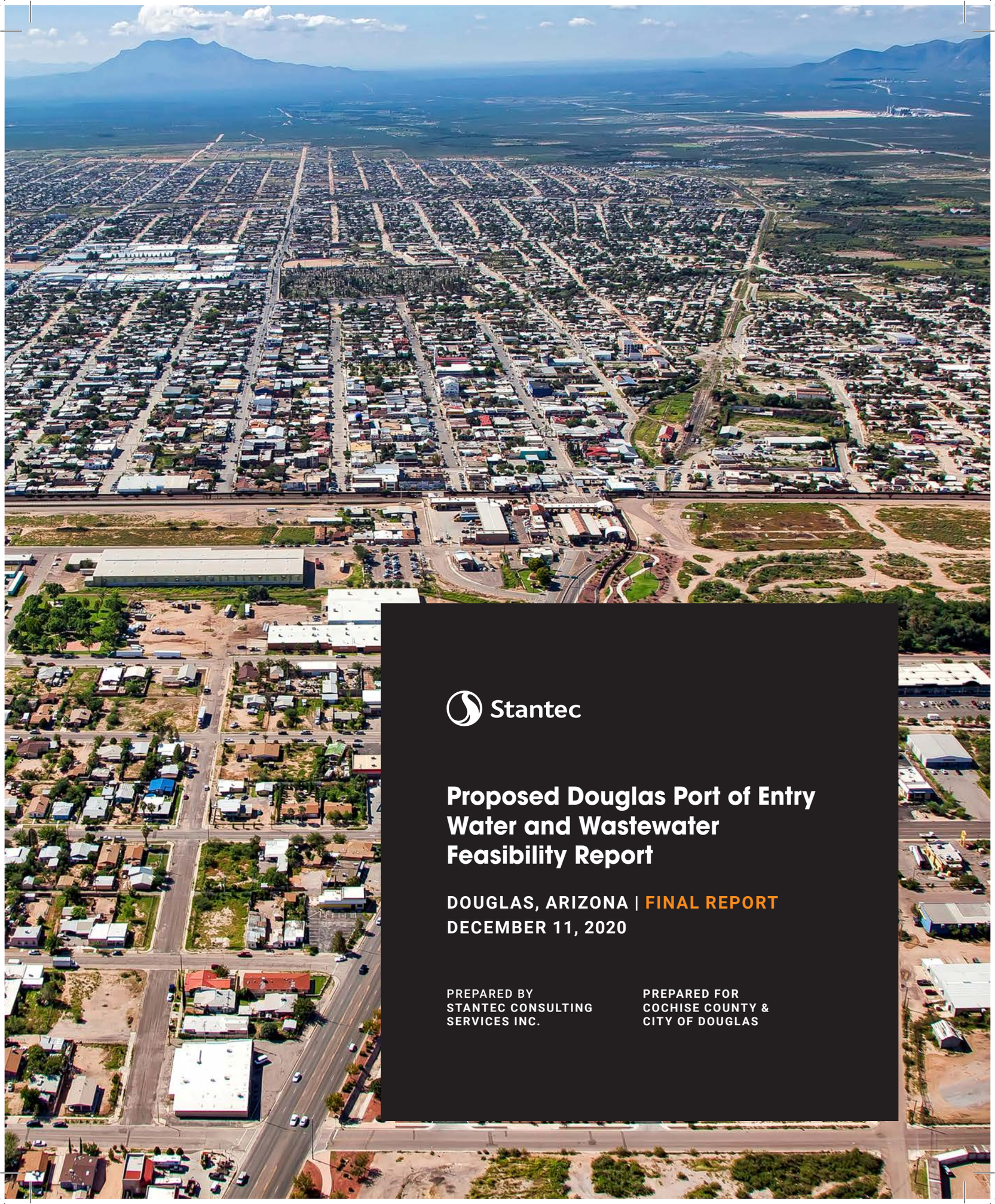


Stantec

Proposed Douglas Port of Entry Water and Wastewater Feasibility Report

DOUGLAS, ARIZONA | FINAL REPORT
DECEMBER 11, 2020

PREPARED BY
STANTEC CONSULTING SERVICES INC.

PREPARED FOR
COCHISE COUNTY & CITY OF DOUGLAS

Proposed Douglas Port of Entry Water and Wastewater Feasibility Report

Water and wastewater requirements and options for a future commercial Port of Entry, as well as Planning Areas, US Border Patrol facility, Cochise College, and the Bisbee Douglas International Airport

December 11, 2020

Prepared for:

Cochise County
Sharon Gilman
1415 Melody Lane, Building G
Bisbee, AZ 85603

Prepared by:

Stantec Consulting
3133 W. Frye Rd, Suite 300
Chandler, AZ 85226

Jack Bryck P.E. BCEE
Colleen Ruiz P.E.

Revision	Description	Author		Quality Check		Independent Review	
0	Draft	J Bryck,	10/15/20	Colleen Ruiz	10/10/20	C Woodward	10/17/20
0	Draft	D Graves	22/07/20			Rick Reinke	15/07/20
0	Draft	H. Zimmerman	17/09/20	Michael Georgalas	19/09/20	F. McKenzie	18/09/20
1	Final	J Bryck	12/09/20	Collee Ruiz	12/01//20	Antonio Valencia	12/08/20

This document entitled Proposed Douglas Port of Entry Water and Wastewater Feasibility Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Cochise County (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not account for any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by

Jack Bryck, PE

Reviewed by

(signature)

Antonio Valencia, PE

Approved by

Colleen Ruiz, PE

Table of Contents

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

TABLE OF CONTENTS

LIST OF FIGURES

TABLE OF CONTENTS

LIST OF APPENDICES

EXECUTIVE SUMMARY

1.0 City of Douglas. Douglas, Arizona, is located along the U.S.-Mexico border approximately 120 miles southeast of Tucson, and 70 miles south of Interstate 10 (I-10). It has an estimated area of 9.99 square miles. U.S. Route 191 directly connects Douglas to I-10. The City shares an international border with Agua Prieta, Sonora, Mexico. The Douglas Port of Entry (POE) is the second largest commercial port in Arizona. Raul H. Castro Port of Entry is the sole port of entry between Douglas and Agua Prieta. It is located in the downtown area of both cities affecting transportation between both countries and limiting economic expansion.

2.0 New Commercial Point of Entry. Cochise County, City of Douglas, State of Arizona, and Federal stakeholders, including the General Services Administration (GSA), support development of a new commercial POE. The proposed POE would be located on James Ranch Road about five miles west of the current Douglas border crossing. The POE is a greenfield site with no road and utility services in place.

3.0 Water and Wastewater to POE, Existing Institutional and County Planning Areas 1-8. This report analyzes multiple solutions for water and wastewater service at the POE. Analysis considers addition of public utility services to existing and County identified future County development zones along James Ranch Road, State Route 80, and along U.S. Highway 191 (US 191) including Planning Areas 1-8. The report also analyzes potential growth and long-range utility improvement needs to expand water and utility services to Cochise College, the US Border Patrol facility, and the Bisbee Douglas International Airport (BDIA)/Arizona Department of Corrections Facility (ADCF) complex. The County will use the engineering exhibits and costs identified in this report to support applications for alternative funding resources for this major project.

The City of Douglas has an estimated service area population of about 16,000 persons with the City owned water supply system based on a groundwater supply including approximately 490,000 feet of water mains. The City owned wastewater system includes the City of Douglas Wastewater Treatment Plant (WWTP) upgrades completed in 2020 to a capacity of 3.1 million of gallons per day (mgd). The City's WWTP treated effluent is discharged under permit to the Rio Agua Prieta in Mexico and is used for irrigation. The average daily water demand for the reported 2018 population of 15,978 was about 2.6 million gallons per day (mgd). The average daily unit demand was 167 gallons per capita per day (gpcpd). July has the highest cumulative monthly usage with an average daily water usage of 3.9 mgd and a daily unit demand of 242 gpcpd. The maximum daily flow in 2019 occurred on June 25th and was at 5 mgd or a maximum daily unit demand of 318 gpcpd.

The US Border Patrol facility has a septic system with ground disposal and two groundwater wells. One well of poor raw water quality and storage in an elevated tank is dedicated for site fire suppression and the second well for domestic water use with water treatment for nitrate removal. The facility is approximately four miles west of Douglas City limits, south of State Route 80. Cochise College has an onsite drinking water well and onsite lagoon system with ground disposal that are maintained by staff. The college is approximately 10 miles west of Douglas City limits along State Route 80. BDIA and the adjacent ADCF utilizes several groundwater wells and have a dedicated connection to the City of Douglas wastewater system, the complex is 12 miles north of Douglas along I-191.

4.0 POE and County Planning Areas 1-8. The Cochise County Plan Growth Areas and Land Jurisdiction has a growth boundary surrounding the City of Douglas. The area designated for the POE is

currently private land. Most of the land along the proposed water and wastewater alignments do not have a designated zone. Eight planning areas were provided by the County. One grouping extends west to Cochise College along State Route 80 and south to the Commercial POE and Border Patrol facility. Within this area are five identified planning areas labeled Planning Areas 1 to 5. The total land area is 3,213 acres. The second grouping extends north to the BDIA. Within this area are three identified planning areas labeled Planning Areas 6, 7, and 8. The total land area is 4,417 acres. The total area of both planning areas is 7,630 acres. The County land zoning designations for these planning areas includes B - Developing (Residential/ Commercial Industrial), C - Developing (Commercial Industrial), and Enterprise (Commercial Industrial). By comparison the land area within the current City of Douglas boundary is 6,393 acres or 9.99 square miles. The total area of Planning Areas 1-8 is twelve square miles (7,630 acres) which is a larger area than Douglas city limits.

Land use and development density estimates were used to calculate utility demands at build out. The full build out average day water demand is estimated to be 10 mgd with a maximum day demand of 20 mgd while the average day wastewater flow is estimated to be 4.6 mgd and a peak hour flow of 10.8 mgd. The timing for full build out of the Planning Areas is estimated at over 200 years but may vary depending on market conditions.

5.0 Growth Projections. The Douglas, Arizona, population was 17,378 according to the 2010 census. Census, and population estimates for 2018 are 15,978. This shows an 8.7 percent decrease in population over the last 8 years. There are currently 3,798 households with 2.85 people per household and 1,465 businesses operating in Douglas, according to the U.S. Census Bureau Quick Facts. The Arizona Office of Employment and Population Statistics projects a range of 0.67 to 0.90 percent per year growth rate within the City of Douglas and a range of 1.14 to 1.52 percent per year growth rate for the unincorporated portion of Cochise County depending on location. Working with the Cochise County planners it was agreed that to account for the impact from the Federal Government investment in the POE, a two percent growth rate for water and wastewater system planning will be used with design for 50 years into the future. Full build out at two percent growth rate of the planning areas 1-8 is estimated to be over 200 years.

6.0 Future Water Supply. New groundwater sources and wells will be developed as a water source for the POE and Planning Areas 1-8. The principle aquifer of the basin is the alluvial deposits, which are reported to range from approximately 1,200 – 2,000 ft thick. The annual recharge to the aquifer is estimated to range from 15,500 – 22,000 acre-feet per year (afy) (approximately 9,600 – 13,630 gallons per minute (gpm)), with an existing estimated aquifer storage of 26 – 32 million acre-feet (ADWR, 2008). Previous studies summarized groundwater quality in the Douglas area as good to excellent; however, localized areas of the aquifer may have elevated concentrations of some contaminants. For purposes of this report it is assumed that based on the development rate of two percent that two wells of 1000 gpm will be needed in the first 20-50 years to meet the projected maximum day water demand. At full build there could be the need for a total of about 14 wells

7.0 Water Supply to the POE and Planning Areas 1-8. The alternatives include:

a. Onsite POE only water supply with a dedicated groundwater well, a fire pump, and a water storage tank on the POE site.
b. A community water distribution system to serve the POE, Border Services facilities, and Planning Areas 1-5 centered on State Route 80 including waterlines, one booster pump station, two storage tanks, and pressure reducing valve station (PRV). The water system would be connected to the City water system, but the water supply would come from new groundwater wells. Depending on the placement of a storage tank the system could serve the Cochise College site.

c. Dedicated water utility to serve only the POE with a dedicated watermain (no connections other than POE) along State Route 80 to James Ranch Road and along James Ranch Road to the POE. This system would include waterlines, a storage tank for adequate fire flow, and a booster pump station.
d. A community water distribution system to serve BDIA/ADCF area and Planning Areas 6-8. This option is connected to the City water system, but the water supply will come from new groundwater wells.

Table ES-1 includes a summary of water infrastructure require to serve Planning Areas 1-8 at full build-out.

Table ES 1: Summary of Community Water Systems Infrastructure for Full Buildout of POE and County Planning Areas 1-8

Service Area	POE/Planning Areas 1-5	Comments	BDIA/ADCF-Planning Areas 6-8	Comments
Watermains	37,100 feet (7.0 miles)	Does not include water supply to Cochise County	47,900 feet (9.1 mi)	
Booster Pump Station	One between West High and Low Zones		One between East High and Low Zones	
Pressure Reducing Station	One between West High and Low Zones		One between East High and Low Zones	
Water Storage Tanks	West High zone Tank- 5 M gals. East Low Zone Tank – 350K gals.	Additional undefined storage will be needed at full build of Planning Areas 1-5	East High zone Tank- 350 gals. East Low Zone Tank – 350K gals.	Additional undefined storage will be needed at full build of Planning Areas 6-8
Groundwater Supply Wells	One well	For full built out an estimated total of 5 wells (1000 gpm) are needed.	One well	For full built out an estimated total of 9 wells (1000 gpm) are needed.

The water demand associated with the full buildout of the POE and Planning Areas 1-5 and 6-8 is estimated to be decades. It is recommended that the water distribution system to serve the POE and Planning Areas 1-5 and the Planning Areas 6-8 be done in identified phases to match the development rate and capital cost expenditures within the planning areas.

7.1 Conceptual Water Costs – POE Onsite This POE water servicing option assumes that within the 80 ac. POE site that there will be an onsite groundwater well and include chlorine treatment, a 360,000-gallon storage tanks, a hydropneumatics booster pump station, a fire suppression system, and a water distribution system. The estimated most probable capital cost at an AACE Level 5 is $5.7 M with a range of $3.7 M to $9.4 M.

7.2 Conceptual Water Delivery Phasing and Costs – Community System. A community water system to serve the POE and the County Planning Areas 1-8 has been developed. Full build out at two percent growth rate of the Planning Areas 1-8 is estimated to be over 200 years. It is recommended that a phasing of the water system be adopted. Table ES-2 is a summary of the approach.

Table ES 2: Summary of Water System Phasing Approach

DESCRIPTION		AAEE LEVEL 5 PROBABLE COST AND RANGE OF COSTS
SERVICE TO POE/ PLANNING AREAS 1-5		
Phase 1	West High Zone water storage tank (550K gals), Well (1000 gpm) and 14,000 feet of Connecting Pipe to POE	$8.4M with a range of $5.4 M to $13.8 M
Phase 2	20,400 feet of watermain - connect West High Zone to City System along SR 80 and pressure reducing valve station connecting West High Zone to West/City Low Zone.	$4.5 M with a range of $2.9 M to $7.4 M
Phase 3	Booster pump station connecting West High Zone to West/City Low Zone.	$4.2 M with a range of $2.7 M to $7.0 M
Phase 4	West Low Zone water storage tank (350K gals) and 2330 feet of watermain	$1.6 M with a range of $1.1 M to $2.7 M
Phase 5	Four groundwater wells (1000 gpm each), and water storage tanks in western Low and High Zones	Likely beyond 2050. Needs to be identified with growth. Not costed in this report.
SERVICE TO BDIA/ADCF AREA/PLANNING AREAS 6-8		
Phase 1a	Connect Planning Area 6 to City Low Zone with 15,100 feet of watermain and East Low Zone reservoir (350K gals)	Timing of Phases 1a and 1b to align with growth locations. $3.8 m with a range of $2.4 M to $6.2 M
Phase 1b	Connect Planning Areas 7 and 8 to City High Zone with 33,190 feet of water main	Timing of Phase 1a and 1b to align with growth locations. $7.9 M with a range of $5.1 M to $13.1 M
Phase 3	East High Zone water storage tank (350K gals), Well (1000 gpm) and 10,580 ft of connecting pipe.	$4.6 M with a range of $3.0 M to $7.5 M
Phase4	Booster pump station and pressure reducing valve station connecting East High Zone to West/City Low Zone.	$6.9 M with a range of $4.5 M to $11.4 M
Phase 5	Eight groundwater wells, additional water storage tanks in East Low and High Zones	Likely beyond 2050. Needs to be identified with growth. Not costed in this report.

Phase 1 includes a new groundwater well located near a new West High Zone storage tank and pipeline between the storage tank and the POE. This is illustrated on **Figure 1-5**. Phases 2-4 will be constructed as development starts in Planning Areas 1-5. This could involve a connection to the City system and development of the water pipeline to the west along State Route 80 to match the location of the development. The water main should eventually be constructed to the east boundary of the West Low-Pressure Zone and include the West Low Zone tank and booster pump/PRV station.

Alternatively, the system could start with a PRV at the boundary of the West Low Pressure Zone and the West High Pressure Zone to allow water from the high zone to flow to the low zone, but must eventually include the pipeline along State Route 80 to connect to the City water distribution system. The water distribution network can be expanded to match the rate of development.in planning areas 1-5.

The initial phase (Phase 1) serving the BDIA/ADCF and Planning Areas 6-8 would include either Phase 1a with a water main within the City Low Zone connecting the City system to the boundary of the East Low Zone and the East High Zone to supply water to Planning Area 6 or Phase 1b with a water main within the City High Zone connecting the City system to an area within Planning Areas 7 and 8 at US

191. The timing between Phases 1a and 1b would be tied to the timing of the development in the planning areas. The next phases (Phases 3-4) would include water mains in the East High Zone to connect to the East Low Zone including a booster pump station and PRV and the EHZT (350,000 gals) and one groundwater well and connecting a water main. It may be possible to include the existing BDIA/ADCF 200,000-gallon tank but the top water level (TWL) elevation was not available for this report. Phase 5 would likely be many decades in the future and include eight groundwater wells and additional water storage tanks of undefined volume in East Low and High Zones

8.0 Wastewater Service to POE and Planning Areas 1-8. Three alternatives are considered for wastewater collection and treatment:

1. POE onsite wastewater collection, treatment, and ground disposal.

2. A dedicated connection (no other connections other than POE) to the City of Douglas sewer collection system including a pump station at the POE and dedicated force main between the pump station and the connection to the City system.

3. Community wastewater collection system connected to the City of Douglas wastewater system with an expanded wastewater collection system to serve the POE and potential County identified development Planning Areas 1-5 centered on State Route 80 between the west boundary of the City and the POE along the USA/Mexico International Border. This option includes an expanded wastewater collection system serving potential County identified development Planning Areas 6-8 north along US 191 to BDIA/ADCF.

A summary of the wastewater system alternatives in Table ES 3 below summarizes the descriptions as well as provides a high-level cost range for each alternative.

Table ES 3: Summary of Wastewater System Alternatives

	DESCRIPTION	AAEE LEVEL 5 PROBABLE COST AND RANGE OF COSTS
POE Onsite Wastewater System	• Wastewater collection, treatment, and reuse system within the POE site.	$3.40M with a range of $2.2M to $5.6M
Sanitary Wastewater System to Connect to the POE/Planning Areas 1-5 to the City of Douglas Wastewater Plant- SR 80 Alignment	• Estimated average day wastewater flow full build out= 1.91 mgd. 2025 to 2055 estimated flow of 0. 24 mgd • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 54,000 feet • Connection to City WWTP (2025 to 2055)	$12.7 M with a range of $8.2 M to $20.9 M

EXECUTIVE SUMMARY

Sanitary Wastewater System to Connect to the POE/Planning Areas 1-5 to the City of Douglas Wastewater Plant-USA Mexico International Boundary Alignment	• Estimated average day wastewater flow full build out= 1.91 mgd. 2025 to 2055 estimated flow of 0.24 mgd • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 80,400 ft. • Connection to City WWTP (2025 to 2055)	$18.7 M with a range of $12.2 M to $30.9 M
Sanitary Wastewater System to Connect Only the POE to the City of Douglas Wastewater Plant.	• Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 26,800 ft. • Connection to City WWTP (2025 to 2055)	$5.9 M with a range of $3.8M to 9.7 M
Sanitary Wastewater System to Connect the Planning Areas 6-8 to The City of Douglas Wastewater Plant	• Estimated average day wastewater flow at full build out is approximately 2.65 mgd. By 2055 0.24 mgd is expected. • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 35,200 ft. • Connection to City WWTP	$14.0 M with a range $9.1 M to $23.2 M

9.0 Sustainable Water Supply Initiatives. The drinking water supply for the POE and for possible development located in the identified Planning Areas 1-8 will be groundwater. The management of the groundwater is by the Arizona Department of Water Resources. It is incumbent that the water supply development and management of the POE and planning areas identified in this report are done in a way that recognize the limitations and needs of the long-term sustainability of the Douglas groundwater aquifer. A list of sustainable water initiatives is included in this report to ensure adequate water supply and limit water usage and minimize losses. They serve as the initial framework for establishing conservative water use practices and are to be incorporated in the design phase of proposed infrastructure. They would be implemented by the owner of the water supply and distribution system serving the Douglas POE and the Planning Areas 1-8.

10.0 Funding Opportunity Research. As part of this Feasibility study, a variety of potential funding sources for Phase 1 of the project were evaluated and consolidated into an initial funding strategy. No single funding partner will fully fund the projects. Cochise County and Douglas will need to seek funding from multiple sources. In order to successfully acquire funding from multiple sources. Cochise County and Douglas will need to organize a funding team and engage regularly with potential funding partners in an organized manner. Consistently engaging funding partners will enable Douglas to be responsive and adaptive if new funding opportunities emerge and Congress provides support through appropriations. The Rural Water Infrastructure Committee will be an effective first stop as they have representatives from many of the funding partners identified. Other potential funding partners are the Water Infrastructure Finance Authority of Arizona, the North American Development Bank, the U.S. Department of Agriculture Rural Development program, the General Services Administration Port of Entry program, and a variety of third-party partners who would benefit from project completion. Once interested funding partners have been identified, Cochise County and Douglas will define critical dates, work products, and roles and responsibilities to successfully acquire the needed funding.

11.0 Cost-Benefit Analysis. This cost-benefit analysis indicates the potential for substantial benefits that could be realized by local customers of the City's water and wastewater system, as well as residents of the region. These benefits are summarized below:

- **Economies of Scale**
  - Water system expansion alternatives 2, 3 and 5 all yield reduced unit costs and achieve economies of scale by increasing capacity at a reduced cost. Based on the assumptions described above, this would indicate the unit costs to serve existing and new customers could be reduced with the expanded system.
    - The alternatives that solely serve the new POE, alternatives 1 and 4, would not achieve economies of scale due to the small amount of capacity added to the system relative to the costs needed to construct, operate, and maintain those assets.
  - Wastewater expansion alternatives 2 and 5 yield reductions to the overall unit costs for service and achieve economies of scale, with alternative 3 leading to a very minor increase under the baseline assumptions. This increase in unit costs under alternative 3 would be considered within the margin of error for this analysis.
    - Similar to the water system alternatives, the wastewater system expansion alternatives that solely serve the POE do not achieve economies of scale due to the small amount of capacity added to the system relative to the costs needed to construct, operate, and maintain those assets.
  - Sensitivity analyses focusing on the range of capital costs provided in this repot, and the range of grant funding provided to fund capital costs, indicated that the findings described above could change depending on actual costs and the level of grant or other funding contributions realized.
- **Regional Economic Impacts**
  - The estimated economic impacts to the region were estimated at $10.8-$20.0 million per year, with the addition of 110-220 new sustainable jobs in the area. This benefit is large enough to more than offset the costs of constructing, operating and maintaining the water and wastewater system expansion projects.
    - It is worth noting that while these benefits would be very real in terms of improving the overall economic vitality of the area by increasing employment opportunities and increasing tax revenue, these benefits should be considered separately from the impacts to water and wastewater customers who would be focused on the potential changes to their monthly utility bills.
- **Additional Economic Considerations**
  - A number of additional opportunities for economic enhancement exist as a result of constructing the second POE and extending water and wastewater service to the POE and development areas. These opportunities include, but are not limited to, increasing traffic at the local Bisbee-Douglas Airport and expanding the facilities and student population at the Cochise College campus. These potential benefits were not quantified at this stage of the analysis but are worth investigating further as planning and design continue to move forward.

12.0 Real-Estate Implications. Moving from a single port of entry in downtown Douglas, AZ to a two port model whereby the existing Port of Entry will serve passenger vehicles and the new port would be used exclusively for commercial traffic, will have measurable impacts on the tangential real estate that surrounds these two ports. Our high level analysis, conducted via interviews with market participants, the City of Douglas, Cochise County, and engagement in the planning sessions organized by Renaissance Planning, revealed market dynamics that, if properly capitalized on, could deliver meaningful economic benefit to both the City and the County.

Abbreviations

AACE	Association for the Advancement of Cost Estimating
ADCF	Arizona Department of Corrections Facility
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
BDIA	Bisbee-Douglas International Airport
BECC	Border Environment Cooperation Commission
BOD	Biochemical Oxygen Demand
CBP	Customs and Border Protection
CC	Cochise College
CDBG	Community Development Block Grant
DU	Dwelling Units
EHZT	East High Zone Tank
ELZT	East Low Zone Tank
ENT	Enterprise
EPA	Environmental Protection Agency
ER	Environmental Report
GB	General Business
GPM	Gallons per Minute
GSA	General Service Administration
HP	Horsepower
INA	Irrigation Non-Expansion Area
MGD	Millions of Gallons per Day
NADB	North American Development Bank
NB	Neighborhood Business
PER	Preliminary Engineering Plan
POE	Port of Entry

PRV	Pressure Reducing Valve
RAS	Return Activated Sludge
USDA-RD	United States Department of Agriculture Rural Development
USDA-RUS	United States Department of Agriculture Rural Utility Services
SAR	Soil Absorption Rate
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
WAS	Waste Activated Sludge
WHZT	West High Zone Tank
WLZT	West Low Zone Tank
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

1.0 PROJECT PLANNING

1.1. INTRODUCTION

Cochise County is conducting a study to determine the feasibility of providing the City of Douglas water and wastewater utilities to a future commercial port of entry (POE), the existing US Border Patrol Facility, Cochise College, and the Bisbee-Douglas International Airport (BDIA). The future POE area does not have existing utilities in the area and is approximately five miles west of Douglas City limits, at the border and the south end of James Ranch Road. It is understood that 80 acres of land has been reserved for the POE.

The US Border Patrol Facility has a septic system with ground disposal and two groundwater wells. One well of poor raw water quality and storage in an elevated tank is dedicated for site fire suppression and the second well for domestic water use with water treatment for nitrate removal. The facility is approximately four miles west of Douglas City limits, south of State Route 80. Cochise College staff operate a drinking water well and lagoon septic system with ground disposal currently in use. The college is approximately 10 miles west of Douglas City limits along State Route 80. BDIA and the adjacent Arizona Department of Correction Facility (ADCF) utilizes several groundwater wells and has a dedicated connection to the City of Douglas wastewater system and is 12 miles north of Douglas along US 191.

All these facilities would benefit from connecting to municipal water and wastewater systems. New system connections would also benefit existing property owners along the proposed traffic routes who have either failing septic systems or water quality/supply issues. Utilities along these routes will promote future development related to trade including residential and commercial developments, as well as warehouses.

This feasibility study was funded by Cochise County and presents a preliminary description of the project area, need for the project, and development alternatives. This feasibility study may be utilized to develop the complete Preliminary Engineering Report (PER) which may be submitted for additional capital funding sources to complete the design and construction of specific water and wastewater expansions. Additional information beyond this feasibility study will be required for the development of the PER and for the applications for project funding sources.

Potential funding sources could include United States Department of Agriculture Rural Utility Services (USDA RUS), Border Environment Cooperation Commission (BECC), Community Development Block Grant (CDBG) Program, Water Infrastructure Finance Authority of Arizona (WIFA) Loan Program, and/or other funding sources. An analysis of potential funding sources is included in this report for planning purposes.

1.2. LOCATION

The City of Douglas is within Cochise County, Arizona, in Sulfur Springs Valley in the southeast corner of the state. US 191 leads north from Douglas, 69 miles to Interstate 10 (I-10) near Wilcox, Arizona. Twenty

six miles of Arizona State Route 80 (SR-80) tie Douglas to Bisbee. The accompanying **Figure 1-1** illustrates the general location of Douglas, Arizona. Douglas has a current estimated population of close to 16,000 people. The land area within the City boundary is 9.99 square miles.

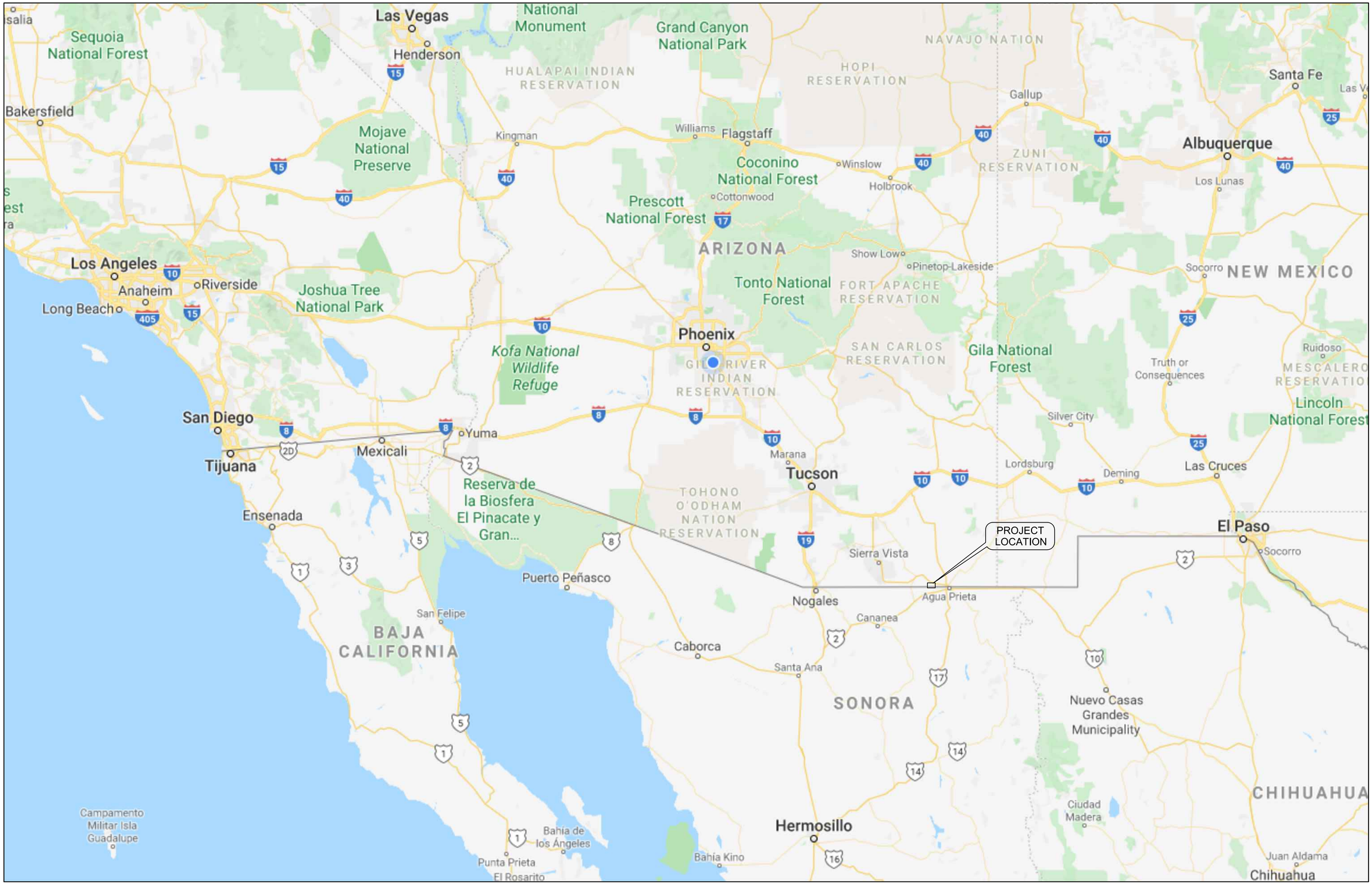
Douglas and Agua Prieta host the Hector Castro Land Port of Entry (POE). Traffic feasibility studies found that a new commercial POE five miles west of the City will reduce overcrowding and commercial truck traffic in downtown Douglas. The town encompasses approximately 10 square miles of incorporated land. The City of Douglas General Plan, 2002, contains more information about the City. More information about the history and location of Douglas can be found in the Douglas 2002 General Plan.

The Wastewater treatment plant for Douglas is in the SW corner of the town at the border of Mexico, just east of the Phelps Dodge mining site and White-Water Draw. It was recently upgraded to increase the capacity by 60 percent to serve nearby colonias.

1.3. ZONING SUMMARY

Figure 1-2 on the following page is the City of Douglas Zoning Map. It depicts the City's growth boundary in blue and current zoning within the City of Douglas Planning Area. The City's current zoning is a mix of residential, commercial, and industrial for incorporated parcels. Most of the parcels in the improvement area are within the City limits. Exceptions include the ADCF and Pirtleville, a residential development outside of City limits. The Comprehensive Plan designation Enterprise allows for rezoning to Neighborhood Business (NB), General Business (GB), Light and Heavy Industrial (LI, and HI).

Figure 1-3 is the Potential Use Category and Designation Map developed by Cochise County in anticipation of the future commercial POE. The area designated for the future commercial POE is currently private land. Assumptions have been made with county coordination to identify future land planning zones of specified planning areas that could be impacted by the POE. These assumptions along with associated dwelling unit (DU) densities, zone designated water/wastewater average usage, and land areas to determine both existing and future water and wastewater quantities. The areas surrounding the proposed POE, James Ranch Road, and SR-80 are designated as Developing (tan). The areas west of White-Water Draw are designated as Enterprise. The Comprehensive Plan designation Enterprise allows for rezoning to NB, GB, or LI and HI. This rezoning flexibility will be helpful to varied developments as the area grows following installation of the commercial POE.



NORTH

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

GENERAL PROJECT LOCATION
FOR
DOUGLAS PORT OF ENTRY
DOUGLAS, ARIZONA

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 1-1

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 1-1 - project location map.dwg PLOTTED: 8/20/2020 11:06 PM

PROJECT PLANNING

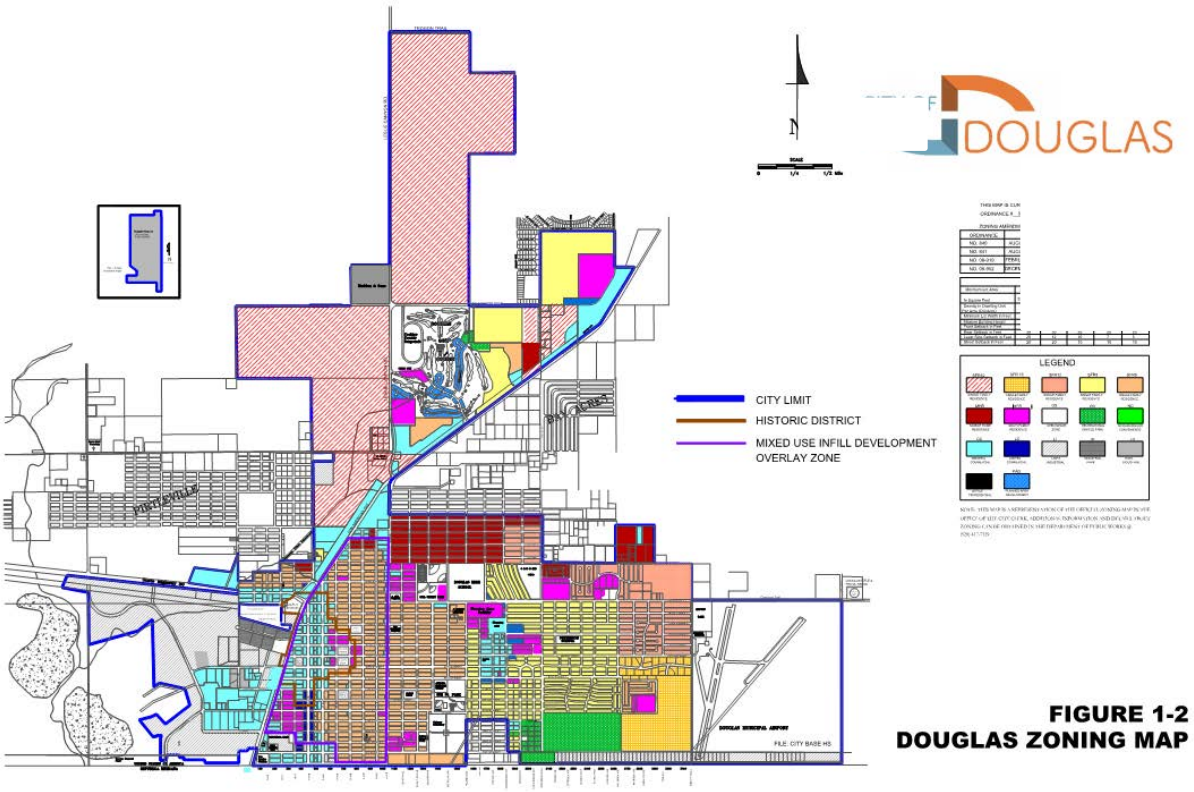
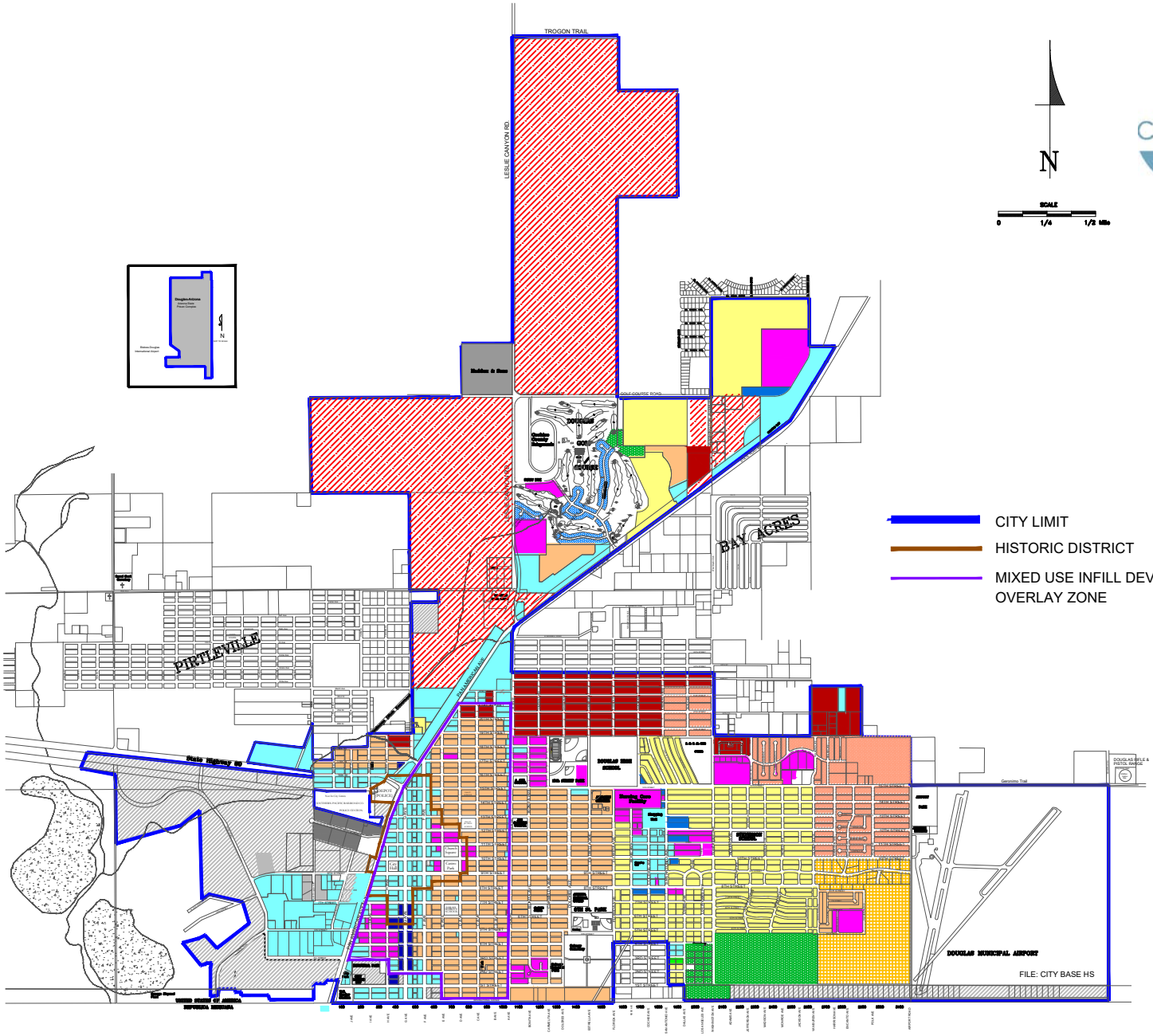


Figure 1-2: The City of Douglas Zoning Map



CITY OF DOUGLAS

CITY LIMIT

HISTORIC DISTRICT

MIXED USE INFILL DEVELOPMENT OVERLAY ZONE

THIS MAP IS CURRENT THROUGH
ORDINANCE # 08-952 DATED DECEMBER 10, 2008

ZONING AMENDMENTS

ORDINANCE	DATE
NO. 840	AUGUST 13, 2003
NO. 841	AUGUST 13, 2003
NO. 08-919	FEBRUARY 13, 2008
NO. 08-952	DECEMBER 10, 2008

ANNEXATION AMENDMENTS

ORDINANCE	DATE
NO. 08-933	MAY 14, 08

DISTRICT-COMPATIBLE

Minimum Lot Area	SFR 32	SFR 16	SFR 12	SFR 8	SFR 6
In Square Feet	32,000 SF	16,000 SF	12,000 SF	8,000 SF	6,000 SF
Density in Dwelling Unit Per Acre (DU/Acre)	1	2	3	5	7
Minimum Lot Width in Feet	150	125	100	75	50
Maxium Building Height	25	25	25	25	25
Front Setback in Feet	40	30	25	25	20
Rear Setback in Feet	30	30	25	25	20
Least Side Setback in Feet	20	12	10	7	5
Street Setback in Feet	20	20	15	10	10

LEGEND

SFR32 SINGLE FAMILY RESIDENCE
SFR 16 SINGLE FAMILY RESIDENCE
SFR12 SINGLE FAMILY RESIDENCE
SFR8 SINGLE FAMILY RESIDENCE
SFR6 SINGLE FAMILY RESIDENCE
MHR MOBILE HOME RESIDENCE
MFR MULTI-FAMILY RESIDENCE
OS OPEN SPACE ZONE
RV RECREATIONAL VEHICLE PARK
NC NEIGHBORHOOD CONVENIENCE
GC GENERAL COMMERCIAL
LC LIMITED COMMERCIAL
LI LIGHT INDUSTRIAL
IP INDUSTRIAL PARK
HI HIGH INDUSTRIAL
OP OFFICE PROFESSIONAL
PAD PLANNED AREA DEVELOPMENT

NOTE: THIS MAP IS A REPRESENTATION OF THE OFFICIAL ZONING MAP IN THE OFFICE OF THE CITY CLERK. ADDITIONAL INFORMATION AND DETAILS ABOUT ZONING CAN BE OBTAINED IN THE DEPARTMENT OF PUBLIC WORKS @ (520) 417-7329

FIGURE 1-3
DOUGLAS ZONING MAP

Pirtleville is a development directly northwest of Douglas that is a census-designated place in an area of 1.8 square miles with a population of approximately 1,744. Douglas provides Pirtleville with utility services. As the planning areas shown in this report develop, the City and County will determine whether to leave them as county islands with City facilities or annex the planning areas into the City of Douglas.

Figure 1-4 is the Project Plan Map. This exhibit shows the future commercial POE, existing POE, City of Douglas, SR-80, US 191, and the planning areas specified by Cochise County for future development analysis to provide water and wastewater services. It is anticipated that future growth will follow James Ranch Road, SR-80, and US 191 through town and that construction of utilities along those corridors would encourage growth.

1.4. PROPOSED WATER AND WASTEWATER IMPROVEMENTS

The proposed location for the POE is on undeveloped land without roadway or utility infrastructure in place to support the intended purpose. There is no water supply, wastewater treatment or reuse, road right-of-way or road connecting to SR-80, power supply, internet/communication service, or connection to natural gas supply. The land and utility/roadway routes are located within Cochise County jurisdiction and are privately owned. Right-of-way acquisition, funding, design and construction within the Planning Areas are needed prior to GSA commitment to the POE. The planning areas may be annexed into the City of Douglas for service. ADOT can also be a helpful partner with James Ranch Road construction.

A couple of different potential solutions are under study for this feasibility report. The costs, benefits, and life cycle analysis, as well as funding opportunities will be researched and presented for potential solutions.

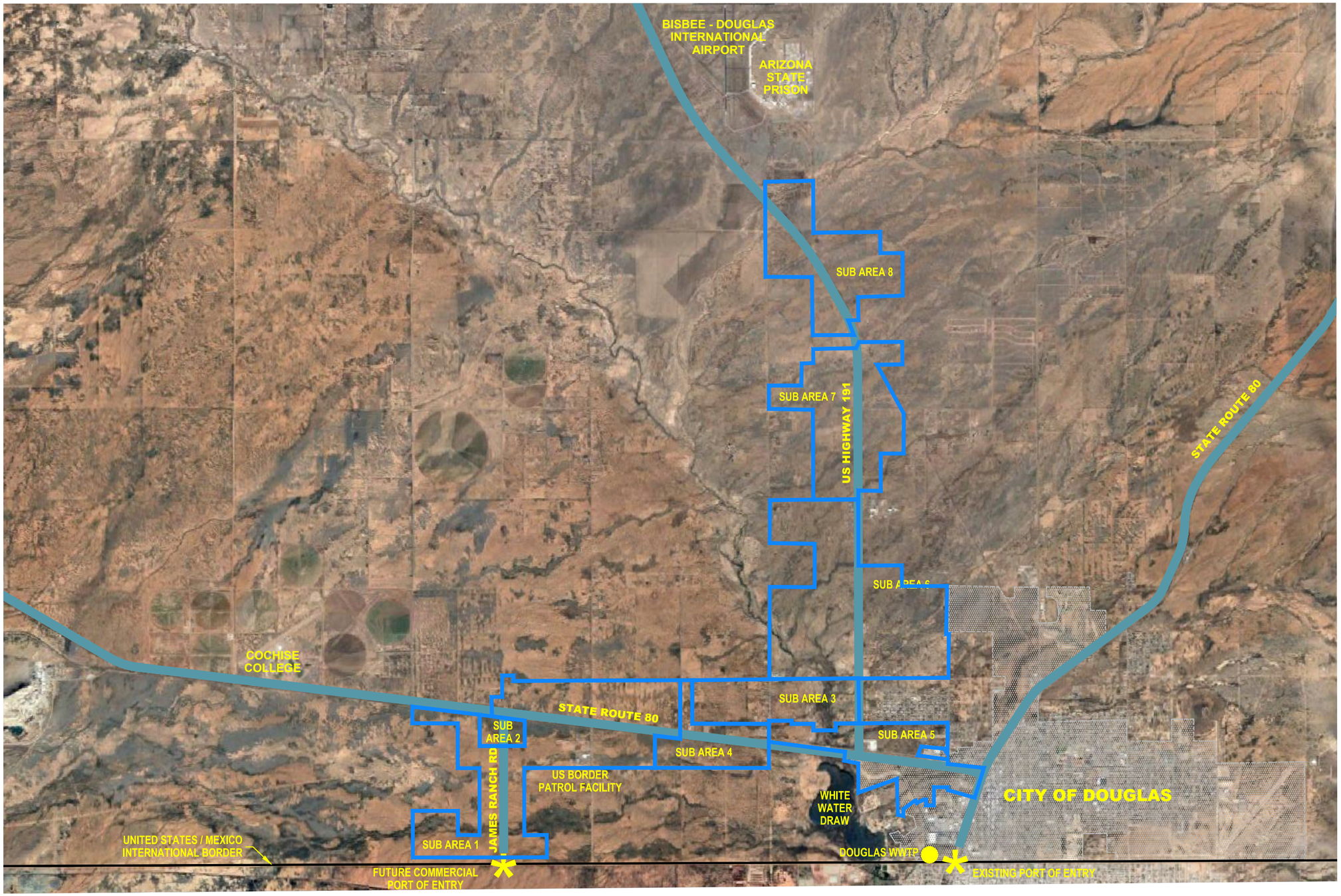
1.4.1 Community Municipal Water and Wastewater Service

Municipal water and wastewater services will include construction of water and wastewater lines, sewer lift stations, water storage, and wells along the following routes:

- West along SR-80 to the US Border Patrol Facility and Cochise College
- South along James Ranch Road to the future POE
- North along US 191 to the BDIA

1.4.2 Onsite POE Water and Wastewater Service

Alternatively, onsite improvement options to municipal water and wastewater systems are for onsite systems only. The POE includes construction of a well, storage, and wastewater facilities at the future POE. This is a more cost-effective solution, but it does not provide utilities to the planning areas.



LEGEND

- PLANNING AREA BOUNDARY
- HIGHWAYS
- INTERNATIONAL BORDER
- DOUGLAS CITY LIMITS

NORTH

1"=6000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 1-4 overall project map.dwg PLOTTED: 8/20/2020 11:07 PM

PREPARED BY:

Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:

COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

OVERALL PROJECT MAP

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 1-4

1.4.3 Other Infrastructure - Roads, Internet, Power, Natural Gas Services

Coordination of the right-of-way acquisition and construction of the water, sewer, and fiber to the site must take place prior to General Service Administration (GSA's) commitment to the POE. Available GSA funding is limited to onsite work. All right-of-way planning and acquisition shall be compliant with National Environmental Policy Act (NEPA) and the Uniform Right of Way Act, in order to qualify for Federal Funding.

A Port of Douglas Future Commercial Route is designated as priority number 9 of 10 in the 2040 Cochise County Long-Range Transportation Plan completed in 2015. The right-of-way acquisition process for Cochise County is detailed in the 2040 Long-Range Plan on page 10. Recommendations within the report included the following relevant goals:

- Acquire a minimum of 30 miles of right-of-way for existing roadway network per year.
- Provide a minimum advance right-of-way acquisition budget for future corridors.
- Identify and pursue opportunities to acquire right-of-way for future roadway alignment.
- Encourage donations of right-of-way to the County on existing declared roadways.

Construction of roadway, water, and wastewater to the proposed POE, if using federal or state funds, can be included in the region's Southeastern Council of Government's (SEAGO) Transportation Improvement Program (TIP) or the Sierra Vista Metropolitan Planning Organization's (SVMPO) TIP. All projects receiving funding should be funded and constructed in compliance with all required federal, state, and local regulations, as applicable. Cochise County has experience with addressing and complying with federal, state, and local regulations, including those related to the Clean Water Act and Endangered Species Act. This project will likely require drainage permits from the Army Corp of Engineers, as well as 404 permits since the James Ranch Road alignment crosses a historical drainage path. The James Ranch Road should be evaluated during the design phase for any permits that may be required from outside agencies.

The ability to effectively implement the proposed POE infrastructure project is dependent on supportive legislative actions at the federal and state levels. The County works with several lobbying groups, such as, the National Association of County Governments, the Rural Transportation Advocacy Council, and the Arizona Transit Association. These organizations work on the County's behalf with national and state elected officials to represent policy positions and advocate for a strong, effective, and safe transportation system.

The Arizona Department of Transportation (ADOT) right-of-way office can provide guidance for the acquisition process. Utility easements are included in the definition of real property and must adhere to the FHWA guidelines, as well as, right-of-way. Environmental, right-of-way, and utility clearances must be obtained during the due diligence phase and completed before ADOT adds the project to the five-year plan making it eligible for state funding. Funding, regardless of federal or state, is allocated by phase to control costs and progress of activity during the development, construction, and project close-out phases.

Federal funding requires a match using state or local funds. State funds may not be used for work outside of state right-of-way.

Preliminary ADOT requirements along James Ranch Road include a minimum of 200' for right-of-way. The typical section of right-of-way should include space for two lane roadways in each direction and utilities including water, wastewater, internet, power, natural gas, streetlights etc. located outside of driving lanes. Coordination with the utility owners should start early in the process to determine connection locations, costs, timelines, and feasibility.

GSA has also identified fiber lines as an important requirement for the POE and recommends installation of conduits during the utility design project to reduce costs later when the telecom company is ready to install. Arizona Public Service (APS) is aware of the project and ready to provide necessary resources to planning as the requirements develop. Natural gas may also be considered depending on the type of development expected along the utility corridors.

