## Planning Area B

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | BARS/SCREEN UNIT | 1 | LS | $40,000 | $40,000 |
| 2 | BIOLAC SYSTEM | 1 | LS | $250,000 | $250,000 |
| 3 | SAND FILTER | 2 | LS | $20,000 | $40,000 |
| 4 | SLUDGE DRYING BED | 2 | LS | $20,000 | $40,000 |
| 5 | SLUDGE BUILDING | 1 | LS | $25,000 | $25,000 |
| 6 | UV DISINFECTION UNIT | 1 | LS | $40,000 | $40,000 |
| 7 | POST AERATION TANK/FLOW METERS | 1 | LS | $25,000 | $25,000 |
| 8 | OFFICE/BLOWERS BUILDING | 1 | LS | $100,000 | $100,000 |
| 9 | YARD PIPING | 1 | LS | $70,000 | $70,000 |
| 10 | SITE WORK | 1 | LS | $40,000 | $40,000 |
| 11 | ELECTRICAL AND CONTROL | 1 | LS | $40,000 | $40,000 |
| 12 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| 13 | LAND ACQUISITION | 2 | AC | $10,000 | $20,000 |
| SUBTOTAL | | | | | $742,000 |
| 10% CONTINGENCY | | | | | $74,200 |
| 20% NON-CONSTRUCTION | | | | | $163,240 |
| **TOTAL** | | | | | **$979,440** |

## Planning Area C

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | BARS/SCREEN UNIT | 1 | LS | $10,000 | $10,000 |
| 2 | BIOLAC SYSTEM | 1 | LS | $60,000 | $60,000 |
| 3 | SAND FILTER | 2 | LS | $5,000 | $10,000 |
| 4 | SLUDGE DRYING BED | 2 | LS | $5,000 | $10,000 |
| 5 | SLUDGE DRYING BED BUILDING | 1 | LS | $6,000 | $6,000 |
| 6 | UV DISINFECTION UNIT | 1 | LS | $10,000 | $10,000 |
| 7 | POST AERATION TANK/FLOW METERS | 1 | LS | $6,000 | $6,000 |
| 8 | OFFICE/BLOWERS BUILDING | 1 | LS | $50,000 | $50,000 |
| 9 | YARD PIPING | 1 | LS | $15,000 | $15,000 |
| 10 | SITE WORK | 1 | LS | $8,000 | $8,000 |
| 11 | ELECTRICAL AND CONTROL | 1 | LS | $8,000 | $8,000 |
| 12 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| 13 | LAND ACQUISITION | 2 | AC | $10,000 | $20,000 |
| SUBTOTAL | | | | | $225,000 |
| 10% CONTINGENCY | | | | | $22,500 |
| 20% NON-CONSTRUCTION | | | | | $49,500 |
| **TOTAL** | | | | | **$297,000** |

## Combined Planning Areas

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | BARS/SCREEN UNIT | 1 | LS | $60,000 | $60,000 |
| 2 | BIOLAC SYSTEM | 1 | LS | $375,000 | $375,000 |
| 3 | SAND FILTER | 2 | LS | $30,000 | $60,000 |
| 4 | SLUDGE DRYING BED | 2 | LS | $30,000 | $60,000 |
| 5 | SLUDGE DRYING BED BUILDING | 1 | LS | $40,000 | $40,000 |
| 6 | UV DISINFECTION UNIT | 1 | LS | $60,000 | $60,000 |
| 7 | POST AERATION TANK/FLOW METERS | 1 | LS | $40,000 | $40,000 |
| 8 | OFFICE/BLOWERS BUILDING | 1 | LS | $100,000 | $100,000 |
| 9 | YARD PIPING | 1 | LS | $90,000 | $90,000 |
| 10 | SITE WORK | 1 | LS | $50,000 | $50,000 |
| 11 | ELECTRICAL AND CONTROL | 1 | LS | $60,000 | $60,000 |
| 12 | 6" SANITARY FORCE MAIN, COMPLETE | 14,600 | LF | $24 | $350,400 |
| 13 | LAND ACQUISITION | 2 | AC | $10,000 | $20,000 |
| 14 | PAVEMENT REMOVAL & REPLACEMENT | 2,500 | SY | $30 | $75,000 |
| 15 | SEEDING & MULCHING, COMPLETE | 1,200 | SY | $1 | $1,200 |
| 16 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $1,451,600 |
| 10% CONTINGENCY | | | | | $145,160 |
| 20% NON-CONSTRUCTION | | | | | $319,352 |
| **TOTAL** | | | | | **$1,916,112** |

## New Wastewater Treatment Plant - Facultative Lagoon System

The second alternative for the new wastewater treatment plant for Jackson Township considered in this study is a facultative lagoon system. The primary treatment for wastewater in this case is also screening. This will help to minimize floatables that could potentially accumulate in the lagoon.

A lagoon is a passive method of providing treatment by retaining wastewater for many months allowing microbes to break down the waste. In this process, sludge will be produced as a by-product which settles to the bottom until dredged.

Lagoons are used for residential, small commercial and small community applications that have suitable, available land.  Lagoons provide treatment at a slow rate. Large volume and slow treatment are tradeoffs for little to no external energy requirements. Lagoons provide treatment through physical and biological processes.

Two types of lagoon systems commonly used for small communities include flow-through and controlled discharge lagoons which is dependent upon the stream size and characteristics for discharge.  Flow-through systems require larger streams to minimize impact to the water quality.  In this case, large streams are not immediately available, thus a controlled discharge lagoon would be considered.

In cold climates, lagoons which treat strong wastewater may require aerated lagoon systems.  In an aerated lagoon, oxygen is supplied by means of surface aerators or diffused air units. The turbulence in a basin created by aeration keeps solids in suspension and aids in microbial growth to break down components in the wastewater. In this case, since wastewater is primarily residential, aeration will not be considered a necessary design addition.

Lagoon type systems are one of the most commonly used type system for small communities. The advantages of this type of system are the low O,M&R cost and minimum maintenance requirements. However, this type of system requires a large area for construction and treatment parameters of the effluent can't be controlled by operational means, which might require construction of additional treatment units.

Ten States Standards requires construction of three lagoons as a minimum and retaining the average daily flow for 180 days using an average depth of 4 feet in the ponds because of sludge accumulation.  For example, with an average daily flow of 20,000 GPD, a surface area of 3 acres would be needed to meet the storage requirements.  In order to construct dikes to contain the water surface, an additional 80% of the water surface land size is needed. Thus site requirements would approach 6 acres (1.8 x 3 = 5.4 acres).

*Advantages*

- Easy to operate
- Requires little energy
- Smaller quantity of removed material

*Disadvantages*

- Difficult to control or predict ammonia levels
- Require large areas of land
- Burrowing animals

Listed below in Table 5-7 are construction cost estimates for a lagoon treatment system.

## Table 5-7: Lagoon Treatment System Cost Analysis

### Planning Area A

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | EXCAVATION & EMBANKMENT | 1 | LS | $100,000 | $100,000 |
| 2 | PROCESS PIPING | 1 | LS | $10,000 | $10,000 |
| 3 | CONTROLS | 1 | LS | $20,000 | $20,000 |
| 4 | INFLUENT CHAMBERS | 1 | LS | $10,000 | $10,000 |
| 5 | OUTFALL STRUCTURE | 1 | LS | $10,000 | $10,000 |
| 6 | SITE WORK | 1 | LS | $20,000 | $20,000 |
| 7 | GROUNDWATER CONTROL | 1 | LS | $20,000 | $20,000 |
| 8 | LAND ACQUISITION | 8 | AC | $10,000 | $80,000 |
| 9 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $282,000 |
| 10% CONTINGENCY | | | | | $28,200 |
| 20% NON-CONSTRUCTION | | | | | $62,040 |
| **TOTAL** | | | | | **$372,240** |

### Planning Area B

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | EXCAVATION & EMBANKMENT | 1 | LS | $300,000 | $300,000 |
| 2 | PROCESS PIPING | 1 | LS | $30,000 | $30,000 |
| 3 | CONTROLS | 1 | LS | $60,000 | $60,000 |
| 4 | INFLUENT CHAMBERS | 1 | LS | $30,000 | $30,000 |
| 5 | OUTFALL STRUCTURE | 1 | LS | $30,000 | $30,000 |
| 6 | SITE WORK | 1 | LS | $60,000 | $60,000 |
| 7 | GROUNDWATER CONTROL | 1 | LS | $50,000 | $50,000 |
| 8 | LAND ACQUISITION | 20 | AC | $10,000 | $200,000 |
| 9 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $772,000 |
| 10% CONTINGENCY | | | | | $77,200 |
| 20% NON-CONSTRUCTION | | | | | $169,840 |
| **TOTAL** | | | | | **$1,019,040** |

## Planning Area C

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | EXCAVATION & EMBANKMENT | 1 | LS | $70,000 | $70,000 |
| 2 | PROCESS PIPING | 1 | LS | $10,000 | $10,000 |
| 3 | CONTROLS | 1 | LS | $15,000 | $15,000 |
| 4 | INFLUENT CHAMBERS | 1 | LS | $10,000 | $10,000 |
| 5 | OUTFALL STRUCTURE | 1 | LS | $10,000 | $ 10,000 |
| 6 | SITE WORK | 1 | LS | $15,000 | $15,000 |
| 7 | GROUNDWATER CONTROL | 1 | LS | $10,000 | $10,000 |
| 8 | LAND ACQUISITION | 6 | AC | $10,000 | $60,000 |
| 9 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $212,000 |
| 10% CONTINGENCY | | | | | $21,200 |
| 20% NON-CONSTRUCTION | | | | | $46,640 |
| **TOTAL** | | | | | **$279,840** |

## Combined Planning Areas

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | EXCAVATION & EMBANKMENT | 1 | LS | $400,000 | $400,000 |
| 2 | PROCESS PIPING | 1 | LS | $40,000 | $40,000 |
| 3 | CONTROLS | 1 | LS | $60,000 | $60,000 |
| 4 | INFLUENT CHAMBERS | 1 | LS | $20,000 | $20,000 |
| 5 | OUTFALL STRUCTURE | 1 | LS | $40,000 | $40,000 |
| 6 | SITE WORK | 1 | LS | $70,000 | $70,000 |
| 7 | GROUNDWATER CONTROL | 1 | LS | $60,000 | $60,000 |
| 8 | LAND ACQUISITION | 25 | AC | $10,000 | $250,000 |
| 9 | 6" SANITARY FORCE MAIN, COMPLETE | 14,600 | LF | $24 | $350,400 |
| 10 | PAVEMENT REMOVAL & REPLACEMENT | 2,500 | SY | $30 | $75,000 |
| 11 | SEEDING & MULCHING, COMPLETE | 1,200 | SY | $1 | $1,200 |
| 12 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $1,376,600 |
| 10% CONTINGENCY | | | | | $137,660 |
| 20% NON-CONSTRUCTION | | | | | $302,852 |
| **TOTAL** | | | | | **$1,817,112** |

## New Wastewater Treatment Plant - Packed Bed Media

Packed bed media filters are a secondary treatment option and designed to follow primary treatment, as achieved in the STEP collection system. If a different collection system is utilized then some other primary treatment process will have to be provided. Some of the media options for the packed bed media filter are sand/gravel, peat, foam, and textile (AdvanTex). The textile filter operates in the recirculating mode, similar to a recirculating sand or gravel filter and is the proposed media for this alternative.

Wastewater first enters an anoxic tank and then is applied over the top of the filter in small, uniform doses several times per hour. This process provides maximum holding time for the water within the fabric. Effluent is then collected at the bottom of the filter and returns to the Recirculation /Dilution (R/D) tank. The effluent is typically recirculated four times before being discharged. A diagram of the packed bed media process can be found in Figure 5-9.

Periodic maintenance by a trained service provider is critical to maintaining high quality effluent from the filter. If the biomat builds on top of the textile configuration, it will need to be periodically removed. The land size requirement for a packed bed media filter is smaller than most treatment systems. The land size requirement for this project would approximately be 1/2 for the plant and 2 acres for the building, parking, and future expansions.

Disinfection in this alternative will be achieved using UV disinfection and the treated effluent can be discharged.

A building will be provided for the electrical components, process controls and appurtenances as required.

