6.650	6.65	LOW	95.22%	$ 44,112	$ 36,835
747	MARIE ST.	6	CI	1990	135.62	27	1.650	2006	1.0	6.650	6.65	LOW	95.26%	$ 17,840	$ 14,897
1019		0.75	COPPER	2000	995.79	17	1.256	2006	5.0	1.256	6.28	LOW	95.51%	$ 130,986	$ 114,530
622	MARIE ST.	4	CI	2000	14.45	17	0.954	2006	1.0	5.954	5.95	LOW	95.52%	$ 1,900	$ 1,719
714	JUNIPER ST.	4	CI	2000	866.99	17	0.954	2006	1.0	5.954	5.95	LOW	95.74%	$ 114,044	$ 103,168
294	SPRUCE ST.	6	PVC-SCH40	2010	857.33	7	0.558	2013	1.0	5.558	5.56	LOW	95.96%	$ 112,773	$ 106,482
295	MARIE ST.	6	PVC-SCH40	2010	360.00	7	0.558	2013	1.0	5.558	5.56	LOW	96.05%	$ 47,355	$ 44,713
298	MARIE ST.	6	PVC-SCH40	2010	300.03	7	0.558	2013	1.0	5.558	5.56	LOW	96.12%	$ 39,466	$ 37,264
989		6	PVC-SCH40	2010	22.71	7	0.558	2013	1.0	5.558	5.56	LOW	96.13%	$ 2,987	$ 2,820
990		6	PVC-SCH40	2010	391.49	7	0.558	2013	1.0	5.558	5.56	LOW	96.23%	$ 51,497	$ 48,624
955		8	PVC-C900	1996	267.93	21	2.497	1996	2.0	2.497	4.99	LOW	96.30%	$ 46,993	$ 35,259
956		8	PVC-C900	1996	215.87	21	2.497	1996	2.0	2.497	4.99	LOW	96.35%	$ 37,862	$ 28,408
957		8	PVC-C900	1996	527.85	21	2.497	1998	2.0	2.497	4.99	LOW	96.49%	$ 92,579	$ 69,463
969		6	PVC-C900	2009	303.79	8	0.660	2006	7.0	0.660	4.62	LOW	96.57%	$ 39,960	$ 37,323
691	JUNIPER ST.	6	PVC-C900	2005	136.57	12	1.124	2000	4.0	1.124	4.50	LOW	96.60%	$ 17,964	$ 15,944
693	IVY ST.	4	PVC-C900	2005	373.57	12	1.124	2005	4.0	1.124	4.50	LOW	96.70%	$ 49,140	$ 43,614
744	IVY ST.	6	PVC-C900	2005	722.00	12	1.124	1999	4.0	1.124	4.50	LOW	96.88%	$ 94,972	$ 84,294
749	JUNIPER ST.	6	PVC-C900	2005	382.88	12	1.124	1999	4.0	1.124	4.50	LOW	96.98%	$ 50,364	$ 44,701
967		10	PVC-C900	2010	324.31	7	0.558	2011	7.0	0.558	3.91	LOW	97.06%	$ 71,101	$ 67,134
968		10	PVC-C900	2010	693.39	7	0.558	2011	7.0	0.558	3.91	LOW	97.24%	$ 152,018	$ 143,537
1047		12	PVC-C900	2010	47.69	7	0.558	2011	7.0	0.558	3.91	LOW	97.25%	$ 12,546	$ 11,846
1109		0	Unknown	1980	1267.71	37	3.696		1.0	3.696	3.70	LOW	97.57%	$ 166,755	$ 105,117
961		6	PVC-C900	2000	1138.02	17	1.831	2003	2.0	1.831	3.66	LOW	97.86%	$ 149,695	$ 122,287
1094		6	PVC-C900	2000	203.91	17	1.831	2006	2.0	1.831	3.66	LOW	97.92%	$ 26,822	$ 21,911
991		6	PVC-C900	2013	796.76	4	0.285	2013	9.0	0.285	2.57	LOW	98.12%	$ 104,806	$ 101,817
1049		0.75	COPPER	2010	751.72	7	0.426	2010-2011	6.0	0.426	2.56	LOW	98.31%	$ 98,881	$ 94,666
1055		0	Unknown	2005	177.48	12	0.809	2005	3.0	0.809	2.43	LOW	98.36%	$ 23,345	$ 21,457
1088		1	POLY	1990	157.43	27	2.346	1993	1.0	2.346	2.35	LOW	98.40%	$ 20,708	$ 15,849
1089		1	POLY	1990	245.54	27	2.346	1993	1.0	2.346	2.35	LOW	98.46%	$ 32,298	$ 24,720

APPENDIX A

Risk Scoring of Water System Distribution System Assets and Estimated Replacement Value/Current Value

GIS ID	DESCRIPTION	PIPE DIAMETER	MATERIAL	YEAR INSTALLED	SHAPE LENGTH	AGE (in 2017)	AGE_SCORE	HydrantAge	CONSEQUENCE SCORE	CONDITION SCORE	RISK SCORE	RISK_LEVEL	SUM TOTAL PERCENT (LENGTH)	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on
959		0	PVC-C900	2000	481.63	17	1.831	2003	1.0	1.831	1.83	LOW	98.58%	$ 63,353	$ 51,754
982		6	PVC-C900	2000	1028.91	17	1.831	1994	1.0	1.831	1.83	LOW	98.85%	$ 135,343	$ 110,563
1092		2	PVC-C900	2000	383.86	17	1.831	1999	1.0	1.831	1.83	LOW	98.94%	$ 50,492	$ 41,248
1099	SILVER ST.	6	PVC-C900	2000	1173.58	17	1.831	2010	1.0	1.831	1.83	LOW	99.24%	$ 154,373	$ 126,109
1010		0.75	COPPER	2000	359.86	17	1.256	2005	1.0	1.256	1.26	LOW	99.33%	$ 47,336	$ 41,389
1017		2	COPPER	2000	62.38	17	1.256	2006	1.0	1.256	1.26	LOW	99.35%	$ 8,205	$ 7,175
1018		1	COPPER	2000	354.97	17	1.256	2006	1.0	1.256	1.26	LOW	99.44%	$ 46,692	$ 40,826
616	JUNIPER ST.	6	PVC-C900	2005	354.14	12	1.124	2004	1.0	1.124	1.12	LOW	99.53%	$ 46,584	$ 41,346
618	JUNIPER ST.	4	PVC-C900	2005	193.46	12	1.124	1999	1.0	1.124	1.12	LOW	99.58%	$ 25,448	$ 22,586
624	JUNIPER ST.	4	PVC-C900	2005	587.87	12	1.124	2000	1.0	1.124	1.12	LOW	99.73%	$ 77,328	$ 68,633
811	JUNIPER ST.	6	PVC-C900	2005	331.39	12	1.124	1984	1.0	1.124	1.12	LOW	99.82%	$ 43,591	$ 38,690
1068		4	PVC-C900	2005	361.00	12	1.124	2004	1.0	1.124	1.12	LOW	99.91%	$ 47,486	$ 42,147
1073		8	PVC-C900	2005	360.02	12	1.124	1999	1.0	1.124	1.12	LOW	100.00%	$ 63,143	$ 56,043

APPENDIX B

Inventory, Risk Scoring, and Estimated Replacement Value/Current Value of Water System Well, Pump System, Buildings/Structures, and Storage Tank Assets

APPENDIX B

T or C Water System Inventory: Groundwater Supply Wells

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	System Well No.	SEO Well No.	Capacity/ Production (GPM)	Top of Well Elevation (Feet)	Well Depth (Feet)	Static Water Level (Feet)	Casing Diameter (Inch)	Casing Depth (Feet)	Casing Material	Screen Depth (Feet)	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Driller	Estimated Asset Value (Replacement Value)	Notes/Comments
FID	NORTHING	EASTING	LOC_DESC	WELL_NO	SEO_NO	CAPTY_GPM	TOW_EL_FT	WELL_DP_FT	SWL_FT	CAS_DIA_IN	CAS_DP_FT	CAS_MAT	SCRN_DP_FT	YR_INSTL	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	DRILLER	ASSET_VALUE	NOTES_COMM
0	2890347.9	772105.1	Cook St. Pump Station (Water Treatment Facility)	Well #1	HS-11-S-2	375		395	80	16		Steel		1990				Larjon Drilling Co.	$25,000	Well Pump Characteristics: Submersible; 30 HP; capacity of 450 GPM; set at depth of 220 feet. Info Sources: 2007 NMED Sanitary Survey and 1991 OSE Well Record. Capacity estimated from 2007 NMED Survey.
1	2889685.8	771994.8	South side of Cook St. about 600 feet from Cook St. Water Treatment Facility	Well #2	HS-11	280		420	80	12	420	Steel		1945				Layne Texas Co.	$25,000	Well Pump Characteristics: Turbine; 25 HP; capacity of 500 GPM; set at depth of 150 feet. Info Source: 2007 NMED Sanitary Survey and 1961 OSE Record. Capacity estimated from 2007 NMED Survey.
2	2887377.1	771309.4	Approx 250 southwest of Intersection of Ridge Rd.and Central Ave.	Well #4	HS-11-S-5	240		404	60	16	235	Steel	N/A	1958				Johnson Drilling Co.	$25,000	Well Pump Characteristics: Submersible; 30 HP; capacity of 240 GPM; set at depth of 220 feet. Info Source: 2007 NMED Sanitary Survey.
3	2889366.5	771116.1	Approx. 380 feet NW of the Intersectin of S Broadway St. and Rio Grande Ave.	Well #6	HS-11-S-4	600		511	80	12	511	Steel	230-507	1976				Rayford Guffey	$30,000	Pump house replaced in 1999, but well was not replaced/rehabbed. Well Pump Characteristics: Turbine; 60 HP; capacity of 600 GPM; set at depth of 220 feet. Info Source: 2007 NMED Sanitary Survey.
4	2890720.6	770842.9	NE corner of the Intersection of Veater St. and Hyde Ave.	Well #7	HS-11-S-10	900	4238	600	80	12	600	Steel		1999		2014/2015	$58,000	Roger & Co., Inc.	$35,000	Well Pump Characteristics: Turbine; 75 HP; capacity of 900 GPM; set at depth of 260 feet. Info Source: 2007 NMED Sanitary Survey and Operator Interview.
5	2888356.8	771774.1	NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Well #8	HS-11-S-9	640	4264	600	80	12	600	Steel		1999				Roger & Co., Inc.	$35,000	Well Pump Characteristics: Turbine; 60 HP; capacity of 640 GPM; set at depth of 280 feet. Info Source: 2007 NMED Sanitary Survey.

APPENDIX B

T or C Water System Inventory: Pumps Systems - Pumps

Asset ID (GIS Point No./ID)	Northing	Easting	Location/Description	Pump Type	Duty Pt. Capacity/ Flowrate (GPM)	Duty Pt. Motor Horsepower (HP)	Pump Setting Depth (Feet)	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Manufacturer	Model No.	Serial No.	Project No./ System No./ Job No., Etc.	Estimated Asset Value (Replacement Value)	Notes/Comments
			LOC_DESC	PMP_TYPE	CAPTY_GPM	MTR_HP	PMP_DP	YR_INST	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	MANUFACT	MOD_NO	SERIAL_NO	PROJECT_NO	ASSET_VALUE	
0	2890327.4	772209.7	Cook St. Treatment Facility on Cook St; Pump No. 1	Vertical Turbine	3000	225	N/A	1996				Verti-Line		96-10241-1	Factory Order #8G6-10241/P.O. # 204513	$120,000	Pump in very good condition Pumps observed producing 100 PSI in pipe manifold. Info source: Site Visit, Oper. Interview, submittal data, and O&M Manual
1	2890361.3	772211.0	Cook St. Treatment Facility on Cook St; Pump No. 2	Vertical Turbine	3000	225	N/A	1996				Verti-Line		96-10241-2	Factory Order #8G6-10241/P.O. # 204513	$120,000	Pump in very good condition Pumps observed producing 100 PSI in pipe manifold. Info source: Site Visit, Oper. Interview, submittal data, and O&M Manual
2	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS); Pump No. 1	Aurora Horizontal Split Case Model 411 (Duplex System)	600	42	N/A	2007		2012	$3,000	Pumps: Aurora Pump; System: Canariis Corp.	TDH-1200-90		System ID # 07-0203	$25,000	Duplex Booster Skid-Mounted System with 2 pumps each rated to 600 GPM, 60HP (Model # TDH-1200-90/System ID # 07-0203) -Distributor JC&H. Pump in very good condition - Impeller was replaced in 2014.
3	2897491.2	774996.1	Cielo Vista Booster Pump System at the end of Camino De Cielo; Pump No. 1	Vertical Split Case		3	N/A	2006								$1,000	Small package system with two pumps, connected in a common manifold, all housed in a small fiberglass dome. Pump No. 1 in good condition. Info Sources: 2007 NMED Sanitary Survey and Operator interview and Site Visit.
4	2897484.7	774948.4	Cielo Vista Booster Pump System at the end of Camino De Cielo; Pump No. 2	Vertical Split Case		1	N/A	2006								$500	Small package system with two pumps, connected in a common manifold, all housed in a small fiberglass dome. Pump No. 1 in good condition. Info Sources: 2007 NMED Sanitary Survey and Operator interview and Site Visit.
5	2901216.7	778224.5	Pershing St. Booster Pump Station at SE corner of N Pershing St. and W Eighth Ave.	Aurora Horizontal Split Case HSC-410	850	64	N/A	1996				Aurora Pump			Job# 96-065; PO# 204514 (JC&H)	$25,000	**REPURPOSED** - pumps were removed from station in approx. 2012 and put into storage at the WWTP site.
6	2901215.3	778207.1	Pershing St. Booster Pump Station at SE corner of N Pershing St. and W Eighth Ave.	Aurora Horizontal Split Case HSC-410	850	64	N/A	1992				Aurora Pump				$25,000	**REPURPOSED** - pumps were removed from station in approx. 2012 and put into storage at the WWTP site.
7	2890346.2	772121.0	Well #1 at Cook St Water Treatment Facility (Southern part of Property)	Submersible	450*	24	220	1991		2001		Red Jacket				$18,000	Pump replace in 2001 and in good condition. *Flow observed at 500 GPM using new flow meter. Info Sources: 2007 NMED Sanitary Survey and Operator interview and Site Visit.
8	2890382.7	772281.6	Well #2 Pump House (inside) at Cook St. about 600 ft west of Water Treatment Facility	Vertical Turbine	450	20	150	1945		1961		Layne and Bowler, Inc.				$15,000	Pump in fair to poor condition. Operator believes it is from the 1970s visual inspection indicates it is at least that old, OSE Record has 1961. Info Sources: 2007 NMED Sanitary Survey, OSE Record, Operator Interview.
9	2887196.2	771213.6	Well #4 Pump Shed (inside) at Approx. 250 feet SW of the Intersection of Ridge Rd and Central Ave.	Submersible	240	24	270	1958		2001						$15,000	Pump replaced in approx. 2001 and in good condition Info Sources: 2007 NMED Sanitary Survey and Operator interview and Site Visit.
10	2889348.7	770884.1	Well #6 Pump Building (inside) at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	Vertical Turbine	500*	49	220	1976		1999	$1400**	Goulds Pumps, Inc.				$25,000	*Flow observed at 850 GPM at 30 PSI. Pump in good condition. **Pump was Salvaged/Rehabbed and reinstalled in 1999 as part of new building construction. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator interview and Site Visit
11	2890775.8	770850.2	Well #7 Pump Building (inside) at NE corner of the Intersection of Veater St. and Hyde Ave.	Vertical Turbine	650	60	260	1999								$30,000	Pump in good condition. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator Interview and Site Visit.
12	2888378.2	771776.5	Well #8 Pump Building (inside) at NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Vertical Turbine	500	49	280	1999		2014-2015*						$25,000	*Pump in fair condition - Bearing to be replaced winter 2014. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator Interview and Site Visit.
13	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS); Pump No. 2	Aurora Horizontal Split Case Model 411 (Duplex System)	600	42	N/A	2007		N/A	N/A	Pumps: Aurora Pump; System: Canariis Corp.	TDH-1200-90		System ID # 07-0203	$25,000	Duplex Booster Skid-Mounted System with 2 pumps each rated to 600 GPM, 60HP (Model # TDH-1200-90/System ID # 07-0203) -Distributor JC&H. Pump in very good condition

