SECTION 4

ALTERNATIVES CONSIDERED

4.1 Collection System Alternatives

The following alternatives were considered for wastewater collection in the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Road Areas:

- No Action
- Conventional Gravity Sewer System
- Low Pressure Sewer System with Grinder Pump Stations
- Vacuum Sewer System
- Septic Tank Effluent Pressure Sewer System

Alternative No. 1 - No Action:

Description:

The current wastewater system for the study area consists of septic tanks for treatment and on-site soil absorption for disposal. There are port-o-lets located on some of the properties within the study area. Many of the existing on-site septic systems are more than 50 years old and are experiencing frequent failures. Adequate repairs to these existing systems to comply with County and State (410 IAC 6-8.2) requirements cannot be made due to small lot sizes and poor soil conditions. The no action alternative would continue to create adverse environmental impacts to the watershed and to Beanblossom Creek, which is a tributary to Lake Lemon located approximately 6 miles downstream from Bean Blossom. Inadequate wastewater collection and disposal facilities presently limit economic growth of the study area. Copies of letters from local residents and businesses, taken from the R.W. Armstrong Preliminary Engineering Report dated January 2001, provided in Appendix D, describe some of the present septic treatment/disposal problems. The No Action Alternative would provide the study areas with neither short nor long term benefits.

Design Criteria:

Not applicable.

Map:

Not applicable for this alternative.

Environmental Impacts:

The no action alternative would continue to pollute nearby waterways, potentially pollute the groundwater and therefore have a negative impact on the environment.

Land Requirements:

Not applicable.

Potential Construction Problems:

Not applicable.

Sustainability Considerations:

Not applicable.

Water and Energy Efficiency:

Not applicable.

Cost Estimates:

Not applicable.

Alternative No. 2 - Conventional Gravity Sewer System:

Description:

Conventional gravity sewer systems have been in use for years as the usual method of conveying sanitary sewage. The operation and maintenance costs are low, but the construction costs can be high. With a conventional gravity system, sewers are laid to a slope to maintain scouring velocity in the pipe. Too low of a velocity will result in sedimentation in the pipe with subsequent degradation in sewer performance. The major disadvantage of a conventional gravity sewer is the need, at times, for excessively deep trenches to maintain slope on a sewer or to avoid a natural barrier such as a creek or hill, at which time a lift station may become necessary. Lift stations are used to pump the flow up to a higher level, either to a treatment plant or to another portion of the collection system, through a conveyance line (force main) for further processing. A conventional gravity sewer system was not considered practical for the Woodland Lake, Little Fox Lake and Freeman Ridge Road Areas due to its rolling topography, which would require several, lift stations and multiple pumping of the wastewater. There are a few existing buildings that either sit below the street level, or that have significant topography changes between the building and proposed sewer main that will most likely require grinder pump stations, which have been considered in the conventional gravity sewer system alternative cost tables for Bean Blossom. Adjustments to the final collection system layouts will be required during the design phase when more accurate survey information is obtained. For purposes of this study there have been a few grinder pump stations proposed for a few buildings to eliminate the need for deep gravity sewers and additional lift stations in the conventional gravity sewer system alternatives.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards, 327 IAC 3 and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.1 for a layout map of the gravity sewer system alternative for Bean Blossom.

Environmental Impacts:

This alternative would involve the installation of sewers, some within road or alley right-of-ways and some within private easements. The removal of a few trees where sewers are proposed within private easements will most likely be required. Hoppers Branch will be crossed, and other smaller ditches will be crossed, or the sewer will parallel it. Directional drilling of the pipe across Hoppers Branch and other precautions along or across small ditches will be taken to minimize erosion and environmental impacts. The proposed lift stations are anticipated to be installed outside of existing public right-of-ways, which may require archaeological and other environmental reviews. Gravity sewer depths will be greater than the other collection system alternatives meaning wider trenches and larger areas of disturbances, which may result in increased environmental impacts. Wider trenches will result in more excess dirt that will need to be hauled off and disposed of.

Land Requirements:

Permanent and temporary construction easements will be needed for some of the proposed sewers. Land acquisition will be required for the proposed lift stations.

Potential Construction Problems:

According to the Brown County Soils Report, most all soils within the service areas are very limited in respect to shallow excavations. The rating on the soil properties that influence the ease of digging, depth to bedrock or a cemented pan, hardness of bedrock, depth to the seasonal high-water table, flooding, the amount of large stones, etc. Therefore, the construction of a conventional gravity sewer system may be difficult.

Sustainability Considerations:

A conventional gravity sewer system will be easier to operate and maintain when comparing it to the other alternatives evaluated. This alternative would use less energy than the other alternatives evaluated, as there is less pumping of the wastewater. However, the larger pipes associated with this alternative use more materials and most likely more energy in the manufacturing process.

Water and Energy Efficiency:

This alternative does not have any known water efficiency cost savings. However, this alternative would eliminate the need for grinder or effluent pumps at every building being served and thereby result in some overall energy cost savings. But the BCRSD would pay more in energy cost for the lift stations. Whereas with the other considered alternatives, the building owner would pay for energy costs.

Cost Estimates:

The estimated construction and non-construction costs for a conventional gravity sewer system in Bean Blossom are provided in Table 4.1, the estimated replacement costs (short-lived assets) in Table 4.2, and the total estimated operation, maintenance and replacement (short-lived asset) costs in Table 4.3.

Table 4.1 Estimated Construction and Non-Construction Cost for Conventional Gravity					
Construction					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	8" Gravity Sewer	13,710	LF	$35	$479,850
2	6" Force Main	3,200	LF	$25	$80,000
3	3" Force Main	950	LF	$26	$24,700
4	2-1/2" Force Main	900	LF	$22	$19,800
5	2" Force Main	3,600	LF	$20	$72,000
6	1-1/2" Pressure Sewer	2,050	LF	$18	$36,900
7	6" Laterals (*1)	13,000	LF	$30	$390,000
8	8" x 6" Wyes	74	EA	$90	$6,660
9	Simplex Grinder Pump Stations	10	EA	$6,000	$60,000
10	Pressure Sewer Valve Assemblies	10	EA	$500	$5,000
11	4' Diameter Manholes	47	EA	$3,500	$164,500
12	Force Main Air Release Valves	9	EA	$3,000	$27,000
13	Compacted Granular Backfill	2,500	LF	$30	$75,000
14	Pavement Replacement	1,900	LF	$50	$95,000
15	Main Lift Station	1	LS	$125,000	$125,000
16	Staley's Mobile Home Park Grinder Pump Lift Station	1	LS	$70,000	$70,000
17	SR 45 W. Grinder Pump Lift Station	1	LS	$70,000	$70,000
18	Covered Bridge Road Grinder Pump Lift Station	1	LS	$70,000	$70,000
19	Old Settler's Road Grinder Pump Lift Station	1	LS	$70,000	$70,000
20	6" Force Main, Directional Bores	100	LF	60	$6,000
21	3" Force Main, Directional Bores	50	LF	$45	$2,250
22	2-1/2" Force Main, Directional Bores	100	LF	$35	$3,500
23	2" Force Main, Directional Bores	300	LF	$30	$9,000
24	2" Force Main, Directional Bores	300	LF	$20	$6,000
25	8" Gravity Sewer Stream Crossing	100	LF	$100	$10,000
26	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$197,820	$197,820
27	Mobilization, Bond & Insurance	1	LS	$108,800	$108,800
Subtotal Construction					**$2,284,780**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$191,300
Additional Engineering	$12,500
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$14,500
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$228,470
Subtotal Non-Construction	**$573,470**
Total Cost	**$2,858,250**

Notes for Table 4.1:

*1 – 6" lateral quantity includes extending pipe to near the building to be served for purposes of comparing to the low-pressure sewer alternatives, which includes extending the lateral to near the building where it is assumed that the existing septic tank is located. If it is determined that gravity is the selected alternative in this chapter then the lateral quantity will be reduced in the project cost estimate, provided later in this report, to extend only from the mainline sewer to the right-of-way, or edge of easement line. The building owner would be responsible for extending the lateral from the right-of-way line to the building.

Table 4.2 Estimated Fixed Assets Costs for Conventional Gravity	
Item	**Estimated Annual Cost**
Lift Station Pumps, Controls & Motors	$3,800
Grinder Pumps & Controls	$1,700
Air Release Valve Replacement	$900
Total	**$6,400**

Table 4.3 Estimated O, M & R Costs for Conventional Gravity	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs) – Lift Stations (*1)	$4,560
Materials & Supplies	$550
Repairs	$550
Fixed Assets Costs (From Table 4.2)	$6,400
Outside Services (Tank Cleaning, Billing, etc.)	$5,250
Insurance	$1,100
Conferences, Training, etc.	$350
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$48,560**

Note for Table 4.3:
*1 – For purposes of comparing alternatives, includes estimated power cost for simplex grinder pumps, which would be paid by the customer

Alternative No. 3 – Low Pressure Sewer System with Grinder Pump Stations:

Description:

Low-pressure sewer systems consist of low-pressure pipes that generally are buried below the frost line following the land contours and grinder pump stations. The grinder pump station consists of a wet well (usually 2-feet diameter and 6-feet deep) which includes the pump and level controls. Each grinder pump station has its own control panel, which is either mounted, at the pump unit or on the building owners' structure. There are some major disadvantages with the pressure systems including higher maintenance cost with each building owner having a grinder pump station and the possibility of grease build-up and pump clogging. The major advantage of the pressure system is that the pipes are buried shallower and are smaller sized than conventional gravity sewers and therefore can sometimes result in a lower construction cost.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards, 327 IAC 3 and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit's 4.2, 4.3, and 6.1 for a layout map of the low-pressure sewer system for Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge respectively.

Environmental Impacts:

This alternative would involve the installation of sewers, some within road or alley right-of-ways and some within private easements. The removal of a few trees where sewers are proposed within private easements will most likely be required. Hoppers Branch and Bean Blossom Creek will be crossed, and other smaller ditches will be crossed, or the sewer will parallel it. Unlike conventional gravity sewers that need to be laid on line and grade, the pressure sewers can be directional bored, or auger bored in many instances, and the pipes can be installed following the contour of the ground or zigzagged around obstacles, which minimizes surface disruptions and reduces the environmental impacts. Directional drilling of the pipe across Hoppers Branch and Bean Blossom Creek, in addition to other precautions along or across small ditches will be taken to minimize erosion and environmental impacts. The proposed grinder pump stations and some of the pipes are anticipated to be installed outside of existing public right-of-ways, which may require archaeological and other environmental reviews. However, much of the land where the system will be installed has been previously disturbed.

Land Requirements:

Permanent and temporary construction easements will be needed for some of the proposed sewers.

Potential Construction Problems:

As referenced under the conventional gravity sewer alternative, according to the Brown County Soils Report, most all soils within the service areas are very limited in respect to shallow excavations. The rating on the soil properties that influence the ease of digging, depth to bedrock or a cemented pan, hardness of bedrock, depth to the seasonal high-water table, flooding, the amount of large stones, etc. Therefore, the construction of a low-pressure system may encounter some challenges, but not as many as with a deeper installed conventional gravity sewer system.

Sustainability Considerations:

A low-pressure sewer system will require more to operate and maintain when comparing it to the conventional gravity sewer alternative evaluated. This alternative would use more energy than the other alternatives evaluated, as there is more pumping of the wastewater. However, the pipes are smaller than the other alternatives meaning less material used, which equates to less energy usage in the manufacture of the pipe.

Water and Energy Efficiency:

This alternative does not have any known water efficiency cost savings. This alternative would result in the highest energy use considering a 3500 RPM grinder pump would be placed at every building to be served.

Cost Estimates:

The estimated construction and non-construction costs for a low-pressure sewer system with grinder pump stations in Bean Blossom, Woodland Lake, Little Fox Lake, and Freeman Ridge Road Areas are provided in Table's 4.4, 4.5, 4.6 and 4.7 respectively. The estimated replacement costs (short-term assets) for these same Areas are provided in in Table's 4.8, 4.9, 4.10 and 4.11, respectively. The total estimated operation, maintenance and replacement (short-lived assets) for the Areas are provided in in Table's 4.12, 4.13, 4.14 and 4.15, respectively.

