GRAPHIC SCALE

0 250 500

(IN FEET)

1 inch = 500 ft.

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ibigroup.com

REVISION:

SUBMISSION:

VILLAGE OF BOWERSVILLE
MVRPC
UNSEWERED
COMMUNITIES

SHEET TITLE:

STEP/GRINDER
SEWER SYSTEM
LAYOUT

FIGURE 5-4

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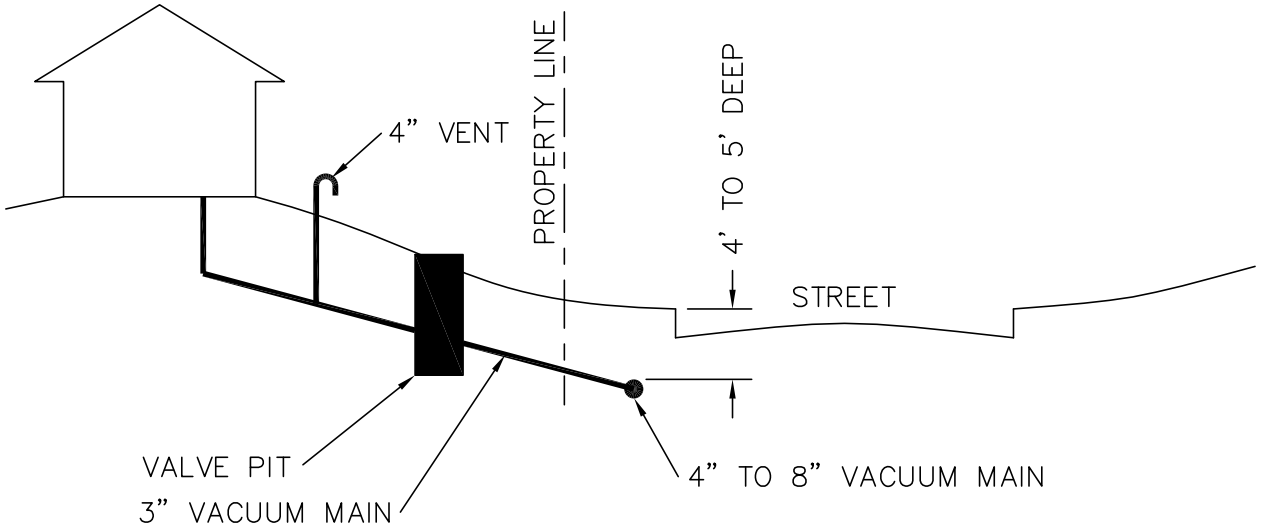
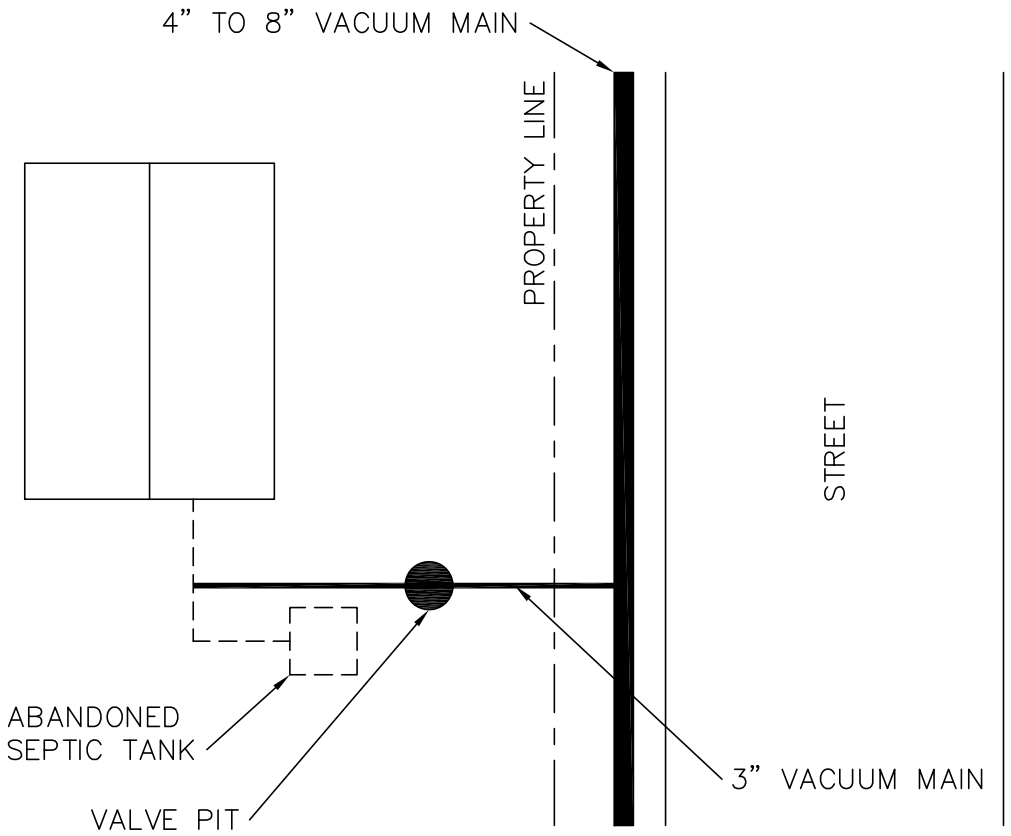
VILLAGE OF BOWERSVILLE

MVRPC UNSEWERED COMMUNITIES

FIGURE 5-5: CONVENTIONAL VACUUM SEWER CONNECTION



SECTION (TYP.)