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

Item No.	Description	Unit	Est. Qty.	SMA Unit Cost	SMA Total Cost	Spartan Constructors of Texas, Inc Unit Cost	Spartan Constructors of Texas, Inc Total Cost	Smithco Construction, Inc. Unit Cost	Smithco Construction, Inc. Total Cost	File Construction Unit Cost	File Construction Total Cost	J29 Enterprises, LLC. Unit Cost	J29 Enterprises, LLC. Total Cost	Highland Enterprises, LLC Unit Cost	Highland Enterprises, LLC Total Cost
1	Furnish full-coverage pre and post construction video documentation of the entire construction site (DVD format)	LS	1	$ 3,600.00	$ 3,600.00	$ 1,695.38	$ 1,695.38	$ 2,500.00	$ 2,500.00	$ 10,303.30	$ 10,303.30	$ 2,687.00	$ 2,687.00	$ 369.89	$ 369.89
2	Material Testing Allowance	ALLOW	1	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
3	Traffic Control	LS	1	$ 20,000.00	$ 20,000.00	$ 45,210.00	$ 45,210.00	$ 50,000.00	$ 50,000.00	$ 22,946.90	$ 22,946.90	$ 25,532.00	$ 25,532.00	$ 69,916.24	$ 69,916.24
4	Preparation, Implementation and Maintenance of Dona Ana County Storm Water Pollution Prevention Plan (SWPPP)(Includes BMP and all related appurtenances not otherwise Included on Bid Form)	LS	1	$ 9,000.00	$ 9,000.00	$ 9,607.13	$ 9,607.13	$ 5,000.00	$ 5,000.00	$ 18,880.20	$ 18,880.20	$ 5,745.00	$ 5,745.00	$ 6,719.75	$ 6,719.75
5	Furnish and install NMDOT-approved seeding material along maximum disturbed area width of 20-feet in accordance with NMDOT permit. (Include all labor, materials, and related appurtenances not separately listed on Bid Form), CIP.	Acres	4	$ 7,000.00	$ 28,000.00	$ 7,911.75	$ 31,647.00	$ 6,000.00	$ 24,000.00	$ 8,153.10	$ 32,612.40	$ 8,900.00	$ 35,600.00	$ 6,164.91	$ 24,659.64
6	Utility Relocation (location and utility invoices must be approved by Engineer and Owner prior to any relocation)	Allow.	1	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
7	Furnish and Install 6-inch C900 PVC DR-18 Waterline, (Includes all material, labor, potholing, trenching, type D bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	578	$ 20.00	$ 11,560.00	$ 29.592	$ 17,104.18	$ 20.00	$ 11,560.00	$ 26.30	$ 15,201.40	$ 18.00	$ 10,404.00	$ 58.85	$ 34,015.30
8	Furnish and Install 10-inch C900 PVC DR-18 Waterline, (Includes all material, labor, potholing, trenching, type D bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	7984	$ 30.00	$ 239,520.00	$ 32.921	$ 262,841.26	$ 25.00	$ 199,600.00	$ 30.10	$ 240,318.40	$ 34.80	$ 277,843.20	$ 57.85	$ 461,874.40
9	Furnish and Install 12-inch C900 PVC DR-18 Waterline, (Includes all material, labor, potholing, trenching, type D bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	7943	$ 35.00	$ 278,005.00	$ 38.007	$ 301,889.60	$ 30.00	$ 238,290.00	$ 37.90	$ 301,039.70	$ 31.00	$ 246,233.00	$ 65.00	$ 516,295.00
10	Furnish and Install 12-inch HDPE Waterline, (Includes all material, labor, potholing, trenching, type D-2 bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	450	$ 40.00	$ 18,000.00	$ 52.762	$ 23,742.90	$ 60.00	$ 27,000.00	$ 55.10	$ 24,795.00	$ 45.75	$ 20,587.50	$ 61.62	$ 27,729.00
11	Furnish and Install 10-inch Ductile Iron Waterline, (Includes all material, labor, potholing, trenching, type D-2 bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	746	$ 40.00	$ 29,840.00	$ 54.175	$ 40,414.55	$ 65.00	$ 48,490.00	$ 60.20	$ 44,909.20	$ 53.85	$ 40,172.10	$ 65.92	$ 49,176.32
12	Furnish and Install 6-inch Gate Valve in Cast Iron Valve Box, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	1	$ 1,500.00	$ 1,500.00	$ 1,361.44	$ 1,361.44	$ 1,500.00	$ 1,500.00	$ 1,175.30	$ 1,175.30	$ 1,345.00	$ 1,345.00	$ 1,350.12	$ 1,350.12
13	Furnish and Install 10-inch Gate Valve in Cast Iron Valve Box, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	9	$ 2,600.00	$ 23,400.00	$ 2,493.742	$ 22,443.68	$ 2,500.00	$ 22,500.00	$ 2,084.70	$ 18,762.30	$ 2,464.00	$ 22,176.00	$ 2,615.15	$ 23,536.35

316K Gal. Tank

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
27	Furnish and install by Open-cut 24-inch steel casing at station 65+80 on Highway 28 (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	45	$ 200.00	$ 9,000.00	$ 153.303	$ 6,898.64	$ 150.00	$ 6,750.00	$ 315.90	$ 14,215.50	$ 143.72	$ 6,467.40	$ 128.31	$ 5,773.95
28	Furnish and install by Open-cut 24-inch steel casing at station 73+45 on Highway 28 (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	18	$ 200.00	$ 3,600.00	$ 158.954	$ 2,861.17	$ 150.00	$ 2,700.00	$ 369.50	$ 6,651.00	$ 137.80	$ 2,480.40	$ 135.77	$ 2,443.86
29	Furnish and install by Open-cut 24-inch steel casing at station 81+10 on Highway 28 (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	17	$ 200.00	$ 3,400.00	$ 170.257	$ 2,894.37	$ 150.00	$ 2,550.00	$ 436.30	$ 7,417.10	$ 136.15	$ 2,314.55	$ 143.75	$ 2,443.75
30	Furnish and install by Open-cut 24-inch steel casing at the intersection of Lara Road and Highway 28 (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	22	$ 200.00	$ 4,400.00	$ 158.955	$ 3,497.01	$ 150.00	$ 3,300.00	$ 354.80	$ 7,805.60	$ 149.00	$ 3,278.00	$ 139.83	$ 3,076.26
31	Furnish and install by trenchless methods 14-inch steel casing for the 6-inch waterline stubout at Sta. 2+10 (Includes trenching, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	63	$ 265.00	$ 16,695.00	$ 466.958	$ 29,418.35	$ 250.00	$ 15,750.00	$ 347.10	$ 21,867.30	$ 533.30	$ 33,597.90	$ 355.69	$ 22,408.47
32	Furnish and Install Three-Way Fire Hydrant Assembly, (Includes tee on mainline, all pipe from tee to hydrant, fittings, risers, gate valve, hydrant, restrained joints, drain rock, trenching, labor, backfill and site restoration), CIP	EA	7	$ 5,000.00	$ 35,000.00	$ 5,100.511	$ 35,703.58	$ 6,500.00	$ 45,500.00	$ 4,826.40	$ 33,784.80	$ 5,214.00	$ 36,498.00	$ 6,807.29	$ 47,651.03
33	Furnish and Install welded steel tank, (Includes cathodic protection and all appurtenance not Included separately on bid form for a complete installation), CIP	LS	1	$ 370,000.00	$ 370,000.00	$ 437,119.05	$ 437,119.05	$ 475,000.00	$ 475,000.00	$ 450,000.00	$ 450,000.00	$ 487,046.00	$ 487,046.00	$ 428,295.44	$ 428,295.44
34	New well Building (Includes concrete foundation, interior walls, electrical, HVAC, plumbing, wash sinks, shower, plumbing, valves, doors, etc.) As Shown on Plans and detailed in Technical Specifications, CIP	EA	1	$ 120,000.00	$ 120,000.00	$ 124,327.60	$ 124,327.60	$ 210,000.00	$ 210,000.00	$ 165,000.00	$ 165,000.00	$ 181,346.00	$ 181,346.00	$ 123,494.24	$ 123,494.24
35	Furnish and Install 6-inch Gate Valve with handwheel, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	1	$ 2,000.00	$ 2,000.00	$ 1,136.42	$ 1,136.42	$ 1,500.00	$ 1,500.00	$ 1,103.00	$ 1,103.00	$ 937.00	$ 937.00	$ 850.76	$ 850.76
36	Furnish and Install well house piping, (Includes air relief valves, gauges, pressure transducer, sample ports, hose bibs, pipe supports and related appurtenances not separately listed on Bid Form), CIP	LS	1	$ 30,000.00	$ 30,000.00	$ 51,169.50	$ 51,169.50	$ 85,000.00	$ 85,000.00	$ 43,000.00	$ 43,000.00	$ 20,702.00	$ 20,702.00	$ 63,418.43	$ 63,418.43
37	Chlorination Station (include chlorine drum, (2) pumps, tubing, 1 full 55 gallon barrel, water supply, (2) injection ports diffuser, spill containment unit and all related appurtenances required for a complete working installation), CIP	LS	1	$ 30,000.00	$ 30,000.00	$ 23,776.35	$ 23,776.35	$ 15,000.00	$ 15,000.00	$ 13,500.00	$ 13,500.00	$ 26,827.00	$ 26,827.00	$ 15,523.24	$ 15,523.24
38	Furnish and Install Eight Foot High Chain Link Fence (Includes vehicle gate, pedestrian gate, removal and disposal of existing fence, concrete footings and all related appurtenances), CIP	LF	327	$ 23.00	$ 7,521.00	$ 74.597	$ 24,393.22	$ 70.00	$ 22,890.00	$ 74.00	$ 24,198.00	$ 79.50	$ 25,996.50	$ 76.75	$ 25,097.25
39	Utility 3-phase power extension to the site (Includes coordination with El Paso Electric Company and utility invoices must be approved by Engineer and Owner prior commencing any electrical extension work)	Allow	1	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00	$ 270,000.00
40	Furnish and Install New 4-inch Magnetic flow meter (Includes fittings, and all required appurtenances not otherwise listed in the Bid Form), CIP	EA	1	$ 10,000.00	$ 10,000.00	$ 3,966.15	$ 3,966.15	$ 4,000.00	$ 4,000.00	$ 6,800.00	$ 6,800.00	$ 3,875.00	$ 3,875.00	$ 9,243.67	$ 9,243.67
41	Furnish and Install New 6-inch Flow Control valve (Includes fittings, and all required appurtenances not otherwise listed in the Bid Form), CIP	EA	2	$ 10,000.00	$ 20,000.00	$ 26,057.40	$ 52,114.80	$ 14,000.00	$ 28,000.00	$ 14,200.00	$ 28,400.00	$ 10,475.00	$ 20,950.00	$ 13,328.54	$ 26,657.08
42	Mobilization of the well drilling Equipment	LS	1	$ 10,000.00	$ 10,000.00	$ 2,825.63	$ 2,825.63	$ 45,000.00	$ 45,000.00	$ 40,400.00	$ 40,400.00	$ 49,765.00	$ 49,765.00	$ 44,011.19	$ 44,011.19
43	Demobilization of the well drilling equipment	LS	1	$ 10,000.00	$ 10,000.00	$ 2,825.63	$ 2,825.63	$ 18,000.00	$ 18,000.00	$ 5,000.00	$ 5,000.00	$ 19,150.00	$ 19,150.00	$ 16,927.38	$ 16,927.38

215,000 gal *

487,046 → size?