Table 4.4 **Estimated Construction and Non-Construction Cost for Low Pressure Grinder Pump Sewers – Bean Blossom**					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	6" Force Main	3,200	LF	$25	$80,000
2	4" Pressure Sewer	1,150	LF	$22	$25,300
3	3" Pressure Sewer	3,800	LF	$21	$79,800
4	2" Pressure Sewer	10,350	LF	$19	$196,650
5	1-1/4" Pressure Sewer	11,000	LF	$15	$165,000
6	Simplex Grinder Pump Stations (*1)	81	EA	$5,500	$445,500
7	Pressure Sewer Valve Assemblies	81	EA	$500	$40,500
8	Pressure Sewer/Force Main Air Release Valves	11	EA	$3,000	$33,000
9	Line Flushing Valve Pits	27	EA	$2,000	$54,000
10	Compacted Granular Backfill	1,000	LF	$18	$18,000
11	Bill Monroe C'Ground/Festival Park Main Lift Station	1	LS	$175,000	$175,000
12	Staley's Mobile Home Park Grinder Pump Lift Station	1	LS	$45,000	$45,000
13	Electric Conduit & Pump Control Panels	81	EA	$1,000	$81,000
14	6" Force Main, Directional Bores	100	LF	$60	$6,000
15	4" Pressure Sewer, Directional Bores	500	LF	$50	$25,000
16	3" Pressure Sewer, Augured/Directional Bores	900	LF	$45	$40,500
17	2" Pressure Sewer, Augured Bores	600	LF	$30	$18,000
18	1-1/4" Pressure Sewer, Augured Bores	1,000	LF	$20	$20,000
19	Spare Parts	1	LS	$5,000	$5,000
20	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$159,825	$159,825
21	Mobilization, Bond & Insurance	1	LS	$87,905	$87,905
Subtotal Construction					**$1,845,980**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$157,150
Additional Engineering	$26,300
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$5,500
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$184,600
Subtotal Non-Construction	**$500,250**
Total Cost	**$2,346,230**

Table 4.5 Estimated Construction and Non-Construction Cost for Pressure Grinder Pump Sewers – Woodland Lake					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	4" Force Main	8,500	LF	$22	$187,000
2	4" Pressure Sewer	2,500	LF	$22	$55,000
3	3" Pressure Sewer	3,100	LF	$21	$65,100
4	2" Pressure Sewer	2,050	LF	$19	$38,950
5	1-1/4" Pressure Sewer	15,400	LF	$15	$231,000
6	Simplex Grinder Pump Stations (*1)	79	EA	$5,500	$434,500
7	Pressure Sewer Valve Assemblies	79	EA	$500	$39,500
8	Pressure Sewer/Force Main Air Release Valves	17	EA	$3,000	$51,000
9	Line Flushing Valve Pits	11	EA	$2,000	$22,000
10	Compacted Granular Backfill	3,000	LF	$18	$54,000
11	Stone Drive/Roadway Replacement	2,500	LF	$12	$30,000
12	Woodland Lake Lift Station	1	LS	$120,000	$120,000
13	Electrical Conduit & Pump Control Panels	79	EA	$1,000	$79,000
14	4" Force Main, Augured Bores	500	LF	$50	$25,000
15	3" Pressure Sewer, Augured Bores	500	LF	$45	$22,500
16	2" Pressure Sewer, Augured Bores	150	LF	$30	$4,500
17	1-1/4" Pressure Sewer, Augured Bores	200	LF	$20	$4,000
18	Spare Parts	1	LS	$5,000	$5,000
19	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$146,805	$146,805
20	Mobilization, Bond & Insurance	1	LS	$80,745	$80,745
Subtotal Construction					**$1,695,600**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$145,500
Additional Engineering	$24,700
Construction Inspection	$50,400
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$3,400
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$169,560
Subtotal Non-Construction	**$453,050**
Total Cost	**$2,148,660**

The Woodland Lake cost estimate (Table 4.5) includes the conveyance system from Woodland Lake to Bean Blossom.

Table 4.6 Estimated Construction and Non-Construction Cost for Pressure Grinder Pump Sewers – Little Fox Lake					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	2" Pressure Sewer	4,665	LF	$19	$82,935
2	1-1/4" Pressure Sewer	3,550	LF	$15	$53,250
3	Simplex Grinder Pump Stations (*1)	18	EA	$5,500	$99,000
4	Pressure Sewer Valve Assemblies	18	EA	$500	$9,000
5	Pressure Sewer/Force Main Air Release Valves	4	EA	$3,000	$12,000
6	Line Flushing Valve Pits	4	EA	$2,000	$8,000
7	Compacted Granular Backfill	1,500	LF	$18	$27,000
8	Stone Drive/Roadway Replacement	1,000	LF	$12	$12,000
9	Electrical Conduit & Pump Control Panels	18	EA	$1,000	$18,000
10	2" Pressure Sewer, Directional Bores	1,000	LF	$30	$30,000
11	1-1/4" Pressure Sewer, Augured Bores	200	LF	$20	$4,000
12	Spare Parts	1	LS	$2,000	$2,000
13	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$35,720	$35,720
14	Mobilization, Bond & Insurance	1	LS	$19,645	$19,645
Subtotal Construction					**$412,550**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$44,260
Additional Engineering	$5,400
Construction Inspection	$16,800
Legal	$2,000
Bond Council	$4,000
Financial Advisor	$1,800
CFF Grant Administration (includes Environmental Review & Labor Standards)	$2,500
Land/Easement Acquisition	$330
Soils Evaluation	$1,000
Administrative	$400
Construction Contingency	$41,250
Subtotal Non-Construction	**$119,740**
Total Cost	**$532,290**

Table 4.7
Estimated Construction and Non-Construction Cost for Pressure Grinder Pump Sewers – Freeman Ridge Road Area

Item	Description	Quantity	Unit	Unit Cost	Amount
1	3" Pressure Sewer	6,000	LF	$21	$126,000
2	2" Pressure Sewer	6,350	LF	$19	$120,650
3	1-1/4" Pressure Sewer	3,000	LF	$15	$45,000
4	Simplex Grinder Pump Stations (*1)	32	EA	$5,500	$176,000
5	Pressure Sewer Valve Assemblies	32	EA	$500	$16,000
6	Pressure Sewer/Force Main Air Release Valves	5	EA	$3,000	$15,000
7	Line Flushing Valve Pits	7	EA	$2,000	$14,000
8	Compacted Granular Backfill	600	LF	$18	$10,800
9	Electrical Conduit & Pump Control Panels	32	EA	$1,000	$32,000
10	3" Pressure Sewer, Directional Bores	1,000	LF	$45	$45,000
11	2" Pressure Sewer, Directional Bores	200	LF	$30	$6,000
12	1-1/4" Pressure Sewer, Augured Bores	200	LF	$20	$4,000
13	Spare Parts	1	LS	$2,000	$2,000
14	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$61,245	$61,245
15	Mobilization, Bond & Insurance	1	LS	$33,685	$33,685
	Subtotal Construction				**$707,380**

Non-Construction

Item	Amount
Engineering Design and Construction	$68,120
Additional Engineering	$9,600
Construction Inspection	$25,200
Legal	$2,500
Bond Council	$5,200
Financial Advisor	$2,500
CFF Grant Administration (includes Environmental Review & Labor Standards)	$3,000
Land/Easement Acquisition	$580
Soils Evaluation	$1,000
Administrative	$500
Construction Contingency	$70,730
Subtotal Non-Construction	**$188,930**
Total Cost	**$896,310**

Notes for Table's 4.4 through 4.7:

*1 – The potential for clustering buildings into one simplex grinder pump station may be possible but cannot be determined until a detailed topographical survey is obtained during the engineering design phase of the project. For conservative purposes this study assumes one simplex grinder pump station per building being served.

Table 4.8 Estimated Fixed Assets Costs for Pressure Sewers with Grinder Pumps – Bean Blossom	
Item	**Estimated Annual Cost**
Grinder Pumps and Controls	$11,880
Lift Station Pumps and Controls	$1,370
Air Release Valve Replacement	$1,100
Total	**$14,350**

Table 4.9 Estimated Fixed Assets Costs for Pressure Sewers with Grinder Pumps – Woodland Lake	
Item	**Estimated Annual Cost**
Grinder Pumps and Controls	$11,500
Lift Station Pumps and Controls	$700
Air Release Valve Replacement	$1,700
Total	**$13,900**

Table 4.10 Estimated Fixed Assets Costs for Pressure Sewers with Grinder Pumps – Little Fox Lake	
Item	**Estimated Annual Cost**
Grinder Pumps and Controls	$2,640
Air Release Valve Replacement	$400
Total	**$3,040**

Table 4.11 Estimated Fixed Assets Costs for Pressure Sewers with Grinder Pumps – Freeman Ridge	
Item	**Estimated Annual Cost**
Grinder Pumps and Controls	$4,700
Air Release Valve Replacement	$500
Total	**$5,200**

Table 4.12 Estimated O, M & R Costs for Pressure Sewers with Grinder Pumps – Bean Blossom	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs) (*1)	$2,550
Materials & Supplies	$550
Repairs	$550
Fixed Assets Costs (From Table 4.8)	$14,350
Outside Services (Tank Cleaning, Billing, etc.)	$4,500
Insurance	$2,500
Conferences, Training, etc.	$350
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$55,150**

Table 4.13 Estimated O, M & R Costs for Pressure Sewers with Grinder Pumps – Woodland Lake	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$14,400
Energy (Power Costs) (*1)	$1,450
Materials & Supplies	$300
Repairs	$300
Fixed Assets Costs (From Table 4.9)	$13,900
Outside Services (Tank Cleaning, Billing, etc.)	$3,500
Insurance	$1,800
Conferences, Training, etc.	$200
Professional Services (Attorney, Engineer, Financial, etc.)	$600
Total	**$36,450**

Table 4.14 Estimated O, M & R Costs for Pressure Sewers with Grinder Pumps – Little Fox Lake	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$0
Energy (Power Costs) (*1)	$160
Materials & Supplies	$300
Repairs	$200
Fixed Assets Costs (From Table 4.10)	$3,040
Outside Services (Tank Cleaning, Billing, etc.)	$1,500
Insurance	$300
Conferences, Training, etc.	$0
Professional Services (Attorney, Engineer, Financial, etc.)	$0
Total	**$5,500**

Table 4.15 Estimated O, M & R Costs for Pressure Sewers with Grinder Pumps – Freeman Ridge	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$0
Energy (Power Costs) (*1)	$580
Materials & Supplies	$600
Repairs	$300
Fixed Assets Costs (From Table 4.11)	$5,200
Outside Services (Tank Cleaning, Billing, etc.)	$1,500
Insurance	$500
Conferences, Training, etc.	$200
Professional Services (Attorney, Engineer, Financial, etc.)	$600
Total	**$9,480**

Note for Table's 4.12 and 4.15:
*1 – For purposes of comparing alternatives, includes estimated power cost for simplex grinder pumps, which would be paid by the customer

Alternative No. 4 – Vacuum Sewer System:

Description:

Vacuum sewer systems consist of low-pressure pipes that generally are buried beneath the frost line at a slope with periodic step-ups to avoid deep installation. The wastewater flows from the building by gravity to a vacuum pit. A vacuum pit can serve each building, or a few buildings located close together can be clustered to one vacuum pit. The vacuum pit has an interface valve that automatically opens when a certain volume of sewage is collected in the vacuum pit. A central collection system station generates vacuum, which sucks the sewage from the vacuum pit when the interface valve opens. The advantage of a vacuum system is that pipe sizes are kept to a minimum; usually 4 to 8-inch and major spills of sewage are impossible. The disadvantage of the vacuum system is that the collector station is very expensive unless the cost can be shared amongst several users.

Based on input received from a representative of AIRVAC, a vacuum sewer system company, a vacuum system was determined to be feasible for the Bean Blossom Area but was not for the Old Settler's Road Area and Woodland Lake Area. In addition, a representative of AIRVAC has indicated that when there are less than 90 customers; this alternative not practical due to the high cost of the vacuum station. Considering the separation of the service areas from the Bean Blossom area, the low number of customers in each area and the AIRVAC correspondence, this alternative has been deemed unfeasible and will not be considered further.

Alternative No. 5 – Septic Tank Effluent Pressure (STEP) System:

Description:

The STEP sewer system is very similar to the low-pressure grinder pump sewer system except for the following:

- Septic tanks (watertight) are used in lieu of grinder pump stations
- Effluent pumps are used following the septic tank in lieu of grinder pumps, as the larger solids in the wastewater settle out in the septic tank prior to reaching the pump
- Preliminary treatment is being achieved in the septic tank, which requires periodic (estimated every 8 to 10 years) solids removal and disposal, whereas the grinder pump stations convey all of the wastewater, including ground up solids to the treatment plant site

As with the low-pressure grinder pump sewer system, the STEP sewer system requires similar installation complexity, and electrical service provided for the pump controls.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards, 327 IAC 3, and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit's 4.2, 4.3, and 6.1 for a layout map of the STEP system for Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas, respectively. These exhibits are the same as those for Alternative No. 3 except in lieu of grinder pumps there would be 2-compartment 1,000-gallon septic tanks with effluent pumps for the residential customers and larger tanks for Bill Monroe Park, Staley's Mobile Home Park and Brownie's Restaurant. Refer to Exhibit 6.1 for a layout of the STEP System.

Environmental Impacts:

This alternative would involve the installation of sewers, some within road or alley right-of-ways and some within private easements. The removal of a few trees where sewers are proposed within private easements will most likely be required. Hoppers Branch and Beanblossom Creek will be crossed, and other smaller ditches will be crossed, or the sewer will parallel it. Unlike conventional gravity sewers that need to be laid on line and grade, the pressure sewers can be directional bored, or auger bored in many instances, and the pipes can be installed following the contour of the ground or zigzagged around obstacles, which minimizes surface disruptions and reduces the environmental impacts. Directional drilling of the pipe across Beanblossom Creek and Hoppers Branch, in addition to other precautions along or across small ditches will be taken to minimize erosion and environmental impacts. The proposed septic tanks and some of the pipes are anticipated to be installed outside of existing public right-of-ways, which may require archaeological and other environmental reviews. However, much of the land where the system will be installed has been previously disturbed.

Land Requirements:

Permanent and temporary construction easements will be needed for some of the proposed sewers.

Potential Construction Problems:

As referenced under the conventional gravity and low pressure with grinder pump stations sewer alternatives, according to the Brown County Soils Report, most all soils within the service areas are very limited in respect to shallow excavations. The rating on the soil properties that influence the ease of digging, depth to bedrock or a cemented pan, hardness of bedrock, depth to the seasonal high-water table, flooding, the amount of large stones, etc. Therefore, the construction of a low-pressure system will most likely encounter some challenges, but not as many as with a deeper installed conventional gravity sewer system.

Sustainability Considerations:

A low-pressure sewer system, with grinder pumps, or septic tanks and effluent pumps will require more to operate and maintain when comparing it to the conventional gravity sewer alternative evaluated. This alternative would use more energy than the conventional gravity sewer alternative but less than the low-pressure sewer with grinder pump stations alternative, as there is pumping of the wastewater, but it is partially treated septic tank effluent. The pipes are similar in size to the low pressure with grinder stations and smaller than the conventional gravity sewer pipes meaning less material used, which equates to less energy usage in the manufacture of the pipe.

Water and Energy Efficiency:

This alternative does not have known water efficiency costs savings. This alternative would most likely be more energy efficient than the grinder pump alternative, as pumping the septic tank effluent does not require grinding up the solids

Cost Estimates:

The estimated construction and non-construction costs for a STEP system in Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge are provided in Table's 4.16, 4.17, 4.18 and 4.19, respectively. The estimated replacement costs (short-lived assets) for the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas are provided in in Table's 4.20, 4.21, 4.22 and 4.23, respectively. The total estimated operation, maintenance and replacement (short-lived asset) for the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas are provided in in Table's 4.24, 4.25, 4.26 and 4.27, respectively.

