PRELIMINARY ENGINEERING REPORT

Dubois County Regional Sewer District Project 1 – Phase 1

Prepared for: Dubois County

Project Number: D0440050

Prepared by: Clark Dietz, Inc.
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Professional Consulting and Design Services

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EXECUTIVE SUMMARY

Dubois County is seeking to establish a new Regional Sewer District to address failing septic systems. Many small communities throughout the County are facing similar issues with failing septic systems resulting in untreated domestic waste pollution to nearby waterbodies. Many of these areas with failing septic systems are facing high capital costs for replacement and are located in areas of soil conditions that are not favorable for the installation of septic systems as a long-term solution. Previous studies have evaluated several small communities throughout the rural countryside as alternatives for new public sewer and wastewater treatment. Those studies established Haysville and Portersville as potential options for routing sewers to the City of Jasper for regional treatment.

This project aims to provide sewer collection and treatment systems for Haysville and Portersville and provide a framework and strategy for future expansion with the creation of the Dubois County Regional Sewer District (DCRSD). Currently, there is no collection system infrastructure or treatment available in the towns of Haysville and Portersville. These communities are working with the County to develop regional sewer networks for transport and treatment in the City of Jasper.

County elevation data was used to establish preliminary local sewer collection systems as well as regional lift stations and forcemain routes. Due to the length and topography between Haysville, Portersville, and the City of Jasper, multiple options were identified as possible options and evaluated with consideration to cost and the number of homes/customers able to be connected. The selected solution provides the lowest cost option for providing sewer collection to most homes in the Haysville and Portersville area, all homes along the route to Jasper, and provide gravity sewer along the entire route to maximize future connections.

This Preliminary Engineering Report (PER) is for the Dubois County Regional Sewer District Phase I Sewer Improvements ad is an update to the PER submitted in March 2022.

CHAPTER 1 - PROJECT LOCATION

1.1 PROJECT AREA

Dubois County is located in Southern Indiana, with Interstate 64 running along the County's southern border. The County is approximately 432 square miles, has 12 townships, and includes incorporated communities of Jasper, Huntingburg, Birdseye, Ferdinand, and Holland. The project area is located around two unincorporated communities of the County– Haysville, and Portersville.

Haysville is an unincorporated community near the northern border of Dubois County within Harbison Township. Haysville is located in Section 25, Township 1N, Range 5W, around the intersection of State Road 56 and US Highway 231.

Like Haysville, Portersville is also an unincorporated community located near the northern border of Dubois County; however, Portersville lies within Boone Township and is reportedly the oldest community in Dubois County also having held the county seat before Jasper. Portersville is located in Section 21, Township 1N, Range 5W, around the intersection of Portersville Road and 2nd Street.

All the local collection system work will be performed within the limits of Haysville and Portersville. The lift stations for regional pumping to Jasper will be located in the right of way along Highway 231 and Portersville Road from the respective community to County Road 500 N at which point sewerage will be collected and treated by the City of Jasper under a separate project. The project location is identified in USGS quadrangle map in Appendix A.

1.2 SERVICE AREA

There is currently no service area for Haysville and Portersville. The proposed service area includes Haysville and Portersville region and is shown in Appendix A.

Chapter 2 - CURRENT SITUATION

2.1 BACKGROUND

Dubois County and the existing sewer districts within the County have been concerned about several unsewered areas over the last two decades. Efforts to expand the existing three large sewer districts within the County – City of Jasper, City of Huntingburg, and Patoka Lake Regional Water and Sewer District to provide services to these rural areas have been largely unsuccessful in the past years primarily due to economic constraints, remoteness, and sparse population among other factors. Additionally, the constraints of municipal sewer districts expanding the legal limits of their system without annexation of the additional area has also complicated providing sewer services to these rural areas.

2.1.1 REGIONAL SEWER DISTRICT

In 2019, the decision was made to develop a study forming a regional sewer district to provide sewers to rural areas of the County. The formation of a Regional Sewer District (RSD) would provide a feasible long-term solution for addressing economic and health concerns in rural areas beyond the capabilities of the existing WWTP Districts.

2.1.2 PREVIOUS WORK

Clark Dietz developed a County-wide study in 2020 to identify and prioritize unsewered communities for connection to a public sanitary sewer system and recommend long-term solutions to convert target communities from private septic systems to public sewer systems. This study determined that the Haysville area was the most in need of immediate public sewers due to the high level of failing septic systems, small lot sizes, and poor soil quality. Other medium-sized communities - Dubois Crossroads, St Henry, and Portersville also ranked highly for sewer project prioritization. This study recommended the evaluation and review of the bundling of sewer projects during the preliminary engineering phase based on proximity and potential economic benefits.

2.2 PROJECT NEED AND OBJECTIVES

The long-term objective is for the County to construct, own, and maintain collection system infrastructure that serves the rural areas of the County and to utilize the treatment facilities of the three existing sewer districts in the County.

2.2.1 OBJECTIVES

This project is the first in a series of several future projects aimed to design and construct collection system infrastructure within the County as part of the regionalization effort. The main objective of this project is to provide public sewer collection systems to properties in the Haysville and Portersville areas (as identified in the previous planning effort) and properties along the main route between each area and the connection to the City of Jasper's system.

2.3 EXISTING COLLECTION SYSTEM AND TREATMENT FACILITIES

2.3.1 EXISTING COUNTY TREATMENT FACILITIES

Dubois County is currently served by six wastewater treatment facilities, with service areas of varying sizes and capacities as shown in Table 2-1. The six facilities have a current total design flow rate of 6.3 MGD with average daily flows closer to 4.0 MGD. The treatment facilities vary in their treatment processes, with Holland and Birdseye utilizing controlled discharge lagoons and Ferdinand, Huntingburg, Jasper, and Patoka using an activated sludge treatment process. In addition to these six existing treatment facilities, Ireland also operates a municipal wastewater collection system. Still, it utilizes the capacity of the Jasper Municipal WWTP to treat the collected wastewater.

Table 2-1. NPDES WWTPs in Dubois County, IN

NPDES ID	Permit Name	Size (sq.miles)	Design flow	Treatment method	Accepting Waters
IN0039748	BIRDSEYE WWTP	0.42	0.08	WSL - Controlled Discharge	Anderson River via Waddle Branch
IN0020648	FERDINAND WWTP	8.58	0.70	Activated Sludge	Patoka River via Hunley Creek and Holey Run
IN0023108	HOLLAND WWTP	0.34	0.10	WSL - Controlled Discharge	Ohio River via Little Pigeon and Sugar Creeks
IN0023124	HUNTINGBURG WWTP	21.75	1.11	Activated Sludge	Patoka River via Hunley Creek Tributary
IN0020834	JASPER MUNICIPAL WWTP	50.63	3.60	Activated Sludge	Patoka River
IN0052698	PATOKA LAKE REGIONAL WATER & SEWER DISTRICT	110.49	0.70	Activated Sludge	Patoka River

These six permitted treatment facilities currently service approximately 192 square miles within the County. Of that, residents account for approximately 80% of the total connections and the remaining 20% are attributed to industrial or commercial connections. The existing sewer districts and WWTPs are shown in Appendix A.

The City of Jasper, the largest community in Dubois County, has the largest collection system. The city currently operates and maintains a total of 27 miles of forcemain and 131 miles of gravity sewer serving an estimated population of 15,724, per the US Census Bureau (2019). This includes lift stations located throughout the service area and a 3.6 MGD treatment facility located in the center of the service area, with approximately 60% of their treatment capacity utilized during dry weather. The WWTP has a current master plan that identifies several opportunities for expansion.

The City of Huntingburg, with an estimated population of 6,170, serves an area of nearly 22 square miles. This includes approximately 50.0 miles of sanitary sewers (6-15 inches in diameter), 15.7 miles forcemains (2-16 inches in diameter), 939 manholes, and 16 lift stations, in addition to the wastewater treatment facility. The current 1.1 MGD treatment facility is at 90% capacity during dry weather flows and so the City is currently designing a new 3.3-3.5 MGD WWTP at a new site to allow for future growth and additional flows.

The Patoka Lake Regional Water and Sewer District has the largest service area within the County at just over 110 square miles; however, most of the residents within this area utilize private septic systems and not public infrastructure for their wastewater treatment needs. The Patoka Lake Regional Water and Sewer District currently operates and maintains approximately 71.0 miles of sanitary sewers/forcemains and 24 lift stations

discharging wastewater to their 0.70 MGD wastewater treatment facility. The facility is 40 years old and in need of upgrades.

Ferdinand is a town of approximately 2,065 people and is located on the southern border of the County, just north of Interstate 64. Ferdinand maintains and operates a 0.70 MGD activated sludge wastewater treatment plant along with lift stations, sanitary sewers, and forcemains. There are plans to build a new WWTP north of town; however, this is in the preliminary planning stages.

The communities of Holland and Birdseye have nearly the same statistics in the categories being evaluated for this study. Both towns are similar in population (between 550 and 650 per the US Census Bureau) along with nearly the same service area (0.42 sq.mi for Birdseye and 0.34 sq.mi for Holland) and type of wastewater treatment facility and collection system. Holland maintains and operates a 0.1 MGD sludge lagoon along with lift stations, sanitary sewers, and forcemains. Birdseye maintains and operates a 0.08 MGD sludge lagoon along with 5 lift stations, 36 manholes, sanitary sewers, and forcemains, serving approximately 240 users.

Holland has already started evaluating the possibility of merging with the RSD if the RSD is able to complete this first phase. If this merger moves forward, ownership of Holland's current collection system and their users would revert to the RSD. In addition to the Holland's existing users, their proposed 70 acre housing development would also be part of the RSD. Their existing lagoons would either be decommissioned or transfered to a local private manufacturer. The flow from this area would be treated by Huntingburg's newly upgraded WWTP.

2.3.2 HAYSVILLE AND PORTERSVILLE SEWER FACILITIES

There is currently no sewer collection or treatment for Haysville and Portersville. These areas are served by septic systems of which 80% were installed before 1978 and most of the remaining were installed before 1999. Nearly all these septic systems are beyond their useful life and have not received regular maintenance based on public feedback.

The systems installed before 1978 predate the On-Site Sewage Disposal rules and therefore have very limited records of the existing septic systems and likely several that would not meet typical/approved septic system standards. For example, many systems installed before 1978 do not have leach fields and consist simply of a buried tank. Overall, less than a dozen properties in the project area meet current regulations for a properly functioning septic system.

2.4 EVIDENCE OF WATER POLLUTION AND PUBLIC HEALTH HAZARDS

This section presents direct evidence of water pollution within Dubois County and discusses public health concerns within the region due to the failing and/or lack of septic systems.

2.4.1 EXISTING WATER QUALITY ASSESSMENT – TMDL REPORT

The only existing water quality assessment available within Dubois County is the Total Maximum Daily Load (TMDL) Report for the Lower East Fork White River Watershed. This report was completed in 2019 for the Environmental Protection Agency (EPA) Region 5, by the Indiana Department of Environmental Management (IDEM), due to local interest in addressing water quality issues by determining a local baseline for monitoring and sampling streams impaired by E. coli, impaired biotic communities (IBC), nutrients, and dissolved oxygen.

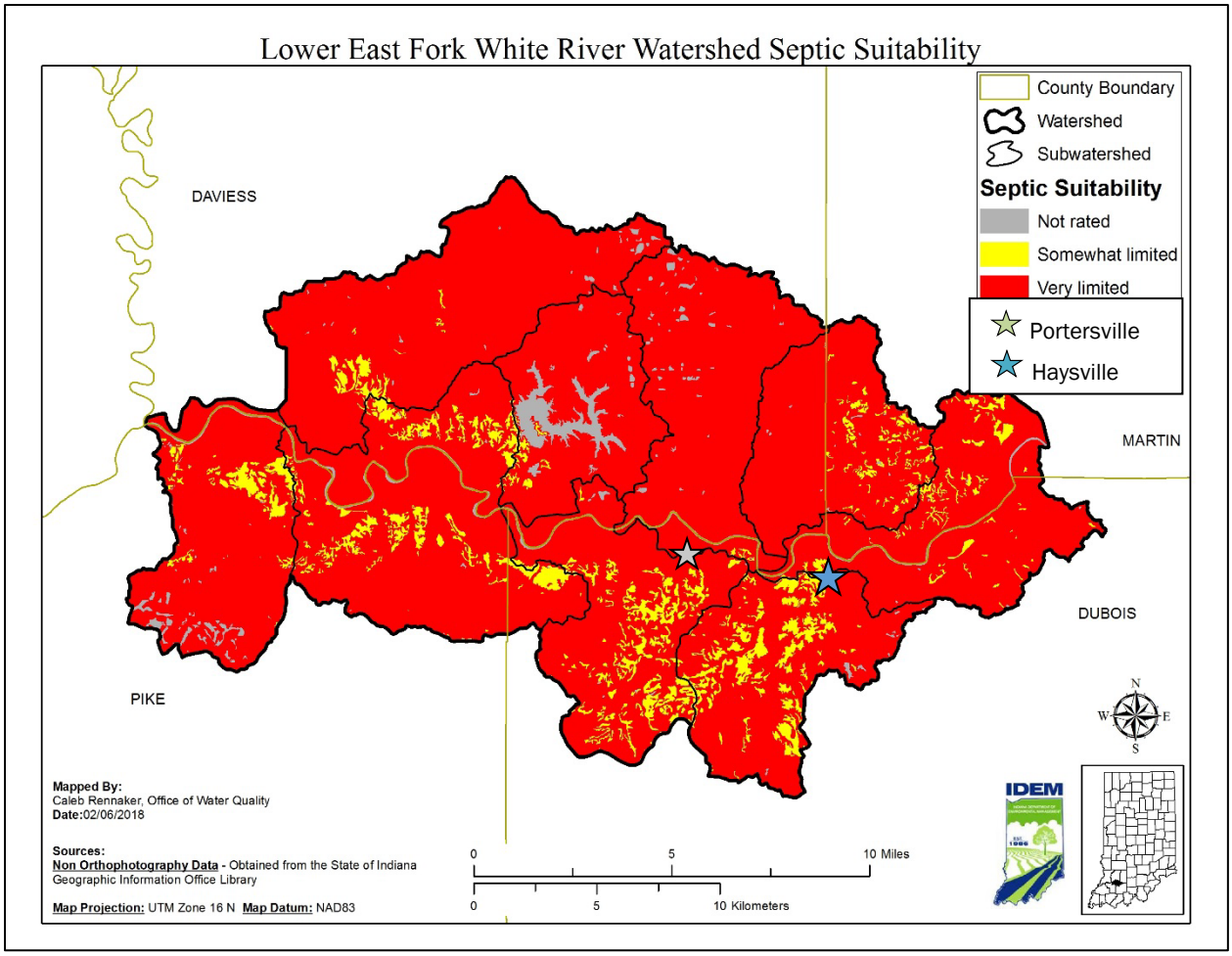

Figure 2-1. Suitability of Soils for Septic Systems in the Lower East Fork White River Watershed

This watershed and corresponding report lie mostly in Daviess County, but also dips into Pike, Martin, and the northwestern portion of Dubois County. This watershed encompasses two of the larger known areas of concern in Portersville and Haysville. While the report covers a wide variety of topics related to the local water quality, the main takeaway from this study is found in Section 2.3.2 *Septic Tank Absorption Field Suitability.* In this section, the soil characteristics and geology were evaluated for allowing gradual seepage of wastewater into surrounding soils and the effects on the local groundwater quality. Figure 2-1 (Figure 16 of the TMDL Report) gives a good indication of the extent to which the soils (between 24-60 inches in depth) are suitable for septic systems within the watershed. Soils labeled "very limited" indicate that at least one variable is unfavorable for private septic systems. These unfavorable conditions account for approximately 91% of the watershed, including the Haysville and Portersville areas.

2.4.2 WATER QUALITY STANDARDS, WATER QUALITY TARGETS, AND E-COLI FINDINGS

Water Quality Standards

Under the Clean Water Act (CWA), every state must adopt water quality standards to protect, maintain, and improve the quality of the nation's surface waters. These standards represent a level of water quality that will

support the CWA's goal of "swimmable/fishable" waters. Water quality standards consist of three different components:

- **Designated Uses** reflect how the water can potentially be used by humans and how well it supports a biological community. Examples of designated uses include aquatic life support, drinking water supply, and full body contact recreation. Every waterbody in Indiana has a designated use or uses; however, not all uses apply to all waters.
- **Criteria** express the condition of the water that is necessary to support the designated uses and are of two types – numeric and narrative. Numeric criteria represent the concentration of a pollutant that can be in the water and still protect the designated use of the waterbody. Narrative criteria are the general water quality criteria ("free froms…") that apply to all surface waters. Numeric criteria for E. coli, Impaired Biotic Communities (IBC), and Dissolved Oxygen were used as the basis of the Lower East Fork White River Watershed TMDLs.
- **Antidegradation** policies provide protection of existing uses and extra protection for high-quality or unique waters.

Water Quality Targets

Target values are needed for the development of TMDLs because of the need to calculate allowable daily loads. For parameters that have numeric criteria, such as E. coli, the target equals the numeric criteria. Three target values – Total Phosphorus, Total Suspended Solids, and E-Coli were used for the development of the Lower East Fork White River Watershed TMDLs.

E.coli Data and Findings

The following section describes the water quality standards of E.Coli, target values used, related *E. coli* Data and findings.

1. E. coli

E. Coli is an indicator of the possible presence of pathogenic organisms (e.g., enterococcal E. coli, viruses, and protozoa) which may cause human illness. The direct monitoring of these pathogens is difficult; therefore, E. coli is used as an indicator of potential fecal contamination. E. coli is a sub-group of fecal coliform; the presence of E. coli in a water sample indicates recent fecal contamination is likely. Concentrations are typically reported as the count of organisms in 100 milliliters of water (count/100 mL) and may vary at a particular site depending on the baseline E. coli level already in the river, inputs from other sources, dilution due to precipitation events, and die-off or multiplication of the organism within the river water and sediments.

2. E. coli TMDL

The target value used for the Lower East Fork White River Watershed TMDL was based on the 235 counts/100 mL single sample maximum component of the water quality standard (i.e., daily loading capacities were calculated by multiplying flows by 235 counts/100 mL).

3. E. coli Data

For pathogens, 17 sites in the Lower East Fork White River were sampled. Table 2-2 (extracted from the TMDL Report) below provides a summary of pathogen data for all the subwatersheds in the Lower East Fork White River.

Table 2-2. Summary of Pathogen Data in Lower East Fork White River by Subwatershed

Subwatershed	Station #	AUID	Period of Record	Total Number of Samples	Percent of Samples Exceeding *E. coli* WQS (#/100 mL)		Geomean (#/100 mL)	Single Sample Maximum (SSM) (#/100 mL)	Percent Reduction Based on Geomean (125/100mL)	Percent Reduction Based on SSM (235/100mL)
					125	235				
Mill Creek	WEL-15-0011 (T05)	INW08F1_01	4/9/18-10/15/18	10	50	40	722.1	51,720	82.69	99.55
	WEL-15-0012 (T06)	INW08F1_03	5/21/18-10/15/18	9	100	100	1,739.93	41,060	92.82	99.43
Hoffman Run (US)	WEL-14-0003 (T01)	INW08E7_01	5/21/18-10/15/18	9	11.11	11.11	41.46	1,732.9	0	86.44
Slate Creek	WEL-15-0008 (T02)	INW08F3_02	4/9/18-10/15/18	10	80	60	431.86	15,150	71.06	98.45
	WEL-15-0007 (T04)	INW08F3_03	4/9/18-10/15/18	10	70	50	262.8	4,550	52.44	94.84
	WEL-15-0021 (T03)	INW08F3_T1002	4/9/18-10/15/18	9	55.56	33.33	235.03	>2,419.6	46.82	>90.29
Sugar Creek	WEL-15-0010 (T07) [Hoffman Run (DS)]	INW08F4_01	4/9/18-10/15/18	10	30	20	75.46	>2,419.6	0	90.29
	WEL-15-0018 (T08)	INW08F4_T1004	4/9/18-10/15/18	9	77.78	66.67	320.16	>2,419.6	60.96	>90.29
	WEL-15-0022 (T09)	INW08F4_T1006	4/9/18-10/15/18	10	60	40	233.28	>2,419.6	>46.42	>90.29
	WEL-15-0009 (T10)	INW08F4_T1003	4/9/18-10/15/18	9	88.89	44.44	446.89	12,110	72.03	98.06
Dogwood Lake	WEL-15-0019 (T13)	INW08F5_02	ND	ND	ND	ND	ND	ND	ND	ND
Birch Creek	WEL-15-0013 (T11)	INW08F6_T1006	4/10/18-10/16/18	9	88.89	88.89	767.69	2,419.6	83.72	90.29
	WEL-15-0014 (T12)	INW08F6_T1003	4/10/18-10/16/18	10	80	30	279.24	>2,419.6	>55.24	>90.29
Aikman Creek	WEL170-0008 (T16)	INW08F7_04	4/10/18-10/16/18	10	60	60	360.95	5,910	65.37	96.02
Bear Creek	WEL-15-0015 (T14)	INW08F8_T1008	4/10/18-10/16/18	10	100	80	461.91	>2,419.6	>72.94	>90.29
	WEL-15-0016 (T15)	INW08F8_T1010	4/10/18-10/16/18	10	90	80	698.56	5,200	82.11	95.48
Mud Creek	WEL-15-0020 (T18)	INW08F9_03	4/10/18-10/16/18	10	30	20	115.82	>2,419.6	0	>90.29
	WEL-15-0017 (T17)	INW08F9_T1001	5/22/18-10/16/18	9	88.89	44.44	258.09	3,230	51.57	92.72

Notes: ND=No Data, SSM = Single Sample Maximum

The pathogen data for the Lower East Fork White River Watershed presented in the Table 2-2 above indicates that 90-99% or greater reductions are required to meet the TMDL target values for E.coli in Mill Creek, Slate Creek, Sugar Creek, Birch Creek, Aikman Creek, Bear Creek, and Mud Creek.

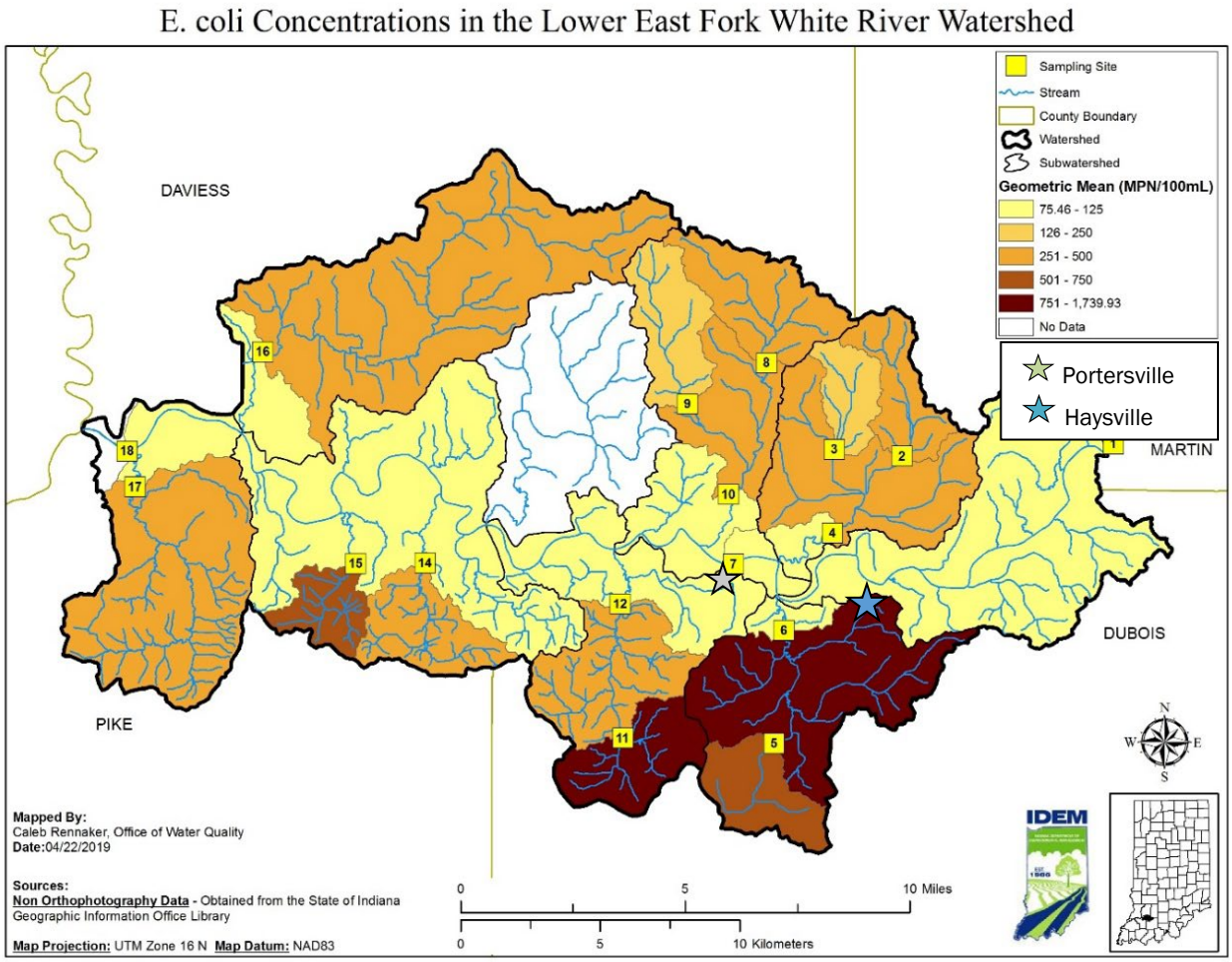

Figure 2-2. E. coli concentration in the Lower East Fork White River Watershed

Figure 2-2 shows E. coli concentrations based on 5-week geometric mean (MPN/100 mL) and sampling site drainage areas for 2017-2018. A significant part of Dubois County watershed including Haysville and Portersville have values over 250 MPN/100 mL and is therefore not in compliance with the current WQS for E.Coli.

Linkage Analysis and Conclusions

A linkage analysis connects the observed water quality impairment to what has caused that impairment. An essential component of developing a TMDL is establishing a relationship between the source loadings and the resulting water quality. Though a descriptive analysis for all target pollutants is included in the TDML report, this discussion will focus primarily on E.Coli.

E. coli sources typically associated with high flow and moist conditions include failing onsite wastewater systems, urban stormwater/CSOs, run-off from agricultural areas, and bacterial re-suspension from the

streambed. E. coli sources typically associated with low flow conditions include a large number of homes on failing or illicitly connected septic systems that would provide a constant source. Elevated E. coli levels at low flow could also result from inadequate disinfection at wastewater treatment plants or animals with direct access to streams. With a significant portion of Dubois County watershed (including Haysville, Portersville) having elevated E. coli levels, it can be concluded that failing and/or absence of private septic systems is one of the major contributing reasons as several communities are unsewered and rely on private septic systems.

2.4.3 PUBLIC HEALTH CONCERNS AND ON-SITE TREATMENT SYSTEM REQUIREMENTS

Problems and Failures of Onsite Systems

Properly designed and maintained on-site wastewater treatment systems (e.g., septic systems) are not a source of contamination to surface water. The problem arises when these on-site treatment systems fail. These failures occur for a variety of reasons such as soil type limitations, hydraulic failures (surface breakouts), hydrogeological failures (inadequate soil filtration), etc., and when they do occur, there can be adverse effects on the surrounding surface waters. These are likely to be some of the issues surrounding the Haysville and Portersville communities.

Most of the residential and business structures in Haysville were built before the 1978 On-Site Sewage Disposal Rule was established and do not have permitted or inspected septic systems. These systems typically only have some form of septic tank, but no sewage disposal field to dispose of the effluent. As such, the straight discharges of sewage and ongoing septic failures have caused raw sewage discharges into neighboring creeks and drainage ditches. This sewage discharge is also a public health concern as disease organisms can be transmitted to humans by direct contact or can be carried into homes by insects, rodents, and animals. In addition, water quality testing conducted by the Indiana Department of Environmental Management (IDEM) has proven elevated E. coli levels in this area watershed as described in the previous section. The Dubois County Health Department has received numerous public complaints on sewage disposal issues in Haysville, which are currently being addressed on a case-by-case basis; however, the repair of existing sewage disposal systems is very difficult due to very small lot sizes and poor soil quality.

Dubois County Health Department

To further understand ongoing private septic issues in the region and the process used to address these issues by the Dubois County Health Department, we contacted Mr. Shawn Werner, Director of the Dubois County Public Health Department. The following section summarizes the information from that discussion related to complaints, the system used by the health department to manage private septic systems, and the county health department's responsibilities:

- **Local Complaints:** A majority of the received sewage complaints are related to failing septic systems with the number of complaints varying each year, typically from 30 to 50 complaints. These complaints come from various regions of Dubois County, with problem areas being Haysville, Beaver Creek Lake, Idlewild Lake, Duff, St. Henry, and areas with poor soils as shown in Figure 2-1. Most septic complaints that originate in these regions are either "direct discharge of waste to the surface" or related to general septic failures of permitted systems.
- **Procedure for Complaint Follow-up:** All sewage complaints must be submitted through the complaint form found at the county health department's website, which are then investigated by county staff to verify if it is a violation. The owner is then contacted by either phone, email, or certified mail depending on the situation. A deadline is given and if not followed, further legal action is sometimes taken by the department's attorney.
- **Private Septic System Management System:**
    - Permits: Typically the permit filing process includes submission of the property owner's information, system specifications and plans, and backfill inspection drawings. The County maintains permit submittal information on each private septic system. Newer systems are GPS located and included on the County's GIS mapping system.

- Data Management: The information is saved both on paper and digitally.
- County Responsibility: All residential and commercial septic systems are permitted and inspected by the Dubois County Health Department. This information is kept in perpetuity, with the earliest records dating back to 1978.

On-Site Treatment System Requirements

While public gravity sewers and wastewater treatment facilities are the preferred methods for wastewater treatment, they cannot be the county-wide solution. New on-site treatment systems will be a necessary part of the overall solution. There is currently no comprehensive database for on-site private treatment systems within Dubois County; however, a plan for ensuring the systems that do exist are maintained and functioning properly needs to be an integral part of the overall solution. The Indiana State Department of Health (IDSH) regulates through the local health department the residential on-site sewage disposal program. The key requirements per the 410 Indiana Administrative Code (IAC) 6-8.3: Residential on-site sewage treatment systems are listed below:

Section 52 - General Sewage Disposal Requirements

- No person shall throw, run, drain, seep, or otherwise dispose into any of the surface waters or ground waters of this state, or cause, permit, or suffer to be thrown, run, drained, allowed to seep, or otherwise disposed into such waters, any organic or inorganic matter from a dwelling or residential on-site sewage system that would cause or contribute to a health hazard or water pollution.
- The design, construction, installation, location, maintenance, and operation of residential on-site sewage systems shall comply with the provisions of this rule.
- Any dwelling that is not connected or cannot be connected to a public sewerage system shall be provided with an on-site sewage system consisting of septic tank and a soil absorption system.

Section 55 - Violations; Permit Denial and Revocation

- Should a residential on-site sewage system fail, the failure shall be corrected by the owner within the time limit set by the health officer.
- If any component of a residential on-site sewage system is found to be defective, malfunctioning, or in need of service; the health officer may require the repair, replacement, or service of that component. The repair, replacement, or service shall be conducted within the time limit set by the health officer.
- The health officer may deny an application for a construction/operating permit, or may revoke a permit previously issued, for reasons including, but not limited, to the following:
    - On-site treatment system does not meet the minimum requirements of this rule or local sewage ordinances.
    - Failure to comply with any provisions of this rule and/or limitations, terms, conditions of a permit/misrepresentation/any unapproved change related to design, construction, or usage of an on-site system.

2.4.4 LOCAL SEWER ORDINANCE

Dubois County Ordinance No. 2018-1 regulates the design, construction, installation, maintenance and operation of private sewage disposal systems in Dubois County, Indiana. Most of the sections contained in this ordinance refer to 410 Indiana Administrative Code (IAC) 6-8.3. The Dubois County Sewer Ordinance is included in Appendix B.

CHAPTER 3 - FUTURE SITUATION

This chapter discusses the current development trends and 30-year population projections for the Haysville and Portersville service areas. The chapter further identifies design flows for each region.

3.1 CURRENT POPULATION

Dubois County is a community that has experienced a fair amount of growth over the last 60 years as shown by the federal census data in Table 3-1. The average growth over the last 30 years is about 6% and appears to be relatively consistent. The historical data indicates that a year-over-year growth rate of about 2% to 6% could be possible for the next 30 years, with sanitary sewer infrastructure being a significant factor impacting that growth rate. Utilizing the aggregated data from STATS Indiana, a public data utility, a small leveling off of population growth could also occur over the next 20-30 years. This indicates a total population in the range of 41,000 to 51,000 by 2050.

Table 3-1. Dubois County Population

Year	Dubois County
1900	20,357
1910	19,843
1920	19,915
1930	20,553
1940	22,579
1950	23,785
1960	27,463
1970	30,934
1980	34,238
1990	36,616
2000	39,674
2010	41,889
2020	43,637
2030[1]	*46,255*
2040	*49,031*
2050	*51,972*
Notes: 1. Estimated population using 6% accelerated growth	

The demographic data for Haysville and Portersville is based on population of their townships from US Census Bureau as shown in Table 3-2. The combined population of these townships account for approximately 6% of Dubois County. Due to limited population data of these unincorporated communities, we developed population projections using two methods as described in the following sections.

Table 3-2. Township Population Data

Year	Population
Harbison Township	
2010	1588
2020	1585
Boone Township	
2010	799

3.1.1 MID-STATES CORRIDOR PROJECT

The Mid-States Corridor Project examines the concept of an improved highway connection in southern Indiana. The project is anticipated to begin at SR 66 near the William H. Natcher Bridge crossing of the Ohio River at Rockport, continue through the Huntingburg and Jasper areas and extend north to connect to Interstate 69. The project includes an evaluation of the existing 26-miles of four-lane US 231 from the Natcher Bridge. The study is also evaluating the US 231 corridor through Dubois, Martin, and Daviess counties and corridors to the east and west to provide an improved connection to I-69/SR 37. The Mid-States Corridor Regional Development Authority (RDA) and Indiana Department of Transportation (INDOT) conducted a Tier 1 Environmental Study to identify a preferred corridor which will run through project sewer system area. A map of the current preferred route is included in the Appendix A.

Though this project is currently under the study and analysis phase, the completion of the Mid-States Corridor would significantly increase growth and economic development within the project area and would benefit from a public sewer system. The potential economic and urban development related to this project would be restricted if no sanitary sewer service is available.

3.2 FUTURE POPULATION PROJECTIONS AND GROWTH

3.2.1 METHOD 1 – HISTORIC POPULATION TREND

Haysville and Portersville represent approximately 6% of the County population based on available township data. This 6% ratio was used to analyze the population trends of Haysville and Portersville communities. Figure 3-1 shows the population projections for three scenarios – slow, expected, and accelerated growth rate. Using an expected growth rate of 4.5%, the population is in the range of 2,700 to 3,100 over the next four years.

Table 3-3. Future Population Projection – Method 1

Year	Dubois County	Haysville & Portersville
1900	20,357	1,221
1910	19,843	1,191
1920	19,915	1,195
1930	20,553	1,233
1940	22,579	1,355
1950	23,785	1,427
1960	27,463	1,648
1970	30,934	1,856
1980	34,238	2,054
1990	36,616	2,197
2000	39,674	2,380
2010	41,889	2,513
2020	43,637	2,618
2030[1]		2,736
2040		2,859
2050		2,988
2060		3,122
Notes: 1. Estimated population using an expected growth rate of 4.5%. Indiana population increased by 4.5% between 2010 and 2020,		

Year	Dubois County	Haysville & Portersville
same growth rate was applied for future projection.		

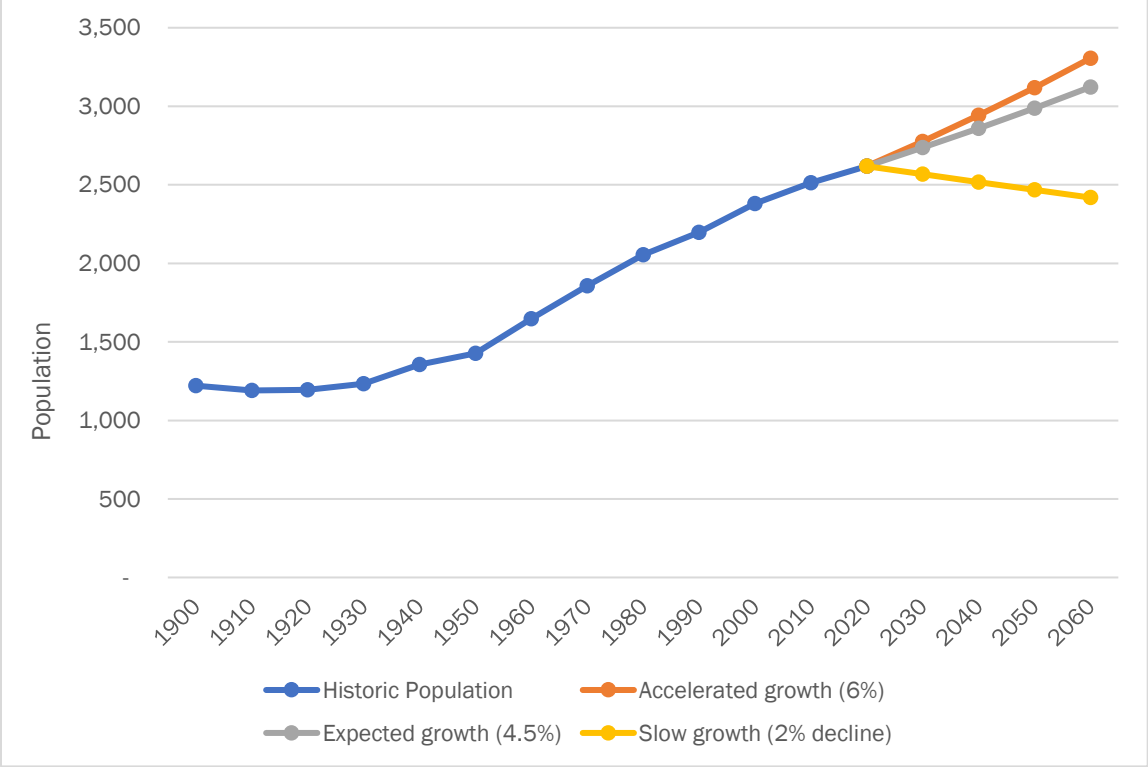

Figure 3-1. Method 1: Population projections

3.2.2 METHOD 2 – HOUSING UNITS ESTIMATION

In the second method, the housing unit data of each township was reviewed to determine the population per housing unit. We also estimated the current housing units in Haysville and Portersville with parcel data and counting properties from aerial maps. The combined current population of these communities was then developed using a population/housing unit factor from available township data to the number of housing units.

Table 3-4. Current Population and Housing Data

Year	Population	Housing Units	Population/ Housing Units
Harbison Township			
2010	1588	NA	
2020	1585	824	1.9
Boone Township			
2010	799	321	**2.5**

Table 3-5. Method 2: Housing units and Population Projections

Year	Current [1] Housing units	Projected housing units	Projected[2] Population
2020	320	320	800
2030		*339*	*848*
2040		*360*	*899*
2050		*381*	*953*
2060		*404*	*1,010*

Notes:
1. Approximately 180 housing units was noted for Haysville and 70 for Portersville. 25% factor of safety was applied to current total housing units.
2. Estimated population using an accelerated growth rate of 6.0% and population/housing unit factor of 2.5.

Figure 3-2 shows the population projections (based on housing units) for three scenarios – slow, expected, and accelerated growth rate. Using an accelerated growth rate of 6.0% population is in the range of 800 to 1,010 over the next forty years.

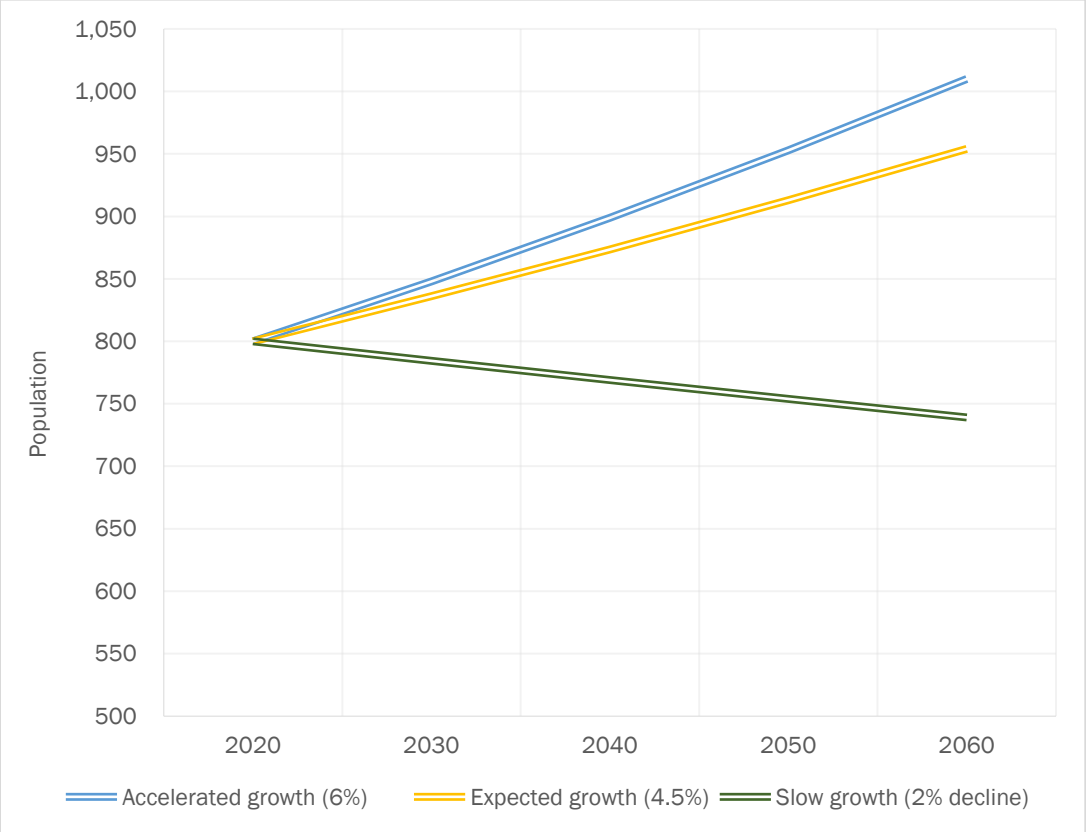

Figure 3-2. Method 2: Population Projections

3.2.3 SELECTED APPROACH

Historical trends for future population projections are the most common approach for large to mid-sized communities. Since Portersville and Haysville are small and rural communities, projecting future populations based on housing units gives a better and more realistic estimate than historical population data. While the population estimate from Method 2 is only 30% of the projection from Method 1, sewer and collection system sized based on this projection will provide for the adequate future growth needs of the system without being oversized for flows that these communities may never realize.

3.3 FUTURE DESIGN FLOWS

The design average and peak flow rate values for the collection system is calculated following the guidelines of Indiana Administrative Code - Section 327 IAC 3-6-11. The design average flow rate for each community was determined by using general average daily flow rate for single family homes, estimated properties, and applying a 25% factor of safety. A peak daily factor of 4.0 was applied to the estimated design average to determine the peak flow rates for each system. Regional sewer system design average and peak flows are summarized in Table 3-6.

Table 3-6. Design Flows for Haysville & Portersville Sewer Collection System

Parameter	Design Average	Peak[3]
Haysville		
Flow[1], gpd	114,400	457,300
Flow, gpm	80	320
Flow, mgd	0.11	0.46
Portersville		
Flow[2], gpd	44,600	178,300
Flow, gpm	40.0	130.0
Flow, mgd	0.04	0.18
Notes:		
1. Design flow (Haysville) was estimated using the following equation: Flow = Estimated properties*Factor of Safety*General Average daily flow for single-family homes = 295*1.25*310 = 114,400 gpd General average daily flow of 310 gpd/unit for single family home from Section 327, IAC 3-6-11.		
2. Design flow (Portersville) was estimated using the following parameters: Flow = 115*1.25*310 = 35,900 gpd		
3. Peak daily factor of 4.0 was applied to estimate peak flow as described in Section 327, IAC 3-6-11.		

CHAPTER 4 - EVALUATION OF ALTERNATIVES

This chapter discusses the alternatives evaluated for the Phase 1 Design project.

4.1 PRELIMINARY ALTERNATIVES ANALYSIS OVERVIEW

An alternative analysis was used to identify and evaluate the benefits and drawbacks of each potential sewer system improvement while qualitatively determining how each proposed project would impact the sewer system.

Three potential approach alternatives were investigated to determine the feasible route for the regional sewer system for each community, as shown in Figure 4-1 and summarized here:

- Approach Alternative 1 – This alternative consists of installing the main sewer along Route 231 to the West 500 N for the Haysville region and along North Portersville Rd to the intersection of 500 N for the Portersville region.
- Approach Alternative 2 – This alternative consists of installing the main sewer along West Haysville Road. The sewer alignment will jog south of 200 W, extend further west along West 700 N, and then follow the route along North Portersville Road, similar to approach alternative 1.
- Approach Alternative 3 – This alternative consists of installing the main sewer along West 600 N Road. The sewer alignment will follow route 231, extend along Old Rd 45, and jog west along W 600 N. The remaining route along North Portersville Road is similar to approach alternative 1.

The three approaches were selected based on available sewer routes along existing roadways. Alternative 1 consists of a regional sewer from both Haysville and Portersville south of the 500 N for connection to Jasper's collection system for treatment. Alternative 2 and 3 were identified as potential routes to combine flows to reduce the total sewer length or the number of lift stations required. Based on preliminary investigation, alternatives 2 and 3 were eliminated from further analysis due to significant limitations on topography, future development potential, and ability to serve communities. The sewer route maps for all the alternatives evaluated are included in Appendix A.