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
44	Drill 24-inch diameter boring for conductor casing, collect drill cutting samples every 10 feet	LF	40	$ 375.00	$ 15,000.00	$ 141.281	$ 5,651.24	$ 130.00	$ 5,200.00	$ 150.00	$ 6,000.00	$ 140.42	$ 5,616.80	$ 124.13	$ 4,965.20
45	Furnish and Install 18-inch diameter steel conductor casing, CIP	LF	42	$ 216.00	$ 9,072.00	$ 40.689	$ 1,708.94	$ 200.00	$ 8,400.00	$ 43.00	$ 1,806.00	$ 210.60	$ 8,845.20	$ 186.20	$ 7,820.40
46	Drill 10-inch pilot borehole from bottom of surface casing to total depth, collect drill cutting samples every 10 feet	LF	610	$ 70.00	$ 42,700.00	$ 56.513	$ 34,472.93	$ 70.00	$ 42,700.00	$ 59.00	$ 35,990.00	$ 74.00	$ 45,140.00	$ 65.45	$ 39,924.50
47	Geophysical Logging of borehole	ALLOW	1	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00	$ 14,000.00
48	Discrete interval sampling as specified in technical specifications	EA	2	$ 7,700.00	$ 15,400.00	$ 1,977.94	$ 3,955.88	$ 18,000.00	$ 36,000.00	$ 2,100.00	$ 4,200.00	$ 19,787.00	$ 39,574.00	$ 17,491.63	$ 34,983.26
49	Water Quality Testing	ALLOW	1	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00	$ 6,000.00
50	Plug and Abandon pilot boring with grout if completion of production well not justified	LF	650	$ 7.50	$ 4,875.00	$ 6.081	$ 3,952.65	$ 6.00	$ 3,900.00	$ 7.00	$ 4,550.00	$ 6.38	$ 4,147.00	$ 5.64	$ 3,666.00
51	Ream pilot borehole to 16-inch production borehole from bottom of surface casing to total depth	LF	610	$ 90.00	$ 54,900.00	$ 158.235	$ 96,523.35	$ 80.00	$ 48,800.00	$ 161.00	$ 98,210.00	$ 88.08	$ 53,728.80	$ 77.87	$ 47,500.70
52	Furnish and Install 10-inch i.d. Blank Casing, CIP	LF	290	$ 100.00	$ 29,000.00	$ 46.566	$ 13,504.14	$ 75.00	$ 21,750.00	$ 48.00	$ 13,920.00	$ 82.98	$ 24,064.20	$ 73.35	$ 21,271.50
53	Furnish and Install 10-inch i.d. dielectric metal adaptors for welding screen to casing, CIP	EA	3	$ 4,000.00	$ 12,000.00	$ 1,158.507	$ 3,475.52	$ 6,000.00	$ 18,000.00	$ 1,214.00	$ 3,642.00	$ 6,382.90	$ 19,148.70	$ 5,642.46	$ 16,927.38
54	Furnish and Install 10-inch i.d. Well Screen, CIP	LF	360	$ 250.00	$ 90,000.00	$ 248.655	$ 89,515.80	$ 150.00	$ 54,000.00	$ 260.00	$ 93,600.00	$ 165.95	$ 59,742.00	$ 146.70	$ 52,812.00
55	Furnish and install centralizers	EA	6	$ 200.00	$ 1,200.00	$ 254.307	$ 1,525.84	$ 100.00	$ 600.00	$ 267.00	$ 1,602.00	$ 108.50	$ 651.00	$ 95.92	$ 575.52
56	Furnish and install filter pack (assumed to be 410 linear ft of 8-16 silica sand filter pack)	CU. YD	13	$ 1,000.00	$ 13,000.00	$ 957.322	$ 12,445.19	$ 1,000.00	$ 13,000.00	$ 974.00	$ 12,662.00	$ 1,055.75	$ 13,724.75	$ 933.26	$ 12,132.38
57	Furnish and install pea gravel between bentonite seals of screened intervals	CU. YD	5	$ 850.00	$ 4,250.00	$ 378.634	$ 1,893.17	$ 350.00	$ 1,750.00	$ 385.00	$ 1,925.00	$ 382.98	$ 1,914.90	$ 338.55	$ 1,692.75
58	Furnish and Install Bentonite Seal and cement grout, CIP	CU. YD.	12	$ 850.00	$ 10,200.00	$ 1,057.914	$ 12,694.97	$ 1,000.00	$ 12,000.00	$ 1,075.00	$ 12,900.00	$ 1,174.45	$ 14,093.40	$ 1,038.21	$ 12,458.52
59	Well Development	HRS	24	$ 350.00	$ 8,400.00	$ 226.05	$ 5,425.20	$ 675.00	$ 16,200.00	$ 230.00	$ 5,520.00	$ 740.00	$ 17,760.00	$ 654.53	$ 15,708.72
60	Test pumping of well	HRS	50	$ 370.00	$ 18,500.00	$ 226.05	$ 11,302.50	$ 225.00	$ 11,250.00	$ 235.00	$ 11,750.00	$ 248.93	$ 12,446.50	$ 220.06	$ 11,003.00
61	Standby at the request of Owners Representative	HRS	8	$ 300.00	$ 2,400.00	$ 310.819	$ 2,486.55	$ 375.00	$ 3,000.00	$ 325.00	$ 2,600.00	$ 383.00	$ 3,064.00	$ 338.55	$ 2,708.40
62	Well Disinfection and bacteriological testing	LS	1	$ 2,500.00	$ 2,500.00	$ 5,086.13	$ 5,086.13	$ 3,000.00	$ 3,000.00	$ 5,200.00	$ 5,200.00	$ 3,190.00	$ 3,190.00	$ 2,821.23	$ 2,821.23
63	Furnish and Install 1-inch sounding line (Includes 1-inch breather pipe with screen, sounding tube with lock and all other appurtenances not included on bid form), CIP	LF	410	$ 17.00	$ 6,970.00	$ 2.396	$ 982.36	$ 3.00	$ 1,230.00	$ 2.50	$ 1,025.00	$ 3.19	$ 1,307.90	$ 2.82	$ 1,156.20
64	Furnish and install 4-inch i.d. Drop pipe, CIP	LF	430	$ 58.00	$ 24,940.00	$ 19.271	$ 8,286.53	$ 25.00	$ 10,750.00	$ 20.00	$ 8,600.00	$ 25.28	$ 10,870.40	$ 22.34	$ 9,606.20
65	Furnish and install Pitless Adapter, Lift Pipe, & 4'x4' concrete pad around well seal pursuant to NMED requirements, CIP	LS	1	$ 19,300.00	$ 19,300.00	$ 13,243.14	$ 13,243.14	$ 15,000.00	$ 15,000.00	$ 13,500.00	$ 13,500.00	$ 16,439.00	$ 16,439.00	$ 14,531.59	$ 14,531.59
66	Construct wellhead (Includes concrete, sampling port with backflow preventer, air release valve, conduit, steel plates and all other appurtenances not included on bid form), CIP	LS	1	$ 14,000.00	$ 14,000.00	$ 9,042.00	$ 9,042.00	$ 12,000.00	$ 12,000.00	$ 4,800.00	$ 4,800.00	$ 1,915.00	$ 1,915.00	$ 2,256.98	$ 2,256.98
67	Furnish and Install 30 HP Submersible Pump w/ Controls, CIP	EA	1	$ 20,000.00	$ 20,000.00	$ 25,533.48	$ 25,533.48	$ 15,000.00	$ 15,000.00	$ 26,000.00	$ 26,000.00	$ 15,320.00	$ 15,320.00	$ 13,541.90	$ 13,541.90
68	Site Preparation and Grading (Includes clearing and grubbing, grading of tank location, roadway to tank, ponding completion, placement of gravel bedding for tank, excavation of tank discharge pond and installation of riprap), CIP	LS	1	$ 25,000.00	$ 25,000.00	$ 152,131.65	$ 152,131.65	$ 140,000.00	$ 140,000.00	$ 162,500.00	$ 162,500.00	$ 175,270.00	$ 175,270.00	$ 66,257.99	$ 66,257.99
69	Remove and Replace Gravel Roadway (Includes labor and material required to construct roadway to the well and tank site and related appurtenance not separately listed on the bid form) CIP	SY	5216	$ 10.00	$ 52,160.00	$ 8.235	$ 42,953.76	$ 10.00	$ 52,160.00	$ 16.00	$ 83,456.00	$ 10.50	$ 54,768.00	$ 10.00	$ 52,160.00
70	Furnish and Install 12-foot vehicle gate on existing fence (Includes removal and disposal of existing fence, vehicle gate, and related appurtenances not separately listed on the bid form) CIP	EA	3	$ 396.00	$ 1,188.00	$ 1,808.40	$ 5,425.20	$ 1,250.00	$ 3,750.00	$ 1,600.00	$ 4,800.00	$ 1,531.00	$ 4,593.00	$ 1,972.77	$ 5,918.31
71	Furnish and Install 8-inch C900 PVC DR-18 Waterline, (Includes all material, labor, potholing, trenching, type D bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	15	$ 25.00	$ 375.00	$ 86.105	$ 1,291.58	$ 75.00	$ 1,125.00	$ 177.00	$ 2,655.00	$ 91.75	$ 1,376.25	$ 183.55	$ 2,753.25
72	Furnish and Install 8-inch Gate Valve in Cast Iron Valve Box, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	1	$ 1,900.00	$ 1,900.00	$ 1,700.51	$ 1,700.51	$ 2,200.00	$ 2,200.00	$ 1,600.00	$ 1,600.00	$ 1,760.00	$ 1,760.00	$ 2,272.39	$ 2,272.39

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
73	Furnish & Install 8-inch Ductile Iron (DI) Pipe (Includes pipe material and fittings, megalugs, trenching, installation, bedding material, backfill, compaction, utility crossings, testing, disinfection, and all related appurtenances not listed in the Bid Form), CIP	LF	5	$ 50.00	$ 250.00	$ 170.156	$ 850.78	$ 150.00	$ 750.00	$ 290.00	$ 1,450.00	$ 215.00	$ 1,075.00	$ 270.52	$ 1,352.60
74	Furnish & Install 12-inch Ductile Iron (DI) Pipe (Includes pipe material and fittings, megalugs, trenching, installation, bedding material, backfill, compaction, utility crossings, testing, disinfection, and all related appurtenances not listed in the Bid Form), CIP	LF	108	$ 60.00	$ 6,480.00	$ 62.369	$ 6,735.85	$ 85.00	$ 9,180.00	$ 77.00	$ 8,316.00	$ 46.75	$ 5,049.00	$ 68.76	$ 7,426.08
75	Geotechnical Report for New Tanks Site	LS	1	$ 5,000.00	$ 5,000.00	$ 8,476.88	$ 8,476.88	$ 6,000.00	$ 6,000.00	$ 5,100.00	$ 5,100.00	$ 3,635.00	$ 3,635.00	$ 3,754.43	$ 3,754.43
76	Over excavate existing soil for Tank footings and replace with engineered fill as directed by the completed geotechnical report (incl. removing native material, processing and compaction of engineered fill, and all related appurtenances not included on Bid Form), CIP	CY	15	$ 90.00	$ 1,350.00	$ 57.026	$ 855.39	$ 125.00	$ 1,875.00	$ 350.00	$ 5,250.00	$ 1,005.00	$ 15,075.00	$ 9.21	$ 138.15
77	Furnish & Install 1.5-feet thick layer of 6" to 8" Fractured Rock for slope protection at the inlet and outlet side of the low water crossings, (Include all labor, materials, and related appurtenances not separately listed on Bid Form), CIP	SY	200	$ 200.00	$ 40,000.00	$ 51.17	$ 10,234.00	$ 60.00	$ 12,000.00	$ 45.00	$ 9,000.00	$ 49.79	$ 9,958.00	$ 49.94	$ 9,988.00
78	Install 22-feet wide x 60-feet long x 8-inch thick concrete slab (4,000 psi) low water crossing. (Include all labor, materials, and related appurtenances not separately listed on Bid Form), CIP.	EA	2	$ 25,000.00	$ 50,000.00	$ 15,350.85	$ 30,701.70	$ 25,000.00	$ 50,000.00	$ 15,425.00	$ 30,850.00	$ 26,787.25	$ 53,574.50	$ 17,232.16	$ 34,464.32
	Total Base Bid:			$	2,458,701.00	$	2,718,432.91	$	2,749,460.00	$	2,800,733.80	$	2,857,094.05	$	3,087,769.82
	Written Total:			$	238,967.50	$	2,717,251.77	$	2,749,460.00	$	2,799,427.00	$	2,857,094.05	$	3,087,769.82