Table 4.16 **Estimated Construction and Non-Construction Cost for Septic Tank Effluent Pressure Sewers – Bean Blossom**					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	6" Force Main	3,200	LF	$25	$80,000
2	4" Pressure Sewer	1,450	LF	$22	$31,900
3	3" Pressure Sewer	3,300	LF	$21	$69,300
4	2" Pressure Sewer	9,200	LF	$19	$174,800
5	1-1/4" Pressure Sewer	11,000	LF	$15	$165,000
6	Septic Tanks w/Effluent Pump (*1)	80	EA	$5,000	$400,000
7	Pressure Sewer Valve Assemblies	80	EA	$500	$40,000
8	Pressure Sewer/Force Main Air Release Valves	11	EA	$3,000	$33,000
9	Line Flushing Valve Pits	27	EA	$2,000	$54,000
10	Compacted Granular Backfill	1,000	LF	$18	$18,000
11	Bill Monroe C'Ground/Festival Park Main Lift Station	1	LS	$100,000	$100,000
12	Staley's Mobile Home Septic Tanks and Lift Station	1	LS	$45,000	$45,000
13	Brownie's Restaurant Septic Tank and Lift Station	1	LS	$30,000	$30,000
14	Electrical Conduit & Pump Control Panels	83	EA	$1,000	$83,000
15	6" Force Main, Directional Bores	100	LF	$60	$6,000
16	4" Pressure Sewer, Directional Bores	500	LF	$50	$25,000
17	3" Pressure Sewer, Directional Bores	900	LF	$45	$40,500
18	2" Pressure Sewer, Directional Bores	600	LF	$30	$18,000
19	1-1/4" Pressure Sewer, Augured Bores	1,000	LF	$20	$20,000
20	Spare Parts	1	LS	$5,000	$5,000
21	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$143,850	$143,850
22	Mobilization, Bond & Insurance	1	LS	$79,120	$79,120
Subtotal Construction					**$1,661,470**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$142,930
Additional Engineering	$26,300
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$5,500
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$166,140
Subtotal Non-Construction	**$467,570**
Total Cost	**$2,129,040**

Table 4.17 Estimated Construction and Non-Construction Cost for Septic Tank Effluent Pressure Sewers – Woodland Lake					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	4" Force Main	10,650	LF	$22	$234,300
2	4" Pressure Sewer	2,750	LF	$22	$60,500
3	3" Pressure Sewer	3,100	LF	$21	$65,100
4	2" Pressure Sewer	2,600	LF	$19	$49,400
5	1-1/4" Pressure Sewer	15,400	LF	$15	$231,000
6	Septic Tanks w/Effluent Pump (*1)	79	EA	$5,000	$395,000
7	Pressure Sewer Valve Assemblies	79	EA	$500	$39,500
8	Pressure Sewer/Force Main Air Release Valves	17	EA	$3,000	$51,000
9	Line Flushing Valve Pits	11	EA	$2,000	$22,000
10	Compacted Granular Backfill	3,300	LF	$18	$59,400
11	Stone Drive/Roadway Replacement	3,000	LF	$12	$36,000
12	Electrical Conduit & Pump Control Panels	79	EA	$1,000	$79,000
13	4" Force/Pressure Main, Directional Bores	600	LF	$50	$30,000
14	3" Pressure Sewer, Directional Bores	500	LF	$45	$22,500
15	2" Pressure Sewer, Directional Bores	150	LF	$30	$4,500
16	1-1/4" Pressure Sewer, Directional Bores	200	LF	$20	$4,000
17	Spare Parts	1	LS	$5,000	$5,000
18	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$138,970	$138,970
19	Mobilization, Bond & Insurance	1	LS	$76,430	$76,430
	Subtotal Construction				**$1,605,100**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$138,450
Additional Engineering	$23,700
Construction Inspection	$50,400
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$1,500
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$160,510
Subtotal Non-Construction	**$434,060**
Total Cost	**$2,039,160**

Table 4.18 Estimated Construction and Non-Construction Cost for Septic Tank Effluent Pressure Sewers – Little Fox Lake					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	3" Pressure Sewer	4,365	LF	$21	$91,665
2	1-1/4" Pressure Sewer	3,550	LF	$15	$53,250
3	Septic Tanks w/Effluent Pump (*1)	18	EA	$5,000	$90,000
4	Pressure Sewer Valve Assemblies	18	EA	$500	$9,000
5	Pressure Sewer/Force Main Air Release Valves	4	EA	$3,000	$12,000
6	Line Flushing Valve Pits	4	EA	$2,000	$8,000
7	Compacted Granular Backfill	1,500	LF	$18	$27,000
8	Stone Drive/Roadway Replacement	1,000	LF	$12	$12,000
9	Electrical Conduit & Pump Control Panels	18	EA	$1,000	$18,000
10	3" Pressure Sewer, Directional Bores	1,000	LF	$45	$45,000
11	1-1/4" Pressure Sewer, Directional Bores	200	LF	$20	$4,000
12	Spare Parts	1	LS	$2,000	$2,000
13	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$37,190	$37,190
14	Mobilization, Bond & Insurance	1	LS	$20,455	$20,455
Subtotal Construction					**$429,560**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$47,200
Additional Engineering	$5,400
Construction Inspection	$16,800
Legal	$2,000
Bond Council	$4,000
Financial Advisor	$1,800
CFF Grant Administration (includes Environmental Review & Labor Standards)	$2,500
Land/Easement Acquisition	$330
Soils Evaluation	$1,000
Administrative	$400
Construction Contingency	$42,950
Subtotal Non-Construction	**$124,380**
Total Cost	**$553,940**

Table 4.19 **Estimated Construction and Non-Construction Cost for Septic Tank Effluent Pressure Sewers – Freeman Ridge**					
Item	**Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	3" Pressure Sewer	3,800	LF	$21	$79,800
2	2" Pressure Sewer	4,300	LF	$19	$81,700
3	1-1/4" Pressure Sewer	3,000	LF	$15	$45,000
4	Septic Tanks w/Effluent Pump (*1)	32	EA	$5,000	$160,000
5	Pressure Sewer Valve Assemblies	32	EA	$500	$16,000
6	Pressure Sewer/Force Main Air Release Valves	5	EA	$3,000	$15,000
7	Line Flushing Valve Pits	7	EA	$2,000	$4,000
8	Compacted Granular Backfill	600	LF	$18	$10,800
9	Electrical Conduit & Pump Control Panels	32	EA	$1,000	$32,000
10	3" Pressure Sewer, Directional Bores	1,000	LF	$45	$45,000
11	2" Pressure Sewer, Directional Bores	200	LF	$30	$6,000
12	1-1/4" Pressure Sewer, Directional Bores	200	LF	$20	$4,000
13	Spare Parts	1	LS	$2,000	$2,000
14	Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	1	LS	$51,130	$51,130
15	Mobilization, Bond & Insurance	1	LS	$28,120	$28,120
Subtotal Construction					**$590,550**

Non-Construction	
Item	**Amount**
Engineering Design and Construction	$59,290
Additional Engineering	$9,600
Construction Inspection	$25,200
Legal	$2,500
Bond Council	$5,200
Financial Advisor	$2,500
CFF Grant Administration (includes Environmental Review & Labor Standards)	$3,000
Land/Easement Acquisition	$580
Soils Evaluation	$1,000
Administrative	$500
Construction Contingency	$59,050
Subtotal Non-Construction	**$168,420**
Total Cost	**$758,970**

Note for Table's 4.16 through 4.19:

*1 – The potential for clustering buildings into one septic tank may be possible but cannot be determined until a detailed topographical surveying is obtained during the engineering design phase of the project. For conservative purposes this study assumes one septic tank per building being served.

The Woodland Lake cost estimate (Table 4.17) includes the conveyance system from Woodland Lake to Bean Blossom.

Table 4.20 **Estimated Fixed Assets Costs for Septic Tank Effluent Pressure Sewers – Bean Blossom**	
Item	**Estimated Annual Cost**
STEP Pumps and Controls	$7,560
Lift Station Pumps and Controls	$1,020
Air Release Valve Replacement	$1,100
Total	**$9,680**

Table 4.21 **Estimated Fixed Assets Costs for Septic Tank Effluent Pressure Sewers – Woodland Lake**	
Item	**Estimated Annual Cost**
STEP Pumps and Controls	$7,370
Air Release Valve Replacement	$1,700
Total	**$9,070**

Table 4.22 **Estimated Fixed Assets Costs for Septic Tank Effluent Pressure Sewers – Little Fox Lake**	
Item	**Estimated Annual Cost**
STEP Pumps and Controls	$1,680
Air Release Valve Replacement	$400
Total	**$2,080**

Table 4.23 **Estimated Fixed Assets Costs for Septic Tank Effluent Pressure Sewers – Freeman Ridge**	
Item	**Estimated Annual Cost**
STEP Pumps and Controls	$2,990
Air Release Valve Replacement	$500
Total	**$3,490**

Table 4.24 Estimated O, M & R Costs for Septic Tank Effluent Pressure Sewers – Bean Blossom	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs)	$1,740
Materials & Supplies	$550
Repairs	$550
Fixed Assets Costs (From Table 4.20)	$9,680
Outside Services (Tank Cleaning, Billing, etc.)	$3,050
Insurance	$2,500
Conferences, Training, etc.	$350
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$48,220**

Table 4.25 Estimated O, M & R Costs for Septic Tank Effluent Pressure Sewers – Woodland Lake	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$14,400
Energy (Power Costs) – STEP Pumps and Lift Station	$1,070
Materials & Supplies (incl. Odor Control Chemical)	$1,100
Repairs	$300
Fixed Assets Costs (From Table 4.21)	$9,070
Outside Services (Tank Cleaning, Billing, etc.)	$6,160
Insurance	$1,800
Conferences, Training, etc.	$200
Professional Services (Attorney, Engineer, Financial, etc.)	$600
Total	**$34,700**

Table 4.26 Estimated O, M & R Costs for Septic Tank Effluent Pressure Sewers – Little Fox Lake	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$0
Energy (Power Costs) – STEP Pumps and Lift Station	$250
Materials & Supplies (incl. Odor Control Chemical)	$300
Repairs	$200
Fixed Assets Costs (From Table 4.22)	$2,080
Outside Services (Tank Cleaning, Billing, etc.)	$1,500
Insurance	$300
Conferences, Training, etc.	$0
Professional Services (Attorney, Engineer, Financial, etc.)	$0
Total	**$4,630**

Table 4.27 Estimated O, M & R Costs for Septic Tank Effluent Pressure Sewers – Freeman Ridge	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$0
Energy (Power Costs) – STEP Pumps and Lift Station	$430
Materials & Supplies (incl. Odor Control Chemical)	$600
Repairs	$300
Fixed Assets Costs (From Table 4.23)	$3,490
Outside Services (Tank Cleaning, Billing, etc.)	$2,500
Insurance	$500
Conferences, Training, etc.	$0
Professional Services (Attorney, Engineer, Financial, etc.)	$0
Total	**$7,820**

Note for tables 4.24 through 4.27 – See page 4-15

4.2 Treatment and Disposal System Alternatives

The following alternatives were considered for wastewater treatment for the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas:

- No Action
- Conveyance to Helmsburg WWTP
- Conveyance to Town of Nashville WWTP
- Extended Aeration Activated Sludge WWTP
- Algaewheel WWTP
- Membrane Bioreactor (MBR) or Moving Bed Biofilm Reactor (MBBR)
- Constructed Wetlands
- Facultative Lagoons with Land Application of Effluent
- Re-circulating Filter Media

The Bill Monroe Facility has approximately six 3-day weekend festivals and one 8-day festival per year. Each of these festivals can generate a daily wastewater flow of approximately 20,000 gpd. Considering that these festivals are periodic, it does not seem prudent to size a wastewater treatment plant to handle these peak flows. Therefore, a flow equalization tank was determined to make the most sense in handling the Bill Monroe peak flows. In addition, in anticipation of a higher than normal wastewater strength, due to a low water usage, an aerated flow equalization tank would provide for some preliminary treatment and allow the small treatment plant to receive a constant flow rate. Three scenarios for determining the size of the flow equalization tank were evaluated, and are as follows:

- #1 – Daily flow during festivals of 20,000 gpd, 500 gpd during non-festival days, and treating 3,000 gpd – Flow equalization volume determined is approximately 200,000 gallons
- #2 – In anticipation of adding festival events, daily flow during festivals of 40,000 gpd, 500 gpd during non-festival days, and treating 3,000 gpd – Flow equalization volume determined is approximately 500,000 gallons
- #3 - In anticipation of adding festival events, daily flow during festivals of 40,000 gpd, 500 gpd during non-festival days, and treating 5,000 gpd – Flow equalization volume determined is approximately 400,000 gallons

Estimated cost scenarios were present to Bill Monroe staff on June 28, 2016 and Scenario #3 was selected. Considering Scenario #3, a 400,000-gallon capacity aerated flow equalization tank would be required for the local WWTP alternatives. The flow equalization tank would also be needed if conveying to Nashville, as their Wastewater Agreement limits the maximum daily flow.

Additional information received at the October 11, 2017 BCRSD Board Meeting by a third-party person indicated that the Bill Monroe staff was not in favor of the expense associated with a 400,000-gallon tank and they thought 200,000 gallon was sufficient. Based on this information the BCRSD Board agreed to move forward with a 200,000-gallon tank and if Bill Monroe desired additional capacity in the future, then Bill Monroe would be responsible for it.

Alternative No. 1 - No Action:

Description:

For the same reasons indicated in the Collection System Alternatives section, the no action alternative would continue to create adverse environmental impacts to the watershed and to Beanblossom Creek, which is a tributary to Lake Lemon, located approximately 6 miles downstream from Bean Blossom. Inadequate wastewater collection and disposal facilities presently limit economic growth of the study area. The No Action Alternative would provide the study areas with neither short nor long term benefits.

