

**GLAMORGAN COMMUNITY  
SEWER COLLECTION PROJECT  
PRELIMINARY ENGINEERING REPORT  
DECEMBER 2019**



**PREPARED FOR:**

Wise County Public Service Authority  
5622 Industrial Park Drive  
Norton, Virginia 24273  
Phone: 276.679.1263

**PREPARED BY:**

The Lane Group  
P.O. Box 452  
316 East 5<sup>th</sup> Street South  
Big Stone Gap, Virginia 24219  
Phone: 276.523.3771



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## TABLE OF CONTENTS

<b>1.0 Executive Summary</b> .....	<b>1</b>
<b>2.0 Project Planning Area</b> .....	<b>2</b>
2.1 Location.....	2
2.2 Environmental Resources Present.....	2
2.3 Growth Areas & Population Trends.....	2
<b>3.0 Existing Facilities</b> .....	<b>4</b>
3.1 History.....	4
3.2 Current Project Area Services.....	4
3.3 Condition of Existing Facilities.....	4
3.4 Operating Central Facilities Financial Status.....	5
<b>4.0 Need for Project</b> .....	<b>5</b>
4.1 Health & Safety.....	5
4.2 System Operation & Maintenance.....	5
4.3 Growth.....	6
<b>5.0 Project Implementation Considerations</b> .....	<b>6</b>
5.1 Design Criteria.....	6
5.1.1 Flow Projections.....	6
5.1.2 Line Sizing – Gravity.....	6
5.1.3 Line Sizing – Pressure.....	6
5.2 Environmental Impacts.....	6
5.2.1 Floodplains.....	6
5.2.2 Wetlands & Streams.....	7
5.2.3 Cultural Resources.....	7
5.2.4 Biological Resources.....	7
5.2.5 Water Quality.....	7
5.3 Permits & Approvals.....	8
5.3.1 VDEQ Permit to Construct.....	8
5.3.2 Roads & Streets.....	8
5.3.3 Erosion & Sediment (E&S) Control.....	9
5.3.4 Virginia Stormwater Management Program (VSMP).....	9
5.3.5 Railroads.....	9
5.3.6 Wetlands & Streams.....	9
5.4 Funding Agencies.....	9
5.5 Land Requirements - General.....	10
5.6 Construction Issues - General.....	10
5.6.1 Permit Compliance.....	10
5.6.2 Existing Utilities.....	10
5.6.3 Unknown Underground Utilities.....	10
5.6.4 Restricted Work Areas.....	10
5.6.5 Stream Crossings.....	10
5.6.6 Road/Street & Railroad Crossings.....	11
5.6.7 Transportation.....	11
5.6.8 Air Quality.....	11



## TABLE OF CONTENTS

5.6.9 Noise	11
5.7 Construction & Related Costs – General	12
5.7.1 Construction Costs	12
5.7.2 Related Costs	12
5.8 Treatment, Operation & Maintenance Costs – General	13
5.9 Present Worth – General	13
<b>6.0 Alternatives Considered</b>	<b>14</b>
6.1 Phasing	14
6.2 Alternative No.1 – “No Action”	14
6.3 Alternatives No. 2 & 3 – Single or Multiple Phase Gravity Sewer Collection System	14
6.3.1 Project Description	14
6.3.2 Land Requirements	14
6.3.3 Environmental, Permitting & Construction Issues	14
6.3.4 Project Costs	15
6.3.5 Treatment Cost	15
6.3.6 Operation & Maintenance Cost	15
6.3.7 Present Worth	15
6.4 Selected Alternative – Single Project	16
6.4.1 Comparative Analysis	16
6.4.2 Selected Alternative – Advantages/Disadvantages	16
<b>7.0 Proposed Project</b>	<b>16</b>
7.1 Project Design	16
7.1.1 Sewage Treatment	16
7.1.2 Sewage Collection System	16
7.1.3 Transmission Line Capacity	17
7.2 Construction Issues	17
7.3 Opinion of Probable Costs	17
7.4 Annual Operating Budget	18
7.4.1 Project Income	18
7.4.2 Operation & Maintenance Cost	18
7.4.3 Net Revenue	18
7.5 Project Funding Sources	18
7.5.1 Grants/Principal Forgiveness & Loans	19
7.5.2 Reserves & Short-lived Assets	19
7.6 Project Funding Scenarios	19
7.6.1 100% Grant/Principal Forgiveness	20
7.6.1 50% Grant/Principal Forgiveness and 50% Loan	22
7.6.3 100% Loan	24
<b>8.0 Conclusions &amp; Recommendations</b>	<b>26</b>
8.1 Conclusions	26
8.2 Recommendations	26



## TABLE OF CONTENTS

### Figures:

Figure GV1: General Vicinity Map

### Tables:

Table 1.0: Project Area Population Projections  
Table 6.0: Opinion of Probable Cost  
Table 6.1: O&M Costs  
Table 6.2: Present Worth  
Table 7.0: Selected Alternative Opinion of Probable Cost  
Table 7.1: Non-construction Opinion of Probable Cost  
Table 7.2: Annual Revenue Projections  
Table 7.3: O&M Costs – Selected Alternative  
Table 7.4: Net Revenue  
Table 7.5: 100% Grant/Principal Forgiveness Project Planning Factors  
Table 7.6: 100% Grant Annual Budget  
Table 7.7: 50% Grant/Principal Forgiveness & 50% Loan Project Planning Factors  
Table 7.8: 50% Grant/Principal Forgiveness & 50% Loan Annual Budget  
Table 7.9: 100% Loan Project Planning Factors  
Table 7.10: 100% Loan Annual Budget  
Table 8.0: Selected Alternative Summary

### Appendices:

- Appendix A – Sewer System Conceptual Plans (User Agreement Mapping)
- Appendix B – Opinion of Probable Cost
- Appendix C – Short-Lived Assets

## 1.0 EXECUTIVE SUMMARY

The Glamorgan Community Sewer Collection Project is located near the northwestern corporate limit line of the Town of Wise, Virginia. The project area is situated along both sides of US Route 23 in Wise County and US Business Route 23 (W. Main Street) in the Town of Wise. The project area is drained primarily by Sepulcher Creek, which is a tributary to the Guest River. Elevations in the project area range from approximately 2200 to 2700 feet above mean sea level. At this time, there is no public sewer service in the project area. Domestic wastewater is treated via aging septic systems and possible straight piping to tributaries of the Guest River.

The Wise County Public Service Authority (PSA) provides wastewater collection and treatment for 16 individual sewer systems once the Wells-Adams project, which is currently under construction, is completed. Once completed, the PSA's system will consist of approximately 1,073 connections, 118,200 lf of gravity collection and transmission line, seven (7) sewage pump stations, three (3) decentralized treatment facilities, and 27,000 lf of forcemain.

In 2016, the PSA updated its *2009 Wise County Wastewater Study Amendment* in support of its 2016/2017 Capital Improvement Program (CIP) for selected projects. The Glamorgan Community Sewer Collection Project was included in the update.

The project may be accomplished as a single overall project or via two (2) separate phases. Combined, Phases I and II entail the installation of approximately 6,800 linear feet (lf) of 8-inch gravity sewer, 600 lf of 6-inch gravity sewer, 6,200 lf of 4-inch sewer service line, 34 manholes, 62 sewer connections, several road crossings (including an underground boring of 4-lane US Route 23), one railroad crossing, and associated items. The development of the project as a single overall project, consisting of both Phases I and II, is the Selected Alternative.

Per the analysis, the following can be concluded:

- Installation of a sewage collection system in the Glamorgan Community with treatment at the CNW Regional WWTP will eliminate possible straight piping and remove non-complying septic systems from the environment, thereby improving water quality in the Guest River and its tributaries.
- The total estimated project cost for the Glamorgan Community Sewer Collection Project, as described above, is estimated to be \$1,863,312, which consists of \$1,477,415 in construction costs and \$385,897 in related (non-construction) costs.

The Selected Alternative Summary follows:

SELECTED ALTERNATIVE SUMMARY – SINGLE PROJECT (PHASES I and II)							
Connections	Revenue	O&M Cost	Net Revenue	Construction Cost	Related Cost	Total Project Cost	Cost per Connection
62	\$ 34,782	\$ 3,764	\$ 31,018	\$ 1,477,415	\$ 385,897	\$ 1,863,312	\$ 23,889

It is recommended the PSA submit the PER to VDEQ for review and approval and to all applicable funding agencies along with appropriate funding applications. When funding is secured, it is recommended further that the PSA procure the services of a licensed, Professional Engineer and begin design/permitting of the proposed project.



## 2.0 PROJECT PLANNING AREA

### 2.1 Location

The Glamorgan Community Sewer Collection Project is located near the northwestern corporate limit line of the Town of Wise, Virginia. The project area is situated along both sides of US Route 23 in Wise County and US Business Route 23 (W. Main Street) in the Town of Wise. The project area is drained primarily by Sepulcher Creek, which is a tributary to the Guest River. Elevations in the project area range from approximately 2200 to 2700 feet above mean sea level. Refer to Figure GV1: General Vicinity Map.

### 2.2 Environmental Resources Present

An Environmental Assessment (EA) will be prepared by the LENOWISCO Planning District Commission upon confirmation of funding. Regulatory agency database reviews will be conducted and letters requesting information regarding the presence of environmental resources within the project area will be sent to the following:

