

**BROWN COUNTY REGIONAL SEWER DISTRICT
COLLECTION AND TREATMENT SYSTEM IMPROVEMENTS
PRELIMINARY ENGINEERING REPORT**

**Bean Blossom Creek Watershed
Brown County, Indiana**

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PREPARED BY

**BEAM, LONGEST & NEFF, LLC.
8320 Craig Street
Indianapolis, Indiana 46250
Telephone: 317-849-5832
Fax: 317-841-4280**

BLN JOB NO. 220095

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Preliminary Engineering Report**

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0. PREFACE

0.1. Project Scope, Study Area, and Service Area

Beam, Longest and Neff, LLC was commissioned to prepare this preliminary engineering report by the Brown County Regional Sewer District (BCRSD) to identify and evaluate various alternatives for providing sanitary sewer service to unincorporated areas of Brown County. BCRSD was originally established in 2006 as the Bean Blossom Regional Sewer District but was expanded and renamed as the Brown County Regional Sewer District in April 2013. District boundaries of BCRSD include all unincorporated areas within Brown County, excluding the boundaries of the existing Helmsburg Regional Sewer District (HRSD), Gnow Bone Regional Sewer District, Cordry Sweetwater Conservancy District, and Town of Nashville.

In this report, the **study area** refers to the entire Bean Blossom Creek watershed area as shown on the overall map and USGS maps presented in **Appendix A**. The **service area or project area** refers to the anticipated boundaries of the Phase 1 project, which is a sub-area of the watershed. The maps in **Appendix A** also show the service area and project elements.

The study area for this report focuses on the Bean Blossom Creek watershed, including the eastern half of Lake Lemon and the unincorporated communities of Trevlac, Needmore, Helmsburg, Beanblossom, and Fruitdale. The western limit is generally the Brown County border with Monroe County. The eastern limit is Upper Salt Creek Road, inclusive of the area around Sprunica Elementary School. The northern limits are near the Brown County border with Morgan County, and the southern limits are generally along Freeman Ridge Road near Beanblossom and Plum Creek Road near Needmore. The study area of this PER is approximately 72 square miles and consists mainly of wooded, hilly terrain. Bean Blossom Creek generally bisects the study area in the east-west direction. The study area includes approximately 2,400 potential sewer customers.

At present, the study area is primarily residential but also contains a festival campground, restaurants, and churches. All homes and businesses in the study area utilize septic systems with absorption fields for septage treatment. This report aims to develop present and future strategies for wastewater collection systems, treatment facilities in cooperation with HRSD, and possible additional treatment facilities within the Brown County RSD, while maintaining compliance with all regulations and authorities having jurisdiction. The report follows the Brown County Regional Sewer District **Strategic Wastewater Plan** dated April 2022.

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Numerous engineering reports were prepared between 1992 and 2019 which included all or parts of the study area. These studies all identified the need for sewage collection and treatment. A 2019 report by Ladd Engineering focused on the Beanblossom area and proposed a low-pressure collection system and a small wastewater treatment plant. In 2022, a watershed and water quality report were completed by Lochmueller Group which found various pollutants, including *Escherichia coli* (*E. coli*) and prescription drugs, in water bodies within the study area.

0.2. Need for Project

In 2010, Hoosier Environmental Council (HEC) estimated that **30% of septic systems in Bean Blossom Creek watershed were failing**. In the 13 years since that estimate was made, there have been no large-scale septic system improvements within the watershed. Water sampling has occurred on multiple occasions within the past 10 years to determine the degradation of water quality in the study area. The results have repeatedly indicated that *E. coli* is a major concern in the watershed, and that **prescription drugs are consistently present in water bodies** as well. Indiana Department of Environmental Management (IDEM) lists Bean Blossom Creek and all its tributaries as **impaired due to high levels of *E. Coli***, and in 2006 set a Total Maximum Daily Load (TMDL) for the creek of 125 colony forming units per 100 milliliters (125 cfu/100 mL).

In addition to the previously described issues at Bean Blossom Creek, **Lake Lemon has reached unsafe water quality levels requiring closure** of the lake to recreation numerous times between 2006 and 2022.

Residents in the western half of the study area near Lake Lemon have therefore recognized the need for a rural sewer utility to collect and treat sewer waste. Citizens in the Lake Lemon Conservancy District have expressed great interest in retiring their existing septic systems, which are subjected to periodic flooding, to install a more reliable collection system. Many properties in the study area are very small, and as a result **upgrades to failing septic systems are infeasible due to lack of space**. Documentation of existing issues with septic systems in the study area has been collected from several sources, including a 2020 report from Indiana University School of Public and Environmental Affairs (SPEA), which found many ***E. Coli* counts that were too numerous to count** (TNTC), and letters from Brown County Department of Health documenting **high *E. coli* counts and cyanobacterium blooms**. To be considered TNTC, bacteria counts must generally be higher than 200 colonies per 100 mL. These documents are included in **Appendix B** along with letter requests written

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by residents to provide sewer service in the Lake Lemon, Beanblossom, and Woodland Lake areas.

Finally, as the study area continues to develop and more collection systems are planned and installed to replace septic systems, BCRSD must have a plan in place to convey and treat the resulting wastewater that is captured. The need for a new or upgraded treatment plant is therefore critical to fully resolving the water quality concerns in the study area.

0.3. Summary of Recommendations

We have conducted detailed engineering analyses of the site conditions, the historical and anticipated flows from the study area, the comparative cost-effectiveness and feasibility of several alternatives, and the opportunity to develop sewer systems for future sewer extensions in the area. Based on these assessments, this report recommends the phased installation of a low-pressure sewer system throughout the study area and the cooperative expansion and operation of the existing HRSD treatment plant in Helmsburg. Should an agreement with HRSD not be achieved, this report instead recommends a new treatment plant to be constructed in the Needmore/Trevlac vicinity.