Design Criteria:

Not applicable.

Map:

Not applicable for this alternative.

Environmental Impacts:

The no action alternative would continue to pollute nearby waterways, potentially pollute the groundwater and therefore be a negative impact to the environment.

Land Requirements:

Not applicable.

Potential Construction Problems:

Not applicable.

Sustainability Considerations:

Not applicable.

Water and Energy Efficiency:

Not applicable.

Cost Estimates:

Not applicable.

Alternative No. 2 – Conveyance to Helmsburg RSD:

Description:

Conveyance of wastewater from the Bean Blossom planning area to the existing treatment plant at Helmsburg is a considered alternative. The Helmsburg Regional Sewer District (RSD) operates a 25,000-gpd extended aeration steel packaged-type treatment plant that was constructed in 1995. The treated flow is discharged into Beanblossom Creek. The condition of the existing plant appears fair but in need of maintenance, as the steel components above the water level are showing significant corrosion deterioration caused by the release of hydrogen sulfide gas. The average daily and maximum daily flow to the plant for the period of March 2008 through May 2009 was 5,000 and 11,000 gpd, respectively. The influent BOD concentration during that same period averaged 368 mg/L, which is considerably higher than the 210 mg/L the plant was designed for. The higher BOD concentration is most likely due to long detention times within the collection system and low levels of inflow or infiltration into the collection system. Considering the volume available in the existing aeration chamber and the maximum BOD organic rate allowed by IDEM of 15 lbs BOD/1,000 cft, the actual average plant capacity is approximately 20,500 gpd. Considering that the community has remained status quo, this daily flow and BOD loading is assumed to be the same today. It is suspected that the significant corrosion of the plant components is caused by anaerobic wastewater, possibly from low flows within Helmsburg's low-pressure/grinder pump collection system.

The estimated future flow from the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas is 0.050 mgd. In order for the existing Helmsburg plant to receive this additional flow it would need to be expanded. Besides, based on the condition of the existing steel plant components, a new plant would need to be constructed so that its projected useful life would exceed the duration of any loan period, assuming that a loan would be needed for the project financing. The reuse of the existing steel plant structure could be considered for sludge digestion, sludge storage or flow equalization if a new plant was constructed. Based on information obtained in 2009, the Helmsburg system currently has approximately 63 customers. The estimated number of current users from the Bean Blossom, Woodland Lake, Little Fox Lake and Freeman Ridge Areas are 212.

A new plant is suggested at Helmsburg due to the existing plants lack of capacity and condition. One option would be for Helmsburg to construct a new plant with other improvements to existing facilities and the Brown County RSD would then pay an upfront connection charge to help offset a significant portion of the costs.

A second option would be for the Helmsburg RSD to merge with the Brown County RSD and then the Brown County RSD would take over the Helmsburg treatment property and other facilities then finance the treatment plant improvements. Under the first option, the Helmsburg RSD would need to incur some debt to finance a portion of the proposed WWTP.

A 200,000-gallon flow equalization tank with aeration would be included to handle the peak flows generated by the Bill Monroe Facility during their periodic festival events. It would be located at the Bill Monroe Facility.

The general improvements associated with this alternative include the following:

- Lift Station at Bean Blossom with Odor Control
- Conveyance force main from Lift Station to Helmsburg WWTP
- Influent flow splitter box
- Construct 0.20 MG Flow Equalization Tank for Bill Monroe
- Construct 60,000 gpd AeroMod plant
- Standby Generator
- Piping and Valves
- Existing plant upgrades and painting
- Ultraviolet (UV) disinfection system and post aeration
- Geotextile bag system for sludge drying
- Control/Storage Building (30' x 40')
- Electrical
- Site Work and restoration of disturbed areas

Design Criteria:

The design criteria for this alternative comply with 10-States Standards, 327 IAC 3 and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.4 for a map showing conveyance to Helmsburg and Exhibit 4.5 for a flow schematic of the treatment plant.

Environmental Impacts:

It is anticipated that the new WWTP would mostly be constructed on the existing Helmsburg WWTP property, which has been previously disturbed. No negative environmental impacts are anticipated. The IDEM NPDES permit effluent limits are anticipated to be more stringent than the existing limits, due to their anti-degradation rules. This would benefit the environment.

Land Requirements:

An additional 1 acre of land (minimum) would be required for this alternative.

Potential Construction Problems:

Considering that most of the new WWTP would be elevated to be above the 100-year flood elevation, no construction problems related to excavation are anticipated. There will most likely be minor construction problems associated with switchover from the existing plant to a new plant.

Sustainability Considerations:

Considering that the proposed WWTP will be an extended aeration type plant, additional energy use will be required. In addition, the lift station at Bean Blossom conveying the flow to Helmsburg will require more energy when compared to having a treatment near Bean Blossom. This alternative would improve the existing WWTP condition and thus make the system more reliable and sustainable.

Water and Energy Efficiency:

This alternative does not have any known water or energy efficiency cost savings.

Cost Estimates:

The estimated construction and non-construction costs for the conveyance and treatment facilities to Helmsburg is provided in Table 4.28 The estimated replacement costs (short-lived assets) for this alternative are provided in in Table 4.29. The total estimated operation, maintenance and replacement (short-lived asset) for this alternative are provided in in Table 4.30.

Table 4.28 Estimated Construction and Non-Construction Cost – Conveyance to Helmsburg RSD for Treatment	
Item	**Amount**
6" Force Main – Open Cut (12,800 LF)	$332,800
Road/Driveway Crossings – Open Cut (400 LF)	$26,000
Highway/Railroad Crossings – Jack & Bore (200 LF)	$60,000
6" Force Main – Directional Bore (2,500LF)	$137,500
Force Main Air Release Valves (15 EA)	$45,000
Force Main Connection at Helmsburg RSD WWTP	$3,000
0.20 MG Flow Equalization Tank	$285,300
Influent Flow Splitter Box	$30,000
.06 MGD AeroMod Plant	$500,000
Existing Plant Upgrades/Conversions	$20,000
UV Disinfection System & Post Aeration	$45,000
Plant Drain Lift Station	$30,000
Standby Generator	$35,000
Piping & Valves	$25,000
Control/Storage Building	$70,000
Electrical	$75,000
Geotextile Bag System for Sludge Drying	$25,000
Miscellaneous (Site Restoration, Painting, Fence, Flow Meter, etc.)	$174,460
Bond, Mobilization & Insurance	$95,950
Subtotal Construction	**$2,014,950**
Non-Construction	
Item	**Amount**
Engineering Design and Construction	$170,000
Additional Engineering	$3,000
Construction Inspection	$100,800
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$4,500
Soils Evaluation	$2,500
Administrative	$2,000
Construction Contingency	$201,495
Subtotal Non-Construction	**$539,355**
Total Cost	**$2,554,305**

Table 4.29 Estimated Fixed Assets Costs for Conveyance & Treatment at Helmsburg	
Item	**Estimated Annual Cost**
Blowers and Controls	$6,135
Sludge Pump	$200
Chemical Feed Polymer Pumps	$215
UV Bulbs	$200
Air Release Valve Replacement	$1,200
Total	**$7,950**

Table 4.30 Estimated O, M & R Costs for Conveyance & Treatment at Helmsburg	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs)	$31,200
Materials & Supplies (incl. Chemicals)	$3,000
Repairs	$1,000
Fixed Assets Costs (From Table 4.29)	$7,950
Outside Services (Certified Operator)	$12,000
Biosolids Handling & Disposal	$5,000
Insurance	$4,500
Conferences, Training, etc.	$700
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$95,150**

Alternative No. 3 – Conveyance to Town of Nashville:

Description:

Conveyance of wastewater from the Bean Blossom planning area to the existing treatment plant at Nashville is a considered alternative. The Town of Nashville operates an extended aeration treatment plant that was upgraded and expanded recently. The Town has indicated that they have 100,000 gpd of excess capacity available. Therefore, there would be available capacity, the Town's cost for treatment capacity is $291,000 for a flow of 52,650 gpd. The Town has indicated that the conveyance line from Bean Blossom would connect to their existing wastewater treatment plant, located in the southwest corner of town. The Town's wholesale rate for treatment is $4.00/1,000 gallons for septic tank effluent wastewater. Refer to Appendix I for the wholesale wastewater treatment agreement from the Town of Nashville. There are approximately 46 additional customers that could be connected to the conveyance line for this alternative.

A 200,000-gallon flow equalization tank with aeration would be included to handle the peak flows generated by the Bill Monroe Facility during their periodic festival events. The O, M & R costs would be paid for by the Bill Monroe Facility.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards, 327 IAC 3 and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.4 for a map showing conveyance options to Nashville. A second conveyance option is shown if HRSD and Bean Blossom/Woodland Lake/Little Fox Lake/Freeman Ridge both conveyed their wastewater to Nashville. Per the Town of Nashville, either option would be required to connect directly into the Nashville WWTP.

Environmental Impacts:

The conveyance line route would be south of Bean Blossom along SR 135 to Greasy Creek Road then south along Greasy Creek Road to Nashville. The areas along the way, just south of Bean Blossom are steep and wooded, requiring the construction of pipe through hills and ravines. Therefore, it is anticipated that some tree clearing will be needed and some potentially archeological reconnaissance along the proposed conveyance line route. Some of the conveyance line will be directional drilled in an attempt to minimize environmental impacts.

Land Requirements:

Permanent and temporary construction easements will be required for this alternative.

Potential Construction Problems:

A considerable amount of the proposed conveyance line will be installed through hilly wooded topography. Some of the proposed conveyance line will be directional drilled in an effort to minimize disturbances and to reduce potential negative environmental impacts.

Sustainability Considerations:

Considering that the Nashville WWTP is existing, the energy used to operate the plant would most likely not increase as a result of adding the Brown County RSD as a customer. The lift station at Bean Blossom conveying the flow to Nashville will require more energy when compared to having a treatment plant near Bean Blossom, or conveyance to Helmsburg, as it would be larger in size. Due to the length of conveyance line and the elevation differences between Bean Blossom and Nashville, the conveyance line will allow for future connections, avoiding future sewer extensions, which makes for a sustainable future situation.

Water and Energy Efficiency:

This alternative does not have any known water efficiency cost savings. This alternative would require more energy from pumps conveying the wastewater greater distances and elevations.

Cost Estimates:

The estimated construction and non-construction costs for the conveyance to Nashville are provided in Table 4.31. The estimated replacement costs (short-term assets) for this alternative are provided in in Table 4.32. The total estimated operation, maintenance and replacement (short-lived assets) for this alternative are provided in in Table 4.33.

Table 4.31
Estimated Construction and Non-Construction Cost – Conveyance to Nashville

Item	Amount
Bean Blossom Lift Station, including Odor Control, Flow Meter & Standby Generator	$200,000
8" Force Main – Open Cut (24,000 LF)	$744,000
8" Force Main – Directional Bore (2,000 LF)	$166,700
Force Main Air Release Valves (21 EA)	$65,000
Compacted Backfill & Stone Drive Replacement	$25,000
Flow Meter & Force Main Connection at Nashville	$30,000
0.20 MG Flow Equalization Tank Including Aeration	$285,300
Miscellaneous (Site Restoration, Traffic Control, Rule 5 Permit, etc.)	$135,000
Bond, Mobilization & Insurance	$72,600
Subtotal Construction	**$1,523,600**
Non-Construction	
Item	**Amount**
Engineering Study, Design and Construction	$135,000
Additional Engineering	$1,000
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$3,000
Soils Evaluation	$6,500
Administrative	$2,000
Nashville Capacity Cost	$331,800
Construction Contingency	$152,360
Subtotal Non-Construction	**$753,860**
Total Cost	**$2,277,460**

Table Notes:

1. The 6-inch force main quantity is from the proposed lift station near the Freeman Ridge Road intersection to the Nashville WWTP.
2. The Nashville capacity cost is based on $5.53/gal. and 60,000 gpd.

Table 4.32 Estimated Fixed Assets Costs for Conveyance to Nashville	
Item	**Estimated Annual Cost**
Lift Station Pumps and Controls	$2,920
Chemical Feed Pumps	$110
Air Release Valve Replacement	$2,100
Flow Meters	$1,000
Total	**$6,130**

Table 4.33 Estimated O, M & R Costs for Conveyance to Nashville	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$14,400
Energy (Power Costs) – Lift Station & Flow Meter	$4,450
Materials & Supplies (incl. Odor Control Chemical)	$1,000
Repairs	$600
Fixed Assets Costs (From Table 4.32)	$6,130
Outside Services (Tank Cleaning, etc.)	$500
Treatment Cost	$73,000
Insurance	$1,000
Conferences, Training, etc.	$500
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$102,580**

Note for Table 4.33:
The estimated treatment cost is based on 50,000 gpd @ $4/1,000 gallons.

Alternative No. 4 – Extended Aeration Activated Sludge WWTP

Description:

The extended aeration activated sludge process uses microorganisms to feed on organic contaminants in wastewater, producing a high-quality effluent for discharge to a nearby receiving stream, or into a subsurface elevated mound, drip irrigation system, or other land application technique. The activated sludge plant is probably the most popular biological treatment process. It is used for both large and small installations. These plants are capable of producing a high-quality effluent for the price. Activated sludge package plants are used by isolated facilities such as hospitals or hotels, cluster situations, subdivisions and small communities. The basic activated sludge process consists of several interrelated components including; an aeration tank where the biological reaction takes place; an aeration source that provides oxygen and mixing; a clarifier tank where the solids settle and are separated from wastewater treatment and; a means of collecting the solids either to return them to the aeration tank, or to remove them from the process. The removed solids are then further processed and disposed of. There are several types of extended aeration activated sludge processes including oxidation ditches, sequential batch reactors, vertical loop reactors, etc. The extended activated sludge process is a viable alternative for the planning area and a packaged type AeroMod plant will be further evaluated.

A 200,000-gallon flow equalization tank with aeration would be included to handle the peak flows generated by the Bill Monroe Facility during their periodic festival events.