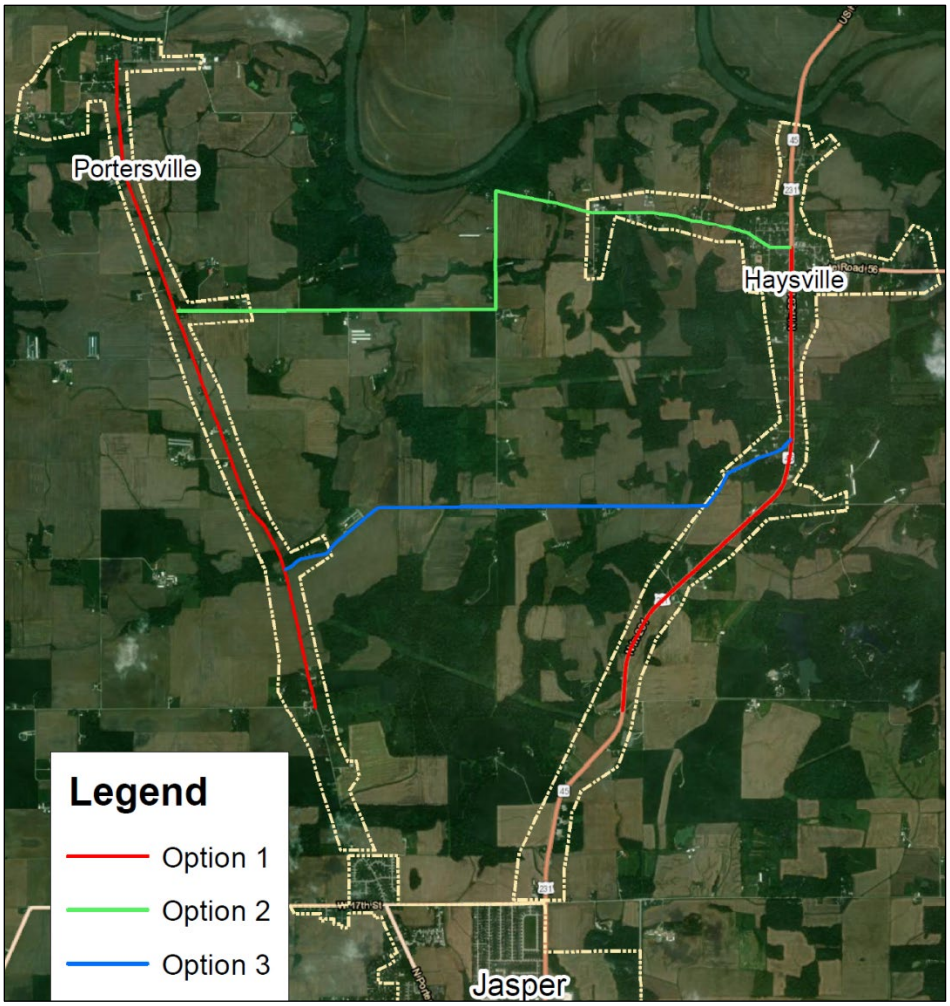

Figure 4-1. Preliminary Approach Alternative Evaluation

4.2 GENERAL DESIGN CONSIDERATIONS

The proposed sewer improvements will be designed in accordance with the Indiana Administrative Code – Title 327 Section 3-6 – Technical Standards for Sanitary Collection Systems as summarized here:

- **Sanitary sewer materials** – All piping, accessories, and other materials will conform to the applicable standards listed in 327 IAC 3-6-8 Sanitary sewer materials. Plastic pipe will be used in gravity sewer and force mains as part of the sewer network.
- **Separation of collection systems from water mains and drinking water wells** – Sanitary sewer and lift stations will not be located within 10-ft of any of existing or proposed water main as measured horizontally from the outside edge of sanitary sewer/lift stations to the outside edge of any existing water mains as specified in IAC 327 3-6-9.
- **Gravity sewer slope requirements and sizing**– Sanitary sewers will be sized so that peak daily flow can be collected from the proposed collection system. Gravity sewer will be designed and constructed with slope such that average velocity is not less than 2ft/s per 327 IAC 3-6-12. 8-inch gravity sewer at minimum slope (0.40%) and sufficient depth (maximum 10-ft) will be provided to connect new collection sewers.

- **Force main requirements** - Forcemain will be designed to meet the requirements of 327 IAC 3-6-13. Force main will be designed to provide a scour velocity of at least 2 ft/s throughout the length of the pipe at design pumping rate. Additionally, air relief valves will be installed at every intermediate high point where air may accumulate. Reaction devices will be also installed to prevent movement in pipes and fittings as necessary. 4-inch forcemain will be installed both regions and with one stretch (along Haysville route) being 6-inch to avoid excessive high flow velocities and headloss.
- **Manholes** - Manholes will be located at all end points of sanitary sewers, wherever changes in grade, size, or alignment occurs, and at all intersection of sanitary sewers. Separation distances of any two manholes will not be greater than 400 ft. Manhole sizing, materials, pipe connections, and testing shall meet the standards of 327 IAC 3-6-16.
- **Topography** - Roadway profiles of the main routes – Route 231 and North Portersville Rd were analyzed to determine stretches where gravity conveyance would be possible. Topography of each service area (Haysville and Portersville) was also reviewed to determine the high and low points along main roads and delineate drainage basins. Proposed sewer alignments were developed to follow the natural topography of the areas as much as possible.
- **Lift stations** - Two pumps will be provided in every regional lift station with each pump rated for design peak hourly flow capacity. Pumps will also meet the requirements listed in 327 IAC 3-6-23. Shutoff valves and check valves that are operable from floor level will be provided for each lift station. Ventilation, electrical systems and components, and audible and visual alarm systems will also be provided for each lift station to meet the technical standards.

4.3 ALTERNATIVE 1 – ROUTE 231 AND PORTERSVILLE RD SEWER PROJECT

This alternative consists of installing gravity/forcemain sewer along 231 in the Haysville service area and along the North Portersville Rd in the Portersville service area. This public sewer system is intended to convey wastewater flows from downtown Haysville and Portersville areas, serve most properties along the main routes, and transport untreated effluent to the City of Jasper's collection network. Four sewer network options were reviewed as part of this alternative and are discussed in the sections below. These options consider different numbers of regional lift stations (from highest to lowest) for each service area to explore each sewer network configuration's potential benefits and drawbacks and determine the most feasible option.

4.3.1 OPTION 1A

Haysville Sewer System Description

This alternative would consist of installing 8-inch gravity sewer segments and 4-inch/6-inch forcemain that connect to five regional lift stations along route 231 for the Haysville area. The collection system network would be installed to collect flows from properties along West Haysville Rd and N 150 West Rd, serving the west branch of the Haysville service area. Collection sewers and one local station would also be installed along Route 56 and extending further east as shown in Figure 4-2 serving the east branch of the service area. The design parameters are summarized in Table 4-1

Portersville Sewer System Description

For the Portersville region, this alternative would consist of installing 8-inch gravity sewer segments and 4-inch forcemain that connect to four regional lift stations along the North Portersville Road. Collection system sewers and two local lift stations would be provided to collect flows along West Portersville Road and local streets to serve the downtown area. Collection sewers would also be installed to serve several remote properties located east of North Portersville Rd.

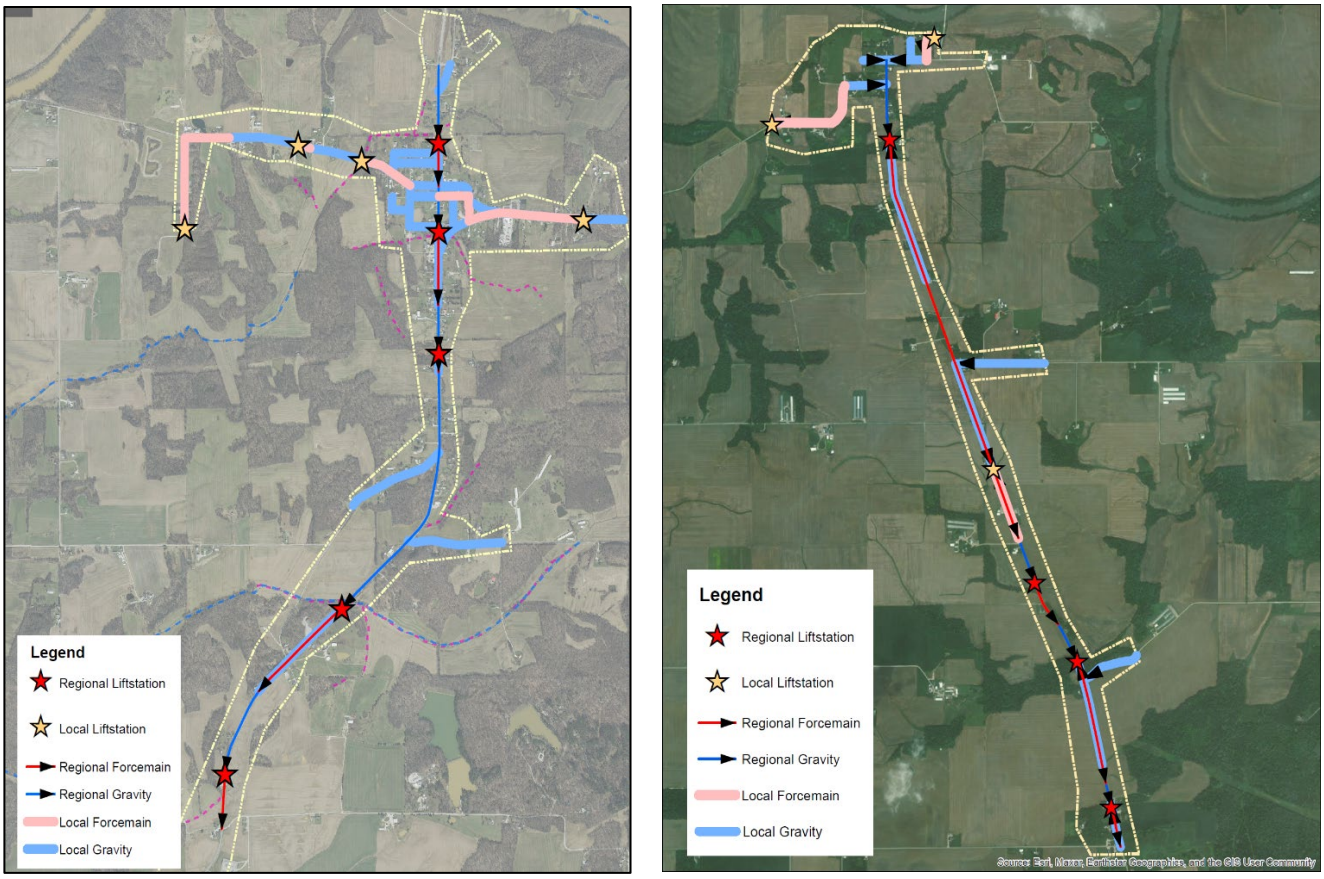

Figure 4-2. Option 1A – Haysville and Portersville Sewer System

Design parameters

Table 4-1. Option 1A - Sewer network summary

Parameter	Value
Haysville	
Regional gravity sewer, lf	9,252
Regional forcemain, lf	6,159
Collection system gravity sewer, lf	28,075
Collection system forcemain, lf	7,658
Number of collection system lift stations	4
Number of regional lift stations	5
Portersville	
Regional gravity sewer, lf	4,221
Regional forcemain, lf	14,178
Collection system gravity sewer, lf	20,264
Collection system forcemain, lf	4,554
Number of collection system lift stations	3
Number of regional lift stations	4

4.3.2 OPTION 1B

Haysville Sewer System Description

This alternative would follow a similar route as option 1A. 8-inch gravity sewers and 6-inch/4-inch forcemain would be installed along route 231 with three regional lift stations for the Haysville region. The collection network in this option would be designed to collect flows from both east and west branches, similar to option 1A. The main disadvantage of this option is that several sections along the route would require parallel forcemain/gravity lines to convey flow to the nearest regional lift station, impacting the pumping system's operational efficiency. The consolidation of lift stations also results in longer forcemains and reduced gravity sewer along the regional route, which presents operational challenges, including additional air release valves, larger pumps, and reduced ability for expansion. The reduction of gravity sewer along the main regional route increases the complexity of future home/community connections by requiring a pump station to connect along a long, shared forcemain network.

Portersville Sewer System Description

The alternative would follow a similar route along the North Portersville Rd and comprise of 8-inch gravity lines and 4-inch forcemain with only two regional lift stations. Due to fewer regional lift stations along the main route, local lift stations would be installed to collect flows from the low-lying areas. Like option 1a, the collection sewers and two small local lift stations would be constructed to serve the downtown region; sewers would be installed to extend the collected flows from properties east of N Portersville Rd and three local lift stations (replacing regional lift stations) would be installed along the route to convey flows to Jasper's system.

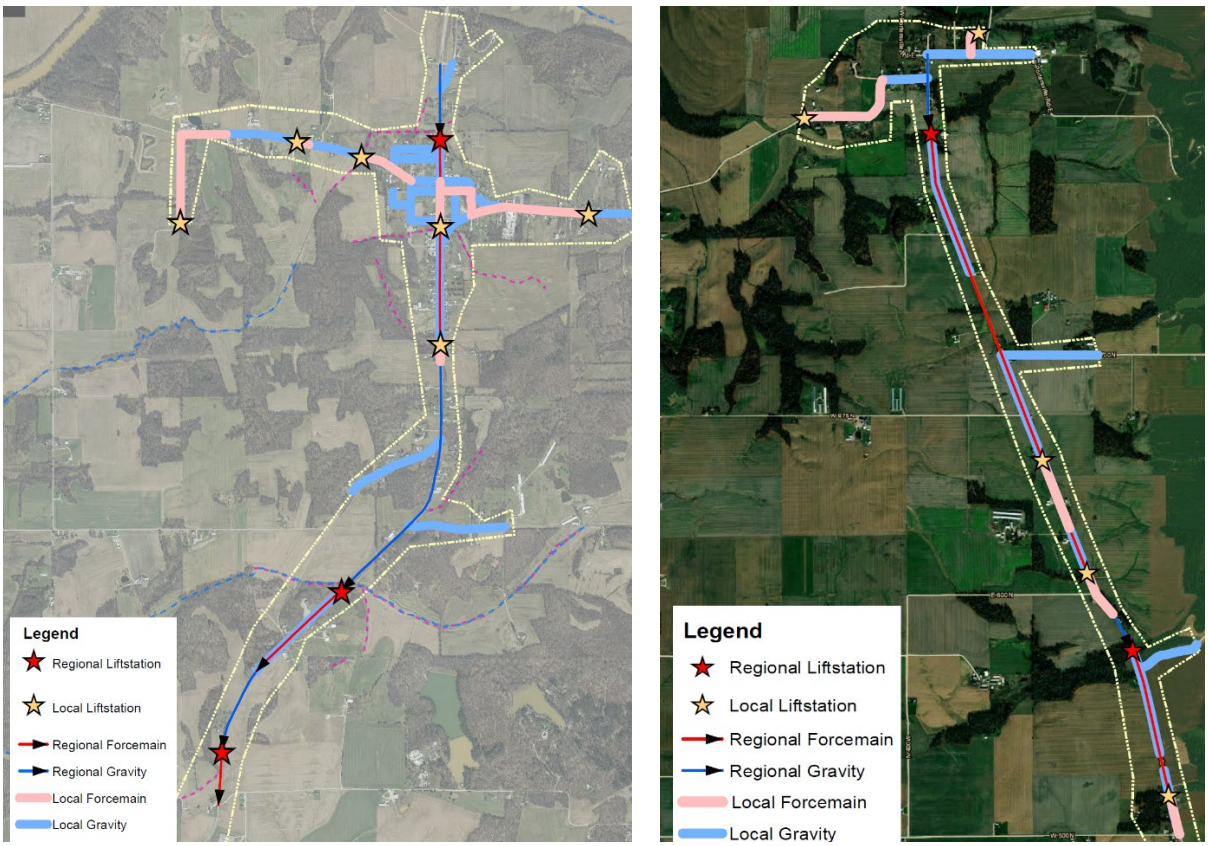

Figure 4-3. Option 1B - Haysville and Portersville Sewer System

Design parameters

Table 4-2. Option 1B - Sewer Network Summary

Parameter	Value
Haysville	
Regional gravity sewer, lf	7,551
Regional forcemain, lf	7,940
Collection system gravity sewer, lf	30,536
Collection system forcemain, lf	9,927
Number of collection system lift station	6
Number of regional lift station	3
Portersville	
Regional gravity sewer, lf	2,586
Regional forcemain, lf	15,814
Collection system gravity sewer, lf	21,809
Collection system forcemain, lf	6,494
Number of collection system lift station	5
Number of regional lift station	2

4.3.3 OPTION 1C

Haysville Sewer System Description

This alternative would follow a route similar to option 1A/1B and comprise 8-inch gravity sewers and 6-inch/4-inch forcemain along route 231 with only two regional lift stations. The collection network in this option would be designed to collect flows from both east and west branches, similar to the previous options. This option would require long stretches of forcemain, relatively short distances of gravity conveyance along main route with the highest number of collection lift stations, making it the least preferred choice. Similar to the previous option, this option would be the least operationally efficient system and more challenging to expand in response to future growth.

Portersville Sewer System Description

For Portersville, eliminating one additional regional lift station was not considered feasible; therefore, option 1B layout, with two regional lift stations was assumed.

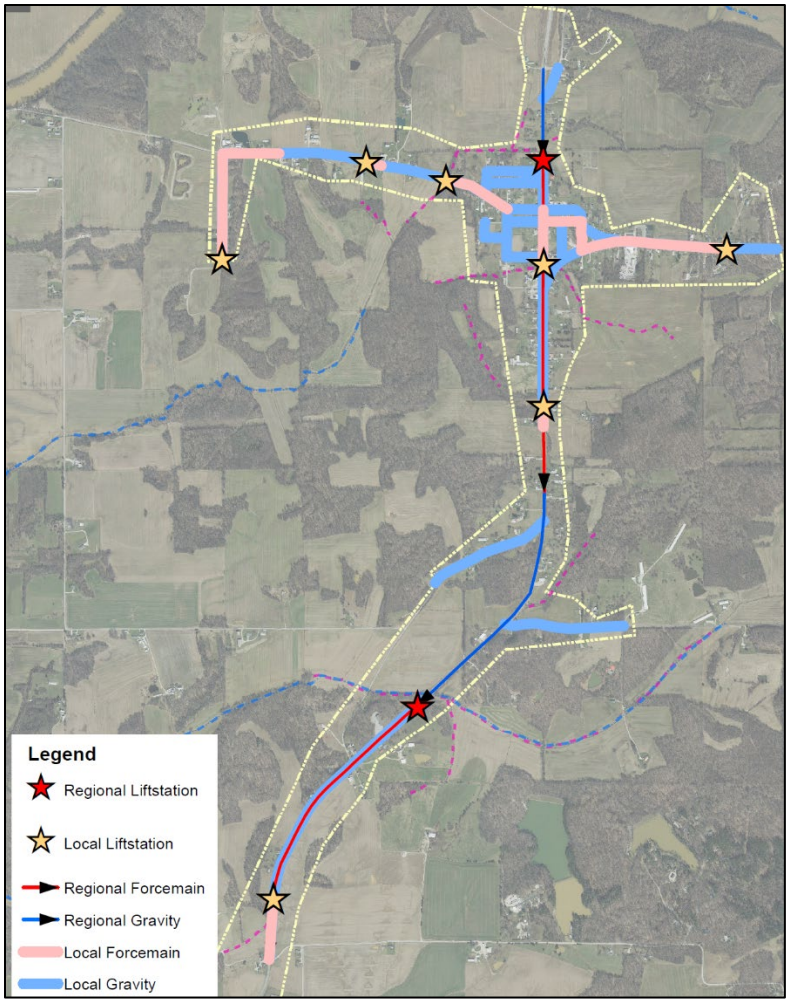

Figure 4-4. Option 1C - Haysville Sewer Network

Design parameters

Table 4-3. Option 1C - Haysville Sewer Network Summary

Parameter	Value
Haysville	
Regional gravity sewer, lf	5,854
Regional forcemain, lf	10,691
Collection system gravity sewer, lf	33,299
Collection system forcemain, lf	10,916
Number of collection system lift station	7
Number of regional lift stations	2

4.3.4 OPTION 1D

Option 1D explores a more economical version of Option 1A which eliminates branches of sewer and connections that present a disproportional amount of sewer installation compared to the number of homes served.

Haysville Sewer System Description
This alternative would consist of installing 8-inch gravity sewer segments and 4-inch/6-inch forcemain that connect to five regional lift stations along route 231 for the Haysville area. The collection system network would consist entirely of gravity sewer in the central Haysville area. The design parameters are summarized in Table 4-4.

Portersville Sewer System Description
For the Portersville region, this alternative would consist of installing 8-inch gravity sewer segments and 4-inch forcemain that connect to four regional lift stations along the North Portersville Road. The collection system sewers and two local lift stations would be provided to collect flows along West Portersville Road and local streets to serve the downtown area.

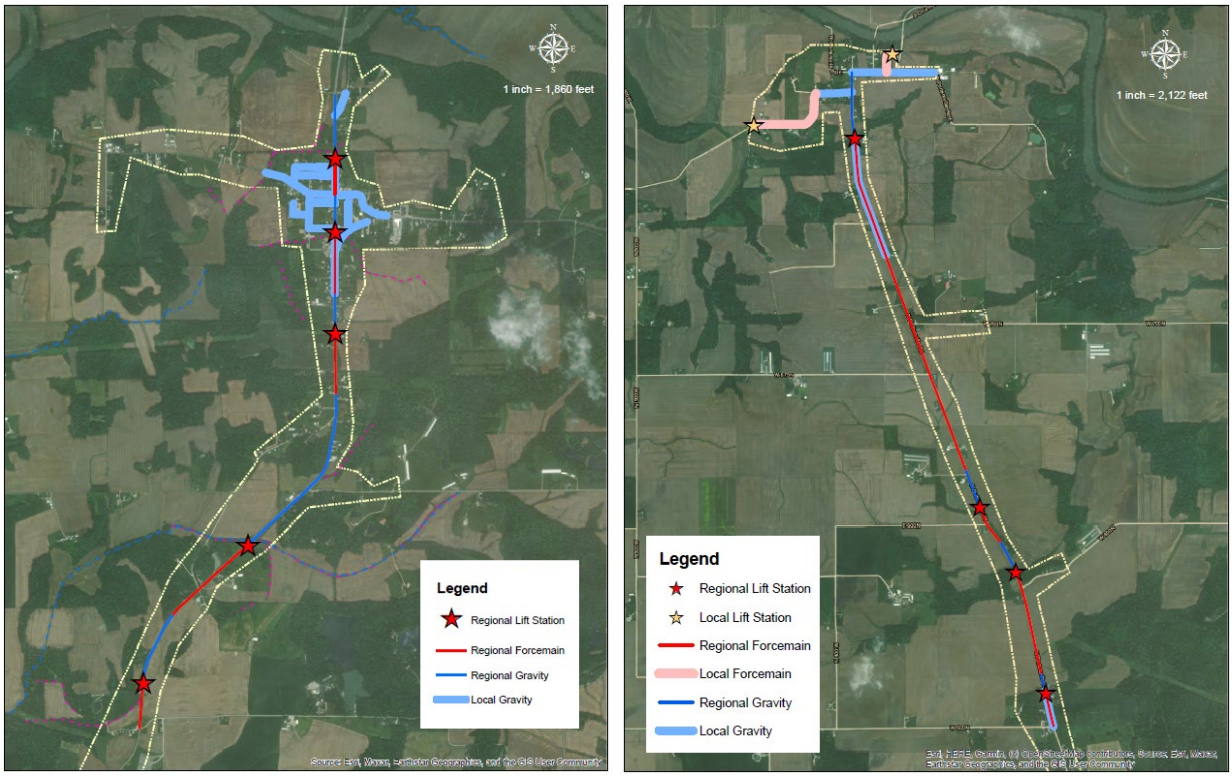

Figure 5-5. Option 1D - Haysville and Portersville Sewer System

Design parameters

Table 4-4. Option 1D - Sewer Network Summary

Parameter	Value
Haysville	
Regional gravity sewer, lf	9,252
Regional forcemain, lf	6,159
Collection system gravity sewer, lf	7,423
Collection system forcemain, lf	0
Number of collection system lift station	0
Number of regional lift stations	5
Portersville	
Regional gravity sewer, lf	4,221
Regional forcemain, lf	14,178
Collection system gravity sewer, lf	10,319
Collection system forcemain, lf	2,931
Number of collection system lift station	2
Number of regional lift station	4

4.4 ALTERNATIVE ANLAYSIS

4.4.1 ECONOMIC EVALUATION

Preliminary cost estimates (in 2023 dollars) were developed for each alternative for evaluation. Table 4-5 presents the total construction costs for each option. Detailed cost estimates and life cycle cost estimates are included in Appendix C.

Table 4-5. Preliminary Cost Estimate Summary

Option	Haysville	Portersville	Total[1]
1A	$12,220,000	$9,970,000	$30,580,000
1B	$12,310,000	$9,950,000	$30,610,000
1C	$12,890,000	$9,950,000	$31,370,000
1D	$6,580,000	$7,540,000	$19,510,000

Notes:
1. The costs are rounded to the nearest $10,000.
2. Gravity and force main cost estimates are based on preliminary layouts.
3. Total cost includes mobilization/demobilization, overhead/profit, design engineering, and contingency.

4.4.2 NON-ECONOMIC EVALUATION

There are several design complexities related to designing a regional sewer system in a rural area. The non-economic evaluation of Option 1A through Option 1D focused on these parameters.

Topography

Topography from the State lidar data was used to create preliminary surfaces in AutoCAD Civil3D and identify changes in elevation and low points along each route. There are several large hills and valleys along each regional route.

Option 1A includes a lift station at each main low point along the route and gravity sewer from the high point to the next lift station, whereas Option 1B and Option 1C extend the forcemain routes to limit the number of total lift stations.

Pump Design

Pumps are sized based on the total developed head (TDH) which is a combination of frictional head loss through pipe and static head due to elevation changes. Due to the distance between Haysville/Portersville and Jasper, extension of the forcemains can create excessive headloss for a small rural collection system design. Higher headloss will generally increase motor size, change electrical requirements, and result in more specialized equipment. This project aimed to design a system well suited for a rural environment with more “off the shelf” equipment. Pump calculations for each option is included in Appendix E.

Forcemain Design

High headloss along the forcemain route can present issues with future expansion. Future connections into a forcemain would require a lift station or grinder pump from the new home/community connection, resulting in a shared forcemain network. Depending on the amount of added flow, the new connection could impact the original regional pumps and/or the new station may have difficulty pumping against the regional lift station pressures. Alternatively, for a gravity system, future connections can simply drain to a manhole along the system.

Another issue with excessive forcemain length, particularly with low flows, is the length of time sewage will sit in the forcemain, which can result in odors, corrosion, or settling in the forcemain.

Maintenance

The level of maintenance is a function of the number and type of assets in the collection system. While Option 1A has the most lift stations, it does not require additional air release valves or specialized equipment. Air release valves are required at intermediate high points on a forcemain and can create maintenance burdens and additional service trips for operators.

Service Area

The primary goal of this project is to provide a regional sewer collection system and eliminate connections to the failing septic systems identified in the County. Option 1D delivers a significant cost reduction for the installation of the sewer; however, it serves nearly 30% fewer homes. Options 1A, 1B, and 1C serve approximately 300 homes, whereas only 214 homes are served by Option 1D based on parcel and aerial data. Option 1D has been included as the low cost option. In case the RSD doesn't receive enough funding for the preferred option, 1D will at least provide a skeleton network that can be expanded in the future

CHAPTER 5 - EVALUATION OF ENVIRONMENTAL IMPACTS

Environmental impacts are defined as direct or indirect. Direct impacts are those that result from the implementation, improvement, or maintenance processes. Indirect impacts are those resulting from the completion of the project, such as changes that ultimately have negative effects on the local environment. The following section discusses specific environmental issues related to the proposed sewer projects in accordance with the published guidance documents.

5.1 DISTURBED AND UNDISTURBED LAND

The proposed sewer improvements identified in this report will be located within Dubois County. The Project Area map is included in Appendix D.

5.2 HISTORIC/ARCHITECTURAL RESOURCES

The proposed projects will typically be constructed along county roads and right of ways and on previously disturbed grounds. It is anticipated that no historic, architectural, or archaeological sites will be affected by the project, as all work activities will occur within the county limits. There is one Indiana Historic Sites and Structures Inventory (IHSSI) rated *Outstanding* property located adjacent to the project limits, the Saint Paul's Evangelical Lutheran Church in Haysville (IHSSI # 037-304-06018). There are 41 IHSSI-rated *Contributing* properties, one IHSSI rated *Notable* cemetery (Sherritt's Graveyard, IHSSI # 037304-10047/ CR-19-23) three IHSSI rated *Contributing* cemeteries, located along to the survey area limits. There are no National Register of Historic Places (NRHP) listed sites, structures, or properties adjacent to or within the project's limits. Records of the NRHP and IHSSI will be reviewed further during the preliminary engineering phase of every sewer project. Dubois County Interim report and historical structures property map is included in Appendix D.

5.3 WETLANDS

The wetland map for each region is included in Appendix D. The proposed project area is within a wetland polygon. Furthermore, the proposed survey area contains eight National Wetlands Inventory (NWI) lines.

5.4 SURFACE WATERS

The proposed sewer project is not anticipated to adversely affect waters of high quality listed in 327 IAC 2-1-11(b), Natural, Scenic and Recreational Rivers and Streams listed in 312 IAC 7-2, Salmonid Streams listed in 327 IAC 2-1.5-5(a)(3), or waters on the Outstanding Rivers list (Natural Resources Commission Non-Rule Policy Document). This proposed survey area has twelvee rivers and/or streams including Haysville Run, Mud Branch, Water Drain, Mill Creek, Sherritt Drain, two branches of Mudhole Creek, Little Creek, Portersville Drain, Unknown stream, Shoal Run, and the two east forks of Mill Creek as shown in the Appendix D.

5.5 100-YEAR FLOODPLAINS AND FLOODWAYS

National Flood Insurance Rate Maps (FIRM Panel) of proposed service area is included in Appendix D. 100-year floodplains and floodways for each project region were reviewed and evaluated during the preliminary engineering phase of every sewer project. The proposed sewer project appears to be located in the vicinity of four floodplain polygons as shown in the FIRM map included in Appendix D.

5.6 GROUND WATER

The proposed project is not anticipated to impact a drinking water supply or sole source aquifer.

5.7 PLANTS AND ANIMALS

The proposed sewer project is not anticipated to negatively impact state or federal-listed endangered species or their habitat. The project will be implemented to minimize impact to non-endangered species and their habitat.

5.8 PRIME FARMLAND AND GEOLOGY

Both communities (Haysville and Portersville) are adjacent to farmland; however, it is anticipated that all sanitary sewer infrastructure will be placed under or immediately adjacent to the roadway. Therefore, it is not anticipated that the proposed project area will involve the conversion of prime agricultural land.

Soil Characteristics
The soil map of Haysville and Portersville areas is included in Appendix D.

Geology
Soil types of project region will be further reviewed during the detailed design process.

5.9 AIR QUALITY

Dust, fumes, and noise are typical byproducts of the construction process. Wetting the construction surface before and during operation will help minimize negative impacts associated with dust and airborne particulates. The regulation of construction to normal daytime operating hours will minimize the effects of noise and fumes in the area. These impacts are short-term, terminating upon the completion of the construction process. Construction activities should not impact ozone, airborne pollutants, or other current or future air quality concerns.

5.10 OPEN SPACE AND RECREATIONAL OPPORTUNITIES

The project is neither anticipated to create nor destroy open space and recreational opportunities.

5.11 LAKE MICHIGAN COAST PROGRAM

The project is not located in and are not anticipated to affect the Lake Michigan Coastal Zone.

5.12 NATIONAL NATURAL LANDMARKS

The project is not anticipated to impact natural national landmarks.

5.13 SECONDARY IMPACTS

Dubois County, through the authority of its Council, planning commission, or other means will ensure that future development, as well as future collection system or treatment projects connecting to these facilities, will not adversely impact wetlands, archaeological/historical/structural resources, or other sensitive environmental resources. The County will require new development and treatment works projects to be constructed within the

guidelines of the U.S. Fish and Wildlife Service, Indiana Department of Natural Resources, and other environmental review authorities.

5.14 MITIGATION MEASURES TO AVOID NEGATIVE IMPACTS

The preliminary project design focuses on installation of sewer along existing roadways. Erosion control measures including silt fence will be required to be in place prior to excavation to prevent runoff of construction debris. Any creek crossings or environmentally sensitive areas will be directionally drilled as needed to avoid negative impacts. Frac out contingency plans will be required to be reviewed and approved prior to drilling.

CHAPTER 6 - SELECTED PLAN

6.1 RECOMMENDED ALTERNATIVE

Based on alternative evaluations and discussions with the County, Alternative 1A – Route 231 and Portersville Road Sewer Project is the recommended alternative as it provides best community-wide public sewer infrastructure for both Haysville and Portersville, thereby addressing the existing public health and environmental concerns. Sewer collection system network layout developed for recommended alternative is extensive and would provide maximum residential service connections, replacing the aging septic systems in the region as well as allowing for future development in these areas.

6.2 PROJECT DESCRIPTION

6.2.1 GENERAL

The selective alternative consists of new sewer collection systems and regional lift stations for Haysville and Portersville. The Haysville system consists of 4 local grinder lift stations, 5 regional lift stations, and 8" gravity sewer. The Portersville System consists of 2 local grinder lift stations, 4 regional lift stations, and 8" gravity sewer. The preliminary layout for each system is shown in Figure 6-1.

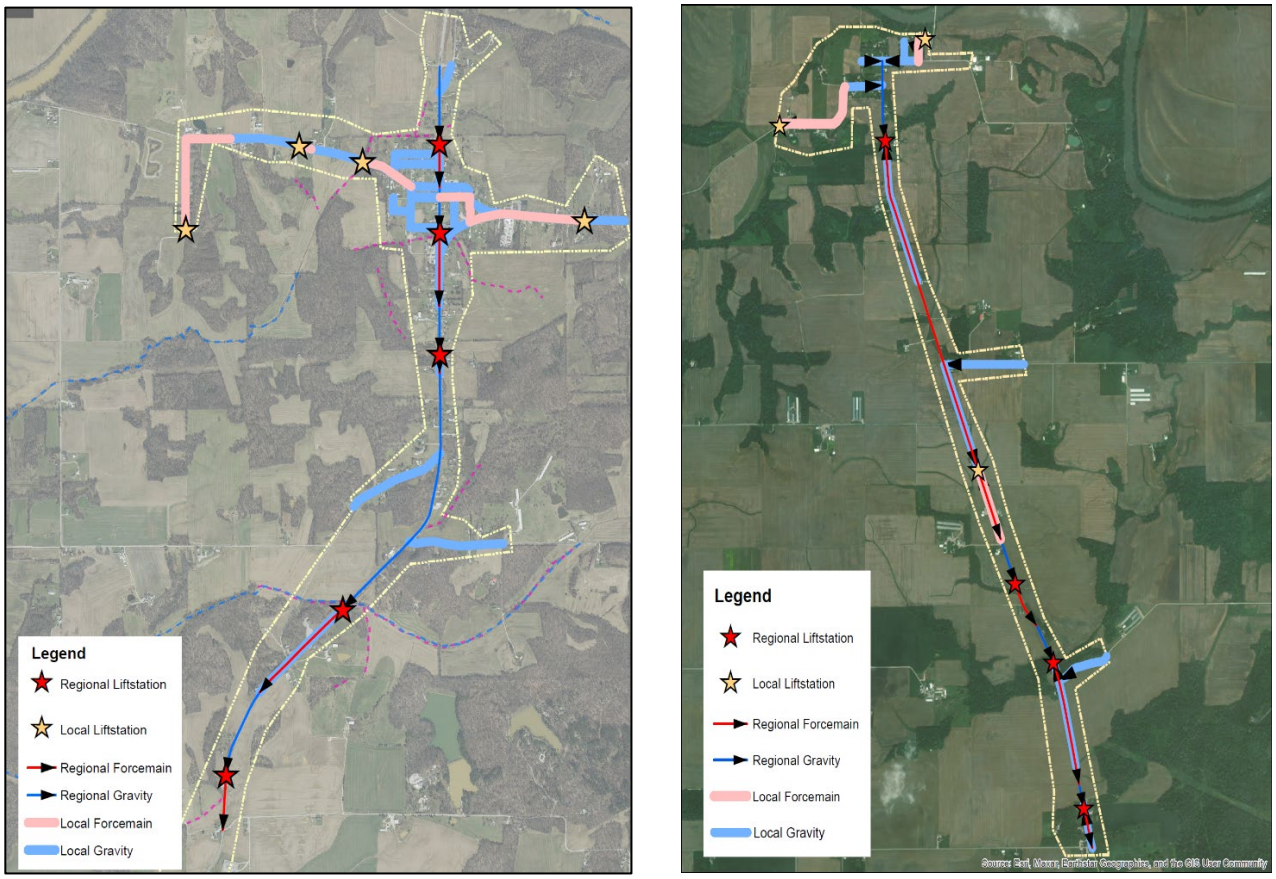

Figure 6-1. Selected Plan - Option 1A Collection & Sewer network

6.2.2 PRELIMINARY DESIGN CRITERIA

Regional Lift Stations – Pump Design

Regional Lift Stations were evaluated based on the number of homes served and preliminary forcemain layout. The pump flows represented are equal to the peak flow calculated with 1 pump operating and 1 pump as spare. Lift station calculations were developed for each option and summarized in Table 6-1. Clark Dietz also solicited budgetary proposals for pumps and grinder stations based on preliminary design parameters. Proposals are included in Appendix E.

Table 6-1. Preliminary Lift Station Design Parameters

Lift Station	Design Flow (gpm)	Design TDH (ft)	No. Submersible Pumps	Controls
Haysville Lift Station 1	20	51.7	2 (1 Spare)	Level
Haysville Lift Station 2	230	60.7	2 (1 Spare)	Level
Haysville Lift Station 3	260	42.6	2 (1 Spare)	Level
Haysville Lift Station 4	310	98.2	2 (1 Spare)	Level
Haysville Lift Station 5	300	37.6	2 (1 Spare)	Level
Portersville Lift Station 1	60	63.8	2 (1 Spare)	Level
Portersville Lift Station 2	80	33.6	2 (1 Spare)	Level
Portersville Lift Station 3	90	48.1	2 (1 Spare)	Level
Portersville Lift Station 4	100	55.2	2 (1 Spare)	Level

Regional Lift Stations – Station Design

The wet well design assumed a maximum depth of 12 feet and separated valve vault. Each wet well will have a standard design, including a base elbow (2), submersible pump (2), floats, lifting chains, guide rails, and access hatch. Discharge piping for each pump will exit the wet well to a separate valve vault with a plug valve and check valve on each line and combining with a tee to a single forcemain discharge with air release valve and flow meter.

Pumps will be operated based on level with a float system installed in the wet well. Preliminary setpoints were determined to maintain detention time less than 30 minutes and limit the number of starts per hour. A summary of preliminary set points and lift station design calculations are included in the Appendix E. Preliminary floats design includes floats for Low-Level Alarm/Pump Off, Pump Off, Pump On, and High-Level Alarm.

Forcemain

Forcemain size was determined based on the flow and headloss calculations. Per design standards, a minimum flow of 2 ft/s is required to create scour in the forcemain. The velocity was evaluated in conjunction with the TDH calculations to determine the forcemain size. The Haysville regional forcemain will be 6” diameter and the Portersville forcemain will be 4” diameter based on this analysis.

Gravity Sewer

The flows from the local collection systems are small enough that the minimum pipe size is sufficient for conveyance. Per Indiana Administrative code 327 IAC 3-6-12, the gravity pipe will be 8” with a minimum slope of 0.40% and pipe velocity of 2 ft/s.

Controls & SCADA

Lift station controls will be developed in detail during final design. At minimum, an alarm dialer system will be included to provide operators with alarm information. A basic SCADA system is recommended for remote monitoring due to the number of stations proposed.

Local Collection Grinder Stations

Grinder pump stations for local collection serving a small number of homes are anticipated to be a package grinder station system with basic float controls and spare pump. All the homes will still connect to gravity line and each of the local grinder stations will collect flows from these homes.

6.3 PROJECT PHASING AND SCHEDULE

This project is the first in a series of many future projects aimed to design and construct collection system infrastructure to serve unsewered communities in the Dubois County as part of the Regional Sewer District process. The schedule for Phase I improvements is summarized in Table 6-2. The planning and design of sewer projects for the remaining unsewered communities is ultimately dependent on the funding availability, therefore, a definite implementation of timeline cannot be identified at this point.

Table 6-2. Selected Plan Project Schedule

Action	Proposed Date
Submit PER to IDEM	March 2023
Anticipated SRF Approval of PER	June/July 2023
Submit Plans and Specs to IDEM with Construction permit application	July 2023
IDEM issues Construction Permit	October 2023
Advertise for Construction Bids	October - November 2023
Bid Opening for Construction	November 2023
Close on SRF Loan	December 2023
Contract Award	December 2023
Initiation of construction	January 2024
Substantial completion of construction	December 2024
Initiation of operation	January 2025
Final Completion of Phase I Improvements	March 2025

6.4 PROJECT COSTS

6.4.1 PROJECT COMPONENT COSTS

As described in Chapter 4, the recommended alternative was chosen by the design team based on the discussions with the County and a detailed evaluation of economic and non-economic factors. Preliminary cost estimates were prepared for each alternative and is included in Appendix C. Table 6-3 shows the preliminary cost estimate of the recommended alternative.

Table 6-3. Preliminary Cost Estimate – Recommended Alternative 1A

Item	Qty	Unit	Total Cost
Haysville			
Regional system	5	ls	
Regional Lift Station	9252	lf	$1,500,000
8-inch PVC Gravity Sewer	6159	lf	$1,850,400
6-inch Forcemain			$1,231,800
Collection system	4	ls	
Grinder station	28075	lf	$90,000
8-inch PVC Gravity sewer	7658	lf	$5,615,000
2-inch Forcemain			$957,250
Miscellaneous	103	ea	
Manholes	2	ea	$821,190
Air release valves	1	ls	$10,000
Connection to Existing Manholes	1	ls	$25,000
Road Cuts & Pavement Replacement	1	ls	$50,000
Traffic Maintenance	1	ls	$25,000
Tree Removal	1	ls	$10,000
Manhole and Gravity Sewer Testing	5	ls	$25,000
Subtotal			**$12,220,000**
Portersville			
Regional system			
Regional Lift Station			$1,200,000
8-inch PVC Gravity Sewer			$844,200
4-inch Forcemain			$2,552,040
Collection system			
Grinder station			$67,500
8-inch PVC Gravity sewer			$4,052,800
2-inch Forcemain			$569,250
Miscellaneous			
Manholes			$538,670
Air release valves			$10,000
Connection to Existing Manholes			$25,000
Road Cuts & Pavement Replacement			$50,000
Traffic Maintenance			$25,000
Tree Removal			$10,000
Manhole and Gravity Sewer Testing			$25,000
Subtotal			**$9,970,000**
General			
Land acquisition	ls		$180,000
Contractor overhead and profit	10%		$2,220,000
Mobilization/Demobilization	3%		$670,000
Bonds and Insurance	2%		$440,000
Contingency	10%		$2,220,000
Design/CES Engineering	12%		$2,660,000
TOTAL PROJECT COST			**$30,580,000**

6.4.2 SELECTED PLAN COSTS

The purpose this PER is to secure funding for the Phase 1 Sewer Improvements Project. Table 6-4 shows the estimated project costs for Phase 1 design and construction.

Table 6-4. Select Plan Cost Summary

Item	Total Cost
Non-Construction Costs	
Administrative and Legal	
*Land and Right-of-Way Acquisition	$180,000
Relocation	
Engineering Fees	
Design	$2,660,000
Construction	$3,330,000
Other	
Project Inspection	
Costs related to Plant Start-up	
Non-Construction Subtotal	$6,170,000
Construction and Equipment Subtotal	$22,190,000
Contingencies (not to exceed 10%)	$2,220,000
Total Project Cost	**$ 30,580,000**

Preliminary Project Rates

We estimated the Project rate per EDU for two funding scenarios and also calculated the funding needed for specific project rates:

1) The post project rate per EDU assuming no grant funding is $607.92.
2) The post project rate per EDU assuming all grant funding is $77.17.
3) Grant funding needed to achieve a post project rate per EDU of $85 is $30,965,000.
4) Grant funding needed to achieve a post project rate per EDU of $95 is $30,375,000.

CHAPTER 7 - LEGAL, FINANCIAL, AND MANAGERIAL CAPABILITIES

7.1 MANAGEMENT RESOLUTIONS

Resolutions from Dubois County Board for an Authorized Representative and PER Acceptance can be found in Appendix F.

7.2 SRF PROJECT FINANCING INFORMATION

SRF Project Financing Information for Phase I Sewer Improvements Project – Recommended Alternative 1 A is given below:

SRF Project Financing Information

1.	Project Cost Summary	
a.	Collection/transport system cost	$ $22,190,000
b.	Treatment system cost (Equipment Purchase)	$_____
c.	Non-Point source (NPS) cost	$_____
	Subtotal Construction Cost	$_____
d.	Capacity Reservation Fees	$_____
e.	Contingencies[1] (should not exceed 10% of construction costs)	$ 2,220,000
f.	Non-construction costs e.g., engineering/design services, field exploration studies, project management & construction inspection, legal & administrative services, land costs (including capitalized costs of leased lands, ROWs, and easements), start-up costs (i.e., O & M manual, operator training)	$ 6,170,000
g.	**Total Project Cost** (lines a+b+c+d+e+f)	$ 30,580,000
h.	Total ineligible SRF costs (Total ineligible SRF costs will not be covered by the SRF loan.)	$180,000
i.	Other funding sources (list other grant/loan sources and amounts)	
	(1) Local Funds (hook-on fees, connection fees, capacity fees etc.)	$_____
	(2) Cash-on-hand	$ _____
	(3) Indiana DOC Community Focus Fund (CFF)	$_____
	(4) US Dept. of Agriculture Rural Development (RD)	$_____
	(5) Other	$_____
	Total Other Funding Sources	$_____
2.	**SRF Loan Amount** (line g minus line item h)	$30,400,000

3. Financial Advisor
   a. Firm _____
   b. Name _____
   c. Phone Number _____

4. Bond Counsel
   a. Firm Contact _____
   b. Name _____
   c. Phone Number _____

The following costs are *not eligible* for SRF Reimbursement:

1. Land Cost (*unless it's for sludge application*) $ 0

   Only the actual cost of the land is **not eligible**; associated costs (such as attorney's fees, site title opinion and the like) **are eligible**.

2. Materials and work done on private property $ 0
   (*Installation/repair of laterals, including disconnection of inflow into laterals; abandonment of on-site systems {septic tank or mound systems}).* Grinder pumps, vacuum stations and other appurtenances/installations on private property to treat/transport ARE fundable IF owned and maintained by the participant.

3. Grant applications and income surveys done for other agencies (e.g., OCRA, RUS, etc.).
   $ 0

4. Any project solely designed to promote economic development and growth is ineligible.

5. Costs incurred for preparing NPDES permit applications and other tasks unrelated to the SRF Project.
   $ 0

6. Cleaning of equipment, such as digesters, sand filters, grit tanks and settling tanks.

   These items should have been maintained through routine operation, maintenance and replacement by the political subdivision. Sewer cleaning is **ineligible** for SRF *unless* the cleaning is required for sewer rehabilitation such as slip-lining and cured in place piping (CIPP). $ 0

7.2.1 LAND ACQUISITION SCHEDULES

Land acquisition may be required for five regional lift stations. The project will be located within the Dubois County boundaries. This requirement will be further reviewed and evaluated during the preliminary engineering phase of the project.

7.2.2 INTER-LOCAL GOVERNMENTAL AGREEMENT

The treatment facilities of three cities – City of Jasper, City of Huntingburg, and Patoka Lake Regional Water and Sewer District will be utilized for the treatment of the flows from the Regional Sewer District's collection system. Interlocal governmental agreement will therefore be required and prepared once funding is secured, confirming that the project will be able to move forward.

7.2.3 FISCAL SUSTAINABILITY PLAN

The Fiscal Sustainability Plan Self-Certification Form will be included in Appendix ___ once approved.

CHAPTER 8 - PUBLIC PARTICIPATION

8.1 TIME AND PLACE OF PUBLIC HEARING

Several public meetings and stakeholder meetings were held over the last four years (2019 – 2022) to make residents aware of the regional sewer district planning, County's intent to create RSD, reasons for proposed sewer expansion and sharing findings of the Regional Sewer District Study Report.

The most recent public hearing was held on November 21, 2022 – 9:00 am (EST) at the Dubois County Annex Building in Jasper IN. An additional public hearing will be held prior to construction.