1. PROJECT LOCATION

1.1. Project Location

The proposed project is located within the limits of the Brown County Regional Sewer District, which is about 30 miles south of Indianapolis in Brown County, Indiana. The following sections describe the project location in greater detail.

1.2. Description

The study area for this report includes all land within the watersheds listed in the following **Table 1**, as defined by their hydrologic unit codes (HUC14):

Table 1: Service Area Watersheds

HUC14	Watershed Name
05120202010040	Bean Blossom Creek – Lake Lemon
05120202010030	Bean Blossom Creek – Lick / Bear Creeks
05120202010020	North Bear Fork
05120202010010	Bean Blossom Creek - Headwaters

The study area is shown on USGS Quadrangle maps in **Appendix A**. The study area is situated partially within Jackson and Hamblen Townships in Brown County and partially within North Benton township in Monroe County.

The overall study area is further subdivided in anticipation of a 3-phased approach to collection system installation. Phase 1 is the service area for the proposed project included in this report.

Phase 1 spans nearly the entire length of the service area east-to-west. This phase contains the populated areas of Point Idalawn, Needmore, Trevlac, Beanblossom, and Woodland Lake. The main trunkline of the proposed collection system is anticipated to be installed along the major roads within this phase including North Shore Drive, South Shore Drive, State Road 45, State Road 135, and Bittersweet Road. Smaller sewer line branches will then be extended from the main line to serve homes along local roads. The westernmost portions of Phase 1 are within Monroe County and therefore outside of BCRSD’s jurisdiction. However, an interlocal agreement is being pursued so that BCRSD can provide sewer service there.

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Phase 2 will see the collection system from the first phase extended north and south from State Road 45 along larger local roads to capture as many sewer customers as possible. This phase will primarily extend along Spearsville Road to the northeast and State Road 45 to the east and west, and begin extensions down Carmel Ridge Road, Lick Creek Road, Railroad Road, Possum Trot Road, and North Shore Drive. Detailed design of this future phase is beyond the scope of this engineering report. When designed, it may be further split into more phases or zones based on need, community interest, and available financing at the time. This section has been included only to aid with discussion of future treatment system sizing.

Phase 3 will continue the gradual expansion of the collection system to lower priority and less densely populated areas as connection requests are received. Detailed design of this phase is beyond the scope of this engineering report. When designed, it may be further split into more phases or zones based on need, community interest, and available financing at the time. This section has only been included to aid with discussion of future treatment system sizing.

The legal location of the study and service areas are described in the following **Table 2**. It is anticipated that all work will be confined to existing rights-of-way or in new private easements along the major roads within the service area. The lift stations will be purchased by fee simple along with the new treatment plant site, should that alternative be selected. Acreage of land to be acquired will be determined during final project design. The project owner will negotiate in good faith regarding all land acquisition.

Table 2: Project Location

Phase	County	U.S.G.S. Quadrangle Map	Township	Range	Township Name	Section
Service Area -Phase 1	Brown / Monroe	Morgantown Beanblossom Hindustan	9N, 10N	1E, 2E, 3E	Jackson / Hamblen	All Sections within this township and range
Study Area - Phase 2	Brown / Monroe	Hindustan Morgantown Belmont Beanblossom	9N, 10N	1E, 2E, 3E	Jackson / Hamblen	All Sections within this township and range
Study Area - Phase 3	Brown / Monroe	Hindustan Morgantown Beanblossom	9N, 10N	1E, 2E, 3E	Jackson / Hamblen	All Sections within this township and range

2. CURRENT SITUATION

At present, there is no sanitary sewer collection system within the study area other than the HRSD. At least three businesses in the Beanblossom area are on pump-and-haul systems: Brownie's Restaurant, the Bill Monroe Music Park, and the Farm House Café. All other Brown County residents rely on individual septic systems for treatment and discharge of wastewater. However, the soils and terrain within the study area are poorly suited for septic systems, making their use problematic. There is an existing wastewater treatment plant operating in Helmsburg just south of State Road 45, but it does not have adequate capacity to treat and discharge wastewater from the entire service area in its current condition. The plant currently serves 64 residential customers and 2 commercial customers and has a capacity of 0.025 MGD (25,000 GPD).

The vast majority of Brown County is covered by well-drained soils created by weathered shale, siltstone and limestone. According to Purdue University's Census of Wastewater Disposal by Indiana County, all Brown County soils are severely limited for septic system use. Soils data compiled by the Natural Resource Conservation Service (NRCS) support these findings indicating that the vast majority of soils in Brown County are severely limited for on-site septic use. United States Department of Agriculture (USDA) also classifies soils in Brown County as "Severe" in terms of septic system unsuitability. Despite these limitations, of the 8,400 households in Brown County, nearly 7,700 are still served by on-site septic systems.

2.1. Problems and Needs

A. General Septic System Problems and Age

Septic system use in Brown County is challenging due to the naturally hilly terrain and poor soil. Attempts to upgrade or replace existing septic systems are difficult due to the small size of most properties within the service area. Brown County Health Department surveyed the properties in the Bean Blossom Creek watershed and found that **40% of households do not have any records for their septic systems**. If there are no records, these systems likely were not designed to current code or standards. Additionally, **83% of surveyed households have septic systems over 10 years old**, 59% have systems over 20 years old, 25% have systems over 30 years old, and 12% have septic systems which are over 40 years old. BCHD estimated that **30% of septic systems in the Bean Blossom Creek watershed were failing in 2010**, a figure that has likely increased greatly over the past decade

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B. Public Health and Impaired Waters Need

Besides the issues documented by the County, there are additional State reports detailing the water quality failures in the study area. Indiana State Department of Health (ISDH) has documented **several cases of enteric disease** in the county. In all, there were 41 cases noted between 2012 and 2017 from ***E. coli* diarrhea, salmonellosis, campylobacteriosis, and cryptosporidiosis**. IDEM lists Bean Blossom Creek and its tributaries as Impaired due to high *E. coli* levels, and has identified failing septic systems, illicit discharges, agricultural runoff, and wildlife waste as the primary pathways for *E. coli* to enter area waters.