PLAN VIEW (TYP.)

GRAPHIC SCALE

0 250 500

(IN FEET)

1 inch = 500 ft.

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SUBMISSION:

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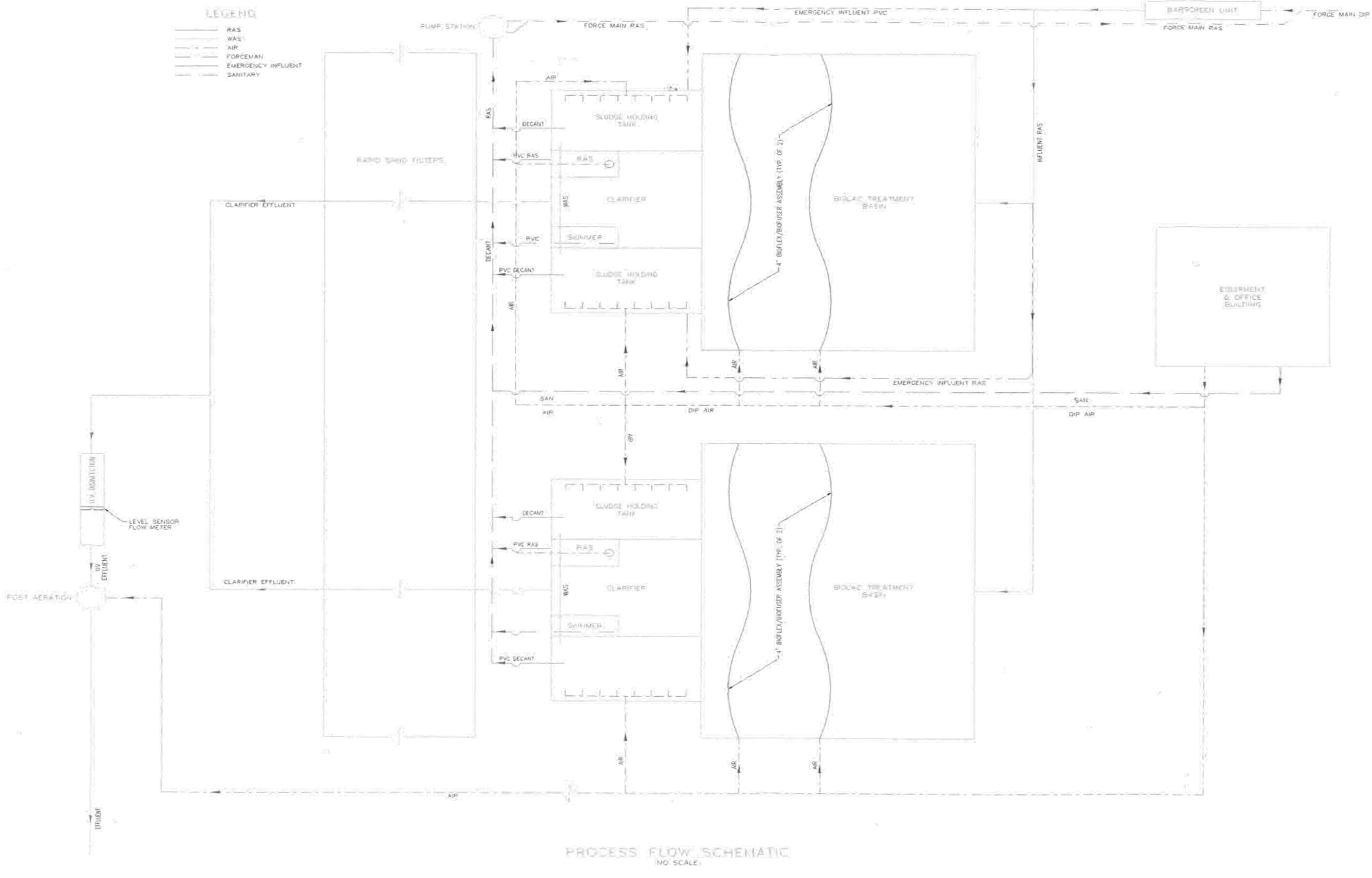
MVRPC
UNSEWERED
COMMUNITIES

SHEET TITLE:

VACUUM SEWER
LAYOUT

FIGURE 5-6



PROCESS FLOW SCHEMATIC
NO SCALE

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REVISION:

SUBMISSION:

VILLAGE OF BOWERSVILLE
MVRPC
UNSEWERED
COMMUNITIES

SHEET TITLE:

EXTENDED
AERATION
TREATMENT
PROCESS

FIGURE 5-7

GRAPHIC SCALE

0 1000 2000

(IN FEET)

1 inch =2000 ft.