ADDITIVE ALTERNATIVE NO. 1

Item No.	Description	Unit	Est. Qty.	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
1.1	Furnish and Install 10-inch C900 PVC DR-18 Waterline, (Includes all material, labor, potholing, trenching, type D bedding, removal of waste excavation, joint restraints, fittings, warning tape, tracer wire, above ground pipe markers, backfilling, compaction, disinfection, site restoration, hydrostatic pressure testing and all related appurtenances not separately listed on the bid form), CIP	LF	3550	$ 30.00	$ 106,500.00	$ 31.056	$ 110,248.80	$ 25.00	$ 88,750.00	$ 34.50	$ 122,475.00	$ 23.68	$ 84,064.00	$ 29.96	$ 106,358.00
1.2	Furnish and Install 10-inch Gate Valve in Cast Iron Valve Box, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	2	$ 2,600.00	$ 5,200.00	$ 2,606.770	$ 5,213.54	$ 3,000.00	$ 6,000.00	$ 2,379.20	$ 4,758.40	$ 2,463.00	$ 4,926.00	$ 2,615.16	$ 5,230.32
1.3	Remove and replace existing roadway with 3-inch HMAC, 8-inch base course and 12-inch subgrade prep; assumed 12-foot max width (Includes removal and disposal to an approved site of the existing asphalt and gravel, tack coat, asphalt and restoration of pavement markings to preconstruction configuration), CIP	SY	85	$ 43.00	$ 3,655.00	$ 113.025	$ 9,607.13	$ 65.00	$ 5,525.00	$ 66.70	$ 5,669.50	$ 55.65	$ 4,730.25	$ 51.00	$ 4,335.00
1.4	Locate and tie to existing 6-inch Waterline (Includes tee, megalugs, caps, reducers, removal of existing valves & fittings and all other required fittings and appurtenances for a complete working installation), CIP	EA	1	$ 2,500.00	$ 2,500.00	$ 2,388.940	$ 2,388.94	$ 3,500.00	$ 3,500.00	$ 4,207.90	$ 4,207.90	$ 4,257.00	$ 4,257.00	$ 986.39	$ 986.39
1.5	Remove and Replace 6-inch thick Concrete Driveway pad (Includes disposal of existing concrete to an approve site, labor, equipment, coordination of removal locations with Engineer and Owner and all related appurtenances not separately listed on the bid form), CIP	SY	61	$ 85.00	$ 5,185.00	$ 94.530	$ 5,766.33	$ 100.00	$ 6,100.00	$ 94.70	$ 5,776.70	$ 103.50	$ 6,313.50	$ 140.18	$ 8,550.98
1.6	Tie to existing yard piping (Includes all other required fittings and appurtenances for a complete working installation), CIP	EA	1	$ 2,500.00	$ 2,500.00	$ 1,709.770	$ 1,709.77	$ 3,500.00	$ 3,500.00	$ 1,565.90	$ 1,565.90	$ 2,325.00	$ 2,325.00	$ 986.39	$ 986.39

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
1.7	Remove and Replace Gravel Roadway (Includes labor and material required to construct roadway to the well and tank site and related appurtenance not separately listed on the bid form) CIP	SY	4284	$ 20.00	$ 85,680.00	$ 8.122	$ 34,794.65	$ 10.00	$ 42,840.00	$ 13.00	$ 55,692.00	$ 10.45	$ 44,767.80	$ 7.31	$ 31,316.04
	Total of Additive Alternative No. 1:			$ 211,220.00		$ 169,729.15		$ 156,215.00		$ 200,145.40		$ 151,383.55		$ 157,763.12	
	Written Total:			$ 211,220.00		$ 169,731.48		$ 156,215.00		$ 200,145.40		$ 151,383.55		$ 157,763.12	

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

ADDITIVE ALTERNATIVE NO. 2

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
Item No.	Description	Unit	Est. Qty.	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
2.1	Furnish and Install material to sand blast and repaint interior of existing water storage tank (incl. adding tank vent shroud, add security hatch locking device and related appurtenances not separately listed on the bid form) CIP	LS	1	$ 70,000.00	$ 70,000.00	$ 113,590.130	$ 113,590.13	$ 110,000.00	$ 110,000.00	$ 110,046.10	$ 110,046.10	$ 121,712.00	$ 121,712.00	$ 107,592.68	$ 107,592.68
	Total of Additive Alternative No. 2:			$	70,000.00	$	113,590.13	$	110,000.00	$	110,046.10	$	121,712.00	$	107,592.68
	Written Total:			$	70,000.00	$	113,590.13	$	110,000.00	$	110,046.10	$	121,712.00	$	107,592.68

ADDITIVE ALTERNATIVE NO. 3

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
Item No.	Description	Unit	Est. Qty.	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price	Unit Price	Total Price
3.1	Furnish and Install material to rehabilitate existing well (incl. removal and disposal of existing Ductile Iron pipe and related appurtenances not separately listed on the bid form) CIP	LS	1	$ 25,000.00	$ 25,000.00	$ 18,649.130	$ 18,649.13	$ 110,000.00	$ 110,000.00	$ 8,000.00	$ 8,000.00	$ 51,632.00	$ 51,632.00	$ 46,155.32	$ 46,155.32
	Total of Additive Alternative No. 3:			$	25,000.00	$	18,649.13	$	110,000.00	$	8,000.00	$	51,632.00	$	46,155.32
	Written Total:			$	25,000.00	$	18,649.13	$	110,000.00	$	8,000.00	$	51,632.00	$	46,155.32
	Bid Total (Base Bid + Alternative 1 + Alternative 2 + Alternative 3):			$	2,764,921.00	$	3,020,401.32	$	3,125,675.00	$	3,118,925.30	$	3,181,821.60	$	3,399,280.94

*Cells with red text indicate that a correction has been made in accordance with Article 14.01.C of the Instructions to Bidders (C-200)

CERTIFICATION:

I certify that the above figures are the evaluated bid prices from those submitted in the Bid Form.

Marty Howell, P.E.
Souder, Miller & Associates

August 20, 2019
Date

Chamberino Mutual Domestic Water Consumer and Sewer Association
Water System Improvements Project
Bid Tabulation
August 16, 2019

				SMA		Spartan Constructors of Texas, Inc		Smithco Construction, Inc.		File Construction		J29 Enterprises, LLC.		Highland Enterprises, LLC	
14	Furnish and Install 12-inch Gate Valve in Cast Iron Valve Box, (Includes all labor, materials and related appurtenances not separately listed on Bid Form), CIP	EA	8	$ 3,200.00	$ 25,600.00	$ 2,750.104	$ 22,000.83	$ 3,000.00	$ 24,000.00	$ 2,783.70	$ 22,269.60	$ 2,900.00	$ 23,200.00	$ 2,708.86	$ 21,670.88
15	Furnish and Install 1-inch Single Body Combination Air Valve w/ Traffic Rated Vault on new 10-inch waterline, (Includes all materials, labor, excavation, backfill and site restoration), CIP	EA	14	$ 4,800.00	$ 67,200.00	$ 4,310.363	$ 60,345.08	$ 5,500.00	$ 77,000.00	$ 4,082.90	$ 57,160.60	$ 4,446.00	$ 62,244.00	$ 4,046.65	$ 56,653.10
16	Locate and tie to existing 6-inch Waterline (Includes tee, megalugs, caps, reducers, removal of existing valves & fittings and all other required fittings and appurtenances for a complete working installation), CIP	EA	1	$ 2,500.00	$ 2,500.00	$ 1,824.85	$ 1,824.85	$ 3,500.00	$ 3,500.00	$ 1,953.70	$ 1,953.70	$ 1,910.00	$ 1,910.00	$ 1,048.03	$ 1,048.03
17	Furnish and install water service line (include excavation, backfill, compaction, polyethylene pipe, and all other appurtenances required for a complete working installation), CIP	LF	60	$ 10.00	$ 600.00	$ 15.402	$ 924.12	$ 15.00	$ 900.00	$ 21.10	$ 1,266.00	$ 19.81	$ 1,188.60	$ 20.24	$ 1,214.40
18	Furnish and install Water Meter Service Connection (include entire meter assembly, double strap saddle, corporation stop assembly, pipe, fittings, meter, meter box, meter setting equipment, connection to service line, and all other appurtenances required for a complete working installation), CIP	EA	4	$ 1,000.00	$ 4,000.00	$ 625.748	$ 2,502.99	$ 1,250.00	$ 5,000.00	$ 1,457.00	$ 5,828.00	$ 871.25	$ 3,485.00	$ 659.65	$ 2,638.60
19	Furnish and install 2-inch water service line (include excavation, backfill, compaction, polyethylene pipe, and all other appurtenances required for a complete working installation), CIP	LF	20	$ 15.00	$ 300.00	$ 20.551	$ 411.02	$ 18.00	$ 360.00	$ 51.40	$ 1,028.00	$ 21.90	$ 438.00	$ 40.69	$ 813.80
20	Furnish and install by trenchless methods 24-inch steel casing at the state land berm (Includes pit excavation, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	160	$ 320.00	$ 51,200.00	$ 497.474	$ 79,595.84	$ 220.00	$ 35,200.00	$ 295.80	$ 47,328.00	$ 458.06	$ 73,289.60	$ 369.32	$ 59,091.20
21	Furnish and install by Open-cut 24-inch steel casing at station 28+12 of Ranch Road (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	20	$ 200.00	$ 4,000.00	$ 85.489	$ 1,709.78	$ 150.00	$ 3,000.00	$ 380.10	$ 7,602.00	$ 152.02	$ 3,040.40	$ 135.87	$ 2,717.40
22	Furnish and install by Open-cut 24-inch steel casing at station 56+27 of Ranch Road (Includes backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	22	$ 200.00	$ 4,400.00	$ 96.79	$ 2,129.38	$ 150.00	$ 3,300.00	$ 411.00	$ 9,042.00	$ 151.40	$ 3,330.80	$ 139.10	$ 3,060.20
23	Furnish and install by trenchless methods 24-inch steel casing at Ranch Road and Chamberino Lateral (Includes pit excavation, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	65	$ 350.00	$ 22,750.00	$ 444.353	$ 28,882.95	$ 250.00	$ 16,250.00	$ 341.70	$ 22,210.50	$ 557.12	$ 36,212.80	$ 572.67	$ 37,223.55
24	Furnish and install by trenchless methods 24-inch steel casing at station 15+89 of Highway 28 (Includes pit excavation, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	20	$ 350.00	$ 7,000.00	$ 452.265	$ 9,045.30	$ 450.00	$ 9,000.00	$ 557.40	$ 11,148.00	$ 436.77	$ 8,735.40	$ 483.33	$ 9,666.60
25	Furnish and install by trenchless methods 24-inch steel casing at Highway 28 and La Vina Road (Includes pit excavation, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	20	$ 320.00	$ 6,400.00	$ 452.265	$ 9,045.30	$ 450.00	$ 9,000.00	$ 557.40	$ 11,148.00	$ 924.58	$ 18,491.60	$ 483.33	$ 9,666.60
26	Furnish and install by Open-cut 24-inch steel casing at station 39+37 on Highway 28 (Includes pit excavation, backfill and compaction, carrier pipe, seals, spacers and all other appurtenances required for a complete working installation), CIP	LF	20	$ 320.00	$ 6,400.00	$ 153.304	$ 3,066.08	$ 450.00	$ 9,000.00	$ 384.20	$ 7,684.00	$ 156.75	$ 3,135.00	$ 139.88	$ 2,797.60

APPENDIX B

T or C Water System Inventory: Pump Systems - Motors

Asset ID (GIS Point No./ID)	Northing	Easting	Location/Description	Pump Type	Motor Horse - power (HP)	Motor RPM	Motor Voltage (V)	Motor Freq. (Hz)	Motor Phase	Motor Current (Amps)	Manufacturer	Model No. / Serial No. / ID No.	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Project No./ System No./ Job No., Etc.	Estimated Asset Value (Replacement Value)	Notes/Comments
			LOC_DESC	PMP_TYPE	MTR_HP	MTR_RPM	MTR_VOLT	MTR_FREQ	MTR_PHASE	MTR_AMPS	MANUFACT	MOD_NO	YR_INSTL	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	PROJECT_NO	ASSET_VALUE	
0	2890327.4	772209.7	Cook St. Treatment Facility on Cook St: Pump No. 1 Motor	Vertical Turbine	250	1780	460	60	3	284	US Electric Motors	H08289	1996		2014	$5,000	Factory Order #8G6-10241/ P.O. # 204513	$15,000	According to Operator, Turner Electric added additional windings to pump motor to assist with VFD operation. Info sources: Site Visit, Oper. Interview, submittal data, and O&M Manual
1	2890361.3	772211.0	Cook St. Treatment Facility on Cook St; Pump No. 2 Motor	Vertical Turbine	250	1780	460	60	3	284	US Electric Motors	H08289	1996				Factory Order #8G6-10241/ P.O. # 204513	$15,000	Pump No. 2 of Cook St Pump Station. Pump may need additional windings to assist with VFD operation. Info source: Site Visit, Oper. Interview, submittal data, and O&M Manual
2	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS); Pump No. 1 Motor	Aurora Horizontal Split Case Model 411 (Duplex System)	60	3500	460	60	3	68	Motor: Emerson Motor Comp.; System: Canarlis Corp.	Model# R366	2007				Order # 485692 / System ID # 07-0203	$5,500	Part of Duplex Booster Skid-Mounted System (Model # TDH-1200-90/System ID # 07-0203). Motor is original and in good condition. Info sources: Site Visit, Oper. Interview, and O&M Manual
3	2897491.2	774996.1	Cielo Vista Booster Pump System at the end of Camino De Cielo; Pump No. 1 Motor	Vertical Split Case	3	3450	208	60	3	8.42	WEG	Mod No. 1UTO1CGNXJ003020	2006					$500	Motor Label indicates: motor is 3 HP; Manfact is WEG in Brazil; Manufact Date is Oct 31, 2006. Motor in good condition. Info Source: Oper. Interview and Site Visit
4	2897484.7	774948.4	Cielo Vista Booster Pump System at the end of Camino De Cielo; Pump No. 2 Motor	Vertical Split Case	1								2006					$500	Motor in good condition. Info Source: Oper. Interview and Site Visit. Need info from pump label or O&M Manual.
5	2901216.7	778224.5	Old Pershing St. Booster Pump Station Pump No. 1 Motor	Horizontal Split Case HSC-410	75	3600	230/460	60	3	85	US Electric Motors		1996				Job# 96-065; PO# 204514 (JC&H)		**REPURPOSED** - pumps (and motors) were removed from station in approx. 2012 and put into storage at the WWTP site.
6	2901215.3	778207.1	Old Pershing St. Booster Pump Station Pump No. 2 Motor	Horizontal Split Case HSC-410	75						US Electric Motors		1992						**REPURPOSED** - pumps (and motors) were removed from station in approx. 2012 and put into storage at the WWTP site.
7	2890346.2	772121.0	Well #1 at Cook St Water Treatment Facility (Southern part of Property)	Submersible	30								1991		2001			$3,000	Motor replace in 2001 and in good condition. Info Sources: Operator Interview and Site Visit
8	2890382.7	772281.6	Well #2 Pump House (inside) at Cook St. about 600 ft west of Water Treatment Facility	Vertical Turbine	25		220/440	60	3		US Electric Motors		1945		1985			$3,000	Motor replaced in approx. 1985 and is in fair to good condition. Info Source: 2007 NMED Sanitary Survey, Operator nterview and Site Visit.
9	2887196.2	771213.6	Well #4 Pump Shed (inside) at Approx. 250 feet SW of the Intersection of Ridge Rd and Central Ave.	Submersible	30								1958		2001			$3,000	Motor replaced in approx. 2001 and is in good condition. Info Source: 2007 NMED Sanitary Survey, Operator nterview and Site Visit.
10	2889348.7	770884.1	Well #6 Pump Building (inside) at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	Vertical Turbine	60	1750	230/460	60	3	69	US Electric Motors	ID No. D10-S329A-M C2	1976		1999			$5,500	Motor replaced in 1999 and appears to be in very good condition. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator Interview and Site Visit .
11	2890775.8	770850.2	Well #7 Pump Building (inside) at NE corner of the Intersection of Veater St. and Hyde Ave.	Vertical Turbine	75	1800	230/460	60	3		US Electric Motors		1999					$7,000	Motor appears to be in good condition. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator Interview and Site Visit .
12	2888378.2	771776.5	Well #8 Pump Building (inside) at NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Vertical Turbine	60	1775	460	60	3		US Electric Motors		1999					$5,500	Motor appears to be in very good condition. Info Sources: 2007 NMED Sanitary Survey, LH 1998-99 As-builts, Operator Interview and Site Visit .
13	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS); Pump No. 2 Motor	Aurora Horizontal Split Case Model 411 (Duplex System)	60	3500	460	60	3	68	Motor: Emerson Motor Comp.; System: Canarlis Corp.	Model# R366 Cat # D60P1BS-C	2007				Order # 485692 / System ID # 07-0203	$5,500	Part of Duplex Booster Skid-Mounted System (Model # TDH-1200-90/System ID # 07-0203). Motor is original and in good condition. Info sources: Site Visit, Oper. Interview, and O&M Manual