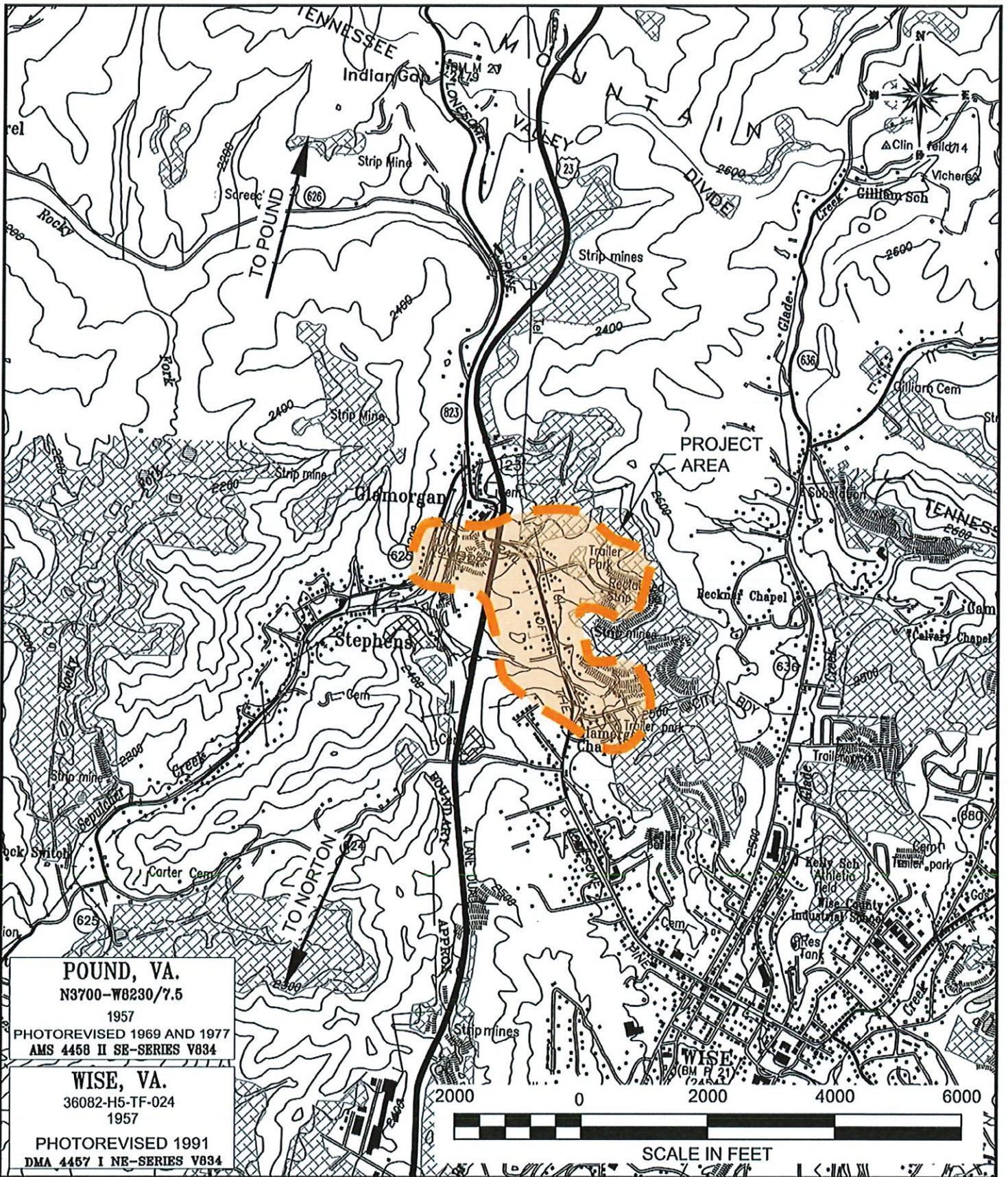
- Virginia Department of Conservation & Recreation (VDCR)
- Virginia Department of Agriculture & Consumer Services (VDACS)
- Virginia Department of Environmental Quality (VDEQ)
- Virginia Department of Game & Inland Fisheries (VDGIF)
- Virginia Department of Historic Resources (VDHR)
- Virginia Department of Transportation (VDOT)
- Virginia Marine Resources Commission (VMRC)
- US Army Corps of Engineers (USACE)
- USDA Natural Resources Conservation Service (NRCS)
- US Fish and Wildlife Service (USFWS)

### 2.3 Growth Areas & Population Trends

Per the *Wise County Water & Sewer Study* (1997), Wise County's population was estimated at 39,573 in 1990, with a 6.65 percent increase through the year 2025. Per the 2010 U.S. Census, Wise County's population was 41,452. With the dramatic and recent decline in the coal and gas markets and lack of new industry to offset job loss, population growth has declined. Recent growth has been negative with a 3 percent net loss of population from 2010 through 2015. For purposes of analysis, 0.00 percent growth is projected for the project area into the foreseeable future, based on the 2015 population. Table 1.0 provides future population projections.

<b>Year</b>	<b>Phase I</b>	<b>Phase II</b>	<b>Phases I &amp; II</b>
2019 through 2059	48	14	62





**the LANE GROUP**  
 engineering  
 architecture  
 environmental

316 EAST FISH STREET SOUTH | BIG STONE GAP, VA 24219  
 Phone: 276-523-3771 | www.thelanegrp.com  
 ARLINGTON | BIG STONE GAP | GALAX

**GLAMORGAN SEWER EXTENSION  
 PROJECT - PHASE I & II  
 WISE COUNTY PSA**

GENERAL VICINITY  
 MAP

Drawn By: CWC	<b>PAGE GV1</b>
Checked By: JEB	
Date: 07/22/2019	

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### **3.0 EXISTING FACILITIES**

#### **3.1 History**

The Wise County Public Service Authority (PSA) was formed by the Wise County Board of Supervisors in 1969 to serve the potable water and wastewater treatment needs of its citizens. Prior to 1989, the PSA had no wastewater treatment capacity. However, with the construction of the 4.0 MGD Coeburn-Norton-Wise Regional Wastewater Treatment Plant (CNW), it did purchase a 0.40 MGD allocation within the plant. In 2014, CNW completed an upgrade to 6.5 MGD. Today, the PSA has 1.223 MGD available within the WWTP for treating its customer's wastewater.

The PSA is currently adding to its wastewater customer base with one on-going project:

- Wells-Adams Extension with 17 connections.

#### **3.2 Current Project Area Services**

At this time, there is no public sewer service in the project area. Domestic wastewater is treated via aging septic systems and possible straight piping to tributaries of the Guest River.

#### **3.3 Condition of Existing Facilities**

The PSA provides wastewater collection and treatment for 16 individual sewer systems, as follows:

- Central Operations Area
  - Riverview Estates – conventional gravity system with treatment at CNW.
  - Stephens Community (*aka* Guest River) – conventional gravity system with transport through the City of Norton and treatment at CNW.
  - Bold Camp Community – septic tank effluent treatment system and pump station with treatment by the Town of Pound.
  - Josephine Community – conventional gravity system and pump station with transport through the City of Norton and treatment at CNW.
  - Blackwood – conventional gravity system and pump station serving the industrial park and landfill, with transport through the City of Norton and treatment at CNW.
  - Wise County Fairgrounds – conventional gravity system and pump station transport through the Town of Wise with treatment at CNW.
  - Hamilton Town (*aka* Esserville Community) – conventional gravity system with transport through the City of Norton and treatment at CNW.
  - Eisenhower Road Extension – conventional gravity system utilizing capacity to the Stephens Community (*aka* Guest River), with transport through the City of Norton and treatment at CNW.
  - Banner Community Sewer System – conventional gravity system with transport through the Town of Coeburn and treatment at CNW.
- Appalachia Operations Area
  - Callahan Creek Service Area
    - Derby Community – conventional gravity system and pump station with transport through the Town of Appalachia and treatment at the Big Stone Gap Regional WWTP.
    - Roda & Osaka Phase I – conventional gravity system and pump station with transport

through the Town of Appalachia and treatment at the Big Stone Gap Regional WWTP.

- Stonega Phase II – conventional gravity system and pump station with transport through the Town of Appalachia and treatment at the Big Stone Gap Regional WWTP.

#### Pigeon Creek Decentralized Service Area

- Imboden Community – Septic tank effluent treatment gravity system with subsurface decentralized treatment.
- Lower Exeter Community – Septic tank effluent treatment gravity system with subsurface decentralized treatment.
- Upper Exeter Community – conventional gravity system currently with surface water discharge decentralized treatment. Plans and specifications are in process to convert from decentralized sewage treatment to a pump station and forcemain to the Town of Appalachia gravity system for treatment at the Town of Big Stone Gap Regional WWTP.

Once the pending projects are completed, the PSA's system will consist of approximately 1,073 connections, 118,200 lf of gravity collection and transmission line, seven (7) sewage pump stations, two (2) decentralized treatment facilities and 27,000 lf of forcemain.

### **3.4 Operating Central Facilities Financial Status**

With the completion of the pending projects, the PSA will serve approximately 1,073 sewer customers, with approximately 855 sewer connections in its Central Operations Area and 218 in its Appalachia Operations Area.

On July 01, 2018, the PSA set all rates County-wide the same. The current sewer rates, effective July 01, 2019, are as follows:

- \$37.00 base rate (1,500 gallons) and \$13.50 per 1,000 gallons above the base.

## **4.0 NEED FOR PROJECT**

### **4.1 Health & Safety**

The residents in the Glamorgan Community are not served by a public wastewater collection and/or treatment system. They rely on individual septic tank/drain field systems, and possibly direct discharge to adjacent streams. Satisfactory soil conditions and sufficient land area required to construct or expand properly functioning subsurface treatment systems are not available to a majority of those residing in the project area.

Due to the improper treatment of human wastes, or the lack of treatment altogether, public and environmental health issues and concerns are prevalent in the project area. Without an adequate collection and treatment, and public awareness of the potential health and ecological issues, water quality will further diminish and the risk to public health will increase.

### **4.2 System Operation & Maintenance**

The Wise County PSA will own, operate and maintain the proposed Glamorgan Community Sewer Collection Project.



### 4.3 Growth

As previously noted, according to the Wise County Water & Sewer Study, the project planning area is not expected to experience measurable growth over the next 40 years.

## 5.0 PROJECT IMPLEMENTATION CONSIDERATIONS

### 5.1 Design Criteria

Per the VDEQ *Sewage Collection and Treatment Regulations*, the following design criteria are used:

#### 5.1.1 Flow Projections

- Dwellings – 100 gpd/person at 2.53 (2017 American FactFinder) persons/residence; use 253 gpd/connection.
- Commercial/Business – 200 to 300 gpd/1,000 sf floor space; use 300 gpd/1,000 sf.
- Churches – Flow rates are not projected for churches as during their primary time of use, other sources will likely not be generating wastewater.

#### 5.1.2 Line Sizing – Gravity

- Interceptor lines must pass 200% of the average daily residential flow.
- Main or Trunk lines must pass 250% of the average daily residential flow.
- Minimum scouring velocity is 2.0 feet per second (fps) for non-settled sewage.
- Minimum gravity line size shall be 8-inches, except for laterals that serve up to six (6) connections or less may be 6-inches (not applied to the PER estimates).
- Generally maximum lateral length serving a single connection = 150 feet (not VDEQ criteria).
- Gravity line minimum slope:
  - 6-inch = 0.49 percent
  - 8-inch = 0.40 percent
  - 10-inch = 0.28 percent
  - 12-inch = 0.22 percent
  - 15-inch = 0.15 percent

#### 5.1.3 Line Sizing – Pressure

Pressure line is sized based on the average daily and peak daily flow output from pump stations, a function of duplex pumping capacity. Lines are sized such that the velocity, based on wastewater hydraulic characteristics, is between 2.0 fps, minimum scouring velocity, and 8.0 fps, above which erosion of pipe materials may become an issue.

### 5.2 Environmental Impacts

A separate EA, the *Glamorgan Community Sewer Collection Project Environmental Assessment*, will be prepared in accordance with VDHCD and VDEQ agency guidelines.