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SUBMISSION:

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MVRPC
UNSEWERED
COMMUNITIES

SHEET TITLE:

FORCE MAIN TO
PORT WILLIAM

FIGURE 5-8

GRAPHIC SCALE

0 1250 2500

(IN FEET)

1 inch = 2500 ft.

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SUBMISSION:

VILLAGE OF BOWERSVILLE
MVRPC
UNSEWERED
COMMUNITIES

SHEET TITLE:

FORCE MAIN TO JAMESTOWN

FIGURE 5-9

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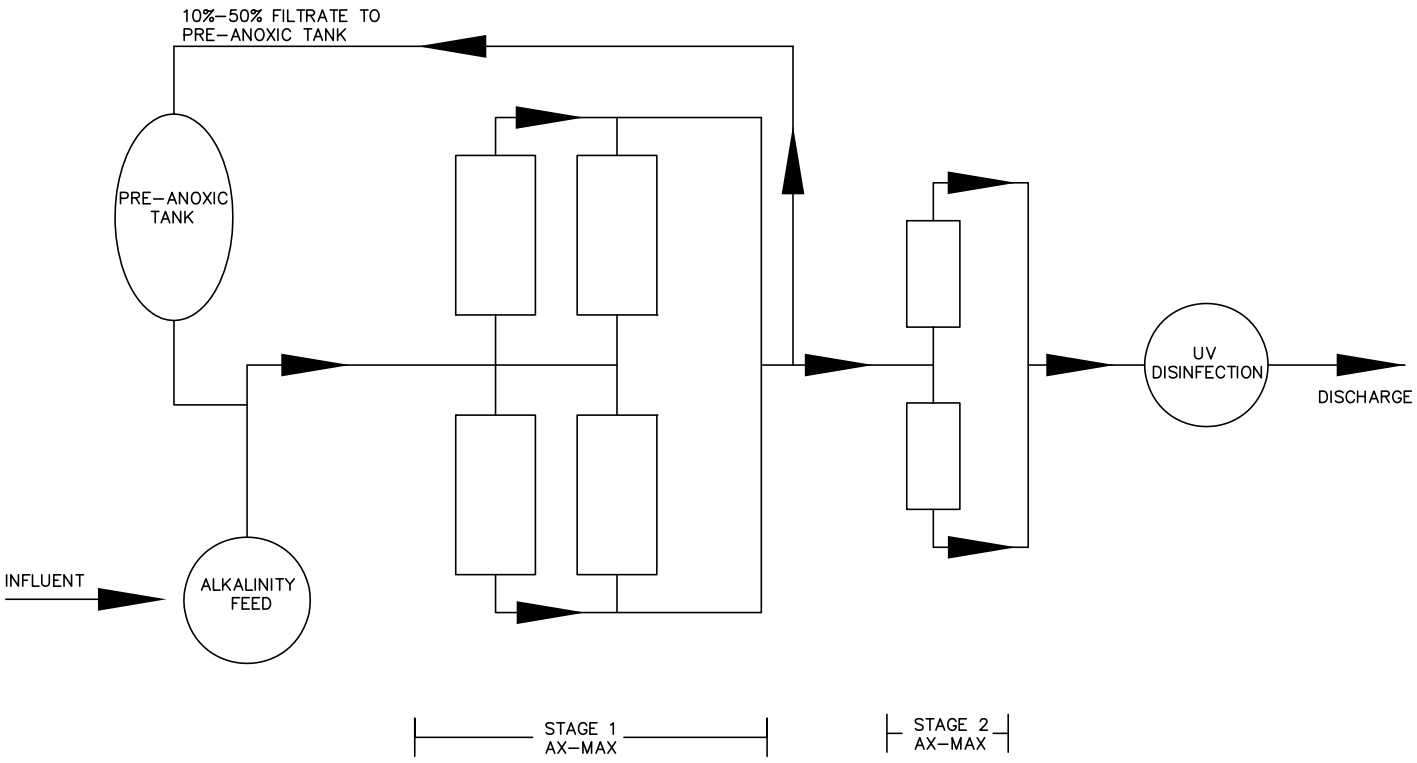
VILLAGE OF BOWERSVILLE

MVRPC UNSEWERD COMMUNITY

FIGURE 5-10: PACKED BED MEDIA TREATMENT SYSTEM LAYOUT



Chapter 6 – Other Cost

The alternatives presented in this study are evaluated economically by comparing their present worth. The present worth of an alternative is the amount of money invested at 6 percent, which would provide the funds needed for all expenses during the life of the project (including operation and maintenance, but not including inflation). This provides a method of comparing the real costs of each system in its entirety, as opposed to the comparison of construction costs only. The procedures used in developing present worth are as follows:

Contingency

Contingency costs are capital costs incurred to purchase and install each component of a collection alternative. These costs are estimates for a future construction date and include a 10 percent design contingency. Contingency costs typically costs for the following:

- Sewers, force mains, and pump stations
- Fittings and valves
- Earthwork
- Pavement replacement
- Grading and seeding
- Boring and jacking under railroads, highways, and streams
- Granular backfill Bid margin
- Design contingency
- Appurtenances

Contingency cost estimates for the various alternatives are included in the individual estimates.