The notice of the public hearing was published in the local newspapers on November 9, 2022, and November 16, 2022. Copies of the Publisher's Affidavits will be included in Appendix F. Completed drafts of the Regional Sewer District Study were made available to the public from the date of the published notice until the public hearing. These copies of the report were available at Dubois County Board as well as on the Dubois County website for viewing.

8.2 PUBLIC HEARING MINUTES AND SIGN-IN SHEET

The most recent public hearing was held on November 21, 2022 – 9:00 am (EST) at the Dubois County Annex Building in Jasper IN. Every property owner within the project limits received a letter in the mail notifying them that their property is located within the project limits and of the Public Hearing.

The public hearing notice, sign-up sheet, meeting minutes, and resolution is included in Appendix F.

8.3 PUBLIC HEARING COMMENTS

Questions and comments received during the public hearing are summarized in a Meeting memo included in Appendix F.

Clark Dietz, Inc.
125 W Church St
Champaign, IL 61820

p 217.373.8900

clarkdietz.com

Clark Dietz

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Appendix A

Project Area Maps

USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

JASPER QUADRANGLE
INDIANA
7.5-MINUTE SERIES

PORTERSVILLE

HAYSVILLE

JASPER

Portersville
Haysville
Ireland
Saint Marys Catholic Cem
Alexander Cem
Dillin Cholera Cem
McKee Cem
Wilhoit Cem
Evans Cem
Sherritt Cem
Cooper Cem
Chattin Cem
Church Cem
Kelso Cem
Reed Cem
Cavender Cem
Hope Cem
Buffalo Flat
Lottes Lake
Calumet Lake
Izaak Walton Lake
Deerwood Lake
Ruxer Lake
Briedenbaugh Lake
Buck Shoals
MARTIN CO
DUBOIS CO
DAVIESS CO
DUBOIS CO
East Fork White River
Portersville Ditch
Water Drain
Mill Creek
Near Brook
Haysville Run
Cooper Run
Shoal Run
White Hollow
Home Drain
Riz Run
Razlefeg
Little Cr
Mud Pt
Hole Run
Mudhole Br
Sherritt Drain
E Fork Mill Cr
Bison Br
Calf Br
Buffalo Stream
Long Ditch
Patoka River
Mackenson Br
Grist Run
Ireland Brook
Ire Run
Mill Cr
Pat Run
Pitch Br
Patoka River
Part Brook
Plain Drain
Jahn Cr
Jasper Brook
Coon Run
Cline Brook
Fish Run
Evans Brook
Alexander Run
Crooked Cr
Dick Cr
Shiloh Drain
Crooked Cr
Jasper Middle School to Schuetter Rd.
Jasper Riverwalk
Jasper Lake
Bonnet Bark Trail
W PORTERSVILLE RD
N PORTERSVILLE RD
W HAYSVILLE RD
E STATE RD 56
W STATE RD 56
E STATE RD 164
2ND AVE
3RD AVE
MARKET ST
N PARK ST
CO RD 20 E
CO RD 60 E
N KELLERVILLE RD
MERIDIAN RD
E JASPER DUBOIS RD
NEWTON ST
MILL ST
MANNHEIM RD
MAIN ST
JACKSON ST
BARTLEY ST
GREEN ST
W 47TH ST
W 36TH ST
W 31ST ST
E 36TH ST
E 30TH ST
W 20TH ST
W 19TH ST
W 15TH ST
E 15TH ST
W 14TH ST
E 14TH ST
W 13TH ST
E 13TH ST
E 12TH ST
W 8TH ST
E 8TH ST
W 7TH ST
E 6TH ST
W 6TH ST
W 2ND ST
W 1ST AVE
W 5TH AVE
W DIVISION RD
W 700 N
W 675 N
W 600 N
W 570 N
W 500 N
W 400 N
W 350 N
W 300 N
W 200 N
W 180 N
W 150N
E 600 N
E 500 N
E 420 N
E 400 N
E 330N
E 300 N
E 190 N
N B325E
W CO FARM RD
W 50 N
W LADINO LN
W SHILOH RD
W SKYVIEW DR
PEBBLE DR
BRESCHER DR
GREGORY LN
HANNAH LN
EVANS LN
LECHNER LN
MILL CREEK LN
N RAFT LN
RHINE STRASSE
BADEN STRASSE
MANOR DR
LAKESIDE DR
FOXRIDGE DR
BITTERSWEET DR
GRASSLAND HILLS RD
W NORTHWOOD AVE
LESLIE DR
HOWARD DR
BIRK DR
TERRY LN
CATHY LN
ROLLING RIDGE RD
VALLEY VIEW DR
COBBLESTONE RD
SAINT CHARLES ST
EMILY ST
VINE ST
LEOPOLD ST
GREEKE ST
CHERRY ST
E RIVERSIDE DR
CLAY ST
GILESLEE RD
RUMBACH AVE
CHURCH AVE
WERNSING RD
N TRUMAN RD
S TRUMAN RD
S KLUEMPER RD
N KLUEMPER RD
S SUNSHINE DR
N SKYVIEW DR
SAVANNAH DR
N SAPPHIRE DR
N WHEATLAND DR
N 500 W
N 425 W
N 400 W
N 360 W
N 350 W
N 200 W
N 150W
N 490 W
N 450 W
N 100 E
N 125E
N 175 E
N 25 E
S NEWTON ST
S MERIDIAN RD
N MERIDIAN RD
N MILL ST
S MILL ST
S UNIVERSITY DR
MAPLECREST BLVD
N WHODERVILLE RD
CO RD 100 E
231
56
164

-87.0000° EH
-86.8750°
38.5000°
38.3750°
01 000mE
02
03
04
05
06
07
08
09
10
11 000mE
42 61 000mN
42 48 000mN

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 16S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2016 - July 2016
Roads..... U.S. Census Bureau, 2016 - 2019
Names.....GNIS, 1979 - 2018
Hydrography.....National Hydrography Dataset, 2002 - 2018
Contours.....National Elevation Dataset, 2016
Boundaries.....Multiple sources; see metadata file 2017 - 2018
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1980

MN
GN
4°4′ 72 MILS
0°2′ 1 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
EH
Grid Zone Designation 16S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

INDIANA
QUADRANGLE LOCATION

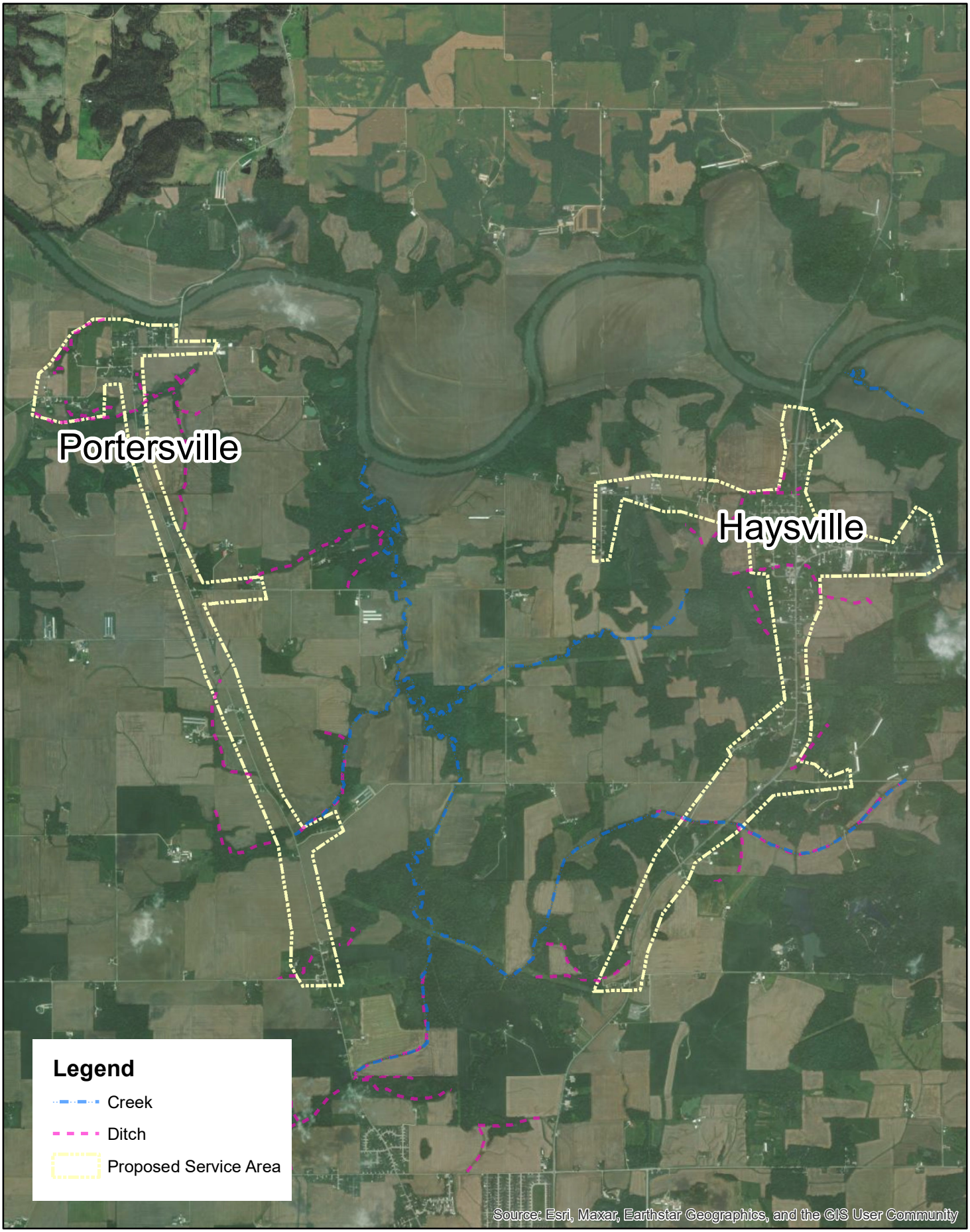
1 2 3
4 5
6 7 8
ADJOINING QUADRANGLES

1 Glendale
2 Alfordsville
3 Rusk
4 Otwell
5 Dubois
6 Velpen
7 Huntingburg
8 Saint Anthony

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

JASPER, IN
2019

NSN 7643016362117
NGA REF NO. USGSX24K22414



Dubois County Regional Sewer District Project 1
Proposed Service Area Map

ClarkDietz
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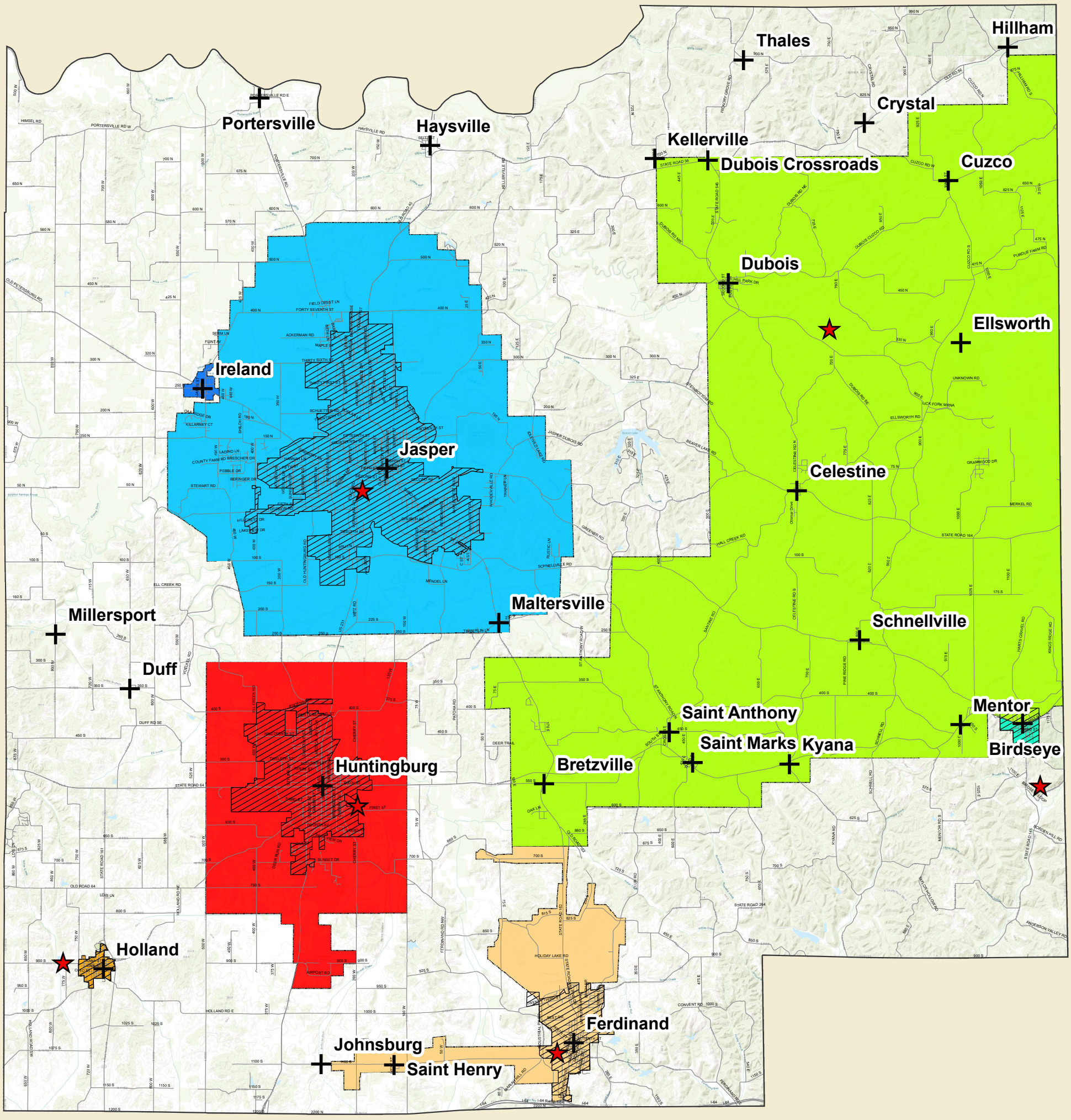
N
W E
S

1 inch = 3,503 feet

Dubois County
Existing Sewer District



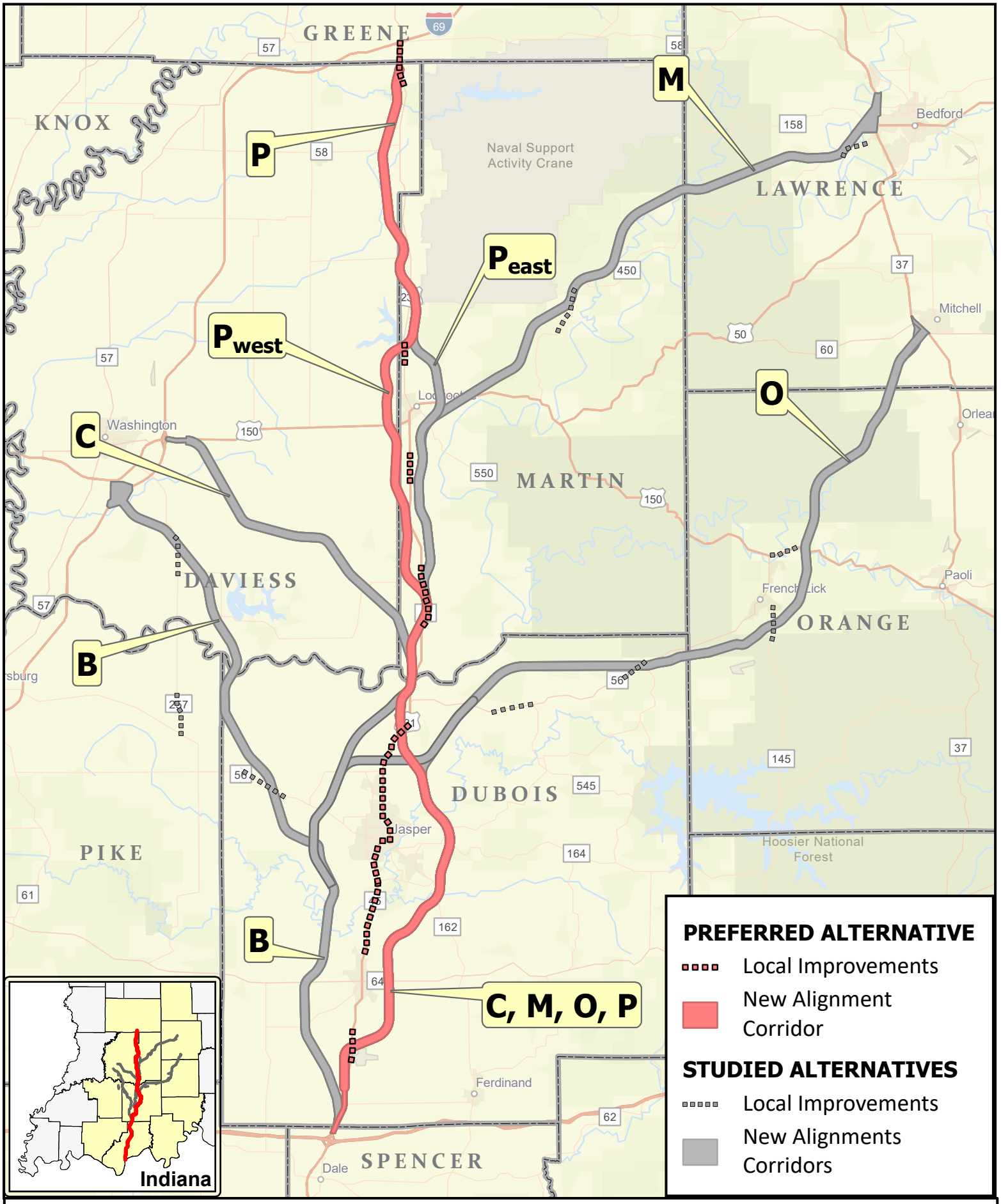
Legend

- Existing WWTP
- Places
- Incorporated Areas
- Roads

Existing Sewer Districts

- Birdseye
- Ferdinand
- Holland
- Huntingburg
- Ireland
- Jasper
- Patoka

0 1 2 4 6 Miles



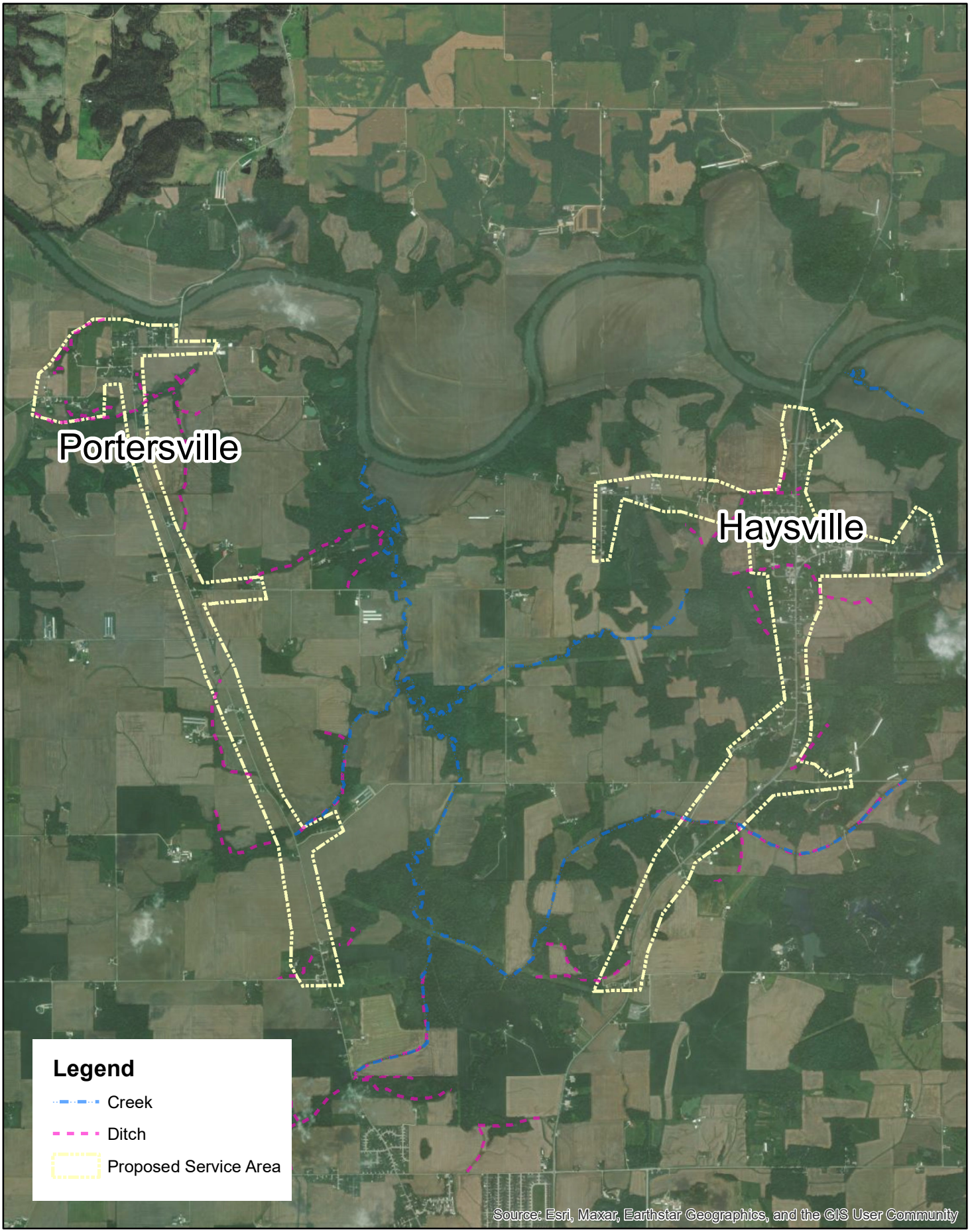
MID-STATES CORRIDOR

Mid-States Corridor Alternatives

0 2.5 5 10 Miles

N

3/30/2022



Dubois County Regional Sewer District Project 1
Proposed Service Area Map

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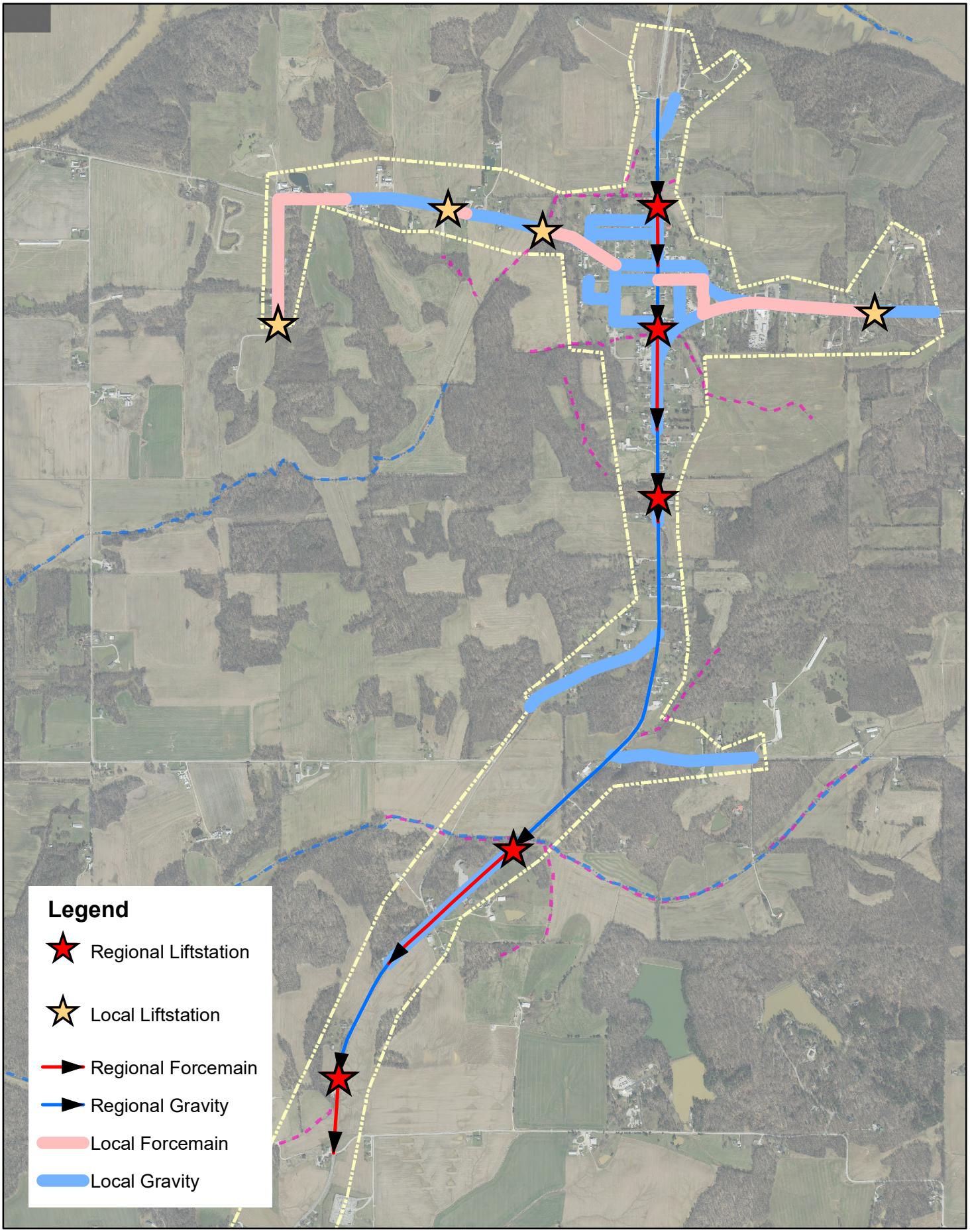
N
W E
S

1 inch = 3,503 feet



Dubois County Regional Sewer District Project 1
Haysville Option 1a Sewer Map

ClarkDietz
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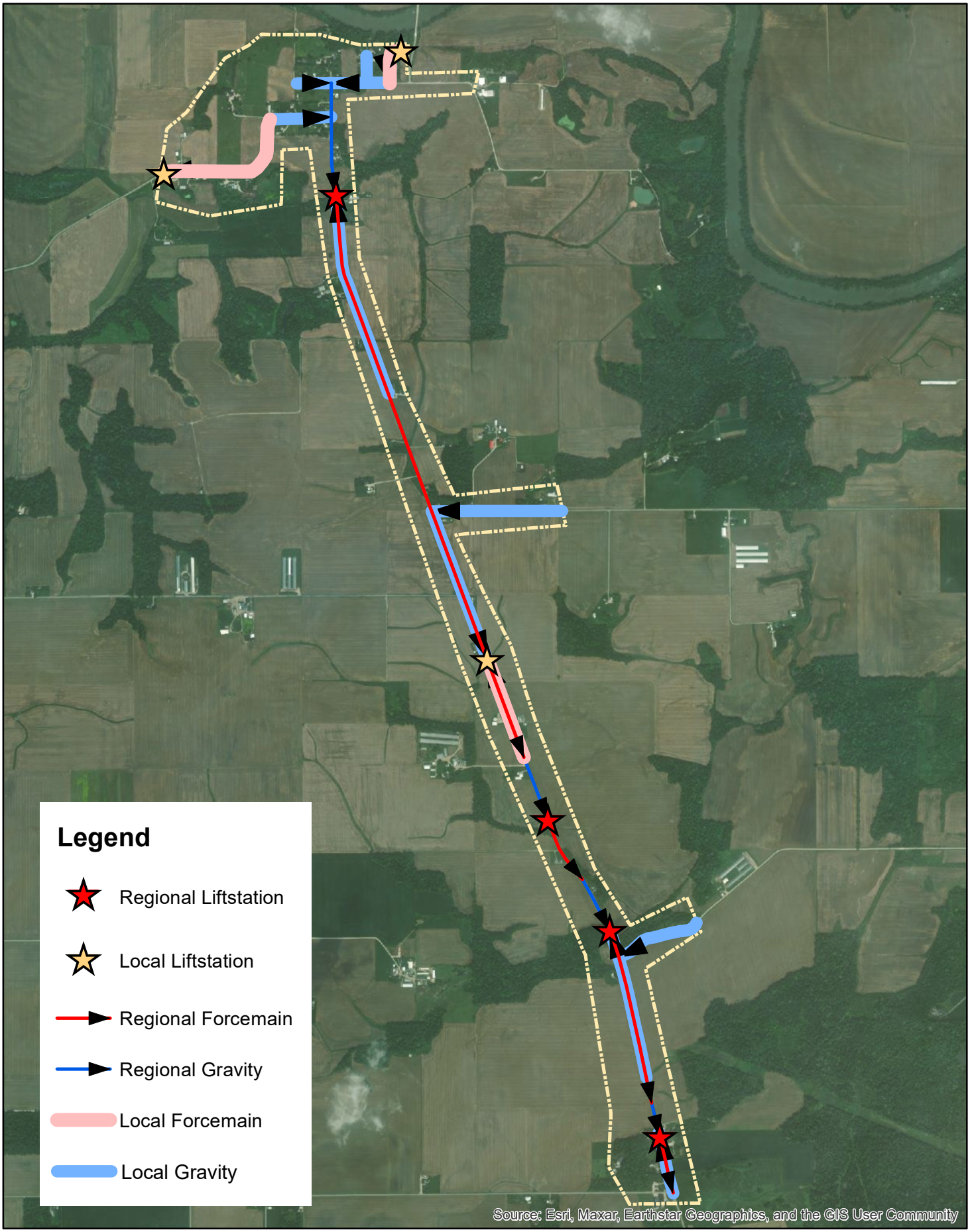
N
W E
S

1 inch = 1,791 feet



Dubois County Regional Sewer District Project 1
Portersville Option 1a Sewer Map

ClarkDietz
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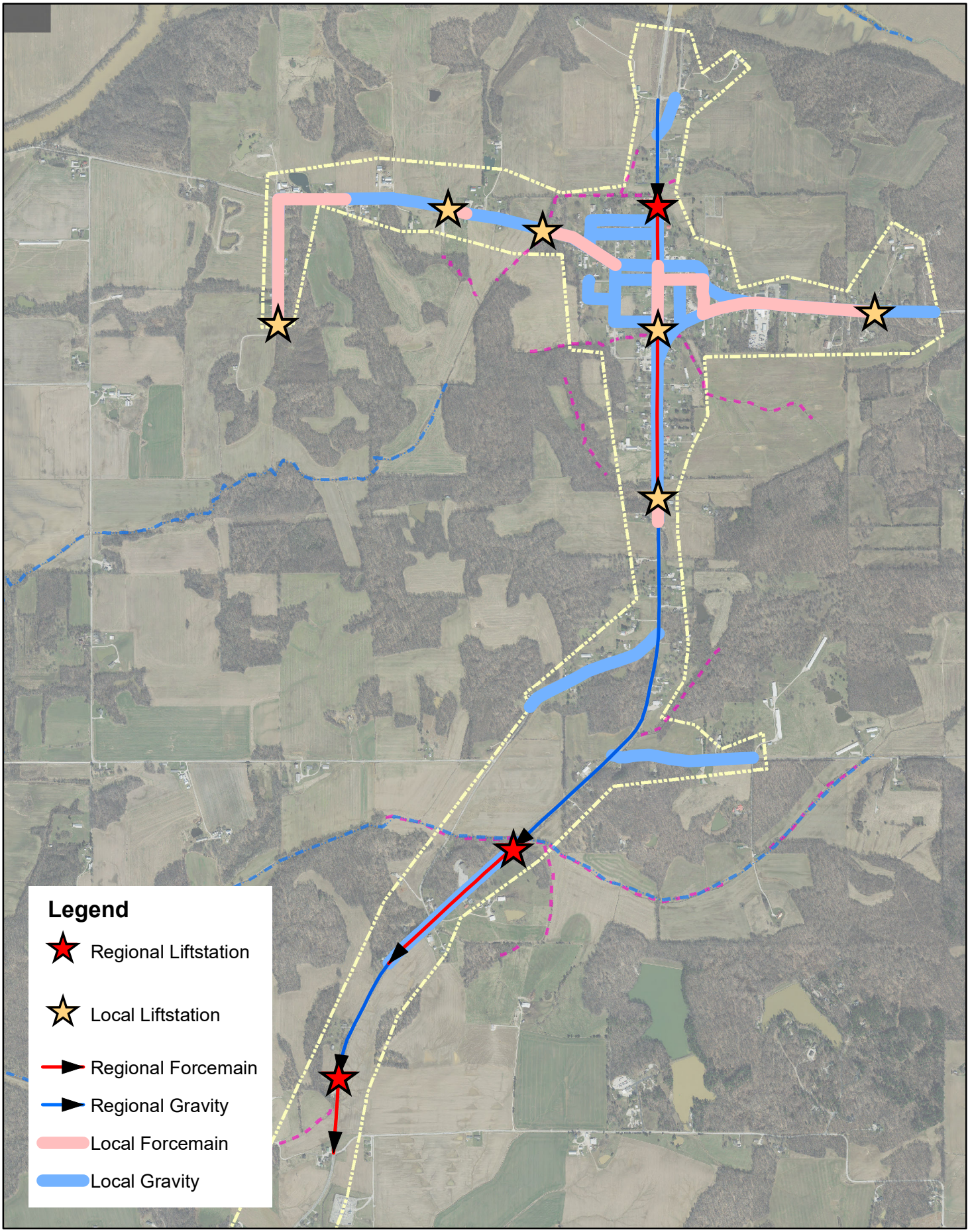
N
W E
S

1 inch = 1,998 feet



Dubois County Regional Sewer District Project 1
Haysville Option 1b Sewer Map

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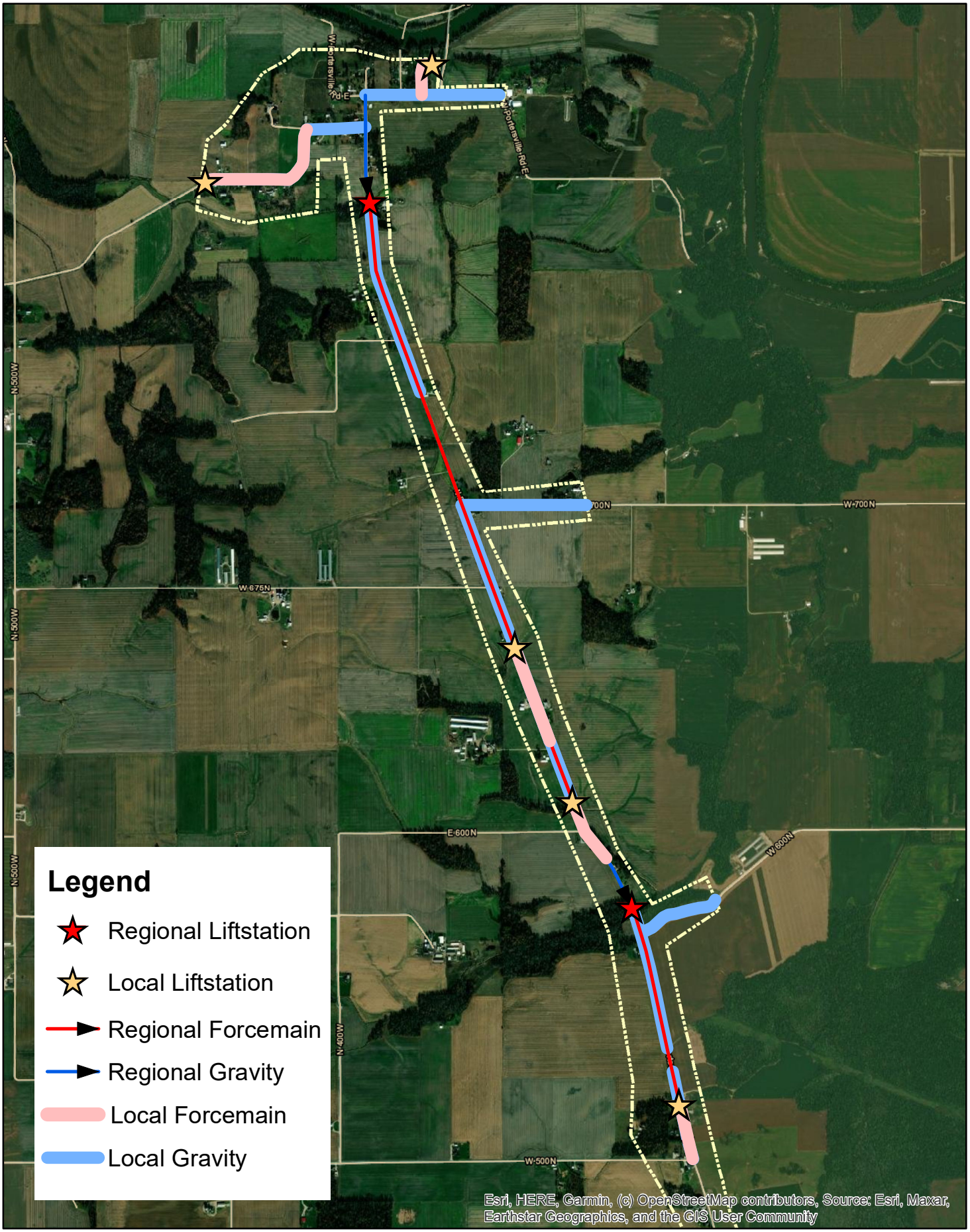
N
W E
S

1 inch = 1,791 feet



Dubois County Regional Sewer District Project 1
Portersville Option 1b Sewer Map

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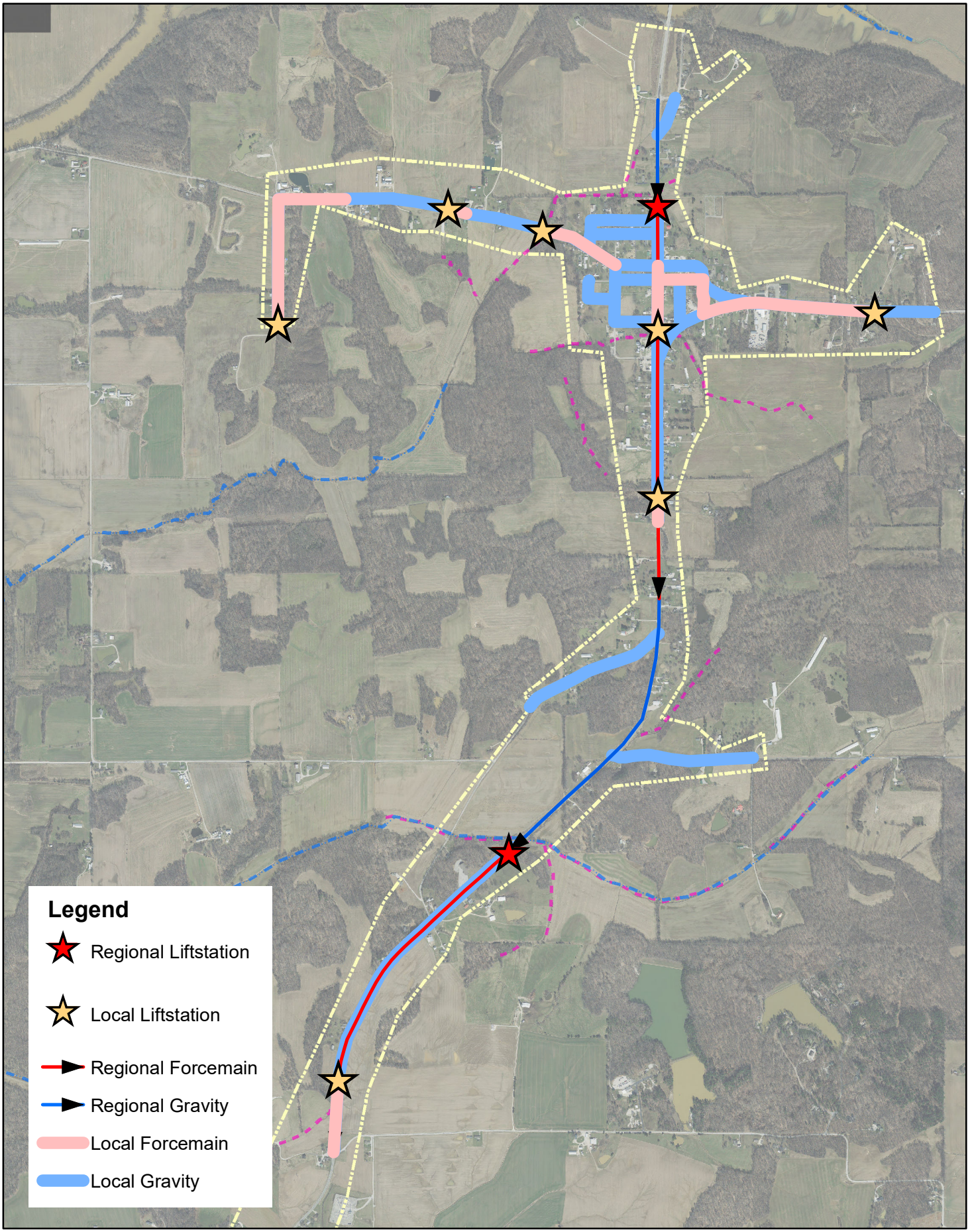
N
W E
S

1 inch = 2,083 feet



Dubois County Regional Sewer District Project 1
Haysville Option 1c Sewer Map

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N
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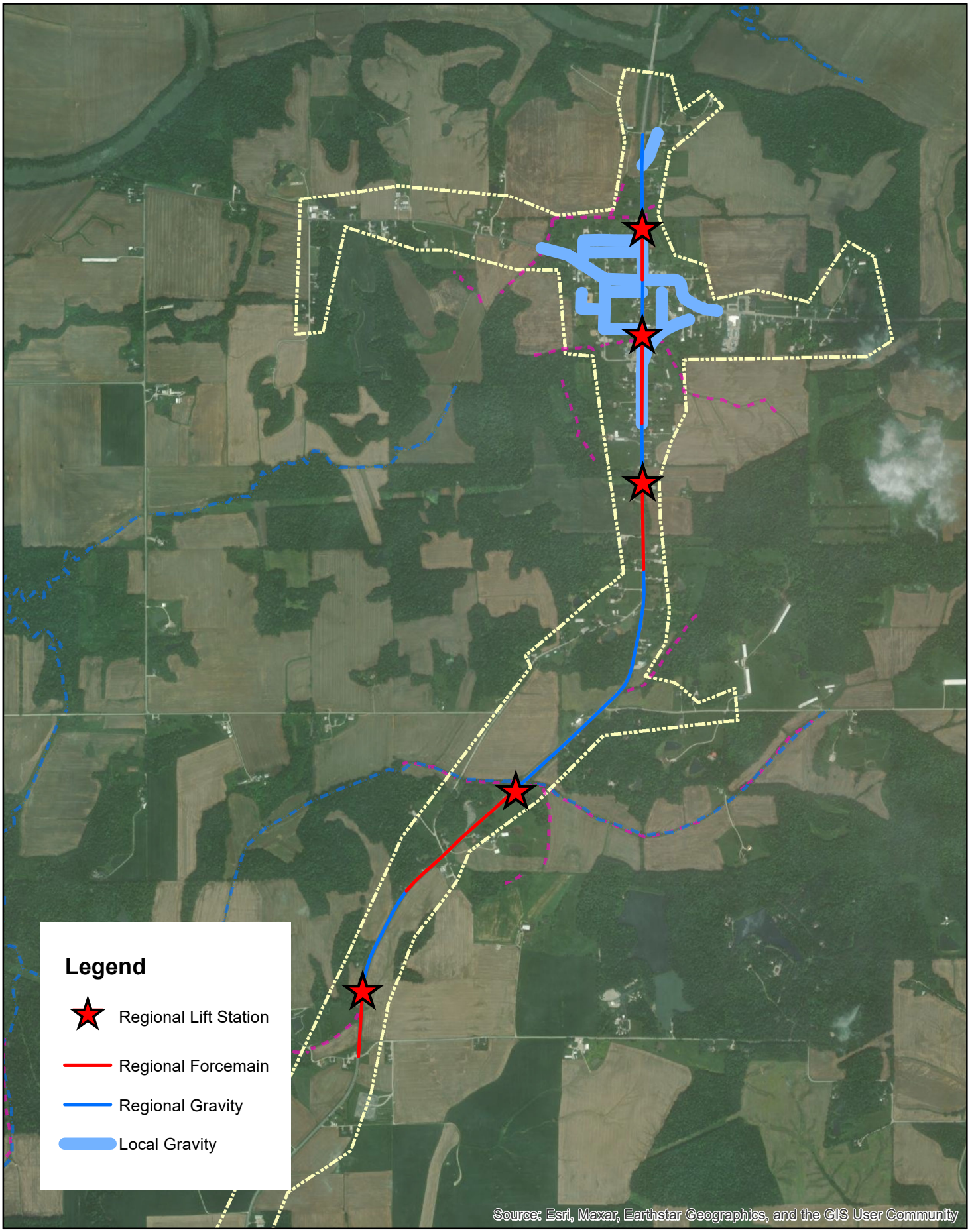
S

1 inch = 1,791 feet



Dubois County Regional Sewer District Project 1
Haysville Option 1d Sewer Map

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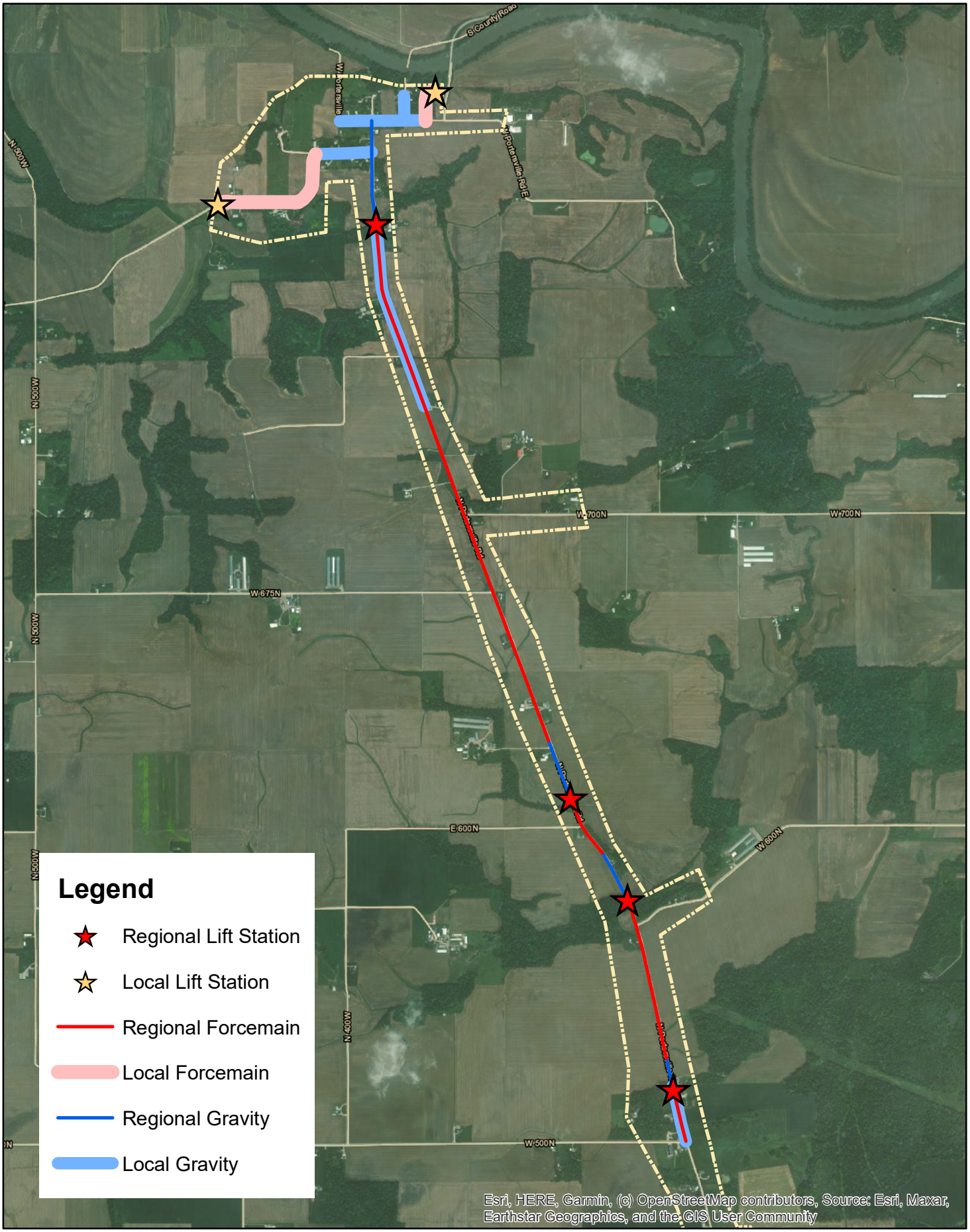
N
W E
S

1 inch = 2,046 feet



Dubois County Regional Sewer District Project 1
Portersville Option 1d Sewer Map

N
W E
S

1 inch = 2,173 feet

Appendix B

Sewer Ordinance

ORDINANCE NO. 2018-1

AN ORDINANCE REGULATING THE DESIGN, CONSTRUCTION, INSTALLATION, MAINTENANCE AND OPERATION OF PRIVATE SEWAGE DISPOSAL SYSTEMS IN DUBOIS COUNTY, INDIANA; REQUIRING A PERMIT TO INSTALL, REPAIR OR ALTER ANY PRIVATE SEWAGE DISPOSAL SYSTEM AND ESTABLISHING REGULATIONS WITH REGARD TO THE INSTALLATION THEREOF; REQUIRING THE REGISTRATION OF INSTALLERS OF SUCH SYSTEMS; AND PENALTIES FOR VIOLATIONS THEREOF.