The following is a summary of public health information:

Bean Blossom Creek and Salt Creek watersheds have undergone extensive testing and sampling in the past two decades. Fact sheets from BCRSD summarizing the tests and results can be found in **Appendix B**, with a brief summary also presented in this section.

Lake Lemon Annual Water Quality Reports prepared by Indiana University School of Public and Environmental Affairs (IU SPEA) from 2006 to 2021 are included in **Appendix B** which indicate extremely high levels of *E. coli*, including several measurements labeled Too Numerous To Count (TNTC). The sampled values in these reports are frequently 10 to 50 times the Indiana standard for full body contact and recreation, which is 200 cfu/100 mL. Over 160 individual samples have been collected, of which 85 have exceeded the IDEM standard of 235 cfu/100 mL. *E. coli* concentrations in Lake Lemon have been measured as high as 27,840 cfu/100 mL. As a result, Lake Lemon has been closed to recreation on numerous occasions over the past two decades.

In addition to water quality issues at Lake Lemon, the water quality of streams within the study area is also greatly impaired. In 2010, HEC sampling for *E. coli* reported 10 of 13 locations in the Bean Blossom Creek watershed which exceeded the IDEM standard of 125 cfu/100 mL.

In 2019, BCHD sampling **tested positive for numerous pharmaceutical drugs including caffeine, acetaminophen, codeine, warfarin, fluoxetine, sulfamethoxazole, naproxen, and diclofenac**. Of 12 stream locations sampled in the Bean Blossom Creek watershed in 2020, 11 locations **exceeded Indiana standards for *E. coli***. Another 12 of 19 sampled stream locations exceeded state standards for *E. coli* in the Salt Creek watershed in 2020. In spring 2021, sampling of 2 locations in Bean Blossom Creek watershed and 3 locations in

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Salt Creek watershed using eDNA methods suggested that the **primary source of *E. coli* in those watersheds was human in origin**, composing between 54% and 96% of the total *E. coli* counts.

From a treatment perspective, the existing Helmsburg treatment plant (0.025 MGD) does not have the capacity to treat additional flow from the study area. With the installation of a new collection system, the amount of collected wastewater sent for treatment will greatly increase and the need for a higher capacity treatment plant will become evident. Either the existing Helmsburg plant will need to be upgraded to increase its capacity or additional treatment plants will need to be constructed in the study area to accommodate the additional flow.

2.2. Service and Study Area Wastewater Flows

A. Flow Estimates

Flow estimates provide the basis for sizing ideal wastewater treatment systems within the service area. This report relies on house count data within the service area to estimate expected flows. The following **Table 3** summarizes daily flow estimates for the service area and the study area. The treatment plant alternatives should be sized to handle the service area flows but also capable of expanding to accommodate the future study area flows. Estimated flow rates in gallons per day (GPD) for each land use category are based on 327 IAC 3-6-11, Table 11.1.

Table 3: Service and Study Area Flow Estimates

Phase	GPD per Unit	Units	Daily Flow (GPD)	Total Phase Flow (GPD)
Phase 1 – Service Area				231,215
<i>Residential Home</i>	310	612	189,720	
<i>Trailer Home</i>	200	102	20,400	
<i>Church</i>	5	225	1,125	
<i>Campground – RV</i>	50	150	7,500	
<i>Campground – Tent</i>	20	200	4,000	
<i>Vet Clinic – Run</i>	10	10	100	
<i>Vet Clinic – Staff</i>	75	6	450	
<i>Vet Clinic – Surgery Room</i>	50	2	100	
<i>Office</i>	20	12	240	
<i>Restaurant</i>	35	200	7,000	
<i>Volunteer Fire Station</i>	35	12	420	
<i>Dry Goods Store</i>	20	8	160	
Phase 2 – Study Area (Future)				346,705
<i>Residential Home</i>	310	1,054	326,740	

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<i>Office</i>	20	17	340	
<i>Picnic/Park</i>	5	150	750	
<i>Restaurant</i>	35	225	7,875	
<i>Church</i>	5	200	1,000	
<i>Campground – RV</i>	50	200	10,000	
Phase 3 – Study Area (Future)				274,660
<i>Residential Home</i>	310	886	274,660	

B. Loading Estimates

Loading refers to the mass of pollutants in wastewater which must be treated. Loading values are one factor utilized in the sizing of wastewater treatment and disposal systems. The pollutants of concern in domestic wastewater are generally BOD₅, Total Suspended Solids (TSS), Ammonia Nitrogen (NH₃-N), and Phosphorus (P).

The Water Environment Federation (WEF), in its Manual of Practice for Operation of Municipal Wastewater Treatment Plants, indicates that BOD₅ in collection systems can be up to 250 mg/L in concentration. TSS can range from 250 mg/L for medium-strength wastewater to 350 mg/L for strong domestic wastewater. Ammonia ranges in domestic wastewater can vary significantly, from 12 mg/L to 50 mg/L according to the WEF.

In **Table 4** below, estimated loading generated by the wastewater from the service area is presented based on conservative assumed values of BOD₅ (300 mg/L), TSS (300 mg/L), NH₃ (60 mg/L), and P (15 mg/L) for residential waste. Assumed values of BOD₅ (1100 mg/L), TSS (500 mg/L), NH₃ (80 mg/L), and P (15 mg/L) for restaurant waste.

