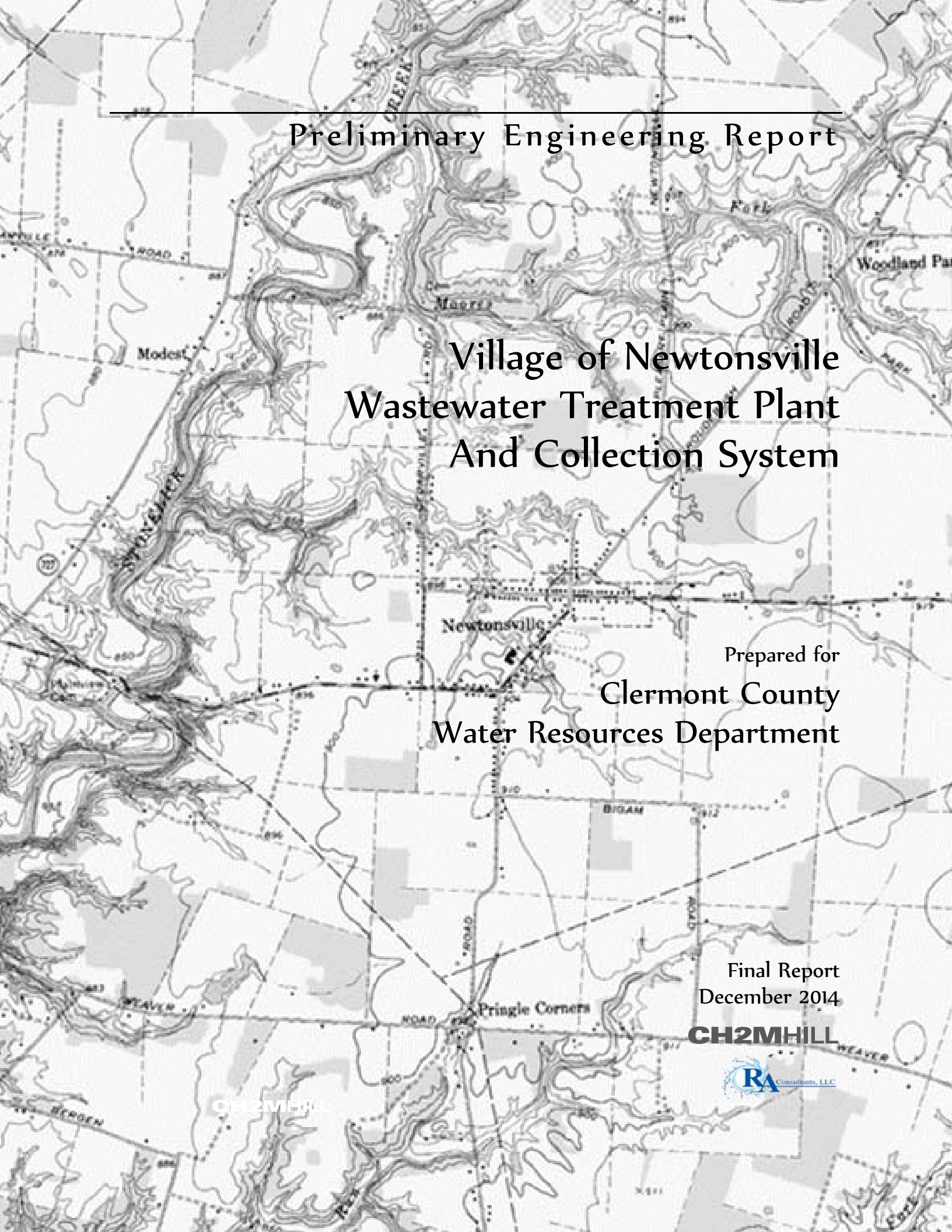

Preliminary Engineering Report

Village of Newtonsville Wastewater Treatment Plant And Collection System

Prepared for

Clermont County Water Resources Department

Final Report
December 2014

CH2MHILL

RA Consultants, LLC

PRELIMINARY ENGINEERING REPORT
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1.0 Project Planning

1.1 Introduction

The purpose of this planning and preliminary engineering study is three-fold: 1) to develop and present candidate sites and treatment technologies for a proposed wastewater treatment facility; evaluate siting criteria for each site with stakeholder input and recommend, from those sites under consideration, a preferred location and treatment technology for the proposed centralized treatment site, 2) to develop and evaluate wastewater collection and conveyance options to the recommended location of the proposed wastewater treatment facility and 3) to recommend a cost conscious approach to centralize wastewater collection, conveyance and treatment for the Village of Newtonsville and surrounding properties.

This Preliminary Engineering Report is intended to summarize the completed planning level work as described above that supports and forms the basis for a National Pollutant Discharge Elimination System (NPDES) Permit application that will be submitted to the Ohio Environmental Protection Agency (OEPA) for review and approval. Secondly, the Report serves as a planning document required by state and federal agencies for obtaining financial assistance for development of pollution control projects such as wastewater collection and treatment facilities.

The Report will broadly adhere to and address the following subject areas: describe existing facilities, describe the need for the project, present alternatives considered and alternatives selected, present the recommended alternative (proposed project) and conclusions and recommendations of the report.

Specific tasks to be completed are as follows:

- Determination and development of the service area for the proposed facilities;
- Selection and evaluation of (3) candidate sites located within or adjacent to the Village of Newtonsville for the proposed wastewater treatment facility;
- Field-location of existing septic systems that are strategic to proposed collection system alignment options;
- Completion of an environmental assessment, including wet land and stream delineation survey, Ohio Department of Natural Resources (ODNR) database search, State Historical Preservation Office (SHPO) consultation and U.S. Fish and wildlife habitat assessment, of areas affected by project (Special Note: an Environmental Report is being prepared under separate cover to accompany the findings of the Preliminary Engineering Report);

- Completion of a localized stream sampling and analysis campaign to document current water quality in the Newtonsville area and establish a water quality baseline for anticipated future water quality improvement associated with centralized wastewater collection and treatment;
- Evaluation of (6) alternatives to convey wastewater within Newtonsville to the proposed wastewater treatment location, including conventional gravity conveyance, low pressure conveyance technology, vacuum conveyance, septic tank effluent pumping (STEP) and a hybrid solution that combines two or more of the above alternatives;
- Preliminary layout of recommended conveyance alignment to serve the needs of the service area based on the outcome of the alternatives evaluation;
- Recommendation and preliminary layout of treatment processes capable of meeting anticipated discharge limits consistent with "best available demonstrated control technology" standards;
- Development and presentation of life cycle costs;
- Completion of an NPDES Permit application for the discharge of treated wastewater to waters of the State;
- Participation in public outreach activities aimed at the involvement and education of local area residents and stakeholders, including the Village of Newtonsville and Wayne Township.

1.2 Location

The project planning area is located in the northeastern quadrant of Clermont County within Wayne Township. **Exhibit 1-1** at the end of this section, presents the proposed service area and Newtonsville corporate boundaries. The Village of Newtonsville is 0.25 square miles (160 acres) in size. Included in the study area are small, unnamed streams which are tributary to Stonelick Creek. Stonelick Creek flows southwest to its confluence with the East Fork Little Miami River which, in turn, joins the Little Miami River, a state and national scenic river.

Two of the small unnamed streams extend into the western section of the Village from the south and converge before flowing in a northwesterly direction away from town. A third unnamed stream extends through the eastern section of the Village, also flowing in a northwesterly direction before joining a larger unnamed tributary stream. This larger stream also carries flow from the other two unnamed streams mentioned previously before joining Stonelick Creek west of the Village.

Newtonsville lies within the broad, nearly level till plains of northern Clermont County. Generally, the soils are poorly drained and high groundwater levels are not uncommon. The generalized subsurface

profile consists of post-glacial loess, typically extending down to 40 inches from the surface. The loess is underlain by weathered brown, then gray Illinoian glacial till deposits. The underlying bedrock is Arnheim shale. Bedrock depths vary but are relatively shallow, within 8-20 feet of the ground surface. The soils underlying Newtonsville are poorly drained and the presence of a high groundwater table combines to create conditions that are not conducive for the operation of household sewage treatment systems that are prevalent in the planning area.

Land use within this study area is predominantly single-family residential development with some multi-family dwellings present. Small commercial enterprises exist along Main Street and its intersection with Cross Street. Although the zoning commission of Wayne Township manages the land use and type of development in its township, the Village of Newtonsville is not included in the township's zoning resolution. Accordingly, local development trends and detailed zoning information is not readily available for the planning area.

The Village of Newtonsville is generally located at the following coordinates: N39.18154°, W84.08848° (NAD83) and at a general elevation of 898 feet MSL. **Exhibit 1-2** (end of section) shows the local topography of the project planning area and the local waterbodies of the immediate and surrounding areas. The Village is settled in a rural environment that is generally defined by Cedarville Road to the west and State Route 131 to the south and Main Street to the north. The project planning area has no centralized sanitary sewer service. Water is provided to the Village via Clermont County's distribution system that extends along SR 131.

1.3 Environmental Resources

1.3.1 Wetland and Waterbody Delineation

A wetland and waterbody delineation field survey was conducted on December 2, 2013, October 31, 2014 and November 5, 2014 on behalf of the Clermont County Water Resources Department (Clermont County) for the Newtonsville Wastewater Treatment Plant and Collection System Project (Refer to Technical Memorandum in **Appendix A**). The field survey included the proposed collection system sewer alignment areas and (3) properties that have been identified as candidate treatment sites all within, or in the vicinity of, the Village of Newtonsville. These include the following properties:

- Riggs Property (3.1 acres) located on Cedarville Road,
- Village of Newtonsville Property (8 acres), located on Wright Street, and

- Pschesang Property (7.8 acre), located west of Newtonsville on State Route 131.

The purpose of the delineation was to assess the presence or absence of wetlands, or other waters that may be affected by the proposed wastewater treatment facilities, and to assess general ecological conditions within the service area.

Before conducting the wetland and waterbody delineation, the following resources were utilized to identify potential locations and extent of wetlands and waterbodies within the area:

- United States Geological Survey (USGS) topographic map (Newtonsville, 1970);
- Aerial photography (ESRI Online Imagery; World Imagery Layer, 2012);
- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey;
- USGS National Hydrography Dataset (NHD-mapped streams); and
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) dataset.

The USGS topographic map and NHD-mapped streams dataset identified the following streams in the service area:

- (1) perennial stream, an unnamed tributary of Stonelick Creek, within the southern boundary of the Riggs Property;
- (1) perennial stream, an unnamed tributary of Stonelick Creek, located in the northwestern corner of the Village of Newtonsville Property; and
- (3) perennial streams (one named perennial stream, Stonelick Creek), within the Pschesang Property's western and southern boundaries.

Stonelick Creek is a tributary to Lick Fork (Hydrologic Unit Code (HUC) 050902021303 – Moore's Fork – Stonelick Creek), located west/southwest of the service area, and subsequently to the Middle Ohio River – Little Miami Sub-basin (HUC 05090202). All wetlands and waterbodies within the service area are hydrologically connected to Stonelick Creek, and are therefore, located in this HUC.

The USDA NRCS Web Soil Survey shows nine soil unit types within the area in addition (two within the Riggs Property, five within the Village of Newtonsville Property, and four within the Pschesang Property). The mapped soil unit types were non-hydric and predominantly non-hydric. Generally, hydric soils are those soils that indicate through their color and structure that they have experienced oxygen deficient conditions. Oxygen-deficient conditions result from inundation and/or saturation by water.

NWI maps were used as a guide along with other data to indicate the potential presence of wetlands. The NWI map information is typically dated, and often not field checked. The presence of an NWI feature is not a definitive indicator that a wetland or waterbody is present. The NWI identified two features within the service area:

- (1) palustrine, emergent, persistent, semi-permanently flooded, diked/impounded (PEM1Fh) feature, located along an unnamed tributary to Stonelick Creek within the Village of Newtonsville Property; and
- (1) palustrine, unconsolidated bottom, intermittently exposed, excavated (PUBGx) feature which corresponds to Stonelick Creek within the Pschesang Property.

The memorandum in the Appendix A contains photographic documentation of the delineated wetlands, streams, and vegetation communities identified within the area.

Wetlands and waterbodies were delineated in accordance with applicable federal and state regulations and guidance. Wetland boundaries were field-delineated according to the routine onsite methodology described in the *USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, 2012* (Version 2.0).

Vegetative communities within the service area consisted of open fields, upland forest, riparian forest, and palustrine emergent (PEM) wetland. The vegetative communities on the Village of Newtonsville Property include open field, early successional forest, and palustrine emergent wetland. The early successional forest habitat was dominated by bush honeysuckle, black cherry, eastern red cedar, hackberry, sugar maple, northern red oak, winter creeper, multi-flora rose and sassafras. The open field habitat was dominated by fescue, white clover, common plantain and goldenrod. The PEM wetland was dominated by creeping jenny and rice cutgrass. Refer to the appendix for details and photographs of the vegetative communities noted in the field at each site.

One PEM wetland, five perennial streams, one ephemeral stream, and one open water feature were identified within the service area. Additional information about wetlands and waterbodies within the area are presented in the appendix.

One 0.07-acre PEM wetland, W001, was identified within the northwestern portion of the Village of Newtonsville Property. This wetland was dominated by creeping jenny and rice cutgrass. Based on an ORAM score of 47, this wetland was classified as a Category 2 wetland.

1.3.2 Floodplain

The service area is located within an unclassified zone according to the FEMA map 39025C0165G dated March 16, 2006. Accordingly, there are no land areas located within the 100 year flood plain. Refer to **Appendix B** which shows FEMA map for the Newtonsville area.

1.4 Population Trends

Since 1920, the population of Newtonsville has steadily increased; however, the most recent 2010 census indicates that the Village population is 392, down from the previous 2000 census population of 492. **Exhibit 1-3** provides a graphical display of census data over the past 100 years. As of 2010, there were 144 total housing units in the Village. The average household size of owner-occupied units is 2.93 and the average household size of renter-occupied units is 3.05. Taking a weighted average of each, results in an average household size of 2.97 per unit. Future population growth in the Newtonsville area cannot be accurately determined. Provision of sanitary sewer service to the planning area may contribute to some degree of population growth in the planning area; however, for purposes of this preliminary engineering report, the population growth rate for the next 20 years is assumed to be minimal to low.

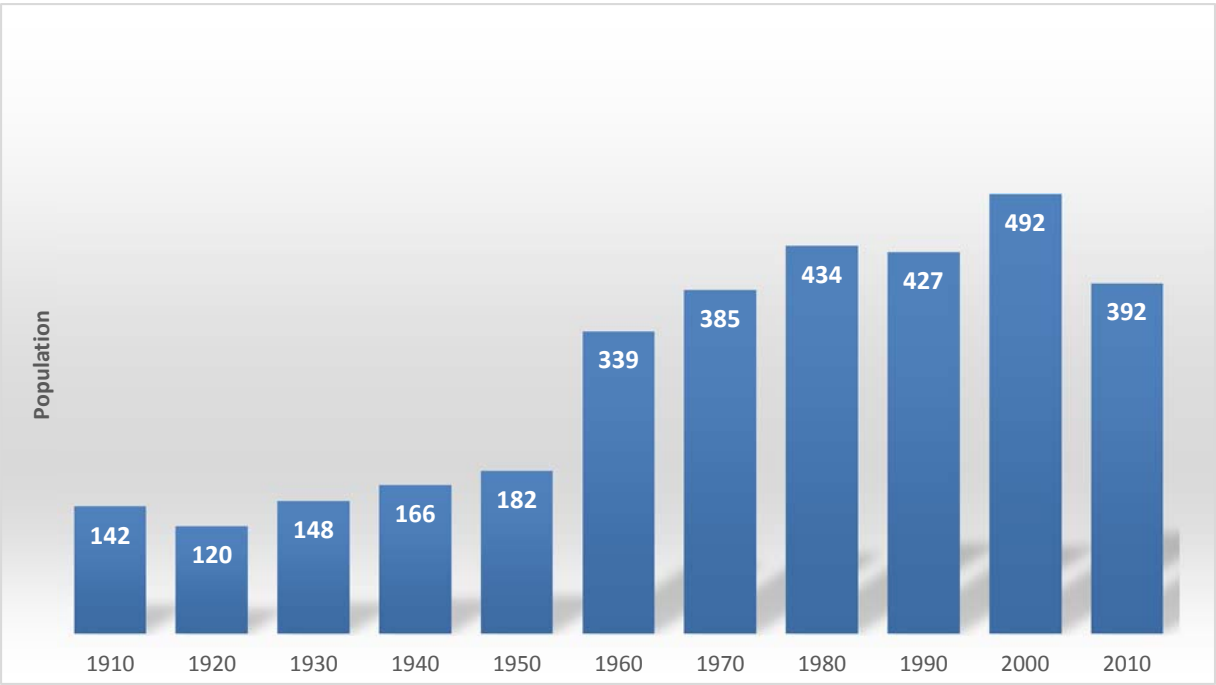


Exhibit 1-3 Newtonsville Historical Population (US Census) 1910-2010)

1.5 Community Engagement

The Village of Newtonsville lies within an area with a high concentration of home sewage treatment systems defined as 100 or more systems per square mile by Ohio, Kentucky, Indiana (OKI) Regional Council of Governments. In April 2011, the Clermont County General Health District (CCGHD) conducted a survey of existing home sewage treatment systems within the Village of Newtonsville and adjoining properties. The purpose of this survey was to determine the extent and location of failed septic systems in this area. Each of the 171 properties to be surveyed was sent a mailer that explained the purpose of the survey in advance of the field investigation. CCGHD staff visited each property unless the property owner elected to not participate in the survey.

On-site investigations were conducted to determine if any component of the septic system was inoperable and if sewage was evident on the ground surface using dye tracing techniques where necessary. A septic system was categorized as failing if either of the above were observed in the field. The results of the survey suggest a septic system failure rate in the Newtonsville area that ranges between 31-43 percent. The estimated fraction of failed septic systems in the Newtonsville area is higher than the estimated state average (31%) and the estimated 16 County southwest district average (18%) as reported by the Ohio Department of Health in their *2012 Survey of Household Sewage Treatment Systems Operation and Failure Rates in Ohio.*

In September 2012, County staff representing the Water Resources Department and General Health District met with Newtonsville Village council to discuss the current conditions of home sewage treatment systems in the Village and to discuss the possibility of a public sewer system.

The following month, October 2012, an information mailer was sent to property owners within the Village and the adjacent areas that included general information from the County and a petition/comment submittal form to gage local interest in supporting a public sewer system. Out of a total of 270 properties/parcels represented by 165 property owners, a total of 36 petitions were received, representing 63 properties, which supported a public sewer system to serve the Village of Newtonsville. There were 15 comment sheets representing 29 properties that opposed the public sewer.

On March 12, 2013, a public information meeting was held during the meeting of Village Council to present the results of the survey and to answer any questions from the property owners. As a result of the survey outcome and local support for a public sewer system, the County's 5-Year Wastewater Capital

improvement Plan (2013-2017) included a project for a centralized wastewater collection and treatment system that would serve the Village of Newtonsville and some adjacent property owners.

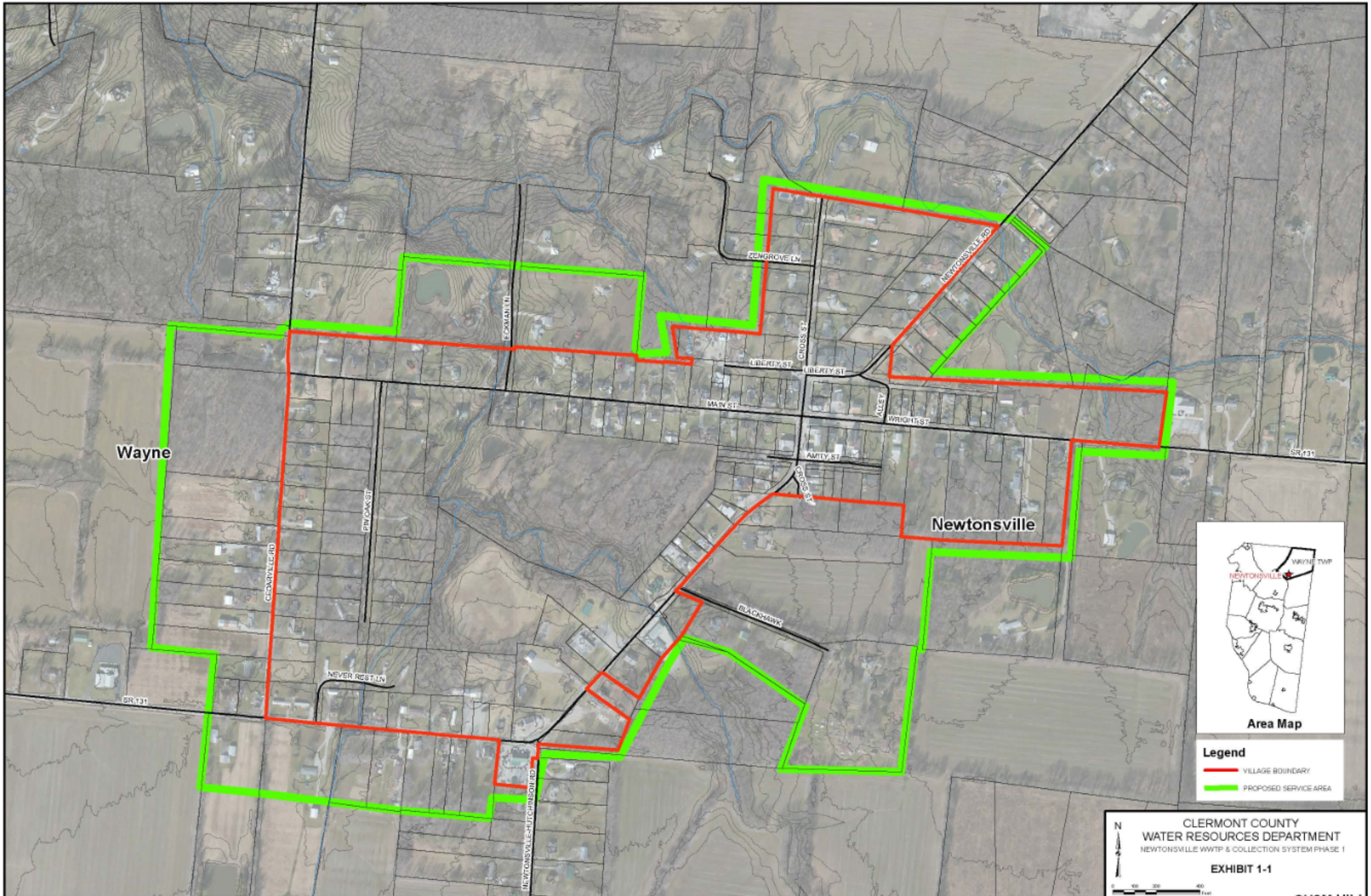
On January 21, 2014, County staff from the Clermont County Water Resources Department (CCWRD) met with Village Council to update Council on the planning and preliminary engineering progress for a centralized wastewater collection and treatment system. The strategy for the selection of a site for the wastewater treatment facilities was presented to Village Council. The Village was solicited and agreed to participate in the selection process. Candidate sites for the wastewater treatment system were presented and discussed.

On February 2, 2014, County staff from CCWRD and Clermont County Department of Environmental Quality (CCDEQ) met with Wayne Township trustees to update the Township on the planning and preliminary engineering progress for a centralized wastewater collection and treatment system. This meeting was similar in content to the previous meeting with Village Council which identified candidate sites for proposed wastewater treatment facilities and outlined the strategy for selection of a wastewater treatment site. The Township was also solicited and agreed to participate in the selection process.

On June 17, 2014, a public meeting was held during the meeting of Village Council to present the outcome of the wastewater treatment site selection process. Each of the three candidate sites was ranked based on collective input which included representatives from the County, the Township, the Village and CH2MHILL. A privately-owned site was recommended that was later determined to be unavailable for purchase. During this meeting, the Village was asked by the County to approve the use of a portion of Village-owned property located on Wright Street for the wastewater treatment site.

On July 15, 2014, County staff from CCWRD again met with Village Council to further discuss the use of Village-owned property on Wright Street for siting wastewater treatment facilities. The discussion focused on possible legal impediments that could prevent the property from being utilized in this manner and the County and Village both agreed to investigate this further before taking additional action.

On July 29, 2014, following additional legal investigation by the Village and County concerning permissible use of Village-owned property on Wright Street, Village Council passed a resolution (Resolution 2014-B) authorizing the utilization of Village property for a wastewater treatment facility. Future engagement of the public through Newtonsville Village Council will take place as planning and preliminary design continues.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ECKMAN LN
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LIBERTY ST
MAIN ST
ALLEY
WRIGHT ST
AMITY ST
SR 131
PIN OAK ST
CEDARVILLE RD
BLACKHAWK
NEVER REST LN
NEWTONSVILLE-FITCHVILLE RD
WAYNE TWP
Area Map
Legend
VILLAGE BOUNDARY
PROPOSED SERVICE AREA
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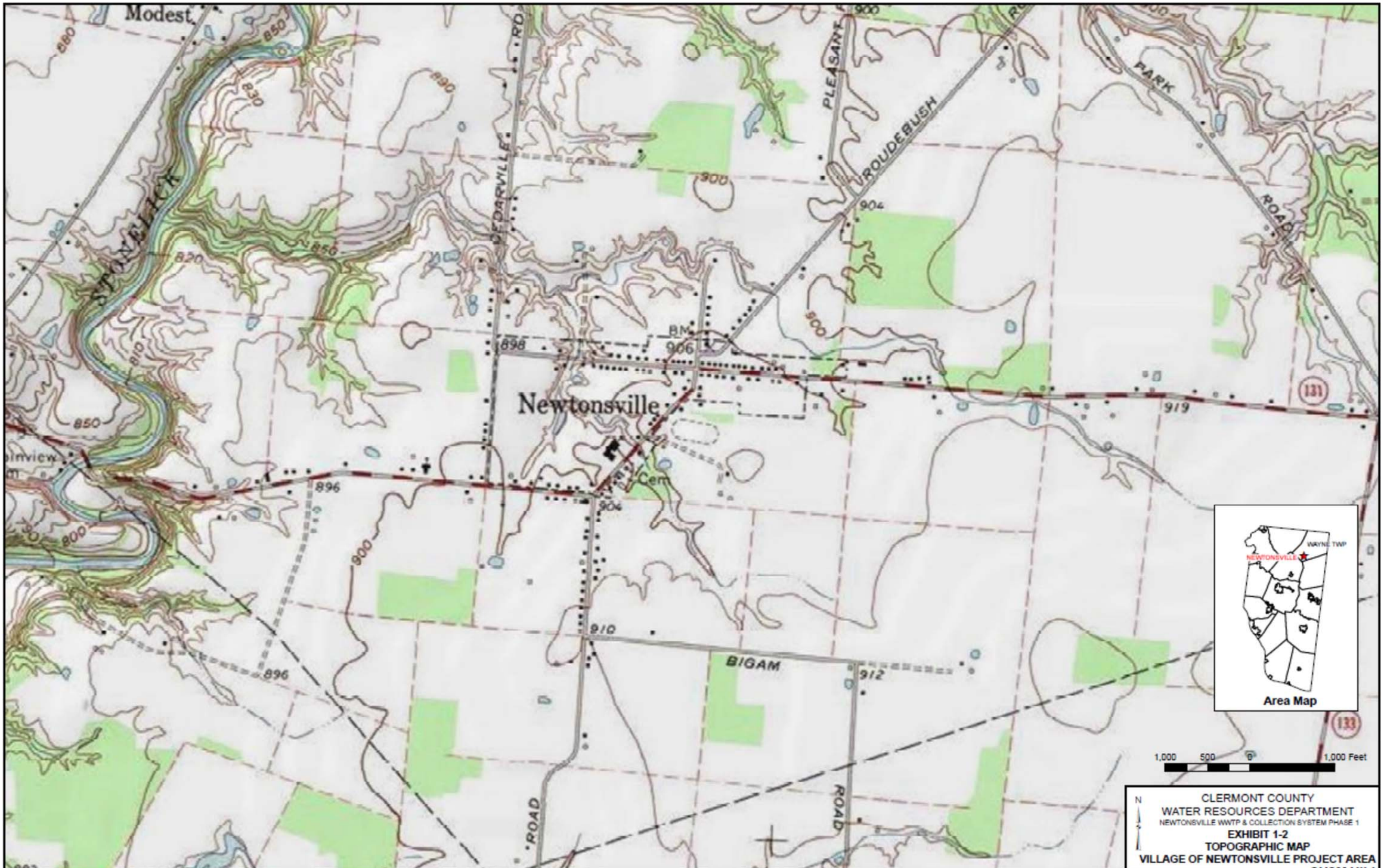
NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1
EXHIBIT 1-1
CH2M HILL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Area Map
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CLERMONT COUNTY
WATER RESOURCES DEPARTMENT
NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1
EXHIBIT 1-2
TOPOGRAPHIC MAP
VILLAGE OF NEWTONSVILLE PROJECT AREA
CH2M HILL

2.0 Existing Facilities

2.1 Location Map

Refer to **Exhibit 1-1** in the preceding section which provides a map of the service area and jurisdictional boundary of the Village of Newtonsville. **Exhibit 2-1** shows the composition of the service area broken down into classifications that include single family, multi-family, commercial, institutional and government owned parcels.

2.2 History

The Village of Newtonsville has no centralized wastewater collection and treatment system. Local residences are served by household sewage treatment systems (HSTSs). The Clermont County General Health District (CCGHD) has jurisdiction over each household sewage treatment system or small flow on-site sewage treatment system located in Clermont County. The CCGHD estimates that there are approximately 171 HSTSs in the Village of Newtonsville and adjacent properties. This translates to an estimated density of 684 HSTSs per square mile which is considered a high density by *Ohio-Kentucky-Indiana (OKI) Regional Council of Governments*.

Most if not all of these existing HSTSs are septic-to-soil-based leaching systems which consist of a buried receptacle designed and constructed to receive sewage from a home, separate solids from the liquid, provide limited digestion of organic material, store digested solids and allow the separated liquid to leach into the soil. According to the 2002 Clermont County Soils Survey, the soil conditions in this area are generally not suitable for soil adsorption systems and the size of some of the older lots are not adequate for properly sized replacement systems. This creates the potential for HSTS failure and release of septic leachate to local streams and rivers.

2.3 Condition of Existing Facilities

In April 2011, CCGHD conducted a survey of existing HSTSs within the Village of Newtonsville and adjoining properties. Each of the 171 properties were sent a mailer that explained the purpose of the survey in advance of the field investigation. CCGHD staff visited each property unless forewarned that the property owner elected to not participate. On-site investigations were conducted to determine if any component of the septic system was inoperable and if sewage was evident on the ground surface using dye tracing techniques. If either of the above criteria were observed in the field, the septic system was categorized as a 'failed system'.

The results of the survey are summarized in **Table 2.1**. The estimated fraction of failed septic systems in the Newtonsville area (35 percent) is higher than the estimated State of Ohio average (31 percent) and the estimated Southwest District (18 percent) which includes 16 Ohio counties.

Table 2.1 Village of Newtonsville Household Sewage Treatment System Survey – April 2011	
Total Systems Surveyed	171
Systems Passed inspection	97
Systems Failed inspection	53
Systems not Inspected	21
Documented Fraction Failed	35%
Potential Fraction Failed	43%
Note: 'Potential Fraction Failed' is based on the assumption that those systems not inspected were in a failed condition in addition to those confirmed as failed through inspection.	

This project seeks to replace the existing failed household sewage treatment systems in the Newtonsville area with a centralized wastewater collection and conveyance system which will deliver the wastewater to a new treatment plant.

2.4 Financial Status of Existing Facilities

The following sub-sections summarize Clermont County's current rate schedules, annual O&M costs, capital improvement program, utility user description and tabulation and status of existing debts and reserve account information. Additional details are contained in **Appendix C**.

2.4.1 Current Rate Schedules

Table 2.2 summarizes the current water and sewer rates applicable to all users of the Clermont County system. All water service branches or connections are subject to a minimum bi-monthly charge based on the size of the water meter or on the number of residential units served by the water meter, whichever is greater. The charges for sewer services provided by the County are based on the quantity of metered water used in accordance with formulae established by the Board of Clermont County Commissioners. Future sewer service provided to the Village of Newtonsville will be based on this or a future amended rate schedule.

Table 2.2 Clermont County Water and Sewer Use Rates					
Meter Size	Bi-Monthly Usage (gal) [1]	Bi-Monthly Minimum Charge		Rate ($/1,000 gal)	
Water/Sewer	Water/Sewer	Water	Sewer	Water	Sewer
¾-inch residential	5,000	$17.40	$22.20	$3.48	$4.44
¾-inch commercial	8,000	$27.84	$35.52	$3.48	$4.44
1-inch	20,000	$69.60	$88.80	$3.48	$4.44
1 ½ inch	40,000	$139.20	$177.60	$3.48	$4.44
2-inch	64,000	$222.72	$284.16	$3.48	$4.44
3-inch	128,000	$445.44	$568.32	$3.48	$4.44
4-inch	200,000	$696.00	$888.00	$3.48	$4.44
6-inch	400,000	$1,392.00	$1,776.60	$3.48	$4.44
8-inch	640,000	$2,227.20	$2,841.60	$3.48	$4.44
10-inch	920,000	$3,201.60	$4,084.80	$3.48	$4.44
Multi-family [2]	5,000	$17.40	$22.20	$3.48	$4.44

Notes:
1. Bi-monthly usage (gal) included in minimum bi-monthly charge.
2. Bi-monthly minimum charge for multi-family is per each residential unit.

2.4.2 Annual Operation and Maintenance (O&M) Costs

Annual operation and maintenance costs for sewer services for the three year period (2011-13) are summarized in **Appendix C.** This includes the discrete categories of: salaries/overtime/benefits, maintenance & repair, outside and other required services, supplied materials and utilities. A general trend in the reduction in O&M costs during this 3-year period is a reflection of overall improvement in operational and management efficiencies by the County's Water Resources Department. The 3-year average O&M cost to maintain wastewater pump stations, force main and gravity line conveyances and treatment facilities in $8.68M which excludes any sewer service facilities intended to serve the proposed Newtonsville service area.

2.4.3 Capital Improvement Program

The County has established and maintains: 1) a rolling five year capital improvement plan (CIP) which drives the County's annual operating budget, 2) a fiscal policy on cash reserves for the General Fund and Capital Project Funds and 3) a conservative investment policy for the safe-guarding of investment income. The current 5-year Wastewater CIP (2014-18) has an adjusted expenditure plan totaling $29.5M over this period.

2.4.4 Tabulation of Users by Category (2013 Fiscal Year)

A tabulation of existing (2013 basis) County water customers within the Village of Newtonsville is summarized in **Table 2.3**.

Table 2.3
Village of Newtonsville
Tabulation of Existing (2013 basis) Water Users by Billing Category

Category (Class)	Number
Residential (¾-inch meter)	138
Multi-Family (¾-inch meter)	3
Multi-Family (1-inch meter)	1
Commercial/Pool (¾-inch meter)	9
Commercial/Pool (1-inch meter)	1
Commercial/Pool (No connection or tied into another account)	3
Institutional (¾-inch meter)	1
Government (¾-inch meter)	1
Government (Meter size not known with certainty)	1
Total Existing Water Accounts (Users)	**158**

The average residential water consumption is 3,768 gallons per month. The overall average water consumption across all billing categories is 4,291 gallons per day. The number of equivalent dwelling unit (EDUs) within Newtonsville is estimated at 192. This was obtained by assigning each residential user a value of 1 EDU and normalizing the water consumption of each non-residential user (i.e. the water consumption of each non-residential user is divided by the average residential water usage to arrive an equivalent dwelling unit count). The EDU determination is summarized in **Table 2.4**.

Table 2.4 Village of Newtonsville Equivalent Dwelling Unit Determination				
User Category	**Avg Monthly Water Usage (gal)**	**Total Connections**	**Total Monthly Water Usage (gal)**	**Equivalent Dwelling Units**
Single Family Residential	3,768	123	463,464	123
Single Family Residential (Other)	Not Available	15	Not Available	15
Multi-Family	14,111	4	56,445	15
Commercial	10,174	10	101,740	26
Commercial (Other)	Not Available	3	Not Available	3
Institutional	1,073	1	1,073	1
Government	873	1	873	1
Government (Other)	Not Available	1	Not Available	1
			Total EDUs	**185**

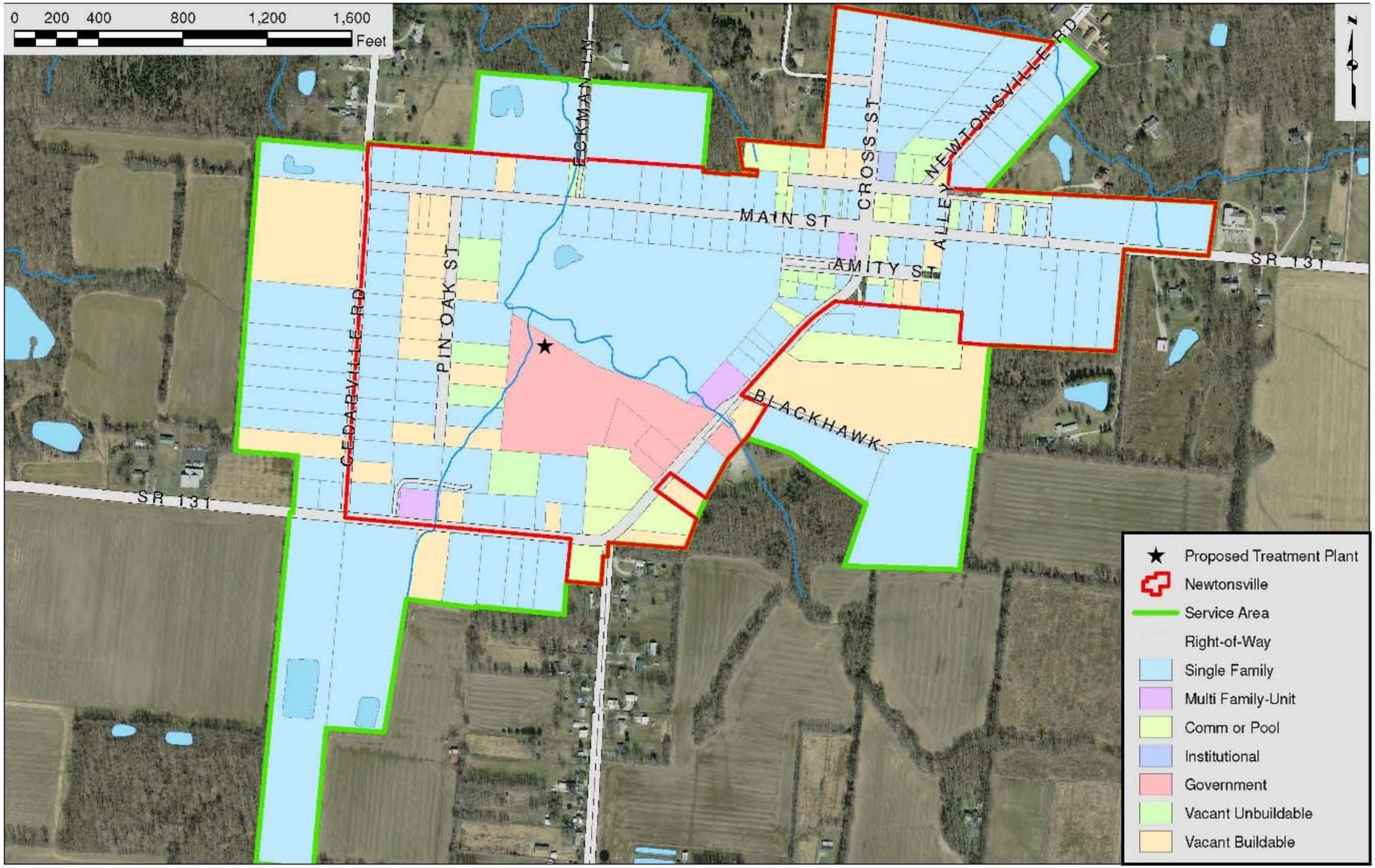
Notes:
1. Above computations based on 2013 water usage records from Clermont County Water Resources Dept.
2. EDU count for non-residential users was obtained by dividing the average monthly single family residential water usage into the total monthly water usage for each non-residential user category. For those non-residential users that consume water at a fraction of the residential rate, the EDU value is set equal to 1.

2.4.5 Status of Existing Debts/Reserve Accounts

Long term debt carried by Clermont County Water Resources Department is summarized in **Appendix C** along with sewer revenue projections though 2021, the amortization schedule of each loan from the Ohio Public Works Commission (OPWC) and Ohio Water Development Authority (OWDA).

2.5 Water/Energy/Waste Audits

Water, energy and waste audits are not applicable to project and are therefore not discussed in this report.


0 200 400 800 1,200 1,600
Feet
ECKMAN LN
CROSS ST
NEWTONSVILLE RD
MAIN ST
AMITY ST
ALLEY
SR 131
PIN OAK ST
CEDARVILLE RD
BLACKHAWK
SR 131
Proposed Treatment Plant
Newtonsville
Service Area
Right-of-Way
Single Family
Multi Family-Unit
Comm or Pool
Institutional
Government
Vacant Unbuildable
Vacant Buildable

3.0 Need for Project

Provision of centralized wastewater collection, conveyance and treatment for the Newtonsville service area is needed for the following reasons:

- Stream sampling and analysis by Clermont County over the past 17 years has documented the impact of failed household sewage treatment systems on local waterways;
- The recent study and report of the East Fork Little Miami River Basin completed in May 2014 by the Ohio EPA has concluded that identified local streams and rivers downstream from Newtonsville are classified as being in partial and non-attainment with warmwater habitat criteria;
- The State-wide survey of household sewage treatment systems completed in 2012 points to the continued problem of failed on-site systems in Ohio and its impact on local water quality and the potential exposure to humans of pathogenic bacteria;
- The April 2011 field survey of 171 existing household sewage treatment systems in the Newtonsville area revealed a failure rate between 35 and 43 percent;
- The Newtonsville area has a household sewage treatment system density of 684 units per square mile which is over six times greater than what Ohio-Kentucky-Indiana Regional Council of Governments (OKI) considers to be a “high density” area.

3.1 Health, Sanitation and Security

3.1.1 Clermont County Office of Environmental Quality - Stream Monitoring

Beginning in 1996, Clermont County began a comprehensive stream sampling and analytical program that had three objectives:

- Characterize the surface water quality within Clermont County streams;
- Investigate potential impacts associated with observed impairment of surface water quality through dry weather sampling upstream and downstream of suspect discharges;
- Monitor strategic sample sites during wet weather to determine impacts associated with major rain events.

Data collected by the County through its Office of Environmental Quality provided a basis for tracking trends in water quality over time and providing support for planning and management programs. The Newtonsville area was included as part of the dry weather sampling program in

2007 due to suspected water quality impacts resulting from failed home sewage treatment systems.

Water quality sampling locations established by the Clermont County Office of Environmental Quality in the Newtonsville area are shown in **Exhibit 3-1** (end of section). Grab samples were collected during the summer months at each sample location during dry weather conditions which is defined as no rainfall during the preceding 48 hours.

The recent sampling and analytical survey performed by Clermont County in August 2013 serves as a water quality baseline and confirms prior sampling results that point to known water quality impacts in the Newtonsville area. Stream sampling and analysis will continue into the future at the locations presented to document anticipated water quality and biological quality improvements associated with proposed centralized wastewater collection and treatment facilities. Refer to **Table 3.1** for a summary of local stream sampling data downstream of the Village of Newtonsville. The geometric mean (GM) of bacterial density through the years suggests the recurring presence of untreated sewage at this location and total phosphorus levels spike above background levels. Refer to **Appendix D** for a technical memorandum that summarizes the data at each sample location.

3.1.2 Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries, 2012

The East Fork Little Miami River was recently surveyed by Ohio EPA in 2012 to aid in the development of a total maximum daily load (TMDL) model for the East Fork Basin. Sentinel sampling sites were selected by Ohio EPA to establish baseline water chemistry and biological indices under varying stream flow conditions that range from the 10th to 90th percentile values. Samples were collected at each sentinel site on a monthly basis. Of the 88 sample sites that were included in the 2012 survey, two sites were located near Newtonsville. The report entitled *Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries, 2012*, that summarized field work conducted in 2012, was published and released by Ohio EPA in May 2014.

The 2012 field survey documented biological impairment and non-attainment of the warmwater habitat aquatic life use criteria throughout much of the East Fork Basin (52 percent of 88 sample sites were biologically impaired) due to low dissolved oxygen levels caused primarily by organic

Table 3.1 Sample Station NEWTN0.9 Downstream of Newtonsville							
Year	NH4-N mg/L	Conductivity umhos/cm	D.O. mg/L	GM E.Coli #/100mL	pH S.U.	Total P mg/L	Water Temp Deg C
1997							
Max	0.00	1,270	7.6		8.00	0.34	22.8
Min	0.00	123	4.1		7.70	0.07	17.3
Avg	0.00	882	6.1	--	7.84	0.16	20.5
1998							
Max	0.12	840	7.4		8.00	0.19	22.9
Min	0.00	550	4.6		7.60	0.06	19.8
Avg	0.03	637	6.0	104	7.83	0.15	21.1
1999							
Max	0.00	1,290	5.2		7.80	0.24	18.6
Min	0.00	997	2.8		7.70	0.25	18.3
Avg	0.00	1,144	4.0	306	7.75	0.19	18.4
2000							
Max	0.42	836	7.4		7.70	0.57	22.5
Min	0.00	417	2.3		7.40	0.20	20.3
Avg	0.13	620	5.5	2,307	7.55	0.39	21.2
2001							
Max	0.14	1,050	7.7		7.90	0.44	24.0
Min	0.00	469	4.6		7.50	0.23	18.8
Avg	0.06	776	5.8	382	7.70	0.33	21.4
2006							
Max	--	--	--		--	0.18	--
Min	--	--	--		--	0.18	--
Avg	--	--	--	--	--	0.18	--
2007							
Max	--	--	--		--	1.15	--
Min	--	--	--		--	0.74	--
Avg	--	--	--	1,442	--	0.95	--
2013							
Max	0.00	994	6.6		7.51	0.14	22.1
Min	0.00	953	4.8		7.40	0.10	29.8
Avg	0.00	972	5.7	115	7.44	0.12	20.9

enrichment and, to a lesser extent, nutrient enrichment. In each case, naturally occurring low flow stream flows and poor stream habitat contributed to the biological impairment. Among the sources cited for contributing to organic and nutrient enrichment were home sewage treatment systems. The report reiterated that soil associations within Clermont County are, without exception, ill-suited to supporting on-site sewage treatment.

Key findings of the May 2014 Study that pertain to the Newtonsville area include:

- Forty percent of the Moore's Fork-Stonelick Creek Watershed Assessment Unit (050902021303) sample sites which included Newtonsville are impaired and in non-attainment;
- The attainment status of the tributary stream to Stonelick Creek (at Cedarville Road) is in non-attainment (this stream flows through the Village of Newtonsville);
- Stonelick Creek (bridge west of Newtonsville located on SR 131) is in partial attainment with warmwater habitat criteria.

Refer to **Appendix E** for relevant excerpts of the Ohio EPA report related to the Newtonsville area.

Stream water quality and biological data collected as part of the 2012 survey will support TMDL development for the East Fork Little Miami River. The East Fork Little Miami River TMDL report is scheduled for release in 2015. The components of the TMDL process supported by the 2012 stream survey are primarily the identification of impaired waters, verification (and re-designating if necessary) of beneficial use designations, gathering ambient information that will factor into the wasteload allocation, and ascribing causes and sources of use impairment.

The resultant TMDL model will estimate pollutant loads from the various sources within the basin, define and characterize allowable loads to support beneficial uses, and allocate pollutant loads among different pollutant sources through appropriate controls such as NPDES permitting or other abatement strategies. Accordingly, the TMDL outcome will impact the design of the proposed wastewater treatment facilities for the Newtonsville service area.

3.1.3 Statewide Survey of Household Sewage Treatment Systems, 2012

In 2008, the Ohio Department of Health (ODH) assisted the Ohio Environmental Protection Agency (OEPA) by collecting information on home sewage treatment systems throughout Ohio. As the state agency with regulatory authority for household sewage systems, ODH and the local health departments have knowledge of the types of systems and issues associated with the design, installation, operation and failure of these systems. The data collected was published in a report entitled *Survey of Household Sewage Treatment Systems Operation and Failure Rates in Ohio* released by ODH in 2008.