Based on preliminary conservations with a property owner, the WWTP location is shown on Exhibit 4.4. The plant effluent will be discharged to Beanblossom Creek.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.4 for a map showing the WWTP location and Exhibit 4.6 for a flow schematic of the WWTP.

Environmental Impacts:

An archeological reconnaissance at the proposed treatment plant site may be required. The site is in an open area, so no trees will need to be removed for the proposed treatment plant. A few trees may need to be removed for the installation of the plant effluent pipe.

Land Requirements:

The purchase of land will be required for the WWTP. Approximately 1.5 acres of property is anticipated.

Potential Construction Problems:

No construction problems are anticipated with this alternative, as the plant will be elevated above grade minimizing excavation required.

Sustainability Considerations:

This alternative will use energy, comparable to the Helmsburg treatment alternative and more than the conveyance to Nashville alternative.

Water and Energy Efficiency:

This alternative does not have any known water or energy cost savings.

Cost Estimates:

The estimated construction and non-construction costs for the extended aeration treatment plant are provided in Table 4.34. The estimated replacement costs (short-term assets) for this alternative are provided in in Table 4.35. The total estimated operation, maintenance and replacement (short-lived assets) for this alternative are provided in in Table 4.36.

Table 4.34
Estimated Construction and Non-Construction Cost – Extended Aeration Treatment

Item	Amount
6" Force Main – Open Cut (500 LF)	$12,500
Road/Driveway Crossings – Open Cut (150 LF)	$9,750
Force Main Connection at WWTP	$1,800
0.20 MG Flow Equalization Tank, including Aeration	$285,300
0.050 mgd AeroMod Plant	$580,000
UV Disinfection & Post Aeration	$40,000
Standby Generator	$40,000
Piping, Valves	$25,000
Control Storage Building	$75,000
Geotextile Bag System for Sludge Drying	$25,000
Plant Drain Lift Station	$50,000
Sitework	$20,000
Electrical	$90,000
Miscellaneous (Site Restoration, Painting, Fence, Flow Meter, etc.)	$125,500
Bond, Mobilization & Insurance	$69,000
Subtotal Construction	**$1,448,850**
Non-Construction	
Item	**Amount**
Engineering Study, Design and Construction	$125,500
Additional Engineering	$3,000
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$50,000
Soils Evaluation	$5,000
Administrative	$2,000
Construction Contingency	$144,885
Subtotal Non-Construction	**$452,585**
Total Cost	**$1,901,435**

Table 4.35 Estimated Fixed Assets Costs for Extended Aeration WWTP	
Item	**Estimated Annual Cost**
Chemical & Polymer Feed Pumps	$220
Blowers and Controls	$5,480
UV Bulbs	$200
Sludge Pump	$200
Air Release Valve Replacement	$200
Total	**$6,300**

Table 4.36 Estimated O, M & R Costs for Extended Aeration WWTP	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs)	$32,800
Materials & Supplies (incl. Chemicals)	$3,000
Repairs	$1,000
Fixed Assets Costs (From Table 4.35)	$6,300
Outside Services (Certified Operator)	$12,000
Biosolids Handling & Disposal	$5,000
Insurance	$4,500
Conferences, Training, etc.	$700
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$95,100**

Alternative No. 5 – Algaewheel WWTP

Description:

The extended Algaewheel process uses algae and bacteria to feed on organic contaminants in wastewater, producing a high-quality effluent for discharge to a nearby receiving stream, or into a subsurface elevated mound, drip irrigation system, or other land application technique. The Algaewheel process utilizes rotating wheels, using light, carbon dioxide and nutrients. Algae produce oxygen, consume carbon dioxide, and generate polysaccharides (sugars). Bacteria consume the oxygen and sugars and produce carbon dioxide, completing the cycle. When subjected to light the algal biofilms become saturated with oxygen and when combined with wheel rotation, high dissolved oxygen levels enhance BOD reduction and nitrification. A small air blower generates bubbles that lift and slowly rotate the buoyant Algaewheels. The plant components would consist of a primary clarifier, shallow concrete tanks for the Algaewheels, secondary clarifier, post treatment tank and sludge holding tank. The removed solids are then further processed and disposed of.

A 200,000-gallon flow equalization tank with aeration would be included to handle the peak flows generated by the Bill Monroe Facility during their periodic festival events.

Based on preliminary conservations with a property owner, the WWTP location is shown on Exhibit 4.4. The plant effluent will be discharged to Beanblossom Creek.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.4 for a map showing the WWTP location and Exhibit 4.7 for a flow schematic of the WWTP.

Environmental Impacts:

An archeological reconnaissance at the proposed treatment plant site may be required. The site is in an open area, so no trees will need to be removed for the proposed treatment plant. A few trees may need to be removed for the installation of the plant effluent pipe.

Land Requirements:

The purchase of land will be required for the WWTP. Approximately 1.5 acres of property is anticipated.

Potential Construction Problems:

No construction problems are anticipated with this alternative, as the plant will be elevated above grade minimizing excavation required.

Sustainability Considerations:

This alternative will use the least amount of energy compared to the other alternatives.

Water and Energy Efficiency:

This alternative does not have any known water efficiency savings however, it does provide the least cost for energy.

Cost Estimates:

The estimated construction and non-construction costs for the Algaewheel treatment plant are provided in Table 4.37. The estimated construction cost was based on a proposal from Algaewheel considering the organic waste loads from a grinder pump pressure system. Their costs may be able to be reduced if a STEP system is utilized, as the organic waste loads are anticipated to be lower. The estimated replacement costs (short-term assets) for this alternative are provided in in Table 4.38. The total estimated operation, maintenance and replacement (short-lived assets) for this alternative are provided in in Table 4.39.

Table 4.37
Estimated Construction and Non-Construction Cost – Algaewheel Treatment

Item	Amount
6" Force Main – Open Cut (500 LF)	$12,500
Road/Driveway Crossings – Open Cut (150 LF)	$9,750
Force Main Connection at WWTP	$1,800
0.20 MG Flow Equalization Tank, including Aeration	$285,300
0.050 mgd Algaewheel including Sludge Holding, Screening & Disinfection Plant	$1,350,000
Standby Generator	$20,000
Piping, Valves	$15,000
Control Storage Building	$40,000
Geotextile Bag System for Sludge Drying	$25,000
Plant Drain Lift Station	$50,000
Sitework	$20,000
Electrical	$50,000
Miscellaneous (Site Restoration, Painting, Fence, Flow Meter, etc.)	$187,900
Bond, Mobilization & Insurance	$103,360
Subtotal Construction	**$2,170,610**
Non-Construction	
Item	**Amount**
Engineering Study, Design and Construction	$185,500
Additional Engineering	$3,000
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$50,000
Soils Evaluation	$5,000
Administrative	$2,000
Construction Contingency	$217,060
Subtotal Non-Construction	**$584,760**
Total Cost	**$2,755,370**

Table 4.38 Estimated Fixed Assets Costs for Algaewheel WWTP	
Item	**Estimated Annual Cost**
Chemical & Polymer Feed Pumps	$220
Blowers and Controls	$3,880
Algaewheel Air Diffusers	$200
UV Bulbs	$200
Sludge Pump	$200
Air Release Valve Replacement	$200
Total	**$4,900**

Table 4.39 Estimated O, M & R Costs for Algaewheel WWTP	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs)	$19,500
Materials & Supplies (incl. Chemicals)	$3,000
Repairs	$1,000
Fixed Assets Costs (From Table 4.38)	$4,900
Outside Services (Certified Operator)	$12,000
Biosolids Handling & Disposal	$4,000
Insurance	$4,500
Conferences, Training, etc.	$700
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$79,400**

Alternative No. 6 – MBR or MBBR WWTP

Description:

The Membrane Bioreactor (MBR) is essentially a version of the conventional activated sludge system. While the conventional activated sludge process uses a secondary clarifier or settlement tank for solid/liquid separation, an MBR uses a membrane for this function. This provides a number of advantages relating to process control and product water quality.

The Moving Bed Biofilm Reactor (MBBR) technology employs thousands of polyethylene biofilm carriers operating in mixed motion within an aerated wastewater treatment basin. Each individual biocarrier increases productivity through providing protected surface area to support the growth of heterotrophic and autotrophic bacteria within its cells. It is this high-density population of bacteria that achieves high-rate biodegradation within the system, while also offering process reliability and ease of operation.

A 200,000-gallon flow equalization tank with aeration would be included to handle the peak flows generated by the Bill Monroe Facility during their periodic festival events.

The MBR or MBBR process is a viable alternative for the planning area and therefore will be further evaluated.

Based on preliminary conservations with a property owner, the WWTP location is shown on Exhibit 4.4. The plant effluent will be discharged to Beanblossom Creek.

Design Criteria:

The design criteria for this alternative comply with 10-States Standards and RUS design policies (7 CFR 1780.57).

Map:

Refer to Exhibit 4.4 for a map showing the WWTP location and Exhibit 4.8 for a flow schematic of the WWTP.

Environmental Impacts:

An archeological reconnaissance at the proposed treatment plant site may be required. The site is in an open area, so no trees will need to be removed for the proposed treatment plant. A few trees may need to be removed for the installation of the plant effluent pipe.

Land Requirements:

The purchase of land will be required for the WWTP. Approximately 1.5 acres of property is anticipated.

Potential Construction Problems:

No significant construction problems are anticipated with this alternative. The plant tankage will be located below grade level, except for the flow equalization tank.

Sustainability Considerations:

This alternative is estimated to use more energy than the other treatment alternatives evaluated.

Water and Energy Efficiency:

This alternative does not have any known water efficiency savings. This alternative is believed to use the most energy of the considered alternatives.

Cost Estimates:

The estimated construction and non-construction costs for the MBR or MBBR treatment plant are provided in Table 4.40. The estimated replacement costs (short-term assets) for this alternative are provided in in Table 4.41. The total estimated operation, maintenance and replacement (short-lived assets) for this alternative are provided in in Table 4.42.

Table 4.40
Estimated Construction and Non-Construction Cost – MBR or MBBR Treatment

Item	Amount
6" Force Main – Open Cut (500 LF)	$12,500
Road/Driveway Crossings – Open Cut (150 LF)	$9,750
Force Main Connection at WWTP	$1,800
0.20 MG Flow Equalization Tank, including Aeration	$285,300
0.050 mgd Aqua Point or Inceptor Plant	$675,000
UV Disinfection & Post Aeration	$40,000
Standby Generator	$35,000
Piping, Valves	$35,000
Control Storage Building	$75,000
Geotextile Bag System for Sludge Drying	$25,000
Plant Drain Lift Station	$50,000
Sitework	$20,000
Electrical	$90,000
Miscellaneous (Site Restoration, Painting, Fence, Flow Meter, etc.)	$135,450
Bond, Mobilization & Insurance	$74,500
Subtotal Construction	**$1,564,300**
Non-Construction	
Item	**Amount**
Engineering Study, Design and Construction	$139,300
Additional Engineering	$3,000
Construction Inspection	$67,200
Legal	$6,000
Bond Council	$15,000
Financial Advisor	$10,000
CFF Grant Administration (includes Environmental Review & Labor Standards)	$24,000
Land/Easement Acquisition	$50,000
Soils Evaluation	$5,000
Administrative	$2,000
Construction Contingency	$156,430
Subtotal Non-Construction	**$477,930**
Total Cost	**$2,042,230**

Table 4.41 Estimated Fixed Assets Costs for MBR or MBBR WWTP	
Item	**Estimated Annual Cost**
Chemical & Polymer Feed Pumps	$214
Blowers and Controls	$4,833
UV Bulbs	$200
Pumps and Controls	$833
Sludge Pump	$200
Air Release Valve Replacement	$200
Total	**$6,480**

Table 4.42 Estimated O, M & R Costs for MBR or MBBR WWTP	
Item	**Estimated Annual Cost**
Labor (Salary, Benefits, Payroll Tax, Insurance, etc.)	$28,800
Energy (Power Costs)	$41,350
Materials & Supplies (incl. Chemicals)	$3,000
Repairs	$1,000
Fixed Assets Costs (From Table 4.41)	$6,480
Outside Services (Certified Operator)	$12,000
Biosolids Handling & Disposal	$4,000
Insurance	$4,500
Conferences, Training, etc.	$700
Professional Services (Attorney, Engineer, Financial, etc.)	$1,000
Total	**$102,830**

Alternative No. 7 – Constructed Wetlands

Description:

The Constructed Wetlands utilizes a combination of chemical and biological processes to remove nutrients from wastewater. The wetlands system is preceded with preliminary treatment consisting of individual septic tanks at each property, or large septic tank treatment at the centralized plant location. After preliminary treatment is achieved the wastewater flows into a wetland cell or cells. A system of plants planted in a sand/gravel medium provides a natural treatment within the cell(s) by up taking the nutrients. Constructed wetland effluent would either be disinfected and discharged into a surface water-receiving stream or disposed of by drip irrigation or into an elevated mound. The constructed wetland cannot meet the NPDES permit limits for discharge into a surface water-receiving stream. While discharging constructed wetland effluent into a subsurface source can be viable, it is not considered to be for the Bean Blossom area due to the soils limitations for septic system discharge and shallow excavations. Therefore, the constructed wetland alternative will not be considered further.