Section 1. This ordinance shall be administered by the Dubois County Health Department through the Health Officer or his designee. Minimum requirements shall be specified by the Indiana State Department of Health as now provided in its Residential Sewage Disposal Systems Rule 410 IAC 6-8.3 or as the same may be hereafter changed or amended.

Section 2. 410 IAC 6-8.3-52 General sewage disposal requirements. Part (L). Wherever a public sanitary sewer becomes available and is within 200 feet from the residential or business property line served by a private sewage disposal system or privy, situated in Dubois County, Indiana, a direct connection shall be made to the said sewer. Any septic tank, seepage pits, privy pits and similar sewage disposal and treatment facilities shall be abandoned and filled in a safe and sanitary manner.

Section 3. 410 IAC 6-8.3-57 Separation distances. The following provisions shall apply in Dubois County:

Minimum distance in feet from	Septic tank, Dosing tank,	Upslope from absorption field	Down slope from absorption field
Front, side or rear lot lines	10	10	10

Section 4. 410 IAC 6-8.3-74 Subsurface trench on-site sewage systems: general design and construction requirements. Part (Q) the following provision shall apply in Dubois County: There shall be a minimum separation of ten (10) feet, on center, between absorption field trenches.

Section 5. Permits to install, registering of installers, permit and registration fees and inspections.

A. Before commencement of construction of any business building or private residence where a private sewage disposal system or privy is to be installed or where any alterations, repair or addition of an existing private sewage disposal system is planned, the owner or agent of the owner shall obtain a soil evaluation by an Indiana Registered Soil Scientist and complete the plan review form provided by the Dubois County Health Department.
B. Site reviews will be conducted by the Dubois County Health Department to verify written plan review before application for a permit may be made. The application for such permit shall be made on a form provided by the Dubois County Health Department which application shall be supplemented by any plans, specifications and any other information deemed necessary by the Health Officer or his designee.
C. No person shall construct, install, connect, alter or extend a private sewage disposal system within Dubois County, Indiana without first having filed a written application as set forth in this ordinance and having a written permit from the Health Officer or his designee.
D. A fee established by the Dubois County Board of Health shall be paid with each application for permits filed with the Dubois County Health Department.
E. A separate permit shall be obtained for sewage disposal work on each dwelling.
F. If the sewage disposal system has not been constructed, installed, altered or extended before the rule governing it changes, the permit shall automatically expire.

G. The Health Officer or his designee shall deny a permit if the information on the application is incomplete, inaccurate or indicates that the provisions of this ordinance cannot be met.
H. The issuance of a permit does not constitute assumption by the Dubois County Health Department or its employees of liability for the failure of any sewage disposal system.
I. The Health Officer or his designee shall maintain a register of all people engaged in or intending to engage in the installation of sewage disposal devices or equipment within Dubois County, Indiana.
J. Any individual, firm, association or corporation engaged in or intending to engage in the installation of sewage disposal devices or equipment shall make application to the Health Officer or his designee to have his name placed on the register for those engaged in the installation of sewage disposal devices or equipment. The applicant shall submit an application fee established by the Dubois County Board of Health per calendar year or part thereof. The application form shall contain the name and address of the person making application and the address of the firm or place of business he is associated with, and such information as the Health Officer or his designee determines will reasonably aid in the administration and enforcement of this ordinance.
K. Upon recommendation of the Health Officer or his designee, the Board may remove the name of any individual, partnership, firm, association or corporation from the register or persons engaged in the installation of sewage disposal devices or equipment who have demonstrated inability or unwillingness to comply with the regulations. Such person may have his name reinstated on the register of persons engaged in the installation of sewage disposal devices or equipment by the Board of Health after satisfactory demonstration of ability or willingness to comply with the regulations.
L. All fees collected under the terms of this ordinance shall be receipted monthly into the Dubois County Treasury and credited to the Dubois County Health Fund for services rendered in enforcing this ordinance.
M. The provisions of the permit for the construction of a private sewage disposal system or privy shall not be considered fulfilled until the installation is completed to the satisfaction of the Health Officer or his designee. The permitee shall notify the Health Officer or his designee at least two (2) working days prior to completion of the system for final backfill inspection. Such final inspection is required before any underground portions are covered.
N. The Health Officer or his designee shall be permitted to enter upon all properties for purposes of inspection, observation and testing necessary to carry out the provisions of this ordinance.

Section 6. Enforcement Procedures

A. Any person found to be violating any provisions of this regulation may be served by the Health Officer or his designee with a written order stating the nature of the violation and providing a time limit for satisfactory correction thereof.
B. After receiving an order in writing from the Health Officer or his designee, the owner, agent of the owner, the occupant or agent of the occupant of the property shall comply with the provisions of this ordinance as set forth in said order and within the time limit included therein. Said order shall be served on the owner or agent of the owner or the occupant or the agent of the occupant, but may be served on any person who, by contact with the owner, has assumed the duty of complying with the provisions of an order.

Section 7. Penalties

A. Any person found to be violating any provisions of this ordinance shall be guilty of a misdemeanor. On conviction, the violator shall be punished for the first offense by a fine of not more than five hundred ($500.00) dollars; for the second offense by the fine of not more than one thousand ($1,000.00) dollars; and for the third and each subsequent offense by a fine of not more than one thousand ($1,000.00)

dollars to which may be added imprisonment for any determined period not exceeding ninety (90) days, and each day after the expiration of the time limit for abating insanitary conditions and conditions as ordered by the Health Officer or his designee, shall constitute a distinct and separate offense.

Section 8. Appeals Procedure

A. If an applicant is refused a permit, the Health Officer shall, upon request, afford the applicant a fair hearing in accordance with provisions of IC 4-21.5-3.
B. The Health Officer may, after reasonable notice and opportunity for a fair hearing, in accordance with the provisions of IC 4-21.5-3, revoke a permit if it finds that the holder of the permit has failed to comply with any provisions of this ordinance.

Section 9. Validity

A. If any section, paragraph, sentence, clause, phrase or work of this ordinance, or any part thereof be declared invalid for any reason, the remainder of said ordinance shall not be affected thereby and shall remain in full force and effect.
B. Adoption of this ordinance shall serve to supersede Dubois County Board of Health Ordinance 2011-1.

Section 10. Date of effect

A. This ordinance shall be in full force and effect on the 18th of June, 2018, upon its adoption and its publication as provided by law.

Signed By: Dubois County Commissioners

Nick Hostetter _____

Chad Blessinger _____

Elmer Brames _____

Appendix C

Preliminary Cost Estimate

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Life Cycle Cost Analysis
March 2023

	Option 1-A	Option 1-B	Option 1-C	Option 1-D
PLANNING PARAMETERS				
Planning Period, years	20	20	20	20
Discount Rate[1], % per year	2.0%	2.0%	2.0%	2.0%
Electricity Cost per KW-Hr, $	0.10	0.10	0.10	0.10
Estimated Operating Load, kWh	300	200	307	203
Annual Power Consumption, KW-Hrs/yr	109,675	73,100	112,069	74,137
ANNUAL OPERATING COSTS				
Power Costs	$ 10,967	$ 7,310	$ 11,207	$ 7,414
Maintenance Costs	$ 20,000	$ 18,000	$ 15,300	$ 16,000
TOTAL - ANNUAL COSTS	**$ 31,000**	**$ 25,000**	**$ 27,000**	**$ 23,000**

20-Year Planning Period				
PRESENT VALUE COSTS				
Capital Costs	$30,580,000	$30,610,000	$31,370,000	$19,510,000
20-Year Power Costs	$230,000	$154,000	$235,000	$156,000
20-Year Maintenance Costs	$420,000	$378,000	$321,000	$336,000
TOTAL - PRESENT VALUE	**$31,230,000**	**$31,142,000**	**$31,926,000**	**$20,002,000**

Notes:

1 Real discount rate (20-year) taken from Appendix C - OMB Circular No A-94, revised December 2022

Net Present Value

Preliminary Opinion of Probable Cost

Planning Parameter	
Planning Period, years	20
Electrical Cost , $ per kW-hr	$ 0.100
Annual O&M Cost Escalation, per year	2.0%
Interest Rate, % per year	2.0%

	Option 1A			Option 1B			Option 1C			Option 1D		
Year	Annual Power Cost	Sewer/Pump station Maintenance Cost	Annual Total O&M Cost	Annual Power Cost	Sewer/Pump station Maintenance Cost	Annual Total O&M Cost	Annual Power Cost	Sewer/Pump station Maintenance Cost	Annual Total O&M Cost	Annual Power Cost	Sewer/Pump station Maintenance Cost	Annual Total O&M Cost
2023	$ 10,967	$ 20,000	$ 30,967	$ 7,310	$ 18,000	$ 25,310	$ 11,207	$ 15,300	$ 26,507	$ 7,414	$ 16,000	$ 23,414
2024	$ 11,187	$ 20,400	$ 31,587	$ 7,456	$ 18,360	$ 25,816	$ 11,431	$ 15,606	$ 27,037	$ 7,562	$ 16,320	$ 23,882
2025	$ 11,411	$ 20,808	$ 32,219	$ 7,605	$ 18,727	$ 26,333	$ 11,660	$ 15,918	$ 27,578	$ 7,713	$ 16,646	$ 24,360
2026	$ 11,639	$ 21,224	$ 32,863	$ 7,757	$ 19,102	$ 26,859	$ 11,893	$ 16,236	$ 28,129	$ 7,867	$ 16,979	$ 24,847
2027	$ 11,872	$ 21,649	$ 33,520	$ 7,913	$ 19,484	$ 27,396	$ 12,131	$ 16,561	$ 28,692	$ 8,025	$ 17,319	$ 25,344
2028	$ 12,109	$ 22,082	$ 34,191	$ 8,071	$ 19,873	$ 27,944	$ 12,373	$ 16,892	$ 29,266	$ 8,185	$ 17,665	$ 25,851
2029	$ 12,351	$ 22,523	$ 34,874	$ 8,232	$ 20,271	$ 28,503	$ 12,621	$ 17,230	$ 29,851	$ 8,349	$ 18,019	$ 26,368
2030	$ 12,598	$ 22,974	$ 35,572	$ 8,397	$ 20,676	$ 29,073	$ 12,873	$ 17,575	$ 30,448	$ 8,516	$ 18,379	$ 26,895
2031	$ 12,850	$ 23,433	$ 36,283	$ 8,565	$ 21,090	$ 29,655	$ 13,131	$ 17,926	$ 31,057	$ 8,686	$ 18,747	$ 27,433
2032	$ 13,107	$ 23,902	$ 37,009	$ 8,736	$ 21,512	$ 30,248	$ 13,393	$ 18,285	$ 31,678	$ 8,860	$ 19,121	$ 27,982
2033	$ 13,369	$ 24,380	$ 37,749	$ 8,911	$ 21,942	$ 30,853	$ 13,661	$ 18,651	$ 32,312	$ 9,037	$ 19,504	$ 28,541
2034	$ 13,637	$ 24,867	$ 38,504	$ 9,089	$ 22,381	$ 31,470	$ 13,934	$ 19,024	$ 32,958	$ 9,218	$ 19,894	$ 29,112
2035	$ 13,909	$ 25,365	$ 39,274	$ 9,271	$ 22,828	$ 32,099	$ 14,213	$ 19,404	$ 33,617	$ 9,402	$ 20,292	$ 29,694
2036	$ 14,188	$ 25,872	$ 40,060	$ 9,456	$ 23,285	$ 32,741	$ 14,497	$ 19,792	$ 34,290	$ 9,590	$ 20,698	$ 30,288
2037	$ 14,471	$ 26,390	$ 40,861	$ 9,645	$ 23,751	$ 33,396	$ 14,787	$ 20,188	$ 34,975	$ 9,782	$ 21,112	$ 30,894
2038	$ 14,761	$ 26,917	$ 41,678	$ 9,838	$ 24,226	$ 34,064	$ 15,083	$ 20,592	$ 35,675	$ 9,978	$ 21,534	$ 31,512
2039	$ 15,056	$ 27,456	$ 42,512	$ 10,035	$ 24,710	$ 34,745	$ 15,385	$ 21,004	$ 36,388	$ 10,177	$ 21,965	$ 32,142
2040	$ 15,357	$ 28,005	$ 43,362	$ 10,236	$ 25,204	$ 35,440	$ 15,692	$ 21,424	$ 37,116	$ 10,381	$ 22,404	$ 32,785
2041	$ 15,664	$ 28,565	$ 44,229	$ 10,440	$ 25,708	$ 36,149	$ 16,006	$ 21,852	$ 37,858	$ 10,589	$ 22,852	$ 33,441
2042	$ 15,978	$ 29,136	$ 45,114	$ 10,649	$ 26,223	$ 36,872	$ 16,326	$ 22,289	$ 38,616	$ 10,800	$ 23,309	$ 34,109
2043	$ 16,297	$ 29,719	$ 46,016	$ 10,862	$ 26,747	$ 37,609	$ 16,653	$ 22,735	$ 39,388	$ 11,016	$ 23,775	$ 34,792
PV	**$ 230,000**	**$ 420,000**	**$ 650,000**	**$ 154,000**	**$ 378,000**	**$ 532,000**	**$ 235,000**	**$ 321,000**	**$ 557,000**	**$ 156,000**	**$ 336,000**	**$ 492,000**

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Power Calculation
March 2023

	Option 1A	Option 1B	Option 1C	Option 1D
Haysville				
No. of regional pumps(operating)	5	3	2	5
Average pump motor size, hp	5	4	8	4
No of starts/hr	2	2	3	2
Average run time/start	9.6	9.4	9.7	9.4
Total runtime, minutes/day per pump	460.8	451	698	451
Total runtime, hours/day	38.4	23	23	38
Regional stations Power draw, kWh	73,584	34,584	71,376	57,641
Portersville				
No. of regional pumps(operating)	4.00	2	2	4
Average pump motor size, hp	2.00	2.5	2.5	1.5
No of starts/hr	5.00	5	5	4.4
Average run time/start	3.40	3.8	3.8	3
Total runtime, minutes/day per pump	408.00	456.00	456.00	316.80
Total runtime, hours/day	27.20	15.20	15.20	21.12
Regional stations Power draw, kWh	20,849	14,564	14,564	12,141
Collection System				
No of grinder stations	7	11	12	2
Estimated runtime/station, hr/day	4	4	4	4
Total runtime of grinder stations, hours/day	28	44	48	8
Grinder station motor size, hp	2	2	2	2
Grinder station Power draw, kWh	15,242	23,952	26,129	4,355
Estimated Annual Load, kWh/yr	**109,675**	**73,100**	**112,069**	**74,137**
Estimated Operating Load, kWh	**300**	**200**	**307**	**203**

Notes:
Conversion factor 1 hp is 1.05 kW

Dubois County Regional Sewer District Phase 1 Sewer Improvements

Dubois County, IN

Preliminary Opinion of Probable Construction Costs

March 2023

Option 1A

	Quantity	Unit	Unit Price	Installation[1]	Total[2]	Notes
Haysville						
Regional system						
Regional Lift Station	5	ls	$ 200,000	$ 100,000	$1,500,000	
8-inch PVC Gravity Sewer	9252	lf	$ 200	$ -	$ 1,850,400	
6-inch Forcemain	6159	lf	$ 200	$ -	$ 1,231,800	
Collection system						
Grinder station	4	ls	$ 15,000	$ 7,500	$90,000	
8-inch PVC Gravity sewer	28075	lf	$ 200	$ -	$5,615,000	
2-inch Forcemain	7658	lf	$ 125	$ -	$957,250	
Miscellaneous						
Manholes	103	ea	$ 8,000	$ -	$ 821,190	
Air release valves	2	ea	$ 5,000	$ -	$ 10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 12,220,000**	
Portersville						
Regional system						
Regional Lift Station	4	ls	$200,000	$ 100,000	$1,200,000	
8-inch PVC Gravity Sewer	4,221	lf	$ 200	$ -	$ 844,200	
4-inch Forcemain	14,178	lf	$ 180	$ -	$ 2,552,040	
Collection system						
Grinder station	3	ls	$ 15,000	$ 7,500	$67,500	
8-inch PVC Gravity sewer	20,264	lf	$ 200	$ -	$4,052,800	
2-inch Forcemain	4,554	lf	$ 125	$ -	$569,250	
Miscellaneous						
Manholes	67	ea	$ 8,000	$ -	$538,670	
Air release valves	2	ea	$ 5,000	$ -	$10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 9,970,000**	
General						
Land acquisition	ls		$ 180,000		$ 180,000	
Contractor overhead and profit	10%		$ 2,219,000		$ 2,220,000	
Mobilization/Demobilization	3%		$ 665,700		$ 670,000	
Bonds and Insurance	2%		$ 443,800		$ 440,000	
Contingency	10%		$ 2,219,000		$ 2,220,000	
Design/CES Engineering	12%		$ 2,662,800		$ 2,660,000	
TOTAL CONSTRUCTION COST					**$ 30,580,000**	

Notes

1. Installation assumed to be 50% of equipment cost
2. Line items have been rounded to the nearest $1,000. All costs are in 2023 dollars.
3. Equipment cost per manufacturer quote. Scope includes pumps, fittings, accessories, panels, and VFDs.
4. Unless otherwise noted, values are assumed from previous project experience.

Dubois County Regional Sewer District Phase 1 Sewer Improvements

Dubois County, IN

Preliminary Opinion of Probable Construction Costs

March 2023

Option 1B

	Quantity	Unit	Unit Price	Installation[1]	Total[2]	Notes
Haysville						
Regional system						
Regional Lift Station	3	ls	$ 200,000	$ 100,000	$900,000	
8-inch PVC Gravity Sewer	7551	lf	$ 200	$ -	$ 1,510,200	
4-inch Forcemain	7940	lf	$ 180	$ -	$ 1,429,200	
Collection system						
Grinder station	6	ls	$ 15,000	$ 7,500	$135,000	
8-inch PVC Gravity sewer	30536	lf	$ 200	$ -	$6,107,200	
2-inch Forcemain	9927	lf	$ 125	$ -	$1,240,875	
Miscellaneous						
Manholes	105	ea	$ 8,000	$ -	$ 837,910	
Air release valves	2	ea	$ 5,000	$ -	$ 10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 12,310,000**	
Portersville						
Regional system						
Regional Lift Station	2	ls	$200,000	$ 100,000	$600,000	
8-inch PVC Gravity Sewer	2,586	lf	$ 200	$ -	$ 517,200	
4-inch Forcemain	15,814	lf	$ 180	$ -	$ 2,846,520	
Collection system						
Grinder station	5	ls	$ 15,000	$ 7,500	$112,500	
8-inch PVC Gravity sewer	21,809	lf	$ 200	$ -	$4,361,800	
2-inch Forcemain	6,494	lf	$ 125	$ -	$811,750	
Miscellaneous						
Manholes	67	EA	$ 8,000	$ -	$536,690	
Air release valves	4	EA	$ 5,000	$ -	$20,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 9,950,000**	
General						
Land acquisition	ls		$100,000		**$100,000**	
Contractor overhead and profit	10%		$2,226,000		$ 2,230,000	
Mobilization/Demobilization	3%		$667,800		$ 670,000	
Bonds and Insurance	2%		$445,200		$ 450,000	
Contingency	10%		$2,226,000		$ 2,230,000	
Design/CES Engineering	12%		$2,671,200		$ 2,670,000	
TOTAL CONSTRUCTION COST					**$ 30,610,000**	

Notes

1. Installation assumed to be 50% of equipment cost
2. Line items have been rounded to the nearest $1,000. All costs are in 2023 dollars.
3. Equipment cost per manufacturer quote. Scope includes pumps, fittings, accessories, panels, and VFDs.
4. Unless otherwise noted, values are assumed from previous project experience.

Dubois County Regional Sewer District Phase 1 Sewer Improvements

Dubois County, IN

Preliminary Opinion of Probable Construction Costs

March 2023

Option 1C

	Quantity	Unit	Unit Price	Installation[1]	Total[2]	Notes
Haysville						
Regional system						
Regional Lift Station	2	ls	$ 200,000	$ 100,000	$600,000	
8-inch PVC Gravity Sewer	5854	lf	$ 200	$ -	$ 1,170,800	
4-inch Forcemain	10691	lf	$ 180	$ -	$ 1,924,380	
Collection system						
Grinder station	7	ls	$ 15,000	$ 7,500	$157,500	
8-inch PVC Gravity sewer	33299	lf	$ 200	$ -	$6,659,800	
2-inch Forcemain	10916	lf	$ 125	$ -	$1,364,500	
Miscellaneous						
Manholes	108	ea	$ 8,000	$ -	$ 861,370	
Air release valves	2	ea	$ 5,000	$ -	$ 10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 12,890,000**	
Portersville						
Regional system						
Regional Lift Station	2	ls	$200,000	$ 100,000	$600,000	
8-inch PVC Gravity Sewer	2,586	lf	$ 200	$ -	$ 517,200	
4-inch Forcemain	15,814	lf	$ 180	$ -	$ 2,846,520	
Collection system						
Lift station	5	ls	$ 15,000	$ 7,500	$112,500	
8-inch PVC Gravity sewer	21,809	lf	$ 200	$ -	$4,361,800	
2-inch Forcemain	6,494	lf	$ 125	$ -	$811,750	
Miscellaneous						
Manholes	67	EA	$ 8,000	$ -	$536,690	
Air release valves	5	EA	$ 5,000	$ -	$25,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 9,950,000**	
General						
Land acquistion	ls		$80,000		**$80,000**	
Contractor overhead and profit	10%		$2,284,000		$ 2,280,000	
Mobilization/Demobilization	3%		$685,200		$ 690,000	
Bonds and Insurance	2%		$456,800		$ 460,000	
Contingency	10%		$2,284,000		$ 2,280,000	
Design/CES Engineering	12%		$2,740,800		$ 2,740,000	
TOTAL CONSTRUCTION COST					**$ 31,370,000**	

Notes

1. Installation assumed to be 50% of equipment cost
2. Line items have been rounded to the nearest $1,000. All costs are in 2023 dollars.
3. Equipment cost per manufacturer quote. Scope includes pumps, fittings, accessories, panels, and VFDs.
4. Unless otherwise noted, values are assumed from previous project experience.

Dubois County Regional Sewer District Phase 1 Sewer Improvements

Dubois County, IN

Preliminary Opinion of Probable Construction Costs

March 2023

Option 1D

	Quantity	Unit	Unit Price	Installation[1]	Total[2]	Notes
Haysville						
Regional system						
Regional Lift Station	5	ls	$ 200,000	$ 100,000	$1,500,000	
8-inch PVC Gravity Sewer	9252	lf	$ 200	$ -	$ 1,850,400	
6-inch Forcemain	6159	lf	$ 200	$ -	$ 1,231,800	
Collection system						
Grinder station	0	ls	$ 15,000	$ 7,500	$0	
8-inch PVC Gravity sewer	7423	lf	$ 200	$ -	$1,484,600	
2-inch Forcemain	0	lf	$ 125	$ -	$0	
Miscellaneous						
Manholes	46	ea	$ 8,000	$ -	$ 366,850	
Air release valves	2	ea	$ 5,000	$ -	$ 10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 6,580,000**	
Portersville						
Regional system						
Regional Lift Station	4	ls	$200,000	$ 100,000	$1,200,000	
8-inch PVC Gravity Sewer	4,221	lf	$ 200	$ -	$ 844,200	
4-inch Forcemain	14,178	lf	$ 180	$ -	$ 2,552,040	
Collection system						
Grinder station	2	ls	$ 15,000	$ 7,500	$45,000	
8-inch PVC Gravity sewer	10,319	lf	$ 200	$ -	$2,063,800	
2-inch Forcemain	2,931	lf	$ 125	$ -	$366,375	
Miscellaneous						
Manholes	40	ea	$ 8,000	$ -	$319,880	
Air release valves	2	ea	$ 5,000	$ -	$10,000	
Connection to Existing Manholes	1	ls	$ 25,000	$ -	$ 25,000	
Road Cuts & Pavement Replacement	1	ls	$ 50,000	$ -	$ 50,000	
Traffic Maintenance	1	ls	$ 25,000	$ -	$ 25,000	
Tree Removal	1	ls	$ 10,000	$ -	$ 10,000	
Manhole and Gravity Sewer Testing	1	ls	$ 25,000	$ -	$ 25,000	
Subtotal					**$ 7,540,000**	
General						
Land acquisition	ls		$ 180,000		$ 180,000	
Contractor overhead and profit	10%		$ 1,412,000		$ 1,410,000	
Mobilization/Demobilization	3%		$ 423,600		$ 420,000	
Bonds and Insurance	2%		$ 282,400		$ 280,000	
Contingency	10%		$ 1,412,000		$ 1,410,000	
Design/CES Engineering	12%		$ 1,694,400		$ 1,690,000	
TOTAL CONSTRUCTION COST					**$ 19,510,000**	

Notes

1. Installation assumed to be 50% of equipment cost
2. Line items have been rounded to the nearest $1,000. All costs are in 2023 dollars.
3. Equipment cost per manufacturer quote. Scope includes pumps, fittings, accessories, panels, and VFDs.
4. Unless otherwise noted, values are assumed from previous project experience.

Appendix D

Environmental Section Maps

USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

JASPER QUADRANGLE
INDIANA
7.5-MINUTE SERIES

PORTERSVILLE

HAYSVILLE

JASPER

Portersville
Haysville
Ireland
Saint Marys Catholic Cem
Alexander Cem
Dillin Cholera Cem
McKee Cem
Wilhoit Cem
Evans Cem
Sherritt Cem
Cooper Cem
Chattin Cem
Church Cem
Kelso Cem
Reed Cem
Cavender Cem
Hope Cem
Buffalo Flat
Lottes Lake
Calumet Lake
Izaak Walton Lake
Deerwood Lake
Ruxer Lake
Briedenbaugh Lake
Buck Shoals
MARTIN CO
DUBOIS CO
DAVIESS CO
DUBOIS CO
East Fork White River
Portersville Ditch
Water Drain
Mill Creek
Near Brook
Haysville Run
Cooper Run
Shoal Run
White Hollow
Home Drain
Riz Run
Razlefeg
Little Cr
Mud Pt
Hole Run
Mudhole Br
Sherritt Drain
E Fork Mill Cr
Bison Br
Calf Br
Buffalo Stream
Long Ditch
Patoka River
Mackenson Br
Grist Run
Ireland Brook
Ire Run
Mill Cr
Pat Run
Pitch Br
Patoka River
Part Brook
Plain Drain
Jahn Cr
Jasper Brook
Coon Run
Cline Brook
Fish Run
Evans Brook
Alexander Run
Crooked Cr
Dick Cr
Shiloh Drain
Crooked Cr
Jasper Middle School to Schuetter Rd.
Jasper Riverwalk
Jasper Lake
Bonnet Bark Trail
W PORTERSVILLE RD
N PORTERSVILLE RD
W HAYSVILLE RD
E STATE RD 56
W STATE RD 56
E STATE RD 164
2ND AVE
3RD AVE
MARKET ST
N PARK ST
CO RD 20 E
CO RD 60 E
N KELLERVILLE RD
MERIDIAN RD
E JASPER DUBOIS RD
NEWTON ST
MILL ST
MANNHEIM RD
MAIN ST
JACKSON ST
BARTLEY ST
GREEN ST
W 47TH ST
W 36TH ST
W 31ST ST
E 36TH ST
E 30TH ST
W 20TH ST
W 19TH ST
W 15TH ST
E 15TH ST
W 14TH ST
E 14TH ST
W 13TH ST
E 13TH ST
E 12TH ST
W 8TH ST
E 8TH ST
W 7TH ST
E 6TH ST
W 6TH ST
W 2ND ST
W 1ST AVE
W 5TH AVE
W DIVISION RD
W 700 N
W 675 N
W 600 N
W 570 N
W 500 N
W 400 N
W 350 N
W 300 N
W 200 N
W 180 N
W 150N
E 600 N
E 500 N
E 420 N
E 400 N
E 330N
E 300 N
E 190 N
N B325E
W CO FARM RD
W 50 N
W LADINO LN
W SHILOH RD
W SKYVIEW DR
PEBBLE DR
BRESCHER DR
GREGORY LN
HANNAH LN
EVANS LN
LECHNER LN
MILL CREEK LN
N RAFT LN
RHINE STRASSE
BADEN STRASSE
MANOR DR
LAKESIDE DR
FOXRIDGE DR
BITTERSWEET DR
GRASSLAND HILLS RD
W NORTHWOOD AVE
LESLIE DR
HOWARD DR
BIRK DR
TERRY LN
CATHY LN
ROLLING RIDGE RD
VALLEY VIEW DR
COBBLESTONE RD
SAINT CHARLES ST
EMILY ST
VINE ST
LEOPOLD ST
GREEKE ST
CHERRY ST
E RIVERSIDE DR
CLAY ST
GILESLEE RD
RUMBACH AVE
CHURCH AVE
WERNSING RD
N TRUMAN RD
S TRUMAN RD
S KLUEMPER RD
N KLUEMPER RD
S SUNSHINE DR
N SKYVIEW DR
SAVANNAH DR
N SAPPHIRE DR
N WHEATLAND DR
N 500 W
N 425 W
N 400 W
N 360 W
N 350 W
N 200 W
N 150W
N 490 W
N 450 W
N 100 E
N 125E
N 175 E
N 25 E
S NEWTON ST
S MERIDIAN RD
N MERIDIAN RD
N MILL ST
S MILL ST
S UNIVERSITY DR
MAPLECREST BLVD
N WHODERVILLE RD
CO RD 100 E
231
56
164

-87.0000° EH
-86.8750°
38.5000°
38.3750°
01 000mE
02
03
04
05
06
07
08
09
10
11 000mE
42 61 000mN
42 48 000mN

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 16S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2016 - July 2016
Roads..... U.S. Census Bureau, 2016 - 2019
Names.....GNIS, 1979 - 2018
Hydrography.....National Hydrography Dataset, 2002 - 2018
Contours.....National Elevation Dataset, 2016
Boundaries.....Multiple sources; see metadata file 2017 - 2018
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1980

MN
GN
4°4′ 72 MILS
0°2′ 1 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
EH
Grid Zone Designation 16S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

INDIANA
QUADRANGLE LOCATION

1 2 3
4 5
6 7 8
ADJOINING QUADRANGLES

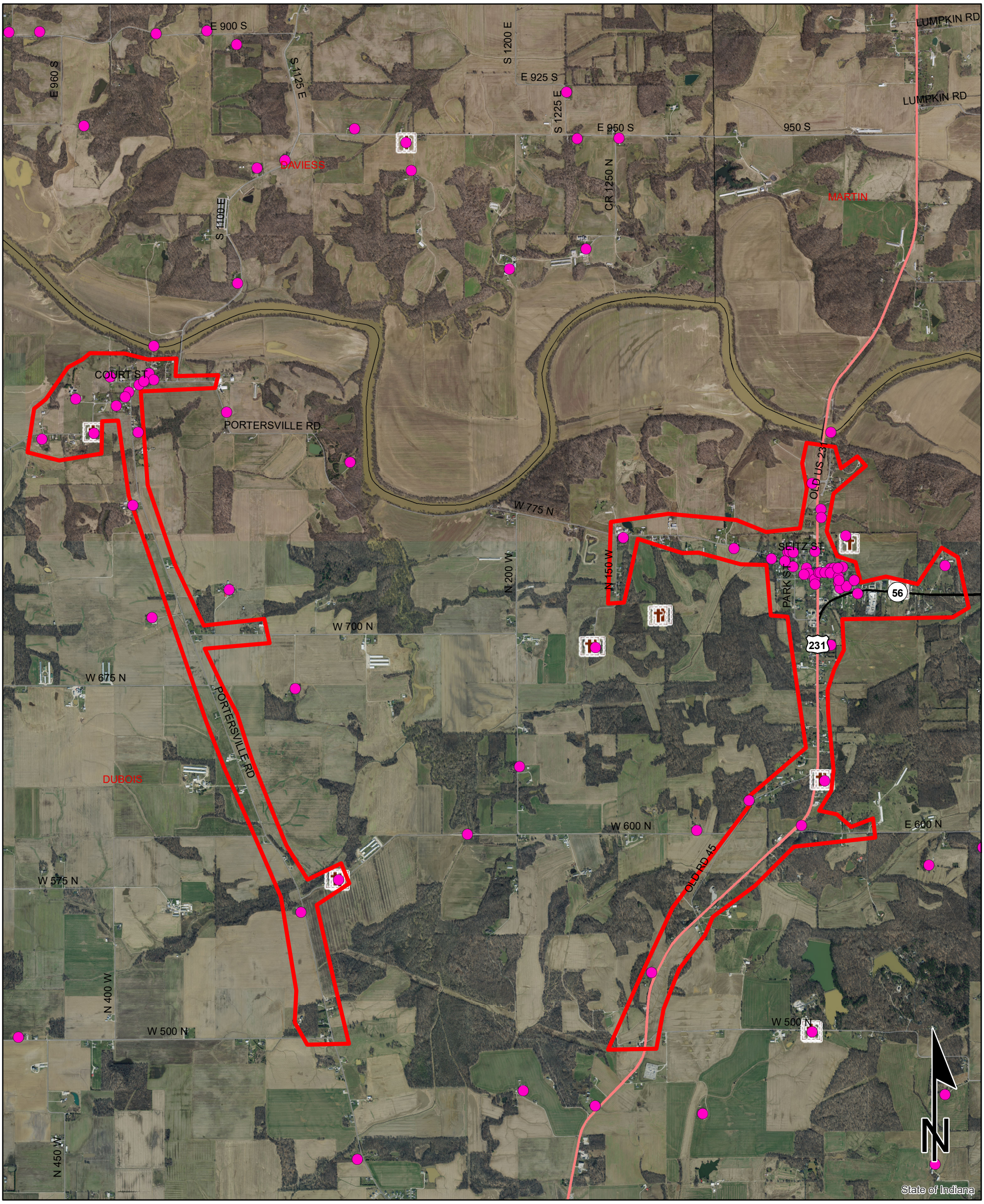
1 Glendale
2 Alfordsville
3 Rusk
4 Otwell
5 Dubois
6 Velpen
7 Huntingburg
8 Saint Anthony

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

JASPER, IN
2019

NSN 7643016362117
NGA REF NO. USGSX24K22414

Red Flag Investigation - Historic Structures and Sites
Dubois County Regional Sewer District Project 1 – Phase 1
Des. No. D0440050, Preliminary Engineering Report
Dubois County, Indiana



0.6 0.3 0 0.6 Miles

Sources:

Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library

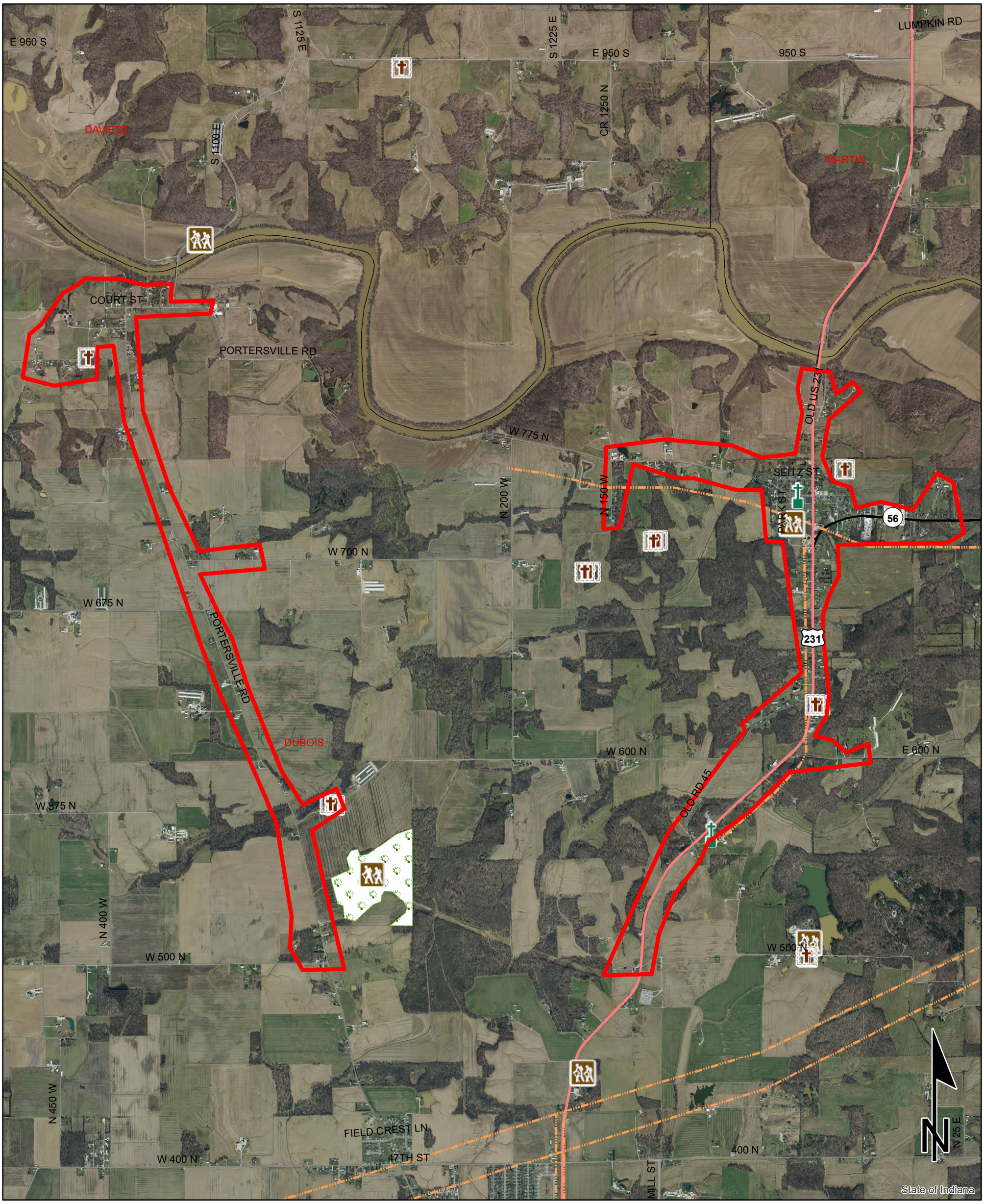
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)

Map Projection: UTM Zone 16 N **Map Datum:** NAD83

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

- Historic Structures and Sites
- Survey Areas
- Cemeteries
- County Boundary
- Toll
- Interstate
- State Route
- US Route
- Local Road

Red Flag Investigation - Infrastructure
Dubois County Regional Sewer District Project 1 – Phase 1
Des. No. D0440050, Preliminary Engineering Report
Dubois County, Indiana

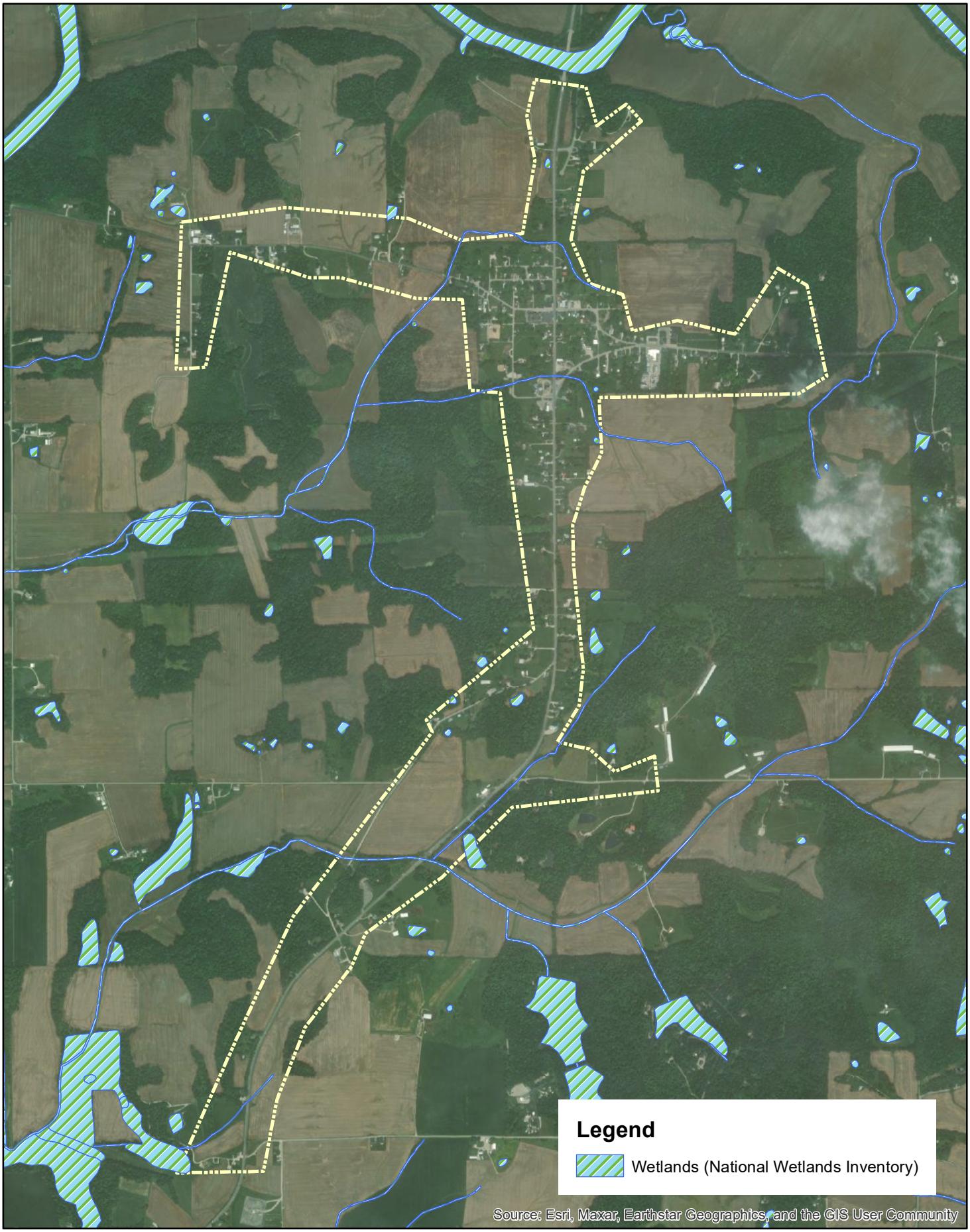


0.6 0.3 0 0.6 Miles

Sources:
Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

- Religious Facility
- Airport
- Cemeteries
- Hospital
- School
- Recreation Facility
- Pipeline
- Railroad
- Trails
- Managed Lands
- County Boundary
- Survey Area
- Toll
- Interstate
- State Route
- US Route
- Local Road