In 2012, OEPA again partnered with ODH as part of the USEPA's *Clean Watersheds Needs Survey* (CWNS) to evaluate wastewater treatment infrastructure across the country. The CWNS is

conducted every four years as required by the Clean Water Act. The results were compiled into a report and issued to Congress to formulate policy decisions and assess funding needs to meet water quality goals.

The results of the 2012 CWNS revealed that approximately 31 percent of all home sewage treatment systems throughout the state of Ohio are experiencing some degree of failure. This is an increase from the 23 percent failure rate reported by ODH in 2008. The Southwest District of Ohio which includes Clermont County and 15 other counties, reported a significantly lower failure rate (18 percent) compared to the statewide average.

The results of this survey brings into focus the statewide trend in the increase of failed household sewage systems and places into perspective the results of the 2011 survey in Newtonsville conducted by the Clermont County General Health Department. This survey, presented in Section 2, documented a household sewage treatment failure rate between 35-43 percent which is higher than the state average and much higher than the Southwest District of Ohio average.

3.1.4 OKI Water Quality Management Plan Update, 2013

The *2013 Wastewater Management Plan Update* prepared by OKI provides a current perspective on surface water quality conditions in southwest Ohio based on available data from federal, state and local sources. It considers development trends and its implications on water quality and wastewater treatment needs.

For areas without centralized wastewater collection and treatment, general information was provided for on-site wastewater treatment systems such as septic tank-leach field systems, their water quality impacts, how they are currently regulated, and recommendations to improve their management.

OKI has stated and continues to mention that the characteristic soils common to Clermont County are relatively impervious and thus do not provide an adequate means to sustain onsite sewage treatment. Along with the poor soil permeability, several other factors were cited that contribute to problems with this method of sewage disposal, including: prolonged soil saturation which contributes to failed absorption fields and untreated sewage emerging on the soil surface, improperly designed or installed systems, excessive sewage loadings, improper maintenance, reduction of bacterial action by chemical wastes, and clogging of absorption fields.

According to OKI, stormwater runoff is the most significant problem with on-site systems in Clermont County because as local soils become saturated, stormwater runoff transports pollutants from failing systems to drainage ditches and streams, and thus contributes to pollution of local waterways. OKI's current recommendations offer little other than continued collaboration with local health districts to track changes and maintain watershed profiles, improved public education and additional monitoring of water quality impacts. OKI's geographical information system identifies any location with 100 or more on-site sewage treatment systems per square mile as a high density area. Using this standard, the Village of Newtonsville, with an estimated on-site sewage treatment system density of 684 units per square mile, is classified as a high density area for on-site sewage treatment systems.

3.2 Aging Infrastructure

There is no wastewater infrastructure within the Village of Newtonsville other than the aforementioned household sewage treatment systems that abound in the area. Although the age of these facilities is not known with certainty, the present failure rate of a significant percentage of these on-site systems makes them inherently unsafe and a potential threat to the general health of the community.

3.3 Foreseeable Growth

Based upon a review of the US Census data for the Village of Newtonsville presented in Section 1, the anticipated growth rate for this village is minimal to low; however, the proposed plan to provide centralized wastewater collection, conveyance and treatment facilities my provide impetus for new growth and development, although this is unclear at the present time. The proposed plan will provide service to those existing residents in the service area with sufficient reserve capacity to provide for some measure of future growth. As this is a small community, with minimal to low growth anticipated, there are no plans for providing phased capacity increases. The number of equivalent dwelling units that will be serviced by the project is estimated to be 192.

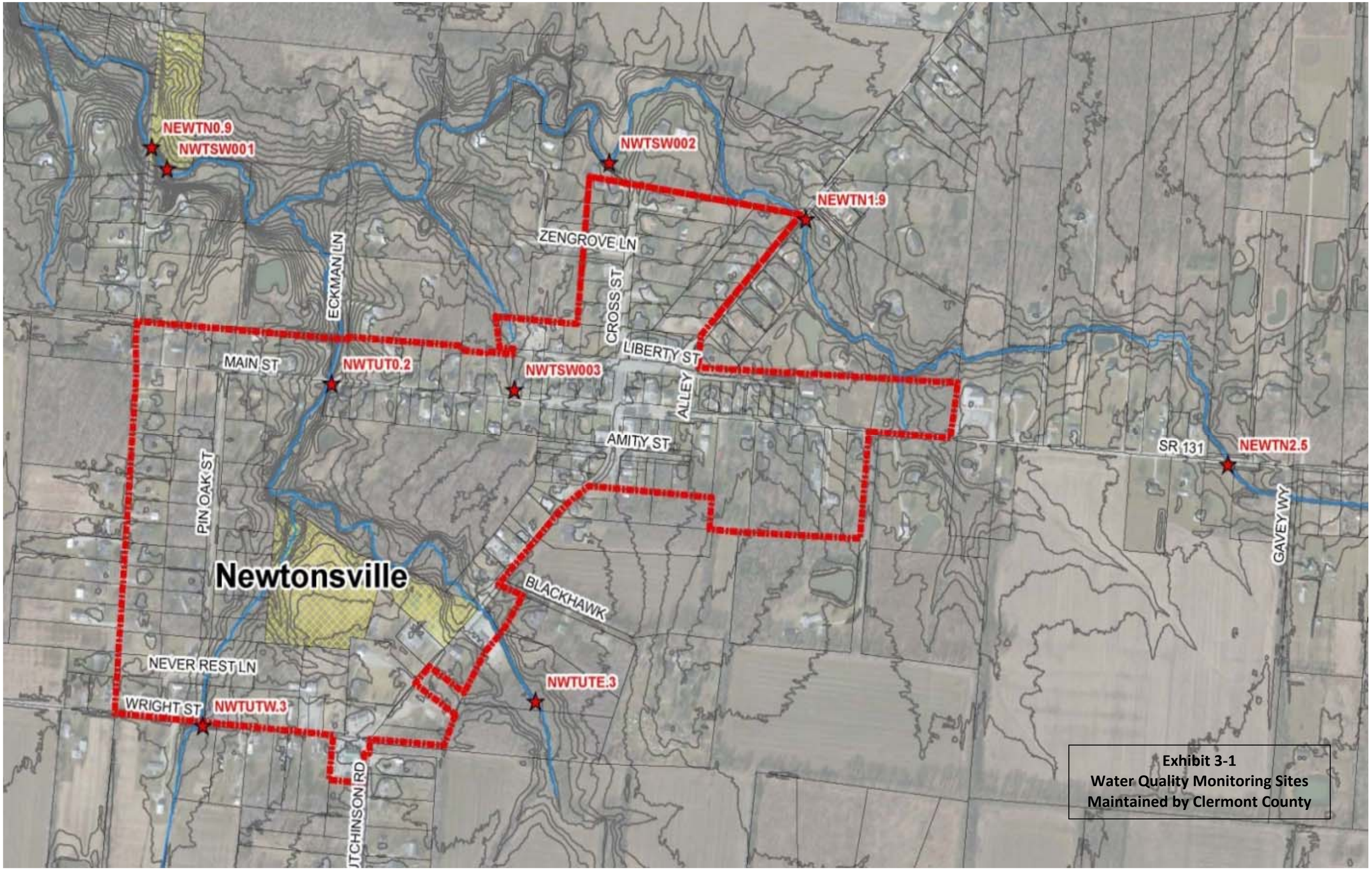


Exhibit 3-1
Water Quality Monitoring Sites Maintained by Clermont County

4.0 Alternatives Considered

4.1 Estimated Initial Wastewater Production

Based upon a review and analysis of recent bi-monthly water billings within the Newtonsville corporation limit, the total usage rate in 2013 was 5,850,000 gallons. For this period, there were a total of 109 active accounts which yields a gross usage rate (including all billing classes) of 147 gallons per day, or approximately 50 gallons per capita per day, based on the 2010 census household size of 2.93. This per capita rate is lower than the standard guideline of 100 gallons per capita per day given in *Recommended Standards for Wastewater Facilities, 2004 Edition* (*aka "Ten States Standards"*). For the Newtonsville study area, it is recommended that a per capita design wastewater production rate of 75 gallons per capita per day be utilized, which is 1.5 times the per capita water usage. **Table 4.1** summarizes the design wastewater production for the Newtonsville service area which includes the Village of Newtonsville and adjacent properties which lie outside the Village boundary but inside the service area.

Table 4.1
Design Wastewater Production
Newtonsville Service Area

Projected Initial Wastewater Production from Newtonsville [2]	**DAF (GPD) [1, 3]**	**Est. PHF (GPD) [1]**
Residential	35,800	
Commercial	5,930	
Other	440	
Subtotal	**42,170**	**169,000**
Projected Additional Wastewater Production from Service Area [5]	**DAF (GPD)**	**Est. PHF (GPD)**
Residential	7,030	
Vacant/Buildable Inside Newtonsville	5,710	
Vacant/Buildable Outside Newtonsville	2,200	
Subtotal	**14,940**	**59,000**
Projected Newtonsville Service Area Design Flows	**57,000**	**228,000**
Estimated Design Population of Service Area (at Buildout)	592	

Notes:
1. DAF refers to design average flow; PHF refers to peak hourly flow.
2. Based on 2013 active water accounts and EDU computation.
3. DAF is based on 75 gallons per capita per day.
4. Peak hourly flow rates have been developed from (Fair and Geyer Eqn.-Ten States Standards).
5. Includes existing residences and currently inactive water accounts and buildable vacant parcels inside and outside Newtonsville that are in service area.

Table 4.2 presents a summary of the parcels that are within the Newtonsville service area; both within the incorporated area and adjacent properties.

Table 4.2 Summary of Parcels within Newtonsville Service Area	
Inside Newtonsville	
Parcels with Existing Structures	124
Vacant Parcels Judged Buildable	26
Subtotal Inside Newtonsville	**150**
Outside Newtonsville/Inside Service Area	
Cedarville Road	
Parcels with Existing Structures	10
Buildable Vacant Parcels	7
Wright Street	
Parcels with Existing Structures	12
Buildable Vacant Parcels	3
Newtonsville Road	
Parcels with Existing Structures	8
Buildable Vacant Parcels	0
Eckman Road	
Parcels with Existing Structures	2
Buildable Vacant Parcels	0
Outside Newtonsville/Inside Service Area Subtotal	**42**
Total Parcels	**192**

Notes:
1. Existing 6 acre vacant lot on Cedarville Rd assumed subdivided into 6-1 acre parcels.
2. "Total Parcels" includes those within Service Area with existing structures and vacant properties judged buildable.

4.2 Future Wastewater Production

Since the proposed service area is already populated by water customers, there is little opportunity for additional production of wastewater unless all parcels, vacant and occupied, are included or the service area boundary is expanded at some future date. For purposes of this preliminary engineering report, it is assumed that the service area boundary will remain unchanged for the foreseeable future. The design wastewater production for the Newtonsville service area assumes that all buildable parcels are occupied and active.

4.3 Wastewater Management Alternatives

While there are numerous alternatives possible for the treatment of wastewater there are few alternatives that are considered practical and affordable. Wastewater management alternatives have been developed as a means of providing feasible, reliable and cost effective plans for the treatment of wastewater within the Newtonsville service area. The alternatives developed have been premised on the following goals:

- Provide reliable wastewater treatment for existing and projected future flows;
- Protect local water quality resources and use designations;
- Comply with Ohio water quality standards.

The alternatives considered include the following:

- **No Action Alternative –** not a viable approach to successful wastewater management since it is clear that existing problems (i.e. environmental impacts due to failed home sewage treatment systems) without intervention will persist and continue to adversely impact local water quality and may expose humans to pathogenic bacteria; for this reason, this approach is not considered further;
- **Household Sewage Treatment System (HSTS) Improvements Alternative -** because of the prevalence of small lot sizes, poor local soil conditions, local hydrology and other factors contributing to HSTS failure, replacing existing on-site systems with more modern septic tanks and new leach fields meeting State of Ohio and Clermont County General Health District requirements, or installation of any other type of on-lot treatment systems, is not considered feasible and is not considered further;
- **Non-Degradation Alternative -** would result in the elimination of the need to lower local water quality; this approach consists of a regional solution that includes the collection and conveyance of wastewater to existing nearby regional wastewater treatment facilities owned and operated by Clermont County;
- **Minimal Degradation Alternative** - would result in a lesser lowering of water quality; this approach considers a land application system for the treatment of wastewater that balances land application of treated wastewater with controlled discharge to waters of the State under conditions that minimize impact on the aquatic environment, such as discharge or storage during winter months and land application during summer months;
- **Preferred Alternative** – which is proposed to consist of an activated sludge system that would be equipped with front end screening, effluent filtration, ultraviolet light disinfection and post aeration

unit processes at a site determined through stakeholder (Village of Newtonsville, Wayne Township and Clermont County) involvement.

4.4 Treatment Alternatives Analysis

Each alternative considered below is based on a proposed design average flow of 57,000 gallons per day.

4.4.1 Non-Degradation Alternative Description

The non-degradation alternative consists of no local wastewater treatment which would result in no local discharge and therefore no impact to the water quality of local area streams. The non-degradation alternative considers pumping wastewater, following its collection, from the Village of Newtonsville to another service area within the County. The two service areas under consideration are the Lower East Fork (LEF) and Middle East Fork (MEF) service areas where existing regional facilities treat and release wastewater to the East Fork Little Miami River.

The analysis consists of three parts: 1) a determination of whether there is available capacity in either the LEF or MEF sewer systems to accept the estimated wastewater flow, 2) what improvements, if any, are needed to accommodate the estimated wastewater flow, and 3) development of a means to reliably convey the wastewater flow to the regional system. Refer to **Appendix F** for a more detailed analysis of this non-degradation alternative

Conveyance to Lower East Fork Service Area: The proposed location where the Newtonsville flow would discharge to the LEF system is shown spatially in **Exhibit 4-1** (end of section). A discharge point upstream of the Longfield Pump Station (LPS) along State Route 131 is the closest and most direct alignment for pumping flows from Newtonsville to the LEF system.

This alternative would consist of the following work, which assumes the installation of a collection system within Newtonsville:

- Construction of a pumping station at the low end of the Newtonsville service area and construction of two booster pumping stations along the route of conveyance;
- Installation of a force main a distance of approximately six miles to convey Newtonsville wastewater to the LEF collection system;
- Upgrades to the LPS, as described in the 2011 Wastewater Master Plan Update;
- Upgrades to the sewers between the Newtonsville force main discharge manhole and the LPS;

As part of this alternative, a single force main system is proposed, which would extend approximately six miles westward. The route of the proposed force main is illustrated in **Exhibit 4-1.** The proposed force main would be routed from Newtonsville extending west along SR 131. At Stonelick Creek, the force main would be installed under the stream using horizontal directional drilling (HDD) trenchless methods. The length of the HDD would be approximately 200 linear feet and would require one launch site and one receiving site on either side of the stream.

Except for the stream crossing, the force main installation would be open cut. From the stream crossing, the force main would continue west along SR 131 and terminate at a manhole at the east end of an existing 10-inch sanitary sewer at the intersection of Victory Park Drive and SR 131.

This alternative conveys additional flow into the LEF service area, which impacts the existing system. The 2011 Wastewater Master Plan Update identified the Longfield Pump Station as being under capacity for existing 2010 flows. The sewers tributary to the LPS were identified as adequate to convey the projected flows through 2030; however, the addition of flow from Newtonsville will require sewer replacement between the discharge manhole at the intersection of Victory Park Drive and SR 131 and the LPS. The required upgrades to these sewers would include replacement of approximately 572 feet of 10-inch pipe with 12-inch pipe and approximately 4,254 feet of 10-inch with 15-inch pipe.

The following assumptions were made as part of this alternative to the Lower East Fork Service Area:

- The force main would consist of a 6-inch C-900 DR14 PVC pipe, approximately 30,900 linear feet long.
- The force main would be routed in the existing rights-of-way and would terminate at a manhole at the intersection of Victory Park Dr. and SR 131.
- The average force main depth would be 6 feet.
- The force main would have 40 manholes and five air release/vacuum relief valves.
- The force main would cross under Stonelick Creek and would be installed via horizontal directional drilling.
- The pumping stations would be submersible pumping stations with estimated depths of 15 feet.

- Odor and corrosion control facilities would be provided at each pumping station.
- The LPS would be upgraded to accommodate the additional flows from Newtonsville and the projected 2030 flows as identified in the 2011 Wastewater Master Plan Update.
- The sewers tributary to the LPS from the discharge manhole at Victory Park Dr. and SR 131 would be upgraded, including replacement of 17 sanitary manholes. The total length of replacement sewer would be approximately 4,826 linear feet.

Conveyance to Middle East Fork Service Area: As with the previous LEF evaluation, the location where the Newtonsville flows would discharge to the Middle East Fork (MEF) service area was determined by proximity to the Village as well as probable routing of the force main. The proposed location where the Newtonsville flow would discharge to the MEF system is shown in **Exhibit 4-2** (end of section).

The closest point to discharge flows from Newtonsville to the MEF sewer system is in Owensville. Of the two options considered, Option 1 would discharge the flow on the east side of Owensville along US 50 and Option 2 would discharge the flow in the northern part of Owensville along Belfast-Owensville Road. The baseline model run for the MEF system showed that the Owensville Pump Station (OPS) has adequate capacity to convey the existing tributary flows. Additionally, the sewers downstream of the OPS were able to convey existing flows to the MEF WWTP without surcharge.

This alternative would consist of the following work, which assumes the installation of a collection system within Newtonsville:

- Construction of a pumping station within the low end of Newtonsville service area and construction of two booster pumping stations along the route of conveyance;
- Installation of a force main a distance of approximately five miles to convey Newtonsville wastewater to the MEF service area;
- Upgrades to the un-modeled sewers between the Newtonsville force main discharge manhole and the OPS.

The routing assumes that the force main terminates at a discharge manhole on the east side of Owensville along US 50. The route of the proposed force main is illustrated in **Exhibit 4-2**. The force main would extend southwest along SR 131, turn south along Newtonsville Road (which

turns into Newtonsville-Hutchinson Road), then turn west onto US 50, and terminate at a manhole at the east end of an existing 8-inch sanitary sewer approximately 500 feet east of the intersection of Brushy Fork Road and US 50.

Two stream crossings are assumed necessary: one crossing at 1.53 miles and the second crossing at 4 miles from Newtonsville, respectively. The stream crossings would be installed under the stream using HDD trenchless methods. The length of each HDD would be approximately 100 linear feet and require a launch site and receiving site on either side of the stream. Except for these stream crossings, the force main would be open cut.

The following assumptions were made as part of this alternative to the Middle East Fork Service Area:

- The force main portions of the pipeline would consist of a single 6-inch C-900 DR14 PVC pipe. The total length of the force main segments is approximately 15,750 linear feet.
- The gravity sewer portions of the pipeline would consist of a single 10-inch PVC pipe, including 31 sanitary manholes. The total length of the gravity sewer segments is approximately 10,400 linear feet.
- The average force main depth would be 6 feet.
- The force mains would have 21 manholes, and five air release/vacuum relief valves.
- The stream crossings would be installed via horizontal directional drilling.
- The pumping stations would be submersible pumping stations with estimated depths of 15 feet.
- Odor and corrosion control facilities would be provided at each pumping station.
- The sewers tributary to the OPS from the discharge manhole at Brushy Fork Road and US 50 would be upgraded, including replacement of eight sanitary manholes. The total length of replaced sewer would be approximately 2,535 linear feet.

4.4.1.1 Substances Discharged

The non-degradation alternative conveys all wastewater produced within the Newtonsville service area to a regional location for treatment and therefore will not discharge any treated wastewater to local area streams.

4.4.1.2 Permitting and Treatment Requirements

No direct discharge to waters of the State, therefore no permitting or treatment required.

4.4.1.3 Reliability

Although the technology being proposed to convey wastewater from the Newtonsville Service Area to a nearby regional treatment facility is field-proven and appropriate for the application, the length of conveyance (five miles to MEF and six miles to LEF) and the number of pumping stations required (one at Newtonsville and two additional booster pumping stations) make this approach subject to increased operation and maintenance and vulnerable to mechanical failure.

Additionally, a force main break at any location would cause the entire system to remain out of service unless dual force mains are considered. Diagnosis of the damaged force main location along a five mile run could conceivably prolong the emergency repair, making this approach comparatively unreliable.

4.4.1.4 Human Health and Water Resources Impacts

The non-degradation alternative will protect human health and local water resources which together represents an improvement over existing conditions. This would result from the elimination of household sewage treatment systems and the documented impacts resulting from failed systems in the service area.

4.4.1.5 Social and Economic Impacts

The non-degradation alternative will provide social and economic benefit associated with providing a centralized collection system that would replace the existing HSTSs in the service area and likely increase property values. The social benefit of this alternative is associated with the recreational value of Stonelick Creek and the East Fork Little Miami River. Both water resources are represent a significant social value and recreational opportunity. Protection of these assets would be achieved through this alternative.

This alternative will likely have no direct economic benefit associated with local industrial, commercial or residential growth.

4.4.1.6 Environmental Impacts

Implementation of the non-degradation alternative will reduce annual pollutant loadings to Stonelick Creek and the East Fork Little Miami River and serve to eliminate the nonpoint source impacts on primary headwater habitat streams that flow through the Newtonsville service area. Pollutant loadings to local streams that are anticipated to be eliminated include bacterial, organic, ammonia and phosphorus loadings.

4.4.2 Minimal-Degradation Alternative Description

The minimal degradation alternative is similar to the non-degradation alternative in that a centralized collection system would be installed within the service area which would drain to a pumping station. Instead of pumping the wastewater to an existing regional treatment facility, the wastewater would be pumped to a new land application facility nearby. This treatment option was explored previously by the County and is envisioned to consist of a 111 acre constructed natural system inclusive of treatment lagoons, engineered wetland and spray irrigation system which would result in limited seasonal discharge of pollutants to waters of the state. The regulatory oversight for the design, construction, operation and maintenance of land application systems is covered under Chapter 3745-42-13 of the Ohio Administrative Code.

This wastewater management alternative was originally considered and recommended for the Newtonsville service area in a preliminary engineering design report entitled *Wastewater Collection, Treatment and Disposal for the Town of Newtonsville* prepared for the Clermont County Water and Sewer District in 1998. These proposed facilities were intended to be located south of Newtonsville off Peterson Road in Wayne and Stonelick Townships. An easement would be needed for a force main that would pump collected wastewater from Newtonsville to this location for treatment and disposal.

Facilities comprising this system would consist of the following:

Mechanical Bar Screen: For the removal of large neutrally buoyant or floating debris from the wastewater which will reduce the accumulation of non-biodegradable and floating materials in subsequent treatment units;

Facultative Lagoon: The lined lagoon, measuring approximately 150 feet by 150 feet, would perform the initial stage of wastewater treatment. The upper water layer of the lagoon would contain oxygen resulting from atmospheric re-aeration and algal respiration. The bottom layer

would contain settleable solids and little to no oxygen. The intermediate layer would range from aerobic near the top to anaerobic near the bottom, depending upon temperature-induced water density variations which could cause the contents of the lagoon to invert, creating unstable conditions that could lead to high turbidity and release of odors.

The oxygen, produced by algae and surface re-aeration, would be used by aerobic and facultative bacteria to stabilize organic material in the upper water layer. Anaerobic fermentation of settleable solids is the dominant activity in the bottom layer in the lagoon with the organic fraction of settleable solids being reduced to methane and nitrogen gas. During colder weather, oxygenation and fermentation reaction rates are significantly reduced which affects the quality and reliability of treatment.

Engineered Wetland: Treated wastewater from the facultative lagoon would flow by gravity to a 3.8 acre lined, constructed wetland to undergo further treatment. To conserve space, the engineered wetland could surround a portion of the facultative lagoon. Combined nitrification and de-nitrification reactions would occur in the wetland to reduce the concentration of ammonia and nitrate nitrogen in the lagoon effluent. Wetland plant composition would be selected to accomplish a high degree of water loss through evaporation and transpiration. This would reduce the quantity of water reaching the land application site.

Dual Pumping Station: Effluent from the engineered wetland would flow by gravity to the dual pumping station which would contain a common wet well and two sets of pumps; one set of pumps for recycling wetland effluent back to the facultative lagoon or effluent storage lagoon and a second set of pumps for the land application system. The recyle pumps would also be equipped with an air injection system to oxygenate the water as it is returned to the facultative lagoon or to extended storage.

Effluent Storage Lagoon: The function of the effluent storage lagoon is to store treated effluent during periods when land application is unavailable or undesirable. The storage lagoon would be capable of storing the accumulation of treated wastewater for the period that extends from December through March of the year.

Land Application System: The land application system would consist of twelve irrigation guns strategically placed to spray treated effluent in a non-overlapping circular pattern covering approximately 20 acres. This land area has been based on the Clermont Series soil characteristics

of the Peterson Road site, whose soil permeability is in the range of 0.2 to 0.6 inches per hour. The areas of land application would be planted with vegetative species selected to increase soil permeability and increase evaporation and transpiration of the applied effluent. This spray irrigation area would be graded to prevent surface runoff.

Table 4.3 summarizes the preliminary design criteria for the minimal degradation alternative which consists of the natural treatment system described above.

Table 4.3
Minimal Degradation Alternative Using Natural Treatment
Preliminary Design Summary

Component	Description
Bar Screen	
Number	1
Type	Mechanical (0.5 inch clear openings)
Facultative Lagoon	
Number	1
Dimensions	150 ft x 150 ft x 15 ft depth
Volume	1.3 MG
Detention	24 days @ 53,000 GPD
Engineered Wetland	
Number	1
Dimensions	700 ft x 150 ft
Area Required	3.8 acres
Effluent Storage Lagoon	
Number	1
Dimensions	320 ft x 270 ft x 10 ft depth
Area Required	6.3 acres
Volume	7.9 MG
Detention	149 days @ 53,000 GPD
Land Application System	
Area Required	20 acres
Application Rate	6 inch/month (April – November)
Yearly Application Rate	2.4 inches/acre/year

4.4.2.1 Substances Discharged

The minimal degradation alternative would convey all wastewater produced within the Newtonsville service area to a facultative lagoon and engineered wetland for treatment followed by land application via spray irrigation. Provisions for storage of treated effluent during periods when land application is unavailable or undesirable would limit the discharge of any wastewater to local area streams.

4.4.2.2 Permitting and Treatment Requirements

Installation of a land application system is not possible without first submitting and obtaining approval of a permit-to-discharge and permit-to-install (PTI) application and complying with the general requirements contained in OAC 3745-42-13. For a system such as this minimal degradation alternative having a design flow greater than 10,000 gallons per day and a land application rate less than 12 inches per acre per year, Class B treated sewage requirements must be met. The minimum requirements for Class B sewage treatment requirements are summarized in **Table 4.4**.

Table 4.4
Class B Sewage Treatment
(Minimum Requirements)

Effluent Parameter	30-Day Average	Daily Maximum
Total Suspended Solids	45 mg/L	——
Carbonaceous BOD5	40 mg/L	——
E. Coli.	-----	126 cfu/100 mL
Oil & Grease		10 mg/L
pH	6.0 – 9.0 S.U.	

Notes:
1. Treatment requirements applicable at point where the effluent leaves the treatment system, prior to storage or prior to land application.

4.4.2.3 Reliability

This type of minimal degradation treatment system has been proven effective and reliable according to many reported case histories of similar systems for small communities treating municipal waste. These systems have reported effective removal of organic materials, suspended solids, nutrients, heavy metals and pathogens; although judgment is still pending on the removal and impacts associated with toxic or hazardous pollutants.

The passive nature of these systems and direct exposure to the weather can cause the effectiveness of treatment to seasonally vary and potentially cause seasonal odors. Additionally, the exposed water surface will attract and create opportunities for mosquitoes and invite other pests which, in turn, will require added management to prevent a nuisance condition from developing.

4.4.2.4 Human Health and Water Resources Impacts

The minimal degradation alternative will protect human health and local water resources which represents an improvement over existing conditions. This would result from the

elimination of household sewage treatment systems and the documented impacts associated with failed systems in the service area. The HSTSs would be replaced with a centralized collection system and pumping station that would deliver the wastewater from the Newtonsville service area to the site of the natural treatment system.

4.4.2.5 Social and Economic Impacts

Similar to the non-degradation alternative, the minimal degradation alternative will provide social and economic benefit resulting from a centralized collection system that would replace the existing HSTSs in the service area. The social benefit derived from this alternative is enhanced recreational value of Stonelick Creek and the East Fork Little Miami River through improved water quality. Both water resources have a significant social value and offer recreational opportunities. Protection of these assets would be achieved through this alternative. Natural treatment systems also offer educational opportunities to students and the potential to conduct fundamental research on natural treatment system performance and dynamics.

This alternative will likely have no direct economic benefit associated with local industrial, commercial or residential growth.

4.4.2.6 Environmental Impacts

Implementation of the minimal degradation alternative will reduce annual pollutant loadings to Stonelick Creek and the East Fork Little Miami River and serve to eliminate the nonpoint source impacts on primary headwater habitat streams that flow through the Newtonsville service area. Pollutant loadings that are anticipated to be significantly reduced to local streams include bacterial, organic, ammonia and phosphorus loadings.

4.4.3 Preferred Alternative Description and Site Location

Treatment Site Evaluation: The preferred treatment alternative consists of constructing a new wastewater treatment facility to provide capacity for an average design flow of 57,000 gallons per day (GPD). The location of the new treatment facility was determined through engagement of a stakeholder panel that was charged with evaluating each of three (3) candidate treatment sites. The stakeholder panel consisted of four representatives from Clermont County, two representatives from the Village of Newtonsville, two representatives from Wayne Township and two representatives from the planning and design consultant.

In addition to evaluating the candidate treatment sites, eight of the stakeholders (i.e. two each from Clermont County, Newtonsville and Wayne Township) participated in an exercise to determine the weighting factors to be applied to each of the seven site evaluation criteria. Weighting factors were determined to give additional weight to those criteria that the stakeholders deemed to be most important. Both the site evaluation and weighting factor determination were conducted in a "blind" manner in that no stakeholder had any knowledge of the weighting factor outcome during the site evaluation process. This approach was designed to eliminate bias in the site evaluation results. The site evaluation criteria included the following:

- Proximity to Water Body
- Topography/Flood Protection
- Vegetative Buffer
- Property Acquisition Capability
- Community Impact
- Construction Impact
- Project Costs

Refer to **Appendix G** for the site evaluation ballots issued to each stakeholder for purposes of establishing weighting factors for the site evaluation criteria and for evaluating each candidate treatment site and the aggregate scoring results. The candidate site with the highest score is located on Cedarville Road, immediately northwest of Newtonsville. The property is a three acre privately owned parcel, originally available for potential purchase; however, following the site evaluation process the property owner decided to remove the property from consideration.

As a consequence of this action, negotiations with the owner of the second-ranked candidate site were initiated. This property, an eight acre parcel located on Wright Street and within the Village of Newtonsville, is owned by the Village. On July 29, 2014, the Village Council passed and adopted Resolution 2014-B which authorizes the utilization of Village property for a wastewater treatment facility. Refer to **Exhibit 4-3** (end of section) for an aerial view of the proposed treatment site.

Treatment System Description: The preferred treatment system consists of raw sewage screening, biological treatment using sequencing batch reactor (SBR) technology, effluent filtration, ultraviolet (UV) light disinfection and post aeration. Refer to **Appendix H** for a preliminary layout and equipment cut sheets of the proposed facilities. The recommended land

area required for the treatment facility is 2.0 acres. A permanent easement will be needed for County personnel to enter onto the treatment site from SR 131 (Wright Street).

One spiral-type fine screen for removal, compaction and dewatering of debris normally found in wastewater will be provided. The fine screen having 6 millimeter clear openings will be installed in a reinforced concrete channel having sufficient dimensions to accommodate the screen. Captured screenings will be conveyed by an inclined shaftless screw conveyor which will compact and dewater the material before discharging into a bagging device to contain the screenings and associated odors. The unit will be capable of being pivoted out of the channel for inspection and service and eliminate the need for a bypass screen channel. The captured screening material will be capable of passing the "paint filter test" to allow the material to be directly land-filled.

The screened raw wastewater will flow by gravity to the SBR for treatment. This technology accomplishes all phases of treatment in a single tank, thus reducing cost, land requirements and complexity. System features and benefits include the following:

- Independent aeration and mixing (lowers energy consumption);
- Quiescent settling (produces the high quality effluent);
- Small footprint using common wall construction (lowers construction cost);
- Modular design (facilitates future expansion if necessary);
- Sequential phase treatment (accomplishes biological phosphorus removal and de-nitrification);
- All components of the system are retrievable and easily accessible;
- Secondary clarifiers, return activated sludge pumps and associated piping are eliminated;
- Hydraulic fluctuations are controlled through a time-managed process operating strategy.

Treated effluent is removed using a floating decanter mechanism that follows the liquid level in the reactor and maximizes the distance between the clarified effluent and sludge blanket. This system ensures no floating surface materials and sludge blanket solids are drawn into the effluent during normal and peak flow conditions.

The SBR system features time-managed operation and control of aerobic, anoxic and anaerobic processes within the reactor using a programmable logic controller. The SBR utilizes five basic

phases of operation to meet advanced wastewater treatment objectives. The duration of any particular phase is manually adjustable and can be tuned to specific waste characteristics and/or effluent objectives. The individual treatment phases include:

- **Fill/Mix:** Screened wastewater enters the reactor and mixing is initiated to completely mix the contents of the tank in the absence of aeration. Anoxic conditions are created which facilitate removal of residual nitrates or nitrites via de-nitrification and limit the proliferation of filamentous bacteria which can hinder sludge settling velocity. To promote biological phosphorus removal, this mix/fill stage is extended to create anaerobic conditions to encourage growth of phosphorus accumulating organisms (PAO) that release phosphorus under anaerobic conditions prior to the uptake of phosphorus during the aerobic phase.
- **Fill/Aerate**: Following the prescribed time under mix-only conditions, air is added to the reactor while wastewater continues to enter the tank. During this phase, carbonaceous biochemical oxygen demand (cBOD) and nitrogenous oxygen demand is exerted and removal of organic compounds and conversion of ammonia nitrogen to nitrate nitrogen begins along with the biological uptake of phosphorus. Separation of aeration and mixing allows the blower to be turned down during low flow conditions to conserve energy while the system's flexibility allows nitrification/de-nitrification to occur.
- **Mix/Aerate**: Wastewater flow into the reactor ceases during the aeration phase and mixing and aeration continue. Ammonia reduction, cBOD removal and phosphorus uptake continue under aerobic conditions until treatment is complete.
- **Flocculate/Settle:** Following the completion of treatment, mixing and aeration are terminated which allows the activated sludge to flocculate and settle as a blanket. Nearly ideal solids/liquid separation is achieved due to quiescent conditions in the tank.
- **Decant/Waste:** Effluent decanting is initiated after the sludge has had time to settle and compact. Effluent is removed by subsurface withdrawal using a floating decant mechanism that follows the liquid level in the tank, thus maximizing the distance between the withdrawal point and the sludge blanket. Following the decant cycle, excess sludge produced from biological growth is pumped from the tank and transferred to the aerobic digester to maintain process control objectives.

The proposed use of tertiary filtration equipment is intended to reduce the discharge of suspended solids in the effluent and lower the discharge of total phosphorus that is bound into the biological sludge solids. **Table 4.5a, 4.5b, 4.5c** and **4.5d** summarize the proposed facilities of the preferred treatment alternative.

Table 4.5a
Preferred Alternative
Preliminary Design Summary

Parameter	Description
Influent Flows	
Design Average	57,000 GPD
Peak Hourly	228,000 GPD
Design Loadings (Average Day)	
Total Suspended Solids	47 lb/day (98 mg/L)
Carbonaceous BOD_5	59 lb/day (124 mg/L)
Ammonia Nitrogen	18 lb/day (40 mg/L)
Total Phosphorus	3 lb/day (6 mg/L)
Solids Production	
Average Day	104 lb/day (1,240 gal/day @ 1%TS)
Maximum Month	145 lb/day (1,740 gal/day @ 1%TS)
Preliminary Treatment	
Type	Perforated screen/screw conveyor
Quantity	1 screen
Openings	6 mm
Motor	480v/3 phase/60 Hertz/2 HP
Biological Treatment	
Type	Sequencing Batch Reactor (SBR)
Quantity	2 reactors
Reactor Size	25 ft x 25 ft
Maximum Liquid Depth	11.8 ft
Reactor Cycle Times (1 reactor)	
Mixing/Aeration	3.15 hrs/cycle at design average flow
Settling	0.75 hrs/cycle at design average flow
Decanting	0.90 hrs/cycle at design average flow
Total Cycle Time	4.80 hrs/cycle at design average flow
Total Cycles per Day	5

Notes:
1. Design loadings are preliminary and based on limited manhole sampling results in Amelia/Bethel areas serving POD systems.
2. Loadings will be subject to re-evaluation during detailed design phase.

Table 4.5b Preferred Alternative Preliminary Design Summary	
Parameter	**Description**
Biological Treatment Equipment	
Mixers	
Type	Direct Drive, Floating
Quantity	2 mixers (1 per tank)
Motor	480v/3 phase/60 Hertz/3 HP
Blowers	
Type	Positive Displacement
Quantity	3 blowers; 53 scfm/each
Reactor Design Air Flow Rate	106 scfm
Motor	480v/3 phase/60 Hertz/7.5HP
Oxygen Transfer	
Type	Fine Pore Membrane Diffusers
Quantity	20 per tank
Maximum Airflow Rate	2.65 scfm/diffuser
Diffuser Headloss	1.3 psig @ x 2.65 scfm
Waste Sludge Pumps	
Type	Submersible Non-Clog
Quantity	2 pumps (1 per tank)
Motor	480v/3 phase/60 Hertz/2.4 HP

Table 4.5c Preferred Alternative Preliminary Design Summary	
Item	**Description**
Tertiary Filtration	
Type	High Rate Disk Filter
Quantity	2 units (125 gpm/each)
Power Required	
Backwash Pump	480v/3 phase/60 Hertz/2HP
Drive Motor	480v/3 phase/60 Hertz/0.75HP
Effluent Disinfection	
Type	Ultraviolet Light
Quantity	Single Channel
Lamp Type	Low Pressure Mercury Vapor
Channel Width	20 inch
Modules Per Channel	4
Lamps Per Module	2
Total Lamps	8
Power Required	1.4 kW

Table 4.5d Preferred Alternative Preliminary Design Summary	
Parameter	**Description**
Aerobic Digester/Sludge Holding Tanks	
Quantity	1 tank
Dimensions	25 ft x 6 ft
Maximum Liquid Depth	11.8 ft
Blowers	
Type	Positive Displacement
Quantity	1 blower
Airflow Requirement	53 scfm
Motor	480v/3 phase/60 Hertz/7.5 HP
Oxygen Transfer	
Type	Coarse Bubble Membrane Diffusers
Quantity	5
Maximum Airflow Rate	10.6 scfm/diffuser
Sludge Transfer Pump	
Type	Submersible Non-Clog
Quantity	1 pump
Motor	480v/3 phase/60 Hertz/2.4 HP

4.4.3.1 Substances Discharged

The preferred alternative will convey all wastewater produced within the Newtonsville service area to an activated sludge treatment system followed by direct release to waters of the state. The substances to be discharged will comply with the BADCT limits as set forth by the Ohio EPA as summarized in **Table 4.6.**

Table 4.6 Best Available Demonstrated Control Technology (BADCT) for New Source Discharges OAC 3745-01-05 (Effective March 1, 2011)		
Effluent Parameter	**30-Day Average**	**7-Day Average**
Carbonaceous BOD_5	10 mg/L	15 mg/L
Total Suspended Solids	12 mg/L	18 mg/L
Ammonia (Summer)	1.0 mg/L	1.5 mg/L
Ammonia (Winter)	3.0 mg/L	4.5 mg/L
E. Coli	126/100 mL	235/100 mL
Dissolved Oxygen	6.0 mg/L (minimum)	

In addition to the BADCT discharge limits that will be imposed on the discharge, there will be a requirement to remove total phosphorus (TP). The exact discharge limit will not be known with certainty until the completion of the East Fork Little Miami River Basin TMDL report which is scheduled for release in 2015. For purposes of this planning document, a TP limit of 1.0 mg/L is assumed; however, measures have been taken to provide additional TP removal using effluent filtration to complement planned biological phosphorus removal. Further actions may be taken during the design phase, such as providing a chemical assist to precipitate soluble phosphorus, to comply with the discharge limits issued.

4.4.3.2 Permitting Process and Treatment Requirements

Since the preferred alternative system is classified as a new source, an NPDES discharge permit is required that grants permission to discharge treated wastewater to waters of the State and which defines and specifies final effluent limits. The application for an NPDES permit to discharge will be submitted to the Ohio EPA along with the Preliminary Engineering Report following the County's review and concurrence of the recommendations presented.

4.4.3.3 Reliability

The activated sludge treatment system is viewed as an industry-wide standard for the treatment of sanitary wastewater and therefore is considered highly reliable. This technology is proven and the likelihood of process upsets are minimal and the proposed facilities will be designed to meet the expected demands on the system. The preferred design alternative also provides operational flexibility not afforded by other alternatives. For example, the cycle times of the batch system can be adjusted and tuned to meet specific process requirements and new regulatory initiatives, such as total phosphorus and total nitrogen removal and can be adjusted to equalize incoming peak daily flows.

4.4.3.4 Human Health and Water Resources Impacts

The preferred design alternative will protect human health, improve water quality and address existing known stream impairment. This would result from the elimination of household sewage treatment systems and the documented impacts resulting from failed systems in the service area. The existing household sewage treatment systems will be

replaced with a centralized collection system that delivers the wastewater from the Newtonsville service area to the site of the proposed treatment system.

4.4.3.5 Social and Economic Impacts

The preferred alternative will provide social and economic benefit resulting from 1) a centralized collection system that will replace the existing on-site treatment systems in the service area and 2) a high quality, reliable form of wastewater treatment to serve the area and benefit the Stonelick Creek sub-basin. The social benefit derived from this alternative is enhanced recreational value of Stonelick Creek and the East Fork Little Miami River through improved water quality. Both water resources have a significant social value and offer recreational opportunities. A centralized collection and treatment system will create new opportunity for development and will likely have a positive impact on the value of property.

4.4.3.6 Environmental Impacts

Implementation of the preferred design alternative will reduce annual organic, ammonia nitrogen, phosphorus and bacterial pollutant loadings to the unnamed tributaries that extend through the Village of Newtonsville and to Stonelick Creek and address known areas of impairment. There are no perceived environmental benefits lost with the preferred alternative. This alternative will continue to protect and improve the warmwater habitat water quality of local area streams.

4.5 Collection and Conveyance Alternatives

Thus far, an analysis of various treatment options has been presented covering non-degradation, minimal degradation and preferred treatment alternatives. In addition to treatment alternatives, there are various alternatives for small community wastewater collection and conveyance that deserve examination. This sub-section presents an evaluation of six (6) options for the collection and conveyance of wastewater in the Newtonsville service area as follows:

- Gravity Conveyance (Inside Rights-of-Way)
- Gravity Conveyance (Outside Rights-of-Way/Following Topography)
- Low Pressure Conveyance
- Vacuum System Conveyance

- Septic Tank Effluent Pumping/Gravity
- Hybrid/Combination Conveyance

Refer to **Appendix I** for a technical memorandum containing a detailed evaluation of each collection and conveyance alternative, including proposed conveyance alignments contained in Appendix B of the technical memorandum and costs.

4.5.1 Overview of Topography

Referring to **Exhibit 4-4** (end of section), local topography ranges from El. 896 in the northwest corner of the Village to El. 902 in areas to the south areas and to El. 908 in the east (approximate slope of 0.40% across the Village). Several natural waterways flow through and around the Village. Drainage generally proceeds from east to west in Newtonsville Creek (a perennial stream) along the Village's northern boundary. Just west of Cedarville Road, Newtonsville Creek is joined by an intermittent stream flowing up from the southeast. This unnamed stream has two forks that extend from the center of the Village through the south side of the limits. This intermittent stream crosses under Main Street near Eckman Lane at El. 875. The east fork of this stream crosses under SR 131 south of Blackhawk Drive at El. 890. The west fork crosses State Route 131 east of Never Rest Lane at El. 892.

This exhibit also shows a breakdown of the service area into four zones that serve as a guide to the discussion of wastewater collection and conveyance. The location of the proposed new wastewater treatment facility is in the center of town near the fork of the intermittent stream. The ground elevation in this location is at approximate El.896.

4.5.2 Geotechnical Overview

Two (2) test boring were taken on June 13, 2014 to identify soil types and bedrock location. The following were noted from the geotechnical report:

- Medium stiff fill material consisting of sandy silty clay with gravel can be expected for the first 4 to 7 feet which is underlain by brown, moist, stiff to very stiff glacial clay;
- A layer of residual clay containing limestone fragments was encountered before hitting bedrock at a depth of 10 to 16 feet;

- The bedrock consists of inter-bedded gray, moist, very weak, weathered shale and gray, strong limestone, which is representative of the Sunset and Oregonia members of the Arnheim Geologic Formation;
- Ground water will typically be encountered as seepage along the limestone layers within the bedrock or as perched water just above the bedrock.

4.5.3 Collection and Conveyance Alternatives Evaluation

4.5.3.1 Gravity Conveyance/Inside Rights-of-Way

In this alternative, the collector alignment was maintained within the limits of the rights-of way (with exception of routing to the proposed treatment facility) to minimize the number of easements required and the impact to property owners. **Exhibit 4-5** (end of section) presents the selected alignment. This alternative is based on intercepting flow from each property lateral prior to entering the existing septic tanks. The lateral would be intercepted and rerouted to the new sewer located in front of the property.

The elevation at the site of the proposed wastewater treatment plant, where the gravity system terminates, is one of the higher elevations in the Village. In addition, the surface topography generally slopes upward toward the center of town, where the gravity sewers converge. Maintaining minimum requirements for sewer slope yields sewer depths in excess of 30 feet in the center of town, up to 20 feet of which is assumed to be in rock. Construction of sewers to these depths would require trench protection and benching and shoring resulting in road closures on Main Street and State Route 131 throughout the duration of construction. The sewers converge at the east end of Zone 1 and follow the east fork of the stream to the treatment plant. The depth through this stretch of sewer would be in excess of 40 feet.

This gravity conveyance alternative consists of over 13,500 lineal feet of pipe ranging from 8 to 10 inch diameter at depths ranging from 8 to 40 feet and slopes generally between 0.45% and 1.00%. A minimum of 44 manholes would be required and a single lift station would be required at the treatment site.

Constructability: The three main constructability issues for this alternative are related to the depths of excavation. Due to area topography relative to the plant location, several stretches of sewer are laid against grade, resulting in excavation depths greater than 30

feet. Several of these excavations are located in areas where buildings are in close proximity. In addition, the restoration requirements within the roadway will require significant quantities of controlled density fill (CDF) material with the displaced spoils hauled away. Hard rock, if discovered at depth, may require greater effort and special consideration.

Easements Required: Only one easement is anticipated where the sewer alignment parallels the property line located along the east fork of the stream. In general this easement is for the last stretch of pipe from the system to the treatment plant.

Environmental Impact: There are three (3) stream crossings; two (2) are located along SR 131, one on each fork of the stream. The third crossing is at Never Rest Lane. The alignment leading to the treatment plant site starts south of the intersection of the east fork and runs along the stream heading west.

Homeowner Impact: Gravity conveyance options, in general, have the lowest overall residential impact because property owners are only responsible for maintaining the lateral from the home to the right-of-way. Construction of the lateral may impact landscaping and other yard features, but this issue is common to each alternative under consideration.

System Reliability: Gravity conveyance systems typically have the best overall system reliability. This is due to field-proven design standards and reliance on gravity rather than mechanical systems for the conveyance of wastewater.

Local Use Precedent: Gravity conveyance is the most common and widely used type of conveyance in Clermont County. It has a proven performance record and is typically the most favorable system where costs are affordable.

4.5.3.2 Gravity Conveyance/Outside Rights-of-Way

In this alternative, the alignment was determined by minimizing depth of the gravity sewer by following the terrain; though, where practical, the alignment was maintained within rights-of-way. The goal was to reduce several cost factors and constructability issues, including, rock excavation and road excavation. The conceptual layout is included in **Exhibit 4-6** (end of section).