#### 5.2.1 Floodplains

The project area was compared to Federal Emergency Management Agency Flood Insurance Rate Maps for Wise County. The flood map that covers the project area is Flood Map Number 51195C0230D. As depicted on this map, the project area is situated in Zone X, which is an area of

minimal flood hazard. As such, the area is considered to be located outside of the 100- and 500-year floodplains. Therefore, no impacts to floodplains are expected as a result of this project.

#### 5.2.2 Wetlands & Streams

Prior to any land disturbing activity, detailed project plans along with site specific permit information will be submitted to the USACE for its review. After its review, the design engineer will locate utility lines, where practical, away from wetlands and watercourses. Recommendations offered by the USACE to minimize potential impacts will be incorporated into the project. In the event that a wetland is encountered, heavy equipment will be placed on mats to prevent soil compaction. Machinery will be kept out of streams and wetlands when not being actively used. No stockpiled material will be stored on a wetland site and the affected site(s) will be restored to its original contour. All required permits will be obtained prior to construction activity.

#### 5.2.3 Cultural Resources

The VDHR has primacy over cultural resources per Section 106 of the National Historic Preservation Act (NHPA). A plan for the treatment of unanticipated/unexpected historical or archaeological discoveries during construction in accordance with VDHR Regulations §800.13 will be incorporated into the construction documents. The plan will include names, telephone and fax numbers of the appropriate County and agency contacts.

#### 5.2.4 Biological Resources

VDCR and VDGIF have primacy over aquatic and terrestrial ecosystems. Both have on-line databases to address potential impacts to biological resources from a specific project. Historically, project information was also submitted to USFWS for review and approval. A review of USFWS's online Information, Planning and Consultation system (IPaC) database is the protocol for USFWS review and concurrence. Future comments will be strictly adhered to and implemented during the design process. As per the request of the USFWS, a Species Conclusion Table will be compiled by LENOWISCO against the data provided by a review by the VDCR.

To protect the critical habitats of all threatened and endangered species and the surrounding environment, an Erosion & Sediment Control Plan, as prescribed in the *Virginia Erosion and Sediment Control Handbook*, (VESCH) 1992, VDCR, will be developed, approved, and implemented prior to any construction activity.

Recommendations, if any, made by VDCR, VDGIF or USFWS to avoid or minimize potential impacts to threatened and endangered species within close proximity of the project area will be followed.

#### 5.2.5 Water Quality

The proposed project is expected to involve several minor stream crossings of tributaries to the Guest River. However, no adverse impacts to the water quality of the project area are anticipated in conjunction with the construction of this project. Potential impacts resulting from surface runoff must be minimized using Best Management Practices (BMP).

Erosion and sediment control measures, as outlined in *Virginia Erosion and Sediment Control Handbook (VESCH)* are critical to water protection. Adherence to BMP's must be maintained to protect all streams in the project area from impairment due to sediment.



Effective July 01, 2014, VDEQ revised 9VAC25-870, its Stormwater Management Regulations (VSMR), to address water quality as well as quantity from development/construction projects disturbing greater than 1.0 acres. Refer to Section 5.3.4 for a discussion of the water quality and quantity requirements.

For unavoidable impacts, VDEQ may suggest implementation of the following practices to minimize impacts to wetlands and waterways:

- The operation of machinery and construction vehicles outside of streambeds and wetlands
- The use of directional drilling from upland locations for the installation of utilities
- The use of synthetic mats when in-stream work is unavoidable
- Stockpiling of excavated trench material for replacement, if directional drilling is not feasible.

VDEQ recommends that trench backfill consist of the original material removed. The top 12 inches of material, consisting also of trench material removed from wetlands, will be stockpiled on mats or filter cloth for final placement as wetland seed and rootstock in the excavated area.

The use of herbicides and pesticides during construction or for landscape maintenance will be in accordance with the principles of integrated pest management. VDOT standards will be employed. The least toxic pesticides that are effective in controlling the target species will be used. The use of these chemicals near waterways will be avoided and the use of petroleum products, other chemicals or other hazardous materials will be carefully monitored.

### **5.3 Permits & Approvals**

Implementation of the construction will require approval from local and state agencies having jurisdiction over specific activities. Permit approvals will be secured after completion of the final design. Various agencies do require fees for review and approval.

#### **5.3.1 VDEQ Permit to Construct**

The PER will be submitted to VDEQ for review and approval. Upon approval, securing funding, and issuance of the notice to proceed, the design will be initiated.

The VDEQ Application for Certificate to Construct (CTC) under the *Sewage Collection and Treatment Regulations* 9 VAC 25-790 is a self-certification by the Engineer-of-Record. Due to construction approval policy changes in 2008, the Engineer-of-Record submits proper forms and associated documents to VDEQ requesting a CTC; it generally requires a week to secure. The project may be advertised upon securing all appropriate/applicable permits and authorizations.

Projects with VDEQ funding will have to undergo project-specific VDEQ review and approval. There are no agency fees associated with review and approval of the design documents by VDEQ.

#### **5.3.2 Roads & Streets**

The proposed project is expected to have several road crossings, including one major crossing of four-lane US Route 23. For those roads impacted by the project, the VDOT Resident Engineer will review the design. This permit will likely be approved at the Resident Engineer's office in Wise, Virginia. Upon approval, the VDOT requirements will be cited in the VDOT Land Use Permit for the project.

VDOT has a structured fee process for its review/approval, based on the size, scope, and specific



elements of construction activities in its right-of-way. Contractor bond fees will be cited in VDOT's Land Use Permit.

### 5.3.3 Erosion & Sediment (E&S) Control

The infrastructure proposed is linear. Therefore, linear BMP's will be employed and the need for sediment traps, temporary sediment basins, and stormwater management is not likely. The Wise County Building Inspector will review/approve plans within the County. VDOT's Resident Engineer will have approval authority for construction activities within VDOT's right-of-way.

Local jurisdictions typically waive review and approval fees. Any VDOT required fee will be cited in its Land Use Permit and paid by the Contractor.

### 5.3.4 Virginia Stormwater Management Program (VSMP)

In conjunction with the Erosion & Sediment Control Permit, the VDEQ requires permits for land disturbance associated with construction in excess of 1.0 acre. The VSMP permit is appended to the E&S Control Permit. It requires the Contractor to procure the permit in association with the Owner.

As the sewer line replacement will be linear in previously disturbed areas, with surface restoration in-kind, a waiver to the VSMP Regulations will be sought.

The permit fee is based on disturbed acres. The Wise County Building Inspector's Office, through the City of Norton Building Inspector, will review/approve the plans within the County.

### 5.3.5 Railroads

Two (2) types of railroad permits are possible, crossings and parallelisms. Parallelisms tend to be costlier than 90-degree crossings. Typically, it is a one-time, two (2) part fee: permit review/approval fee and crossing permit fee, unless it involves the replacement of an existing permitted crossing. This cost may be an annual fee. These costs are an eligible project expense by funding agencies.

The cost to secure railroad permits tends to be somewhat high and has a direct impact on the project budget. The cost varies, depending on the amount of line in crossings and parallelism.

There is one potential railroad crossing associated with the project.

### 5.3.6 Wetlands & Streams

The USACE and VDEQ may have processing fees. If there is an impact and mitigation is not a part of the project, a program entitled "fee in-lieu of" to mitigate impacts to wetlands and streams is available. Actual cost is dependent on the size, quality, and diversity of the ecosystem lost to the project. "Fee in-lieu of" can be very costly. Wetland replacement is generally \$65,000 (2012) per acre and \$375.00 per linear foot in the Tennessee River watershed for stream mitigation.

## 5.4 Funding Agencies

VDEQ's approval process is cited in Section 5.3.1. USDA-RD has a formal Contract Document review and approval process through its State Engineer, similar to other state agency biddability reviews. Receipt of approval allows for advertisement. VDHCD and ARC have no internal design review process. However, VDHCD does review the Project Manual for conformance with its standards and Program Design Manual. There are no fees associated with funding agency review



and approval.

## **5.5 Land Requirements - General**

Sewer line construction is generally expected to follow existing VDOT or other public rights-of-way to the extent possible. Permanent easements will be secured from private property owners where the sewer system is not installed in public right-of-way.

## **5.6 Construction Issues - General**

### **5.6.1 Permit Compliance**

The Bid/Contract Documents will incorporate the mandates of any permit. The Contractor shall be required to comply with all provisions of any permit affecting construction.

### **5.6.2 Existing Utilities**

The proposed project will require working in close proximity to existing underground and overhead utilities. These may include potable water, natural gas, power, communications, and/or fiber optic cable. Note: Known utilities will be shown on the design documents. Special care should be taken to avoid, limit damage to, or interrupt these services.

### **5.6.3 Unknown Underground Utilities**

It is not uncommon in developed areas to encounter previously unknown underground utilities or structures. During the design phase, research will be conducted to determine, to the extent possible, the location of existing utilities and structures. In some instances, underground utilities and/or structures may not be recorded on maps, plans, or other documents of record and pose an obstacle to construction or potential work hazard. Examples, in addition to water and other utilities, underground storage tanks (fuel and others), refuse, demolition debris, dumps, and other similar elements may be encountered. The Contractor will be required to contact Miss Utility prior to excavation for underground utility marking.

### **5.6.4 Restricted Work Areas**

Construction in areas of previous development is often restricted due to limitation of horizontal and vertical clearances. Examples of obstructions include buildings, utility poles, overhead lines, vehicular and pedestrian traffic, parked vehicles, and other similar conditions.

### **5.6.5 Stream Crossings**

Open cutting of stream crossings will be dependent on water level and permit restrictions. The Contractor will schedule its activities to coincide with the lowest seasonal stream levels within the Contract period and recent/pending rainfall events.

Bored stream crossing may be either conventional or directional. Conventional boring equipment typically requires a 30 foot bore and exit pit. (An easement may be required for the pits.) Generally, it will be below groundwater and pumping will be required. Directional boring can begin and exit above groundwater levels. However, entry and exit of the bore typically requires 100 feet or more on each side to angle drill to the desired depth. In both cases, rock can adversely impact directional boring to a greater extent than conventional boring.



VMRC and/or VDOT permit requirements will apply.

#### 5.6.6 Road/Street & Railroad Crossings

Open cuts are generally less expensive. If open cutting of a road/street is permitted by VDOT or a municipality, traffic control and proper backfilling must be assured. Paving of road/street crossings should be accomplished as soon as possible.

If open cut is not permitted, conventional boring methods are generally employed. Conventional boring equipment typically requires a 30 foot bore and exit pit. (An easement may be required for the pits.) If the pit is below the groundwater table, pumping will be required. Rock can adversely impact the bore. Railroads will also require boring and notification prior to installing the bore.

VDOT, VMRC, a local municipality, and/or railroad crossing permit requirements will apply.

#### 5.6.7 Transportation

Project construction activities will add limited tractor-trailer and delivery vehicle traffic to these roads during construction. The traffic loading will be short-term and should not have an adverse impact on the transportation network. Completed project activities should not produce an increase in the volume of traffic or have any other adverse impacts to transportation within the area.