APPENDIX B

T or C Water System Inventory: Pump Systems - Manifolds and Flow Meters

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Equipment Description	Manifold Pipe Size (Dia) (Inches)	Material	Flow Meter Type	Flow Meter Size (Inches)	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Manufacturer	Project No./ System No./ Job No., Etc.	Estimated Asset Value (Replacement Value)	Notes/Comments
			LOC_DESC	EQUIP_DESC	PIPE_SIZE	MATERIAL	FM_TYPE	FM_SIZE	YR_INSTL	INIT_COS	YR_RPC_RHB	RPC_RHB_CT	MFG	JOB_NO	ASSET_VALUE	NOTES_COMM
0	2890363.7	772289	Cook St. Treatment Facility on Cook St	Cook St. Treatment Facility Pump System Manifold	12; 8; 6	Ductile Iron			1996		2002*	$5000*	Check Valves: APCO; Control Valves: ClaVal Co.; ARVs: APCO: Gate Valves: American Flow Control	Factory Order #8G6-10241 / P.O. # 204513	$120,000	Manifold piping is 12" for large pumps, 8" for small pumps (not yet installed) and 6" for auxiliary piping. Associated Components: 4 check valves (2x 12", 2x 8"), 10 isolation (Gate) valves (3x 12", 3x 8", 4x 6"), 4x 4" ClaVal control valves, 8 ARVs, many press. gauges. All components in good condition except one 12" CV that has a significant leak. A replacement valve is in storage. *1x 12" Check Valve (APCO) was replaced in 2002 at a cost of $5,000. Concrete supports of manifold need to be replaced/repaired - Priority in AMP Report. Pumps observed producing 100 PSI in pipe manifold. Info sources: O&M Manual, Oper. Interview, and Site Visit.
1	2890375.8	772287.3	Cook St. Treatment Facility on Cook St	Cook St. Treatment Facility Pump System Flow Meter		Ductile Iron; Sch 80 PVC	Propeller	12	1996				Water Specialities (McCrometer)		$20,000	One flow meter on discharge pipe coming from chlorination system to 0.200 MG storage tank. Pipe going in to the side of storage tank is 18", but appears to choke down to 12" pipe section for the flow meter, inside the FM access vault. Flange of FM pipe has been corroded by chlorine and should be replaced in the next 5 years. Info sources: Oper. Interview and Site Visit.
2	2897124.8	774923.7	Booster Pump Station #2 (Morgan PS);	Booster Pump Station #2 Pump System Manifold	8	Ductile Iron			2007				Butterfly Valves: NIBCO; Surge Anticipator: ClaVal Co.; System: Canaris Corp.	Canaris Corp. System ID # 07-0203	$30,000	Manifold for Duplex Booster Skid-Mounted System (Model # TDH-1200-90); Includes one 4" Cla-Val Surge Anticipator (angle, flanged) and four 8" isolation valves (Butterfly). Info sources: O&M Manual, Oper. Interview, and Site Visit.
3	2897422.4	774769.5	Booster Pump Station #2 (Morgan PS)	Booster Pump Station #2 Pump System Flow Meter			Magnetic	8	2007				FM: Badger; System: Canaris Corp.	Canaris Corp. System ID # 07-0203	$10,000	Badger Magnetoflo FM for Duplex Booster Skid-Mounted System on separate discharge pipe inside FM vaults outside of building. Info sources: O&M Manual, Oper. Interview, and Site Visit.
4	2897125.8	774867	Cielo Vista Above Ground Booster Pump System at the end of Camino De Cielo	Cielo Vista Above Ground Booster Pump System Manifold	4	Ductile Iron			2006				EFI (Engineered Fluid)	EFI Project #85092	$2,500	Associated Components: Two ClaVals. No Flow Meter. Manifold in good condition. Info sources: Oper. Interview and Site Visit.
5	2891899	769497.1	Pershing St. PRV Station at SE corner of N Pershing St. and W Eighth Ave.	Pershing St. PRV Station Manifold	8	Ductile Iron			1945		2012* ; 2000**		PRV: ClaVal Co.		$20,000	**REPURPOSED** - Piping Manifold remains in service with new PRV as a Pressure Reducing Station that separates the high and low pressure zones of the distribution system. Associated Components: two 8" isolation (Gate) valves and PRV. Overall the manifold piping appeared in fair-to-good condition. *PRV installed new in 2012. **Gate valves appear to be from 2000. Info sources: Oper. Interview and Site Visit.
6	2897127.2	774839.9	Well No. 1 at Cook St Water Treatment Facility (Southern part of Property)	Well No. 1 Manifold	6	Ductile Iron			1991						$10,000	Associated Components: Isolation valve, ARV, sampling tap. All components in good condition, except a portion of pipe that is old and corroded. Info Sources: Operator interview, Site Visit, and 2007 NMED Sanitary Survey.
7	2890346.2	772121	Well No. 1 at Cook St Water Treatment Facility (Southern part of Property)	Well No. 1 Flow Meter		Sch 80 PVC	Propeller	6	1991		2014	$2,900	McCrometer (Water Specialties)		$3,000	Flow observed at 500 GPM using brand new flow meter (McCrometer Propeller FM - 2014). FM in excellent condition. Info Sources: Operator interview and Site Visit
8	2890343.4	772109.4	Well #2 Pump House (inside) at Cook St. about 600 ft west of Water Treatment Facility	Well No. 2 Manifold	6	Ductile Iron; Sch 80 PVC			1945		2004*; 2013**		ARV: APCO?		$15,000	Associated Components: 6" check valve, two 6" isolation gate valves, ARV, sampling tap. Check valve appears to be original; One gate valve looks to be 30 years old; *One gate valve replaced in 2004. Manifold piping components in fair to good condition. **Portions of manifold piping replaced with schedule 80 pipe. Info Source: Operator Interview,Site Visit, 2007 NMED Sanitary Survey.

APPENDIX B

T or C Water System Inventory: Pump Systems - Manifolds and Flow Meters

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Equipment Description	Manifold Pipe Size (Dia) (Inches)	Material	Flow Meter Type	Flow Meter Size (Inches)	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Manufacturer	Project No./ System No./ Job No., Etc.	Estimated Asset Value (Replacement Value)	Notes/Comments
			LOC_DESC	EQUIP_DESC	PIPE_SIZE	MATERIAL	FM_TYPE	FM_SIZE	YR_INSTL	INIT_COS	YR_RPC_RHB	RPC_RHB_CT	MFG	JOB_NO	ASSET_VALUE	NOTES_COMM
9	2887377.1	771309.4	Well #2 Pump House (inside) at Cook St. about 600 ft west of Water Treatment Facility	Well No. 2 Flow Meter		Ductile Iron	Propeller	6	1945		2000*		McCrometer (Water Specialties)?		$3,000	Flow meter located on north side of building. *FM Estimated to be approx 15 years old and is in good condition. Info Sources: Operator Interview and Site Visit
10	2889366.5	771116.1	Well #4 Pump Shed (inside) at Approx. 250 feet SW of the Intersection of Ridge Rd and Central Ave.	Well No. 4 Manifold	6	Ductile Iron			1958		1992*		Gate Valves: American Flow Control		$15,000	Associated Components: 6" check valve, two 6" isolation (Gate) valves, sampling tap. Manifold components in fair to good condition. Manifold concrete and metal pipe supports in good condition. *Gate Valves were installed in 1992. Info Source: 2007 NMED Sanitary Survey, Operator Interview, and Site Visit.
11	2890720.6	770842.9	Well #4 Pump Shed (inside) at Approx. 250 feet SW of the Intersection of Ridge Rd and Central Ave.	Well No. 4 Flow Meter		Sch 80 PVC		6	1958		2004*		McCrometer (Water Specialties)		$3,000	*Flow Meter is in fair condition - looks to be about 10 years old and is weathered. Info Sources: Operator Interview and Site Visit
12	2888358.2	771775.7	Well #6 Pump Building (inside) at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	Well No. 6 Manifold	8	Ductile Iron			1999				Gate Valves: Mueller; Check Valve: Flomatic; ARV: APCO		$22,500	Associated Components: 8" check valve, two 8" isolation (Gate) valves, pressure gauges, 1" ARV, sampling tap. Manifold components are all original and in good condition. Flow observed at 850 GPM at 30 PSI (pressure gauge may be wrong).
13	2897124.8	774900.5	Well #6 Pump Building (inside) at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	Well No. 6 Flow Meter		Ductile Iron; Sch 80 PVC	Propeller	8	1999				McCrometer (Water Specialties)		$5,000	FM in good condition and appears to be from the original installation because the pipe component is DI. Info Sources: 2001 LH As-builts, Operator Interview, and Site Visit.
14	2887383	771309.3	Well #7 Pump Building (inside) at NE corner of the Intersection of Veater St. and Hyde Ave.	Well No. 7 Manifold	8	Ductile Iron			1999		2010*		Gate Valves: Mueller; Check Valve: APCO; ARVs: APCO		$22,500	Assoc Components: 8" check valve, three isolation (Gate) valves (3", 6", and 8"), pressure gauges, two ARVs (1" and 3"), sampling tap. Manifold components inside building and concrete and metal suppors all in good condition. *The 8" gate valve was replaced in 2010. Info Sources: 2001 LH As-builts, Operator Interview, and Site Visit.
15	2889366.6	771109.9	Well #7 Pump Building (inside) at NE corner of the Intersection of Veater St. and Hyde Ave.	Well No. 7 Flow Meter		Sch 80 PVC	Propeller	8	1999				McCrometer (Water Specialties)		$5,000	FM in good condition and appears to be original. Info Sources: 2001 LH As-builts, Operator Interview, and Site Visit.
16	2890720.5	770838.3	Well #8 Pump Building (inside) at NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Well No. 8 Manifold	8	Ductile Iron			1999				Gate Valves: Mueller; Check Valve: APCO; ARVs: APCO		$22,500	Associated Components: 8" check valve, three isolation (Gate) valves (3", 6", and 8"), pressure gauges, two ARVs (1" and 3"), sampling tap. Manifold components all in good condition. Manifold concrete and metal pipe supports in good condition. Info Sources: 2007 NMED Sanitary Survey, 2001 LH As-builts, Operator Interview and Site Visit.
17	2888358.2	771771.2	Well #8 Pump Building (inside) at NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Well No. 8 Flow Meter		Sch 80 PVC	Propeller	8	1999				McCrometer (Water Specialties)		$5,000	FM in good condition and appears to be original. Info Sources: 2001 LH As-builts, Operator Interview, and Site Visit.