1.5. ENVIRONMENTAL RESOURCES

A full Environmental Report (ER) for the proposed improvements and Environmental Clearance for acquisition of right-of-way may be prepared in conjunction with the preliminary engineering report at a future date. The federal General Service Administration (GSA) is currently preparing environmental report for the proposed site that will be referenced if completed prior to this report.

The use of state or federal funds for infrastructure projects require that the NEPA requirements are met. This typically includes a biological assessment, cultural resource clearance, preliminary assessment of hazardous materials, water quality and stormwater pollution prevention plans, and approvals from a variety of agencies, such as the Army Corps of Engineers, may be required.

The costs for needed environmental assessments and mitigation are typically included as design costs. These costs range from as little as two percent to 30 percent or more of total project costs, and, like right-of-way acquisition costs, are not incidental considerations. These initial costs may prove to be substantive both in time and money. Historically, most transportation improvement projects within Cochise County have been located upon, or adjacent to, cultural artifacts or valuable environmental resources. Very few roadway segments within Cochise County have been fully evaluated. County recommendations from the 2040 Long-Range Plan regarding environmental requirements include:

- Develop a NEPA Process Chart to assist with tracking environmental requirements and progress toward Environmental Clearance when implementing construction projects.
- Use available environmental and archeological databases and tools in the project scoping phase.
- Use standard formulas to calculate culvert and crossing structure size and openness ratios that accommodate target species, follow wildlife-friendly fence guidelines, use local scale wildlife corridor mapping that incorporates wildlife movement data and habitat conditions, and implement other standard mitigation recommendations that allow planners and engineers to effectively and easily consider wildlife during the scoping phase of projects.

- Advance archeological studies along known existing and future corridors desired for improvement to jump-start projects when the time is right for construction.

An EPA Environmental Assessment was prepared in January of 2014 for an improved Douglas Wastewater Treatment Plant to service the Bay Acres Colonia. The report was completed as part of grant funding for the Boarder Environment Infrastructure Fund (BEIF) which provides water and wastewater infrastructure projects located along the international boundary of the US and Mexico. Certification includes compliance with both Mexican environmental regulations and NEPA. The report described the affected environment including land use, soils, water resources, vegetative habitat, wildlife resources, and cultural, historical, and archeological resources.

1.6. POPULATION TRENDS

The Douglas, Arizona population was 17,378 according to the 2010 census. Census population estimates for 2018 are 15,978. This shows an 8.7 percent decrease in population over the last 8 years. There are currently 3,798 households with 2.85 people per household and 1,465 businesses operating in Douglas, according to the U.S. Census Bureau Quick Facts.

U.S. Census Bureau Quick Facts also showed that Douglas' population has grown at an average or 1.5 percent over the 108 years between the first census in 1910 and the last population estimate in 2018. The population was 6,440 people in 1910. Southern Arizona towns have not experienced significant growth in the last 10 years. Nogales' population grew by 0.22 percent, Wilcox grew by 0.08 percent, Yuma grew by 9.2 percent, Sierra Vista lost 4.9 percent, and Bisbee lost 6.3 percent. The average of these rates is -0.34 percent.

The Douglas Census County Division (CCD) includes Douglas, the ADCF prison, Pirtleville, Bay Acres, and surrounding unincorporated areas. To determine the future population growth rate for the recent wastewater treatment facility upgrade, CDM Smith used the population projections through 2035 published by the Arizona Office of Employment and Population Statistics for the design of the expanded City of Douglas Wastewater Treatment Facility. The office projected a 0.67 to 0.90 percent per year growth rate for Douglas and a 1.14 to 1.52 percent per year growth rate for the unincorporated portion of Cochise County. The growth rate for the weighted average population from these two areas ranges from 0.74 to 0.99 percent per year. The population projections in the table below assume a constant population of 2,000 in the prison and growth of two percent per year for the remaining population.

2.0 INVESTIGATION

Investigation includes analysis of existing water and wastewater system capacity and capability, determination of facilities to be constructed, onsite POE water solutions, calculations of flow and demand of the facilities and at ultimate build out, utility route analysis, and land planning requirements. This investigation is completed at a high level for the feasibility trail and lists assumptions and resources for future design and analysis requirements.

2.1. ANALYSIS OF EXISTING WATER AND WASTEWATER SYSTEMS

2.1.1 Commercial Port of Entry

Water or wastewater facilities at the proposed 80-acre commercial POE site are not currently available. In addition, there is no right-of-way connecting the POE to SR-80, power supply, internet/communication service, or connection to natural gas supply.

2.1.2 US Border Patrol Facility

The local US Border Patrol (USBP) Facility is located at 1608 N. Kings Hwy, Douglas, Arizona. Record drawings prepared by the US Army Corp of Engineers titled '5- Agent Border Patrol Office Phase 1 September 2000' were provided by the City of Douglas.

Mr. Allan Humphrey P.E., Douglas City Engineer contacted the US Border Patrol office in June of 2020 and learned that they are not interested in connecting to a possible potable water system but would like a sewer connection to a possible municipal wastewater collection system.

2.1.2.1 Water System Analysis

There is an existing well at the USBP site in the northwest corner of Kings Highway and Puzzi Ranch Road that has been shut down due to poor water quality. Well Registration 55-400274 was abandoned in 2001 per Arizona Department of Water Resources (ADWR) records.

There is a 600' non potable well with a 400 gpm capacity that has arsenic issues. It is reported that this well is part of the onsite fire suppression system which includes an elevated storage tank with 200,000-gallon capacity. The as-built drawings dated September 2000 show that the storage tank is about 144 ft. (45 m) above the current grade. The reference point on the tank is not known, but if it is the TWL then based on a ground contour of 4,020 feet, the top water level (TWL) is at 4,165-foot elevation. By comparison, the estimated City's Low Zone TWL elevation is 4,110 ft and the estimated City's High Zone TWL is 4,200 feet.

There is also a second a 200' well with 30 gpm capacity with nitrate issues. A 16,200 gpd ion exchange nitrate treatment system is used to treat the water. Bottled water is currently brought in for drinking. Due to COVID stay at home orders it is reported that they are currently using only 3,000 gpd of water.

2.1.2.2 Wastewater System Analysis

The USBP Facility relies on onsite wastewater septic tank treatment and a leach field. It is reported by the City that the estimated capacity of the wastewater treatment system is about 27,000 Gallons per Day.

2.1.3 Cochise College- Douglas Campus

Cochise College has an average annual enrollment of approximately 979 students at the Douglas Campus over the last three years. 141 faculty and staff serve the campus as well. Cochise College was constructed in 1964 and is located 10 miles west of Douglas City limits.

2.1.3.1 Water System Analysis

Cochise College has two onsite wells according to ADWR for adequate water supply. Maintenance staff's primary concern is the onsite wastewater system. The Cochise College wells are summarized in Table 2-1 below.

Table 2-1: **Cochise College Wells.**

Well ID	Diameter	Depth	Depth to Water	Ground Elevation
55-601343	16"	400	176.5'	4,130
55-601344	16"	350'	189.1'	4,135

2.1.3.2 Wastewater System Analysis

A wastewater lagoon system was installed at the school in 1964. It is a Type 1.09, Grade A system that is designed to process < 22,000 gallons per day. Maintenance costs for the lagoons are minimal. The flow meter on the facility is not currently working. Plans are in place for repair.

2.1.4 Bisbee-Douglas International Airport and Arizona Department of Corrections

2.1.4.1 Water System Analysis

The system is operated by the City of Douglas on behalf of BDIA/ADCF. There are two abandoned wells at the BDIA. Well number1 was ordered to be removed by ADEQ on February 14, 2020 due to the presence of diesel and oil range organic total petroleum hydrocarbon constituents. Well number 3 is no longer in use. Well numbers 7 and 8 remain active. The City reports that the water demand is very close to exceeding the well production rates. The BDIA wells are summarized in Table 2-2 below.

Table 2-2: BDIA Wells

Well ID	Diameter	Depth	Depth to Water	Ground Elevation	Pump
55-606412 (well #7)	16”	650’	219.2	4,066	200 HP (1977)
55-516373 (well #8)	16”	435’	228.6’	4,068	200 HP (1089)

A 200,000-gallon elevated storage tank for the shared system is located on the west side of the ADCF. It ties to a 12” waterline fed by well numbers 7 and 8. The City of Douglas reports the top water level of the elevated storage tank as 4,330 ft based on the total of the ground contour elevation of 4,120 feet plus tank height of 210 feet. Current average water demands are 27,526,000 gallons per month for the airport.

It is strongly recommended that a land survey tied to the City of Douglas benchmark system be done by the City to confirm the critical elevations of each of this tank (top water level, overflow, structure bottom) for use in future water distribution system planning and development.

2.1.4.2 Wastewater System Analysis

Collector sewers from the BDIA and ADCF drain to a City of Douglas sanitary sewer lift station located at the ADCF. The flow meter on the lift station is currently inoperable. It is reported by the Douglas City Engineer that the average wastewater flow from the BDIA/ADCF is about 250,000 gpd with a peak wastewater flow of 300,000 gpd associated with inflow during rain events.

The City provided two undated and unlabeled plan view drawings of the pipeline prepared by Wilson and Company. The pump station and pipeline consist of one pump, approximately 23,000 feet of 8-inch diameter force main and approximately 16,000 feet of 15- inch gravity sewer with some 16-inch gravity sewer.

The BDIA sewer drains north to south, on the east side of US 191 for about 6 miles. A Pirtleville line runs alongside the BDIA line for a short distance and both discharge to a common City manhole north of the City’s Wastewater Treatment Facility (WWTF). The City reports that area within the City that would drain to the gravity sewer is limited. There might be a possibility of connecting a sewer from the west at the manhole at SR 80 and US 191. The flow capacity of the pump station, force main and gravity pipeline were not available for this report. It is recommended that this be determined to evaluate the possibility of excess capacity available for future growth.

2.1.5 City of Douglas, Arizona

2.1.5.1 Drinking Water System Understanding

The City of Douglas drinking water source is groundwater. The water distribution system has about 490,000 ft (92 mi) of waterlines, four operating storage tanks/reservoir and six groundwater wells. **Figure 2-1** is a CAD drawing illustrating the system. There are two different pressure zones in the City of Douglas water system. The High Zone serves development at higher elevations of the City and the Low Zone serves development at the lower elevations of the City.

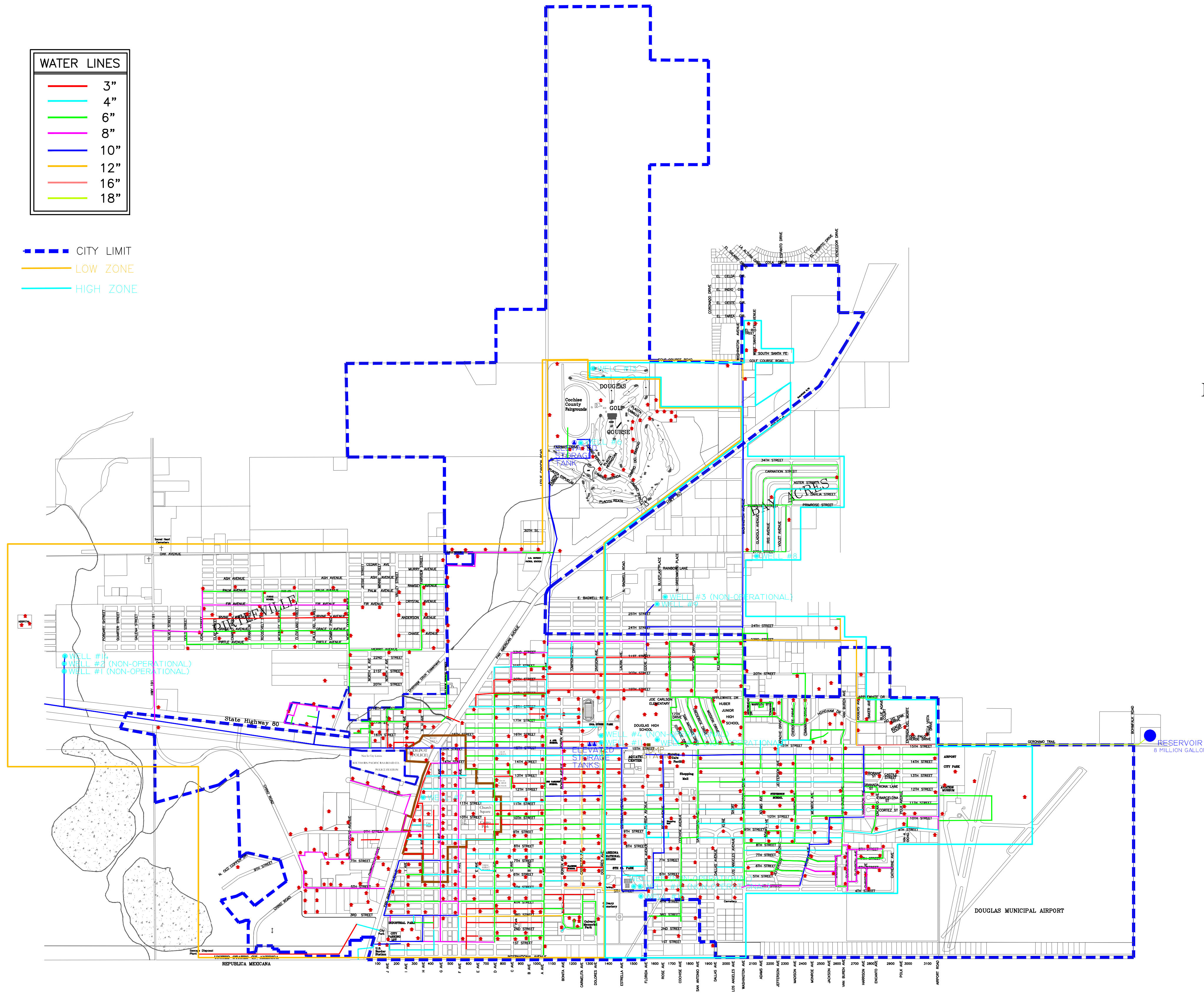
There are six wells that serve the City of Douglas within the two zones. The High Zone contains three active wells and the Low Zone contains three wells, with two currently active. There is one Pressure Reducing Valve (PRV) facility located on the boundary of the High and Low Zones, but it is reported that it has not been in operation for many years. The City reported that in a recent fire situation in the Low Zone, they manually opened a valve at the boundary between the two zones and, under controlled conditions, allowed the transfer of High Zone water for the duration of the event.

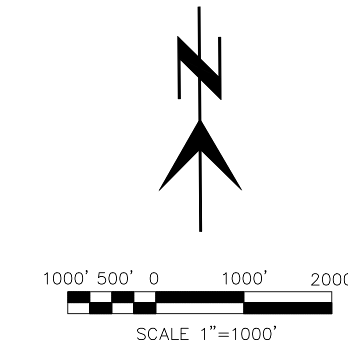
There are several inactive wells. It is reported by the City that the inactive wells are abandoned by the City since they were non-productive due to a drop in the groundwater table over many years. It is reported that all service connections are metered. The estimated service area population in 2018 was 15,978 people.

The following is a summary of the pumping capacity of the active wells and the total volume pumped by each well in 2019. **Table 2-3** summarizes the instantaneous pumping rate of the active wells, the City pressure zones they are located in and the total volume pumped by each well in 2019. These instantaneous pumping rates were used in the development of the City Water Distribution Model, a part of this report.

Table 2-3: Summary of the City of Douglas Active Wells.

Well #	Identified Number	City Reported Instantaneous Pumping Rate (gpm)	City Reported Pumped Volume in 2019 (ac-ft)	Comments
15	POE 11- 55-599-184	416	533	High Zone
6	POE 02- 55-603-984	776	496	High Zone
9	POE 005- 55-603-987	300	182	High Zone, Intermittent use throughout the year.
16	POE 016- 55-217-893	776	522	Low Zone
17	POE 017- 55-912-890	1,372	1,119	Low Zone
11	POE 007- 55-504-004	250	141	Low Zone, issue with sand and air. Emergency only.





City of Douglas Arizona
Incorporated May 15, 1905

DEPARTMENT OF PUBLIC WORKS
WATER DISTRIBUTION SYSTEM

NO	DATE	REVISION	BY	CH	APPR

CITY OF DOUGLAS, ARIZONA
DEPARTMENT OF PUBLIC WORKS
MAP OF THE WATER DISTRIBUTION SYSTEM

1 OF 1

DRAWN BY L.A.O. /E.A. 20 09
DSGN BY L.A.O. /E.A. 20 09
CHKD BY ______ 20__
APPD BY ______ 20__ PROJECT ENGINEER
REF ______ SCALE 1"=1000'
PLAN NO. OFFICE USE

INVESTIGATION

The City identified that the existing wells are not able to meet current system water demands and that they are looking at adding future well source capacity. The possibilities include:

- Re-develop/New well on the Well Number 11 site with an expectation of a yield of 500 gpm
- Re-develop/New well on the Well Number 12 site with an expectation of a yield of 500 gpm
- A New well at the corner of 15th Street and Van Buren with an expectation of a yield of 500 gpm.

Total water distribution storage capacity is in four storage structures: one five-million-gallon reservoir and three three-hundred-thousand-gallon elevated storage tanks. The five-million-gallon tank is in the High Zone. The three, three-hundred-thousand-gallon tanks are in elevated storage tanks in the Low Zone. The elevated storage tanks were constructed in 1942. The key storage structures elevations (top water level, overflow, structure bottom) were not available from the City.

The City, however, estimated the key elevation of the storage tanks by identifying the elevation contour on the storage structure property from LIDAR contour mapping (NAVD88 datum), measuring the vertical difference between the contour elevation and the top water level and overflow and calculating the bottom of the tank by subtracting the tank wall dimension from the overflow. For the 15th Street Park East Tank and 15th Street West Tank the ground elevation from LIDAR contour mapping was 4,028 feet while for the well number 6 tank the ground elevation was 4,034 feet.

The estimated critical elevations of the storage facilities are summarized in the following **Table 2-4**. **It is strongly recommended that a land survey (tied to the City benchmark system) be completed by the City to confirm the critical elevations of each of the three tanks and the one reservoir (top water level, overflow, structure bottom) for use in future water distribution system planning and development.**

Table 2-4: City of Douglas Water Storage Tank Elevations

Water Storage Tank Name	Pressure Zone	Storage Volume (Gallons)	City Estimated Top Water Level Elevation (feet)	City Estimated Overflow Elevation (Feet)	City Estimated Tank Bottom Elevation (Feet)
Regular Reservoir	Upper	5,000,000		4,220	4,210
15th Street Park East Tank	Lower	300,000	4,110.1	4,110.6	4,093.1
15th Street Park West Tank	Lower	300,000	4,110.1	4,110.6	4,093.1
Well Number 6 Tank	Lower	300,000	4,116.1	4,116.6	4,099.1
Total Distribution Water Volume (gallons)		**5,900,000**			

Note: Contours are on the NAVD 88 Benchmark System.

2.1.5.1.1 Water System Usage Analysis for February 2019 through January 2020

The City provided water usage data for the period February 2019 to January 2020. Monthly water usage for the 12 months is illustrated in **Figure 2-2**. Monthly reports of water usage were used to determine flows for each month except for September and October of 2019 where data was unavailable. For September and October, monthly flows were estimated through the summation of monthly well production data. These include wells 6, 9, 11, 15, 16, and 17.

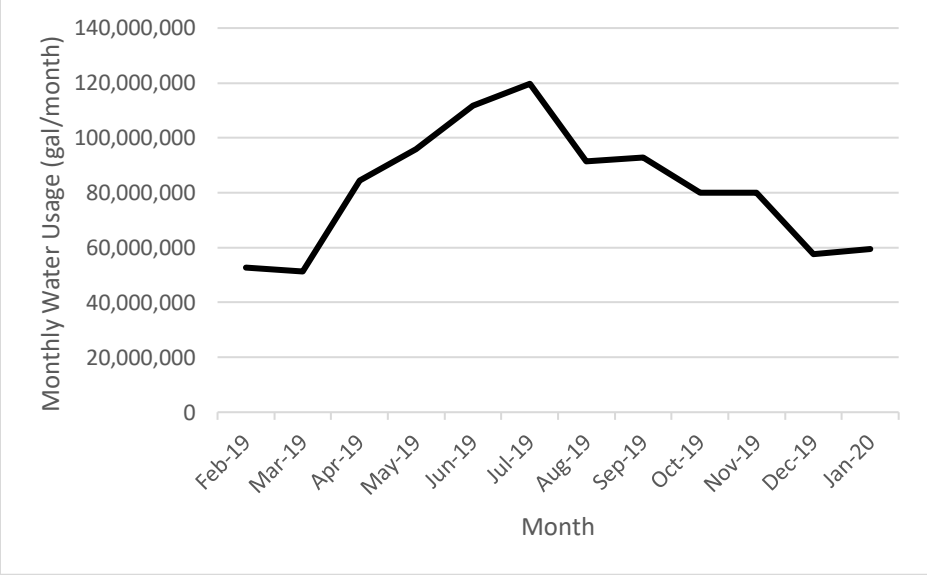


Figure 2-2: City of Douglas monthly water usage from February 2019 to January 2020.

Using the monthly reports and well data, the average daily water demand for the reported 2018 City population of 15,978 is about 2,677,000 gpd. The average daily unit demand is 167 gpcpd. July has the highest cumulative monthly usage of 119,701,250 gal/month or an average daily water usage of 3,861,331 gpd and a daily unit demand of 242 gpcpd. Based on City well data, maximum daily flow in 2019 occurred on June 25th and is 5,074,660 gpd or a maximum daily unit demand of 318 gpcpd. The ratio of maximum daily unit demand to average daily unit demand is 1.9 to 1.

2.1.5.1.2 Water Distribution System Hydraulic Model

As part of this project, development of a water system hydraulic model was requested by the County and the City. The hydraulic model was developed to understand the capability of the existing water system groundwater well sources, the distribution system piping, the water system storage tanks, and reservoirs to meet existing water demand conditions. The report submitted to the County and City on October 30, 2020 was entitled **'City of Douglas, AZ Water System Hydraulic Model Report - Final Evaluation of Existing Water System October 30, 2020'**

All the required information to create the model was provided by the City including the City CAD drawings of the water system, flow records, flow from each of the source water wells, characteristic of three storage

tanks and the one storage reservoir. The City also undertook fire hydrant testing procedures on July 22, 2020 to collect information to allow for calibration of the hydraulic model.

A City review of the capacity and condition of the water system (water supply, water treatment, water distribution and storage) was not available for this report.

2.1.5.1.3 City Water Utility Budget.

The City of Douglas Water Utility budget for 2017 to 2021 is shown in **Table 2-5**. The amount of source water supplied to the system is identified and the total expenses per gallon of source water supplied are also identified.

Table 2-5: City of Douglas Annual Water Budget

	2017	2018	2019	2020	2021
Personnel Expenses	$555,650	$574,253	$549,133	$641,164	$698,002
Operating Expenses	$661,154	$677,289	$586,432	$839,216	$893,536
Total Capital Outlay	$524,275	$542,806	$515,654	$171,565	$121,591
Total Expenses	$1,746,080	$1,794,348	$1,651,221	$1,657,949	$1,713,129
Total Annual Source Water supplied, Gallons	1,057,060,644	1,005.250,335	975,597,894	Not Available	Not available
$/1000 gallon of water supplied/ year	$1.65	$1.78	$1.69		

2.1.5.1.4 City Water and Wastewater Systems Impact Fees.

The current City impact water and wastewater fees for new water and wastewater service connections to are as summarized in **Table 2-6**. For a single-family residence, the total fees to connect to the City systems are currently $3,500 and for 3-inch diameter commercial connection currently cost $52,500. The City noted that the impact fees will be reviewed by the City.

Table 2-6: City of Douglas Annual Water and Wastewater Impact Fees

Size (inches)	Wastewater Impact Fee	Water Impact Fee	Total Impact Fee
0.75	$2,100	$1,400	$3,500
1	$5,250	$3,500	$8,750
1.5	$10,500	$7,000	$17,500
2	$16,800	$10,200	$28,000
3	$31,500	$20,000	$52,500

2.1.5.2 Wastewater Treatment Plant Understanding

Douglas' WWTP is off West International Avenue, just east of the closed mining facility. Treated effluent is conveyed into Rio Agua Prieta in Mexico and is used for irrigation. In 2018 and 2019, grant funding from the U.S. Department of Agriculture Rural Development (USDA-RD), the Water Infrastructure Finance Authority of Arizona and EPA through the Border Environment Infrastructure Fund administered by North American Development Bank (NADB) provided $7.48 million of the $16.3 million-dollar upgraded facility. The construction was completed to accept 350 new residential sewer service connections from the Bay Acres Colonia and Pirtleville areas adjacent to the City. The following information was from the City's Arizona Department of Environmental Quality (ADEQ) Wastewater Treatment Plan Permit.

ADEQ requires that a WWTP operate at no more than 85 percent of its capacity. According to ADEQ Wastewater Treatment Plan Permit #100831, the City of Douglas constructed a 2 mgd treatment facility in 2002. In 2016 that permit was amended to increase the total treatment plant capacity to 3.1 mgd by adding new oxidation ditches, clarifiers and modifying the existing treatment units. The Upgraded WWTP has a capacity to collect and treat a maximum average monthly flow of 3.1 mgd. Design flows are summarized for the WWTP in **Table 2-7** below.

Table 2-7: WWTP Upgrade Design Flow Summary

Design Flow (mgd)	Max. Month Factor	Max. Month Flow (mgd)	Peak Hour Factor	Peak Hour Flow (mgd)	APP Alert Level (mgd)	Planning Action Level (mgd)
2.6	1.2	3.1	1.4	4.3	2.9	2.6

The treatment process consists of two existing headworks with mechanical bar screens, manual screens and grit removal chambers, two new oxidation ditches for nitrification-denitrification, one existing and one new clarifier, a new return activated sludge (RAS)/waste activated sludge (WAS) pump station, modified existing RAS/WAS pump station, and existing chlorine contact chamber. The existing two aeration basins will be converted to aerobic digesters and an existing clarifier will be converted to a sludge thickener. The sludge generated from the treatment process will be digested in two newly converted aerobic digesters and thickened in the sludge thickener. The sludge will be dried in an existing belt press and/or existing sludge drying beds. Sludge shall be hauled off-site for disposal in accordance with state and federal regulations.

The Upgraded WWTP will produce reclaimed water meeting Class B+ Reclaimed Water Standards (A.A.C. R18-11, Article 3). Treated effluent from the WWTP will be discharged to Mexico to irrigate 240-acre community farm. Depth to groundwater at the site is approximately 120 feet below ground surface and the direction of groundwater flow is to the south-southeast.

2.1.5.2.1. City Wastewater Collection System

The City provided the CAD drawing of the wastewater collection system. A City review of the hydraulic capacity and condition of the wastewater collection system was not available for this report.

2.1.5.2.2. City of Douglas Wastewater Utility Budget

The City of Douglas Wastewater Utility budget for 2017 to 2021 is as follows in **Table 2-8**. The amount of wastewater treated is identified as is the total expenses per gallon of wastewater treated.

Table 2-8: **City of Douglas Annual Wastewater Utility Budget**

	2017	2018	2019	2020	2021
Personnel Expenses	$399,017	$413,912	$452,479	$550,633	$593,572
Operating Expenses	$419,365	$486,938	$500,580	$1,113,956	$1,113,956
Total Capital Outlay	$679,410	$660,412	$618,602	$205,067	$177,472
Total Expenses	$1,497,795	$1,561,262	$1,581,661	$1,869,657	$1,885,000
Annual Average Day Wastewater Treated, gallons	1.228 MG average day	1.303 MG average day	1.315 MG average day	1.474 MG average day- July 2019 to June 2020	Not Available
$/average day treated flow, gallons/year	$1.22	$1.20	$1.20	$1.27	

2.2. FACILITIES TO BE CONSTRUCTED

The existing City of Douglas water and wastewater infrastructure systems have been analyzed to determine the potential for expansion.

2.2.1 Proposed Port of Entry Proposed Facilities

The following alternatives are considered for water supply to the POE:

1. **POE Onsite Water System.** Develop water supply system with a dedicated groundwater well, a fire pump, and a water storage tank on the POE site serving only the POE.

2. **Community Water System - POE, Planning Areas 1-5 -** Develop a community water system to serve the POE and potential county identified development Planning Areas 1-5 centered on SR-80 between the City west boundary and the POE including new water production wells. While under this option the water system would be connected to the City water system, the water supply would come from new groundwater wells. This option has been further developed in phases to match the timing and location of development in Planning Areas 1-5. An alternative is to expand the system to serve Cochise College.

3. **Dedicated Water Supply from the City System to Serve the POE Only** - Connection to the City of Douglas water system including a dedicated watermain (no connections other than POE)

along SR-80 to James Ranch Road and along James Ranch Road to the POE. It would include a storage tank with a water volume dedicated to fire flow and new water production wells.

4. **Community Water Utility Routes - Area of BDIA/ADCF, Planning Areas 6-8 -** Connection to the City water system with an expanded water distribution system to serve areas in vicinity of BDIA/ADCF and County identified development Planning Areas 6-8 centered on US 191 between the City north boundary and BDIA including new water production wells. While under this option the water system would be connected to the City water system, the water supply would come from new groundwater wells.

The following alternatives are considered for wastewater collection and treatment to the POE and County Planning Areas 1-8:

1. **Onsite wastewater collection, treatment, and ground disposal.** Development of a wastewater collection, treatment and groundwater recharge system serving only the POE.
2. **Dedicated Wastewater System to the City to Serve the POE Only.** A dedicated connection (no other connections other than POE) to the City of Douglas sewer connection system including a pump station at the POE and dedicated force main between the pump station and the connection to the City system.
3. **Connection to the City of Douglas wastewater system- POE, Planning Areas 1-5. A**n expanded wastewater collection system to serve the POE and County identified development Planning Areas 1-5 centered on State Route 80 or the USA/Mexico International Boundary between the west boundary of the City and the POE.
4. **Connection to the City of Douglas wastewater system- Area of BDIA/ADCF, Planning Areas 6-8**. An expanded City wastewater collection system to serve the County identified development Planning Areas 6-8 north along US 191 to BDIA/ADCF.

2.2.2 US Border Patrol Proposed Facilities

The US Border Patrol facility currently has elevated water storage facilities. The City reports that proposed project could include a tie to the possible public water system associated with the POE instead of bottled water for drinking. The existing wastewater septic system may be replaced with a tie to the possible municipal wastewater system associated with the POE.

2.2.3 Cochise College Proposed Facilities

The City reports proposed improvements associated with the community water system serving the POE could include connection into the municipal water system. The existing wastewater septic system could also be replaced with a tie to the municipal wastewater system associated with a community wastewater system serving the POE.

2.2.4 BDIA Proposed Facilities

BDIA could utilize existing utility lines, wells, and storage tanks. A waterline must be constructed to connect into the municipal system. BDIA and the prison are already connected to the municipal sewer system with a lift station.

2.2.5 City of Douglas Proposed Facilities

The City's Five-Year Capital Plan for water and wastewater utilities is identified in **Table 2.9**. The total value of the water system is $ 4,455,000 and the wastewater system value is $810,000. A report prepared by the USEPA released April 16, 2001 and entitled 'Douglas, Arizona Wastewater Collection and Potable Water Distribution Improvement Project Environmental Assessment identified deficiencies in the both the water and wastewater systems. It is unknown which deficiencies have been resolved.

Table 2-9: City of Douglas Five Year Capital Improvement Plan (2020-2025)

5 Year Capital Improvement Plan 2020 Through 2025

	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	New/Replace/Impr
PW Water						
Chlorinator rooms and alarm system	$40,000.00					IMPROVEMENTS
Safety Barricades	$5,000.00					REPLACEMENT
2 New Wells	$1,600,000.00	$1,600,000.00				NEW
Rehab Well 15	$80,000.00					IMPROVEMENTS
Resevoir Roof	$130,000.00					IMPROVEMENTS
2 Back up Generators	$100,000.00	$100,000.00				NEW
Mini Excavator		$45,000.00				NEW
Booster Pump & Motors forAlegre Water Supply		$5,000.00				IMPROVEMENTS
Flush to Waste System for Wells 15, 6 & 9'	$20,000.00	$20,000.00				IMPROVEMENTS
AMI Meter System	$500,000.00					NEW
300k Gallon (3) Elevated Storage Tank Inspection	$30,000.00					SAFETY IMPROVEMENT
16" Geronimo Trail Trans. Line		$90,000.00	$90,000.00			IMPROVEMENTS
Department Total	$2,505,000.00	$1,860,000.00	$90,000.00	$0.00	$0.00	
PW Wastewater						
Work Truck	$5,000.00					NEW
50 ft walkway for chlorine contact chamber	$25,000.00					IMPROVEMENTS
Muffin Monster for 8" line	$30,000.00					NEW
R&R Sewer Line Between 17/18th Street from F Ave to A Ave		$100,000.00	$100,000.00	$100,000.00		
New Sewer Install 20th and 23rd Street W of Washington to Lincoln Ave		$100,000.00	$100,000.00	$100,000.00		
New Sewer Install 2nd and 3rd St Cochise and San Antonio Ave		$50,000.00	$50,000.00	$50,000.00		
Department Total	$60,000.00	$250,000.00	$250,000.00	$250,000.00	$0.00	

2.3. WASTEWATER FLOWS & WATER DEMANDS - POE FACILITY

At the date of this report, the land usage at the proposed Douglas POE has not been defined. In the absence of land use planning information, it is assumed that the wastewater flow contributions will include Border Security staff, administration offices, emergency personnel offices, public restrooms, and limited CBP accommodations. The average wastewater flow is estimated to be16,000 gpd. It is recommended that when the GSA identifies this information that these assumptions be reviewed and modified as necessary.

At the date of this report, the firefighting rate of flow and duration has not been defined to this project team by GSA. In the absence of land use planning information, it is assumed that the water demand will include Border Security point of entry and administration offices, emergency personnel offices, public restrooms, and limited CBP accommodations. The average day water flow is estimated to be 25,000 gpd. The maximum day water demand is assumed to be five times the average day demand or about 125,000 gpd. More detailed information about these values and assumptions made can be found in the onsite facilities section later in this report. It is recommended that when the GSA can identify this information that these assumptions be reviewed and modified as necessary.

2.4. DETERMINE FUTURE FLOWS WITHIN PLANNING AREAS

2.4.1 County Planning Areas 1-8

Eight utility planning areas were provided by the County in support of the POE. One grouping will extend west to Cochise College along SR-80 and south to the Commercial POE and Border Patrol Facility. Within this area are identified five planning areas labeled Planning Areas 1 to 5. The total land area is 3,213 acres.

The boundaries of Planning Areas 1-5 are illustrated on **Figure 2-3**. On the same **Figure 2-3** is a summary of the area within each planning area, the county identified land use, the unit development density, the average water demand per unit and the expected wastewater flow per unit. These assumptions are used to estimate the water demand and wastewater flow from these areas at full build out. The timing for full build out is uncertain but likely many decades.

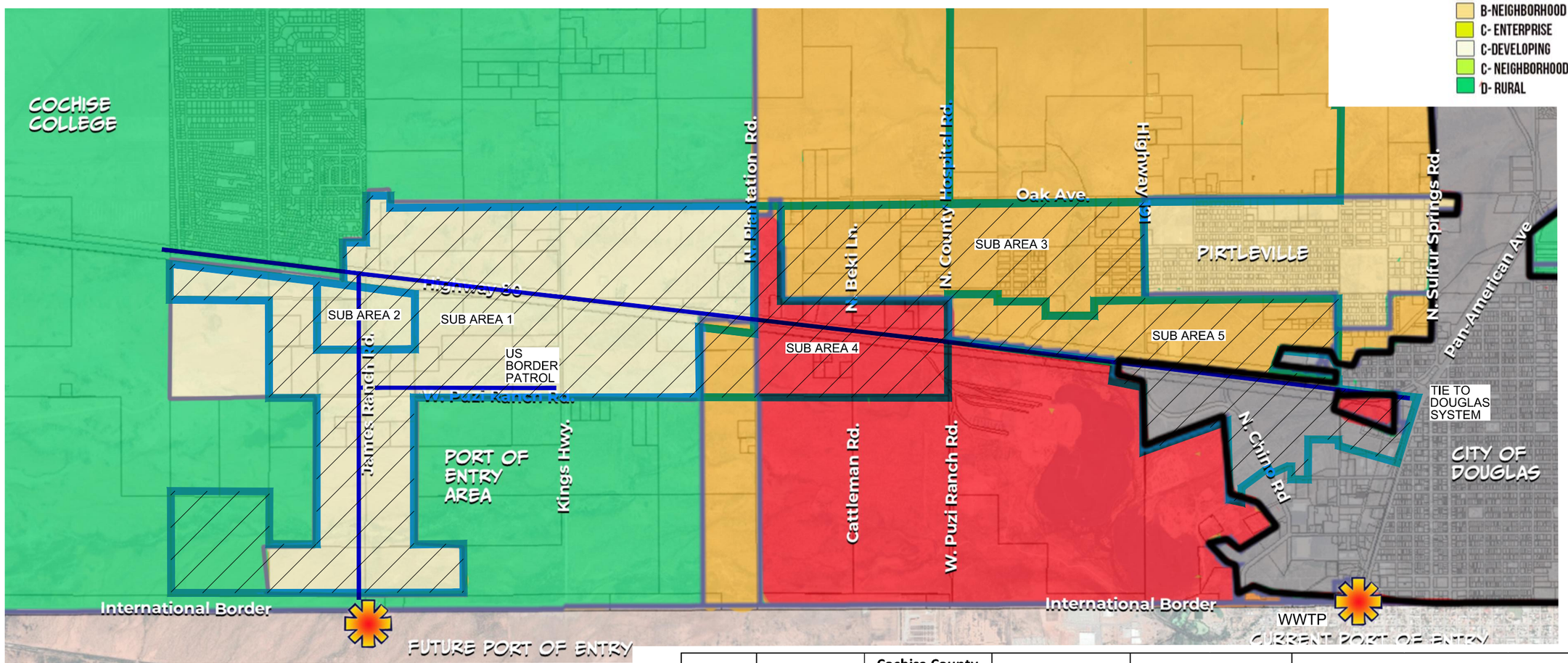
The second grouping will extend north to the BDIA. Cochise County assigned preliminary zoning boundaries. Within this area are identified three planning areas labeled Planning Areas 6, 7 and 8. The total land area is 4,417 acres. The total area of both planning areas is 7,630 acres. The boundaries of the Planning Areas 6-8 are illustrated on **Figure 2-4**. On the same **Figure 2-4** is a summary of the area within each planning area, the county identified land use, the unit development density, the average water demand and the expected wastewater flow per acre. These assumptions are used to estimate the water demand and wastewater flow from these areas at full build out. The timing for full build out is uncertain but likely many decades.

The current total land area within the City of Douglas boundary is 9.99 square miles (6,393 acres). The total land area of Planning Areas 1-8/POE is 12 square miles (7,630 acres) or greater than the current area within the City of Douglas boundary. It is understood that the land within the boundaries of Planning Areas 1-8 is mainly privately held with a small percentage being State Lands.

2.4.2 Estimated Water Demand and Wastewater Flows for County Planning Areas 1-8

An estimate of the water demand and wastewater flow associated with each Planning Areas 1-8 is summarized on **Table 2-10** as is the total ultimate estimated water demand and wastewater flow for the

PORT OF ENTRY, U.S. BORDER PATROL AND COCHISE COLLEGE
UTILITY ROUTE, PLANNING AREA AND AVERAGE WATER/WASTEWATER USES



Sub Area	Gross Area	Cochise County Land Use Designation	AZ Admin. Code Designation	Domestic Water		Wastewater			
	(acres)			Average[4]	Max Day -2	Per acre wastewater generation rate[1]	Average Daily Design Flow, ADWF (gpd)	Peaking Factor[2]	Peak Flow PDWF (gpd)
				Gals/acre	Gals/acre				
1	1941	C-Developing	Comercial/Industrial	2,717,400	5,434,800	600	1,164,600	2.38	2,771,748
2	103	C- Developing	Comercial/Industrial	144,200	288,400	600	61,800	2.38	147,084
3	609	B-Developing	Residential	852,600	1,705,200	800	487,200	2.38	1,159,536
4	425	B- Enterprise	Comercial/Industrial	595,000	1,190,000	600	255,000	2.38	606,900
5	747	B- Developing	Comercial/Industrial	1,045,800	2,091,600	600	448,200	2.38	1,066,716
SubTotals				**5,355,000**	**10,710,000**		**2,416,800**		**5,751,984**

LEGEND

– UTILITY PLANNING AREA

– PROPOSED UTILITY CORRIDOR FOR POE AND U.S. BORDER PATROL

NORTH

1"=3000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 2-3 – summary of sub planning areas 1-5.dwg PLOTTED: 12/10/2020 8:44 AM

PREPARED BY:

Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:

COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

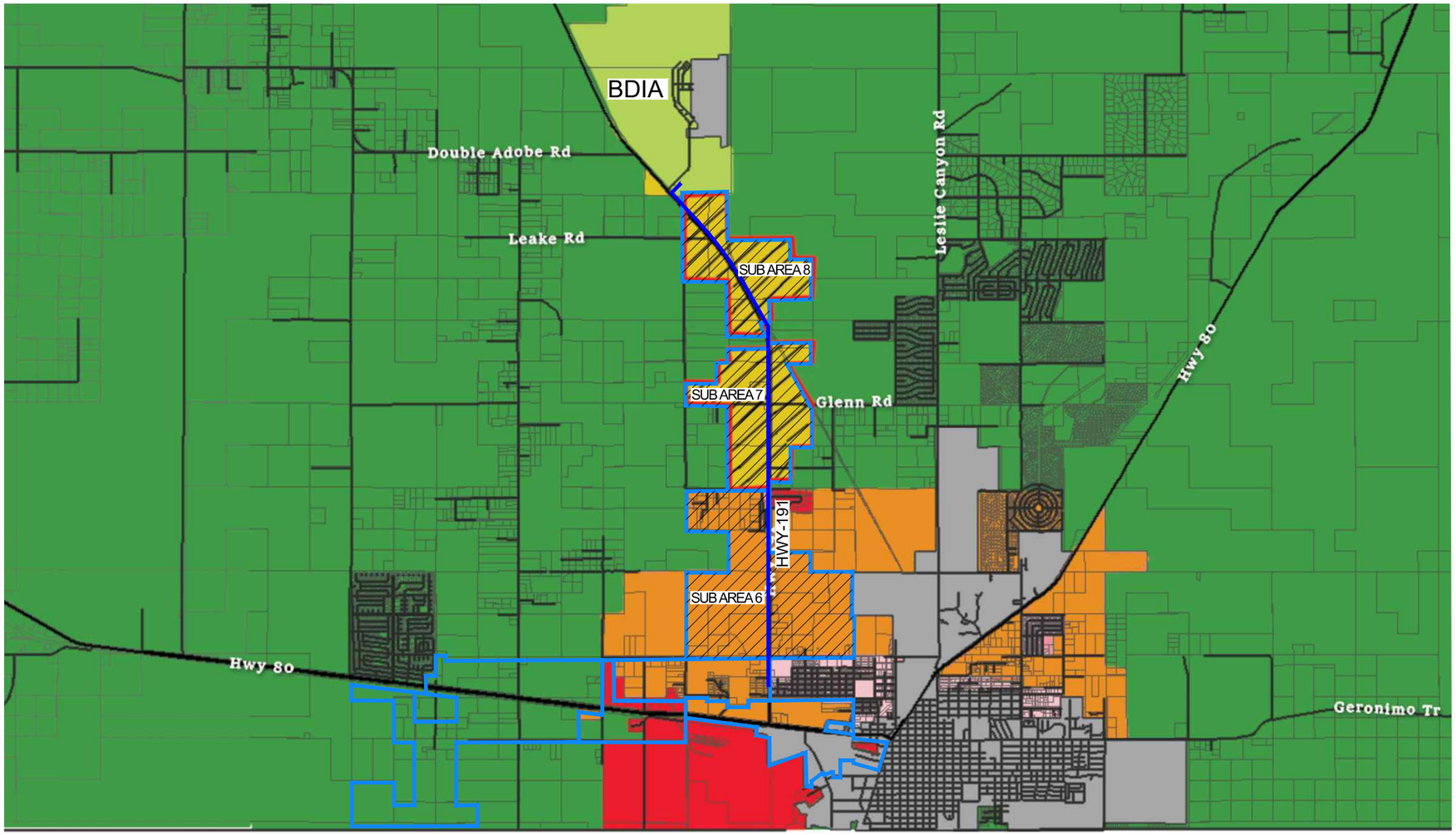
UTILITY PLANNING AREA
FOR
DOUGLAS PORT OF ENTRY
DOUGLAS, ARIZONA

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 2-3

BISBEE - DOUGLAS INTERNATIONAL AIRPORT
UTILITY ROUTE, PLANNING AREA AND AVERAGE WATER/WASTEWATER USES



Sub Area	Gross Area / Population	Cochise County Land Use Designation	AZ Admin. Code Designation	Domestic Water		Wastewater			
	(acres)			Average[4]	Max Day -2	Per acre wastewater generation rate[1]	Average Daily Design Flow, ADWF (gpd)	Peaking Factor[2]	Peak Flow PDWF (gpd)
				Gals/unit	Gals/unit				
6	1875	C-Developing	Comercial/Industrial	2,625,000	5,250,000	600	1,125,000	2.38	2,677,500
7	1088	C- Developing	Comercial/Industrial	1,523,200	3,046,400	600	652,800	2.38	1,553,664
8	940	B-Developing	Comercial/Industrial	1,316,000	2,632,000	600	564,000	2.38	1,342,320
SubTotals				**5,464,200**	**10,928,400**		**2,341,800**		**5,573,484**

LEGEND

– UTILITY PLANNING AREA

– PROPOSED UTILITY CORRIDOR

NORTH

1"=8000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 2-4 – summary of sub planning areas 6-8.dwg PLOTTED: 8/20/2020 11:08 PM

PREPARED BY:

Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:

COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

UTILITY PLANNING AREA
FOR
BISBEE - DOUGLAS
INTERNATIONAL AIRPORT

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 2-4

INVESTIGATION

Table 2-10: Summary of Water Demand and Wastewater Flow for Planning Areas 1-8

Sub Area	Gross Area	Cochise County Land Use Designation	AZ Admin. Code Designation	Domestic Water		Wastewater			
	(acres)			Average[4] (gpd)	Max Day -2 (gpd)	Per acre wastewater generation rate[1]	Average Daily Design Flow, ADWF (gpd)	Peaking Factor[2]	Peak Flow (gpd)
1	1,904	C-Developing	Comercial/Indust	2,665,600	5,331,200	600	1,142,400	2.38	2,718,912
2	109	C- Developing	Comercial/Indust	152,600	305,200	600	65,400	2.38	155,652
3	615	B-Developing	Residential	861,000	1,722,000	450	276,750	2.38	658,665
4	161	B- Enterprise	Comercial/Indust	225,400	450,800	600	96,600	2.38	229,908
5	424	B- Developing	Comercial/Indust	593,600	1,187,200	600	254,400	2.38	605,472
SubTotals	**3,213**			**4,498,200**	**8,996,400**		**1,835,550**		**4,368,609**

Cochise County - BDI Planning Area Projected Wastewater and Water

Sub Area	Gross Area	Cochise County Land Use Designation	AZ Admin. Code Designation	Domestic Water		Wastewater			
	(acres)			Average[4] (gpd)	Max Day -2 (gpd)	Per acre wastewater generation rate[1]	Average Daily Design Flow, ADWF (gpd)	Peaking Factor[2]	Peak Flow PDWF (gpd)
6	2,439	C-Developing	Comercial/Indust	3,414,600	6,829,200	600	1,463,400	2.38	3,482,892
7	1,070	C- Developing	Comercial/Indust	1,498,000	2,996,000	600	642,000	2.38	1,527,960
8	908	B-Developing	Comercial/Indust	1,271,200	2,542,400	600	544,800	2.38	1,296,624
SubTotals	**4,417**			**6,183,800**	**12,367,600**		**2,650,200**		**6,307,476**
TOTALS:	**7,630**			**10,682,000**	**21,364,000**		**4,485,750**		**10,676,085**

Notes:

1	For residences assume 450 gpd/acre for a 3 bedroom house with less than 21 fixtures on one acre per AAC R18-9 Table 1 per person rate for Dwellings.
	For commercial/industrial areas assume 600 gpd/acre for a non-urban community. 25 gpd/employee.
	This is based on planning flow rates used in other densely urban Arizona communities (i.e.Pima County).
2	Peaking factor per current Arizona Administrative Code (AAC) R18-9E301(D)(1)(b)(i)
3	PWWF = 1.1 * PDWF ; This is an additional 10% allowance for Inflow and Infiltration.
4	Estimated 1,400 gpd/acre average water use per Community Water Company in southern Arizona.

Assumptions:

1	These planning areas and zoning were provided by Cochise County.
2	It is estimated that full build out of these areas may take 45 years or more depending on growth rates. Estimated growth rate is 6.29% based on historical census data.

total planning areas. The unit water demand and the unit wastewater flow are based on typical unit flows for the assumed type of development for the noted planning designation. The total average and peak day water demand is 10.7 mgd and 21.4 mgd, respectively, and average day and peak day wastewater flow of 4.5 mgd and 10.7 mgd, respectively.

By comparison, the City average day water demand and maximum day water demand was 2.7 mgd and 5.1 mgd respectively in the period February 2019 to January 2020. The existing City WWTP average day flow in 2019 was 1.3 mgd and the WWTP is rated to treat 3.1 mgd of wastewater.

Thus, the POE and full build out in the 7,630 acres of land in Planning Areas 1-8 will be significant in comparison to the present City water demand and WWTP flows. It is likely, however, that the time to full build out of Planning Areas 1-8 will be many decades in the future.

2.5. DETERMINE ULTIMATE FLOWS AND DEMANDS

It is estimated that the commercial POE construction could be complete in approximately 5-10 years (2025 to 2030). The Arizona Office of Employment and Population Statistics projects a 0.67 to 0.90 percent per year growth rate for Douglas and a 1.14 to 1.52 percent per year growth rate for the unincorporated portion of Cochise County. Working with the Cochise County planners it was agreed that to account for the impact from the Federal Government investment in the POE and subsequent growth, a two percent growth rate for water and wastewater system planning will be used with design for 50 years into the future with an average of one person per acre. Full build out at two percent growth rate of Planning Areas 1-8 is estimated to be over 200 years. The timeline to full build out of Planning Areas 1-8 can be extrapolated from the average two percent growth trend shown in Douglas. **Table 2-11** shows expected water and wastewater needs in multiyear to full-build out of the 7,630 aces for planning and funding purposes.

This data will be used to outline possible phasing of the required proposed water distribution, sewage collection, and treatment system infrastructure sizing and installation timing. At the two percent growth rate, the time to full build out is approximately 200 years.

2.6. POTENTIAL UTILITY ROUTES

Utility routes to each of the facilities have been analyzed and constraints such as land ownership, crossing conflicts, grade, etc. that affect cost, schedule, and constructability have been accounted for to serve the new POE, Cochise College, the Border Patrol Facility, and BDIA.