*Advantages*

- Limited operator involvement
- Low power costs
- Able to handle seasonal or increasing flows
- Easy to expand

*Disadvantages*

- Needs Primary Treatment First
- Occurrence of clogging
- Media requires cleaning

Listed below in Table 5-8 are construction cost estimates for a packed bed media treatment system.

## Table 5-8: Packed Bed Media Treatment System Cost Analysis

### Planning Area A

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 42 ft AX-MAX | 4 | EA | $75,000 | $300,000 |
| 2 | 14 ft PUMP BASIN | 1 | EA | $30,000 | $30,000 |
| 3 | RNE PUMP | 1 | EA | $600 | $600 |
| 4 | DUPLEX PUMPING PACKAGE | 5 | EA | $2,000 | $10,000 |
| 5 | PRE-ANOXIC TANK | 1 | EA | $40,000 | $40,000 |
| 6 | DISCHARGE PUMPING PACKAGE | 1 | LS | $2,000 | $ 2,000 |
| 7 | ALKALINITY WATER FEED PUMP | 1 | EA | $600 | $600 |
| 8 | ALKALINITY FEED SYSTEM | 1 | LS | $10,000 | $10,000 |
| 9 | INSTRUMENTATION/ FLOW METER | 1 | EA | $10,000 | $10,000 |
| 10 | FLOW EQUALIZATION TANK PUMPING EQUP. | 1 | LS | $5,000 | $5,000 |
| 11 | DISINFECTION (UV) | 1 | EA | $10,000 | $10,000 |
| 12 | CONTROLS BUILDING | 1 | EA | $50,000 | $50,000 |
| 13 | TELEMETRY CONTROL PANEL | 5 | EA | $5,000 | $25,000 |
| 14 | LAND ACQUISION | 2 | AC | $10,000 | $20,000 |
| 15 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $525,200 |
| 10% CONTINGENCY | | | | | $52,520 |
| 20% NON-CONSTRUCTION | | | | | $115,544 |
| **TOTAL** | | | | | **$693,264** |

## Planning Area B

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 42 ft AX-MAX | 8 | EA | $75,000 | $600,000 |
| 2 | 14 ft PUMP BASIN | 1 | EA | $30,000 | $30,000 |
| 3 | RNE PUMP | 1 | EA | $600 | $600 |
| 4 | DUPLEX PUMPING PACKAGE | 15 | EA | $2,000 | $30,000 |
| 5 | 35 ft AX-MAX | 4 | EA | $67,000 | $268,000 |
| 6 | PRE-ANOXIC TANK | 1 | EA | $75,000 | $75,000 |
| 7 | DISCHARGE PUMPING PACKAGE | 1 | LS | $2,000 | $2,000 |
| 8 | ALKALINITY WATER FEED PUMP | 1 | EA | $600 | $600 |
| 9 | ALKALINITY FEED SYSTEM | 1 | LS | $30,000 | $30,000 |
| 10 | INSTRUMENTATION/ FLOW METER | 1 | EA | $10,000 | $10,000 |
| 11 | FLOW EQUALIZATION TANK PUMPING EQUP. | 1 | LS | $5,000 | $5,000 |
| 12 | DISINFECTION (UV) | 1 | EA | $25,000 | $25,000 |
| 13 | CONTROLS BUILDING | 1 | EA | $50,000 | $50,000 |
| 14 | TELEMETRY CONTROL PANEL | 6 | EA | $5,000 | $30,000 |
| 15 | LAND ACQUISION | 2 | AC | $10,000 | $20,000 |
| 16 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $1,188,200 |
| 10% CONTINGENCY | | | | | $118,820 |
| 20% NON-CONSTRUCTION | | | | | $261,404 |
| **TOTAL** | | | | | **$1,568,424** |

## Planning Area C

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 42 ft AX-MAX | 1 | EA | $75,000 | $75,000 |
| 2 | 14 ft PUMP BASIN | 1 | EA | $30,000 | $30,000 |
| 3 | RNE PUMP | 1 | EA | $600 | $600 |
| 4 | DUPLEX PUMPING PACKAGE | 3 | EA | $2,000 | $6,000 |
| 5 | 35 ft AX-MAX | 1 | EA | $65,000 | $65,000 |
| 6 | PRE-ANOXIC TANK | 1 | EA | $30,000 | $30,000 |
| 7 | DISCHARGE PUMPING PACKAGE | 1 | LS | $2,000 | $2,000 |
| 8 | ALKALINITY WATER FEED PUMP | 1 | EA | $600 | $600 |
| 9 | ALKALINITY FEED SYSTEM | 1 | LS | $8,000 | $8,000 |
| 10 | INSTRUMENTATION/ FLOW METER | 1 | EA | $10,000 | $10,000 |
| 11 | FLOW EQUALIZATION TANK PUMPING EQUP. | 1 | LS | $5,000 | $5,000 |
| 12 | DISINFECTION (UV) | 1 | EA | $5,000 | $5,000 |
| 13 | CONTROLS BUILDING | 1 | EA | $50,000 | $50,000 |
| 14 | TELEMETRY CONTROL PANEL | 3 | EA | $5,000 | $15,000 |
| 15 | LAND ACQUISION | 2 | AC | $10,000 | $20,000 |
| 16 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| SUBTOTAL | | | | | $334,200 |
| 10% CONTINGENCY | | | | | $33,420 |
| 20% NON-CONSTRUCTION | | | | | $73,524 |
| **TOTAL** | | | | | **$441,144** |

## Combined Planning Areas

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 42 ft AX-MAX | 12 | EA | $75,000 | $900,000 |
| 2 | 14 ft PUMP BASIN | 1 | EA | $30,000 | $30,000 |
| 3 | RNE PUMP | 1 | EA | $600 | $600 |
| 4 | DUPLEX PUMPING PACKAGE | 20 | EA | $2,000 | $40,000 |
| 5 | 35 ft AX-MAX | 5 | EA | $65,000 | $325,000 |
| 6 | PRE-ANOXIC TANK | 1 | EA | $80,000 | $80,000 |
| 7 | DISCHARGE PUMPING PACKAGE | 1 | LS | $2,000 | $2,000 |
| 8 | ALKALINITY WATER FEED PUMP | 1 | EA | $600 | $600 |
| 9 | ALKALINITY FEED SYSTEM | 1 | LS | $35,000 | $35,000 |
| 10 | INSTRUMENTATION/ FLOW METER | 1 | EA | $10,000 | $10,000 |
| 11 | FLOW EQUALIZATION TANK PUMPING EQUP. | 1 | LS | $5,000 | $5,000 |
| 12 | DISINFECTION (UV) | 1 | EA | $35,000 | $35,000 |
| 13 | CONTROLS BUILDING | 1 | EA | $50,000 | $50,000 |
| 14 | TELEMETRY CONTROL PANEL | 11 | EA | $5,000 | $55,000 |
| 15 | LAND ACQUISION | 2 | AC | $10,000 | $20,000 |
| 16 | 6" SANITARY FORCE MAIN, COMPLETE | 14,600 | LF | $24 | $350,400 |
| 17 | PAVEMENT REMOVAL & REPLACEMENT | 2,500 | SY | $30 | $75,000 |
| 18 | SEEDING & MULCHING, COMPLETE | 1,200 | SY | $1 | $1,200 |
| 19 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $2,024,800 |
| 10% CONTINGENCY | | | | | $202,480 |
| 20% NON-CONSTRUCTION | | | | | $445,456 |
| **TOTAL** | | | | | **$2,672,736** |

## Regionalize with Adjacent Community - Transport Wastewater to Union City

Another treatment option is to transport the wastewater to the Village of Union City for planning areas A and C or directly to the Village's WWTP for planning area B. The WWTP is located within a few hundred yards of planning area B, along Beamsville-Union City Road. The design capacity for the Union City WWTP is 0.40 MGD and the average daily flow is 0.25 MGD.

Planning area A would connect into the Village of Union City's collection system by a proposed force main traveling along Union City-Elroy Road. The force main would then connect into Union City's collection system. Planning area B would pump the collected wastewater directly to Union City's WWTP. Similarly to planning area A, planning area C would connect into the Village's collection system by a force main. The proposed force main would travel along Worth Road from planning area C to the Village of Union City. The locations of these force mains can be found in Figure 5-10.

Based on discussions with the Village of Union City's Utility Director, Eric Hanna, the Village is currently experiencing challenges with Infiltration and Inflow in the collection system, thus affecting the lagoon treatment system's capacity. As such the Village is currently not interested in receiving wastewater from the Jackson Township planning areas. Should this alternate be the preferred treatment, further discussion between Darke County and the Village of Union City would be needed.

### Table 5-9: Transport to Union City Cost Analysis

#### Planning Area A

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 6" SANITARY FORCE MAIN, COMPLETE | 3,300 | LF | $24 | $79,200 |
| 2 | AIR RELEASE MANHOLE AND VALVE | 2 | EA | $6,000 | $12,000 |
| 3 | PAVEMENT REMOVAL & REPLACEMENT | 550 | SY | $30 | $16,500 |
| 4 | SEEDING & MULCHING, COMPLETE | 2,600 | SY | $1 | $2,600 |
| 5 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $120,300 |
| 10% CONTINGENCY | | | | | $12,030 |
| 20% NON-CONSTRUCTION | | | | | $26,466 |
| **TOTAL** | | | | | **$158,796** |

#### Planning Area B

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 6" SANITARY FORCE MAIN, COMPLETE | 500 | LF | $24 | $12,000 |
| 2 | AIR RELEASE MANHOLE AND VALVE | 2 | EA | $6,000 | $12,000 |
| 3 | PAVEMENT REMOVAL & REPLACEMENT | 85 | SY | $30 | $2,550 |
| 4 | SEEDING & MULCHING, COMPLETE | 400 | SY | $1 | $400 |
| 5 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $36,950 |
| 10% CONTINGENCY | | | | | $3,695 |
| 20% NON-CONSTRUCTION | | | | | $8,129 |
| **TOTAL** | | | | | **$48,774** |

#### Planning Area C

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 6" SANITARY FORCE MAIN, COMPLETE | 1,500 | LF | $24 | $36,000 |
| 2 | AIR RELEASE MANHOLE AND VALVE | 2 | EA | $6,000 | $12,000 |
| 3 | PAVEMENT REMOVAL & REPLACEMENT | 250 | SY | $30 | $7,500 |
| 4 | SEEDING & MULCHING, COMPLETE | 1,200 | SY | $1 | $1,200 |
| 5 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $10,000 | $10,000 |
| SUBTOTAL | | | | | $66,700 |
| 10% CONTINGENCY | | | | | $6,670 |
| 20% NON-CONSTRUCTION | | | | | $14,674 |
| **TOTAL** | | | | | **$88,044** |

## Combined Planning Areas

| ITEM | DESCRIPTION | QTY. | UNIT | COST/UNIT | TOTAL |
|---|---|---|---|---|---|
| 1 | 6" SANITARY FORCE MAIN, COMPLETE | 53,000 | LF | $24 | $1,272,000 |
| 2 | AIR RELEASE MANHOLE AND VALVE | 6 | EA | $6,000 | $36,000 |
| 3 | PAVEMENT REMOVAL & REPLACEMENT | 885 | SY | $30 | $26,550 |
| 4 | SEEDING & MULCHING, COMPLETE | 4,200 | SY | $1 | $4,200 |
| 5 | MAINTENANCE & PROTECTION OF TRAFFIC | 1 | LS | $30,000 | $30,000 |
| SUBTOTAL | | | | | $1,368,750 |
| 10% CONTINGENCY | | | | | $136,875 |
| 20% NON-CONSTRUCTION | | | | | $301,125 |
| **TOTAL** | | | | | **$1,806,750** |