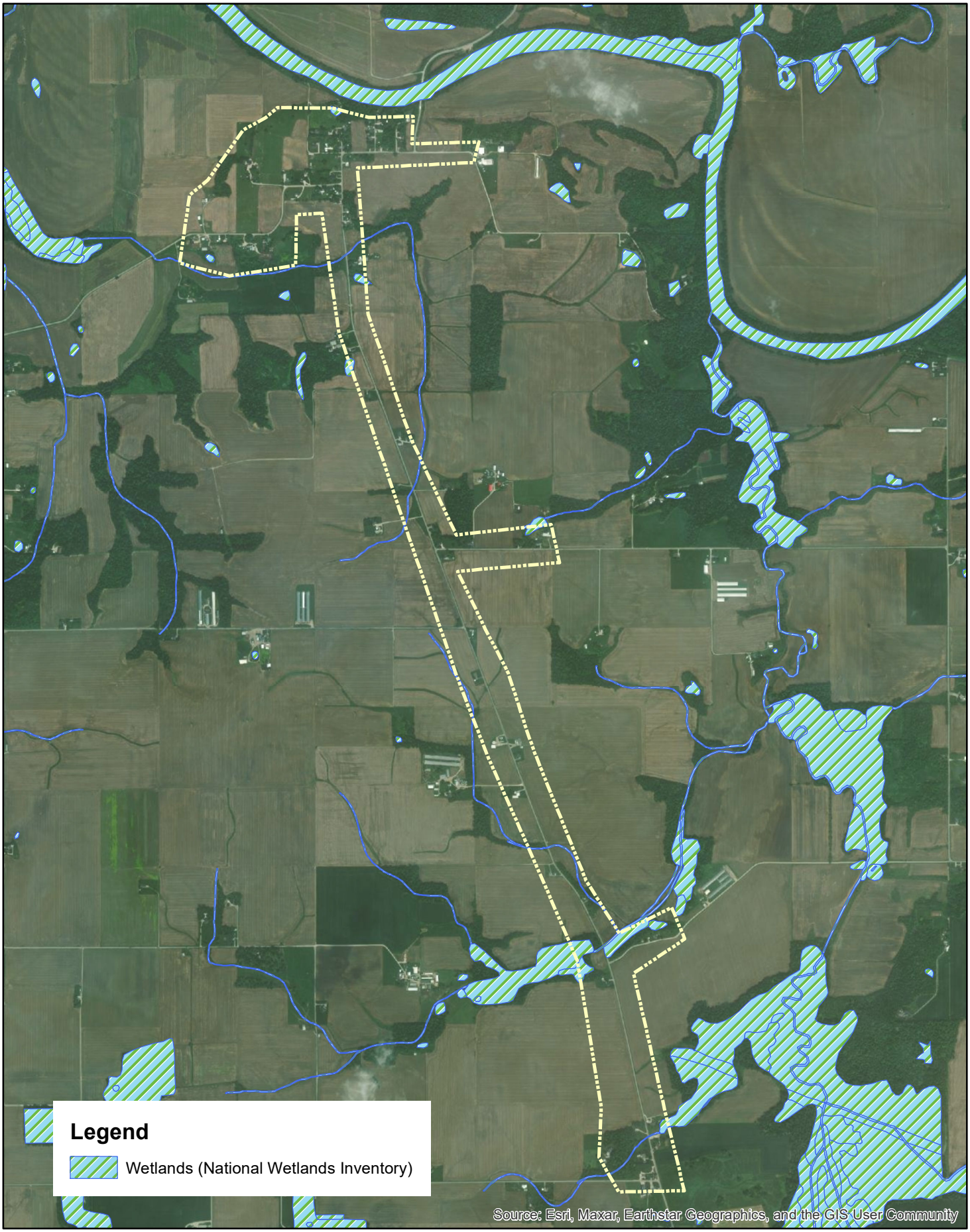


Dubois County Regional Sewer District Project 1
Haysville Region Wetlands Map

ClarkDietz
Engineering Quality of Life®

N
W E
S

1 inch = 1,877 feet



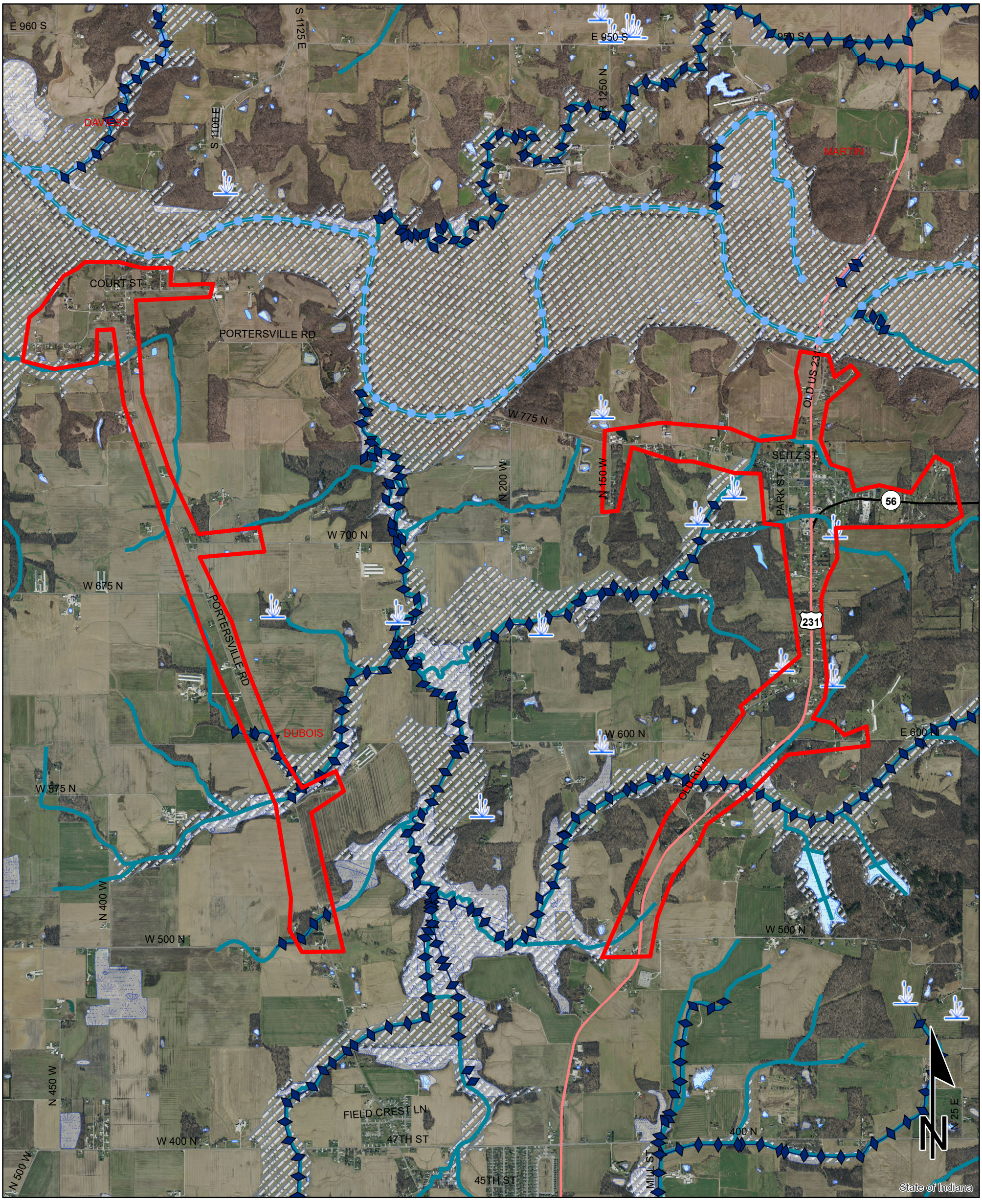
Dubois County Regional Sewer District Project 1
Portersville Region Wetlands Map

ClarkDietz
Engineering Quality of Life®

N
W E
S

1 inch = 2,154 feet

Red Flag Investigation - Water Resources
Dubois County Regional Sewer District Project 1 – Phase 1
Des. No. D0440050, Preliminary Engineering Report
Dubois County, Indiana

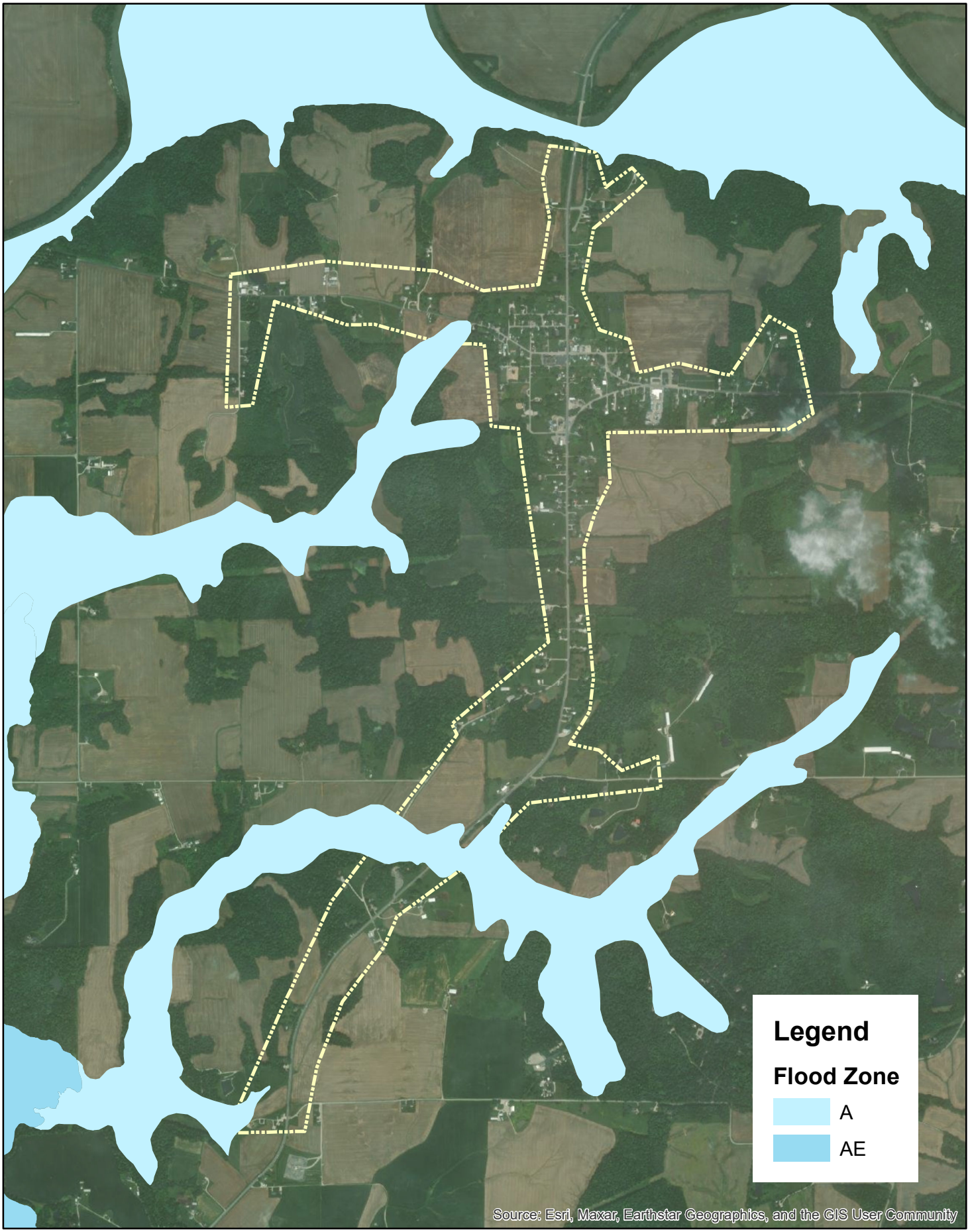


0.6 0.3 0 0.6 Miles

Sources:
Non Orthophotography Data - Obtained from the State of Indiana Geographical Information Office Library
Orthophotography - Obtained from Indiana Map Framework Data (www.indianamap.org)
Map Projection: UTM Zone 16 N **Map Datum:** NAD83

This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

- NWI - Point
- Karst Spring
- NWI- Line
- Impaired_Stream_Lake
- NPS NRI listed
- River
- Canal Structure - Historic
- Canal Route - Historic
- Wetlands
- Lake
- Floodplain - DFIRM
- Cave Entrance Density
- Sinkhole Area
- Sinking-Stream Basin
- County Boundary
- Survey Area
- Toll
- Interstate
- State Route
- US Route
- Local Road



Dubois County Regional Sewer District Project 1
Haysville Region Flood Hazard Map

ClarkDietz
Engineering Quality of Life®

N
W E
S

1 inch = 2,076 feet

Dubois County Regional Sewer District Project 1
Portersville Region Flood Hazard Map

ClarkDietz
Engineering Quality of Life®

N
W E
S

1 inch = 2,154 feet

United States Department of Agriculture

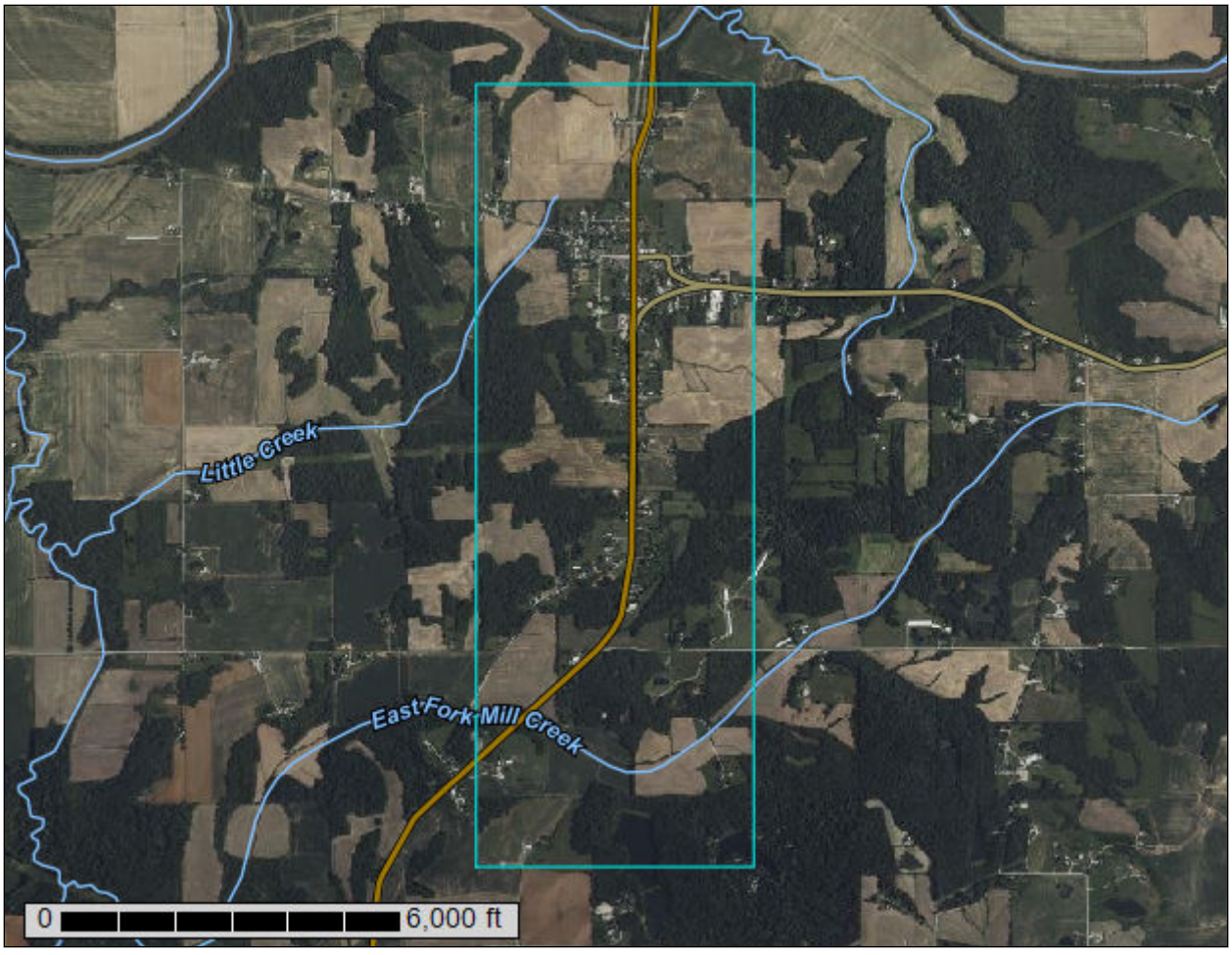
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Dubois County, Indiana

Haysville Region Soil Map



March 17, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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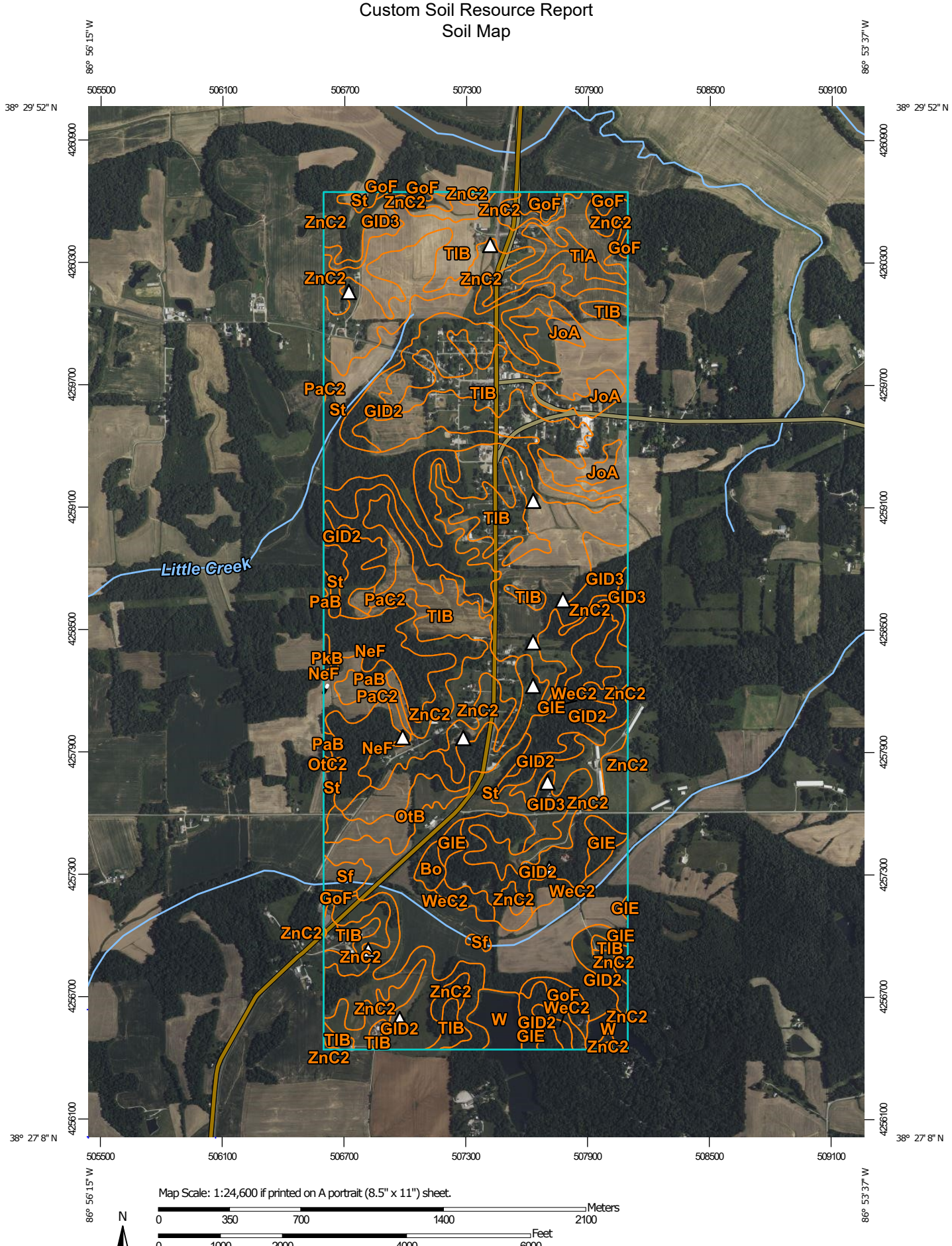
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dubois County, Indiana
Survey Area Data: Version 23, Sep 3, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 15, 2022—Jul 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bo	Bonnie silt loam, frequently flooded	5.5	0.4%
GlD2	Gilpin silt loam, 12 to 18 percent slopes, eroded	280.0	17.9%
GlD3	Gilpin silt loam, 12 to 18 percent slopes, severely eroded	57.7	3.7%
GlE	Gilpin silt loam, 18 to 25 percent slopes	46.1	3.0%
GoF	Gilpin-Berks complex, 20 to 50 percent slopes	19.3	1.2%
JoA	Johnsburg silt loam, 0 to 2 percent slopes	20.3	1.3%
NeF	Negley loam, 18 to 50 percent slopes	60.1	3.8%
OtB	Otwell silt loam, 2 to 6 percent slopes	21.7	1.4%
OtC2	Otwell silt loam, 6 to 12 percent slopes, eroded	0.7	0.0%
PaB	Parke silt loam, 2 to 6 percent slopes	9.3	0.6%
PaC2	Parke silt loam, 6 to 12 percent slopes, eroded	19.0	1.2%
PkB	Pike silt loam, 2 to 6 percent slopes	1.3	0.1%
Sf	Steff silt loam, 0 to 2 percent slopes, frequently flooded	8.9	0.6%
St	Stendal silt loam, frequently flooded	246.5	15.8%
TlA	Tilsit silt loam, 0 to 2 percent slopes	11.7	0.7%
TlB	Zanesville silt loam, 2 to 6 percent slopes	283.7	18.1%
W	Water	21.0	1.3%
WeC2	Wellston silt loam, 6 to 12 percent slopes, eroded	18.6	1.2%
ZnC2	Apalona-Zanesville silt loams, 6 to 12 percent slopes, eroded	431.7	27.6%
Totals for Area of Interest		**1,563.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Dubois County, Indiana

Bo—Bonnie silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzc0
Elevation: 340 to 500 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie

Setting

Landform: Backswamps, flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Acid silty alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Cg1 - 10 to 34 inches: silt loam
Cg2 - 34 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F120BY020IN - Wet Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Minor Components

Stendal

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

GID2—Gilpin silt loam, 12 to 18 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzc6
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Structural benches, hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

A - 0 to 8 inches: silt loam
Bt - 8 to 22 inches: channery loam
BC - 22 to 34 inches: very channery loam
Cr - 34 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

GID3—Gilpin silt loam, 12 to 18 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: kzc7
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin, severely eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin, Severely Eroded

Setting

Landform: Hills, structural benches
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

Ap - 0 to 3 inches: silt loam
Bt - 3 to 22 inches: channery loam
BC - 22 to 29 inches: very channery loam
Cr - 29 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

GIE—Gilpin silt loam, 18 to 25 percent slopes

Map Unit Setting

National map unit symbol: kzc8
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hills, structural benches
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

A - 0 to 8 inches: silt loam
Bt - 8 to 22 inches: channery loam
BC - 22 to 34 inches: very channery loam
Cr - 34 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 18 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

GoF—Gilpin-Berks complex, 20 to 50 percent slopes

Map Unit Setting

National map unit symbol: kzcb
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 65 percent
Berks and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Structural benches, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

A - 0 to 8 inches: silt loam
Bt - 8 to 22 inches: channery loam
BC - 22 to 34 inches: very channery loam
Cr - 34 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Berks

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy-skeletal residuum over sandstone and shale

Typical profile

A/E - 0 to 5 inches: channery silt loam
Bw - 5 to 28 inches: very channery loam
Cr - 28 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120BY008IN - Loamy Skeletal Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

JoA—Johnsburg silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2wltg
Elevation: 390 to 930 feet
Mean annual precipitation: 39 to 57 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 151 to 246 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Johnsburg and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Johnsburg

Setting

Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Fine-silty loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 10 inches: silt loam
Bt - 10 to 36 inches: silt loam
Btx - 36 to 72 inches: silt loam
2CB - 72 to 90 inches: silt loam
2Cr - 90 to 100 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 39 inches to fragipan; 82 to 100 inches to paralithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Apalona

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Peoga

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

NeF—Negley loam, 18 to 50 percent slopes

Map Unit Setting

National map unit symbol: kzcj
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Negley and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Negley

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy outwash

Typical profile

A/E - 0 to 11 inches: loam
Bt1 - 11 to 40 inches: sandy clay loam
Bt2 - 40 to 72 inches: sandy loam
BC - 72 to 80 inches: loamy sand

Properties and qualities

Slope: 18 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

OtB—Otwell silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzcq
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Otwell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otwell

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 23 inches: silt loam
Btx - 23 to 52 inches: silt loam
2Bt - 52 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 20 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

OtC2—Otwell silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzcr
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Otwell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otwell

Setting

Landform: Lake plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 17 inches: silt loam
Btx - 17 to 42 inches: silt loam
2Bt - 42 to 80 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 12 to 20 inches to fragipan
Drainage class: Moderately well drained

Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PaB—Parke silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: kzcs
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Parke and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parke

Setting
Landform: Outwash plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile
Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silt loam
2Bt2 - 26 to 35 inches: silt loam
3Btb - 35 to 80 inches: fine sandy loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PaC2—Parke silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzct
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Parke and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parke

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silt loam
2Bt2 - 26 to 35 inches: silt loam
3Btb - 35 to 80 inches: fine sandy loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PkB—Pike silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzd1
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pike and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pike

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 39 inches: silty clay loam
2Bt - 39 to 53 inches: silt loam
3Btb - 53 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Sf—Steff silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 2wlvr
Elevation: 370 to 790 feet
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 43 to 67 degrees F
Frost-free period: 160 to 215 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition
Steff, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steff, Frequently Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile
Ap - 0 to 9 inches: silt loam
Bw - 9 to 33 inches: silt loam
C - 33 to 80 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 20 to 39 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Cuba, frequently flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F120BY017IN - Well Drained Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Stendal, frequently flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bonnie, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F120BY020IN - Wet Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

St—Stendal silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzd6
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Stendal and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stendal

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 40 inches: silt loam
Cg - 40 to 60 inches: stratified silt loam to silty clay loam to loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Bonnie

Percent of map unit: 3 percent
Landform: Backswamps, flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

TIA—Tilsit silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: kzd7
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tilsit and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tilsit

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy residuum over sandstone and shale

Typical profile

A - 0 to 7 inches: silt loam
Bt - 7 to 31 inches: silty clay loam
2Btx - 31 to 58 inches: silt loam
2BC - 58 to 64 inches: channery silt loam
2R - 64 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 36 inches to fragipan; 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C/D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

TlB—Zanesville silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2vp3n
Elevation: 430 to 980 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 43 to 68 degrees F
Frost-free period: 157 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Zanesville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 25 inches: silt loam
Btx - 25 to 46 inches: silty clay loam
2C - 46 to 72 inches: silty clay loam
2R - 72 to 82 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 32 inches to fragipan; 40 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D

Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Tilsit
Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston
Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Johnsburg
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups
Land capability classification (irrigated): None specified
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

WeC2—Wellston silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2vtzz
Elevation: 370 to 1,000 feet
Mean annual precipitation: 37 to 57 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 141 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silt loam
2Bt3 - 32 to 43 inches: loam
2Cr - 43 to 53 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 69 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120BY007IN - Deep Well Drained Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Zanesville, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Gilpin, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

ZnC2—Apalona-Zanesville silt loams, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2s2d3
Elevation: 380 to 930 feet
Mean annual precipitation: 39 to 53 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 165 to 224 days
Farmland classification: Not prime farmland

Map Unit Composition

Apalona, eroded, and similar soils: 45 percent
Zanesville, eroded, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Apalona, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-silty loess over clayey residuum weathered from shale over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 23 inches: silt loam
Btx - 23 to 43 inches: silt loam
2Bt - 43 to 65 inches: clay
3BCt - 65 to 81 inches: loam
3Cr - 81 to 91 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 17 to 28 inches to fragipan; 71 to 87 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Zanesville, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 24 inches: silt loam
Btx - 24 to 40 inches: silty clay loam
2C - 40 to 60 inches: clay loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 22 to 30 inches to fragipan; 40 to 79 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Deuchars, eroded

Percent of map unit: 10 percent
Landform: Hills, structural benches
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Wellston, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

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United States Department of Agriculture

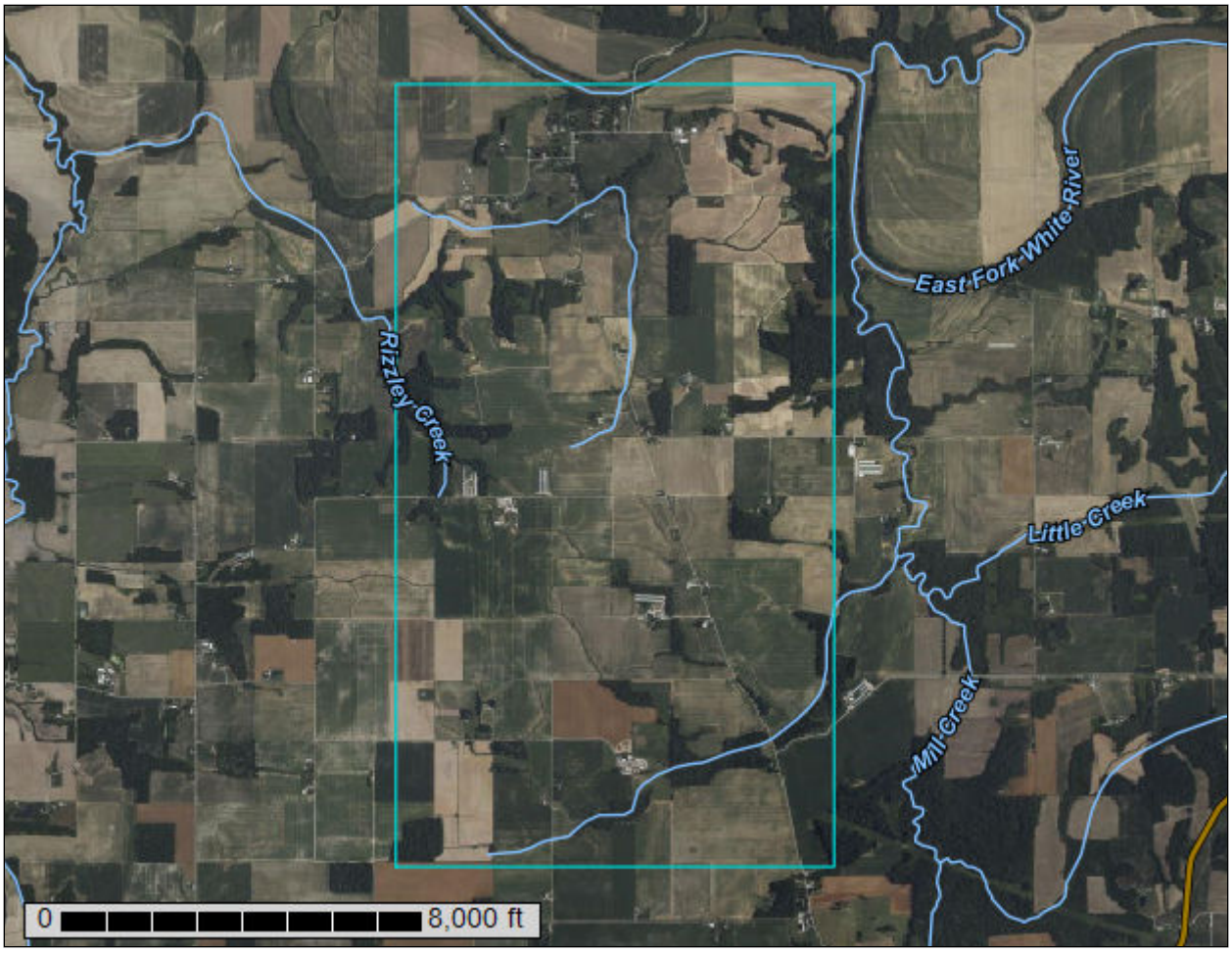
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Daviess County, Indiana, and Dubois County, Indiana

Portersville Region Soil Map



March 17, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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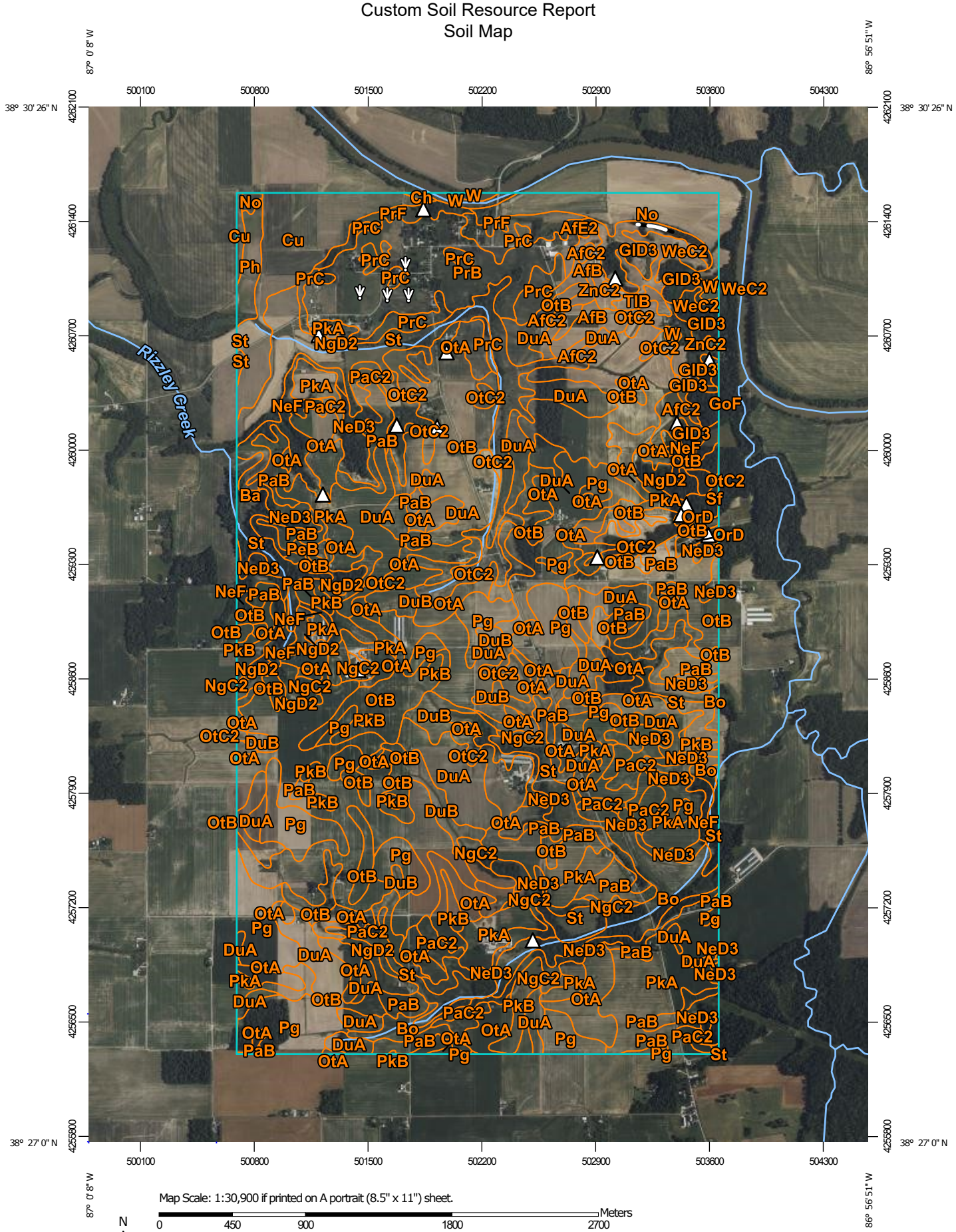
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Daviess County, Indiana
Survey Area Data: Version 26, Sep 3, 2022

Soil Survey Area: Dubois County, Indiana
Survey Area Data: Version 23, Sep 3, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 15, 2022—Jul 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
W	Water	2.6	0.1%
Subtotals for Soil Survey Area		**2.6**	**0.1%**
Totals for Area of Interest		**3,875.2**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AfB	Alford silt loam, 2 to 6 percent slopes	25.4	0.7%
AfC2	Alford silt loam, 5 to 10 percent slopes, eroded	25.9	0.7%
AfE2	Alford silt loam, 18 to 35 percent slopes, eroded	2.7	0.1%
Ba	Bartle silt loam, 0 to 2 percent slopes	1.4	0.0%
Bo	Bonnie silt loam, frequently flooded	101.4	2.6%
Ch	Chagrin silt loam, frequently flooded	1.5	0.0%
Cu	Cuba silt loam, frequently flooded	107.7	2.8%
DuA	Dubois silt loam, 0 to 2 percent slopes	560.5	14.5%
DuB	Dubois silt loam, 2 to 6 percent slopes	74.2	1.9%
GlD3	Gilpin silt loam, 12 to 18 percent slopes, severely eroded	68.9	1.8%
GoF	Gilpin-Berks complex, 20 to 50 percent slopes	9.0	0.2%
NeD3	Negley loam, 12 to 18 percent slopes, severely eroded	237.0	6.1%
NeF	Negley loam, 18 to 50 percent slopes	64.3	1.7%
NgC2	Negley silt loam, 6 to 12 percent slopes, eroded	33.4	0.9%
NgD2	Negley silt loam, 12 to 18 percent slopes, eroded	68.1	1.8%
No	Nolin silt loam, frequently flooded	70.8	1.8%
OrD	Orthents, 6 to 25 percent slopes	13.1	0.3%
OtA	Otwell silt loam, 0 to 2 percent slopes	469.7	12.1%
OtB	Otwell silt loam, 2 to 6 percent slopes	480.2	12.4%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
OtC2	Otwell silt loam, 6 to 12 percent slopes, eroded	108.8	2.8%
PaB	Parke silt loam, 2 to 6 percent slopes	132.5	3.4%
PaC2	Parke silt loam, 6 to 12 percent slopes, eroded	66.7	1.7%
PeB	Pekin silt loam, 2 to 6 percent slopes, rarely flooded	2.7	0.1%
Pg	Peoga silt loam	234.9	6.1%
Ph	Petrolia silty clay loam, 0 to 2 percent slopes, frequently flooded	19.8	0.5%
PkA	Pike silt loam, 0 to 2 percent slopes	264.5	6.8%
PkB	Pike silt loam, 2 to 6 percent slopes	51.0	1.3%
PrB	Princeton fine sandy loam, 2 to 6 percent slopes	157.6	4.1%
PrC	Princeton fine sandy loam, 6 to 12 percent slopes	75.9	2.0%
PrF	Princeton fine sandy loam, 20 to 60 percent slopes	19.3	0.5%
Sf	Steff silt loam, 0 to 2 percent slopes, frequently flooded	1.2	0.0%
St	Stendal silt loam, frequently flooded	253.3	6.5%
TlB	Zanesville silt loam, 2 to 6 percent slopes	9.2	0.2%
W	Water	9.7	0.3%
WeC2	Wellston silt loam, 6 to 12 percent slopes, eroded	22.5	0.6%
ZnC2	Apalona-Zanesville silt loams, 6 to 12 percent slopes, eroded	27.6	0.7%
Subtotals for Soil Survey Area		**3,872.5**	**99.9%**
Totals for Area of Interest		**3,875.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the

characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered

practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Daviess County, Indiana

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Other vegetative classification: Trees/Timber (Woody Vegetation)

Hydric soil rating: No

Dubois County, Indiana

AfB—Alford silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzbw
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Alford and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 13 inches: silt loam
Bt1 - 13 to 27 inches: silty clay loam
Bt2 - 27 to 55 inches: silt loam
2BC - 55 to 80 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XB803IN - Wet Silty Eolian Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

AfC2—Alford silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2x06b
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Alford, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
Bt2 - 26 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F114XB803IN - Wet Silty Eolian Forest
Hydric soil rating: No

Minor Components

Hosmer, eroded

Percent of map unit: 6 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F115XA004IL - Fragic Upland
Hydric soil rating: No

Wakeland, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F114XB203IN - Wet Floodplain Forest
Hydric soil rating: No

Alvin

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F114XB801IN - Sandy Eolian Woodland
Hydric soil rating: No

AfE2—Alford silt loam, 18 to 35 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2x06j
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Alford, eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

A - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
Bt2 - 26 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F114XB803IN - Wet Silty Eolian Forest
Hydric soil rating: No

Minor Components

Princeton, eroded

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R115XA103IL - Sand Dunes
Hydric soil rating: No

Ba—Bartle silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2zs58
Elevation: 390 to 870 feet
Mean annual precipitation: 38 to 57 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 141 to 212 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bartle and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bartle

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty loess over loamy alluvium

Typical profile

Ap - 0 to 11 inches: silt loam
BE - 11 to 17 inches: silt loam
Btg - 17 to 30 inches: silty clay loam
Btx - 30 to 55 inches: silt loam
2BC - 55 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 28 to 31 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.13 in/hr)
Depth to water table: About 16 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F120BY013IN - Moist Terraces
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Peoga

Percent of map unit: 3 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F120BY014IN - Saturated Flats
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Pekin

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F120BY013IN - Moist Terraces
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bo—Bonnie silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzc0
Elevation: 340 to 500 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie

Setting

Landform: Backswamps, flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Acid silty alluvium

Typical profile

Ap - 0 to 10 inches: silt loam

Cg1 - 10 to 34 inches: silt loam
Cg2 - 34 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F120BY020IN - Wet Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Minor Components

Stendal

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Ch—Chagrin silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzc2
Elevation: 340 to 1,020 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 51 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Chagrin and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chagrin

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Bw - 8 to 38 inches: loam
C - 38 to 60 inches: stratified loam to gravelly sandy loam to loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Petrolia

Percent of map unit: 3 percent
Landform: Flood plains, backswamps
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Cu—Cuba silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzc3

Elevation: 340 to 1,020 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 51 to 57 degrees F
Frost-free period: 150 to 210 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Cuba and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cuba

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Bw - 8 to 30 inches: silt loam
C - 30 to 60 inches: stratified silt loam to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F120BY017IN - Well Drained Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Steff

Percent of map unit: 10 percent
Landform: Flood-plain steps, flood plains
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

DuA—Dubois silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: kzc4
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Dubois and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubois

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 10 inches: silt loam
BE - 10 to 17 inches: silt loam
Bt - 17 to 38 inches: silty clay loam
2Btx - 38 to 82 inches: silt loam
3Bt - 82 to 96 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 22 to 40 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Peoga

Percent of map unit: 3 percent
Landform: Stream terraces, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Flat
Ecological site: F114XA101IN - Wet Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

DuB—Dubois silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzc5
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Dubois and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dubois

Setting

Landform: Lake plains
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam
BE - 8 to 12 inches: silt loam
Bt - 12 to 28 inches: silty clay loam
2Btx - 28 to 68 inches: silt loam
3Bt - 68 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 22 to 40 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Peoga

Percent of map unit: 3 percent
Landform: Stream terraces, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

GID3—Gilpin silt loam, 12 to 18 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: kzc7
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin, severely eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin, Severely Eroded

Setting

Landform: Hills, structural benches
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

Ap - 0 to 3 inches: silt loam
Bt - 3 to 22 inches: channery loam
BC - 22 to 29 inches: very channery loam

Cr - 29 to 40 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

GoF—Gilpin-Berks complex, 20 to 50 percent slopes

Map Unit Setting

National map unit symbol: kzcb
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 65 percent
Berks and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Structural benches, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum over sandstone and shale

Typical profile

A - 0 to 8 inches: silt loam
Bt - 8 to 22 inches: channery loam
BC - 22 to 34 inches: very channery loam
Cr - 34 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120BY005IN - Moderately Deep Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Berks

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy-skeletal residuum over sandstone and shale

Typical profile

A/E - 0 to 5 inches: channery silt loam
Bw - 5 to 28 inches: very channery loam
Cr - 28 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120BY008IN - Loamy Skeletal Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

NeD3—Negley loam, 12 to 18 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: kzch
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Negley, severely eroded, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Negley, Severely Eroded

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy outwash

Typical profile

Ap - 0 to 3 inches: loam
Bt1 - 3 to 34 inches: sandy clay loam
Bt2 - 34 to 67 inches: sandy loam
BC - 67 to 80 inches: loamy sand

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

NeF—Negley loam, 18 to 50 percent slopes

Map Unit Setting

National map unit symbol: kzcj
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Negley and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Negley

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy outwash

Typical profile

A/E - 0 to 11 inches: loam
Bt1 - 11 to 40 inches: sandy clay loam
Bt2 - 40 to 72 inches: sandy loam
BC - 72 to 80 inches: loamy sand

Properties and qualities

Slope: 18 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

NgC2—Negley silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzck
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Negley and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Negley

Setting

Landform: Eskers
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 13 inches: loam
2Bt2 - 13 to 80 inches: sandy clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

NgD2—Negley silt loam, 12 to 18 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzcl
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Negley and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Negley

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy outwash

Typical profile

Ap - 0 to 8 inches: silt loam
2Bt1 - 8 to 37 inches: sandy clay loam
2Bt2 - 37 to 72 inches: sandy loam
2BC - 72 to 80 inches: loamy sand

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

No—Nolin silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzcm
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Nolin and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nolin

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Bw - 10 to 68 inches: silt loam
C - 68 to 80 inches: stratified silt loam to loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F115XA013IL - Silty Floodplain
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Wilhite

Percent of map unit: 3 percent
Landform: Backswamps, flood plains
Ecological site: F115XA018IL - Wet Clayey Floodplain
Hydric soil rating: Yes

Nolin, long duration

Percent of map unit: 3 percent
Landform: Flood plains
Ecological site: F115XA013IL - Silty Floodplain
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

OrD—Orthents, 6 to 25 percent slopes

Map Unit Setting

National map unit symbol: kzcn
Elevation: 350 to 1,250 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Typic udorthents and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Typic Udorthents

Setting

Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coal extraction mine spoil

Typical profile

Ap - 0 to 2 inches: silt loam
A/C - 2 to 5 inches: silt loam
Cd - 5 to 11 inches: loam
2C - 11 to 80 inches: very parachannery silt loam

Properties and qualities

Slope: 6 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Typic udorthents, very deep, loamy, cut area

Percent of map unit: 5 percent
Hydric soil rating: No

Udorthents, rubbish

Percent of map unit: 3 percent
Hydric soil rating: No

Water

Percent of map unit: 2 percent
Hydric soil rating: No

OtA—Otwell silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: kzcp
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Otwell and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otwell

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 23 inches: silt loam
Btx - 23 to 52 inches: silt loam
2Bt - 52 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 20 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Peoga

Percent of map unit: 3 percent
Landform: Flats
Ecological site: F114XA101IN - Wet Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

OtB—Otwell silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzcq
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Otwell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otwell

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 23 inches: silt loam
Btx - 23 to 52 inches: silt loam
2Bt - 52 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 20 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

OtC2—Otwell silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzcr
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Otwell and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Otwell

Setting

Landform: Lake plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 17 inches: silt loam
Btx - 17 to 42 inches: silt loam
2Bt - 42 to 80 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 12 to 20 inches to fragipan
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F114XB104IN - Lacustrine Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PaB—Parke silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzcs
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Parke and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parke

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silt loam
2Bt2 - 26 to 35 inches: silt loam
3Btb - 35 to 80 inches: fine sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PaC2—Parke silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: kzct
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Parke and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parke

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silt loam
2Bt2 - 26 to 35 inches: silt loam
3Btb - 35 to 80 inches: fine sandy loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PeB—Pekin silt loam, 2 to 6 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: kzcw
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pekin and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pekin

Setting

Landform: Stream terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy alluvium

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 29 inches: silt loam
Btx - 29 to 67 inches: silt loam
BC - 67 to 80 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 38 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F120BY013IN - Moist Terraces
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Pg—Peoga silt loam

Map Unit Setting

National map unit symbol: kzcy
Elevation: 340 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Peoga and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peoga

Setting

Landform: Stream terraces, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over loamy lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
EBg - 9 to 16 inches: silt loam
Btg - 16 to 37 inches: silt loam
Btgx - 37 to 56 inches: silt loam
BC - 56 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F114XA101IN - Wet Lacustrine Forest, F120BY013IN - Moist Terraces
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Ph—Petrolia silty clay loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2yp3y
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Petrolia, frequently flooded, and similar soils: 90 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Petrolia, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 8 inches: silty clay loam
Bg - 8 to 30 inches: silty clay loam
Cg - 30 to 79 inches: stratified silty clay loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F114XB203IN - Wet Floodplain Forest
Hydric soil rating: Yes

Minor Components

Wakeland, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F114XB203IN - Wet Floodplain Forest
Hydric soil rating: No

Beaucoup, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F114XB203IN - Wet Floodplain Forest
Hydric soil rating: Yes

PkA—Pike silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: kzd0
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pike and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pike

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 39 inches: silty clay loam
2Bt - 39 to 53 inches: silt loam
3Btb - 53 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Pike

Percent of map unit: 8 percent
Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PkB—Pike silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzd1
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pike and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pike

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over loamy outwash

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 39 inches: silty clay loam
2Bt - 39 to 53 inches: silt loam
3Btb - 53 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XB404IN - Dry Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PrB—Princeton fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: kzd2
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Princeton and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Princeton

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

A - 0 to 8 inches: fine sandy loam
Bt - 8 to 41 inches: fine sandy loam
E and Bt - 41 to 60 inches: loamy sand
CB - 60 to 80 inches: stratified fine sand to loamy sand to loamy fine sand to fine sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent

Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F114XA404IN - Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PrC—Princeton fine sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: kzd3
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Princeton and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Princeton

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

A - 0 to 8 inches: fine sandy loam
Bt - 8 to 41 inches: fine sandy loam
E and Bt - 41 to 60 inches: loamy sand
CB - 60 to 80 inches: stratified fine sand to loamy sand to loamy fine sand to fine sandy loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent

Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F114XA404IN - Outwash Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

PrF—Princeton fine sandy loam, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: kzd4
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 45 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Princeton and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Princeton

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian sands

Typical profile

A - 0 to 8 inches: fine sandy loam
Bt - 8 to 41 inches: fine sandy loam
E and Bt - 41 to 60 inches: loamy sand
CB - 60 to 80 inches: stratified fine sand to loamy sand to loamy fine sand to fine sandy loam