Non - Construction Costs

Non-construction costs are calculated at 20 percent of the sum of the construction cost and contingency cost. They include the following:

- Engineering, legal, and administrative cost
- Easements
- Interest during construction
- Initial operation
- Construction inspection and administration
- Financing/Funding Administration

Operation, Maintenance, and Replacement

Operation and maintenance costs are those costs associated with the daily or periodic inspection/ upkeep of the proposed collection system. They include, but are not limited to, the following:

- Salary – Labor costs are based on the number of operating personnel required including benefits.
- Pump Stations - Operation and maintenance costs including inspections, repairs to impellers and bearings, etc.
- Collection System – Maintenance costs are historically calculated at a unit cost per mile of collection pipe. Unit costs vary according to type of system.
- Electrical – Electrical costs associated with pump stations, effluent pumps, and vacuum stations.
- Office & Overhead – Costs associated with the monthly billing operations such as paper, stamps, computers, and personnel.

The operation and maintenance costs associated with the gravity, STEP, vacuum, and grinder collection systems are as follows:

Table 6-1: Collection System O&M Costs

Gravity Collection System

ITEM	DESCRIPTION	COST
1	PUMP STATION POWER	$3,000
2	COLLECTION SYSTEM MAINTENANCE	$2,000
3	EQUOIMENT REPLACEMENT	$3,000
TOTAL		**$8,000**

Septic Tank Effluent Pump Collection System

ITEM	DESCRIPTION	COST
1	PRIMARY TANK PUMP OUT (155 tanks based on 7 year frequency @ $400 per tank)	$8,800
2	PRO-ACTIVE PREVENTITIVE MAINTENANCE (pump and controls inspection annually)	$2,500
3	REACTIVE MAINTENANCE (repairs to pump components)	$1,000
4	EQUIPMENT REPAIR AND REPLACEMENT (pump replacement frequency 10 years)	$3,500
TOTAL		**$15,800**

Grinder Pump Collection System

ITEM	DESCRIPTION	COST
1	PRO-ACTIVE PREVENTITIVE MAINTENANCE (pump and controls inspection annually)	$2,500
2	REACTIVE MAINTENANCE (repairs to pump components)	$1,000
4	EQUIPMENT REPAIR AND REPLACEMENT (pump replacement frequency 10 years)	$5,500
TOTAL		**$9,000**

Vacuum Collection System

ITEM	DESCRIPTION	COST
1	VACUUM STATION POWER	$6,000
2	PRO-ACTIVE PREVENTITIVE MAINTENANCE	$2,500
3	REACTIVE MAINTENANCE	$1,000
4	EQUIPMENT REPAIR AND REPLACEMENT	$6,000
TOTAL		**$15,500**

The operation and maintenance costs associated with the treatment systems are as follows:

Table 6-2: Treatment Systems O&M Costs

Extended Aeration Treatment

ITEM	DESCRIPTION	COST
1	LABOR & ADMINISTRATION	$30,000
2	CHEMICALS	$1,500
3	POWER	$3,500
4	LABORATORY	$2,000
5	SLUDGE HANDLING	$3,000
4	EQUIPMENT REPAIR AND REPLACEMENT	$7,000
TOTAL		**$47,000**

Lagoon Treatment System

ITEM	DESCRIPTION	COST
1	LABOR & ADMINISTRATION	$20,000
2	CHEMICALS	$900
3	POWER	$2,000
4	LABORATORY	$1,000
4	EQUIPMENT REPAIR AND REPLACEMENT	$2,000
TOTAL		**$25,900**

Packed Bed Media Treatment System

ITEM	DESCRIPTION	COST
1	LABOR & ADMINISTRATION	$20,000
2	CHEMICALS	$900
3	POWER	$2,000
4	LABORATORY	$1,000
4	EQUIPMENT REPAIR AND REPLACEMENT	$3,000
TOTAL		**$26,900**

Transport to Jamestown

ITEM	DESCRIPTION	COST
1	FORCEMAIN MAINTENANCE	$1,000
2	ODOR CONTROL	$1,000
3	JAMESTOWN TREATMENT CHARGES (based on $3.04/750 gal – 110,000 GPD)	$94,900
TOTAL		**$96,900**

Chapter 7 – Selected Plan

Summary

The previously identified sewer system alternatives have been analyzed for feasibility based on existing and future projected demands, regulatory considerations, estimated costs and with regional service options based on user rate analysis. The following section will identify the recommended alternative based on the factors listed above.

The estimated costs for each collection and treatment alternative have been developed and are presented in the Tables below. These tables include the total project cost, estimated annual operation and maintenance costs, and present worth cost.

A 20-year present value analysis was used to compare alternatives against each other. Present value, also known as present worth or present discounted value, is the value on a given date (i.e. the present) for a future payment or series of future payments, discounted to reflect the time value of money. Present value calculations are widely used in engineering economics to provide a means to compare costs at different times on a meaningful “like to like” basis.