Construction along roadways will require a VDOT approved Traffic Control Plan. It must address coal haul traffic; road closures will be limited. All permits will be obtained prior to construction.

#### 5.6.8 Air Quality

Project construction will require the use of fossil-fuel burning equipment (i.e., trucks, excavators, backhoes, etc.) and will not likely affect air quality. The use of fossil-fuel burning equipment will produce normal engine exhaust, a by-product of gasoline and diesel fuel combustion. Such emissions are state and federally regulated. Engine emissions occur daily and dissipate into the atmosphere at acceptable quality levels. The emissions produced as part of construction activities are not unusual events, and should not have an adverse impact upon air quality. Completed project activities will not generate additional air emissions above pre-construction ambient conditions.

During construction, measures will be taken to ensure compliance with federal and state regulations regarding fugitive dust control. Fugitive dust will be kept at a minimum. Measures, such as application of water to suppress dust and the washing down of construction vehicles and paved roadways immediately adjacent to the construction site, should be implemented. All land clearing debris will be disposed of in accordance with permit requirements and VDOT standards.

Open burning of combustible debris generated from land clearing activities will be permitted as long as it is compliant with local and state ordinances/regulations. The Contractor will be directed to contact local government to assure compliance.

#### 5.6.9 Noise

During project construction, some nuisance levels may be produced by the engines of construction equipment representing short-term negative impacts. The noise levels produced will not be at any health-endangering thresholds. Upon completion, project operations will not produce noise above the pre-construction ambient conditions.

Contractors will be encouraged to use noise control devices and limit activities to daylight hours.



## 5.7 Construction & Related Costs – General

### 5.7.1 Construction Costs

Construction costs are based on unit costs for specific line items multiplied by the quantity. They are generally derived from similar project type bid costs in the region. When similar local costs are not available, they are computed utilizing industry standards, i.e. R. S. Means, adapted to the region.

### 5.7.2 Related Costs

- Basic Engineering: This line item includes the costs of basic surveying (topographic and planimetric mapping) and engineering design services. This cost is set at a percentage of construction cost. Percentages are taken from Rural Utilities Services Bulletin 1780-2 Attachment 1, revised April 2018.
- Resident Project Representation: This line item includes the cost of providing resident project representation/monitoring services. It is a computed cost based on a 40-hr week and number of resident project representatives, using the Rural Utilities Services Bulletin 1780-2 Attachment 1.
- Additional Engineering: This line item consists of the cost for surveying and engineering services other than those covered in Basic Engineering. Additional surveying services typically include boundary surveys, plat and easement preparation; permits; environmental studies; geotechnical studies; special structural design; and other technical items/issues related to contract document preparation. This cost varies per Alternative considered. It may range up to 20 percent of Basic Engineering (per VDHCD).
- Administration: Administration services typically include grant/loan fund tracking, project documentation coordination, etc. It is based on an allowable generally approved by funding agencies that allow this cost. VDHCD allows administration as an eligible project expense. VDH allows such, but to a much lesser extent than VDHCD. The allowable VDHCD fee is up to \$75,000. USDA RD and VDEQ do not provide funding for administration.
- Legal Services & Bond Counsel: Legal services may consist of the preparation of agreements, plats, easements and related services. The cost for legal services will vary with the complexity of the project. Bond Counsel is required for VDEQ loans (through the Virginia Resources Authority) and USDA RD loans. Individually (per funding agency), these costs tend to range from \$6,500 to \$10,000 in far Southwest Virginia. If more than one (1) agency is providing loan monies, the combined cost will be less than the sum of the two (2).
- Land Acquisition: This line item consists of the costs for land purchase(s) required for construction of decentralized wastewater treatment plants, sewage pump stations, valve/meter boxes, and appraisals/acquisition of permanent and temporary utility easements. These costs will vary with the land use/area needs of the Alternative under consideration.
- Interest during Construction: This line item accounts for interest accrued on loans during construction of the project. USDA-RD requires interim financing on projects in excess of \$500,000. This cost is not applicable to this project at this time.
- Contingency: This line item accounts for unforeseeable project costs that may be encountered. This cost is typically ten percent (10.00%) of total PER construction cost. Note: VDHCD does not fund contingency.



## 5.8 Treatment, Operation & Maintenance Costs – General

The treatment, operation and maintenance costs projected for each Alternative considered are based on the following:

- Treatment: The Wise County PSA has a 1.223 MGD allocation in the CNW treatment plant at an annual cost of \$281,689. At this time, the Wise County Board of Supervisors (BOS) is paying the cost. However, the PSA is in the process of reducing the cost paid by the BOS and pays \$13,000 towards the CNW treatment cost.

The PSA is currently delivering an overall sewage flow that is below its current allocation. The anticipated wastewater volume from the project area is approximately 4,950 gpd. The combined flows in its Central Operations Area do not exceed the PSA's available capacity of 1.223 MGD at CNW. Therefore, there is no additional cost to treatment by adding the Glamorgan Community wastewater.

- Power: There are no sewage pump stations or treatment plants associated with the proposed project. Therefore, no additional power costs are expected as a result of the project.
- Employee Wages & Benefits: Payroll and benefits costs for operation and maintenance are proportional to time anticipated for maintaining the collection system, pumps and/or treatment facilities. As each Alternative is unique, the costs vary.
- Office Expenses: Clerical and administrative costs associated with sewage collection will be added to the existing water system billing and include postage, billing materials, and tasks/materials required to execute administrative tasks.
- Operation, Maintenance & Repair: The cost for maintenance and repair is highly dependent on the type of collection system and treatment. As the system becomes more complex, the costs increase. Maintenance costs under this category consist of heavy equipment; repair/ replacement materials such as pipe, stone, concrete, asphalt and the like; mechanical and electrical equipment replacement; and, engineering and permitting, if required.
- Operation & Maintenance Reserve: The Operations & Maintenance (O&M) Reserve is projected as 25 percent of the O&M costs, excluding treatment, distributed over five (5) years.

## 5.9 Present Worth – General

Present worth is used to compare the total cost outlay for the construction and operation of a particular project, accounting for future operational costs expressed in terms of current dollar values.

Present worth is defined as:

$$\text{Present Worth} = \text{Initial Capital Cost} + \frac{\text{Total O\&M Cost over Time, Expressed in Today's Dollars}}$$

The total O&M cost over time is found using the following equation:

$$\text{Total O\&M over Time} = \text{Annual O\&M} \times \frac{(1+i)^n - 1}{i \times (1+i)^n}$$

where:

Annual O&M = estimated annual O&M cost of project

i = interest rate (Federal Discount Rate) = 0.75% (June '06)

n = number of years of operation = 40 years



## 6.0 ALTERNATIVES CONSIDERED

### 6.1 Phasing

In 2016, the Wise County PSA updated its *2009 Wise County Wastewater Study Amendment* in support of its 2016/2017 Capital Improvement Program (CIP) for selected projects. The Glamorgan Community Sewer Collection Project was included in the update. The project, as currently envisioned, consists of two (2) potential phases (Phases I and II), which will provide sewer service to a total of 62 connections (48 and 14 for the Phases I and II areas, respectively).

### 6.2 Alternative No. 1 – “No Action”

The “No Action” alternative will allow and possibly accelerate continuing direct discharge and leakage from failed/failing septic systems, impacting local public health and ecosystems. As such, this is not considered a responsible action to meet the needs of the Glamorgan Community and the Guest River watershed. It is, therefore, eliminated from further consideration.

### 6.3 Alternatives No. 2 and 3 – Single or Multiple Phase Gravity Sewer Collection System

#### 6.3.1 Project Description

The project may be accomplished via two (2) separate phases (Phases I and II) or by combining both phases into a single project. Combined, Phases I and II entail the installation of approximately 6,800 linear feet (lf) of 8-inch gravity sewer, 600 lf of 6-inch gravity sewer, 6,200 lf of 4-inch sewer service line, 34 manholes, 62 sewer connections, several road crossings (including an underground boring of 4-lane US Route 23), one railroad crossing, and associated items. A schematic layout of the project alternative is provided in Appendix A: Sewer System Conceptual Plans.

#### 6.3.2 Land Requirements

The gravity lines will be laid to the extent possible in VDOT or other public rights-of-way. Permanent easements will be secured from private property owners where the proposed sewer system is not installed in public rights-of-way. Land may be donated, a permanent easement acquired or purchased.

#### 6.3.3 Environmental, Permitting & Construction Issues

The following is applicable to both Phase I and Phase II:

- Environmental: Portions of the collection system construction will occur along stream banks and in the stream channel. Proper precautions must be taken to assure streams and regulated species are not adversely impacted. This may require aquatic species studies, which will be determined as a part of construction document preparation under Additional Services.

A plan for the treatment of unanticipated cultural, historic and/or archaeological discoveries made in the course of construction in accordance with VDHR Regulations §800.13 will be incorporated into the construction documents.

- Permitting: There are no unique permit requirements known at this time; refer to Section 5.3.
- Construction Issues: There are no construction issues known at this time; refer to Section 5.6.

### 6.3.4 Project Costs

The anticipated project costs are as follows (refer to Appendix B – Opinion of Probable Cost for detailed cost analysis):

<b>TABLE 6.0: OPINION OF PROBABLE COST</b>				
<b>Cost Item</b>	<b>Phase I</b>	<b>Phase II</b>	<b>Phases I &amp; II Separately</b>	<b>Phases I &amp; II Single Proj.</b>
Construction	\$ 1,044,663	\$ 427,266	\$ 1,471,929	\$ 1,477,415
Related (Non-construction)	\$ 299,882	\$ 125,227	\$ 425,109	\$ 385,897
Contingency	\$ 0	\$ 0	\$ 0	\$ 0
<b>Total Projected Cost</b>	<b>\$ 1,344,545</b>	<b>\$ 552,493</b>	<b>\$ 1,897,038</b>	<b>\$ 1,863,312</b>

### 6.3.5 Treatment Cost

Wastewater will be conveyed via the existing PSA gravity system along the Guest River to the CNW Regional Wastewater Treatment Plant. Per Section 5.8, with the addition of flow from the Glamorgan Community Sewer Collection Project, there is no additional treatment cost to the Wise County PSA at CNW.