Table 4: Service and Study Area Loading Estimates

Phase	Total Flow (GPD)	BOD₅ (lbs/day)	TSS (lbs/day)	NH₃ (lbs/day)	P (lbs/day)
Phase 1 – Service Area	231,215	626	591	117	29
Phase 2 – Study Area (Future)	346,705	920	881	175	46
Phase 3 – Study Area (Future)	274,660	688	688	138	34

3. FUTURE SITUATION

3.1. Current Population

The Brown County Regional Sewer District is not an identifiable entity within U.S. Census data. Instead, a house count was performed to estimate the number of users in the service and study area and project future growth. House count data has been presented previously in **Table 3**.

3.2. Projected Population and Customer Base

The population projection has considered current house counts and potential future development. The service area was examined to project future residences and future commercial uses using population growth rates derived from recent Census.gov data. The projected population during a 20-year planning period is anticipated to be close to the current population. Looking at historical census data between 2011 and 2021, Jackson and Hamblen townships have grown at a combined average rate of +0.23% per year. At this rate of growth, the estimated number of users within the service area and the anticipated wastewater flows at the end of a 20-year planning period ending in 2043 would increase according to the following **Table 5**.

Table 5: Projected Future Users and Wastewater Flows

Phase	GPD per Unit	Current Estimated Units	Current Estimated Daily Flow (GPD)	Projected Future Units	Projected Future Daily Flow (GPD)
Phase 1 – Service Area					
<i>Residential Home</i>	310	612	189,720	641	198,710
<i>Trailer Home</i>	200	102	20,400	107	21,400
<i>Church</i>	5	225	1,125	225	1,125
<i>Campground – RV</i>	50	150	7,500	160	8,000
<i>Campground – Tent</i>	20	200	4,000	210	4,200
<i>Vet Clinic – Run</i>	10	10	100	10	100
<i>Vet Clinic – Staff</i>	75	6	450	6	450
<i>Vet Clinic – Surgery Room</i>	50	2	100	2	100
<i>Office</i>	20	12	240	13	260
<i>Restaurant</i>	35	200	7,000	200	7,000
<i>Volunteer Fire Station</i>	35	12	420	12	420
<i>Dry Goods Store</i>	20	8	160	8	160
Phase 2 – Study Area (Future)					
<i>Residential Home</i>	310	1,054	326,740	1,104	342,240
<i>Office</i>	20	17	340	18	360

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<i>Picnic/Park</i>	5	150	750	150	750
<i>Restaurant</i>	35	225	7,875	225	7,875
<i>Church</i>	5	200	1,000	200	1,000
<i>Campground – RV</i>	50	200	10,000	210	10,500
Phase 3 – Study Area (Future)					
<i>Residential Home</i>	310	886	274,660	927	287,370

The combined average daily flow for all three phases based on current conditions is 0.59 million gallons per day (MGD), and the peak flow is assumed to be 2.36 MGD using a peak daily factor of 4.0 as required by 327 IAC 3-6-11(a). The projected average and peak daily wastewater flow for the year 2043 are around 0.62 MGD and 2.48 MGD, respectively.

3.3. Proposed Wastewater Effluent Limits

Since the proposed project will simply pump wastewater to the Helmsburg treatment plant, no new effluent limits have been obtained by BCRSD. New limits for the Helmsburg treatment plant expansion have been obtained by HRSD and will be included in their separate report. Should the selected treatment plant alternative become a new wastewater treatment plant, BCRSD will work with IDEM to obtain proposed limits. An antidegradation study will likely be required. The new treatment plant alternative discussed in the following sections will be capable of meeting the anticipated limits.

3.4. Evaluation of Ability to Treat & Transport All Flows

The collection system will be designed to accommodate all current and future wastewater flows. The force mains will be sized in accordance with 10 State Standards to maintain the minimum required velocities. The lift stations will also be designed for current and future wastewater flows. Pumps will be selected to meet Phase 1 and future demands and provide minimum adequate velocities for the designed force mains. The lift stations will be designed so that the pumps can be replaced in the future as Phases 2 and 3 develop. The collection system will be designed so that the flows can either be pumped to the existing treatment plant in Helmsburg or to a new treatment plant.

4. EVALUATION OF ALTERNATIVES

4.1. No Action Alternative

One alternative the RSD can consider is the No Action Alternative. This alternative would allow existing wastewater systems to continue to function in their present state. Private septic systems would continue to contribute to increased *E. coli* levels in nearby streams and public trust would continue to decline. Growth in the area would be restricted due to a lack of variety in the collection and treatment methods offered. Any collection system projects planned such as the current low pressure sewer project would have few options for downstream connection and treatment. The large distances needed to route such projects to existing systems would increase project costs and disturbance within the district. RSD may also encounter additional disputes with IDEM regarding the water quality of streams within its jurisdiction. For the purposes of this report, the No Action Alternative will not be pursued further.

4.2. Collection System Alternatives

Two collection system alternatives were evaluated for the service area. Both alternatives explore options for providing wastewater collection along existing roadways throughout the service area. These alternatives are described in the following sections.

A. Collection System Alternative 1 – Gravity Sanitary Sewers

For this alternative, the feasibility of installing gravity sanitary sewers was analyzed. Due to the hilly topography of the service area, the installation of sanitary sewers to collect wastewater would require the design and construction of many lift stations, making this alternative economically infeasible as well as a poor choice from an efficiency perspective. The service area varies in elevation from 625 feet to 927 feet with slopes as high as 37%. Additionally, cutting a profile view across any alignment within the service area shows that large hills and valleys occur generally every two-tenths of a mile, often even more frequently. Rock is also present at a 2-to-6-foot depth in the majority of the area. With these existing conditions, not only does sewer construction become prohibitively expensive, but it also requires extensive installation of sewers at 25-foot or greater depth, which greatly increases land disturbance, prolongs the construction schedule, and significantly increases the difficulty of construction. The only recourse under the gravity sewer alternative to avoid installing such deep sewers would be to construct an excessive number of lift stations to continue lifting flow from low points over the existing topography, which also results in prohibitively high construction costs. Additionally, maintenance costs to keep such an extensive series of lift stations in service

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and functioning properly would be an unnecessary and permanent drawback for Brown County RSD. For these reasons, a gravity sanitary sewer system is considered impractical for the service area and this alternative will not be pursued further within the report.