Criteria and factors used in the present value analysis include the following:

Design Life	20 years
Replacement Period	10 years
Discount Rate	6 percent
O&M Present Worth Factor	11.4699

The following pages show each possible collection and treatment option for Bowersville only and again including the Village of Port William.

The first set of tables shows all of the options if only the Village of Bowersville is contributing to a WWTP. The second set of tables illustrates if the Village of Bowersville regionalizes with the Village of Port William. With regionalizing with Port William the project cost for the treatment will increase, but so will the number of customers. The cost for the collection system will stay the same for both of these scenarios because the Village of Bowersville will only pay for their collection system and not the Village of Port William’s collection system.

The first option in a table is the collection system alternative, and the treatment alternative is listed directly below. The project cost of each of these is listed in the project cost column. The operation and maintenance for each option is listed in the O&M column. The present worth for each of the options is calculated by multiplying the O&M cost by the present worth factor (11.4699) and adding the project cost. The bold number in the table represents the total project present worth cost for that collection and treatment combination.

Bowersville Only

Gravity Sewer System

	Project Cost	O&M	Present Worth
Gravity Sewer	$2,186,617	$8,000	$2,278,376
Extended Aeration	$1,009,800	$47,000	$1,548,885
Total	$3,196,417	$55,000	**$3,827,262**

	Project Cost	O&M	Present Worth
Gravity Sewer	$2,186,617	$8,000	$2,278,376
Lagoon	$930,600	$25,900	$1,227,670
Total	$3,117,217	$33,900	**$3,506,047**

	Project Cost	O&M	Present Worth
Gravity Sewer	$2,186,617	$8,000	$2,278,376
Pump to Jamestown	$951,502	$96,900	$ 2,062,935
Total	$3,138,119	$104,900	**$4,341,312**

STEP Sewer System

	Project Cost	O&M	Present Worth
STEP Sewer	$2,634,888	$15,800	$2,816,112
Packed Bed Media	$921,888	$26,900	$1,230,428
Total	$3,556,776	$42,700	**$4,046,541**

Grinder Pump Sewer System

	Project Cost	O&M	Present Worth
Grinder Sewer	$2,683,332	$9,000	$2,786,561
Extended Aeration	$1,009,800	$47,000	$1,548,885
Total	$3,693,132	$56,000	**$4,335,446**

	Project Cost	O&M	Present Worth
Grinder Sewer	$2,683,332	$9,000	$2,786,561
Lagoon	$ 930,600	$25,900	$1,227,670
Total	$3,613,932	$34,900	**$4,014,232**

	Project Cost	O&M	Present Worth
Grinder Sewer	$2,683,332	$9,000	$2,786,561
Pump to Jamestown	$951,502	$96,900	$2,062,935
Total	$3,634,834	$105,900	**$4,849,496**

Vacuum Sewer System

	Project Cost	O&M	Present Worth
Vacuum Sewer	$2,704,754	$15,500	$2,882,537
Extended Aeration	$1,009,800	$ 47,000	$1,518,285
Total	$3,714,554	$62,500	**$4,431,423**

	Project Cost	O&M	Present Worth
Vacuum Sewer	$2,704,754	$5,500	$2,882,537
Lagoon	$ 930,600	$25,900	$1,227,670
Total	$3,635,354	$41,400	**$4,110,208**

	Project Cost	O&M	Present Worth
Vacuum Sewer	$2,704,754	$15,500	$2,882,537
Pump to Jamestown	$951,502	$96,900	$2,062,935
Total	$3,656,256	$112,400	**$4,945,473**

Regionalize with the Village of Port William

Gravity Sewer System

	Project Cost	O&M	Present Worth
Gravity Sewer	$2,186,617	$8,000	$2,278,376
Extended Aeration	$1,413,800	$47,000	$1,952,885
Total	$3,600,417	$55,000	**$4,231,262**

	Project Cost	O&M	Present Worth
Gravity Sewer	$2,186,617	$8,000	$2,278,376
Lagoon	$1,302,900	$25,900	$1,599,970
Total	$3,489,517	$33,900	**$3,878,347**

STEP Sewer System

	Project Cost	O&M	Present Worth
STEP Sewer	$2,634,888	$15,800	$2,816,112
Packed Bed Media	$1,290,700	$26,900	$1,599,240
Total	$3,925,588	$42,700	**$4,415,353**

Grinder Pump Sewer System

	Project Cost	O&M	Present Worth
Grinder Sewer	$2,683,332	$9,000	$2,786,561
Extended Aeration	$1,413,800	$47,000	$1,952,885
Total	$4,097,132	$56,000	**$4,739,446**

	Project Cost	O&M	Present Worth
Grinder Sewer	$2,683,332	$9,000	$2,786,561
Lagoon	$1,302,900	$25,900	$1,599,970
Total	$3,986,232	$34,900	**$4,386,532**

Vacuum Sewer System

	Project Cost	O&M	Present Worth
Vacuum Sewer	$2,704,754	$15,500	$2,882,537
Extended Aeration	$1,413,800	$47,000	$1,952,885
Total	$4,118,554	$62,500	**$4,835,423**

	Project Cost	O&M	Present Worth
Vacuum Sewer	$2,704,754	$15,500	$2,882,537
Lagoon	$1,302,900	$25,900	$1,599,970
Total	$4,007,654	$41,400	**$4,482,508**

Based on the present worth values, the best alternative when the Village of Bowersville is the only contributor to the WWTP is a gravity sewer collection system and a lagoon treatment system. The best option when regionalizing with the Village of Port William is also a gravity sewer collection system and a lagoon treatment system.