### 6.3.6 Operation & Maintenance Cost

Table 6.1 provides an estimate of the projected annual O&M cost:

<b>TABLE 6.1: O&amp;M COSTS</b>			
<b>Cost Item</b>	<b>Phase I</b>	<b>Phase II</b>	<b>Phases I &amp; II</b>
Treatment - Annual CNW Cost	\$ -	\$ -	\$ -
CNW Administrative Fee	\$ -	\$ -	\$ -
Pump Station Power			
Employee Wages/Benefits	\$ 2,160	\$ 630	\$ 2,790
Office Expenses	\$ 365	\$ 185	\$ 545
Maintenance & Repair	\$ 250	\$ 250	\$ 250
Operations	\$ -	\$ -	\$ -
O&M Maintenance Reserve	\$ 139	\$ 53	\$ 179
<b>Total Cost</b>	<b>\$ 2,914</b>	<b>\$ 1,118</b>	<b>\$ 3,764</b>

### 6.3.7 Present Worth

Table 6.2 projects the Present Worth for the Alternatives:

<b>TABLE 6.2: PRESENT WORTH</b>				
<b>Cost Item</b>	<b>Phase I</b>	<b>Phase II</b>	<b>Phases I &amp; II Separately</b>	<b>Phases I &amp; II Single Proj.</b>
Annual O&M	\$ 3,929	\$ 1,507	\$ 5,436	\$ 5,075
Construction Cost	\$ 1,044,663	\$ 427,266	\$ 1,471,929	\$ 1,477,415
Non-construction & Other Costs	\$ 299,882	\$ 125,227	\$ 425,109	\$ 385,897
<b>Total Present Worth</b>	<b>\$ 1,348,474</b>	<b>\$ 554,000</b>	<b>\$ 1,902,474</b>	<b>\$ 1,868,387</b>



## **6.4 Selected Alternative – Single Project**

### **6.4.1 Comparative Analysis**

As there are no other viable alternatives other than the installation of a gravity system, all metrics are essentially equal. At this time, the Wise County BOS is paying the cost for treatment at CNW; refer to Section 5.8. However, the PSA is in the process of reducing the cost paid by the BOS and pays \$13,000 annually towards the CNW treatment cost.

In a comparison of anticipated project costs, as presented in Table 6.1 above, implementing Phases I and II separately results in a minimal cost increase of \$33,726 over combining both phases into a single project. Similarly, a comparison of the present worth, as presented in Table 6.2 above, indicates that the two-project approach (Phases I and II separately) results in an increase of \$50,177 over the single project approach. Since the cost difference is considered minimal between these alternatives, the single-phase approach (combining Phases I and II into a single project) is the Selected Alternative.

### **6.4.2 Selected Alternative – Advantages/Disadvantages**

#### **Advantages**

- Provides safe, reliable, and efficient method for removal and treatment of human waste.
- Eliminates leaching septic tanks/drainfields and direct discharges to area streams.
- Eliminates the need/cost of private septic tank systems.
- Reduces health risks associated with the contamination of surface and ground water.
- Enhances ecosystems and the environment in the project area and downstream receptors.

#### **Disadvantages**

- Users may have to provide for the cost of bringing a lateral from the tap and possible re-piping of their plumbing systems (VDEQ and USDA-RD funding; VDHCD provides as an eligible cost).
- Users will incur a monthly bill for public sewer service.

## **7.0 PROPOSED PROJECT**

The Selected Alternative project will be accomplished in a single project, consisting of both Phases I and II. The various costs and factors have been adjusted accordingly.

### **7.1 Project Design**

#### **7.1.1 Sewage Treatment**

The PSA is currently under its available capacity in the CNW Regional Wastewater Treatment Plant. The actual anticipated wastewater volume from the Glamorgan project area is approximately 15,690 gpd (PSA system-wide average of 2,475 gallons per month). The combined flows do not exceed the PSA's 1.223 MGD capacity allocation in the CNW WWTP. Therefore, there is no additional cost to treatment by adding the Glamorgan Community customers.

#### **7.1.2 Sewage Collection System**

The layout of the proposed collection system will generally follow existing VDOT and other public rights-of-way to the extent possible. Where the proposed sewer line deviates from existing rights-of-

way, appropriate easements will need to be obtained from property owners. A general layout of the proposed collection system is shown on the User Agreement Mapping Sheets provided in Appendix A: Sewer System Conceptual Plans. Final, detailed locations of collection system piping and appurtenances will be determined in final design.

### 7.1.3 Transmission Line Capacity

The Glamorgan Community sewage will be discharged into an existing PSA gravity sewer line which will eventually transport it to the CNW WWTP. This line will convey the anticipated wastewater needs of the region through 2050. Development has not occurred as projected. The anticipated average daily flow from Phases I and II is 15,690 gpd, with a design peak flow of 39,225 gpd (transmission lines). Note: gpd projections are based on VDEQ design criteria, not actual PSA flow. Adequate capacity exists within the existing line to accept this flow per VDEQ’s *Sewerage Collection and Treatment Regulations*.

## 7.2 Construction Issues

The project will involve the installation of gravity sewer lines with several minor crossings of tributaries to the Guest River. Such action requires following accepted construction methods and best management practices to protect water resources and aquatic species from adverse impacts.

## 7.3 Opinion of Probable Costs

The anticipated project costs are as follows (refer to Appendix B: Opinion of Probable Cost):

<b>TABLE 7.0: SELECTED ALTERNATIVE OPINION OF PROBABLE COST</b>	
<b>Cost Item</b>	<b>Single Project (Phases I and II)</b>
Construction	\$ 1,477,415
Related (Non-construction)	\$ 385,897
Contingency	\$ 0
<b>Total Projected Cost</b>	<b>\$ 1,863,312</b>

Table 7.1 provides a breakout of the non-construction costs.

<b>TABLE 7.1: NON-CONSTRUCTION OPINION OF PROBABLE COST</b>	<b>Single Project (Phases I and II)</b>	
	<b>Basis</b>	<b>Cost</b>
Basic Engineering	9.90%	\$ 146,331
Additional Engineering	1.50%	\$ 22,161
Preliminary Engineering Report		\$ 8,000
Resident Project Representation	---	\$ 109,824
Administration (VDHCD Funding Only)	---	\$ 75,000
Legal	0.25%	\$ 3,694
Bond Counsel	---	\$ 7,387
Land Acquisition	0.50%	\$ 10,470
Railroad Permit Fees	---	\$ 7,000
Contingency	0.00%	\$ 0
<b>Total Related Cost</b>		<b>\$ 385,897</b>



## 7.4 Annual Operating Budget

### 7.4.1 Project Income

The Wise County PSA FY 2019 rates are \$34.00 base rate (1,500 gallons) and \$13.00 per 1,000 gallons above the base.

Table 7.2 projects the anticipated revenue generation from the Banner service area:

<b>TABLE 7.2: ANNUAL REVENUE PROJECTIONS</b>					
<b>Usage</b>	<b>No. Conn.</b>	<b>Ave. Flow</b>	<b>Mo. Rate</b>	<b>Mo. Rev.</b>	<b>Annual Rev.</b>
Phase I	48	3,000	\$ 46.75	\$ 2,244	\$ 26,928
Phase II	14	3,000	\$ 46.75	\$ 655	\$ 7,854
<b>Total (Phases I and II)</b>	<b>62</b>	<b>3,000</b>	<b>\$ 46.75</b>	<b>\$ 2,899</b>	<b>\$ 34,782</b>

### 7.4.2 Operation & Maintenance Cost

Table 7.3 details the operation and maintenance costs that are used on the Project Planning Factors worksheets as follows:

<b>TABLE 7.3: O&amp;M COSTS – SELECTED ALTERNATIVE</b>	
<b>Cost Item</b>	<b>Single Project (Phases I and II)</b>
Employee Wages/Benefits	\$ 2,790
Office Expenses	\$ 545
Maintenance & Repair	\$ 250
O&M Maintenance Reserve	\$ 179
<b>Total Cost</b>	<b>\$ 3,764</b>

<sup>1</sup> For purposes of this PER, the transmission fee is assumed at \$2.00 per 1,000 gallons.

### 7.4.3 Net Revenue

Per Sections 7.4.1 and 7.4.2, the net revenue available for debt service and other reserve requirements is:

<b>TABLE 7.4: NET REVENUE</b>	
<b>Cost Item</b>	<b>Single Project (Phases I and II)</b>
Revenue	\$ 34,782
O&M Cost (including Treatment)	\$ 3,764
<b>Available Funds</b>	<b>\$ 31,018</b>

## 7.5 Project Funding Sources

At this time, the Wise County PSA is considering multiple funding sources for the Glamorgan Community Sewer Collection Project. Potential funders include VDHCD, the Appalachia Regional Commission (ARC), the LENOWISCO Planning District Commission and VDEQ.

### 7.5.1 Grants/Principal Forgiveness & Loans

The following are various potential sources and the unique requirements of each. As the project advances, the sources of funding may be changed, based on the commitment of others. The Project Planning Factors address the current vision of the PSA relative to funding.

- VDHCD: VDHCD provides 100 percent grants as long as the majority of the residents qualify as low to moderate income. Based on income surveys in the project areas, the project will meet this threshold. Funding is based on a per connection cost allocation of \$18,000 up to \$1.0M.
- ARC: Per ARC, Wise County has been designated as “Distressed.” As such, it can receive a priority for these funds. Construction projects may apply for up to \$500,000.
- LENOWISCO: The Planning District Commission (PDC) receives an annual allocation of water and sewer construction grant funds from VDHCD. For planning purposes, \$150,000 is anticipated from the PDC.
- VDEQ: VDEQ has both loan forgiveness (grant) and loan funds available. The distribution between which will be determined at the time of the funding request. Loans may be 20 to 30 years and the interest rate can be as low as 0.00 percent. For purposes of the analyses, a 30-year loan at 3.00 percent is typically used for line work and 20 years for facilities. Funds are provided through the Virginia Resources Authority (VRA).
- USDA – RD: RD has both grant and loan funds available. The distribution between which will be determined at the time of the funding request. At this time, loans are for a period 38-years. A 2.50 percent annual interest rate is typically used for the analysis. Funds are provided through either a General Obligation Bond, as the PSA is not eligible for Revenue Bonds. USDA – RD funds are not anticipated for the Glamorgan Community Sewer Collection Project at this time.

### 7.5.2 Reserves & Short-lived Assets

- O&M Reserve: The O&M Reserve is a USDA-RD requirement, computed as 5% (for existing systems) x [O&M - Treatment Costs] funded over 5 years. As a matter of good business, it is included as a line item in the financial analysis, Table 7.6, regardless of funding sources.
- Debt Reserve: Per both VDEQ and USDA-RD funding guidelines, 10 percent of the annual debt repayment must be set aside annually until such time that a year’s worth of loan payments are accumulated. However, USDA-RD only requires it if a General Obligation Bond is sought. If payment is through a Revenue Bond, it does not require a Debt Service Reserve. As VDEQ funds will be provided through VRA, a Debt Service Reserve is required at all times. Debt reserve payments are shown in the Project Planning Factors worksheets, provided in Section 7.6 for each scenario considered at this time as a matter of good business practice.
- Short-lived Assets (Equipment Replacement Reserve): The Wise County PSA current system-wide annualized sewer Short-lived Assets is \$24,896. A summary for Short-lived Assets appears at the end of this section, with a detailed analysis in Appendix C – Short-Lived Assets.