The piping within Zone 1 was aligned in two pathways from the high point in the southeast corner toward the proposed treatment facility. Zone 2 utilizes two sewer alignments to serve the north and south sections. The piping connects to Zone 1 toward the South end of Pin Oak Street and from Never Rest Lane respectively. Depths along the alignment are expected to reach 18 feet.

Zone 3 conveyance was accomplished with two mainline sections. The east section conveys flow from the area surrounding the Cross Street and Main Street intersection and slopes south along State Route 131 to Zone 1. The proposed alignment is expected to reach a maximum of 18 feet deep through this section of town. The west section serves the properties along Main Street and the creek and slopes north along Eckman Lane to the pump station. This pump station would deliver flow south along the creek to the proposed treatment facility. By including a pump station in this location, the sewer depth is reduced by more than ten feet compared to the gravity conveyance inside rights-of-way alternative.

This proposed alternative includes over 18,500 lineal feet of pipe ranging from 8 to 10 inch diameter at depths ranging from 8 to 25 feet and slopes generally between 0.45% and 1.00%. A minimum of 65 manholes would be required. Two (2) lift stations are required, one at the treatment site and another at the north end of Eckman Lane. About 1,850 feet of force main is required to deliver flow from the Eckman Lane station, south to the proposed treatment plant site.

Easements Required: Approximately 15 properties will require easements where sewers from run along Newtonsville Creek to the proposed Eckman Lane lift station. Two easements would be needed to continue the force main from the intersection of Eckman Lane and Main Street to the proposed treatment plant. Two to three easements would be needed from the deadends of Pin Oak Street and Never Rest Lane across the west fork of the stream. Up to four more properties will need easements, as the alignments parallel each fork of the stream. Approximately 24 easements are required in total for this alternative.

Environmental Impact: A total of six (6) stream crossings would be required for this alternative. The crossings are located in the eastern half of the service area: two on each fork of the stream; one near the intersection of Eckman Lane and Main Street; and one

just east of the pump station at the north end of Eckman Lane. In addition, this alignment parallels the stream and portions of Newtonsville Creek. There may be an impact to several trees within the riparian zone based on this alignment.

Homeowner Impact: In general, gravity conveyance options have the lowest overall owner impact because residents are only responsible for maintaining the lateral from the home to the right-of-way.

System Reliability: Gravity conveyance systems in general have the best overall system reliability. This is due to the field-proven design standards and reliance on gravity rather than mechanical systems for the conveyance of wastewater. Reliability is decreased as pump stations are included in the system. This alternative would be considered less reliable than the previous gravity alternative since an additional pump station would be needed. It would also have a higher operation and maintenance cost due to additional sewer length, in incremental number of manholes and another force main.

Local Use Precedent: Gravity conveyance is the most widespread form of conveyance throughout the US and Clermont County. It has a proven performance record and is typically the most favorable system when affordable.

4.5.3.3 Low Pressure Conveyance

Low pressure conveyance systems commonly use package systems, located on the properties they serve, to force flow through the collection system (using positive pressure). Flow is intercepted prior to the septic tank and routed from the new lateral to a package pump station. The package system stores, grinds and pumps the sewage throughout a manifolded pressurized system to the treatment plant.

There are options that include either one package system per property served, or systems where one system is shared with each property. For this option, it is assumed that the County would own/maintain the package system, one system would be provided per homeowner and the system would be located outside the home. The package system typically includes the following components:

- Dual compartment tank with dry upper section for access to pump and electrical disconnect and lower wet well section.

- Pump: two options are available specific to manufacturer (progressive cavity pump or centrifugal pump). For the basis of comparison, the progressive cavity pump option was selected.
- Level sensors: for pump on/off, malfunction and high level alarms.
- Piping and valves within unit
- Individual force main (from unit to sewer network)
- Sewer network

Based on the layout presented in **Exhibit 4-7** (end of section) for the Low Pressure Conveyance option, service branches are 1 ½ inches, and main lines within the Village will range from 2 to 4 inches. These pipes being small diameter and shallow can be installed by a variety of methods, including; open cut, trenching and horizontal directional drilling (HDD). Because the main lines are proposed to be within the roadway, open cut was used as the basis of cost.

Because the main is pressurized, Schedule-80 PVC pipe would be utilized and the minimum depth is 48 inches (60 inches at creek crossing) to be below the frost line. In addition, the pressurized main would follow the topography, virtually eliminating deep excavation into bedrock. The proposed alignment would be maintained within rights-of-way, minimizing the number of easements. This alignment would consist of 14,000 lineal feet of conduit ranging in diameter from 2 to 4 inches at depths ranging from 4 to 5 feet. No manholes are required and two to four air release valves are anticipated at main line high points throughout the system.

Constructability: The construction of the main lines requires much less effort than gravity conveyance alternatives as the piping is shallow. Constructability issues are more challenging because home owner coordination is needed to locate the package system within the property boundary and power has to be run from each home to the package system.

Easements Required: A service easement would be required on each property connecting to the sewer, extending from the collector sewer right-of-way to the septic

system. Another easement is anticipated, where the main line parallels the property line located along the east fork of the stream within Zone 1.

Environmental Impact: There are three (3) stream crossings; two are along State Route 131, one on each fork of the stream and the third is at Never Rest Lane.

Homeowner Impact: The homeowner would be responsible for maintaining the lateral to the pump vault and supplying power to the pump. Pumps operate with 1 horsepower, 240 volt, single phase motors requiring 30 amp service per the manufacturer. Older homes in the community may have to upgrade their electric in order to be connected into the system. The costs of the electrical upgrades would be borne by the property owner.

The County would install on-lot components, including installing the pump vault, the service line to the main, the alarm panel and electrical connection from the panel to the pump. The County would retain ownership and be responsible for the maintenance of all system components with the exception of the pipe lateral to the pump vault.

System Reliability: The system is dependent on satisfactory pump operation at each individual home. If an electric outage occurs in part or all of the service area, the individual homes impacted by the outage would be out of sewer service; however, the rest of the system would continue to function. The pump vaults have a 70 gallon total capacity which offers some storage volume. If the loss of service is due to a power outage, water usage would be expected to be reduced. These systems have been designed for ease of maintenance, but because they are reliant on pumps, electricity and controls, the system is less reliable than a gravity collection system.

Grinder pumps are prone to blockages and mechanical breakdowns, which could lead to sewage buildup in the vault. If sewage in the tank reaches a volume exceeding the design capacity, an alarm would alert the property owner that service is required. Due to the grinding action, pumps can expected to be totally rebuilt about every 5 to 8 years and replaced every 15 years.

Local Use Precedent: There are no low pressure conveyance systems installed in Clermont County but other Ohio communities such as Greene County, Logan County (Indian Lake) and Waynoka Regional Water and Sewer have these systems in place.

Additional Considerations: Effluent received from grinder pumps is expected to be less septic and less odorous. The resulting higher strength sewage would be better suited for biological phosphorus removal; however, the shred-and-release action generally increases centralized treatment needs. Front-end screening would be required at the treatment plant.

4.5.3.4 Vacuum Pressure System Conveyance

Vacuum sewers use negative pressure to draw waste to a central vacuum station. A small valve pit stores wastewater near the source. When the level of sewage reaches a predetermined level in the pit, the vacuum valve opens and the pressure difference draws the wastewater into the system. The waste is then pumped to the treatment facility. This system must remain watertight, as any air leakage reduces the vacuum of the system.

In general, the main lines follow topography, but they utilize a saw-tooth profile where wastewater flows by gravity to a low point in the line. A short lift of one to one and a half feet (typical) causes the formation of a "wastewater plug" in the line. When a valve upstream of this plug opens, the pressure differential propels the wastewater up the lift and through the pipe. Where elevation changes are required due to slope changes or topographical features, the main line depth may need to be adjusted to make up the elevation change over a series of "saw-tooth" adjustments or lifts.

Details of the Vacuum System Conveyance option are shown in **Exhibit 4-8.** Flow from Zone 4 would be routed toward the intersection of Cross Street and Main Street. The saw-tooth lifts are closer together (anywhere from 50 to 125 feet) in order to "climb" up slope. Flow from Zone 3 would begin near the intersection of Eckman Lane and Main Street and heads east to State Route 131. Due to the elevation at the head end of this segment, the sewer must "climb" 8 feet. The flow would combine with that of Zone 4 and continue south along State Route 131 into Zone 1. Because the terrain falls through this stretch, the lift sections are further apart, about 300 to 500 feet. The slope for the last segment in Zone 3 would be steeper than minimum slope due to the stream elevation.

Zone 2 would collect flow from Pin Oak Street and Main Street west of the stream and route it south on Cedarville Road. The head end on Main Street must overcome about 8 foot of rise. The sewer would continue east on 131, where it picks up flow from Never

Rest Lane. The slope must increase greater than minimum to cross the stream into Zone 1. Zone 1 would carry the flow from Zone 2 at the west fork of the stream and must rise 12 feet as the sewer traverses to the high point at the southeast corner of Zone 1. About 5 feet of rock excavation can be expected in this area. Slopes must increase as the sewer continues toward the northeast to combine with Zone 3. The alignment would continue westward along the east fork and must climb about 7 feet to the vacuum station. From the station, flow would be pumped to the proposed treatment plant.

The proposed alignment would consist of nearly 14,000 lineal feet of conduit ranging in diameter from 4 to 6 inches at depths ranging from 4 to 15 feet and would generally slope from 0.20% to 1.00%. An estimated 16 isolation valves would be required to isolate sections of the sewer system for servicing.

Constructability: Of the conveyance systems being evaluated, vacuum sewers are the most sensitive to construction flaws. Poor seals between joints or damage to the pipe caused by construction activities, ground shifts or poor bedding could lead to leaks that drive up operation and maintenance costs, while reducing system performance. In general, the overall depths are less than those required for gravity systems, but slightly deeper than low pressure and Septic Tank Effluent Pump (STEP) systems.

Easements Required: A service easement would be required on each property connecting to the sewer, extending from the collector sewer right-of-way to the septic system. Another easement is anticipated, where the main line parallels the property line located along the east fork of the stream within Zone 1.

Environmental Impact: There are three (3) stream crossings: two are located along State Route 131, one on each fork of the stream; the third is at Never Rest Lane.

Homeowner Impact: On-lot components consist of rerouting the lateral to the vacuum valve vault, the valve vault and the vacuum service to the main line.

System Reliability: The valves actuate based the system pressure, so there would be no electrical components for the on-lot facilities. The valves could periodically get stuck in the open or closed position, typically due to a blockage at the valve. During cold weather, the valves could freeze.

Local Use Precedent: There are no vacuum pressure conveyance systems installed in Clermont County.

4.5.3.5 Septic Tank Effluent Pumping (STEP) Conveyance

The collection equipment used in STEP systems incorporates a screen designed to filter out solids before being pumped. A pump well is installed in the middle of the vault and draws from the "clear zone" of the tank. Settleable solids are retained on the outside of the pump well.

Due to the unknown structural integrity of existing septic tanks within the service area and the risk of introducing ground water infiltration to the system, this analysis assumes a new septic tank will be installed on each occupied property. Providing new septic tanks supports the goal of this project by providing a long lasting system.

Effluent sewers function similarly to low pressure systems. One main difference is that the STEP tanks perform primary treatment at the source. The settleable solids remain in the tank to be digested and are removed periodically. Only the "clear zone" wastewater is pumped to the conveyance network to the treatment plant. The pumping system is a fabricated unit complete with pump, electrical components, instrumentation and controls. The septic tank serves as a storage unit in the case of system failure due to power loss or mechanical issues.

For this option, it is assumed that the County would own/maintain the system beyond the lateral. Each septic tank would receive a filtered STEP vault which screens the septic tank effluent before reaching the pump. A control system would respond to the water level in the septic tank and automatically actuate the pump at pre-set levels. Each connection would require a valve box with a shut-off valve and check valve near the force main connection at the street.

The package system typically includes the following components:

- STEP unit complete with pump, piping and valves
- Septic tank
- Level sensors: for pump on/off, malfunction and high level alarms.
- Individual force main (from unit to sewer network)

Service connection lines of 1-inch diameter are proposed to connect each household pump system to the force main network. Approximately 53 properties would be serviced by the South Route through Zones 1 and 2 and an estimated 108 properties would be serviced by the North Route through Zones 3 and 4. A map showing this preliminary layout is included in **Exhibit 4-9** (end of section).

Based on this layout, a 2-inch line size would be sufficient to serve the majority of the network. The North Route and South Route would join together to complete the path to the proposed treatment plant site. This combined line is 3-inch diameter. The approximate length of the various lines is 14,000 lineal feet. The mains are proposed to be constructed of Schedule-80 PVC per County standards. As with low pressure force mains, it is important that the mains be sealed against leakage and infiltration and be pressure rated.

Constructability: Construction of the main lines would be much less challenging than gravity conveyance alternatives as the piping is only four to five feet deep. The constructability issues are more challenging because homeowner coordination is needed to locate the package system within the property boundary and power has to be run from each home to the package system.

Easements Required: A service easement would be required on each property connecting to the sewer, extending from the collector sewer right-of-way to the septic system. Another easement is anticipated, where the main line parallels the property line located along the east fork of the stream within Zone 1.

Environmental Impact: There are three (3) stream crossings; two are along State Route 131, one on each fork of the stream, the third is at Never Rest Lane.

Homeowner Impact: The homeowner is responsible for the lateral to the new septic tank. The County requires the electronic control service to have a 30 amp fused disconnect 120/240 volt for the pump. Older homes in the community may have to upgrade their electric service in order to be connected to the system.

System Reliability: The system is dependent on properly functioning pumps and controls. If an electric outage occurs in part or all of the service area, the individual homes

impacted by the outage would be out of power to their sewer service, but the rest of the system would function. The septic tanks have storage volume which is estimated to be more than 24-hours based on water usage. If the outage is due to a power outage, water usage is expected to be reduced.

Local Use Precedent: Septic Tank Effluent Pump (STEP) Systems have been in existence and have gained credibility in the United States since the 1970's. The technology has been endorsed by U.S. EPA, Electric Power Research Institute (EPRI), Water Environment Federation (WEF), and others as a viable, sustainable, and economical alternative to conventional sewer systems. Clermont County currently has Septic Tank Effluent sewers within their jurisdiction.

Additional Considerations: This conveyance alternative would not require screening at the treatment plant since screening is provided at the source; thus, treatment facility construction costs will be reduced. This conveyance option would also produce lower strength sewage which will likely reduce biological phosphorus removal capabilities and the peak hydraulic loadings would be lessened because of the absence of infiltration and inflow to the collection system.

4.5.3.6 Hybrid/Combination Conveyance

Referring to **Exhibit 4-10**, an effort was made in the hybrid option to minimize the number of properties connected via a pump. The Hybrid/Combination Conveyance option would have: 42 parcels connected to conventional gravity sewers, 41 parcels connected to septic tank effluent pumping and 78 parcels connected to septic tank effluent gravity (STEG). This approach yields 75% of the parcels served by gravity and 25% served by pumps.

The following logic guided the hybrid system layout:

- A goal was set to achieve a 10-foot to 12-foot sewer depth at the intersection of Main Street and State Route 131. This is the area with the highest population density and greatest opportunity to reduce the number of pumping systems.
- Stream crossings were set to have 4 feet of cover. This helped to extend conventional gravity service to Pin Oak Street in Zone 2 – as the sewer was sufficiently deep after

flowing under the stream on the south end of the street. Ohio EPA regulations allow for 4 feet of cover over gravity sewers and 5 feet of cover over fore mains.

- Once conventional gravity service was extended to the limit of where it could be laid at 10 feet to 12 feet of depth at minimum slopes, the public main was transitioned to STEG service at minimum slopes to extend the gravity service as far as possible. Once the STEG main reached about 6-foot depth or a depth indicated by the septic tank elevation surveys from earlier in the project, the public main was transitioned to STEP service. (Note: extension of gravity service beyond that noted will be further investigated during the design stage)

Flow in the collection system starts in the low-lying northern reaches as STEP where pressure mains deliver septic tank effluent to the furthest extent of the STEG mains. The low-lying reaches cannot be served through grinder pumps because the pressure mains must discharge to the small diameter, low-slope mains of the STEG system. Most of the residents in Zone 4 and the northern extents of Zones 3 and 4 will be served via STEP system.

The STEG sewers serve as a transition for the collection system on the eastern and western extents of Newtonsville and the Village's core area at the intersection of Main Street and State Route 131. Flow moves through the STEG zones toward the wastewater treatment plant in the center of the service area. The STEG system transitions to conventional gravity as guided by the third bullet noted above. The southern portion of Zone 3, nearly all of Zone 1, and the eastern portion of Zone 2 are able to be served by a conventional gravity sewer system. Sewers from the eastern and western portions of the service area parallel minor streams as they enter the Village's park parcel and combine at a pump station adjacent to the wastewater treatment plant.

This alignment would consist of about 2,700 linear feet of 2-inch diameter force main for the low pressure system at depths ranging from 4 to 5 feet following the slope of the terrain. No air release valves would be required. There would also be approximately 6,500 linear feet of 6-inch diameter gravity main in the STEG system and 5,500 linear feet of conventional 8-inch gravity main at depths of 10 to 15 feet. Future expansion could be accommodated through the connection of pressure sewers or STEP pumps to the system in virtually any location.

Constructability: The constructability of the force mains is much simpler than conventional gravity sewers due to the shallow depth and small diameter pipe. The gravity sewer is generally in the range of 10 to 12 feet deep, so it will be more challenging to install than force main, but substantially easier than the deep sewers seen with the gravity only alternatives.

Easements Required: Two to three easements would be needed from the dead-ends of Pin Oak Street and Never Rest Lane across the west fork of the stream located between Zones 1 and 2. Up to four more properties would need easements in Zone 1, as the alignments would parallel each fork of the stream. 119 easements will be needed for the STEG and STEP properties. Overall, about 126 easements will be needed for the hybrid option.

Environmental Impact: There are three stream crossings; one is along State Route 131, at the east fork of the stream. The others would be at Never Rest Lane and east of the south end of Pin Oak Street. The alignment would parallel both forks of the stream as sewers approach the plant site.

Homeowner Impact: The homeowner is responsible for the lateral to the new septic tank in STEP areas. The County requires the electronic control service to have a 30 amp fused disconnect 120/240 volt for the pump. Older homes in the community may have to upgrade their electric service in order to be connected into the system. The costs of the electrical upgrades would be borne by the property owner. Residents on STEP systems would expect to see increases in their electric bill of $12 to $14 per year based on $0.0639 per kWh and 0.5 to 0.6 kWh per day expected usage. Properties served by gravity would obviously not be subject to electric requirements imposed by those with pumps.

System Reliability: The system is dependent on properly functioning pumps and controls. If an electric outage occurs in part or all of the STEP properties the individual homes impacted by the outage will be out of power to their sewer service, but the rest of the system will function. The septic tanks have various storage volumes depending on size, which is estimated to be more than 24-hours (per manufacturer) based on water usage. If the outage is due to loss of utility power, water usage would be expected to be reduced.

Gravity service is the most reliable section of the system although the reliability is decreased somewhat due to the pump station at the treatment facility.

Local Use Precedent: As these newer technologies become more prominent, integration into long established gravity infrastructure has developed. As a result, hybrid systems have become more common throughout the United States. In Bethel and Amelia, CCWRD has experience with STEG and STEP systems.

4.6 Cost Estimates

This sub-section provides a summary of costs for the technically feasible wastewater collection and conveyance alternatives and wastewater treatment alternatives considered herein. The costs are based on the following unit costs:

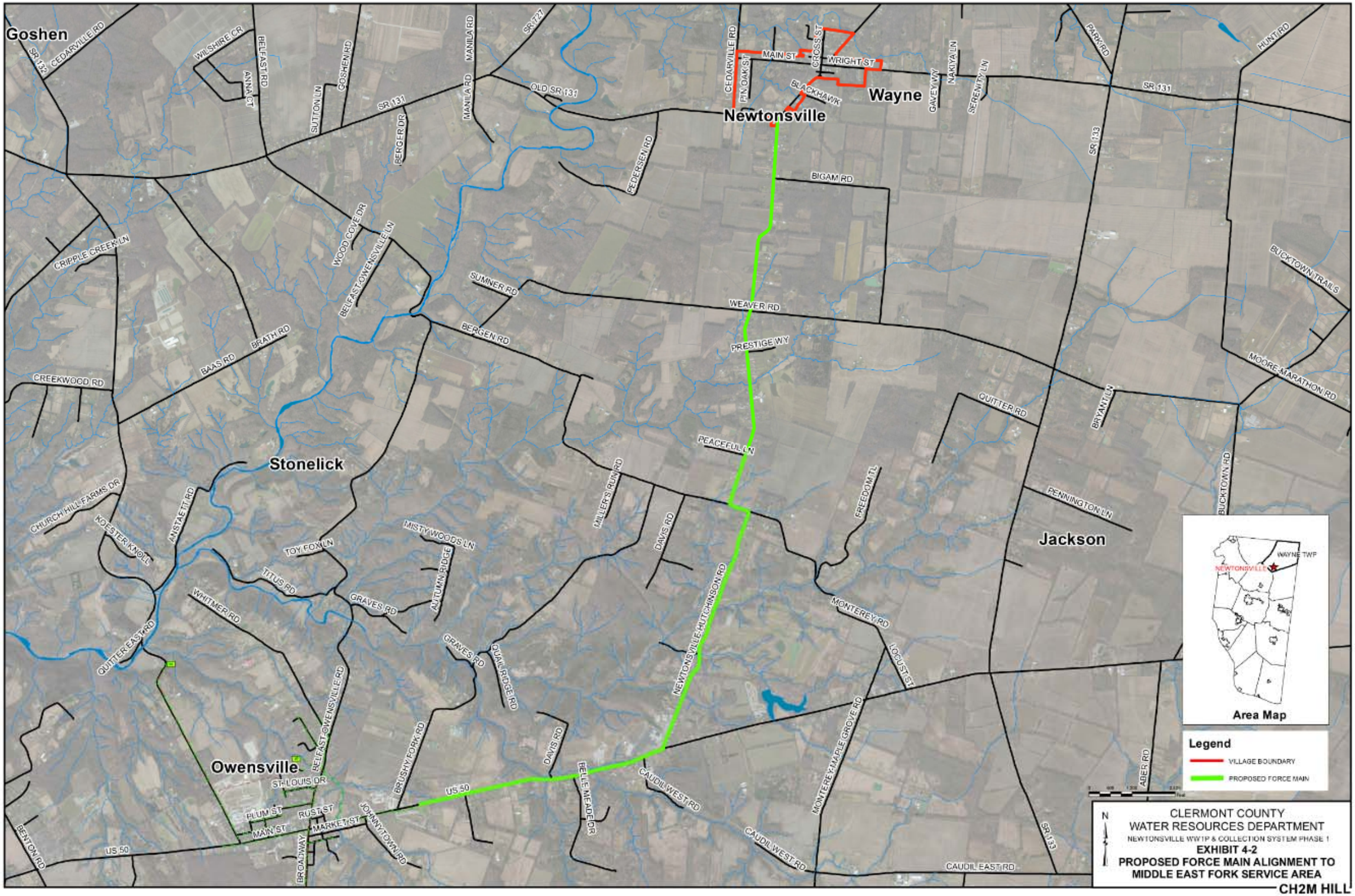
- Labor ($40/hr)
- Electrical Energy ($0.064/KWh)
- Sludge Hauling ($0.01/gal)
- Easement Acquisition ($2,000)
- Land in Service Area ($8,000/acre)
- Water ($3.48/1000 gal)
- Sewer ($4.44/1000 gal)
- Chemical Cost (Liquid Alum-$1.60/gal)

The construction cost contingency is included in the non-construction cost category. Operation and maintenance costs are further broken down into sub-categories for refinement. Refer to **Table 4.7** and **Table 4.8** for a summary of estimated costs in each of these categories for wastewater collection and treatment, respectively. These costs are used as a basis for the life cycle cost analysis presented in Section 5.

Table 4.7 Wastewater Collection and Conveyance Alternatives Preliminary Estimates of Cost						
Description	**Gravity Inside R/W**	**Gravity Outside R/W**	**Low Pressure Conveyance**	**Vacuum Conveyance**	**STEP Conveyance**	**Hybrid Conveyance**
CC Estimate	**$5,206,000**	**$4,141,000**	**$2,535,000**	**$3,491,000**	**$2,690,000**	**$3,232,000**
Non-Construction Project Costs (NCPC)						
Contingency	$1,301,500	$1,035,250	$633,750	$872,750	$672,500	$808,000
Design	$260,300	$207,050	$152,100	$192,005	$161,400	$177,760
Const. Engineering	$156,180	$124,230	$76,050	$104,730	$80,700	$96,960
Inspection	$83,200	$83,200	$83,200	$83,200	$83,200	$83,200
Legal & Permitting	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
Easement Acq.	$2,000	$48,000	$324,000	$324,000	$324,000	$252,000
Interest	$83,296	$66,256	$40,560	$55,856	$43,040	$51,712
Training	$0	$0	$0	$6,982	$0	$0
Funding Admin	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Subtotal NCPC	**$1,916,476**	**$1,593,986**	**$1,339,660**	**$1,659,523**	**$1,394,840**	**$1,499,632**
CC+NCPC(rounded)	**$7,123,000**	**$5,735,000**	**$3,875,000**	**$5,151,000**	**$4,085,000**	**$4,732,000**
Estimated Annual Operation & Maintenance Costs						
Operational Labor	$16,640	$16,640	$4,160	$4,400	$4,160	$4,160
Administrative	$5,206	$4,141	$2,535	$3,491	$2,690	$3,232
Insurance	$10,412	$8,282	$5,070	$6,982	$5,380	$6,464
Water	$0	$0	$0	$0	$0	$0
Electric Energy	$7,040	$13,440	$0	$7,040	$0	$941
Test Services	$0	$0	$0	$0	$0	$0
Chemical	$0	$0	$0	$0	$0	$0
Maintenance	$20,823	$35,776	$22,000	$50,732	$33,488	$37,440
Supplies	$5,206	$4,141	$2,535	$3,491	$2,690	$3,232
Solids Disposal	$0	$0	$0	$0	$13,685	$3,485
Est. Annual O&M (rounded)	**$65,830**	**$83,420**	**$36,300**	**$76,140**	**$62,100**	**$59,460**

Table 4.8 Wastewater Treatment Alternatives Preliminary Estimates of Cost			
	Non-Degradation Alt.	**Minimal Degradation Alt.**	**Preferred Alternative**
Description	Pump to Middle East Fork Service Area	Constructed Wetlands & Land Application	Activated Sludge Treatment
CC Estimate	**$,5,620,000**	**$2,077,000**	**$2,262,000**
Estimated Non-Construction Project Costs (NCPC)			
Contingency	$1,405,000	$519,250	$565,500
Planning & Design	$281,000	$207,700	$226,200
Const Eng'g & Inspection	$251,800	$187,050	$196,300
Legal/Permits/ROW	$132,400	$61,540	$24,000
Land	$0	$444,000	$16,000
Interest	$89,920	$33,232	$36,192
Training	$5,000	$5,000	$5,000
Funding Admin	$10,000	$10,000	$10,000
Subtotal NCPC	**$2,175,120**	**$1,467,772**	**$1,079,192**
CC+NCPC(rounded)	**$7,796,000**	**$3,545,000**	**$3,342,000**
Estimated Annual Operation & Maintenance Costs			
Operational Labor	$4,160	$8,320	$8,320
Administrative	$5,620	$2,077	$2,262
Insurance & Legal	$11,240	$4,154	$4,524
Water Service	$0	$0	$104
Electric Energy	$6,720	$10,512	$4,976
Test Services	$0	$3,500	$3,500
Chemical	$0	$0	$3,000
Maintenance/Replacement	$46,460	$33,732	$32,168
Supplies	$5,620	$2,077	$2,262
Solids Hauling/Disposal	$0	$0	$1,952
Est. Annual O&M (rounded)	**$79,820**	**$64,380**	**$63,070**

Goshen
Wayne
Miami
Stonelick
Newtonsville
WOODVILLE PI
WOODVILLE DR
GARDEN DR
REDBIRD DR
ROLLAWAY DR
HERITAGE WOODS DR
IVY RD
PARKER RD
SR 132
DEER WOODS DR
CRAWFORD LN
OAK VIEW
HICKORY LN
DEERFIELD RD
LINDA WY
HILLTOP WY
GREIMANN LN
MOLER RD
GOSHEN RD
CEDARVILLE RD
BELFAST RD
WILSHIRE CR
ANNAOT
SUTTON LN
SR 131
MANILA RD
PRESLEY LN
KIRBY LN
SR 727
OLD SR 131
BERGER DR
BELFAST-OWENSVILLE RD
BELFAST-OWENSVILLE LN
SUMNER RD
BERGEN RD
WEAVER RD
PRESTIGE WY
PEACEFUL LN
BRUSHY FORK RD
MILLER'S RUN RD
DAVIS RD
MISTY WOODS LN
TOY FOX LN
ANSTAETT RD
CHURCH HILL FARMS DR
CRAVER RD
APGAR RD
MT ZION RD
WILD ROSE LN
CREEKWOOD RD
BRATH RD
BAAS RD
STONELICK-WILLIAMS CORNER RD
CRIPPLE CREEK LN
ROSEWOOD LN
CHESTNUT VIEW LN
APPLE CIDER LN
MAPLE LEAF DR
RED FOX LN
SHILOH RD
PRINGLE RD
NEWTONSVILLE RD
BACH LN
GREENWOOD DR
DEER RUN RD
LOCUST VIEW LN
SPRING HILL RD
BRITTANY LN
SUMMER HILL RD
WERNER LN
ROUDEBUSH RD
MAFFEY RD
PARK RD
ZAYNE WY
MAIN ST
CROSS ST
WRIGHT ST
SR 131
BLACKHAWK
PIN OAK ST
NEWTONSVILLE-HUTCHINSON RD
GAVEY WY
NAKIYA LN
SERENITY LN
BIGAM RD
WAYNE TWP
NEWTONSVILLE
Area Map
Legend
VILLAGE BOUNDARY
PROPOSED FORCE MAIN
N
CLERMONT COUNTY
WATER RESOURCES DEPARTMENT
NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1
EXHIBIT 4-1
PROPOSED FORCE MAIN ALIGNMENT TO
LOWER EAST FORK SERVICE AREA
CH2M HILL


Goshen
Wayne
Newtonsville
Stonelick
Jackson
Owensville
SR 132
CEDARVILLE RD
WILSHIRE CR
BELFAST RD
ANNA CT
SUTTON LN
GOSHEN RD
SR 131
MANILA RD
SR 727
OLD SR 131
PERGER DR
CEDARVILLE RD
PIN OAK ST
MAIN ST
CROSS ST
WRIGHT ST
BLACKHAWK
GAVEY WY
NAKIYA LN
SERENITY LN
PARK RD
HUNT RD
SR 131
SR 133
CEDERSEN RD
BIGAM RD
CRIPPLE CREEK LN
WOOD COVE DR
BELFAST-OWENSVILLE LN
SUMNER RD
WEAVER RD
BUCKTOWN TRAILS
BERGEN RD
BRATH RD
BAAS RD
PRESTIGE WY
MOORE-MARATHON RD
CREEKWOOD RD
QUITTER RD
BRYANT LN
PEACEFUL LN
BUCKTOWN RD
CHURCH HILL-FARMS DR
KOESTER KNOLL
ANSTAETT RD
MILLER'S RUN RD
FREEDOM TL
PENNINGTON LN
TOY FOX LN
MISTY WOODS LN
DAVIS RD
TITUS RD
AUTUMN RIDGE
WHITMER RD
GRAVES RD
NEWTONSVILLE-HUTCHINSON RD
MONTEREY RD
QUITTER EAST RD
QUAIL RIDGE RD
LOCUST ST
BELFAST-OWENSVILLE RD
BRUSHY FORK RD
MONTEREY-MAPLE GROVE RD
ST LOUIS DR
BELLE MEADE DR
CAUDIL WEST RD
US 50
PLUM ST
RUST ST
MAIN ST
MARKET ST
JOHNNYTOWN RD
BROADWAY
BENTON RD
CAUDIL EAST RD
ABER RD
Area Map
WAYNE TWP
NEWTONSVILLE
Legend
VILLAGE BOUNDARY
PROPOSED FORCE MAIN
N
CLERMONT COUNTY
WATER RESOURCES DEPARTMENT
NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1
EXHIBIT 4-2
PROPOSED FORCE MAIN ALIGNMENT TO
MIDDLE EAST FORK SERVICE AREA
CH2M HILL

Parcel No.: 501104.101.
1.261 acres
Parcel No.: 501104.102.
0.6258 acres
Parcel No.: 501103.045.
17.438 acres
Parcel No.: 501103.011.
0.289 acres
Parcel No.: 501103.047.
0.608 acres
Parcel No.: 501104.077.
8.009 acres
Parcel No.: 501104.105.
1.079 acres
Parcel No.: 501104.013.
0.6 acres
WRIGHT ST
Parcel No.: 501104.049.
1.12 acres
Parcel No.: 501104.020.
0 acres
Parcel No.: 501104.018.
1.75 acres
Parcel No.: 501104.014.
0.768 ac
Parcel No.: 493412D085
WAYNE TWP
NEWTONSVILLE
Area Map
Legend
SITE BOUNDARY
N
CLERMONT COUNTY
WATER RESOURCES DEPARTMENT
NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1
EXHIBIT 4-3
VILLAGE OF NEWTONSVILLE
PROPOSED WASTEWATER TREATMENT SITE
CH2M HILL

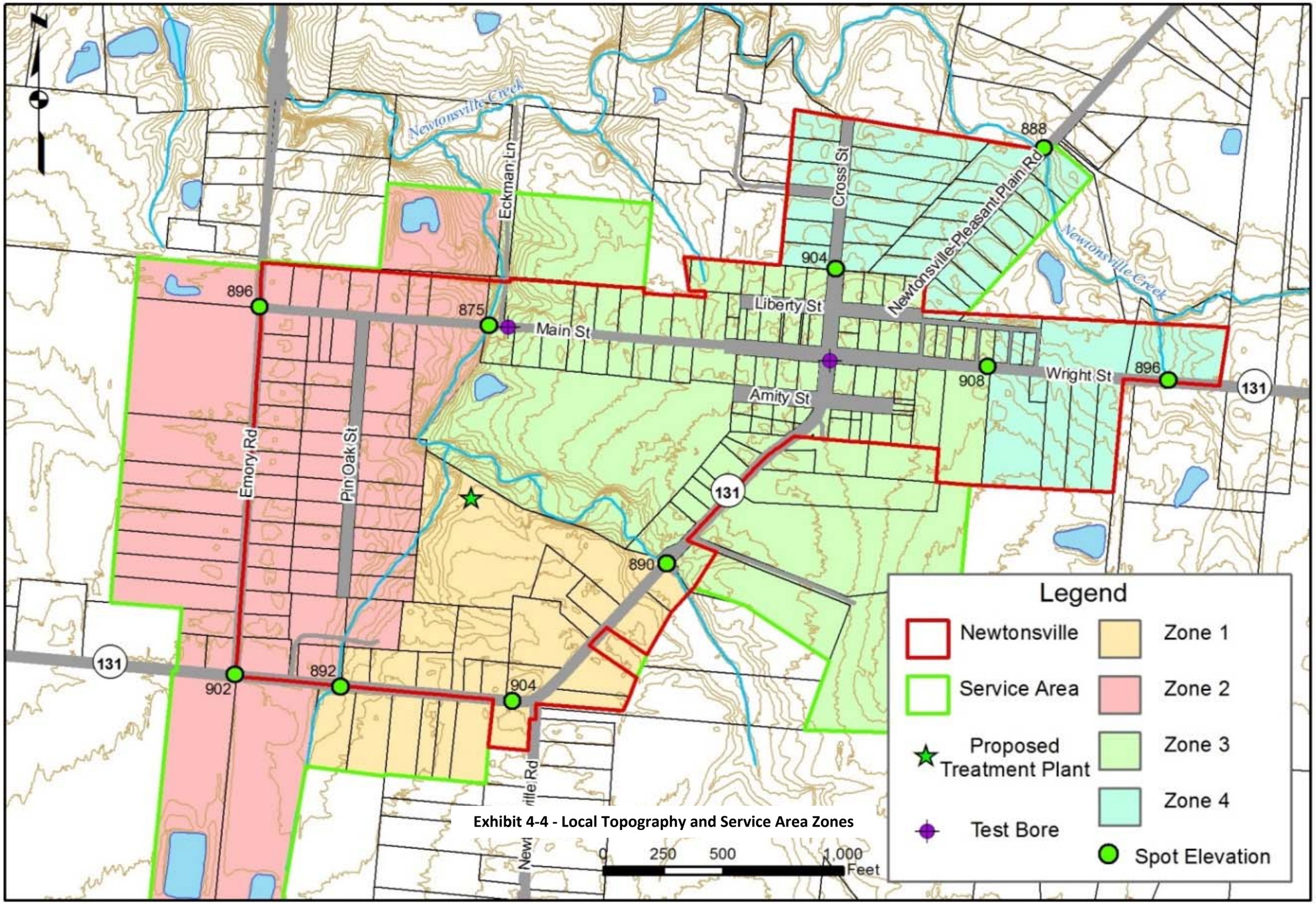


Exhibit 4-4 - Local Topography and Service Area Zones

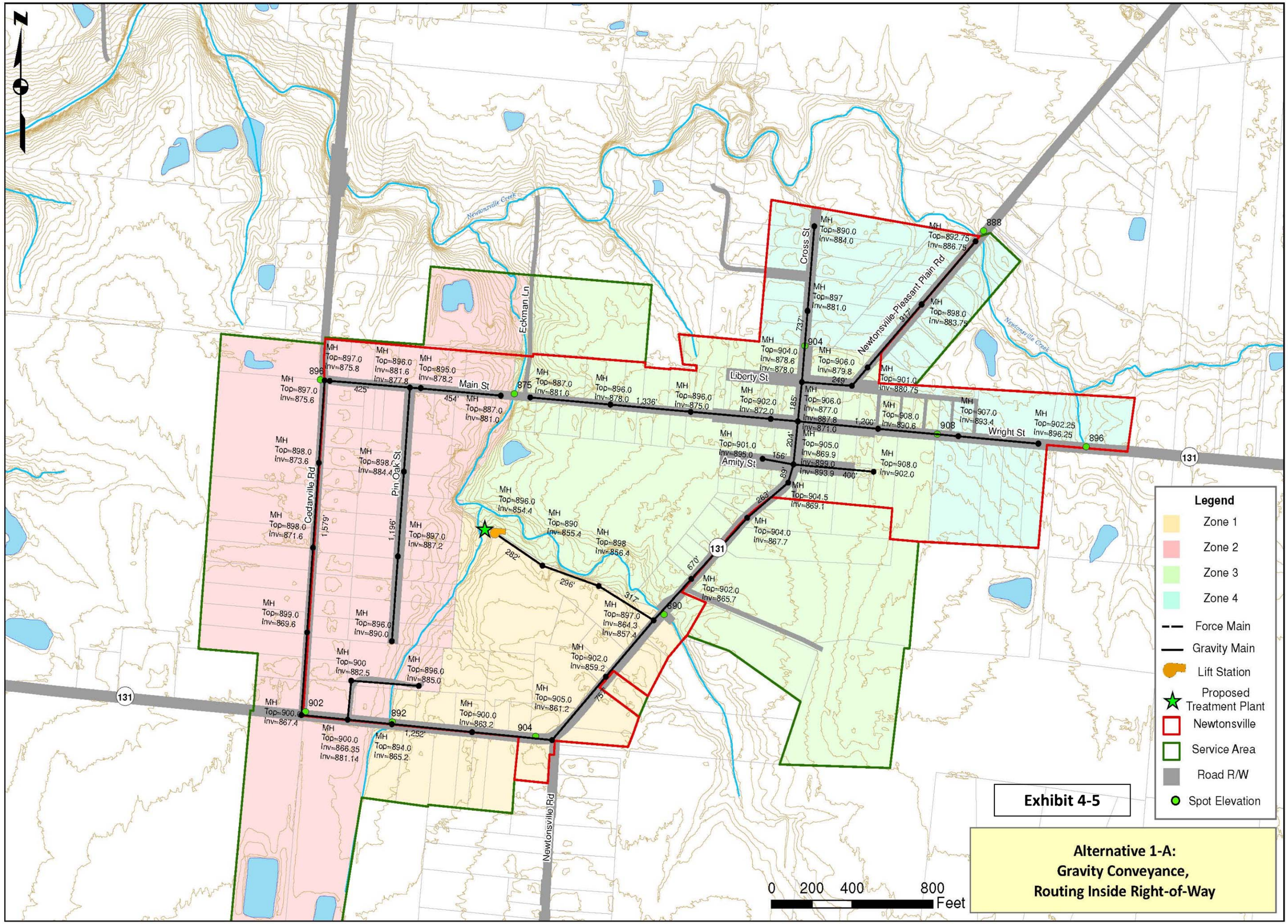


Exhibit 4-5

Alternative 1-A: Gravity Conveyance, Routing Inside Right-of-Way

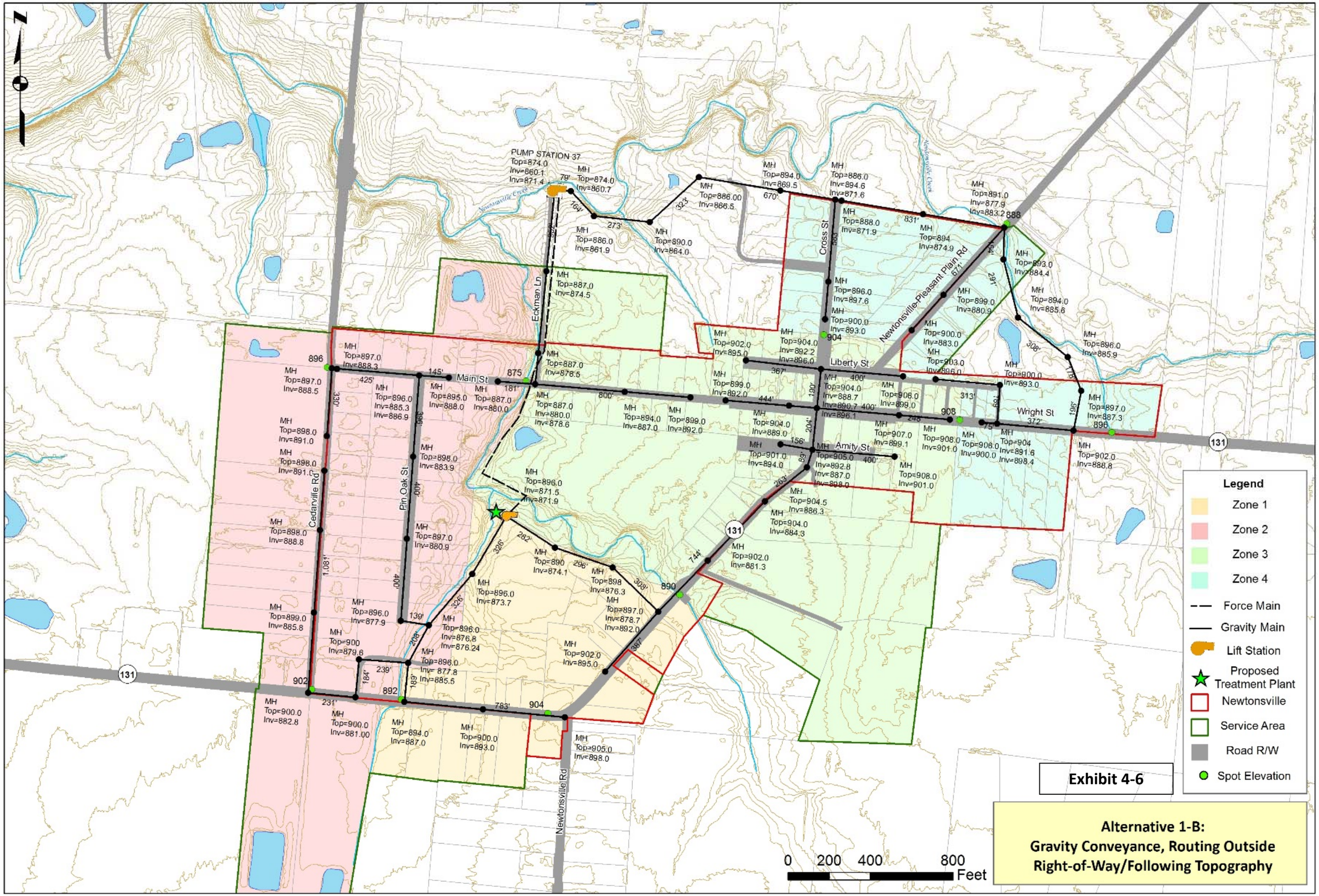


Exhibit 4-6

Alternative 1-B:
Gravity Conveyance, Routing Outside Right-of-Way/Following Topography