2.7. PORT OF ENTRY ON-SITE UTILITY FACILITIES

2.7.1 POE Onsite Wastewater Collection, Treatment and Disposal Systems

There was no information available on the proposed site for this report. It is understood that the total site area is 80 acres. A preliminary concept approach was developed for an onsite wastewater treatment and disposal system to serve only the 80 acres proposed US Customs and Border Protection (CBP) Douglas

POE complex. The treatment and disposal process approach are based on the design flow, wastewater characteristics, and the site soil absorption rate (SAR). The average wastewater flow from the Douglas POE service area is related to the level of development and type of activities for each development. At the date of this report, the land usage at the proposed Douglas POE has not been defined. In the absence of land use planning information, it is assumed that the wastewater flow contributions will include

Table 2-11: Projected Planning Area Water and Wastewater at Two Percent Growth

		Domestic Water		Wastewater	
Year	Developed Area (acres)	Average (gpd)	Peak (gpd)	Average (gpd)	Peak (gpd)
1	153	213,640	427,280	91,560	217,913
10	183	255,773	511,547	109,617	260,889
20	223	312,402	624,805	133,887	318,650
30	273	381,569	763,138	163,530	389,200
40	333	466,049	932,099	199,735	475,370
50	407	569,234	1,138,468	243,957	580,619
75	670	938,508	1,877,016	402,218	957,278
100	1105	1,547,338	3,094,675	663,145	1,578,284
150	1822	2,551,127	5,102,255	1,093,340	2,602,150
175	3004	4,206,097	8,412,193	1,802,613	4,290,219
200	4953	6,934,679	13,869,358	2,972,005	7,073,372
222	7691	10,767,523	21,535,045	4,614,653	10,982,873
Notes:					
1	Projected developed areas are calculated by projecting growth rate Nt= Pe^r*t) where e=2.71828				
2	Estimated 1,400 gpd/acre per Community Water Company in southern Arizona.				
3	Peak Water Demand is 2 times average demand.				
4	Wastewater peaking factor of 2.388 per current Arizona Administrative Code (AAC) R18-9E301(D)(1)(b)(i)				

Border security, administration offices, emergency personnel offices, public restrooms, and limited CBP accommodations. The average wastewater flow is estimated to be 16,000 gpd. For ADEQ approval, the onsite wastewater treatment facility is required to abide by the Arizona Administrative Code (A.A.C.), Title 18. The applicable guidelines and permitting requirements specified in the A.A.C. include, but are not limited to the following:

1. BOD_5 < 30 mg/l (30-day average) and 45 mg/l (seven-day average)
2. $CBOD_5$ < 25 mg/l (30-day average) 40 mg/l (seven-day average)
3. TSS < 30 mg/l (30-day average) and 45 mg/l (seven-day average)

It is understood that a detailed soil sampling and percolation testing program to determine soil characteristics to accommodate effluent disposal was carried out. Results of the testing were unavailable at the date of this report. In the absence of soil investigation data, the USDA Soil Survey of Cochise County, Douglas, and Tombstone were used. The survey indicated that the soils on the 80-acre CBA Douglas site are a variation of sandy loam soil composition. The SAR for a sandy loam composition falls between 0.4 and 0.8 gallons of effluent per day per square foot of effluent disposal trench (gal/day/ft $^{2)}$ per R18-9-A312(D). According to R18-9-A312(D)(3), since the wastewater treatment facility is described by a

4.23 General Permit, the SAR value is dependent on the treatment facility's ability to reduce the amount of total suspended solids (TSS) and the five-day biochemical oxygen demand (BOD5) in the wastewater flow from the Douglas POE.

For secondary wastewater treatment with levels of BOD_5 less than 30 mg/l (30-day average) and TSS less than 30 mg/l (30-day average), the adjusted SAR values for SAR 0.4 and 0.8 gpd/ft ^{2} are 0.55 and 1.45 gpd/ft^2, respectively.

The secondary treated effluent would be recharged through an onsite soil dispersal system based on a trench network of perforated pipes. Trench design criteria is described in R18-9-E302. Trench design assumptions for the adjusted SAR value of 0.55 gpd/ft^2 and design flow of 16,000 gpd include a trench length of 99 ft, trench width of three ft, and an effective trench depth of four ft. Under these conditions, 27 trenches, a drainage field width of 289 ft, and a drainage field area of 0.66 acres are proposed. Trench design assumptions for the adjusted SAR value of 1.45 gpd/ft^2 and design flow of 16,000 gpd include a trench length of 91.5 ft, trench width of three ft, and an effective trench depth of four ft. Under these conditions, 11 trenches, a drainage field width of 113 ft, and a drainage field area of 0.24 acres are proposed.

Various setback requirements described in R18-9-A312(C) must be met depending on the surrounding features of the wastewater treatment plant and effluent disposal fields. These setbacks for the CBA Douglas POE are not clear at this time. If noise, odor, or aesthetic controls are not in place at the new facility, then a setback of 250 ft shall be established as stated in R18-9-B201. If the controls are in place, then a setback of 25 ft is required unless otherwise specified in R18-9-A312(C). For purposes of this conceptual design, the more restrictive 250 feet has been used. Assuming two drainage fields are to be constructed so that one field may rest while the other operates, the total area needed for the soil drainage field system becomes 12.6 acres and 9.6 acres for an adjusted SAR value of 0.55 gpd/ft 2 and 1.45 gpd/ft 2, respectively.

Components of the wastewater facility centered around the secondary wastewater treatment plant include the following:

1. Assumed gravity collection system piping of 2,000 feet in length connecting the building units on the Douglas POE to the wastewater treatment plant.
2. A pump station to pump the gravity collection sewer system flow into the wastewater treatment plant.
3. Vehicle access and parking for operation and maintenance including servicing the equipment, periodic removal of wastewater treatment solids, and so on.
4. Primary power supply and power distribution to meet site electrical needs.
5. Standby power system
6. Noise, odor, and aesthetic controls.
7. A security fence around the wastewater facility and site lighting.
8. SCADA system.

Components of the effluent disposal system include the following:

1. Two drain fields with one in operation and one resting.

2. Flow diversion between drain fields and flow rate measuring equipment.
3. Monitoring piezometers.
4. Access ports for remote CCTV access to all the drain field pipes.
5. Access road around the perimeter of the drain fields with perimeter fencing. There must never be any vehicle traffic on the drain fields.

The information on the nature of the POE development to estimate the wastewater flow at full build out was not available from GSA to this project team at the time of development of this report. It is recommended that the approach detailed in this section be reviewed and updated when the specific details of the concept development of the GSA proposed Douglas POE site are available and when the specific identification of the soils from onsite testing and capacity to accommodate the treatment effluent is available.

2.7.2 POE Onsite Water System

A preliminary concept approach was developed for an onsite water supply system to serve only the 80 acres proposed US Customs CBP Douglas POE complex. The average and maximum day water demands from the Douglas POE service area is related to the level of development and type of activities for each development. The water system must also provide firefighting capacity. At the date of this report, the land usage at the proposed Douglas POE has not been defined to this project team. At the date of this report, the firefighting rate of flow and duration has not been defined to this project team. In the absence of land use planning information, it is assumed that the water demand will include Border Security point of entry and administration offices, emergency personnel offices, public restrooms, and limited CBP accommodations. The average day water flow is estimated to be 25,000 gpd. The maximum day water demand is assumed to be five times the average day demand or about 125,000 gpd. The firefighting criteria is assumed to be 2,000 gpm for 2.5 hours (150 minutes). It is assumed that the site landscaping will be drought tolerant for the climate in the area. It is assumed that the all indoor plumbing fixtures and equipment will be water saving to the latest applicable Federal Codes.

Components of the onsite water system include the following:

1. One onsite groundwater well capable of sustained operating rate of at least 80 gpm and high as 160 gpm. It is assumed that the groundwater is available with a well on the 80-acre site to a depth of 500 - 750 feet. As discussed in this report, there is a good potential to be able to develop a well on the POE site.
2. The water supply would include chlorine treatment. The City of Douglas well supplies are chlorinated. There are, however, anecdotal information that there are groundwater wells in the general area of Douglas that have nitrate and/or arsenic water quality issues that require further treatment. The water quality issue and treatment needs will have to be determined after the water supply well is developed.
3. The water would be pumped directly to a storage tank on the POE site. The water would be re-pumped from the storage reservoir through a pressure controlling hydropneumatics system into the onsite water distribution system. It is assumed water system piping of 2,000 feet in length connecting the building units on the Douglas POE to the onsite storage reservoir. Fire hydrants at critical location would be included.
4. A fire pump system sized to deliver 2,000 gpm

5. A storage reservoir with volume for the fire flow of 2,000 gpm for 180 minutes, peak hour and emergency storage, emergency storage assumed to be 20 percent of the peak hour plus fire flow volumes. The assumed total storage volume is 500,000 gallons.
6. The well and storage reservoir have vehicle access and parking for operation and maintenance including servicing the equipment.
7. Primary power supply and power distribution to meet site electrical needs.
8. Standby power system.
9. Noise, odor, and aesthetic controls.
10. A security fence around the water facility and site lighting.
11. SCADA system.

Including the area for a storage reservoir volume of 500,000 gallons, disinfection water treatment, hydropneumatics water system, a fire pump system, standby power, site security, a groundwater well, vehicle parking, operation and maintenance, and permitting the estimated required land area for the onsite water supply system is three acres.

The information on the nature of the POE development to estimate the water demand at full build out was not available from GSA to this project team. Also, the information on the nature of the fire pump was not available to this project team. It is recommended that the approach detailed in this section be reviewed and updated when the specific details of the concept development of the GSA proposed Douglas POE site are available including fire suppression system requirements.

2.8. LAND PLANNING – ACQUISITION NEEDS & ZONING OPTIONS

If the City plans to provide utility service to the proposed planning areas, there are several steps that need to occur including coordination with ADEQ through a 208 Consistency Review for expansion of service areas. The City and County should coordinate to expand the existing growth boundary and consider annexation of these areas into the City of Douglas.

The water and wastewater solutions proposed for the POE and Planning Area 1 will require right-of-way acquisition of James Ranch Road from SR-80 to the proposed POE site, as well as, utility encroachment permitting from Arizona Department of Transportation (ADOT) along SR-80. Early conversations with ADOT led to a conceptual 200’ right-of-way section along James Ranch Road to accommodate two lanes in each direction, shoulders, and a median. Additional conversations will be needed prior to right-of-way acquisition to determine if a frontage road may be beneficial or cost effective to account for the long outbound lanes and access to adjacent properties.

Water and service to the US Border Patrol Site and Planning Area 4 will require right-of-way acquisition of Puzzi Road from James Ranch Road to Cattleman or Plantation Road. Wastewater pump stations should be located on the POE site and west of White-Water Draw near the intersection of Copper Avenue and SR-80. See the planning exhibits for approximate locations of lift stations, wells, booster pumps, and utility lines.

Inclusion of the James Ranch Road project in the region's SEAGO TIP or the SVMPO TIP may help with acquisition of federal or state funds. Projects seeking funding should follow required federal, state, and local regulations, as applicable. Cochise County has experience with addressing and complying with federal, state, and local regulations, including those related to the Clean Water Act and Endangered Species Act. The use of state or federal funds for infrastructure projects requires that NEPA requirements are met. This typically includes a biological assessment, cultural resource clearance, preliminary assessment of hazardous materials, water quality and stormwater pollution prevention plans and approvals from a variety of agencies, such as the Army Corps of Engineers, may be required. The James Ranch Road should be evaluated during the design phase for any permits that may be required from outside agencies.

The ability to effectively implement the proposed port of entry infrastructure project is dependent on supportive legislative actions at the federal and state levels. The county works with several lobbying groups; such as, the National Association of County Governments, the Rural Transportation Advocacy Council, and the Arizona Transit Association. These organizations work in the county's behalf with national and state elected officials to represent policy positions and advocate for a strong, effective, and safe transportation system.

3.0 ENGINEERING ANALYSIS

3.1. ASSESS WATER AND SEWER OPTIONS

The following section provides several alternative community approaches to the water and wastewater systems serving the POE and the Planning Areas 1-8.The described approach in this section is of servicing the POE and Planning Areas 1-8 not to rely on the City water system to supply the water, but is based on new groundwater supply wells, new storage tanks, and new water mains and integrating them into the City water system. This approach will strengthen the City water system capacity, reliability, and resiliency.

While the water supply distribution alternatives are for full build out of the POE and Planning Areas 1-8, there is opportunity to phase the infrastructure development to align with the rate of land development. The POE and Planning Areas 1-8 total about 7,630 acres of land that likely will be developed over many decades.

The wastewater systems to accommodate development in the POE and the County Planning Areas 1-8 are based on integration into the City wastewater collection, treatment, and reuse system at least for the anticipated two percent growth out 20 to 50 years.

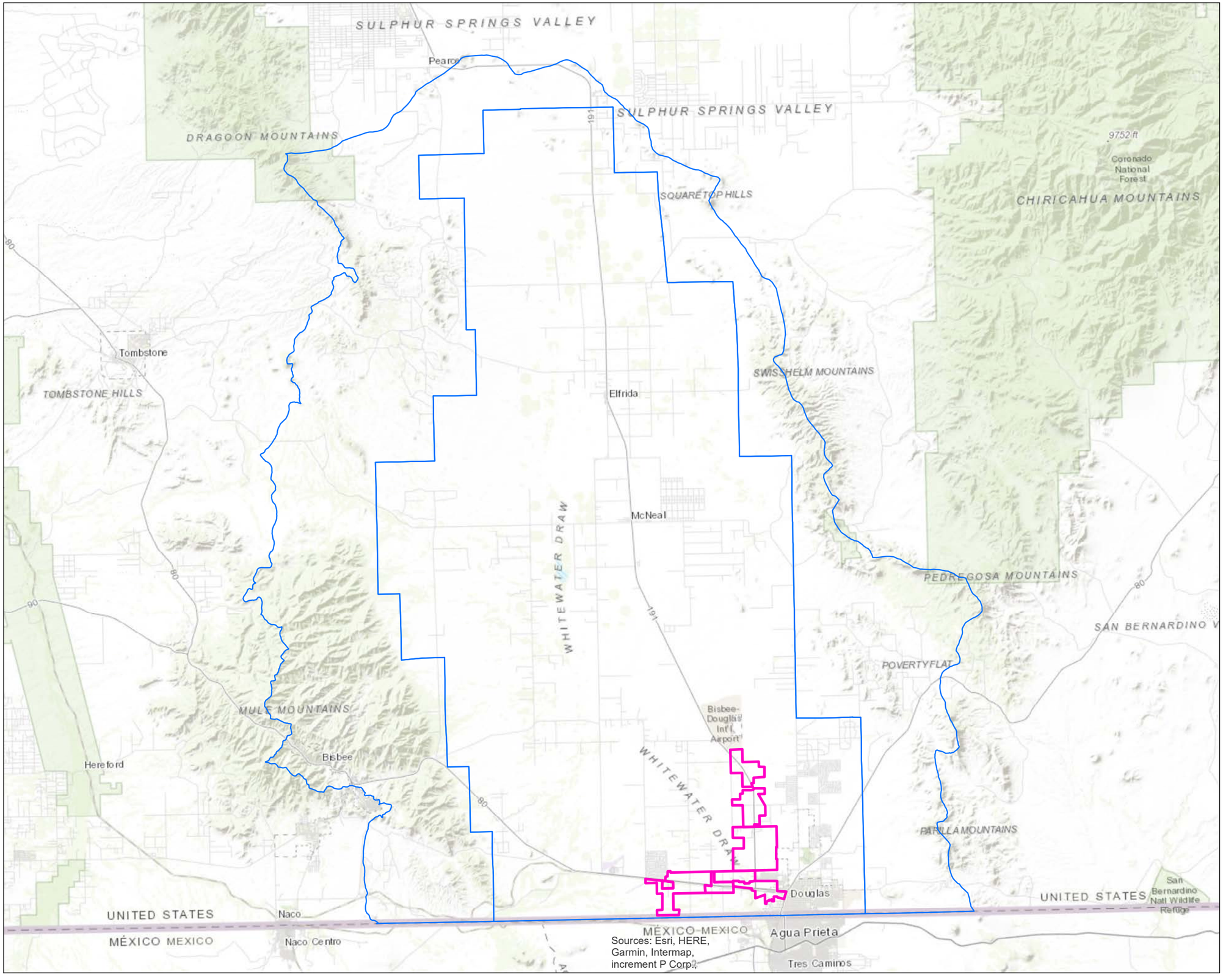
3.1.1 Groundwater Supply to Serve POE and Planning Areas 1-8

The City of Douglas system is supplied by groundwater wells. Three wells are in the High Pressure Zone (HPZ) – well numbers 6, 9 and 15 and three wells in the Lower Pressure Zone (LPZ) – well numbers 11,

16 and 17. There are several inactive City wells made inoperative reportedly because of a long term decreased water table. The City reports that they believe they need two more wells in the production range of greater than 500 gpm to meet their current maximum day demand. It is likely that they will need additional well capacity to meet expected long-term growth within the current City service area boundary.

For purposes of this report, it is assumed that new groundwater sources and wells will be developed as a water source for the POE and the zoned land between the City of Douglas west boundary, generally along SR-80 and the POE (Planning Areas 1-5), and the zoned land between the City of Douglas and the BDIA (Planning Area 6-8), generally along US 191.

The City of Douglas is in the Douglas Groundwater Basin as illustrated on **Figure 3-1**. There are no surface water supplies in the general area of the City of Douglas and the POE. The future water supply to serve the POE and Planning Areas 1-8 will be groundwater.



Stantec

Legend

- Douglas Groundwater Basin
- Subareas

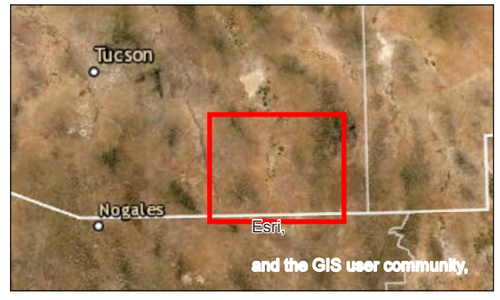
N

0 20,000 40,000 Feet

1:270,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl



Project Location

City of Douglas, AZ

2042584400

Prepared by SW on 2020-06-08

Technical Review by DMG on 2020-06-09

Client/Project

City of Douglas

Figure No.

3-1

Title

Location map

V:\2330\resource\reference_materials\GIS\temp_projects\Fig1_Location.mxd Revised: 2020-06-09 By: siwong

ENGINEERING ANALYSIS

A desktop hydrogeologic investigation has been performed to provide recommended locations and production capacity estimates for new water supply wells. The details and supporting documentation for this hydrogeologic investigation are provided as a Technical Memo in **Appendix A**, which is summarized herein. This investigation included review of available hydrogeologic and water resource data, including well logs, publications from the Arizona Department of Water Resources (ADWR), United States Geological Survey (USGS), ADEQ, and City-provided data for the existing municipal supply wells.

The purpose of this investigation is to estimate production capacity and water quality for various locations within or near the POE and County Planning Areas 1–8 for consideration of future well siting and water supply adequacy.

The principle aquifer of the basin is the alluvial deposits, which are reported to range from approximately 1,200 – 2,000 ft thick within Planning Areas 1-8. The annual recharge to the aquifer is estimated to range from 15,500 – 22,000 acre-feet per year (afy) (approximately 9,600 – 13,630 gpm), with an existing estimated aquifer storage of 26 – 32 million acre-feet (ADWR, 2008). Average water level declines near the City has been approximately 3 ft/yr. due to prolonged pumping of City wells. Previous studies summarized groundwater quality in the Douglas area as good to excellent; however, localized areas of the aquifer may have elevated concentrations of some contaminants. Additional data collection is recommended to further define and quantify water quality conditions within or near the planning area boundaries.

Preliminary estimates of water demand in the expansion areas at full build out may be as much as 20 (mgd), or approximately 14,000 gpm (22,600-afy). Based on local and regional data published by ADWR (2009), well production of 1,000 gpm is common in the area; therefore, this evaluation assumes that future wells will produce 1,000 gpm and a total of 14 wells are assumed to meet the future water demand of the full development of Planning Areas 1-8 and the POE.

However, actual well production will be variable in each location based upon specific hydrogeologic conditions at each location. The total number of wells needed to meet demand could be more, or less, than 14. A full basin water budget would be required to quantify storage depletion rates, including other groundwater extraction (e.g., City and irrigation wells), but preliminary estimates suggest existing saturated thickness, aquifer storage, and natural recharge are likely available to yield the approximately 22,600 afy (14,000 gpm) forecasted demand, at least in the relative near-term. See **Table 3-1** Summary of Projected Water Demand and Number of Wells per County Planning Areas.

Table 3-1: Summary of Projected Water Demand and Number of Wells per County Planning Areas

Table 3-1. Summary of Projected Water Demand and Number of Wells per Subarea

Subarea	Projected Water Demand (Max Day)[a]		Number of Wells
	MGD	GPM	
1	4.70	3,264	3[b]
2	0.31	215	0[c]
3	1.72	1,194	1
4	0.45	312	0[c]
5	1.19	826	1
6	6.80	4,722	5
7	3.00	2,083	2
8	2.54	1,764	2

[a] Approximate values

[b] Includes one well near the port of entry location to potentially be used independently

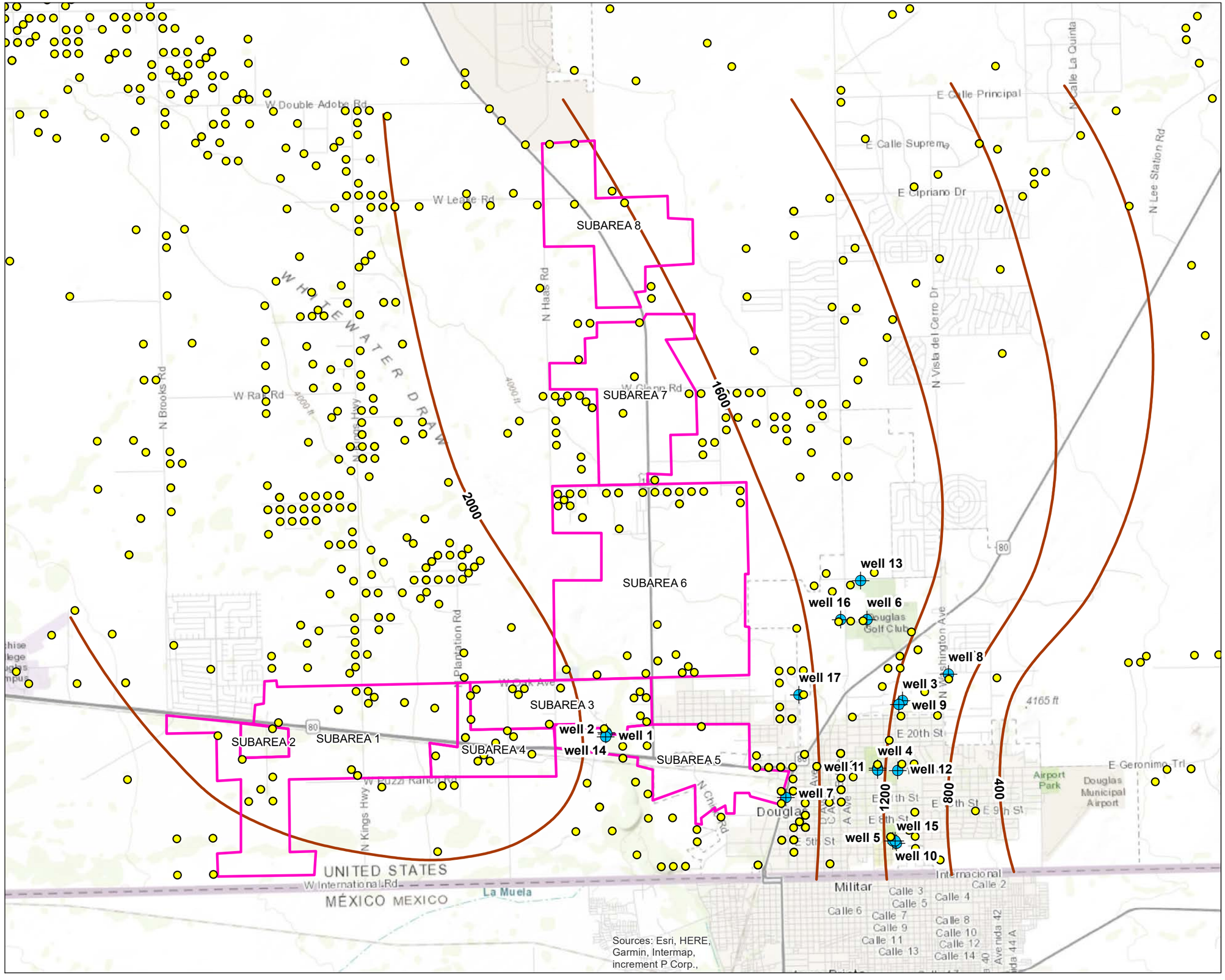
[c] Wells in other Subareas are anticipated to supply these lower-demand locations

The appropriate number of wells were assigned to the respective Planning Areas 1-8 based on forecasted maximum-day water demand (**Table 3-1**). This includes one well located at the POE (southern portion of Planning Area 1 near the international border), which could potentially be a stand-alone service location.

Any future well(s) would require a withdrawal authority issued by ADWR pursuant to a water right (e.g., service area water right), and all new well locations would require an impact analysis to determine effects on nearby wells. An impact on a nearby well is defined by ADWR as 10 ft of drawdown in a five-year period.

Based on estimated aquifer transmissivity, a separation distance of 800 ft from existing wells was calculated to minimize potential impacts, and future (potential) production wells were theoretically placed outside these buffer zones (**Figure 3-2)**. It may not be feasible to locate future wells with such separation from existing wells, and a case-by-case evaluation of potential impacts will be required. This high-level evaluation does not intend to discretely select future well locations, but rather to provide a conceptual layout that could feasibly meet demands with minimal impacts on existing wells.

Additional data collection and investigations are recommended to validate the assumptions provided herein. Such data collection could include test drilling, water quality sample collection, and aquifer performance testing. A regional water budget and numerical groundwater flow model are recommended to corroborate these preliminary findings. Results of additional investigations or modeling will yield more accurate projections of well yields, aquifer capacity, potential well impacts, water quality concerns, and long-term water level declines.



Legend

- Subareas
- ADWR Registered Well
- Existing City Well
- Depth to bedrock contour (400 ft interval)

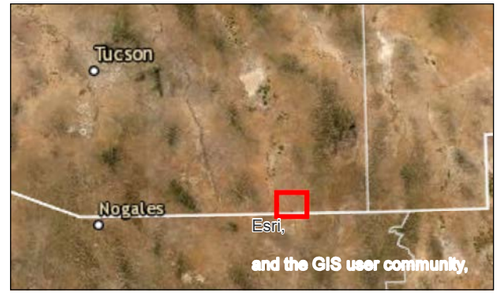
N

0 5,000 10,000 Feet

1:60,989 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 HARN StatePlane Arizona Central FIPS 0202 Feet Intl



Project Location
City of Douglas, AZ

2042584400
Prepared by SW on 2020-06-08
Technical Review by DMG on 2020-06-09

Client/Project
City of Douglas

Figure No.
3-2

Title
Depth to Bedrock Contour Map

V:\2330\resource\reference_materials\GIS\temp_projects\Fig2_DepthtoBedrock.mxd Revised: 2020-06-09 By: siwang

The water source for the City of Douglas is groundwater wells. There are three wells in the Upper Pressure Zone (well numbers 6, 9, and 15) and three wells in the Lower Pressure Zone (well numbers 11, 16, and 17). There are several inactive City wells made inoperative reportedly because of a long term decreased water table.

An assessment of three locations for potential future well sites was evaluated. These locations include the sites of existing wells 11 and 12, and 15th Street and Van Buren Avenue. In general, locations with greater saturated thickness and higher transmissivity values are more productive for water supply wells. Based on the limited available data, forecasted projections of saturated thickness and resulting transmissivity, it appears that the locations at existing wells 11 and 12 could likely yield a long-term production of 500 gpm. Furthermore, well depth extensions at existing wells 11 and 12 could ease permit requirements, as an impact analysis would not be required by ADWR if replacement wells could remain within 160 ft of the existing well. The location at 15th Street and Van Buren Avenue may not have adequate saturated thickness or aquifer transmissivity to achieve a 500 gpm well, especially if water level declines continue at a similar rate into the future. Additionally, this "new" well site would require an impact analysis to determine if any impacts would result to other nearby wells. **Therefore, of the three locations evaluated, replacement of wells 11 and 12 are recommended. For purposes of this report, specifically hydraulic modeling of the City water distribution system, it is assumed that the replacement wells 11 and 12 are developed and in operation.**

For purposes of this report it is assumed that new groundwater sources and wells will be needed as a source for the POE and the zoned land between the City of Douglas west boundary, generally along SR-80 and the POE (Planning Areas 1-5), and the zoned land between the City of Douglas and the BDIA (Planning Area 6-8), generally along US 191.

For purposes of this report it is assumed that based on the development rate of two percent as discussed earlier that two wells of 1000 gpm will be needed in the first 20-50 years to meet the projected maximum day water demand. At full build there could be the need for a total of about 14 wells

3.1.2 Water Supply System to the POE, Planning Areas 1-5.

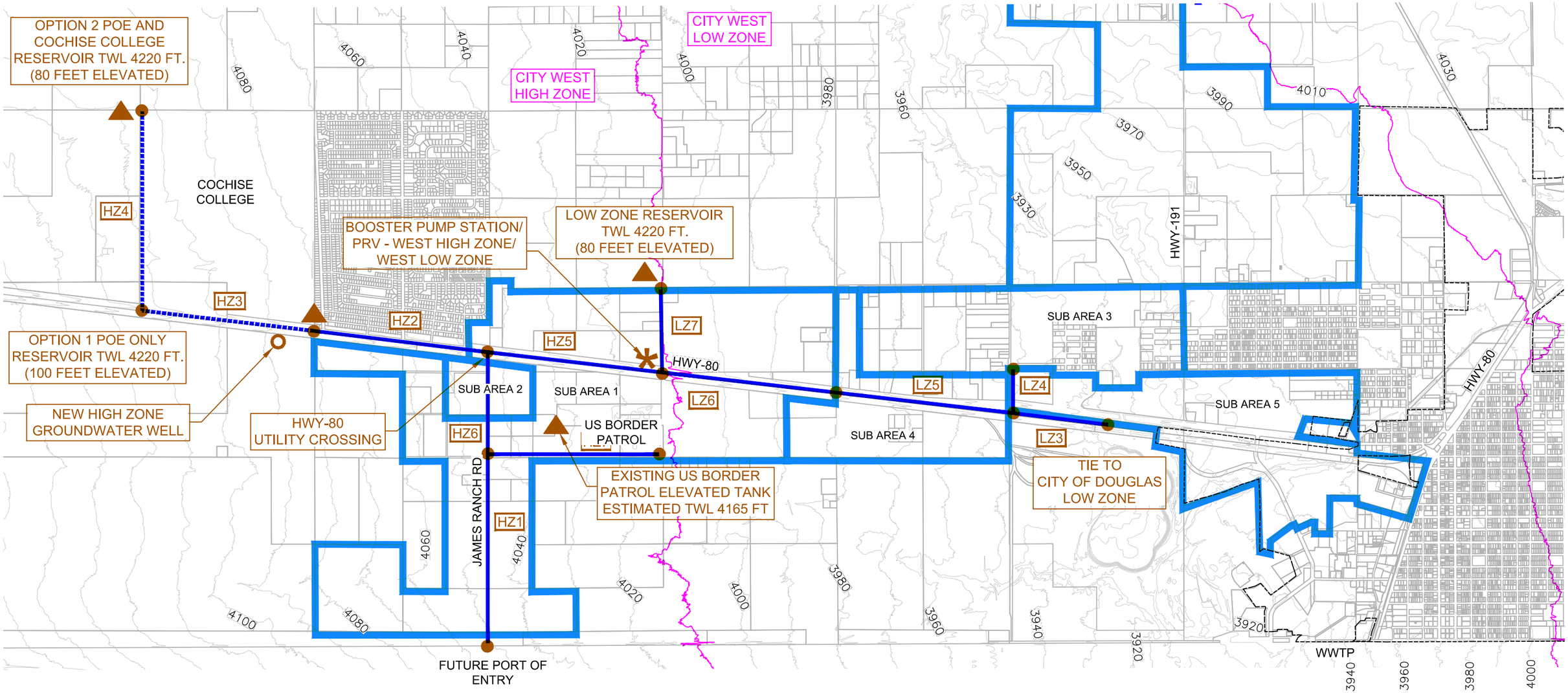
3.1.2.1 Full Development of POE and Planning Area 1-5.

The water supply system for the new Douglas POE and the County identified potential development between the west boundary of the City of Douglas and the general area within the new Douglas POE (Planning Areas 1-5) is illustrated on **Figure 3-3**.

Based on modeling of the City water distribution model:

- A 12 in diameter pipeline would be located along the north side of SR-80 from a point of a connection to a City 10 in. diameter water pipe north and west of the SR-80 and US 191 intersection and close to well number 14 and to the intersection of James Ranch Road and SR-80.

Concept Water Distribution System
Douglas POE, Cochise College, and Sub Planning Areas 1-5



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- PROPOSED UTILITY CORRIDOR
- NODE
- HZ5 – PIPE ID
- RESERVOIR
- BOOSTER PUMP STATION

NUMBER OF GROUNDWATER WELLS AT ULTIMATE BUILDOUT

WEST HIGH ZONE	–	3 WELLS
WEST LOW ZONE	–	2 WELLS

NUMBER OF GROUNDWATER WELLS 2020 TO 2050

WEST HIGH ZONE	–	1 WELLS
WEST LOW ZONE	–	0 WELLS

NORTH

1"=3000'

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
LZ3	2930 LF	12”
LZ4	1300 LF	8”
LZ5	5470 LF	12”
LZ6	5420 LF	12”
LZ7	2560 LF	8”
TOTAL	20390 LF	

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
HZ1	5890 LF	12”
HZ2	5350 LF	16”
HZ3	5300 LF	12”
HZ4	6100 LF	12”
HZ5	5390 LF	12”
HZ6	3165 LF	16”
HZ7	5230 LF	12”
TOTAL	36725 LF	

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Water Distribution System
Douglas POE,
Cochise College, and
Sub Planning Areas 1-5

HORIZONTAL SCALE: AS SHOWN

2042 584400

FIGURE 3-3

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-3 – concept water distribution system – poe and planning sub areas 1-5.dwg PLOTTED: 8/24/2020 10:01 AM

- A 16 in diameter pipe would be located between the intersection of James Ranch Road and SR-80 and the proposed elevated storage tank at SR-80 and west of James Ranch Road (for purposes of this report identified as the West High Zone Tank- WHZT).
- A 16 in diameter pipe would be located between the intersection of James Ranch Road and the US Border Patrol Road and from there to the POE a 12 in diameter pipe.

In addition, a storage tank at SR-80 and east of James Ranch Road (for purpose of this report identified as the West Low Zone Tank -WLZT) would be located in the West Low/City Low Zone.

The proposed TWL for the WHZ Tank 4,220 feet and for the WLZ Tank is 4,115 feet. The WHZ Tank proposed top water elevation is established to provide a minimum static elevation of between 40 and 50 psi and the WLZ tank would be the same as with the top water level in the existing City distribution systems low zone tanks. The estimated required pipe length is about 20,500 ft in the west high zone and 28,000 ft in the west low zone.

It is recommended that the TWL for the WHZ Tank be reviewed to establish whether the service area boundary should be specific to the POE or should be located at a higher elevation to service a larger area. It is recommended that a review of achieving the storage with elevated or ground located tanks be undertaken. The latter would likely require the tank to be location at a higher elevation (equal to the required tank top water level). This will result in additional waterline length.

The area between the City and the WLZT is in the City's Low-pressure Zone. The area west of the James Ranch Road including the new Douglas POE would be in the City's High-pressure Zone. A booster pump station would pump water from the Low-pressure Zone to the High-pressure Zone with a pressure reducing valve (PRV) facility allowing water to move under controlled conditions from the West High Zone to the West Low Zone.

The GSA Fire flow requirements to the POE were not available for this report. For purposes of this report the governing fire flow in the West High Zone is assumed to be 2,000 gpm for three hours to the Douglas POE and 1,500 gpm for 2 hours to the West Low Zone. The latter is based on commercial/industrial development.

Based on modeling of the City water distribution model the 12 in diameter water main along SR-80 can provide a fire flow of 1,500 gpm near the west boundary of Planning Area 4, but with the PRV station, the model shows a fire flow of 1,500 gpm is possible to the West High Zone/West Low Zone boundary.

It is recommended that this methodology be reviewed with the fire suppression permitting entity and ADEQ when the land development plans are better developed.

It is assumed that there is only one fire event and it occurs coincidentally with the maximum day demand. The storage volume is sum of the assumed fire flow requirements plus 1.5 times the average day demand for one day. The estimated storage volume at full buildout for the WHZ Tank is 550,000 gallons and for the WLZ Tank is 350,000 gallons. This is based on the estimated average day water demand in the first

20-50 years. H**igher storage volumes will be required as development occurs. It is recommended that the estimated storage volumes be reviewed periodically and if necessary, the installed volumes are increased as development occurs.**

The US Border Patrol owns and uses a 200,000-gallon elevated storage tank, for suppression on the site, constructed in the early 2000's with an estimated TWL elevation of 4,165 feet. The top water level is not high enough to provide gravity service to the POE. It also does not have the storage volume to accommodate the fire suppression requirements of the POE.

3.1.2.2 Phasing of Water Infrastructure for POE and Planning Areas 1-5

- **Phase 1-** Under this alternative the WHZT could be constructed along with a new groundwater supply well and a water main between the WHZT and the POE that would also serve Planning Areas 1 and 2. This could be constructed and put into operation to serve the POE and the Planning Areas 1-2 separate from other water system developments. This would be complete and operation before construction of the POE would begin.

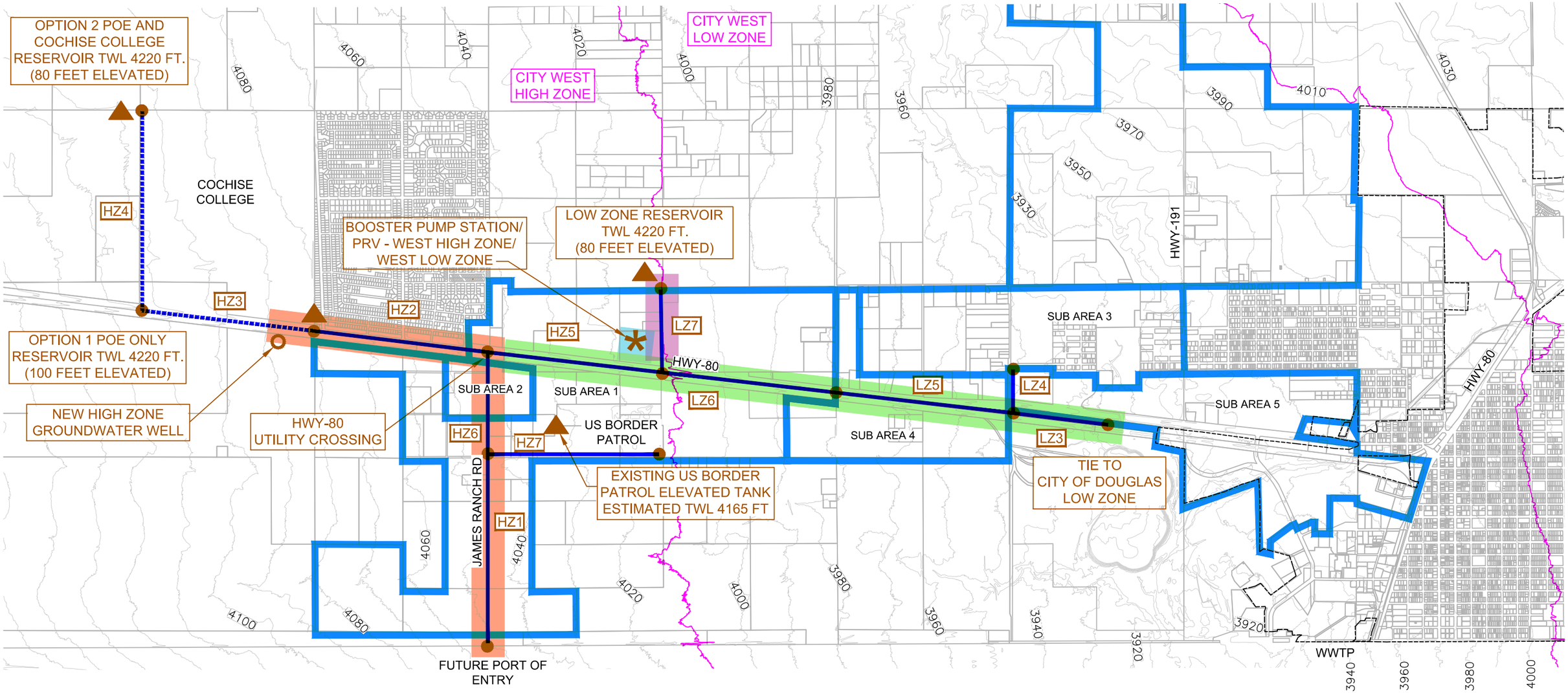
- **Phase 2** - Under this phase the water line between James Ranch Road and connection to the City system could be constructed to match land development in the County Planning Areas 3 and 4 along the route. If it began from the James Ranch Road, a PRV should be installed along with the connecting pipe along SR-80 in stages to eventually connect to the existing system. Alternatively, the pipe along SR-80 could be started at the point of connection to the City system and constructed in stages going east to James Ranch Road. This would be done as development in Planning Areas 1-5 begins.

- **Phase 3** – The booster pump station can be constructed once the connection from the City water system to James Ranch Road has been constructed. It would boost water from the City/WLZT low-pressure zone to the WHZ pressure zone. It would be needed if there are potential operational concerns with reliability and maintenance of the new ground water supply well to the WHZT. In the absence of the booster pump station, any operating or maintenance issues with the groundwater supply well will be an issue as it will not be possible to move water from the low zone to the high zone. Eventually with development and an increase in water system demand, the plan would be to add three more wells feeding the WLZT, but this could take many decades. This phase should be completed at the same time as Phase 2's completion.

- **Phase 4** - In this phase the WLZT and connection to the pipeline along SR-80 would be constructed to provide more operating fire suppression water storage. This phase would be completed as operating the fire and demand storage increases in WLZT Planning Area 3-5.

- **Phase 5** - In this phase up to three more wells would be installed pumping directly into the WLZT. The need for this phase will coincide with the development in Planning Areas 1-5 and is likely not needed for several decades based on the two percent growth rate discussed earlier.

Concept Water Distribution System
Douglas POE, Sub Areas 1-5 - Potential Phasing Strategy



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- PROPOSED UTILITY CORRIDOR
- NODE
- HZ5 – PIPE ID
- RESERVOIR
- BOOSTER PUMP STATION

LEGEND

- Phase 1 – WHZ reservoir and well with pipeline joining the WHZ reservoir to the POE
- Phase 2 – water main from the James Ranch Road to the point of connection to the City system
- Phase 3 – Booster pump Station
- Phase 4 – WLZ reservoir and connecting pipeline
- Phase 5 – three future groundwater wells

NORTH

1"=3000'

NUMBER OF GROUNDWATER WELLS AT ULTIMATE BUILDOUT

WEST HIGH ZONE	–	3 WELLS
WEST LOW ZONE	–	2 WELLS

NUMBER OF GROUNDWATER WELLS 2020 TO 2050

WEST HIGH ZONE	–	1 WELLS
WEST LOW ZONE	–	0 WELLS

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Water Distribution System
Douglas POE,
Sub Areas 1-5
Potential Phasing Strategy

HORIZONTAL SCALE: AS SHOWN

2042 584400

FIGURE 3-4

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-4 – potential phasing strategy area 1-5.dwg PLOTTED: 8/24/2020 10:00 AM

3.1.3 Water Routes to Port of Entry, Planning Areas 1-5 and Cochise College

An available option is to include the Cochise College site in the water distribution system. This infrastructure would include re-locating the WLZT at SR-80 west of James Ranch Road to the north west corner of the Cochise College property with a pipeline connecting the storage tank to the illustrated piping at SR-80 and James Ranch Road. This is illustrated on **Figure 3-5**.

3.1.4 Dedicated Water Utility Route to Serve Port of Entry Only

Another available option is to provide a single waterline directly from the Douglas water system to the HZWT tank to and convey water to the POE from the City system. A pipe line would be located along the north side of SR-80 from a point of a connection to a City 10 inch diameter water pipe north and west of the SR-80 and US 191 intersection and close to well number 14 and to a proposed elevated WHZ storage tank at SR-80 and west of James Ranch Road A booster pump station would be required at the Low/High Pressure zone boundary.

The connection would not be sized for future growth and would not provide services lines for future growth or include additional wells and storage. This would be in lieu of providing a new groundwater supply to the WHZT tank. While this may be a more affordable short-term solution than full build out, in the long term, it will limit the growth potential of the City of Douglas. **Figure 3-6** illustrates this approach.

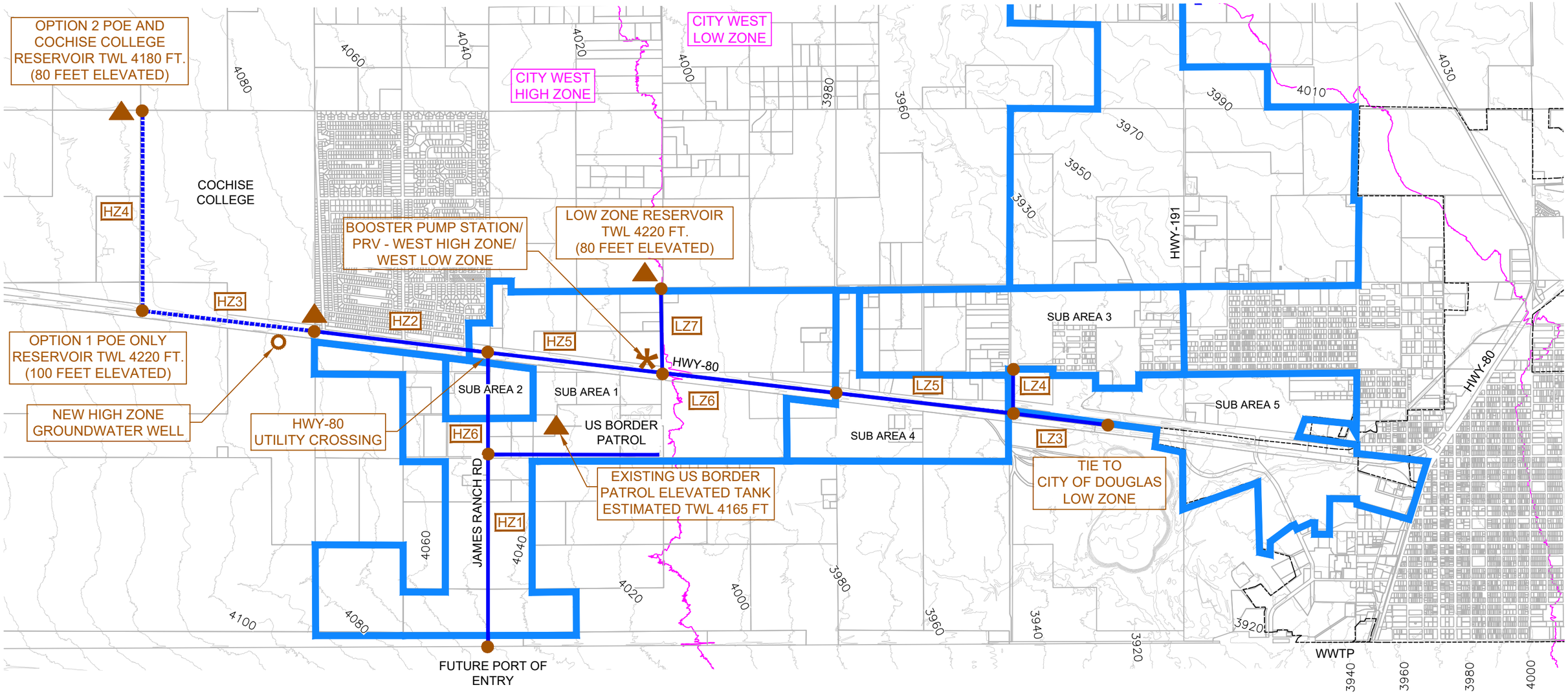
3.1.5 Water Supply System to BDIA and Planning Areas 6-8

The water supply system to serve the County identified potential development between the north boundary of the City of Douglas and the general area in the vicinity of the BDIA, is illustrated on **Figure 3-7**. The boundary between the City low and high zone and the high zone boundary are illustrated on the **Figure 3-7.** The Planning Area 6 is generally in the City's low-pressure zone and the Planning Area 7 and 8 are in the City's high-pressure zone.

3.1.5.1 Planning Area 6

Based on modeling of the City water distribution model, a 16-inch diameter pipeline would be located along the US 191 with a connection to the City water distribution system at SR-80 at the boundary of the East High Zone/ East Low Zone. This would provide service to the Planning Area 6 including 1500 gpm fire flow for two hours. In the long term there would be an elevated storage tank at (for purposes of this report identified as the East Low Zone Tank- ELZT). It is likely the need for this tank is beyond 50 years and so it is not costed in this report.