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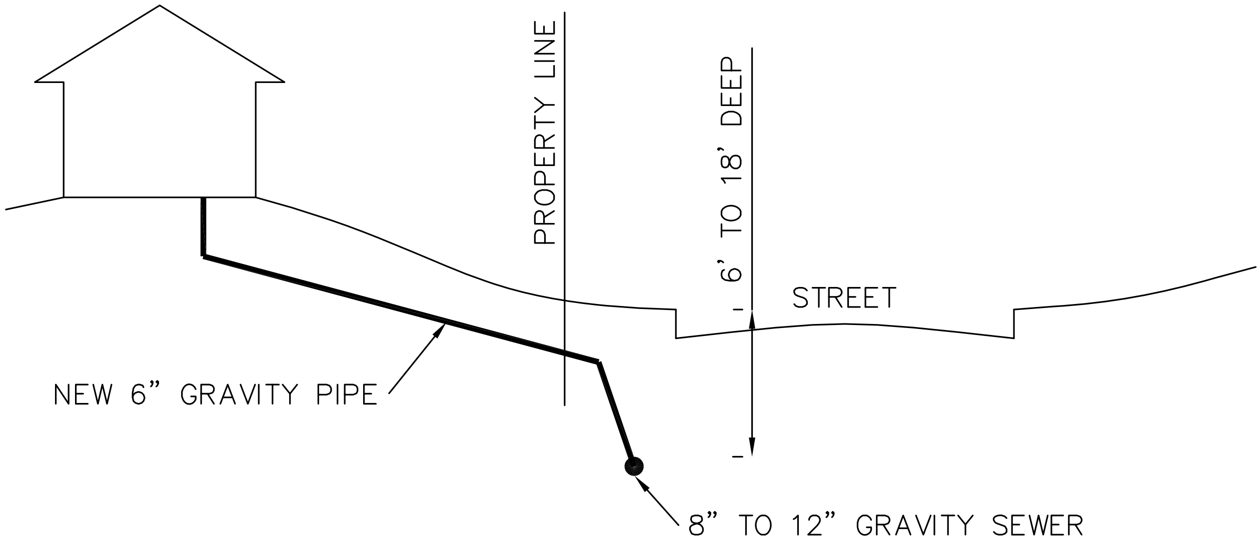
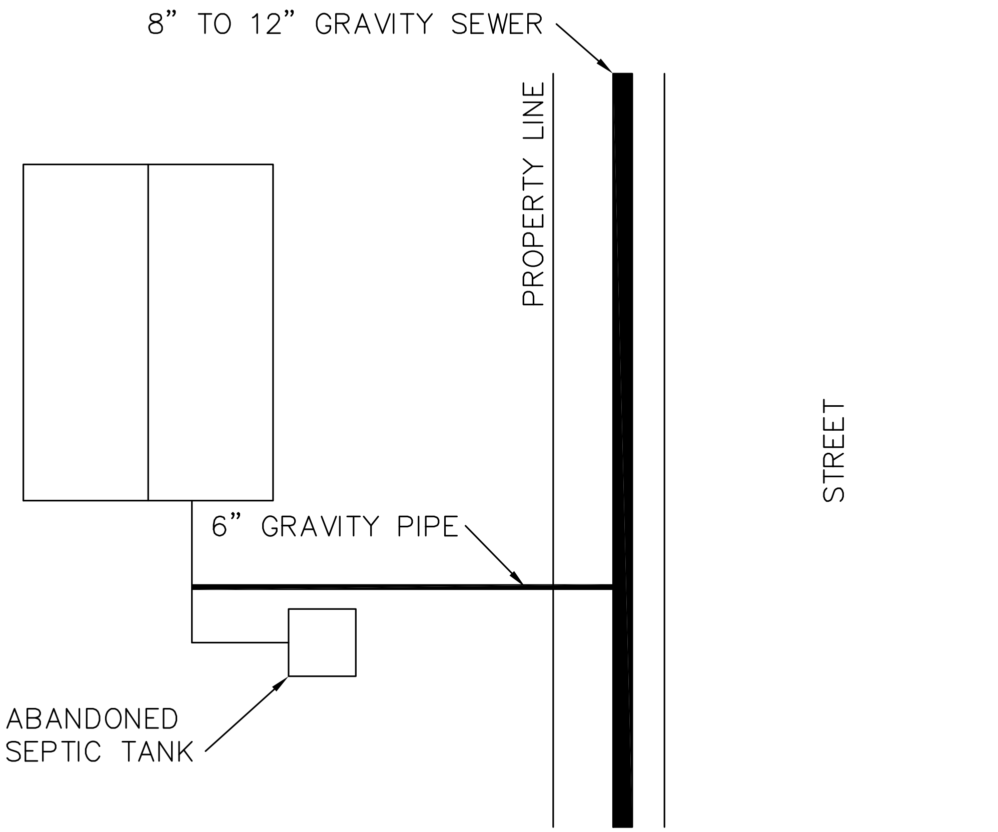
JACKSON TOWNSHIP

MVRPC UNSEWERED COMMUNITIES

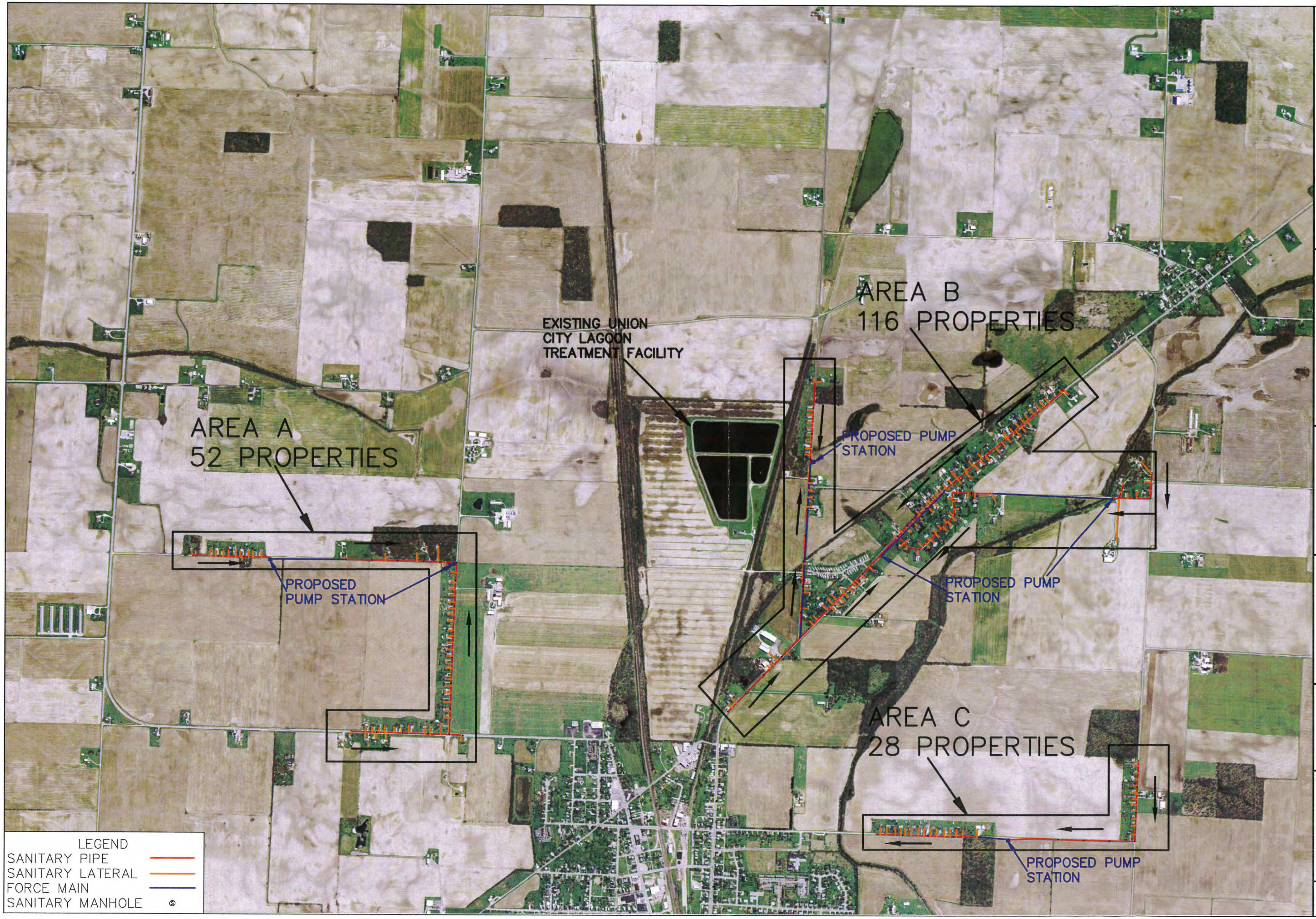
CONVENTIONAL GRAVITY SEWER CONNECTION
FIGURE 5-1




SECTION (TYP.)




PLAN VIEW (TYP.)




GRAPHIC SCALE

0 700 1400

( IN FEET )

1 inch = 1400 ft.

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SUBMISSION:

JACKSON TOWNSHIP

MVRPC UNSEWERED COMMUNITIES

SHEET TITLE:

GRAVITY SEWER LAYOUT

FIGURE 5-2

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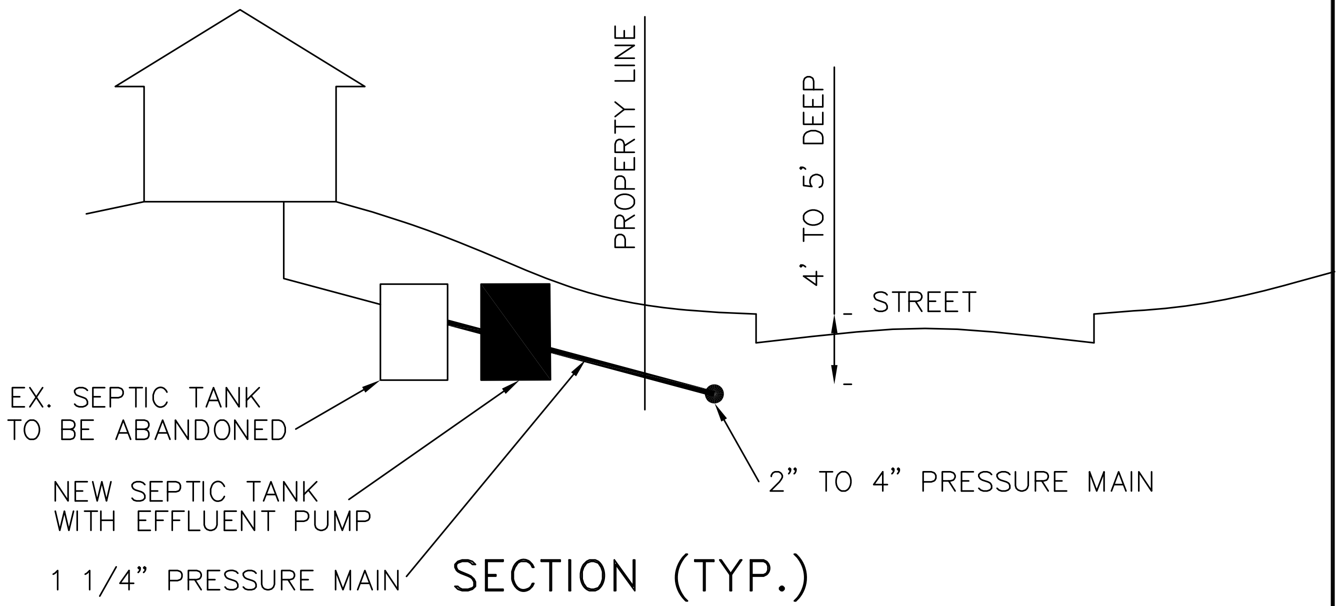
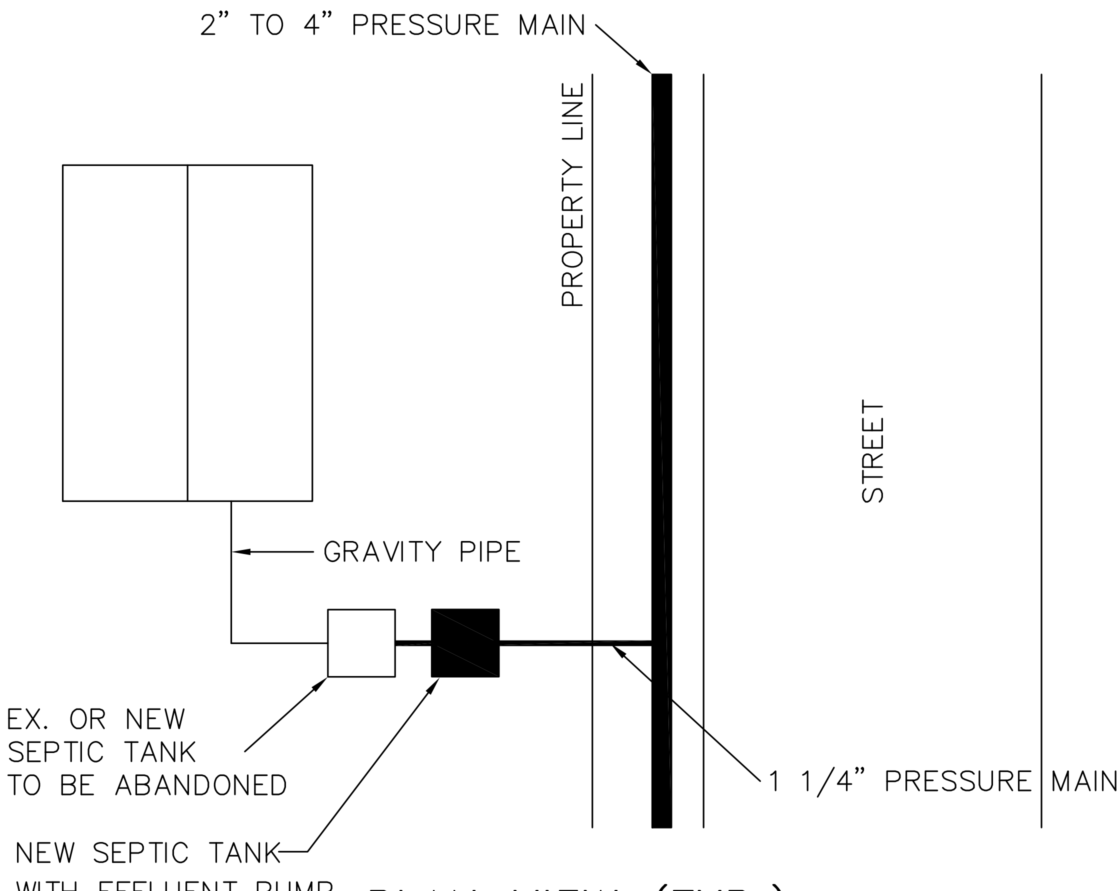
MVRPC UNSEWERED COMMUNITIES