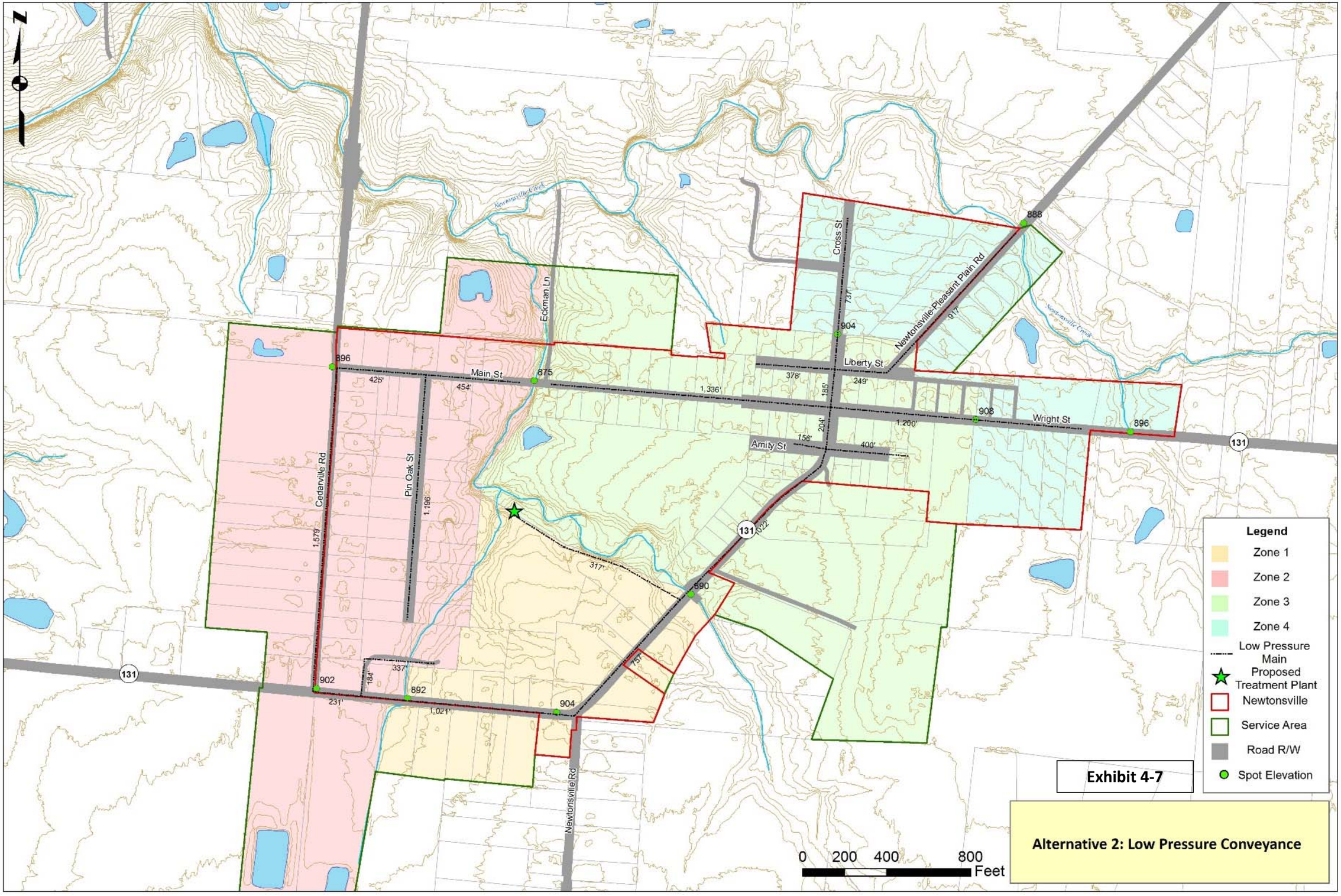
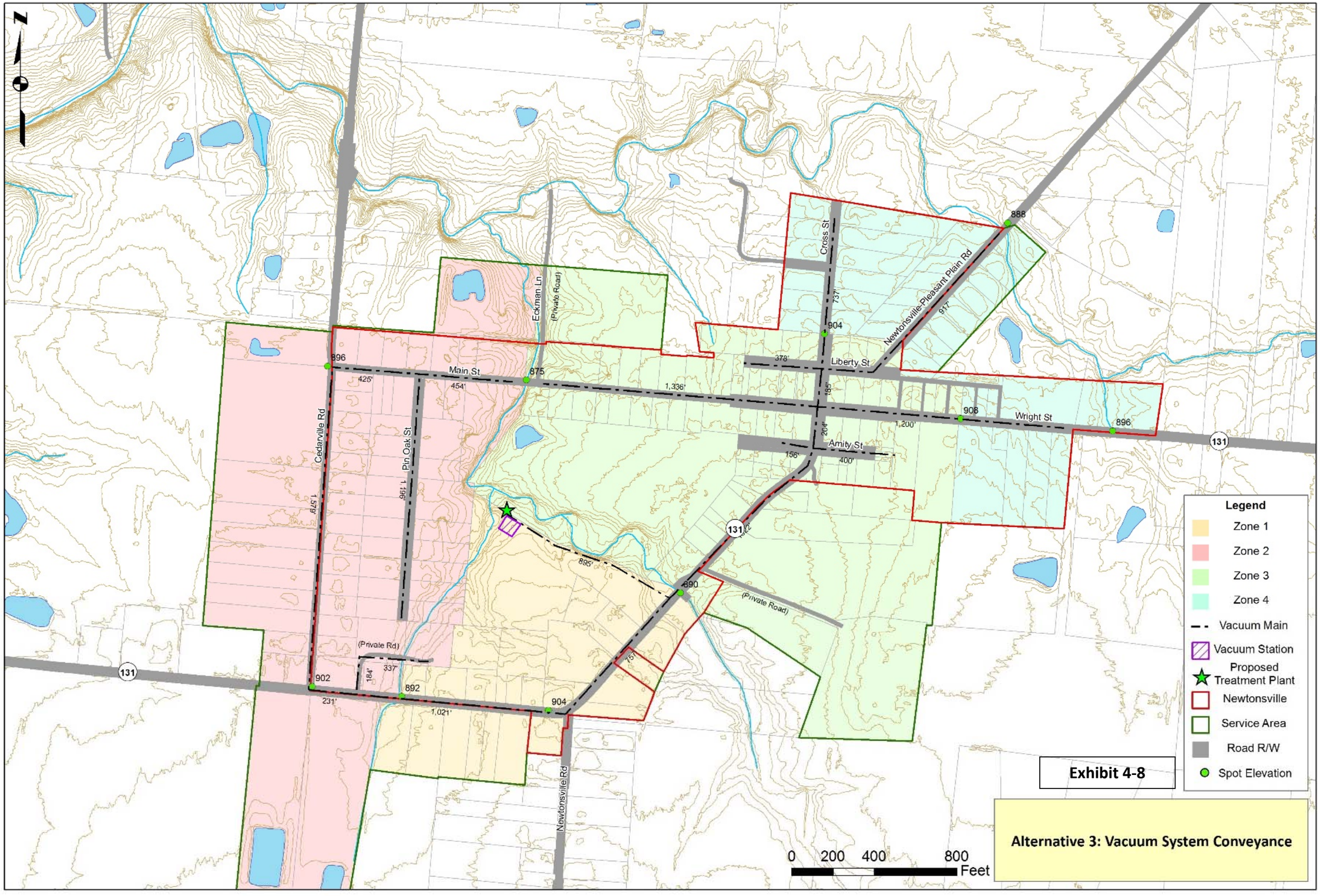


Exhibit 4-7

Alternative 2: Low Pressure Conveyance


N
Legend
Zone 1
Zone 2
Zone 3
Zone 4
Vacuum Main
Vacuum Station
Proposed Treatment Plant
Newtonsville
Service Area
Road R/W
Spot Elevation
Exhibit 4-8
Alternative 3: Vacuum System Conveyance
0 200 400 800 Feet
Main St
Liberty St
Wright St
Amity St
Cross St
Cedarville Rd
Pin Oak St
Eckman Ln
(Private Road)
Newtonsville-Pleasant Plain Rd
Newtonsville Rd
(Private Rd)
131
888
904
896
875
908
896
902
892
904
890
425'
454'
1,336'
378'
737'
917'
185'
204'
1,200'
156'
400'
1,576'
1,196'
895'
757'
337'
184'
231'
1,021'

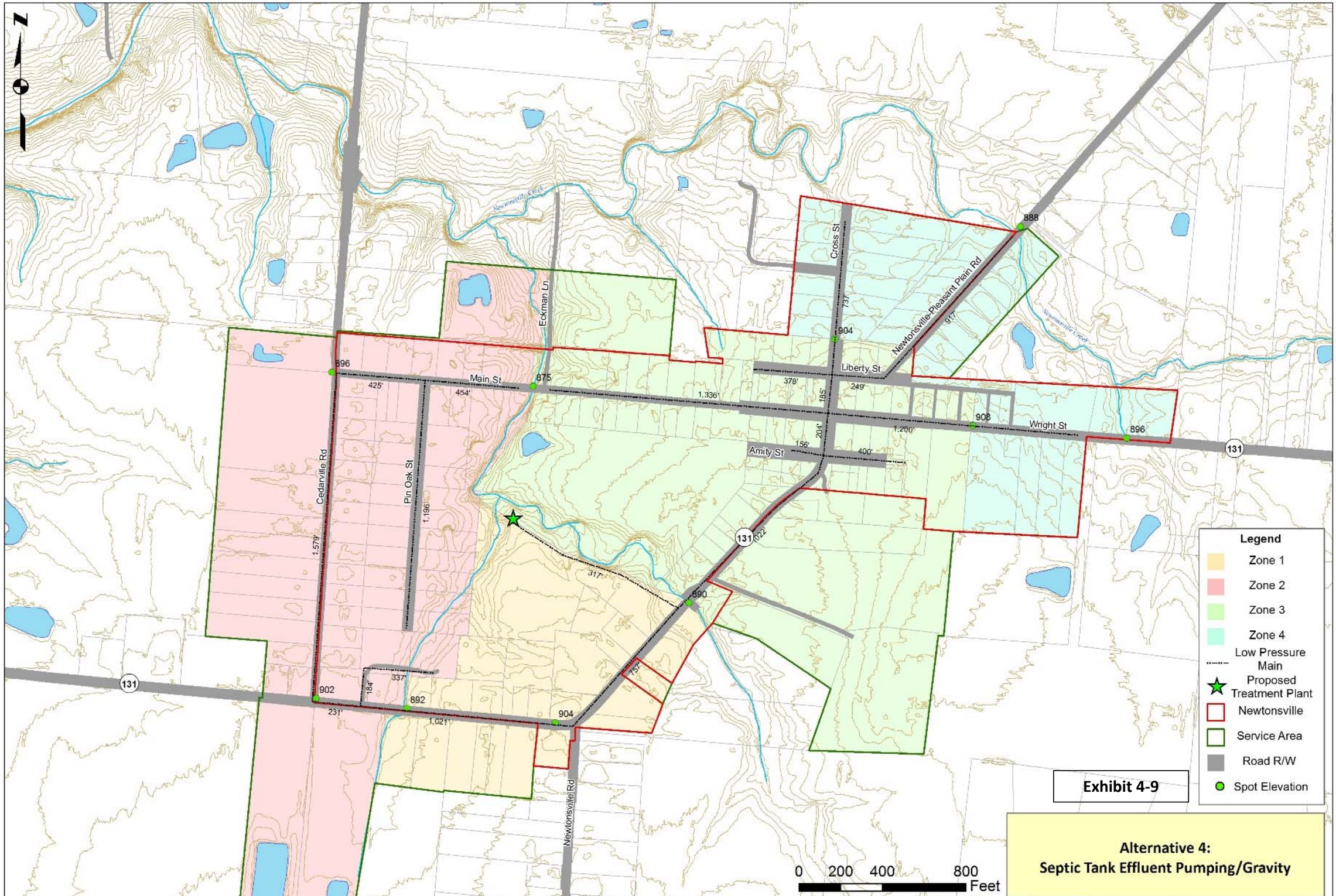
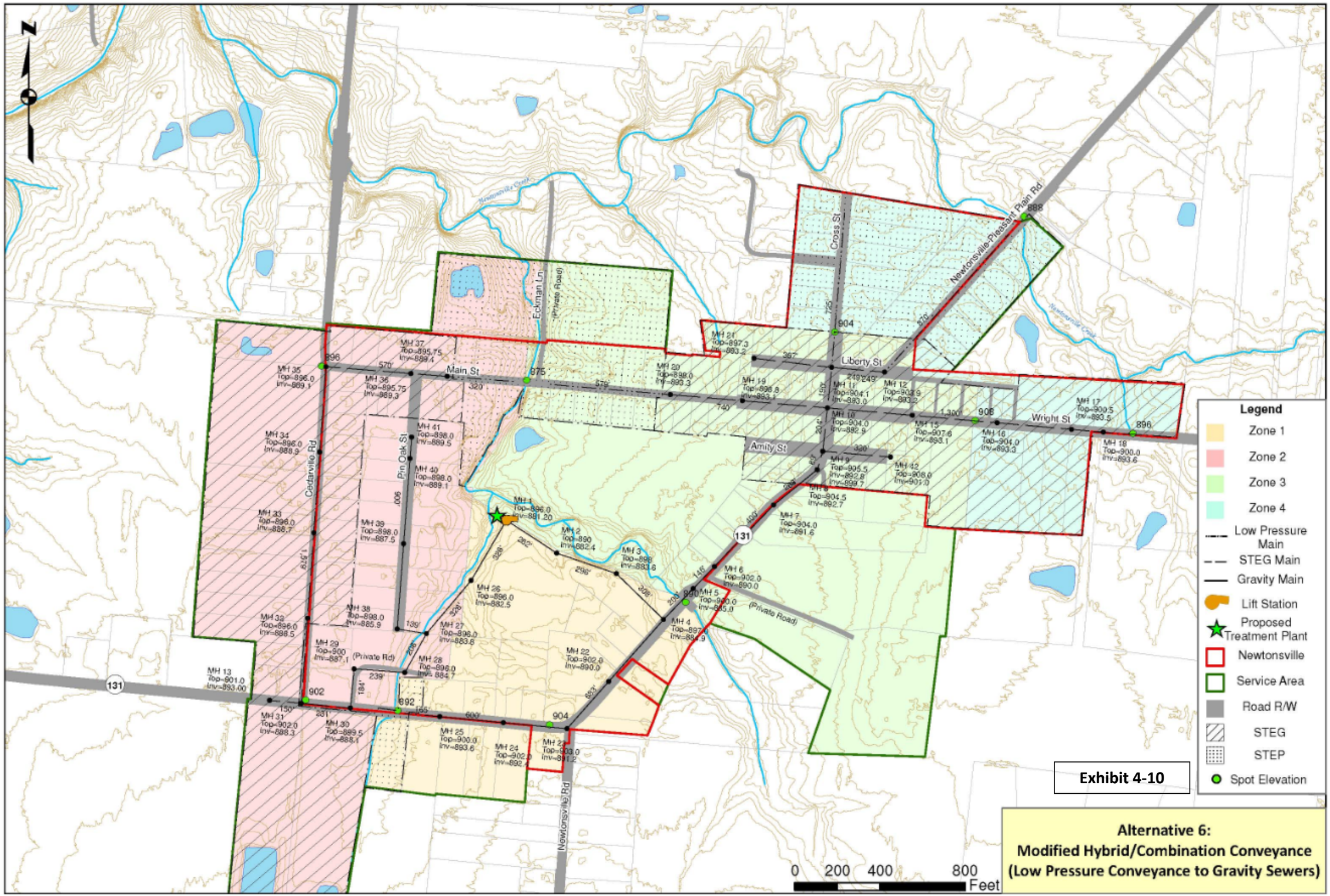


Exhibit 4-9

Alternative 4:
Septic Tank Effluent Pumping/Gravity


N
Legend
Zone 1
Zone 2
Zone 3
Zone 4
Low Pressure Main
STEG Main
Gravity Main
Lift Station
Proposed Treatment Plant
Newtonsville
Service Area
Road R/W
STEG
STEP
Spot Elevation
Exhibit 4-10
Alternative 6:
Modified Hybrid/Combination Conveyance
(Low Pressure Conveyance to Gravity Sewers)
0 200 400 800
Feet
Main St
Liberty St
Wright St
Amity St
Cross St
Eckman Ln
(Private Road)
Newtonsville-Pleasant Plain Rd
Cedarville Rd
Pin Oak St
(Private Rd)
131
Newtonsville Creek

5.0 Alternative Selection

Selection of an alternative if the process by which data presented in the previous Section 4 is further analyzed to identify a recommended alternative. This analysis includes consideration of life cycle costs and non-monetary factors.

The life cycle analysis is an engineering economics technique used to evaluate present and future costs for comparison of feasible alternatives. The following criteria have been utilized in the analysis of collection system and conveyance alternatives and wastewater treatment alternatives:

- All costs are converted to September 2014 dollars (ENR CCI = 9068);
- 20 year planning period;
- Discount rate used is taken from Appendix C of OMB Circular A-94 (1.6%);
- Total capital cost is the sum of estimated construction cost and non-construction costs as identified;
- Estimated annual operation and maintenance (O&M) costs are converted to present day dollars using a uniform series present worth calculation (P/A = 17, i=1.6%, n=20);
- The salvage value of the constructed project is estimated using the anticipated life expectancy of equipment using straight-line depreciation calculated at the end of the planning period and converted to present day dollars, $S = P(1-i)^n$;
- The present worth of the salvage value is subtracted from the present worth costs;
- The net present value (NPV) is calculated for each feasible alternative as the sum of the capital cost and the present worth of the uniform series of annual O&M costs less the single payment present worth of the salvage value at the end of the planning period;

Tables showing the capital cost, annual O&M cost, salvage value, present worth of each of these values and NPV are presented herein for review. All factors used in the analysis are tabulated. Non-monetary factors have been considered in determining which alternative is recommended and are also presented herein.

5.1 Life Cycle Cost Analysis

5.1.1 Collection and Conveyance

Life cycle cost derivation and net present value computations of each collection and conveyance alternatives described in Section 4 are presented individually in **Tables 5.1 through 5.6. Table 5.7** presents the comparative results of each alternative.

Table 5.1 Conventional Gravity Conveyance Inside ROW (Net Present Value and Life Cycle Cost)

COST ANALYSIS						
CONVENTIONAL GRAVITY CONVEYANCE (INSIDE ROW)						
NET PRESENT VALUE	**$8,242,000**				Lift Stations	1
EASEMENTS	**1**					
Description		Conv Gravity Inside ROW	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost (CC)		**$5,206,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$1,301,500				
Outside Design Services		$260,300				
Construction Eng'g		$156,180				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$2,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$83,296				
Training		$0				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,916,476**				
Estimated Annual Operational Costs						
Operational Labor (hr)	$40	$16,640				
Administrative	0.1%	$5,206				
Insurance & Legal	0.2%	$10,412				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$7,040				
Monitoring & Testing		$0				
Chemical		$0				
Generator Service & Maintenance		$500				
Pump Service & Maintenance		$1,248				
Sewer Maintenance		$19,575				
Consumable Supplies	0.1%	$5,206				
Residuals Disposal		$0				
Total Estimated Annual O&M Costs		**$65,827**				
Short-Lived Depreciable Assets						
Replace Lift Station Pumps	20 yr					
Replace Generator	20 yr					
Replace Pumps & Controls	20 yr					
Subtotal			$0	$0	$0	$0
Total Capital Cost		$7,122,476				
Present Worth Annual Operating Costs		$1,119,059				
Present Worth Replacement Costs		$0				
Total Present Worth Cost		$8,241,535				
Present Worth of Salvage		$0				
20 Yr Net Present Value		**$8,242,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.2 Conventional Gravity Conveyance Outside ROW (Net Present Value and Life Cycle Cost)

COST ANALYSIS						
CONVENTIONAL GRAVITY CONVEYANCE (OUTSIDE ROW)						
NET PRESENT VALUE	**$7,153,000**				Lift Stations	2
EASEMENTS	**24**					
Description		Conv Gravity Outside ROW	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$4,141,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$1,035,250				
Outside Design Services		$207,050				
Construction Eng'g		$124,230				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$48,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$66,256				
Training		$0				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,593,986**				
Estimated Annual Operational Costs						
Operational Labor (hr)	$40	$16,640				
Administrative	0.1%	$4,141				
Insurance & Legal	0.2%	$8,282				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$13,440				
Monitoring & Testing		$0				
Chemical		$0				
Generator Service & Maintenance		$1,000				
Pump Service & Maintenance		$2,496				
Sewer and Force Main Maintenance		$33,280				
Consumable Supplies	0.1%	$4,141				
Residuals Disposal		$0				
Estimated Annual Operational Costs		**$83,420**				
Short-Lived Depreciable Assets						
Replace Lift Station Pumps	20 yr					
Replace Generators	20 yr					
Replace Pumps & Controls	20 yr					
Subtotal			$0	$0	$0	$0
Total Capital Cost		$5,734,986				
Present Worth Annual Operating Costs		$1,418,140				
Present Worth Replacement Costs		$0				
Total Present Worth Cost		$7,153,126				
Present Worth of Salvage		$0				
20 Yr Net Present Value		**$7,153,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.3 Low Pressure Conveyance - Net Present Value and Life Cycle Cost

COST ANALYSIS						
LOW PRESSURE CONVEYANCE (GRINDER PUMPS)						
NET PRESENT VALUE	**$5,504,000**					
EASEMENTS	**162**					
Description		Low Pressure Conveyance	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$2,535,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$633,750				
Outside Design Services		$152,100				
Construction Eng'g		$76,050				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$324,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$40,560				
Training		$0				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,339,660**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$4,160				
Administrative	0.1%	$2,535				
Insurance & Legal	0.2%	$5,070				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$0				
Monitoring & Testing		$0				
Chemical		$0				
Pump Service & Maintenance		$22,000				
Consumable Supplies	0.1%	$2,535				
Residuals Disposal		$0				
Total Estimated Annual O&M Costs		**$36,300**				
Short-Lived Depreciable Assets						
Pump Vaults & Covers	30 yr	$1,200				$47,600
Re-Build Grinder Pumps	5yr	$1,500	$241,500		$241,500	
Replace Grinder Pumps & Controls	10 yr	$3,500		$563,500		0
Subtotal			$241,500	$563,500	$241,500	$47,600
Total Capital Cost		$3,874,660				
Present Worth Annual Operating Costs		$617,100				
Present Worth Replacement Costs		$1,046,500				
Total Present Worth Cost		$5,538,260				
Present Worth of Salvage		($34,653)				
20 Yr Net Present Value		**$5,504,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.4 Vacuum Pressure Conveyance - Net Present Value and Life Cycle Cost

COST ANALYSIS						
VACUUM CONVEYANCE						
NET PRESENT VALUE	**$6,383,000**					
EASEMENTS	**162**					
Description		Low Pressure Conveyance	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$3,491,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$872,750				
Outside Design Services		$192,005				
Construction Eng'g		$104,730				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$324,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$55,856				
Training	0.2%	$6,982				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,669,523**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$4,400				
Administrative	0.1%	$3,491				
Insurance & Legal	0.2%	$6,982				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$7,040				
Monitoring & Testing		$0				
Chemical		$0				
Generator Service & Maintenance		$500				
Pump Service & Maintenance		$50,232				
Consumable Supplies	0.1%	$3,491				
Residuals Disposal		$0				
Total Estimated Annual O&M Costs		**$76,136**				
Short-Lived Depreciable Assets						
Vacuum Valve Vault	30yr	$4,600				$246,867
Re-Build Valves/Controllers	10yr	$100		$16,100		
Replace Pumps/Controls	15yr	$570			$91,770	
Subtotal			$0	$16,100	$91,770	$246,867
Total Capital Cost		$5,160,523				
Present Worth Annual Operating Costs		$1,294,312				
Present Worth Replacement Costs		$107,870				
Total Present Worth Cost		$6,562,705				
Present Worth of Salvage		($179,719)				
20 Yr Net Present Value		**$6,383,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.5 Septic Tank Effluent Pumping (STEP) - Net Present Value and Life Cycle Cost

COST ANALYSIS						
SEPTIC TANK EFFLUENT PUMPING (STEP) CONVEYANCE						
NET PRESENT VALUE	**$5,494,000**					
EASEMENTS	**162**					
Description		STEP Conveyance	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$2,690,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$672,500				
Outside Design Services		$161,400				
Construction Eng'g		$80,700				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$324,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$43,040				
Training		$0				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,394,840**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$4,160				
Administrative	0.1%	$2,690				
Insurance & Legal	0.2%	$5,380				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$0				
Monitoring & Testing		$0				
Chemical		$0				
Pump Service & Maintenance		$33,488				
Consumable Supplies	0.1%	$2,690				
Residuals Disposal ($/yr/unit)	$85	$13,685				
Total Estimated Annual O&M Costs		**$62,093**				
Short-Lived Depreciable Assets						
Replace Lift Station Pumps	20 yr					
Septic Tanks & Covers	30 yr	$2,500				$134,167
Replace STEP Pumps & Controls	10 yr	$2,800		$450,800		0
Subtotal				$450,800		$134,167
Total Capital Cost		$4,084,840				
Present Worth Annual Operating Costs		$1,055,581				
Present Worth Replacement Costs		$450,800				
Total Present Worth Cost		$5,591,221				
Present Worth of Salvage		($97,673)				
20 Yr Net Present Value		**$5,494,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.6 Hybrid Conveyance - Net Present Value and Life Cycle Cost

COST ANALYSIS						
HYBRID CONVEYANCE (STEG/STEP/CONVENTIONAL GRAVITY)					Gravity	42
					STEG	78
NET PRESENT VALUE	**$5,831,000**				STEP	41
EASEMENTS	**126**					
Description		Hybrid Conveyance	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$3,232,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$808,000				
Outside Design Services		$177,760				
Construction Eng'g		$96,960				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition (Ea)	$2,000	$252,000				
Land ($/acre)	$8,000	$0				
Interest During Construction		$51,712				
Training		$0				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,499,632**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$4,160				
Administrative	0.1%	$3,232				
Insurance & Legal	0.2%	$6,464				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$941				
Monitoring & Testing		$0				
Chemical		$0				
Generator Service & Maintenance		$500				
Pump Service & Maintenance		$24,960				
Sewer Maintenance		$12,480				
Consumable Supplies	0.1%	$3,232				
Residuals Disposal ($/yr/unit)	$85	$3,485				
Total Estimated Annual O&M Costs		**$59,454**				
Short-Lived Depreciable Assets						
Septic Tanks & Covers	30 yr	$6,000				$47,600
Replace Lift Station Pumps	20yr					
Replace STEP Pumps & Controls	10 yr	$3,000		$123,000		0
Subtotal			$0	$123,000	$0	$47,600
Total Capital Cost		$4,731,632				
Present Worth Annual Operating Costs		$1,010,715				
Present Worth Replacement Costs		$123,000				
Total Present Worth Cost		$5,865,347				
Present Worth of Salvage		($34,653)				
20 Yr Net Present Value		**$5,831,000**				

Evaluation Period	20 yr
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%
Uniform Series Present Worth Factor	17
Single Payment Present Worth Factor	0.728

* Salvage value is estimated using anticipated life expectancy of items and straight-line depreciation at end of evaluation period

Table 5.7 Collection & Conveyance Alternatives - Comparative Cost Summary

COST ANALYSIS SUMMARY
COLLECTION & CONVEYANCE ALTERNATIVES

Description	Conv Gravity Inside ROW	Conv Gravity Outside ROW	Low Pressure Conveyance	Vacuum Conveyance	STEP Conveyance	Hybrid Conveyance
Preliminary Estimate of Construction Cost	$5,206,000	$4,141,000	$2,535,000	$3,491,000	$2,690,000	$3,232,000
Total Estimated NCPC	$1,916,476	$1,593,986	$1,339,660	$1,669,523	$1,394,840	$1,499,632
Total Estimated Annual O&M Costs	$65,827	$83,420	$36,300	$76,136	$62,093	$59,454
20 Yr Net Present Value (Rounded)	$8,242,000	$7,153,000	$5,504,000	$6,383,000	$5,494,000	$5,831,000

Based upon the cost evaluation, the Septic Tank Effluent Pumping (STEP) Conveyance had the lowest net present value; however, the Low Pressure and Hybrid Conveyance alternatives are each within 10 percent of the lowest net present value. Accordingly, from a life cycle cost perspective, these three alternatives are considered to be equal, given the accuracy of the analysis.

Table 5.8 presents a summary of non-monetary cost factors that were considered as part of the alternatives evaluation. The outcome of this analysis in conjunction with the life cycle analysis suggests that the STEP and Hybrid options emerge as the two most favorable conveyance alternatives.

Table 5.8 Collection & Conveyance Alternatives - Evaluation of Non-Monetary Factors

Conveyance Alternative	Constructability	Easements	Environmental Impact	Home Owner Impact	System Reliability	Local Use Precedent	Expandability	Cost	Overall Score
Gravity Conveyance, Inside Right-of-Way	6	1	5	1	1	1	6	6	27
Gravity Conveyance, Outside Right-of-Way/Following Topography	5	2	6	1	2	1	6	5	28
Low Pressure Conveyance	1	6	1	6	5	6	1	1	27
Vacuum System Conveyance	4	6	1	5	6	6	5	2	35
Septic Tank Effluent Pumping	2	6	1	5	4	3	1	1	23
Hybrid/Combination Conveyance (STEP to gravity sewers)	2	5	2	3	3	3	1	1	20

5.1.2 Wastewater Treatment

Life cycle cost derivation and net present value computations of each wastewater treatment alternative covering non-degradation, minimal degradation and preferred alternatives described in Section 4 are presented individually in **Tables 5.9 through 5.11. Table 5.12** presents the comparative results of each alternative.

Table 5.9 Non-Degradation Wastewater Treatment - Net Present Value and Life Cycle Costs

COST ANALYSIS						
NON-DEGRADATION TREATMENT ALTERNATIVE						
PUMP TO MIDDLE EAST FORK SERVICE AREA						
NET PRESENT VALUE	**$9,197,000**				Lift Stations	1
					Booster Stations	2
Description		Pump to MEF Service Area	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$5,620,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$1,405,000				
Outside Design Services		$281,000				
Construction Eng'g		$168,600				
Inspection		$83,200				
Legal & Permitting		$20,000				
Rights of Way	2.0%	$112,400				
Agricultural Land ($/acre)	$4,000	$0				
Interest During Construction		$89,920				
Training		$5,000				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$2,175,120**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$4,160				
Administrative	0.1%	$5,620				
Insurance & Legal	0.2%	$11,240				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$6,720				
Monitoring & Testing		$0				
Chemical		$0				
Generator Service & Maintenance		$1,500				
Pump Service & Maintenance	0.4%	$22,480				
Force Main Maintenance	0.2%	$11,240				
Replacement	0.2%	$11,240				
Consumable Supplies	0.1%	$5,620				
Residuals Disposal		$0				
Total Estimated Annual O&M Costs		**$79,820**				
Short-Lived Depreciable Assets						
Replace Lift Station Pumps	20yr					
Replace Pump Controls	10 yr			$45,000		0
Subtotal			$0	$45,000	$0	$0
Total Capital Cost		$7,795,120				
Present Worth Annual Operating Costs		$1,356,940				
Present Worth Replacement Costs		$45,000				
Total Present Worth Cost		$9,197,060				
Present Worth of Salvage		$0				
20 Yr Net Present Value		**$9,197,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.10 Minimal Degradation Wastewater Treatment - Net Present Value and Life Cycle Costs

COST ANALYSIS						
MINIMAL DEGRADATION TREATMENT ALTERNATIVE						
CONSTRUCTED WETLANDS AND LAND APPLICATION						
NET PRESENT VALUE	**$4,654,000**				Lift Stations	1
Description		Const. Wetlands & Land Appl	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$2,077,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$519,250				
Outside Design Services		$207,700				
Construction Eng'g		$103,850				
Inspection		$83,200				
Legal & Permitting		$20,000				
Rights of Way	2%	$41,540				
Agricultural Land ($/acre)	$4,000	$444,000				
Interest During Construction		$33,232				
Training		$5,000				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,467,772**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$8,320				
Administrative	0.1%	$2,077				
Insurance & Legal	0.2%	$4,154				
Water ($/1000 gal)	$3.48	$0				
Electrical Energy ($/KWH)	$0.064	$10,512				
Monitoring & Testing		$3,500				
Chemical		$0				
Generator Service & Maintenance		$500				
Equipment Service & Maintenance	0.4%	$8,308				
Force Main Maintenance	0.2%	$4,154				
Replacement	1.0%	$20,770				
Consumable Supplies	0.1%	$2,077				
Residuals Disposal		$0				
Total Estimated Annual O&M Costs		**$64,372**				
Short-Lived Depreciable Assets						
Replace Recirculation & Land Appl Pumps	20yr					
Replace Pump Controls	10 yr			$15,000		0
Subtotal			$0	$15,000	$0	$0
Total Capital Cost		$3,544,772				
Present Worth Annual Operating Costs		$1,094,324				
Present Worth Replacement Costs		$15,000				
Total Present Worth Cost		$4,654,096				
Present Worth of Salvage		$0				
20 Yr Net Present Value		**$4,654,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.11 Preferred Wastewater Treatment Alternative-Net Present Value and Life Cycle Costs

COST ANALYSIS						
PREFERRED TREATMENT ALTERNATIVE						
ACTIVATED SLUDGE TREATMENT - SEQUENCING BATCH REACTOR TECHNOLOGY						
NET PRESENT VALUE	**$4,442,000**					
Description		Activated Sludge Treatment - SBR	5 Year Replacement	10 Year Replacement	15 Year Replacement	20 Year Salvage Value
Preliminary Estimate of Construction Cost		**$2,262,000**				
Non-Construction Project Costs (NCPC)						
Construction Contingency	25%	$565,500				
Outside Design Services		$226,200				
Construction Eng'g		$113,100				
Inspection		$83,200				
Legal & Permitting		$20,000				
Easement Acquisition		$4,000				
Land Inside Service Area ($/acre)	$8,000	$16,000				
Interest During Construction		$36,192				
Training		$5,000				
OPWC & USDA/RD Funds Administration		$10,000				
Total Estimated NCPC		**$1,079,192**				
Estimated Annual Operational Costs						
Operational Labor ($/hr)	$40	$8,320				
Administrative	0.1%	$2,262				
Insurance & Legal	0.2%	$4,524				
Water ($/1000 gal)	$3.48	$104				
Electrical Energy ($/KWH)	$0.064	$4,976				
Monitoring & Testing		$3,500				
Chemical		$3,000				
Generator Service & Maintenance		$500				
Equipment Service & Maintenance	0.4%	$9,048				
Force Main Maintenance	0.2%	$0				
Replacement	1.0%	$22,620				
Consumable Supplies	0.1%	$2,262				
Residuals Disposal		$1,952				
Total Estimated Annual O&M Costs		**$63,068**				
Short-Lived Depreciable Assets						
Mixer Motors	10 yr	$2,500		$5,000		
Blower Motors & Controls	10 yr	$5,000		$10,000		
UV Controls	10 yr	$7,000		$7,000		
Filter Backwash Pumps	20 yr					
Filter Backwash Controls	10 yr	$2,000		$4,000		
Filter Drive Motors	10 yr	$1,500		$3,000		0
Subtotal			$0	$29,000	$0	$0
Total Capital Cost		$3,341,192				
Present Worth Annual Operating Costs		$1,072,151				
Present Worth Replacement Costs		$29,000				
Total Present Worth Cost		$4,442,343				
Present Worth of Salvage		$0				
20 Yr Net Present Value		**$4,442,000**				
Evaluation Period	20 yr		* Salvage value is estimated using anticipated life expectancy of			
Discount Rate (OMB Circ A-94, Dec. 2013)	1.6%		items and straight-line depreciation at end of evaluation period			
Uniform Series Present Worth Factor	17					
Single Payment Present Worth Factor	0.728					

Table 5.12 Wastewater Treatment Alternatives - Comparative Cost Summary

COST ANALYSIS SUMMARY			
WASTEWATER TREATMENT ALTERNATIVES			
Description	**Non-Degradation Alternative**	**Minimal Degradation Alternative**	**Preferred Alternative**
Preliminary Estimate of Construction Cost	$5,620,000	$2,077,000	$2,262,000
Total Estimated NCPC	$2,175,120	$1,467,772	$1,079,192
Total Estimated Annual O&M Costs	$79,820	$64,372	$63,068
20 Yr Net Present Value (Rounded)	$9,197,000	$4,654,000	$4,442,000

Based upon the cost evaluation, the Minimal Degradation Alternative (Constructed Wetlands and Land Application) is within 10 percent of the Preferred Wastewater Treatment Alternative (Activated Sludge/Sequencing Batch Reactor Technology) which yielded the lowest net present value. Accordingly, from a life cycle cost perspective, these two alternatives are considered to be equal, given the accuracy of the analysis.

Table 5.13 presents a summary of non-monetary cost factors that were considered as part of the alternatives evaluation. The outcome of this analysis in conjunction with the life cycle analysis suggests that the Activated Sludge Treatment using Sequencing Batch Reactor Technology is the most favorable wastewater treatment alternative.

Table 5.13 Wastewater Treatment Alternatives - Evaluation of Non-Monetary Factors

Conveyance Alternative	Constructability	Easements/RW Acquisition	Environmental Impact	Residential Impact	System Reliability	Local Use Precedent	Expandability	Cost	Overall Score
Non-Degradation Alternative (Pump Wastewater to Middle East Fork Service Area)	**5**	**5**	**1**	**2**	**3**	**1**	**2**	**6**	**25**
Minimal Degradation Alternative (Constructed Wetlands and Land Application)	**4**	**4**	**2**	**2**	**4**	**6**	**3**	**1**	**26**
Preferred Alternative (Activated Sludge Treatment Using Sequencing Batch Reactor Technology)	**2**	**1**	**3**	**5**	**1**	**1**	**1**	**1**	**15**

6.0 Proposed Project

This section provides a description of the proposed project based on the wastewater collection, conveyance and treatment alternatives described in Section 4.0 and analyzed in Section 5.0. The proposed project will consist of: 1) a new collection and conveyance system to serve the Village of Newtonsville and some adjacent properties not in Newtonsville but in the service area within reach of the sewer system, 2) a new pumping station at the proposed location of the wastewater treatment facility that will collect all wastewater produced within the service area and 3) a new wastewater treatment facility that will discharge to a small stream that is tributary to Stonelick Creek and will be designed to meet applicable regulatory requirements.

6.1 Collection and Conveyance System

The proposed collection and conveyance system for the service area is the hybrid system referred to in previous **Exhibit 4.10**. An effort was made in the hybrid option to minimize the number of properties connected via a pump for the following reasons:

- Pumps typically although not always require home owner electrical upgrades;
- Pumps add maintenance responsibility for CCWRD staff;
- Pump operation will increase home owner electrical bills;
- Pump operation will be disrupted by utility power outage.

Flow in this collection system begins as STEP in the low-lying northern reaches of the service area where pressure mains deliver septic tank effluent to the furthest extent of the STEG mains. The low-lying reaches cannot be served through grinder pumps because the pressure mains must discharge to the small diameter, low-slope mains of the STEG system. Most of the residents in Zone 4 and the northern extent of Zones 3 and 4 will be served via STEP system.

The STEG sewers serve as a transition for the collection system on the eastern and western extent of Newtonsville and the Village's core area at the intersection of Main Street and State Route 131. Flow moves through the STEG zones toward the wastewater treatment plant in the center of the service area. The southern portion of Zone 3, approximately all of Zone 1, and the eastern portion of Zone 2 are able to be served by a conventional gravity sewer system. Sewers from the eastern and western portions of the service area parallel minor streams as they enter the Village's parcel on Wright Street and combine at a pump station adjacent to the wastewater treatment plant.

This alignment would consist of about 2,700 linear feet of 2-inch diameter force main for the low pressure system at depths ranging from 4 to 5 feet following the slope of the terrain. No air release valves would be required. There would also be approximately 6,500 linear feet of 6-inch diameter gravity main in the STEG system and 5,500 linear feet of conventional 8-inch gravity main at depths of 10 to 15 feet. Future expansion could be accommodated through the connection of pressure sewers or STEP pumps to the system in virtually any location.

6.2 Pumping Station

The proposed pumping station will be located on the wastewater treatment site and be designed to receive all flows from the service area via an 8-inch gravity sewer. Ten States Standards requires wastewater treatment pumping stations be designed based on the peak hourly flow. For the Newtonsville service area, the peak hourly flow projection has been determined to be 228,000 GPD (160 GPM). A duplex pump station is proposed, consisting of two submersible constant speed pumps, each rated at 160 GPM. A valve vault will be constructed adjacent to the pump station wet well for access and flow isolation purposes. **Table 6.1** summarizes the attributes of the raw sewage pump station.

Table 6-1
Proposed Raw Sewage Pump Station
Village of Newtonsville Service Area

Influent Sewer	8-inch
Sewer Invert	El. 881.2 ±
Structure, Top of Concrete	El. 896.0 ±
Pump Station Capacity	
Total (2)	320 GPM
Firm (1)	160 GPM @ 25'TDH
Pumps	
Type	Submersible, Non-clog
Quantity	2 units
Capacity, each	160 GPM, constant speed
Power	480/3/60/3 HP
Wet Well	
Diameter	6 feet
Invert	El. 881.2±

A stand-by diesel-powered generator with automatic transfer switch will be provided to meet the need for emergency power. This unit will be designed and installed to comply with Ten States Standards. The

size of the generator will be determined during the design phase to operate the pump station and other key wastewater treatment equipment if utility power is interrupted.

6.3 Wastewater Treatment

The preferred treatment alternative consists of constructing a new wastewater treatment facility to provide capacity for an average design flow of 57,000 gallons per day (GPD) and a peak hourly flow of 228,000 GPD. The proposed location of the new treatment facility will be on an eight acre parcel of land (Parcel ID 501104.077) currently owned by the Village of Newtonsville on Wright Street (Refer to **Exhibit 4.3**). The recommended land area required for the treatment facility is 2.5 acres but efforts will be undertaken to reduce land area to 2 acres during the design phase. A block diagram of the proposed treatment facilities is shown in **Exhibit 6.1.**

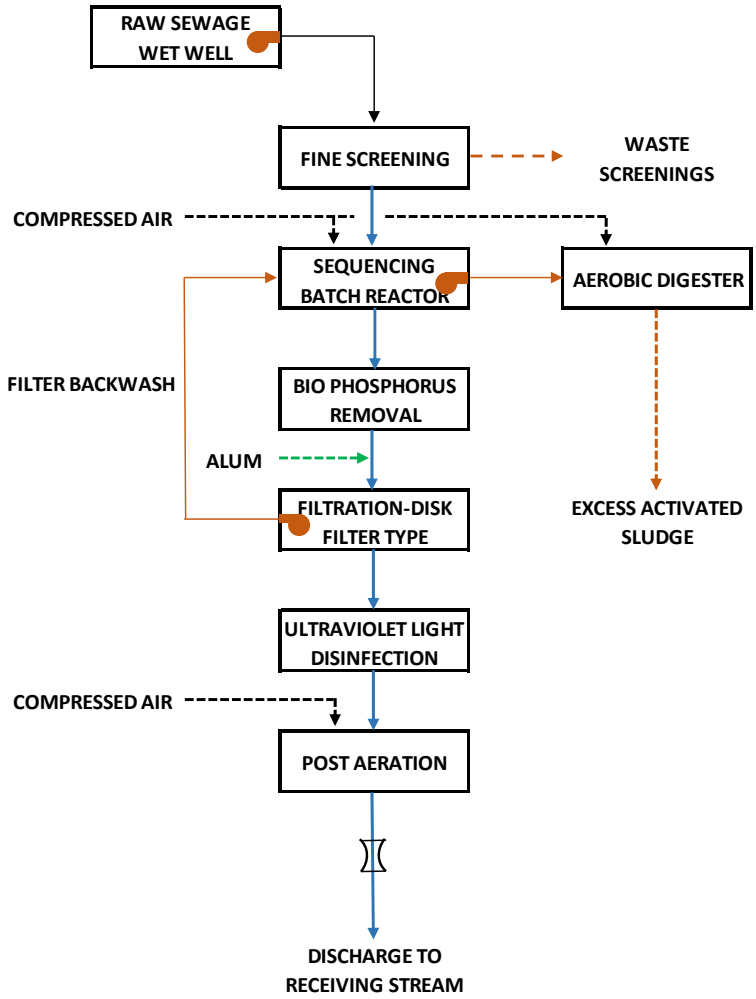


Exhibit 6.1 – Block Diagram of Proposed Treatment Facilities

A permanent easement will be required for County personnel to enter onto the treatment site from SR 131 (Wright Street). **Exhibit 6.2** provides a preliminary site plan of the proposed facilities. The alignment of the access driveway is preliminary and will be re-examined with input from the County and Village during the design phase.

Plant loadings have been developed with assistance from composite sampling results obtained by the County from the Amelia and Bethel area during the period October 6-12, 2014. The areas sampled included locations where the County maintains septic tank systems that discharge effluent to local gravity

sewers. The wastewater characteristics from these systems differ from "standard strength" domestic wastewater that directly enters the sewer. **Table 6.2** presents the sampling and analytical results from the October sampling event.

Table 6.2
Septic Tank Effluent Gravity Sampling Results
(Amelia and Bethel Areas)

Site	Date	TSS (mg/L)	$cBOD_5$ (mg/L)	NH_4-N (mg/L)	Total P (mg/L)
Amelia (Denny Dr) MH A-14	10/06/14	34.7	75	46.6	-----
	10/07/14	31.3	95	50.6	6.07
	10/08/14	37.3	114	50.8	6.28
	10/09/14	59.3	113	43.2	5.78
	10/10/14	24.7	80	38.2	4.83
	10/11/14	23.3	60	51.3	5.86
	10/12/14	28.0	110	56.9	5.82
	Site Average	**34**	**92**	**48**	**5.8**
Bethel 1 (Sunset Dr) MH-4	10/06/14	43.0	118	55.1	-----
	10/07/14	71.7	114	46	5.65
	10/08/14	56.7	115	39.9	5.23
	10/09/14	26.0	83	39.1	4.94
	10/10/14	42.7	86	35.8	4.56
	10/11/14	23.3	44.3	38.3	4.18
	10/12/14	44.7	108	40.6	4.73
	Site Average	**44**	**95**	**42**	**4.9**
Bethel 2 (Airport Rd) MH-28A	**10/06/14**	61.3	182	45.8	**-----**
	10/07/14	72.7	90.2	44.4	**5.78**
	10/08/14	60.7	105	47.6	**6.24**
	10/09/14	45.3	92	43.0	**5.69**
	10/10/14	48.7	90	37.9	**4.73**
	10/11/14	44.0	48	39.3	**4.14**
	10/12/14	52.0	114	48.6	**5.61**
	Site Average	55	**103**	**44**	**5.4**
	Overall Avg	44	**97**	**45**	**5.3**
Standard Wastewater Strength		**250**	**200**	**15**	**8**

Notes:
1. Standard Wastewater Strength as defined by CCWRD, Rules and Regulations (May 2012)
2. TSS = Total Suspended Solids; $cBOD_5$ = 5-Day Biochemical Oxygen Demand
3. NH_4-N = Ammonia Nitrogen; Total P = Total Phosphorus

From the results, there is a high degree of consistency in the data between the sample locations. Second, the results for TSS, $cBOD_5$ and Total P indicate that this wastewater is weaker (in some cases much weaker) than standard wastewater strength. Third, the results for NH_4-N indicate that this septic tank effluent wastewater is much stronger than standard wastewater strength. The determination of treatment plant

loadings must consider the impact from these systems. For the hybrid conveyance alternative, 42 properties (26% of the total) would be served by conventional gravity with the remaining 119 properties receiving either STEG or STEP service. Using a weighted average process to compute the anticipated composition of the "hybrid" wastewater yields the results summarized in **Table 6.3**. The proposed wastewater treatment facilities have been designed based on the anticipated plant loadings contained in **Table 6.3.** These loadings will be re-evaluated during the design phase.

Table 6.3
Projected Composition of Hybrid Raw Wastewater
(Using Weighted Average Technique)
Village of Newtonsville Service Area

Parameter	Average Concentration	Average Loading
Total Suspended Solids	98 mg/L	47 lb/day
Carbonaceous BOD_5	124 mg/L	59 lb/day
Ammonia Nitrogen	37 mg/L	18 lb/day
Total Phosphorus	6 mg/L	3 lb/day

The anticipated allowable effluent discharge loadings are summarized in **Table 6.4**. The outcome of the East Fork Little Miami River TMDL which is scheduled to be released by Ohio EPA in 2015 may impact the allowable discharge limits and loadings. This will be reviewed during the design phase. The point of discharge will be a small un-named tributary that flows through Newtonsville from the south and which is located on the treatment plant site. The facility will likely be classified as a Class I treatment works in accordance with OAC 3745-7-04 that requires 4.5 hours of staffing per week.

Table 6.4
Anticipated Allowable Effluent Discharge Loadings

Effluent Parameter	30-Day Avg Conc	30-Day Avg Load	7-Day Avg Conc	7-Day Avg Load
Total Suspended Solids	12 mg/L	5.7 lb/day	8.6 lb/day	
Carbonaceous BOD_5	10 mg/L	4.8 lb/day	7.2 lb/day	
Ammonia (Summer)	1.0 mg/L	0.48 lb/day	1.5 mg/L	
Ammonia (Winter)	3.0 mg/L	1.4 lb/day	4.5 mg/L	
E. Coli	126/100 mL		235/100 mL	
Dissolved Oxygen	6.0 mg/L (minimum)			

The preferred treatment system consists of raw sewage screening, biological treatment using sequencing batch reactor (SBR) technology, effluent filtration, ultraviolet (UV) light disinfection and post aeration.

Refer to **Appendix H** for a preliminary layout and equipment cut sheets of the proposed facilities. One spiral-type fine screen for removal, compaction and dewatering of debris normally found in wastewater will be provided. The fine screen having 6 millimeter clear openings will be installed in a reinforced concrete channel having sufficient dimensions to accommodate the screen. Captured screenings will be conveyed by an inclined shaftless screw conveyor which will compact and dewater the material before discharging into a bagging device to contain the screenings and associated odors. The unit will be capable of being pivoted out of the channel for inspection and service and eliminate the need for a bypass screen channel. The captured screening material will be capable of passing the "paint filter test" to allow the material to be directly land-filled. The screened raw wastewater will flow by gravity to the SBR for treatment. This technology accomplishes all phases of treatment in a single tank, thus reducing cost, land requirements and complexity. System features and benefits include the following:

- Independent aeration and mixing (lowers energy consumption);
- Quiescent settling (produces high quality effluent);
- Small footprint using common wall construction (lowers construction cost);
- Modular design (facilitates future expansion if necessary);
- Sequential phase treatment (accomplishes biological phosphorus removal and de-nitrification);
- All components of the system are retrievable and easily accessible;
- Secondary clarifiers, return activated sludge pumps and associated piping are eliminated;
- Hydraulic fluctuations are controlled through a time-managed process operating strategy.

Treated effluent is removed using a floating decanter mechanism that follows the liquid level in the reactor and maximizes the distance between the clarified effluent and sludge blanket. This system ensures no floating surface materials and sludge blanket solids are drawn into the effluent during normal and peak flow conditions.

The SBR system features time-managed operation and control of aerobic, anoxic and anaerobic processes within the reactor using a programmable logic controller. The SBR utilizes five basic phases of operation to meet advanced wastewater treatment objectives, including biological phosphorus removal. The duration of any particular phase is manually adjustable and can be tuned to specific waste characteristics and/or effluent objectives. The individual treatment phases and a summary of proposed facilities have been presented previously in Section 4.0.