Concept Water Distribution System
Douglas POE, Cochise College, and Sub Planning Areas 1-5



LEGEND

- – UTILITY PLANNING AREA
- – CITY OF DOUGLAS LIMITS
- – PROPOSED UTILITY CORRIDOR
- – NODE
- HZ5 – PIPE ID
- – RESERVOIR
- – BOOSTER PUMP STATION

NUMBER OF GROUNDWATER WELLS AT ULTIMATE BUILDOUT

WEST HIGH ZONE	–	3 WELLS
WEST LOW ZONE	–	2 WELLS

NUMBER OF GROUNDWATER WELLS 2020 TO 2050

WEST HIGH ZONE	–	1 WELLS
WEST LOW ZONE	–	0 WELLS

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
LZ3	2930 LF	12”
LZ4	1300 LF	8”
LZ5	5470 LF	12”
LZ6	5420 LF	12”
LZ7	2560 LF	8”
TOTAL	20390 LF	

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
HZ1	5890 LF	16”
HZ2	5350 LF	12”
HZ3	5300 LF	12”
HZ4	6100 LF	12”
HZ5	5390 LF	12”
HZ6	3165 LF	12”
TOTAL	28130 LF	

NORTH

1"=3000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-3 – concept water distribution system – poe and planning sub areas 1-5.dwg PLOTTED: 8/20/2020 11:30 PM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

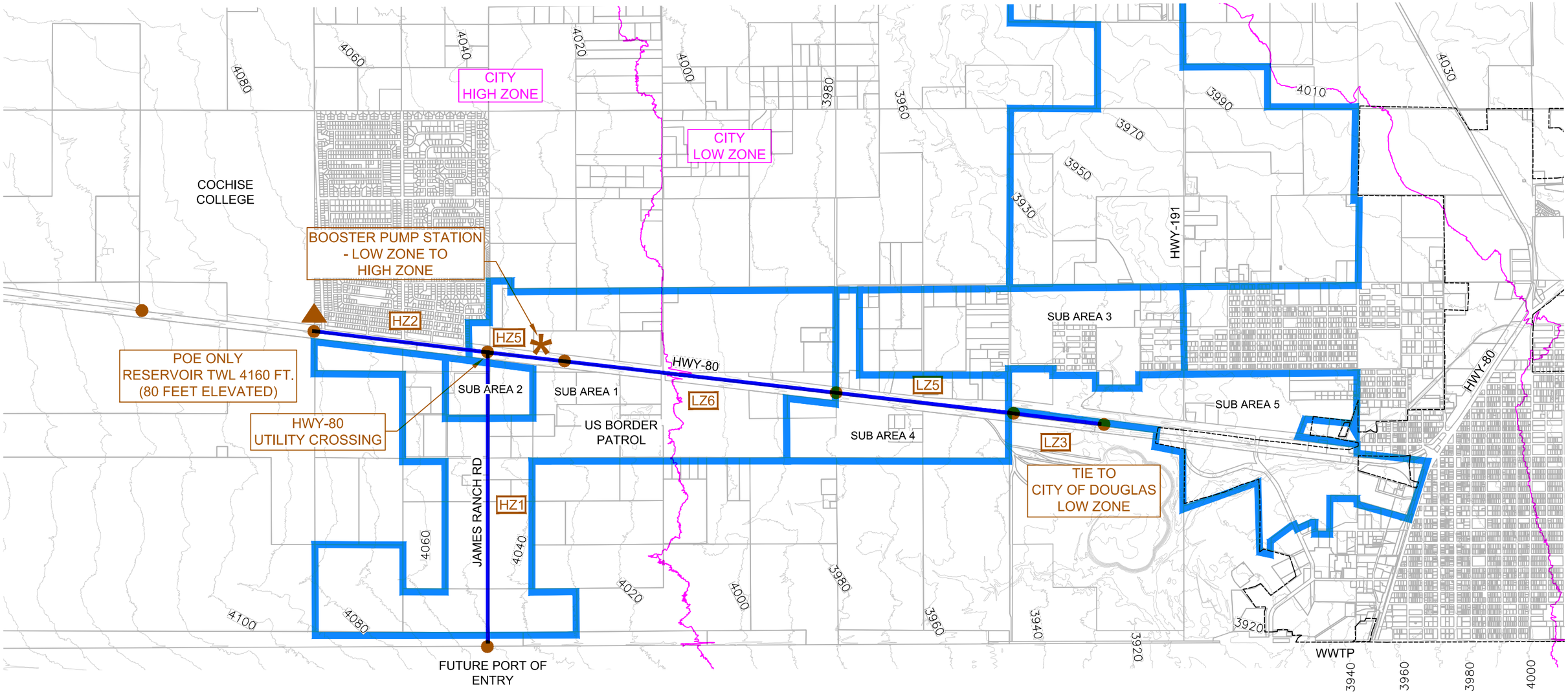
Concept Water Distribution System
Douglas POE,
Cochise College, and
Sub Planning Areas 1-5

HORIZONTAL SCALE: AS SHOWN

2042 584400

FIGURE 3-5

Concept Water Distribution System
Dedicated Water Service Connection from the City of Douglas Water System to the POE



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- PROPOSED UTILITY CORRIDOR
- NODE
- HZ5 – PIPE ID
- RESERVOIR
- BOOSTER PUMP STATION

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
LZ3	2930 LF	8”
LZ5	5470 LF	8”
LZ6	8360 LF	8”
TOTAL	16760 LF	

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
HZ1	9000 LF	12”
HZ2	5350 LF	12”
HZ5	2380 LF	10”
TOTAL	16730 LF	

NORTH

1"=3000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-5 – serve only douglas poe from city water system.dwg PLOTTED: 8/21/2020 1:46 PM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

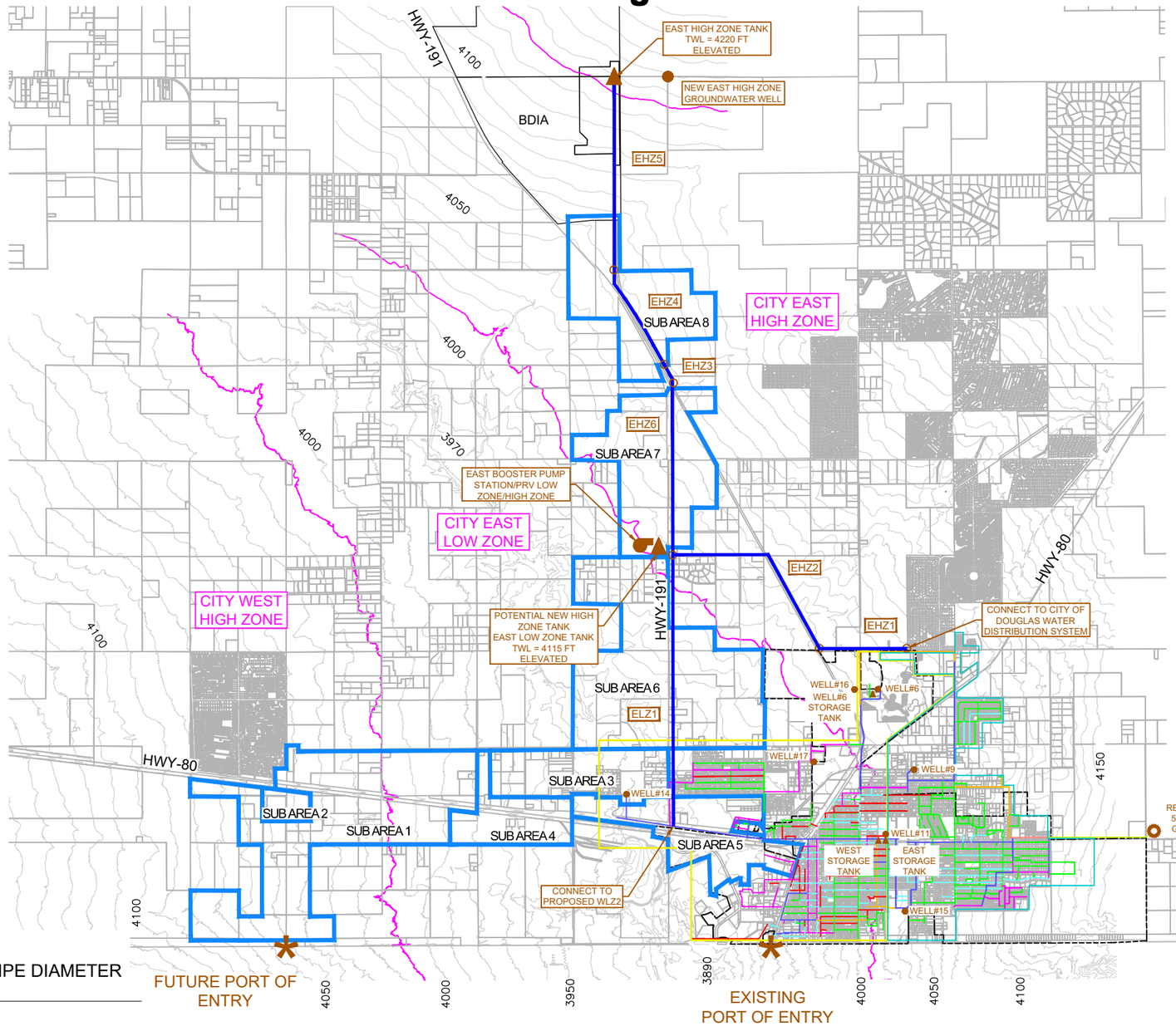
Concept Water Distribution System
Dedicated Water Service Connection from the City of Douglas Water System to the POE

HORIZONTAL SCALE: AS SHOWN

2042 584400

FIGURE 3-6

Concept Water System
Vicinity of Bisbee Douglas International Airport, and Sub Planning Areas 6-8



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- LOW ZONE
- HIGH ZONE
- 3" WATER LINES
- 4" WATER LINES
- 6" WATER LINES
- 8" WATER LINES
- 10" WATER LINES
- 12" WATER LINES
- 16" WATER LINES
- 18" WATER LINES
- PROPOSED UTILITY CORRIDOR
- STORAGE TANK
- WELL
- WATER ZONE BOUNDARY

NUMBER OF GROUNDWATER WELLS AT ULTIMATE BUILDOUT

WEST HIGH ZONE	–	4 WELLS
WEST LOW ZONE	–	5 WELLS

NUMBER OF GROUNDWATER WELLS 2020 TO 2050

WEST HIGH ZONE	–	1 WELLS
WEST LOW ZONE	–	0 WELLS

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIAMETER (INCHES)
EHZ1	5000 LF	12"
EHZ2	11230 LF	12"
EHZ3	1260 LF	16"
EHZ4	6100 LF	16"
EHZ5	10850 LF	16"
EHZ6	9600 LF	16"
ELZ1	15100 LF	16"
TOTAL	65230 LF	

NORTH

1"=7000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-7 – concept water distribution system – planning sub areas 6-8.dwg PLOTTED: 8/20/2020 11:34 PM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Water System
Vicinity of
Bisbee Douglas International Airport, and Sub Planning Areas 6-8

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-7

3.1.5.2 Planning Area 7 and 8

Based on modeling of the City's water distribution it is not possible to provide 1500 gpm fire flow to Planning Areas 7 and 8 from a connection point to the existing City system in the vicinity of the Golf Course. The issue is with undersized pipes for this magnitude of fire flow in the City high zone system as well as low pressure outcomes within the five mgd City high zone reservoir. The latter is a service area around the City's five MG reservoir at an elevation close to the elevation of the reservoir resulting in normally inadequate operating low water pressure and even lower unacceptable water pressures at any fire flow in the City's high-pressure zone.

Based on modeling of the City's water hydraulic model, 12 inch diameter waterline between the point of connection to the City system by the golf course and the US 191 is required and 16 inch waterline between the East Low Zone/ East High Zone boundary and the area BDIA/ADCF serving Planning Areas 7 and 8 are required. This outcome depends on a new high zone storage tank.

Two alternative storage tank locations were identified and modeled using the City water distribution system model. With the noted pipe diameters and either tank locations, the system was able to provide a fire flow of 1500 gpm for two hours to Planning Areas 6 and 8.

- An elevated storage tank at the East Low Zone/East High Zone boundary on US 191 (for purpose of this report identified as East High Zone Tank 1)
- An elevated storage tank within BDIA/ADCF area (for purpose of this report identified as the East High Zone Tank 2.

It may be possible to integrate the BDIA/ADCF 200,000-gallon storage tank into the proposed system. It however is too high to fit into the City pressure system. The City estimated the TWL as 4,330 ft. which compares to the City high zone TWL of 4,220 ft. It is recommended that a review of the possible use of the BDIA/ADCF tank be made.

In addition, a booster pump station would pump water from the Low-Pressure Zone to the High-Pressure Zone with a pressure reducing valve (PRV) facility allowing water to move under controlled conditions from the East High Zone to the East Low Zone including the existing City service area. The governing fire is assumed to be 1500 gpm for two hours in both pressure zones. It is assumed that there is only one fire and it occurs on the maximum day demand. The storage volume is sum of the assumed fire flow requirements plus 1.5 times the average day demand for one day. The estimated storage volume for the EHZ Tank is 350, 000 gallons and for the ELZ Tank is 350,000 gallons. This is based on the estimated average day water demand in the first 20-50 years. It is recommended that the estimated storage volume be reviewed periodically as development occurs.

It is recommended that phasing of the booster pump stations, and storage be considered to match the rate of development in Planning Areas 6-8. For purposes of this report, it is recommended that new groundwater sources and wells will be needed as a water source for zoned land between the City of Douglas and the BDIA (County Planning Areas 6-8), generally along US 191. As identified in Table 3-1, it

is proposed that at full build out of Planning Area 6-8 there will be need for nine new wells likely pumping into the EHZT and ELZT storage tanks. Within 20-50 years one well should be constructed near the pump into the EHZ storage tank.

3.1.5.3 Phasing of Water Infrastructure Servicing BDIA Area and Planning Areas 6-8

The phasing of the water system development will depend on the rate and location of the development in Planning Area 6-8. The planning area is generally in the City's Low-Pressure Zone and the Planning Areas 7 and 8 are generally in the City's High-Pressure zone. The initial development could be supplied with water from the City's existing system, but with growth in development in the Planning Areas 6-8 the new wells, storage tanks, the booster pump station, and PRV would have to be constructed.

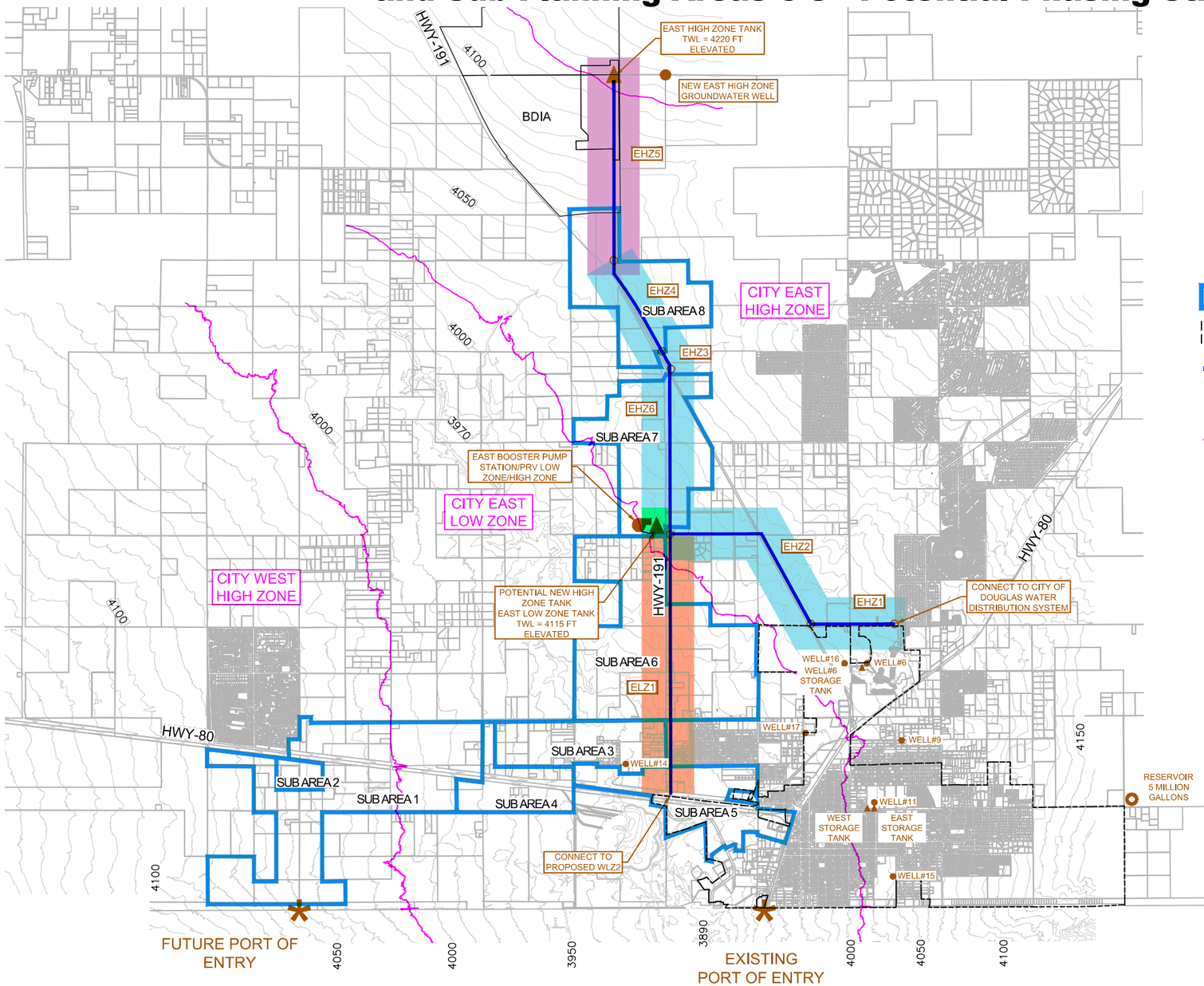
- **Phase 1a -** Under this alternative a connection to the existing City High Zone could initially supply water to Planning Areas 7 and 8. The timing between 1a and 1b is tied to the timing of any development in the planning areas. To provide a fire flow of 1,500 gpm, this phase may need to be developed with Phase 3.
- **Phase 1b** - Under this alternative a connection to the existing City Low Zone could initially supply water to Planning Area 6. The timing between 1a and 1b is tied to the timing of any development in the planning areas.
- **Phase 3** - In this phase a new groundwater well connected to the ELZT with a connecting pipeline to the Phase 1a. Over the years, an additional three wells would be needed. The need for this phase will coincide with the development in Planning Areas 6 and 7 and is likely not needed for several decades based on the two percent growth rate discussed earlier.
- **Phase 4** - In this phase the booster pump station/PRV between the ELZ and the EHZ would be constructed in addition to the storage reservoir. The need for this phase will coincide with the development in Planning Areas 6 and is likely not needed for several decades based on the two percent growth rate discussed earlier.
- **Phase 5**- In this phase up to five wells would be installed, pumping directly into the WLZT and three groundwater wells connected to the EHZT. The need for this phase will coincide with the development in Planning Areas 1-5 and is likely not needed for several decades based on the two percent growth rate discussed earlier.

The **Figure 3-8** illustrates the approach to phasing the water system development serving the BDIA area and Planning Areas 6-8.

3.1.6 Wastewater Collection System City of Douglas and POE

There are two likely alignments for the wastewater collection system in collaboration with the City to serve the new Douglas POE and the County identified potential development Planning Areas 1-5 between the west boundary of the City of Douglas and the general area in the vicinity of the new Douglas POE are illustrated on **Figure 3-9 and Figure 3-10**. The wastewater collection system is oriented to convey wastewater to the City of Douglas WWTP.

Concept Water System
Vicinity of Bisbee Douglas International Airport, and Sub Planning Areas 6-8 - Potential Phasing Strategy



LEGEND

- – UTILITY PLANNING AREA
- – CITY OF DOUGLAS LIMITS
- – PROPOSED UTILITY CORRIDOR
- – STORAGE TANK
- – WELL
- – WATER ZONE BOUNDARY

- Phase 1A – If development occurs first in sub planning area 6 Connect to existing City Low Zone
- Phase 1B – If development occurs first in sub planning areas 7 and 8. Connect to existing City High Zone
- Phase 3 – EHZ Tank and Well with connecting pipeline
- Phase 4 – Booster pump Station and PRV with connecting pipeline

NORTH

1"=7000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-8 – potential phasing strategy area 6-8.dwg PLOTTED: 8/24/2020 10:54 AM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

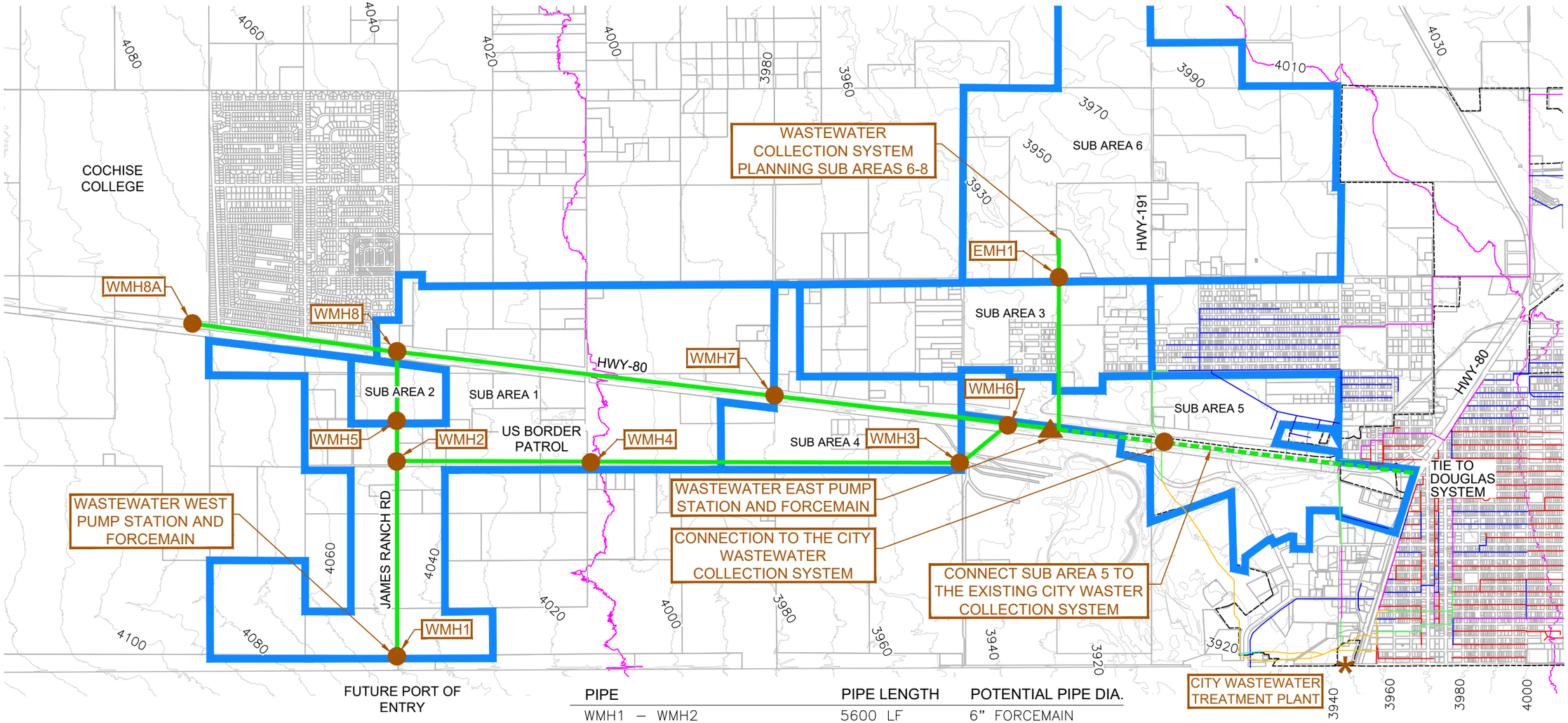
Concept Water System
Vicinity of
Bisbee Douglas International Airport,
and Sub Planning Areas 6-8
- Potential Phasing Strategy

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-8

HWY 80 Alignment
Trunk Wastewater Collection System - Planning Sub Area 1-5, Douglas POE



PIPE	PIPE LENGTH	POTENTIAL PIPE DIA.
WMH1 – WMH2	5600 LF	6" FORCEMAIN
WMH2 – WMH4	5480 LF	8"
WMH4 – WMH3	10520 LF	10"
WMH3 – WMH6	1870 LF	12"
WMH2 – WMH5	1220 LF	8"
WMH5 – WMH8	1990 LF	10"
WMH8 – WMH7	10800 LF	8"
WMH7 – WMH6	6680 LF	12"
WMH8 – WMH8A	5860 LF	8"
WMH6 – PUMP STATION	1230 LF	15"
PUMP STATION – CONNECTION	3100 LF	24"
TOTAL	54350 LF	

LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- 6" SANITARY SEWER LINES
- 8" SANITARY SEWER LINES
- 10" SANITARY SEWER LINES
- 12" SANITARY SEWER LINES
- 15" SANITARY SEWER LINES
- 16" SANITARY SEWER LINES
- 18" SANITARY SEWER LINES
- 21" SANITARY SEWER LINES
- CONCEPT WASTEWATER ALIGNMENT
- FORCEMAIN

NORTH

1"=3000'

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

HWY 80 Alignment
Trunk Wastewater Collection System - Planning Sub Area 1-5, Douglas POE

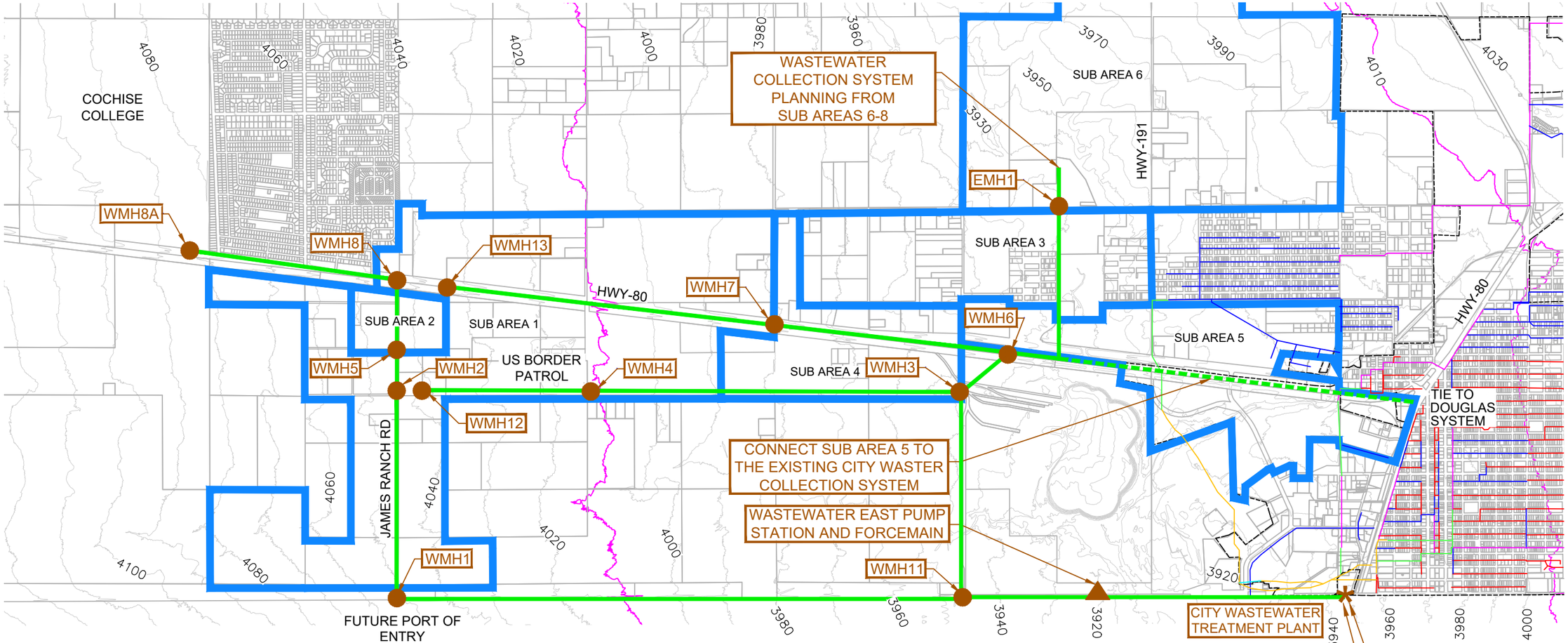
HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-9

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-9.dwg PLOTTED: 8/20/2020 11:11 PM

Southern Alignment
Trunk Wastewater Collection System - Planning Sub Area 1-5, Douglas POE



PIPE	PIPE LENGTH	POTENTIAL PIPE DIA.
WMH1 – WMH11	16000 LF	12”
WMH12 – WMH4	4800 LF	8”
WMH4 – WMH3	10520 LF	8”
WMH3 – WMH6	1870 LF	15”
WMH2 – WMH5	1220 LF	8”
WMH5 – WMH8	1990 LF	8”
WMH7 – WMH6	6680 LF	12”
WMH11 – EAST PUMP STATION	3820 LF	24”
EAST PUMP STATION – WWTF	6980 LF	24”
WMH3 – WMH11	5500 LF	18”
WMH1 – WMH2	5850 LF	8”
WMH13 – WMH7	9350 LF	10”
WMH8 – WMH8A	5860 LF	8”
TOTAL	80440 LF	

LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- 6” SANITARY SEWER LINES
- 8” SANITARY SEWER LINES
- 10” SANITARY SEWER LINES
- 12” SANITARY SEWER LINES
- 15” SANITARY SEWER LINES
- 16” SANITARY SEWER LINES
- 18” SANITARY SEWER LINES
- 21” SANITARY SEWER LINES
- CONCEPT WASTEWATER ALIGNMENT
- FORCEMAIN

NORTH

1"=3000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-10.dwg PLOTTED: 8/20/2020 11:13 PM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Southern Alignment
Trunk Wastewater Collection System - Planning Sub Area 1-5, Douglas POE

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-10

The illustrated approach in **Figure 3-9** centers around the POE and a trunk main along the SR-80 corridor between Cochise College and the connection to the City wastewater collection system. It serves the POE, Cochise College, and Planning Areas 1-5. The illustrated approach in **Figure 3-10** centers around the POE and trunk main along the Mexico/USA border and a connection to the wastewater treatment plant. It serves the POE, Cochise College, and the Planning Areas 1-5. In both approaches the collection from Planning Areas 6-8 also joins with the collection systems illustrated in **Figures 3-9 and 3-10**.

In the approach illustrated in **Figure 3-9,** the Wastewater West Pump Station would convey wastewater from the POE to a gravity collection pipe from an east west direction (WMH2 to WMH6). At this point it would combine with an east west collection line along the north side of SR-80 (WMH8 to WMH6). The wastewater would be conveyed by gravity to a wastewater pump station (Wastewater East Pump Station) to be pumped into the City of Douglas Collection 15 in diameter pipe conveying wastewater to the City WWTF. The pump station would also accept wastewater from the collection system from Planning Areas 6-8 between the City and BIDA.

The information on the hydraulic capacity of the City 15 in diameter pipe conveying wastewater to the system to the City WWTP was not available. In discussion with the City and for the purposes of this report it is assumed that the 15 In diameter pipe has capacity to convey the wastewater from the Planning Area 1-8 in the initial 50-year planning horizon. This will need to be confirmed at a later stage of future project work.

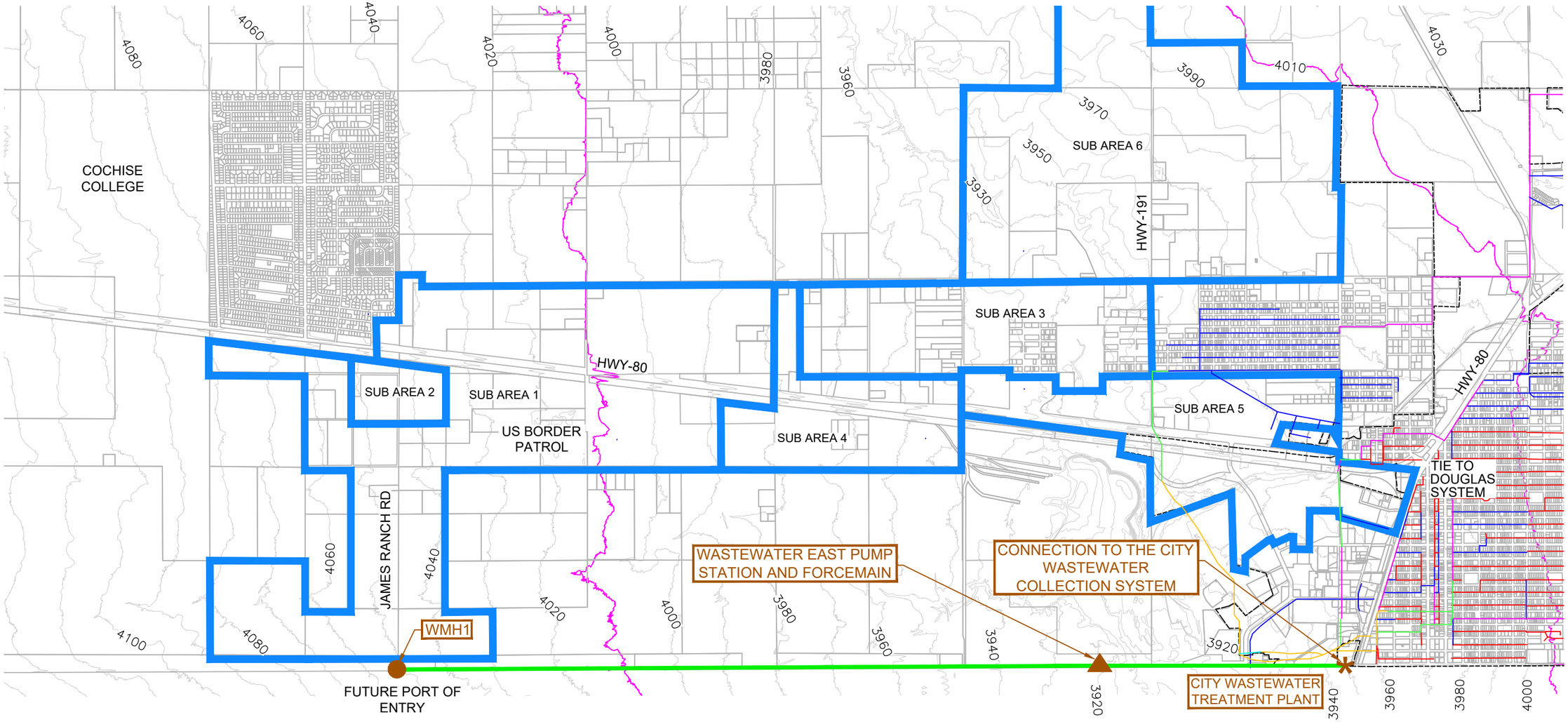
An alternative wastewater collection system to serve the new Douglas POE, Cochise College, and the County identified potential development Planning Areas 1-5 between the west boundary of the City of Douglas and the general area in the vicinity of the new Douglas POE is illustrated on **Figure 3-10**.

A trunk sewer would be located parallel the Mexico/USA border between the POE and the City WWTF. It would combine with an east west collection line along the north side of SR-80 and a north south collection system from Planning Areas 6-8. The wastewater would be conveyed to a wastewater pump station (Wastewater East Pump Station) to be pumped into the City of Douglas WWTF. The issue is that it is not centered on the serving the SR-80 corridor made up of Planning Areas 2-5.

3.1.7 Wastewater Collection System to the City Wastewater System – Serving Only the Douglas POE

The wastewater collection system, in collaboration with the City, to serve only the new Douglas POE is illustrated on **Figure 3-11**. There would be no connections on this line other than the POE. The sewer collection pipe would be located in an east west alignment along the Mexico/USA border between the POE and the City's WWTF. The wastewater would be conveyed by gravity to the Wastewater East Pump Station to be pumped into the City of Douglas Collection WWTF. There would be about 19,900 ft (3.8 mi) of gravity pipe from the POE to the pump station and 6,880 ft. (1.3 mi.) of force main between the pump station and the City WWTF.

Concept Wastewater Collection
Trunk System – Serve the Douglas POE Only



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- 6" SANITARY SEWER LINES
- 8" SANITARY SEWER LINES
- 10" SANITARY SEWER LINES
- 12" SANITARY SEWER LINES
- 15" SANITARY SEWER LINES
- 16" SANITARY SEWER LINES
- 18" SANITARY SEWER LINES
- 21" SANITARY SEWER LINES
- CONCEPT WASTEWATER ALIGNMENT

PIPE	PIPE LENGTH (FEET)	POTENTIAL PIPE DIA. (INCHES)
WMH1 – PUMP STATION	19900 LF	6"
PUMP STATION – CWTP	6880 LF	6" FORCEMAIN
TOTAL	26780 LF	

NORTH

1"=3000'

PREPARED BY:

Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:

COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Wastewater Collection
Trunk System – Serve The Douglas POE Only

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-11

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-11.dwg PLOTTED: 8/20/2020 11:22 PM

This is a very unusual approach given the estimated low sewage flow from the POE, the length of gravity sewer pipe, issues of solids settling and wastewater age, the length of the force main, and the location of the pump station. The pump station location will have challenges with regards to the provision of primary power and vehicle access that would be required for operation and maintenance. The right-of-way would have to be secured from the landowner to locate infrastructure and the location may have to be approved by the Federal Government. The route could also face issues with crossing the area where the 'slag heap' is located. It would not be able to provide wastewater collection to the Planning Areas 1-8 without the addition of north south connector pipe(s).

The information on the approach to the connection at the WWTF was not hydraulic capacity of the City collection system to the City WWTP was not available. The wastewater west pump station, would convey wastewater from the POE to a gravity collection pipe from an east west direction (WMH2 to WMH6). The wastewater would be conveyed by gravity to a wastewater pump station (Wastewater East Pump Station) to be pumped into the City of Douglas Collection system.

The information on the hydraulic capacity of the City collection system to the City WWTP was not available.

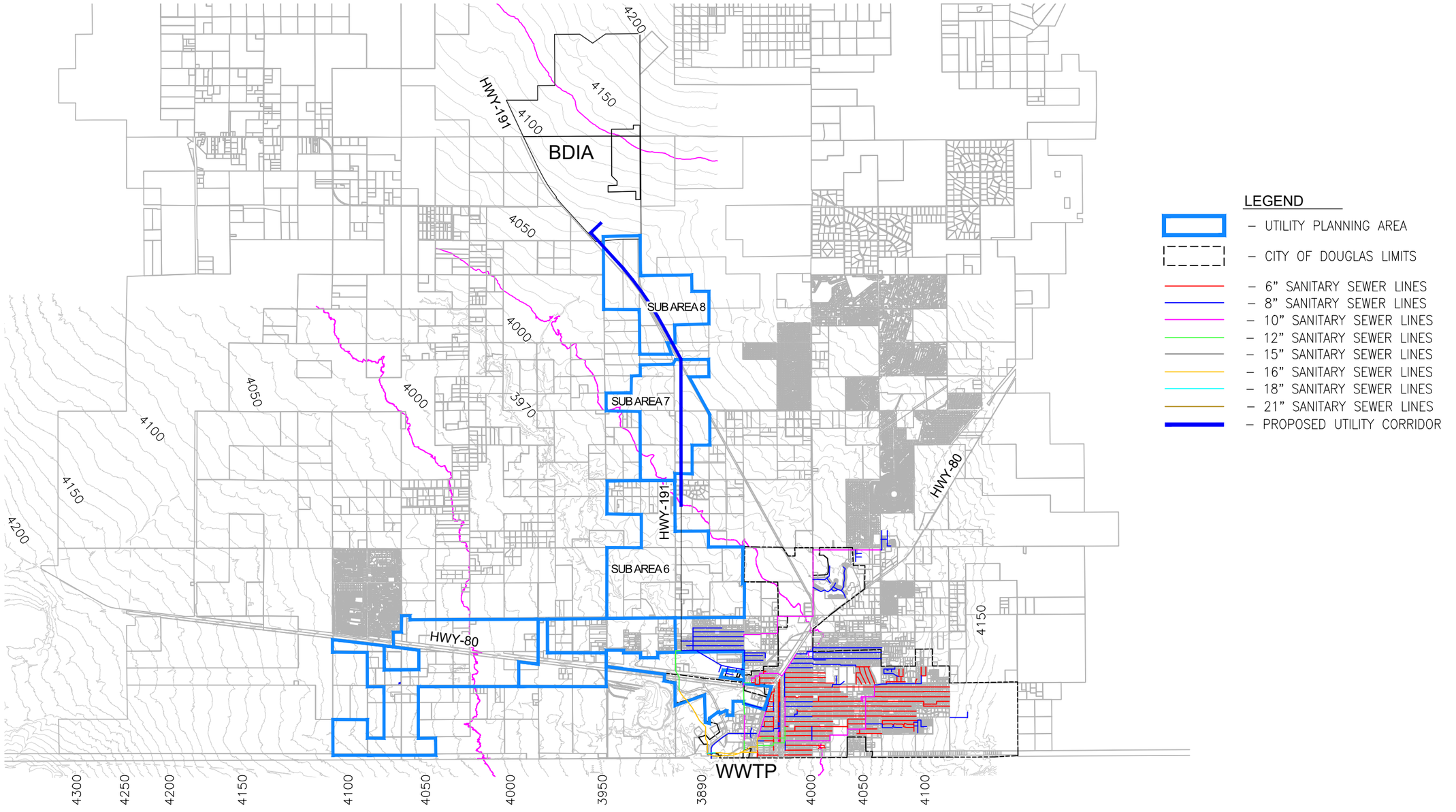
3.1.8 Wastewater Collection System Serving Planning Areas 6-8 and Area in Vicinity of BDIA

The wastewater collection system, in collaboration with the City, to serve the County identified potential development Planning Areas 6-8 between the west boundary of the City of Douglas and the general area in the vicinity of BDIA is illustrated on **Figure 3-12**. The BDIA/ADCF have a connection to the City of Douglas wastewater system. It is anticipated that this system does not have the capacity to accommodate the potential wastewater flows from Planning Areas 6-8. The information was not available to make this determination.

The wastewater would be conveyed by gravity from EMH4 to EMH1 and then to the Wastewater East Pump Station, to be pumped into the City of Douglas Collection system. The pump station would also accept wastewater from the collection system between the City and the POE/ Planning Areas 1-5.

The information on the hydraulic capacity of the City collection system to the City WWTP was not available.

SEWER ROUTE TO
BISBEE - DOUGLAS INTERNATIONAL AIRPORT



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- 6" SANITARY SEWER LINES
- 8" SANITARY SEWER LINES
- 10" SANITARY SEWER LINES
- 12" SANITARY SEWER LINES
- 15" SANITARY SEWER LINES
- 16" SANITARY SEWER LINES
- 18" SANITARY SEWER LINES
- 21" SANITARY SEWER LINES
- PROPOSED UTILITY CORRIDOR

NORTH

1"=8000'

PREPARED BY:

Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:

COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

SEWER ROUTE
TO
BISBEE - DOUGLAS
INTERNATIONAL AIRPORT

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 3-12

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 3-12.dwg PLOTTED: 8/20/2020 11:24 PM

4.0 DETERMINE CAPACITY/CONSTRAINTS OF UTILITY SYSTEMS

The City was unable to share any asset analysis and limitations and capital planning details on budgeted upgrades to the City water supply system (groundwater wells, water treatment, and distribution infrastructure) and the City wastewater system (collection, treatment, and reuse).

Accordingly, we could not provide high-level analysis of the existing water and sewer infrastructure within the City of Douglas to determine to capacity and constraints of the existing utility system based on data provided by the City.

4.1. DETERMINE REQUIRED UPGRADES TO DOUGLAS POE UTILITY SYSTEMS

The existing Douglas POE is adequately served by water and sewer and should see a decrease in use as the commercial POE, therefore no utility upgrades are required to the current POE.

The proposed POE location is located on undeveloped land currently without any infrastructure in place to support the intended purpose. There is no water supply, wastewater treatment or reuse, road right-of-way or road connecting to SR-80, power supply, internet/communication service, or connection to natural gas supply. The land and utility/roadway routes are located within Cochise County jurisdiction and are privately owned.

4.2. DETERMINE LAND NEEDS AT PORT OF ENTRY FOR ON-SITE COMPONENTS OF UTILITIES

As noted earlier, there was no information available on the proposed site for this report. It is understood that the total site area is 80 acres. A preliminary concept approach was developed for an onsite wastewater treatment and disposal system to serve only the 80 acres proposed US Customs and Border Protection (CBP) Douglas POE complex. The treatment and disposal process approach are based on the design flow, wastewater characteristics, and the site soil absorption rate (SAR). Assuming two drainage fields are to be constructed so that one field may rest while the other operates, the total area needed for the soil drainage field system becomes 12.6 acre and 9.6 acre for an adjusted SAR value of 0.55 gpd/ft 2 and 1.45 gpd/ft 2, respectively.

A preliminary concept was developed for an onsite water supply system. Based on the area for a storage reservoir volume of 360,000 gallons, disinfection water treatment , hydropneumatics water system, a fire pump system, standby power, site security, a groundwater well, vehicle parking, operation and maintenance, and permitting need such as storm water control, the estimated land area is three acres.

4.3. PRELIMINARY HYDRAULIC ANALYSIS TO SIZE PIPE, PUMP STATIONS, AND STORAGE

4.1.1 Fire and Operation Storage Tanks

It is assumed that there is only one fire event and it occurs coincident with the maximum day demand. The storage volume is sum of the assumed fire flow requirements plus 1.5 times the average day demand for one day.

The City is not aware of any direction from the Insurance Advisory on the recommended flow flows and duration that the City should meet. In the absence of this, the following fire flow rates and durations are used in this analysis.

The storage volumes in the existing City storage tanks and proposed storage tanks for the initial phase of development of the POE and Planning Areas 1-8 are summarized in Table 4-1. **The required storage volume will increase with the development in Planning Areas 1-8. It is recommended the storage volume requirements be periodically reviewed and increased to match the rate of planning area development.**

Table 4-1: City of Douglas Water Storage Tank Elevations

Water Storage Tank Name	Pressure Zone	Storage Volume (gallons)	City Estimated Top Water Level Elevation (feet)	Comments
Regular Reservoir	City High Zone	5,000,000	4,220.0	Existing concrete reservoir
15th Street Park East Tank	City Low Zone	300,000	4,110.1	Existing elevated steel tank
15th Street Park West Tank	City Low Zone	300,000	4,110.1	Existing elevated steel tank
Well Number 6 Tank	City Low Zone	300,000	4,116.1	Existing elevated steel tank
Existing Total Distribution Water Volume (gallons)		**5,900,000**		
WHZT	West High Zone	550,000	4,220.0	Proposed elevated/on grade steel tank. Will need additional volume with long term development in Planning Areas 1-8
WLZT	West Low Zone		4,110.0	Proposed elevated/on grade steel tank. Will need additional volume with long term development in Planning Areas 1-8
EHZT	East High Zone		4,200.0	Proposed elevated/on grade steel tank. Will need additional volume with long term development in Planning Areas 1-8
ELZT	East Low Zone		4,110.0	Proposed elevated/on grade steel tank. Will need additional volume with long term development in Planning Areas 1-8

Note: Contours are on the NAVD 88 Benchmark System.

5.0 PRELIMINARY COST ESTIMATES

This section provides a high-level order of magnitude cost estimates of the proposed works to service the Douglas POE and the planning lands identified by Cochise County that could be impacted by the Douglas POE. The costing is at a Class 5 of the Association for the Advancement of Cost Estimating (AACE) recommended practice. Class 5 estimates are generally prepared based on limited information and subsequently have wide accuracy ranges, typically -35 percent to + 65 percent. They are typically used for concept development project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, the level of project definition is zero percent to two percent of full project definition.

There are two wastewater pump stations in the proposed wastewater collection systems. The wastewater pump stations costs include: wet-well (including screen or grinding), pumps, motors and on-site piping, valves (isolation, check, ARV's), odor control / ventilation system, on-site electrical from transformer, MCC, VFD, site grading and earthwork, service building/ housing, telemetry / SCADA, startup, and commissioning. The costing does not include the land purchase, primary power connection, or access road connection

There are two water booster pump stations in the proposed water distribution system pumping from the West Low-Pressure Zone to the West High-Pressure zone and the East Low-Pressure Zone to the East High-Pressure Zone. Each pump station will include a PRV to allow water to be conveyed from the high-pressure zone to the low-pressure zone. The water pump stations costs include pumps, motors and on-site piping, valves (isolation, check, ARV's), surge protection, on-site electrical from transformer, MCC, VFD, site grading and earthwork, service building/ housing, telemetry / SCADA, startup, and commissioning. The costing does not include the land purchase, right of way costs, primary power connection, or access road connection.

The estimated June 2020 Order of Magnitude Cost Estimates for the various options including the POE onsite wastewater, the POE on site Water, the community water system between the City and the POE, the community water system between the City and BDIA, the groundwater wells and connection systems and the community wastewater collection system tied to the City wastewater treatment plant are identified in the following sections and summarized in **Appendix B Probable Cost Estimates at AAEE Class 5**.

All of the analysis is based on the two new City wells in place as discussed earlier.

5.1 POE ONSITE WASTEWATER SYSTEM

This POE wastewater servicing option assumes that within the 80 acre POE site, there is land available for a wastewater collection system, an onsite advanced wastewater treatment system and an onsite treated effluent to ground disposal system all as outlined in Section 2.7.1. Costing elements that make up the probable WWTF including the effluent reuse are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training.

Costing elements not costed include are infrastructure outside the perimeter of the onsite wastewater systems such as primary power supply, communication system and vehicle access. The estimated most probable capital cost at an AACE Level 5 is $3.4 M with a range of $ 2.2 M to $5.6 M.

The information on the nature of the POE development to estimate the wastewater demand and soil characteristics for reuse at full build out was not available to this project team. It is recommended that this be reviewed when the information is made available.

5.2 POE ON SITE WATER SYSTEM INCLUDING FIRE PROTECTION AT 2000 GPM FOR THREE HOURS

This POE water servicing option assumes that within the 80-acre POE site that there is an available land for an onsite system including a groundwater well and storage reservoir. The system includes one groundwater well, chlorine treatment, a 360,000-gallon storage tanks, a hydropneumatics booster pump station, a fire suppression system, and a water distribution system as outlined in Section 2.7.2. Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. Costing elements not costed include infrastructure outside the perimeter of the onsite water systems such as primary power supply, communication system and vehicle access or water treatment beyond chlorine disinfection. The estimated most probable capital cost at an AACE Level 5 is $ $5.7 M with a range of $3.7 M to $9.4 M.

The information on the nature of the POE development to estimate the water demand and fire flow at full build out was not available to this project team. It is recommended that this be reviewed when the information is made available.

5.3 CITY WATER SYSTEM TO THE PLANNING AREAS 1-5/POE

This POE servicing option is development of water distribution system connected to the City of Douglas system to serve the new Douglas POE and the county identified potential development between the west boundary of the City of Douglas and the general area in the vicinity of the new Douglas POE. As described in Section 2.6.1. The distribution system includes water distribution piping, connection to the City water distribution system, and one groundwater supply well. The West Low Zone elevated storage tank, the West High Zone elevated storage tank, a booster pump station to pump water from the City Low Pressure Zone to the City High Pressure Zone and a Pressure Reducing Valve (PRV) facility allowing water to move under controlled conditions from the West High Zone to the West Low Zone.

The water booster pump station to pump water from the City low pressure zone to the high pressure zone would include service building, pumps/motors, valves, surge control, standby generator, MCC, VFD, on-site electrical (from transformer), site grading and earthwork, and startup and commissioning. It also includes access road to the site off SR-80 and primary power from the power grid. The facility also includes a pressure reducing station for controlled movement of water from the high to the low City pressure zones. This booster pump station may not be needed in the first 50-year planning horizon of

PRELIMINARY COST ESTIMATES

Planning Areas 1-5 if the water from the groundwater supply wells are conveyed directly to the West High Zone tank.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $18.7 M with a range of $12.2 M to $ 30.9 M. The information on the nature of the POE development to estimate the water demand and fire flow at full build out was not available to this project team.

The master plan development of the water supply system to serve the Douglas POE and Planning Areas 1-5 was discussed in earlier sections. The water demand associated with the full build out of the POE and Planning Areas 1-5 is estimated to be decades. It is recommended that the water distribution system to serve the POE and Planning Areas 1-5 be done in phases to match the development rate and capital cost expenditures within the planning areas.

The priority is the water supply to the Douglas POE. The Douglas POE water system needs at this time has not been identified by the GSA. Based on assumed Douglas POE water system design criteria the first phase of the community water system could be the West High Zone Tank that is sized for the fire flow and peak hours conditions and at elevation and location to fit into the City High Pressure Zone. The initial phase would include a new groundwater well located near the storage tank and pipeline between the storage tank and the POE.

In the next phase of development of the water system between James Ranch Road and the connection to the City system would occur when development occurred in the Planning Areas 1-5. This could involve a connection to the City system and development of the water pipeline to the west along SR-80 to match the location of the development. This phase should include a PRV station to allow water to move from the WHZT to the West/City Low Zone. The water main should eventually be constructed to the east boundary of the City Low Pressure Zone West and include the West Low Zone tank and booster pump/PRV station.

Alternatively, it could start with a PRV at the boundary of the West Low Pressure Zone and the West High Pressure Zone to allow water from the high zone to flow to the low zone but must eventually include the pipeline along SR-80 to connect to the City water distribution system. The water distribution network can be expanded to match the rate of development in Planning Areas 1-5.

The estimated most probable capital cost at an AACE Level 5 is as follows for the development Phases 1- 5:

- **Phase 1** - Construct the WHZT along with one new groundwater supply well, a 550K gal storage tank and 19,600 feet of water main between the WHZT and the POE. The estimated most probable capital cost at an AACE Level 5 is $8.4 M with a range of $5.4 M to $13.8 M.
- **Phase 2** - Construct the 20,510 ft water line between James Ranch Road and connection to the City system through a PRV at James Ranch Road. The estimated most probable capital cost at an AACE Level 5 is $4.5 M with a range of $2.9 M to $ 7.4 M.

- **Phase 3** - Construct the booster pump station. The estimated most probable capital cost at an AACE Level 5 is $ 4.2 M with a range of $ 2.7 M to $ 7.0 M.
- **Phase 4** - Construct the WLZT and connection to the pipeline along I 80. The estimated most probable capital cost at an AACE Level 5 is $1.6 M with a range of $1.1 M to $ 2.7 M.

5.4 CITY WATER SYSTEM TO THE PLANNING AREAS 1-5/POE + COCHISE COLLEGE

This POE servicing option is identical to that costed in Section 3.6.3 except the West High Zone Tank would be located on Cochise College site to provide service to the college. Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $19.9 M with a range of $12.9 M to $32.8 M. The information on the nature of the POE development to estimate the water demand and fire flow at full build out was not available to this project team.

5.5 CITY WATER SYSTEM WITH DEDICATED CONNECTION TO THE POE

This POE servicing option is to provide a single dedicated waterline directly from the Douglas water system to the POE. It would not serve the Planning Areas 1-5. It is not sized for future growth and does not provide services lines for future growth or include additional wells and storage. While this may be a more affordable short-term solution than the full build out approach, in the long term, it will limit the growth potential of the City of Douglas.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $12.4 M with a range of $8.0 M to $ 20.4 M. The information on the nature of the POE development to estimate the water demand and fire flow at full build out was not available to this project team.

5.6 CITY WATER SYSTEM TO THE BDIA/ADCF & PLANNING AREAS 6-8

This water supply option is development of water distribution system connected to the City of Douglas system to serve the County identified potential development between the north boundary of the City of Douglas and the general area in the vicinity of the BDIA/ADCF as described in Section 2.6.2.

The distribution system includes water distribution piping, connection to the City High Zone Water distribution system, the City Low Zone Water distribution system, the East Low Zone elevated storage tank, the East High Zone Tank, a booster pump station to pump water from the Low Pressure Zone to the High Pressure Zone with PRV facility allowing water to move under controlled conditions from the East High Zone to the East Low Zone.

PRELIMINARY COST ESTIMATES

The water booster pump station to pump water from the City low pressure zone to the high pressure zone would include service building, pumps/motors, valves, surge control, standby generator, MCC, VFD, on-site electrical (from transformer), site grading and earthwork, and startup and commissioning. It also includes access road to the site off US 191 and primary power from the power grid. The facility also includes a pressure reducing station for controlled movement of water from the high to the low City pressure zones. This pump station may not be needed in the first 50-year planning horizon of Planning Areas 6-8 if the water from the groundwater supply wells are conveyed directly to the East High Zone tank.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $24.5 M with a range of $15.9 M to $40.4 M.

The master plan development of the water supply system to serve the BDIA/ADCF and the Planning Areas 6-8 was discussed in earlier sections. The water demand associated with the full build out of the POE and Planning Areas 6-8 is estimated to be decades. It is recommended that the water distribution system to serve the area of the BDIA/ADCF and Planning Areas 6-8 be done in phases to match the development rate and capital cost expenditures within the planning areas.

The initial development could be supplied with water from the City's existing system but with growth in development in the Planning Areas 6-8 the new wells, storage tanks and the booster pump station and PRV would have to be constructed.