CONVENTIONAL STEP SEWER CONNECTION
FIGURE 5-3




SECTION (TYP.)




PLAN VIEW (TYP.)

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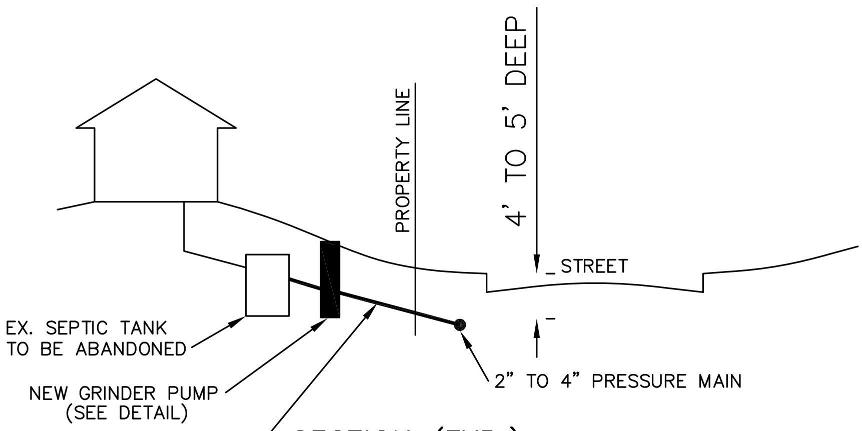
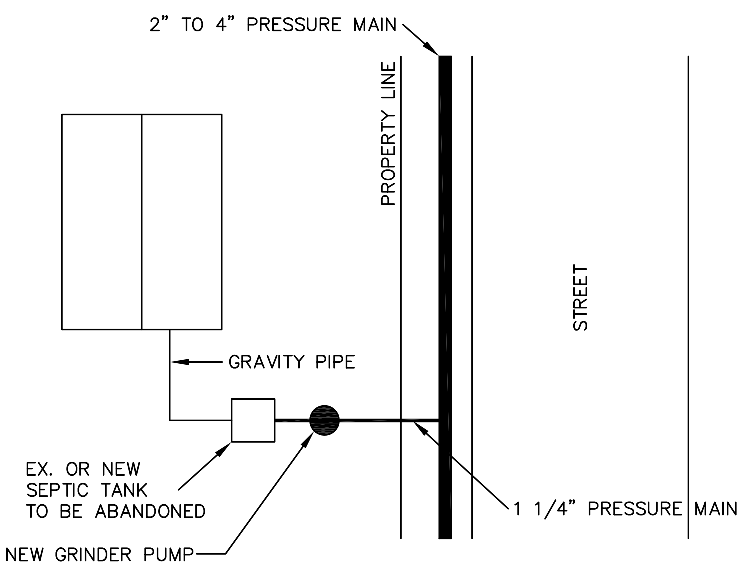
# MVRPC UNSEWERED COMMUNITIES

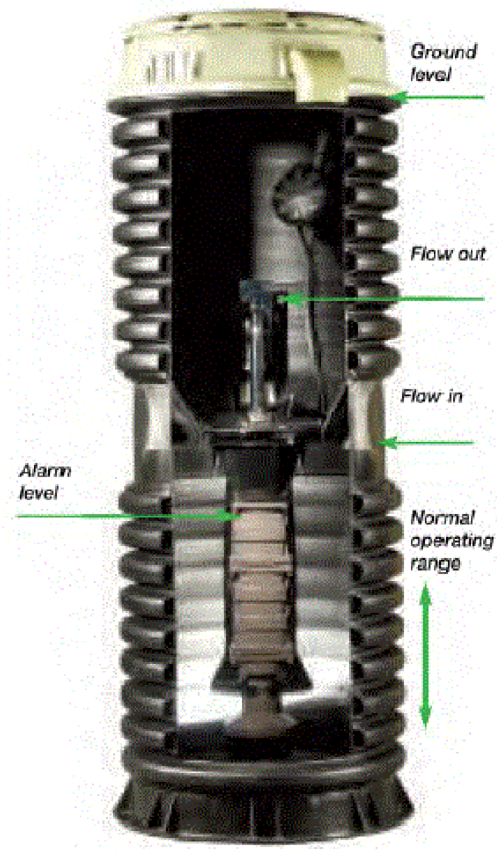
CONVENTIONAL GRINDER SEWER CONNECTION
FIGURE 5-4



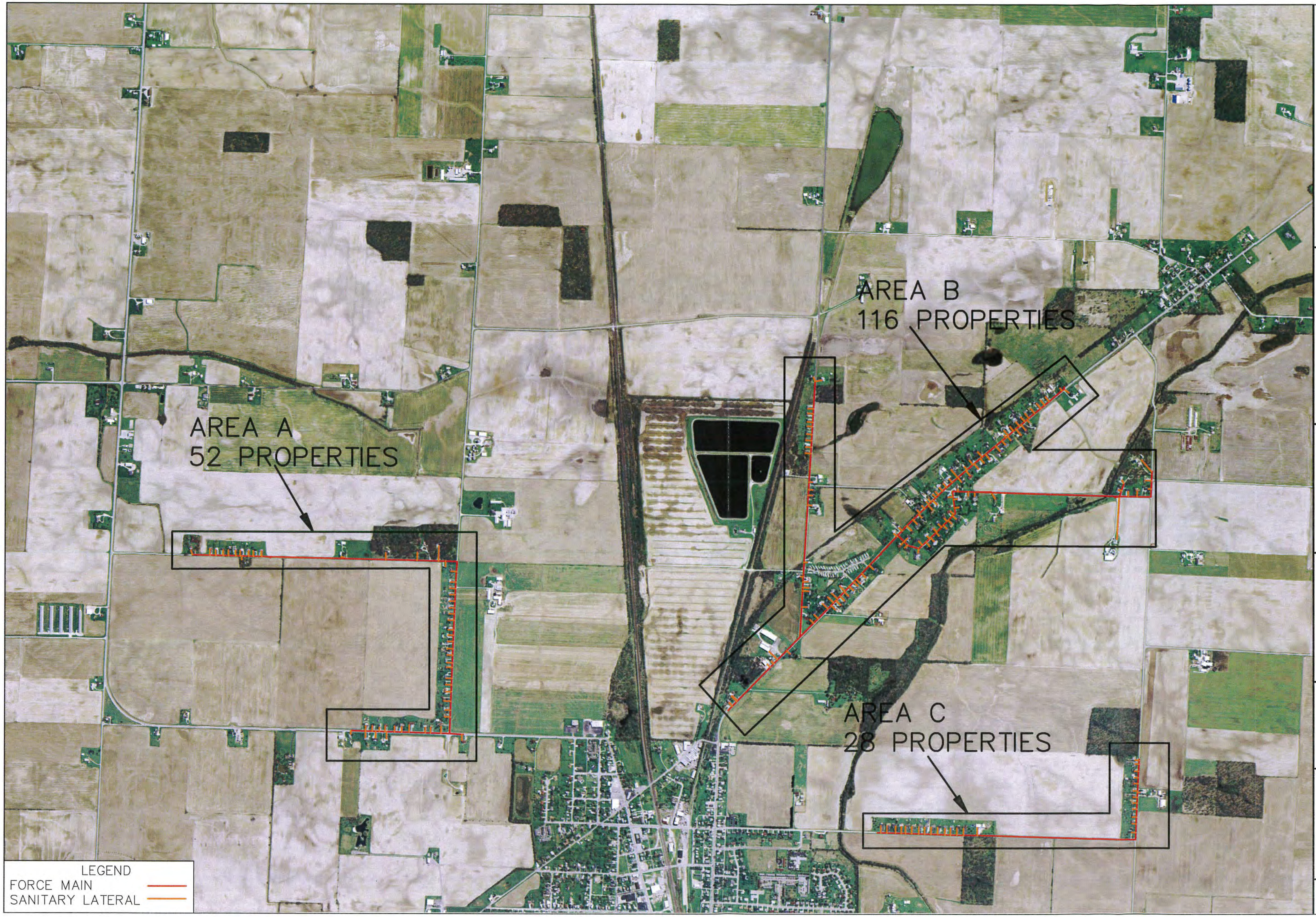

SECTION (TYP.)




PLAN VIEW (TYP.)