APPENDIX B

T or C Water System Inventory: Pump Systems - Electrical and Control Systems

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Equipment Description	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Manufacturer	Project No./ System No./ Job No., etc.	Estimated Asset Value (Replacement Value)	Notes/Comments
FID			LOC_DESC	EQUIP_DESC	YR_INSTL	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	MANUFACT	JOB_NO	ASSET_VALUE	
0	2890327.4	772209.7	Cook St. Treatment Facility on Cook St	Cook St. Treatment Facility Pump System	1996		2014			Factory Order #8G6-10241 / P.O. # 204513	$120,000	Elec. equipment appears to be in good condition overall. New control panels for the pumps, including new soft-starters, were installed in spring 2014. Approx. 40' of electrical wires, incl ground wire, were replaced for Pump No. 1 at cost of $2500 in fall 2014. Info sources: Oper. Interview and Site Visit.
1	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS)	Booster Pump Station #2 Pump System	2007		2013	3500*	System: Canariis Corporation;	Canariis Corp. System ID # 07-0203	$55,000	All elec equipment is original and in good condition. *Transfer switch was replace in 2013. Info Sources: Canariis O&M Manual, Operator interview, and Site Visit.
2	2897484.7	774948.4	Cielo Vista Above Ground Booster Pump System at the end of Camino De Cielo	Cielo Vista Above Ground Booster Pump System	2006				System: EFI (Engineered Fluid)	EFI Project #85092	$5,000	All elec equipment is original and in good condition. Info Sources: Operator interview and Site Visit.
3	2901216.7	778224.5	Pershing St. PRV Station at SE corner of N Pershing St. and W Eighth Ave.	Pershing St. PRV Station	1996						NA	**REPURPOSED** - Piping Manifold and PRV remain in service. All Electrical components (not in use) to be scrapped.
4	2890346.2	772121.0	Well No. 1 at Cook St Water Treatment Facility (Southern part of Property)	Well No. 1	1991						$30,000	All elec equipment is in good to fair condition- doesn't need replacement in the next 5 years but should be housed in weather proof structure. Info Sources: Operator nterview and Site Visit.
5	2890382.7	772281.6	Well #2 Pump House (inside) at Cook St. about 600 ft west of Water Treatment Facility	Well No. 2	1975						$35,000	All elec equipment is from approx. 1975 and in poor condition - Should be replaced in the next 3 years Info Sources: Operator nterview and Site Visit.
6	2887196.2	771213.6	Well #4 Pump Shed (inside) at Approx. 250 feet SW of the Intersection of Ridge Rd and Central Ave.	Well No. 4	1985						$35,000	All elec equipment is from approx. 1985 and in fair condition - Should be replaced in the next 10 years. Info Sources: Operator nterview and Site Visit.
7	2889348.7	770884.1	Well #6 Pump Building (inside) at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	Well No. 6	1999						$50,000	All elec equipment is original and in good condition. Info Sources: 2001 LH As-builts, Operator interview and Site Visit.
8	2890775.8	770850.2	Well #7 Pump Building (inside) at NE corner of the Intersection of Veater St. and Hyde Ave.	Well No. 7	1999						$50,000	All elec equipment is original and in good condition. Info Sources: 2001 LH As-builts, Operator interview and Site Visit.
9	2888378.2	771776.5	Well #8 Pump Building (inside) at NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Well No. 8	1999						$50,000	All elec equipment is original and in good condition. Info Sources: 2001 LH As-builts, Operator interview and Site Visit.
10	2897282.9	774978.8	Booster Pump Station #2 (Morgan PS)	Booster Pump Station #2 Back-up Generator	2007				Onan		$100,000	Generator is original and in good condition. Manufactured by Onan, Model/Type: QuiteSite II.

APPENDIX B

T or C Water System Inventory: Pump Systems- SCADA System

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement / Rehab Cost	Manufacturer	Serial No./Shop Order No.	Estimated Asset Value (Replacement Value)	Description/Comments
FID			LOC_DESC	YR_INSTL	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	MANUFACT	SERIAL_NO	ASSET_VALUE	NOTES_COM
0	2887656.6	785234.3	WWTP Facility at the south end of Radium St.	1997		2001*	$17,000*	US Filter/ Consolidated Electric	Shop Order # 62879 (James, Cooke & Hobson)	$35,000	Originally Installed in Sept 1997 - *Software for entire system upgraded in 2001. The Water System SCADA is intergrated with WWTP System SCADA. The Master Control CTU (Central Telemetry Unit) is located at the WWTP Office.
1	2888135.8	785359.3	WWTP Facility at the south end of Radium St.	1997		2001*		US Filter/ Consolidated Electric	Serial # 62879-A	NA	Existing Master Control/Transceiver Updates- Softeware for Master Controller and communication RTU.
2	2888760.8	785338.5	WWTP Facility at the south end of Radium St.	1997		2001*		US Filter/ Consolidated Electric	Serial # 62879-B	NA	Existing Desktop Computer Software Updates- Software updates for graphics display, security, alarm/event logging, historical data trending, tank level control, pump input output control, diagnostics etc.
3	2889365.0	785401.0	Sierra County Central Dispatch Station at 1502 N. Date St.	1997		2001*		US Filter/ Consolidated Electric	Serial # 62879-C	NA	Existing Sierra County Dispatch Alarm Monitoring Transceiver Updates- Software for alarm monitoring for water sytem locations.
4	2889885.8	785338.5	Storage Tank located at Broad St. and Corona St., next to Booster Pump Station No. 2	1997		2001*		US Filter/ Consolidated Electric	Serial # 62879-D	NA	Existing Lower Zone Repeater Updates- Softeware for communication RTU; control panel and probes; NEMA 12 enclosure.
5	2890573.3	785317.7	Storage Tank located at Broad St. and Corona St., next to Booster Pump Station No. 2	1997				US Filter/ Consolidated Electric	Serial # 62879-E	$13,000	Lower Zone Tank Level Transducer- Model 221 GCD Pressure/level Transducer in figerglass enclosure.
6	2887615.0	784546.8	Storage Tanks at 2900 Cemetery Rd (North Date St), west of I-25	1997				US Filter/ Consolidated Electric	Serial # 62879-F	$2,000	Upper Zone Tank Transceiver RTU 12- Model SBC2 Radio Telemetry Transceiver in NEMA 3R enclosure.
7	2888240.0	784630.2	Storage Tanks at 2900 Cemetery Rd (North Date St), west of I-25	1997				US Filter/ Consolidated Electric	Serial # 62879-G	$2,000	Upper Zone Tank Level Transducer_ Model 221 GCD Pressure/level Transducer in figerglass enclosure.
8	2888719.1	784630.2	Well No. 1 at Cook St Water Treatment Facility (Southern part of Property)	1997				US Filter/ Consolidated Electric	Serial # 62879-H1	$13,000	Well # 1 RTU 13- Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
9	2889427.5	784609.3	Well #2 Pump House at Cook St. about 600 ft west of Water Treatment Facility	1997				US Filter/ Consolidated Electric	Serial # 62879-H2	$13,000	Well # 2 RTU 14- Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
10	2889969.1	784588.5	Well #4 Building at approx. 250 southwest of Intersection of Ridge Rd.and Central Ave.	1997				US Filter/ Consolidated Electric	Serial # 62879-H3	$13,000	**Old Well # 3 RTU 15 - Repurpused as New Well #4 RTU in 1999-** Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
11	2890719.1	784630.2	Well #7 Building at NE corner of the Intersection of Veater St. and Hyde Ave.	1997				US Filter/ Consolidated Electric	Serial # 62879-H4	$13,000	**Old Well # 4 RTU 16 - Repurpused as New Well #7 RTU in 1999-** Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
12	2887635.8	783880.2	Well #8 Building at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	1997				US Filter/ Consolidated Electric	Serial # 62879-H5	$13,000	**Old Well # 5 RTU 17 - Repurpused as New Well #8 RTU in 1999-** Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
13	2888198.3	783901.0	Well #6 Building at Approx. 380 feet NW of the Intersection of S Broadway St. and Rio Grande Ave.	1997				US Filter/ Consolidated Electric	Serial # 62879-H6	$13,000	**Old Well # 6 RTU 18 - Repurpused as New Well #6 RTU in 1999-** Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.

APPENDIX B
T or C Water System Inventory: Pump Systems- SCADA System

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement / Rehab Cost	Manufacturer	Serial No./Shop Order No.	Estimated Asset Value (Replacement Value)	Description/Comments
FID			LOC_DESC	YR_INSTL	INIT_COST	YR_RPC_RHB	RPC_RHB_CT	MANUFACT	SERIAL_NO	ASSET_VALUE	NOTES_COM
14	2888698.3	783942.7	Cook St. Treatment Facility Building on Cook St	1997				US Filter/ Consolidated Electric	Serial # 62879-I	$13,000	Cook St. Booster Pump Station/Reservoir Transceiver RTU 19- Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure.
15	2889260.8	783963.5	Cook St. Treatment Facility Building on Cook St	1997				US Filter/ Consolidated Electric	Serial # 62879-J	$2,000	Cook St Reservoir Level Transducer- Model 221 GCD Pressure/level Transducer in figerglass enclosure.
16	2889969.1	783963.5	Pershing St. PRV Station Building at SE corner of N Pershing St. and W Eighth Ave.	1997				US Filter/ Consolidated Electric	Serial # 62879-K	NA	Pershing St. Booster Pump Station/Reservoir Transceiver RTU 20- Model SBC2 Radio Telemetry Transceiver in a NEMA 3R enclosure. **No longer in service and still attached to Pershing PRV Building.**

Source for all SCADA information: US Filter O&M Manual provided James, Cooke, & Hobson.

APPENDIX B

T or C Water System Inventory: Buildings and Stuctures

Asset ID (GIS Point No./ID)	Northing	Easting	Location Description	Building Name/ Description	Interior Size (Area) (Square Feet)	Length (Feet)	Width (Feet)	Height (TOW) (Feet)	Finished Floor Elevation (Feet)	Wall Material	Wall Width (Inches)	Roof Material	Foundation Material	Foundation thickness (Inches)	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replacement/ Rehab Cost	Estimated Asset Value (Replacement Value)	Notes/Comments
FID			LOC_DESC	BLDG_DESC	SIZE_FT_SQ	LNGTH_FT	WDTH_FT	HGHT_FT	FF_EL_FT	WALL_MAT	WALL_WD_IN	ROOF_MAT	FND_MAT	FND_THK_I	YR_INSTL	INIT_COS	YR_RPC_RHB	RPC_RHB_CT	ASSET_VALUE	NOTES_COMM
0	2890367.1	772282.6	Cook St. Water Treatment Facility	Cook St. Treatment Facility Pump Building	1110	40	30	15		CMU	8	Wood and metal	Concrete	12	1996				$300,000	Building is in good condition overall - the walls, roof, doors, ceiling, foundation, electrical, and HVAC are all okay. The AC Unit on the west side of the building needs to be replaced - priority item for Report. Info Source: Site Visits and Pperator Interviews
1	2890317.5	772312.3	Cook St. Water Treatment Facility	Cook St. Treatment Facility Chlorination Shed	50	8	6	6		Fiberglass	3	Fiberglass	4" Metal Skid on Concrete	6	1996				$10,000	Chlorination Shed is in good condition. Info Source: Site Visits and Operator Interviews
2	2890445.8	772322.0	Cook St. Water Treatment Facility	Cook St. Treatment Facility Storage Building	1400	50	30			Brick and Wood Frame/ stucco	8	Wood and metal			1974				$100,000	Old building next to the Cook St. Infrastructure. Building looks to be about 40 years old. Info Source: Site Visit and Operator Interview
3	2897124.8	774923.7	Broad St. and Corona St.	Booster Pump Station #2 Pump Building	480	30	18	12		CMU	8	Wood and metal	Concrete	8	2007				$130,000	Building constructed specifically to house pre-fab pump skid in 2007. It is in very good condition overall. Info Source: Site Visit and Operator Interview
4	2901191.5	778200.0	SE corner of N Pershing St. and W Eighth Ave.	Pershing St. Pressure Reducing Valve (PRV) Building	180	20	14	9		Brick with stucco exterior	8	Wood	Concrete	8	1945				$100,000	**REPURPOSED** - pumps were removed from station in approx. 2012 and put into storage. Building is currently only used to house and operate the PRV that separates the "High" and "Low" pressure zones of the distrib. system. Building in fair condition: walls, windows, floor okay; Roof must be replaced - Priority Item for report Info Source: Site Visit and Operator Interview
5	2889685.8	771994.8	South side of Cook St. about 600 feet from Cook St. Water Treatment Facility	Well #2 Pump Control System Shed	100	10.5	10.5	8		Wood frame/stucco	6	Wood frame with metal siding exterior	Concrete	6	1939		2010		$100,000	Structure is a small shed used to house only pump controls. Well is located to the NE of the shed. Shed is part of old wind mill struct. orig instl'd in 1939 with well. Shed is in good condition and had the roof and walls rehabbed about 5 years ago. Shed should be replaced in 5-10 years, but okay for at least 3 more years. Info Source: Site Visit and Operator Interview
6	2887377.1	771309.4	Approx. 235 feet due E very end (dead end) of Foster Ave.	Well #4 Pump Control System Shed	120	12.5	10.5	7		Wood frame with metal siding exterior	6	Wood frame with metal siding exterior			1940s				$100,000	Structure is small shed used to house pump controls. Well is located NE of shed. Shed should be replaced in 3-5 years, but good for approx. 3 more years. Info Source: Site Visit and Operator Interview
7	2889366.5	771116.1	Approx. 380 feet NW of the Intersectin of S Broadway St. and Rio Grande Ave.	Well #6 Pump Building	252	18.67	14.67	11.33	4237.26	CMU	8	Wood and metal	Concrete	6			1999		$100,000	The orig. Metal building was demo'ed and replace in 1998-99. Exist. building is in good condition overall - the walls, roof, doors, ceiling, foundation, electrical, and AC unit are all okay. Info Source: 1998 Leedhill-Herkenhoff Record Drawings (As-builts), verified by Operator.
8	2890733.3	770843.5	NE corner of the Intersection of Veater St. and Hyde Ave.	Well #7 Pump Building	336	24.67	14.67	11.33	4237.26	CMU	8	Wood and metal	Concrete	6	1999		N/A	N/A	$100,000	Building in very good condition overall - the walls, roof, doors, ceiling, foundation, electrical, and AC unit are all okay. Building Includes: 6" concrete slab (thicker under pumps) with 16" wide footers on top of 4' of eng. fill; roll-up door; Metal double doors; cooler unit on concrete slab (4 SF by 4" thick); heater; removable skylight; Control Panel, RTU w/ant., various elec panels/enclosures, flour. lights. Info Source: 1998 Leedhill-Herkenhoff Record Drawings (As-builts), verified by Operator.
9	2888356.8	771774.1	NW corner of City Utility Yard Property approx 300 due west of Michigan St.	Well #8 Pump Building	336	24.67	14.67	11.33	4266.5	CMU	8	Wood and metal	Concrete	6	1999		N/A	N/A	$100,000	Building in very good condition overall -the walls, roof, doors, ceiling, foundation, electrical, and AC unit are all okay. Building Includes: 6" concrete slab (thicker under pumps) with 16" wide footers on top of 4' of eng. fill; roll-up door; Metal double doors; cooler unit on concrete slab (4 SF by 4" thick); heater; removable skylight; Control Panel, RTU w/ant., various elec panels/enclosures, flour. lights. Info Source: 1998 Leedhill-Herkenhoff Record Drawings (As-builts), verified by Operator.
10	2897423.8	774763.9	Cielo Vista Booster Pump System at the end of Camino De Cielo	Cielo Vista Above Ground Booster Pump System Housing	15	5	3	4		Fiberglass	0.25	Fiberglass	Fiberglass	0.25	2006				$2,000	Structure is a small fiberglass dome housing for the Pre-fab pump system. It is in good condition. Info Source: Site Visit and Operator Interview
11	2890438.6	772395.9	Southern portion of Cook St. Water Treatment Facility property	Well #1 Shade Structure		10	8	7		Wood Posts		Wood frame with metal siding top	Dirt		1991				$100,000	Structure in fair to poor condition. Does not protect equipment from weather or vandalism. Priority to install new Pre-fab Building to house controls and manifold. Info Source: Site Visit and Operator Interview