## 7.6 Project Funding Scenarios

There are numerous variations in the potential funding options. The following sections provide an indication of project costs relative to revenue, operations, percentage grant/loan forgiveness, etc. Upon securing funds, a new, separate analysis will be required. Grants will be sought from VDHCD,



ARC and LENOWISCO. At this time, the source of any loan is unknown. They may be sought from local banks or VDEQ.

7.6.1 100% Grant/Principal Forgiveness

The following are the Project Planning Factors:

<b>TABLE 7.5: 100% GRANT PROJECT PLANNING FACTORS</b>	
<b>Cost and Funding</b>	<b>Single Project (Phases I and 2)</b>
<b>Project Cost:</b>	
• Construction	\$ 1,447,415
• Engineering	
- Basic	\$ 146,331
- Additional Engineering	\$ 22,161
- Resident Project Representation	\$ 109,824
- Preliminary Engineering Report	\$ 8,000
• Administration (VDHCD Funding Only)	\$ 75,000
• Legal	\$ 3,694
• Bond Counsel	\$ 7,387
• Land Acquisition	\$ 10,470
• Railroad Permit Fees	\$ 7,000
• Contingency	\$ 0
<b>Total Project Cost</b>	<b>\$ 1,863,312</b>
<b>Grant Project Funding:</b>	
• ARC Grant	\$ 500,000
• VDHCD - CDBG Grant	\$ 1,000,000
• LENOWISCO - W&S Fund Grant	\$ 150,000
• VDEQ-VCWRLF	\$ 0
• Other TBD	\$ 213,312
<b>Funding</b>	<b>\$ 1,863,312</b>
<b>Loan Funds Needed:</b>	\$ -
• VDEQ Loan (20 yrs. @ 0.00%)	\$ -
• TBD Loan (30 yrs. @ 3.00%)	\$ -
<b>Total Project Funding</b>	<b>\$ 1,863,312</b>



Based on the funding allocations cited in Table 7.5, Table 7.6 is the Annual Budget.

<b>TABLE 7.6: 100% GRANT ANNUAL BUDGET</b>	
<b>Budget</b>	<b>Single Project (Phases I and 2)</b>
Customer Billings	\$ 34,782
Other	\$ -
<b>Total Annual Income:</b>	<b>\$ 34,782</b>
<b>Operation &amp; Maintenance:</b>	
Employee Wages/Benefits	\$ 2,790
Office Expenses	\$ 545
Maintenance & Repair	\$ 250
O&M Maintenance Reserve <sup>1</sup>	\$ 179
<b>Subtotal Operation &amp; Maintenance</b>	<b>\$ 3,764</b>
<b>Debt Repayment:</b>	
VDEQ Debt Service - Subsequent Loan Amount	\$ -
TBD Debt Service - Subsequent Loan Amount	\$ -
<b>Subtotal Debt Repayment</b>	<b>\$ -</b>
<b>Reserves:</b>	
O&M Reserve (shown as an O&M Expense above)	
Short-lived Assets	\$ 697
VDEQ Debt Service Reserve - 10% Total Annual	\$ -
Other Debt, if Necessary, TBD	\$ -
<b>Subtotal Reserves</b>	<b>\$ 697</b>
<b>Total Expenses</b>	<b>\$ 4,461</b>
<b>Balance Available</b>	<b>\$ 30,321</b>



7.6.2 50% Grant/Principal Forgiveness and 50% Loan

The following are the Project Planning Factors:

<b>TABLE 7.7: 50% GRANT &amp; 50% LOAN PROJECT PLANNING FACTORS</b>	
<b>Cost and Funding</b>	<b>Single Project (Phases I and 2)</b>
<b>Project Cost:</b>	
• Construction	\$ 1,447,415
• Engineering	
- Basic	\$ 146,331
- Additional Engineering	\$ 22,161
- Resident Project Representation	\$ 109,824
- Preliminary Engineering Report	\$ 8,000
• Administration (VDHCD Funding Only)	\$ 75,000
• Legal	\$ 3,694
• Bond Counsel	\$ 7,387
• Land Acquisition	\$ 10,470
• Railroad Permit Fees	\$ 7,000
• Contingency	\$ 0
<b>Total Project Cost</b>	<b>\$ 1,863,312</b>
<b>Grant Project Funding:</b>	
• ARC Grant	\$ 500,000
• VDHCD - CDBG Grant	\$ 250,000
• LENOWISCO - W&S Fund Grant	\$ 150,000
• VDEQ-VCWRLF	\$ 0
• Other TBD	\$ 31,656
<b>Funding</b>	<b>\$ 931,656</b>
<b>Loan Funds Needed:</b>	
• VDEQ Loan (20 yrs. @ 0.00%)	\$ 500,000
• TBD Loan (30 yrs. @ 3.00%)	\$ 431,656
<b>Total Project Funding</b>	<b>\$ 1,863,312</b>

Based on the funding allocations cited in Table 7.7, Table 7.8 is the Annual Budget.

<b>TABLE 7.8: 50% GRANT &amp; 50% LOAN ANNUAL BUDGET</b>	
<b>Budget</b>	<b>Single Project (Phases I and 2)</b>
Customer Billings	\$ 34,782
Other	\$ -
<b>Total Annual Income:</b>	<b>\$ 34,782</b>
<b>Operation &amp; Maintenance:</b>	
Employee Wages/Benefits	\$ 2,790
Office Expenses	\$ 545
Maintenance & Repair	\$ 250
O&M Maintenance Reserve <sup>1</sup>	\$ 179
<b>Subtotal Operation &amp; Maintenance</b>	<b>\$ 3,764</b>
<b>Debt Repayment:</b>	
VDEQ Debt Service - Subsequent Loan Amount	\$ 24,996
TBD Debt Service - Subsequent Loan Amount	\$ 21,840
<b>Subtotal Debt Repayment</b>	<b>\$ 46,836</b>
<b>Reserves:</b>	
O&M Reserve (shown as an O&M Expense above)	
Short-lived Assets	\$ 697
VDEQ Debt Service Reserve - 10% Total Annual	\$ 2,500
Other Debt, if Necessary, TBD	\$ 1,092
<b>Subtotal Reserves</b>	<b>\$ 697</b>
<b>Total Expenses</b>	<b>\$ 54,889</b>
<b>Balance Available</b>	<b>\$ (20,107)</b>



7.6.3 100% Loan

The following are the Project Planning Factors:

<b>TABLE 7.9: 100% LOAN PROJECT PLANNING FACTORS</b>	
<b>Cost and Funding</b>	<b>Single Project (Phases I and 2)</b>
<b>Project Cost:</b>	
• Construction	\$ 1,447,415
• Engineering	
- Basic	\$ 146,331
- Additional Engineering	\$ 22,161
- Resident Project Representation	\$ 109,824
- Preliminary Engineering Report	\$ 8,000
• Administration (VDHCD Funding Only)	\$ 75,000
• Legal	\$ 3,694
• Bond Counsel	\$ 7,387
• Land Acquisition	\$ 10,470
• Railroad Permit Fees	\$ 7,000
• Contingency	\$ 0
<b>Total Project Cost</b>	<b>\$ 1,863,312</b>
<b>Grant Project Funding:</b>	
• ARC Grant	\$ -
• VDHCD - CDBG Grant	\$ -
• LENOWISCO - W&S Fund Grant	\$ -
• VDEQ-VCWRLF	\$ -
• Other TBD	\$ -
<b>Funding</b>	<b>\$ 0</b>
<b>Loan Funds Needed:</b>	
• VDEQ Loan (20 yrs. @ 0.00%)	\$ 931,656
• TBD Loan (30 yrs. @ 3.00%)	\$ 931,656
<b>Total Project Funding</b>	<b>\$ 1,863,312</b>

Based on the funding allocations cited in Table 7.9, Table 7.10 is the Annual Budget.

<b>TABLE 7.10: 100% LOAN ANNUAL BUDGET</b>	
<b>Budget</b>	<b>Single Project (Phases I and 2)</b>
Customer Billings	\$ 34,782
Other	\$ -
<b>Total Annual Income:</b>	<b>\$ 34,782</b>
<b>Operation &amp; Maintenance:</b>	
Employee Wages/Benefits	\$ 2,790
Office Expenses	\$ 545
Maintenance & Repair	\$ 250
O&M Maintenance Reserve <sup>1</sup>	\$ 179
<b>Subtotal Operation &amp; Maintenance</b>	<b>\$ 3,764</b>
<b>Debt Repayment:</b>	
VDEQ Debt Service - Subsequent Loan Amount	\$ 46,584
TBD Debt Service - Subsequent Loan Amount	\$ 47,136
<b>Subtotal Debt Repayment</b>	<b>\$ 93,720</b>
<b>Reserves:</b>	
O&M Reserve (shown as an O&M Expense above)	
Short-lived Assets	\$ 697
VDEQ Debt Service Reserve - 10% Total Annual	\$ 4,658
Other Debt, if Necessary, TBD	\$ 2,357
<b>Subtotal Reserves</b>	<b>\$ 697</b>
<b>Total Expenses</b>	<b>\$ 105,196</b>
<b>Balance Available</b>	<b>\$ (70,414)</b>



**8.0 CONCLUSIONS & RECOMMENDATIONS**

**8.1 Conclusions**

- The installation of a sewage collection system in the Glamorgan Community with treatment at the CNW Regional WWTP will eliminate possible straight piping and will remove non-complying septic systems from the environment, thereby improving water quality in the Guest River and its tributaries.
- The development of the Glamorgan Community Sewer Collection Project will entail the installation of approximately 6,800 linear feet (lf) of 8-inch gravity sewer, 600 lf of 6-inch gravity sewer, 6,200 lf of 4-inch sewer service line, 34 manholes, 62 sewer connections, several road crossings(including an underground boring of 4-lane US Route 23), one railroad crossing, and associated items.