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent

Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R111XA022IN - Sand Dune
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Sf—Steff silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2wlvr
Elevation: 370 to 790 feet
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 43 to 67 degrees F
Frost-free period: 160 to 215 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Steff, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Steff, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile

Ap - 0 to 9 inches: silt loam
Bw - 9 to 33 inches: silt loam
C - 33 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 20 to 39 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Cuba, frequently flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F120BY017IN - Well Drained Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Stendal, frequently flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Bonnie, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F120BY020IN - Wet Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

St—Stendal silt loam, frequently flooded

Map Unit Setting

National map unit symbol: kzd6
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Stendal and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stendal

Setting

Landform: Flood-plain steps
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
B - 8 to 40 inches: silt loam
Cg - 40 to 60 inches: stratified silt loam to silty clay loam to loam to fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120BY019IN - Moist Silty Alluvium
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Bonnie

Percent of map unit: 3 percent
Landform: Backswamps, flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

TIB—Zanesville silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2vp3n
Elevation: 430 to 980 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 43 to 68 degrees F
Frost-free period: 157 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Zanesville and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 25 inches: silt loam
Btx - 25 to 46 inches: silty clay loam
2C - 46 to 72 inches: silty clay loam
2R - 72 to 82 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 32 inches to fragipan; 40 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D

Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Tilsit
Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston
Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Johnsburg
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups
Land capability classification (irrigated): None specified
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

WeC2—Wellston silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2vtzz
Elevation: 370 to 1,000 feet
Mean annual precipitation: 37 to 57 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 141 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
Bt2 - 26 to 32 inches: silt loam
2Bt3 - 32 to 43 inches: loam
2Cr - 43 to 53 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 69 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F120BY007IN - Deep Well Drained Sandstone-Shale Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Zanesville, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Gilpin, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

ZnC2—Apalona-Zanesville silt loams, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2s2d3
Elevation: 380 to 930 feet
Mean annual precipitation: 39 to 53 inches
Mean annual air temperature: 41 to 67 degrees F
Frost-free period: 165 to 224 days
Farmland classification: Not prime farmland

Map Unit Composition

Apalona, eroded, and similar soils: 45 percent
Zanesville, eroded, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Apalona, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-silty loess over clayey residuum weathered from shale over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 23 inches: silt loam
Btx - 23 to 43 inches: silt loam
2Bt - 43 to 65 inches: clay
3BCt - 65 to 81 inches: loam
3Cr - 81 to 91 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 17 to 28 inches to fragipan; 71 to 87 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 15 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Zanesville, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bt - 6 to 24 inches: silt loam
Btx - 24 to 40 inches: silty clay loam
2C - 40 to 60 inches: clay loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 22 to 30 inches to fragipan; 40 to 79 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F120BY002IN - Fragipan Uplands
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Deuchars, eroded

Percent of map unit: 10 percent
Landform: Hills, structural benches
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Wellston, eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

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Appendix E

Preliminary Pump Calculations

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Preliminary Pump Calculations
March 2023
Haysville Region - Option 1A

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.45	5
#45 Elbows	0.24	10
#Plug Valves	0.27	2
#Check Valves	1.5	1
#Tees (thru)	0.3	1
#Tees (branch)	0.9	1

Flow and Forcemain Parameters		**Option 1A**				
Regional Liftstation	number	1	2	3	4	5
No of properties served per liftstation		12	162	182	217	225
d	inches	6	6	6	6	6
C		130	130	130	130	130
No of person/family dwelling		2.5	2.5	2.5	2.5	2.5
PE	gpcd	100	100	100	100	100
Safety factor		1.25	1.25	1.25	1.25	1.25
Qin	mgd	0.00	0.05	0.06	0.07	0.07
Qin	gpm	10.0	40.0	40.0	50.0	50.0
Qfutureave*	mgd	0.006	0.079	0.089	0.106	0.11
Qfutureave	gpm	10	60	70	80	100
Qfuturepeak	mgd	0.02	0.33	0.37	0.44	0.46
Qfuturepeak	gpm	20	230	260	310	300
L	ft	848	1,432	1,432	2,414	1,063
h_s	ft	51.64	52.86	32.68	76.13	27.69
Output:						
∑K		7.89	7.89	7.89	7.89	7.89
v	ft/s	0.23	2.61	2.95	3.52	3.40
h_f	ft	0.0	7.0	8.8	20.6	8.5
h_m	ft	0.01	0.83	1.07	1.52	1.42
h_s	ft	51.6	52.9	32.7	76.1	27.7
TDH	**ft**	**51.7**	**60.7**	**42.6**	**98.2**	**37.6**
Pump Power*						
Pump Efficiency	%	70%	70%	70%	70%	70%
Pump power	**hp**	**0.4**	**5.0**	**4.0**	**11.0**	**4.1**
Design pumping rate	**gpm**	**20**	**230**	**260**	**310**	**300**

Wet Well Elevations						
Wet Well Depth	ft	12	12	12	12	12
Inside Diameter	ft	5	6	6	6	6
First Pump "ON" Elevation	ft					
Pump "OFF" Elevation						
Height	ft	1	6.5	6.5	6.5	6.5
Area	sf	19.6	28.27	28.27	28.27	28.27
Effective Volume	cf	19.6	183.78	183.78	183.78	183.78
Effective Volume	gal	146.9	1374.9	1374.9	1374.9	1374.9
Cycle Time						
Current inflow fill time	min	14.7	34.4	34.4	27.5	27.5
Current inflow pump run time	min	14.7	7.2	6.2	5.3	5.5
Average Fill Time	min	14.7	22.9	19.6	17.2	13.7
Maximum Fill Time	min	7.3	6.0	5.3	4.4	4.6
Avg Pump Run Time	min	14.7	8.1	7.2	6.0	6.9
Max Pump Run Time	min	7.3	6.0	5.3	4.4	4.6
Detention Time	min	29.4	31.0	26.9	23.2	20.6
Max flow cycle time		14.7	12.0	10.6	8.9	9.2
Average cycle time		29.4	31.0	26.9	23.2	20.6
Current inflow cycle time		29.4	41.6	40.6	32.8	33.0
Max starts		4.1	5.0	5.7	6.8	6.5
Average starts	per hr	2.0	1.9	2.2	2.6	2.9
Current inflow starts	per hr	2.04	1.44	1.48	1.83	1.82

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number properties located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN

Preliminary Pump Calculations

March 2023

Portersville Region - Option 1A

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.51	5
#45 Elbows	0.27	10
#Plug Valves	0.31	2
#Check Valves	1.7	1
#Tees (thru)	0.34	1
#Tees (branch)	1.02	1

Flow and Forcemain Parameters		**Option 1A**			
Liftstation		1	2	3	4
No of properties		40	51	58	80
d	inches	4	4	4	4
C		130	130	130	130
No of person/family dwelling		2.5	2.5	2.5	2.5
PE		100	100	100	100
Safety factor		1.25	1.25	1.25	1.25
Qin	mgd	0.013	0.016	0.018	0.025
Qin	gpm	10.0	20.0	20.0	20.0
Qfutureave*	mgd	0.02	0.03	0.03	0.04
Qfutureave	gpm	14	18	20	28
Qfuturepeak	mgd	0.09	0.11	0.13	0.18
Qfuturepeak	gpm	60	80	90	100
L	ft	9,361	1,100	2,801	961
h_s	ft	35.96	27.49	29.98	47.05

Output:

∑K		8.93	8.93	8.93	8.93
v	ft/s	1.53	2.04	2.30	2.55
h_f	ft	27.5	5.5	17.4	7.3
h_m	ft	0.33	0.58	0.73	0.90
h_s	ft	35.96	27.49	29.98	47.05

TDH	**ft**	**63.75**	**33.56**	**48.11**	**55.21**
Pump Power*					
Pump Efficiency	%	70%	70%	70%	70%
Pump power	hp	1.4	1.0	1.6	2.0
Design pumping rate	**gpm**	**60**	**80**	**90**	**100**
Wet Well Elevations					
Wet Well Depth	ft	12	12	12	12
Inside Diameter	ft	5	5	5	5
First Pump "ON" Elevation	ft				
Pump "OFF" Elevation					
Height	ft	1	1.5	1.5	1.5
Area	sf	19.6	19.6	19.6	19.6
Effective Volume	cf	19.6	29.5	29.5	29.5
Effective Volume	gal	146.9	220.3	220.3	220.3
Cycle Time					
Current inflow fill time	min	14.7	11.0	11.0	11.0
Current inflow pump run time	min	2.9	3.7	3.1	2.8
Average Fill Time	min	10.6	12.4	10.9	7.9
Maximum Fill Time	min	2.4	2.8	2.4	2.2
Avg Pump Run Time	min	3.2	3.5	3.2	3.1
Max Pump Run Time	min	2.4	2.8	2.4	2.2
Detention Time	min	13.8	16.0	14.1	11.0
Max flow cycle time		4.9	5.5	4.9	4.4
Average cycle time		13.8	16.0	14.1	11.0
Current inflow cycle time		17.6	14.7	14.2	13.8
Max starts		12.3	10.9	12.3	13.6
Average starts	per hr	4.4	3.8	4.3	5.5
Current inflow starts	per hr	3.40	4.08	4.24	4.36

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number prop located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Preliminary Pump Calculations
March 2023
Haysville Region - Option 1B

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value			
#90 Elbows	0.45	5		
#45 Elbows	0.24	10		
#Plug Valves	0.27	2		
#Check Valves	1.5	1		
#Tees (thru)	0.3	1		
#Tees (branch)	0.9	1		

Flow and Forcemain Parameters		**Option 1B**		
Liftstation number		1	2	3
No of properties/liftstation		15	217	222
d	inches	6	6	6
C		130	130	130
No of person/family dwelling		2.5	2.5	2.5
PE		100	100	100
Safety factor		1.25	1.25	1.25
Qin	mgd	0.005	0.07	0.07
Qin	gpm	10.0	50.0	50.0
Qfutureave*	mgd	0.006	0.088	0.09
Qfutureave	gpm	10	70	70
Qfuturepeak	mgd	0.03	0.45	0.46
Qfuturepeak	gpm	30	320	300
L	ft	4,465	2,393	1,082
h_s	ft	56.12	71.13	22.69

Output:

∑K		7.89	7.89	7.89
v	ft/s	0.34	3.63	3.40
h_f	ft	0.5	21.6	8.7
h_m	ft	0.01	1.62	1.42
h_s	ft	56.12	71.13	22.69
TDH	**ft**	**56.64**	**94.36**	**32.78**

Pump Power*				
Pump Efficiency	%	70%	70%	70%
Pump power	hp	0.6	10.9	3.6
Design pumping rate	**gpm**	**20**	**320**	**300**
Wet Well Elevations				
Wet Well Depth	ft	12	12	12
Inside Diameter	ft	5	6	6
First Pump "ON" Elevation	ft			
Pump "OFF" Elevation				
Height	ft	1	6.5	6.5
Area	sf	19.6	28.27	28.27
Effective Volume	cf	19.6	183.78	183.78
Effective Volume	gal	146.9	1374.9	1374.9
Cycle Time				
Current inflow fill time	min	14.7	27.5	27.5
Current inflow pump run time	min	14.7	5.1	5.5
Average Fill Time	min	14.7	19.6	19.6
Maximum Fill Time	min	4.9	4.3	4.6
Avg Pump Run Time	min	14.7	5.5	6.0
Max Pump Run Time	min	4.9	4.3	4.6
Detention Time	min	29.4	25.1	25.6
Max flow cycle time		9.8	8.6	9.2
Average cycle time		29.4	25.1	25.6
Current inflow cycle time		29.4	32.6	33.0
Max starts		6.1	7.0	6.5
Average starts	per hr	2.0	2.4	2.3
Current inflow starts	per hr	2.04	1.84	1.82

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number prop located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN

Preliminary Pump Calculations

March 2023

Portersville Region - Option 1B/1B

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}{}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.51	5
#45 Elbows	0.27	10
#Plug Valves	0.31	2
#Check Valves	1.7	1
#Tees (thru)	0.34	1
#Tees (branch)	1.02	1

Flow and Forcemain Parameters		Option 1B/1C	
Liftstation		1	2
No. of properties/liftstation		40	64
d	inches	4	4
C		130	130
No of person/family dwelling		2.5	2.5
PE		100	100
Safety factor		1.25	1.25
Qin	mgd	0.013	0.020
Qin	gpm	10.0	20.0
Qfutureave*	mgd	0.025	0.04
Qfutureave	gpm	17	28
Qfuturepeak	mgd	0.11	0.18
Qfuturepeak	gpm	80	130
L	ft	11,561	4,253
h_s	ft	31.5	56.05

Output:

SK		8.93	8.93
v	ft/s	2.04	3.32
h_f	ft	57.8	52.2
h_m	ft	0.58	1.53
h_s	ft	31.5	56.05

TDH	**ft**	**89.84**	**109.75**
Pump Power*			
Pump Efficiency	%	70%	70%
Pump power	hp	2.6	5.2
Design pumping rate	**gpm**	**60**	**100**
Wet Well Elevations			
Wet Well Depth	ft	12	12
Inside Diameter	ft	5	5
First Pump "ON" Elevation	ft		
Pump "OFF" Elevation			
Height	ft	1	2
Area	sf	19.6	19.6
Effective Volume	cf	19.6	39.3
Effective Volume	gal	146.9	293.8
Cycle Time			
Current inflow fill time	min	14.7	14.7
Current inflow pump run time	min	2.9	3.7
Average Fill Time	min	8.5	10.6
Maximum Fill Time	min	0.8	0.8
Avg Pump Run Time	min	3.4	4.1
Max Pump Run Time	min	1.8	2.3
Detention Time	min	11.9	14.6
Max flow cycle time		2.6	3.0
Average cycle time		11.9	14.6
Current inflow cycle time		17.6	18.4
Max starts		23.2	19.8
Average starts	per hr	5.0	4.1
Current inflow starts	per hr	3.40	3.27

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number properties located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Preliminary Pump Calculations
March 2023
Haysville Region - Option 1C

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.45	5
#45 Elbows	0.24	10
#Plug Valves	0.27	2
#Check Valves	1.5	1
#Tees (thru)	0.3	1
#Tees (branch)	0.9	1

Flow and Forcemain Parameters		Option 1C	
Liftstation		1	2
No of properties/liftstation		15	222
d	inches	6	6
C		130	130
No of person/family dwelling		2.5	2.5
PE		100	100
Safety factor		1.25	1.25
Qin	mgd	0.005	0.069
Qin	gpm	10.0	50.0
Qfutureave*	mgd	0.0061	0.09
Qfutureave	gpm	10	100
Qfuturepeak	mgd	0.03	0.46
Qfuturepeak	gpm	30	300
L	ft	5,548	5,143
h_s	ft	56.12	29.1

Output:

∑K		7.89	7.89
v	ft/s	0.34	3.40
h_f	ft	0.6	41.2
h_m	ft	0.01	1.42
h_s	ft	56.12	29.1
TDH	**ft**	**56.76**	**71.74**

Pump Power*			
Pump Efficiency	%	70%	70%
Pump power	hp	0.6	7.8
Design pumping rate	**gpm**	20	300
Wet Well Elevations			
Wet Well Depth	ft	12	12
Inside Diameter	ft	5	5
First Pump "ON" Elevation	ft		
Pump "OFF" Elevation			
Height	ft	1	6.5
Area	sf	19.6	19.6
Effective Volume	cf	19.6	127.6
Effective Volume	gal	146.9	954.8
Cycle Time			
Current inflow fill time	min	14.7	19.1
Current inflow pump run time	min	14.7	3.8
Average Fill Time	min	14.7	9.5
Maximum Fill Time	min	4.9	3.2
Avg Pump Run Time	min	14.7	4.8
Max Pump Run Time	min	4.9	3.2
Detention Time	min	29.4	14.3
Max flow cycle time		9.8	6.4
Average cycle time		29.4	14.3
Current inflow cycle time		29.4	22.9
Max starts		6.1	9.4
Average starts	per hr	2.0	4.2
Current inflow starts	per hr	2.04	2.62

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number properties located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN
Preliminary Pump Calculations
March 2023
Haysville Region - Option 1D

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.45	5
#45 Elbows	0.24	10
#Plug Valves	0.27	2
#Check Valves	1.5	1
#Tees (thru)	0.3	1
#Tees (branch)	0.9	1

Flow and Forcemain Parameters		**Option 1D**				
Regional Liftstation	number	1	2	3	4	5
No of properties served per liftstation		8	113	125	140	150
d	inches	6	6	6	6	6
C		130	130	130	130	130
No of person/family dwelling		2.5	2.5	2.5	2.5	2.5
PE	gpcd	100	100	100	100	100
Safety factor		1.25	1.25	1.25	1.25	1.25
Qin	mgd	0.00	0.04	0.04	0.04	0.05
Qin	gpm	10.0	30.0	30.0	40.0	40.0
Qfutureave*	mgd	0.005	0.068	0.075	0.084	0.09
Qfutureave	gpm	10	50	60	60	100
Qfuturepeak	mgd	0.02	0.28	0.31	0.35	0.37
Qfuturepeak	gpm	20	200	220	240	300
L	ft	848	1,432	1,432	2,414	1,063
h_s	ft	51.64	52.86	32.68	76.13	27.69
Output:						
∑K		7.89	7.89	7.89	7.89	7.89
v	ft/s	0.23	2.27	2.50	2.72	3.40
h_f	ft	0.0	5.4	6.5	12.8	8.5
h_m	ft	0.01	0.63	0.76	0.91	1.42
h_s	ft	51.6	52.9	32.7	76.1	27.7
TDH	**ft**	**51.7**	**58.9**	**39.9**	**89.8**	**37.6**
Pump Power*						
Pump Efficiency	%	70%	70%	70%	70%	70%
Pump power	**hp**	**0.4**	**4.3**	**3.2**	**7.8**	**4.1**
Design pumping rate	**gpm**	**20**	**200**	**220**	**240**	**300**

Wet Well Elevations						
Wet Well Depth	ft	12	12	12	12	12
Inside Diameter	ft	5	6	6	6	6
First Pump "ON" Elevation	ft					
Pump "OFF" Elevation						
Height	ft	1	6.5	6.5	6.5	6.5
Area	sf	19.6	28.27	28.27	28.27	28.27
Effective Volume	cf	19.6	183.78	183.78	183.78	183.78
Effective Volume	gal	146.9	1374.9	1374.9	1374.9	1374.9
Cycle Time						
Current inflow fill time	min	14.7	45.8	45.8	34.4	34.4
Current inflow pump run time	min	14.7	8.1	7.2	6.9	5.3
Average Fill Time	min	14.7	27.5	22.9	22.9	13.7
Maximum Fill Time	min	7.3	6.9	6.2	5.7	4.6
Avg Pump Run Time	min	14.7	9.2	8.6	7.6	6.9
Max Pump Run Time	min	7.3	6.9	6.2	5.7	4.6
Detention Time	min	29.4	36.7	31.5	30.6	20.6
Max flow cycle time		14.7	13.7	12.5	11.5	9.2
Average cycle time		29.4	36.7	31.5	30.6	20.6
Current inflow cycle time		29.4	53.9	53.1	41.2	39.7
Max starts		4.1	4.4	4.8	5.2	6.5
Average starts	per hr	2.0	1.6	1.9	2.0	2.9
Current inflow starts	per hr	2.04	1.11	1.13	1.45	1.51

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number properties located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Dubois County Regional Sewer District Phase 1 Sewer Improvements
Dubois County, IN

Preliminary Pump Calculations

March 2023

Portersville Region - Option 1D

Equations:

$h_f=0.00208*L*((100/C)^{1.85})*(Q_{gpm}^{1.85})/(d^{4.8655})$

$h_m=h_v*SK$

$h_v=v^2/2g$

Input:

	K Value	
#90 Elbows	0.51	5
#45 Elbows	0.27	10
#Plug Valves	0.31	2
#Check Valves	1.7	1
#Tees (thru)	0.34	1
#Tees (branch)	1.02	1

Flow and Forcemain Parameters		**Option 1D**			
Liftstation		1	2	3	4
No of properties		32	40	46	65
d	inches	4	4	4	4
C		130	130	130	130
No of person/family dwelling		2.5	2.5	2.5	2.5
PE		100	100	100	100
Safety factor		1.25	1.25	1.25	1.25
Qin	mgd	0.010	0.013	0.014	0.020
Qin	gpm	10.0	10.0	10.0	20.0
Qfutureave*	mgd	0.02	0.02	0.03	0.04
Qfutureave	gpm	14	17	20	28
Qfuturepeak	mgd	0.07	0.09	0.10	0.14
Qfuturepeak	gpm	50	60	70	100
L	ft	9,361	1,100	2,801	961
h_s	ft	35.96	27.49	29.98	47.05
Output:					
∑K		8.93	8.93	8.93	8.93
v	ft/s	1.28	1.53	1.79	2.55
h_f	ft	19.6	3.2	10.9	7.3
h_m	ft	0.23	0.33	0.44	0.90
h_s	ft	35.96	27.49	29.98	47.05
TDH	**ft**	**55.79**	**31.04**	**41.35**	**55.21**

Pump Power*					
Pump Efficiency	%	70%	70%	70%	70%
Pump power	hp	1.0	0.7	1.0	2.0

Design pumping rate	gpm	60	80	90	100
Wet Well Elevations					
Wet Well Depth	ft	12	12	12	12
Inside Diameter	ft	5	5	5	5
First Pump "ON" Elevation	ft				
Pump "OFF" Elevation					
Height	ft	1	1.5	1.5	1.5
Area	sf	19.6	19.6	19.6	19.6
Effective Volume	cf	19.6	29.5	29.5	29.5
Effective Volume	gal	146.9	220.3	220.3	220.3
Cycle Time					
Current inflow fill time	min	14.7	22.0	22.0	11.0
Current inflow pump run time	min	2.9	3.1	2.8	2.8
Average Fill Time	min	10.7	12.9	11.2	7.9
Maximum Fill Time	min	2.9	3.7	3.1	2.2
Avg Pump Run Time	min	3.2	3.5	3.1	3.1
Max Pump Run Time	min	2.9	3.7	3.1	2.2
Detention Time	min	13.9	16.4	14.3	11.0
Max flow cycle time		5.9	7.3	6.3	4.4
Average cycle time		13.9	16.4	14.3	11.0
Current inflow cycle time		17.6	25.2	24.8	13.8
Max starts		10.2	8.2	9.5	13.6
Average starts	per hr	4.3	3.7	4.2	5.5
Current inflow starts	per hr	3.40	2.38	2.42	4.36

Notes:

1. Future design average flow and design peak flow is used for the last lift station located the downstream end. The flows for each lift station (1 through the second last station) is estimated by taking the ratio of number properties located in that lift station basin divided by the total number of current properties.
2. Pump power is estimated using calculated head, assumed efficiency, and conversion factors.

Xylem Water Solutions USA, Inc.
Flygt Products

9745 Hedden Road
Evansville, IN 47725
Tel 812/602-6800
Fax 812/402-6128

March 8, 2023

LAI LTD
5400 NEWPORT DR
SUITE 10
ROLLING MEADOWS IL 60008

Quote # 2023-EVN-0050
Project Name: Dubois County
Job Name:

Xylem Water Solutions USA, Inc. is pleased to provide a budget quote for the following Flygt equipment - Pricing is for budget purposes only.

250 GPM @ 91' TDH

Qty	Description
2	@NX-3 HT/HC 10/380-480/3/CH+ FM 50' FLS
2	CONNECTION,DISCH 3X3" CI
2	KIT,SLIDING BRACKET DN80 ENF
2	HARDWARE,DISC CONN ASSY 304SS
2	KIT,HARDWARE 3/8IN SS (2X)
2	BRACKET,GUIDE BAR UPPER 2" 316
80	TS3162 FEET 2"GUIDE RAIL 316SS
2	HOOK,SAFETY ASSEMBLY SS
2	KIT,CHAIN FITTING 3067-3127+ 316SS
40	CHAIN,3/16" 316L
1	Duplex Control Panel - Concertor 10 HP
2	MINI-CASII 120V
2	SOCKET,11 PIN OCTAL DIN MOUNT
4	SENSOR,ENM-10 0.95-1.1 40'

250 GPM @ 91' TDH Price USD $ 49,106.92

100 GPM @ 55' TDH

Qty	Description
2	NX-3 HT/HC 5.5/380-480/3/CH+ FM 50' FLS
2	CONNECTION,DISCH 3X3" CI
2	KIT,SLIDING BRACKET DN80 ENF
2	HARDWARE,DISC CONN ASSY 304SS
2	KIT,HARDWARE 3/8IN SS (2X)
2	BRACKET,GUIDE BAR UPPER 2" 316
80	TS3162 FEET 2"GUIDE RAIL 316SS
2	HOOK,SAFETY ASSEMBLY SS
2	KIT,CHAIN FITTING 3067-3127+ 316SS
40	CHAIN,3/16" 316L
1	Duplex Control Panel - Concertor 5.5 HP
2	MINI-CASII 120V

FLYGT
a xylem brand

Qty	Description
2	SOCKET,11 PIN OCTAL DIN MOUNT
4	SENSOR,ENM-10 0.95-1.1 40'

100 GPM @ 55' TDH Price USD $ 52,514.92

300 GPM @ 38' TDH

Qty	Description
2	NX-3 HT/HC 5.5/380-480/3/CH+ FM 50' FLS
2	CONNECTION,DISCH 3X3" CI
2	KIT,SLIDING BRACKET DN80 ENF
2	HARDWARE,DISC CONN ASSY 304SS
2	KIT,HARDWARE 3/8IN SS (2X)
2	BRACKET,GUIDE BAR UPPER 2" 316
80	TS3162 FEET 2"GUIDE RAIL 316SS
2	KIT,CHAIN FITTING 3067-3127+ 316SS
40	CHAIN,3/16" 316L
1	Duplex Control Panel - Concertor 5.5 HP
2	MINI-CASII 120V
2	SOCKET,11 PIN OCTAL DIN MOUNT
4	SENSOR,ENM-10 0.95-1.1 40'

300 GPM @ 38' TDH Price USD $ 52,142.92

Total Price $ 153,764.76

Freight Charge $ 6,735.00

Total Price $ 160,499.76

Terms & Conditions

This order is subject to the Standard Terms and Conditions of Sale – Xylem Americas effective on the date the order is accepted which terms are available at http://www.xyleminc.com/en-us/Pages/terms-conditions-of-sale.aspx and incorporated herein by reference and made a part of the agreement between the parties.

Purchase Orders: Please make purchase orders out to: Xylem Water Solutions USA, Inc.

Freight Terms: 3 DAP - Delivered At Place 08 - Jobsite (per IncoTerms 2020)
See Freight Payment (Delivery Terms) below.

Taxes: State, local and other applicable taxes are not included in this quotation.

Back Charges: Buyer shall not make purchases nor shall Buyer incur any labor that would result in a back charge to Seller without prior written consent of an authorized employee of Seller.

Shortages: Xylem will not be responsible for apparent shipment shortages or damages incurred in shipment that are not reported within two weeks from delivery to the jobsite. Damages should be noted on the receiving slip and the truck driver advised of the damages. Please contact our office as soon as possible to report damages or shortages so that replacement items can be shipped and the appropriate claims made.

Terms of Payment: 100% N30 after invoice date.

Xylem's payment shall not be dependent upon Purchaser being paid by any third party unless Owner denies payment due to reasons solely attributable to items related to the equipment being provided by FLYGT.

Validity: This Quote is valid for sixty (60) days.
Schedule: Submittals will be supplied 2-3 weeks after order acceptance.
Time of Delivery: Approximately 10-12 working weeks after receipt of approved submittals.
Terms of Delivery: PP/Add Order Position
Start Up: One (1) day Start Up / Owner Training is included.

Thank you for the opportunity to provide this quotation. Please contact us if there are any questions. To place an order, please send a Purchase Order which includes Purchase Order Number, Billing and Shipping Address, any applicable Tax Exemption Certificates, and Contact Person and Phone Number. As an alternative, please complete, sign and return the Customer Acceptance Page attached.

Sincerely,

Seth Bowman
Sales Representative
Phone: 812-616-6755
Cell: 812-632-8220
seth.bowman@xylem.com

Zackary Bauschke
Sales Representative
Phone: 708-781-0177
Cell: 574-336-7195
zackary.bauschke@xylem.com
Fax:708-342-0491

FLYGT
a xylem brand

Customer Acceptance

This order is subject to the Standard Terms and Conditions of Sale – Xylem Americas effective on the date the order is accepted which terms are available at http://www.xyleminc.com/en-us/Pages/terms-conditions-of-sale.aspx and incorporated herein by reference and made a part of the agreement between the parties.

A signed copy of this Quote is acceptable as a binding contract.

Purchase Orders: Please make purchase orders out to: Xylem Water Solutions USA, Inc.

Quote #: 2023-EVN-0050
Customer Name: LAI LTD
Job Name:
Total Amount: $ 153,764.76
(excluding freight)

Signature: _____ Name: _____
(PLEASE PRINT)

Company/Utility: _____ PO: _____

Address: _____ Date: _____

_____ Phone: _____

_____ Email: _____

_____ Fax: _____

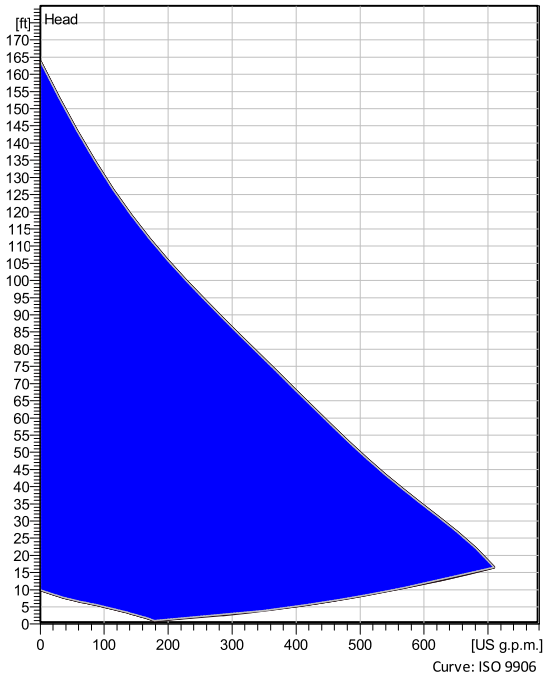
FLYGT
a xylem brand

Concertor XPC N80-2750

Designed for sewage pumping stations in collection systems, the XPC system powered by Nexicon consists of 1-4 pumps, the Nexicon control, and 1 Dirigo module for each of the pumps Perfect for users who require the full functionality of the Concertor system, including maximum energy savings and clean wet well.

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N6020.181 18-08-1AZ-W 5.5hp

Installation type
X - Optional installation, Wet or Dry

Impeller diameter
170 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
170 mm

Discharge diameter
3 inch

Inlet diameter
100 mm

Maximum operating speed
800-2623.7 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project	Xylect-20233217	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-2750

Technical specification

Motor - General

Motor number N6020.181 18-08-1AZ-W 5.5hp	**Phases** 3~	**Rated speed** 800-2624 rpm	**Rated power** 5.5 hp
ATEX approved No	**Insulation class** H	**Rated current** 6.19 A	**Type of Duty** S1
Frequency 60 Hz	**Rated voltage** 460 V	**Motor efficiency class** IE4 according to IEC/TS 60034-30-2 Ed. 1	

Motor - Technical

Power factor - 1/1 Load 0.94	**Motor efficiency - 1/1 Load** 89.0 %	**Nominal speed - 1/1 Load (200-240V)** 1150	**Nominal speed - 1/1 Load (380-480V)** 2300
Power factor - 3/4 Load 0.94	**Motor efficiency - 3/4 Load** 89.0 %	**Nominal speed - 3/4 Load (200-240V)** 1035	**Nominal speed - 3/4 Load (380-480V)** 2070
Power factor - 1/2 Load 0.93	**Motor efficiency - 1/2 Load** 90.0 %	**Nominal speed - 1/2 Load (200-240V)** 920	**Nominal speed - 1/2 Load (380-480V)** 1840

Starting current
6.19 A

Project	Xylect-20233217	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-2750

Monitoring and Control equipment

Gateway

Yes

Power Supply	24 V DC
Ports	1 x USB
	1 x RS485
	1 X Ethernet RJ 45
	1 x Display interface, CAN
Communication	Modbus RTU
	Modbus TCP
Standard I/O	4 x Digital outputs
	4 x Digital inputs
	1 x Analog input
	1 x Analog output
Pump Interface	1 x Pump Communication Port
User Interface	14 x LED
	1 x Rotator Switch
Data Logging	1000 data points
Environment Class	Protection class: IP 20
	Operation temperature: -20˚C to +65˚C
Software Version	XPC software – Pump station management, including Energy minimizer
Approvals	CE, UL, CSA

Interface (HMI)

Basic

Power Supply	24V DC
Ports	1 x Controller interface, CAN
Interface	To operator: screen & LEDs
	From operator: jog wheel & buttons
Environment Class	Protection class: Front: IP54, Back: IP21
	Operation temperature: -20 ˚C to +70˚C
Approvals	CE, UL, CSA

WiFi

No

Communication

Standard

Additional I/O

No

Cloud connection

No

Project	Xylect-20233217	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

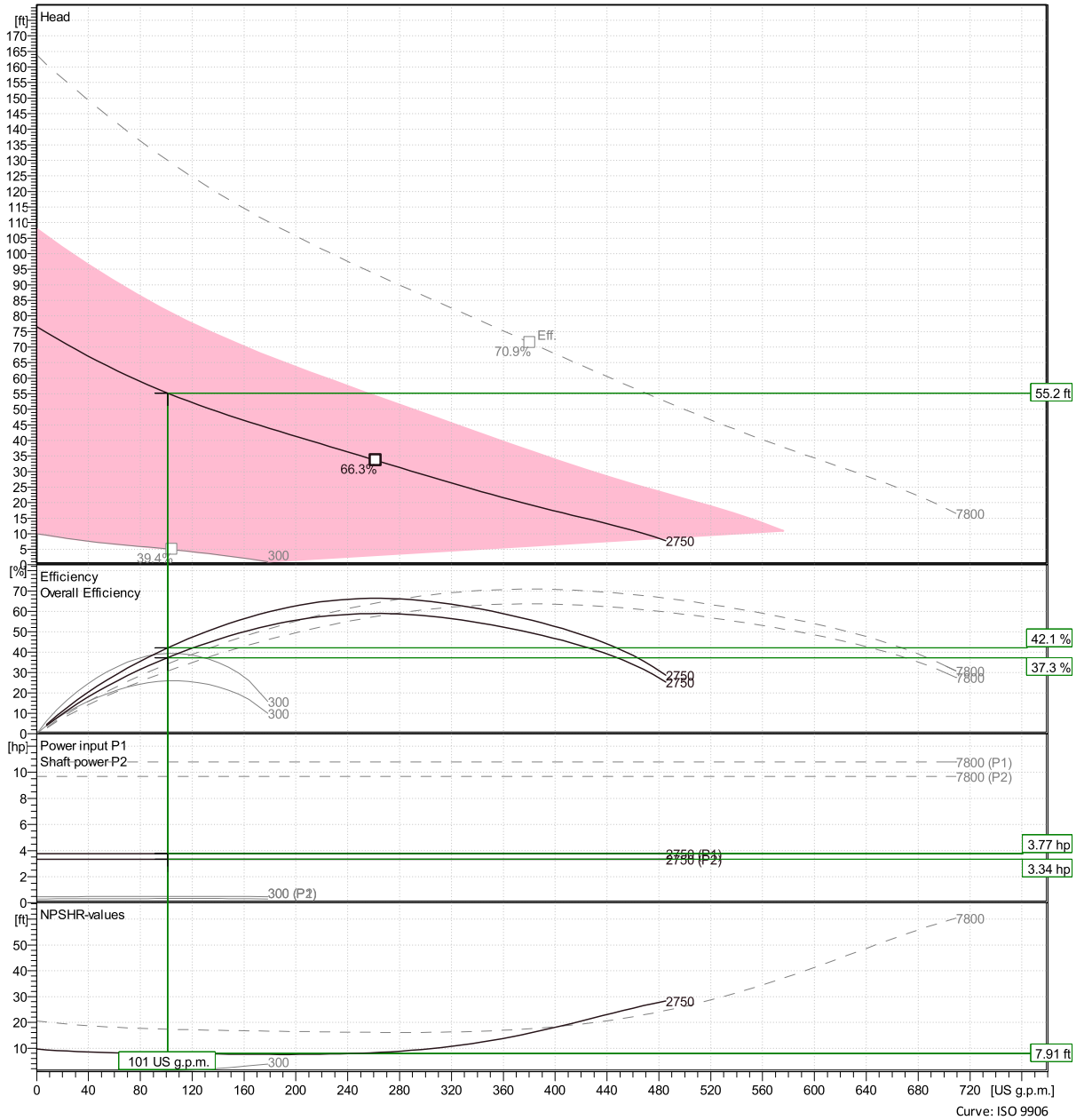
Concertor XPC N80-2750

Performance curve

Duty point

Flow	Head
101 US g.p.m.	55.2 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



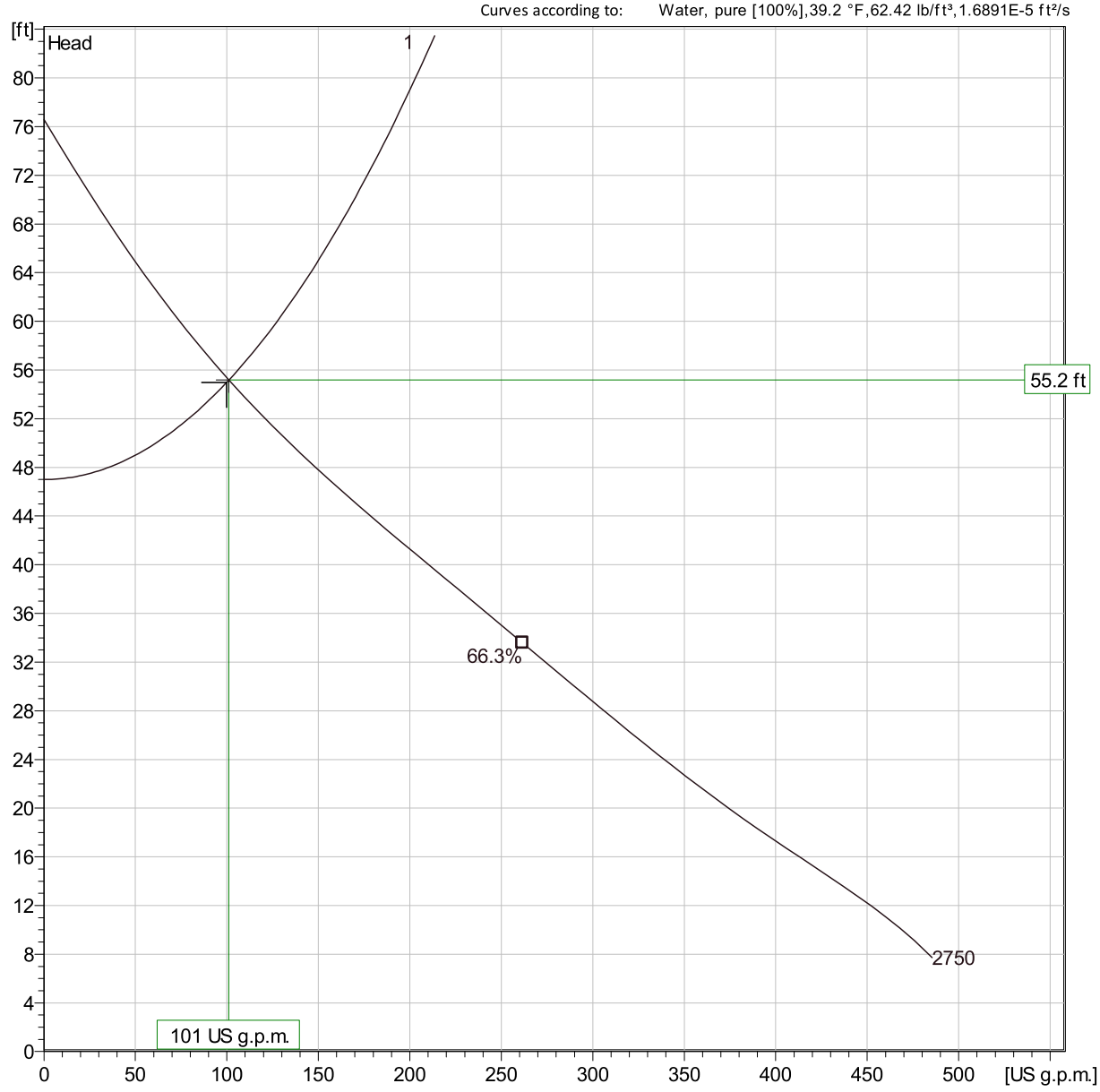
Curve: ISO 9906

Project	Xylect-20233217	**Created by**	Chris Tuinstra	**Last update**	3/3/2023
Block		**Created on**	3/3/2023		

Concertor XPC N80-2750

Duty Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



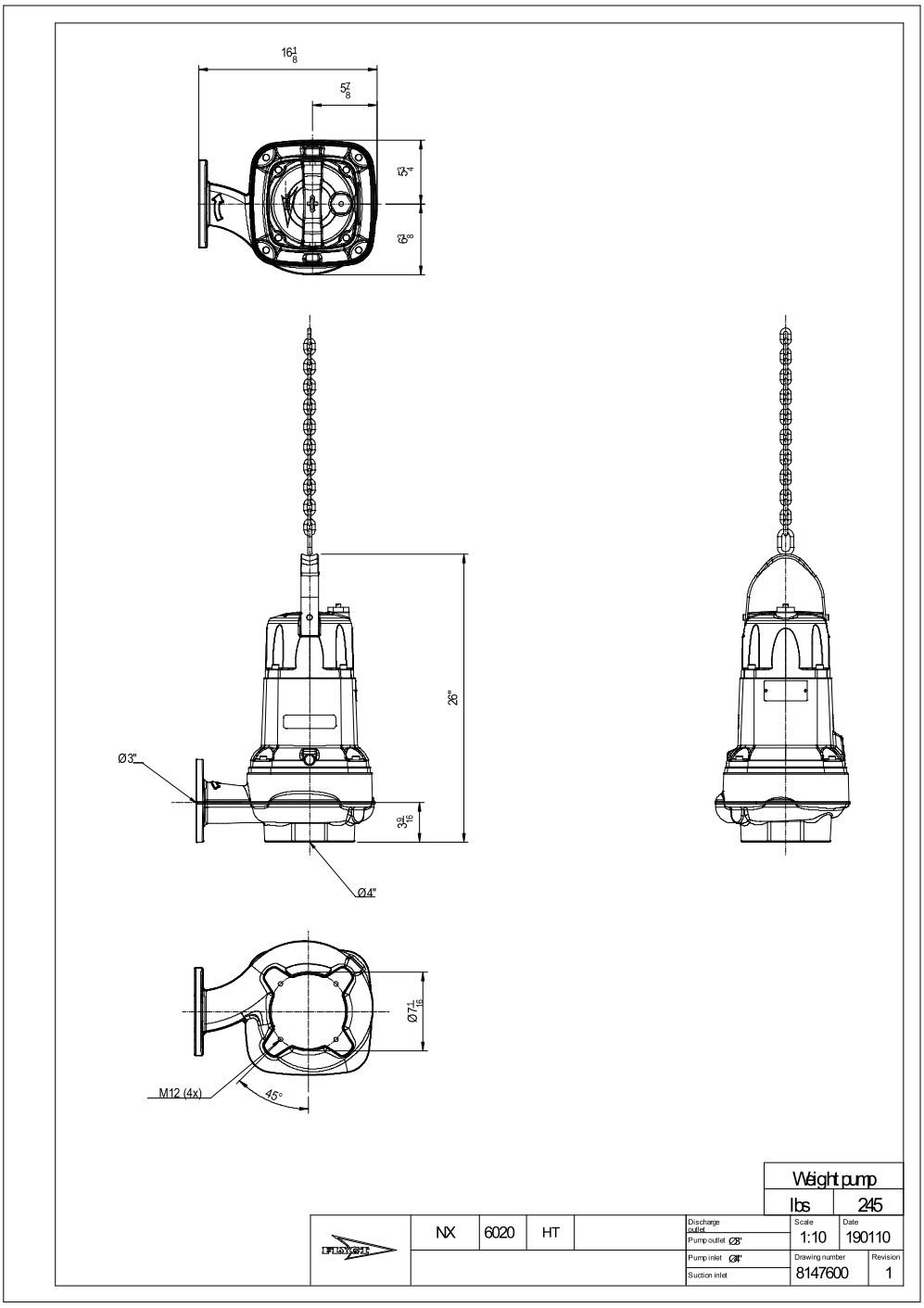
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	101	55.2	3.34	101	55.2	3.34	42.1 %	454	7.91

Project		**Created by**	Chris Tuinstra		
Block	Xylect-20233217	**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-2750

Dimensional drawing



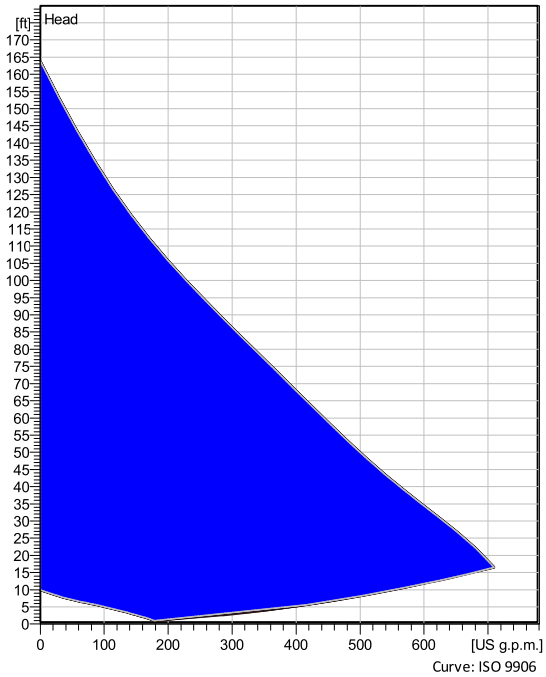
Project	Xylect-20233217	**Created by**	Chris Tuinstra
Block		**Created on**	3/3/2023
		Last update	3/3/2023

Concertor DP N80-7300

A process-controlled wastewater pumping system suitable for customers who utilize specially designed process control algorithms and want to benefit from lower capital costs, smaller control cabinets and higher pump system efficiencies. Concertor DP is also suitable as a reliabl and energy efficient on/off controlled wastewater pumping system for customers who want t benefit from easily adjustable pump performance, soft start/soft stop, constant power and motor protection. This system is scalable to as many pumps as required by your application, with one gateway per pump.