The present worth value for the Village of Bowersville only option is lower than regionalizing with the Village of Port William option. The collection cost for each of these options is the same and the treatment cost is the difference in these scenarios. Table 7-1 shows the breakdown of the average cost per customer for each of the treatment options. The average cost per customer was obtained by adding the treatment project cost and the O&M together and then dividing that number by the number of customers. The Village of Port William has approximately 245 customers.

Table 7-1: Average Treatment Cost per Customer

	Bowersville	Bowersville & Port William
Treatment Project Cost	$902,400	$1,263,400
O&M	$25,900	$25,900
Number of Customers	155	245
Average cost /Customer	**$ 5,989**	**$5,262**

Conclusions

The previously identified wastewater collection and treatment system alternatives have been analyzed to determine the best collection system and treatment system scenario for the Village of Bowersville. Each of these scenarios took the project cost, operation and maintenance cost, and the environmental conditions into consideration to provide the Village of Bowersville a viable option for a future wastewater system.

Recommendations

Based on the cost analysis and environmental conditions, the best scenario for the Village of Bowersville is to have a gravity sewer collection system and if Port William is willing, regionalize with a lagoon treatment facility. Otherwise, Bowersville should size the lagoon system to serve Bowersville only with land to expand for if, and when Port William is ready to join.

The gravity sewer system had the lowest combined project cost as well as the lowest combined present worth value. The gravity sewer system is the most common collection alternative, which will be a benefit for installation and repair.

The lagoon treatment system also has the lowest combined project costs and the lowest combined present worth value. A lagoon system is also easy to operate and maintain and does not require significant energy usage.

Chapter 8 – Funding

There are several Federal and State funding sources available to help assist in covering the cost of this project. Below are several sources which Bowersville may consider with the project. These include both grants and low-interest loans.

Each year, qualified communities are bypassed in the apportioning of public funds, not for lack of need or eligibility, but simply because of failure to meet deadlines and provide necessary documentation. With the assistance of a qualified funding consultant, communities can be assisted in the time-consuming and laborious task of applying for grants and loans.

Federal Funding

Community Development Block Grants (Grant Program)

Approximately $20.4 million is average annually split up among Ohio Counties. Counties typically fund 3 to 4 projects up to $30,000. Financing is available in the form of supplemental grants. To be eligible for this grant, the project benefit area must include at least 51% Low to Moderate Income (LMI) households. Applications are due to the County in the Spring of each year.

State Funding

Ohio Public Works Commission (Grant/Loan Program)

Financing is available in the form of grants and loans with varying interest rates. Grants may pay up to 50% of water or sewer project costs for new projects and up to 90% for repair or replacement projects. Loans may fund up to 100% of total project costs, each district will recommend an interest rate from 0% to 3% interest. The Loan Assistance is a grant that pays for the interest on a public or private loan during the construction period plus one year. Once project is complete a payment schedule is provided requiring payments every January and July, there is no prepayment penalty.

Ohio Water Development Authority (Loan)

Financing is available in the form of a loan program to plan, design and construct projects. The loan interest rate is current market rate. Discount rates are offered to previous borrowers and disadvantaged communities. The Village of Bowersville has a Median Household Income of $31,298 (according to the 2014 American Community Survey), and would be considered a disadvantaged community. The loan has a term of 5 to 30 years. To date, all eligible applicants have been funded.

Residential Public Infrastructure (Grant)

Grants are available on a competitive basis up to $500,000, at a $1 to $1 (other funds) ratio for projects benefiting at least 51% LMI households. Applications are due 2nd Quarter of each year. The Village of Bowersville 2014 Low Moderate Income is 50.0%. An income survey to confirm the Low Moderate Income should be conducted to confirm the accuracy of the Census data.

Unsewered Area Assistance Program (Grant)

Grants are available for construction of a publicly owned sewer system for un-sewered areas that have failing on-lot sanitary systems. The project area must have a Median household Income below the state MHI ($48,071), per the American Community Survey. The Village of Bowersville MHI is $31,298 and has under 200 customers, they could possibly qualify for $500,000 in grant funding under this program.

Water Pollution Control Loan Fund (Loan)

Financing is available through a revolving fund designed to operate in perpetuity to provide low interest rate loan and other forms of assistance for water resource protection and improvement projects. Interest rates are determined by project areas Median household Income. The Village of Bowersville Median Household Income is $31,298 and would qualify for an interest rate of 0% for 20 years.