The proposed use of tertiary filtration equipment is intended to reduce the discharge of suspended solids in the effluent and lower the discharge of total phosphorus that is bound into the biological sludge solids. Ultraviolet disinfection is proposed to disinfect the treated wastewater from May through October. This means of disinfection does not generate any disinfection by-products that could otherwise potentially impact local streams. Post aeration facilities are proposed to meet expected regulatory requirements of 6.0 mg/L dissolved oxygen at the point of discharge and to ensure the receiving stream is adequately oxygenated.

Table 6.5 summarizes the connected horsepower of the proposed facilities. With the exception of post aeration and seasonal UV disinfection, all of the proposed equipment will operate intermittently and sequentially.

Table 6.5
Connected Horsepower
Proposed Wastewater Treatment Facilities

Equipment	Quantity	Horsepower
Screen Conveyor Drive Motor	1	2 HP
Floating Mixer Motors	2	3 HP/each
Aeration Blower Motors	3	7.5 HP/each
Wastewater Sludge Pump Motors	2	2.4 HP/each
Tertiary Filter		
Backwash Pump Motor	2	2 HP/each
Filter Drive Motor	2	0.75 HP/each
UV Disinfection	1	1.4 KW (1.88 HP)
Total Connect Load		**42.7 HP**

6.4 Proposed Project Schedule

The proposed project schedule is presented in **Table 6.6** which begins with the permit submittal process in December 2014 and concludes with the completion of construction in November 2017.

6.5 Permit Requirements

Permit requirements will consist of an application for the discharge of treated wastewater through the National Pollutant Discharge Elimination System (NPDES) process. This process has a statutory limitation of six months for review and approval, pending any third party objection or antidegradation-based disallowance. Secondly, a nationwide permit from the United States Army Corps of Engineers may be needed for activities related to the construction of an effluent outfall structure.

Effluent discharge from the outfall is will be authorized under the National Pollutant Discharge Elimination System Program (Section 402 of the Clean Water Act).

Third, a permit-to-install (PTI) application and approval will be required following the completion of design documents and prior to the bid process. This process generally takes four to six weeks to obtain PTI application approval, barring any third party objection. Finally, there will be miscellaneous construction-related permits needed through the Ohio Department of Transportation (ODOT), the County Engineer's Office and the County's Permit Central/Building Inspection Department who oversees, inspects and approves electrical, mechanical and plumbing construction.

Table 6.6
Proposed Project Schedule
Village of Newtonsville Wastewater Treatment and Collection System

Phase I - Planning & Preliminary Design	
Prepare/Submit NPDES Permit to Discharge Application	Dec 2014
Public Notice Permit Application	Jan 2015
Public Hearing (If necessary)	Feb 2015
Obtain NPDES Permit to Discharge Approval	Apr 2015
Phase II - Detailed Design Phase II	
Initiate Detailed Design of WWTP & Collection System	Apr 2015
Mid-Design Submittal & Review	Jun 2015
Pre-Final Design Submittal & Review	Sep 2015
Initiate Easement Acquisition	Sep 2015
Final Design Complete	Oct 2015
Submit Permit to Install Application	Oct 2015
Public Notice PTI Application	Nov 2015
Obtain PTI Approval	Dec 2015
Easement Acquisition Complete	Mar 2016
Obtain BoCC Approval	Mar 2016
Advertise Bid Documents	Apr 2016
Receive Bids	May 2016
BoCC Approval/Bid	Jun 2016
Award/Issuance of NTP	Jun 2016
Complete Construction	Nov 2017

6.6 Preliminary Estimate of Project Cost

The preliminary estimate of total project cost is itemized based on the estimated period of construction and includes construction, construction contingency, land acquisition, easements, legal, design phase engineering, construction phase engineering, inspection, funding administration, interest and other costs associated with the proposed project. The non-construction cost subtotal is included to establish the total project costs. The construction costs are based Class 4 cost estimates having a range of +40% to -20% as classified by AACE International's *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*. **Table 6.7** presents the individual costs for the proposed collection and conveyance system and wastewater treatment system. The total project cost, including preliminary estimates of construction and non-construction costs, is $8.08 million.

Table 6.7 Project Cost Summary

PROJECT COST SUMMARY			
HYBRID/COMBINATION WASTEWATER CONVEYANCE + ACTIVATED SLUDGE TREATEMENT WITH SEQUENCING BATCG REACTORS			
Description		**Hybrid/Combination Wastewater Conveyance**	**Activated Sludge Treatment Sequencing Batch Reactors**
Preliminary Estimate of Construction Cost		**$3,232,000**	**$2,262,000**
Non-Construction Project Costs (NCPC)			
Construction Contingency	25%	$808,000	$565,500
Outside Design Services		$177,760	$226,200
Construction Eng'g		$96,960	$113,100
Inspection		$83,200	$83,200
Legal & Permitting		$20,000	$20,000
Easement Acquisition (Ea)	$2,000	$252,000	$4,000
Land ($/acre)	$8,000	$0	$16,000
Interest During Construction		$51,712	$36,192
Training		$0	$5,000
OPWC & USDA/RD Funds Administration		$10,000	$10,000
Total Estimated NCPC Subtotal		**$1,499,632**	**$1,079,192**
Total Estimated Project Cost (rounded)		**$4,731,600**	**$3,341,200**

6.7 Annual Operating Budget

6.7.1 Expenditures and Income

Each year, Clermont County Water Resources Department presents a five year capital plan to the Board of County Commissioners for approval. This legislative action authorizes new dollars to be committed to the list of wastewater capital projects in the plan. The plan details new projects that will begin and projects that will need construction legislation. **Table 6.8** summarizes the currently approved five year wastewater capital improvement program for the period (2014-2018) inclusive

of planned yearly expenditures and income derived from capital improvement fund, assessments, loans and grants.

Sewer service provided by the District is based on the amount of metered water used, as established by the Board of Commissioners. All sewer service connections are subject to a minimum bi-monthly charge based on the size of the water meter or on the number of residential units served by one meter, whichever is greater, as set forth in the County's Rules and Regulations. The current sewer service rate for residential customers having a ¾-inch water meter is $4.44/1,000 gallons. This translates to a minimum bi-monthly charge of $22.20 at the minimum usage of 5,000 gallons. Sewer charges in excess of the minimum are billed at $4.44/1,000 gallons.

Table 6.8
Five Year (2014-2018)
Clermont County - Wastewater Capital Improvement Project Summary

Category	2014	2015	2016	2017	2018	Total
Expenditures	$5,614,879	$5,611,000	$6,310,000	$6,220,000	$5,793,140	$29,549,019
Capital Imp. Fund	$5,578,895	$4,686,396	$5,025,000	$4,205,000	$5,793,140	$25,288,431
Assessment	$0	$358,218	$900,000	$2,015,000	$0	$3,273,218
Loans	$0	$271,007	$0	$0	$0	$271,007
Grants	$69,321	$295,379	$385,000	$0	$0	$716,363

6.7.2 Annual O&M Costs

The estimated annual operation and maintenance costs for the project are individually itemized and summarized in **Table 6.9** for the proposed conveyance and treatment systems.

Table 6.9 Estimated Annual Operation and Maintenance Costs

ESTIMATED ANNUAL O&M COSTS			
HYBRID/COMBINATION WASTEWATER CONVEYANCE + ACTIVATED SLUDGE TREATEMENT WITH SEQUENCING BATCG REACTORS			
Description		**Hybrid/Combination Wastewater Conveyance**	**Activated Sludge Treatment Sequencing Batch Reactors**
Estimated Annual Operational Costs			
Operational Labor ($/hr)	$40	$4,160	$8,320
Administrative	0.1%	$3,232	$2,262
Insurance & Legal	0.2%	$6,464	$4,524
Water ($/1000 gal)	$3.48	$0	$104
Electrical Energy ($/KWH)	$0.064	$941	$4,976
Monitoring & Testing		$0	$3,500
Chemical		$0	$3,000
Generator Service & Maintenance		$500	$500
Equipment Service & Maintenance		$24,960	$9,048
Sewer Maintenance		$12,480	$0
Replacement		$0	$22,620
Consumable Supplies	0.1%	$3,232	$2,262
Residuals Disposal		$3,485	$1,952
Total Estimated Annual O&M Costs		**$59,450**	**$63,070**

6.7.3 Debt Repayment

Clermont County will own the collection, conveyance and treatment system and be the applicant for funding. The Water Resources Department is established as an Enterprise Fund with all revenues generated by users of the system. Therefore, the cost of the project will be borne by users that directly benefit from the project through an assessment for the collection and treatment system. Outside financing is being sought through United States Department of Agriculture/Rural Development (USDA/RD) and the Ohio Public Works Commission (OPWC). Loan and available grant funding application is in progress and will be secured before the initiation of construction 2016.

Proposed project financing consists of the following:

Planning level estimate of construction cost	$5,500,000 (rounded)
USDA/RD Grant (45%)	$2,475,000
OPWC Grant	$500,000
OPWC Loan	$500,000
USDA/RD Loan	$2,025,000

The resulting debt service of $2,525,000 will be borne by benefitted users of the system through a special assessment.

6.7.4 Debt Service Reserve

Special assessment debt is paid from the proceeds of assessments levied against benefited property owners. In the event that an assessed property owner fails to make payments, the County is required to pay the related debt. Anticipated loans from USDA/RD and OPWC will be paid from revenues derived by the County from the operation of the sewer system. General Obligation bonds are proposed to be used by the County for loan security and are secured by the County's ability to levy a property tax within the limitations of Ohio law.

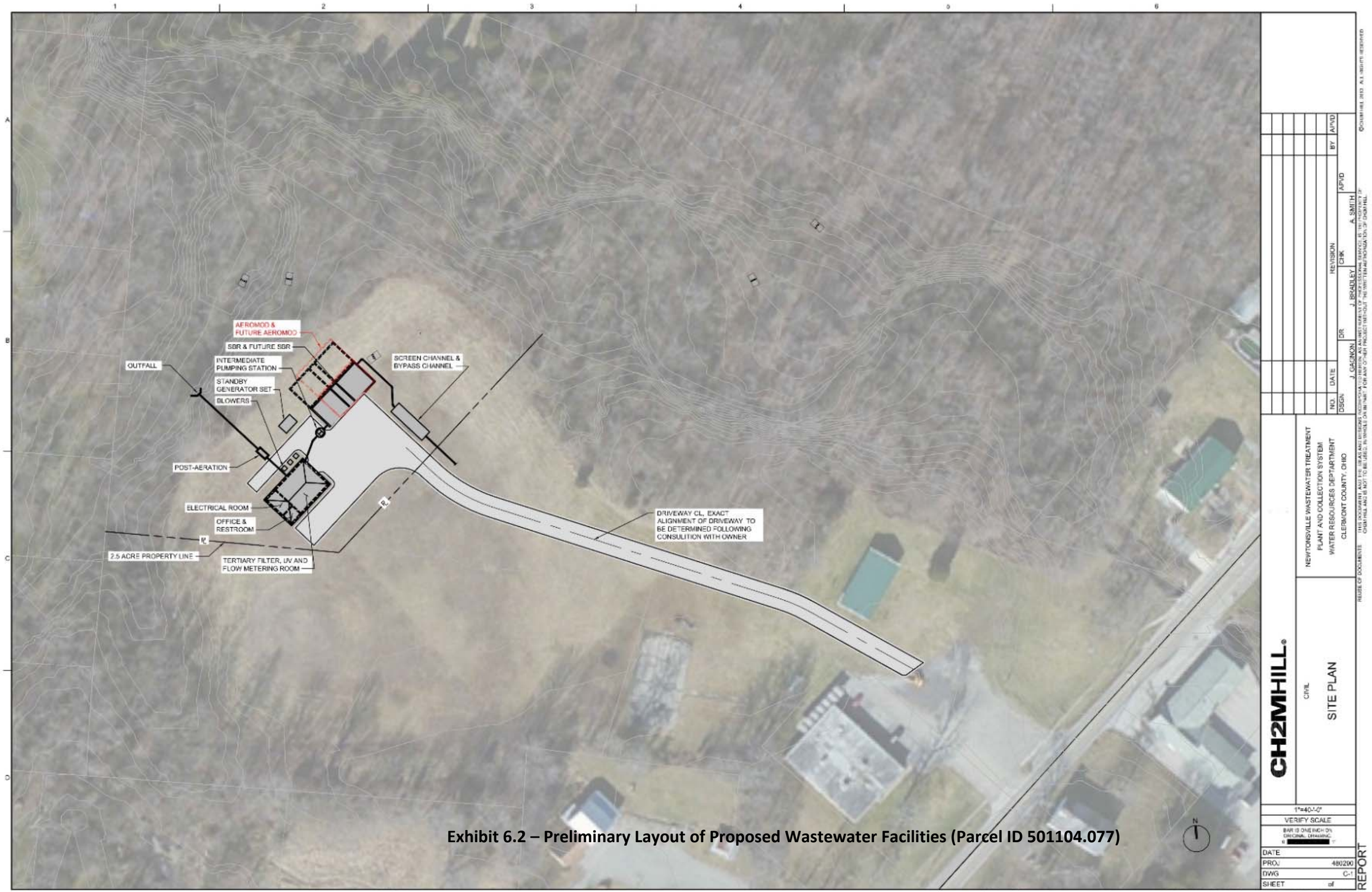


Exhibit 6.2 – Preliminary Layout of Proposed Wastewater Facilities (Parcel ID 501104.077)

7.0 Conclusions and Recommendations

The Preliminary Engineering Report prescribes capital improvements and measures to eliminate an unsewered area having a high density of household sewage treatment systems. The Village of Newtonsville Wastewater Treatment and Collection System is viewed as a vital project with an anticipated win-win-win outcome that will benefit the Village of Newtonsville, Clermont County and the East Fork of the Little Miami River. This project will address known environmental impacts that have been identified by the Clermont County General Health District, the Clermont County Office of Environmental Quality and the Ohio Environmental Protection Agency, notably the following:

- Stream sampling and analysis by Clermont County over the past 17 years has documented the impact of failed household sewage treatment systems on local waterways;
- The recent study and report of the East Fork Little Miami River Basin completed in May 2014 by the Ohio EPA has concluded that identified local streams and rivers downstream from Newtonsville are classified as being in partial and non-attainment with warmwater habitat criteria;
- The State-wide survey of household sewage treatment systems completed in 2012 points to the continued problem of failed on-site systems in Ohio and its impact on local water quality and the potential exposure to humans of pathogenic bacteria;
- The April 2011 field survey of 171 existing household sewage treatment systems in the Newtonsville area revealed a failure rate between 35 and 43 percent;
- The Newtonsville area has a household sewage treatment system density of 684 units per square mile which is over six times greater than what Ohio-Kentucky-Indiana Regional Council of Governments (OKI) considers to be a “high density” area.

This report develops and evaluates wastewater collection and conveyance options and recommends a cost effective approach to centralize wastewater collection and conveyance for the Village of Newtonsville and surrounding properties. Additionally, this report presents an analysis of three candidate sites for a proposed wastewater treatment facility which has included stakeholder input from Village, Township and County levels and which has resulted in the selection of a site owned by the Village.

The conclusions drawn from the Preliminary Engineering Report are as follows:

1. Centralized wastewater collection in the service area is feasible and cost effective using a hybrid/combination collection system that places emphasis on gravity conveyance and minimizes the use of pumping;

2. Wastewater treatment is feasible and cost effective using proven activated sludge treatment processes that feature sequencing batch technology. The proposed treatment system is recommended to be designed for an average flow of 57,000 gallons per day and will discharge to an unnamed tributary stream that extends northward from the Village;

3. The Village has passed a resolution which was adopted on July 29, 2014 that authorizes the utilization of Village property for a planned wastewater treatment facility to serve the Village of Newtonsville;

4. The planning level construction costs for the service area's proposed centralized wastewater collection system and wastewater treatment facilities, inclusive of raw sewage pumping are estimated to be $3.23 million dollars and $2.26 million dollars, respectively, based on Class 4 cost estimates having a range of +40% to -20% as classified by AACE International's *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*;

The following recommendations emerge from the Report:

1. Prepare a National Pollutant Discharge Elimination System (NPDES) Permit application and submit to the Ohio Environmental Protection Agency (OEPA) for their subsequent review and approval following review and concurrence by the County;

2. Continue the public involvement process and arrange a public meeting through the Newtonsville Village Council to present the conclusions and recommendations of the Report;

3. Submit the Preliminary Engineering Report that supports and forms the basis for project financing to the United States Department of Agriculture/Rural Development (USDA/RD) for their review and approval in granting project funding;

CH2M HILL
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Tel 513.530.5520
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January 6, 2013

Chris Rowland, P.E.
Assistant Sanitary Engineer
Clermont County Water Resources Department
4400 Haskell Lane
Batavia, OH 45103

Subject: Newtonsville Wastewater Treatment Plant Project
Clermont County Water Resources Department
Clermont County, Ohio
Wetland and Waterbody Delineation Report

Dear Mr. Rowland:

This Wetland and Waterbody Delineation Report (Report) summarizes the results of the wetland and waterbody delineation field survey conducted by CH2M HILL Engineers, Inc. (CH2M HILL), on December 2, 2013, on behalf of the Clermont County Water Resources Department (Clermont County) for the Newtonsville Wastewater Treatment Plant Project (the Project; Attachment A). The Project includes three separate properties all within, or in the vicinity of, the Village of Newtonsville. The three properties that comprise the Project area include the following:

- Riggs Property (3.1 acres),
- the Village of Newtonsville Property (8 acres), and
- the Pschesang Property (7.8 acre).

Clermont County is proposing to construct a wastewater treatment plant (WWTP) at one of the three locations. The purpose of the delineation was to assess the presence or absence of wetlands, or other waters that may be affected by the proposed Project, and to assess general ecological conditions within the Project area.

BACKGROUND INFORMATION

Before conducting the wetland and waterbody delineation, CH2M HILL reviewed the following resources to identify the potential locations and extent of wetlands and waterbodies within the Project area:

- United States Geological Survey (USGS) topographic map (Newtonsville, 1970);
- Aerial photography (ESRI Online Imagery; World Imagery Layer, 2012);
- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey;

- USGS National Hydrography Dataset (NHD-mapped streams); and
- United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) dataset.

The USGS topographic map (Figure 1) and NHD-mapped streams dataset (Figure 2), which identify intermittent and perennial streams, identified the following streams:

- One perennial stream, an unnamed tributary of Stone Lick Creek within the southern boundary of the Riggs Property;
- One perennial stream, an unnamed tributary of Stone Lick Creek, located in the northwestern corner of the Village of Newtonsville Property; and
- Three perennial streams (one named perennial stream, Stone Lick Creek), within the Pschesang Property's western and southern boundaries.

Stone Lick Creek is a tributary to Lick Fork (Hydrologic Unit Code (HUC) 050902021303 – Moores Fork – Stonelick Creek), located west/southwest of the Project area, and subsequently to the Middle Ohio River – Little Miami Subbasin (HUC 05090202). All wetlands and waterbodies within the Project area are hydrologically connected to Stone Lick Creek, and are therefore, located in this HUC.

The USDA NRCS Web Soil Survey shows nine soil unit types within the Project area in addition to water (two within the Riggs Property, five within the Village of Newtonsville Property, and four including water within the Pschesang Property) (Figure 3). Two soil map units are located within more than one property. The mapped soil unit types were non-hydric and predominantly non-hydric. Non-hydric indicates all components are classified as not hydric, and predominantly non-hydric indicates that greater than 0 percent and less than 34% of the components are hydric. Generally, hydric soils are those soils that indicate through their color and structure that they have experienced dominantly reducing (i.e. oxygen poor) conditions. Oxygen-poor conditions result from inundation and/or saturation by water.

NWI maps are used as a guide along with other data to indicate the potential presence of wetlands. The NWI map information is typically dated, and often not field checked. The presence of an NWI feature is not a definitive indicator that a wetland or waterbody is present. The NWI identified two features within the Project area:

- One palustrine, emergent, persistent, semipermanently flooded, diked/impounded (PEM1Fh) feature, located along an unnamed tributary to Stone Lick Creek within the Village of Newtonsville Property; and
- One palustrine, unconsolidated bottom, intermittently exposed, excavated (PUBGx) feature which corresponds to Stone Lick Creek within the Pschesang Property.

A review of 2012 ESRI Aerial Imagery of the Project area (Figure 4) shows that surrounding land uses are comprised of forested areas, open fields, and old field habitats.

The attached figures include an overview map, based on a USGS topographic map, showing the proposed Project area (Figure 1); a map showing NWI and NHD features (Figure 2); an NRCS soils map (Figure 3); and an aerial site map showing delineated wetlands and streams (Figure 4).

Attachment A contains photographic documentation of the delineated wetlands, streams, and vegetation communities identified within the Project area. Attachment B contains a Stream and Open

Water Summary Table. Attachment C includes United States Army Corps of Engineers (USACE) wetland determination data forms. Attachment D contains Ohio Environmental Protection Agency (OEPA) Ohio Rapid Assessment Method version 5.0 (ORAM) scoring forms. OEPA Headwater Habitat Evaluation Index (HHEI) scoring forms are included in Attachment E. OEPA Qualitative Habitat Evaluation Index (QHEI) scoring forms are included in Attachment F.

METHODOLOGY

Wetlands and waterbodies were delineated within the Project area in accordance with applicable federal and state regulations and guidance. Wetland boundaries were field-delineated according to the routine onsite methodology described in the 2012 USACE *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region* (Version 2.0).

The outer boundaries of each identified wetland and the ordinary high water mark (OHWM) for each waterbody within the Project area were delineated and recorded using a Global Positioning System (GPS) unit, with the exception of Stone Lick Creek. GIS data for Stone Lick Creek was obtained from the Clermont County GIS Department. As wetland and waterbody features were documented, they were each assigned a unique feature identification (ID) number. Wetland delineation data were recorded on the USACE wetland determination data forms and the OEPA ORAM scoring forms, stream habitat quality was recorded on the OEPA HHEI scoring forms.

VEGETATIVE COMMUNITIES

Vegetative communities within the Project area consisted of open fields, upland forest, riparian forest, and palustrine emergent (PEM) wetland.

Riggs Property

The vegetative communities at the Riggs Property include open field, riparian forest, and upland forest. Species identified within the open field habitat include dandelion (*Taraxacum officinale*), fescue (*Festuca* sp.) and clover (*Trifolium* spp.). The riparian forest habitat was dominated by black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), bush honeysuckle (*Lonicera maackii*), hackberry (*Celtis occidentalis*), goldenrod (*Solidago* spp.), wild strawberry (*Fragaria virginiana*), and eastern red cedar (*Juniperus virginiana*). The upland forest habitat contained the same species as the riparian forest with the addition of black locust (*Robinia pseudoacacia*).

Village of Newtonsville Property

The vegetative communities at the Village of Newtonsville Property include open field, early successional forest, and palustrine emergent wetland. The early successional forest habitat was dominated by bush honeysuckle, black cherry, eastern red cedar, hackberry, sugar maple (*Acer saccharum*), northern red oak (*Quercus rubra*), winter creeper (*Euonymus fortunei*), multiflora rose (*Rosa multiflora*), and sassafras (*Sassafras albidum*). The open field habitat was dominated by fescue, white clover (*Trifolium repens*), common plantain (*Plantago major*), and goldenrod. The PEM wetland was dominated by creeping jenny (*Lysimachia nummularia*) and rice cutgrass (*Leersia oryzoides*).

Pschesang Property

The vegetative communities at the Pschesang Property include open field and riparian/early successional forest. Additionally, an area of exposed bedrock and standing water with algal growth was also observed. The open field habitat included timothy (*Phleum pratense*), red clover (*Trifolium*

pratense), white clover, fescue, dandelion, and narrowleaf plantain (*Plantago lanceolata)*. The riparian/early successional forest was dominated by sycamore (*Platanus occidentalis*), black walnut (*Julgans nigra*), American beech (*Fagus grandifolia*), sugar maple, eastern red cedar, and bush honeysuckle.

Site photographs documenting vegetation communities within the Project area are included in Attachment A.

WETLANDS AND WATERBODIES

One PEM wetland, five perennial streams, one ephemeral stream, and one open water feature were identified within the Project area. Additional information about wetlands and waterbodies within the Project area is presented below. Summary waterbody information is also provided in Attachment B. Wetland and stream datasheets are provided in Attachments C through F.

Wetlands

One 0.07-acre PEM wetland, W001, was identified within the northwestern portion of the Village of Newtonsville Property. W001 is abutting Stream S002. This wetland was dominated by creeping jenny and rice cutgrass. Based on an ORAM score of 47, W001 was classified as a Category 2 wetland..

Waterbodie
s

One ephemeral stream and five perennial streams were identified within the Project area. One perennial stream is located on the Riggs Property. One ephemeral stream and two perennial streams are located on the Village of Newtonsville Property. One perennial stream is located within the Pschesang Property and another perennial stream, Stone Lick Creek, borders this property. Additional details about each of these streams are included in Attachment B.

One open water feature was identified on the Pschesang Property. It contained two to three inches of standing water and appeared to be isolated from Stone Lick Creek (S005). The water was stagnant and algal growth was observed. Due to the standing water and algal growth, the exact composition of the substrate could not be determined. It was clearly a hard, impenetrable substance, assumed to be either concrete or bedrock. This feature appears to be potentially remnant of an old access lane.

CONCLUSION

This letter report summarizes the results of a wetland and waterbody delineation conducted by CH2M HILL within the proposed Newtonsville Wastewater Treatment Plant Project area, in Clermont County, Ohio on December 2, 2013. CH2M HILL identified one PEM wetland, one open water feature, one ephemeral stream, and five perennial streams within or bordering the Project area. The identified wetland and five streams have been interpreted as hydrologically connected to surface waters within the Project area, and therefore likely jurisdictional. The shallow waterbody found at the Pschesang Property appears to be isolated, and therefore likely not jurisdictional.

We appreciate the opportunity to assist the Clermont County Water Resources Department with this project. If you have questions, please call Maggie Vuturo Bosiljevac at 513-587-7003.

Sincerely,

CH2M HILL Engineers, Inc.

Lindsey Hesch
Environmental Scientist

Maggie Vuturo Bosiljevac
Senior Environmental Scientist

Alan Smith, P.E.
Project Manager

Attachments:

Figures
Attachment A – Site Photographs
Attachment B – Waterbodies Table
Attachment C – USACE Wetland Determination Datasheets
Attachment D – ORAM Datasheet
Attachment E – HHEI Datasheets
Attachment F – QHEI Datasheets

REFERENCES

Cowardin, L. M., V. Carter, and F. C. Golet. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. Washington D. C. FWS/OBS-79/31.

Mack, John J. Ohio Environmental Protection Agency (OEPA). 2000. *ORAM v. 5.0 Quantitative Score Calibration*. Columbus, Ohio.

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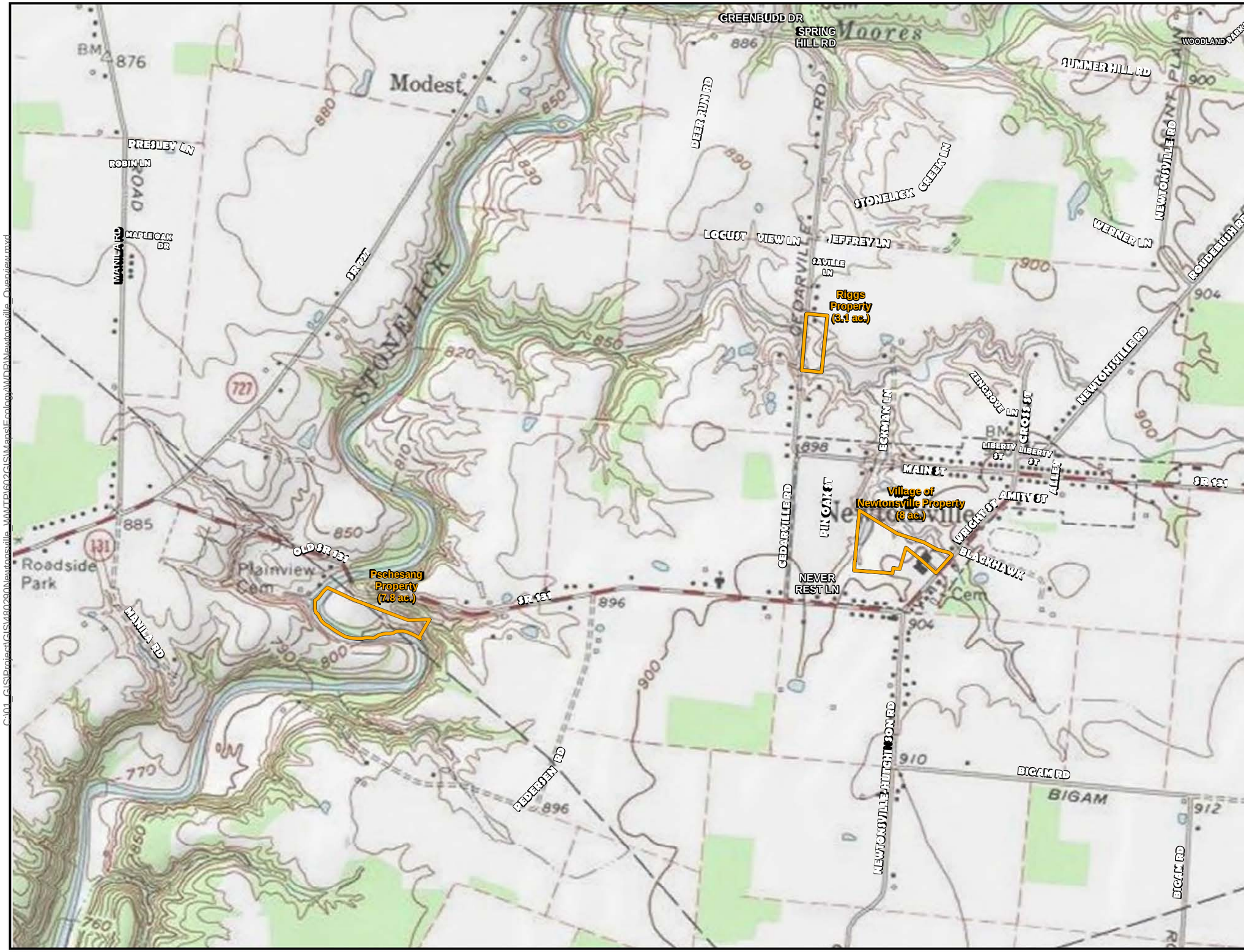
Ohio Environmental Protection Agency (OEPA). 2002. *Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams*. Final Version 1.0. September 2002.

Ohio Environmental Protection Agency (OEPA). 2006. *Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index (QHEI)*. June 2006.

Ohio Environmental Protection Agency (OEPA). 2009. *Field Evaluation Manual for Ohio's Primary Headwater Habitat Streams*. Review Version 2.3. October 2009.

United States Army Corps of Engineers (USACE). 2010. "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)", ERDC/EL TR-10-16, U.S. Army Engineer Research and Development Center, Vicksburg, MS. August 2010.

Figures



LEGEND:

Proposed Site Location

BASE MAP SOURCE:
USGS 7.5-minute Topographic Quadrangle:
Newtonsville, OH (published 1970)

0 1,000 2,000

Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 1
OVERVIEW MAP

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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LEGEND:

- Proposed Site Location
- 10-ft. Contour
- NHD Stream
- NWI Wetland

BASE MAP SOURCE:
ESRI Online Imagery;
World Imagery Layer, 2012

WETLANDS SOURCE:
National Wetland Inventory (NWI);
US Fish and Wildlife Service

STREAMS SOURCE:
National Hydrography Dataset (NHD);
US Geological Survey

0 500 1,000
Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 2
NATIONAL WETLAND INVENTORY (NWI) AND NATIONAL HYDROLOGY DATASET (NHD) MAP

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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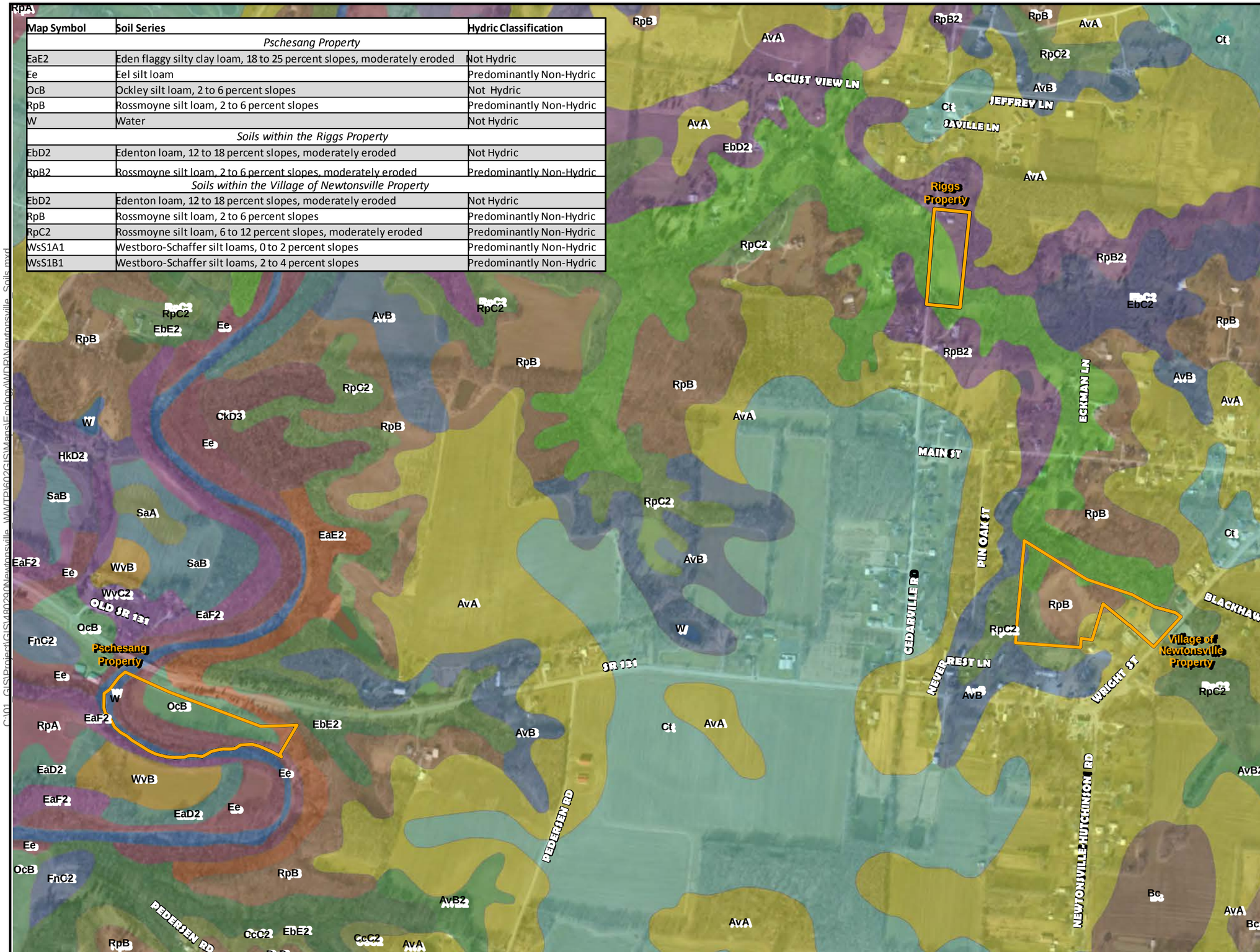
Map Symbol	Soil Series	Hydric Classification
	Pschesang Property	
EaE2	Eden flaggy silty clay loam, 18 to 25 percent slopes, moderately eroded	Not Hydric
Ee	Eel silt loam	Predominantly Non-Hydric
OcB	Ockley silt loam, 2 to 6 percent slopes	Not Hydric
RpB	Rossmoyne silt loam, 2 to 6 percent slopes	Predominantly Non-Hydric
W	Water	Not Hydric
	Soils within the Riggs Property	
EbD2	Edenton loam, 12 to 18 percent slopes, moderately eroded	Not Hydric
RpB2	Rossmoyne silt loam, 2 to 6 percent slopes, moderately eroded	Predominantly Non-Hydric
	Soils within the Village of Newtonsville Property	
EbD2	Edenton loam, 12 to 18 percent slopes, moderately eroded	Not Hydric
RpB	Rossmoyne silt loam, 2 to 6 percent slopes	Predominantly Non-Hydric
RpC2	Rossmoyne silt loam, 6 to 12 percent slopes, moderately eroded	Predominantly Non-Hydric
WsS1A1	Westboro-Schaffer silt loams, 0 to 2 percent slopes	Predominantly Non-Hydric
WsS1B1	Westboro-Schaffer silt loams, 2 to 4 percent slopes	Predominantly Non-Hydric



LEGEND:

Proposed Site Location

Soil Series Map Symbol

AvA	EaF2	RpB
AvB	EbC2	RpB2
AvB2	EbD2	RpC2
Bc	EbE2	SaA
CcC2	Ee	SaB
CkD3	FnC2	W
Ct	HkD2	WvB
EaD2	OcB	WvC2
EaE2	RpA	

BASE MAP SOURCE:
ESRI Online Imagery;
World Imagery Layer, 2012

SOILS SOURCE:
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for Clermont County, Ohio.

0 500 1,000
Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 3
SOILS MAP

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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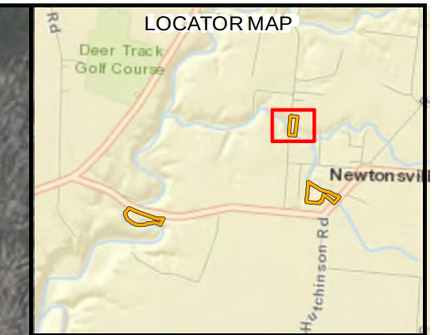

LEGEND:

- Proposed Site Location 10-ft. Contour

Delineated Features

- Wetland Data Point
- Upland Data Point
- Stream
- Palustrine Emergent Wetland
- Open Water Feature

BASE MAP SOURCE:
ESRI Online Imagery;
World Imagery Layer, 2012

0 100 200
Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 4A
WETLANDS AND WATERBODIES
RIGGS PROPERTY

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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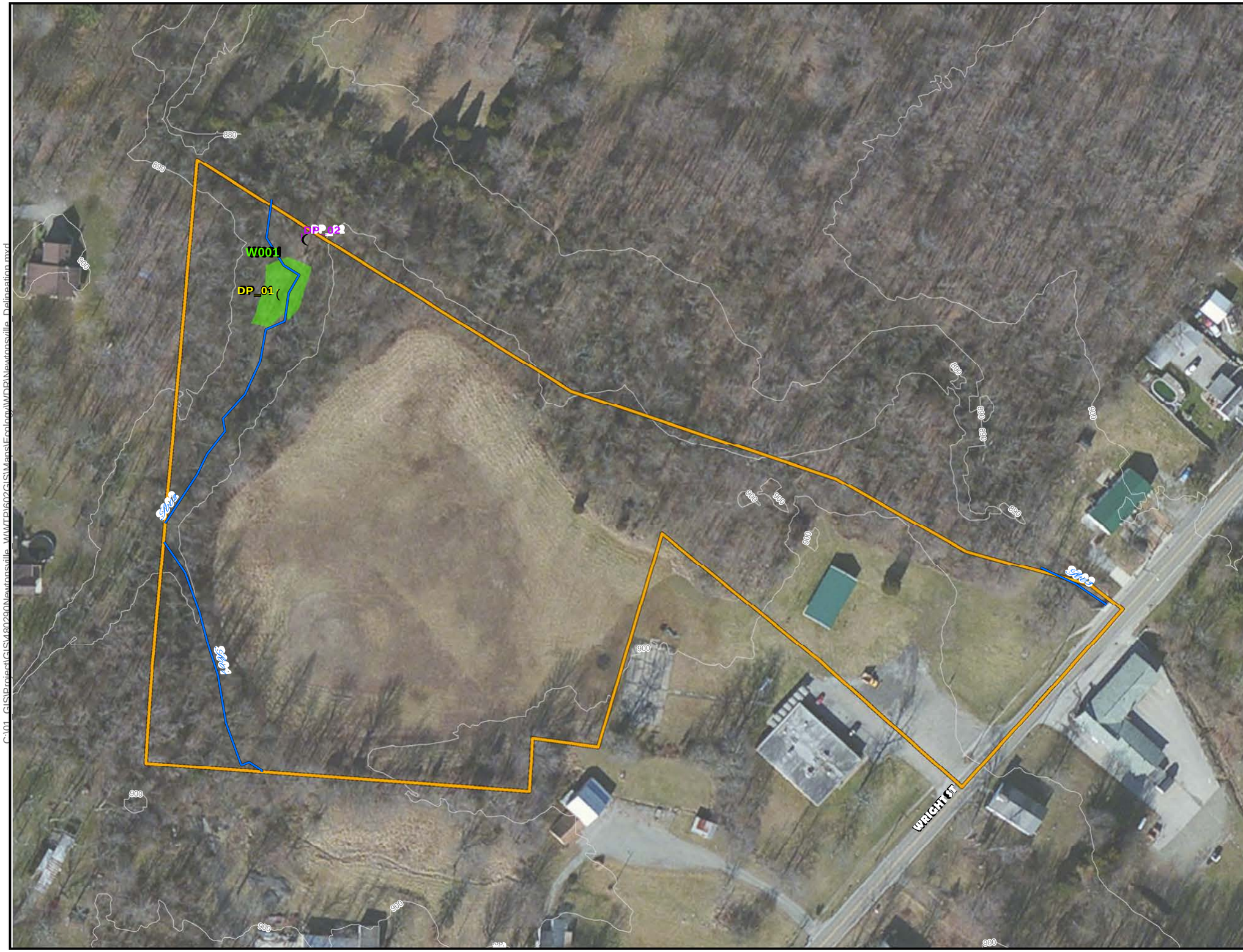

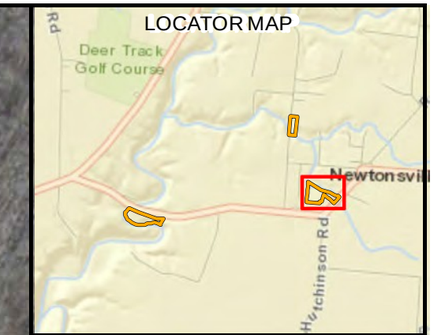

LEGEND:

- Proposed Site Location
- 10-ft. Contour

Delineated Features

- Wetland Data Point
- Upland Data Point
- Stream
- Palustrine Emergent Wetland
- Open Water Feature

BASE MAP SOURCE:
ESRI Online Imagery;
World Imagery Layer, 2012

0 100 200
Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 4B
WETLANDS AND WATERBODIES
VILLAGE OF NEWTONSVILLE PROPERTY

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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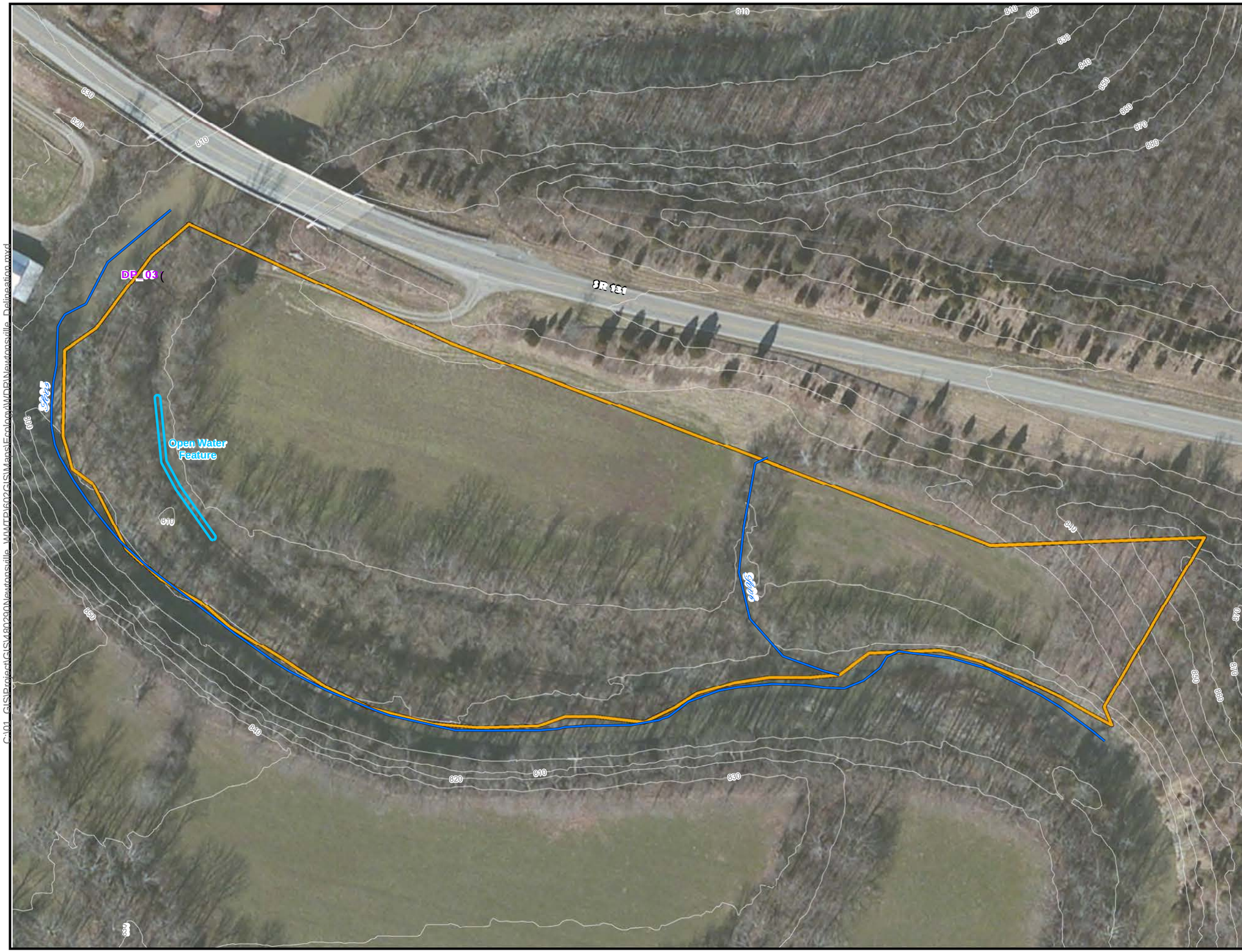

LEGEND:

- Proposed Site Location
- 10-ft. Contour

Delineated Features

- Wetland Data Point
- Upland Data Point
- Stream
- Palustrine Emergent Wetland
- Open Water Feature

BASE MAP SOURCE:
ESRI Online Imagery;
World Imagery Layer, 2012

0 100 200
Scale In Feet

CLERMONT COUNTY WATER RESOURCES DEPARTMENT

NEWTONSVILLE WWTP & COLLECTION SYSTEM PHASE 1

FIGURE 4C
WETLANDS AND WATERBODIES
PSCHESANG PROPERTY

PN: 480290	DATE: 12/18/2013
CREATED BY: BMC	CH2MHILL
REVIEWED BY: MVB	

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Attachment A
Site Photographs

Photo 1: View of S004, looking upstream.

Photo 2: View of riparian forest around S004, looking west.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 3: View of open field habitat, looking north.

Photo 4: View of S001, looking upstream.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 5: View of S002, looking upstream.

Photo 6: View of S003, looking downstream from Wright Street/State Route 131.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 7: View of W001 and DP1, looking west.

Photo 8: View of the DP2, an upland area, looking south.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 9: View of dense upland forest understory near S001, looking west.

Photo 10: View of open field habitat, looking southwest.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 11: View of S005, Stonelick Creek, looking upstream.

Photo 12: View of S006, looking upstream.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Photo 13: View of open water feature, looking south.

Photo 14: View of riparian/ early successional forest habitat, looking southwest.