- **Phase 1a** - Construct 15,100 ft of water main within the City Low Zone connecting the City system to the boundary of the East Low Zone and the East High Zone to supply water to Planning Area 6. The timing between 1a and 1b is tied to the timing of any development in the planning areas. The estimated most probable capital cost at an AACE Level 5 is $3.8 M with a range of $2.4 M to $6.2 M.
- **Phase 1b** - Construct 33,190 ft of water main within the City High Zone connecting the City system to an area within Planning Area 8 at US 191. The timing between 1a and 1b is tied to the timing of any development in the planning areas. The estimated most probable capital cost at an AACE Level 5 is $7.9 M with a range of $5.1 M to $13.1 M.
- **Phase 3** - Construct the East High Zone Tank (350,000 gallons), a new groundwater well, and 10,850 ft connecting the water main in the East High Zone. The need for this phase may coincide with Phase 1b. The estimated most probable capital cost at an AACE Level 5 is $4.6 M with a range of $3.0 M to $7.5 M. It may be possible to include the existing BDIA/ACFD 200,000-gallon tank, but it will require evaluation.
- **Phase 4** - Construct ELZT (350,000 gallons), a booster pump station, and PRV. The phase is likely not needed for several decades based on the two percent growth rate discussed earlier. The estimated most probable capital cost at an AACE Level 5 is $6.9 M with a range of $4.5 M to $11.4 M.

5.7 NEW WELLS TO CONNECT TO THE EXPANDED WATER DISTRIBUTION SYSTEM EXTENSION

For purposes of costing the new wells to serve the Douglas POE and Planning Areas 1-8 at full build out are as follows:

- WHZ - 3 wells
- WLZ - 2 wells
- ELZ - 5 wells
- EHZ - 4 wells

The costing includes drilling and equipping each groundwater well 1,000 feet deep, pumping capacity of 1,500 gpm each pumping directly to a storage tank and including chlorine treatment, SCADA and power connection. It is assumed there is no storage at any well site and the connection between each well and a storage tank of 2,000 ft. It is assumed that the existing City wells would not be used to provide water to the Planning Areas 1-8 over any extended period.

It is recommended that the development of the groundwater supply wells be scheduled to align with the rate of development in Planning Areas 1-8. Based on the rate of development of Planning Areas 1-8 it is estimated that one to two new wells would be needed in the first 50-year period with new wells added as growth occurs in the subsequent period of time to full build out.

The costing for the two wells is included in the water system detailed costing. This report does not include any costing for the groundwater wells 3 to 14.

5.8 SANITARY WASTEWATER FROM WWTP TO THE POE/PLANNING AREAS ALONG SR-80

The wastewater collection system, in collaboration with the City, to serve the new Douglas POE and the County identified potential development Planning Areas 1-5 between the west boundary of the City of Douglas and the general area in the vicinity of the new Douglas POE. The main trunk sewer alignment is along SR-80.

The wastewater would be conveyed by pumping from the POE to gravity line and from Planning Areas 2-5 by gravity to the Wastewater East Pump Station to be pumped into the City of Douglas Collection system. The information on the hydraulic capacity of the City collection system to the City WWTP was not available.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $12.7 M with a range of $8.2 M to $20.9 M. The information on the nature of the POE development to estimate the wastewater flow at full build out was not available to this project team.

5.9 SANITARY WASTEWATER SYSTEM FROM WWTP TO THE POE/ PLANNING AREAS ALONG USA/MEXICO BORDER ALIGNMENT

The wastewater collection system, in collaboration with the City, to serve the new Douglas POE and the County identified potential development Planning Areas 1-5 between the west boundary of the City of Douglas and the general area in the vicinity of the new Douglas POE.

The wastewater would be conveyed by pumping from the POE to gravity line and from Planning Areas 2-5 by gravity to the Wastewater East Pump Station to be pumped into the City of Douglas Collection system. The information on the hydraulic capacity of the City collection system to the City WWTP was not available.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The estimated most probable capital cost at an AACE Level 5 is $18.7 M with a range of $12.2 to $ 30.9 M. The information on the nature of the POE development to estimate the wastewater flow at full build out was not available to this project team.

5.10 SANITARY WASTEWATER FROM WWTP TO ONLY THE POE

The wastewater collection system, in collaboration with the City, to serve only the new Douglas POE. There would be no connections on this line other than the POE. The sewer collection pipe would be located along an east-west alignment along the Mexico/USA border between the POE and the City's WWTF. The wastewater would be conveyed by gravity to the Wastewater East Pump Station to be pumped into the City of Douglas WWTF. Information on the approach to the connection at the WWTF was not available.

Costing elements that make up the probable of the costs are: ADEQ permitting, pre-design (including detailed soil investigation), detailed design, construction, start-up, commissioning, operating plan, and training. The cost does not include efforts to secure the land for the pipeline and pump station, permits and permission to be located along the International Border, right-of-way and access road construction for vehicle access between SR-80 and the pipeline/pump station infrastructure and right-of-way and power supply construction from the nearest primary power connection to the pump station.

The estimated gravity and force main pipe length is 26,800 feet. Included in the cost estimate are 54 manholes at 500 foot spacing and a wastewater pump station. The estimated most probable capital cost at an AACE Level 5 is $5.9 M with a range of $3.8 M to $ 9.7 M. The information on the nature of the POE development to estimate the wastewater fire flow at full POE build out was not available to this project team. There was no information available on the soil geotechnical conditions and topography along the alignment.

5.11 SANITARY WASTEWATER SYSTEM FROM WWTP TO PLANNING AREAS 6-8

This wastewater option is development of wastewater collection system connected to the City of Douglas system to serve the County identified potential development between the north boundary of the City of Douglas and the general area in the vicinity of the BDIA/ADCF as described in Section 3.1.8.

The wastewater would be conveyed by gravity to the Wastewater East Pump Station to be pumped into the City of Douglas Collection system. The pump station would also accept wastewater from the collection system between the City and the POE/ Planning Areas 1-5. The estimated total pipe length is 35,000 ft.

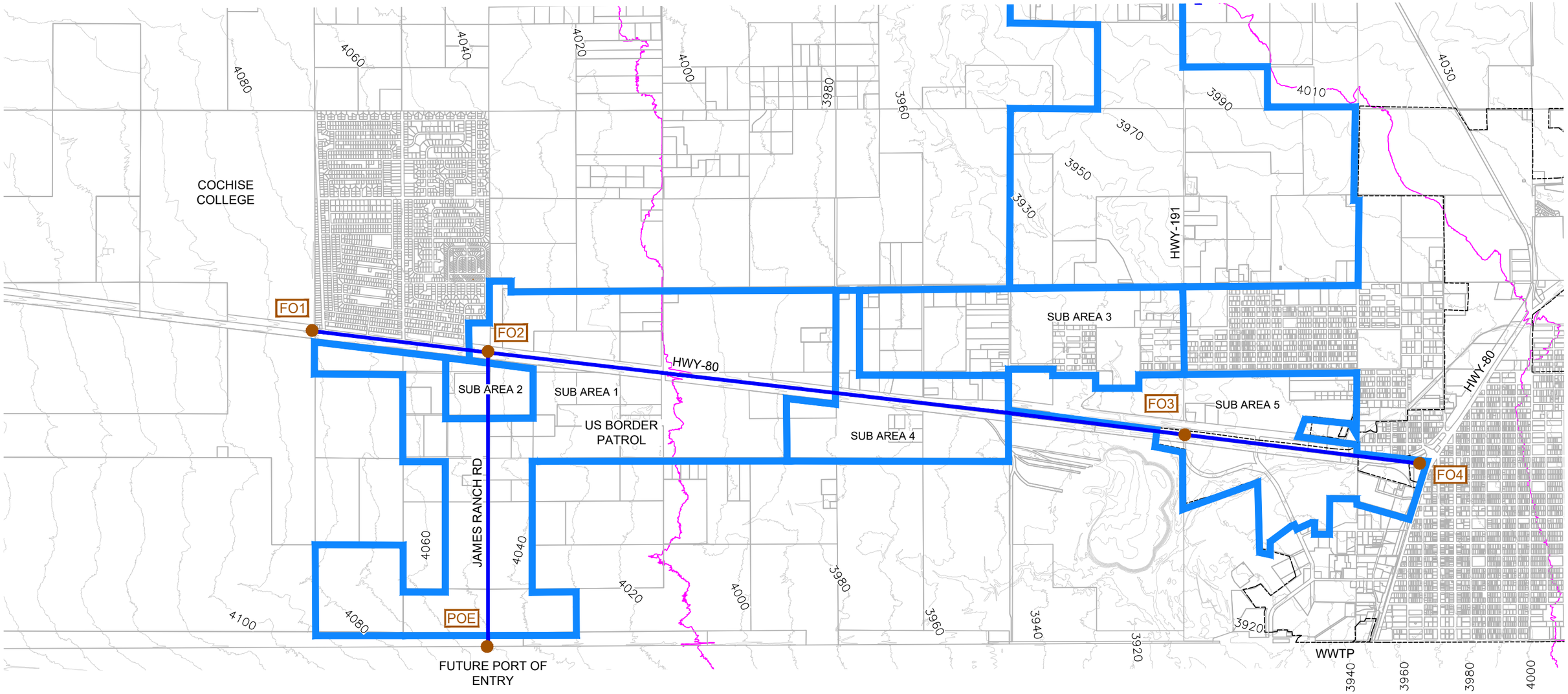
5.12 FIBER OPTIC

A fiber optic conduit and cable communications network does not exist to the POE or within County Planning Areas 1-8. The GSA indicates a very strong need for the communication link to be in place before construction begins on the POE.

A new fiber optic conduit and fiber network has been assumed between the POE and the intersection of James Ranch Road and SR-80, along SR-80 to the intersection of US 191 and along US 191 to BDIA. The **Figure 5-1** illustrates the concept level system former alignment. The estimated length is about 42,000 feet. The latter **Figure 5-2** illustrates the concept level system latter alignment. The estimated length is about 39,000 feet. The conceptual location of the fiber optic conduit along James Ranch Road is illustrated in the concept level road cross section and is assumed to be within the ADOT SR-80 and US 191 road rights-of-way.

The total length of conduit and cable is 81,00 ft. The estimated most probable capital cost at an AACE Level 5 is $1,280,000 with a range of $742,000 to $ 2,112,000. At this time, the point of connection to a communication source is not known and will be in addition to these costs.

Concept Fiber Optic Routing – POE Planning Sub Areas 1-5



LEGEND

- UTILITY PLANNING AREA
- CITY OF DOUGLAS LIMITS
- FIBER OPTIC CONDUIT/CABLE

PIPE	CONDUIT/CABLE LENGTH
POE TO FO2	9000 LF
FO1 TO FO2	5500 LF
FO2 TO FO3	21500 LF
FO3 TO FO4	7300 LF
TOTAL	43300 LF

NORTH

1"=3000'

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Fiber Optic Routing – POE Planning Sub Areas 1-5

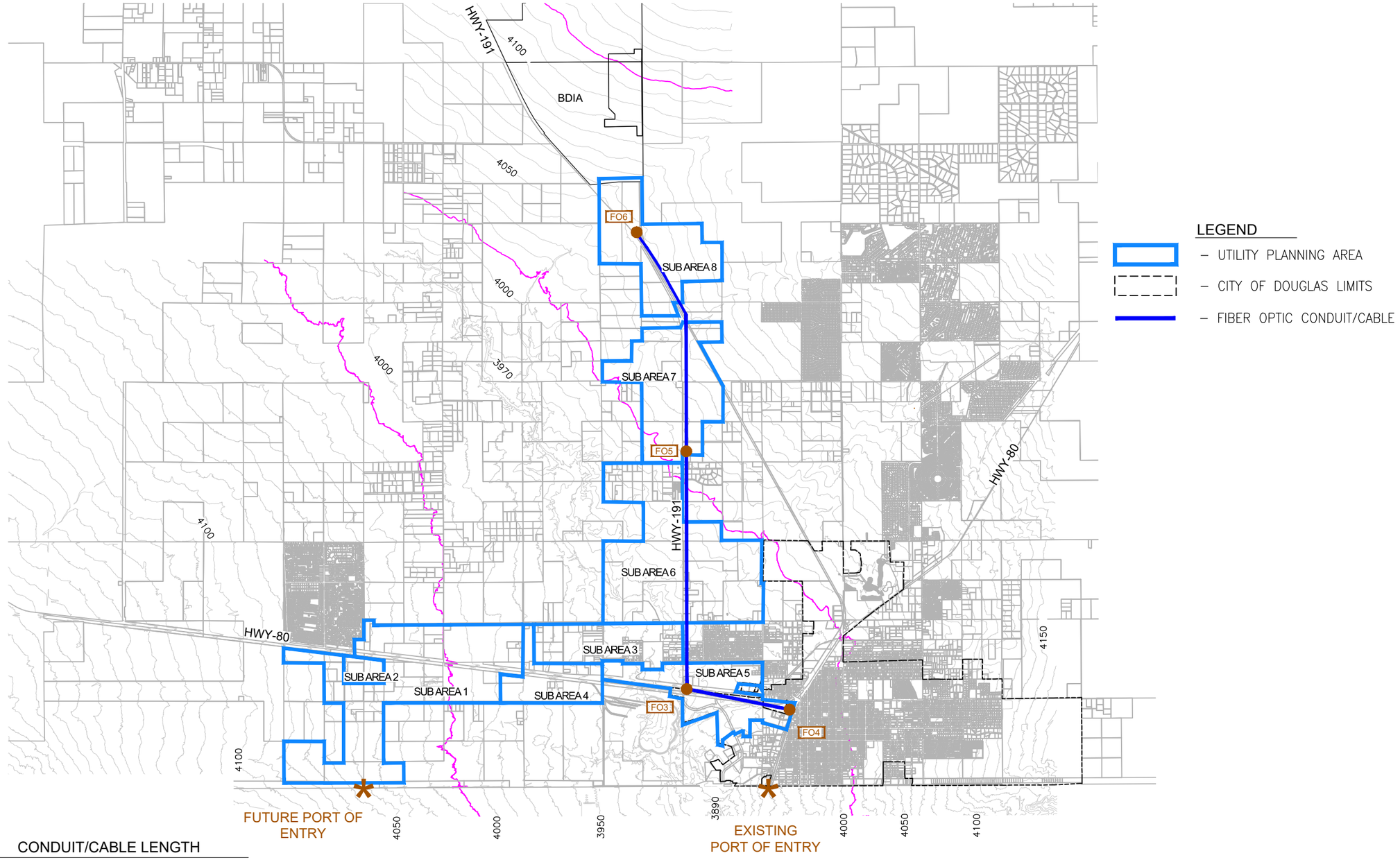
HORIZONTAL SCALE: AS SHOWN

2042 584400

FIGURE 5-1

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 5-1 – conceptual fiber optic routing 1.dwg PLOTTED: 8/21/2020 1:19 PM

Concept Fiber Optic Routing - BDIA/ADCF Planning Sub Area 6-8



PIPE	CONDUIT/CABLE LENGTH
FO3 TO FO4	7300 LF
FO3 TO FO5	16000 LF
FO5 TO FO6	15500 LF
TOTAL	38800 LF

NORTH

1"=7000'

DRAWING: v:\2042\active\2042584400\drawings\exhibit_files\figure 5-2 – conceptual fiber optic routing 2.dwg PLOTTED: 8/21/2020 1:21 PM

PREPARED BY:
Stantec
3133 West Frye Road, Suite 300
Chandler, AZ. 85226
www.stantec.com

PREPARED FOR:
COCHISE COUNTY PROCUREMENT DEPARTMENT
1415 MELODY LAND, BUILDING C
BISBEE, ARIZONA 85603

Concept Fiber Optic Routing - BDIA/ADCF Planning Sub Area 6-8

HORIZONTAL SCALE: AS SHOWN VERTICAL SCALE: N/A

2042 584400

FIGURE 5-2

5.13 SUMMARY MOST PROBABLE COSTS WATER AND WASTEWATER

Table 5-1 provides a Summary of the 'Water System Program and Alternatives to Serve the POE and the County Planning Areas 1-8 while **Table 5-2** provides a 'Summary of the Wastewater System Program and Alternatives to Serve the POE and the County Planning Areas 1-8. The most probable costs are a high-level order of magnitude cost estimate of the proposed works associated with the Douglas POE, the Planning Areas 1-8 lands identified by the Cochise County that could be impacted with the Douglas POE and the impact to the City.

The water system alternatives in **Table 5-1** include:

1. An onsite POE water supply system serving only the POE,
2. A community water system connected to the City of Douglas water system and serving the POE and the Planning Areas 1-5 including development in five phases to align with the actual timing of development in Planning Areas 1-5,
3. A community water system connected to the City of Douglas water system and serving the POE, Cochise College and the Planning Areas 1-5 including development in five phases to align with the timing of development in Planning Areas 1-5
4. A community water system connected to the City of Douglas water system and serving only the POE
5. A community water system connected to the City of Douglas water system and serving the area of the BDIA/ADCF and the Planning Areas 6-8 including development in four phases to align with the timing of development in Planning Areas 6-8

PRELIMINARY COST ESTIMATES

Table 5-1: Summary of Most Probable Water Cost at an AAEC Level 5 Costing

#	Alternative	Description	Probable Cost ($ Million)	Range of Probable Cost ($ Million)	Details
1	POE On Site Water System	Groundwater source, treatment, storage and distribution within the POE site.	5.7	3.7 - 9.4	Groundwater well, treatment, storage, fire pump system (2000 gpm for 3 hours) hydro pneumatic water distribution system.
2	Water System to the Sub Areas 1-5/POE (Option 1)	New groundwater supply wells, treatment, operation storage and distribution to serve POE and County sub planning areas 1-5	18.7	12.2 - 30.9	• Sub Planning Areas 1-5. Estimated max. day demand at full build out= 8.3 MGD • Estimated total water system piping length of about 20,500 ft in the west low zone and 16,700 feet in west high zone • One booster pump station and one PRV • Two storage tanks: WHZT-550,000 gals, WLZT 350,000 gals • One groundwater well pumping to WHZT
2a	Phase 1	WHZT (550K gals.) New groundwater water well and connecting piping	8.4	5.4 -13	• Supply water and operational storage for fire flow at POE and 16,700 ft of pipe • A new groundwater supply well to complement City wells.
2b	Phase 2	Connection to the City distribution system with pipeline along I80	4.5	2.9 - 7.4	• Develop water distribution by connecting Phase 1 to City water distribution system. 18,200 feet of pipe • Algin with rate and location of development sub planning area 3-5
2c	Phase 3	Booster pump station between west low/west high-pressure zone/PRV	4.2	2.7 - 7.0	• A water booster station to pump water from the WLZ/City Low Zone to the WHZ and PRV to allow water to flow from the WHZ to the WLZ/City Low Zone
2d	Phase 4	WLZT and connecting piping to pipe along I I80	1.6	1.1 - 2.7	• Likely many decades after start of POE • Connecting pipe length of 2300 ft.
3	Water System to the Subareas 1-5/ POE + Cochise College (Option 2)	Same as Item 3 except the HZWT is repositioned to higher elevation.	19.9	12.9 - 32.8	• Same as Water System to POE and sub areas 1-5 except the HZWT is on the north west corner of Cochise County
4	Dedicated Water System to the POE	Supply City water to POE	12.4	8.0 - 20.4	• Connect to City system and groundwater wells, new booster pump station/PRV and new WHZT. Dedicated pipe with no connections
5	City Water System to the BDIA/ACDF and Subareas 6-8	New groundwater supply well, treatment, operation storage and distribution to serve County sub planning areas 6-8	24.5	15.9 - 40.4	• Estimated max. day demand at full build out= 12.4 mgd • Estimated total water system piping length 59,140 feet • One booster pump station and one PRV • Two storage tanks in initial phase (2020 to 2050) • 1 groundwater wells initially pumping to EHZT
5a	Phase 1a	Develop water system in sub planning area 6 connected to City Low Pressure Zone	3.8	2.4 - 6.2	• Construct 15,100 feet of water main within the City Low Zone connecting the City system to the boundary of the East Low Zone and the East High Zone to supply water to sub planning area 6
5b	Phase 1b	Develop water system in sub planning areas 7 & 8 connected to City High Pressure Zone	7.9	5.1 - 13.1	• Construct 33,190 feet of water main within the City High Zone connecting the City system to an area within sub planning 8 at I191
5d	Phase 3	East High Zone Reservoir, groundwater well and connecting watermain	4.6	3.0 - 7.5	• Construct 10,580 feet of water main including the EHZT (350,000 gals) TWL 4220 ft and one groundwater well
5c	Phase 4	East Zone Reservoir, Booster Pump Station/PRV	6.9	4.5 - 11.4	• East Low Zone Reservoir including a booster pump stations and PRV.

PRELIMINARY COST ESTIMATES

The wastewater system alternatives are summarized in **Table 5-2**:

Table 5-2: Summary of Most Probable Wastewater Cost at an AAEC Level 5 Costing

#	Alternative	Description	Probable Cost ($ Million)	Range of Probable Cost ($ Million)	Details
1	POE Onsite Wastewater System	Wastewater collection, treatment, and reuse system within the POE site.	3.4	2.2 - 5.7	Secondary wastewater treatment plant, groundwater recharge on the site of POE
2	Sanitary Wastewater System to Connect to the POE/Sub Planning Areas 1-5 to the City of Douglas Wastewater Plant. SR 80 Alignment	New wastewater collection system to serve POE and County sub planning areas 1-5. Early program treatment and reuse is assumed at the City's WWTP. Alignment along SR 80	12.7	8.2 - 20.9	• Estimated average day wastewater flow full build out= 1.91 MGD • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 54,000 ft. • Connection to City WWTP
3	Sanitary Wastewater System to Connect to the POE/Sub Planning Areas 1-5 to the City of Douglas Wastewater Plant. US/Mexico Alignment	New wastewater collection system to serve POE and County sub planning areas 1-5. Early program treatment and reuse is assumed at the City's WWTP. Alignment along USA/ Mexico International Border	18.7	12.2 - 30.9	• Estimated average day wastewater flow full build out= 1.91 MGD • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 80,400 ft. • Connection to City WWTP
4	Sanitary Wastewater System to Connect Only the POE to the City of Douglas Wastewater Plant.	New wastewater collection system to serve only the POE with connection for treatment and reuse at the City's WWTP.	5.9	3.8 - 9.7	• Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 26,800 ft. • Connection to City WWTP
5	Sanitary Wastewater System to Connect the Sub Planning Areas 6-8 to the City of Douglas Wastewater Plant	New wastewater collection system to serve vicinity of BDIA and County sub planning areas 6-8. Early program treatment and reuse is assumed at the City's WWTP.	14.0	9.1 - 23.2	• Estimated average day wastewater flow full build out= 2.65 MGD • Gravity sewer collection pipe and one pump station • Estimated total wastewater collection piping length of about 35,200 ft. • Connection to City WWTP

5.14 SUSTAINABLE PRACTICES

The drinking water supply for the POE and for possible development located in the identified Planning Areas 1-8 will be groundwater. The groundwater in the greater Douglas area has been used for decades and is currently the water source for numerous water users including but not limited individual homeowners, agriculture, industry, and public organizations such as the City of Douglas. The management of the groundwater is by the Arizona Department of Water Resources.

It is incumbent that the water supply development and management of the POE and planning areas identified in this report are done in a way that recognize the limitations and needs of the long-term sustainability of the Douglas groundwater aquifer. A list of sustainable project initiatives has been developed (**Table 5-3**). These initiatives aim to ensure adequate water supply and limit water usage and minimize losses. They serve as the initial framework for establishing conservative water use practices and are to be incorporated in the design phase of proposed infrastructure. They would be implemented by the owner of the water supply and distribution system serving the Douglas POE and the Planning Areas 1-8 and be adopted by Cochise County and the City of Douglas in zoning regulations,

All future groundwater supply wells must be installed and permitted pursuant to State water right legislation. All wells will require an impact analysis per ADWR to determine if nearby wells will be impacted. An impact is defined as 10 ft of drawdown in a five-year period. This analysis is an administrative safeguard against over-drafting the aquifer in discrete locations that may cause interference to other well owners.

Table 5-3: Sustainable Water Use Initiatives

	Sustainable Initiative	Description	Expected Outcome
1	Utility Water Conservation Strategy	The water utility with ownership of the water system serving the Douglas POE and the -Planning Areas 1-8 would develop a long-term water conservation strategy	Reduced water use
2	Water Management Program- Universal Metering	Adopt universal metering of all withdrawals from the proposed water systems including all service connections. Meters should be placed at all connections to the water distribution system including groundwater well sites, points of connection to the existing City of Douglas water distributions system. This would allow for the management of unaccounted for losses. A long-term program to compile and manage the historic data to better manage the water supply and distribution system.	Track and eliminate unaccounted water system losses. Identification and resolution of unusual high-water usage Locate and eliminate leaks and malfunctions Operation and maintenance cost savings An efficient and sustainable water system
3	User Rate Incentives	Adopt a water users rate structure to encourage water conservation such as an inclining block rate structure. Water users are incentivized to minimize their water intake	Decreased water usage
4	Water-Efficient Fixtures	Mandate water efficient indoor fixtures and equipment including low flush toilets, low water use/waterless urinals, showerheads, etc., that meet federal water-efficiency standards established by the U.S. Department of Energy.	Significantly reduced indoor water use Savings on water utility costs

PRELIMINARY COST ESTIMATES

5	Low water uses industrial equipment	Policy of low water use equipment measures such as avoidance of single-pass cooling is a system that circulates water once through the cooling system before draining.	Significantly reduced water use Large savings on water utility costs
6	Water-Efficient Landscaping and Irrigation	Mandate low water use outdoor landscaping including plant native and drought tolerate plants to minimize irrigation needs. The irrigation system can be optimized through an irrigation water audit where soil moisture sensors or WaterSense labeled weather-based irrigation controllers are used to irrigate the plants only when needed.	10-20% reduction of irrigation demands if an irrigation water audit is in place. Large savings on water utility costs
7	Investigate a Rainwater Recovery Program	During monsoon season, rainwater can be collected from rooftops, stored and used cooling tower systems, landscape irrigation, or groundwater recharge.	Reduced use of water distribution water Seasonal water utility savings
8	Well Rehabilitation Schedule	Schedule periodic maintenance and rehabilitation on well sites to ensure optimal and long-lasting usage.	Proper maintenance and rehabilitation will ensure long term and efficient well functionality
9	Investigate Effluent Groundwater Recharge.	The practice of recharging effluent to aquifers through controlled methods. This a long-term strategy requiring planning and investment as well as ADEQ permitting	Reduce negative impact on water table
10	Water Accountability Program	Establish and fund an ongoing leakage-detection management program to locate and eliminate water distribution system losses	Minimize water loss Effective resource management Development of timely mitigation plans for maintenance and repairs
11	Groundwater Numerical Model	In collaboration with other users from the Douglas Aquifer, develop and maintain a numerical model of the groundwater to predict groundwater conditions such as water levels, pumping response and determine capacity of future wells.	Optimized operations Target new well locations Ability to monitor and prevent excessive well water intake Ability to predict future conditions allows for proper planning efforts and curbing current water intake
12	Water Conservation Education Program	Ongoing public outreach to systems users about water conservation measures. This may be through distributing pamphlets and utility personal contact.	Reduced water usage Development of conservative water usage habits

The Douglas Basin has also been selected by ADWR as an Irrigation Non-expansion Area (INA). This is a geographical area which has been designated pursuant to [A.R.S. Title 45, Chapter 2, Article 3] as having insufficient groundwater to provide a reasonable safe supply for the irrigation of the cultivated lands at the current rate of withdrawal. In an INA, only land that has an “irrigation authority” can be irrigated (i.e., irrigation of new acreage is prohibited); however, new non-exempt wells (e.g., new service area wells) are not prohibited. This administrative control should limit the competition for groundwater use for the expansion area.

Additional measures are recommended for long-term sustainability include water level data collection to optimize aquifer withdrawal management. This could include instrumenting new or existing wells with water level recording devices (i.e., pressure transducers), and/or installing observation wells in strategic locations to serve as an early detection of excessive water level declines. A numerical groundwater flow model could be used as a management tool to identify optimal locations for future wells (e.g., most transmissive portions of the aquifer that would minimize drawdown) and could also be used as a predictive tool to estimate drawdown and aquifer storage depletion rates.

6.0 FINANCIAL AND GROWTH ANALYSIS

6.1 COST BENEFIT ANALYSIS

This cost-benefit analysis was conducted to evaluate the potential impacts to local water and wastewater customers, as well as to the regional economic landscape, resulting from constructing the second POE and expanding the water and wastewater systems. This analysis calculated the net benefits to water and wastewater customers under each of the water and wastewater system expansion alternatives, including those that solely serve the new POE, and those that would also serve new development in sub-areas 1-5 and sub-areas 6-8. Additional benefits to the local economy were also considered and are discussed in this chapter.

6.1.1 Water System Capital Costs

As discussed in previous sections, multiple approaches are under evaluation to serve the Douglas POE, as well as potentially serving additional development areas in planning sub-areas 1-5 and sub-areas 6-8. **Table 6-1** presents a summary of the capital costs associated with each option as well as the maximum and minimum costs based on the AACE Level 5 estimates. The costs presented in Table 6-1 are expressed in current dollars.

Table 6-1 - Water System Capital Costs by Phase

	Alt. 1: POE On-Site System	Alt. 2: Serve Sub-Areas 1-5 & POE	Alt. 3: Serve Sub-Areas 1-5, POE, Cochise College	Alt. 4: Direct Connection of POE to Water System	Alt. 5: Serve BDIA/ACDF & Sub-Areas 6-8
Average	$5,700,000	$18,700,000	$19,900,000	$12,400,000	$24,500,000
Maximum	$9,400,000	$30,900,000	$32,800,000	$20,400,000	$40,400,000
Minimum	$3,700,000	$12,200,000	$12,900,000	$8,000,000	$15,900,000

In addition to capital costs, ongoing operations and maintenance (O&M), and repairs and replacement (R&R) will be necessary for the system. These costs are expected to be incurred on an annual basis immediately following completion of the project(s). At this feasibility level of analysis, these O&M and R&R expenses were estimated based on a percentage of capital costs. Assumptions used to estimate these costs are discussed in Section 6.1.3.2.

6.1.2 Wastewater System Capital Costs

The wastewater system is to be constructed to serve the POE and, as feasible, sub-planning areas 1-5 and areas 6-8. Several alternative approaches to serve these areas were developed and included in the cost-benefit analysis to evaluate the relative impacts of each. Table 6-2 presents a summary of the

capital costs associated with each option as well as the maximum and minimum costs based on the AACE Level 5 estimates. The costs presented in Table 6-2 are expressed in current dollars.

Table 6-2 - Wastewater System Capital Costs by Alternative

	Alt. 1: POE On-Site System	Alt. 2: Serve Sub-Areas 1-5 & POE, SR 80 Alignment	Alt. 3: Serve Sub-Areas 1-5 & POE, Border Alignment	Alt. 4: Direct Connection of POE to Sanitary System	Alt. 5: Serve BDIA/ACDF & Sub-Areas 6-8
Average	$3,400,000	$12,700,000	$18,700,000	$5,900,000	$14,000,000
Maximum	$5,600,000	$20,900,000	$30,900,000	$9,700,000	$23,200,000
Minimum	$2,300,000	$8,200,000	$12,200,000	$3,800,000	$9,100,000

As stated for the water system expansion, ongoing O&M and R&R will be necessary for the system. Again, for this feasibility level of analysis, these O&M and R&R expenses were estimated based on a percentage of capital costs. These estimates are discussed further in Section 6.1.3.2.

6.1.3 Cost-Benefit Analysis

6.1.3.1 Grants & Capital Funding

A number of options exist to help meet the funding needs to construct the assets necessary to serve new customers in the expanded areas. One key funding option is grants, primarily from state and federal funding programs. This is considered a benefit for this analysis as the construction of the new POE has the potential to enhance grant funding to meet infrastructure needs of the area. Details of potential grant funding options are explained in detail in Section 6.2.

Grant funding was included in this analysis to understand the potential impacts of funding a portion of the capital costs using these programs. The amount of grant funding could have a significant impact on the overall net benefit associated with completing these projects. A range of grant funding levels was included as part of a sensitivity analysis to understand the impacts to the overall results of this evaluation.

It is worth noting that in addition to grant funding, additional funding could be provided by alternative sources to customer rate revenues, including system development fees. These would be fees paid by developers who would directly benefit from the County constructing the infrastructure needed to serve the newly developed areas. Alternatively, developers may opt to construct the needed assets and then transfer ownership to the County (or City). Therefore, the grant funding assumption described below can also serve to capture a portion of capital costs that are grant funded, as well as a portion of costs covered by local developers. Whether relying entirely on grants, entirely on system development fees, or partially relying on a combination of the two, the analyses below provide the range of outcomes that could be expected under alternative funding scenarios.

6.1.3.2 Economies of Scale

By increasing the capacity and extending the reach of the system to serve new customers, the potential exists to achieve economies of scale. Economies of scale would benefit local rate payers as the addition of new customers, and increases in water sales and use of the wastewater system offset the additional expenses, thereby reducing the unit costs to customers. This benefit was estimated based on a change in the unit cost for service, expressed in dollars per gallons per day (gpd) of capacity. Due to uncertainty in the timing of development phases and full build-out for these options at this time, this analysis focuses on the overall capital costs (expressed as annualized capital costs using financing assumptions) and estimated O&M and R&R costs relative to the capacity provided by each alternative. Because average flows will vary over time through project phasing, calculating this benefit in terms of unit costs for capacity provides a consistent basis for comparison, effectively comparing total net benefits at full build-out.

As stated in the previous sections, a number of assumptions were made to estimate the total costs associated with constructing and operating the expanded systems, and to evaluate capital funding options and annualized capital expenditures. These baseline assumptions are outlined in the list below:

- **O&M and R&R Expenses:**
    - Ongoing O&M estimated as 2.0% of capital costs
    - Annual R&R estimated at 3.0% of capital costs to reflect approximate annual depreciation for assets with a 30-year useful life
- **Grant Funding:**
    - Baseline assumption of 50% grant funding for capital costs under each alternative
- **Capital Financing:**
    - Assumed interest rates of 3.5%
    - Assumed loan duration of 30-years corresponding to the estimated 30-year asset useful life

Based on the capital costs for each alternative proposed in this report, estimates were developed to evaluate the unit costs, and resulting potential for economies of scale for each option. The analysis began with recent O&M expenses, debt service costs and capital expenditures (estimated based on annual depreciation expense[1]) presented in the City's fiscal year (FY) 2019 comprehensive annual financial reports (CAFR). These current costs were evaluated relative to the capacities of the existing water and wastewater systems to calculate a baseline unit cost of capacity for water and wastewater

[1] Because actual capital costs in a water or wastewater system capital improvement plan can vary significantly from year to year, depreciation was used to estimate the annual level of investment needed to maintain the existing system

service. **Table 6-3** presents the baseline costs, capacity and calculated unit cost of capacity based on FY 2019 expenses and the current capacities of the water and wastewater systems.

Table 6-3 – Baseline Unit Cost of Capacity Calculation

Baseline Costs	Water 2019 Expenditures	Wastewater 2019 Expenditures
O&M Expenses	$2,192,519	$1,083,018
Debt Service	$129,652	$541,901
Depreciation	$495,186	$576,783
Total Expenses	$2,817,357	$2,201,702
Baseline Capacity (gpd)	5,000,000	2,600,000
Baseline Unit Cost ($/gpd)	$0.56	$0.85

The calculation in **Table 6-3** is not intended to represent the typical volumetric rate or typical bill paid by the City's current water and wastewater customers. Rather, these values represent the unit costs to operate and maintain the current system which is rated at a given service capacity. These values can be evaluated relative to the alternatives proposed in this Study to determine the resulting unit cost of capacity for a system combining the current system with each expansion alternative.

Each alternative was added to this baseline to calculate a new unit cost with the addition of the capital and operating costs as well as the added capacity. These alternatives include each water system expansion option to serve the POE, sub-planning areas 1-5, and areas 6-8. Recognizing the alternatives serving areas 6-8 could be additive with the alternatives serving areas 1-5, the final row presents the combined unit cost of capacity for the existing system, plus each alternative serving the POE and/or areas 1-5, plus areas 6-8. The alternatives intended to serve sub-planning areas 6-8 were evaluated independent of the alternatives serving the POE and areas 1-5, and in combination with these alternatives. **Table 6-4** presents the calculations of economies of scale for the water system expansion, with the same analysis presented for the wastewater system in **Table 6-5**.

Table 6-4 – Water System Economies of Scale Analysis

	Alt. 1: POE On-Site System	Alt. 2: Serve Sub-Areas 1-5 & POE	Alt. 3: Serve Sub-Areas 1-5, POE, Cochise College	Alt. 4: Direct Connection of POE to Water System	Alt. 5: Serve BDIA/ACDF & Sub-Areas 6-8
Capital Expenses	$5,700,000	$18,700,000	$19,900,000	$12,400,000	$24,500,000
Grant Funding (50%)	($2,850,000)	($9,350,000)	($9,950,000)	($6,200,000)	($12,250,000)
Financing					
Interest Rate	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
Duration	*30*	*30*	*30*	*30*	*30*
Annualized CIP	$154,958	$508,372	$540,995	$337,102	$666,049
O&M and R&R Expenses	$285,000	$935,000	$995,000	$620,000	$1,225,000
Total Annual Expenses	$439,958	$1,443,372	$1,535,995	$957,102	$1,891,049
Added Capacity (gpd)	125,000	8,300,000	8,300,000	125,000	12,400,000
Project Unit Cost of Capacity ($/gpd)	$3.52	$0.17	$0.19	$7.66	$0.15
Baseline + Projected Costs	$3,257,315	$4,260,729	$4,353,352	$3,774,459	$4,708,406
Combined Capacity (gpd)	5,125,000	13,300,000	13,300,000	5,125,000	17,400,000
Projected Combined Unit Cost of Capacity ($/gpd)	$0.64	$0.32	$0.33	$0.74	$0.27
Combined Unit Cost of Capacity Adding Areas 6-8 ($/gpd)	$0.29	$0.24	$0.24	$0.32	NA

Table 6-5 - Wastewater System Economies of Scale Analysis

	Alt. 1: POE On-Site System	Alt. 2: Sub-Areas 1-5 & POE System, SR 80	Alt. 3: Sub-Areas 1-5 & POE System, Border	Alt. 4: Sanitary System to POE	Alt. 5: City System to BDIA/ACDF & Sub-Areas 6-8
Capital Expenses	$3,400,000	$12,700,000	$18,700,000	$5,900,000	$14,000,000
Grant Funding (50%)	($1,700,000)	($6,350,000)	($9,350,000)	($2,950,000)	($7,000,000)
Financing					
Interest Rate	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*
Duration	*30*	*30*	*30*	*30*	*30*
Annualized CIP	$92,431	$345,258	$508,372	$160,395	$380,599
O&M and R&R Expenses	$170,000	$635,000	$935,000	$295,000	$700,000
Total Annual Expenses	$262,431	$980,258	$1,443,372	$455,395	$1,080,599
Added Capacity (gpd)	16,000	1,910,000	1,910,000	16,000	2,650,000
Project Unit Cost of Capacity ($/gpd)	$16.40	$0.51	$0.76	$28.46	$0.41
Baseline + Projected Costs	$2,464,133	$3,181,960	$3,645,074	$2,657,097	$3,282,301
Combined Capacity (gpd)	2,616,000	4,510,000	4,510,000	2,616,000	5,250,000
Projected Combined Unit Cost of Capacity ($/gpd)	$0.94	$0.71	$0.81	$1.02	$0.63
Combined Unit Cost of Capacity Adding Areas 6-8 ($/gpd)	$0.67	$0.60	$0.66	$0.71	NA

The calculations presented in Table 6- 3 and Table 6-4 clearly illustrate the potential benefits to local ratepayers as a result of the system expansion. By increasing the total capacity of the water and wastewater systems to serve additional customers, the unit cost of capacity drops for all alternatives that include connecting to sub-areas 1-5 and sub-areas 6-8. The alternatives that solely serve the POE would lead to an increase in unit costs for the system due to the fact that the level of capital investment relative to the capacity added to the system is high compared to current costs and the costs for other alternatives.

These estimates rely on high-level estimates due to the early-stage nature of this analysis. As a result, sensitivity analyses were conducted to determine a range of outcomes when adjusting key variables. These sensitivity analyses evaluate the total unit cost incorporating current baseline expenditures and the additional costs and corresponding capacities for each proposed project. It should be noted that the sensitivity analyses evaluated alternative 5 with service to sub-areas 6-8 as a standalone project added to the existing system, and does not include the option of adding alternative 5 to the other four alternatives.

The first sensitivity analysis evaluates the resulting unit costs under the stated range of capital costs provided in Sections 6.1.1 and 6.1.2 (and discussed in previous sections of the report) to account for the uncertainty inherent to the AACE Level 5 cost estimates. By adjusting the capital costs for each alternative, this analysis not only adjusts the up-front investment and associated annualized debt service to finance the project, but also affects the estimated ongoing O&M and R&R expenses that were estimated as a percent of capital costs. **Figure 6-1** presents the range of unit cost estimates resulting from the average, maximum, and minimum capital cost estimates provided for each alternative. These unit costs were compared to the unit costs under baseline operations, represented by the solid black line.

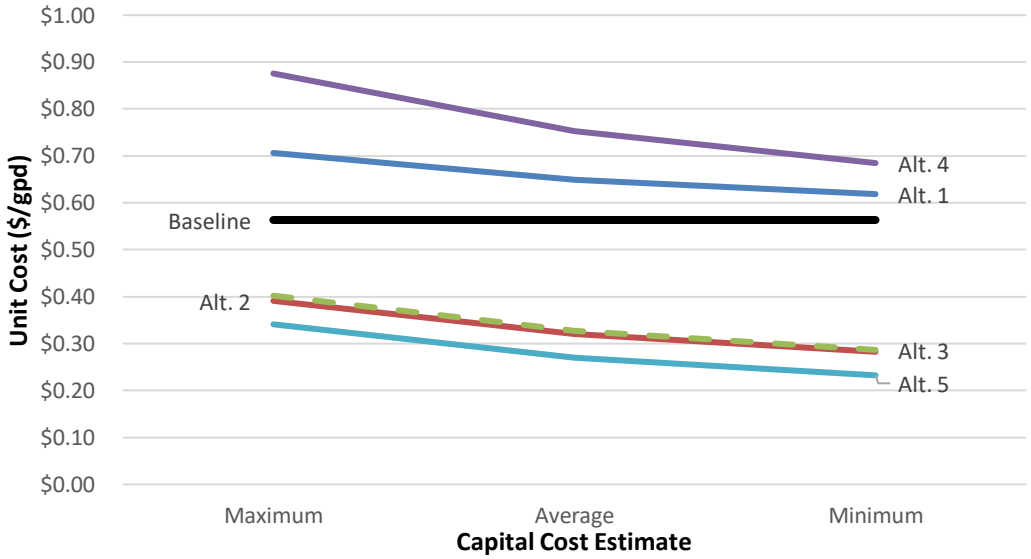


Figure 6-1 - Water Capital Cost Sensitivity Analysis

Comparing each water system alternative at the range of capital costs provided, it is clear that the two alternatives that serve solely the POE do not achieve economies of scale relative to the baseline under the range of capital

costs estimated. Conversely, the alternatives that serve sub-areas 1-5 and sub-areas 6-8 all achieve economies of scale under the entire range of capital costs.

Figure 6-2 presents the same sensitivity analysis for the range of capital costs for each of the wastewater system alternatives.

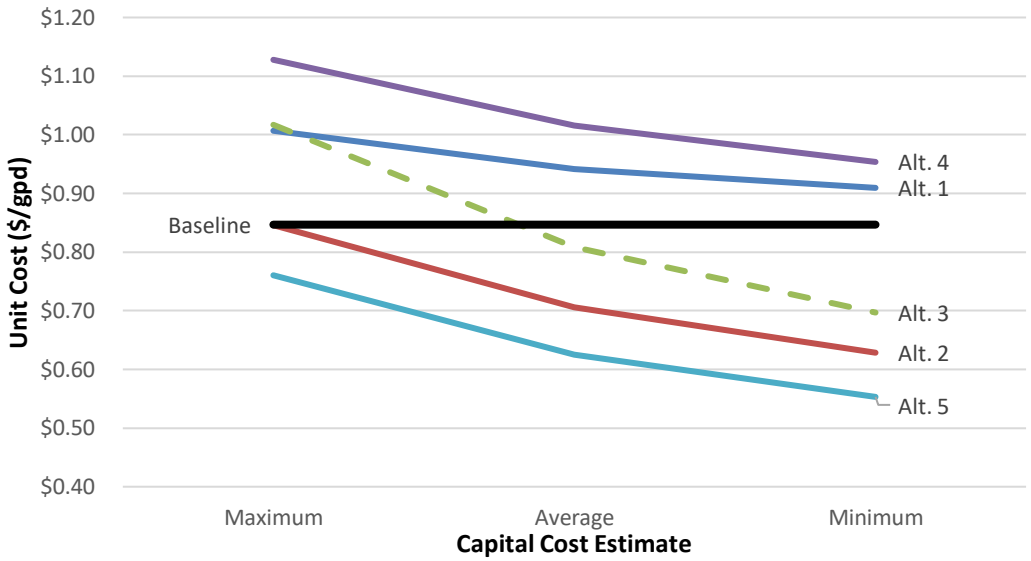


Figure 6-2 - Wastewater Capital Cost Sensitivity Analysis

As illustrated in Figure 6-2, the range of capital costs have the potential to make meaningful impacts to the results of the analysis. Alternatives 2 and 3 fail to achieve economies of scale and lead to about the same or increased unit costs for service at the maximum unit cost. However, at the average or minimum capital costs, only alternatives 1 and 4 yield unit costs for capacity greater than the baseline unit cost.

The second sensitivity analysis focused on the level of grant funding that could be used to meet capital cost needs. This analysis looked at the impacts of 0%, 50% (baseline assumption), and 100% grant funding for each option. **Figure 6-3** presents a summary of the results for the water system alternatives, comparing the unit costs for water service at each of the corresponding grant funding levels. These unit costs are compared against the baseline unit cost, represented by the black line.

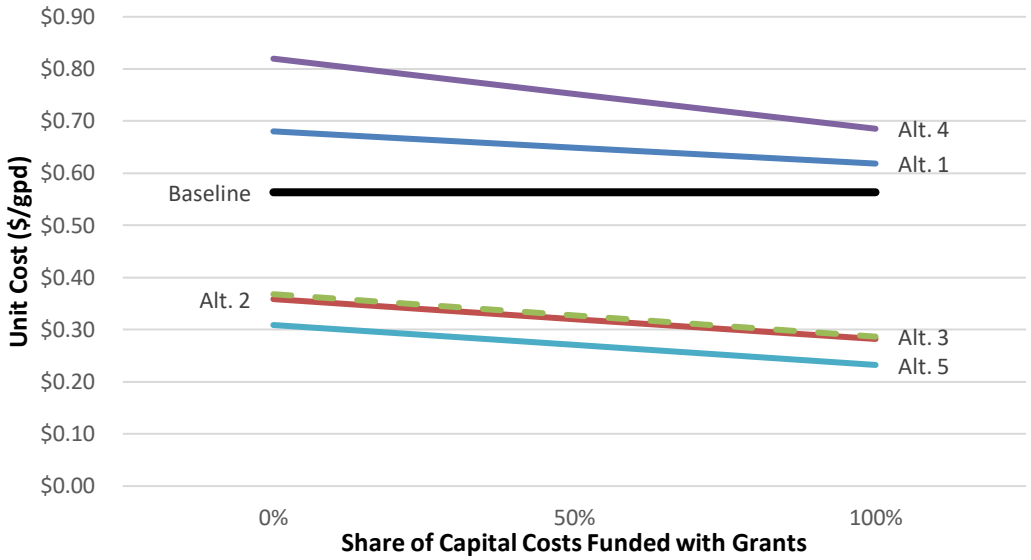


Figure 6-3 - Water System Grant Funding Sensitivity Analysis

Figure 6-3 clearly illustrates the impacts of grant funding on the overall water system unit cost results. When comparing the resulting unit costs to the baseline unit cost under current operations, the results from the preliminary analysis remain true. This means the alternatives that serve sub-areas 1-5 and sub-areas 6-8 achieve economies of scale at all levels of grant funding, while those options that solely serve the new POE still lead to increased unit costs over the baseline, therefore lacking economies of scale.

Figure 6-4 presents the same sensitivity analysis for the wastewater system alternatives at each level of grant funding. Again, the unit costs for each alternative were compared against the baseline unit cost under current operations.

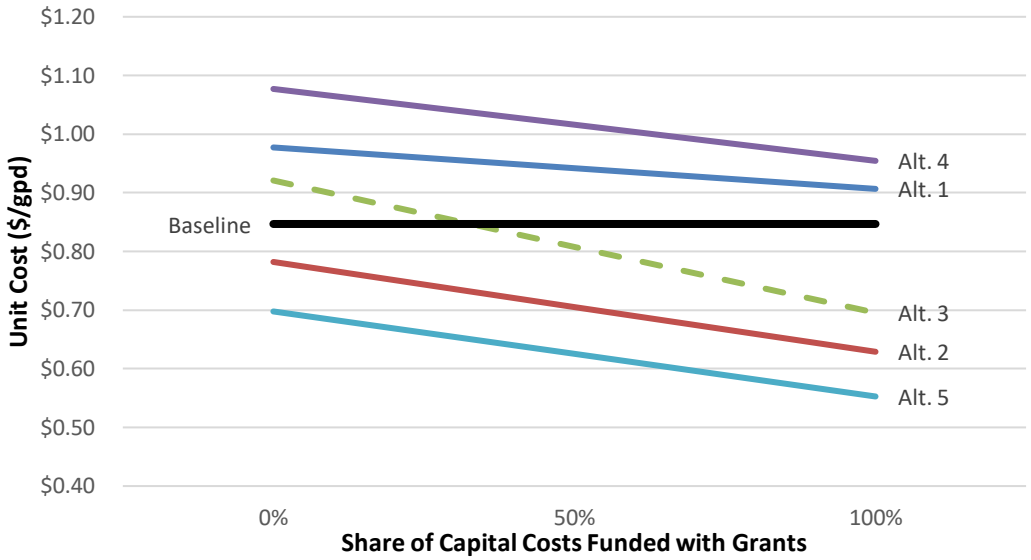


Figure 6-4 - Wastewater System Grant Funding Sensitivity Analysis

Similar to the results shown in Figure 6-2, the level of grant funding can have a meaningful impact on the ability to achieve economies of scale under some alternatives. Alternative 3 remains a net beneficial project alternative if 50% or more of the project can be grant funded, but could lead to increased unit costs for service if less funding is available. Similar to the results shown in Table 6-4, alternatives 2 and 5 continue to produce net benefits to rate payers at all levels of grant funding, while the alternatives that solely serve the POE do not.

6.1.4 Regional Economic Impact

According to the *Working Paper: Measuring the Economic Impact of a Two-Port Solution in Douglas, Arizona* published by US Economic Research in September 2020[2], development of the second port of entry could have a significant beneficial impact to the County. These benefits are expected to result from increased commerce, business, and retail traffic in the area. This report estimates initial increases in economic activity of approximately **$10.8 million per year**, and an increase of approximately **110 long-term jobs** in the County.

The economic benefits resulting from the two-port solution are primarily associated with decreased wait times at the Douglas POE. These reductions in wait times will have the effect of increasing tourism and business travel in the City, as well as changes in freight transportation. This increasing economic activity could impact myriad sectors of the local economy. Industries expected to realize the greatest beneficial impacts are listed below:

- Retail
- Food services
- Real estate and rental & leasing

[2] US Economic Research. Working Paper: Measuring the Economic Impact of a Two-Port Solution in Douglas, Arizona. September 1, 2020.

- Health care and social assistance
- Utilities
- Finance and insurance
- Transportation and warehousing

These benefits are anticipated to increase over time with the potential to double to **$20 million per year** and **220 sustainable jobs** once the area reaches full build-out. This analysis was stated to be a preliminary analysis based on high-level estimates and assumptions. As such, the author indicates additional analyses would be warranted to further investigate the long-term impacts of the two-port solution. Estimates in the report were stated to be based on conservative assumptions and do not include short-term impacts associated with increased activity resulting from construction and development during the expansion process.

It is worth noting that these regional economic benefits would not directly impact existing water and wastewater system customers, and are therefore treated as a separate consideration in the range of benefits associated with this project. Although the economies of scale analysis showed that a number of alternatives yield material benefits to water and wastewater system customers in reducing the average unit cost for service, regional economic impacts would benefit all residents by increasing employment opportunities, tax revenues, and other economic activities, thereby increasing opportunities for investment in the community.

6.1.5 Additional Economic Considerations

Additional opportunities for economic enhancements could be realized as a result of constructing the second POE and expanding the water and wastewater systems. These opportunities could not be quantified at this time, but are worth investigating further as the project moves forward:

- Increased Airport Traffic – The Bisbee-Douglas International Airport has the potential to see significant benefits as a result of increased commerce in the area. By increasing commercial traffic through the second POE, the area could become a hub for logistics and distribution leading to increased air freight transport and stimulating business at the airport. This could also lead to increases in passenger air travel due to increases in retail, tourism, and business travel to the area.
- Cochise College – Alternatives that would expand utility service to the Cochise College campus could lead to opportunities to expand the existing campus and increase enrollment. Connecting Cochise College to the City systems would eliminate the need to construct dedicated water supplies or wastewater management infrastructure for the campus if and when facilities and student populations grow in the future. This would greatly reduce the cost for expanding the current campus and increasing enrollment at the college.