Table 8.1 provides a summary of the Selected Alternative for the analysis:

<b>TABLE 8.0: SELECTED ALTERNATIVE SUMMARY – SINGLE PROJECT (PHASES I and II)</b>							
<b>Connections</b>	<b>Revenue</b>	<b>O&amp;M Cost</b>	<b>Net Revenue</b>	<b>Construction Cost</b>	<b>Related Cost</b>	<b>Total Project Cost</b>	<b>Cost per Connection</b>
62	\$ 34,782	\$ 3,764	\$ 31,018	\$ 1,477,415	\$ 385,897	\$ 1,863,312	\$ 23,889

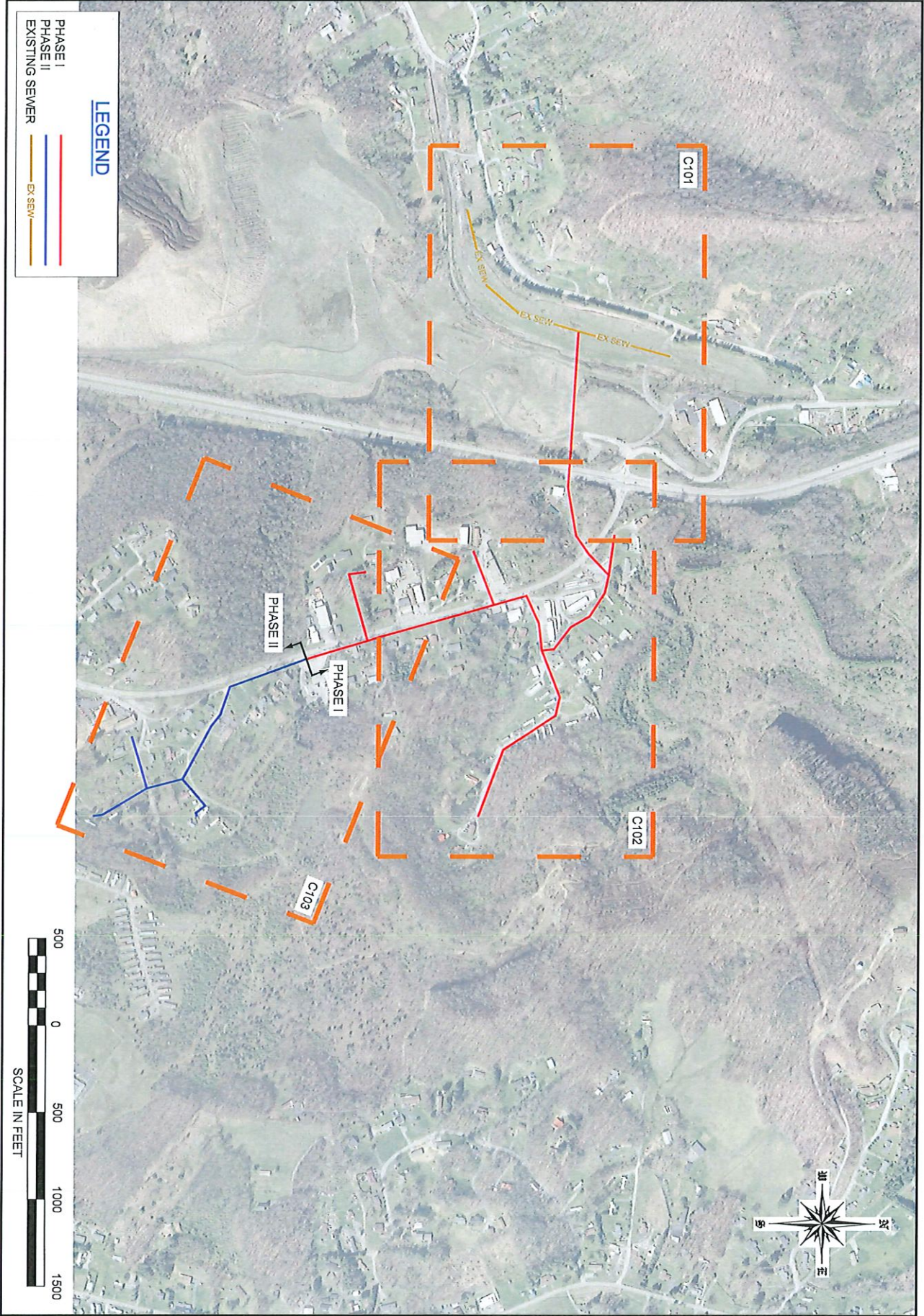
**8.2 Recommendations**

- Submit the PER to VDEQ for review and approval.
- Submit the PER and appropriate funding applications to all applicable funding agencies.
- When funding is secured, procure the services of a licensed, Professional Engineer and begin design/permitting of the proposed Project.



**APPENDIX A: SEWER SYSTEM CONCEPTUAL  
PLANS**





**LEGEND**

PHASE I  
PHASE II  
EXISTING SEWER

— EX SEW —

NO.	DESCRIPTION	REVISION DATE
1		
2		
3		

PROJECT NO: GVI/1

DATE: 08/11/2011

SCALE: AS SHOWN

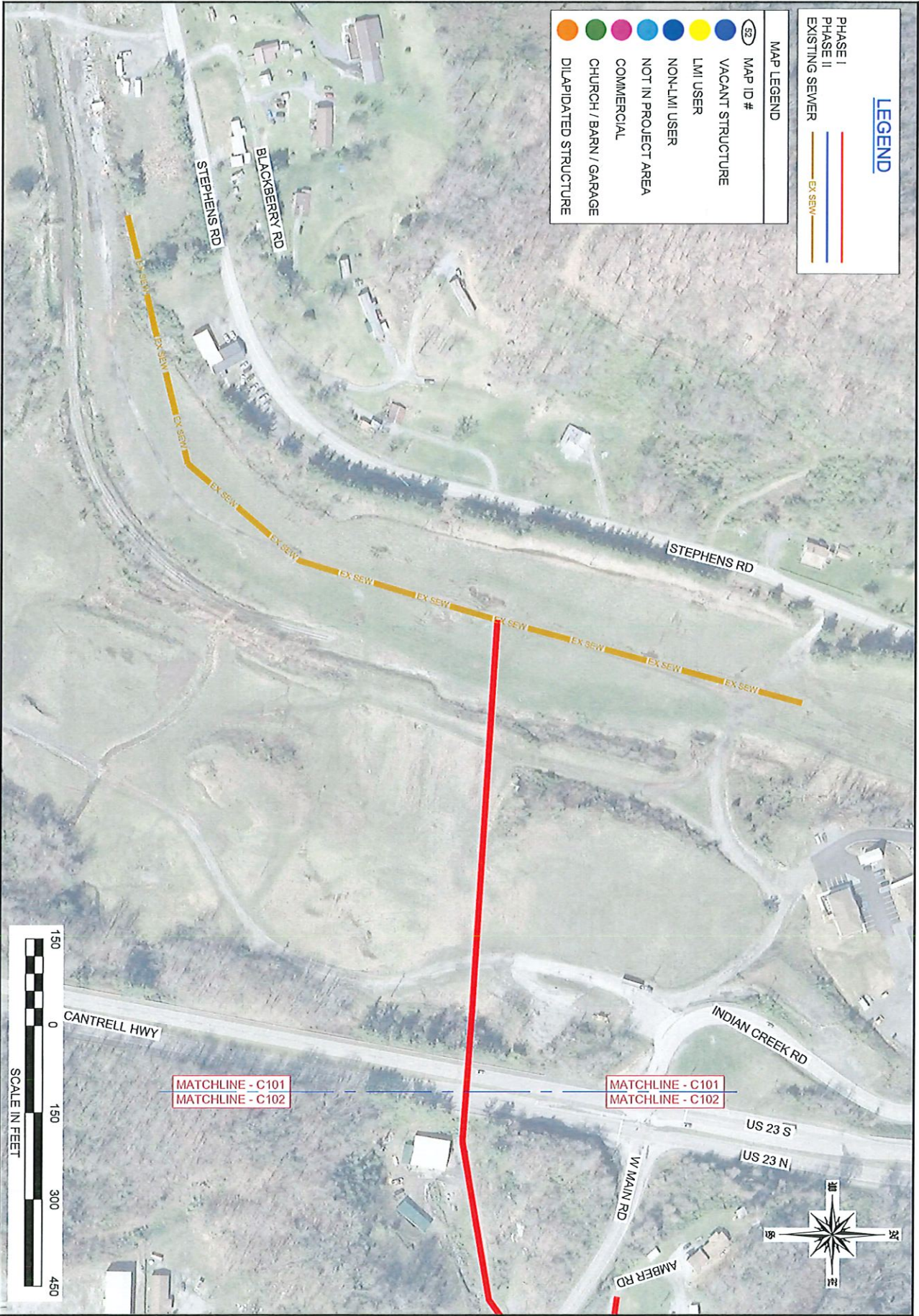
GENERAL VICINITY MAP

GLAMORGAN SEWER EXTENSION  
PROJECT - PHASE I & II  
WISE COUNTY  
PUBLIC SERVICE AUTHORITY

**the GLANE GROUP** engineering architecture environmental

314 EAST 11TH STREET, SUITE 100, DENVER, CO 80202  
PHONE: 303.733.3711 WWW.THEGLANEGROUP.COM  
8540 COON | BIG ROCK CANY | CALDER





**LEGEND**

PHASE I  
PHASE II  
EXISTING SEWER

— EX SEW

**MAP LEGEND**

MAP ID #

VACANT STRUCTURE

LMI USER

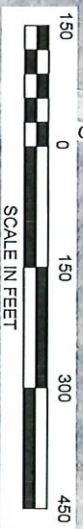
NON-LMI USER

NOT IN PROJECT AREA

COMMERCIAL

CHURCH / BARN / GARAGE

DILAPIDATED STRUCTURE



NO.	REVISION DATE
1	
2	
3	

C101

USER AGREEMENT  
MAPPING

GLAMORGAN SEWER EXTENSION  
PROJECT - PHASE I & II  
WISE COUNTY  
PUBLIC SERVICE AUTHORITY

**the GLANE GROUP** engineering architecture environmental

318 EAST 17TH STREET, SUITE 100 | DENVER, CO 80202  
Phone: 303.733.3771 | www.theglane.com  
AR-00004 | MS-00004 | CA-00004