Clermont County Water Resources Department
Newtonsville Wastewater Treatment Plant Project
Riggs Property, Village of Newtonsville Property, and Pschesang Property
Clermont County, Ohio
Photographed on December 2, 2013

Attachment B
Waterbodies Table

Project Study Area Stream and Open Water Summary
Newtonsville WWTP Project

Feature ID	Property	Waterbody Name	Flow Regime[1]	12-Digit HUC	Drainage Area (square miles)	Approximate Length Delineated within the Environmental Survey Corridor (feet)	Approximate Width of OHWM (feet)	RPW or Non-RPW[2]	QHEI Score[5]	QHEI Narrative Rating[5]	OEPA Aquatic Life Use Designation[3]	HHEI Score	Preliminary OEPA Stream Designation[4]	TNW Connection
STREAMS														
S001	Village of Newtonsville Property	UNT to Stone Lick Creek	Ephemeral	050902021303	0.09	284	1	Non-RPW	NA	NA	NA	17	Class I PHWH	Ohio River
S002	Village of Newtonsville Property	UNT to Stone Lick Creek	Perennial	050902021303	0.12	407	3	RPW	NA	NA	NA	64	Class II PHWH	Ohio River
S003	Village of Newtonsville Property	UNT to Stone Lick Creek	Perennial	050902021303	0.27	54	3.5	RPW	NA	NA	NA	63	Class III PHWH	Ohio River
S004	Riggs Property	UNT to Stone Lick Creek	Perennial	050902021303	1.75	136	10	RPW	51	Fair	NA	NA	NA	Ohio River
S005	Pschesang Property	Stone Lick Creek	Perennial	050902021303	38.6	89	>50	RPW	68	Good	WWH	NA	NA	Ohio River
S006	Pschesang Property	UNT to Stone Lick Creek	Perennial	050902021303	0.15	297	5	RPW	NA	NA	NA	84	Class III PHWH	Ohio River
TOTAL	-	-		-	-	**1,267**	-	-	-	-	-	-	-	-
OPEN WATER														
Open Water	-	-	-	050902021303	-	0.02[6]	-	-	-	-	-	-	-	-
TOTAL	-	-		-	-	**0.02[6]**	-	-	-	-	-	-	-	-

Abbreviations:

HHEI	Headwater Habitat Evaluation Index	PHWH	Primary Headwater Habitat
HUC	Hydrologic Unit Code	QHEI	Qualitative Habitat Evaluation Index
ID	Identification	RPW	Relatively Permanent Water
NA	Not Applicable	TNW	Traditionally Navigable Water
Non-RPW	Non-Relatively Permanent Water	UNT	Unnamed Tributary
OEPA	Ohio Environmental Protection Agency	WWH	Warmwater Habitat
OHWM	Ordinary High Water Mark		

NOTES:

[1]Flow regime is defined as perennial, intermittent, or ephemeral. This determination was interpreted using field observations, USGS topographic maps, and the OEPA HHEI, as appropriate.

[2]Intermittent and perennial streams were recorded as RPWs; ephemeral streams were recorded as non-RPWs.

[3]OEPA Aquatic Life Use Designation based on OAC Chapter 3745-1 Water Quality Standards

[4]Primary headwater habitat (PHWH) class for streams with watersheds smaller than 1 square mile is defined based on HHEI scores according to OEPA 2002.

[5]QHEI narrative rating based on OEPA 2006. The QHEI score was based on site observations and conditions during the field surveys.

[6]Provided as acreage

Attachment C
USACE Wetland Determination Datasheets

WETLAND DETERMINATION DATA FORM - Midwest

Project/Site: Village of Newtonsville Property City/County: Clermont Sampling Date: December 2, 2013

Applicant/Owner: Clermont County Water Resources Department State: OH Sampling Point: DP-01

Investigator(s): M. Vuturo Bosiljevac and S. Aselage Section, Township, Range:

Landform (hillslope, terrace, etc.): depression Local Relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): Lat: 39.18037169 Long: -84.0923559 Datum: NAD83

Soil Map Unit Name: Edenton loam, 12 to 18 percent slopes, moderately eroded NWI classification:

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X	No		
Wetland Hydrology Present?	Yes X	No		

Remarks:
W001; located adjacent to S002

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches): none
Water Table Present?	Yes X	No	Depth (inches): 14
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 10

Wetland Hydrology Present? Yes X No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: DP-01

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Celtis occidentalis	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5	= Total Cover	

Sapling/Shrub Stratum: (Plot Size: 30)			
1. Rosa multiflora	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	5	= Total Cover	

Herb Stratum: (Plot size: 15)			
1. Lysimachia nummularia	20	Yes	FACW
2. Leersia oryzoides	50	Yes	OBL
3. Agrimonia sp.	5	No	
4. Carex sp.	10	No	
5. Solidago sp.	5	No	
6. Scirpus atrovirens	5	No	OBL
7.			
8.			
9.			
10.			
11.			
12.			
	95	= Total Cover	

Woody Vine Stratum: (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
6.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 4/1	70	5 YR 3/4	5	C	M	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL= Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___
- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): ___

Type:

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest

Project/Site: Village of Newtonsville Property City/County: Clermont Sampling Date: December 2, 2013

Applicant/Owner: Clermont County Water Resources Department State: OH Sampling Point: DP-02

Investigator(s): M. Vuturo Bosiljevac and S. Aselage Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local Relief (concave, convex, none): _____ Slope (%): 0

Subregion (LRR or MLRA): _____ Lat: 39.18053964 Long: -84.09225203 Datum: NAD83

Soil Map Unit Name: Edenton loam, 12 to 18 percent slopes, moderately eroded NWI classification: _____

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	Is the Sampled Area within a Wetland?	Yes _____ No X
Hydric Soil Present?	Yes _____	No X		
Wetland Hydrology Present?	Yes _____	No X		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Gauge or Well Data (D9)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches):	none
Water Table Present?	Yes _____	No X	Depth (inches):	>8
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches):	>8

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: DP-02

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Celtis occidentalis	25	Yes	FAC
2. Prunus serotina	25	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	50	= Total Cover	

Sapling/Shrub Stratum: (Plot Size: 30)			
1. Lonicera maackii	50	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	50	= Total Cover	

Herb Stratum: (Plot size: 15)			
1. Fragaria virginiana	5	Yes	FACU
2. Lonicera maackii	5	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10	= Total Cover	

Woody Vine Stratum: (Plot size: 30)			
1. Lonicera japonica	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 17 (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10 YR 4/2	100					silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL= Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ 5 cm Mucky Peat or Peat (S3)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Loamy Mucky Mineral (F1)
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ Coast Prairie Redox (A16)
- ____ Dark Surface (S7)
- ____ Iron-Manganese Masses (F12)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: woody plant root

Depth (inches): 8

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest

Project/Site: Pschesang Property City/County: Clermont Sampling Date: December 2, 2013

Applicant/Owner: Clermont County Water Resources Department State: OH Sampling Point: DP-03

Investigator(s): M. Vuturo Bosiljevac and S. Aselage Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local Relief (concave, convex, none): _____ Slope (%): 0

Subregion (LRR or MLRA): _____ Lat: 39.17802434 Long: -84.11298035 Datum: NAD83

Soil Map Unit Name: Water NWI classification: _____

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation no, Soil no, or Hydrology no significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation no, Soil no, or Hydrology no naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	Is the Sampled Area within a Wetland? Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:
Located within floodplain of Stonelick Creek

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- _____ Surface Water (A1)
- _____ High Water Table (A2)
- _____ Saturation (A3)
- _____ Water Marks (B1)
- X Sediment Deposits (B2)
- X Drift Deposits (B3)
- _____ Algal Mat or Crust (B4)
- _____ Iron Deposits (B5)
- _____ Inundation Visible on Aerial Imagery (B7)
- _____ Sparsely Vegetated Concave Surface (B8)
- _____ Water-Stained Leaves (B9)
- _____ Aquatic Fauna (B13)
- _____ True Aquatic Plants (B14)
- _____ Hydrogen Sulfide Odor (C1)
- _____ Oxidized Rhizospheres on Living Roots (C3)
- _____ Presence of Reduced Iron (C4)
- _____ Recent Iron Reduction in Tilled Soils (C6)
- _____ Thin Muck Surface (C7)
- _____ Gauge or Well Data (D9)
- _____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- _____ Surface Soil Cracks (B6)
- _____ Drainage Patterns (B10)
- _____ Dry-Season Water Table (C2)
- _____ Crayfish Burrows (C8)
- _____ Saturation Visible on Aerial Imagery (C9)
- _____ Stunted or Stressed Plants (D1)
- _____ Geomorphic Position (D2)
- _____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): none	
Water Table Present?	Yes _____	No X	Depth (inches): >16	**Wetland Hydrology Present?**
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): >16	Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: DP-03

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	15	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	15	= Total Cover	

Sapling/Shrub Stratum: (Plot Size: 30)			
1. Lonicera maackii	15	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	15	= Total Cover	

Herb Stratum: (Plot size: 15)			
1. Lysimachia nummularia	15	Yes	FACW
2. Dichanthelium clandestinum	15	Yes	FACW
3. Elymus virginicus	15	Yes	FACW
4. Poa sp.	15	Yes	
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	60	= Total Cover	

Woody Vine Stratum: (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
6.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:			Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 4/3	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL= Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ____ Histosol (A1)
- ____ Histic Epipedon (A2)
- ____ Black Histic (A3)
- ____ Hydrogen Sulfide (A4)
- ____ Stratified Layers (A5)
- ____ 2 cm Muck (A10)
- ____ Depleted Below Dark Surface (A11)
- ____ Thick Dark Surface (A12)
- ____ Sandy Mucky Mineral (S1)
- ____ 5 cm Mucky Peat or Peat (S3)
- ____ Sandy Gleyed Matrix (S4)
- ____ Sandy Redox (S5)
- ____ Stripped Matrix (S6)
- ____ Loamy Mucky Mineral (F1)
- ____ Loamy Gleyed Matrix (F2)
- ____ Depleted Matrix (F3)
- ____ Redox Dark Surface (F6)
- ____ Depleted Dark Surface (F7)
- ____ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ____ Coast Prairie Redox (A16)
- ____ Dark Surface (S7)
- ____ Iron-Manganese Masses (F12)
- ____ Very Shallow Dark Surface (TF12)
- ____ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

Attachment D
ORAM Datasheet

Site: W001	**Rater(s):** M. Vuturo Bosiljevac	**Date:** 12/2/13

0	0
max 6 pts.	subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

- [ ] >50 acres (>20.2ha) (6 pts)
- [ ] 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- [ ] 10 to <25 acres (4 to <10.1ha) (4 pts)
- [ ] 3 to <10 acres (1.2 to <4ha) (3 pts)
- [ ] 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- [ ] 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- [✓] <0.1 acres (0.04ha) (0 pts)

9	9
max 14 pts.	subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- [ ] WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- [✓] MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- [ ] NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- [ ] VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- [ ] VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- [✓] LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- [ ] MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- [ ] HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

23	32
max 30 pts.	subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- [ ] High pH groundwater (5)
- [ ] Other groundwater (3)
- [✓] Precipitation (1)
- [ ] Seasonal/Intermittent surface water (3)
- [✓] Perennial surface water (lake or stream) (5)

3b. Connectivity. Score all that apply.

- [ ] 100 year floodplain (1)
- [ ] Between stream/lake and other human use (1)
- [ ] Part of wetland/upland (e.g. forest), complex (1)
- [✓] Part of riparian or upland corridor (1)

3c. Maximum water depth. Select only one and assign score.

- [ ] >0.7 (27.6in) (3)
- [ ] 0.4 to 0.7m (15.7 to 27.6in) (2)
- [✓] <0.4m (<15.7in) (1)

3d. Duration inundation/saturation. Score one or dbl check.

- [ ] Semi- to permanently inundated/saturated (4)
- [✓] Regularly inundated/saturated (3)
- [ ] Seasonally inundated (2)
- [ ] Seasonally saturated in upper 30cm (12in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- [✓] None or none apparent (12)
- [ ] Recovered (7)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] ditch
- [ ] tile
- [ ] dike
- [ ] weir
- [ ] stormwater input
- [ ] point source (nonstormwater)
- [ ] filling/grading
- [ ] road bed/RR track
- [ ] dredging
- [ ] other_____

13	45
max 20 pts.	subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- [✓] None or none apparent (4)
- [ ] Recovered (3)
- [ ] Recovering (2)
- [ ] Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- [ ] Excellent (7)
- [ ] Very good (6)
- [ ] Good (5)
- [ ] Moderately good (4)
- [✓] Fair (3)
- [ ] Poor to fair (2)
- [ ] Poor (1)

4c. Habitat alteration. Score one or double check and average.

- [ ] None or none apparent (9)
- [✓] Recovered (6)
- [ ] Recovering (3)
- [ ] Recent or no recovery (1)

Check all disturbances observed

- [ ] mowing
- [ ] grazing
- [ ] clearcutting
- [✓] selective cutting
- [ ] woody debris removal
- [ ] toxic pollutants
- [ ] shrub/sapling removal
- [ ] herbaceous/aquatic bed removal
- [ ] sedimentation
- [ ] dredging
- [ ] farming
- [ ] nutrient enrichment

45
subtotal this page

Site: W001	**Rater(s):** M. Vuturo Bosiljevac	**Date:** 12/2/13

45
subtotal first page

0	45
max 10 pts.	subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- [ ] Bog (10)
- [ ] Fen (10)
- [ ] Old growth forest (10)
- [ ] Mature forested wetland (5)
- [ ] Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- [ ] Lake Erie coastal/tributary wetland-restricted hydrology (5)
- [ ] Lake Plain Sand Prairies (Oak Openings) (10)
- [ ] Relict Wet Prairies (10)
- [ ] Known occurrence state/federal threatened or endangered species (10)
- [ ] Significant migratory songbird/water fowl habitat or usage (10)
- [ ] Category 1 Wetland. See Question 1 Qualitative Rating (-10)

2	47
max 20 pts.	subtotal

Metric 6. Plant communities, interspersion, microtopography.

6a. Wetland Vegetation Communities.
Score all present using 0 to 3 scale.

- [ ] Aquatic bed
- [1] Emergent
- [ ] Shrub
- [ ] Forest
- [ ] Mudflats
- [ ] Open water
- [ ] Other_____

6b. horizontal (plan view) Interspersion.
Select only one.

- [ ] High (5)
- [ ] Moderately high(4)
- [ ] Moderate (3)
- [ ] Moderately low (2)
- [ ] Low (1)
- [X] None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- [ ] Extensive >75% cover (-5)
- [ ] Moderate 25-75% cover (-3)
- [ ] Sparse 5-25% cover (-1)
- [ ] Nearly absent <5% cover (0)
- [X] Absent (1)

6d. Microtopography.
Score all present using 0 to 3 scale.

- [ ] Vegetated hummucks/tussucks
- [ ] Coarse woody debris >15cm (6in)
- [ ] Standing dead >25cm (10in) dbh
- [ ] Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

47	**GRAND TOTAL (max 100 pts)**

Refer to the most recent ORAM Score Calibration Report for the scoring breakpoints between wetland categories at the following address: http://www.epa.state.oh.us/dsw/401/401.html

Attachment E
HHEI Datasheets

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 17

SITE NAME/LOCATION: Newtonsville WWTP Project - Village of Newtonsville Property

SITE NUMBER: S001 RIVER BASIN: _____ DRAINAGE AREA (mi^2): 0.09

LENGTH OF STREAM REACH (ft): _____ LAT. 39.17928 LONG. -84.09258 RIVER CODE: _____ RIVER MILE: _____

DATE: 12/02/13 SCORER: MVB COMMENTS: _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☑ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]	0%	☑	SILT [3 pt]	100%
☐	BOULDER (>256 mm) [16 pts]	0%	☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐	BEDROCK [16 pt]	0%	☐	FINE DETRITUS [3 pts]	0%
☐	COBBLE (65-256 mm) [12 pts]	0%	☐	CLAY or HARDPAN [0 pt]	0%
☐		0%	☐		0%
☐	SAND (<2 mm) [6 pts]	0%	☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00% (A) Substrate Percentage Check 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 6 **TOTAL NUMBER OF SUBSTRATE TYPES:** 1

HHEI Metric Points

Substrate Max = 40: 7

A + B

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☑ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS ag ditch in forested riparian area **MAXIMUM POOL DEPTH (centimeters):** 3

Pool Depth Max = 30: 5

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☑ ≤ 1.0 m (<=3' 3") [5 pts]

COMMENTS OHWM = 12"; TOB averages 2' **AVERAGE BANKFULL WIDTH (meters):** 0.60

Bankfull Width Max=30: 5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY *NOTE: River Left (L) and Right (R) as looking downstream*

L	R	RIPARIAN WIDTH (Per Bank)	L	R	FLOODPLAIN QUALITY (Most Predominant per Bank)	L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☑	☑	Moderate 5-10m	☑	☑	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☐ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☑ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☑ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name:	Stonelick Creek	Distance from Evaluated Stream	1.54 miles
☐ CWH Name:		Distance from Evaluated Stream	
☐ EWH Name:		Distance from Evaluated Stream	

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Newtonsville NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Clermont Township / City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 12/02/13 Quantity: 0.03

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 100%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

Performe I? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

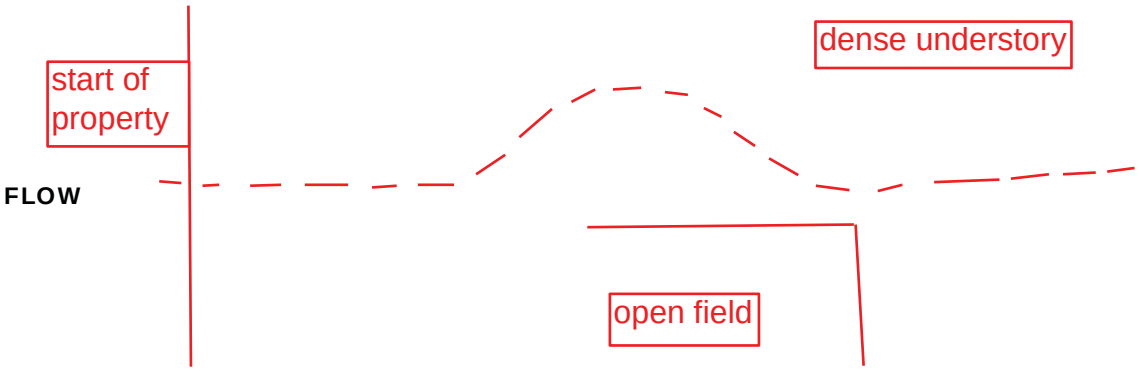
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



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Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 64

SITE NAME/LOCATION: Newtonsville WWTP Project - Village of Newtonsville Property

SITE NUMBER: S002 RIVER BASIN: _____ DRAINAGE AREA (mi²): 0.12

LENGTH OF STREAM REACH (ft): _____ LAT. 39.18017 LONG. -84.09242 RIVER CODE: _____ RIVER MILE: _____

DATE: 12/02/13 SCORER: MVB COMMENTS: _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☑ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes

TYPE		PERCENT	TYPE		PERCENT
☐ ☐	BLDR SLABS [16 pts]	0%	☑ ☐	SILT [3 pt]	90%
☐ ☐	BOULDER (>256 mm) [16 pts]	0%	☐ ☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐ ☐	BEDROCK [16 pt]	0%	☐ ☐	FINE DETRITUS [3 pts]	0%
☐ ☐	COBBLE (65-256 mm) [12 pts]	0%	☐ ☐	CLAY or HARDPAN [0 pt]	0%
☐ ☐		10%	☐ ☐		0%
☐ ☐	SAND (<2 mm) [6 pts]	0%	☐ ☐	ARTIFICIAL [3 pts]	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 0.00% (A)

Substrate Percentage Check: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 12 **TOTAL NUMBER OF SUBSTRATE TYPES:** 2

Metric Points

Substrate Max = 40: 14

A + B

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☑ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ **MAXIMUM POOL DEPTH (centimeters):** 30

Pool Depth Max = 30: 30

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) **(Check *ONLY* one box):**

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ::0 1.0 m (<=3' 3") [5 pts]

COMMENTS OHWM = 3'; TOB averages 6' **AVERAGE BANKFULL WIDTH (meters):** 1.80

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY *NOTE: River Left (L) and Right (R) as looking downstream*

L	R	RIPARIAN WIDTH (Per Bank)	L	R	FLOODPLAIN QUALITY (Most Predominant per Bank)	L	R	
☑	☑	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☑	☑	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☐ 2.5	☑ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name:	Stonelick Creek	Distance from Evaluated Stream	1.50 miles
☐ CWH Name:		Distance from Evaluated Stream	
☐ EWH Name:		Distance from Evaluated Stream	

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Newtonsville NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Clermont Township / City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 12/02/13 Quantity: 0.03

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 80%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

Performe I? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

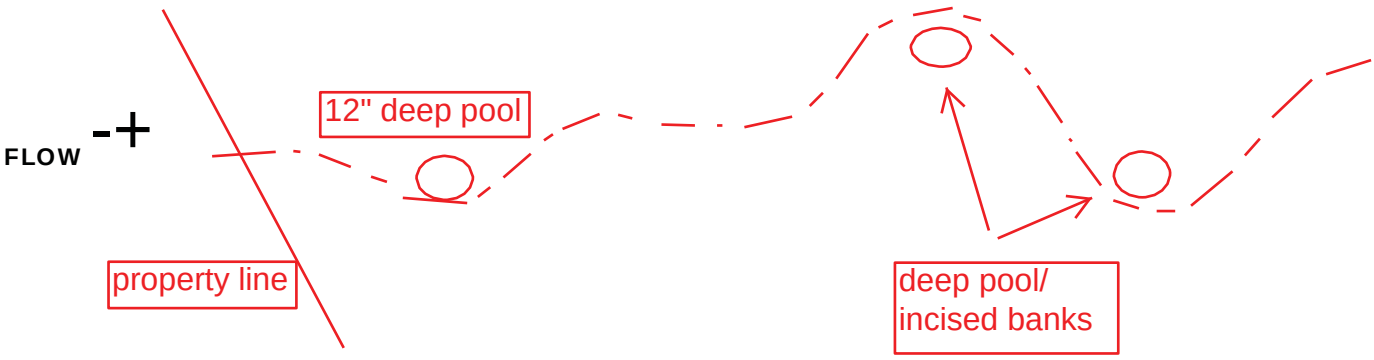
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



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Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 63

SITE NAME/LOCATION: Newtonsville WWTP Project - Village of Newtonsville Property

SITE NUMBER: S003 RIVER BASIN: ____ DRAINAGE AREA (mi^2): 0.27

LENGTH OF STREAM REACH (ft): ____ LAT. 39.17956 LONG. -84.08931 RIVER CODE: ____ RIVER MILE: ____

DATE: 12/02/13 SCORER: MVB COMMENTS: ____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☑ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

Box culvert under road

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes

TYPE		PERCENT	TYPE		PERCENT
☑	BLDR SLABS [16 pts]	25%	☑	SILT [3 pt]	40%
☐	BOULDER (>256 mm) [16 pts]	0%	☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐	BEDROCK [16 pt]	0%	☐	FINE DETRITUS [3 pts]	0%
☐	COBBLE (65-256 mm) [12 pts]	25%	☐	CLAY or HARDPAN [0 pt]	0%
☐		0%	☐		0%
☐	SAND (<2 mm) [6 pts]	0%	☐	ARTIFICIAL [3 pts] concrete, bricks	10%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 50.00% (A)

Substrate Percentage Check: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 19 **TOTAL NUMBER OF SUBSTRATE TYPES:** 4

Metric Points

Substrate Max = 40: 23

A + B

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☑ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS ____ **MAXIMUM POOL DEPTH (centimeters):** 15

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ::0 1.0 m (<=3' 3") [5 pts]

COMMENTS OHWM = 3-4'; TOB averages 6' **AVERAGE BANKFULL WIDTH (meters):** 1.80

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY *NOTE: River Left (L) and Right (R) as looking downstream*

L	R	RIPARIAN WIDTH (Per Bank)	L	R	FLOODPLAIN QUALITY (Most Predominant per Bank)	L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☑	☑	Moderate 5-10m	☑	☑	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS ____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS ____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None	☑ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☐ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

☑ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name:	Stonelick Creek	Distance from Evaluated Stream	1.64 miles
☐ CWH Name:		Distance from Evaluated Stream	
☐ EWH Name:		Distance from Evaluated Stream	

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Newtonsville NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Clermont Township / City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 12/02/13 Quantity: 0.03

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 15%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

Performe I? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

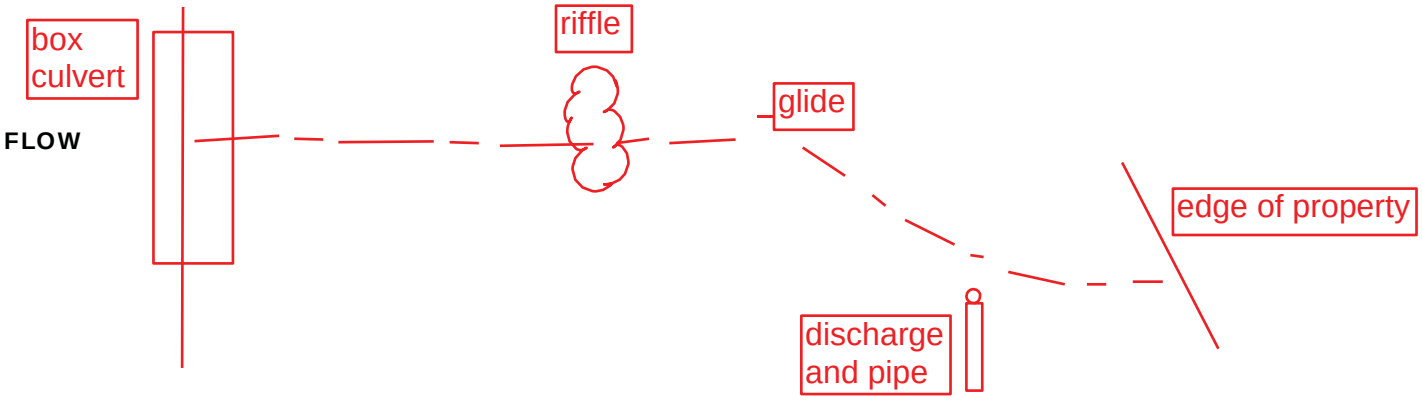
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



October 24, 2002 Revision

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Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 84

SITE NAME/LOCATION: Newtonsville WWTP Project - Pschesang Property

SITE NUMBER: S006 RIVER BASIN: _____ DRAINAGE AREA (mi^2): 0.15

LENGTH OF STREAM REACH (ft): _____ LAT. 39.17711 LONG. -84.11073 RIVER CODE: _____ RIVER MILE: _____

DATE: 12/02/13 SCORER: MVB COMMENTS: _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☑ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

Culvert under farm lane

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☑ ☐	BLDR SLABS [16 pts]	30%	☐ ☐	SILT [3 pt]	5%
☐ ☐	BOULDER (>256 mm) [16 pts]	15%	☐ ☐	LEAF PACK/WOODY DEBRIS [3 pts]	0%
☐ ☐	BEDROCK [16 pt]	15%	☐ ☐	FINE DETRITUS [3 pts]	0%
☐ ☑	COBBLE (65-256 mm) [12 pts]	25%	☐ ☐	CLAY or HARDPAN [0 pt]	0%
☐ ☐		10%	☐ ☐		0%
☐ ☐	SAND (<2 mm) [6 pts]	0%	☐ ☐	ARTIFICIAL [3 pts] concrete, bricks	0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock: 85.00% (A)

Substrate Percentage Check: 100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 28 **TOTAL NUMBER OF SUBSTRATE TYPES:** 6

2. Maximum Pool Depth ***(Measure the maximum pool depth within the 61 meter (200 ft)*** evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☑ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ **MAXIMUM POOL DEPTH (centimeters):** 45

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☑ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ::0 1.0 m (<=3' 3") [5 pts]

COMMENTS OHWM = 4-6' average; TOB averages 15-25' **AVERAGE BANKFULL WIDTH (meters):** 6.10

HHEI Metric Points

	Max	Score
Substrate (A + B)	40	34
Pool Depth	30	20
Bankfull Width	30	30

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY *NOTE: River Left (L) and Right (R) as looking downstream*

L	R	RIPARIAN WIDTH (Per Bank)	L	R	FLOODPLAIN QUALITY (Most Predominant per Bank)	L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☑	☑	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☑	☑	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☑ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☑ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☐ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☑ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☑ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name:	Stonelick Creek	Distance from Evaluated Stream	0.01 mile
☐ CWH Name:		Distance from Evaluated Stream	
☐ EWH Name:		Distance from Evaluated Stream	

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: Newtonsville NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Clermont Township / City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 12/02/13 Quantity: 0.03

Photograph Information: _____

Elevated Turbidity? (Y/N): N Canopy (% open): 50%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (µmhos/cm) _____

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: _____

BIOTIC EVALUATION

Performe I? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) Y Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

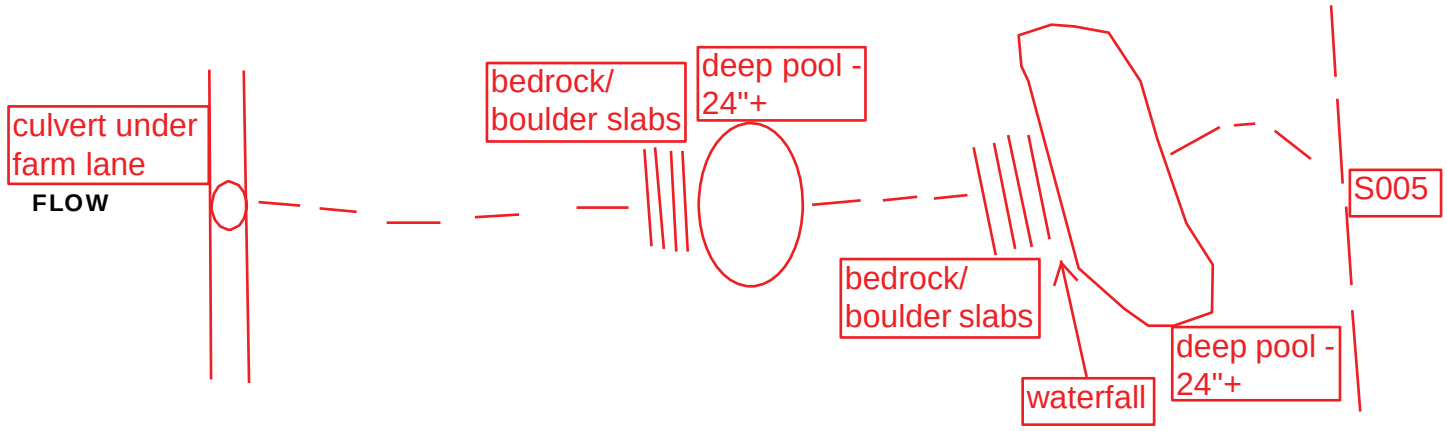
Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) N Voucher? (Y/N) N

Comments Regarding Biology: _____

Fish observed in large pool near confluence with S005

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



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Attachment F
QHEI Datasheets

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 51

Stream & Location: S004 - Unnamed Tributary to Stonelick Creek **RM:** _ _ _._ **Date:** 12 / 2 / 13

Scorers Full Name & Affiliation: M. Vuturo Bosiljevac, CH2M HILL

River Code: _ _ _ - _ _ _ - _ _ _ **STORET #:** _ _ _ _ _ _ **Lat./ Long.:** (NAD 83 - decimal °) 39 . 184977 /84 . 094804 Office verified location ☐

1] SUBSTRATE

Check **ONLY Two** substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]	5		☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	10	10	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]		20	☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]		20	☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]	35	
☐ ☐					
x x BEDROCK [5]	50	50			

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

ORIGIN (Check ONE (*Or 2 & average*))

☒ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐
☐
☐ RIP/RAP [0]
☐ LACUSTURINE [0]
SHALE [-1]
COAL FINES [-2]

QUALITY

SILT
☐ HEAVY [-2]
☐ MODERATE [-1]
☒ NORMAL [0]
☐ FREE [1]

MODERATE / DEDNESS
☐ EXTENSIVE [-2]
☐
☐
☐ MODERATE [-1]
x NORMAL [0]
NONE [1]

Substrate 13 *Maximum 20*

Comments

2] INSTREAM COVER

Indicate presence 0 to 3: **0**-Absent; **1**-Very small amounts or if more common of marginal quality; **2**-Moderate amounts, but not of highest quality or in small amounts of highest quality; **3**-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

1 UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
1 SHALLOWS (IN SLOW WATER) [1]
0 ROOTMATS [1]
0 POOLS > 70cm [2]
0 ROOTWADS [1]
0 BOULDERS [1]
0 OXBOWS, BACKWATERS [1]
0 AQUATIC MACROPHYTES [1]
0 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONE (*Or 2 & average*))

☐ EXTENSIVE >75% [11]
☐
☐ MODERATE 25-75% [7]
☒ SPARSE 5-<25% [3]
NEARLY ABSENT <5% [1]

Cover 6 *Maximum 20*

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (*Or 2 & average*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☒ LOW [2]	☒ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel 10 *Maximum 20*

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (*Or 2 per bank & average*)

River right looking downstream

EROSION (L R)
☐ ☐ NONE / LITTLE [3]
☒ ☒ MODERATE [2]
☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
☐ ☐ WIDE > 50m [4]
☐ ☐ MODERATE 10-50m [3]
☒ ☐ NARROW 5-10m [2]
☐ ☒ VERY NARROW < 5m [1]
☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
☒ ☐ FOREST, SWAMP [3]
☐ ☒ SHRUB OR OLD FIELD [2]
☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ FENCED PASTURE [1]
☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian 6 *Maximum 10*

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check **ONE** (*ONLY!*))
☐ > 1m [6]
☐ 0.7-<1m [4]
☒ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (*Or 2 & average*))
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☒ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current 3 *Maximum 12*

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
☐ BEST AREAS > 10cm [2]
☒ BEST AREAS 5-10cm [1]
☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
☐ MAXIMUM > 50cm [2]
☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
☒ STABLE (e.g., Cobble, Boulder) [2]
☐ MOD. STABLE (e.g., Large Gravel) [1]
☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ NONE [2]
☒ LOW [1]
☐ MODERATE [0]
☐ EXTENSIVE [-1]

Riffle / Run 5 *Maximum 8*

Comments

6] GRADIENT

(30.3 ft/mi)
DRAINAGE AREA (1.75 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

%POOL: 10 %GLIDE: 60
%RUN: 20 %RIFFLE: 10

Gradient 8 *Maximum 10*

A] SAMPLED REACH

Check ALL that apply

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

Due to flooding conditions at the time of the survey, the riffle and run depths had to be estimated. The embeddedness was also estimated.

METHOD

- [ ] BOAT
- [x] WADE
- [ ] L. LINE
- [ ] OTHER

STAGE

1st -sample pass- 2nd

- [ ] HIGH [ ]
- [ ] UP [ ]
- [x] NORMAL [ ]
- [ ] LOW [ ]
- [ ] DRY [ ]

DISTANCE

- [ ] 0.5 Km
- [ ] 0.2 Km
- [ ] 0.15 Km
- [ ] 0.12 Km
- [x] OTHER

0.05 km

meters

CLARITY

1st --sample pass-- 2nd

- [ ] < 20 cm
- [ ] 20-<40 cm
- [ ] 40-70 cm
- [ ] > 70 cm/ CTB
- [ ] SECCHI DEPTH

1st _____cm

2nd _____ cm

CANOPY

- [ ] > 85%- OPEN
- [ ] 55%-<85%
- [x] 30%-<55%
- [ ] 10%-<30%
- [ ] <10%- CLOSED

B] AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- [ ] OIL SHEEN
- [ ] TRASH / LITTER
- NUISANCE
- ODOR
- [ ] SLUDGE DEPOSITS

C] RECREATION

AREA DEPTH

POOL: [ ] >100ft² [ ] >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

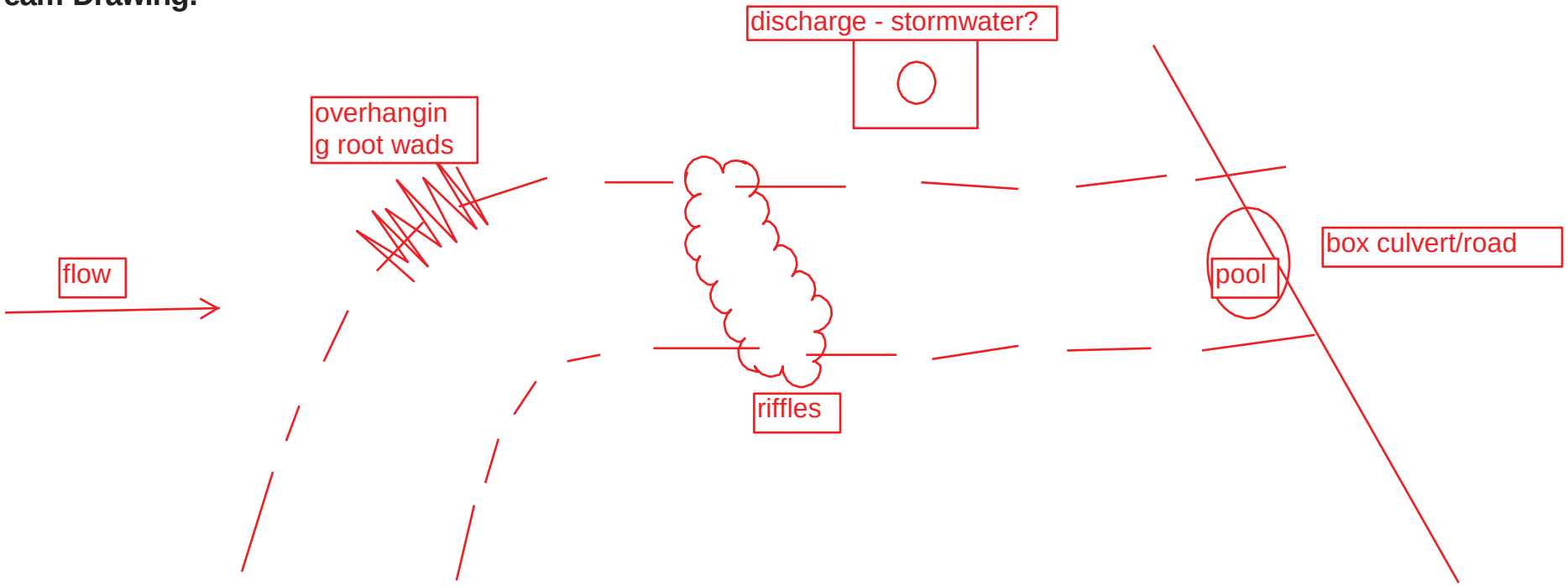
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENTS

- $\bar{x}$ width
- x depth
- max. depth
- $\bar{x}$ bankfull width
- bankfull $\bar{x}$ depth
- W/D ratio
- bankfull max. depth
- floodprone x^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 68

Stream & Location: S005 - STONELICK CREEK **RM:** _ _ _._ **Date:** 12 / 2 / 13

Scorers Full Name & Affiliation: M. Vuturo Bosiljevac, CH2M HILL

River Code: _ _ _ - _ _ _ - _ _ _ **STORET #:** _ _ _ _ _ _ **Lat./ Long.:** (NAD 83 - decimal °) 39 . 176706 /84 . 111892 Office verified location ☐

1] SUBSTRATE

Check **ONLY Two** substrate *TYPE BOXES*; estimate % or note every type present

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☒ BLDR /SLABS [10]	40		☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]		40	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]		30	☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]		30	☐ ☐ SILT [2]	10	
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ x BEDROCK [5]	50				

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN: ☒ LIMESTONE [1] ☐ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] COAL FINES [-2]

QUALITY: ☐ HEAVY [-2] ☐ MODERATE [-1] ☒ NORMAL [0] ☐ FREE [1] ☐ EXTENSIVE [-2] ☐ ☐ MODERATE [-1] ☒ NORMAL [0] NONE [1]

SILT — MODERATE DENSE

Comments

Substrate 18 (*Maximum 20*)

2] INSTREAM COVER

Indicate presence 0 to 3: **0**-Absent; **1**-Very small amounts or if more common of marginal quality; **2**-Moderate amounts, but not of highest quality or in small amounts of highest quality; **3**-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

- 0 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 1 SHALLOWS (IN SLOW WATER) [1]
- 0 ROOTMATS [1]
- 1 POOLS > 70cm [2]
- 0 ROOTWADS [1]
- 0 BOULDERS [1]
- 1 OXBOWS, BACKWATERS [1]
- 0 AQUATIC MACROPHYTES [1]
- 0 LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (*Or 2 & average*)

☐ EXTENSIVE >75% [11] ☐ ☐ MODERATE 25-75% [7] ☒ SPARSE 5-<25% [3] NEARLY ABSENT <5% [1]

Comments

Cover 8 (*Maximum 20*)

3] CHANNEL MORPHOLOGY

Check ONE in each category (*Or 2 & average*)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☒ HIGH [4]	☐ EXCELLENT [7]	☒ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☒ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 15 (*Maximum 20*)

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (*Or 2 per bank & average*)

River right looking downstream

EROSION (L R): ☒ ☒ NONE / LITTLE [3] ☐ ☐ MODERATE [2] ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R): ☐ ☐ WIDE > 50m [4] ☐ ☐ MODERATE 10-50m [3] ☒ ☐ NARROW 5-10m [2] ☐ ☒ VERY NARROW < 5m [1] ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R): ☒ ☐ FOREST, SWAMP [3] ☐ ☒ SHRUB OR OLD FIELD [2] ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1] ☐ ☐ FENCED PASTURE [1] ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R): ☐ ☐ CONSERVATION TILLAGE [1] ☐ ☐ URBAN OR INDUSTRIAL [0] ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 7 (*Maximum 10*)

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check **ONE** (*ONLY!*)

☐ > 1m [6] ☐ 0.7-<1m [4] ☒ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)

☒ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1] ☐ VERY FAST [1] ☐ FAST [1] ☒ MODERATE [1] ☒ SLOW [1] ☐ INTERSTITIAL [-1] ☐ INTERMITTENT [-2] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 (*Maximum 12*)

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (*Or 2 & average*). ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH: ☒ BEST AREAS > 10cm [2] ☐ BEST AREAS 5-10cm [1] ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH: ☐ MAXIMUM > 50cm [2] ☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE: ☒ STABLE (e.g., Cobble, Boulder) [2] ☐ MOD. STABLE (e.g., Large Gravel) [1] ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☒ LOW [1] ☐ MODERATE [0] ☐ EXTENSIVE [-1]

Comments

Riffle / Run 6 (*Maximum 8*)

6] GRADIENT

(20.2 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (38.6 mi²)

%POOL: 15 %GLIDE: 30 %RUN: 35 %RIFFLE: 20

Gradient 8 (*Maximum 10*)

A] SAMPLED REACH

Check ALL that apply

Comment RE: Reach consistency/ Is reach typical of steam?, *Recreation/* Observed - Inferred, *Other/* Sampling observations, Concerns, Access directions, etc.

Due to flooding conditions at the time of the survey, the riffle and run depths had to be estimated. The embeddedness was also estimated.