6.1.6 Conclusions

This cost-benefit analysis indicates the potential for substantial benefits that could be realized by local customers of the City's water and wastewater system, as well as residents of the region. These benefits are summarized below:

6.1.6.1 Economies of Scale

- Water system expansion alternatives 2, 3 and 5 all yield reduced unit costs and achieve economies of scale by increasing capacity at a reduced cost. Based on the assumptions described above, this would indicate the unit costs to serve existing and new customers could be reduced with the expanded system.
    - The alternatives that solely serve the new POE, alternatives 1 and 4, would not achieve economies of scale due to the small amount of capacity added to the system relative to the costs needed to construct, operate, and maintain those assets.
- Wastewater expansion alternatives 2 and 5 yield reductions to the overall unit costs for service and achieve economies of scale, with alternative 3 leading to a very minor increase under the baseline assumptions. This increase in unit costs under alternative 3 would be considered within the margin of error for this analysis.
    - Similar to the water system alternatives, the wastewater system expansion alternatives that solely serve the POE do not achieve economies of scale due to the small amount of capacity added to the system relative to the costs needed to construct, operate, and maintain those assets.
- Sensitivity analyses focusing on the range of capital costs provided in this repot, and the range of grant funding provided to fund capital costs, indicated that the findings described above could change depending on actual costs and the level of grant or other funding contributions realized.

6.1.6.2 Regional Economic Impacts

- The estimated economic impacts to the region were estimated at $10.8-$20.0 million per year, with the addition of 110-220 new sustainable jobs in the area. This benefit is large enough to more than offset the costs of constructing, operating and maintaining the water and wastewater system expansion projects.
    - It is worth noting that while these benefits would be very real in terms of improving the overall economic vitality of the area by increasing employment opportunities and increasing tax revenue, these benefits should be considered separately from the impacts to water and wastewater customers who would be focused on the potential changes to their monthly utility bills.

6.1.6.3 Additional Economic Considerations

- A number of additional opportunities for economic enhancement exist as a result of constructing the second POE and extending water and wastewater service to the POE and development areas. These opportunities include, but are not limited to, increasing traffic at the local Bisbee-Douglas Airport and expanding the facilities and student population at the Cochise College campus. These potential benefits were not quantified at this stage of the analysis but are worth investigating further as planning and design continue to move forward.

6.2 FUNDING OPPORTUNITY RESEARCH

The new Douglas POE has garnered immense support from federal, state, and local entities. To complete the water and wastewater infrastructure for the new POE, Cochise County and the City of Douglas must convert that support into project funding. The cost to complete Phase 1 of the water and wastewater infrastructure related to the new POE is estimated to be $21 million with a range of $13.7 – 34.7 Million. These upgrades cannot be completed without supplemental funding through grants, loans, or additional revenue streams. Potential supplemental funding sources were evaluated with respect to the Phase 1 project, existing loan commitments, and other criteria. This section summarizes the finding of that evaluation, presenting an initial funding strategy, and details on some of the key funding partners identified in that strategy.

6.2.1 Funding Strategy

Due to the estimated cost of completing the Phase 1 upgrades, no singular funding source is likely to meet the anticipated funding needs of the project. Thus, multiple sources of funding will be required to fully fund the project. Also, the funding landscape is dynamic. Federal appropriations, new funding programs, and modifications to existing programs demand flexibility and responsiveness. The funding opportunities presented in this report provide a foundation, but the City and County must be agile and capitalize on new funding options as they arise. Coordinating the process of identifying, organizing, and acquiring funding from these multiple sources will require a team that will engage funding partners, tying together the various technical details and key drivers of the project to attract and secure funding partners. This team will need a clear, integrated funding strategy that outlines work products, timelines of when to engage with potential funding partners, and responsibilities. This section presents an initial funding strategy framework, summarizing the City of Douglas' current funding situation, a timeline of actions and decisions based on that funding situation, and recommendations on how to proceed.

The City has successfully utilized a variety of funding partners in the recent past to fund water and wastewater infrastructure projects. Two major funding partners have been the North American Development Bank (NAD Bank) and the Water Infrastructure Finance Authority of Arizona (WIFA). Douglas successfully received over $10 million dollars in grant funding from NAD Bank to expand and upgrade their wastewater treatment plant to meet current regulations and have excess capacity. Douglas also has received roughly $7 million dollars in funding from WIFA for additional water and wastewater infrastructure projects. These recent funding successes and the institutional knowledge within Douglas at acquiring them improves the chance of future success in acquiring funding for this project.

Currently, Douglas has three loans for wastewater projects and two loans for water projects. Based on available bonding and coverage ratios, Douglas has approximately $538,000 available for wastewater project loans and $378,000 available for water project loans. One decision point when developing a more detailed funding strategy is if this availability will be sufficient to cover anticipated debt service for loans to fund a portion of the project.

Based on an evaluation of Douglas current funding situation, past funding experiences, and future funding needs related to the project, a funding strategy timeline was developed, shown in **Table 6-6**. In practice, funding strategies adjust to meet project timelines and to take advantage of funding opportunities. This timeline groups activities into five phases. The first phase of his strategy, which should be initiated before the end of 2020, is organizing a funding strategy team who will coordinate and implement funding recommendations.

Table 6-6: Funding Strategy Timeline

Funding Strategy Phase and Anticipated Timeframe	Description of Activities
Phase I: Organize Funding Strategy Team **Q4 2020**	Assemble an internal funding strategy team that will coordinate and develop the funding strategy for the project. Douglas already has several key members of the funding strategy team required to fund this project while others will need to be identified. These members should include Douglas staff from engineering, legal, and finance, grant writer, lobbyist, and funding professionals.
Phase II: Assess 2021 Douglas Funding Situation **Q1 2021**	Prior to engaging with potential funding partners, Douglas will need to evaluate their current funding situation. Key outcomes of this evaluation will be the estimated cost to complete the project, remaining payments/duration of existing loan obligations, and ability to take on additional loans.
Phase III: Outreach to Potential Funding Partners **Q4 2020 to Q1 2021 (Ongoing)**[3]	Engage with potential funding partners, identifying those that could provide funding and defining key products and dates required to receive that funding. Utilizing the Rural Water Infrastructure Committee will be an effective first step in engaging with potential funding partners. If Douglas is successful in receiving grant funding from the EDA for the design of the project, then outreach can focus on construction. However, if design still needs to be completed, partners to fund design will need to be identified. A prioritized list of funding partners will be developed.
Phase IV: Develop Funding Strategy Workplan **Q2 2021**	Based on the prioritized list of funding partners, the team must develop a workplan including 1) a calendar of due dates, 2) work products to be created and which requirement they satisfy, and 3) roles and responsibilities of creating work products. Because funding will be required from multiples sources, the funding strategy team will need to coordinate with the various funding partners to develop a singular and cohesive strategy.
Phase V: Execute Funding Strategy Framework **Q2 2021 to Q4 2022**	The funding strategy and technical teams execute the funding strategy framework with the funding partners.

6.2.2 Identified Funding Sources

A variety of federal, state, and non-profit funding sources were evaluated. This section lists key details of the six prioritized funding sources that align well with the project. For each source, a summary table presents details on the funding quantity, the timing and application process, and viability of receiving funds. There is also a summary of the funding source, the application process and administrative burden, and any obstacles or associated risks. A larger set of funding sources considered is presented in the Funding Matrix Summary, Section 6.2.3., and the Funding Matrix, Appendix D.

[3] It is very important the funding strategy team continue to connect with potential funding partners and project advocates.

6.2.2.1 Rural Water Infrastructure Committee - AZ

Summary: Partnership of various federal and state agencies who provide loans, grants, and technical assistance to rural communities in Arizona.	
Funding Magnitude, Duration, and Reliability	Does not directly provide funding, however the committee is comprised of various federal and state agencies who provide loans, grants, and technical assistance to rural communities in Arizona.
Timing and Application Process	Interested parties submit a Project Information Form, then present at one of the quarterly committee meetings. Representatives from the federal/state agencies identify if their organization can assist financially and the committee develops an initial funding strategy.
Viability of Receiving Funds	Committee members will indicate if their available funding source is a good fit for the project, improving the chances of successfully receiving funding.

- **Summary**: - The Rural Water Infrastructure Committee (RWIC) is a partnership of various federal and state agencies who provide loans, grants, and technical assistance to rural communities in Arizona. Interested parties complete and submit a project information form then present to the committee. Agency representatives who think their funding source aligns with the project identify themselves and follow up with the interested party to develop a coordinated funding strategy. While not a direct source of funding, RWIC can help interested parties connect with potential funding sources as well as organize how funding sources can be using in combination with each other. ***Recommendation*****:** Engaging with this organization at the beginning of developing a detailed funding strategy will help to target and connect with potential funding partners.
- **Application Process and Administrative Burden**: Interested parties complete a 1-page project information form that summarizes the potential issues and needs by the project and provides estimated costs, if available. The interested party then presents on this project at one of RWIC's quarterly meetings where federal/state agencies indicate if they could aid based on the project information. These individual agencies then coordinate directly with the interested party.
- **Obstacles, Risks, and Associated Costs**: This organization is not a source of funding and no guarantees can be made of how effective it may be at identifying funding partners for Douglas. Because this organization only acts to introduce funding partners to Douglas, Douglas will need sufficient capacity to coordinate with the individual agencies based on the outcome of the meeting. The committee only meets quarterly and getting on the agenda may take some advocating from committee members. Douglas would need to identify committee members and reach out in advance to improve their chances of getting quickly on a meeting agenda.

6.2.2.2 General Services Administration: Port of Entry Program

Summary: Provides grant funding for planning, engineering, and construction of utility and transportation infrastructure and buildings associated with land ports of entry within the port of entry property.

Funding Magnitude, Duration, and Reliability	No maximum funding bound or duration that funding must be used, though it is limited to only the immediate port of entry area. Funding is limited to immediate Port of Entry area – accounting for approximately 10% of the total project cost.
Timing and Application Process	Funding is delivered once congressional appropriations for project are administered. Douglas will coordinate with GSA on estimating amount of funding will be for water and wastewater utilities within the port of entry property.
Viability of Receiving Funds	Funding is directly tied to congressional appropriations, which have an uncertain timing. While it is very likely the project will be ultimately funded, the exact timing of that funding is uncertain. Once funding is available will need to be used quickly.

- **Summary**: The Land Port of Entry (POE) funding program through the General Services Administration (GSA) provides grant funding for planning, engineering, and construction of utility and transportation infrastructure and buildings associated with land ports of entry. This program has funded major border modernization projects like the new POE in Douglas. However, funding from the program is limited to the infrastructure in the immediate area of the POE which limits how much funding Douglas could acquire. Funding is tied to congressional appropriations and thus there is uncertainty of exactly when this funding would become available.
  ***Recommendation*:** Continue to appraise GSA of project developments and funding needs. Leverage the congressional delegation to advocate for the new Douglas POE in Washington, and specifically, the needed water and wastewater infrastructure.

- **Application Process and Administrative Burden**: Funding requests for projects are handled through the GSA. Douglas will work with the GSA and Customs and Border Protection to define the scope of the project and identify the portion of project costs that will be contributed to by the GSA. This GSA funding source can then be used as part of the larger funding package when developing additional funding sources.

- **Obstacles, Risks, and Associated Costs**: Funding from this source can only cover the costs associated with the immediate POE, estimated to be around 10% of the total project cost. Funding is only made available once congressional appropriation containing the new POE is finalized. Currently, the timing of that appropriation is highly uncertain, though it is very likely the project will ultimately be funded. As advised by the GSA, once funding is available, Douglas will need to act quickly to utilize it. Thus, Douglas will need to be prepared to integrate GSA funding into the project funding strategy as it becomes available.

6.2.2.3 Water Infrastructure Finance Authority of Arizona

Summary: Revolving drinking water and wastewater loan program to finance the construction of water and wastewater infrastructure. Depending on the characteristics of the project and loan recipient, a portion of the principle loan amount may be forgiven.	
Funding Magnitude, Duration, and Reliability	No maximum funding magnitude or duration when funds must be used. There is also the Technical Assistance Program to help develop, design, and satisfy federal requirements for WIFA that has a maximum of $50k per project. Past funding amounts with Douglas were for $1.5 million and $5.5 million.
Timing and Application Process	No application period, board that distributes loans meets six times a year. Interested parties must first get on the project priority list then develop an application. Past application process took 3 to 4 months to complete.

FINANCIAL AND GROWTH ANALYSIS

Viability of Receiving Funds	Douglas has a history of success with WIFA with institutional knowledge. Existing city loan commitments will need to be accounted for before applying for new loans (with principal forgiveness) which could complicate the viability of this funding partner.

- **Summary**: The Water Infrastructure Finance Authority of Arizona (WIFA) administrates the Clean Water State Revolving Fund and the Drinking Water State Revolving Fund from the EPA. WIFA provides low-interest loans to fund the planning, design, and construction of water and wastewater infrastructure projects. Depending on the funding applicant size and socioeconomic makeup, WIFA may also forgive a portion of the principal loan amount, which in effect acts like a partial grant. Funding from WIFA can be combined with other funding partners to complete the funding for a project. ***Recommendation*:** Ensure the project is on the WIFA project priority list and quantify Douglas' WIFA debt capacity based on funds available for debt service.

- **Application Process and Administrative Burden**: Douglas will engage with WIFA to develop their funding application which includes getting on the project priority list and meeting federal requirements. Funding from WIFA, including the loan amount, rate, and repayment period, will be customized based on Douglas' needs and constraints. Because of this, Douglas will need to have staff with sufficient availability to work with WIFA. However, Douglas' recent success at using WIFA as a funding source will improve the efficiency of working with them.

- **Obstacles, Risks, and Associated Costs**: WIFA only provides low-interest loans and while Douglas has in the past gotten a portion of the loan forgiven, a majority will need to be repaid. Douglas already has multiple loans in repayment for both the water and wastewater system and thus the ability to take on more loans will need to be evaluated. This may require raising rates or securing additional sources of revenue, like impact fees. Both can take time and may have costs associated with them.

6.2.2.4 North American Development Bank

Summary: Provides grant funding via multiple individual programs to fund critical water/wastewater infrastructure projects that address either an existing human health or environmental issue for projects within 100 km of the international border with Mexico. Douglas has previously received grants from this funding partner.	
Funding Magnitude, Duration, and Reliability	Mixture of grant and loan programs that require local matching distributed from a variety of individual programs. Funds can be used for project planning, design, and/or construction. Some funds have limits from fund release to completion of project.
Timing and Application Process	Most programs have a rolling application process however the Community Assistance program has an annual application period.
Viability of Receiving Funds	Funding available only for critical infrastructure projects that address an existing human health or environmental need. Douglas has received grant funds in the past to fund upgrades at existing treatment facilities but unclear if the project would qualify as a critical infrastructure need.

- **Summary**: The North America Development Bank (NAD Bank) provides a mixture of grand- and loan-based funding through multiple programs for critical water and wastewater infrastructure projects. These programs cover project planning, design, and construction and can be used in combination with other funding sources. Douglas has previously used this funding partner for $10.4 million in grant-based funding of wastewater treatment plant capacity and compliance upgrades. The programs are:

  - *Project Development Assistance Program Grants (PDAP)*: Grants for water/wastewater project development and design. No max funding limit or duration, 50% match on final design.
  - *Border Environment Infrastructure Fund Grants (BEIF)*: Grant for high-priority water/wastewater projects that address an existing human health or ecological issue. Typically used in conjunction with other funding sources where BEIF would be needed to complete the project. Cannot be combined with funds from the NADB CAP grants. No max funding, projects must complete with 3-years.
  - *Community Assistance Program Grant (CAP)*: Grant funds for critical water/wastewater infrastructure projects. Cannot be combined with NADB BEIF grant funds. Grants NTE of $500k and 10% local cash match. Approval of funds and project initiation NTE 9 months.
  - *Loan Program*: Loans for project development, design, construction of water/wastewater infrastructure projects.
  - *Technical Assistance Program Grant (TAP)*: Grant funds for studies related to the design of water/wastewater infrastructure projects. Grant NTE $250k for single community, $350k for multiple communities and 25% local cash match.

  ***Recommendation*:** Leverage existing relationships with NAD Bank to assess the likelihood of NAD Bank providing capital for the project and consider project modifications that may increase NAD Bank's interest in the project.

- **Application Process and Administrative Burden**: Application process for many of these requires directly coordinating with NAD Bank to get on a project priority list and develop an application. Past applications required significant involvement from Douglas staff and upon reward require detailed quarterly reports.
- **Obstacles, Risks, and Associated Costs**: Funds are only made available to fund critical water/wastewater infrastructure projects that address an existing human health or environmental need. The infrastructure expansions associated with the project may not meet that requirement. Costs associated with project modifications to meet this requirement may negate any advantage of NAD Bank funding. Cost to develop applications can be significant, however Douglas has recent history with this funding partner that may help.

6.2.2.5 U.S. Department of Agriculture – Rural Development

Summary: Provides grant and loan funding for development, design, and construction of water and wastewater infrastructure in rural communities that could face health risks without proper access to utility services.	
Funding Magnitude, Duration, and Reliability	Several programs have different funding requirements. Funds for construction can be fully grants or a mix of grants and loans. Maximum funding amounts for project development and design are limited.
Timing and Application Process	Applications can be submitted year-round through Arizona office of this organization.
Viability of Receiving Funds	Emphasis of program is on connecting rural communities that face an immediate health risk to an existing water and/or wastewater system. The project does extend the water and wastewater system, though not to existing rural communities. May need to work with organization to see how project can fit.

- **Summary**: The U.S. Department of Agriculture through the Rural Development program (USDA-RD) provides grant and loan funding to rural communities to improve or extend water and wastewater infrastructure. The includes the Special Evaluation Assistance for Rural Communities and Households (SEARCH) program provides grant funding for development of feasibility studies, design and technical assistance on water and wastewater infrastructure projects. The Water & Waste Disposal Predevelopment Planning Grants program provides up to $30,000 (with a minimum 25% match) to help develop applications to other USDA-RD grant and loan programs. The Section 306C program provides grant funding to build water and wastewater infrastructure for low-income rural communities facing significant health risks. Finally, the Water & Waste Disposal Loan & Grant Program provides a mixture of grant and loan funding to small utilities for water and wastewater infrastructure projects. ***Recommendation*****:** Local USDA representatives can assist prospective borrowers and grant recipients. The City should connect regularly with the USDA representative to receive specific guidance on positioning for USDA funds.

- **Application Process and Administrative Burden**: Applications are completed and submitted on a rolling basis by coordinating directly with the USDA-RD in Arizona. Grant and loan funds require a preliminary design report to be completed as well as other federal certifications.

- **Obstacles, Risks, and Associated Costs**: The water and wastewater infrastructure expansions from the project may not align with the goals of the USDA-RD funding programs since there is not an immediate health risk and/or low-income households are not planned to be connected to the system.

6.2.2.6 Public/Private Partnerships

Summary: Douglas could engage with other funding partners who have a vested interest in the success of the project to provide additional revenue streams. These could include Freeport-McMoRan, Cochise College, and the US Border Patrol.	
Funding Magnitude, Duration, and Reliability	To help with the financial burden of the project, entities that would benefit could pay an impact fee. This impact fee would be negotiated directly with entities to set an appropriate amount and duration.
Timing and Application Process	No application process, negotiations would occur directly with interested entities.
Viability of Receiving Funds	With effective engagement and impact fee negotiation, Douglas could successfully receive financial assistance from these entities.

- **Summary**: The water and wastewater infrastructure upgrades proposed as part of the project will provide services to other entities besides Douglas. Potential beneficiaries of the project include are a mix of private, non-profit, and governmental entities such as Freeport-McMoRan, Cochise College, and the US Border Patrol. Some of these entities have a vested interest in the success and completion of the project. Some may have a vested interest in the success and completion of the project if it is designed to serve them. They could help Douglas with the financial burden of the project through impact fees or other financial contributions. Impact fees would provide an additional revenue stream to Douglas which could help project costs or increase the ability to receive loan assistance. ***Recommendation:*** The City should quantify the potential benefit of the project for these entities, investigate appropriate revenue structures to equitably recover costs through these beneficiaries, and model the associated revenue impact. Once Douglas understands the significance of these partnerships, the City should initiate structured discussions with potential partners.

- **Application Process and Administrative Burden**: There is no application process associated with acquiring these impact fees. Douglas would need to engage and negotiate with interested entities to arrive at an agreed-upon impact fee and duration. This will require time for Douglas time to work through the negotiations as well as develop any documentation or formal agreements. Often, partnerships fail because parties are unable to come to agreement over terms. Months and years can be spent in back and forth negotiations with lawyers and staff from

both parties. While Cochise College and the US Border Patrol have already indicated an interest in participating in the project, it may be more difficult to engage a broader set of partners. The administrative burden of establishing a public-private or a public-public partnership should not be underestimated.

- **Obstacles, Risks, and Associated Costs**: There is no guarantee that the entities here would be willing to pay impact fees to help share the financial burden of the project. Negotiating with these entities will need to be coordinated with the overall funding pursuit to ensure financial information is properly documented for any grand or loan funding applications. There may be significant Douglas staff time to engage with and finalize negotiations with these entities.

6.2.3 Funding Matrix Summary

A larger set of funding sources considered is presented in the following Funding Matrix Summary and the Funding Matrix spreadsheet in **Appendix D**.

Agency	Program
Grant Programs	
USDA - Rural Development	Section 306C Water and Waste Disposal Grants
USDA - Rural Development	Water & Waste Disposal Predevelopment Planning Grants
USDA - NRCS	Conservation Innovation Grants (CIG)
Economic Development Administration	Economic Adjustment Assistance (CARES Act supplemental funding)
General Services Administration (GSA)	Land Port of Entry
Arizona Department of Housing	CDBG Grant Program - Colonia Set Aside Account
Arizona Department of Housing	CDBG Grant Program - Regional Account
Arizona Department of Housing	CDBG Grant Program - State Special Project Round
Bureau of Reclamation	WaterSMART Water and Energy Efficiency Grants
Federal Emergency Management Administration	Building Resilient Infrastructure and Communities (BRIC)

FINANCIAL AND GROWTH ANALYSIS

Loan Programs	
Water Infrastructure Finance Authority of Arizona	Clean Water SRF
Water Infrastructure Finance Authority of Arizona	Drinking Water SRF
USDA - Rural Development	Water & Waste Disposal Loan & Grant Program
North American Development Bank	Loan Program
North American Development Bank	Border Environment Infrastructure Fund (BEIF/PDAP)
North American Development Bank	Community Assistance Program (CAP)
North American Development Bank	Technical Assistance - Project Studies and Designs
Arizona Department of Housing	CDBG Grants - Section 108 Loan Guarantee
US Environmental Protection Agency	Water Infrastructure Finance and Innovation Act (WIFIA)
Rural Community Assistance Corporation (RCAC)	Environmental Infrastructure Loan Program
Rural Community Assistance Corporation (RCAC)	Community Facilities Loan Program

6.2.4 Conclusions and Next Steps

As part of this Feasibility study, a variety of potential funding sources for Phase 1 of the project were evaluated and consolidated into an initial funding strategy. No single funding partner will fully fund the project; thus Douglas will need to seek funding from multiple sources in order to fully fund the project. In order to successfully acquire funding from multiple sources, Douglas will need to organize a funding team and engage regularly with potential funding partners in an organized manner. Consistently engaging funding partners will enable Douglas to be responsive and adaptive if new funding opportunities emerge and Congress provides support through appropriations. The Rural Water Infrastructure Committee will be an effective first stop as they have representatives from many of the funding partners identified. Other potential funding partners are the Water Infrastructure Finance Authority of Arizona, the North American Development Bank, the U.S. Department of Agriculture Rural Development program, the General Services Administration Port of Entry program, and a variety of third-party partners who would benefit from project completion. Once interested funding partners have been identified, Douglas will need to define critical dates, work products, and roles and responsibilities to successfully acquire the needed funding.

6.3 REAL ESTATE IMPLICATION AND OPPORTUNITIES

6.3.1 Introduction

Moving from a single port of entry in downtown Douglas, AZ to a two port model whereby the existing Port of Entry will serve passenger vehicles and the new port would be used exclusively for commercial traffic, will have measurable impacts on the tangential real estate that surrounds these two ports. Our high level analysis, conducted via interviews with market participants, the City of Douglas, Cochise County, and engagement in the planning sessions organized by Renaissance Planning, revealed market dynamics that, if properly capitalized on, could deliver meaningful economic benefit to both the City and the County

6.3.2 Real Estate Implications and Opportunities at Existing Port of Entry

The current of Port of Entry (“POE”) processes approximately 5,400 passenger and commercial vehicles per day and is projected to process approximately 7,300 passenger vehicles and 3,000 pedestrians per day by 2043, after it is reconfigured as a passenger-only facility. Traffic is projected to increase by 32.9% at this port according to the Douglas Arizona Regional Feasibility Traffic Study for the Raul Hector Castro Land Port of Entry, 2018. The vast majority of non-commercial traffic through the port is from Agua Prieta, Mexico into and through Douglas, AZ and back. The volume and consistency of this traffic is critically important as it forms approximately 70% of sales taxes collected by the City. While a professional study on the border customer has not been performed recently, the 2017 Origin & Destination Study report commissioned by the Sierra Vista Metropolitan Planning Organization points to the Mexican visitor’s interest in the relative quality of consumables available in the United States. Additionally, these consumers are attracted to American brand names they recognize and organize their shopping trips around visits to stores they know. A survey of cross-border visitors reveals their spending habits at these well-recognized retailers, summarized in **Table 6-7**.

Table 6-7: Top Retail/Dining Destinations

Table 2: Top Retail/Dining Destinations

Rank	Retail/Dining Destination	Summer	Fall
1	Mall	37.5%	46.3%
2	Ross	31.8%	23.0%
3	Walmart	22.8%	19.4%
4	Golden Corral	14.4%	17.6%
5	Target	11.7%	10.5%
6	Home Depot	8.4%	7.6%
7	Marshalls	7.8%	6.4%

Source: 2017 Origin & Destination Study report commissioned by the Sierra Vista MPO

While it is beyond the scope of this analysis, it is worth noting that the current retail mix in Douglas does not reflect well the consumer tastes or desires of the cross-border shopper. These shoppers travel through the Douglas POE to destinations beyond, most significantly to Sierra Vista, where they find the shopping amenities they are looking for. As noted in the 2017 report, the fact that many Mexican visitors are eager for better transportations options from Douglas to Sierra Vista for shopping is emblematic of a missed market opportunity. This perception of consumer behavior compliments well the expressed desire by the City to have more brand names and nationally recognized retailers to appeal to American travelers and visitors to Douglas that are not well served by the existing retail mix.

Downtown Douglas has an oversupply of vacant and available property well positioned for retail development, with G Avenue having a few buildings of architectural significance that could serve as new retail anchors. Market participants have noted some of the challenges with these properties, including accrued back taxes, deficient roofs and poor structural integrity. That said, there does not seem to be a supply constraint from a property perspective.

There are a few commercial and warehouse facilities in close proximity to the existing POE that, in all likelihood will be relocated to continue to serve the commercial traffic at the new port. The fact that the city owns two of these properties presents an opportunity to reposition them to a use that can best serve the cross-border traffic, capture a greater portion of the Mexican visitor's spending and entice these consumers to spend more time in Douglas, rather than pass through on their way to Sierra Vista or Tucson. Discussions with the City reveal that both warehouses, one at 300 1st Street at 100,000 square feet and another at 217 E. 3rd Street at 75,000 square feet have uses that are directly related to commercial truck traffic through the existing port. Additionally, given these properties adjacency to the passenger-only port, these represent excellent redevelopment opportunities that will have high visibility, ease of access and first stop / last stop retail development potential. One of the more readily achievable ideas that was surfaced during the planning session was that of a Mercado, where crafts and foods celebrating the rich histories of Douglas and Agua Prieta could enliven a commercial space and bring activity and energy to the street. While some may wish to see this use brought to Downtown Douglas as a way to concentrate the energy on those core blocks, it could also be hosted at one of the warehouses that already have

a structure for shade/weather and would provide for a pleasant gateway to Douglas for those traveling north from the border.

Outside of retail, which, as noted above, primarily serves the Mexican cross-border consumer, there is a significant pent up demand of residential housing that is not being efficiently met. This demand is generated by the Customs and Border Protection staff that currently serve the POE as well as the Correctional Offices that work at the Arizona State Prison north of downtown Douglas. Additionally, there is a demand for short/medium term housing from itinerant labor that comes to Douglas to work on the border wall and will soon be contracting on the new commercial POE.

Total Customs and Border Protection ("CPB") staff working at the existing POE number around 100 and it is anticipated that the new commercial port will bring an additional 100 officers to Douglas and Cochise County. The staff working at the land port facilities are complimented by between 500 and 600 Border Patrol agents whose local facility is located not far from the new commercial port of entry. Finally, the Arizona State Prison Complex off U.S. Highway 191 near the Bisbee – Douglas International Airport employ between 600 and 650 correctional offices. When considered from a residential demand perspective, these essential workers form a substantial pool of housing need; a need that is not currently being met in the City of Douglas where this population is employed. Due to the lack of available, quality housing in Douglas, these employees choose to live in Bisbee or Sierra Vista, significantly farther from their bases of employment. These essential workers' property taxes, retail spending, social and cultural engagement and community building energies are also focused in areas other than Douglas.

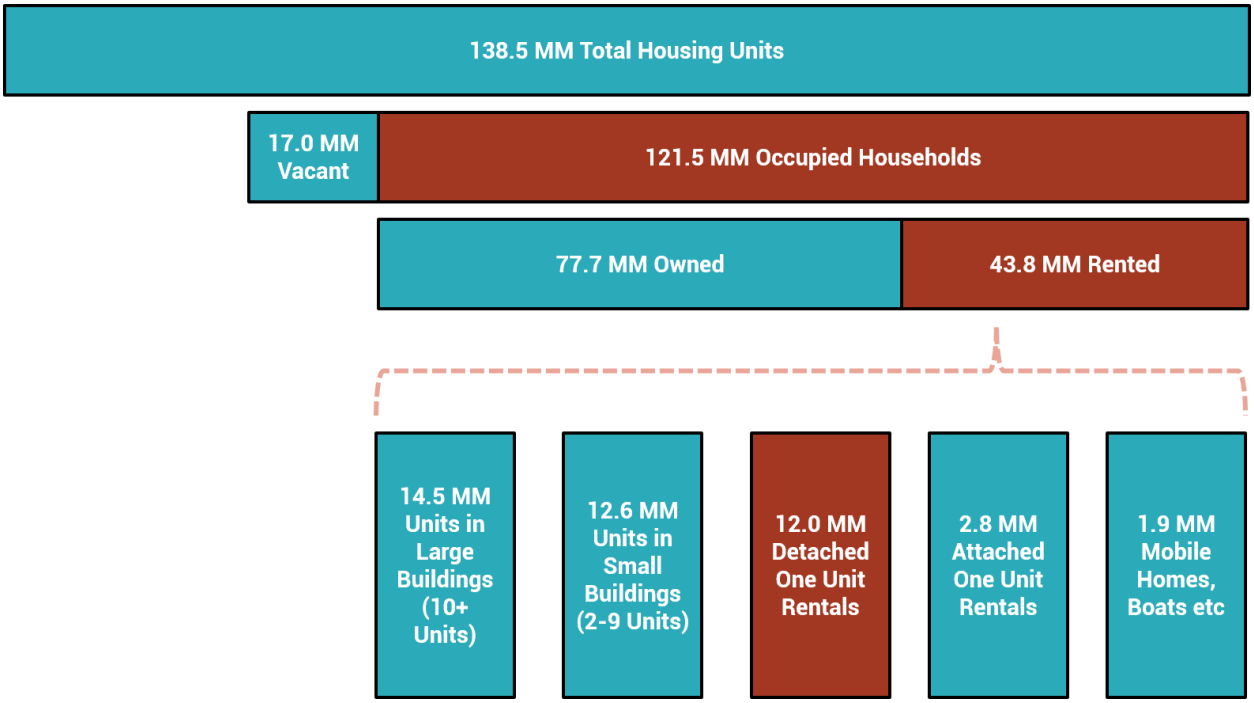
Through conversations with the City, it is understood that between 1,500 and 2,500 contractors will be working on the new POE, with 300-500 working in Douglas at any given time, for 3, 6- or 9-month assignments. Given the total construction timeline of 2-4 years for both ports to be complete, this is a substantial workforce to house, feed and host in a community of 17,300 people. One of the easiest ways to meet this need is with manufactured houses that can be affordably, reliably, and quickly designed and erected in Douglas / Cochise. This product would likely best serve the itinerant labor force that would be working on the new POE and other county and City contracts. Through conversations with general contractors with experience on Land Port of Entry Facility construction, their standard approach to a project in a City as remote as Douglas would be to employ a third party company to deliver a "man camp" for contracting staff with individual rooms, circulation areas and a staffed kitchen for meals. The City's challenge is to get ahead of this anticipated demand by strategically thinking about how host this labor force and direct their spending in a way that supports local businesses. While it is unlikely that these could be properly accommodated for in downtown Douglas, just outside of Douglas proper that can easily host this type of use. Conforming to the anticipated land use designations will also be important to ensure the worker housing is not in conflict with current or future zoning.

Examples of manufactured houses:

An evolution of this concept and one that would likely best accommodate CBP, Border Patrol and Correctional Officers and their families is a Build-For-Rent / Single- Family Rental development model. In this approach, spec homes are designed and constructed specifically with a family renter in mind. The increasing appeal of this product is their affordability, relative to owning a home, the comfort of a single-family detached property with private outdoor space and the opportunity to remain free from long-term financial burdens. As has been noted in many of the planning meetings and sessions with the City and County, there is no lack of land available to host this type of development. That said, minimizing horizontal infrastructure costs by tying into existing water/sewer will help ensure the development can meet the essential workforce housing price point and entice a substantial portion of these workers to make Douglas their home. Identifying property that does not require substantial onsite and offsite improvements and that is close in enough to Downtown so as not to tax extensions of services is a worthwhile exercise.

Nationally, build-for-rent developments are becoming increasingly attractive to the millennial generation, whose homeownership rate of 37% is 8% lower than the homeownership rates of Gen Xers and baby boomers at the same age[4]. The exhibit below shows how significant single-unit detached rentals are becoming as part of the overall US housing stock.

[4] https://www.crowdstreet.com/resources/investing/build-to-rent



Source: RCLCO

Figure 6-5 - US Overall Housing Stock

Examples of Single-Family Rental Communities

The City of Douglas has also commissioned a Hotel Feasibility Study by Newmark Grub Knight Frank, a national brokerage, that concluded the market could support an 80-room, upper-midscale, limited-service hotel in the area north of Downtown Douglas at the intersection of Pan American Avenue and Highway 80. The type of facility recommended, which would provide a complimentary breakfast, fitness center, lobby pantry shop, guest laundry room and a modest amount of meeting space would likely mostly serve out of town contractors and a small

subset of American tourists (the majority of which are day-trippers who overnight in Tucson[5]). At 80 rooms, this hotel would help accommodate the 300-500 contractors active on the new POE at any given time, but significant housing and accommodations options would still be required to host them all comfortably and reliably.

6.3.3 Real Estate Opportunities at New Commercial Land Port of Entry

With the concentration of commercial traffic through the new Land Port of Entry 5 miles to the west of Douglas, there should be a migration of commercial businesses currently serving this customer in Douglas to the new service area. These uses include gas stations, auto parts dealers and warehousing for manufactured goods moving in both directions.

Examples of new development opportunities that could present themselves to serve this traffic is a full-service truck stop/gas station/repair center that offers 24-hour convenience to commercial truck drivers. Facilities like Love's or Pilot Flying J offer a wide range of services tailored for this type of traffic and would have a captive market for the cross-border customer. Additionally, with concentrated commercial traffic, there may be a need for cold -storage warehousing of perishable goods moving north from Sonora, Mexico. Having a properly designed and operated cold storage warehouse to offload and store contents from refrigerated trucks moving produce from Mexico could be a meaningful market opportunity. Currently, these facilities can only be found in Nogales, where there are a growing number of produce warehouses, distribution and repackaging centers and affiliated companies. If the new commercial POE were to demonstrate faster processing and less wait times, commercial traffic currently using Nogales would only consider a move to Douglas if the infrastructure were there to support it. Given Douglas' greater proximity to the large and lucrative Texas market and ease of access to Interstate 10, it could reasonably incubate a warehousing/distribution industry that could provide an economic boost to the City of Douglas and Cochise County. Table 6-8, generated by data provided by the Bureau of Transportation Statistics, illustrates the stark difference in commercial truck traffic between the two ports. It is noted that there may be other factors, including the rail link in Nogales and proximity to Tucson and access to the western United States, that also account for some of this relative imbalance.

Table 6-8: Commercial Truck Traffic

Measure	Port Name	2020	2019	2018	2017	2016	2015	2014
Truck Containers Empty	Nogales	53,083	66,136	60,317	62,755	66,659	64,922	58,334
Truck Containers Empty	Douglas	6,143	6,541	6,762	9,561	12,904	12,652	13,032
Truck Containers Full	Nogales	170,059	293,771	284,896	353,773	271,015	256,895	256,074
Truck Containers Full	Douglas	8,696	20,048	21,044	26,292	17,366	17,478	17,701
Trucks	Nogales	223,746	349,377	337,179	333,941	335,737	319,747	312,010
Trucks	Douglas	14,887	26,588	27,804	30,649	30,815	32,104	33,104

[5] Douglas, Arizona Land Port of Entry Market Study, Fiscal Hot Spot Analysis and Zoning Code Audit. Smart Growth America and Renaissance Planning

7.0 WATER AND WASTEWATER ACTION PLAN

Recognizing the long-term water and wastewater infrastructure plans developed in this report, this section provides a strategy guide to the development of the water and wastewater systems to serve the POE**.** The strategy guide is based on a series of Action Items for the County and City to move forward from this report to in place water and wastewater infrastructure to serve the POE. The GSA date when they expect the water and wastewater infrastructure will to be in place is still not known. For purposes of this report it has been assumed to be 2025.

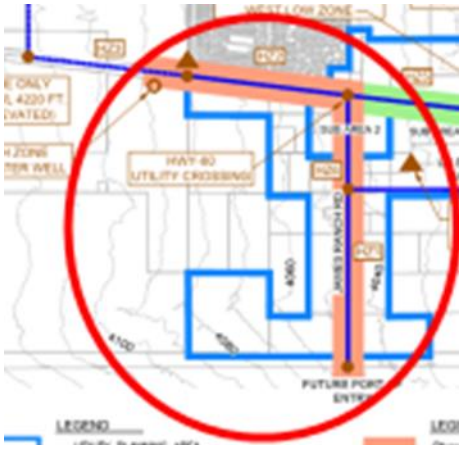
7.1. FULL BUILD OUT

The recommended water and wastewater infrastructure to support to the POE and the Planning Area 1-5 (POE and along James Ranch Road and SR 80 between James Ranch Road and the City of Douglas west boundary) and Planning Areas 6-8(Along I 191 from the north boundary of the City of Douglas to the general area of BDIA/ADCF complex) in support of the POE at full land development buildout of the 7630 acres has been outlined in this report. The full land build out at the noted 2% growth rate is estimated to take many decades (2020 to 2220). The water systems (groundwater wells, water treatment, and distribution pipes and storage) and wastewater systems (wastewater collection, treatment and reuse) have been developed in this report to accommodate development of the POE and full development of the Planning Areas 1-8.

The strategy for the water system is to connect to the City system by building water system with new groundwater wells and storage tanks/reservoirs to meet the water needs of the POE and Planning Areas 1-8 that will also improve the performance, reliability and resilience of the City's existing water system.

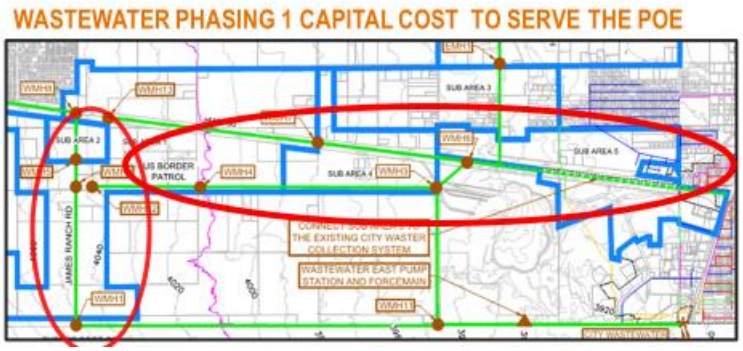
The strategy with the wastewater system is to have the wastewater collection system serving the POE and the Planning Areas 1-8 flow to the City's WWTF. At the noted growth rate, the City's WWTP has the capacity to take the wastewater flow in the early several decades. Planning will have to occur for improvements needed to accommodate the flow stream in the long-term buildout.

7.2. INITIAL SERVICE TO THE POE



It is recognized that in the short term, in this case 2020 to 2025, that only a small portion of the long-term buildout water system would have to be built to serve the POE. This would include a new well and elevated storage tank in the vicinity of James Ranch Road and SR 80 and a pipeline from that location to the POE. The estimated cost is $8.4 M within a range of $5.5 M to $13.8 M. This phase will also provide service to lands immediately bordering the pipeline James Ranch Road.

The plan would be to gradually expand the water system in alignment with future land development along SR 80 between James Ranch Road and the west existing boundary of the City and along I 191 from the north boundary of the City to the vicinity of BDIA/ADCF.



It is recognized that in the short term, in this case 2020 to 2025, that a small part of the long term build out of the wastewater system would be built to serve the POE. This would include a new collection system along James Ranch Road and SR 80 from James Ranch Road to the connect to the City wastewater collection system at the west boundary of the City. The estimated cost is $12.6M within a range of $8.2 M to $20.9M. This phase will also provide service to lands immediately along James Ranch Road and SR 80 to the point of connection to the City wastewater collection system. The plan would be to gradually expand the wastewater system in alignment with future land development along I 191 from the north boundary of the City to the vicinity of BDIA/ADCF.

7.3. ACTION PLAN PROGRAM AND SCHEDULE

This section provides the Action Plan program and tentative schedule 2020 to 2025 with twelve action items for delivery of the water and wastewater systems to the POE site. The Action Plan includes the description of the 'Specific Action', 'Who Leads 'the action item, 'Who to Involve 'in the action item delivery and the 'Time Frame' for the action item. At the date of this report a GSA POE delivery schedule was not available. The schedule may be adjusted to align with the GSA's POE delivery schedule and funding acquisition. The Action Plan is summarized in **Table 7-1** illustrated in **Figure 7-1** 'Water/Wastewater Service to the POE and Connection to City Systems Along SR 80- Capital Program Funding 2020 to 2025'**.** The Action Plan timeline begins with the completion of this report.

Table 7-1: Water and Wastewater Infrastructure Action Plan and Schedule

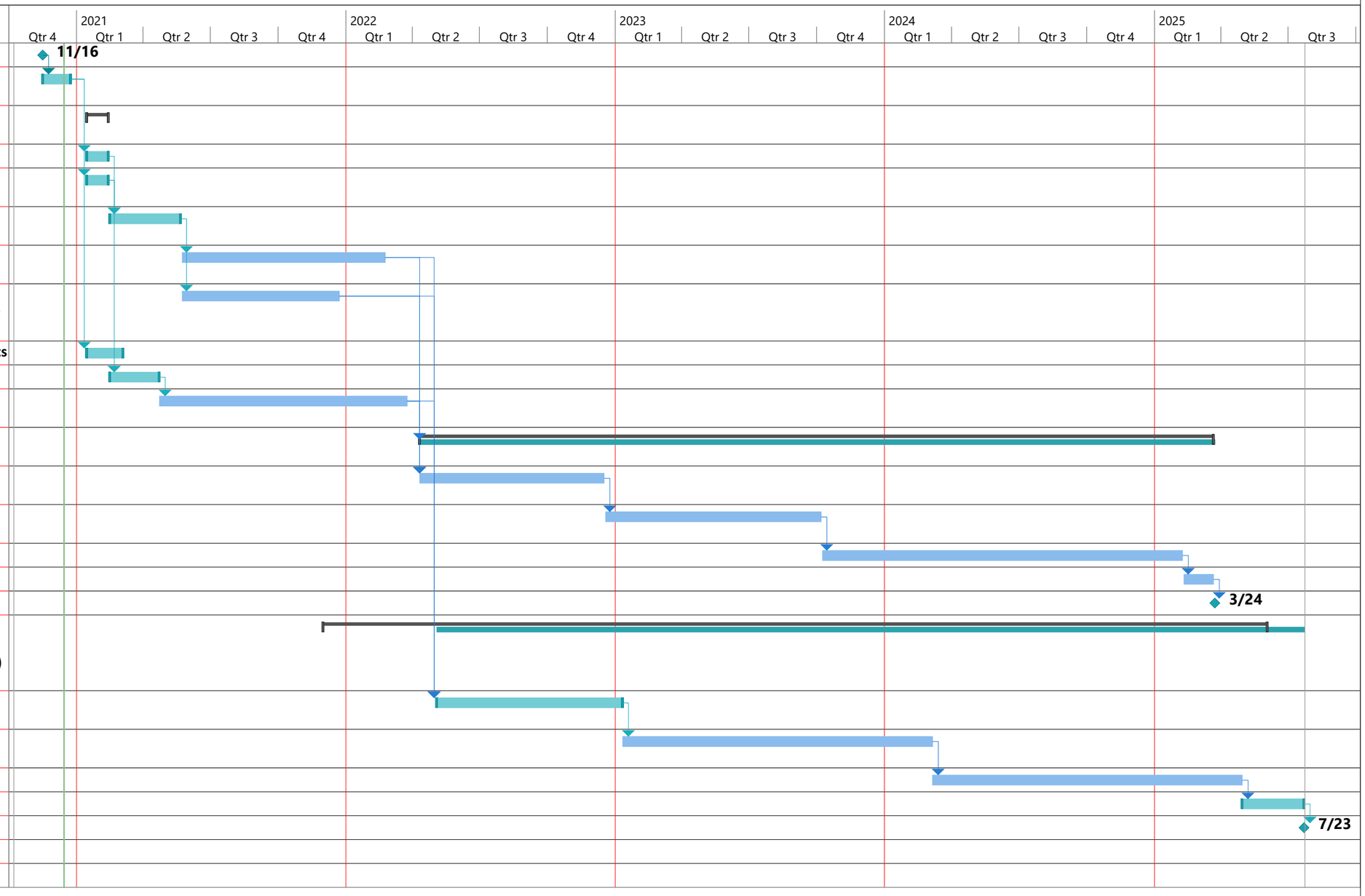
1	***Prepare a Program Action Plan and Schedule 2020 to 2025***			
	Specific Action Plan	**Who Leads**	**Who to Involve**	**Time Frame**
	Prepare an Action Plan and Schedule to deliver the Water and Wastewater Infrastructure to the POE	County/City	Stantec/GSA/ ADOT/APS	Start 11/20 Complete 12/20
2	***Onsite or Community POE Water and Wastewater Systems***. *Decision on the POE servicing approach by either :* *A. A dedicated POE Onsite Water and Wastewater Systems or* *B. Community Water and Wastewater Systems Connected to the existing City of Douglas Water and Wastewater utilities*			
	Specific Action Plan	**Who Leads**	**Who to Involve**	**Time Frame**
	Understand the POE specific servicing needs and project time schedule, reach agreement on the servicing and financing approach by adopting 1) Onsite systems or 2) Community systems. Identify participation of Cochise County.	GSA, City Planning and Engineering, County Planning,	ADEQ, ADWR, Stantec, Cochise College, US Border Protection, BDIA, ADCF, Stakeholders, Public	Start 1/21 Complete 02/21
3	***Annex County Land. Finalize Water and Wastewater Concept Plan to Reflect annexation***. *To reflect the City/County annexation process, revise the 'Stantec- Water and Wastewater Feasibility Report Douglas, Arizona' report to the County November 2020 to:* *A. Identify the boundary of land for annexation to the City in support of the opportunities provided by the POE,* *B. Revise and identify the land use plan for the annexed area reflecting Mexico/USA International border real estate assessment.* *C. Make a determination of the corresponding water and wastewater system needs* *D. Update the 'Stantec November 2020 Infrastructure Report' proposed water and wastewater system needs* *E. Prepare a project schedule to align with the GSA project schedule*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	During the annexation consideration process, identity and reconcile land use differences from the Stantec Water and Wastewater Feasibility Report Douglas, Arizona	City Planning/County Planning	Public, Stakeholders, Stantec	Start 2/21, Complete 5/21
4	***Approval of Water and Wastewater Service Area Boundary Expansion*** *Work with ADEQ, EPA and ADWR for approval to expand the boundaries of the City water and wastewater utilities.*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Prepare and submit materials to the State to receive permission to expand the service area of the City water and wastewater utilities.	City Engineering, Cochise County	ADEQ, EPA, ADWR, Public, Stakeholders	Start 5/21, Complete 2/22
5	***Update City's Master Water and Wastewater Plans.*** *Update the City's' Master Water Plan and the Master Wastewater Plan including financial plan infrastructure phasing and delivery schedule to reflect decisions made to integrate the POE and annexed lands into the City water and wastewater utilities service area.*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Update the City's Master water and Wastewater Plans to reflect the expanded service area needs including the POE. Identify phasing and capital needs to provide immediate service to the POE and annexed lands with initial development potential (2020-2025) and improvements to the City WWTF.	City Engineering / Stantec	ADEQ, ADWR, Public, stakeholders.	Start 5/21 Complete 12/21

WATER AND WASTEWATER ACTION PLAN

	Identify City Utility Operation and Maintenance needs			
6	***Capital Funding & Submittal Requirements.*** *As an outcome of the Cochise County 'Water and Wastewater Feasibility Report Douglas, Arizona' report to the County November 2020, develop the POE/City water and wastewater expanded service area capital infrastructure needs, phasing and a financial plan (capital and operation and maintenance). Approach funding sources identified in the Stantec report to understand the specific submittal needs of each agency.*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Engage all possible State and Federal funding agencies for specific direction on capital funding to construct water and wastewater infrastructure to support the POE and lands within the City expanded water and wastewater service areas.	City Engineering City Finance	Funding organizations Publi Stakeholders Stantec	Start 1/21 Complete 3/21
7	***Capital Funding Applications Submittal Preparation -*** *Develop and submit infrastructure funding application packages specific to the targeted State and Federal funding agencies.*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Develop and submit specific funding packages to targeted State and Federal capital funding agencies recognizing the funding cycle of each funding agency.	City Finance City Engineering	Funding agencies Stantec	Start 2/21 Complete 4/22
8	***Capital Funding Applications Submittal Management***			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Manage capital funding application submittals from the date of submission to the date of approval to targeted State and Federal capital funding agencies recognizing the funding cycle of each funding agency.	City Finance City Engineering	Funding agencies Stantec	Start 4/21 and monitor through to 3/22
9	***Delivery of Water System Phase 1 to Serve POE & James Ranch Road- POE to SR 80*** *(Planing Areas 1 & 2) capital infrastructure delivery program on receipt of capital funding approvals*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Develop Preliminary Engineering Report, right of way/land acquisition, permitting (ADWR & ADEQ), power supply, detailed design, contractor selection, construction, startup and commissioning.	City Finance City Engineering City Purchasing	Funding agencies, Stantec, ADOT, ADWR, ADEQ, EPA, APS, Broadband Supplier, Stakeholders	Start 4/22 Complete 3/25
10	***Delivery of Sanitary Wastewater System to Serve POE & James Ranch Road/SR 80 to connect to the City wastewater system*** *(POE, James Ranch Road/SR 80 to connect to the City wastewater system, Planning Areas 1-5) capital infrastructure delivery program on receipt of capital funding approvals*			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Develop Preliminary Engineering Report, right of way/land acquisition, Permitting (ADWR & ADEQ), detailed design, contractor selection, construction, startup and commissioning	City Finance City Engineering City Purchasing	Funding agencies, Stantec, ADOT, ADWR, ADEQ, EPA, Stakeholders	Start 12/21 Complete 6/25
11	***Ensure that delivery of broadband by the private sector to the POE and the Planning Areas 1-8 is complete and operational***			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Provide City and County support where possible to the private sector broadband providers to ensure a highest quality technical functioning broadband system.	City Engineering, County Engineering, ADOT	Private sector broadband service providers, Stakeholders	Start 12/21 Complete 6/25
12	***Real Estate at US/Mexico International Border Point of Entry***			
	Specific Action	**Who Leads**	**Who to Involve**	**Time Frame**
	Incorporate findings from a review of typical land uses at USA/Mexico Border Points of Entry into land use Planning Areas.	City Planning, County Planning, Stantec	Private sector, stakeholders	Start 12/20 Complete 5/21

Douglas POE- Action Plan 2020-2025- Water / Wastewater Infrastructure

ID	Task Name
1	**POE Water/ Wastewater Feasibility Plan**
2	**Action Item 1 - Prepare the Infrastructure Delivery Action Plan 2020 - 2025**
3	**Action Item 2- Decision POE Onsite/Community Service**
4	**Action Item 2a - POE Onsite Water System**
5	**Action Item 2b - POE/Plan Areas 1-8 Community Water System**
6	**Action Item 3 - Finalize Infrastructure Concept Plan Reflecting Annexation**
7	**Action Item 4 - Approval of Water and Wastewater Service Area Expanded Boundaries**
8	**Action Item 5 - Update City's Master Water/Wastewater Infrastructure/ Finance Phasing Plans**
9	**Action 6 - Capital Funding & Submittal Requirements**
10	**Action Item 7 - Capital Funding Applications**
11	**Action Item 8 - Capital Funding Applications Submittal Management**
12	**Action Item 9 - Delivery of Water System Phase 1 POE & Plan Area 1 & 2 - (James Ranch Road- POE to**
13	**9a Preliminary Enginerering Report (PER) /Right of Ways, ADEQ/ADWR Permitting**
14	**9b Detailed Design and Contractor Selection**
15	**9c Construct**
16	**9d Startup/Commissioning**
17	**9e Complete**
18	**Action Item 10 - Delivery of Sanitary Wastewater System POE & Planning Areas 1-5 - (POE, James Ranch Road/SR 80 to City Wastewater System (City)**
19	**10 aPreliminary Enginerering Report (PER) n/Right of Ways, ADEQ/ADWR Permitting**
20	**10b Detailed Design and Contractor Selection**
21	**10c Construct**
22	**10 Startup/Commissioning**
23	**10e Complete**
24	
25	



Water/Wastewater Service to POE and Connection to City Systems Along SR 80

Date: Tue 12/15/20

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

Figure 7-1

8.0 CONCLUSION

In conclusion, there are many possible alternatives to provide water and sewer to the Port of Entry. While the most cost-effective option is for GSA to provide on-site water and sewer services, development goals should also be considered. This feasibility study provides background information regarding the Planning Areas, zoning, populations trends, Douglas water and wastewater facilities, environmental resources, and groundwater analysis. Multiple alternatives for water and wastewater were developed within the report and a hydraulic model of the existing water system as well as the proposed extensions was developed to serve future needs. Conceptual alignments for both water and wastewater services to Cochise College, the Planning Areas, the Port of Entry, US Border Patrol, and BDIA were developed as well as high level cost estimates. A cost benefit analysis was conducted, funding opportunities were researched, and real estate implications were shared. Finally, an action plan was developed to describe milestones and proposed schedule estimating five years to construction. The action plan identifies the alternatives selected and provides phasing details to first establish water service to the Port of Entry and James Ranch Road and sanitary sewer from the Port to the WWTP. Then phases were developed to design and construct the Planning Areas as funding becomes available.