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N6020.181 18-08-1AZ-W 10hp

Installation type
X - Optional installation, Wet or Dry

Impeller diameter
170 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
170 mm

Discharge diameter
3 inch

Inlet diameter
100 mm

Maximum operating speed
800-3229.6 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project	Xylect-20233178	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor DP N80-7300

Technical specification

Motor - General

Motor number N6020.181 18-08-1AZ-W 10hp	**Phases** 3~	**Rated speed** 800-3230 rpm	**Rated power** 10 hp
ATEX approved No	**Insulation class** H	**Rated current** 10.9 A	**Type of Duty** S1
Frequency 60 Hz	**Rated voltage** 460 V	**Motor efficiency class** IE4 according to IEC/TS 60034-30-2 Ed. 1	

Motor - Technical

Power factor - 1/1 Load 0.94	**Motor efficiency - 1/1 Load** 89.0 %	**Nominal speed - 1/1 Load (200-240V)** 1150	**Nominal speed - 1/1 Load (380-480V)** 2300
Power factor - 3/4 Load 0.94	**Motor efficiency - 3/4 Load** 89.0 %	**Nominal speed - 3/4 Load (200-240V)** 1035	**Nominal speed - 3/4 Load (380-480V)** 2070
Power factor - 1/2 Load 0.93	**Motor efficiency - 1/2 Load** 90.0 %	**Nominal speed - 1/2 Load (200-240V)** 920	**Nominal speed - 1/2 Load (380-480V)** 1840

Starting current
10.9 A

Project	Xylect-20233178	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor DP N80-7300

Monitoring and Control equipment

Gateway

Yes

Power Supply	24 V DC
Ports	1 x USB
	1 x RS485
	1 X Ethernet RJ 45
	1 x Display interface, CAN
Communication	Modbus RTU
	Modbus TCP
Standard I/O	4 x Digital outputs
	4 x Digital inputs
	1 x Analog input
	1 x Analog output
Pump Interface	1 x Pump Communication Port
User Interface	14 x LED
	1 x Rotator Switch
Data Logging	1000 data points
Environment Class	Protection class: IP 20
	Operation temperature: -20˚C to +65˚C
Software Version	DP software – Variable performance control via external signal, status and alarms
Approvals	CE, UL, CSA

Interface (HMI)

None

Project	Xylect-20233178	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

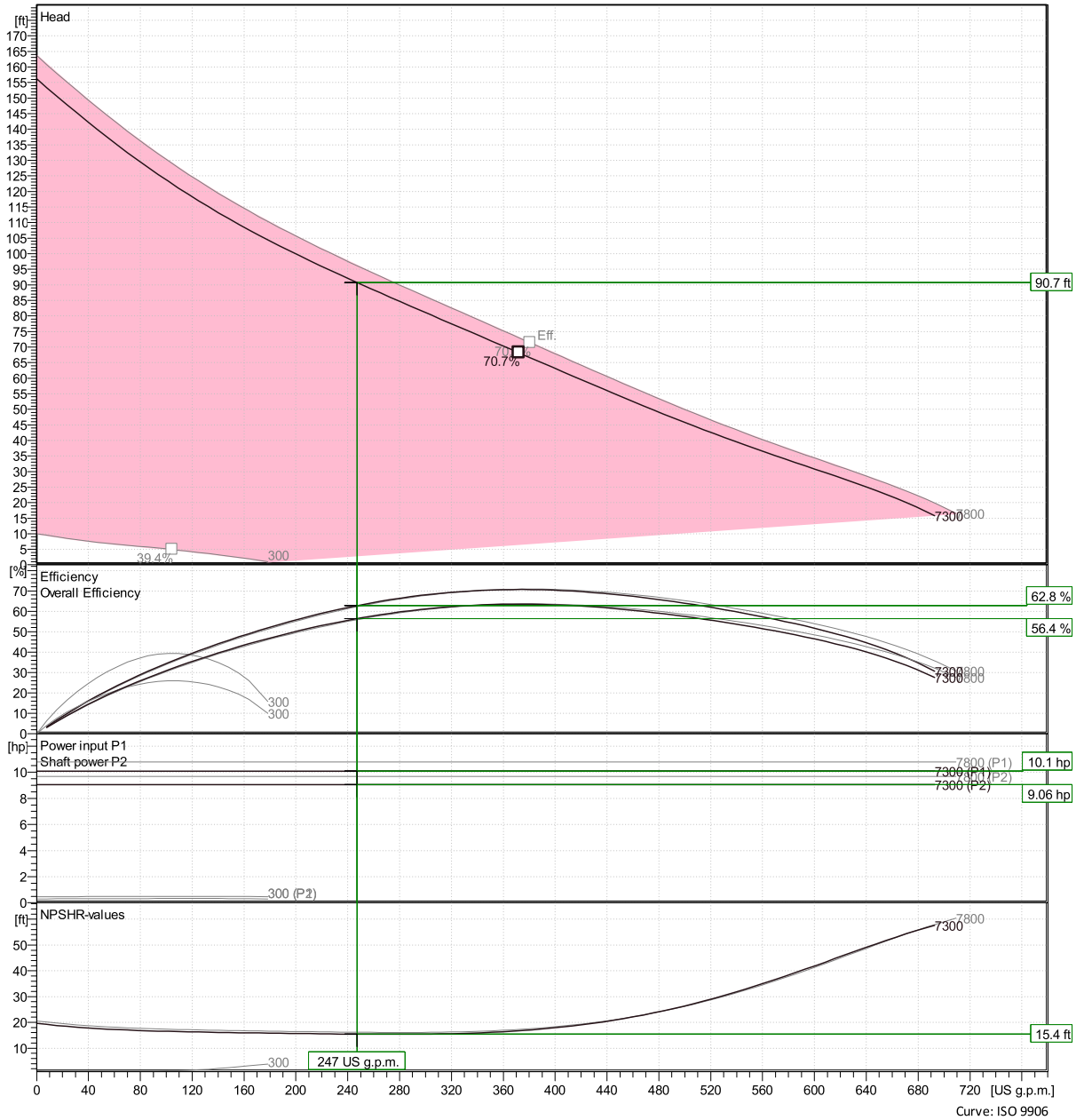
Concertor DP N80-7300

Performance curve

Duty point

Flow	Head
247 US g.p.m.	90.7 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s

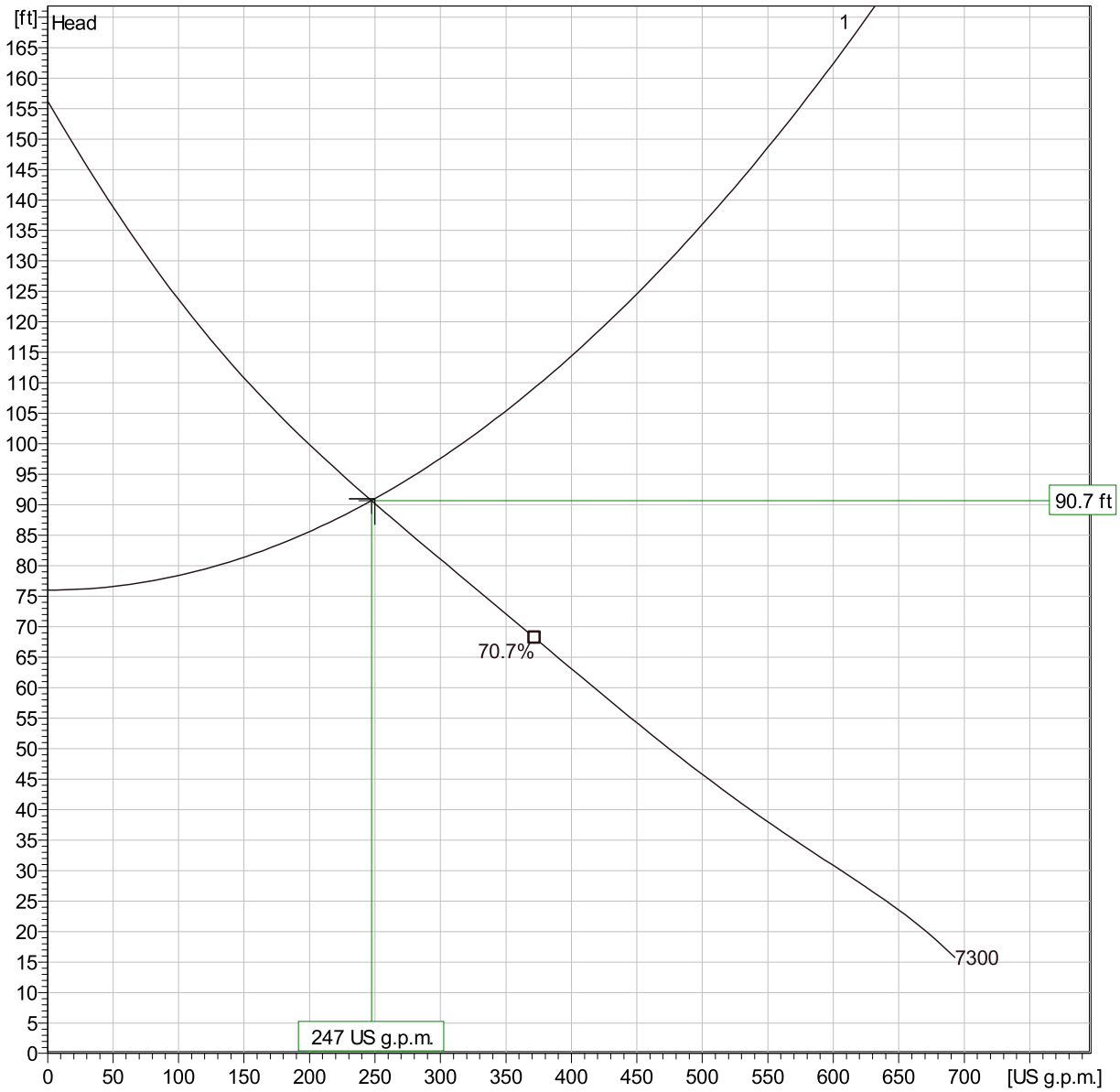


Project	Xylect-20233178	**Created by**	Chris Tuinstra	**Last update**	3/3/2023
Block		**Created on**	3/3/2023		

Concertor DP N80-7300

Duty Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



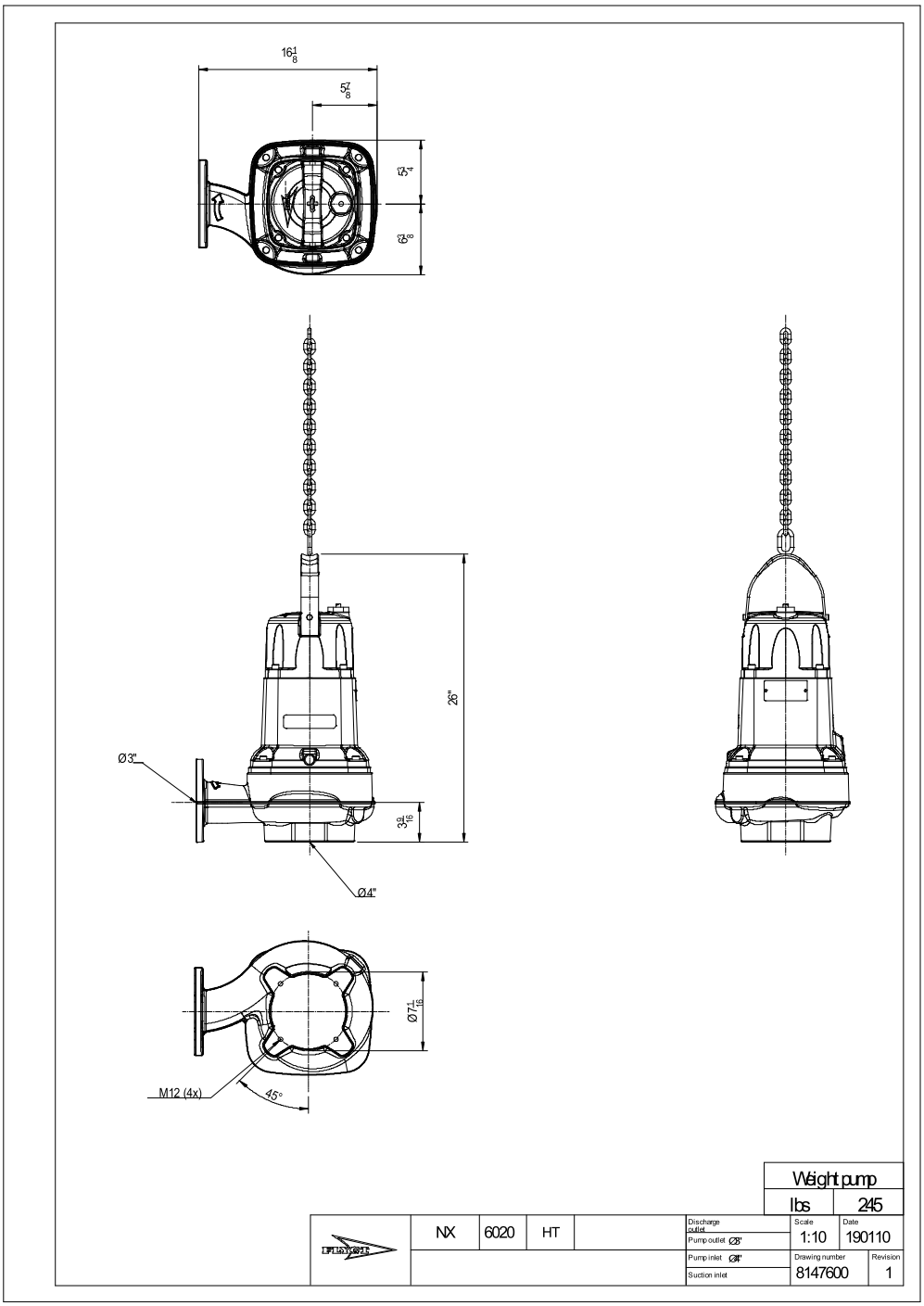
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	247	90.7	9.06	247	90.7	9.06	62.8 %	506	15.4

Project		**Created by**	Chris Tuinstra		
Block	Xylect-20233178	**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor DP N80-7300

Dimensional drawing



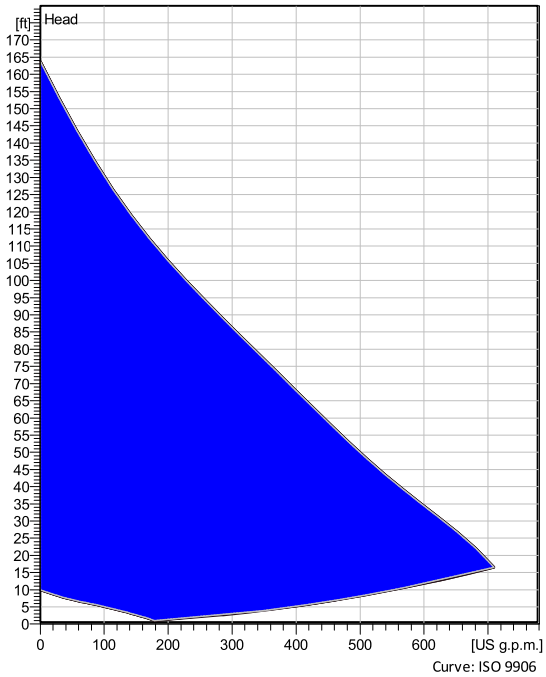
Project	Xylect-20233178	**Created by**	Chris Tuinstra
Block		**Created on**	3/3/2023
		Last update	3/3/2023

Concertor XPC N80-3500

Designed for sewage pumping stations in collection systems, the XPC system powered by Nexicon consists of 1-4 pumps, the Nexicon control, and 1 Dirigo module for each of the pumps Perfect for users who require the full functionality of the Concertor system, including maximum energy savings and clean wet well.

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N6020.181 18-08-1AZ-W 5.5hp

Installation type
X - Optional installation, Wet or Dry

Impeller diameter
170 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
170 mm

Discharge diameter
3 inch

Inlet diameter
100 mm

Maximum operating speed
800-2623.7 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project	Xylect-20233211	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-3500

Technical specification

Motor - General

Motor number N6020.181 18-08-1AZ-W 5.5hp	**Phases** 3~	**Rated speed** 800-2624 rpm	**Rated power** 5.5 hp
ATEX approved No	**Insulation class** H	**Rated current** 6.19 A	**Type of Duty** S1
Frequency 60 Hz	**Rated voltage** 460 V	**Motor efficiency class** IE4 according to IEC/TS 60034-30-2 Ed. 1	

Motor - Technical

Power factor - 1/1 Load 0.94	**Motor efficiency - 1/1 Load** 89.0 %	**Nominal speed - 1/1 Load (200-240V)** 1150	**Nominal speed - 1/1 Load (380-480V)** 2300
Power factor - 3/4 Load 0.94	**Motor efficiency - 3/4 Load** 89.0 %	**Nominal speed - 3/4 Load (200-240V)** 1035	**Nominal speed - 3/4 Load (380-480V)** 2070
Power factor - 1/2 Load 0.93	**Motor efficiency - 1/2 Load** 90.0 %	**Nominal speed - 1/2 Load (200-240V)** 920	**Nominal speed - 1/2 Load (380-480V)** 1840

Starting current
6.19 A

Project	Xylect-20233211	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-3500

Monitoring and Control equipment

Gateway

Yes

Power Supply	24 V DC
Ports	1 x USB
	1 x RS485
	1 X Ethernet RJ 45
	1 x Display interface, CAN
Communication	Modbus RTU
	Modbus TCP
Standard I/O	4 x Digital outputs
	4 x Digital inputs
	1 x Analog input
	1 x Analog output
Pump Interface	1 x Pump Communication Port
User Interface	14 x LED
	1 x Rotator Switch
Data Logging	1000 data points
Environment Class	Protection class: IP 20
	Operation temperature: -20˚C to +65˚C
Software Version	XPC software – Pump station management, including Energy minimizer
Approvals	CE, UL, CSA

Interface (HMI)

Basic

Power Supply	24V DC
Ports	1 x Controller interface, CAN
Interface	To operator: screen & LEDs
	From operator: jog wheel & buttons
Environment Class	Protection class: Front: IP54, Back: IP21
	Operation temperature: -20 ˚C to +70˚C
Approvals	CE, UL, CSA

WiFi

No

Communication

Standard

Additional I/O

No

Cloud connection

No

Project	Xylect-20233211	**Created by**	Chris Tuinstra		
Block		**Created on**	3/3/2023	**Last update**	3/3/2023

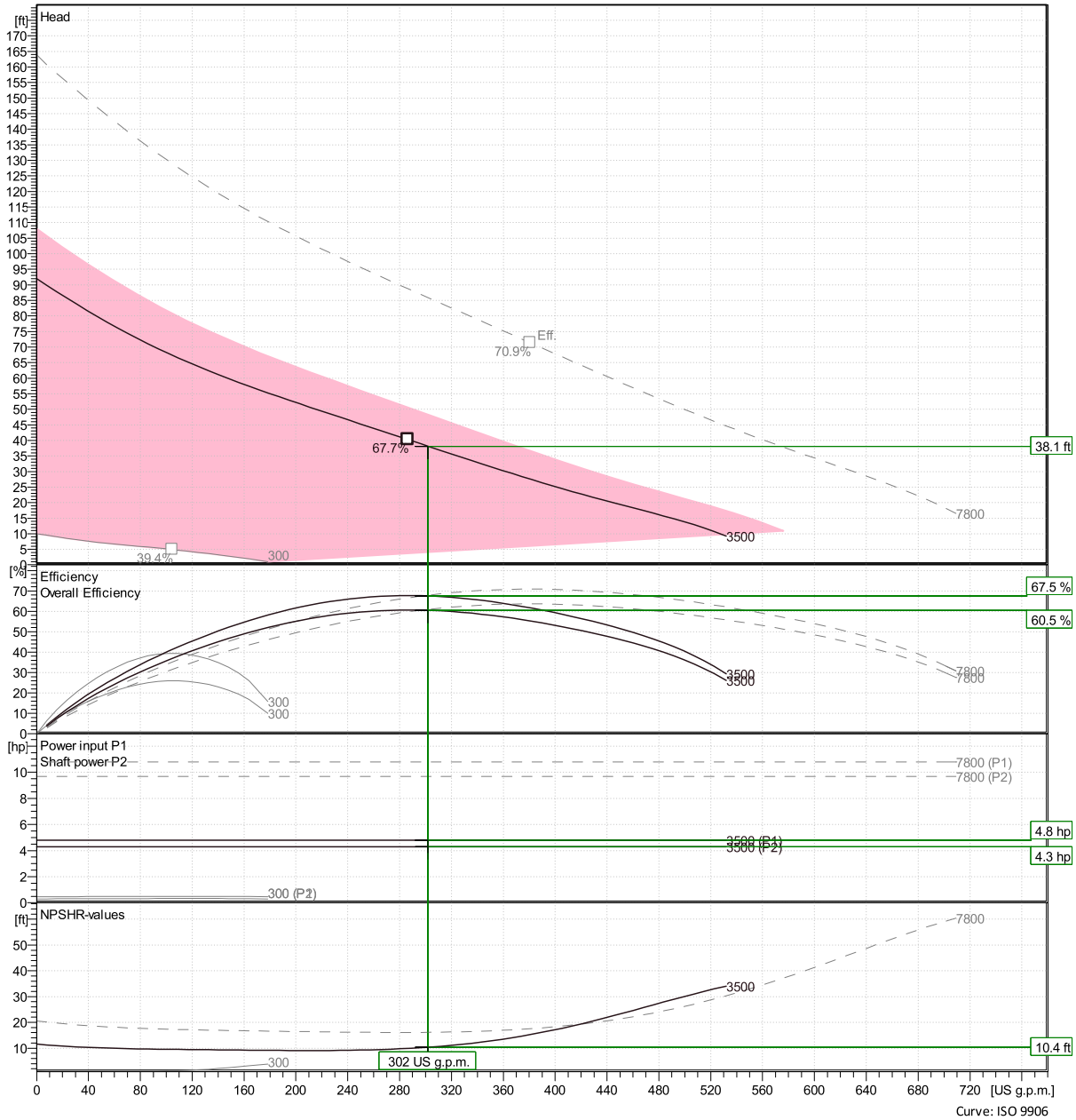
Concertor XPC N80-3500

Performance curve

Duty point

Flow	Head
302 US g.p.m.	38.1 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



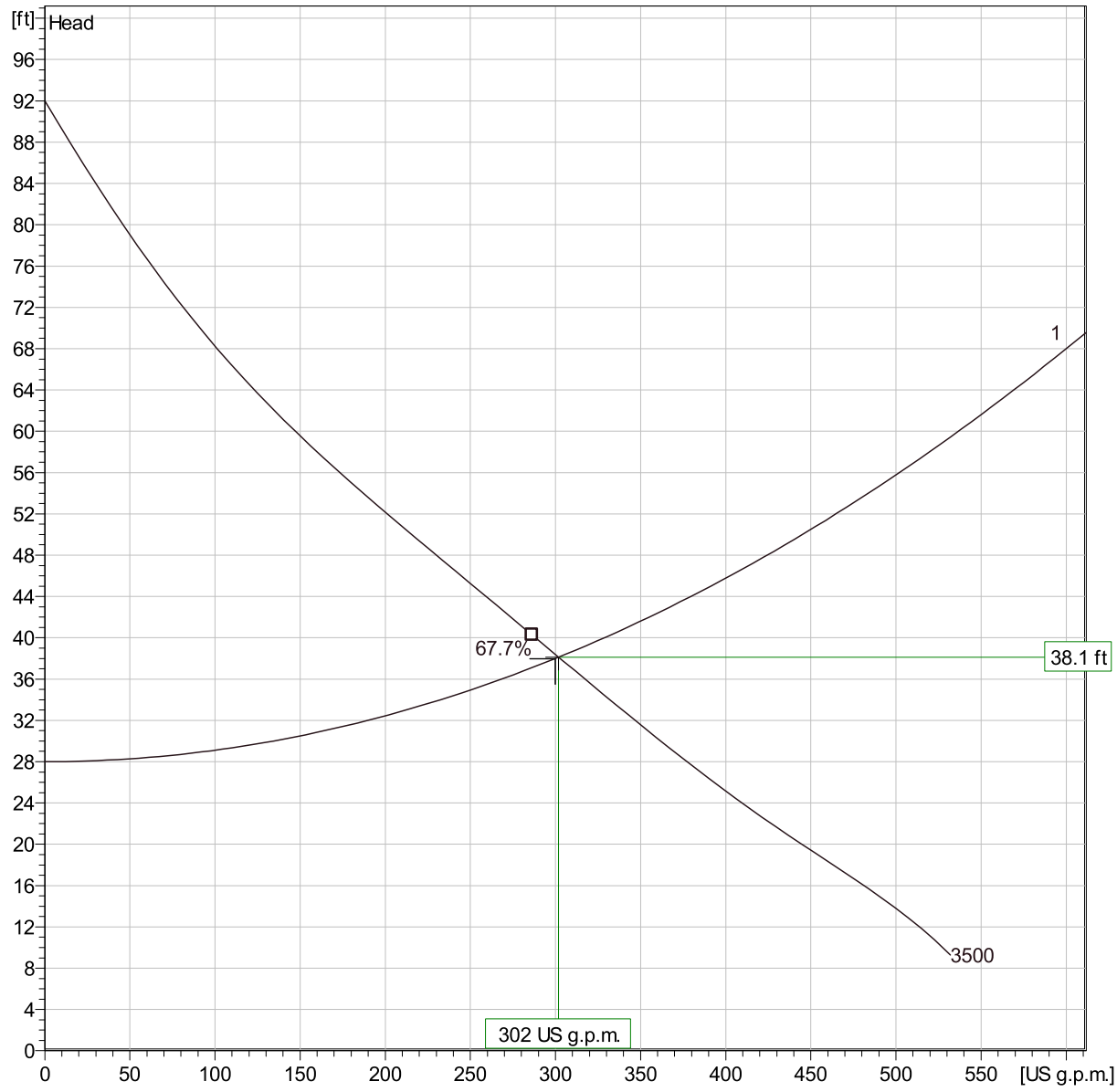
Curve: ISO 9906

Project	Xylect-20233211	**Created by**	Chris Tuinstra	**Last update**	3/3/2023
Block		**Created on**	3/3/2023		

Concertor XPC N80-3500

Duty Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



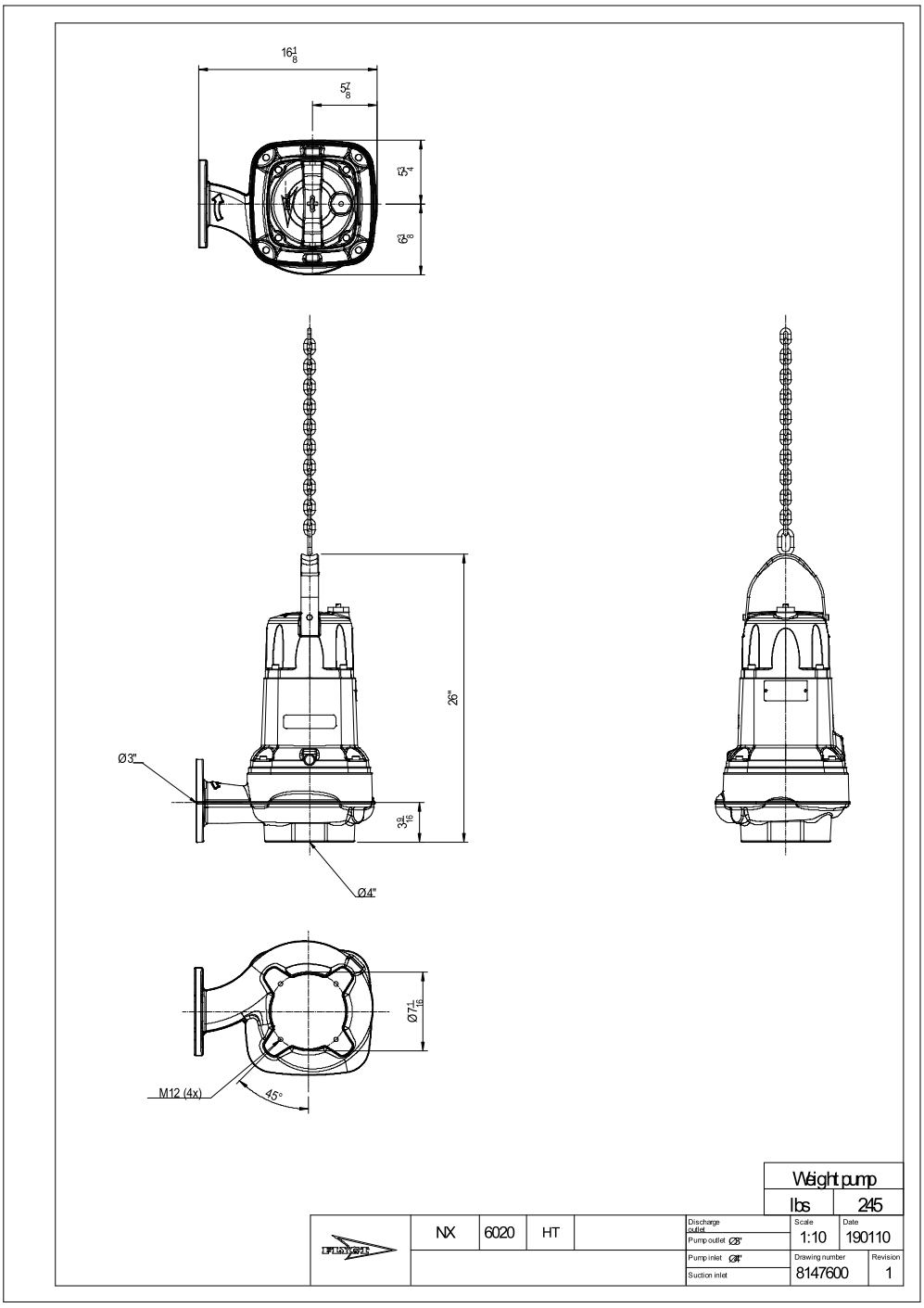
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	302	38.1	4.3	302	38.1	4.3	67.5 %	193	10.4

Project		**Created by**	Chris Tuinstra		
Block	Xylect-20233211	**Created on**	3/3/2023	**Last update**	3/3/2023

Concertor XPC N80-3500

Dimensional drawing



Project	Xylect-20233211	**Created by**	Chris Tuinstra
Block		**Created on**	3/3/2023
		Last update	3/3/2023

Flygt Compit PSS Package

Flygt Compit PSS Package is a complete pressure sewer system optimized for local requirements.

Optimal pump station
The Flygt Compit Package handles wastewater from households to commercial building applications. For the best pumping reliability, the station is equipped with a Flygt M 3068 progressive cavity grinder pump, in a rotationally molded polyethylene self cleaning lift station.

Quick installation
The Flygt Compit is supplied ready for immediate installation. The large anti-flotation flange eliminates the need for concrete reducing installation cost. The Compit has two bosses that can be used for ventilation or electrical connections.

Height flexibility
The Compit is supplied 6 feet - 4-3/4 inches deep and has extensions available to reach depths of 10 feet.

Adaptable to loads/weight
A robust, flat access cover can support pedestrian traffic and, upon request, vehicular traffic.

M 3068 Progressive Cavity Pump
The municipal designed Flygt M 3068 progressive cavity grinder pump handles solids and fibers with ease by providing optimal starting torque that ensures reliable operation.

Flygt FGC211 Control
The FGC211 includes vital functions for pump control in PSS such as level/current measurement, alarms and statistics. Additional functions include auto/forced/blocked mode, start/stop delay, run limitations, and maintenance runs. The FGC211 is expandable to incorporate an inline pressure sensor and/or flush timer to help avoid upset system conditions.

Flygt Three Point Probe
The three point probe has no moving parts and works by using the conductive properties of the sewage to complete a circuit with a controller.

Local service and support
The Flygt Compit PSS Package comes with a solid warranty as well as local service and support through our sales companies, distributors and service partners.

To find your local Flygt representative, visit our website www.flygtus.com.

Three point probe level sensing device

Standard components
- Compit Polyethylene Station
- Flygt M 3068 progressive cavity grinder pump
- Flygt FGC211 PSS pump controller
- Flygt Three point probe level sensor

Flygt M 3068.175

Flygt Compit Basin

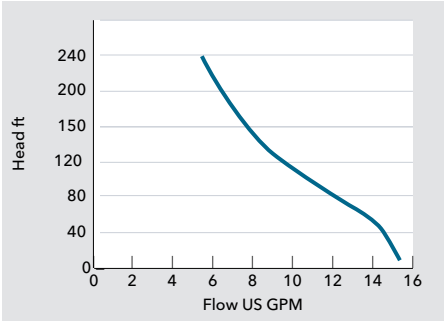
■ Flygt Compit PSS Package

M3068.175 Progressing Cavity Pump
& Compit Polyethylene Basin

FB005-1241 • Flygt Compit PSS Package Brochure • 11/2016 • NACT

Flygt M 3068 Progressive Cavity Grinder Pump

Performance data



Technical data

	M 3068.175
Hydraulic code	450
Discharge	1″
Rated power	1.7HP
Phase	1 or 3
Voltage	230
Rated current (A)	8.1 (230v/1ph) 6.7 (230v/3ph) 3.4 (460v/3ph)
Weight	84 lbs.

Flygt Monitoring & Control

Flygt FGC211
Control Panel

Technical data

	Flygt FGC211 Control Panel
No. of pumps	1
Power supply	230 volt/60 Hz/1 phase
Main fuse	(A) 10
Size (W×H×D in.)	14″x 12″x 6″
Functions	Status indication, level information, alarm log, running hours, number of starts, pump/motor protection
Annunciation	Local Alarm light & Buzzer

Flygt Three Point
Probe Level
Sensor

Technical data

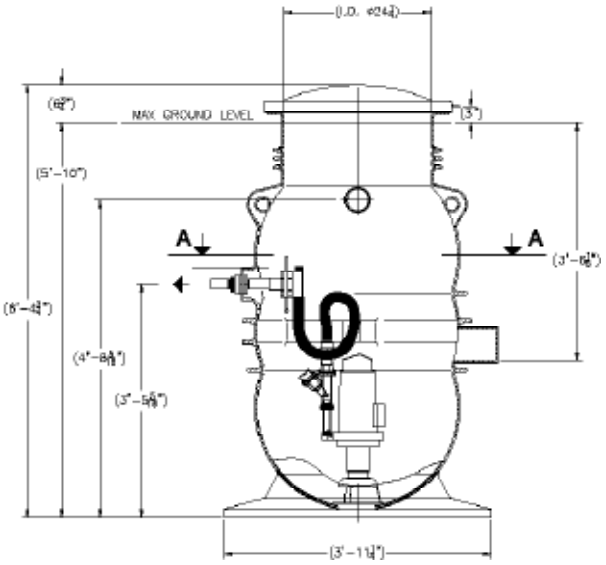
	Flygt Three Point Probe Level Sensor
Output signal	Analog
Supply voltage	18-25 VDC, 3 wire system
Temperature range	-4 to 122˚F
Cable length	30 feet
Measurement range	6 inches between sensors

Flygt Compit Pump Station

Technical data

	Flygt Simplex Grinder Stations
Installation depth	6′-10′ depths
Sump volume	238 gallons
Station weight	278 lbs. includes pump & plumbing
Diameter	24-1/4″ ID at cover
Discharge depths	3 feet 6-1/8″ without any extensions
Access Cover	Polyethylene cover

Dimensions



PumpView3 Web-based Pump Control

Over 12,000 municipal pump stations use MultiTrode controllers...

Why not web-enable them?

PumpView3 enables you to connect to a new or existing MultiTrode pump station and carry out many of the functions of traditional telemetry without any of the risks - and for a much lower cost.

PumpView3 hardware is installed in the panel with either the MultiSmart Pump Station Manager or the MT2PC Family of pump controllers. PumpView3 equipment connects via a serial connection and sends regular status and alarm information to a MultiTrode managed web server via a cellular data network.

The web server stores all your information in a secure database and carries out 2 key functions:

1. Sends specific alarm notification via SMS, email or (in the USA only) voice to each user on the alarm list (until the alarm is acknowledged)

2. Generates web pages enabling customers to log in and view the status of their whole network, see the detailed status of all pump stations, change individual pump status (hand/off/auto) and clear alarms.

You can check well levels, view fault status, reset pumps and alarms, and view historical data.

See the technical specifications for more details, including how to determine if you have coverage at your pump station.

Site visits cost time and money

Traditional pump station control and monitoring is expensive and time-consuming. When something goes wrong, someone has to visit the site, identify the problem and fix it. Ignored too long, a pump problem can mushroom into an environmental nightmare - and nobody can afford that!

Why are over 12,000 municipal pump stations equipped with MultiTrode controllers?

Working with water and sewerage authorities, MultiTrode has addressed many monitoring and control issues with a range of pump controllers designed to sense problems,identify them and, in many cases, correct them without a site visit.

PumpView3 – Your 3-Step Solution

When a problem occurs, 3 things must happen: You need to know about it. You need to identify the problem. You need to fix it. PumpView3 addresses all of these things, and more:

1. Alarm!

Immediately when a problem occurs, PumpView3 sends a specific alarm notification via mobile phone, SMS messaging or e-mail to each user on the Alarm List in turn, until the alarm is acknowledged via web site access or SMS.

2. What's the problem?

PumpView3 generates web pages so you can view the entire network's status. Alarms are highlighted, making it easy to check pump station levels, which pumps are down, which pumps are still available, etc. In moments, you quickly diagnose the cause of the problem.

3. How do I fix it?

With PumpView3, you have many of the functions of traditional telemetry at your fingertips. Quickly and easily clear alarms, reset pumps or change individual pump status from auto to manual (hand) or off.

In addition, the system is being expanded to deliver a broader range of historical data that can forewarn of impending problems with pump motors, electrical supply or predictive blockages and serve as the basis for a proactive maintenance program.

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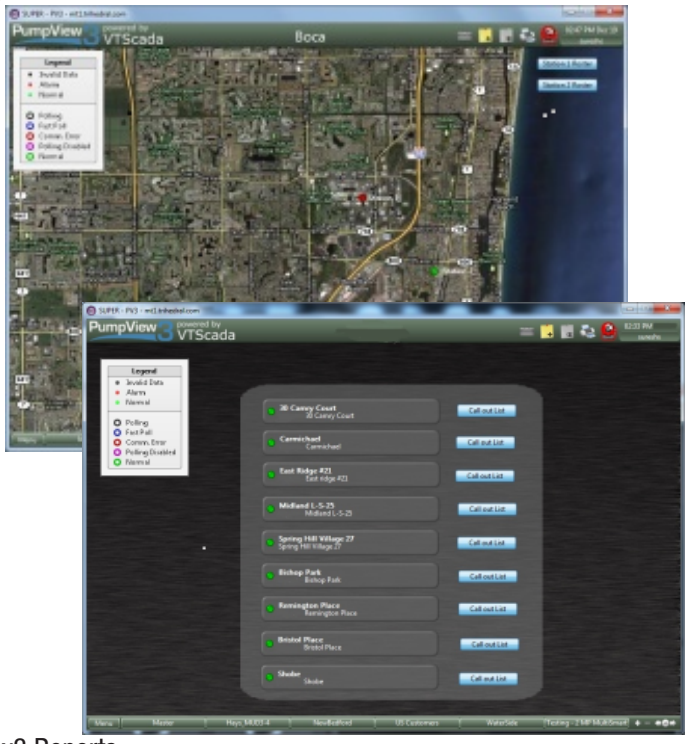
For more information visit www.multitrode.com



MultiTrode's pump controllers were designed to suit the specific needs of municipal authorities. They are simple, user-friendly modules with a range of measurement and control factors that allow supervisors and engineers to monitor just about every aspect of pump activity.

Powerful, Yet Simple

Besides direct operational benefits, MultiTrode also eliminates the technological hassles of running your own system. Many cities do not have the resources required to continually update software, train personnel and write programming code.

PumpView3 takes care of all of that for you! There's no software to install. There's no server to maintain. There's no programming to do. MultiTrode runs the server system that collects, analyzes and presents all your pump station network data on private and secure web pages. We'll take care of your monitoring and database functions, leaving you free to address other issues. When you're ready for it, your information is there – whatever you want - whenever you want it - from wherever you are.

Monitoring Fee vs. Capital Investment

Why spend your capital investment on a SCADA system, investing your valuable budget dollars on expensive servers, software, upgrade, training, documentation, support and high-priced consultants?

MultiTrode is ready, willing and able to provide you with a simple and secure option – all for a minimal monthly fee.

Benefits of Outsourcing

Outsourcing noncore business processes has become standard practice for governments, utilities and corporations worldwide. Benefits include cost savings, improved quality of data, complete network knowledge, reduced site injury, increased energy consumption – not to mention the benefits of MultiTrode's 20+ years of industry experience!

Security and Privacy

VPNs protect data traffic over the internet, and SSL security on the web browser ensures that no one can view the web pages you see. Nobody has access to your data unless you allow it. Data is stored on secure servers available only via password.

24/7 Monitoring

Our servers are secure, backed-up and hosted by one of the most secure web hosting facilities in the world. The data center has technical and security staff on site 24/7. Each element of the system is backed-up from internet connections to power systems. Server management and data transmission costs are all included in your monitoring fee.

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PumpView3 Reports

PumpView3 administrative users receive daily reports emailed in .csv format including:

- Hours Run & Starts Accumulators
- Fault Report - date/time stamp, fault active/inactive, pump station
- Alarm Log - all user alarm interaction including when each user was notified, by what method (email/SMS/voice), who noted the alarm
- User Interaction Log - all user interaction with their remote sites

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AUsales@multitrode.com

MTCAT11.2

xylem
Let's Solve Water

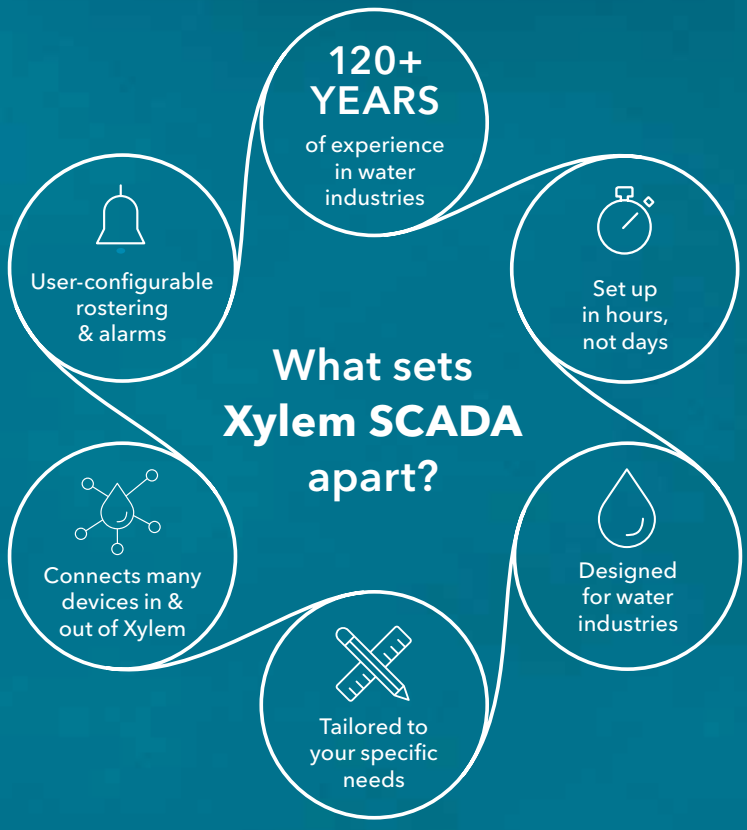
Xylem SCADA

THE COMPLETE AND EASY-TO-USE SOLUTION FOR YOUR WATER INDUSTRY SUPERVISION NEEDS

Customizable SCADA solution

In industries such as water and wastewater, aquaculture, and hydro power, the ability to monitor changing conditions on demand and remotely control your infrastructure is critical. It helps to extend the reach of your team and minimizes downtime. To meet the rigorous demands of each industry, Xylem has developed Xylem SCADA, an easy-to-use software tailored to your needs. It provides user-configurable control of your hardware with minimal integration needed.

Xylem SCADA delivers a secure and comprehensive overview of your systems' performance anytime, anywhere, from your smart phone, tablet, or computer. While Xylem hardware and software are created to work even better together, Xylem SCADA offers connectivity support for many brands of programmable logic controllers (PLCs) and remote telemetry units (RTUs).



User-configurable software tailored to your specific needs

Many SCADA platforms make it complicated to fulfill business needs. Xylem SCADA gets your water industry infrastructure set up in hours instead of days. You can personalize your alarms based on what you want to be alerted about, how you want to receive the alarms, and who receives them in what order.

Xylem SCADA puts you and your team in control with reliable performance and complete, real-time command of your site assets. This includes maps, trend reports, operator notes, weather*, alarm management tools, and more:

Real-time monitoring & control

Lets you easily set and check alarms and other critical information so you can proactively reduce unplanned and costly callouts and downtime. Native weather* helps you to proactively plan for adverse events.

*Xylem SCADA Cloud

On-site server option

Xylem SCADA On-Premise is the perfect option for those who 1) need their server to be on-site due to company or governmental data privacy rules or laws, and/or 2) need an easy, complete redundant server.

Optimization

Real-time data trends and analytics help optimize site configuration and asset performance. Better performance means maximized system uptime.

Easily personalize your water management tools

Install in hours, not days

Xylem SCADA provides simple integration with rapid deployment. Water industry templates, support, installation, and customizations are offered to save you time and money.

Upgrades included

Software updates, upgrades, and security patches are included in annual support packages to keep your software current with water industry trends and cybersecurity protocols.

Communication & connectivity

Xylem SCADA provides communications and connectivity to hundreds of devices, both from within and outside of Xylem's offerings, and many open and third-party protocols are supported.

Optimize your water system's management

Xylem SCADA is an important part of our full suite of digital solutions, Xylem Vue, that combines smart and connected technologies, intelligent systems and services, and 120+ years of problem-solving expertise. Our digital solutions and services make it easier for water and wastewater infrastructure operators to remotely manage assets, optimize performance, and predict failures.

XB061 • Xylem SCADA • 7/2022 • ACT

Discover how Xylem supports your business with our service packages:

Implementation support

Whether you need a little help or full implementation support, we are here to facilitate a smooth on-boarding experience. We help get your systems up and running, and train your team so that you can realize the benefits of Xylem SCADA immediately.

Tailored to your needs

Are coding or system setups not your thing? No worries, Xylem will create full customizations to suit your unique needs to get your system optimized without the headache.

Updates, upgrades, and cybersecurity included

We offer annual support for a fraction of Xylem SCADA's original price. This support includes assistance, software updates/upgrades, and any recommended cybersecurity patches to help maintain the safety of Xylem SCADA. Also, if you want to look more closely at your SCADA ecosystem, we offer actionable, expert Cybersecurity Assessment services and Incident Response to provide greater confidence. For more information visit xylem.com/security.

xylem vue

Digital transformation starts with Xylem Vue

Digital adoption is no longer an option, it's an urgent reality to meet the increasing pressures you face. Xylem Vue brings together our full portfolio of digital solutions to solve your most pressing water challenges along your digital journey. Let's see what's possible for you.

Discover more at xylem.com/XylemVue

xylem
Let's Solve Water

www.xylem.com

July 2022

Appendix F

Public Hearing Information

Prescribed by State Board of Accounts
(Governmental Unit)

General Form No. 99P (Rev. 2009A)

Sandy Morton
Dubois County Auditor's Office
1 Courthouse Square Rm 104
Jasper, IN 47546

The Herald
FIN 61-0301090
Jasper, IN

PUBLISHER'S CLAIM

LINE COUNT

Display Master (Must not exceed two actual lines, neither of which shall total more than four solid lines of the type in which the body of the advertisement is set) -- number of equivalent lines	
Head -- number of lines	
Body -- number of lines	
Tail -- number of lines	
Total number of lines in notice	135

COMPUTATION OF CHARGES

135 at 0.6726 cents per line		$ 90.80
Additional charges for notices containing rule or tabular work (50 per cent of above amount)		$ 45.47
Charge for extra proofs of publication ($1.00 for each proof in excess of two)		$
TOTAL AMOUNT OF CLAIM		$ 136.27

DATA FOR COMPUTING COST

Width of single column in 9 picas — 5 point column type size 7.5

Pursuant to the provisions and penalties of IC 5-11-10-1, I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid.