B. Collection System Alternative 2 – Low-Pressure Sewer System

For this alternative, the cost and feasibility of installing low pressure sewers by horizontal directional drilling (HDD), or boring, was analyzed. Low pressure sewer systems have been installed with great success in other areas with challenging topography, so this alternative is greatly preferred over the installation of a gravity system. Since HDD installation of pressure mains can easily follow existing grades, it will be much more viable to install greater lengths of low-pressure sewer at a time without the need for many manholes and lift stations. Unlike a gravity sewer, flow can be pushed uphill within a low-pressure main which allows for shallower depth of soil cover during installation. Less construction disturbance and fewer structures to install results in much lower project costs and faster project completion. For these reasons, a low-pressure sewer system is the selected collection system alternative.

A general low pressure sewer route was laid out within the service area following existing roads to minimize project impacts and allow for easier access and maintenance. It is estimated that 11,500 linear feet of 1.25" sewer force mains, 13,400 linear feet of 2" sewer force mains, 8,700 linear feet of 3" sewer force mains, and 2,200 linear feet of 4" force mains would be installed under this alternative. Additionally, construction of a low-pressure sewer system requires the installation of simplex grinder pump stations at all properties to be served by the system, low-pressure sewer cleanouts at critical access points, and low-pressure sewer valves and air valves anywhere it will be necessary to restrict flow or allow the release of air, respectively. Additional considerations such as maintenance of traffic, mobilization, field offices, and site restoration are detailed in the project cost estimate. The extents of the low-pressure sewer system are indicated on the maps located in **Appendix A**.

Construction cost estimates for Phase 1 were prepared and are included in **Appendix C**. Unit prices from past projects were used to estimate costs, with multiplicative factors applied for annual inflation. The total estimated project cost for **Collection System Alternative 2, Phase 1** is **\$39,000,000**.

4.3. Wastewater Treatment System Alternatives

Evaluation of the wastewater treatment system alternatives depends on whether an agreement can be reached with the Helmsburg Regional Sewer District to expand their existing plant to serve the surrounding areas.

A. No Action Alternative

The No Action alternative regarding wastewater treatment would be to install no new treatment systems throughout the BCRSD. The septic system failures and other problems afflicting the sewer district described previously in **Section 0.2** and **Section 2.1** would continue unremedied. These unresolved issues would result in worsening water quality in nearby water bodies and continued violations of State-imposed limits and regulations. Since this would also result in further health hazards and environmental distress for the service district, this alternative is considered infeasible and will not be explored further for the purposes of this report.

B. Treatment Plant Alternative 1 – New Plant near Needmore / Trevlac

Alternative 1 consists of the construction of a new wastewater treatment plant within the service area's Phase 1 territory as shown in **Appendix A**. The ideal location for a new wastewater treatment plant within this phase would be in the Needmore/Trevlac area due to its relatively central location within the phase and its higher population density compared to the surrounding areas. Placing a new treatment plant as near as possible to the largest number of potential sewer customers allows BCRSD to maximize the number of residents who can be quickly connected to the treatment system.

A proposed site for the Alternative 1 treatment plant can be seen in **Appendix A**. This site was chosen for the reasons stated previously and through coordination with BCRSD authorities. This alternative would require land acquisition for the new treatment plant site but would also result in a reduction of one of the major lift stations required by the other alternatives.

The proposed treatment system for this alternative would be an activated sludge Aero-Mod custom-designed treatment plant to minimize the amount of land disturbance required at the new plant site. Additional planning and design must be undertaken to ensure the plant is sized properly and will function as needed if this alternative is selected. If Helmsburg RSD agrees to expand and modernize their existing plant to accommodate Phase 1 flows, then this alternative will no longer need to be pursued.

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Construction cost estimates were prepared and are included in **Appendix D**. Unit prices from past projects were used to estimate costs. The total estimated project cost for **Treatment Plant Alternative 1** is **\$10,500,000**.

C. Treatment Plant Alternative 2 – Expansion of Helmsburg RSD Plant

Alternative 2 requires the assistance of Helmsburg RSD and the expansion and use of their existing plant. Helmsburg RSD is currently preparing two engineering reports – one for expansion and modernization of its wastewater treatment plant to accommodate future collection projects, and the other to address existing maintenance issues at the treatment plant. If the maintenance issues and plant expansion projects move forward successfully and an agreement is reached between Helmsburg RSD and BCRSD, this alternative could eliminate the need for additional treatment systems to be constructed within the BCRSD service area. Instead, all future collection system projects could be routed to the Helmsburg plant for treatment, which could then be continually expanded and upgraded as necessary to achieve the required capacity of the sewer district at full build-out.

Helmsburg RSD is preparing a separate report exploring this alternative. The total estimated project cost for **Treatment Plant Alternative 2** is **\$10,219,000**.

4.4. Rationale for Selection of Recommended Alternative

The two collection system alternatives explored would typically have relatively similar construction costs due to their similar characteristics, if not for the hilly terrain of the service area and presence of rock. However, installing gravity sewers in the challenging topography of northwestern Brown County would result in excessive construction costs, a prolonged construction schedule, and inefficiencies associated with installing many lift stations. Additionally, operations and maintenance costs due to the additional lift stations would be extremely high. Given these considerations, **Collection System Alternative 2** was selected for the purposes of this report since it minimizes operations and maintenance concerns and allows for expedited low-cost construction.