In order to fund this project, the following funding plan is proposed:

Table 8-1: Funding Summary

			BOWERSVILLE ONLY	BOWERSVILLE W/ PORT WILLIAM
CUSTOMERS/EDUs			155	155
PROJECT COST- Collection System			$2,186,617	$2,186,617
PROJECT COST- Treatment System*			$930,600	$781,740
TOTAL PROJECT COST			$3,117,217	$2,968,357
ANNUAL O,M&R			$30,900	$30,900
FINANCING				
CDBG Formula Grant			$50,000	$50,000
Residential Public Infrastructure Grant			$480,000	$480,000
OPWC Grant			$400,000	$400,000
Unsewered Area Assistance Program			$500,000	$500,000
Local Funds - Capacity Fee $3,000/Customer			$465,000	$465,000
OPWC Loan	30	0.00%	$800,000	$800,000
OWDA Loan	30	2.00%	$422,217	$273,357
Total Financing			$3,117,217	$2,968,357
ANNUAL DEBT				
Annual OPWC Payment			$26,667	$26,667
Annual OWDA Payment			$18,852	$12,205
ANNUAL DEBT PAYMENT			$45,519	$38,872
DEBT PAYMENT PER MONTH PER EDU			$24.47	$20.90
O,M&R PAYMENT PER MONTH PER EDU			$16.61	$16.61
TOTAL PAYMENT PER MONTH PER EDU			**$41.09**	**$37.51**

* Bowersville's share of enlarged treatment system is 60% of $1,302,900 or $781,740

The above table shows an average payment per customer per month of $41.09 and $37.51 depending on whether Bowersville constructs its own treatment facility or regionalizes and shares a new treatment facility with the Village of Port William. Since the population of Bowersville and Port William is approximately a 60/40 percentage split, the increased cost of the treatment facility is shown at 60 percent. This table shows only the Bowersville portion. Port William would be responsible for the remaining 40 percent as well as the cost of their own collection system.

Chapter 9 – Arrangement for Implementation

Institutional Responsibilities

The Village of Bowersville has the necessary statutory authority for implementing this system and has the necessary legal, financial, institutional, and managerial resources available to ensure construction, operation, and maintenance of the proposed collection system. The proposed collection system involves the Village of Bowersville, MVRPC, Jefferson Township, and potentially the Village of Port William or Village of Jamestown. Various Ordinances and Resolutions of Agreement will have to be passed by the governmental bodies to implement the Bowersville and surrounding areas collection and treatment system.

Implementation Steps

The Village of Bowersville would be the primary stakeholder in this project. Jefferson Township would also be involved with this project in that the sewer system will be constructed within their jurisdiction. They will have varying degrees of direct managerial and supervisory responsibilities for the proposed Bowersville collection facility. The owner will be assisted by the engineer in the preparation of detailed plans, construction, and operation and maintenance of the proposed facility.

The Village plans to finance the project through grants, loans, and user charges. The user charges will be programmed to provide adequate monies to meet bond retirement obligations and operate and maintain the proposed facility, without placing undue burden on local citizens.

The following steps should be completed in order to implement facilities plan recommendations:

1. Completion of the final “facilities plan” and submission for approval by local, regional, and state agencies.
2. Preparation of detailed plans and specifications for the proposed improvements.
3. Submission of the detailed plans and specifications for the proposed system, along with preparation of a financing agreement for State approval.
4. Preparation of all funding applications such as Ohio EPA, OPWC, CDBG, etc.
5. Execution of financial agreements, concurrent with grant/loan approval.
6. Advertisement for bids, bid evaluation, and award of contracts.
7. Construction of proposed system.
8. Preparation of operation and maintenance manual.
9. Employment of additional operation, maintenance, and administrative personnel.
10. Initiation of operation of the improved facilities.

The following implementation schedule is recommended:

Planning:	
Submit completed feasibility plan	June, 2015
Design:	
Authorization to start engineering design	October, 2015
Submit for OWDA planning loan	November, 2015
Completion of detailed plans	August, 2016
Obtain district and Ohio EPA approval	October, 2016
Finalize funding applications	April, 2017
Construction:	
Advertisement for bids	June, 2017
Receive bids	August, 2017
Award contracts	September, 2017
Complete construction	August, 2018
Final inspection	October, 2018

Operation, Maintenance, and Monitoring

The Village of Bowersville wastewater treatment plant will need to be staffed with adequately trained and certified operation and maintenance personnel including a Class I or Class II wastewater treatment plant operator. An operation and maintenance manual for the improved facilities will be prepared by the engineer and used for the preparation of daily operation and maintenance schedules. This manual will also describe the operation and maintenance requirements of newly constructed sewers and pump stations.