I also certify that the printed matter attached hereto is a true copy, of the same column width and type size, which was duly published in said paper 1 times. The dates of publication being as follows:

November 8, 2022
November 15, 2022 Ad# 70499965

Additionally, the statement checked below is true and correct:

___ Newspaper does not have a Web site.
_X_ Newspaper has a Web site and this public notice was posted on the same day as it was published in the newspaper.
___ Newspaper has a Web site, but due to technical problem or error, public notice was posted on
___ Newpaper has a Web site but refuses to post the public notice.

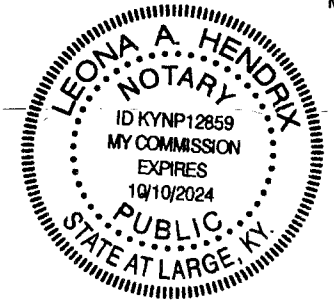
Date: November 15, 2022

Title: Accounting Clerk

ATTACH COPY OF ADVERTISEMENT HERE

Notary Public State of Kentucky

Leona A. Hendrix
My Commission expires the 10th day of October 2024.



LEGAL NOTICE
NOTICE OF PUBLIC HEARING

You are hereby notified that the Dubois County Commissioners plan to petition the Commissioner of the Indiana Department of Environmental Management for an order to establish a Regional Sewer District to be known as the Dubois County Regional Sewer District (DCRSD).

A public hearing will be held on **Monday, November 21, 2022 at 9:00 A.M.** in the Dubois County Commissioners/Council Room in the Dubois County Annex Building, to receive public comments on said petition.

Written comments will also be accepted no later than **December 2, 2022** and mailed to:
Dubois County Commissioners
One Courthouse Square, Room #104
Jasper, Indiana 47546

For comments submitted by email, please submit to cablessinger@duboiscountyin.org. Place "DCRSD Petition Comments" in the subject line and include your name and property address in the email.

For more information regarding the formation of regional water and sewer districts, refer to Indiana Code 13-26. Additionally, a copy of the Petition to form the Dubois County Regional Sewer District will be available for public viewing beginning **November 21, 2022,** at the office of the Dubois County Auditor, One Courthouse Square, Room #104, Jasper, Indiana.

Persons with disabilities or non-English speaking persons who wish to attend the public hearing and need assistance should contact Brent Wendholt, Dubois County ADA Compliance Officer, by email at bawendholt@duboiscountyin.org or by phone at 812-482-5505, extension #3 no later than **November 14, 2022.**

BOARD OF COMMISSIONERS OF
DUBOIS COUNTY, INDIANA

hspaxlp

ATTACH COPY OF ADVERTISEMENT HERE

Prescribed by State Board of Accounts | General Form No. 99P (Rev. 2009A)

Dubois Co Commissioners
(Governmental Unit)
Dubois County, Indiana

To Auditor

Notice of Public Hearing

PUBLISHER'S CLAIM

LINE COUNT

Display Master (Must not exceed two actual lines, neither of which shall total more than four solid lines of the type in which the body of the advertisement is set) -- number of equivalent lines	
Head -- number of lines	
Body -- number of lines	
Tail -- number of lines	
Total number of lines in notice	

COMPUTATION OF CHARGES

..... lines, ... columns wide equals ..... equivalent lines at **2 column x 5 inch, inserted twice**

cents per line	$ 140.00
Additional charges for notices containing rule or tabular work (50 per cent of above amount)	
Charge for extra proofs of publication ($1.00 for each proof in excess of two)	
TOTAL AMOUNT OF CLAIM	$ 140.00

DATA FOR COMPUTING COST

Width of single column in picas 10.5 Size of type 7 point.

Number of insertions 2

Pursuant to the provisions and penalties of IC 5-11-10-1, I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid.

I also certify that the printed matter attached hereto is a true copy, of the same column width and type size, which was duly published in said paper 2 times. The dates of publication being as follows:

11/9/22 & 11/16/22

Additionally, the statement checked below is true and correct:

..... Newspaper does not have a Web site.
X Newspaper has a Web site and this public notice was posted on the same day as it was published in the newspaper.
..... Newspaper has a Web site, but due to technical problem or error, public notice was posted on .....
..... Newpaper has a Web site but refuses to post the public notice.

Date 11/15/2022

Title Legal Advertising Manager

LEGAL ADVERTISING

See table of legal rates in the applicable State Board of Accounts Bulletin

Dubois-Spencer
Counties Publishing, Inc.
PO Box 38
Ferdinand, IN 47532

Claim No. _____ Warrant No. _____

IN FAVOR OF
Ferdinand News

$ 140.00

ON ACCOUNT OF APPROPRIATION FOR
Legal Advertising

Appropriation No. _____

ALLOWED _____, ____

IN THE SUM OF $_____

I have examined the within claim and hereby certify as follows:

That it is in proper form.

That it is duly authenticated as required by law.

That it is based upon statutory authority.

That it is apparently correct / incorrect

I certify that the within claim is true and correct; that the services there in itemized and for which charge is made were ordered by me and were necessary to the public business

_____

_____, ____

PUBLISHER'S AFFIDAVIT

State of Indiana)
County of Dubois) ss:

Personally appeared before me, a notary public in and for said county and state, the undersigned **Richard Tretter** who, being duly sworn, says that he is **President** of **Dubois-Spencer Counties Publishing, Inc.**, publisher of the FERDINAND NEWS, a newspaper of general circulation printed and published in the English language in the town of **FERDINAND** in state and county aforesaid, and that the printed matter attached hereto is a true copy, which was duly published in said paper for 2 time(s), the date(s) of publication being as follows:

11/9/22 & 11/16/22

Richard P. Tretter

Subscribed and sworn to me this 15 day of Nov, 2022

Kathleen J. Tretter

Kathleen J. Tretter, Dubois County, Indiana, Notary Public
My commission expires: October 22, 2022.

NOTICE OF PUBLIC HEARING

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RESOLUTION NO. 2022-16

A RESOLUTION OF THE DUBOIS COUNTY BOARD OF COMMISSIONERS TO PETITION FOR AN ORDER TO ESTABLISH THE DUBOIS COUNTY REGIONAL SEWER DISTIRCT

WHEREAS, Dubois County is an eligible entity for the purpose of IC 13-26; and

WHEREAS, the Dubois County Board of Commissioners has determined that there is a need for a regional sewer district in Dubois County and wishes to authorize the creation and submission of a petition for the establishment of a regional sewer district;

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF DUBOIS COUNTY, that:

Section 1. The Board of County Commissioners Dubois County authorizes the creation and submission of a petition to the Commissioner of Indiana Department of Environmental Management requesting an order for the establishment of the Dubois County Regional Sewer District under IC 13-26.

Section 2. The Board of County Commissioners Dubois County names Nick Hostetter to be the representative of the County and authorizes him to sign the petition on the County's behalf.

DULY ADOPTED AND APPROVED this 21st day of November, 2022 by the Board of Commissioners of Dubois County, Indiana.

Chad Blessinger
CHAD BLESSINGER

Elmer Brames
ELMER BRAMES

NICK HOSTETTER

ATTEST:

Sandra L Morton
SANDRA L. MORTON, AUDITOR OF
DUBOIS COUNTY, INDIANA

ATTENDANCE AT COMMISSIONERS' MEETING

DATE: 11/21/22

PLEASE PRINT

NAME	COMPANY
Rilyn Bauer	HELP
Craig Knies	Cave Quarries, Inc.
Jason Berg	IMI

ATTENDANCE AT COMMISSIONERS' MEETING

DATE: NOVEMBER 21, 2022

PLEASE PRINT

NAME	COMPANY
Marie Ewart	
Tom & Barb Keusch	
Rachel Vogler	
Steve & Susan Willett	
Chad Helming	
Ken + Robyn Corkett	
Nathan Hanselman	
NANCY ECKERLE	
Tyler Haas	
Jayne Street	
John & Wendy	
Clare Bres	
Dean Vanderlee	
Liz Neukam	
Kiersten Knies	City of Jasper
Bryant Bierman	
JON GOLDSBERRY	MULZER

ATTENDANCE AT COMMISSIONERS' MEETING

DATE: November 21, 2022

PLEASE PRINT

NAME	COMPANY
MARK Nowotarski	Resident
MIKE KLUESNER	COUNCIL
Carla Striegel-Winner	SWMD
Marki Rhodes	HR
Amy Kippenbrock	Clerk
MARY AUSTIN	CLERK DIETZ
Ronnie Allen	prop owner
Becky Beckman	Council
Joey Asbell	
Jim Meyer	Cass Emp.
Dennis Beckman	
X Gierer	HARD Emp
Craig McGowan	USDA
Luke Woolems	Patoka Lake Regional
Josh Walker	" "
Shawn Werner	Dubois Co Health Dept.
Kevin Meyer	

SECOND REGULAR MEETING DUBOIS COUNTY COMMISSIONERS

NOVEMBER 21, 2022

The second regular meeting of the Dubois County Commissioners was held in the Commissioners/Council Room of the Courthouse Annex in Jasper, Indiana, beginning at 8:00 a.m. (EST) on November 21, 2022. Present were Commissioners Chad A. Blessinger, Nick Hostetter, and Elmer Brames. Also present were County Auditor Sandra L. Morton, County Attorney Gregory Schnarr, Highway Supervisor Steve Berg, and Highway Engineer Brent Wendholt. A quorum was declared present and the meeting was opened for business by President Blessinger.

Minutes of the November 7, 2022 meeting of the Board of Commissioners were approved as presented. Claims against the County were examined and those found to be just, due and owing were allowed and those found to be not due and owing were disallowed, all as more fully set forth in the Claims and Allowance Docket of the County.

RE: HIGHWAY SUPERVISOR'S REPORT

Highway Engineer Steve Berg presented the following report of Highway projects:

Holiday Reminder Sanitation Hours – Christmas Eve and New Year's Eve occur on Saturday with all sites being open. Holiday Hours will be observed from 8:00 a.m. until noon.

Sanitation Sticker Order – The department needs to order 300,000 sanitation stickers for the coming year. Quotes were received as follows:

Waste Zero	$8,025 including Freight
Trash Stickers, Inc	$7,500

The low quote from Trash Stickers, Inc. will be used to purchase the stickers.

District #2 Foreman Selected – Interviews were held. Keith Kluesner of Dubois has accepted the position. Kluesner currently serves as the Sanitation Driver and will continue in this capacity until December 30, 2022. He will spend his first week as a foreman training the new Sanitation Driver.

Sanitation Driver Opening – Currently, the department is advertising for the open sanitation driver position until December 2. Interviews will be held the week of December 12 with a hire date of January 3, 2023.

Annual Material Bid Opening – Material bids will be opened at 10:00 a.m. Bids will be taken under advisement and awarded on December 5, 2022 at 10:00 a.m.

Small Loader Trade Canceled – On October 3, Berg reported on a potential trade on the 1978 John Deere loader. After several demonstrations and a few recurring problems, it was decided not to proceed with the purchase.

RE: HIGHWAY ENGINEER'S REPORT

Safe Streets for All (Action Plan) – Nothing to Report.

Cuzco Road South (HL2N2129-0.447) – The project was completed on Thursday, November 17. Everything is sealed and ready for water to drain through it.

Bridge 14 on Division Road (90' East of Stewart Road) – The demolition is complete. They will be driving piling for the west abutment this week.

Community Crossing Matching Grant – The next round of grant applications is due December 10.

RE: SOLAR FARM

Commissioner Blessinger reported he had met with Lightsource BP, a company that would like to place a solar farm west of the airport in Cass Township. He reported the company will be seeking a tax abatement.

RE: ABATEMENT COMMITTEE

Commissioner Nick Hostetter agreed to continue serving on the County Tax Abatement Committee.

RE: SOLID WASTE MANAGEMENT DISTRICT

Solid Waste Management District Director Carla Striegel-Winner requested approval to extend the use of 21 hours of PTO time for Eric Tretter until December 31, 2022. A motion was made to approve the request, was duly seconded and carried unanimously.

RE: REPRECINCTING

Clerk Amy Kippenbrock presented an amendment to the Order Establishing Precincts following changes made to a clerical error. A motion was made to approve the document, was duly seconded and carried unanimously.

ORDER ESTABLISHING PRECINCTS

WHEREAS, Indiana Code § 3-11-1.5 requires that the boundaries of precincts be established and revised in compliance with that law; and

WHEREAS, pursuant to Indiana Code § 3-11-1.5, Dubois County, by and through its Board of County Commissioners, has determined that it is necessary and proper to establish and revise the boundaries of certain precincts for the County;

NOW THEREFORE BE IT ORDERED BY THE BOARD OF COMMISSIONERS OF DUBOIS COUNTY, INDIANA AS FOLLOWS:

Section 1: Dubois County by and through the Board of County Commissioners, establishes and revises the boundaries of certain precincts with the County. A precinct description and map of the boundary of each precinct submitted to the Indiana Election Division is attached hereto and incorporated herein by reference.

Section 2: This ORDER becomes effective upon the approval of these precincts by the Indiana Election Division, provided that no objection is filed by a voter of the county with the Indiana Election Division by noon ten (10) days after the publication of the proposed precinct establishment order, or, if a timely objection is filed by a voter of the county, then upon the approval of the Indiana Election Commission after a hearing, pursuant to Indiana Code § 3-11-1.5.

SO ORDERED by the Board of Commissioners of Dubois County on this, the 21st day of November, 2022.

RE: CLERK'S OFFICE CHAIRS

Clerk Kippenbrock requested permission to declare eight chairs in the Courthouse Employee Breakroom surplus/junk. She will be replacing desk chairs in the Clerk's office. The older desk chairs will replace the breakroom chairs. A motion was made to approve the request, was duly seconded and carried unanimously.

RE: CLERK'S OFFICE HOURS

Clerk Kippenbrock requested closing the office at 4:00 p.m. on Wednesday, December 28, 2022 instead of remaining open until 6:00 p.m. A motion was made to amend the schedule for the final Wednesday of the year to close at 4:00 p.m. The motion was seconded and carried unanimously.

RE: AUDITOR SURPLUS PRINTER

Auditor Morton requested permission to declare a printer surplus/junk. A motion was made to approve the request, was duly seconded an carried unanimously.

RE: OPERATION GREENLIGHT

Commissioner Blessinger thanked Custodian Scott Hopf and the City of Jasper for placing the green lights on the Courthouse Square and Veteran Services office in observance of Operation Greenlight from November 7-13, 2022.

RE: REGIONAL SEWER DISTRICT

Mary Austin, PE, Clark Dietz, presented a Professional Services Agreement for the Dubois County Regional Sewer District Project No. 1 which will be reviewed and discussed later in the meeting.

RE: MEETING RECESS

The meeting of the Board of Commissioners was placed into recess at 9:00 a.m.

RE: REGIONAL SEWER DISTRICT PUBLIC HEARING

The time being 9:00 a.m., the advertised time for the Public Hearing of the Regional Sewer District was called to order by Commissioner President Chad Blessinger. County Consultant, Mary Austin, PE, from Clark Dietz was present to answer questions from the public.

Commissioner Blessinger explained the Regional Sewer District would be created to service the Haysville and Portersville areas. Public comments and questions were taken.

Haysville resident Ken Giesler discussed his concern for the lack of his knowledge on the formation of a district. He was unsure of the various means used to notify the public. He urged more avenues of communication be used in the future.

Giesler also questioned the requirements to tap into the system. Austin discussed the requirement to tap onto the system if the current septic system is failing. Old construction would be grandfathered if the system is properly functioning and permitted. New construction would be required to tap in.

A Portersville resident questioned if charges would be connected to water usage. Austin discussed various options – either by using an annual well usage; using the national guidelines for usage; or by installing a meter for actual use.

A resident discussed possibly selling her property and wanted to know if inspections would be required. Inspections could be required to determine an increased demand or if the system is not functioning. Tapping onto the system but not actually using it was also questioned. Austin will research the answer but felt that would not be a possibility. A minimum monthly fee may be required.

An estimated average cost per user is $55 per month. No tap fee for the user if they connect at time of installation but may if service line into the home is at a distance. The district must use the guidelines from the State Revolving Fund (SRF) to determine the service line costs.

Austin discussed the timeline for the project. If the project goes out for bid in October 2023, the construction may start in Spring 2024.

A resident questioned the need to install a garbage disposal since the treatment facility would be at the City of Jasper. Currently no garbage disposal installation requirements have been a part of the study.

Health Administrator Shawn Werner provided information on determining if the current system is a functioning, permitted septic system. If the system was installed before 1978, he can guarantee it is not permitted and would have been installed without the current state regulations.

Commissioner Blessinger explained the funding for the project using the State Revolving Fund. The Indiana Department of Environmental Management (IDEM) is aware of issues in the Haysville and Portersville areas which makes this area a candidate for funding.

County Council President Michael Kluesner questioned the need to eliminate the old septic system costs during construction of the new sewers. Austin will check on the costs covered. Werner explained the processes used currently to eliminate septic tanks. The public can contact the Health Department with questions on their systems.

Austin explained that in February – April 2023 residents will be receiving surveys to determine if they want to be included in the sewer district.

Commissioner Blessinger read aloud Resolution 2022-16 which could be adopted to petition for the establishment of the Regional Sewer District.

Craig McGowan from the US Department of Agriculture (USDA) provided information that federal agencies are trying to find ways to assist with the costs on the project to help make them more feasible for areas in need.

The public hearing was closed at 9:48 a.m.

RE: MEETING RECONVENED

The Board of Commissioners meeting reconvened at 9:52 a.m.

RE: RESOLUTION 2022-16

Mary Austin presented Resolution 2022-16 to petition for an order to establish the Dubois County Regional Sewer District. A motion was made to approve and adopt the Resolution, was duly seconded and carried unanimously.

RESOLUTION No. 2022-16

A RESOLUTION OF THE DUBOIS COUNTY BOARD OF COMMISSIONERS TO PETITION FOR AN ORDER TO ESTABLISH THE DUBOIS COUNTY REGIONAL SEWER DISTRICT

WHEREAS, Dubois County is an eligible entity for the purpose of IC 13-26; and

WHEREAS, the Dubois County Board of Commissioners has determined that there is a need for a regional sewer district in Dubois County and wishes to authorize the creation and submission of a petition for the establishment of a regional sewer district;

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF DUBOIS COUNTY, that:

Section 1. The Board of County Commissioners of Dubois County authorizes the creation and submission of a petition to the Commissioner of Indiana Department of Environmental Management requesting an order for the establishment of the Dubois County Regional Sewer District under IC 13-26.

Section 2. The Board of County Commissioners of Dubois County names Nick Hostetter to be the representative of the County and authorizes him to sign the petition on the County's behalf.

DULY ADOPTED AND APPROVED this 21st day of November, 2022 by the Board of Commissioners of Dubois County, Indiana.

RE: MATERIAL BID OPENING

It being 10:00 a.m., the time advertised for the receipt of bids for the annual purchase of materials during 2023 for use by the Highway Department, the following bids were thereupon received, opened and read:

*** See Exhibit A – Highway Bids***

Following reading of the bids, the bids were made available to those persons desiring to inspect the same. The bids were submitted to the Highway Department personnel for further review and to determine the correctness of bids and compliance with bid and specification requirements. The bids were taken under advisement pending receipt of the Department's report.

RE: PROSECUTOR TITLE IV-D

Prosecutor-Elect Beth Sermersheim presented information on the Title IV-D Child Support program. Deputy Prosecutor William Shaneyfelt has submitted his resignation effective December 31, 2022. Prosecutor-Elect Sermersheim has offered the position to Michael Fritch beginning January 2023. A discussion was held on the current benefits provided for the position. Consensus was to continue providing health insurance for the position.

Prosecutor-Elect Sermersheim provided information on moving the IV-D Office from the Shaneyfelt owned property to 248 E Third Street, Suite B, in Jasper. A three-year lease is required with the rent being $1,500 per month. The owner will build the space to suit the office needs, which will take approximately six months. A letter of intent to consider entering into an agreement to lease the premises was presented. A motion was made to enter into the proposal, was duly seconded and carried unanimously.

Discussions will be held with Mr. Shaneyfelt to continue renting the current office space on a month-to-month basis during the construction period.

RE: H.E.L.P.

Community Coordinator Rilyn Bawel provided information on the four Pathways that have meet and many ideas have been generated. The Pathways will meet for the second time in December. The list will be narrowed to ten projects for the Strategic Investment Plan.

RE: X-SOFT CAMA SOFTWARE

Assessor Angela Giesler presented a contract for services which was reviewed by the County Attorney. A motion was made to approve the contract as presented, was duly seconded and carried unanimously.

RE: REGIONAL SEWER DISTRICT

The Professional Services Agreement was presented for approval. A motion was made to approve the agreement using ARPA funding, was duly seconded and carried unanimously.

Financial services from Baker Tilley Financial Consultants for the Regional Sewer District was discussed. The cost would not exceed $15,000. Consensus was to proceed pending funding by the County Council.

RE: 2023 APPOINTMENTS

The expiring appointments for 2023 were reviewed and discussed.

RE: COURTHOUSE DROP BOX

No action was taken. The Drop Box will be discussed at the next meeting.

RE: DOWNTOWN FITNESS 5K

Auditor Morton presented a request from Jamie Jahn of Downtown Fitness & Running to use the Courthouse restrooms on Thanksgiving morning on November 24, 2022, from 6:30 a.m. until 10:00 a.m. for the Turkey Trot 5K. A motion was made to approve the request, was duly seconded, and carried unanimously.

RE: SANTA'S HOUSE

Auditor Morton presented a request from Whitney Huff of the Greater Downtown Jasper Business Association to place the Santa's House on the southwest side of the Courthouse from November 22 – December 30, 2022. A motion was made to approve the request, was duly seconded, and carried unanimously.

RE: FUTURE MEETING

The next regular meeting will be held on Monday, December 5, 2022, at 8:00 a.m. in the Commissioners/Council Room of the Courthouse Annex.

***** EXHIBIT A – HIGHWAY BIDS***

BIDS FOR MATERIALS/SUPPLIES - 2023

ITEM 1

ALUMINIZED STEEL PIPE TYPE II - 2 2/3" X 1/2" - Three bids this item. Three firm bids.
E3 Bridge freight charge on less than $5,000. Civilcon freight charge on less than $8,500.
Metal Culverts prices are based on $7,500 minimum order.

SIZE	GA	METAL CULVERTS	CIVILCON	E3 BRIDGE
12"	16	15.98	15.63	18.11
15"	16	20.16	18.75	21.74
18"	16	23.94	23.44	27.17
24"	14	40.10	37.50	43.47
30"	14	49.23	46.88	54.34
36"	12	81.88	76.56	88.75
42"	12	95.94	89.06	103.24
48"	12	109.29	101.56	117.73

ITEM 2

POLYETHYLENE SMOOTH INTERIOR - Four bids this item. Three firm bids.
Southern Indiana Supply has a $50 drop charge on orders less than $2,000.
Civil Supply has $7,500 minimum purchase to avoid additional freight charges.
E3 Bridge could have freight charge/drop charge based on size of order.
Civilcon pricing may be subject to adjustment
7/1/23.

SIZE	SOUTHERN IN SUPPLY Truckload	SOUTHERN IN SUPPLY Less than trkload	CIVIL SUPPLY Less than trkload	CIVILCON	E3 BRIDGE
12"	6.27	6.52	6.27	8.06	8.41
15"	8.02	8.33	8.04	10.15	10.78
18"	12.37	12.85	12.39	15.80	16.61
24"	20.79	21.59	20.85	24.30	27.95
30"	28.65	29.75	28.72	36.14	38.49
36"	38.34	39.75	37.45	45.33	50.19
48"	65.19	67.69	65.37	77.80	87.62

ITEM 3

GEOTEXTILE - Four bids this item. Four firm bids.

	SOUTHERN IN SUPPLY	CIVILCON	E3 BRIDGE	CIVIL SUPPLY
Woven - 12.5' wide 500 sy/roll, 6.5 oz/sy	0.75/sy	1.47/sy	1.65/sy	.81/sy
Nonwoven - 15' wide 500 sy/roll, 8.0 oz/sy	1.14/sy	2.03/sy	2.25/sy	1.19/sy

ITEM 4

READY-MIXED CONCRETE - Two bids this item. Two firm bids. IMI stated there will also be a $20.00 per load environmental fee on all deliveries. Central Concrete has a fuel surcharge of $20.00 per load.

	IMI	CENTRAL CONCRETE
CLASS A (6 BAG)	**145.00**	**158.50**
CLASS B (5 BAG)	**140.00**	**156.50**
CLASS C (7 BAG)	**150.00**	**160.50**
Partial Load Charge	**100.00**	**250.00**
IMI (Orders < 3.75 cu yds)		
Central Concrete (Orders < 4 cu yds)		
Winter Service (Nov 1 - March 31) add/cy	**5.00**	**5.50**

ITEM 5

BITUMINOUS - 2022 bid is carried over to 2023 per Commissioner Minutes 10/17/22.

Bidder has escalation/de-escalation clauses. Asphalt Materials stated that they would furnish storage tanks at no charge.

	ASPHALT MATERIALS Delivered to Highway Dept
AE-90, AE-T, AE-PL	**2.5750**
AE-P	**3.5750**
AE-90S	**2.8750**
AE-F	**2.0750**
QB-FOG SEAL	**No bid**

ITEM 6

HOT ASPHALTIC CONCRETE - Two bids this item. Two bids have escalation/de-escalation clause.

	J.H. RUDOLPH & CO Dale Plant	QUARRIES Trucks loaded at Tri-County Plant
BASE (#5 OR 5D)	**63.00**	**84.00**
INTERMEDIATE #8	**67.00**	**86.00**
INTERMEDIATE #9	**67.00**	**86.00**
SURFACE (#9 OR 11)	**70.00**	**89.00**

ITEM 7

COLD MIX - Three bids this item. Two bids have escalation/de-escalation clauses. Flynn Brothers pricing is firm.

		PLANT	GARAGE
J. H. RUDOLPH	**DC Stockpile**	**112.00**	**122.00 (min. 21 tons)**

		FRENCH LICK	DELIVERED TO HWY DEPT
CAVE QUARRIES	SUMMER	80.50	91.40
	WINTER	82.50	93.40
FLYNN BROTHERS	DC Stockpile	110.00	137.00 (min. 20 tons)

ClarkDietz
Engineering Quality of Life®

SUMMARY OF THE RSD PUBLIC HEARING MEMO

To: Dubois County Council
From: Mary Austin, PE
Date: November 21, 2022
Subject: SUMMARY OF THE RSD PUBLIC HEARING MEMO
Copies:

PUBLIC HEARING HELD AT 9:00 AM ON NOVEMBER 21, 2022, IN THE COMMISSIONER/COUNCIL CHAMBERS IN THE DUBOIS COUNTY ANNEX BUILDING

Purpose

The intent of this public hearing was for the Resolution approving the submittal of the IDEM petition for the RSD formation and all the documents included in that submittal. The following are the major documents that are included in the IDEM Petition submittal:

- IDEM form
- Revised PER for the Dubois County RSD (highlighting the Haysville & Portersville area project specifically)
- RSD's By Laws (draft)
- RSD's Ordinance (draft)

General Response from the Public

The first resident to comment, Mr. Asbell (7860 North US 231), expressed significant concerns with the quality of a public sewer option for the area. Noting that a recent project in the County completed by Patoka Utility has had negative reviews from the connected residents. Clark Dietz assured the public that unlike the referenced Patoka project this project does not include any low pressure forcemain connections. That type of construction is considered a last resort option and we have been able to avoid it in our recommended alternative. After receiving confirmation that low pressure forcemain connections are not planned for this project, the resident who originally objected expressed his excitement to see this project move forward. He also noted that in addition to his primary residence, he owns two additional lots in the Haysville area that he would like to make sure are included in the connections. He has wanted to build on both lots and has delayed moving forward because of the current lack of sanitary sewer options.

The rest of the meeting turned into an open conversation where residents were not formally taking to the podium and giving their names and address. However, it was very a productive and overall positive discussion.

There was only one other negative comment towards the project. It came from a property owner in the Portersville area that is planning the construction of a new home on their current property and plan for the new construction to be "off-grid". At this time, she hadn't started any formal construction plans for the home and didn't know for sure when she might start the process. Her obvious concern was if they would be required to hookup to the new sewer. We informed her that if her property line is within

300 feet of a sewer main that yes they would be required to hookup to the sewer. She asked if there was some type of penalty they could pay to avoid hooking up. We explained that the current sewer ordinances are still in draft form, but they do not include an option for that. However, when she is actually ready to start the formal planning process, she may file an appeal to the RSD Board.

Summary of the Comments & Questions from Public Discussion

Below is a list of the main discussion points that were brought up during the open discussion.

- How will sewer bills be calculated for homes that are on well water?
- How will septic systems be determined as "functioning"?
- In the future will property owners be required to have their septic systems inspected prior to selling it or transferring ownership?
- Will all or part of the cost of the services lines be covered in the initial construction project for the properties that connect at the time of construction?
- Will there be a tap-on fee for property owners that connect to the system at the time of construction?
- What will the tap-on cost be for property owners that are able to and choose to wait to a later date to connect to the system?
- Can we get a tab constructed for a property at the time of construction and actually connect to it at a later date?.
- Will the project cover the cost to eliminate/remove/decommission the existing septic systems?

Conclusion

Clark Dietz and the Commissioners informed the public that all their questions/concerns have been noted. The majority of the questions are covered in the sewer ordinances, and they were referenced several times during the discussion. Some of the questions were unable to be answered at the time of this hearing, but will be addressed at the subsequent monthly public Commissioners' meetings as more information and decisions are made. In addition, the County will hold another formal public meeting prior to the start of construction.

Appendix G

Preliminary Asset Management Plan

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Asset Management Program

Executive Summary

Asset Management Programs (AMP) are documents developed to assist in long term management of assets to support cost effective and proactive decision making. All assets depreciate over time and costs must be balanced between increased operation and maintenance (O&M) costs and proactive planning of asset replacement.

This document will serve as the preliminary outline for the Dubois County Regional Sewer District (DCRSD) asset management plan to be implemented and updated once the District and collection system are established.

Technical Section

Background

Dubois County and the existing sewer districts in the County have been concerned about several unsewered areas over the last two decades. Efforts to expand the existing three large sewer districts within the county – City of Jasper, City of Huntingburg, and Patoka Lake Regional Water and Sewer District to provide services to these rural areas have been largely unsuccessful in the past years primarily due to economic constraints, remoteness and sparse population and other factors.

In 2019, the decision was made to develop a study forming a regional sewer district to provide sewers to rural areas of the County. This is because forming a Regional Sewer District (RSD) would provide a long-term feasible solution for addressing economic and health concerns beyond the capabilities of the individual WWTP Districts. Currently, a Preliminary Engineering Report is in development for submission for funding through the State Revolving Fund loan program to construct and form the DCRSD.

Location

The planned DCRSD formation would include local collection systems in Portersville and Haysville with regional lift stations pumping sewage south for treatment in Jasper. Alternative routes were evaluated as part of the PER phase study. Alternative 1A from this report includes the projected full sewer build out and is included in Figure 1 for the Haysville Route and Figure 2 for the Portersville Route. The maps were developed in GIS and include shapefiles and data on preliminary assets, including gravity sewer, forcemain, and lift stations. Detailed collection system assets such as manholes and air release valves will be added once design is finalized.

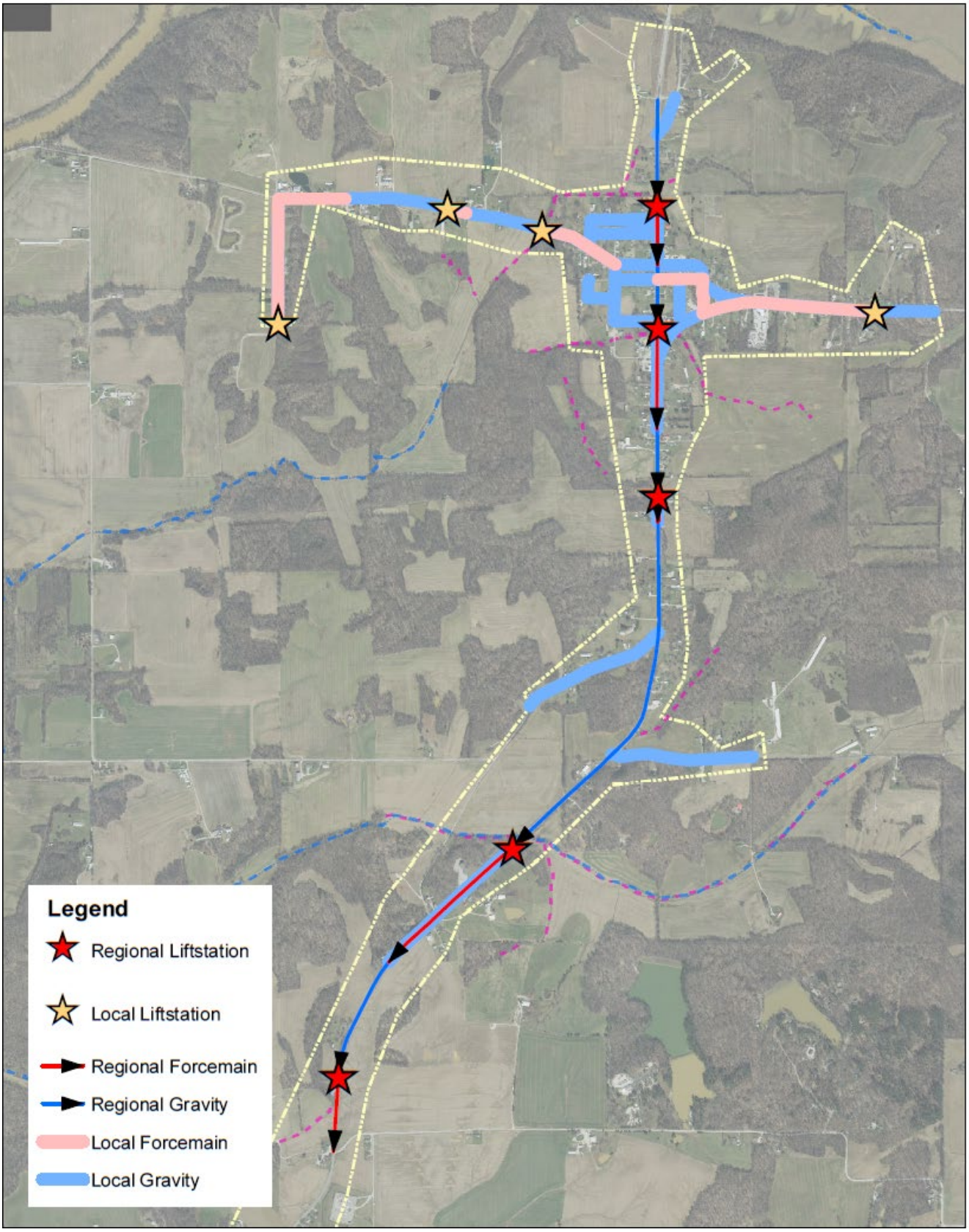

Figure 1 Proposed Haysville Sewer Network

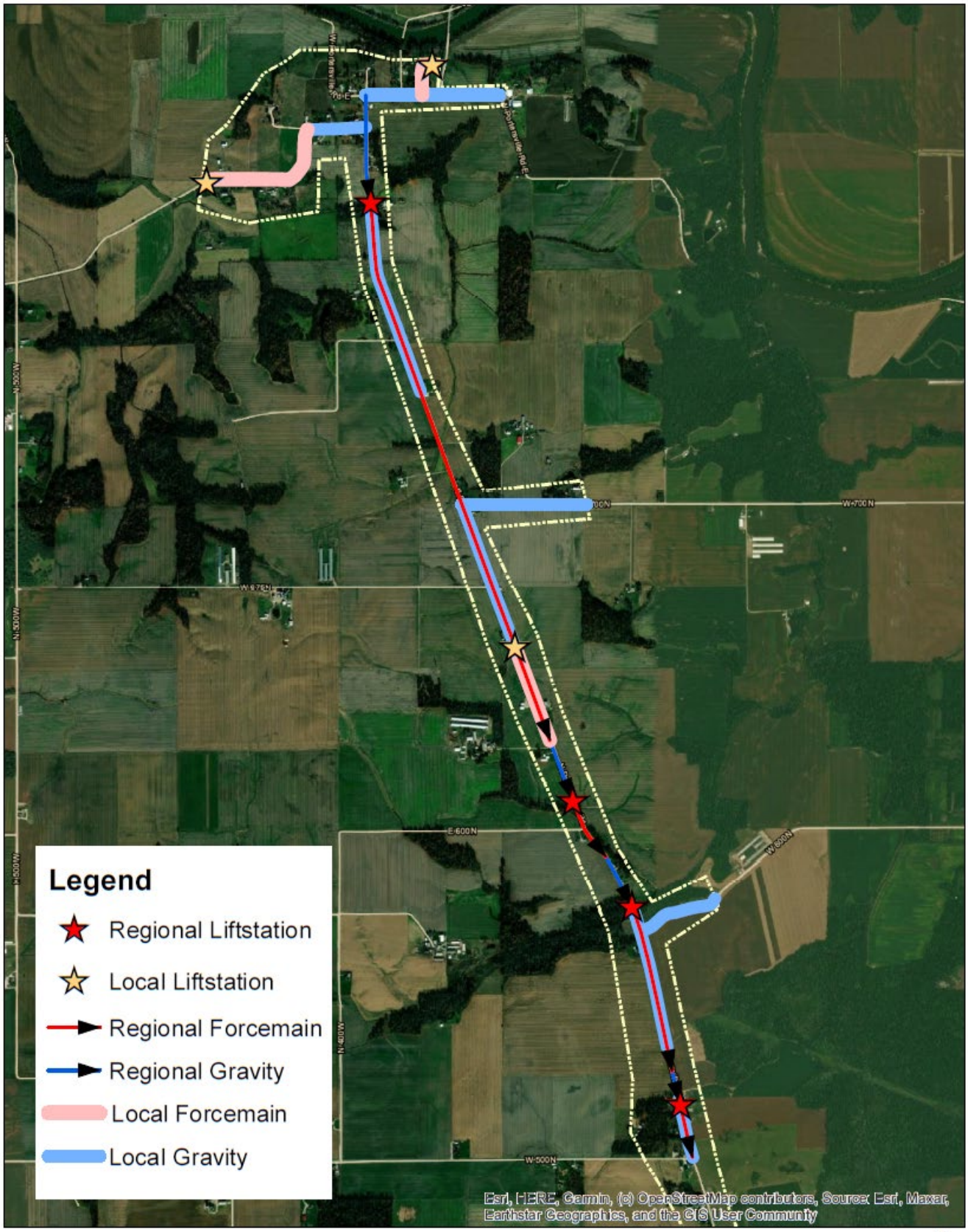

Figure 2 Proposed Portersville Sewer Network

Assets

There are currently no assets for the DCRSD. The proposed assets from the PER were used to populate the asset inventory and condition assessment, included as an Appendix. All assets were provided with a rating of "new" and the lowest likelihood of failure. Criticality of assets are a function of both the consequences of failure and probability of failure. Overall, all assets ranked within the 1-8 rating which is not considered a critical rating.

Table 1 Criticality Assessment

Collection Assets	Condition	Probability of Failure	Consequence of Failure	Criticality	Criticality Risk Rating
Gravity Sewer	1	1	2	2	Not Critical
Forcemain	1	1	3	3	Not Critical
Forcemain	1	1	3	3	Not Critical
Forcemain	1	1	3	3	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Grinder Pump Station	1	1	2	2	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Regional Lift Station	1	1	3	3	Not Critical
Air Release Valve	1	1	3	3	Not Critical
Air Release Valve	1	1	3	3	Not Critical
Air Release Valve	1	1	3	3	Not Critical
Air Release Valve	1	1	3	3	Not Critical
Manholes	1	1	2	2	Not Critical

Water and Energy Conservation Efforts

The Dubois County Regional Sewer District is proposed to address direct evidence of water pollution within the County due to failing or lack of septic systems. A significant portion of the Dubois County watershed including Haysville and Portersville demonstrated elevated E. coli levels and have soils that are largely unsuitable for septic systems. It can be concluded that the failing septic systems in this area is a major contributing factor to the elevated E. coli levels. The formation of the RSD would address the septage issues and protect ground and surface water in the watershed.

Maintenance Plan

The recommended planning period for AMPs is 20 years. As no assets are currently installed, it is anticipated that the full buildout is beyond 20 years for replacement. The estimated cost for installation of the collection system for the RSD was included for the Future Improvements Expenses table, included in the Appendix. Other costs anticipated are related to routine operational and maintenance costs.

Managerial Section

Property Documentation

The design of the DCRSD is currently under development for installation in the future. Once installed, all assets will require documentation including deeds, titles, easements, and/or receipts for all properties. The facilities for this project will consist of lift stations and easements for access.

Once completed, the location of the property documentation shall be recorded in this report along with the status. If the documentation is not complete, a timeline should be provided for completing the documentation. It is anticipated that documentation will be ready by construction in 2025 based on the current project schedule.

Operator Certifications and Licenses

If applicable, all Certified Operators employed by the DCRSD shall be verified through the State of Indiana. A table shall be provided with names, license numbers, issuance dates, expiration, and classification. Continuing education requirements and records shall also be documented.

Currently there are no operators as part of this system and no operators in the current plan. The RSD will consist of sewage collection and pumped to Jasper for treatment.

Overview and Description of System

The DCRSD consists of local collection systems in Haysville and Portersville which consists of 8" gravity sewer and grinder pump systems. Sewage is collected a regional lift station in each area to be pumped to Jasper for treatment. Detailed information on the system is as follows:

Treatment	None. Sewer flows will be pumped to Jasper for treatment at a convention package wastewater treatment facility.
Average Daily Flow	159,000 gpd
Max Daily Flow	635,600 gpd
No. Customers	320
Population Served	800
CSOs	None
Pretreatment	None
Infiltration/Inflow	None (new)

Operating Plan

The organizational chart and job duties are still in development. A preliminary projection is as follows:

- District Director
  - Will be assisted by County employees for regional collection system maintenance
- Billing will be contracted out to a private contractor
- Specialty lift station maintenance will be contracted out to a pump service representative

Anticipated routine maintenance includes:

- Routine pump maintenance:
    - Inspection for wear annually
    - Lubrication annually
    - Pump Overhaul, approximately every 3 years. Replaces key components and addresses worn components, to be completed by manufacturer service technicians.
    - Visual inspection of station operation and alarms, weekly
    - Visual inspection of control panel for damage or corrosion annually
    - Check tightness of terminals at the control panels annually

Written Procedures/External Contact Information/Purchasing Procedures

Written procedures, emergency contacts, and purchasing procedures for DCRSD are not yet developed and will be developed upon creation of the District and installation of assets.

Financial Section

There are currently no assets installed. All assets provided in this report are projected to be installed and will be in new condition with no capital improvement projects anticipated in the 20 year planning period. Upon project approval, a detailed cash flow analysis will be developed for the Asset Management Report. There are currently no historical financial statements, or outstanding bonds and leases.

Asset Inventory **Table 1**

Utility Name:	**Dubois County Regional Sewer District**
Current Plan Year:	**2023**

Directions:

A. List assets
B. Enter asset information
C. To add more assets use insert function and add rows then copy first asset row to new rows to transfer formulas
D. Enter information in yellow cells
E. Remaining cells will calculate automatically.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Collection Assets	**Capacity / Size**	**Material**	**Manufacturer**	**Tag Number (Optional)**	**Original Cost**	**Replacement Cost**	**Year Installed**	**Expected Useful Life in Years**	**Remaining Useful Life in Years**	**Condition**	**Probability of Failure**	**Consequence of Failure**	**Criticality**
Gravity Sewer	8"	PVC			$12,362,400	$12,362,400	2025	80	82	1	1	2	2
Forcemain	6"	DI			$1,231,800	$1,231,800	2025	80	82	1	1	3	3
Forcemain	4"	DI			$2,552,040	$2,552,040	2025	80	82	1	1	3	3
Forcemain	2"	PVC			$1,526,500	$1,526,500	2025	80	82	1	1	3	3
Grinder Pump Station	20 gpm	N/A		Haysville-1	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Haysville-2	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Haysville-3	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Haysville-4	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Haysville-5	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Portersville-1	$22,500	$22,500	2025	50	52	1	1	2	2
Grinder Pump Station	20 gpm	N/A		Portersville-2	$22,500	$22,500	2025	50	52	1	1	2	2
Regional Lift Station	20 gpm	N/A		Haysville Reg-1	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	190 gpm	N/A		Haysville Reg-2	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	210 gpm	N/A		Haysville Reg-3	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	250 gpm	N/A		Haysville Reg-4	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	300 gpm	N/A		Haysville Reg-5	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	60 gpm	N/A		Portersville Reg-1	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	80 gpm	N/A		Portersville Reg-2	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	90 gpm	N/A		Portersville Reg-3	$300,000	$300,000	2025	50	52	1	1	3	3
Regional Lift Station	100 gpm	N/A		Portersville Reg-4	$300,000	$300,000	2025	50	52	1	1	3	3
Air Release Valve	N/A	N/A		Haysville Air-1	$5,000	$5,000	2025	50	52	1	1	3	3
Air Release Valve	N/A	N/A		Haysville Air-2	$5,000	$5,000	2025	50	52	1	1	3	3
Air Release Valve	N/A	N/A		Portersville Air-1	$5,000	$5,000	2025	50	52	1	1	3	3
Air Release Valve	N/A	N/A		Portersville Air-2	$5,000	$5,000	2025	50	52	1	1	3	3
Manholes (Typ. Of 170)	N/A	Concrete			$8,000	$8,000	2025	100	102	1	1	2	2
Collection Assets Subtotal					**$20,535,240**	**$20,530,240**							

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Treatment Assets	**Capacity / Size**	**Material**	**Manufacturer**	**Tag Number (Optional)**	**Original Cost**	**Replacement Cost**	**Year Installed**	**Expected Useful Life in Years**	**Remaining Useful Life in Years**	**Condition**	**Probability of Failure**	**Consequence of Failure**	**Criticality**
N/A													
N/A									-2023				0
Treatment Assets Subtotal					**$0**	**$0**							
Total of All Collection and Treatment Assets					**$20,535,240**	**$20,530,240**							

Future Improvement Expenses

Table 4

Directions:

A. List projects to be completed
B. Determine how long before the project must begin
C. Enter the total projected cost of the project
D. Enter "C" in column D for large replacement expenses that would be funded as a capital project separate from the reserve money set aside each year.
E. To add more improvement expenses, use insert function and add rows then copy first row to new rows to transfer formulas
F. Enter information in yellow cells.
G. Remaining cells will calculate automatically.

Guidance Note:

Include improvements here which are related to:
1. Future/upcoming regulations
2. Major asset replacement, such as structures, tanks, or interceptors
3. System expansion to provide additional capacity or service area
4. System consolidation or regionalization
5. Improved technology to replace obsolete technology
6. Climate resiliency

Include only projects expected to occur within the next 20 years.

A	B	C	D	E	F	G
Projects	**Years Until Project Must Begin**	**Cost**	**R = Use Reserve C = Capital Expense**	**Reserve Required Each Year**	**Future Capital Funds Required**	**Potential Funding Source**
DCRSD Collection System	1	$ 30,580,000	C	$ -	$ 30,580,000	SRF
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Enter project	0	$ -		$ -	$ -	
Total Improvement Expense Required in the Current Year				**$ -**		
Total Future Capital Funds Required					**$ 30,580,000**	