Both monetary and non-monetary factors were considered when choosing an alternative. Each collection system alternative will lead to fewer overflows, illicit discharges, wastewater spills, and less contamination, and therefore will lead to fewer health and sanitation concerns. Environmentally, construction by open cut methods has a greater impact than avoiding disturbances to vegetation and soil using directional drilling or other trenchless methods. This gives an advantage to **Collection System Alternative 2**, which would be installed entirely by

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trenchless methods as opposed to open cut construction. From regulatory and social perspectives, each collection system alternative is generally the same in that they meet the overall goals of compliance with authorities having jurisdiction and elimination of unsanitary conditions in the service area. It is therefore concluded that the non-monetary factors point to selecting the low-pressure sewer alternative. Nothing within this analysis would prohibit the selected Alternative 2 from being pursued.

The treatment plant alternatives are highly dependent on administrative and governmental action between BCRSD and HRSD. Treatment Plant Alternative 2 and 3 have relatively the same estimated project cost as well as O & M costs. **Treatment Plant Alternative 2** is the selected alternative because it is an expansion of the existing facility that will be constructed on land already owned by HRSD and it will not create a new discharge point requiring a new NPDES permit. Currently, HRSD is pursuing their plant expansion project and following the same timeline as BCRSD.

5. EVALUATION OF ENVIRONMENTAL IMPACTS

5.1. Disturbed and Undisturbed Land

The proposed project will be built mostly within public rights-of-way or within easements, which is previously disturbed land, except for the new lift stations, treatment plant alternative, and a small amount of the force main. No borrow areas are expected to be utilized for the project. The following **Table 6** describes the amount of land disturbed for the project. This calculation was based upon a construction width of 25 feet for the new collection system and an approximate measurement of the acreage of lift station and treatment plant sites. **Appendix E** shows a soils map for the project.

Table 6: Project Land Disturbance

Project Element	Land Type	
	Disturbed (acres)	Undisturbed (acres)
Collection system/low-pressure sewer bore pits	~1.24	~0.41
Proposed Lift Stations (6)	0	~0.35

5.2. Historic and Architectural Resources

To identify historic sites and structures, the Interim Reports of Historic Sites and Structures for Brown County and Monroe County were reviewed. A list of State Historic Sites and Structures from the Indiana Department of Natural Resources website was obtained to identify any sites on the State Register near the Project Site. The SHAARD database was checked for Brown County and Monroe County and the list of Indiana's National Historic Landmarks was reviewed for any historic sites that may be affected by the project. All listed or potentially listed historic sites within the project area are outside of the limits of disturbance. If, during detailed design, any historic site is found to be in close proximity to a planned element of the project, the project design will be adjusted to avoid impacts to the historic site.

No historic or architectural sites will be affected by the project since the project will be mainly within the previously disturbed public right-of-way or directly adjacent to it and installed primarily underground by trenchless methods. **Appendix F** shows the historic and architectural sites from the Interim Report and SHAARD that are in the project area. No cemeteries are believed to be near enough to the project to be disturbed during construction. If, during detailed design, any cemetery is found to be near a planned

element of the project, the project design will be adjusted to avoid impacts to the cemetery.

5.3. Wetlands

National Wetlands Inventory (NWI) maps of the Service Area were reviewed to identify wetlands that might be affected by the project. Several wetlands exist near the rights-of-way along which the low-pressure sewers are proposed.

A 1,378.55-acre L1UBHh lake, Lake Lemon, is located near the project area. There are also six L2ABHh lake habitats located near Lake Lemon. No construction is planned that would impact these lakes.

Several Freshwater Forested/Shrub Wetlands come close to the project area. However, no construction is planned within these wetlands. Should any wetland mitigation measures be required by authorities having jurisdiction, the project will comply.

The proposed low-pressure sewer will cross under several riverine habitats labeled R2UBH (9 crossings), R3UBH (3 crossings), R4SBC (11 crossings), and R5UBH (4 crossings). It will also cross beneath a PUBGh Freshwater Pond habitat. Trenchless installation of the proposed collection system improvements will ensure no detrimental impacts to these habitats.

Appendix G contains a map showing the project locations and proximity to delineated wetlands.

All mitigation and erosion control methods for wetlands, including use of trenchless methods, if possible, will be implemented as required by the regulating agencies. Mitigation measures to lessen and compensate for wetland impacts cited in comment letters about the project from the Indiana Department of Natural Resources and the U.S. Fish and Wildlife Service will be implemented. Wetlands will not be affected by construction or operations of the Project.

Hydric soils may also be indicative of wetlands conditions. **Appendix E** contains a map of soils in the project area by hydrologic soil group. No hydric (Group A) soils exist in the Project area.

5.4. Hydrology

A. Surface Waters

A map of streams and project locations is shown in **Appendix H**.

The proposed project will not adversely affect outstanding state resource waters listed in 327 IAC 2-1-11(b), Salmonid Streams listed in 327 IAC 2-1.5-5(a)(3), or waters on the Outstanding Rivers list (National Resources Commission Non-rule Policy Document).

B. 100-Year Floodplains and Floodways

Appendix H also contains a floodplain map within and around the proposed project site. Floodplains have been mapped by the Federal Emergency Management Agency (FEMA) for Brown County and Monroe County. Flood Insurance Rate Maps (FIRMs) #18105C0075D dated 12/17/10 and #18013C0040E, #18013C0045E, #18013C0075E, and #18013C0105E dated 12/8/16 were referenced. The Lake Michigan coastal zone will not be affected by the proposed project. Some of the force mains will be installed through floodplains, but there will be only minor temporary impacts since force mains are underground facilities. There will be no fill material placed in floodplains that would cause an impedance of flow.

The proposed treatment plant site in Alternative 1 sits just on the 100-year flood fringe. This is not the selected alternative at this time, but should it be pursued further fill will have to be used to elevate above the 100-year flood elevation. Proper permitting through IDNR will be required.