**APPENDIX B: OPINION OF PROBABLE COST**

**GLAMORGAN  
OPINION OF PROBABLE COST**

Item	Description	Unit	Phase I		Phase II		Whole Project (Unphased)			
			Unit Cost	Total Cost	Quantity	Total Cost	Quantity	Total Cost		
<b>Gravity Sewer</b>										
	Manhole - in-place/complete	ea.	\$ 3,850	\$ 84,700	22	\$ 84,700	12	\$ 46,200	34	\$ 130,900
	Connection to Existing Manhole, in-place/complete	ea.	\$ 2,750	\$ 2,750	1	\$ 2,750	1	\$ 2,750		\$ -
	6-inch SDR-26 PVC Gravity Sewer, in-place/complete	lf	\$ 38.50	\$ 20,020	520	\$ 20,020	0	\$ -	520	\$ 20,020
	6-inch DI Gravity Sewer, in-place/complete	lf	\$ 104.50	\$ 4,180	40	\$ 4,180	0	\$ -	40	\$ 4,180
	6-inch Cleanout, in-place/complete	ea.	\$ 715	\$ 1,430	2	\$ 1,430	0	\$ -	2	\$ 1,430
	8-inch SDR-35 PVC Gravity Sewer, in-place/complete	lf	\$ 74.80	\$ 313,038	4,185	\$ 313,038	2,353	\$ 176,004	6,538	\$ 489,042
	8-inch DI Gravity Sewer, in-place/complete	lf	\$ 104.50	\$ 30,305	290	\$ 30,305	0	\$ -	290	\$ 30,305
	Concrete Encasement	lf	\$ 110	\$ 4,400	40	\$ 4,400	0	\$ -	40	\$ 4,400
	4-inch Sewer Connection (incl. P/L C/O), using SDR 26 PVC pipe, in-place/complete	ea.	\$ 1,265	\$ 63,250	50	\$ 63,250	21	\$ 26,565	70	\$ 88,550
	4-inch Sewer Connection (incl. P/L C/O), using DI pipe, in-place/complete	ea.	\$ 4,345	\$ 26,070	6	\$ 26,070	2	\$ -	8	\$ 34,760
	4-inch PVC Sewer Service Line on Property, in-place/complete	lf	\$ 26.40	\$ 116,160	4,400	\$ 116,160	1,840	\$ 48,576	6,240	\$ 164,736
	4-inch Cleanout - Yard, in-place/complete	ea.	\$ 385	\$ 42,350	110	\$ 42,350	46	\$ 17,710	156	\$ 60,060
	Gray Water Discharge Connections, in-place/complete	ea.	\$ 550	\$ 3,300	6	\$ 3,300	2	\$ 1,100	8	\$ 4,400
	Redirect House Plumbing, in-place/complete	ea.	\$ 3,300	\$ 26,400	8	\$ 26,400	3	\$ 9,900	12	\$ 39,600
	Pump Out/Cave-in Septic Tanks, in-place/complete	ea.	\$ 1,980	\$ 108,900	55	\$ 108,900	23	\$ 45,540	78	\$ 154,440
	16-inch Steel Casing - Bore, in-place/complete	lf	\$ 303	\$ 12,100	40	\$ 12,100	0	\$ -	40	\$ 12,100
	20-inch Steel Casing - Bore, in-place/complete	lf	\$ 385	\$ 96,250	250	\$ 96,250	0	\$ -	250	\$ 96,250
<b>General</b>										
	Rip-Rap Stream Bank Protection/Stabilization, in-place/complete	tons	\$ 82.50	\$ 1,650	20	\$ 1,650	0	\$ -	20	\$ 1,650
	2.0-inch SMA-12.5 Asphalt Repaving, in-place/complete	sy	\$ 38.50	\$ 19,250	500	\$ 19,250	333	\$ 12,833	833	\$ 32,083
	6.0-inch BIM-25 Asphalt Repaving, in-place/complete	sy	\$ 93.50	\$ 3,740	40	\$ 3,740	27	\$ 2,493	67	\$ 6,233
	Re-Seeding, in-place/complete	LS	\$ 3,300	\$ 6,600	2.00	\$ 6,600	4.00	\$ 13,200	6	\$ 19,800
	Erosion & Sediment Control, in-place/complete	LS	\$ 3,300	\$ 6,600	2.00	\$ 6,600	1.00	\$ 3,300	3	\$ 9,900
	Allowance for VDOT Bonds	LS	\$ 1,650	\$ 1,106	0.67	\$ 1,106	0.34	\$ 561	1	\$ 1,667
	Allowance for VDOT Inspection	LS	\$ 550	\$ 369	0.67	\$ 369	0.34	\$ 187	1	\$ 556
	Mobilization (Maximum 5.00%)	%	5%	\$ 49,746	1	\$ 49,746	1	\$ 20,346	1	\$ 70,353
	<b>Total Construction Cost</b>			<b>\$ 1,044,663</b>				<b>\$ 427,266</b>		<b>\$ 1,477,415</b>

<b>Non-construction</b>									
	Basis	Cost	Basis	Cost	Basis	Cost	Basis	Cost	
Basic Engineering	9.99%	\$ 104,373	14.35%	\$ 61,293	9.90%	\$ 146,331		\$ -	
Additional Engineering	1.50%	\$ 15,670	1.50%	\$ 6,409	1.50%	\$ 22,161		\$ -	
Preliminary Engineering Report		\$ 8,000		\$ -		\$ 8,000		\$ -	
Resident Project Representation		\$ 75,504		\$ 34,320		\$ 109,824		\$ -	
LENOWISCO Administration		\$ 75,000		\$ 20,000		\$ 75,000		\$ -	
Legal	0.25%	\$ 2,612	0.25%	\$ 1,068	0.25%	\$ 3,694		\$ -	
Bond Counsel		\$ 6,500		\$ -		\$ 6,500		\$ -	
Land Acquisition	0.50%	\$ 5,223	0.50%	\$ 2,136	0.50%	\$ 7,387		\$ -	
Railroad Permit Fees		\$ 7,000		\$ -		\$ 7,000		\$ -	
Contingency	0.00%	\$ -	0.00%	\$ -	0.00%	\$ -		\$ -	
<b>Total Related Cost</b>		<b>\$ 299,882</b>		<b>\$ 125,227</b>		<b>\$ 385,897</b>		<b>\$ -</b>	
<b>Total Project Cost</b>		<b>\$ 1,344,545</b>		<b>\$ 552,493</b>		<b>\$ 1,863,312</b>		<b>\$ -</b>	
<b>Cost per Connection</b>		<b>\$ 24,446</b>		<b>\$ 24,021</b>		<b>\$ 23,889</b>		<b>\$ -</b>	



## **APPENDIX C: SHORT-LIVED ASSETS**

WISE PUBLIC SERVICE AUTHORITY: SHORT-LIVED ASSETS										
Description					Replacement Cost			Total Annual	Allocation	
					5-yr (\$)	10-yr (\$)	15-yr (\$)		Water	Sewer
<b>MOTOR VEHICLES</b>										
Make	Type/Model	Year	Mileage	Condition						
Chevrolet	3500	2002	Unknown	Fair		\$ 35,000	\$ 2,333	\$ 1,750	\$ 583	
GMAC	Dump Truck	2004	Unknown	Good		\$ 48,500	\$ 3,233	\$ 2,425	\$ 808	
Chevrolet	3500	2013	Unknown	Very Good		\$ 47,877	\$ 3,192	\$ -	\$ 3,192	
Chevrolet	Colorado	2007	Unknown	Good		\$ 30,000	\$ 2,000	\$ 1,000	\$ 1,000	
Chevrolet	Sport Utility	2008	Unknown	Good		\$ 35,000	\$ 2,333	\$ 1,167	\$ 1,167	
							\$ -	\$ -	\$ -	
							\$ -	\$ -	\$ -	
<b>CONSTRUCTION EQUIPMENT</b>										
Make	Type/Model	Year	Engine Hrs	Condition						
Case	580 SuperM Backhoe	1992	Unknown	Good		\$ 16,640	\$ 1,109	\$ 832	\$ 277	
Caterpillar	307B Excavator	2005	Unknown	Good		\$ 25,000	\$ 1,667	\$ 1,250	\$ 417	
Sewer Jet	Trailer Mounted	2013	Unknown	Good		\$ 104,837	\$ 6,989	\$ 5,242	\$ 1,747	
							\$ -	\$ -	\$ -	
							\$ -	\$ -	\$ -	
<b>MISCELLANEOUS EQUIPMENT</b>										
Goulds	2-inch Pump	Unk.	Unknown	Good		\$ 1,500	\$ 150	\$ 113	\$ 38	
Sullair	Air Compressor	Unk.	Unknown	Fair		\$ 15,000	\$ 1,000	\$ 750	\$ 250	
							\$ -	\$ -	\$ -	
							\$ -	\$ -	\$ -	
<b>Derby Sewage System</b>										
PS Pumps & Controls						\$ 7,500	\$ 750	\$ -	\$ 750	
Residential Grinders		9	\$ 2,500	\$ 22,500		\$ 22,500	\$ 2,250	\$ -	\$ 2,250	
<b>Upper Exeter Decentralized WWTP</b>										
Not Applicable										
WWTP Pumps & Controls		8	\$ 2,500	\$ 20,000		\$ 20,000	\$ 2,000	\$ -	\$ 2,000	
Residential Grinders		3	\$ 2,500	\$ 7,500		\$ 7,500	\$ 750	\$ -	\$ 750	
<b>Lower Exeter Decentralized Wastewater Treatment System</b>										
Not Applicable										
WWTP Pumps & Controls		4	\$ 2,500	\$ 10,000		\$ 10,000	\$ 1,000	\$ -	\$ 1,000	
<b>Imboden Decentralized Wastewater Treatment System</b>										
Not Applicable										
WWTP Pumps & Controls		4	\$ 2,500	\$ 10,000		\$ 10,000	\$ 1,000	\$ -	\$ 1,000	
<b>Josephine Community Sewer Pump Station</b>										
PS Pumps & Controls						\$ 7,500	\$ 500	\$ -	\$ 500	
Residential Grinders		5	\$ 2,500	\$ 12,500		\$ 12,500	\$ 1,250	\$ -	\$ 1,250	
<b>Blackwater (Ind. Park &amp; Landfill) Sewage Pump Station</b>										
PS Pumps & Controls						\$ 7,500	\$ 500	\$ -	\$ 500	
Not Applicable						\$ -	\$ -	\$ -	\$ -	
<b>Bold Camp Sewage System</b>										
PS Pumps & Controls						\$ 7,500	\$ 500	\$ -	\$ 500	
Residential Grinders		5	\$ 2,500	\$ 12,500		\$ 12,500	\$ 1,250	\$ -	\$ 1,250	
<b>Fairground Sewage System</b>										
PS Pumps & Controls						\$ 5,000	\$ 333	\$ -	\$ 333	
Not Applicable						\$ -	\$ -	\$ -	\$ -	
<b>Proposed Roda, Osaka &amp; Stonega Sewage System - Phase I</b>										
PS Pumps & Controls						\$ 20,000	\$ 1,333	\$ -	\$ 1,333	
Residential Grinders		5	\$ 2,500	\$ 12,500		\$ 12,500	\$ 1,250	\$ -	\$ 1,250	
<b>Proposed Roda, Osaka &amp; Stonega Sewage System - Phase II</b>										
Not Applicable										
Residential Grinders		3	\$ 2,500	\$ 7,500		\$ 7,500	\$ 750	\$ -	\$ 750	
							<b>Total</b>	<b>\$ 39,424</b>	<b>\$ 14,528</b>	<b>\$ 24,896</b>
<b>Service Area</b>					<b>Pumps</b>	<b>System</b>	<b>Total</b>			
Short-lived Asset - Phase I					\$ -	\$ 540	\$ 540			
Short-lived Asset - Phase II					\$ -	\$ 157	\$ 157			
Short-lived Asset -					\$ -	\$ -	\$ -			

**NOTES:**

1. Short-lived assets for Motor Vehicles, Construction Equipment and Miscellaneous Equipment short-lived assets are pro-rated under "System" for Derby, Roda, Osaka and Stonega based on percentage of total PSA sewer customers.



**END PRELIMINARY ENGINEERING REPORT**