Mussel shells observed on bank

METHOD

- [ ] BOAT
- [x] WADE
- [ ] L. LINE
- [ ] OTHER

STAGE

1st -sample pass- 2nd

- [ ] HIGH [ ]
- [ ] UP [ ]
- [x] NORMAL [ ]
- [ ] LOW [ ]
- [ ] DRY [ ]

DISTANCE

- [x] 0.5 Km
- [ ] 0.2 Km
- [ ] 0.15 Km
- [ ] 0.12 Km
- [ ] OTHER

_____ meters

CLARITY

1st --sample pass-- 2nd

- < 20 cm
- 20-<40 cm
- [ ] 40-70 cm [ ]
- [ ] > 70 cm/ CTB [ ]
- [ ] SECCHI DEPTH [ ]

CANOPY

- [ ] > 85%- OPEN
- [ ] 55%-<85%
- [ ] 30%-<55%
- [ ] 10%-<30%
- [x] <10%- CLOSED

1st pass _____cm

2nd _____ cm

B] AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- [ ] OIL SHEEN
- [ ] TRASH / LITTER
- NUISANCE ODOR
- [ ] SLUDGE DEPOSITS

C] RECREATION

AREA DEPTH

POOL: [ ] >100ft² [ ] >3ft

D] MAINTENANCE

Circle some & *COMMENT*

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES

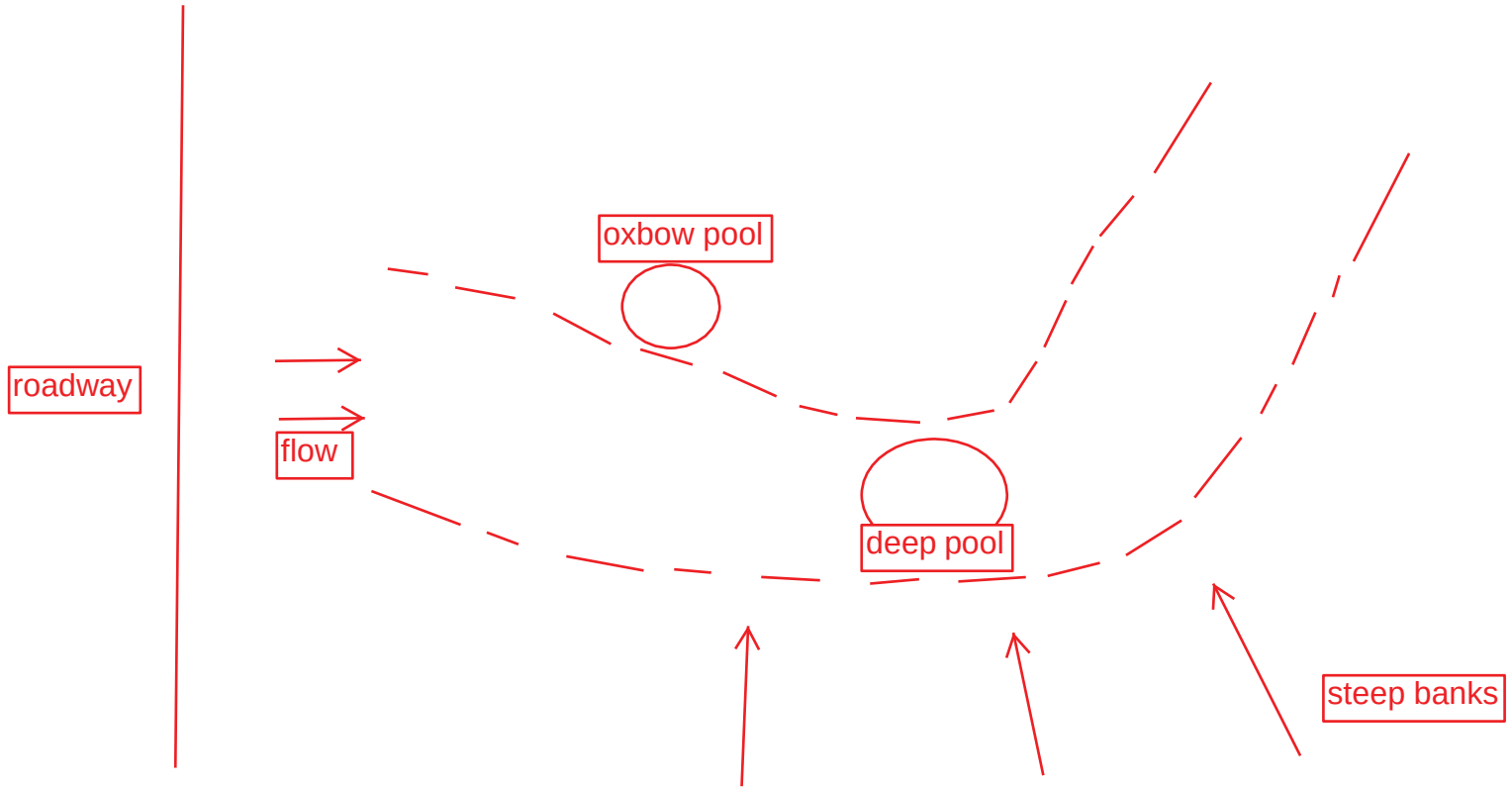
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

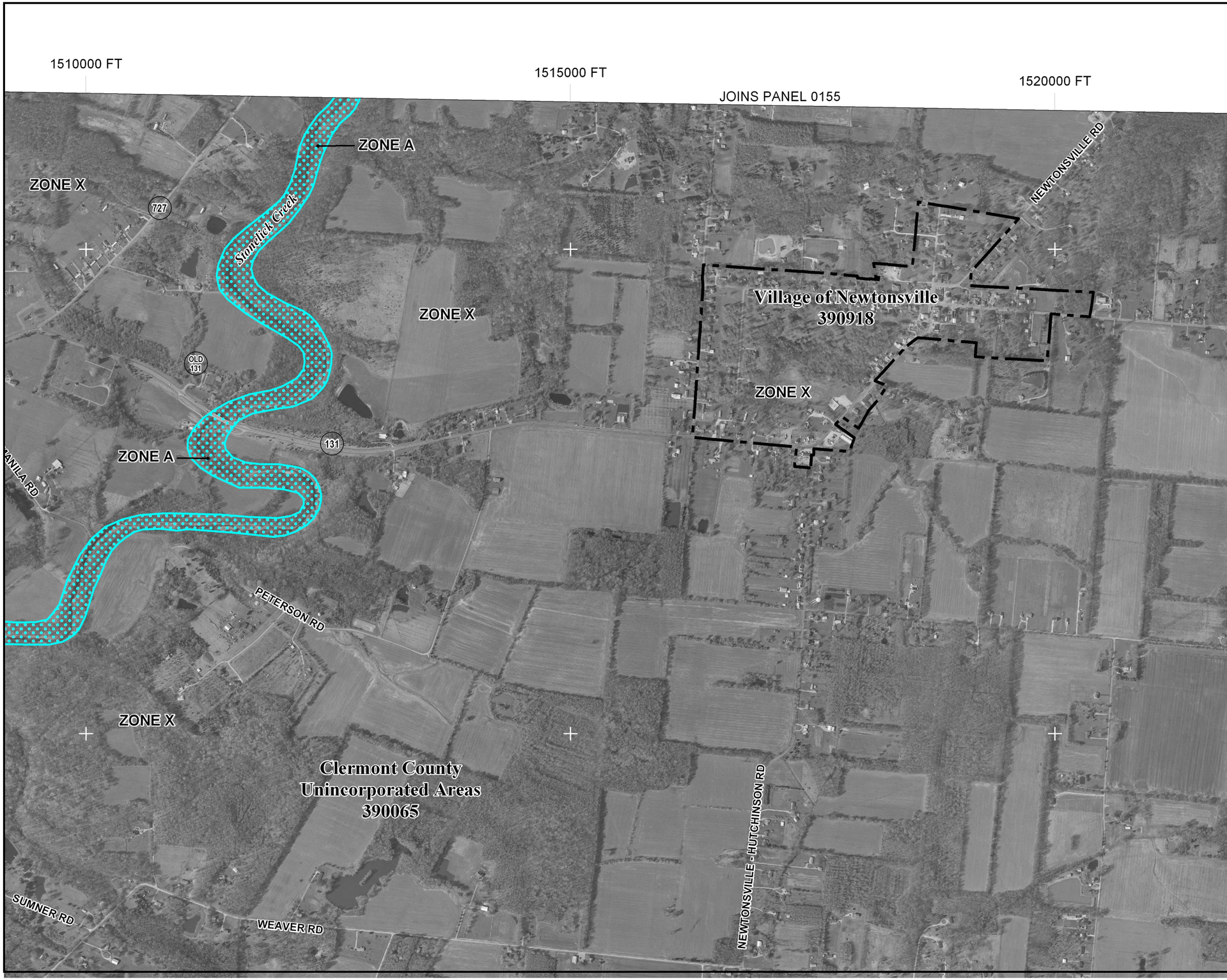
F] MEASUREMENTS

- $\bar{x}$ width
- x depth
- max. depth
- $\bar{x}$ bankfull width
- bankfull $\bar{x}$ depth
- W/D ratio
- bankfull max depth
- floodprone x² width
- entrench. ratio

Legacy Tree:

Stream Drawing:





MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 ADMINISTRATION/SEWER	REGULAR SALARY	511200	36,129.68	37,353.48	37,377.68
6002 COLLECTION	REGULAR SALARY	511200	686,609.68	477,973.24	329,359.29
6002 TREATMENT/SEWER	REGULAR SALARY	511200	1,009,471.57	1,055,861.97	892,999.62
6002 WASTE WATER LAB	REGULAR SALARY	511200	0.00	0.00	180,158.51
SALARIES			**1,732,210.93**	**1,571,188.69**	**1,439,895.10**
OTHER			**0.00**	**0.00**	**0.00**
6002 COLLECTION	OVERTIME	512100	57,603.71	34,993.60	44,723.27
6002 COLLECTION	OVERTIME	512100	0.00	524.33	0.00
6002 TREATMENT/SEWER	OVERTIME	512100	75,953.03	90,248.74	89,105.89
6002 TREATMENT/SEWER	OVERTIME	512100	0.00	585.06	0.00
6002 WASTE WATER LAB	OVERTIME	512100	0.00	0.00	4,430.89
OVERTIME			**133,556.74**	**126,351.73**	**138,260.05**
6002 COLLECTION	RETIREMENT PAYOUT	513200	0.00	10,394.05	0.00
6002 TREATMENT/SEWER	RETIREMENT PAYOUT	513200	0.00	0.00	0.00
RETIREMENT PAYOUT			**0.00**	**10,394.05**	**0.00**
6002 ADMINISTRATION/SEWER	FRINGE BENEFITS	520000	0.00	0.00	0.00
6002 COLLECTION	FRINGE BENEFITS	520000	0.00	0.00	0.00
6002 TREATMENT/SEWER	FRINGE BENEFITS	520000	0.00	0.00	0.00
6002 WASTE WATER LAB	FRINGE BENEFITS	520000	0.00	0.00	0.00
6002 ADMINISTRATION/SEWER	P.E.R.S.	521100	5,058.12	5,237.81	5,232.84
6002 COLLECTION	P.E.R.S.	521100	103,585.16	67,626.79	51,864.07

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 COLLECTION	P.E.R.S.	521100	0.00	73.40	0.00
6002 TREATMENT/SEWER	P.E.R.S.	521100	151,625.28	160,095.17	137,255.98
6002 TREATMENT/SEWER	P.E.R.S.	521100	0.00	81.90	0.00
6002 WASTE WATER LAB	P.E.R.S.	521100	0.00	0.00	25,842.69
6002 ADMINISTRATION/SEWER	SOCIAL SECURITY/MEDICARE	521200	499.34	522.30	519.78
6002 COLLECTION	SOCIAL SECURITY/MEDICARE	521200	9,868.40	7,060.81	5,135.17
6002 COLLECTION	SOCIAL SECURITY/MEDICARE	521200	0.00	7.25	0.00
6002 TREATMENT/SEWER	SOCIAL SECURITY/MEDICARE	521200	15,023.89	15,756.91	13,593.46
6002 TREATMENT/SEWER	SOCIAL SECURITY/MEDICARE	521200	0.00	7.72	0.00
6002 WASTE WATER LAB	SOCIAL SECURITY/MEDICARE	521200	0.00	0.00	2,474.29
6002 ADMINISTRATION/SEWER	HEALTH CARE	522100	5,433.84	4,314.00	3,475.68
6002 COLLECTION	HEALTH CARE	522100	103,054.57	74,205.39	52,665.70
6002 COLLECTION	HEALTH CARE	522100	0.00	62.30	0.00
6002 TREATMENT/SEWER	HEALTH CARE	522100	131,825.25	156,409.11	117,179.19
6002 TREATMENT/SEWER	HEALTH CARE	522100	0.00	115.65	0.00
6002 WASTE WATER LAB	HEALTH CARE	522100	0.00	0.00	31,357.68
6002 ADMINISTRATION/SEWER	WORKERS COMPENSATION	523100	228.50	153.84	175.50
6002 COLLECTION	WORKERS COMPENSATION	523100	10,820.54	5,757.47	24,646.19
6002 TREATMENT/SEWER	WORKERS COMPENSATION	523100	10,228.23	10,528.53	19,898.52
6002 WASTE WATER LAB	WORKERS COMPENSATION	523100	0.00	0.00	0.00
6002 ADMINISTRATION/SEWER	LIFE INSURANCE	525100	31.56	31.56	24.00
6002 COLLECTION	LIFE INSURANCE	525100	507.84	349.16	191.79
6002 COLLECTION	LIFE INSURANCE	525100	0.00	0.70	0.00
6002 TREATMENT/SEWER	LIFE INSURANCE	525100	711.14	782.57	468.43
6002 TREATMENT/SEWER	LIFE INSURANCE	525100	0.00	0.68	0.00
6002 WASTE WATER LAB	LIFE INSURANCE	525100	0.00	0.00	112.00
6002 COLLECTION	LONG TERM DISABILITY	525200	123.46	160.69	254.15
6002 COLLECTION	LONG TERM DISABILITY	525200	0.00	0.14	0.00

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 TREATMENT/SEWER	LONG TERM DISABILITY	525200	448.80	419.07	234.15
6002 WASTE WATER LAB	LONG TERM DISABILITY	525200	0.00	0.00	140.75
BENEFITS			**549,073.92**	**509,760.92**	**492,742.01**
6002 COLLECTION	M&R - BUILDING & GROUNDS	611100	123.50	0.00	8,672.50
6002 TREATMENT/SEWER	M&R - BUILDING & GROUNDS	611100	16,065.90	76,516.36	114,892.54
6002 WASTE WATER LAB	M&R - BUILDING & GROUNDS	611100	0.00	0.00	119.78
6002 ADMINISTRATION/SEWER	M&R - OFFICE EQUIPMENT	611200	10.52	41.45	1.30
6002 COLLECTION	M&R - OFFICE EQUIPMENT	611200	421.31	644.77	628.03
6002 TREATMENT/SEWER	M&R - OFFICE EQUIPMENT	611200	220.88	281.20	97.12
6002 WASTE WATER LAB	M&R - OFFICE EQUIPMENT	611200	0.00	0.00	2.03
6002 COLLECTION	M&R - HVAC	611300	259.00	0.00	0.00
6002 TREATMENT/SEWER	M&R - HVAC	611300	4,423.65	12,625.34	7,536.64
6002 WASTE WATER LAB	M&R - HVAC	611300	0.00	0.00	2,215.12
6002 COLLECTION	M&R - VEHICLES	611400	39,740.75	40,940.06	65,681.82
6002 TREATMENT/SEWER	M&R - VEHICLES	611400	18,505.27	10,010.00	14,960.94
6002 WASTE WATER LAB	M&R - VEHICLES	611400	0.00	0.00	153.78
6002 COLLECTION	M&R - OTHER	619900	270,132.23	246,831.97	303,395.22
6002 COLLECTION/BATAVIA CONTR	M&R - OTHER	619900	0.00	3,047.79	7,835.00
6002 TREATMENT/SEWER	M&R - OTHER	619900	141,922.03	155,370.92	126,714.59
6002 TREATMENT/BATAVIA CONTRAC	M&R - OTHER	619900	0.00	6,281.00	90.00
6002 WASTE WATER LAB	M&R - OTHER	619900	0.00	0.00	875.17
MAINT & REPAIR			**491,825.04**	**552,590.86**	**653,871.58**
6002 ADMINISTRATION/SEWER	TRANSFERS OUT TO ENTERPRISE	700600	1,621,361.36	1,780,680.68	1,530,000.00
6002 ADMINISTRATION/SEWER	ADVANCES OUT TO DEBT SERVICE	702400	64,110.50	36,350.00	46,307.75
OTHER			**1,685,471.86**	**1,817,030.68**	**1,576,307.75**
6002 ADMINISTRATION/SEWER	PURCHASED SERVICES	530000	0.00	0.00	0.00

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 COLLECTION	PURCHASED SERVICES	530000	0.00	0.00	0.00
6002 TREATMENT/SEWER	PURCHASED SERVICES	530000	0.00	0.00	0.00
6002 WASTE WATER LAB	PURCHASED SERVICES	530000	0.00	0.00	0.00
6002 ADMINISTRATION/SEWER	INS - LIABILITY	530101	5,094.78	5,083.14	5,919.12
6002 ADMINISTRATION/SEWER	INS - VEHICLE	530102	10,660.47	9,328.00	9,833.03
6002 ADMINISTRATION/SEWER	INS - EMPLOYEE & OFFICIAL BOND	530103	129.01	163.35	176.31
6002 ADMINISTRATION/SEWER	INS - PROPERTY & CASUALTY	530104	68,636.89	62,097.00	61,917.32
6002 ADMINISTRATION/SEWER	GOV/AGENCIES CONTR & SERVICES	530300	8.27	0.00	0.00
6002 COLLECTION	ADVERTISING	530500	1,364.92	732.57	802.00
6002 TREATMENT/SEWER	ADVERTISING	530500	735.33	333.46	1,815.78
6002 WASTE WATER LAB	ADVERTISING	530500	0.00	0.00	0.00
6002 COLLECTION	SHIPPING CHARGES	530700	157.58	244.42	89.50
6002 TREATMENT/SEWER	SHIPPING CHARGES	530700	16.26	275.37	625.44
6002 WASTE WATER LAB	SHIPPING CHARGES	530700	0.00	0.00	192.98
6002 COLLECTION	RENT	531200	5,871.00	7,257.29	4,631.16
6002 COLLECTION/BATAVIA CONTR	RENT	531200	0.00	45.00	0.00
6002 TREATMENT/SEWER	RENT	531200	1,000.50	3,652.41	3,336.23
6002 COLLECTION	JANITORIAL SERVICES	531300	3,924.70	4,038.64	4,247.40
6002 TREATMENT/SEWER	JANITORIAL SERVICES	531300	1,300.00	1,200.00	100.00
6002 WASTE WATER LAB	JANITORIAL SERVICES	531300	0.00	0.00	1,100.00
6002 COLLECTION	FACILITY SERVICES	531400	6,962.03	6,830.54	7,041.16
6002 TREATMENT/SEWER	FACILITY SERVICES	531400	16,642.71	14,679.52	17,701.83
6002 WASTE WATER LAB	FACILITY SERVICES	531400	0.00	0.00	1,602.50
6002 COLLECTION	MEDICAL/DENTAL SERVICES	531700	790.92	660.27	1,244.95
6002 TREATMENT/SEWER	MEDICAL/DENTAL SERVICES	531700	771.78	59.78	943.35
6002 WASTE WATER LAB	MEDICAL/DENTAL SERVICES	531700	0.00	0.00	264.00
6002 ADMINISTRATION/SEWER	TRUSTEE FEES	532000	200.00	1,920.00	200.00
6002 ADMINISTRATION/SEWER	INDIRECT COSTS	532200	123,828.49	167,043.60	21,080.08

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 COLLECTION	INDIRECT COSTS	532200	0.00	0.00	75,048.00
6002 TREATMENT/SEWER	INDIRECT COSTS	532200	0.00	0.00	89,552.00
6002 COLLECTION	JUDGEMENT & CLAIMS	532300	34,131.04	24,665.08	19,814.65
6002 COLLECTION	PROF DUES & MEMBERSHIPS	532500	0.00	66.00	261.00
6002 TREATMENT/SEWER	PROF DUES & MEMBERSHIPS	532500	442.00	462.00	462.00
6002 TREATMENT/SEWER	SLUDGE REMOVAL	532700	501,866.72	545,935.36	556,936.51
6002 ADMINISTRATION/SEWER	TOWING	532800	75.00	0.00	0.00
6002 TREATMENT/SEWER	TOWING	532800	75.00	150.00	0.00
6002 TREATMENT/SEWER	LAB ANALYSIS/TESTING	533100	48,452.15	39,702.00	5,819.00
6002 WASTE WATER LAB	LAB ANALYSIS/TESTING	533100	0.00	0.00	47,450.48
6002 COLLECTION	UNIFORMS & RELATED	533500	3,837.71	4,189.56	4,132.35
6002 TREATMENT/SEWER	UNIFORMS & RELATED	533500	5,444.87	5,551.18	4,476.74
6002 WASTE WATER LAB	UNIFORMS & RELATED	533500	0.00	0.00	593.40
6002 ADMINISTRATION/SEWER	OTHER PURCHASED SERVICES	539900	669.98	1,334.64	13,719.10
6002 COLLECTION	OTHER PURCHASED SERVICES	539900	62,115.22	25,955.29	19,578.13
6002 COLLECTION	OTHER PURCHASED SERVICES	539900	245,693.00	108,295.00	58,895.00
6002 TREATMENT/SEWER	OTHER PURCHASED SERVICES	539900	132,992.24	110,771.25	62,376.44
6002 WASTE WATER LAB	OTHER PURCHASED SERVICES	539900	0.00	0.00	2,127.24
6002 ADMINISTRATION/SEWER	TRAINING	540100	199.00	0.00	0.00
6002 COLLECTION	TRAINING	540100	840.00	1,560.72	4,648.75
6002 TREATMENT/SEWER	TRAINING	540100	2,910.00	2,520.00	3,135.00
6002 WASTE WATER LAB	TRAINING	540100	0.00	0.00	1,110.00
6002 COLLECTION	TRAVEL	540200	0.00	487.73	242.00
6002 TREATMENT/SEWER	TRAVEL	540200	342.00	127.65	850.00
6002 WASTE WATER LAB	TRAVEL	540200	0.00	0.00	1,166.02
SERVICES			**1,288,181.57**	**1,157,417.82**	**1,117,257.95**
6002 ADMINISTRATION/SEWER	OFFICE SUPPLIES	571000	765.15	388.92	525.44

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 COLLECTION	OFFICE SUPPLIES	571000	1,485.92	3,737.42	1,058.65
6002 TREATMENT/SEWER	OFFICE SUPPLIES	571000	7,108.55	6,454.83	7,637.66
6002 WASTE WATER LAB	OFFICE SUPPLIES	571000	0.00	0.00	1,386.61
6002 ADMINISTRATION/SEWER	POSTAGE	571200	0.00	0.00	126.00
6002 COLLECTION	POSTAGE	571200	500.00	0.00	0.00
6002 TREATMENT/SEWER	POSTAGE	571200	500.00	0.00	0.00
6002 WASTE WATER LAB	POSTAGE	571200	0.00	0.00	210.00
6002 ADMINISTRATION/SEWER	DATA PROCESSING EQUIPMENT	571500	222.10	609.95	291.96
6002 COLLECTION	DATA PROCESSING EQUIPMENT	571500	1,468.60	3,992.45	7,281.91
6002 TREATMENT/SEWER	DATA PROCESSING EQUIPMENT	571500	5,213.96	8,007.64	16,492.74
6002 WASTE WATER LAB	DATA PROCESSING EQUIPMENT	571500	0.00	0.00	2,421.25
6002 COLLECTION	FACILITY SUPPLIES	572500	5,555.56	3,403.67	7,009.04
6002 TREATMENT/SEWER	FACILITY SUPPLIES	572500	30,004.21	31,203.09	76,841.57
6002 WASTE WATER LAB	FACILITY SUPPLIES	572500	0.00	0.00	9,423.00
6002 TREATMENT/SEWER	LAB SUPPLIES	573000	34,070.77	43,547.73	9,364.59
6002 WASTE WATER LAB	LAB SUPPLIES	573000	0.00	0.00	35,051.40
6002 COLLECTION	VEHICLE SUPPLIES	573500	8,829.94	45,224.94	6,349.47
6002 TREATMENT/SEWER	VEHICLE SUPPLIES	573500	5,980.41	9,400.58	4,359.10
6002 WASTE WATER LAB	VEHICLE SUPPLIES	573500	0.00	0.00	0.00
6002 COLLECTION	SAFETY SUPPLIES	574500	708.54	345.92	1,299.24
6002 TREATMENT/SEWER	SAFETY SUPPLIES	574500	607.48	0.00	61.53
6002 COLLECTION	WATER AND SEWER SUPPLIES	575300	553,820.79	650,889.80	691,617.69
6002 COLLECTION/BATAVIA CONTR	WATER AND SEWER SUPPLIES	575300	0.00	1,594.49	4,889.76
6002 TREATMENT/SEWER	WATER AND SEWER SUPPLIES	575300	282,725.68	294,067.44	306,960.46
6002 TREATMENT/BATAVIA CONTRAC	WATER AND SEWER SUPPLIES	575300	0.00	415.12	31.68
6002 COLLECTION	FUEL	575500	145,283.07	104,685.59	96,949.96
6002 TREATMENT/SEWER	FUEL	575500	43,740.72	46,556.09	45,754.94
6002 WASTE WATER LAB	FUEL	575500	0.00	0.00	984.45

FUND: 6002

Org Description	Account		2011 Cash Actual	2012 Cash Actual	2013 Cash Actual
6002 COLLECTION	OTHER MATERIAL AND SUPPLIES	579900	11,571.26	4,664.43	5,757.20
6002 TREATMENT/SEWER	OTHER MATERIAL AND SUPPLIES	579900	20,800.53	4,138.75	7,075.84
6002 WASTE WATER LAB	OTHER MATERIAL AND SUPPLIES	579900	0.00	0.00	1,347.09
SUPPLIES & MATERIALS			**1,160,963.24**	**1,263,328.85**	**1,348,560.23**
6002 COLLECTION	UTIL - ELECTRIC & GAS	631100	488,392.51	415,367.42	388,795.17
6002 COLLECTION/BATAVIA CONTR	UTIL - ELECTRIC & GAS	631100	0.00	5,249.47	8,760.04
6002 TREATMENT/SEWER	UTIL - ELECTRIC & GAS	631100	1,489,446.63	1,104,539.11	1,042,573.87
6002 TREATMENT/BATAVIA CONTRAC	UTIL - ELECTRIC & GAS	631100	0.00	5,297.07	4,624.82
6002 WASTE WATER LAB	UTIL - ELECTRIC & GAS	631100	0.00	0.00	11,845.55
6002 COLLECTION	UTIL - SEWER & WATER	631300	2,780.47	1,610.46	1,746.50
6002 TREATMENT/SEWER	UTIL - SEWER & WATER	631300	7,177.94	9,987.80	7,435.33
6002 WASTE WATER LAB	UTIL - SEWER & WATER	631300	0.00	0.00	417.60
6002 ADMINISTRATION/SEWER	UTIL - TELEPHONE	631400	382.59	192.98	215.04
6002 COLLECTION	UTIL - TELEPHONE	631400	56,170.64	57,991.59	60,785.87
6002 TREATMENT/SEWER	UTIL - TELEPHONE	631400	19,703.47	21,081.22	20,230.78
6002 WASTE WATER LAB	UTIL - TELEPHONE	631400	0.00	0.00	1,727.51
6002 COLLECTION	WASTE COLLECTION	631600	489.25	618.96	627.60
6002 TREATMENT/SEWER	WASTE COLLECTION	631600	12,808.64	13,757.38	14,266.48
6002 WASTE WATER LAB	WASTE COLLECTION	631600	0.00	0.00	414.68
UTILITIES			**2,077,352.14**	**1,635,693.46**	**1,564,466.84**
			9,118,635.44	**8,643,757.06**	**8,331,361.51**

Clermont County Water Resources

Long Term Debt

Sum of Amount Due	Column Labels		
Row Labels	I	P	Grand Total
Sewer	**$8,123,601.71**	**$44,347,339.63**	**$52,470,941.33**
OPWC	**$1,005.19**	**$7,402,843.54**	**$7,403,848.73**
2014	$1,005.19	$586,258.46	$587,263.65
2015		$519,356.74	$519,356.74
2016		$519,356.74	$519,356.74
2017		$519,356.74	$519,356.74
2018		$484,505.71	$484,505.71
2019		$449,655.08	$449,655.08
2020		$449,655.08	$449,655.08
2021		$449,655.08	$449,655.08
2022		$449,655.08	$449,655.08
2023		$449,655.08	$449,655.08
2024		$449,655.08	$449,655.08
2025		$354,092.28	$354,092.28
2026		$341,251.29	$341,251.29
2027		$341,251.29	$341,251.29
2028		$341,215.19	$341,215.19
2029		$227,398.79	$227,398.79
2030		$84,846.94	$84,846.94
2031		$33,980.09	$33,980.09
2032		$33,980.09	$33,980.09
2033		$33,980.09	$33,980.09
2034		$33,980.09	$33,980.09
2035		$33,980.09	$33,980.09
2036		$33,980.09	$33,980.09
2037		$33,980.09	$33,980.09
2038		$33,980.09	$33,980.09
2039		$33,980.09	$33,980.09
2040		$33,980.09	$33,980.09
2041		$33,980.29	$33,980.29
2042		$12,241.67	$12,241.67
OWDA	**$5,312,620.30**	**$17,009,496.09**	**$22,322,116.38**
2014	$541,975.86	$766,690.85	$1,308,666.71
2015	$517,133.37	$791,533.34	$1,308,666.71
2016	$491,485.72	$817,180.99	$1,308,666.71
2017	$465,006.86	$843,659.85	$1,308,666.71
2018	$437,669.80	$870,996.91	$1,308,666.71
2019	$409,446.73	$899,219.97	$1,308,666.71
2020	$380,308.97	$928,357.73	$1,308,666.71
2021	$350,226.80	$958,439.91	$1,308,666.71
2022	$319,169.67	$989,497.04	$1,308,666.71
2023	$287,105.94	$1,021,560.77	$1,308,666.71
2024	$254,002.98	$1,054,663.73	$1,308,666.71
2025	$219,827.07	$1,088,839.63	$1,308,666.71

Clermont County Water Resources

Long Term Debt

Sum of Amount Due	Column Labels		
Row Labels	**I**	**P**	**Grand Total**
2026	$184,543.48	$1,124,123.23	$1,308,666.71
2027	$148,116.05	$1,160,550.66	$1,308,666.71
2028	$113,812.76	$775,250.01	$889,062.77
2029	$88,412.42	$800,650.35	$889,062.77
2030	$62,179.86	$826,882.91	$889,062.77
2031	$35,087.82	$853,974.95	$889,062.77
2032	$7,108.13	$437,423.26	$444,531.38
Revenue	**$2,809,976.22**	**$19,935,000.00**	**$22,744,976.22**
2014	$534,736.22	$2,440,000.00	$2,974,736.22
2015	$463,040.00	$2,455,000.00	$2,918,040.00
2016	$443,400.00	$2,450,000.00	$2,893,400.00
2017	$402,900.00	$2,480,000.00	$2,882,900.00
2018	$353,300.00	$2,555,000.00	$2,908,300.00
2019	$302,200.00	$2,420,000.00	$2,722,200.00
2020	$205,400.00	$2,510,000.00	$2,715,400.00
2021	$105,000.00	$2,625,000.00	$2,730,000.00
Grand Total	**$8,123,601.71**	**$44,347,339.63**	**$52,470,941.33**

2014 Wastewater Capital Improvement Project Summary

Description	Funding Source		Planned	Prior Yr CTD	2014	2015	2016	2017	2018	2019-Beyond	Total	*Adj. 5 Yr Total
Aicholtz Road, Phase II (Ivy Pt.) Sewer In	-	-	350,029	23,269	326,760	-	-	-	-	-	350,029	326,760
	Capital Improvement Fund		-	23,269	*326,760*	-	-	-	-	-	*350,029*	*326,760*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Arrowhead Wastewater Treatment Plant	-	-	1,125,000	-	-	-	-	-	125,000	1,000,000	1,125,000	125,000
	Capital Improvement Fund		-	-	-	-	-	-	*125,000*	*1,000,000*	*1,125,000*	*125,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Bethel Area Sewer Replacement	MEF P2-08	-	1,082,576	77,181	105,395	900,000	-	-	-	-	1,082,576	1,005,395
	Capital Improvement Fund		-	*77,181*	*105,395*	*900,000*	-	-	-	-	*1,082,576*	*1,005,395*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Biosolids Dewatering Equipment	-	-	821,300	19,814	401,486	400,000	-	-	-	-	821,300	801,486
	Capital Improvement Fund		-	*19,814*	*401,486*	*400,000*	-	-	-	-	*821,300*	801,486
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Collection System Rehabilitation	-	-	13,074,844	154,844	1,964,000	1,476,000	2,370,000	2,370,000	2,370,000	2,370,000	13,074,844	10,550,000
	Capital Improvement Fund		-	*154,844*	*1,964,000*	*1,476,000*	*2,370,000*	*2,370,000*	*2,370,000*	*2,370,000*	*13,074,844*	*10,550,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Commercial Revenue Enhancement	-	-	600,000	-	100,000	100,000	100,000	100,000	100,000	100,000	600,000	500,000
	Capital Improvement Fund		-	-	*100,000*	*100,000*	*100,000*	*100,000*	*100,000*	*100,000*	*600,000*	*500,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Environmental Upgrades - WWTP	-	-	6,000,000	-	-	-	-	-	-	6,000,000	6,000,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	*6,000,000*	*6,000,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
GIS - Sewer Share	-	-	100,000	25,000	-	25,000	-	25,000	-	25,000	100,000	50,000
	Capital Improvement Fund		-	*25,000*	-	*25,000*	-	*25,000*	-	*25,000*	*100,000*	*50,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Hall Run Sewer Replacement & EQ Expa	LEF-P1-03	-	3,013,689	13,689	-	-	-	100,000	1,000,000	1,900,000	3,013,689	1,100,000
	Capital Improvement Fund		-	*13,689*	-	-	-	*100,000*	*1,000,000*	*1,900,000*	*3,013,689*	*1,100,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan-	-	-	-	-	-	-	-	-	-	-
		Grant-	-	-	-	-	-	-	-	-	-	-

2014 Wastewater Capital Improvement Project Summary

Description	Funding Source		Planned	Prior Yr CTD	2014	2015	2016	2017	2018	2019-Beyond	Total	*Adj. 5 Yr Total
Happy Hollow LS Upgrade	LEF P1-12	-	922,790	87,595	195,195	640,000	-	-	-	-	922,790	835,195
	Capital Improvement Fund		-	87,595	*195,195*	*640,000*	-	-	-	-	*922,790*	*835,195*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Heatherstone Force Main Replacement	-	-	191,543	174,942	16,601	-	-	-	-	-	191,543	16,601
	Capital Improvement Fund		-	174,942	16,601	-	-	-	-	-	*191,543*	16,601
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Indianview Lift Station	-	-	424,240	39,240	-	35,000	350,000	-	-	-	424,240	385,000
	Capital Improvement Fund		-	*39,240*	-	*35,000*	*350,000*	-	-	-	*424,240*	*385,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Kitty Ln to Eva Ln Sewer Replacement	LEF -P1-06	-	186,444	181,124	5,320	-	-	-	-	-	186,444	5,320
	Capital Improvement Fund		-	*111,803*	*(10,664)*	-	-	-	-	-	*101,139*	*(10,664)*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant (OPWC)	*76,925*	*69,321*	*15,984*	-	-	-	-	-	*85,305*	*15,984*
Lewis Road Trunk Sewer	LHR-P2-T2	-	1,040,000	-	-	-	90,000	950,000	-	-	1,040,000	1,040,000
	Capital Improvement Fund		-	-	-	-	*90,000*	*950,000*	-	-	*1,040,000*	*1,040,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Liftstation Generators	-	-	225,000	-	75,000	75,000	75,000	-	-	-	225,000	225,000
	Capital Improvement Fund		-	-	*75,000*	*75,000*	*75,000*	-	-	-	*225,000*	*225,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Lower East Fork WWTP Expansion	-	-	14,150,000	-	-	-	-	-	-	14,150,000	14,150,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	14,150,000	*14,150,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
	Loan (100% OPWC Loan - CJ25F)		-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Mc Picken Drive Sewer Petition	-	-	126,144	34,191	91,953	-	-	-	-	-	126,144	91,953
	Capital Improvement Fund		-	*34,191*	*91,953*	*(108,218)*	-	-	-	-	*17,926*	*(16,265)*
	Assessment		-	-	-	*108,218*	-	-	-	-	*108,218*	*108,218*
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Miamiville Proper Sewer Assessment	LVHR - 7	13	1,845,000	-	-	-	-	-	-	1,845,000	1,845,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	*170,000*	*170,000*	-
	Assessment		-	-	-	-	-	-	-	*1,675,000*	*1,675,000*	-
		Loan	-	-	-	-	-	-	-	-	-	-
	Grant - CDBG		-	-	-	-	-	-	-	-	-	-

2014 Wastewater Capital Improvement Project Summary

Description	Funding Source		Planned	Prior Yr CTD	2014	2015	2016	2017	2018	2019-Beyond	Total	*Adj. 5 Yr Total
Miamiville Sewer Extension	-	-	570,000	-	70,000	500,000	-	-	-	-	570,000	570,000
	Capital Improvement Fund		-	-	*70,000*	*465,000*	*(385,000)*	-	-	-	*150,000*	*150,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
	Grant Duke/TIF		-	-	-	*35,000*	*385,000*	-	-	-	*420,000*	*420,000*
Middle East Fork WWTP Grit & Screening	-	-	165,000	-	165,000	-	-	-	-	-	165,000	165,000
	Capital Improvement Fund		-	-	*165,000*	-	-	-	-	-	*165,000*	*165,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Mound Street & Spring Street Sewer Petition			1,052,990	68,390	-	-	-	-	-	984,600	1,052,990	-
	Capital Improvement Fund		-	*68,390*	-	-	-	-	-	*25,000*	*93,390*	-
	Assessment		-	-	-	-	-	-	-	*959,600*	*959,600*	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Nature Run Lift Station Generator	-	-	125,000	-	25,000	100,000	-	-	-	-	125,000	125,000
	Capital Improvement Fund		-	-	*25,000*	*100,000*	-	-	-	-	*125,000*	*125,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Newtonsville Collection System Assessm	ST - 3	11	2,048,620	48,620	250,000	200,000	775,000	775,000	-	-	2,048,620	2,000,000
	Capital Improvement Fund		-	*48,620*	*250,000*	*200,000*	*775,000*	*(975,000)*	-	-	*298,620*	*250,000*
	Assessment		-	-	-	-	-	*1,750,000*	-	-	*1,750,000*	*1,750,000*
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Newtonsville WWTP	ST - 1	11	1,144,090	$44,090	200,000	300,000	600,000	-	-	-	1,144,090	1,100,000
	Capital Improvement Fund		-	*44,090*	*200,000*	*300,000*	*(300,000)*	-	-	-	*244,090*	*200,000*
	Assessment		-	-	-	-	*900,000*	-	-	-	*900,000*	*900,000*
		Loan	-	-	-	-	-	-	-	-	-	-
	Grant - CDBG		-	-	-	-	-	-	-	-	-	-
Nine Mile Collection Improvements	NML P1-01	-	1,185,000	-	-	-	135,000	50,000	1,000,000	-	1,185,000	1,185,000
	Capital Improvement Fund		-	-	-	-	*135,000*	*50,000*	*1,000,000*	-	*1,185,000*	*1,185,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Nine Mile WWTP Blower Upgrade	-	-	556,250	-	556,250	-	-	-	-	-	556,250	556,250
	Capital Improvement Fund		-	-	*536,250*	-	-	-	-	-	*536,250*	*536,250*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
	Grant-Duke		-	-	*20,000*	-	-	-	-	-	*20,000*	*20,000*
O'Bannon Trunk Sewer Improvements	OBN P1-02	-	$3,400,060	40,060	85,000	375,000	1,350,000	1,550,000	-	-	3,400,060	3,360,000
	Capital Improvement Fund		-	*40,060*	*85,000*	*375,000*	*1,350,000*	*1,550,000*	-	-	*3,400,060*	*3,360,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-

2014 Wastewater Capital Improvement Project Summary

Description	Funding Source		Planned	Prior Yr CTD	2014	2015	2016	2017	2018	2019-Beyond	Total	*Adj. 5 Yr Total
O'Bannon WWTP Bio-Solids Dewatering	-	-	1,180,000	-	-	-	-	-	-	1,180,000	1,180,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	*1,180,000*	*1,180,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
O'Bannon WWTP Reclaimed Water Pump	-	-	108,000	-	-	-	-	-	-	108,000	108,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	*108,000*	*108,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
O'Bannon WWTP Exterior Building Renov	-	-	56,000	-	56,000	-	-	-	-	-	56,000	56,000
	Capital Improvement Fund		-	-	*56,000*	-	-	-	-	-	*56,000*	*56,000*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Olive Branch-Stonelick Sewer Extension		-	1,870,000	20,000	-	-	-	-	-	1,850,000	1,870,000	-
	Capital Improvement Fund		-	*20,000*	-	-	-	-	-	*1,850,000*	*1,870,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Sewer Scada System	-	-	1,893,040	1,876,880	16,160	-	-	-	-	-	1,893,040	16,160
	Capital Improvement Fund		-	*1,876,880*	*16,160*	-	-	-	-	-	*1,893,040*	*16,160*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
Shayler Run Segment A Sewer Replacem	-	-	594,530	44,530	550,000	-	-	-	-	-	594,530	550,000
	Capital Improvement Fund		-	*44,530*	*550,000*	*(531,386)*	-	-	-	-	*63,144*	*18,614*
	Assessment		-	-	-	-	-	-	-	-	-	-
	Loan (OPWC)		*271,007*	-	-	*271,007*	-	-	-	-	*271,007*	*271,007*
	Grant (OPWC)		*260,379*	-	-	*260,379*	-	-	-	-	*260,379*	*260,379*
Shayler Run - Seg E	LEF P2-19	-	1,262,100	163,960	-	-	-	100,000	998,140	-	1,262,100	1,098,140
	Capital Improvement Fund		-	*163,960*	-	-	-	*100,000*	*998,140*	-	*1,262,100*	*1,098,140*
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
SR 132 Sewer Improvements	MEF P2-24	-	725,000	-	-	-	-	-	-	725,000	725,000	-
	Capital Improvement Fund		-	-	-	-	-	-	-	*725,000*	*725,000*	-
	Assessment		-	-	-	-	-	-	-	-	-	-
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-
SR 132 Sewer Petition	-	-	297,302	42,302	-	255,000	-	-	-	-	297,302	255,000
	Capital Improvement Fund		-	*42,302*	-	*5,000*	-	-	-	-	*47,302*	*5,000*
	Assessment		-	-	-	*250,000*	-	-	-	-	*250,000*	*250,000*
		Loan	-	-	-	-	-	-	-	-	-	-
		Grant	-	-	-	-	-	-	-	-	-	-

2014 Wastewater Capital Improvement Project Summary

Description	Funding Source	Planned	Prior Yr CTD	2014	2015	2016	2017	2018	2019-Beyond	Total	*Adj. 5 Yr Total
Tanglewood Lift Station Elimination		94,900	9,142	85,758	-	-	-	-	-	94,900	85,758
	Capital Improvement Fund	-	*9,142*	*85,758*	-	-	-	-	-	*94,900*	*85,758*
	Assessment	-	-	-	-	-	-	-	-	-	-
	Loan	-	-	-	-	-	-	-	-	-	-
	Grant	-	-	-	-	-	-	-	-	-	-
Turnberry Lift Station Elimination	- -	74,000	-	74,000	-	-	-	-	-	74,000	74,000
	Capital Improvement Fund	-	-	*74,000*	-	-	-	-	-	*74,000*	*74,000*
	Assessment	-	-	-	-	-	-	-	-	-	-
	Loan	-	-	-	-	-	-	-	-	-	-
	Grant	-	-	-	-	-	-	-	-	-	-
Utilities Relocations	- -	600,000	-	100,000	100,000	100,000	100,000	100,000	100,000	600,000	500,000
	Capital Improvement Fund	-	-	*100,000*	*100,000*	*100,000*	*100,000*	*100,000*	*100,000*	*600,000*	*500,000*
	Assessment	-	-	-	-	-	-	-	-	-	-
	Loan	-	-	-	-	-	-	-	-	-	-
	Grant	-	-	-	-	-	-	-	-	-	-
Wards Corner Road Sewer Petition	- -	295,000	-	-	30,000	265,000	-	-	-	295,000	295,000
	Capital Improvement Fund	-	-	-	*30,000*	*265,000*	*(265,000)*	-	-	*30,000*	*30,000*
	Assessment	-	-	-	-	-	*265,000*	-	-	*265,000*	*265,000*
	Loan-OPWC	-	-	-	-	-	-	-	-	-	-
	Grant-OPWC	-	-	-	-	-	-	-	-	-	-
Wastewater Stream Revetment	- -	775,464	275,464	100,000	100,000	100,000	100,000	100,000	-	775,464	500,000
	Capital Improvement Fund	-	*275,464*	*100,000*	*100,000*	*100,000*	*100,000*	*100,000*	-	*775,464*	*500,000*
	Assessment	-	-	-	-	-	-	-	-	-	-
	Loan	-	-	-	-	-	-	-	-	-	-
	Grant	-	-	-	-	-	-	-	-	-	-
TOTAL	Expenditures	65,350,945	3,464,326	5,614,879	5,611,000	6,310,000	6,220,000	5,793,140	32,337,600	65,350,945	29,549,019
	Capital Improvement Fund	58,386,436	3,395,005	5,578,895	4,686,396	5,025,000	4,205,000	5,793,140	29,703,000	58,386,436	25,288,431
	Assessment	5,907,818	-	-	358,218	900,000	2,015,000	-	2,634,600	5,907,818	3,273,218
	Loan	271,007	-	-	271,007	-	-	-	-	271,007	271,007
	Grant	785,684	69,321	35,984	295,379	385,000	-	-	-	785,684	716,363

*Adjusted 5 year plan = 2014-2018 Expenditure Plan

Schedule 4

Water and Sewer Use Rates

Water Use Rates

The charges for and the amount to be paid for water used, as determined by metering of the water, shall be computed in accordance with the following schedule:

Minimum Water Service Charges:

All water service branches or connections shall be subject to a minimum bi-monthly charge based on the size of the water meter or on the number of residential units served by one meter, whichever is greater, as set forth in the following table:

Meter Size	Bi-Monthly Usage included in minimum	Bi-Monthly Minimum Charges	Rate per 1000 gallons
¾" Residential	5,000 gallons	$ 17.40	$ 3.48
¾" Commercial	8,000 gallons	$ 27.84	$ 3.48
1"	20,000 gallons	$ 69.60	$ 3.48
1 ½"	40,000 gallons	$ 139.20	$ 3.48
2"	64,000 gallons	$ 222.72	$ 3.48
3"	128,000 gallons	$ 445.44	$ 3.48
4"	200,000 gallons	$ 696.00	$ 3.48
6"	400,000 gallons	$ 1,392.00	$ 3.48
8"	640,000 gallons	$ 2,227.20	$ 3.48
10"	920,000 gallons	$ 3,201.60	$ 3.48
Multifamily per residential unit	5,000 gallons per unit	$ 17.40 per unit	$ 3.48

Water Rates for consumptions in excess of minimum:

Usage Range	Rate per 1000 Gallons Usage
Minimum to 1.5(X)	$2.62
1.5(X) to 2.0(X)	$3.79
Over 2.0(X)	$5.18

X – greater of Highest Winter Usage or the meter minimum

Highest Winter Usage – Established individually by account on an annual basis.
Read periods from January-April are Winter Usage bills.
The larger consumption of the customers' two winter bills sets the Highest Winter Usage for that customer for the following 12 month period (May-April).

Effective September 1, 2011

Winter Usage for new customers is to be established during their first full bi-monthly billing period.

Public Water Supplier Systems:

Usage Range	Rate per 1000 Gallons Usage
Minimum(per contract)	$2.40
Over minimum	$2.40

Temporary Water – Metered	As detailed above based on meter size
Temporary Water – Not metered	$200.00 per day

Sewer Use Rates

The charges for sewer service provided by the District shall be based on the amount of metered water used, as established by the Board pursuant to the following methodology:

Formulas

1. Basic User Charge Formula: UC = OMR/BG = $/1000 gallons
   - UC - User Charge
   - OMR - Operation, Maintenance and Replacement Cost
   - BG - Billable Gallons, in thousands of gallons

2. Basic Sewer Service Charge:
   - SSC = UC+((DS + OCC)/BG) = $/1000 gallons
   - SSC - Sewer Service Charge per thousand gallons
   - DS - Debt Service
   - OCC - Other Capital Cost

3. Rate Adjustment:
   - RA = Annual increase/decreased costs for Electric, Chemicals, Gas, Sludge Disposal per 1000 gallons billable.

4. Billing Charge:
   - BC = Q * (SSC (+/-) RA + ($S_{u/p\ 1}$ + $S_{u/p\ 2}$ + $S_{u/p\ 3}$ + Etc.))
   - Q =Quantity of water used during the period
   - $S_{u/p}$ =Surcharge for extra strength pollutants (See Schedule 7)

Sewer Rates:

The charges for and the amount to be paid for sewer services, as determined by metering of the water or waste discharge, shall be computed in accordance with the following:

Minimum Sewer Service Charges:

All sewer service branches or connections shall be subject to a minimum bi-monthly charge based on the size of the water meter or on the number of residential units served by one meter, whichever is greater, as set forth in the following table:

Meter Size	Bi-Monthly Usage included in minimum	Bi-Monthly Minimum Charges	Rate per 1000 gallons
¾" Residential	5,000 gallons	$ 22.20	$ 4.44
¾" Commercial	8,000 gallons	$ 35.52	$ 4.44
1"	20,000 gallons	$ 88.80	$ 4.44
1 ½"	40,000 gallons	$ 177.60	$ 4.44
2"	64,000 gallons	$ 284.16	$ 4.44
3"	128,000 gallons	$ 568.32	$ 4.44
4"	200,000 gallons	$ 888.00	$ 4.44
6"	400,000 gallons	$ 1,776.00	$ 4.44
8"	640,000 gallons	$ 2,841.60	$ 4.44
10"	920,000 gallons	$ 4,084.80	$ 4.44
Multifamily per residential unit	5,000 gallons per unit	$ 22.20 per unit	$ 4.44

Sewer Rates for consumptions in excess of minimum:

Usage Range	Rate per 1000 Gallons Usage
Over minimum	$ 4.44

Seasonal Billings

Seasonal billing periods are established for residential users to provide an equitable means of billing sewer charges during summer months.

1. Sewer bills issued for read periods in May, June, July, August, September, October, November and December are to be Summer Cap bills

2. Sewer bills issued for read periods in January, February, March and April are to be Winter Usage bills.

3. Summer Cap bills shall not be less than minimum. Summer Cap bills shall not exceed highest Winter Usage bill of that year. Highest Winter Usage is to be established annually.

Effective September 1, 2011

4. During non-summer periods, read periods January through April, sewer billing will be based on the actual metered volume of water used or waste discharged by a customer or the appropriate minimum for a non-metered customer.

5. Summer Cap for new residential customers is to be established during their first full bi-monthly billing period.

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H

Appendix I

TO:	Chris Rowland, P.E. Assistant Sanitary Engineer Clermont County Water Resources Department
FROM:	CH2MHILL
DATE:	December 5, 2013 (updated)
RE:	Newtonsville WWTP and Collection System Project Phase 1 – Planning and Conceptual Design Newtonsville Area Stream Sampling and Analysis

Background and Purpose

Beginning in 1996, Clermont County began a comprehensive stream sampling and analytical program that had three objectives:

1. Characterize the surface water quality within Clermont County streams;
2. Investigate potential impacts associated with observed impairment of surface water quality through dry weather sampling (July and August) upstream and downstream of suspect discharges;
3. Monitor Shayler Run and Hall Run sample sites during wet weather to determine impacts associated with major rain events.

Data collected by the County through its Office of Environmental Quality provides a basis for tracking trends in water quality over time and providing support for planning and management programs. The Newtonsville area was included as part of the dry weather sampling program in 2007 due to suspected water quality impacts resulting from failed home sewage treatment systems (HSTS). Sampling of the Newtonsville area sites was recently completed by the County in August 2013.

The purpose of this memorandum is to integrate and summarize available water quality data collected by the County and the Ohio EPA for the Newtonsville area and to provide a basis for and support of the referenced project.

Previous Biological and Water Quality Surveys-Ohio EPA

The Village of Newtonsville is located in the East Fork Little Miami River basin. This location was last surveyed by Ohio EPA in 1998. Total Maximum Daily Load (TMDL) models have been prepared for the Upper Little Miami River (approved by USEPA in July 2002) and the Lower little Miami River (approved by USEPA in March 2011). A similar model is being prepared for the East Fork Little Miami River which is due to be released in 2015. To support this model, a water quality and biological survey was performed by Ohio EPA in this drainage basin during the summer of 2012. Draft conclusions drawn from this data suggest that there are non-attainment and partial attainment stream segments in and around Newtonsville (Attachment A)

The TMDL process, supported by the 2012 field survey, will identify impaired waters, verify beneficial use designations (and re-designate if necessary), gather sufficient data that will factor into the wasteload allocation and ascribe causes and sources of use impairment. The objectives of the process are to estimate pollutant loads from the various sources within the basin, define or characterize allowable loads to support beneficial uses and to allocate pollutant loads among different pollutant

sources through appropriate controls, such as NPDES permitting, storm water management, non-point source controls or other abatement strategies.

For the 2012 field survey, strategic sampling locations were developed to establish baseline water chemistry values under varying flow conditions. Two of those sample sites are located in the Newtonsville area: Stonelick Creek at SR 131 and an unnamed tributary (referred to herein as "Newtonsville Creek") that crosses Cedarville Road (river mile 0.9). The results of this water quality and biological survey and the TMDL that follows will be of great interest to the County as planning for the Newtonsville collection system and proposed treatment facility evolves.