C. Groundwater

No sole source aquifers will be affected by the proposed project. Groundwater quality will not be affected by construction of the proposed project. Some locations exist in the service area where high groundwater may be encountered during construction and therefore dewatering may be required.

5.5. Plants and Animals

The construction and operation of the proposed project will not negatively impact the state or federal-listed endangered species or their habitat. The project will be implemented to minimize impacts to non-endangered species and their habitats.

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Mitigation measures cited in comment letters from the Indiana Department of Natural Resources and the U.S. Fish and Wildlife Service will be implemented.

The project will be implemented to minimize impacts to trees and other existing vegetation. Mitigation measures cited in comment letters from the Indiana Department of Natural Resources and the U.S. Fish and Wildlife Service will be implemented.

5.6. Prime Farmland and Geology

The proposed project will not be constructed in or across prime farmland as determined by NRCS and should not cause any long-term impacts to farmland. A copy of the completed Form NRCS-CPA-106 from the Natural Resources Conservation Service indicating that the project will not affect prime farmland is included in **Appendix I**.

5.7. Air Quality

We evaluated air quality impacts from the proposed project for conformance with applicable Rules under Title 326 Articles 1, 2, 6, 7 and 8, the Federal 1990 Clean Air Act Amendments.

A. Construction Activity

To minimize non-conformance with 326 IAC 6-4, "Fugitive Dust Emissions", reasonable and proper construction techniques and clean-up practices will be provided. In addition, surface wetting practices will be utilized to control dust emissions were required. Please note that 326 IAC 6-4-6(3) provides for an exception of the Rule "...from construction or demolition activity where every reasonable precaution has been taken in minimizing fugitive dust emissions." Exhausts of construction equipment will be required to have mufflers for noise and air pollution abatement.

B. Clean Air Act Title III - Hazardous Air Pollutants

Title III calls for a program to prevent accidental releases of hazardous air pollutants from facilities. We do not anticipate use of chemicals in the Project that may release hazardous air pollutants as defined by EPA's Hazardous Air Pollutant Listing. If potential hazardous air pollutants are used on the Project, we will require monitoring, record keeping, reporting, vapor recovery, secondary containment, design, equipment, work practices and operation according to Federal standards.

C. Clean Air Act Title V - Permits

Title V creates a permit program that applies to all major sources under Title I and III. The project is not considered a major source under these regulations.

5.8. Open Space and Recreational Opportunities

The proposed project's construction and operation will neither create nor destroy open space and recreational opportunities.

5.9. Lake Michigan Coastal Program

The proposed project will not affect the Lake Michigan Coastal Zone.

5.10. National Natural Landmarks

The construction and operation of the proposed project will not affect National Natural Landmarks.

5.11. Induced Impacts

BCRSD will ensure that future development, as well as future supply, storage, distribution, or treatment works projects connecting to SRF-funded facilities, will not negatively impact archaeological/historical/structural resources, wetlands, or other sensitive environmental resources. BCRSD will require new projects to be constructed within the guidelines of the U.S. Fish and Wildlife Service, IDNR, IDEM and other environmental review authorities.

5.12. Mitigation Measures

The purpose of mitigation measures is to avoid or minimize adverse environmental impacts of a proposed project. Mitigation can be categorized as structural, restrictive, regulatory, or awareness measures. Structural measures are usually associated with planning, construction, and development activities. Measures characterized as restrictive are usually associated with development and operation. Third parties monitor regulatory measures for compliance, while awareness measures involve third parties providing evidence of compliance.

No direct, indirect, consequential, or cumulative impacts were identified specific to the proposed project.

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The following **Table 8** summarizes the mitigation measures proposed for the project.

Table 7: Summary of Mitigation Measures

Environmental Resource	Mitigation Measure
Land Use	BCRSD will ensure that future wastewater connections comply with their standards and can be adequately accommodated by the treatment system.
	Erosion control measures required by the County and IDEM will be implemented for the project.
Formally Classified Lands	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
	Construction debris will be removed daily, and surface disturbance will be kept to a minimum.
Floodplains	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
Wetlands	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
	No impacts anticipated to mitigate.
Historic Structures	No impacts anticipated to mitigate.
	No impacts anticipated to mitigate.
Visual Aesthetics	If any archaeological artifacts or human remains are uncovered during construction, demolition, or earthmoving activities, work will stop and the discovery will be reported to the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology, within two days. These artifacts or remains will be avoided, minimized, or mitigated in accordance with all applicable regulations.
	Removal of dead trees during the Indiana bat reproductive season (May 1 through August 31) will not occur without prior regulatory approval.
Archaeological Resources	All bare and disturbed areas will be revegetated with a mixture of grasses (excluding all varieties of tall fescue) and legumes as soon as possible upon completion.
	All tree and brush clearing will be minimized and contained within the project limits.
	No trees suitable for Indiana bat or Northern Long-eared bat roosting (greater than 5 inches dbh, living or dead, with loose hanging bark, or with cracks, crevices, or cavities) will be cut from April 1 through September 30.