GRINDER DETAIL




GRAPHIC SCALE

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UNSEWERED
COMMUNITIES

SHEET TITLE:

STEP/GRINDER
SEWER LAYOUT

FIGURE 5-5

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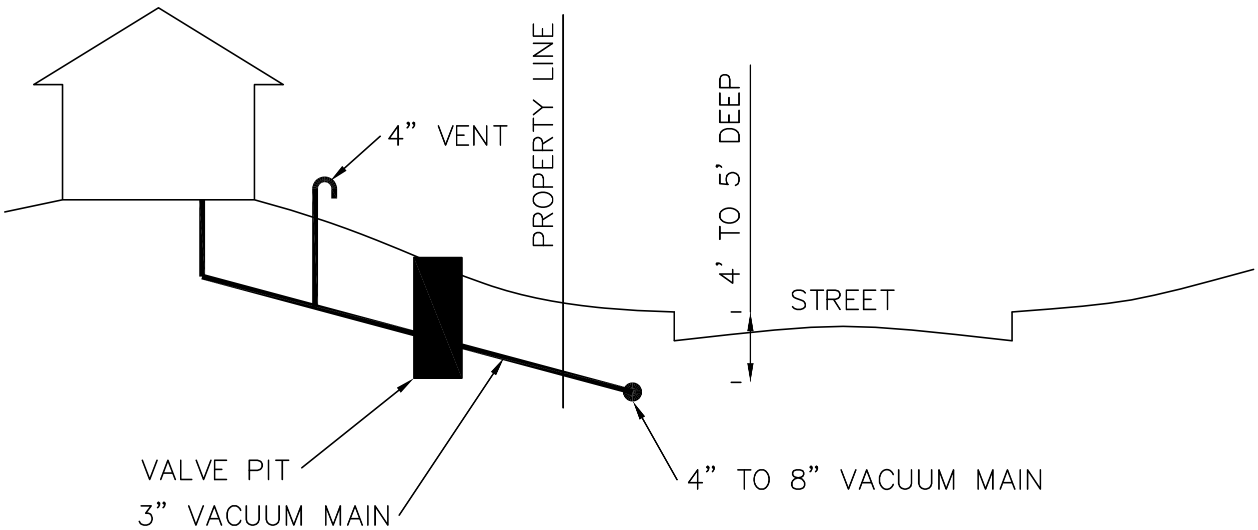
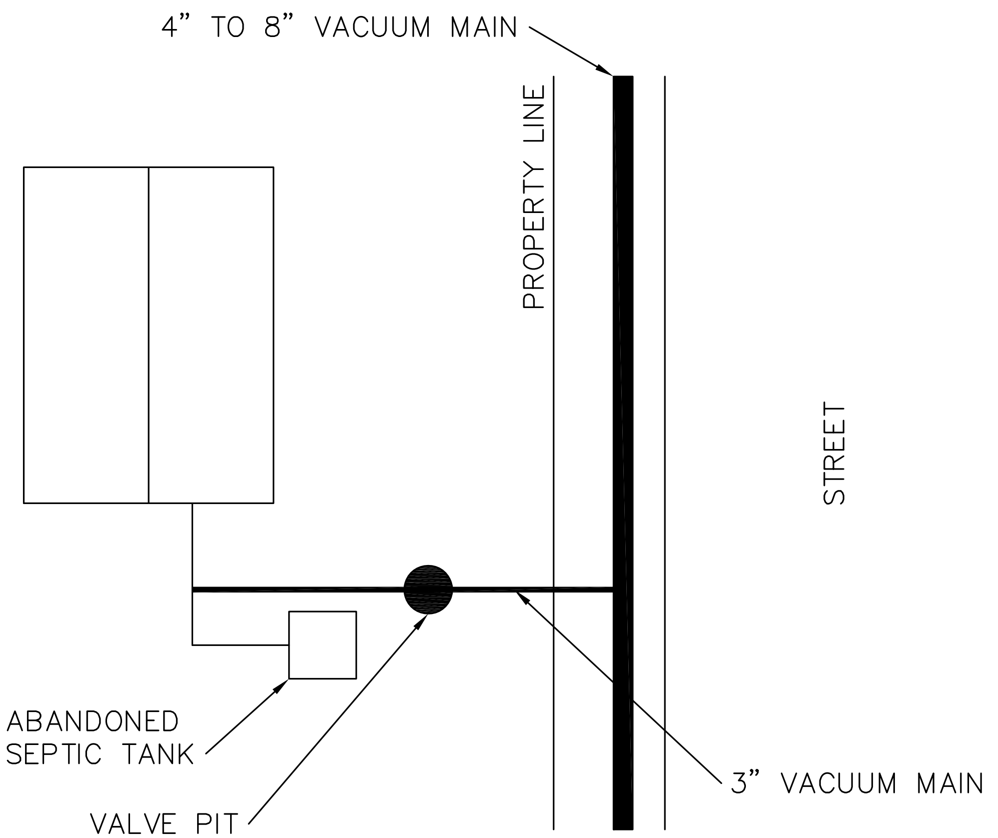
# MVRPC UNSEWERED COMMUNITIES

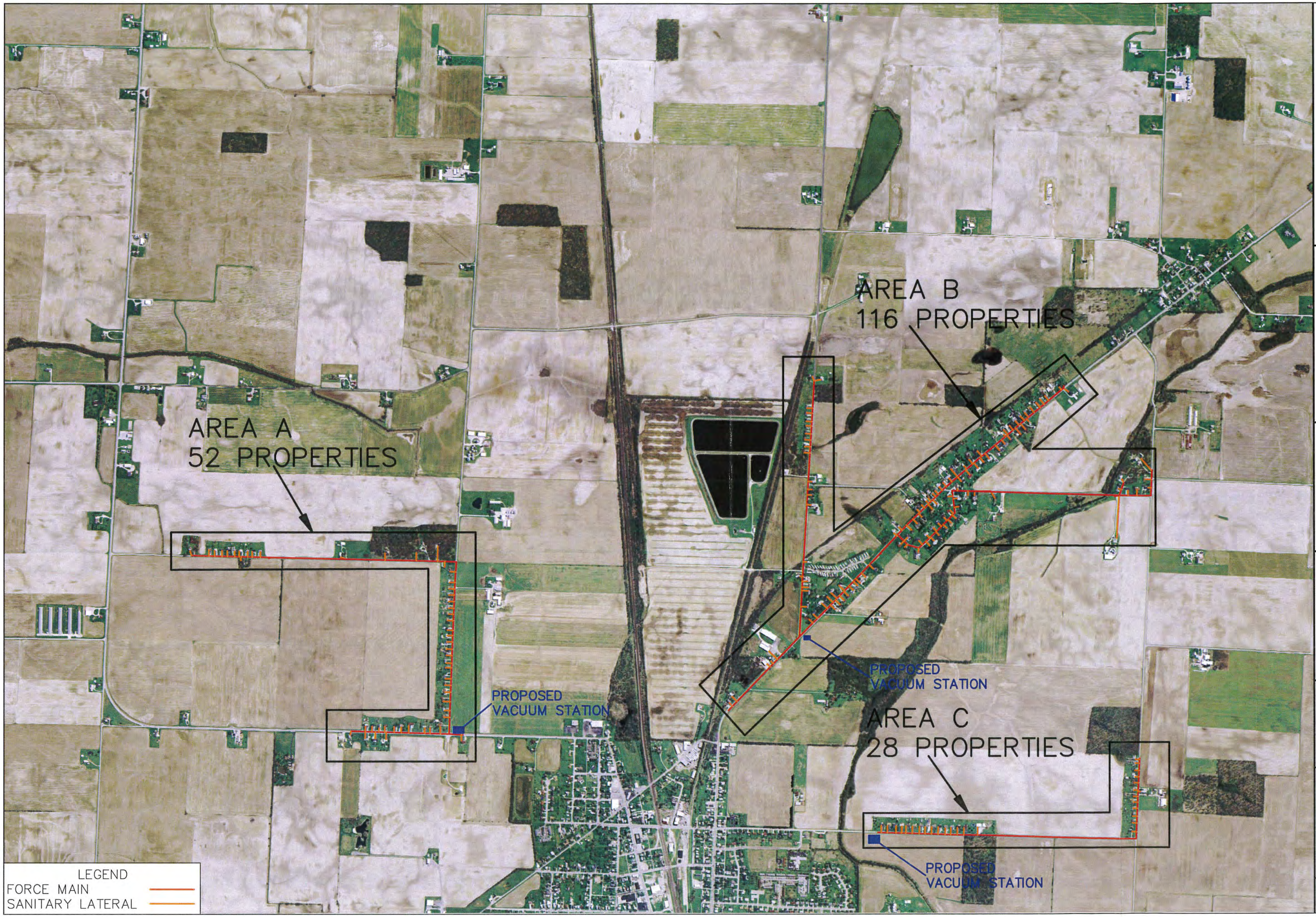
CONVENTIONAL VACUUM SEWER CONNECTION
FIGURE 5-6




SECTION (TYP.)




PLAN VIEW (TYP.)




GRAPHIC SCALE

0 700 1400

( IN FEET )

1 inch = 1400 ft.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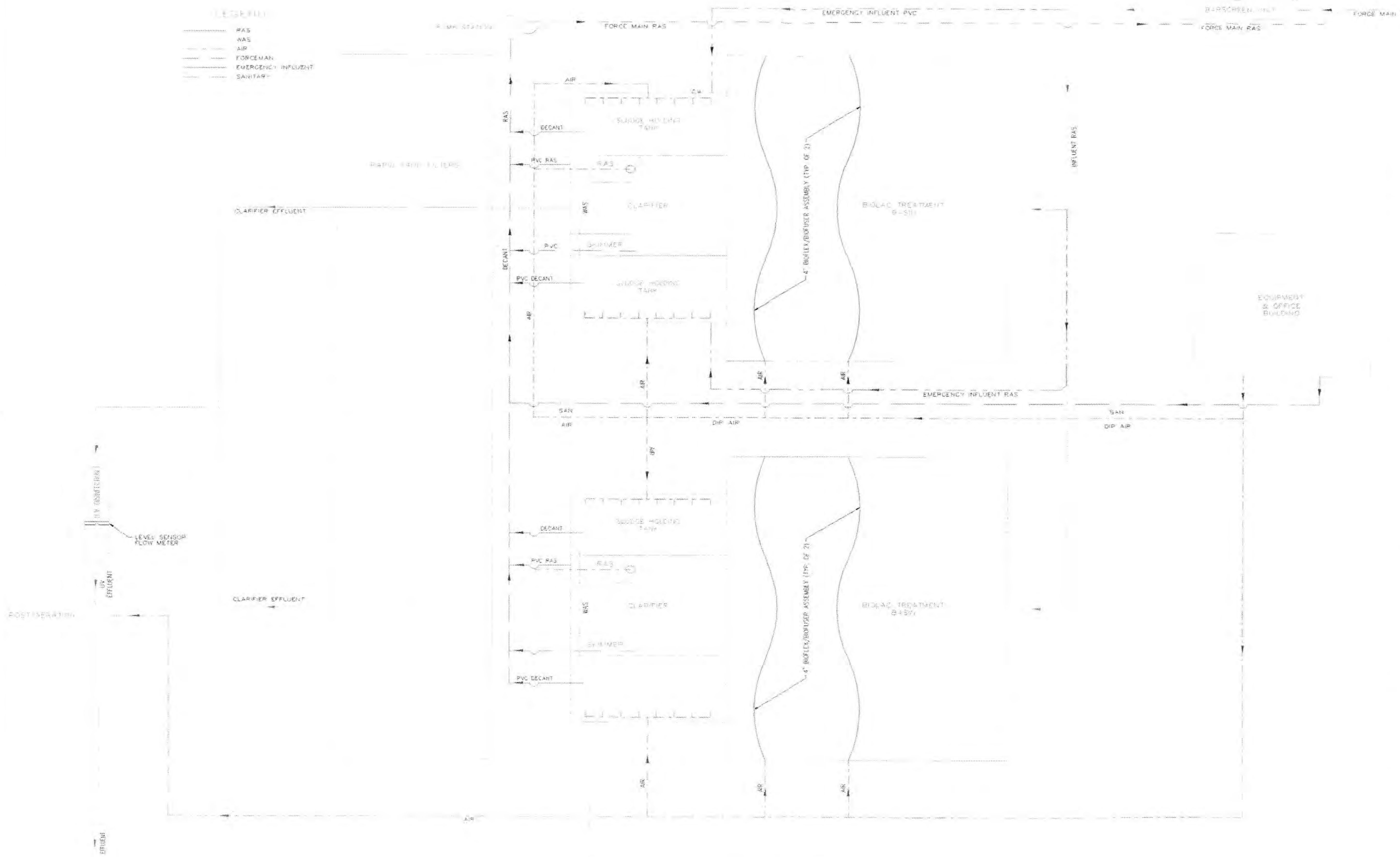
MVRPC UNSEWERED COMMUNITIES

SHEET TITLE:

VACUUM SEWER LAYOUT

FIGURE 5-7




PROCESS FLOW SCHEMATIC
NO SCALE

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COMMUNITIES

SHEET TITLE:

EXTENDED
AERATION
TREATMENT
PROCESS

FIGURE 5-8

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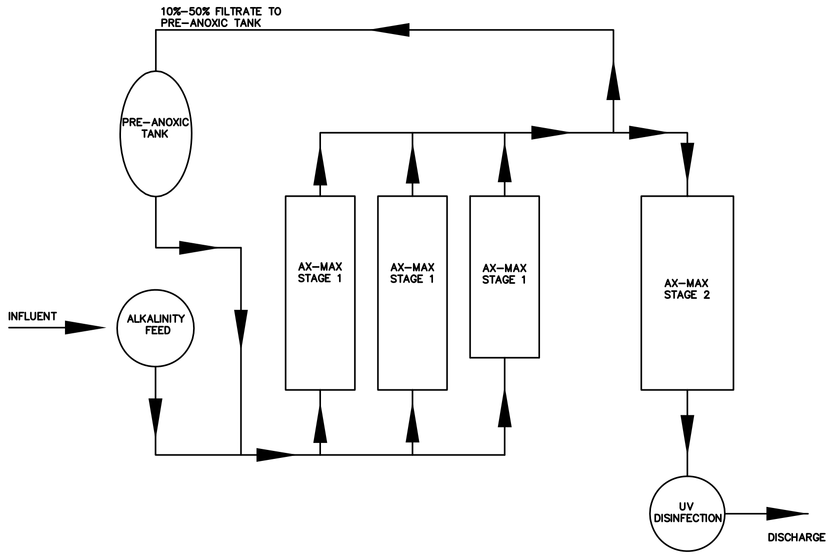
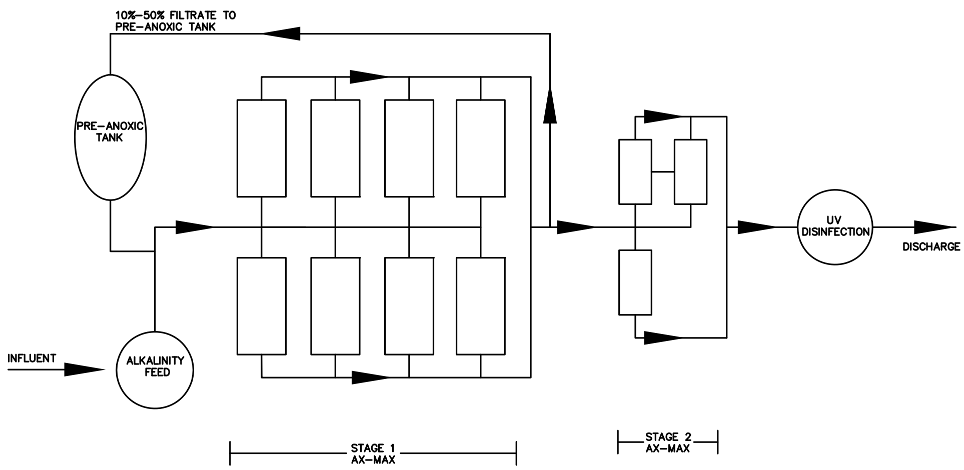
# MVRPC UNSEWERED COMMUNITIES

FIGURE 5-9: PACKED BED MEDIA TREATMENT SYSTEM LAYOUTS

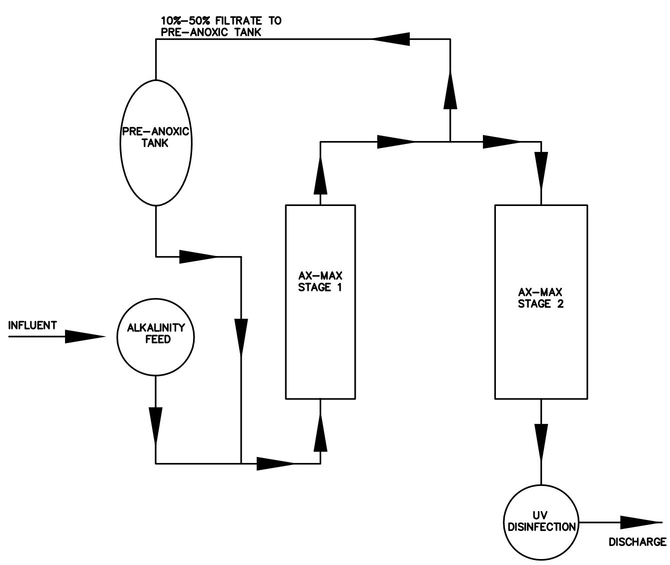
AREA A

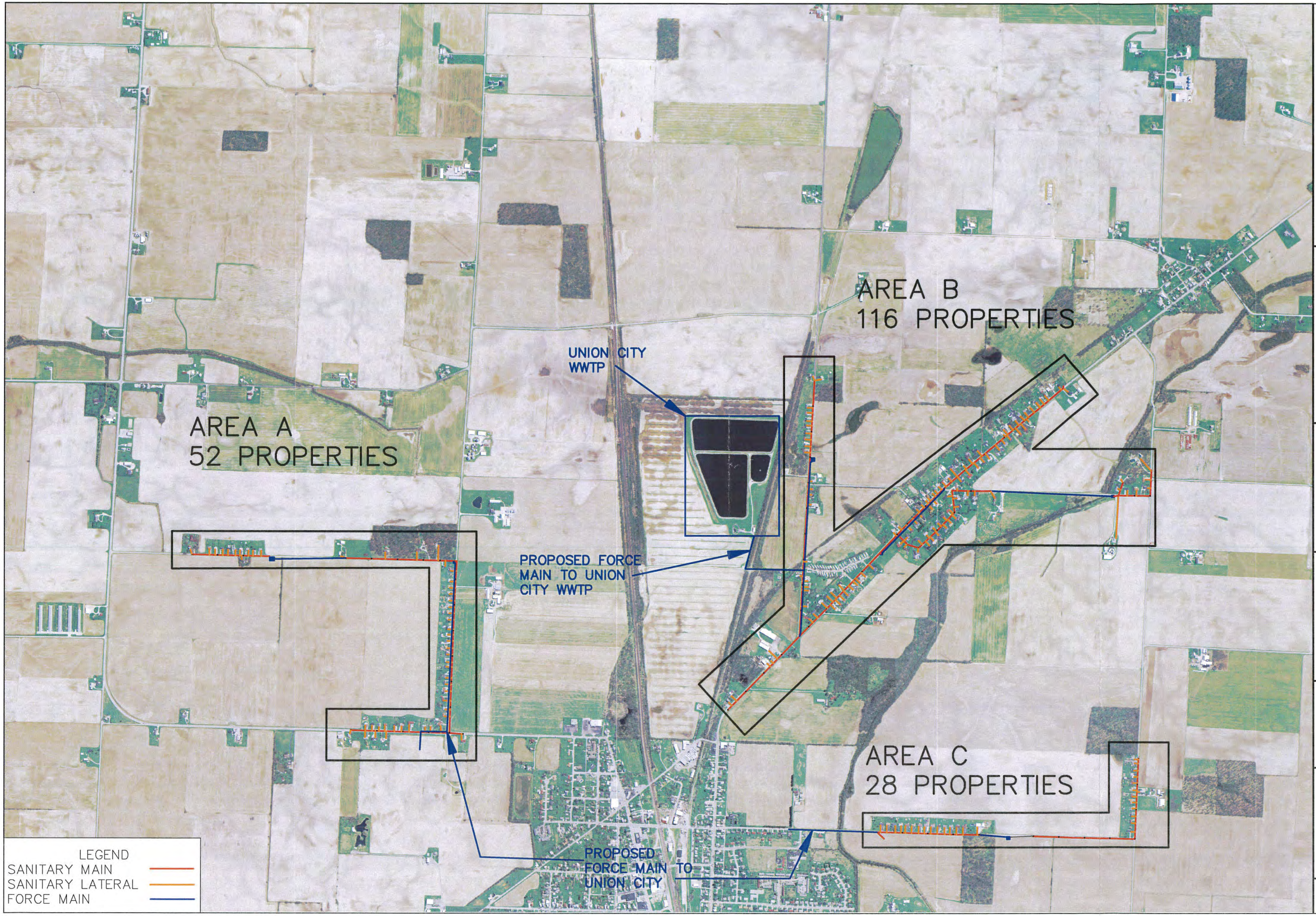



AREA B




AREA C






GRAPHIC SCALE

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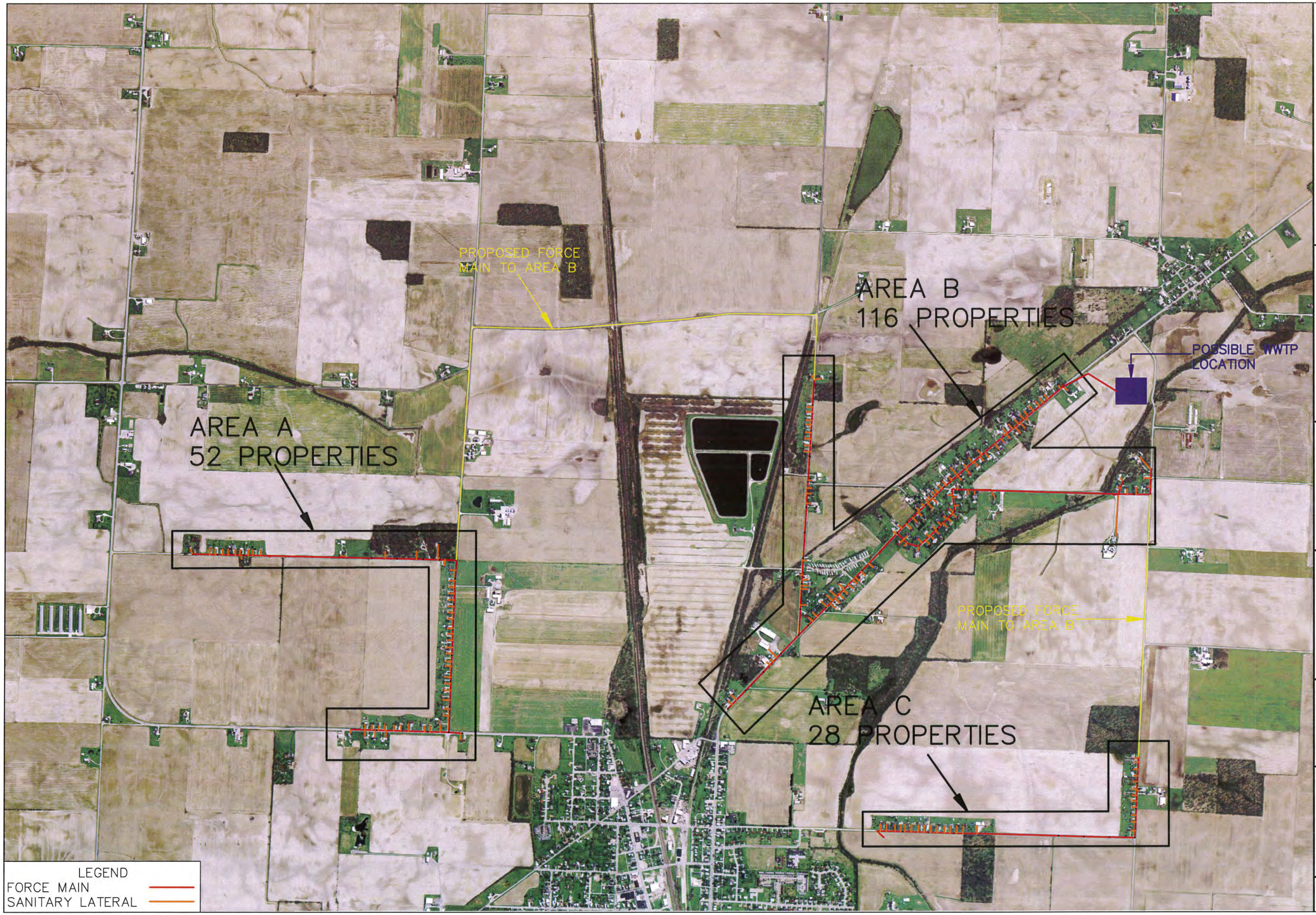
COMMUNITIES

SHEET TITLE:

FORCE MAINS TO
UNION CITY

FIGURE 5-10




GRAPHIC SCALE

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COMMUNITIES

SHEET TITLE:

POSSIBLE WWTP
LOCATIONS

FIGURE 5-11

# Chapter 6 – Other Cost

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

## Contingency

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

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

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

## Non - Construction Costs

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

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

## Operation, Maintenance, and Repair

O,M&R costs are those costs associated with the daily or periodic inspection/ upkeep of the proposed collection system. They include, but are not limited to, the following:

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

The O,M&R costs associated with the gravity, STEP, vacuum, and grinder collection systems are as follows:

Table 6-1: Collection System O,M&R Costs

Gravity Collection System

| | Area: | A | B | C |
|---|---|---|---|---|
| **ITEM** | **DESCRIPTION** | **COST** | **COST** | **COST** |
| 1 | PUMP STATION POWER | $2,000 | $3,000 | $2,000 |
| 2 | COLLECTION SYSTEM MAINTENANCE | $2,000 | $4,000 | $2,000 |
| 3 | EQUIPMENT REPLACEMENT | $1,500 | $3,000 | $1,000 |
| **TOTAL** | | **$5,500** | **$10,000** | **$5,000** |

Septic Tank Effluent Pump Collection System

| | Area: | A | B | C |
|---|---|---|---|---|
| **ITEM** | **DESCRIPTION** | **COST** | **COST** | **COST** |
| 1 | PRIMARY TANK PUMP OUT (tanks based on 7 year frequency @ $300 per tank) | $2,500 | $5,000 | $1,500 |
| 2 | PRO-ACTIVE PREVENTITIVE MAINTENANCE (pump and controls inspection annually) | $1,000 | $2,500 | $1,000 |
| 3 | REACTIVE MAINTENANCE (repairs to pump components) | $1,000 | $1,000 | $1,000 |
| 4 | EQUIPMENT REPAIR AND REPLACEMENT (pump replacement frequency 10 years) | $2,000 | $4,000 | $1,500 |
| **TOTAL** | | **$6,500** | **$12,500** | **$5,000** |

Grinder Pump Collection System

| | Area: | A | B | C |
|---|---|---|---|---|
| **ITEM** | **DESCRIPTION** | **COST** | **COST** | **COST** |
| 1 | PRO-ACTIVE PREVENTITIVE MAINTENANCE (pump and controls inspection annually) | $1,000 | $2,500 | $1,000 |
| 2 | REACTIVE MAINTENANCE (repairs to pump components) | $2,000 | $5,000 | $1,500 |
| 3 | EQUIPMENT REPAIR AND REPLACEMENT (pump replacement frequency 10 years) | $3,000 | $8,000 | $2,000 |
| **TOTAL** | | **$6,000** | **$15,500** | **$4,500** |

Vacuum Collection System

| ITEM | DESCRIPTION | Area: A COST | B COST | C COST |
|---|---|---|---|---|
| 1 | VACUUM STATION POWER | $3,500 | $7,000 | $1,500 |
| 2 | PRO-ACTIVE PREVENTITIVE MAINTENANCE | $1,500 | $3,000 | $1,000 |
| 3 | REACTIVE MAINTENANCE | $1,000 | $1,000 | $1,000 |
| 4 | EQUIPMENT REPAIR AND REPLACEMENT | $2,000 | $6,000 | $1,500 |
| **TOTAL** | | **$8,000** | **$17,000** | **$5,000** |

The O,M&R costs associated with the treatment systems are as follows:

Table 6-2: Treatment Systems O,M&R Costs

Extended Aeration Treatment

| ITEM | DESCRIPTION | Area: A COST | B COST | C COST | ALL COST |
|---|---|---|---|---|---|
| 1 | LABOR & ADMINISTRATION | $25,000 | $25,000 | $25,000 | $25,000 |
| 2 | CHEMICALS | $1,000 | $1,500 | $500 | $2,000 |
| 3 | POWER | $1,500 | $2,500 | $1,000 | $3,500 |
| 4 | LABORATORY | $1,000 | $2,000 | $1,000 | $3,000 |
| 5 | SLUDGE HANDLING | $1,000 | $3,000 | $1,000 | $4,000 |
| 6 | EQUIPMENT REPAIR AND REPLACEMENT | $2,000 | $6,000 | $1,000 | $8,500 |
| **TOTAL** | | **$31,500** | **$40,000** | **$29,500** | **$46,000** |

Lagoon Treatment System

| ITEM | DESCRIPTION | Area: A COST | B COST | C COST | ALL COST |
|---|---|---|---|---|---|
| 1 | LABOR & ADMINISTRATION | $25,000 | $25,000 | $25,000 | $25,000 |
| 2 | CHEMICALS | $1,000 | $1,500 | $500 | $2,000 |
| 3 | POWER | $1,000 | $2,000 | $1,000 | $3,000 |
| 4 | LABORATORY | $1,000 | $2,000 | $1,000 | $3,000 |
| 5 | EQUIPMENT REPAIR AND REPLACEMENT | $1,500 | $2,500 | $1,000 | $3,500 |
| **TOTAL** | | **$29,500** | **$33,000** | **$28,500** | **$36,500** |

Packed Bed Media Treatment System

| ITEM | DESCRIPTION | Area: A COST | B COST | C COST | ALL COST |
|---|---|---|---|---|---|
| 1 | LABOR & ADMINISTRATION | $25,000 | $25,000 | $25,000 | $25,000 |
| 2 | CHEMICALS | $1,000 | $1,000 | $500 | $1,500 |
| 3 | POWER | $1,000 | $1,500 | $1,000 | $2,000 |
| 4 | LABORATORY | $1,000 | $1,000 | $1,000 | $1,500 |
| 5 | EQUIPMENT REPAIR AND REPLACEMENT | $1,000 | $3,000 | $500 | $4,000 |
| **TOTAL** | | **$29,000** | **$31,500** | **$28,000** | **$34,000** |

Transport to Union City — Area: A, B, C, ALL

| ITEM | DESCRIPTION | A COST | B COST | C COST | ALL COST |
|---|---|---|---|---|---|
| 1 | FORCEMAIN MAINTENANCE | $1,000 | $1,000 | $1,000 | $1,000 |
| 2 | ODOR CONTROL | $1,000 | $1,000 | $1,000 | $1,000 |
| 3 | UNION CITY TREATMENT CHARGES (based on $6.27/1,000 gal | $18,000 | $39,000 | $10,000 | $67,000 |
| **TOTAL** | | **$20,000** | **$41,000** | **$12,000** | **$69,000** |

## Summary

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

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

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

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

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

The following pages show each possible collection and treatment options for each planning area in Jackson Township.

The first row in each of the tables is the collection present worth. The second row shows the present worth of the treatment alternative. The total present worth for each area is the last row in the table. The present worth for each of the options is calculated by multiplying the O,M&R cost by the present worth factor (11.4699) and adding the project cost. Tables showing each of the project costs and O,M&R costs for all of the different scenarios for the three planning areas can be found in the appendix. The lowest present worth for each of the areas is highlighted in yellow.

### Gravity Sewer System

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Gravity Sewer | $1,843,368 | $3,564,915 | $1,089,326 | $6,497,609 |
| Extended Aeration | $782,382 | $1,438,236 | $635,362 | $2,437,992 |
| Total | **$2,625,750** | **$5,003,151** | **$1,724,688** | **$8,935,601** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Gravity Sewer | $1,843,368 | $3,564,915 | $1,089,326 | $6,497,609 |
| Lagoon | $710,602 | $1,397,547 | $606,732 | $2,235,763 |
| Total | **$2,553,971** | **$4,962,462** | **$1,696,058** | **$8,733,372** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Gravity Sewer | $1,843,368 | $3,564,915 | $1,089,326 | $6,497,609 |
| Pump to Union City | $388,194 | $519,040 | $225,683 | $2,598,173 |
| Total | **$2,231,562** | **$4,083,955** | **$1,315,008** | **$9,095,782** |

## STEP Sewer System

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| STEP Sewer | $1,013,470 | $1,999,030 | $625,346 | $3,637,846 |
| Packed Bed Media | $1,025,891 | $1,929,726 | $762,301 | $3,062,713 |
| Total | **$2,039,361** | **$3,928,756** | **$1,387,647** | **$6,700,558** |

## Grinder Pump Sewer System

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Grinder Sewer | $1,028,327 | $2,079,375 | $630,699 | $3,738,401 |
| Extended Aeration | $782,382 | $1,438,236 | $635,362 | $2,437,992 |
| Total | **$1,810,709** | **$3,517,611** | **$1,266,061** | **$6,176,394** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Grinder Sewer | $1,028,327 | $2,079,375 | $630,699 | $3,738,401 |
| Lagoon | $710,602 | $1,397,547 | $606,732 | $2,235,763 |
| Total | **$1,738,929** | **$3,476,922** | **$1,237,431** | **$5,974,165** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Grinder Sewer | $1,028,327 | $2,079,375 | $630,699 | $3,738,401 |
| Pump to Union City | $388,194 | $519,040 | $225,683 | $2,598,173 |
| Total | **$1,416,521** | **$2,598,415** | **$856,381** | **$6,336,575** |

## Vacuum Sewer System

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Vacuum Sewer | $1,529,160 | $2,494,270 | $1,160,289 | $5,183,719 |
| Extended Aeration | $782,382 | $1,438,236 | $635,362 | $2,437,992 |
| Total | **$2,311,542** | **$3,932,506** | **$1,795,651** | **$7,621,711** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Vacuum Sewer | $1,529,160 | $2,494,270 | $1,160,289 | $5,183,719 |
| Lagoon | $710,602 | $1,397,547 | $606,732 | $2,235,763 |
| Total | **$2,239,762** | **$3,891,817** | **$1,767,021** | **$7,419,482** |

| | AREA A | AREA B | AREA C | ALL AREAS |
|---|---|---|---|---|
| Vacuum Sewer | $1,529,160 | $2,494,270 | $1,160,289 | $5,183,719 |
| Pump to Union City | $388,194 | $519,040 | $225,683 | $2,598,173 |
| Total | **$1,917,354** | **$3,013,310** | **$1,385,971** | **$7,781,892** |

As mentioned earlier, the best way to compare alternatives of a wastewater system is to evaluate present worth. The Grinder Pump collection system and transporting wastewater to Union City has the lowest present worth when evaluating them separately. If all areas were combined as one project, the lowest present worth is a Grinder Pump collection system with a wastewater lagoon separate from Union City.

## Conclusions

The previously identified wastewater collection and treatment system alternatives have been analyzed to determine the best collection system and treatment system scenario for Jackson Township. Each of these scenarios took the project cost, O,M&R, and the environmental conditions into consideration to provide Jackson Township a viable option for a future wastewater system.

## Recommendations

Based on the cost analysis and environmental conditions, the best scenario of Jackson Township is to sewer the three planning areas and connect into Union City's collection system for treatment at Union City's lagoon system. However, as mentioned before, Union City is experiencing collection problems with Inflow and Infiltration and is affecting the lagoon capacity. As such, Union City is not currently interested in taking on the Jackson Township service area even though it is within Union City's 208 service boundary area.

It is recommended to continue negations with Union City to determine Jackson Township's fair share cost, if any beyond the current rate structure, to connect to the Union City sewer system. The amount generated may be put toward expanding the lagoon sewer system or reducing the amount of inflow and infiltration in the collection system to free up capacity. Determining the cost per customer to expand the Union City's treatment plant is beyond the scope of this study and will require additional coordination with the Village of Union City.

# Chapter 8 – Funding

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

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

The residents of Jackson Township are recognized as being an unincorporated area in Darke County. In order to qualify for funding the need for an income survey is highly recommended for the project service area. The project service area will be determined by identifying the boundaries of the project area. Income surveys of the project service area will be collected in accordance to the Office of Housing and Community Development Income Survey Requirements and submitted for Low to Moderate Income (LMI) and Median Household Income (MHI) approval.

## Federal Funding

### Community Development Block Grants (Grant Program)

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

### Rural Development (Grant/Loan Program)

Grants are available on an open cycle competitive bases with a funding amounts varying depending on the affordability threshold of the community. Applicants must be under Ohio EPA Findings & Orders and have a Median Household Income (MHI) in the range of $38,651-$49,694. The Village of Union City has a MHI of $ 57,609 (according to the 2014 American Community Survey). The areas in Jackson Township would need to have a MHI survey to verify if Jackson Township would qualify for the Rural Development Grant/Loan. If the area qualifies it would be considered eligible for the grant funds combined with a low interest loan of 2.75% for up to 40 years.

## State Funding

### Ohio Public Works Commission (Grant/Loan Program)-OPWC

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

### Ohio Water Development Authority (Loan)-OWDA

Financing is available in the form of a loan program to plan, design and construct projects. The loan interest rate is current market rate. Discount rates are offered to previous borrowers and disadvantaged communities. Jackson Township would need to have an MHI study to verify if Jackson Township would be considered a disadvantaged community. To date, all eligible applicants have been funded.