APPENDIX B
T or C Water System Inventory: Storage Tanks

Asset ID (GIS Point No./ID)	Northing	Easting	Location/Description	Capacity/ Volume (MG)	Diameter (Feet)	Height (Feet)	Material	Year Installed	Initial Cost	Year Replaced/ Rehabbed	Replace-ment/ Rehab Cost	Manufacturer	Job No.	Estimated Asset Value (Replacement Value)	Notes/Comments
FID			LOC_DESC	CAPTY_MG	DIA_FT	HGHT	MAT	YR_INSTL	INIT_COST	YR_RPC_RH	RPC_RHB_C	MFG	JOB_NO	ASSET_VALUE	
0	2890340.7	772361.5	Cook St. Treatment Facility	0.200	47	16.17	Steel	1997		2012		D&R Tank, Co.	Job # 12-84501	$300,000	Tank is part of Cook St. Water Treatment Facility. Tank rehab in 2012 included: New vent hatch and assembly; new access ladders with cages; Cathodic Protection (internal and external) was added. Tank in excellent condition. Info Sources: D&R Tank As-builts 2012; WHPacific O&M Manual 2012; Site Visit and Operator Interview.
1	2899022.2	785094.6	2900 Cemetery Rd (North Date St), west of I-25	3.0	114	40	Steel	1978		2013		D&R Tank, Co.	Job # 12-84520	$1,500,000	Major Rehab of old tank - Sand blasting and repriming/repainting of tank occurred early 2013 and was done by Luckinbill Enterprise, LLC out of Enid Oklahoma. New roof hatch, vent hatches, access ladders with cages and Cathodic Protection(internal and external) were added. Tank Provides pressure for Upper Pressure Zone. No Pump Station at tank. Tank in excellent condition. Info Sources: D&R Tank As-builts 2012; WHPacific O&M Manual 2012; Site Visit and Operator Interview.
2	2900954.2	785154.1	2900 Cemetery Rd (North Date St), west of I-25	1.2	73	40	Steel	2004	$414,823	N/A	N/A	D&R Tank, Co.	Job # 03-50401	$850,000	Constructed in May 2004, Made of steel panels (sides and bottom) on concrete footing. Provides pressure for Upper Pressure Zone. No Pump Station at tank. Tank in excellent condition. Info Sources: D&R Tank Submittals approved by Sullivan Design Group 2010; Site Visit and Operator Interview.
3	2897153.3	775032.2	Broad St. and Corona St., in between I-25 and the north part of City. Located next to Morgan Pump Station	3.0	102	50	Steel	2004	$643,392	-	-	D&R Tank, Co.	Job # 03-50420	$1,500,000	Tank was built in May 2004 with the construction of new 1.2 MG tank (located on Cemetery Rd). Made of steel panels (sides and bottom) on concrete footing. Provides pressure for Lower Pressure Zone. Tank in excellent condition. Info Sources: D&R Tank Submittals approved by Sullivan Design Group 2010; Site Visit and Operator Interview.
4	2900674.8	775998.0	West 2nd Ave. on top of hill south of Commission Chambers, Library, and Water Dept. Building	1.0			Steel	1948		N/A	N/A			NA	Tank was ABANDONED in 2012 when other tanks were rehabbed. Tank remains an asset of the Water System due to historical and artistic value.

APPENDIX B

Water System Well, Pump System, Disifection System, Building/Structure, and Storage Tank Assets - Risk Scores for CIP Ranking and Estimated Replacement Value/Current Value

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Useful Life Score Rounded	Field Visit Assessment Score	Operator Interview Score	Condition Score	Consequence Score	Risk Score	CIP Scheduled Year	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on Remaining Useful Life as of 2015)
Pershing St. PRV Station Building	50	69	0	13.8	14	10	10	34	8	272	2016	$100,000	$0
Cook St. Treatment Facility Pump No. 2 Motor	8	18	0	22.5	23	3	2	28	7	196	2016	$15,000	$0
Gas-Chlorination System	15	18	0	12.0	12	2	2	16	12	192	2016	$140,000	$0
Pershing PRV Station Manifold	35	69	0	19.7	20	2	1	23	8	184	2016	$20,000	$0
Well No. 2 Pump	15	69	0	46.0	46	6	4	56	3	168	2017	$15,000	$0
Cook St. Treatment Facility Pump Manifold	35	18	17	5.1	5	3	2	10	14	140	2017	$120,000	$58,286
Well No. 7 Pump Motor	8	15	0	18.8	19	3	1	23	6	138	2017	$7,000	$0
Well No. 2 Pump Motor	8	29	0	36.3	36	4	3	43	3	129	2017	$3,000	$0
SCADA System RTUs	15	17	0	11.3	11	10	10	31	4	124	2017	$110,000	$0
SCADA System Software	15	13	2	8.7	9	10	10	29	4	116	2017	$35,000	$4,667
Well No. 8 Pump	15	15	0	10.0	10	3	10	23	5	115	2017	$25,000	$0
Cook St. Treatment Facility Pump No. 1	15	18	0	12.0	12	3	1	16	7	112	2019	$120,000	$0
Cook St. Treatment Facility Pump No. 2	15	18	0	12.0	12	3	1	16	7	112	2020	$120,000	$0
Well No. 6 Pump Motor	8	15	0	18.8	19	2	1	22	5	110	2020	$5,500	$0
Well No. 8 Pump Motor	8	15	0	18.8	19	2	1	22	5	110	2020	$5,500	$0
Well No. 1 Pump System Shade Structure	50	23	27	4.6	5	10	10	25	4	100	2021	$100,000	$2,000
Gas-Chlorination System Fiberglass Shed	30	18	12	6.0	6	2	0	8	12	96	2016	$10,000	$4,000
Well No. 2 Pump Electrical System	15	39	0	26.0	26	4	1	31	3	93	2022	$35,000	$0
Well No. 1 Pump Electrical System	15	23	0	15.3	15	5	3	23	4	92	2021	$30,000	$0
Well No. 2	25	69	0	27.6	28			28	3	84	2022	$25,000	$0

APPENDIX B

Water System Well, Pump System, Disifection System, Building/Structure, and Storage Tank Assets - Risk Scores for CIP Ranking and Estimated Replacement Value/Current Value

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Useful Life Score Rounded	Field Visit Assessment Score	Operator Interview Score	Condition Score	Consequence Score	Risk Score	CIP Scheduled Year	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on Remaining Useful Life as of 2015)
Well No. 7 Pump	15	15	0	10.0	10	3	1	**14**	**6**	**84**	2023	$30,000	$0
Well No. 4 Pump System Building	50	70	0	14.0	14	7	7	**28**	**3**	**84**	2024	$100,000	$0
Well No. 2 Pump System Building	50	75	0	15.0	15	6	6	**27**	**3**	**81**	2022	$100,000	$0
Well No. 1 Pump Manifold	35	23	12	6.6	7	8	5	**20**	**4**	**80**	2021	$10,000	$3,429
Well No. 6	25	38	0	15.2	15			**15**	**5**	**75**	2023	$30,000	$0
Cook St. Treat. Facility Pump Building	50	18	32	3.6	4	1	0	**5**	**14**	**70**	-	$300,000	$192,000
Well No. 4 Pump Electrical System	15	29	0	19.3	19	3	1	**23**	**3**	**69**	2024	$35,000	$0
Well No. 1 Pump Motor	8	13	0	16.3	16	0	1	**17**	**4**	**68**	2021	$3,000	$0
Cielo Vista Pump Station Pump No. 2 Motor	8	8	0	10.0	10	5	2	**17**	**4**	**68**	2024	$500	$0
Well No. 4	25	56	0	22.4	22			**22**	**3**	**66**	2024	$25,000	$0
Well No. 7 Pump Electrical System	15	15	0	10.0	10	1	0	**11**	**6**	**66**	2024	$50,000	$0
Well No. 2 Pump Manifold	35	35	0	10.0	10	7	4	**21**	**3**	**63**	2022	$15,000	$0
Well No. 6 Pump	15	15	0	10.0	10	1	1	**12**	**5**	**60**	2025	$25,000	$0
Booster Pump Station No. 2 Pump No. 1 Motor	8	7	1	8.8	9	2	1	**12**	**5**	**60**	2025	$5,500	$688
Well No. 4 Pump Manifold	35	35	0	10.0	10	6	4	**20**	**3**	**60**	2024	$15,000	$0
Cielo Vista Pump Station Pump No. 1 Motor	8	8	0	10.0	10	2	2	**14**	**4**	**56**	2025	$500	$0
Well No. 6 Pump Electrical System	15	15	0	10.0	10	1	0	**11**	**5**	**55**	2025	$50,000	$0
Well No. 8 Pump Electrical System	15	15	0	10.0	10	1	0	**11**	**5**	**55**	2025	$50,000	$0
Well No. 4 Pump Motor	8	13	0	16.3	16	0	1	**17**	**3**	**51**	2024	$3,000	$0
Booster Pump Station No. 2 Electrical System	15	7	8	4.7	5	0	0	**5**	**10**	**50**	-	$55,000	$29,333
Booster Pump Station No. 2 Back-up Generator	15	7	8	4.7	5	0	0	**5**	**10**	**50**	-	$100,000	$53,333

APPENDIX B

Water System Well, Pump System, Disifection System, Building/Structure, and Storage Tank Assets - Risk Scores for CIP Ranking and Estimated Replacement Value/Current Value

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Useful Life Score Rounded	Field Visit Assessment Score	Operator Interview Score	Condition Score	Consequence Score	Risk Score	CIP Scheduled Year	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on Remaining Useful Life as of 2015)
Well No. 7 Pump Manifold	35	23	12	6.6	7	0	0	7	6	42	-	$22,500	$7,714
Well No. 1	25	24	0	9.6	10			10	4	40	-	$25,000	$1,000
Well No. 1 Pump	15	13	2	8.7	9	0	1	10	4	40	-	$18,000	$2,400
Booster Pump Station No. 2 Pump No. 1	15	7	8	4.7	5	2	1	8	5	40	-	$25,000	$13,333
Booster Pump Station No. 2 Pump No. 2	15	7	8	4.7	5	2	1	8	5	40	-	$25,000	$13,333
Booster Pump Station No. 2 Pump Manifold	35	7	28	2.0	2	2	0	4	10	40	-	$30,000	$24,000
3.0 MG Storage Tank next to Booster Pump Station No. 2	50	10	40	2.0	2	0	0	2	20	40	-	$1,500,000	$1,200,000
Cielo Vista Pump Station Pump No. 1	15	8	7	5.3	5	2	2	9	4	36	-	$1,000	$467
Cielo Vista Pump Station Pump No. 2	15	8	7	5.3	5	2	2	9	4	36	-	$500	$233
Cook St. Treatment Facility Pump No. 1 Motor	8	<1	8	1.0	1	3	1	5	7	35	-	$15,000	$15,000
Well No. 6 Pump Manifold	35	23	12	6.6	7	0	0	7	5	35	-	$22,500	$7,714
Well No. 8 Pump Manifold	35	23	12	6.6	7	0	0	7	5	35	-	$22,500	$7,714
Well No. 4 Pump	15	13	2	8.7	9	0	1	10	3	30	-	$15,000	$2,000
Booster Pump Station No. 2 Pump No. 2 Motor	8	1	7	1.3	1	0	5	6	5	30	-	$5,500	$0
Well No. 8	25	15	10	6.0	6			6	5	30	-	$35,000	$14,000
Cook St. Treat. Facility Storage Building	50	40	10	8.0	8	4	3	15	2	30	-	$100,000	$20,000
1.2 MG Storage Tank on Cemetery Rd.	50	10	40	2.0	2	0	0	2	15	30	-	$850,000	$680,000
Cook St. Treatment Facility Electrical System	15	1	14	1.0	1	1	0	2	14	28	-	$120,000	$112,000
Cielo Vista Pump Station Electrical System	15	8	7	5.3	5	1	0	6	4	24	-	$5,000	$2,333
Cielo Vista Pump Station Manifold	35	7	28	2.0	2	3	1	6	4	24	-	$2,500	$2,000
Cook St. Treatment Facility Flow Meter	12	18	0	15.0	15	4	4	23	1	23	-	$20,000	$0

APPENDIX B

Water System Well, Pump System, Disifection System, Building/Structure, and Storage Tank Assets - Risk Scores for CIP Ranking and Estimated Replacement Value/Current Value