9.0 REFERENCES

Arizona Department of Environmental Quality (ADEQ), 2000. Ambient Groundwater Quality of the Douglas Basin: An ADEQ 1995-1996 Baseline Study, ADEQ Fact Sheet 00-08.

Arizona Department of Water Resources (ADWR), 2009, Arizona Water Atlas: Section 3.52 Water Resource Characteristics of the Gila Bend Basin, November 2009.

ADWR, 2016. Douglas and Willcox Basins and San Simon Valley Sub-basin, South Eastern Arizona - Hydrologic Monitoring Report No. 9. May 2016.

ADWR, 2020. Groundwater Site Index. https://gisweb3.azwater.gov/gwsi. Accessed May 2020.

Arizona Department of Water Resources. https://gisweb3.azwater.gov/WellReg. Accessed April 30, 2020.

Clinger, Robert, 2016, The City of Douglas Wastewater Treatment Upgrade to 2.6 MGD Final Design Report.

Coates, D. R., 1952, Douglas basin, Cochise County, in Groundwater in the Gila River basin and adjacent areas, Arizona – a summary by L.C. Halpenney and others: U.S. Geological Survey open-file report, p. 187-194.

Coates, D.R., and Cushman, R.L., 1955. Geology and groundwater resources of the Douglas basin, Arizona, with a section on chemical quality of the groundwater by J.L. Hatchett: U.S. Geological Survey Water-Supply Paper 1354, 56p.

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

Domenico, P.A. and F.W. Schwartz, 1990. *Physical and Chemical Hydrogeology*, John Wiley & Sons, New York, 824 p.

Driscoll, F.G., 1986. *Groundwater and Wells (2nd ed.),* Johnson Filtration Systems, Inc., St. Paul, Minnesota, 1089p.

Rascona, S.J., 1993. Maps Showing Groundwater Conditions in the Douglas Basin, Cochise County, Arizona - 1990. Phoenix, AZ: ADWR.

Douglas Wastewater Treatment Plant Aquifer Protection ... (n.d.). Retrieved from https://static.azdeq.gov/pn/fs_douglas.pdf

News. (2018, May 14). Retrieved from https://www.nadb.org/news/city-of-douglas-breaks-ground-on-wastewater-treatment-plant

Douglas, Arizona Population 2020. (n.d.). Retrieved from https://worldpopulationreview.com/us-cities/douglas-az-population/

Appendix Subtitle

Appendix A DOUGLAS BASIN AND GROUNDWATER SUPPLY TO POE AND PLANNING AREAS 1-8

Appendix B PROBABLE COST ESTIMATES AT AAEE CLASS 5

Appendix C CITY OF DOUGLAS MUNICIPAL SERVICE GUIDE BROCHURE

Appendix D FUNDING MATRIX

APPENDIX A

Stantec

Memo

To:	Sharon Gilman Bisbee AZ	From:	Colleen Ruiz Chandler AZ
File:	2042584400	Date:	July 22, 2020

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY
PROJECT NO. 20-24-BOS-03

Memorandum: Change Order #1: Water System Hydraulic Model- Task 212 Groundwater Resources Investigation

1.0 Executive Summary

The County has approved and funded the development of the City of Douglas Water Distribution System Hydraulic Model by Stantec. The model will be used to not only support the investigation of the water system capacity to service the proposed Douglas POE and sub planning areas 1-8 but as a tool for the City of Douglas (City) to operate and plan future improvements to the City water distribution system.

The City had identified issues with the capacity of the current groundwater wells to meet existing maximum day demand, and suggested three (3) possible locations for adding two wells each 500 gpm, including replacement of wells 11 and 12 and a new well located on City property at 15th Street and Van Buren Avenue. The locations will have an important influence on hydraulic modeling results. This memorandum summarizes the City selected sites that will be used in the water distribution system model.

The Change Order #1: Water System Hydraulic Model- Task 212 Groundwater Resources Investigation includes a desktop analysis to provide high-level assessment on the location and capacity of two (2) future groundwater wells in the City water distribution system. These two (2) new wells, in combination with the existing six (6) wells by agreement with the City, will be included in the water system model.

Depth to groundwater in the City area is approximately 275 ft to 350 ft, with a saturated thickness of the regional aquifer (upper and lower alluvial units, combined) of approximately 400 ft east of the City to approximately 1,600 ft near Pirtleville, to the northwest of the City (ADWR, 2016). A cone of groundwater depression likely exists surrounding the City (pumping center), but due to the International Border to the south and lack of corroborating evidence, this has not been confirmed. ADWR water level data from several City wells indicates a water level decline of approximately 3 ft/year has occurred in recent history.

In general, locations with greater saturated thickness and higher transmissivity values are more productive for water supply wells. Based on the limited available data and forecasted projections of saturated thickness and resulting transmissivity, it appears that the locations at existing wells 11 and 12 could likely yield a long-term production of 500 gpm. Furthermore, well "replacements" at existing wells 11 and 12 could ease permit requirements, as an impact analysis would not be required by ADWR if replacement wells could remain within 160 ft of the existing well(s). The location at 15th

Street and Van Buren Avenue may not have adequate saturated thickness or aquifer transmissivity to achieve a 500 gpm well, especially if water level declines continue at a similar rate into the future. Additionally, this "new" well site would require an impact analysis to determine if any impacts would result to other nearby wells. Therefore, of the three locations evaluated, replacement of wells 11 and 12 are recommended.

Accordingly, Stantec will use the location of the replacements Wells 11 and 12 at 500 gpm each well in development of the City's water distribution system hydraulic model.

The projections and estimates provided herein are based on limited desktop data. The following detailed design steps are recommended.

1. **Use the City's water distribution hydraulic model to confirm the location of the replacement wells 11 and 12.**
2. **Prepare a conceptual well design and specification for bidding. Select a Contractor for test hole drilling at the noted well locations with zonal testing (for water quality and production capacity), and downhole geophysics.**
3. **Finalize the well design based on the pilot borehole data and drill the new well.**
4. **Equip the well with the pump and motor necessary to achieve at least 500 gpm and meet the water distribution hydraulic grade line**
5. **Construct the site civil, mechanical, electrical and communication infrastructure and commission and startup the well.**
6. **A numerical groundwater flow model is also recommended for consideration to calculate a water budget of the area, more accurately project future water level declines, evaluate future well placement, and optimize wellfield management.**

2.0 Introduction

The County has approved and funded the development of the City of Douglas Water Distribution System Hydraulic Model by Stantec. The model will be used to not only support the investigation of the water system capacity to service the proposed Douglas POE and sub planning areas 1-8 but as a tool for the City of Douglas (City) to operate and plan future improvements to the City water distribution system.

The City had identified issues with the capacity of the current groundwater wells to meet existing City water demand conditions. The City had identified three (3) possible locations for adding two wells to the City water system. The locations will have an important influence on hydraulic modeling results.

The Change Order #1: Water System Hydraulic Model- Task 212 Groundwater Resources Investigation is a desktop analysis to provide high level assessment to the City on the location and capacity of two (2) future groundwater wells in the City water distribution system. These two (2) new wells in combination with the existing six (6) wells by agreement with the City, will be included in the water system model.

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03

This memorandum provides a brief desktop investigation of groundwater resources in the vicinity of Douglas, AZ including identification of registered well sites, depths to groundwater, groundwater elevations and flow directions. Water quality of groundwater was also considered. The groundwater investigation reported in this memorandum included researching only existing and available reports. No groundwater modeling is included as part of this phase of work. The results of the investigation include a brief narrative describing the findings of the investigation along with a map showing registered well locations and estimated groundwater elevations and flow directions.

It is noted that Stantec is assisting the County and the City in development of conceptual level water supply systems to serve the proposed Douglas POE and the Country sub planning Area 1-8. The water systems will include new groundwater wells to meet the water demand from these planning areas.

3.0 Methodology

A desktop hydrogeologic investigation has been performed with the objective of providing technical assistance to the City on the suitability of the locations identified by the City for two new municipal water supply wells. This investigation included review of available hydrogeologic and water resource data, including well logs, publications from the Arizona Department of Water Resources (ADWR), United States Geological Survey (USGS), Arizona Department of Environmental Quality (ADEQ), and City-provided data for the existing municipal supply wells.

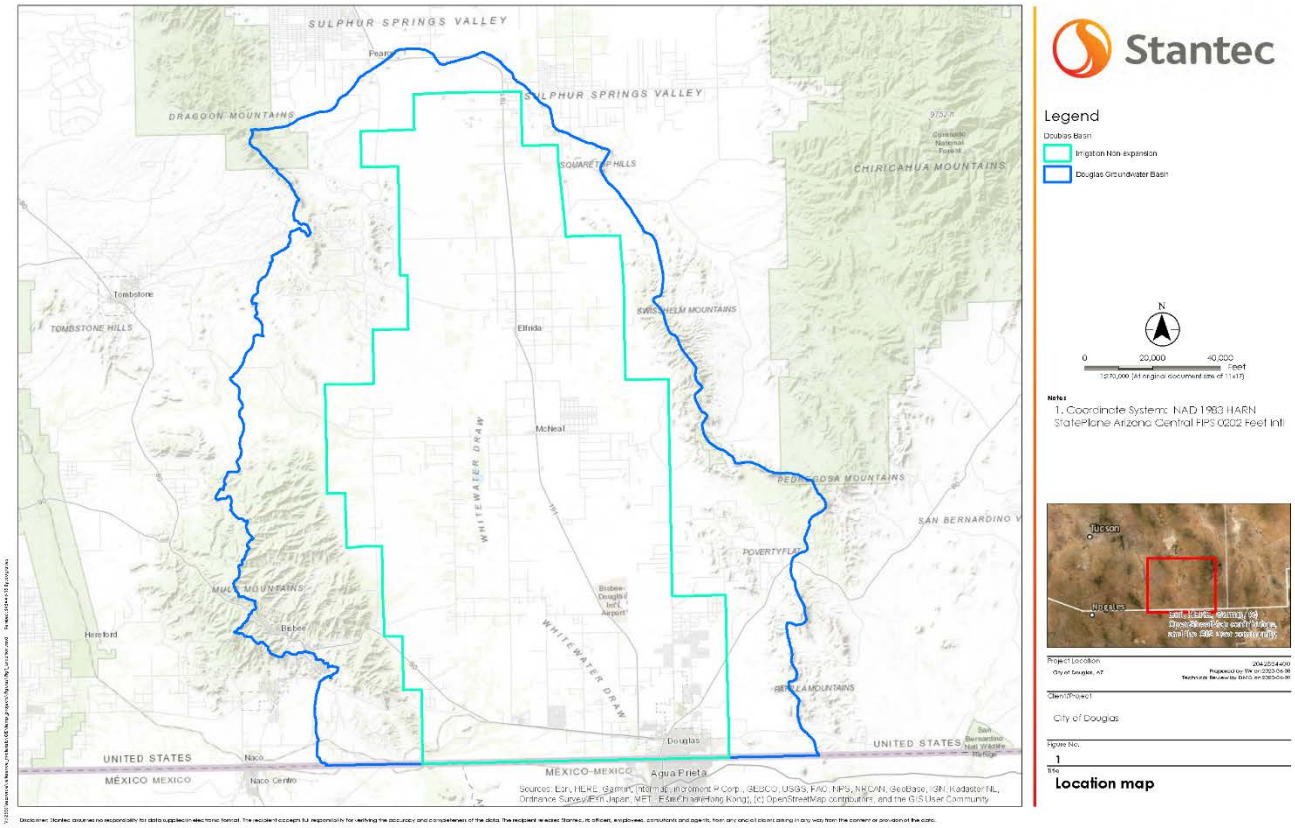
The purpose is to estimate production capacity and water quality for various locations in the City for consideration of future well siting. Although the scale of the investigation is more regional in context, beginning with the Douglas Basin and narrowing on the City of Douglas vicinity, the City has expressed interest in three specific locations for well placement: near existing Well 11, near existing Well 12, and near 15th Street and Van Buren Avenue. These locations are discussed in the following sections.

4.0 Background of Regional Geologic and Hydrogeologic Setting

4.1 Douglas Basin

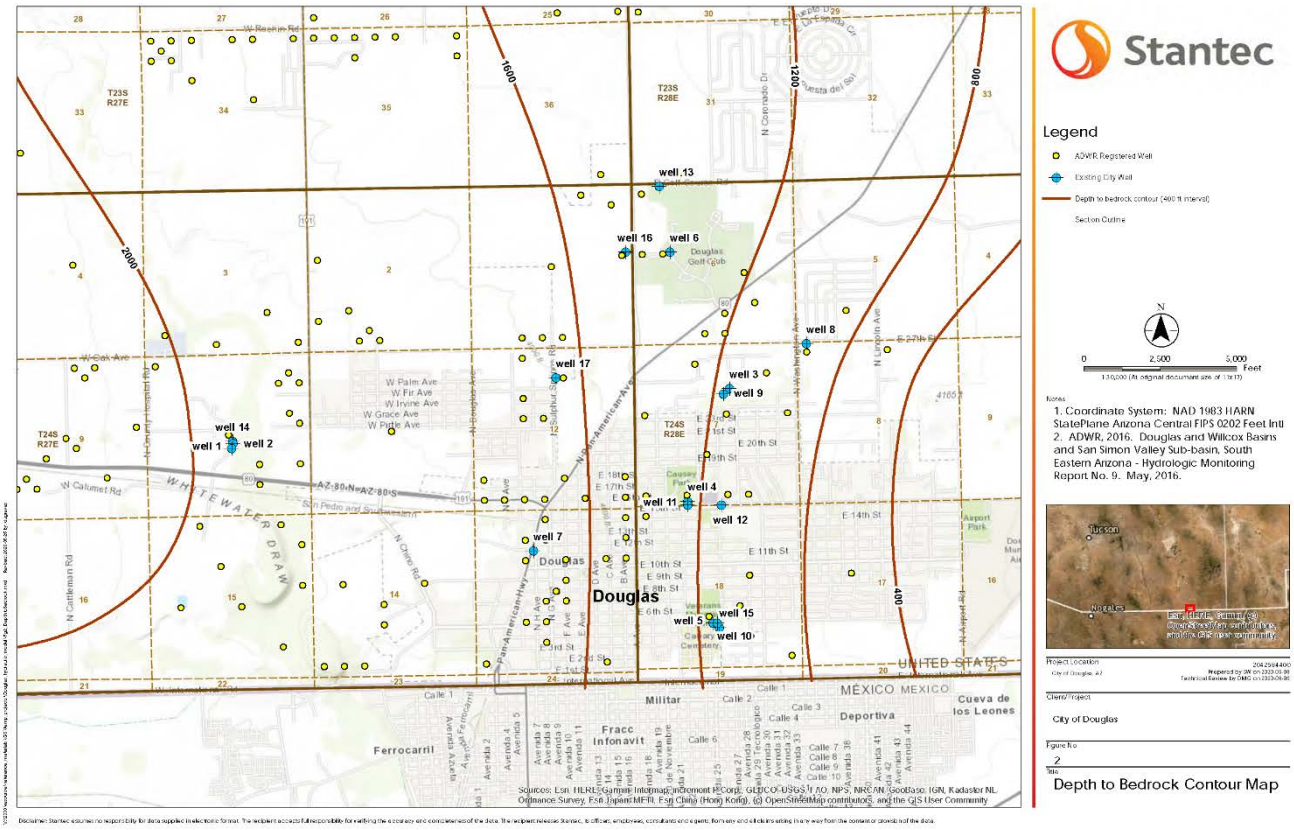
The Douglas Basin is located in the Mexican Highland Section of the Basin and Range Physiographic Region and includes an alluvial-filled basin fault-bounded on the east and west by mountain ranges. The basin is approximately 950 square miles. The primary hydrologic feature of the basin is Whitewater Draw, an ephemeral stream that traverses the longitudinal axis of the basin from north to south and flows through the City of Douglas, which is located in the southeast corner of the basin. Approximately 540 square miles of the basin has been designated as an Irrigation Non-expansion Area (INA), per ADWR, a legislative measure that has been in place since 1980 which prohibits the expansion of land

irrigated with groundwater as a measure to curb over-extraction of the aquifer (Rascona, 1993). **Figure 1** shows the location of the Douglas Basin and City of Douglas.



The basin fill consists of alluvial deposits of variable composition, including silt, sand, and gravel, and is generally divided into the upper alluvial deposits and lower alluvial deposits (Rascona, 1993). The thickness of these deposits is variable across the basin, but the combined thickness of the upper and lower alluvial deposits ranges from approximately 400 ft just east of the City, to approximately 2,000 feet west of the City and Whitewater Draw (ADWR, 2016). **Figure 2** shows the depth to bedrock near the City (i.e., combined thickness of upper and lower alluvial deposits), along with the City wells and other ADWR registered well locations. Localized basalt flows also exist in the area around the City which are interbedded with the upper alluvial deposits. The basalt flow thickness may be several hundred feet in some locations and has been encountered at varying depths, but typically between 300 and 350 feet below land surface.

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03



The principle aquifer of the basin is the upper alluvial deposits, including the interbedded basalt flow formations. The aquifer is unconfined; although localized confined or semi-confined conditions occur sporadically. The aquifer behaves as an interconnected reservoir with the lower alluvial deposits to form a regional aquifer system (Coates, 1952; ADWR, 2016). However, vertical aquifer anisotropy is variable in the basalt flow areas, and perched water table conditions have been encountered in the Douglas area atop the basalt flows.

4.2 Douglas Basin Recharge

Recharge to the basin consists almost entirely of runoff infiltration in the washes, primarily near the mountain-fronts, while minor recharge occurs as direct rainfall, irrigation seepage, and underflow from the Wilcox Basin to the north (Rascona, 1993). The annual recharge to the aquifer is estimated to range from 15,500 – 22,000 acre-feet per year (afy), with an existing estimated aquifer storage of 26 – 32 million acre-feet (ADWR, 2008).

4.3 Existing Groundwater Production Wells

Production wells in the Douglas area, primarily completed in the upper alluvial deposits to depths ranging from 320 – 760 ft, generally range from 300 to 1,300 gallons per minute (gpm). ADWR (2008) indicates that well production exceeding 1,000 gpm is common near Douglas and Pirtleville. **Table 1** provides a summary of the City wells and available production capacity information. As indicated on **Table 1**, most City wells are inactive for various reasons, and active wells are divided among the high and low zone pressure districts.

Table 1. City Well Summary

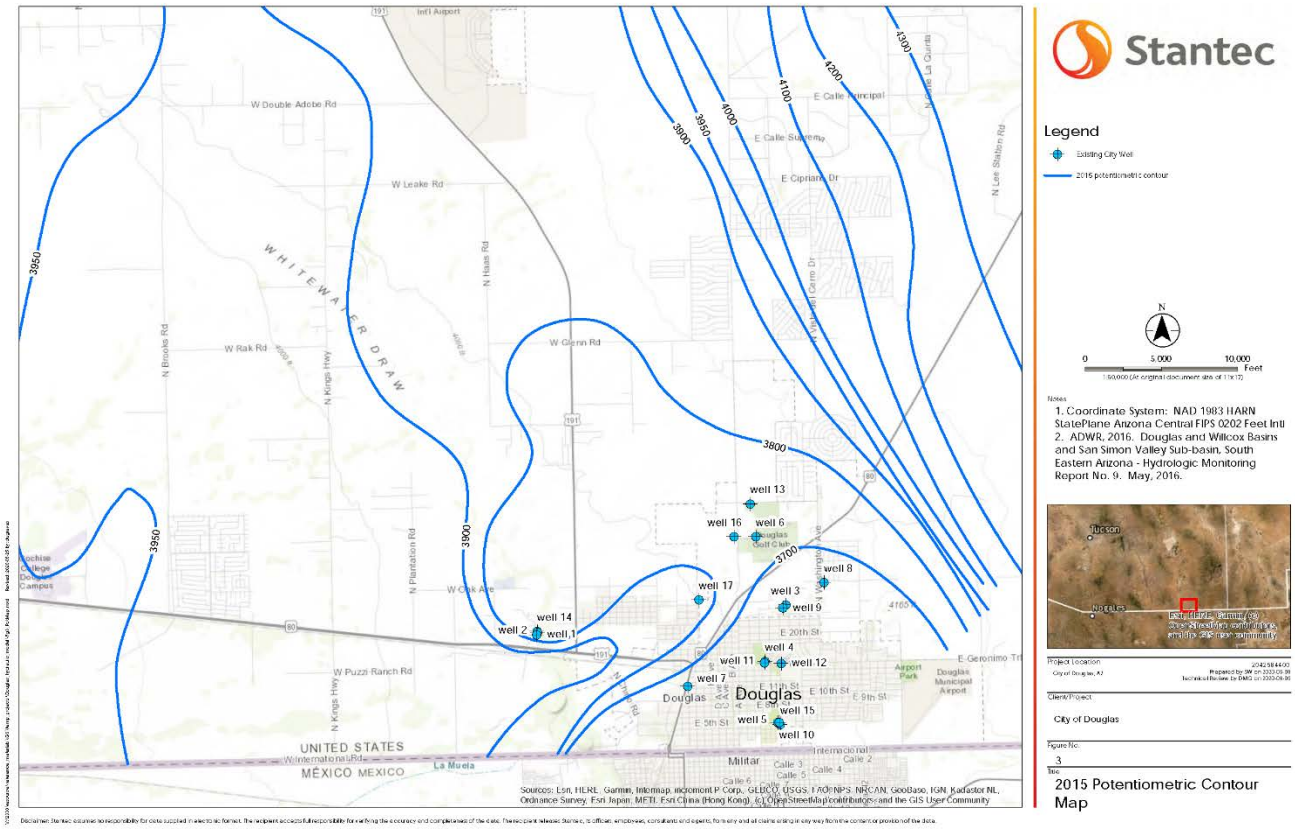
Zone		City Well ID	ADWR (55) Registration Number	Depth (ft, bgs)	Production Rate[a] (gpm)
Active	High	well 6	603984	450	776
		well 9	603987	520	300
		well 15	599184	605	416
	Low	well 11	504004	500	250
		well 16	217893	705	776
		well 17	912890	760	1372
Inactive		well 1	603979	334	--
		well 2	603980	336	--
		well 3	603981	320	--
		well 4	603982	500	--
		well 5	603983	430	--
		well 7	603985	520	--
		well 8	603986	500	--
		well 10	603988	500	--
		well 12	510672	500	--
		well 13	525746	500	--
		well 14	542693	540	--

[a] City-provided instantaneous production rates
bgs = below ground surface
ft = feet
gpm = gallons per minute

4.4 Douglas Basin Groundwater Movement

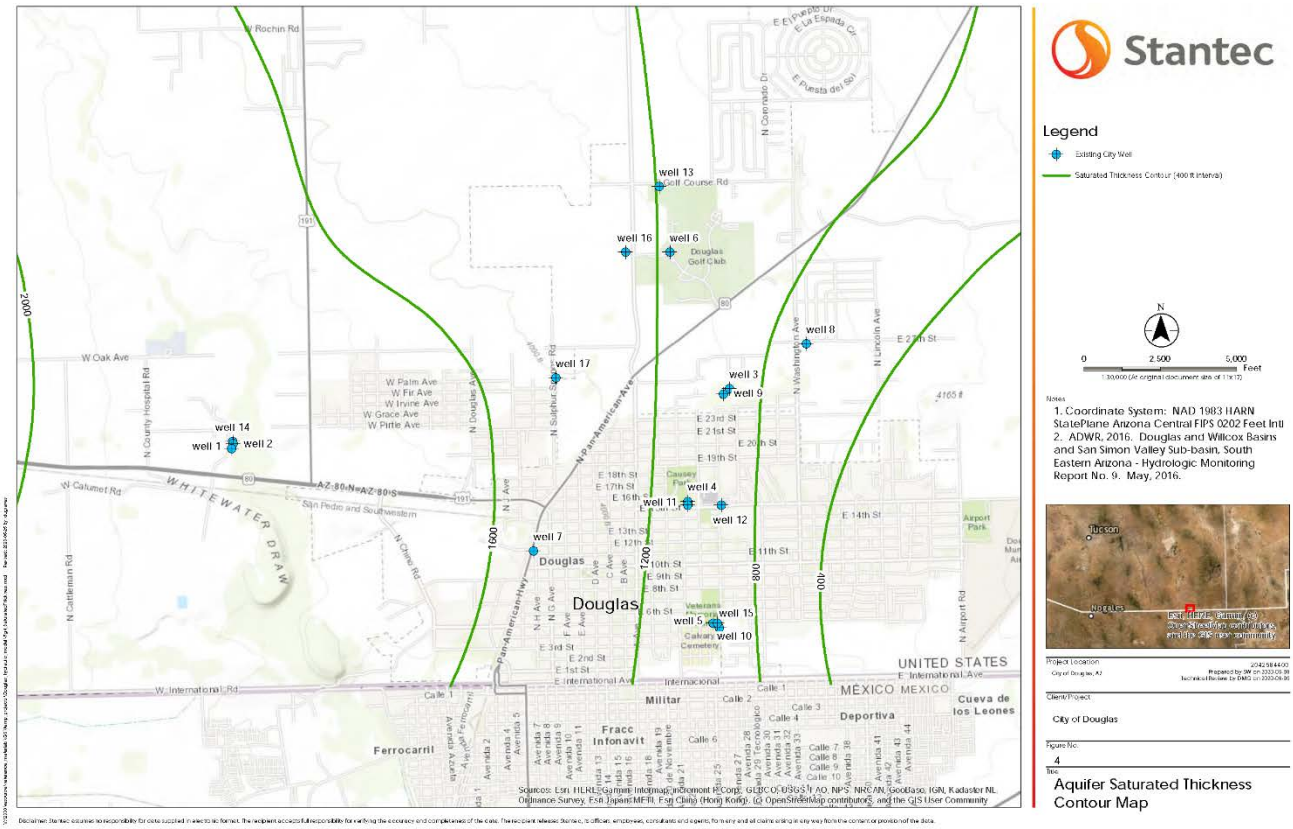
Due to the heterogenous, anisotropic conditions, historical pumping conditions surrounding the City, and localized perched water table, depicting the potentiometric surface near Douglas has proved challenging (Coates and Cushman, 1955; Rascona, 1993); however, general groundwater flow in the basin is from north to south, and toward basin lowlands (generally toward Whitewater Draw) from the surrounding highlands. **Figure 3** shows the groundwater elevation contours in the area from 2015 (ADWR, 2016); the water table elevations reveal a gradient towards the pumping centers of active City wells. Rascona (1993) suggests a cone of depression exists surrounding the City (pumping center), but due to the International Border to the south and lack of corroborating evidence, this has not been confirmed. Depth to groundwater in the Douglas area is approximately 275 ft to 350 ft, with a saturated

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03



thickness of the regional aquifer (upper and lower alluvial units, combined) of approximately 400 ft east of the City to approximately 1,600 ft near Pirtleville, to the northwest of the City (ADWR, 2016) as shown on **Figure 4**.

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03



4.5 Douglas Basins Groundwater Historic Water Levels

Groundwater levels have declined in the Douglas Basin, and specifically near the City, due to prolonged pumping conditions. ADWR (2016) revealed approximately 14 ft to 28 ft of water level declines near the City from 2005 to 2015. Nine of the 17 City wells have water level data available from the groundwater site index (GWSI), an historical data inventory hosted by ADWR (2020). These data revealed a range of water level declines from approximately 1.9 to 5.4 feet per year (ft/yr), with an average of 3.2 ft/yr. **Table 2** summarizes the water level data available for these GWSI wells.

An estimate of the aquifer hydraulic conductivity was calculated from available data including ADWR well records that included pumping rates and drawdown values, as discussed by the procedure below. From the pumping rate and measured drawdown in a well, the specific capacity of the well can be calculated as:

$$\text{Specific capacity} = Q/s$$

Q = flow rate (gpm)

S = drawdown (ft)

Table 2. GWSI Water Level Summary - City Wells								
Well Identification			Earliest Water Level Data Point		Most Recent Water Level Data Point			
City	ADWR (55)	GWSI	Date	Water Elevation (ft)	Date	Water Elevation (ft)	Δ (ft)	Δ / year (ft)
Well 1	603979	312123109351101	1990	3772	2015	3709	63	2.52
Well 2	603980	312123109351201	1978	3802	2004	3715	87	3.35
Well 3	603981	312137109320501	1993	3769	2000	3731	38	5.43
Well 4	603982	312058109322601	1990	3771	2015	3684	87	3.48
Well 6	603984	312218109322901	1966	3845	2004	3714	131	3.45
Well 7	603985	312045109332001	1998	3738	2015	3690	48	2.82
Well 8	603986	312150109313601	1990	3776	2015	3699	77	3.08
Well 12	510672	312059109321001	1990	3769	2018	3717	52	1.86
Well 13	525746	312242109323101	2004	3731	2018	3692	39	2.79
							Average	3.20

ADWR = Arizona Department of Water Resources
ft = foot, feet
GWSI = Groundwater Site Index

From this data, an estimate of aquifer transmissivity, and therefore hydraulic conductivity, can also be calculated (Driscoll, 1986), as follows:

$$T = 1500 * Q/s$$

T = transmissivity (gallons per day / feet^2 [gpd/ft^2])

Q/s = specific capacity (gpm/ft)

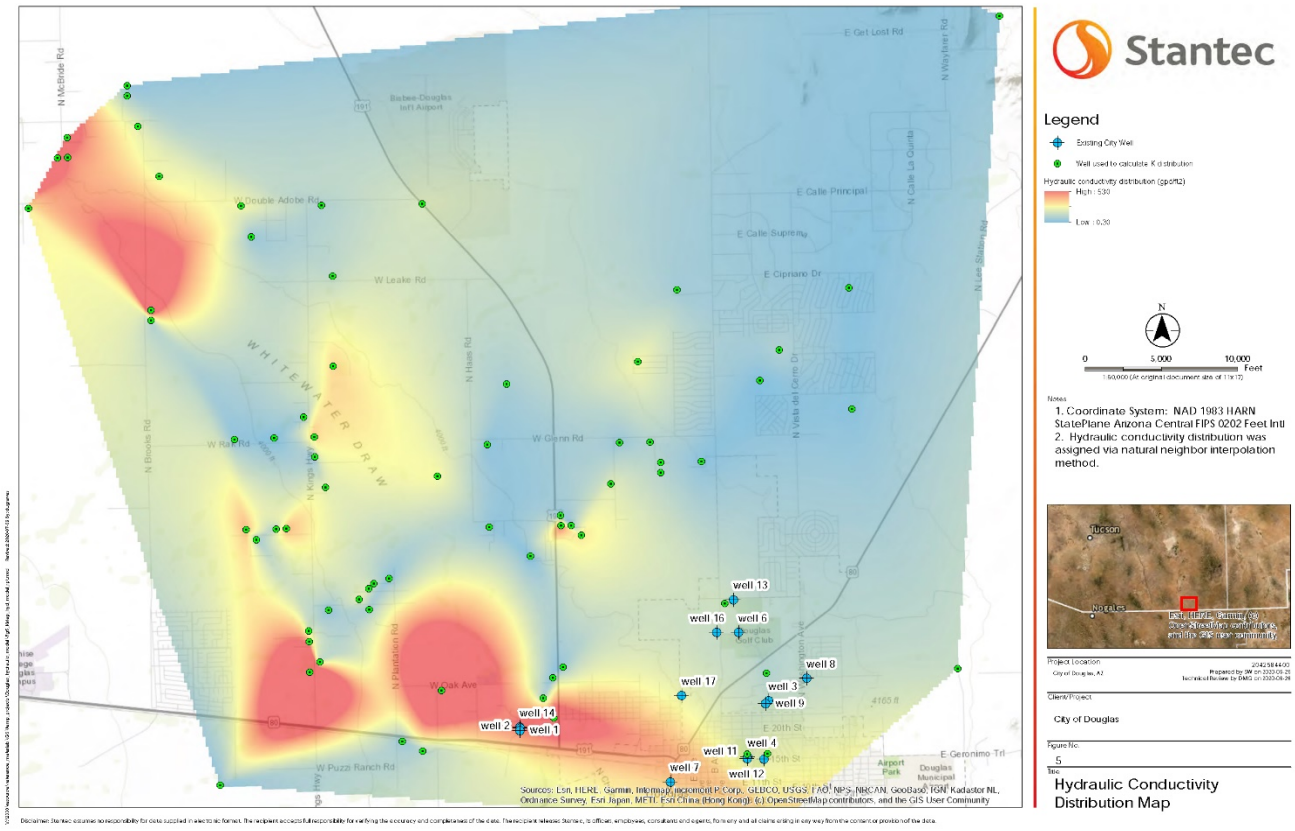
$$K = T/b$$

K = hydraulic conductivity (gpd/ft)

b = aquifer thickness (ft) (i.e., the screened interval of the tested well)

Figure 5 provides the ADWR well locations for which the aforementioned data were available, and the distribution of the hydraulic conductivity across the area. The hydraulic conductivity distribution array was performed via geospatial interpolation methods from the individual data point locations. It should be noted that these values and distributions are merely estimates, as specific capacity is also impacted by well hydraulics (i.e., well efficiency), and hydraulic conductivity tends to be a highly variable parameter, especially in stratified alluvial fill basins. Nonetheless, the hydraulic conductivity distribution provides a qualitative perception of locations in the aquifer that may be more productive. The average calculated hydraulic conductivity from the available data points is 74 gpd/ft, within the typical range for sandy alluvial aquifers (Dominico and Schwartz, 1990), and higher values are generally distributed along the trend of Whitewater Draw. This is not surprising, as re-worked alluvial deposits in low-land valleys often have greater hydraulic conductivity. Relatively greater hydraulic conductivity values were

calculated near City wells 1, 2, and 14, and extending east toward well 7 as compared to the other City well locations.



5.0 Groundwater Quality

5.1 Groundwater Constituents of Concern

Groundwater quality in the Douglas area has been described as good to excellent (ADEQ, 2000; Rascona, 1993); however, elevated concentrations of some contaminants do occur within the basin. The primary parameters of interest, which are common constituents of concern in Arizona alluvial basins, include arsenic, fluoride, nitrate, and total dissolved solids (TDS). The U.S. Environmental Protection Agency (EPA) has Maximum Contaminant Levels (MCLs) for arsenic of 10 micrograms per liter (µg/L), fluoride of 4 milligrams per liter (mg/L), nitrate at 10 mg/L, and secondary Maximum Contaminant Levels (SMCLs) for fluoride of 2 mg/L and TDS of 500 mg/L. SMCLs are based on aesthetics and taste but are not a human health concerns and are not regulated. **Table 3** provides a summary of the water quality data that was available from public records sources. Specific well locations were not available, and so the data is summarized with general proximity to the City of Douglas.

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03

Table 3. Water Quality Summary

Source	Well Location		Water Quality				Notes
	Cadastral / Specific	General	As (µg/L)	F (mg/L)	NO_3 (mg/L)	TDS (mg/L)	
Coates and Cushman, 1955	T23S R27E Section 19	Northwest of City	NA	0.6	0.4	2,060	Data from 1946 - 1952
	T23S R27E Section 19	Northwest of City	NA	0.8	NA	NA	
	T23S R27E Section 19	Northwest of City	NA	1	4.2	4,640	
	T23S R27E Section 19	Northwest of City	NA	0.7	NA	NA	
	T23S R28E Section 15	Northeast of City	NA	0.8	5.7	365	
	T24S R27E Section 3	Northwest of City (Subarea 6)	NA	2.6	2.5	575	
	T24S R27E Section 10	West of City (Subareas 3 & 5)	NA	3.2	1.8	919	
	T24S R27E Section 10	West of City (Subareas 3 & 5)	NA	1.6	21	2,310	
	T24S R28E Section 11	East of City	NA	1.2	16	2770	
	T24S R28E Section 14	East of City	NA	0.8	85	795	
Rascona, 1993	NA	City of Douglas	NA	0.6	NA	330	TDS calculted from specific conductance * 0.6
	NA	North of the City	NA	0.6	NA	303	
	NA	West of the City	NA	2.2	NA	816	
ADWR, 2009	NA	West of the City	>10	NA	NA	NA	--
	NA	Southeast of the City	<10	<4	<10	<500	
ADEQ, 2000	NA	West of the City	NA	NA	NA	NA	SMCL exceedance was indicated, parameter species not identified
ADWR Wells 55	Well 12	City of Douglas	<10	0.4	2.1	391	Data from 1985

Exceeds MCL
Exceeds SMCL
ADEQ = Arizona Department of Environmental Quality
ADWR = Arizona Department of Water Resources
As = Arsenic
F = Fluoride
MCL = maximum contaminant level
mg/L = milligrams per liter
NA = not available
NO_3 = nitrate
SMCL = secondary maximum contaminant level
TDS = total dissolved solids
µg/L = micrograms per liter

5.2 Water Quality Findings

Coates and Cushman (1955) summarized groundwater quality for several wells throughout the basin, including 10 wells near the City of Douglas. This data revealed fluoride concentrations ranging from 0.6 – 3.2 mg/L, nitrate ranging from 0.4 – 85 mg/L, and TDS ranging from 365 – 4,640 mg/L. The highest concentrations of fluoride were reported in Section 10 of Township 24S Range 27E, west of the City (**Figure 2**). The highest concentration of nitrate was reported in Section 14 of Township 24S Range 28E, approximately 3-miles east of the City near the Perilla Mountains. The highest TDS concentration was reported in Section 19 of Township 23S Range 27E, northwest of the City. Arsenic data was not provided. It should be noted this data was collected from 1946 – 1952. Although some geochemical evolution would be expected over time, the data is still considered representative.

Rascona (1993) summarized water quality across the basin and revealed fluoride concentrations of 0.6 mg/L and calculated estimated TDS concentrations of 300 – 330 mg/L near the City. ADWR (2008) evaluated water quality across the basin; only one well located near Douglas, just west of the city, had an arsenic concentration above the MCL of 10 µg/L; no other MCL exceedances were reported.

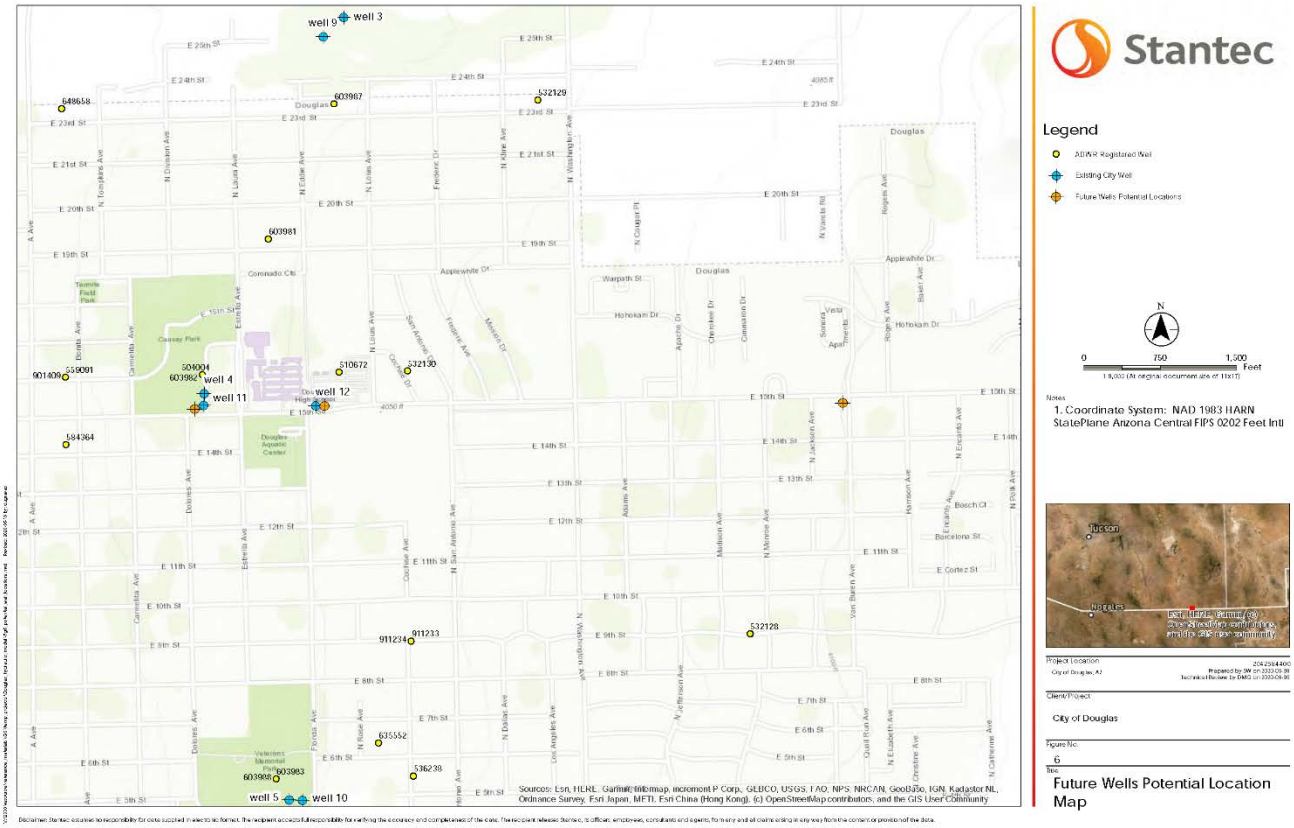
ADEQ (2000) analyzed water quality from 51 well sites across the Douglas basin; however, only two sites near the City of Douglas were analyzed. Analytical data was not available from the report, only qualitative measures to indicate that one well located southeast of the City had no MCL or SMCL exceedances, while another well located west of the City had an SMCL exceedance.

The only groundwater analytical data available for the City wells was from a sample collected from well 12 in 1985. These results revealed good water quality, with concentrations of arsenic less than 10 µg/L, fluoride at 0.4 mg/L, nitrate at 2.1 mg/L, and TDS at 391 mg/L.

6.0 Siting Future City Well Locations

6.1 City Proposed Locations of Two New City Wells

The City has expressed an interest in adding two wells to the system, preferably near existing wells 11 or 12, and/or on city-owned land near 15th Street and Van Buren Avenue on the east side of the City (**Figure 6**) with a desired production rate of approximately 500 gpm per well. Based on the data presented in the previous section, the following is a summary of these locations as an evaluation for future well placement. A 50-year projection of water level declines is also estimated to evaluate potential well locations for relatively long-term performance.



The discussion, projections, and recommendations provided in the following discussion are based on desk-top analyses of limited information. Specifically, this discussion makes the assumption that the entire alluvial fill aquifer could be used for production. However, no data is available to confirm the lower alluvial deposits have similar hydraulic properties (hydraulic conductivity or transmissivity). Furthermore, water quality was not available for the deeper portion of the aquifer. Water quality stratification is common in alluvial fill basins of Arizona, and deeper groundwater may have higher constituent concentrations, potentially as a result of longer residence times and/or increased reaction with geologic materials. Therefore, it is recommended that future well locations should be evaluated qualitatively based on the information provided herein. Additional data collection is recommended to corroborate these estimates and projections.

6.2 Proposed Replacement of Well 11

ADWR records indicate that well 11 was competed with a 16-inch diameter casing to 500 feet depth in 1983. This well is located in the southeast portion of 15th Street park approximately 1,000 ft west of well 12 as discussed below (**Figure 6**). If a "replacement" well were drilled at this location (pursuant to an existing service area water right and permitted extraction volume) within 160 ft of the existing well, an impact analysis would not be required by ADWR for permitting. An "impact" is defined as less than 10 ft of drawdown on surrounding wells in a 5-year period.

Table 4 provides a summary of the estimated saturated thickness and hydraulic properties of the aquifer at the well 11 location. The current estimated saturated thickness at this location is approximately 870 ft based on an estimated depth to water of 330 ft below ground surface (bgs), as measured in nearby well 12 in 2018, and the depth to bedrock of approximately 1,200 ft (ADWR, 2016). With an assumed continued water level decline of 3 ft/yr, a 50-year water level projection results in a depth to water of 480 ft, reducing the saturated thickness of the aquifer to approximately 720 ft. The specific capacity of existing well 11 measured during the pump test in 1983 was 10.8 gpm/ft. Therefore, at a production rate of 500 gpm the expected drawdown would be approximately 46 ft, and the 50-year projected pumping water level would be approximately 526 ft depth (i.e., depth to water at 50-year projection

Table 4. Summary of Potential Well Locations

Location	Saturated Thickness (ft)		Q/s (gpm/ft)[c]	Drawdown (ft)	Pumping Water Level (ft, bgs)	Resulting Saturated Thickness (ft)[d]	Hydraulic Conductivity (gpd/ft^2)	Transmissivity (gpd/ft)
	Current[a]	50-Year[b]						
Well 11	870	720	10.8	46	526	674	70	47159
Well 12	870	720	12.8	39	519	681	78	53113
15th and Van Buren	200	50	12[e]	42	292	8	90	720

[a] Estimated from depth to bedrock (ADWR, 2016) and assumed depth to water of 330 ft (well 11 and well 12) and 200 ft (15th and Van Buren)
[b] Assumes an aquifer water level decline of 3 ft/yr
[c] Assumes a production rate of 500 gpm
[d] 50-Year projection at estimated pumping water level
[e] Specific capacity calculated from estimated transmissivity
bgs = below ground surface
ft = foot, feet
gpd = gallons per day
gpm = gallons per minute

plus anticipated drawdown). The resulting saturated thickness of the aquifer at a pumping water level of 526 ft would be approximately 674 ft. The estimated hydraulic conductivity of the aquifer at this location is approximately 70 gpd/ft (**Figure 5**), which equates to a transmissivity value of 47,159 gpd/ft^2. The forecasted saturated thickness and estimated transmissivity is likely to be adequate for sustaining a well of approximately 500 gpm. However, this assumes that the lower alluvial deposits are transmissive and of suitable water quality.

Groundwater analytical data was not available for existing well 11; however, data from well 12, located approximately 1,000 ft to the east revealed good water quality from sample results collected in 1985. No data was recovered to suggest any water quality concerns for this location. Regional water quality, as discussed above, has been documented to be good, with some MCL or SMCL exceedances noted to the east and west of the City.

6.3 Proposed Replacement of Well 12

ADWR records indicate that well 12 was competed with a 16-inch diameter casing to 500 feet depth in 1985. This well is located in the northeast quadrant of 15th Street and Florida Avenue approximately 1,000 ft east of well 11 and 5,000 ft west of 15th Street and Van Buren Avenue, discussed below (**Figure 6**). If a "replacement" well were drilled at this location (pursuant to an existing service area water right and permitted extraction volume) within 160 ft of the existing well, an impact analysis would not be required by ADWR for permitting.

Table 4 provides a summary of the estimated saturated thickness and hydraulic properties of the aquifer at the well 12 location. The current estimated saturated thickness at this location is approximately 870 ft based on an estimated depth to water of 330 ft below ground surface (bgs), as measured in 2018, and the depth to bedrock of approximately 1,200 ft (ADWR, 2016). With an assumed continued water level decline of 3 ft/yr, a 50-year water level projection results in a depth to water of 480 ft, thus reducing the saturated thickness of the aquifer to approximately 720 ft. The specific capacity of existing well 12 measured during the pump test in 1983 was 12.8 gpm/ft. Therefore, at a production rate of 500 gpm the expected drawdown would be approximately 39 ft, and the 50-year projected pumping water level would be approximately 519 ft depth (i.e., depth to water at 50-year projection plus anticipated drawdown). The resulting saturated thickness of the aquifer at a pumping water level of 519 ft would be approximately 681 ft. The estimated hydraulic conductivity of the aquifer at this location is approximately 78 gpd/ft (**Figure 5**), which equates to a transmissivity value of 53,113 gpd/ft^2. The forecasted saturated thickness and estimated transmissivity is likely to be adequate for sustaining a well of approximately 500 gpm. However, this assumes that the lower alluvial deposits are transmissive and of suitable water quality.

Groundwater analytical data was available from sample results collected in 1985. Results were good, with no exceedances of the respective MCLs or SMCLs for the sampled parameters, including arsenic, fluoride, nitrate, and TDS.

6.4 New Well on City Property – 15th Street and Van Buren Avenue

The City has expressed interest in a possible well location at a parcel located at 15th Street and Van Buren Avenue, approximately 5,000 ft east of well 12, discussed above (**Figure 6**). A well installed at this location would be considered a "new" well and would require installation pursuant to an existing service area water right. As a "new" well location, this would require an impact analysis. An "impact" is defined as less than 10 ft of drawdown on surrounding wells in a 5-year period. The nearest registered well per ADWR records to this location is approximately 2,300 ft to the southwest; however, additional analysis would be required to verify nearby well locations and to determine if an impact would result to surrounding wells.

The depth to bedrock at this location is estimated at approximately 400 ft, and the estimated saturated thickness is approximately 200 ft (assuming depth to groundwater is approximately 200 ft; nearest ADWR well 55-532128 was dry at 150 ft total depth). As no existing well is located nearby, an estimate of specific capacity was calculated (12 gpm/ft) from the estimated transmissivity. At 500 gpm this would result in a drawdown of 42 ft, and the 50-year projected pumping water level would be approximately 392 ft depth (i.e., depth to water at 50-year projection plus anticipated drawdown). The resulting saturated thickness of the aquifer at a pumping water level of 392 ft would be approximately 8 ft. The estimated hydraulic conductivity of the aquifer at this location is approximately 90 gpd/ft (**Figure 5**), which equates to a transmissivity value of 720 gpd/ft^2. These preliminary estimates suggest there may not be adequate saturated thickness of the alluvial deposits to support a well of 500 gpm capacity at this location.

Groundwater analytical data was not available for this location. However, Coates and Cushman (1955) revealed a higher concentration of TDS from a well located to the east of the City, as compared to other sampled wells west of the City.

7.0 Conclusions and Recommendations

7.1 Conclusions

A desktop review of available hydrogeologic data for the Douglas Basin and the City of Douglas was performed which indicates that groundwater flows from the higher elevations towards Whitewater Draw and the pumping center of the City production wells. The saturated thickness of the basin fill aquifer exceeds 1,600 ft west of the City and is reported as less than 400 ft to the east of the City. Hydraulic conductivity of the aquifer generally appears to follow the trend of Whitewater Draw, and relatively greater hydraulic conductivity values were calculated near City wells 1, 2, and 14, and extending east toward well 7 as opposed to other City well locations. Review of available data from the City wells indicates a water level decline of approximately 3 ft/yr. Groundwater quality in the basin has generally been reported to be good, with MCL and SMCL exceedances reported from locations outside the City.