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Table 7: Summary of Mitigation Measures

Environmental Resource	Mitigation Measure
Stream Crossings	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
	Sediment and erosion control in compliance with Indiana Department of Environmental Management requirements will be provided at all areas of surface disturbance.
Air Quality	Reasonable and proper construction techniques and clean-up practices will be provided.
	Surface wetting practices with a dust preventative will be utilized to control dust emissions were required.
	Exhausts of construction equipment will be required to have mufflers for air pollution abatement.
	Ordinances regulating the production and emission of smoke will be strictly met.
	No burning will be permitted.
	If potential hazardous air pollutants are used on the project, the Town will require monitoring, record keeping, reporting, vapor recovery, secondary containment, design, equipment, work practices and operation according to Federal standards.
	Dirt tracked from unpaved areas will be minimized. No construction or demolition will be conducted in wooded areas.
Transportation	All traffic control systems will be provided to safely control the flow of vehicles in and near construction zones.
	Road-related construction activity will be coordinated with the County engineer's office.
	All necessary permits will be acquired for the work.
Noise	Exhausts of combustion-powered construction equipment will be required to have mufflers for noise and air pollution abatement.
	Air compressors shall be equipped with silencers.
	Construction activity and noises will be limited to the provisions of local ordinances but will be no more than daylight hours from Monday through Saturday.
	Blasting shall not be allowed on the project.
Sanitary Construction Facilities	Ample sanitary facilities shall be furnished at worksites during the project. These temporary toilet facilities shall be placed and maintained as required by the local health ordinances.
	The toilets shall be maintained in a sanitary condition and contents shall be removed from the site as often as required.
Solid and Hazardous Waste	Solid waste generated by the construction project will be controlled. The construction sites will be kept as neat as possible.

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Table 7: Summary of Mitigation Measures

Environmental Resource	Mitigation Measure
	No waste will be allowed outside of the construction zone.
	Small debris that may be windblown will be discarded immediately.
	All solid waste will be disposed of in compliance with local, state and federal regulations. All construction debris will be disposed in a sanitary landfill or construction debris (CD) landfill according to local, state, and federal regulations.
	Petroleum that must be stored at the construction sites will be kept in above-ground tanks.
	Only the minimum amount of petroleum and other products that may create special wastes will be stored at the construction sites.
	The release of petroleum to the environment will be kept to a minimum.
	All spills of petroleum and other products that may create special wastes will be mitigated immediately.
	If potentially hazardous waste is encountered during the construction of the project, work in the area of waste will stop and appropriate regulatory agencies will be contacted. The Town will work with the appropriate regulatory agencies to mitigate or avoid the hazardous waste.

6. SELECTED ALTERNATIVE

6.1. Project Description

As stated previously, the most cost-effective collection system alternative is to install low-pressure sewers in a phased approach throughout the service area. Critical locations with the highest population density, such as those along State Road 45, will be prioritized under Phase 1, with additional extensions to follow in future phases. The maps in **Appendix A** show Phase 1 and 1b. The cost estimates only include the Phase 1 lines. Phase 1b lines will be added if the project costs come in lower than estimated and there are funds available. The treatment plant alternative selected will require coordination with Helmsburg RSD to increase capacity and make the necessary upgrades at their existing plant to accommodate the large increase in wastewater flow which will accompany the collection system installation. HRSD is completing a separate report for this project.

In **Appendix A**, the location and maps of the project are presented. The Preliminary Design Summary is presented in **Appendix P**.

6.2. Project Costs

Detailed cost estimates for the collection system are provided in **Appendix C**. The estimated construction cost is the capital cost plus an allowance for contingencies. The non-construction costs include surveying, engineering, geotechnical investigation, permitting, inspection, legal/bond counsel, and a financial advisor, as presented in **Table 8** below. A rate analysis by Brown County’s financial advisor is being completed to determine the rate effect on the sewer system customers as well as the final rate structure. The draft financial report is presented in **Appendix J**.

Table 8: Proposed Project Costs – Collection System Phase 1

Construction Costs	
Low-Pressure Sewers West of Helmsburg	\$19,410,000
Low-Pressure Sewers East of Helmsburg	\$11,110,000
Non-Construction Costs	
Engineering and Inspection Services	\$7,630,000
Legal and Bond Counsel	\$300,000
Financial Advisor and Financing Fees	\$250,000
Electrical Utility Charges	\$200,000
Administration	\$100,000

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	TOTAL	\$39,000,000
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6.3. Project Schedule

A proposed project schedule is presented in the following **Table 9**.

Table 9: Proposed Project Schedule

Task	Date
Submit PER for planning study approval	3/31/2023
Receive approval for planning study	8/30/2023
Receive notification of grant and loan funding	9/30/2023
Start final design of project	4/30/2023
Finalize project design and submit for permits	12/31/2023
Advertise for bids	1/31/2024
Receive permits and funding agency approval	7/31/2024
Receive bids	2/28/2024
Start construction	4/1/2024
Finish construction	10/31/2024

7. LEGAL, FINANCIAL, AND MANAGERIAL CAPABILITIES

7.1. Management Resolutions

A. Preliminary Engineering Report Acceptance Resolution

This Preliminary Engineering Report has been accepted by the **Brown County Regional Sewer District**. In **Appendix K**, we have included a copy of the executed resolution accepting this report.

B. Designated Signatory Authorization

We have included a copy of the executed Signatory Resolution in **Appendix L**.

C. SRF Project Financing Information

The SRF Project Financing Information Form has been provided in **Appendix M**.

D. Notice of Public Hearing

The Notice of Public Hearing has been provided in **Appendix N**.

E. Drinking Water Checklist

A copy of the Clean Water Checklist for the Green Project Reserve Sustainability Incentive has been provided in **Appendix O**.

7.2. Land Acquisition Schedules

Where it is not possible or cost effective to install the new low-pressure sewer force main in existing rights-of-way, it will be installed in a private easement. Private easements may be necessary for BCRSD to access on-site grinder pits and other equipment located on property which is currently private. BCRSD anticipates completing purchase of any land to be acquired before closing on the SRF loan.

8. PUBLIC PARTICIPATION

8.1. Time and Place of Public Hearing

Notice of the public hearing was published in XXXXX on May XX, 2023. A copy of the affidavit of publication for the public notice is included in **Appendix N**. A completed draft of this preliminary engineering report will be made available to the public for review. A public hearing was conducted for this project at XXXXX on May XX, 2023.

8.2. Public Hearing Minutes, Sign-Up Sheet and Comments

A copy of the attendance record for the hearing and the hearing document are included in **Appendix N**.

Appendix A – Study Area Maps