Alternative No. 8 – Facultative Lagoons with Land Application of Effluent

Description:

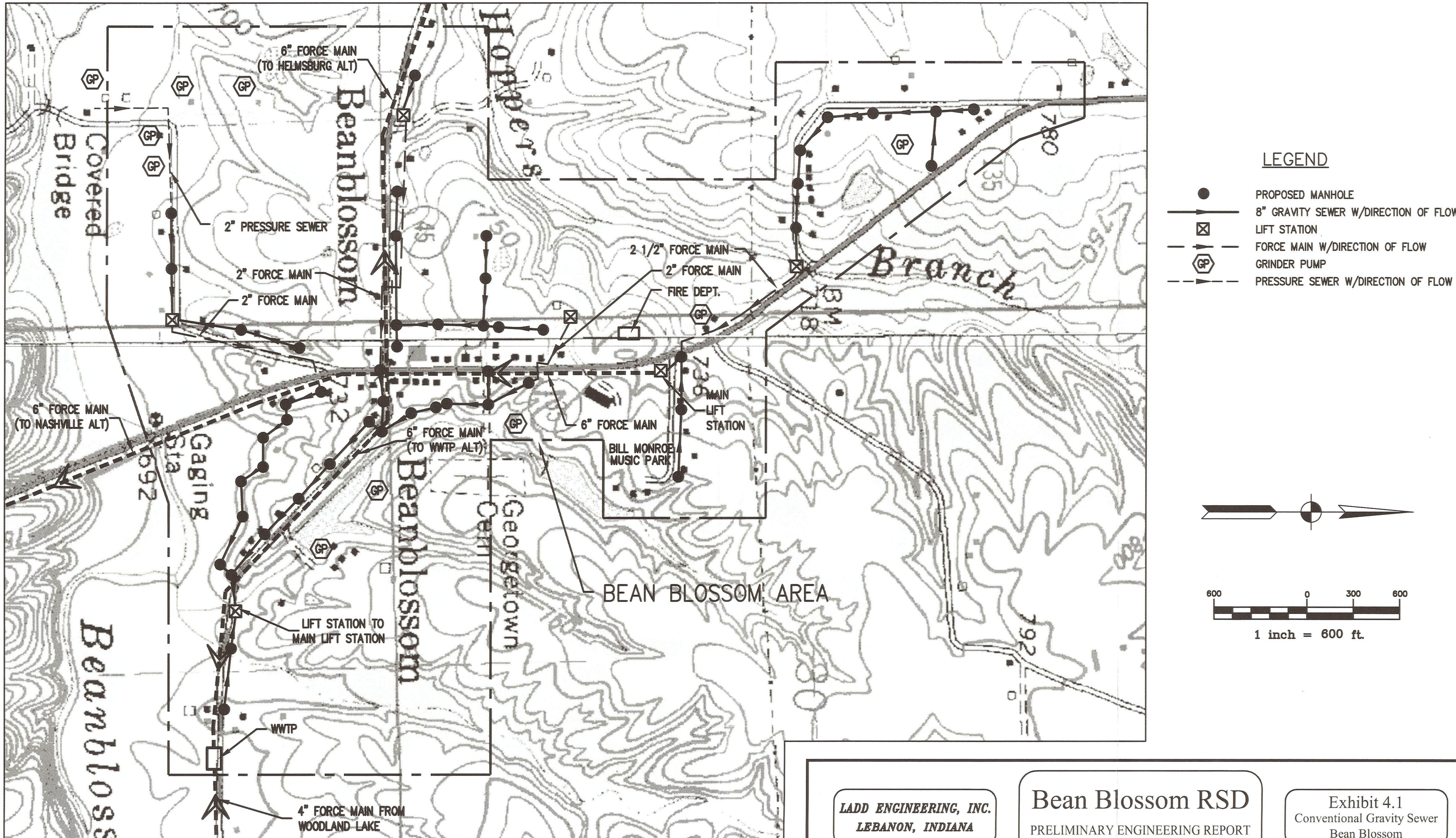
A facultative lagoon system consists of a series of ponds, which hold the wastewater until a sufficient level of treatment is achieved, and the effluent can be safely discharged to a surface water-receiving stream. Facultative lagoons can be either aerated or non-aerated (stabilization lagoons). Stabilization lagoons systems are usually 5 to 6 feet deep where aerated lagoons may be 10 to 20 feet deep. Advantages of lagoon systems include their relatively low maintenance requirements and relatively small quantities of sludge production. Disadvantages of a lagoon system are that the lagoon cannot be located within ¼-mile to the nearest residence, they experience reduced biological activity and treatment efficiency during cold weather, ice formation can hamper the operation and in overloading situations, or spring and fall periods when turnover occurs, odors can be produced, and lagoons require more property area. The facultative lagoon system cannot consistently meet NPDES permit limits associated with a surface water discharge, however an option is to land apply lagoon effluent. This alternative has been deemed unfavorable due to the site location requirements and unavailability of known land for land application. Therefore, the facultative lagoon system alternative will not be considered further.

Land application is permitted through IDEM under 327 IAC 6.1-7 as forms of land application of pollutant-bearing water. Sizing for the reuse field is based on the hydraulic capacity of the soil and the nitrogen uptake of the crop in the field. The proposed crop is usually an alfalfa and/or hardwood tree to maximize nitrogen uptake of the system. Spray irrigation discharges using mechanical irrigation equipment to apply treated wastewater over a wide area that can be used for agricultural purposes. Spray irrigation is limited to slopes less than 6% to prevent runoff of the applied wastewater, requires a 90-day minimum storage for periods when it cannot be applied during wet conditions or on frozen ground, and requires either significant setbacks or effluent disinfection with a high degree of treatment. Because of these limitations, spray irrigation was not considered further for disposal.

Alternative No. 9 – Re-circulating Filter Media

Description:

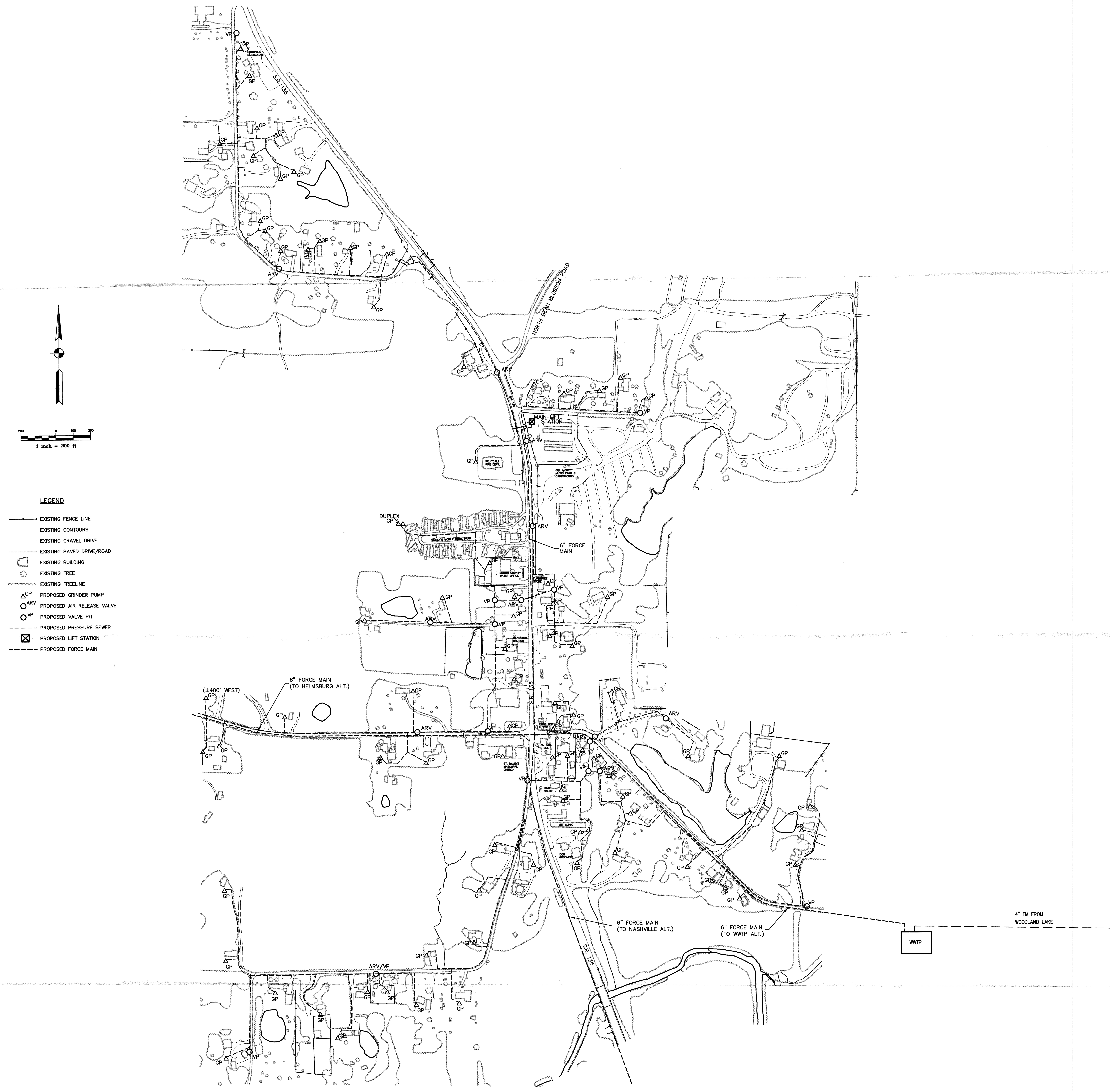
A re-circulating filter media (RMF) system consists of a tank, or earth-lined vessel filled with a bed of graded media (sand, gravel, textiles, etc.) and pump(s). Septic tank effluent enters the filter media tank and pumped onto the media bed where it flows through the media bed. As the partially treated wastewater passes through the media, a combination of physical, chemical, and biological processes consistently treat the wastewater. A portion of the flow that passes through the media is re-circulated over the media and a portion is discharged into either a collection system or for further treatment processing prior to its discharge to a surface water-receiving stream or disposed of by drip irrigation, spray irrigation, or into an elevated mound. Re-circulating filter media systems are fairly simple to operate and include only a few mechanical components (i.e. pumps and controls). Either individual treatment RMF's serving one or two buildings, or a centralized RMF could be considered but both would require preliminary septic tank treatment ahead of the units. The RMF cannot meet the NPDES permit limits for discharge into a surface water-receiving stream. While discharging RMF effluent into a subsurface source or via spray irrigation may be viable, for the same reasons listed for Alternative No. 6 this alternative is deemed to be unfeasible. Therefore, the RMF alternative will not be considered further.



LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD
PRELIMINARY ENGINEERING REPORT

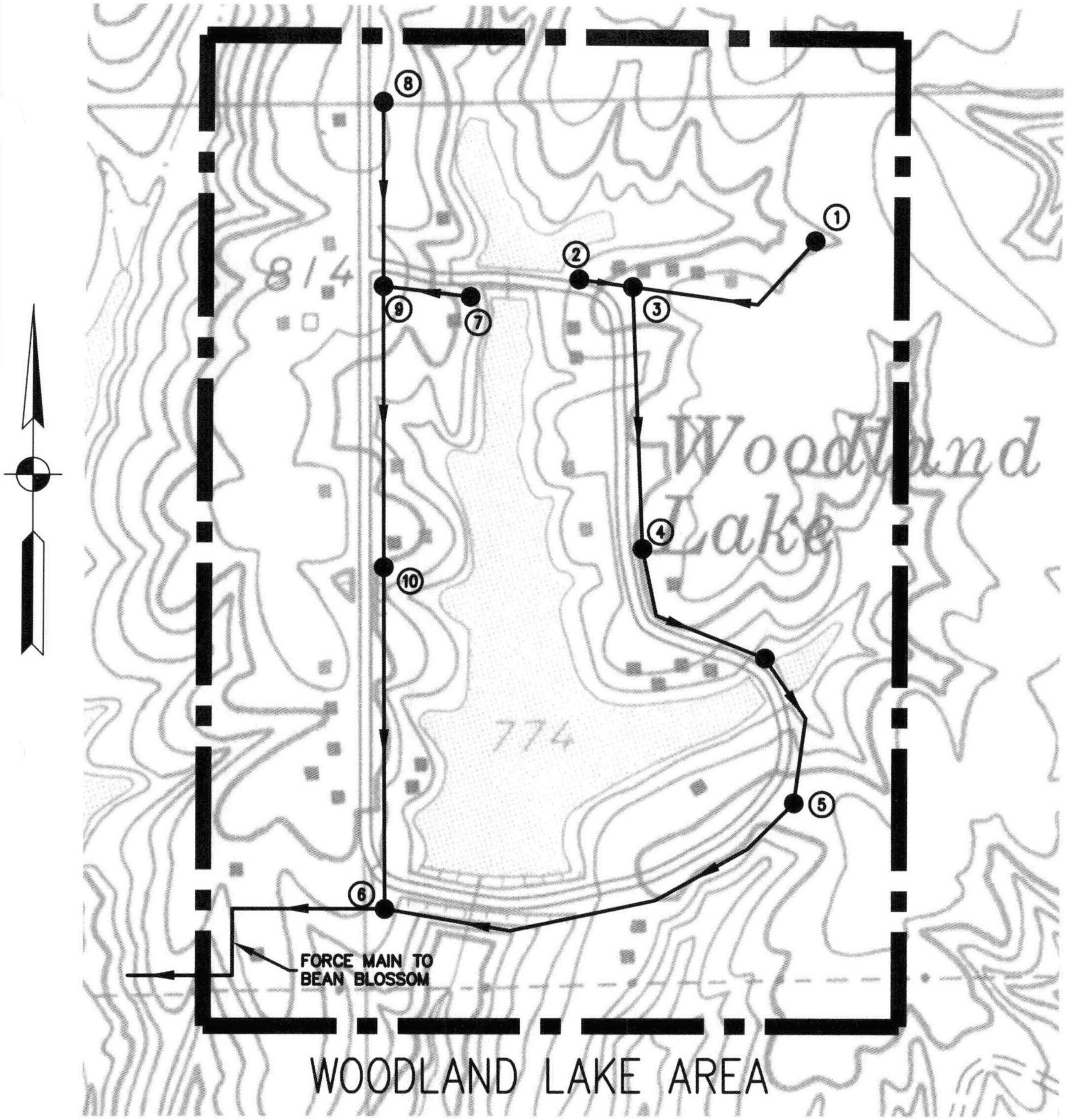
Exhibit 4.1
Conventional Gravity Sewer
Bean Blossom



LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD
PRELIMINARY ENGINEERING REPORT

Exhibit 4.2
Low Pressure Sewer System
Bean Blossom



500 0 250 500

1 inch = 500 ft.