### Residential Public Infrastructure (Grant)-COBG

Grants are available on a competitive basis up to $500,000, at a $1 to $1 (other funds) ratio for projects benefiting at least 51% LMI households. Applications are due 2nd Quarter of each year. Darke County would need to have an income survey conducted to confirm the LMI in the areas of Jackson Township.

### Unsewered Area Assistance Program (Grant)-OWDA

Grants are available for construction of a publicly owned sewer system for un-sewered areas that have failing on-lot sanitary systems. The project area must have a Median household Income below the state MHI ($48,071), per the American Community Survey.

### Water Pollution Control Loan Fund (Loan)-OEPA

Financing is available through a revolving fund designed to operate in perpetuity to provide low interest rate loan and other forms of assistance for water resource protection and improvement projects. Interest rates are determined by project areas Median household Income.

The following five funding tables are provided for reference. The first four tables are based on the Grinder Sewer system with connection into Union City's collection and treatment system. The fifth table shows a funding scenario where Darke County constructs a Grinder Sewer system with its own Lagoon treatment facility. The first four tables do not take into account any capacity fees from Union City toward reducing Inflow and Infiltration or expanding their lagoon system. As mentioned earlier, additional discussions will need to be held with Union City.

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

### Table 8-1: Funding Summary

**Area A: Grinder Sewer / Union City Lagoon**

| | | | |
|---|---|---|---|
| **CUSTOMERS/EDUs** | | | 52 |
| **PROJECT COST- Collection System** | | | $959,508 |
| **PROJECT COST- Treatment System** | | | $158,796 |
| **TOTAL PROJECT COST** | | | $1,118,304 |
| **ANNUAL O,M&R** | | | $26,000 |
| **FINANCING** | | | |
| CDBG Formula Grant | | | $0 |
| Residential Public Infrastructure Grant | | | $480,000 |
| OPWC Grant | | | $388,304 |
| Unsewered Area Assistance Program | | | $250,000 |
| Local Funds - Capacity Fee | | | $0 |
| Rural Development Grant | | | $0 |
| OPWC Loan | 30 | 0.00% | $0 |
| OWDA Loan | 30 | 2.00% | $0 |
| OEPA WPCLF Loan | 30 | 0.00% | $0 |
| Rural Development Loan | 40 | 2.75% | $0 |
| Total Financing | | | $1,118,304 |
| **ANNUAL DEBT** | | | |
| Annual OPWC Payment | | | $0 |
| Annual OWDA Payment | | | $0 |
| Annual OEPA WPCLF Payment | | | $0 |
| Annual Rural Development Payment | | | $0 |
| **ANNUAL DEBT PAYMENT** | | | $0 |
| **DEBT PAYMENT PER MONTH PER EDU** | | | $0.00 |
| **O,M&R PAYMENT PER MONTH PER EDU** | | | $41.67 |
| **TOTAL PAYMENT PER MONTH PER EDU** | | | **$41.67** |

**Area B: Grinder Sewer / Union City Lagoon**

| | | | |
|---|---|---|---|
| **CUSTOMERS/EDUs** | | | 116 |
| **PROJECT COST- Collection System** | | | $1,901,592 |
| **PROJECT COST- Treatment System** | | | $48,774 |
| **TOTAL PROJECT COST** | | | $1,950,366 |
| **ANNUAL O,M&R** | | | $56,500 |
| **FINANCING** | | | |
| CDBG Formula Grant | | | $50,000 |
| Residential Public Infrastructure Grant | | | $480,000 |
| OPWC Grant | | | $400,000 |
| Unsewered Area Assistance Program | | | $250,000 |
| Local Funds - Capacity Fee | | | $0 |
| Rural Development Grant | | | $0 |
| OPWC Loan | 30 | 0.00% | $770,366 |
| OWDA Loan | 30 | 2.00% | $0 |
| OEPA WPCLF Loan | 30 | 0.00% | $0 |
| Rural Development Loan | 40 | 2.75% | $0 |
| Total Financing | | | $1,950,366 |
| **ANNUAL DEBT** | | | |
| Annual OPWC Payment | | | $25,679 |
| Annual OWDA Payment | | | $0 |
| Annual OEPA WPCLF Payment | | | $0 |
| Annual Rural Development Payment | | | $0 |
| **ANNUAL DEBT PAYMENT** | | | $25,679 |
| **DEBT PAYMENT PER MONTH PER EDU** | | | $18.45 |
| **O,M&R PAYMENT PER MONTH PER EDU** | | | $40.59 |
| **TOTAL PAYMENT PER MONTH PER EDU** | | | **$59.04** |

**Area C: Grinder Sewer / Union City Lagoon**

| | | | |
|---|---|---|---|
| **CUSTOMERS/EDUs** | | | 28 |
| **PROJECT COST- Collection System** | | | $579,084 |
| **PROJECT COST- Treatment System** | | | $88,044 |
| **TOTAL PROJECT COST** | | | $667,128 |
| **ANNUAL O,M&R** | | | $16,500 |
| **FINANCING** | | | |
| CDBG Formula Grant | | | $50,000 |
| Residential Public Infrastructure Grant | | | $0 |
| OPWC Grant | | | $367,128 |
| Unsewered Area Assistance Program | | | $250,000 |
| Local Funds - Capacity Fee | | | $0 |
| Rural Development Grant | | | $0 |
| OPWC Loan | 30 | 0.00% | $0 |
| OWDA Loan | 30 | 2.00% | $0 |
| OEPA WPCLF Loan | 30 | 0.00% | $0 |
| Rural Development Loan | 40 | 2.75% | $0 |
| Total Financing | | | $667,128 |
| **ANNUAL DEBT** | | | |
| Annual OPWC Payment | | | $0 |
| Annual OWDA Payment | | | $0 |
| Annual OEPA WPCLF Payment | | | $0 |
| Annual Rural Development Payment | | | $0 |
| **ANNUAL DEBT PAYMENT** | | | $0 |
| **DEBT PAYMENT PER MONTH PER EDU** | | | $0.00 |
| **O,M&R PAYMENT PER MONTH PER EDU** | | | $49.11 |
| **TOTAL PAYMENT PER MONTH PER EDU** | | | **$49.11** |

**Combined Areas: Grinder Sewer / Union City Lagoon**

| | | | |
|---|---|---|---|
| **CUSTOMERS/EDUs** | | | 196 |
| **PROJECT COST- Collection System** | | | $3,440,184 |
| **PROJECT COST- Treatment System** | | | $295,614 |
| **TOTAL PROJECT COST** | | | $3,735,798 |
| **ANNUAL O,M&R** | | | $99,000 |
| **FINANCING** | | | |
| CDBG Formula Grant | | | $50,000 |
| Residential Public Infrastructure Grant | | | $480,000 |
| OPWC Grant | | | $400,000 |
| Unsewered Area Assistance Program | | | $250,000 |
| Local Funds - Capacity Fee | | | $0 |
| Rural Dev. Grant (up to 35% of Project Cost) | | | $1,310,000 |
| OPWC Loan | 30 | 0.00% | $800,000 |
| OWDA Loan | 30 | 2.00% | $0 |
| OEPA WPCLF Loan | 30 | 0.00% | $0 |
| Rural Development Loan | 40 | 2.75% | $445,798 |
| Total Financing | | | $3,735,798 |
| **ANNUAL DEBT** | | | |
| Annual OPWC Payment | | | $26,667 |
| Annual OWDA Payment | | | $0 |
| Annual OEPA WPCLF Payment | | | $0 |
| Annual Rural Development Payment | | | $18,515 |
| **ANNUAL DEBT PAYMENT** | | | $45,181 |
| **DEBT PAYMENT PER MONTH PER EDU** | | | $19.21 |
| **O,M&R PAYMENT PER MONTH PER EDU** | | | $42.09 |
| **TOTAL PAYMENT PER MONTH PER EDU** | | | **$61.30** |

**Combined Areas: Grinder Sewer / Darke County operated Lagoon**

| | | | |
|---|---|---|---|
| **CUSTOMERS/EDUs** | | | 196 |
| **PROJECT COST- Collection System** | | | $3,440,184 |
| **PROJECT COST- Treatment System** | | | $1,817,112 |
| **TOTAL PROJECT COST** | | | $5,257,296 |
| **ANNUAL O,M&R** | | | $62,500 |
| **FINANCING** | | | |
| CDBG Formula Grant | | | $50,000 |
| Residential Public Infrastructure Grant | | | $480,000 |
| OPWC Grant | | | $400,000 |
| Unsewered Area Assistance Program | | | $250,000 |
| Local Funds - Capacity Fee | | | $0 |
| Rural Dev. Grant (up to 35% of Project Cost) | | | $1,840,000 |
| OPWC Loan | 30 | 0.00% | $800,000 |
| OWDA Loan | 30 | 2.00% | $0 |
| OEPA WPCLF Loan | 30 | 0.00% | $0 |
| Rural Development Loan | 40 | 2.75% | $1,437,296 |
| Total Financing | | | $5,257,296 |
| **ANNUAL DEBT** | | | |
| Annual OPWC Payment | | | $26,667 |
| Annual OWDA Payment | | | $0 |
| Annual OEPA WPCLF Payment | | | $0 |
| Annual Rural Development Payment | | | $59,693 |
| **ANNUAL DEBT PAYMENT** | | | $86,360 |
| **DEBT PAYMENT PER MONTH PER EDU** | | | $36.72 |
| **O,M&R PAYMENT PER MONTH PER EDU** | | | $26.57 |
| **TOTAL PAYMENT PER MONTH PER EDU** | | | **$63.29** |

# Chapter 9 – Arrangement for Implementation

## Institutional Responsibilities

Darke County has the necessary statutory authority for implementing this system and has the necessary legal, financial, institutional, and managerial resources available to ensure construction and O,M&R of the proposed collection system. The proposed collection system involves the Darke County Commissioners, MVRPC, Jackson Township, and potentially the Village of Union City. Various Ordinances and Resolutions of Agreement will have to be passed by the governmental bodies to implement Jackson Townships' collection and treatment system.

## Implementation Steps

Darke County would be the primary stakeholder in this project. Jackson Township would also be involved with this project in that the sewer system will be constructed within their jurisdiction. They will have varying degrees of direct managerial and supervisory responsibilities for the proposed Jackson Township collection facility. The Owner will be assisted by the Engineer in the preparation of detailed plans, construction, and O,M&R of the proposed facility.

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

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

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

The following implementation schedule is feasible and represents the shortest time to project implementation:

| | |
|---|---|
| **Planning:** | |
| Submit completed feasibility plan | June, 2015 |
| **Design:** | |
| Authorization to start engineering design | October, 2015 |
| Submit for OWDA planning loan | November, 2015 |
| Completion of detailed plans | December, 2016 |
| Obtain district and Ohio EPA approval | March, 2017 |
| Finalize funding applications | April, 2018 |
| **Construction:** | |
| Advertisement for bids | June, 2018 |
| Receive bids | August, 2018 |
| Award contracts | September, 2018 |
| Complete construction | August, 2019 |
| Final inspection | October, 2019 |

## Operation, Maintenance, and Monitoring

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

## Chapter 10 – Summary of Environmental Considerations

### Future Environment without Project

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

### Environmental Evaluation of Alternatives and Selected Plan

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

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

*Air, Land, and Water Quality*

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

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

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

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

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

### Public Health

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

### Environmental Aesthetics

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

### Historical and Cultural

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

### Noise and Odors

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

### Selected Plan Environmental Impacts

The recommended plan for the study area is the construction of a grinder pump sewer collection system with new lagoon systems and a new mechanical treatment plant with extended aeration. Grinder pump systems have the advantage of the pipes being able to follow the topography of the land and staying relatively closer to the surface than a gravity sewer. This will keep the depth of excavation down during installation. The construction activities will include removal of vegetative cover, noise, dust and occasional odors. A slight degree of water quality degradation may take place after rainstorms as a result of erosion and siltation. The secondary impacts of the proposed action will be beneficial.

## Mitigation Measures

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

## Erosion/Dust Control

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

## Archaeological/Historical Preservation

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

## Vegetation

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

## Noise Control Practices

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

## Odor Control Practices

With proper O,M&R, including routine cleaning and sewer maintenance, no objectionable odors should be produced.