Asset	Life Expectancy (Years)	Age (Years)	Estimated Remaining Useful Life (Years)	Useful Life Score	Useful Life Score Rounded	Field Visit Assessment Score	Operator Interview Score	Condition Score	Consequence Score	Risk Score	CIP Scheduled Year	Estimated Asset Replacement Value (as of 2015)	Estimated Asset Current Value (Based on Remaining Useful Life as of 2015)
Cielo Vista Pump System Fiberglass Housing	30	8	22	2.7	3	2	0	5	4	20	-	$2,000	$1,467
0.2 MG Storage Tank at Cook St. Facility	50	2	48	1.0	1	0	0	1	20	20	-	$300,000	$288,000
Well No. 7 Pump System Building	50	15	35	3.0	3	0	0	3	6	18	-	$100,000	$70,000
3.0 MG Storage Tank on Cemetery Rd.	50	1	49	1.0	1	0	0	1	18	18	-	$1,500,000	$1,470,000
Well No. 2 Flow Meter	12	14	0	11.7	12	2	1	15	1	15	-	$3,000	$0
Well No. 6 Pump System Building	50	15	35	3.0	3	0	0	3	5	15	-	$100,000	$70,000
Well No. 8 Pump System Building	50	15	35	3.0	3	0	0	3	5	15	-	$100,000	$70,000
Well No. 7 Flow Meter	12	15	0	12.5	13	1	0	14	1	14	-	$5,000	$0
Well No. 8 Flow Meter	12	15	0	12.5	13	1	0	14	1	14	-	$5,000	$0
Well No. 6 Flow Meter	12	15	0	12.5	13	0	0	13	1	13	-	$5,000	$0
Well No. 4 Flow Meter	12	10	2	8.3	8	3	1	12	1	12	-	$3,000	$500
Booster Pump Station No. 2 Building	50	7	43	1.4	1	0	0	1	10	10	-	$130,000	$111,800
Booster Pump Station No. 2 Flow Meter	12	7	5	5.8	6	0	0	6	1	6	-	$10,000	$4,167
Well No. 7	25	<1	25	1.0	1			1	6	6	-	$35,000	$35,000
Well No. 1 Flow Meter	12	<1	12	1.0	1	0	0	1	1	1	-	$3,000	$3,000
NEW ITEM- New 0.25 MG Storage/ Transfer Tank at Cook St. Treatment Facility										NA	2016	$400,000	NA
NEW ITEM- Cook St. Treatment Facility Back-up Generator										NA	2018	$220,000	NA

APPENDIX C

Water System Historical Financial Data, Existing Loan Information, and Energy Use Costs

APPENDIX C: Water System Five-Year Historical Financial Data [1]

	FISCAL YEAR	2009/10	2010/11	2011/12	2012/13	2013/14	Five-Year Averages (Typical)
OPERATING REVENUE	Revenue from Water Utility Service Connections	$ 974,560	$ 1,028,892	$ 979,282	$ 966,738	$ 908,993	$ 971,693
	Revenue from Other Water System Services	$ 19,767	$ 25,839	$ 22,597	$ 67,798	$ 58,914	$ 38,983
	TOTAL REVENUE	$ 994,327	$ 1,054,731	$ 1,001,879	$ 1,034,536	$ 967,907	$ 1,010,676
OPERATING EXPENSES	Personnel/Administration	$ 416,414	$ 411,944	$ 362,624	$ 380,285	$ 421,839	$ 398,621
	Utility	$ 138,164	$ 138,057	$ 148,429	$ 147,269	$ 139,795	$ 142,343
	Supplies/Laboratory	$ 10,926	$ 7,493	$ 11,770	$ 8,124	$ 10,762	$ 9,815
	Maintenance and Repair or Replacement of System Components/Equipment and Vehicles	$ 153,839	$ 120,073	$ 188,590	$ 131,799	$ 171,123	$ 153,085
	TOTAL OPERATING EXPENSES	$ 719,343	$ 677,565	$ 711,412	$ 667,477	$ 743,518	$ 707,469
	NET INCOME (LOSS)	$ 274,984	$ 377,166	$ 290,467	$ 367,059	$ 224,389	$ 293,972

[1] Compiled from Revenue and Expenses data reported by the City of T or C for FY 2009/10 -FY 2013/14

Appendix C - ...

PD ~~From~~ Fund 61

Year that Loan Term Ends

TORC 2 **WATER TANK LOAN**

Principal	6103905	$101,205.86
Interest	6103910	$ 17,173.42
Admin Fee	6103915	$ 1,862.30
		$\boxed{\$120,241.58}$ ← Annual Payment Amount

2021

TORC 17 **WTB-229**

Principal	6103905	$ 12,593.00
Interest	6103910	$ 546.04
		$\boxed{\$ 13,139.04}$ ← Annual Payment Amount

2031

TORC 18 **#2613-PP GROUND STORAGE TANKS**

Principal	6103905	$\boxed{\$ 6,905.84}$ ← Annual Payment Amount

2032

TORC 19 **REFINANCED 95,96,98 UTIL BONDS**

Principal	6103905	$ 47,746.66
Interest	6103910	$ 28,241.14
		$\boxed{\$ 75,987.80}$ ← Annual Payment Amount

2033

(some portion of payment handled in WW system Budget)

TORC 22 **WTB-292**

Principal	6103905	$ 3,224.00
Interest	6103910	$ 156.62
		Σ $\boxed{3,380.62}$ ← Annual Payment Amount

2037

Loan 94-10

Principal	6103905	$ 30,344.26
Interest	6103910	$ 3,808.47
		$\boxed{\$ 34,152.73}$ ← Annual Payment Amount

2017

Loan 95-16 **POTABLE WATER SYSTEM**

Principal	6103905	$ 26,768.22
Interest	6103910	$ 7,140.96
		$\boxed{\$ 33,909.18}$ ← Annual Payment Amount

2022

APPENDIX C

Water System Major Pump Systems- Current Energy Use and Power Costs

Asset	Pump Motor Total (Rated) Horse Power (HP)	Pump Motor Actual Horse Power (at Design Point) (HP)	Pump Motor Actual Power (at Design Point) (Kw)	Total Daily Equipment Use (Hours)	Total Power Usage (Kw-Hr)	Daily Power Cost (at $0.108/Kw-Hr)	Pump Capacity (at Design Point) (GPM)	Total Gallons Pumped from Wells (Production)	Total Gallons Pumped from Cook St. Facility to Lower 3.0 MG Tank	Total Gallons Pumped from Booster Pump Station No. 2 to Upper 1.2 MG and 3.0 MG Tanks
Well No. 1 Pump	30	24	17.9	8.00	143.2	$15.46	250	120000		
Well No. 2 Pump	25	20	14.9	8.00	119.3	$12.89	400	192000		
Well No. 4 Pump	30	24	17.9	8.00	143.2	$15.46	225	108000		
Well No. 6 Pump	60	49	36.5	8.00	292.3	$31.57	500	240000		
Well No. 7 Pump	75	60	44.7	8.00	357.9	$38.66	650	312000		
Well No. 8 Pump	60	49	36.5	8.00	292.3	$31.57	500	240000		
Cook St. Treatment Facility Pump No. 1	250	225	167.8	3.35	562.1	$60.70	3000		603000	
Cook St. Treatment Facility Pump No. 2	250	225	167.8	3.35	562.1	$60.70	3000		603000	
Booster Pump Station No. 2 Pump No. 1	60	42	31.3	10.00	313.2	$33.82	600			360000
Booster Pump Station No. 2 Pump No. 2	60	42	31.3	10.00	313.2	$33.82	600			360000
				Daily Totals	**3098.8**	**$334.67**		1212000	1206000	720000
				Annual Totals	**1131046.1**	**$122,152.98**				

Assuming an average of 1.2 MG/day of Production for the Municipal Water System (based on WHPacific 40-Year Water Plan)

Upper Zone assumed to use 60% of daily production

The 0.2 MG Tank at Cook St is pump out entirely 6 times per day

APPENDIX D

WATER METERING REQUIREMENTS

City of Truth or Consequences
505 Sims Street
Truth or Consequences, New Mexico 87901
City (575) 894-6673 Fax (575) 894-0363

March 7, 2017

Re: Water Users and Diversions

As written and adopted in the City of Truth or Consequences Municipal Code

Sec. 14-38. -Water rates – Generally (b) Meters Required:

herefore attached and made a part of this letter,

let it be known that the Governing Body of the City of Truth or Consequences shall require consumers to install water meters with the exception of services installed for fire suppression.

Sincerely,

Juan A. Fuentes
City Manager

Sec. 14-38. - Water rates—Generally.

(a) *Rates to residential and commercial customers within the City limits and the Village of Williamsburg.* The rates for water are as follows:

Customer charge:	$8.15 per month
Usage charge:	
0—7,000 gallons:	$1.75 per each 1,000 gallons
Next 22,000 gallons:	1.93 per each 1,000 gallons
Next 20,000 gallons:	2.12 per each 1,000 gallons
Over 50,000 gallons:	2.33 per each 1,000 gallons

(b) *Meters required.* The Governing Body shall require consumers to install water meters with the exception of services installed for fire suppression.

(c) *Shortage of water.* When there is a shortage of water supply of the City, the Governing Body reserves the right to control the manner of use and time of use by consumers of water supplied to them by the system, and to make such rules and regulations therefore by proclamation of the Governing Body. Any consumer taking or using water contrary to such regulations and rules, as may be promulgated in such proclamation, shall be deemed guilty of a misdemeanor.

(d) *Rates to consumers outside the City limits.* Rates charged to consumers outside the City limits are the same as those rates set forth in section 14-38(a), Water rates—Generally.

(1) *Reference:* As provided in section 14-28(b) Service—Applications; extension: All requests and proposals to supply water to consumers outside the City limits and all proposed water system plans, designs, and specifications to deliver water beyond the City limits require prior approval by the City Commission.

(2) *Reference:* As provided in section 14-28(a) Service—Applications; extension: Applicants who wish to have water supplied beyond the City limits shall be responsible for "payment for necessary line extensions."

The City reserves the right to deny applications and requests to supply water beyond the corporate limits of the City when in the opinion of the City Manager and by vote of the City Commission such requests would impair the supply of water to existing customers located within the corporate limits of the City.

(e) *Industrial fire plug meter.* The minimum monthly charge shall be $91.91, which shall entitle the consumer up to 50,000 gallons per month. The second 50,000 gallons consumed shall be charged at the rate of $1.84 per 1,000 gallons. The third 50,000 gallons consumed shall be charged at the rate of $2.02 per 1,000 gallons. All water consumed in excess of 200,000 gallons per month shall be charged at the rate of $2.22 per 1,000 gallons.

(f) *Effluent water/recycled water.* The charge shall be $1.35 per 1,000 gallons. If a meter is used, the minimum monthly charge shall be $25.00 plus actual usage.

(Code 1962, § 3-3-12; Ord. No. 371, 5-14-90; Ord. No. 387, 11-12-91; Ord. No. 405, 2-8-93; Ord. No. 411, 1-10-94, Ord. No. 459, § 1, 7-13-98; Ord. No. 475, § 1, 7-24-00; Ord. No. 491, § 1, 3-26-01; Ord. No. 497, §§ 1, 2, 7-9-01; Ord. No. 521, § 1, 10-16-02; Ord. No. 526, § 1, 5-27-03; Ord. No. 530, § 1, 8-25-03; Ord. No. 572, 6-20-07)

APPENDIX 12- UTILITY RATES

CONTENT:

- UTILITY RATES TABLE

[THIS PAGE INTENTIONALLY LEFT BLANK]

OLD WATER RATES PRIOR JULY 1,2020

Residential Rates – City of T or C & Village of Williamsburg	
Base Customer Charge (Minimum)	$8.15
Rate per 1000 gallons for Level 1 Usage (1 - 7,000 gallons)	$1.75
Rate per 1000 gallons for Level 2 Usage (7,000 - 30,000 gallons)	$1.93
Rate per 1000 gallons for Level 3 Usage (30,000 – 50,000 gallons)	$2.12
Rate per 1000 gallons for Level 4 Usage (Above 50,000 gallons)	$2.33
Commercial Rates – City of T or C & Village of Williamsburg	
Base Customer Charge (Minimum)	$8.15
Rate per 1000 gallons for Level 1 Usage (1 - 7,000 gallons)	$1.75
Rate per 1000 gallons for Level 2 Usage (7,000 - 30,000 gallons)	$1.93
Rate per 1000 gallons for Level 3 Usage (30,000 – 50,000 gallons)	$2.12
Rate per 1000 gallons for Level 4 Usage (Above 50,000 gallons)	$2.33
Industrial Rates – City of T or C	
Base Customer Charge (Minimum and for Usage 1 – 50,000 gallons)	$91.91
Rate per 1000 gallons for Level 2 Usage (50,001 – 100,000 gallons)	$1.84
Rate per 1000 gallons for Level 3 Usage (100,001 – 150,000 gallons)	$2.02
Rate per 1000 gallons for Level 4 Usage (Above 150,000 gallons)	$2.22

NEW WATER RATES EFFECTIVE JULY 1,2020

Residential Rates – City of T or C & Village of Williamsburg	
15.5	Base Customer Charge (Minimum)
2.71	per 1,000 gallons for first 7,000 gallons
3.07	per 1,000 gallons from 7001 gallons to 29,000 gallons
3.45	per 1,000 gallons from 29,001 gallons to 50,000 gallons
3.88	per 1,000 gallons for amount over 50,000 gallons
Commercial Rates – City of T or C & Village of Williamsburg	
15.5	Base Customer Charge (Minimum)
2.71	per 1,000 gallons for first 7,000 gallons
3.07	per 1,000 gallons from 7001 gallons to 29,000 gallons
3.45	per 1,000 gallons from 29,001 gallons to 50,000 gallons
3.88	per 1,000 gallons for amount over 50,000 gallons
Industrial Rates – City of T or C	
91.91	Customer Charge for first 50,000 gallons
3.07	per 1,000 gallons from 50,001 gallons to 100,000 gallons
3.45	per 1,000 gallons from 100,001 gallons to 150,000 gallons
3.88	per 1,000 gallons for amount over 150,000 gallons
Effluent Water	
100	Deposit
$1.35 per 1,000 gallons + $25.00 if used	

The NEW water rates will affect the City's revenue from July 1, 2020.