LEGEND

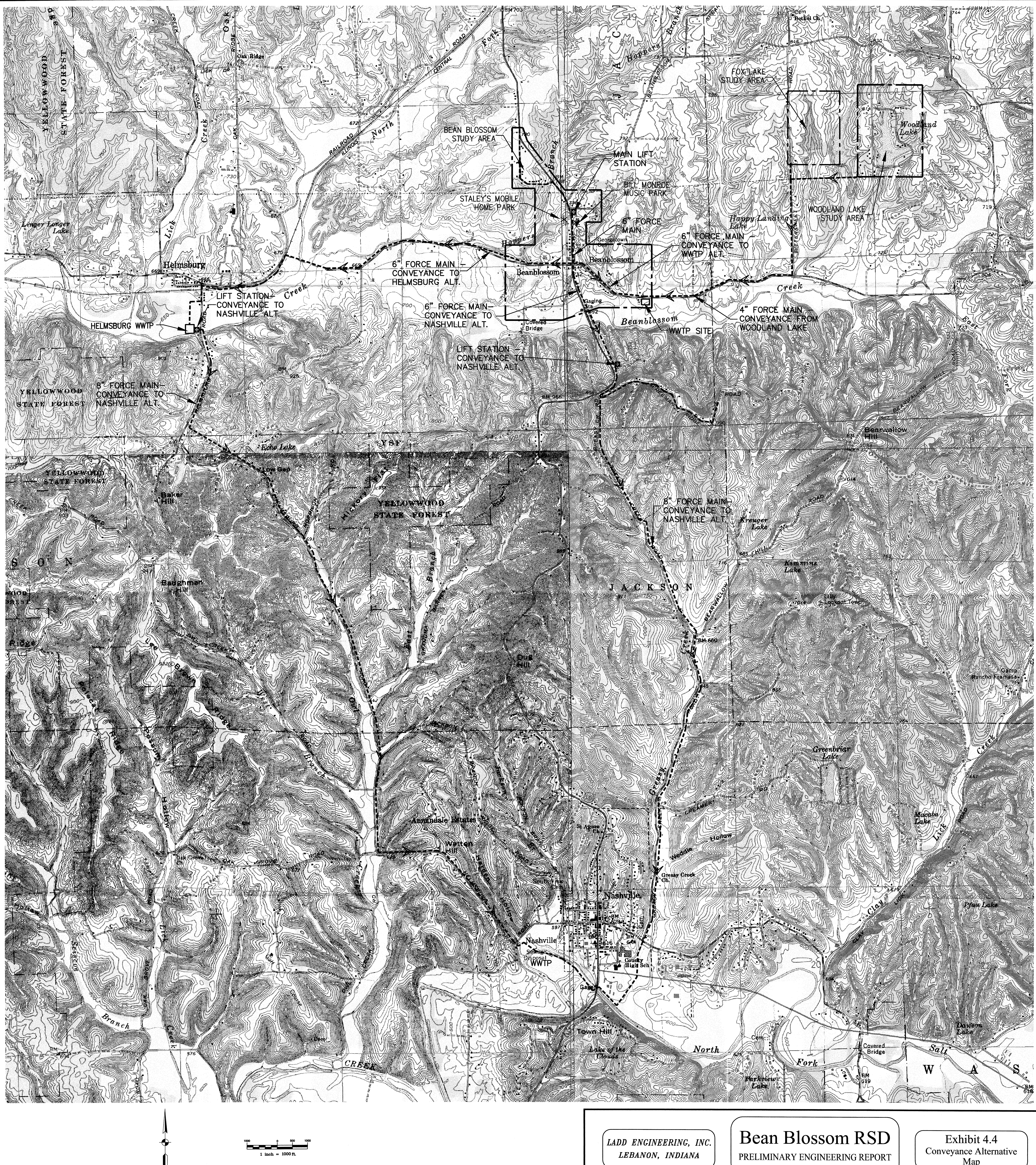
23 ●	NODE W/NUMBER
——►	PRESSURE SEWER W/DIRECTION OF FLOW
⊠	LIFT STATION
●	VALVE PIT

LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD

PRELIMINARY ENGINEERING REPORT

Exhibit 4.3
Low Pressure Sewer System
Woodland Lake



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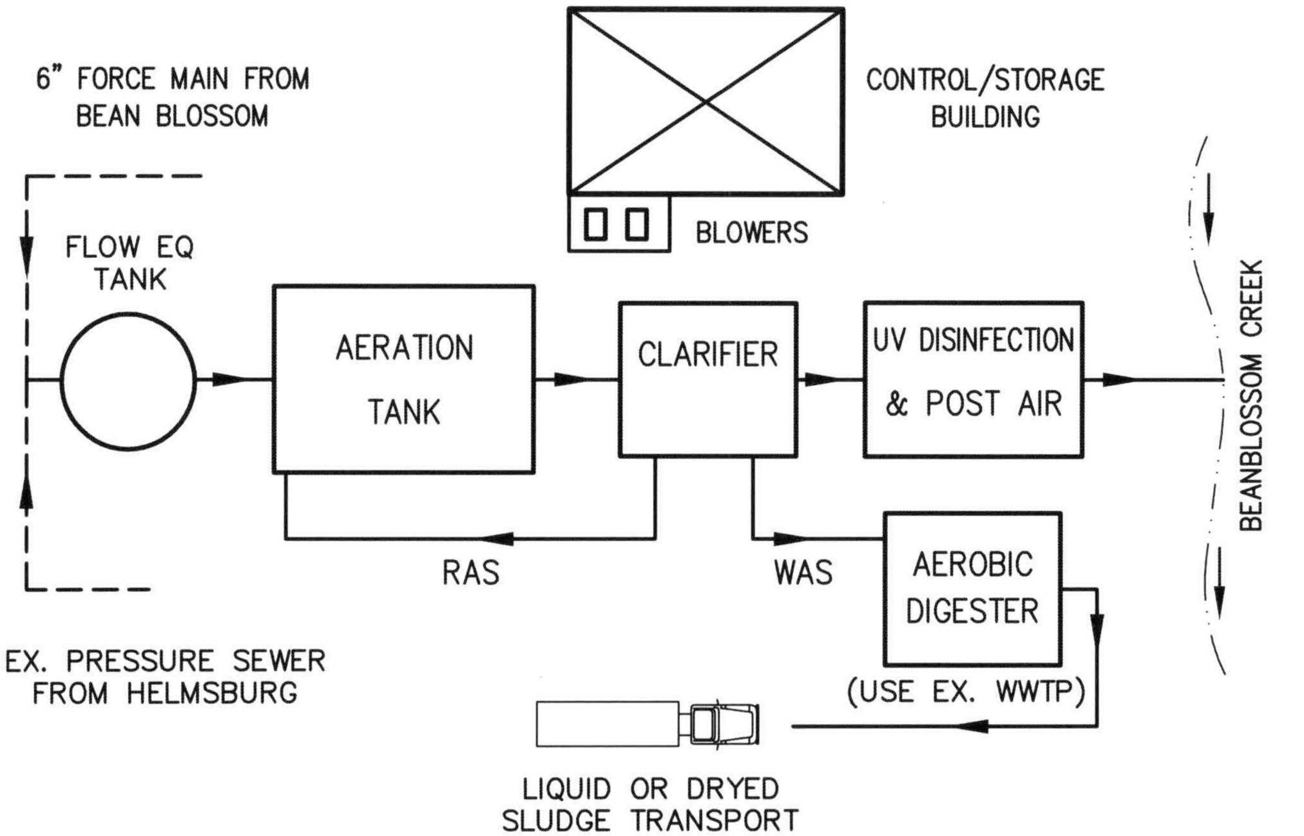
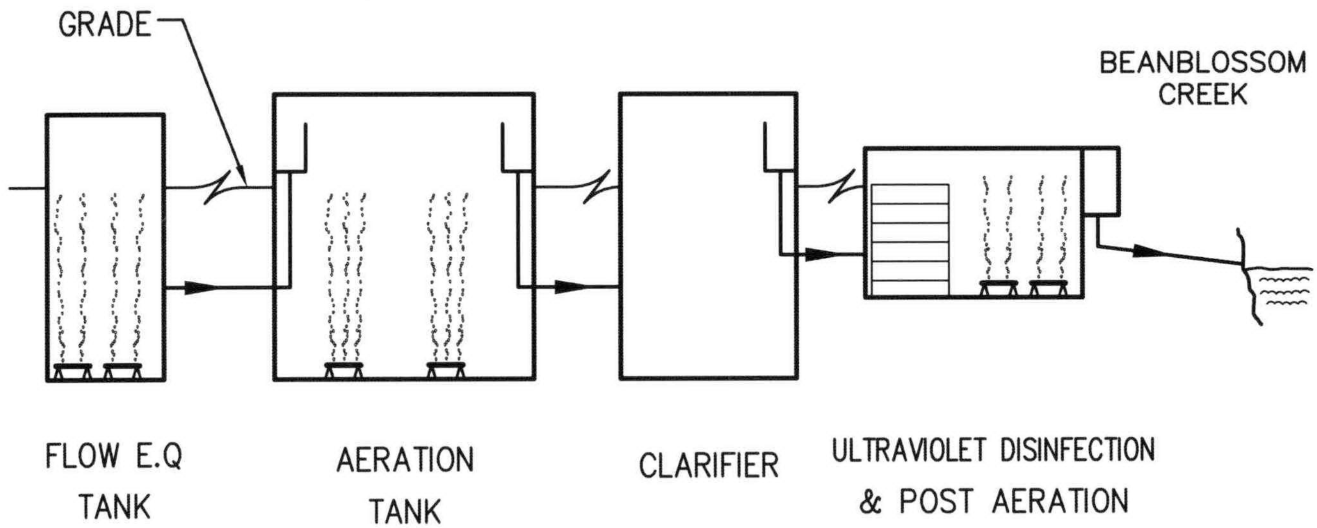
LEBANON, INDIANA

Bean Blossom RSD
PRELIMINARY ENGINEERING REPORT

Exhibit 4.4
Conveyance Alternative Map



FLOW SCHEMATIC – PLAN



FLOW SCHEMATIC – ELEVATION

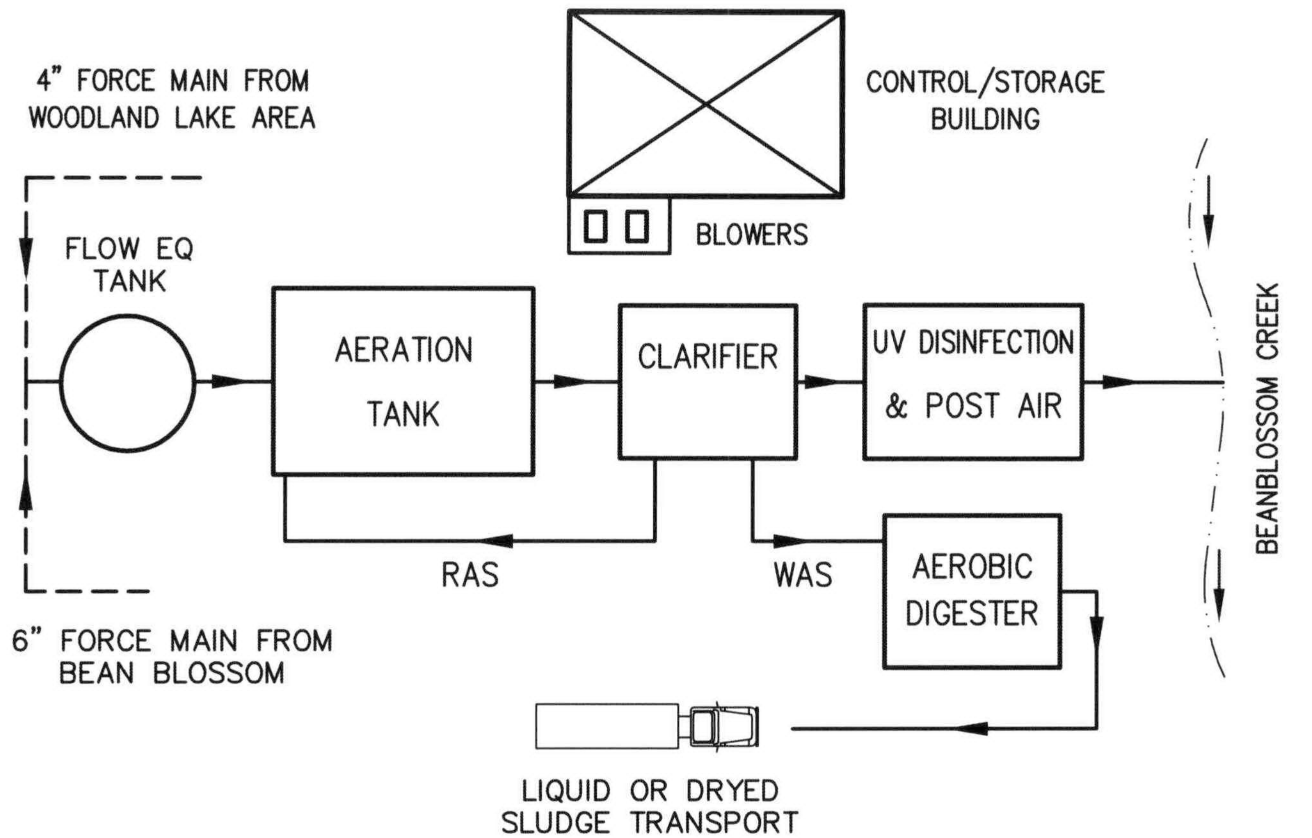
LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD

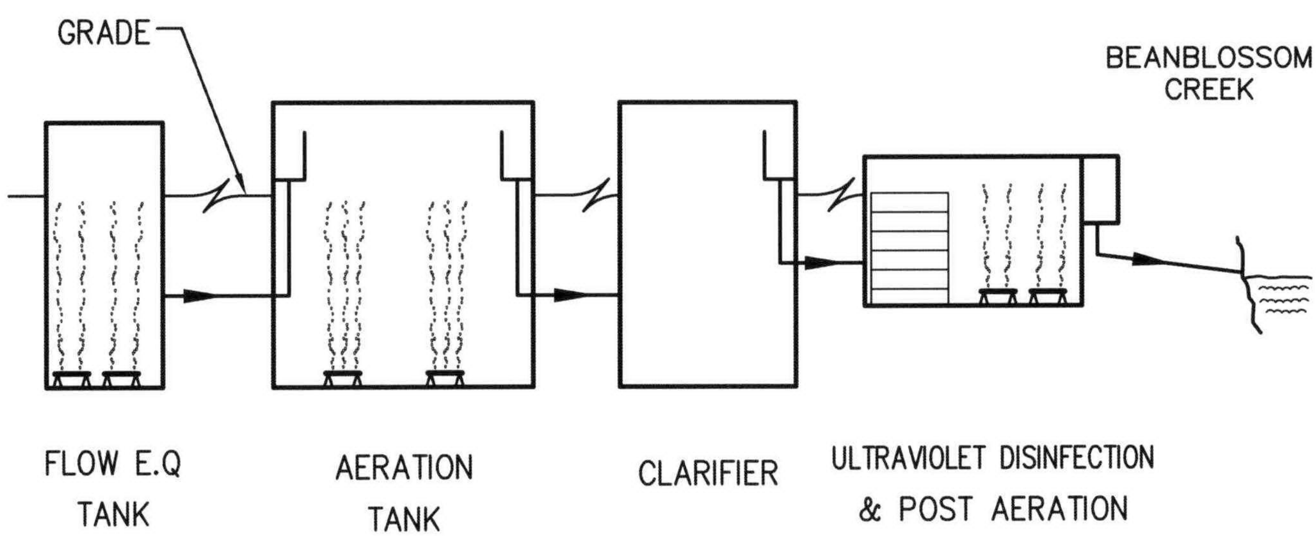
PRELIMINARY ENGINEERING REPORT

Exhibit 4.5

Extended Aeration Activated Sludge Treatment Plant Helmsburg Alt.