Chapter 10 – Summary of Environmental Considerations

Future Environment without Project

The future environment of the unsewered areas with a “no action” policy would allow for the continuation of present conditions to go unabated. This would allow improperly treated wastewater from individual residences to drain into the surrounding natural waterways causing local water pollution problems. Taking no action to solve existing wastewater management problems within the study area would result in the continued malfunctioning of individual soil absorption systems and the surface ponding and discharge of improperly treated septic tank effluent. High fecal coliform levels in roadside ditches preclude compliance with Ohio’s Water Quality Standards and present potential health risks to area residents. Because this alternative does not meet the “effectiveness” criteria established by Ohio’s Water Quality Standards, it was eliminated from further environmental evaluation.

Environmental Evaluation of Alternatives and Selected Plan

The environmental impacts of each alternative include primary and secondary impacts. The primary impacts are those directly related to the construction and operation of the facility. The secondary impacts are induced changes in the patterns of land use, population growth or the resultant effects upon the environment caused by these changes. Both adverse and beneficial impacts must be considered. Items included in this evaluation are the following:

- Air, land, and water quality
- Public Health
- Environmental aesthetics
- Historical and cultural area
- Noise and odors

Air, Land, and Water Quality

Each of the alternatives involving construction will have an initial detrimental or negative impact on air quality near the construction site.

An increase in total suspended particulates in the form of dust, carbon monoxide, and photochemical oxidents is anticipated during the construction period. The increase is a result of diesel and gasoline powered internal combustion engines. The alternatives involving large construction sites will impose a negative initial impact on air quality. The “no action” alternative will have the least negative impact on air quality except for occasional odors.

The overall secondary or induced impact will be beneficial as odors will be reduced. A gravity collection system or vacuum collection system will have the least impact associated with odors where STEP systems or grinder systems may have odor impacts.

Each of the alternatives involving construction will have an initial negative primary impact on the land at the construction site. During and immediately after construction, the land will appear scarred and lacking suitable cover. Erosion will probably occur, creating unsightly washes, puddles and small gullies. The alternatives involving larger construction sites will experience greater negative impact. The secondary impacts will have essentially no impact, beneficial or adverse, on land or development.

Each of the alternatives involving construction will have an initial adverse impact on water quality near the construction site. Erosion will result in an increase in suspended solids and turbidity in area streams. The secondary impact on water quality will be beneficial for all alternatives with the exception of the "no action" alternative. It will result in a considerably lower organic, nutrient and ammonia loadings to the receiving streams.

Public Health

All of the alternatives, with respect to the "no action" alternative, will result in a beneficial primary and secondary effect on public health.

Environmental Aesthetics

The impact of the various alternatives on environmental aesthetics are closely related to the impacts on land and water quality. The immediate primary impact during construction is adverse. The smallest construction site represents the least adverse effect on environmental aesthetics. The 'no action" alternative will result in no construction impacts.

Historical and Cultural

Each of the alternatives including the "no action" alternative will have no impact on any of the historical/archaeological or cultural elements within the planning area.

Noise and Odors

Each of the alternatives, except for the "no action" alternative will result in noise and odors inherent to construction activities. These adverse impacts will vary depending upon the extent of the construction activity and the proximity to existing residences. The secondary impacts will be virtually non-existent.

Selected Plan Environmental Impacts

The recommended plan for the study area is the construction of a gravity sewer collection system with a lagoon treatment system. Gravity sewers have the advantage of delivering nonseptic sewage to the treatment plant by allowing free flows of sewage through the sewers. Even with the pump station, there will be low operation and maintenance of the sewers. There are high construction costs associated with this alternative with possible requirements of deep excavations to maintain an adequate slope to the sewer. The construction activities will include removal of vegetative cover, noise, dust and occasional odors. A slight degree of water quality degradation may take

place after rainstorms as a result of erosion and siltation. The secondary impacts of the proposed action will be beneficial. Gravity sewers are a highly reliable alternative.

Mitigation Measures

Adverse impacts expected from the proposed action will primarily occur during the construction phase. The beneficial long-term impacts must outweigh the short-term adverse impacts for the project to be viable. To insure that the project does not harm the environment, mitigative measures must be taken to lessen the adverse effects of the proposed plan.

Erosion/Dust Control

The soil surface will be exposed only for the minimum amount of time to facilitate construction. Sewers, force mains and appurtenances will be aligned along existing right-of-way and easements to minimize the destruction of vegetative cover. Reseeding and mulching will follow construction as soon as possible. Topsoil removed during construction will be stockpiled for reuse at the site. Terracing, erosion control structures and contouring will be incorporated in the design. Dust control measures will include periodic sprinkling of exposed earth surfaces.

Archaeological/Historical Preservation

The proposed action will not have any impact on known historical or archaeological sites within the planning area. Therefore, no mitigative measures will be required. The Ohio Historic Preservation Office will be notified immediately upon discovery of unknown artifacts uncovered during construction.

Vegetation

As previously mentioned, the construction sites have been selected to minimize disturbance of vegetative cover. Exposed areas will be seeded upon settling and final grading. Fertilizing and watering will be included in routine site maintenance.

Noise Control Practices

Construction equipment will be required to have exhaust mufflers as required by safety standards. Construction activities in close proximity to residential areas will be limited to daytime working hours.

Odor Control Practices

With proper operation and maintenance, including routine cleaning and sewer maintenance, no objectionable odors should be produced.