7.2 Recommendations

7.2.1 Recommended Locations of Additional Wells in the City Water Distribution System Hydraulic Model - An assessment of three locations for potential future replacement well sites (Wells 11 and 12) or a new well site (15th Street and Van Buren Avenue) were evaluated. In general, locations with greater saturated thickness and higher transmissivity values are more productive for water supply wells.

Based on the limited available data and forecasted projections of saturated thickness and resulting transmissivity, it appears the locations at existing wells 11 and 12 could likely yield a long-term production of 500 gpm. Furthermore, well "replacements" at existing wells 11 and 12 could ease permit requirements, as an impact analysis would not be required by ADWR if replacement wells could remain within 160 ft of the existing well. The location at 15th Street and Van Buren Avenue may not have adequate saturated thickness or aquifer transmissivity to achieve a 500 gpm well, especially if water level declines continue at a similar rate into the future. Additionally, this "new" well site would require an impact analysis to determine if any impacts would result to other nearby wells. Therefore, of the three locations evaluated, replacement of wells 11 and 12 are recommended.

Accordingly, Stantec will use the location of the replacement wells 11 and 12 at 500 gpm each well in development of the City's water distribution system hydraulic model.

7.2.2 Well Design Approach - The projections and estimates provided herein are based on limited desktop data. The following detailed design steps are recommended.

1. Use the City's water distribution hydraulic model to confirm the location of the replacement wells 11 and 12.
2. Prepare a conceptual well design and specification for bidding. Select a Contractor for test hole drilling at the noted well locations with zonal testing (for water quality and production capacity), and downhole geophysics.
3. Finalize the well design based on the pilot borehole data and drill the new well.
4. Equip the well with the pump and motor necessary to achieve at least 500 gpm and meet the water distribution hydraulic grade line.
5. Construct the site civil, mechanical, electrical and communication infrastructure and commission and startup the well.
6. A numerical groundwater flow model is also recommended for consideration to calculate a water budget of the area, more accurately project future water level declines, evaluate future well placement, and optimize wellfield management.

References:

Arizona Department of Environmental Quality (ADEQ), 2000. Ambient Groundwater Quality of the Douglas Basin: An ADEQ 1995-1996 Baseline Study, ADEQ Fact Sheet 00-08.

Arizona Department of Water Resources (ADWR), 2009, Arizona Water Atlas: Section 3.52 Water Resource Characteristics of the Gila Bend Basin, November 2009.

ADWR, 2016. Douglas and Willcox Basins and San Simon Valley Sub-basin, South Eastern Arizona - Hydrologic Monitoring Report No. 9. May, 2016.

ADWR, 2020. Groundwater Site Index. https://gisweb3.azwater.gov/gwsi. Accessed May 2020.

Coates, D. R., 1952, Douglas basin, Cochise County, in Groundwater in the Gila River basin and adjacent areas, Arizona – a summary by L.C. Halpenney and others: U.S. Geological Survey open-file report, p. 187-194.

Coates, D.R., and Cushman, R.L., 1955. Geology and groundwater resources of the Douglas basin, Arizona, with a section on chemical quality of the groundwater by J.L. Hatchett: U.S. Geological Survey Water-Supply Paper 1354, 56p.

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

Domenico, P.A. and F.W. Schwartz, 1990. *Physical and Chemical Hydrogeology*, John Wiley & Sons, New York, 824 p.

Driscoll, F.G., 1986. *Groundwater and Wells (2nd ed.),* Johnson Filtration Systems, Inc., St. Paul, Minnesota, 1089p.

Rascona, S.J., 1993. Maps Showing Groundwater Conditions in the Douglas Basin, Cochise County, Arizona - 1990. Phoenix, AZ: ADWR.

Reference: MASTER PLAN UTILITY ENGINEERING – DOUGLAS, ARIZONA PORT OF ENTRY PROJECT NO. 20-24-BOS-03

Dustin Graves PG
Lead Hydrogeologist

Direct: (480) 687-6095
Cell: (812) 204-3204

Dustin.Graves@stantec.com

Jack Bryck PE BCEE
Principal, Process Engineering
Phone: 480 508 1369
Jack.Bryck@stantec.com

c./c Alan Humphrey P.E., City Engineer, City of Douglas

Dawn Prince, City Manager, City of Douglas

Michael Georgalas, Stantec, Tucson

Colleen Ruiz, PE, MPA, CFM, Stantec, Chandler

APPENDIX B

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

POE On Site Waste Water System- Report Sections 2.7.1 and 5.1

Engineer's Estimate of Probable Cost
Date Created: 5/22/2020
By: Mark Peterson

Stantec

	On Site Waste Water Treatment and Disposal	Description	Unit	Unit Cost	Quantity	Cost
	Waste Water Treatment Plant		LS	$1,200,000	1	$1,200,000
	Sanitary Sewer Pump Station		EA	$300,000	1	$300,000
	Drain Field Construction	2 Drains Fields - Thirty 100' long rows each, including piping, sand/gravel and field fabric	LS	$425,000	1	$425,000
	Civil Improvements	Paving, Fencing, etc.	LS	$400,000	1	$400,000
	PVC Sewer Collection Pipe	8", 10" and 12" pipe	LF	$100	2,000	$200,000
	Manholes	Every 500'	EA	$20,000	4	$80,000
	Construction Sub Total					$2,605,000
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$781,500
	Project Delivery Sub Total					**$3,386,500**
	Total Waste Water Treatment Order of Magnitude Cost High Cost of Range	+65% of Project Delivery Sub Total			65%	**$5,587,725**
	Total Waste Water Treatment Order of Magnitude Cost Low Cost of Range	-35% of Project Delivery Sub Total			-35%	**$2,201,225**

Assumptions

1	Douglas POE development will include institutional uses such as Border Security point of entry and
2	Commercial and non-Border Security residential and industrial land uses have been excluded from this
3	Estimated average day Waste Water flow of 16,000 gpd includes the following:
4	Surface Absorption Rate (SAR) is 0.55 gpd/ft^2
5	Secondary Treated Effluent Trench dimensions:
6	250' drain field setback requirement
7	2 drain fields are required each including thirty 100' long rows
8	Land acquisition to be done by GSA. This cost is not included in this estimate

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

POE On Site Water System Sections 2.7.2 and 5.2

Engineer's Estimate of Probable Cost
Date Created: 5/22/2020
By: Mark Peterson

Stantec

	On Site Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line (12" or 18", includes fittings / hydrants)	12" or 18", included fittings / hydrants	LF	$144	2,000	$288,000
	Water Storage Tank (Concrete at grade - 0.5 MG)	Concrete at grade - 0.5 MG	EA	$2,500,000	1	$2,500,000
	Fire Pump (2,000 gpm)	2,000 gpm	EA	$104,000	1	$104,000
	Production Well		EA	$1,500,000	1	$1,500,000
	Construction Sub Total					$4,392,000
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,317,600
	Project Delivery Sub Total					**$5,709,600**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$9,420,840**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$3,711,240**

Assumptions

1	Douglas POE development will include institutional uses such as Border Security point of entry and
2	Commercial and non-Border Security residential and industrial land uses have been excluded from this
3	Land acquisition to be done by GSA. This cost is not included in this estimate

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

City Water System to West SA 1-5 - POE

Engineer's Estimate of Probable Cost
Date Created: 7/31/2020
By: Mark Peterson
Refer to Report Figure 3-4 & Section 3.1.2.2 and Section 5.3

	PHASE 1 - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - HZ1	12", included fittings / hydrants	LF	$144	5,890	$848,160
	DIP Water Line - HZ2	16", included fittings / hydrants	LF	$192	5,350	$1,027,200
	DIP Water Line - HZ6	16", included fittings / hydrants	LF	$192	3,165	$607,680
	DIP Water Line - HZ7	12", included fittings / hydrants	LF	$144	5,230	$753,120
					19,635	
	Water Line Highway Crossings	1 Highway Crossings at 250 feet each	LF	$432	250	$108,000
	West High Zone Reservoir	TWL 4160 Feet, 80 Feet Elevated, 550k gallons	EA	$1,650,000	1	$1,650,000
	Groundwater Well	Drill, develop well and equip with pump, motor, power cable and IT	LS	$1,200,000	1	$1,200,000
	Primary Power	To Groundwater Well	LS	$50,000	1	$50,000
	Vehicle Access	To Groundwater Well	LS	$100,000	1	$100,000
	Water Line	8"	LF	$96	1,000	$96,000
	Construction Sub Total					$6,440,160
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,932,048
	Project Delivery Sub Total					**$8,372,208**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$13,814,143**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$5,441,935**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 2 - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - LZ3	12", included fittings / hydrants	LF	$144	2,930	$421,920
	DIP Water Line - LZ4	8", included fittings / hydrants	LF	$96	1,300	$124,800
	DIP Water Line - LZ5	12", included fittings / hydrants	LF	$144	5,470	$787,680

	DIP Water Line - LZ6	12", included fittings / hydrants	LF	$144	5,420	$780,480
	DIP Water Line - HZ5	12", included fittings / hydrants	LF	$144	5,390	$776,160
					20,510	
	PRV Station	Includes vault	EA	$540,000	1	$540,000
	Construction Sub Total					$3,431,040
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,029,312
	Project Delivery Sub Total					**$4,460,352**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$7,359,581**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$2,899,229**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 3 - City Water System	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
	Booster Pump Station	Low to High Zone	EA	$3,250,000	1	$3,250,000
	Construction Sub Total					$3,250,000
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$975,000
	Project Delivery Sub Total					**$4,225,000**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$6,971,250**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$2,746,250**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 4 - City Water System	**Description**	**Unit**	**Unit Cost**	**Quantity**	**Cost**
	DIP Water Line - LZ7	8", included fittings / hydrants	LF	$96	2,330	$223,680
	Low Zone Reservoir	TWL 4115 Feet, 80 Feet Elevated, 350k gallons	EA	$1,050,000	1	$1,050,000
	Construction Sub Total					$1,273,680
	Project Delivery Cost					

	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$382,104
	Project Delivery Sub Total					**$1,655,784**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$2,732,044**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$1,076,260**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

City Water System to West - SA 1-5 POE + Cochise College

Engineer's Estimate of Probable Cost
Date Created: 6/1/2020
By: Mark Peterson
Refer to Figure 3-4 and Report Section 3.1.3 and Report Section 5.4

Stantec

	City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - LZ3	12", included fittings / hydrants	LF	$144	2,930	$421,920
	DIP Water Line - LZ4	8", included fittings / hydrants	LF	$96	1,300	$124,800
	DIP Water Line - LZ5	12", included fittings / hydrants	LF	$144	5,470	$787,680
	DIP Water Line - LZ6	12", included fittings / hydrants	LF	$144	5,420	$780,480
	DIP Water Line - LZ7	8", included fittings / hydrants	LF	$96	2,560	$245,760
					17,680	
	DIP Water Line - HZ1	12", included fittings / hydrants	LF	$144	5,890	$848,160
	DIP Water Line - HZ2	16", included fittings / hydrants	LF	$192	5,350	$1,027,200
	DIP Water Line - HZ3	16", included fittings / hydrants	LF	$192	5,300	$1,017,600
	DIP Water Line - HZ4	16", included fittings / hydrants	LF	$192	6,100	$1,171,200
	DIP Water Line - HZ5	12", included fittings / hydrants	LF	$144	5,390	$776,160
	DIP Water Line - HZ6	16", included fittings / hydrants	LF	$192	3,165	$607,680
	DIP Water Line - HZ7	12", included fittings / hydrants	LF	$144	5,230	$753,120
					36,425	
	Water Line Highway Crossings	1 Highway Crossings at 250 feet each	LF	$432	250	$108,000
	High Zone Reservoir	TWL 4115 Feet, 80 Feet Elevated, 550k gallons	EA	$1,650,000	1	$1,650,000
	Booster Pump Station	Low to High Zone	EA	$3,250,000	1	$3,250,000
	PRV Station	Includes vault	EA	$540,000	1	$540,000
	Option 2 - POE and Cochise College Reservoir	TWL 4160 Feet, 80 Feet Elevated, 400k gallons	EA	$1,200,000	1	$1,200,000
	Construction Sub Total					$15,309,760
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$4,592,928
	Project Delivery Sub Total					**$19,902,688**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$32,839,435**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$12,936,747**

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

City Water Dedicated to POE Only

Engineer's Estimate of Probable Cost
Date Created: 6/20/2020
By: Mark Peterson
Refer to Report Figure 3-5 and Report Section 3.1.4 and Section 5.5

	City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - LZ3	8", included fittings / hydrants	LF	$96	2,930	$281,280
	DIP Water Line - LZ5	8", included fittings / hydrants	LF	$96	5,470	$525,120
	DIP Water Line - LZ6	8", included fittings / hydrants	LF	$96	8,360	$802,560
	DIP Water Line - HZ1	12", included fittings / hydrants	LF	$144	9,000	$1,296,000
	DIP Water Line - HZ2	12", included fittings / hydrants	LF	$144	5,350	$770,400
	DIP Water Line - HZ5	10", included fittings / hydrants	LF	$120	2,380	$285,600
	Water Line Highway Crossings	1 Highway Crossings at 250 feet	LF	$432	250	$108,000
					33,740	
	Booster Pump Station	Low to High Zone	EA	$3,250,000	1	$3,250,000
	PRV Station	Includes vault	EA	$540,000	1	$540,000
	POE Only Reservoir	TWL 4160 Feet, 80 Feet Elevated, 550k gallons	EA	$1,650,000	1	$1,650,000
	Construction Sub Total					$9,508,960
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$2,852,688
	Project Delivery Sub Total					**$12,361,648**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$20,396,719**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$8,035,071**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

City Water to the North SA 6-8 BDIA

Engineer's Estimate of Probable Cost
Date Created: 6/20/2020
By: Mark Peterson
Refer to Report Figure 3-8 and Section 3.1.5.3 and Section 5.6

	PHASE 1b - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - EHZ1	12", included fittings / hydrants	LF	$144	5,000	$720,000
	DIP Water Line - EHZ2	12", included fittings / hydrants	LF	$144	11,230	$1,617,120
	DIP Water Line - EHZ3	16", included fittings / hydrants	LF	$192	1,260	$241,920
	DIP Water Line - EHZ4	16", included fittings / hydrants	LF	$192	6,100	$1,171,200
	DIP Water Line - EHZ6	16", included fittings / hydrants	LF	$192	9,600	$1,843,200
					33,190	
	Connect to City of Douglas Water Distribution System		LS	$500,000	1	$500,000
	Construction Sub Total					$6,093,440
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,828,032
	Project Delivery Sub Total					**$7,921,472**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$13,070,429**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$5,148,957**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 1a - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	DIP Water Line - ELZ1	16", included fittings / hydrants	LF	$192	15,100	$2,899,200
	Construction Sub Total					$2,899,200
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$869,760
	Project Delivery Sub Total					**$3,768,960**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$6,218,784**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$2,449,824**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 3 - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	East High Zone Reservoir	TWL 4220 Feet, 80 Feet Elevated, 350k gallons	EA	$1,050,000	1	$1,050,000
	DIP Water Line - EHZ5	16", included fittings / hydrants	LF	$192	10,850	$1,111,680
	Groundwater Well	Drill, develop well and equip with pump, motor, power cable and IT	LS	$1,200,000	1	$1,200,000
	Primary Power	To Groundwater Well	LS	$50,000	1	$50,000
	Vehicle Access	To Groundwater Well	LS	$100,000	1	$100,000
	Construction Sub Total					$3,511,680
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,053,504
	Project Delivery Sub Total					**$4,565,184**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$7,532,554**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$2,967,370**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

	PHASE 4 - City Water System	Description	Unit	Unit Cost	Quantity	Cost
	Booster Pump Station	Low to High Zone	EA	$3,250,000	1	$3,250,000
	PRV Station	Includes vault	EA	$540,000	1	$540,000
	East Low Zone Reservoir	TWL 4220 Feet, 80 Feet Elevated, 350k gallons	EA	$1,050,000	1	$1,050,000
	Connect to Proposed WLZ2		LS	$500,000	1	$500,000
	Construction Sub Total					$5,340,000
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,602,000
	Project Delivery Sub Total					**$6,942,000**
	Total Water System Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$11,454,300**
	Total Water System Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$4,512,300**

Assumptions

1 Land acquisition to be done by others. This cost is not included in this estimate

WW Collection to the West SA 1-5 POE - HWY 80 Alignment

Engineer's Estimate of Probable Cost
Date Created: 6/20/2020
By: Mark Peterson
Refer to Report Figure 3-0 and Report Section 3.1.6 and Section 5.8

Stantec

	Concept Wastewater Collection	Description	Unit	Unit Cost	Quantity	Cost
	DIP Wastewater Forcemain - WHM1 - WHM2	6", included fittings	LF	$60	5,600	$336,000
	PVC Wastewater Line - WHM2 - WHM4	8", included fittings	LF	$80	5,480	$438,400
	PVC Wastewater Line - WHM4 - WHM3	10", included fittings	LF	$100	10,520	$1,052,000
	PVC Wastewater Line - WHM3 - WHM6	12", included fittings	LF	$120	1,870	$224,400
	PVC Wastewater Line - WHM2 - WHM5	8", included fittings	LF	$80	1,220	$97,600
	PVC Wastewater Line - WHM5 - WHM8	10", included fittings	LF	$80	1,990	$159,200
	PVC Wastewater Line - WHM8 - WHM7	8", included fittings	LF	$80	10,800	$864,000
	PVC Wastewater Line - WHM7 - WHM6	12", included fittings	LF	$120	6,680	$801,600
	PVC Wastewater Line - WHM8 - WHM8A	8", included fittings	LF	$80	5,860	$468,800
	PVC Wastewater Line - WMH6 - Pump Station	15", included fittings	LF	$150	1,230	$184,500
	PVC Wastewater Line - Pump Station - Connection	24", included fittings	LF	$240	3,100	$744,000
					54,350	
	Manhole	Install MH every 500'	EA	$15,000	109	$1,630,500
	Wastewater Pump Station and Forcemain	West Area, 75 GPM	LS	$680,000	1	$680,000
	Wastewater Pump Station and Forcemain	East Area, 400 GPM	LS	$1,550,000	1	$1,550,000
	Connect to City of Douglas Wastewater Collection System		LS	$500,000	1	$500,000
	Construction Sub Total					$9,731,000
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$2,919,300
	Project Delivery Sub Total					**$12,650,300**
	Total Wastewater Treatment Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$20,872,995**
	Total Wastewater Treatment Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$8,222,695**

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

WW Collection to the West SA 1-5 POE - Southern Alignment- USA Mexican Border

Engineer's Estimate of Probable Cost
Date Created: 6/20/2020
By: Mark Peterson
Refer to Report Figure 3-10 and Section 3.1.6 and Section 5.9

Stantec

	Concept Wastewater Collection	Description	Unit	Unit Cost	Quantity	Cost
	PVC Wastewater Line - WMH1 - WMH 11	12", included fittings	LF	$120	16,000	$1,920,000
	PVC Wastewater Line - WMH12 - WMH4	8", included fittings	LF	$80	4,800	$384,000
	PVC Wastewater Line - WMH4 - WMH3	8", included fittings	LF	$80	10,520	$841,600
	PVC Wastewater Line - WMH3 - WMH6	15", included fittings	LF	$150	1,870	$280,500
	PVC Wastewater Line - WMH2 - WMH5	8", included fittings	LF	$80	1,220	$97,600
	PVC Wastewater Line - WMH5 - WMH8	8", included fittings	LF	$80	1,990	$159,200
	PVC Wastewater Line - WMH7 - WMH6	12", included fittings	LF	$120	6,680	$801,600
	PVC Wastewater Line - WMH11 - East Pump Station	24", included fittings	LF	$240	3,820	$916,800
	PVC Wastewater Line - East Pump Station - WWTF	24", included fittings	LF	$240	6,980	$1,675,200
	PVC Wastewater Line - WMH3 - WMH11	18", included fittings	LF	$180	5,500	$990,000
	PVC Wastewater Line - WMH1 - WMH2	8", included fittings	LF	$80	5,850	$468,000
	PVC Wastewater Line - WMH13 - WMH7	10", included fittings	LF	$100	9,350	$935,000
	PVC Wastewater Line - WMH8 - WMH8A	8", included fittings	LF	$80	5,860	$468,800
					80,440	
	Manhole	Install MH every 500'	EA	$15,000	161	$2,413,200
	Wastewater Pump Station and Forcemain	East Area, 400 GPM	LS	$1,550,000	1	$1,550,000
	Connect to City of Douglas Wastewater Collection System		LS	$500,000	1	$500,000
	Construction Sub Total					$14,401,500
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$4,320,450
	Project Delivery Sub Total					**$18,721,950**
	Total Wastewater Treatment Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$30,891,218**
	Total Wastewater Treatment Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$12,169,268**

Assumptions

1 Land acquisition by others. This cost is not included in this estimate

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

WW Collection to the North SA 6-8 BDIA

Engineer's Estimate of Probable Cost
Date Created: 6/20/2020
By: Mark Peterson
Refer to Figure 3-12 and Report Section 3.1.8 and Section 5.11

Stantec

	Concept Wastewater Collection	Description	Unit	Unit Cost	Quantity	Cost
	DIP Wastewater Line - Connection - Pump Station	10", forcemain included fittings	LF	$100	3,100	$310,000
	PVC Wastewater Line - Pump Station - EMH1	24", included fittings	LF	$240	4,210	$1,010,400
	PVC Wastewater Line - EMH1 - EMH2	18", included fittings	LF	$180	10,650	$1,917,000
	PVC Wastewater Line - EMH2 - EMH3	16", included fittings	LF	$160	9,780	$1,564,800
	PVC Wastewater Line - EMH3 - EMH4	12", included fittings	LF	$120	7,490	$898,800
					35,230	
	Manhole	Install MH every 500'	EA	$15,000	70	$1,056,900
	Wastewater Pump Station and Forcemain	East Area, 400 GPM	LS	$1,550,000	1	$1,550,000
	Connect to City of Douglas Wastewater Collection System		LS	$500,000	1	$500,000
	Expand City of Douglas Wastewater Collection System		LS	$2,000,000	1	$2,000,000
	Construction Sub Total					$10,807,900
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$3,242,370
	Project Delivery Sub Total					**$14,050,270**
	Total Wastewater Treatment Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$23,182,946**
	Total Wastewater Treatment Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$9,132,676**

Assumptions

1	Land acquisition to be done by GSA. This cost is not included in this estimate
2	City to establish a WWTP cost basis to accommodate flows

UTILITY ENGINEERING PLAN - DOUGLAS PORT OF ENTRY

WW Collection Dedicated to POE Along the Border

Engineer's Estimate of Probable Cost
Date Created: 7/6/2020
By: Mark Peterson
Refer to Report Figure 3-11 and Report Section 3.1.7 and Section 5.10

Stantec

	Concept Wastewater Collection	Description	Unit	Unit Cost	Quantity	Cost
	DIP Wastewater Forcemain - Pump Station - City WWTP	6" Forcemain, included fittings	LF	$72	6,880	$495,360
	PVC Wastewater Line - WHM1 - Pump Station	6", included fittings	LF	$60	19,900	$1,194,000
	Manhole	Install MH every 500'	EA	$15,000	54	$803,400
	Wastewater Pump Station and Forcemain	East Area, 400 GPM	LS	$1,550,000	1	$1,550,000
	Connect to City of Douglas Wastewater Collection System		LS	$500,000	1	$500,000
	Construction Sub Total					$4,542,760
	Project Delivery Cost					
	General Conditions + Engineering + Construction Administration	30% of Construction Sub Total	LS		30%	$1,362,828
	Project Delivery Sub Total					**$5,905,588**
	Total Wastewater Treatment Order of Magnitude Cost High Cost of Range	**+65% of Project Delivery Sub Total**			**65%**	**$9,744,220**
	Total Wastewater Treatment Order of Magnitude Cost Low Cost of Range	**-35% of Project Delivery Sub Total**			**-35%**	**$3,838,632**

Assumptions

1 Land acquisition to be done by GSA. This cost is not included in this estimate

APPENDIX C

ABOUT "YOUR SERVICES".....

The City of Douglas offers utility services for water, sewer collection and treatment, sanitation collection, landfill solid waste disposal, and pest control. These services are available to residential and commercial customers located within the City's corporate limits.

Additionally, but to a limited extent, city utility services are provided to customers outside the corporate limits who are located near service areas.

ABOUT "YOUR BILL".....

Utility bills consist of water, sewer, sanitation, landfill, and annually, the pest control fee. These charges are itemized on one monthly statement for each utility service account you have with the City. The method used for determining the amount charged for each service is explained in detail later on in this brochure. Utility bills are prepared as of the last day of the month and mailed, shortly after the 1st of each month.

CREDIT TERMS:

Bills are due and payable upon receipt. If payment is not received by the 20th of the month the account will be deemed delinquent and a $5.00 late fee assessed.

A notice of Delinquency and Discontinuance of Service is sent when the account becomes 30 days past due. Services will be disconnected if payment in full is not received by the 60th day. If you feel there is an error on your bill, you may contest it by contacting the Administrative Services Office prior to the 50th day after initial billing.

The City does offer a Direct Transfer of Funds service wherein your utility payment is automatically deducted from your checking account each month. Please inquire in the Administrative Services Office at City Hall for the appropriate form to authorize this service.

ABOUT "WATER".....

The bill for water service consists of three components: Customer Service Charge, Demand Charge and a Commodity Charge.

The Customer Service Charge is to cover the costs of account maintenance, billing, collection and meter reading. Currently, the Customer Service Charge is $5.00 per month.

The Demand Charge is to cover the cost of potential demand availability of the water systems. The Demand Charge is dependent on the Unit Capacity Value assigned to the size of your meter. The Unit Capacity for typical residential meter sizes of ¾" and 1" is 1.0. Currently, the Demand Charge is $28.20 per Capacity Unit per month. Accordingly, the Demand Charge for the typical residential customer would be $28.20 per month.

The Commodity Charge is to cover the remaining costs of water collection, treatment and distribution. The Commodity Charge is dependent on the amount of water used during the month. To obtain the water usage, a meter is installed in your service line and this meter is read monthly. Generally, meters are read starting around the 20th of the month. It takes approximately 4 to 6 days to complete reading of all meters. Currently, the Commodity Charge is $2.61 per 1000 gallons of water used for usage up to 30,000 gallons; and $3.34 per 1,000 gallons for usage 31,000 and over.

An illustration of these combined charges for a residential customer using 6,000 gallons of water in a month would result in a water bill consisting of:

Customer Service Charge	$ 5.00
Demand Charge	28.20
Commodity Charge (6,000gl/1000X2.61)	15.66
Total Water Charge	$48.86

The total, $45.95, is what will appear on the monthly bill as "Water".

ABOUT "SEWER".....

There are two billing categories for sewer services—commercial and residential. The two categories are identified because of the irrigation activities of residential users that are not generally common to commercial users. The intent is to base the sewer bill on the amount of water consumed that is contributed directly to the sewer system.

FOR RESIDENTIAL USERS: The sewer fee structure consists of two components: a Customer Service Charge and a Volume Charge.

The Customer Service Charge is to cover the costs of account maintenance, billing and collection. The customer service charge is currently $3.48 per month.

The Volume Charge covers the costs of collection and treatment of sewage. The Volume Charge is generally based on your winter quarter water consumption average. This is an attempt not to charge you for the water used for irrigation during the summer months. The average is determined by your water consumption for the winter months of December, January and February. This average is intended to be an estimate of the amount contributed directly to the sewer system. This "winter quarter average" is then used to calculate the sewer fees you will be charged from March of the current year through February of the following year. For example, a winter quarter consumption history might be: December—6,000 gallons, January—5,000 gallons, and February—7,000 gallons. The average would be 6,000 gallons.

Currently, the Volume Charge is $6.13 per 1,000 gallons of water used. This Volume Rate is applied to the winter quarter water consumption average to determine the monthly sewer charge.

An illustration of these combined fees for a residential customer with the 6,000 gallon winter quarter water average from the above example would result in a bill consisting of:

Customer Service Charge	$ 3.48
Volume Charge (6,000/1000X $ 6.09=)	36.78
Total Sewer Charges	$40.26

Again, only $39.85 would show on the monthly bill as "Sewer."

In the event that a winter quarter water consumption history is not available, an alternative method based on occupancy may be used to calculate the monthly sewer fees.

FOR COMMERCIAL USERS:

The same sewer rates apply to commercial users as for residential users, but the method of calculating the fee differs. Generally, commercial properties have very little lawn or landscaping and the amount of water used for irrigation is small. Therefore, if you are a commercial user, your monthly sewer fee will be based on the actual water you consume for any given month and your bill will change as your monthly consumption changes.

If you are a commercial user and you do use a material amount of water for irrigation, it may be possible to install a separate irrigation meter. For further information please contact Public Works.

ABOUT "SANITATION" .....

Billing for sanitation collection services is dependent on the customer classification, available container installation, and pickup frequencies. Residential and commercial fees for collection of solid waste covers the cost of collection only.

FOR RESIDENTIAL USERS:

Residential customers are provided with either an individual 90 gallon roll-out container or a common dumpster, either of which is picked up once a week. Customers with rollouts need to place the container by the curb with the wheels in the gutter line by 7:00 a.m. on the day of pick-up. To confirm the day of the week your sanitation is scheduled to be collected, please call the Public Works Department at 358-9750.

The fee for sanitation collection service is composed of two components consisting of:

Customer Service Charge	$ 4.23
Volume Charge	9.44
Total Sanitation Charge	$ 13.67

The total, $12.93 is what will appear on your bill as "Garbage".

FOR COMMERCIAL USERS:

Commercial sanitation customers are provided with dumpster containers. These containers are generally picked up on the frequency determined by the customer and the City. The fee for commercial users is a Customer Service Charge of $4.23 per month, and $2.36 per pickup, with a minimum of one pickup per week.

ABOUT "LANDFILL".....

The Landfill charge is assessed for the disposal of solid waste which has been collected and delivered to the Landfill. The landfill fee is assessed at $4.81 per pick-up.

For the average residential user with 1 container picked up once per week the monthly charge would be $19.24 and would appear on the monthly bill as "Landfill".

Commercial users are also assessed a Landfill charge of $4.81 per pickup for solid waste disposal at the Landfill.

The Douglas Municipal Landfill is located north of Douglas at the end of Kimball Street. Operating hours are 8:00 a.m. to 5:00 p.m. Monday thru Saturday, except holidays. Currently all forms of refuse are accepted with the exception of car batteries, used motor oil, liquids and any kind of hazardous waste. If you have any questions concerning the Landfill and what is accepted, please call the City of Douglas Public Works Department at 358-9750.

RECYCLING INFORMATION:

The Douglas Recycling Center is located at the Landfill. One is also located on Clay St. west of Gases Plus. The Recycling Center currently accepts newspapers, magazines, office pack including colored paper and paper typically used in an office setting, clean plastics, aluminum tin cans and brown and clear glass. Separate bins for each recyclable item are located inside the trailer. Items should be deposited in the correct bin.

COMPOST BINS are located throughout the City, for specific locations, contact public works at (307) 358-9750 or visit www.cityofdouglas.org

Finished compost materials as well as wood chips are currently available at the Landfill. Please inquire at the Scale House for any additional information.

ABOUT "PEST CONTROL".....

The Pest Control Charge is assessed to cover the cost of controlling insects by sprays. The term "pest" includes houseflies, gnats, mosquitoes, mayflies and any other types of insects that are offensive and apt to carry and transmit germs to the detriment of public health, comfort and safety. At least once a month, during the months of June through September, spraying takes place to help control these pests. Each place of abode and business within the City having a City utility account is assessed an annual Pest Control fee of $5.70. This fee is billed in July and is included in the billing statement received shortly after August 1st. The total, $5.70, will appear on the bill as "Pest Control".

Pesticides and spraying are not the only ways to control unwanted pests. Here are some easy, inexpensive ways to lessen the insect population in and around your home.

1. Empty all standing water. Buckets, cans and even rain gutters that do not drain properly are excellent habitat for insects to breed.
2. Keep trash in closed containers. Always put household refuse in closed plastic bags, and keep lids and tops closed on dumpsters.
3. Keep pet litter cleaned up and deposited in closed plastic bags or containers.
4. Keep grass and weeds cut. Tall grass provides shade and moisture for growing insect larvae, as well as shelter for mice, snakes and skunks.

Many insects are beneficial, such as the lady bug and ants. For more information on these and other helpful insects and controlling insects in your area, contact the Converse County Agriculture agent at 358-2417.

OTHER INFORMATION.....

CONSERVING RESOURCES:

We recommend that you monitor your water consumption. Even a small, undetected leak can cause substantial increases in both water and sewer bills. The effect of leaks as well as excessive water used during December, January and February, when residential sewer bills are recalculated for the winter averaging quarter, is particularly noticeable. Here are four very basic ways to conserve this valuable resource:

1. Check all faucets in your home for leaks. A continuous leak 1/16" in diameter can waste as much as 74 gallons in one day.
2. Check all toilets in your home for leaks. Put a few drops of food coloring in the toilet tank. Without flushing, watch to see if the color shows in the bowl. If it does you have a leak. Up to 100 gallons of water can be lost due to an otherwise invisible toilet leak.
3. Use automatic dishwashers and washing machines with full loads only, even if the machine features short, energy wiser cycles.
4. Water the lawn and garden early, or late in the day, not during midday heat. See that the water goes on the lawn, not on sidewalks or driveways.

THE COST OF WASTING WATER

Besides wasting a valuable natural resource, a leak could cost you the following in water and sewer charges for a month:

Size	Gal. Wasted	Water $	Sewer $
1/4"	394,000	$1,294	$2,415
3/16"	222,000	$720	$1,361
1/8 "	99,000	$309	$607
1/16"	25,000	$ 66	$153

FOR QUESTIONS...?

If you have questions concerning your services, please visit the Administrative Services Office located in City Hall at 101 N. 4th St., or call 358-3462, between 8:00 a.m. and 5:00 p.m. Monday through Friday.

City of Douglas
101 N. 4th St.
P.O. Box 1030
Douglas, WY 82633
(307)358-3462
Public Works: 358-9750

MUNICIPAL UTILITY SERVICES GUIDE

PREPARED FOR YOUR CONVENIENCE BY
THE CITY OF DOUGLAS

APPENDIX D

FUNDING MATRIX - COCHISE COUNTY

Agency	Program	Geography	Purpose / Goals	Eligible Applicants	Eligible Use of Funds	Loan or Grant Maximum	Terms/Requirements/ Notes	Funding Cycle	Contact
USDA - Rural Development	Water & Waste Disposal Predevelopment Planning Grants	Rural areas and towns with populations of 10,000 or less. Check eligible addresses Federally recognized tribal lands Colonias	This program assists low-income communities with initial planning and development of applications for USDA Rural Development Water and Waste Disposal direct loan/grant and loan guarantee programs.	Most state and local governmental entities Nonprofit organizations Federally recognized tribes	Grants may be used to pay part of the costs of developing a complete application for USDA Rural Development Water & Waste Disposal direct loan/grant and loan guarantee programs.	Maximum of $30,000 or 75 percent of the predevelopment planning costs. The average loan + grant size in the past decade has been about $2.5 million.	At least 25 percent of the project cost must come from the applicant or third-party sources. In-kind contributions do not count toward this minimum. Grants may not be used to pay for work already completed. For projects eligible under several programs, the amount of the pre-development or SEARCH grant will be subtracted from the total grant eligibility as determined in underwriting for the water or waste disposal project. These grants do not have to be paid back if the application for the USDA direct loan or loan/grant combination is not successful. Grants are based on demonstrated need and subject to the availability of funds. Partnerships with other federal, state and local entities are encouraged, and grants are awarded only when the applicant cannot afford to borrow the needed funds.	Applications for this program are accepted year round through your local Rural Development (RD) office. Application review typically takes 2-3 months. Funding is typically not available until 1 year after notification of selection.	Jack Smith, State Director 230 North First Avenue, Suite 206 Phoenix, AZ 85003-1706 Voice: (602) 280-8701 Fax: (855) 699-8035 www.rd.usda.gov/az
USDA - NRCS	Conservation Innovation Grants (CIG)	US	To stimulate the development and adoption of innovative conservation approaches and technologies in conjunction with agricultural production.	All US-based non-Federal entities are eligible to apply.	Can fund approaches to incentivizing conservation adoption, including market-based and conservation finance approaches; and conservation technologies, practices, and systems. CIG generally funds pilot projects, field demonstrations and	In 2020, $15M in CIG were available. The award ceiling is $2,000,000 and the award floor is $150,000.	Projects must used a technology or approach that was studied sufficiently to indicate a high probability for success. Up to 10% of total funds are set-aside for proposals from historically	CIG is expected to be funded annually through appropriations. Applications in 2020 are due June 29.	Melanie Krizmanich (202) 572-5805
Economic Development Administration	Economic Adjustment Assistance (CARES Act supplemental funding)	US	Program provides a wide range of financial assistance to communities and regions as they respond to, and recover from, the impacts of the coronavirus pandemic. Support a wide range of non-construction and construction activities. If border activities and associated local, tax	State, county, city or other political subdivision of a State, including a special purpose unit of a State or local government engaged in economic or infrastructure development activities, or a	Construction, Design, Engineering, Non-Construction, Revolving Loan Funds.Projects must be consistent with the region's current Comprehensive Economic Development Strategy (CEDS) or applicants can apply for a Strategy Grant to	Maximum $30,000,000. CARES Act made $1.5B available to EDA programs. The Seattle EDA Region, which includes Arizona, received $266M in funding. The	EDA prioritizes projects that create jobs and support other forms of economic development. Applicants must explain clearly in their application how the project would "prevent, prepare for, and	This is a rolling application but funds with be disbursed by September 30, 2022. Applications should be submitted as soon as possible to capitalize on funding	Richard Berndt, AZ representative. Seattle Regional Office, 915 Second Ave, Seattle, WA 98174. P: (206) 220-7682
General Services Administration (GSA)	Land Port of Entry	US Border	The US GSA along US Customs and Border Protection (CBP) has worked hard to ensure Land Ports of Entry (LPOE) are secure places to process both pedestrian and commercial traffic. ittee on Environment and Public Works authorize funding for LPOE.	State, county, city or other political subdivision of a State, transportation authorities, federal agencies including the Federal Highway Administration, US Department of Homeland Security.	Planning, Engineering, Construction. Energy infrastructure, Water infrastructure, Transportation infrastructure, Buildings. GSA has funded major border modernization projects in recent years including the $741 million San Ysidro LPOE.	No Max	In addition to direct appropriations through Congress, the House Committee on Transportation and Infrastructure and the Community. GSA is only able to fund project elements within the new POE. GSA funding for POEs is appropriation-dependent.	Projects must be submitted to GSA for funding consideration. An Operational Requirements Document defining operational needs for the project is developed by CBP with input from GSA and other stakeholders. The ORD is used in initial project development stage. A regional team is responsible for the project's execution and launches a Feasibility Study which is followed by a request for project design funding, then construction funding.	Ramon Riesgo, Program Specialist, 325 W F St 4236, San Diego CA 92101-6017 Phone: (619)557-5092 Email: ramon.riesgo@gsa.gov
Arizona Department of Housing	CDBG Grant Program - Colonia Set Aside Account	AZ	The Cranston-Gonzalez National Affordable Housing Act of 1990 obligated the U.S. Department of Housing and Urban Development (HUD) to earmark CDBG funding for upgrading the housing and infrastructure of Colonia communities. It mandated a set-aside (10%)	State of Arizona, Department of Housing Certified Colonias, lack of potable water or sanitary sewer prior to Nov 1990	lack of basic infrastructure or safe and sanitary housing	Current program has $1.9M total in grant funding	In order to provide sufficient funding to address those issues that plague Colonias, ADOH will make funding available through the Colonia set-aside once every two years in a competitive	Every 2 years; current deadline is 7/15/2020.	Kathy Blodgett at kathy.blodgett@azhousing.gov or 602.771.1021
Arizona Department of Housing	CDBG Grant Program - Regional Account	AZ	Funding that is distributed on a non-competitive basis through the four non-metro Councils of Governments. Funds available vary based on the region's approved rotational method of distribution	All incorporated cities and towns, except those located within Maricopa and Pima Counties and excluding the cities of Casa Grande, Douglas, Elov, Flagstaff, Florence, Mammoth,	Water Eligible Items: • Installation of new lines. • Replacement of existing lines (but only if such are deteriorated or obsolete based on federal or state	IN 2020, Douglas received $274,259 in CDBG funding through the entitlement programs and CARES Act.	Funds received from CARES must be used to "prevent, prepare for, and respond to coronavirus". Other areas of Cochise County may be eligible for funding from CARES and CDBG	NA Formula allocation.	Kathy Blodgett at kathy.blodgett@azhousing.gov or 602.771.1021
Arizona Department of Housing	CDBG Grant Program - State Special Project Round	AZ	Competitive opportunity for projects that align with State's Consolidated Plan and are ready to implement immediately meaning that environmental reviews are completed, land control	All incorporated cities and towns, except those located within Maricopa and Pima Counties and excluding the cities of Casa Grande, Douglas, Elov, Flagstaff, Florence, Mammoth,	Only project types for the categories listed below will be eligible to apply for CDBG SSP funding: • Public Facilities and Improvements • Community Facilities	Current program has $2.6M in grant funding			Kathy Blodgett at kathy.blodgett@azhousing.gov or 602.771.1021
Bureau of Reclamation	WaterSMART Water and Energy Efficiency Grants	Western US	The objective of the WaterSMART Water and Energy Efficiency Grants Funding Opportunity Announcement (FOA) is to invite states, Indian tribes, irrigation districts, water districts, and other organizations with water or power delivery authority to leverage their money and	state, Indian tribe, irrigation district, water district, or other organization with water or power delivery authority.	Projects that seek to conserve and use water more efficiently; increase the production of hydropower; mitigate conflict risk in areas at a high risk of future water conflict; and accomplish other benefits that contribute to water supply reliability in the	No more than $1,500,000 in total WaterSMART Water and Energy Efficiency Grant funds will be awarded to any single applicant under this FOA per fiscal year	Applicants must provide at least 50% of the total project costs from non-Federal sources, either in cash or as in-kind contributions.	Annually, awards announced in February	Mr. Josh German at 303-445-2839 jgerman@usbr.gov.
Federal Emergency Management Administration	Building Resilient Infrastructure and Communities (BRIC)	US	BRIC is funded by FEMA and administered by the Arizona Department of Emergency and Military Affairs. It's a nationally competitive grant program that was created to assist states, local and tribal governments implement cost-effective hazard mitigation activities before a disaster	The State is the Applicant, municipalities, counties and other public entities are the subapplicants.	Eligible mitigation activities can include: Property Acquisition and Structure Demolition, Property Acquisition and Structure Relocation, Structure Elevation, Mitigation Reconstruction, Dry Floodproofing of Historic Residential Structures, Dry	$10 million maximum for Resilient Infrastructure implementation projects.	FEMA will fund up to 75% of the total project costs. The period of performance for the grant program begins with the opening of the application period and ends no later than 48	Annually. Must complete a benefit cost analysis.	DEMA Mitigation Office, 5636 E McDowell Road Bldg. M5101, Phoenix, AZ 85008. lucrecia.hernandez@azdema.go
Water Infrastructure Finance Authority of Arizona	Clean Water SRF	AZ	WIFA is the administrator for Arizona's CWSRF program, providing communities a permanent, independent source of low-cost financing for a wide range of water quality infrastructure projects.	Public Jurisdictions* can apply for Arizona's CWSRF program, these include: Cities Towns Special Districts County Improvement Districts Sanitary Districts Tribal Entities	Wastewater treatment plants - construction, expansion, upgrade, rehabilitation Interceptors, collectors and lift stations Upgrade or replacement of failing decentralized wastewater systems Septic to sewer Recharge facilities; water reclamation and reuse Stormwater management - both pipes and green stormwater	In 2018 (most recent published annual report), WIFA executed loans totalling $39 million. Interest rates on the loans were, on average, approximately 20% discounted from market interest rates. States are required to provide a 20% match. Federal capitalization of the Arizona CWSRF was $10.8M in 2020.	Under the CWSRF, WIFA provides various types of assistance, including loans, refinancing, purchasing, or guaranteeing local debt and purchasing bond insurance. Our loan terms vary and may include an interest rate discount and repayment periods of up to 30 years*. WIFA tailors all loan terms to the borrower's situation and needs.	Accept applications year round. Board meets 6 times annually to consider loans. Application process starts with getting on the project priority list.	If you have any questions before or during the Project priority list (PPL) process, please feel free to contact us at (602) 364-1310 or fill out a email form at: https://www.azwifa.gov/contact-us
Water Infrastructure Finance Authority of Arizona	Drinking Water SRF	AZ	The DWSRF program helps public and private water systems across Arizona meet the objectives of the SDWA by providing a permanent, independent source of low-cost financing.	Publicly-owned community water systems can apply for Arizona's DWSRF program; these include: • Cities	Treatment - for example, installation or upgrade of facilities to improve the quality of drinking water to comply with standards. Transmission and distribution - for example, installation or	In 2018 (most recent published annual report), WIFA executed loans totalling $39 million. Interest rates on the loans were, on average, approximately 20% discounted	Under the DWSRF, WIFA provides various types of assistance, including loans, technical assistance, and forgivable principal. Our loan terms vary and may include an interest rate	Accept applications year round. Board meets 6 times annually to consider loans. Application process starts with getting on the project priority list.	https://www.azwifa.gov/contact-us
USDA - Rural Development	Water & Waste Disposal Loan & Grant Program	Rural areas and towns with populations of 10,000 or less. Check eligible addresses.	This program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas.	This program assists qualified applicants who are not otherwise able to obtain commercial credit on reasonable terms. Eligible applicants include:	Drinking water sourcing, treatment, storage and distribution Sewer collection, transmission, treatment and disposal		Up to 40-year payback period, based on the useful life of the facilities financed Fixed interest rates, based on the need for the project and the median household income of the	Applications for this program are accepted year round through your local Rural Development (RD) office. Application review typically takes 2-3	Jack Smith, State Director 230 North First Avenue, Suite 206 Phoenix, AZ 85003-1706
North American Development Bank	Loan Program	US Mexico border region	NADB provides direct financing to public and private entities for the implementation of environmental infrastructure projects located within the U.S.-Mexico border region. It also offers a variety of financial services to support border communities and other sponsors in	Projects must be located within the border region, defined as 100 kilometers (62 miles) north of the international boundary in the four U.S. states of Arizona, California, New Mexico	Water: Drinking water supply, treatment & distribution; wastewater collection, treatment & reuse; water conservation; storm drainage & flood control Waste Management: Sanitary landfills, dumpsite closure,	NADB cannot finance more than 85 percent of the eligible costs of a project. Funding from other sources in the form of equity contributions, subordinated loans, grants or	Loan maturities may range up to 30 years, depending on individual project requirements; Loans are available in U.S. dollars or Mexican pesos, depending on the project location and	Loan applications are received year round. Process is demanding and involves getting on the priority list. Applicants must attend multiple board	Renata Manning, rmanning@nadb.org Roberto Molina, rmolina@nadb.org 877.277.1703
North American Development Bank	Border Environment Infrastructure Fund (BEIF/PDAP)	US Mexico border region	This program offers grant financing exclusively for the implementation of high-priority municipal drinking water and wastewater infrastructure projects located within 100 kilometers of the U.S.-Mexico border.	Only water and wastewater infrastructure projects located within 100 kilometers (62 miles) of the U.S.-Mexico border will be considered for funding.	Projects must address an existing human health and/or ecological issue. Priority will be given to those projects likely to have the most impact. Projects must have a U.S.-side benefit. Priority will be given to	BEIF grant may not exceed US$8 million. The cost of any project shall not exceed US$30 million;	Project sponsors are generally expected to finance part of the project with a debt component and must be able to confirm the commitment of other funding sources to complement the BEIF	Applications are received year round. Process is demanding and involves getting on the priority list.	Renata Manning, rmanning@nadb.org Roberto Molina, rmolina@nadb.org 877.277.1703
North American Development Bank	Community Assistance Program (CAP)	US Mexico border region	Through this program, NADB offers grants to support the implementation of critical environmental infrastructure projects for public entities with limited capacity to incur debt in low-income communities in the border region.	The CAP program is exclusively for public and not-for-profit entities with projects ready for construction. It requires that final design and procurement documents are complete in order	Water: Drinking water supply, treatment & distribution; wastewater collection, treatment & reuse; water conservation; storm drainage & flood control Waste Management: Sanitary landfills, dumpsite closure,	Grants up to US $500,000	The project sponsor must contribute at least 10% of the total project cost in the form of cash. On a case-by-case basis, in-kind contributions such as land, equipment or other tangible assets or cost	Applications are received year round. Process is demanding and involves getting on the priority list.	Renata Manning, rmanning@nadb.org Roberto Molina, rmolina@nadb.org 877.277.1703

North American Development Bank	Technical Assistance - Project Studies and Designs	US Mexico border region	NADB offers technical assistance to help border communities and other project sponsors develop environmental infrastructure projects for financing and implementation, as well as to strengthen their financial performance and reinforce the long-term sustainability of their projects.	Utilities, state and local governments and their agencies, and other sponsors of projects that have been certified or sponsors who are actively developing specific projects for financing by	Project design and related development studies Financial studies Analyses of administrative operations Analyses of technical operations	Grants may be awarded in amounts of up to US$250,000. In the event the project represents a regional effort where more than one community is involved, the	The project sponsor or other project partner is expected to cover at least 25% of the cost of the study. The time period from approval of the technical assistance grant to the initiation of the	Applications are received year round. Process is demanding and involves getting on the priority list.	Renata Manning, rmanning@nadb.org Roberto Molina, rmolina@nadb.org 877.277.1703
Arizona Department of Housing	CDBG Grants - Section 108 Loan Guarantee	AZ	Section 108 is the loan guarantee provision of the Community Development Block Grant (CDBG) program. Under this section, HUD offers communities a source of financing for certain community development activities, such as housing rehabilitation, economic	Metropolitan cities and urban counties that receive entitlement grants may apply directly to HUD for loan guarantee assistance. Non-entitlement communities under the state CDBG	Eligible activities are (1) real property acquisition, (2) rehabilitation of property owned by the applicant public entity or its designated public agency, (3) housing rehabilitation eligible under the CDBG program, (4) special economic development		When determining eligibility, the CDBG rules and requirements apply. As with the CDBG program, all projects and activities must meet CDBG's primary objective (use of 70 percent of funds		Kathy Blodgett at kathy.blodgett@azhousing.gov or 602.771.1021
US Environmental Protection Agency	Water Infrastructure Finance and Innovation Act (WIFIA)	US	The WIFIA program accelerates investment in our nation's water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.	Local, state, tribal, and federal government entities Partnerships and joint ventures Corporations and trusts	Projects that are eligible for the Clean Water SRF, notwithstanding the public ownership clause Projects that are eligible for the Drinking Water SRF Enhanced energy efficiency projects at drinking water and	$20 million: Minimum project size for large communities. $5 million: Minimum project size for small communities (population of 25,000 or less).	35 years: Maximum final maturity date from substantial completion. 5 years: Maximum time that repayment may be deferred after substantial completion of the	Annually	U.S. Environmental Protection Agency WIFIA Program Office of Water, Office of
Rural Community Assistance Corporation (RCAC)	Environmental Infrastructure Loan Program	Rural areas w/ pop less than 50,000 in Alaska, Arizona, California, Colorado, Hawaii	Program helps create, improve or expand the supply of safe drinking water, waste disposal systems and other facilities that serve communities in the rural West. RCAC's loan programs are unique — they provide the early funds small rural communities need to determine	Nonprofit organizations, public agencies and tribal governments. Community size is limited to 10,000 for long-term USDA guaranteed loans and	Eligible projects include water, wastewater, solid waste and storm water facilities that primarily serve lower-income rural communities.	Varies	Short, Intermediate, and Long Term Loans available with different requirements		Georgianne McConnell, az, nm, nv, ut (916) 917-4319 • Fax: (916) 244-0990
Rural Community Assistance Corporation (RCAC)	Community Facilities Loan Program	Projects must be located in rural areas with populations of 50,000 or less in	Program helps create or improve essential community facilities to serve communities in the rural West. This RCAC loan program offers short-term loans to meet early acquisition and pre-development needs, interim construction costs and long-term permanent financing.	Nonprofit organizations, public agencies and tribal governments. In instances where the USDA Community Facility loan program is used as the take-out source for an RCAC short-term	Eligible projects include community facility projects that primarily serve low-income populations or that serve the general population in a community where median household income does not exceed the state or the county	Varies	Short and Long Term Loans available with different requirements		Georgianne McConnell, az, nm, nv, ut (916) 917-4319 • Fax: (916) 244-0990