FLOW SCHEMATIC — PLAN



FLOW SCHEMATIC — ELEVATION

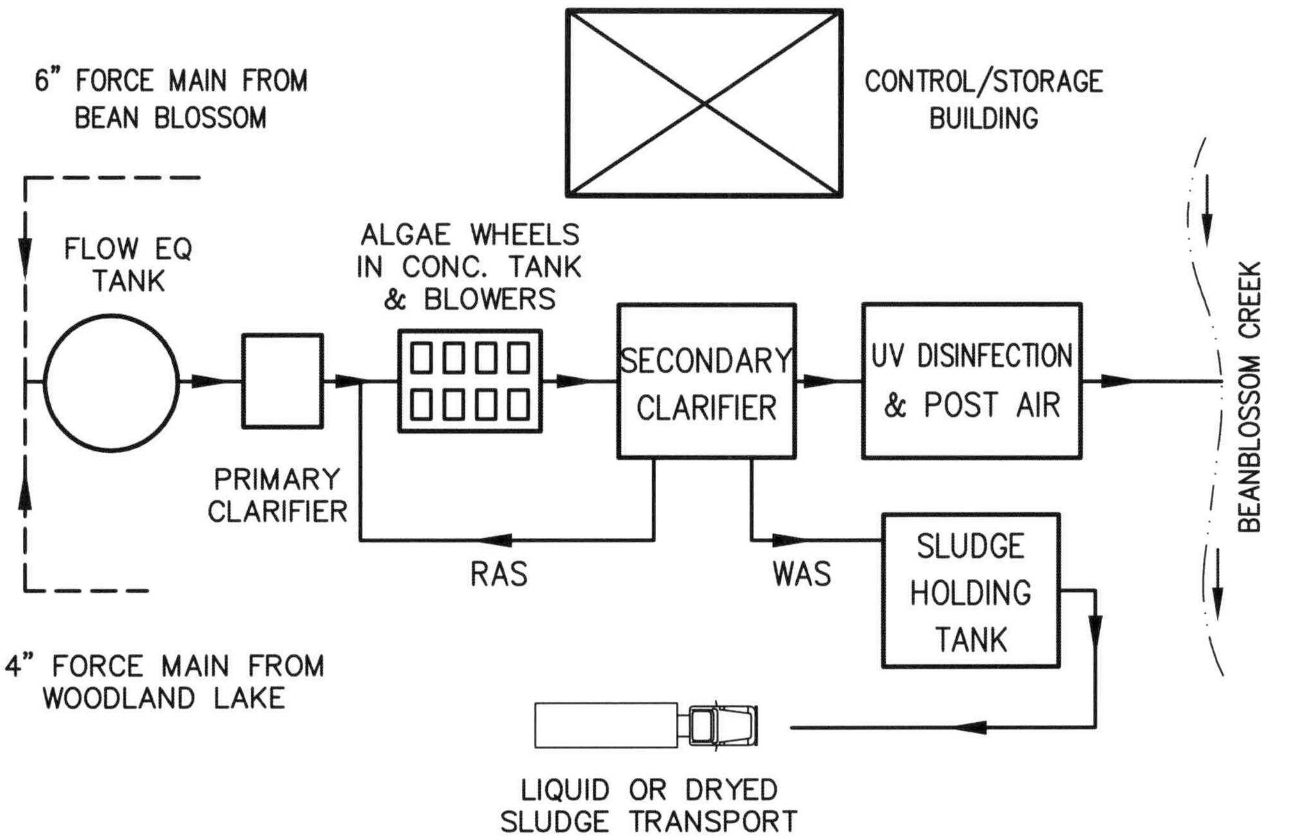
LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD

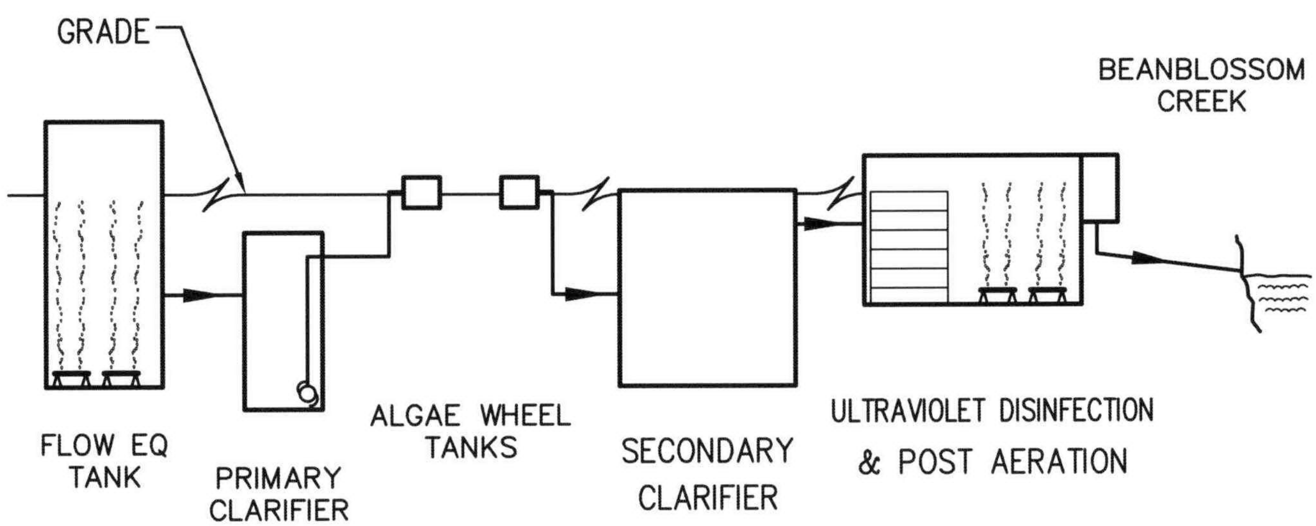
PRELIMINARY ENGINEERING REPORT

Exhibit 4.6

Extended Aeration Activated
Sludge Treatment Plant
Bean Blossom Alt.



FLOW SCHEMATIC – PLAN



FLOW SCHEMATIC – ELEVATION

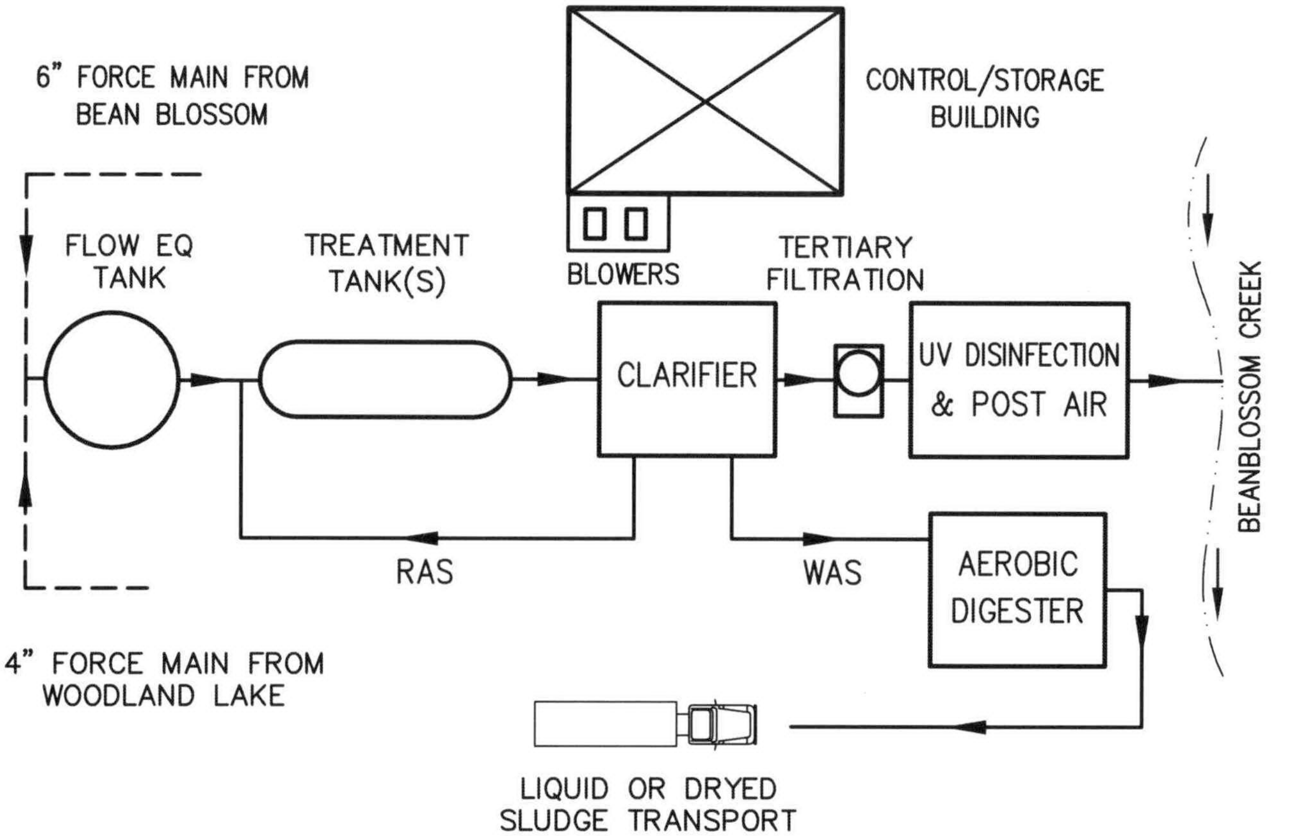
LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD

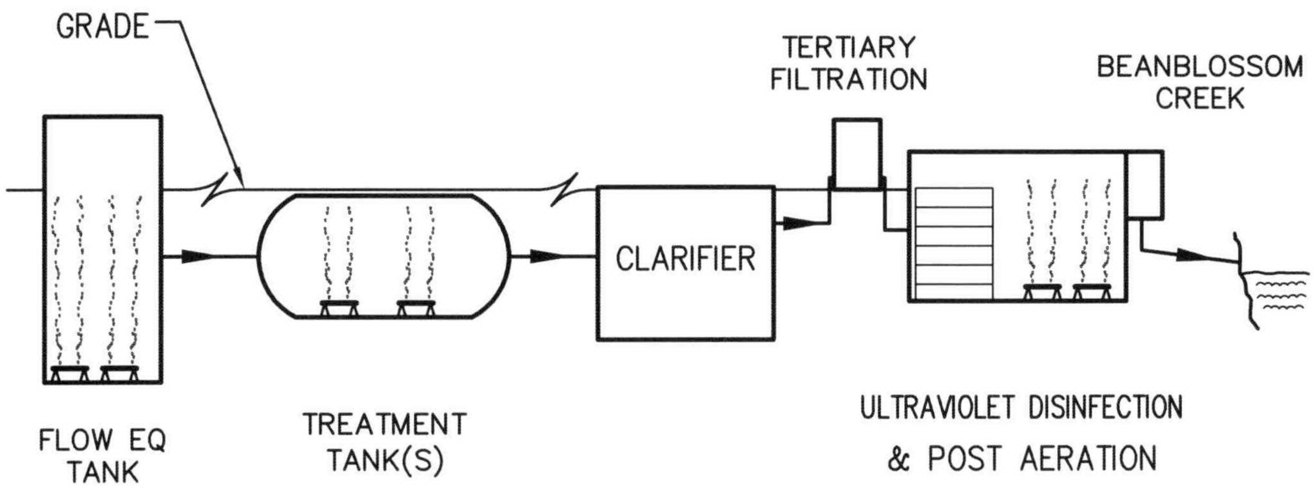
PRELIMINARY ENGINEERING REPORT

Exhibit 4.7

Algae Wheel
Treatment Plant
Bean Blossom Alt.



FLOW SCHEMATIC – PLAN



FLOW SCHEMATIC – ELEVATION

LADD ENGINEERING, INC.
LEBANON, INDIANA

Bean Blossom RSD
PRELIMINARY ENGINEERING REPORT

Exhibit 4.8
MBR/MBBR
Treatment Plant
Bean Blossom Alt.