Prior to 2012, Ohio EPA performed limited biological field work in the Newtonsville area in August 2010 (Refer to Attachment B). Sample sites included two (2) locations on the unnamed tributary that extends through the Village of Newtonsville, one at Cedarville Road (river mile 0.9) and the other at SR 131 (river mile 2.0). The conclusions drawn based on limited biological sampling were: 1) each sample site was characteristic of a *Primary Headwater Habitat Stream* (PHWH) 2) additional sampling and analysis is needed to determine whether *Warmwater Habitat* (WWH) or PHWH classification is most appropriate for these stream segments and 3) based on fish collected at the Cedarville Road location, an index of biological integrity (IBI) score of 36 was determined which does not significantly depart from expected IBI scoring for WWH streams. The significance of stream classification is its bearing on permissible discharge loadings which can be restrictive for PHWH streams compared to larger streams.

Previous Water Quality Surveys-Clermont County

Historical sampling frequencies are presented in Exhibit 1 and Newtonsville area water quality sampling locations established by the Clermont County Office of Environmental Quality are shown in Exhibit 2.

Three (3) sample sites are on the mainstem of what is referred to as "Newtonsville Creek":

NEWTN2.5 (2.5 miles upstream of confluence with Stonelick Creek at SR 131);
NEWTN1.9 (1.9 miles upstream of confluence with Stonelick Creek at Newtonsville Road);
NEWTN0.9 (0.9 miles upstream of confluence with Stonelick Creek at Cedarville Road);

Three (3) sites are located on an unnamed tributary to Newtonsville Creek:

NWTUTE.3 (east branch of unnamed tributary, 0.3 miles upstream of tributary fork)
NWTUTW.2 (west branch of unnamed tributary, 0.2 miles upstream of tributary fork)
NWTUTO.2 (below tributary fork 0.2 miles upstream of confluence with Newtonsville Creek)

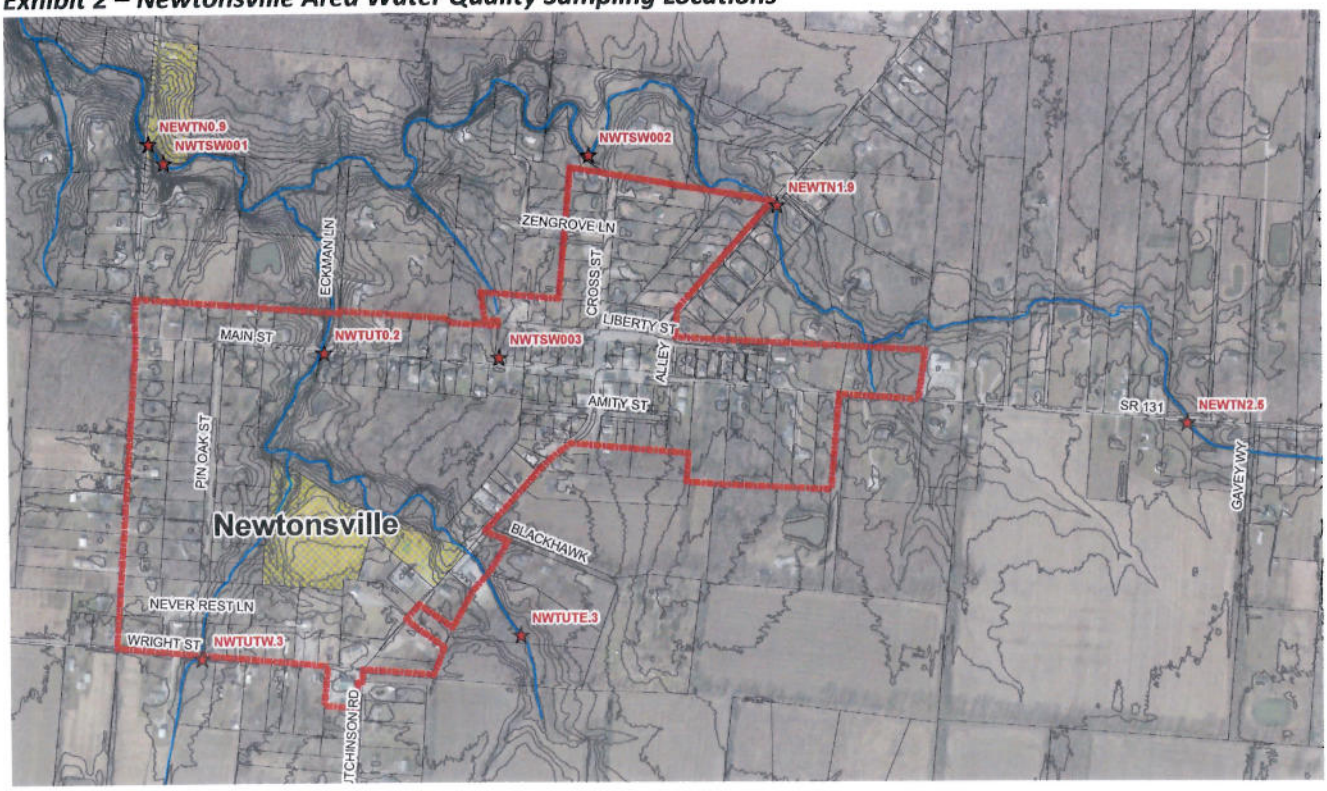
Three (3) additional sites on stormwater outfalls:

NWTSW001 (stormwater outfall upstream of Cedarville Road)
NWTSW002 (stormwater outfall located at the end of Cross Street)
NWTSW003 (stormwater outfall located north of Main Street)

Exhibit 1 – Historical Newtonsville Area Sample Site Designations and Sample Frequencies

YEAR	NEWTN2.5	NEWTN1.9	NEWTN0.9	NWTWTE.3	NWTUTW.2	NWTUTO.2	NWTSW001	NWTSW002	NWTSW003
1997			X						
1998			X						
1999			X						
2000			X						
2001			X						
2006	X	X	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X	X	X
2013	X	X	X	X	X	X	X	X	X

Exhibit 2 – Newtonsville Area Water Quality Sampling Locations



Analytical Results of Sampling

Grab samples were collected during the summer months of July or August at each sample location during dry weather conditions which is defined as no rainfall during the preceding 48 hours. The 2013 sampling period extended from August 26th through August 28th. Results of the surveys are presented in the following exhibits. Refer to Attachment C for a complete summary of data collected at each sample location.

The results for sample site NEWTN2.5 are presented in Exhibit 3. This sample station is located upstream of Newtonsville and data is limited for the parameters displayed prior to 2013. Data does not show significant bacterial contamination with a geometric mean (GM) of 31 colonies per 100mL. The Ohio Water Quality Standard for E. Coli. is 126 colonies per 100mL based on a GM of not less than five samples collected over a 30 day period. As well, the E. Coli. density cannot exceed 298 colonies per 100mL in ten percent of the samples .

Exhibit 3 – Sample Station NEWTN2.5, 2.5 miles upstream of confluence with Stonelick Creek

Year		NH4-N mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	GM E.Coli. #/100 mL	pH S.U.	Total P mg/L	Water Temp DegC
2006								
	Max	-----	-----	-----	-----	-----	0.73	-----
	Min	-----	-----	-----	-----	-----	0.73	-----
	Avg	-----	-----	-----	-----	-----	0.73	-----
2007								
	Max	-----	-----	-----	-----	-----	1.54	-----
	Min	-----	-----	-----	-----	-----	1.54	-----
	Avg	-----	-----	-----	-----	-----	1.54	-----
2013								
	Max	0.00	1,154	13.73		7.65	0.32	26.77
	Min	0.00	1,069	3.00		7.41	0.16	22.41
	Avg	0.00	1,112	7.23	31	7.54	0.25	24.13

Ohio EPA has developed in-stream nutrient targets based on a technical report entitled, *Association Between Nutrients, Habitat and the Aquatic Biota in Ohio Rivers and Streams (1999*) that has concluded that in-stream nutrients such as phosphorus have a measurable impact on the health biological communities. These nutrient targets are not codified in Ohio's water quality standards; therefore, there is a degree of flexibility as to how they can be used in TMDL development. The in-stream target for total phosphorus in WWH streams is 0.08 mg/L. The sample results for 2006, 2007 and 2013 at sample site NEWTN2.5 consistently exceed this target value during dry flow conditions. This suggests the presence of some upstream discharge, point or non-point, which could be impacting in-stream phosphorus levels.

The results for sample site NEWTN0.9 are presented in Exhibit 4. This sample station is located downstream of Newtonsville and has been repeatedly sampled since 1997. Data shows significant bacterial contamination with a GM that is two orders of magnitude higher than sample site NEWTN2.5. The total phosphorus concentrations at this location exceed the in-stream target mentioned previously. These observations suggest that HSTSs in the Newtonsville area may not be providing adequate treatment or are impaired to an extent that allows sewage to reach and impact local streams.

Exhibit 4 – Sample Station NEWTN0.9, 0.9 miles upstream of confluence with Stonelick Creek

Year		NH4-N mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	GM E. Coli #/100 mL	pH S.U.	Total P mg/L	Water Temp DegC
1997								
	Max	0.00	1,270	7.6	-----	8.00	0.34	22.80
	Min	0.00	123	4.1	-----	7.70	0.07	17.30
	Avg	0.00	882	6.1	-----	7.84	0.16	20.48
1998								
	Max	0.12	840	7.4		8.00	0.19	22.90
	Min	0.00	550	4.6		7.60	0.06	19.80
	Avg	0.03	637	6.0	104	7.83	0.15	21.08
1999								
	Max	0.00	1,290	5.2		7.80	0.24	18.60
	Min	0.00	997	2.8		7.70	0.15	18.30
	Avg	0.00	1,144	4.0	306	7.75	0.19	18.45
2000								
	Max	0.42	836	7.4		7.70	0.57	22.50
	Min	0.00	417	2.3		7.40	0.20	20.30
	Avg	0.13	620	5.5	2,307	7.55	0.39	21.18
2001								
	Max	0.14	1,050	7.7		7.90	0.44	24.00
	Min	0.00	469	4.6		7.50	0.23	18.80
	Avg	0.06	776	5.8	382	7.70	0.33	21.45
2006								
	Max	-----	-----	-----		-----	0.18	-----
	Min	-----	-----	-----		-----	0.18	-----
	Avg	-----	-----	-----	-----	-----	0.18	-----
2007								
	Max	-----	-----	-----			1.15	-----
	Min	-----	-----	-----			0.74	-----
	Avg	-----	-----	-----	1,442		0.95	-----
2013								
	Max	0.00	994	6.6		7.51	0.14	22.13
	Min	0.00	953	4.8		7.40	0.10	19.76
	Avg	0.00	972	5.7	115	7.44	0.12	20.91

The results from sampling the unnamed tributary that flows north through the Village of Newtonsville and joins "Newtonsville Creek" is summarized in Exhibits 5, 6 and 7.

Exhibit 5 – Sample Station NWTUTE.3, east branch of unnamed tributary 0.3 miles upstream of fork

Year		NH4-N mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	GM E. Coli #/100 mL	pH S.U.	Total P mg/L	Water Temp DegC
2006								
	Max	-----	-----	-----	-----	-----	0.19	-----
	Min	-----	-----	-----	-----	-----	0.19	-----
	Avg	-----	-----	-----	-----	-----	0.19	-----
2007								
	Max	-----	-----	-----	-----	-----	0.14	-----
	Min	-----	-----	-----	-----	-----	0.04	-----
	Avg	-----	-----	-----	4	-----	0.09	-----
2013								
	Max	0.33	1,081	3.1		7.26	0.41	22.01
	Min	0.00	1,021	1.8		7.21	0.21	21.02
	Avg	0.19	1,042	2.7	931	7.24	0.32	21.39

Exhibit 6– Sample Station NWTUTW.2,, west branch on unnamed tributary 0.2 miles upstream of fork

Year		NH4-N mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	GM E. Coli #/100 mL	pH S.U.	Total P mg/L	Water Temp DegC
2006								
	Max	-----	-----	-----	-----	-----	0.60	-----
	Min	-----	-----	-----	-----	-----	0.60	-----
	Avg	-----	-----	-----	-----	-----	0.60	-----
2007								
	Max	-----	-----	-----	-----	-----	1.59	-----
	Min	-----	-----	-----	-----	-----	0.04	-----
	Avg	-----	-----	-----	1,925	-----	1.02	-----
2013								
	Max	0.14	1,978	4.3		7.52	0.88	21.85
	Min	0.00	1,278	3.8		7.46	0.21	20.73
	Avg	0.09	1,717	4.1	570	7.49	0.63	21.19

Exhibit 7– Sample Station NEWTUTO.2, unnamed tributary below confluence of east and west branch

Year		NH4-N mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	GM E. Coli #/100 mL	pH S.U.	Total P mg/L	Water Temp DegC
2006								
	Max	-----	-----	-----	-----	-----	1.11	-----
	Min	-----	-----	-----	-----	-----	1.11	-----
	Avg	-----	-----	-----	-----	-----	1.11	-----
2007								
	Max	-----	-----	-----	-----	-----	2.42	-----
	Min	-----	-----	-----	-----	-----	1.59	-----
	Avg	-----	-----	-----	23,398	-----	2.01	-----
2013								
	Max	15.00	1,144	2.0		7.42	2.90	22.18
	Min	7.18	1,075	0.9		7.36	1.54	20.70
	Avg	11.59	1,110	1.6	74,904	7.38	2.27	21.37

The preponderance of data from these three sites suggests that there are impacts from HSTSs in the vicinity. The results from sample site NEWTUTO.2 indicate very high levels of E.Coli.bacteria, ammonia

and total phosphorus and suppressed levels of dissolved oxygen. E. Coli. density measured at this location in 2007 and again in 2013 is consistent at two orders of magnitude beyond the primary contact state bacterial standard. This observation poses a significant health risk to local residents as this stream flows through the Village of Newtonsville.

Conclusions and Future Directions

The recent sampling and analytical survey performed by Clermont County in August 2013 serves as a water quality baseline and confirms prior sampling results that points to known water quality impacts in the Newtonsville area. Stream sampling and analysis should continue into the future at the locations presented to document anticipated water quality and biological quality improvements associated with proposed centralized wastewater collection and treatment facilities.

To further support the water quality data, the recent survey of HSTSs in Newtonsville by the Clermont County Health District in 2011 indicated that of the 171 systems surveyed, 53 had failed. There were 21 system assessments that were canceled at the property owner's request; therefore, the percentage of failed systems actually surveyed was 35 percent but the failure rate is likely in the range of 35-43 percent considering the cancelled assessments. The proportion of HSTS failures is approximately five times higher in Newtonsville than the current County average, estimated to be 8 percent. Failing on-site systems that are not properly operated or simply do not function as intended, become chronic contributors to pollutant loading in local streams, specifically in Newtonsville.

The data presented herein for the Newtonsville area supports planning efforts for a wastewater collection system to serve the Village of Newtonsville and a proposed wastewater treatment facility as called for in Clermont County's current 5-Year Wastewater Capital Improvement Plan (2012-2016). This project if approved by the County and regulatory authority will benefit the Village and significantly improve local water quality and public health by removing the impacts associated with failed HSTSs and consequently reducing the level of pathogenic bacteria and nutrient loading in local streams.

Attachment A
Ohio EPA 2012 Field Biological Survey
Draft Conclusions on Attainment
Newtonsville Area Results

Table 2. Attainment status of sites sampled during the 2012 East Fork Little Miami River survey. The aquatic life use is Warmwater Habitat unless otherwise noted.

STORET	RM	QHEI	IBI	MIWb	ICI	STATUS	CAUSES		SOURCES	
11-107-000 Stonelick Creek										
200492	20.0	57.3	38		F	Partial	322, 449	low do, organic enrichment, condition exacerbated by low flow	140, 156	
M04S42	17.7	64.0	30*		MG	Partial	322, 319, 449	low do, organic enrichment condition exacerbated by low flow	142	Stonelick Reservoir backwaters
301905 Rt. 727 near Pringle Rd	13.4	73.0	32*	5.6*	Fair	Non	322, 270, 449	low do, organic enrichment, Condition exacerbated by low flow	142	Stonelick Reservoir
M04S41 Rt. 131	9.8	69.0	34*	6.3*	G	Partial	322, 270, 449	low do, organic enrichment, condition exacerbated by low flow	142	Stonelick Reservoir
301906	6.2	66.8	37	7.9	46	Full				
M99Q14	5.2	67.3	44	8.4	VG	Full				
M04P09	1.0	66.5	42	8.9	E	Full	TIC	Threatened by nutrient enrichment, algae cover thick		
11-107-002 Trib. to Stonelick Creek (RM 10.61)										
301148 Cedarville Rd	0.9	61.8	34*		P	Non	449, 100007	organic enrichment, condition exacerbated by low flow	168	Newtonsville
11-108-000 Lick Fork										
200466	0.6	72.0	56		G	Full				

Table 2. Attainment status of sites sampled during the 2012 East Fork Little Miami River survey. The aquatic life use is Warmwater Habitat unless otherwise
noted.

STORET	RM	QHEI	IBI	MIWb	ICI	STATUS	CAUSES		SOURCES	
11-109-000 Brushy Fork										
301911	2.2	49.0	26*		G	Non	322, 100007	low do, condition exacerbated by low flow and bedrock habitat	155	
301912	0.3	55.8	46		E	Full				
11-111-000 Patterson Run										
301913	0.1	57.3	20*		G	Non	100007, 449	low flow, organic enrichment, Condition exacerbated by marginal habitat	99	Clermont NE Local Schools WWTP?
11-112-000 Moores Fork										
301909	2.9	63.0	38		F	Partial	322, 449, 100007	organic enrichment, low flow		
301910	0.7	66.5	38		HF	Partial	322, 449, 100007	organic enrichment, low flow		

Attachment B
Ohio EPA 2010 Field Biological Survey
Newtonsville Area Results

Newtonsville

The site at Cedarville Road (RM 0.9) appeared interstitial with a fish community representative of a headwater community during electrofishing sampling on 8/4/2010. The marginally good fish community received an IBI=36, which is within non-significant departure of WWH. A total of eleven species of fish were collected, though three species, creek chub (37.64%), central stoneroller minnow (27.99%) and green sunfish (14.86%) comprised 80% of the sample. In addition to the fish, numerous small salamanders were observed upstream of the bridge. Several of the salamanders were collected and identified as larval, southern two-lined salamanders, *E.cirrigera* (identification completed by Mick Micacchion, Ohio EPA). While the presence of two-lined salamanders is indicative of a PHWH stream, additional sampling would need to be completed to determine whether the stream is a Class II or Class III PHWH stream. Macroinvertebrate sampling was attempted on 9/15/2010, six weeks after the fish sampling. However, the only water present were small disconnected pools near the bridge.

The site at State Route 131 (RM 2.2) only had water adjacent to tile drains from the surrounding homes. A total of eleven fish, specifically, green sunfish (5), largemouth bass (2) and bluegill sunfish (4) were collected. Terrestrial vegetation was observed growing in the stream channel. The ephemeral nature of the stream is indicative of a PHWH stream. This site was also completely dry when visited by the macroinvertebrate crew on 9/15/2010. The lack of flow at this upstream location during both visits indicates that the stream is likely a PHWH candidate in this area. In conclusion, additional sampling would need to be completed to determine whether the WWH or a PHWH classification is most appropriate for this stream.

When checking the sites in late September, the macroinvertebrate crew noticed a septic odor possibly due to failing home sewage treatment system discharges as they crossed a bridge in Newtonsville (Figure 1). It is recommended that an investigation into the source(s) of these odors is completed.

Site	RM	Drainage (mi^2)	IBI[1]	QHEI	Comment
Unnamed tributary to Stonelick Creek at RM 10.61	0.9	2.0	36^{NS}	54	Interstitial with larval, two-lined salamanders present.
Unnamed tributary to Stonelick Creek at RM 10.61	2.2	0.7	12	45.5	Intermittent with only water present discharged from tiles in residential yards; likely from HSTS.

1 – WWH IBI biocriterion for headwater sites within the Interior Plateau ecoregion is 40.

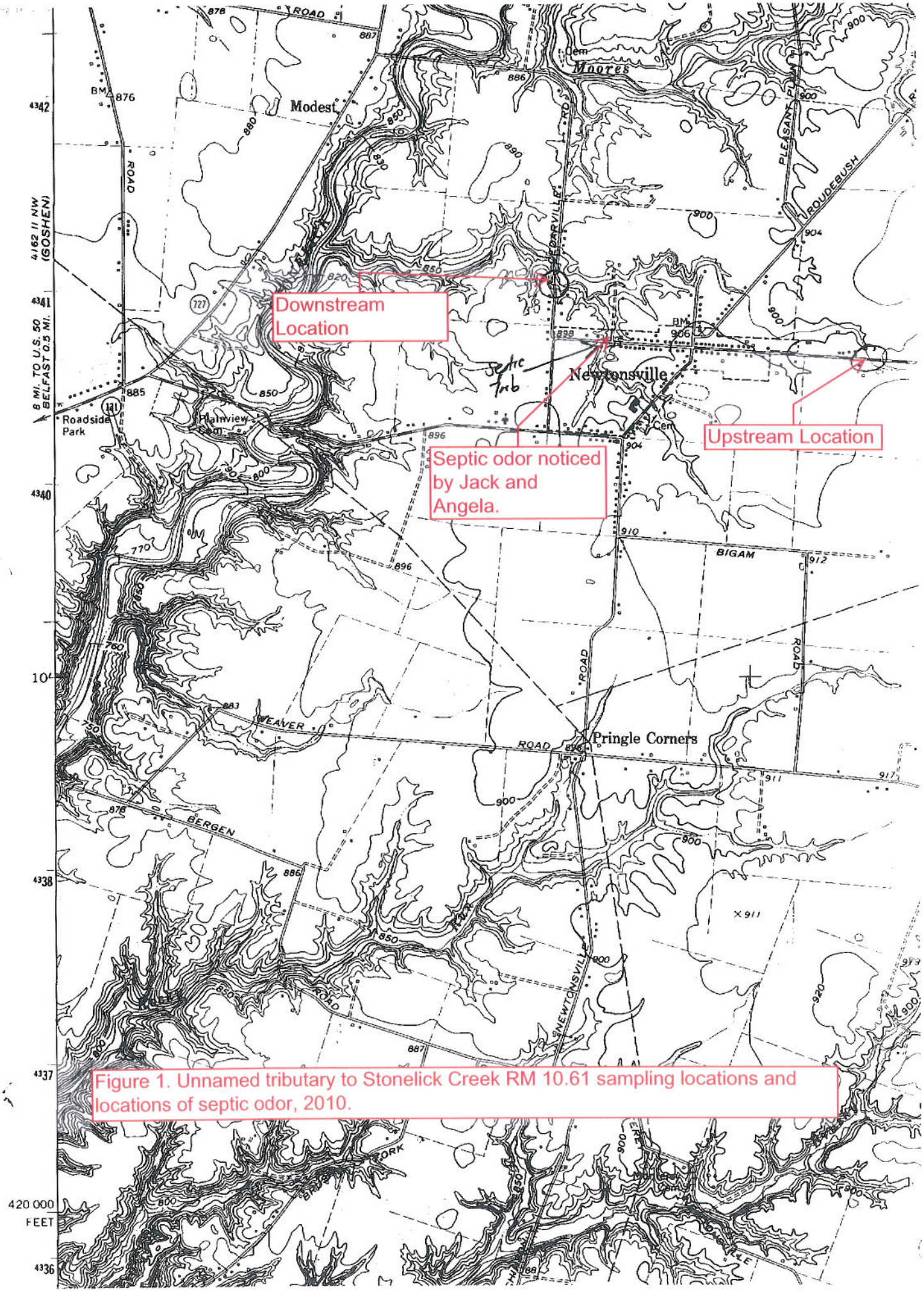


Figure 1. Unnamed tributary to Stonelick Creek RM 10.61 sampling locations and locations of septic odor, 2010.

River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Percent of Individuals: Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
Stonelick trib 10.61 - (11-163)																
Year: 2010																
2.20	E	08/04/2010	0.7	3(1)	0(1)	0(1)	0(1)	0(1)	0(1)	45(1)	0(1)	46(1)	82(1)	0.0(1)	12(1) * *	12
0.90	E	08/04/2010	2.0	11(5)	4(3)	1(1)	0(1)	3(5)	2(3)	64(1)	12(3)	59(1)	22(3)	0.0(5)	368(5)	36

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Species List

River Code: **11-163**	Stream: **Trib. to Stonelick Creek (RM 10.61)**	Sample Date: **2010**
River Mile: **2.20**	Location: St. Rt. 131	Date Range: 08/04/2010
Time Fished: 300 sec	Drainage: 0.7 sq mi	
Dist Fished: 0.15 km	Basin: Little Miami River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
Largemouth Bass	F	C	C		2	4.00	18.18			
Green Sunfish	S	I	C	T	5	10.00	45.45			
Bluegill Sunfish	S	I	C	P	4	8.00	36.36			
	Mile Total				11	22.00				
	Number of Species				3					
	Number of Hybrids				0					

Species List

River Code: **11-163**	Stream: **Trib. to Stonelick Creek (RM 10.61)**	Sample Date: **2010**
River Mile: **0.90**	Location: Cedarville Rd.	Date Range: 08/04/2010
Time Fished: 1338 sec	Drainage: 2.0 sq mi	
Dist Fished: 0.15 km	Basin: Little Miami River No of Passes: 1	Sampler Type: E

Species Name / ODNR status	IBI Grp	Feed Guild	Breed Guild	Tol	# of Fish	Relative Number	% by Number	Relative Weight	% by Weight	Ave(gm) Weight
White Sucker	W	O	S	T	57	114.00	11.00			
Creek Chub	N	G	N	T	195	390.00	37.64			
Fathead Minnow	N	O	C	T	1	2.00	0.19			
Bluntnose Minnow	N	O	C	T	4	8.00	0.77			
Central Stoneroller	N	H	N		145	290.00	27.99			
Largemouth Bass	F	C	C		3	6.00	0.58			
Green Sunfish	S	I	C	T	77	154.00	14.86			
Bluegill Sunfish	S	I	C	P	4	8.00	0.77			
Hybrid X Sunfish					1	2.00	0.19			
Johnny Darter	D	I	C		23	46.00	4.44			
Orangethroat Darter	D	I	S		6	12.00	1.16			
Fantail Darter	D	I	C		2	4.00	0.39			
	Mile Total				518	1,036.00				
	Number of Species				11					
	Number of Hybrids				1					

Key QHEI Components

			WWH Attributes									MWH Attributes														
												High Influence				*Moderate Influence*										
River Mile	QHEI	Gradient (ft/mile)	No Channelization or Recovered	Boulder/Cobble/Gravel Substrates	Silt Free Substrates	Good/Excellent Substrates	Moderate/High Sinuosity	Extensive/Moderate Cover	Fast Current/Eddies	Low-Normal Overall Embeddedness	Max Depth > 40 cm	Low-Normal Riffle Embeddedness	**Total WWH Attributes**	Channelized or No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse/No Cover	Max Depth < 40 cm (WD, HW)	**Total H.I. MWH Attributes**	Recovering Channel	Heavy/Moderate Silt Cover	Sand Substrates (Boat)	Hardpan Substrate Origin	Fair/Poor Development	Low Sinuosity	Only 1-2 Cover Types	Intermittent and Poor Pools	No Fast Current	High/Mod. Overall Embeddedness	High/Mod. Riffle Embeddedness	No Riffle	**Total M.I. MWH Attributes**	**(MWH HI.+1)/(MWH+1) Ratio**	**(MWH MI.+1)/(MWH+1) Ratio**
(11-163) Trib. to Stonelick Creek (RM 10.61)																																			
Year: 2010																																			
2.2	**45.5**	17.86	■	■			■			■			4				◆	◆	2				●			●	●	●			●	5	0.60	1.60
0.9	**54.0**	35.04	■	■				■					3				◆	◆	2		●		●					●		●	●	5	0.75	2.00

Attachment C
Newtonsville Area Sampling Results
Complete Data Record

Newtonsville Stream Sampling Data 1997-2013

Sample Site	Date	NH4-N mg/L	cBOD5 mg/L	Chlorides mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	E. Coli #/100 mL	F. Coli #/100 mL	Hardness, Tot mg/L as CaCO3	NO3-N mg/L	TKN mg/L	pH S.U.	Diss Ortho-P mg/L	Total P mg/L	TSS mg/L	Water Temp DegC
NEWTN0.9	01-Jul-97	0.00	0.0		509	5.80		8	236	0.64	0.00	7.80	0.22	0.28	6.50	21.30
NEWTN0.9	08-Jul-97	0.00	0.0		123	7.50		120		0.20	0.73	8.00	0.04	0.15	19.60	19.30
NEWTN0.9	15-Jul-97	0.00	0.0		1,210	5.40		23	456	0.16	0.73	7.70	0.02	0.08	7.40	22.40
NEWTN0.9	22-Jul-97	0.00	2.8		1,168	4.10		77		0.19	0.78	7.70	0.02	0.07	6.70	22.80
NEWTN0.9	30-Jul-97	0.00	0.0		865	6.80		1,200		0.13	0.73	7.80	0.07	0.17	6.60	17.30
NEWTN0.9	05-Aug-97	0.00	2.2		1,270	6.20		1,100	528	0.08	0.73	7.90	0.02	0.15	21.40	20.10
NEWTN0.9	12-Aug-97	0.00	2.6		1,160	4.50		85		0.20	0.73	7.70	0.02	0.07	11.60	21.70
NEWTN0.9	19-Aug-97	0.00	0.0		611	7.10		540	279	1.55	1.51	8.00	0.16	0.34	23.20	20.50
NEWTN0.9	26-Aug-97	0.00	0.0		1,020	7.60		100		0.33	0.90	8.00	0.08	0.16	11.60	18.90
NEWTN0.9	14-Jul-98	0.12	2.4	38.0	550	7.10	160				0.95	8.00	0.04	0.19	31.50	21.40
NEWTN0.9	28-Jul-98	0.00	0.0	26.0	579	7.40	82				0.28	7.90	0.14	0.16	2.70	20.20
NEWTN0.9	04-Aug-98	0.00	0.0	32.0	580	5.00	85				0.39	7.60	0.15	0.17	3.60	19.80
NEWTN0.9	18-Aug-98	0.00	0.0	73.0	840	4.60					0.48	7.80	0.03	0.06	6.90	22.90
NEWTN0.9	13-Jul-99	0.00	0.0	92.0	997	2.80	180			0.13	0.64	7.70	0.18	0.24	10.30	18.30
NEWTN0.9	10-Aug-99	0.00	0.0	105.0	1,290	5.20	520			0.35	0.90	7.80	0.10	0.15	10.70	18.60
NEWTN0.9	05-Jul-00	0.21	2.7	20.8	417	7.09	5,900			0.82	1.76		0.33	0.54	42.20	22.50
NEWTN0.9	19-Jul-00	0.42	4.3	22.3	445	7.41	6,000			0.81	1.79	7.70	0.34	0.57	46.40	21.10
NEWTN0.9	02-Aug-00	0.00	0.0	35.6	682	2.30	71			0.20	0.78	7.40		0.34	4.10	20.60
NEWTN0.9	16-Aug-00	0.00	0.0	49.5	836	5.40	200			0.25	0.64	7.60	0.17	0.20	2.60	21.40
NEWTN0.9	30-Aug-00	0.00	0.0	37.1	721	5.10	130,000			0.36	0.67	7.50	0.24	0.28	3.30	20.30
NEWTN0.9	11-Jul-01	0.14	0.0		1,050	5.10	500			0.35	0.84	7.80	0.19	0.23	34.20	22.00
NEWTN0.9	23-Jul-01	0.00	0.0		846	5.80	180			0.56	0.64	7.60		0.36	20.70	24.00
NEWTN0.9	15-Aug-01	0.10	0.0		738	4.60	370			0.47	0.84	7.50	0.29	0.44	5.90	18.80
NEWTN0.9	27-Aug-01	0.00	2.1		469	7.70	640		162	0.71	1.06	7.90		0.29	13.40	21.00
NEWTN0.9	07-Aug-06						500			1.21			0.10	0.18	17.10	
NEWTN0.9	24-Jul-07						24,477						0.14	0.33	337.00	
NEWTN0.9	14-Aug-07						85						0.31	0.32	11.70	
NEWTN0.9	26-Aug-13	0.00			968	6.59	440					7.41		0.10		19.76
NEWTN0.9	27-Aug-13	0.00			953	5.74	76					7.51		0.11		20.84
NEWTN0.9	28-Aug-13	0.00			994	4.82	46					7.40		0.14		22.13
NEWTN1.9	07-Aug-06						38			1.11			1.80	2.23	6.50	
NEWTN1.9	24-Jul-07						10			0.22			0.59	1.15	14.00	
NEWTN1.9	14-Aug-07						131			0.10			0.36	0.74	20.00	
NEWTN1.9	26-Aug-13	1.72			677	6.12	21					7.16		1.40		23.88
NEWTN1.9	27-Aug-13	3.33			672	1.94	13					7.15		1.66		22.60
NEWTN1.9	28-Aug-13	2.92			661	2.14	10					7.18		1.62		23.36

Newtonsville Stream Sampling Data 1997-2013

Sample Site	Date	NH4-N mg/L	cBOD5 mg/L	Chlorides mg/L	Conductivity µmho/cm	Diss Oxygen mg/L	E. Coli #/100 mL	F. Coli #/100 mL	Hardness, Tot mg/L as CaCO3	NO3-N mg/L	TKN mg/L	pH S.U.	Diss Ortho-P mg/L	Total P mg/L	TSS mg/L	Water Temp DegC
NEWTN2.5	07-Aug-06						300			1.13			0.46	0.73	59.70	
NEWTN2.5	24-Jul-07						66			0.00			0.22	1.54	42.70	
NEWTN2.5	26-Aug-13	0.00			1,114	13.73	17					7.65		0.32		26.77
NEWTN2.5	27-Aug-13	0.00			1,069	4.96	12					7.57		0.16		22.41
NEWTN2.5	28-Aug-13	0.00			1,154	3.00	141					7.41		0.29		23.20
NWTSWO01	07-Aug-06						15			1.30			0.03	0.04	1.50	
NWTSWO01	24-Jul-07						54,620			0.04			0.04	1.01	739.00	
NWTSWO01	14-Aug-07						20			0.62			0.19	0.01	4.00	
NWTSWO01	26-Aug-13	0.00			1,133	8.02	91					7.76		0.18		19.76
NWTSWO01	27-Aug-13	0.00			1,240	7.15	72					7.78		0.08		20.16
NWTSWO01	28-Aug-13	0.00			1,231	7.68	21					7.75		0.21		20.83
NWTSWO02	07-Aug-06						14,000			1.09			1.36	2.71	65.00	
NWTSWO02	24-Jul-07						1,354			0.23			0.23	0.34	23.00	
NWTSWO02	26-Aug-13	0.14			1,093	2.32	48					7.16		0.41		19.91
NWTSWO02	27-Aug-13	0.46			1,178	1.76	260					7.23		0.34		20.78
NWTSWO02	28-Aug-13	0.36			1,182	2.90	69					7.26		0.35		22.44
NWTSWO03	07-Aug-06						27,000			1.75			3.52	5.26	78.00	
NWTSWO03	24-Jul-07						241,960			0.00			4.50	7.72	66.00	
NWTSWO03	14-Aug-07						12,033			0.20			3.27	4.34	18.00	
NWTSWO03	26-Aug-13	19.00			1,369	2.23	378					7.23		2.12		21.84
NWTSWO03	27-Aug-13	10.60			718	2.74	4,350					7.38		3.24		23.00
NWTSWO03	28-Aug-13	29.60			1,217	2.21	38,730					7.32		3.51		23.32
NWTUT0.2	07-Aug-06						2,400			0.54			0.41	1.11	52.80	
NWTUT0.2	24-Jul-07						141,360			2.33			1.49	2.42	34.00	
NWTUT0.2	14-Aug-07						3,873			0.10			2.72	1.59	9.67	
NWTUT0.2	26-Aug-13	7.18			1,144	2.02	16,700					7.36		1.54		20.70
NWTUT0.2	27-Aug-13	15.00			1,110	1.93	613,100					7.42		2.90		21.24
NWTUT0.2	28-Aug-13	12.60			1,075	0.94	41,060					7.37		2.36		22.18
NWTUTE.3	07-Aug-06						23			0.62			0.02	0.19	53.20	
NWTUTE.3	24-Jul-07						1			0.00			0.01	0.04	10.80	
NWTUTE.3	14-Aug-07						20			0.10			0.15	0.14	23.20	
NWTUTE.3	26-Aug-13	0.00			1,081	3.13	1,207					7.21		0.34		21.02
NWTUTE.3	27-Aug-13	0.25			1,023	3.04	748					7.26		0.21		21.15
NWTUTE.3	28-Aug-13	0.33			1,021	1.84	893					7.25		0.41		22.01
NWTUTW.2	07-Aug-06						300			0.79			0.38	0.60	72.00	
NWTUTW.2	24-Jul-07						957			0.53			0.15	0.45	145.00	
NWTUTW.2	14-Aug-07						3,873			0.10			2.72	1.59	9.67	
NWTUTW.2	26-Aug-13	0.00			1,895	4.31	649					7.46		0.21		20.98
NWTUTW.2	27-Aug-13	0.14			1,278	3.84	399					7.49		0.88		20.73
NWTUTW.2	28-Aug-13	0.13			1,978	4.02	715					7.52		0.80		21.85

Biological and Water Quality Study of the East Fork Little Miami River and Select Tributaries, 2012

Brown, Clermont, Clinton, Highland and Warren Counties, Ohio

Ohio EPA Technical Report EAS/2014-05-05

Division of Surface Water
Ecological Assessment Section
May 16, 2014

Table 2. Attainment status of sites sampled during the 2012 East Fork Little Miami River survey. The aquatic life use is Warmwater Habitat unless otherwise noted by an epsilon ᵉ superscript denoting Exceptional Warmwater Habitat. Letters following drainage area denote sampling method used for fish: A – boat, D – Wading, E – Longline.

STORET	DA	RM	QHEI	IBI	MIWB	ICI	STATUS	Cause	Source
11-107-002	***Trib. to Stonelick Creek (RM 10.61)***								
301148	2.0 E	0.9	61.8	34		P	Non	organic enrichment, condition exacerbated bv low flow	Newtonsville
11-108-000	***Lick Fork***								
200466	6.3 E	0.6	72.0	56		VG	Full		
11-109-000	***Brushy Fork***								
301911	5.7 E	2.2	49.0	26		G	Non	Low D.O., condition exacerbated by low flow and bedrock habitat	
301912	14.8 E	0.3	55.8	46		MG	Full		
11-111-000	***Patterson Run***								
301913	4.2 E	0.1	57.3	20		MG	Non	Low flow, organic enrichment, condition exacerbated by marginal habitat	Clermont NE Local Schools
11-112-000	***Moores Fork***								
301909	4.6 E	2.9	63.0	38		MG	Full		HSTS
301910	10.6 E	0.7	66.5	38		MG	Full		HSTS
11-115-000	***Backbone Creek***								
301903	7.4 E	0.6	65.5	36		G	Partial		
11-115-001	***Trib to Backbone (1.36)***								
301904	3.8 E	0.9	62.8	28		G	Partial	Low D.O., condition exacerbated by low flow	Unknown, Natural
11-116-000	***Lucy Run***								
M04S44	3.7 E	1.9	63.5	30		G	Partial	Low flow, no riffle	Natural
M04S43	7.2 E	0.1	58.8	38		MG	Full	Threatened, enrichment indicators not elevated, but bio declining	

Other Recommendations and Future Monitoring Concerns
Flows from the Batavia WWTP have been redirected to the Middle East Fork plant. Follow-up sampling in the reach bracketing the former discharge would help resolve whether the river has not been realizing its full potential.

HEADWATERS STONELICK CREEK (050902021301)
Status of Aquatic Life Uses
None of the three sites sampled in this unit, all on Stonelick Creek, had biological assemblages fully meeting applicable WWH biocriteria. Organic enrichment was the cause of impairment.

BRUSHY FORK (050902021302)
Status of Aquatic Life Uses
Three sites were sampled in the Brushy Fork unit, two on Brushy Fork and one on Patterson Run. Assemblages sampled in Patterson Run were impaired beyond any limitations imposed by local habitat quality (Figure 2) due to organic and nutrient enrichment. Similarly, the site sampled on Brushy Fork at Brushy Fork Road (301911) narrowly underperformed relative to available habitat due to low dissolved oxygen levels attributed to low flow and enrichment.

Other Recommendations and Future Monitoring Concerns
The package plant serving Clermont Count N.E. Schools (1PT00077) reports occasional violations of the 30-day average limit for ammonia nitrogen (six in 2011, four in 2012). Follow-up monitoring downstream from the discharge is needed to ascertain if the plant is affecting water quality and biological condition.

MOORES FORK-STONELICK CREEK (050902021303)
Status of Aquatic Life Uses
Two sites sampled on Moores Fork had biological assemblages meeting WWH condition. The biological assemblages sampled in the unnamed tributary to Stonelick Creek (10.61) sampled at Cedarville Road (301148) narrowly missed expectations for WWH, but the fish community was consistent with the available habitat, especially given the small drainage area (2 mi^2), lack of flow, and limited pool depth. The macroinvertebrate community, however, appeared to be impaired by nutrient and organic enrichment beyond what could be explained simply due to low flow, as field dissolved oxygen showed extreme supersaturation (>200%) coincidental with the lowest recorded phosphorus levels at the site (i.e., an obvious sign of active uptake), and TKN and ammonia nitrogen were periodically elevated at the site. Two sites on the mainstem of Stonelick Creek were sampled in the assessment unit; one failed condition status for WWH, the other narrowly passed. Again, organic and nutrient enrichment and low flow were factors limiting the biological assemblages.

Table 14. Sites failing the IBI biocriterion, and probable causes based on available indicators, East Fork Little Miami River basin, 2012.

STORET	SITE	Indicators	Probable Cause
Highest confidence in organic and/or nutrient enrichment as the probable cause of impairment based on indicator set			
301888	S. Fk. Dodson Creek @ Tedrick Rd.	NH3, TKN, TP, D.O., QHEI	1° organic enrichment exacerbated by poor habitat & no flow
M04S35	E. Fk. L. Miami R. Dst New Vienna @ Thornbird Rd.	NH3, TKN, TP, D.O.	1° organic and 2° nutrient enrichment
301913	Patterson Run @ Brushy Fork Rd.	TKN, TP, QHEI	2° organic enrichment exacerbated by marginal habitat (bedrock) & low flow
301902	Back Run @ Foozer Rd.	NOx, TP	Nutrient enrichment
M04S49	Fivemile Creek @ Blue Sky Park Rd. (Lower Crossing)	NH3, TKN, TP, D.O., QHEI	2° organic enrichment exacerbated by marginal habitat & no flow
301895	Fivemile Creek @ Blue Sky Park Rd. (Upper Crossing)	NH3, TKN, TP, QHEI	2° organic enrichment exacerbated by marginal habitat
M04W05	Solomon Run @ Anderson State Rd.	NH3, TKN, TP, QHEI	2° organic enrichment exacerbated by marginal habitat & no flow
Other primary or contributing causes.			
M04P13	Hall Run near Milford @ Roundbottom Rd.	QHEI, D.O., TSS	Poor habitat, low flow, urban runoff
200481	Hall Run at Summerside Estates, Dst. Summerside Rd.	D.O., Zn	Urban runoff
M04S41	Stonelick Creek W of Newtonsville @ St. Rt. 131	TKN, TP, D.O.	Low flow, 2° organic enrichment
301905	Stonelick Creek Dst. Stonelick Lake @ St. Rt. 727	TKN, NH3, TP	Low flow, 2° organic enrichment
M04S42	Stonelick Creek Upst. Stonelick Lake, Adj St. Rt. 133	NH3, TKN, D.O.	No flow, 2° organic enrichment
301148	Trib. To Stonelick Creek (10.61) @ Cedarville Rd.	TKN, NH3, TP	No flow, 2° organic enrichment
301911	Brushy Fork @ Brushy Fork Rd.	QHEI, D.O.	Poor habitat
301904	Trib. To Backbone Creek (1.36) @ Elmwood Rd.	TKN, TP	Low flow, modest nutrient enrichment
M04S44	Lucy Run S of Batavia, Dst. Lucy Run Cemetery	QHEI	Unknown, low flow
200468	Cloverlick Creek Ne of Bethel @ St. Rt. 133	QHEI	Low flow, marginal habitat (bedrock)
301898	Cloverlick Creek @ Bethel New Hope Rd.	D.O., TKN, TP	Low flow, 2° organic enrichment
200469	Barnes Run S of Concord @ Concord-bethel Rd.	D.O., QHEI	Low flow, sediment
301900	Poplar Creek @ Bethel Maple Rd.	D.O.	Low flow

STORET	SITE	Indicators	Probable Cause
301901	Sugartree Creek Adj South Campbell Rd	D.O.	low do, condition exacerbated by low flow
301148	Trib To Stonelick Creek (10.61) @ Cedarville Rd	TKN, NH3	organic enrichment
301893	Saltlick Creek @ US 68	QHEI	marginal habitat
M04W05	Solomon Run @ Anderson State Rd	QHEI	marginal habitat, low flow
200508	Turtle Creek E of Lynchburg @ Bald Knob Rd	QHEI	marginal habitat
M04S14	E Fk L Miami R Dst Lynchburg @ Wise Rd		no well-defined cause
M04S22	Pleasant Run N of Williamsburg @ Blue Sky Park Rd		no well-defined cause
301902	Back Run @ Foozer Rd		no well-defined cause
M04S34	E Fk L Miami R SW of Lynchburg, Upst Dodson Creek		no well-defined cause
200506	E Fk L Miami R Ust Lynchburg WWTP		no well-defined cause

East Fork Little Miami River Mainstem

Macroinvertebrate assemblages measured along the run of the East Fork mainstem generally met expectations based on the respective biocriterion. The exception, as previously discus, was in the vicinity of New Vienna, and in the reach that is transitional between WWH and EWH near Lynchburg (Figure 36). Within the transitional reach (river miles 65-75), indicators of environmental stress (e.g., elevated TKN or ammonia, low D.O., poor habitat) were not evident except for a marginally low dissolved oxygen concentration (4.45 mg/l) sampled on one date at RM 70.12. Note, however, that of the 4 stations in the reach, only one water chemistry sample was collected from each of the upstream most two stations (M04S15 [75.33] & 200506 [72.80]). Downstream from river mile 65, macroinvertebrate assemblages met expectations for EWH, and showed no variation in relationship to point sources. Similarly, downstream from Harsha Lake all ICI scores (or narrative equivalents) met expectations for EWH, and showed no longitudinal variation in relation to point sources (Figure 37).

Consistent with broader statewide trends, the quality of macroinvertebrate assemblages measured in 2012 was similar to that measured in 1998, and better than that measured in 1982 (Figure 38) owing to improved wastewater infrastructure and treatment facilitated by the Construction Grants program[17].

[17] The Construction Grants program was implemented under the US EPA National Municipal Policy as contained within the Federal Water Pollution Control Act (Clean Water Act), as amended in 1977 and 1981.

TO:	Chris Rowland, P.E. Assistant Sanitary Engineer Clermont County Water Resources Department
FROM:	CH2MHILL
DATE:	December 12, 2013
RE:	Newtonsville WWTP and Collection System Project Phase 1 – Planning and Conceptual Design Newtonsville "No Treatment Option" Analysis

1.0 Purpose

This technical memorandum focuses on the "no treatment option" in Newtonsville. This approach is considered a "non-degradation" alternative which would result in no local discharge and therefore no impact to the water quality of local area streams resulting from the discharge of reclaimed wastewater. The Ohio EPA requires this type of analysis, per the antidegradation rule (OAC 3745-1-05), before granting permission to discharge reclaimed wastewater to waters of the State.

The non-degradation alternative considers pumping wastewater, following its collection, from the Village of Newtonsville to another service area within the County. The two service areas under consideration are the Lower East Fork (LEF) and Middle East Fork (MEF) service areas where existing facilities treat the wastewater. The analysis consists of three parts: 1) a determination of whether there is available capacity in either the LEF or MEF sewer systems to accept the estimated wastewater flow, 2) what improvements, if any, are needed to accommodate the estimated wastewater flow, and 3) how to reliably convey the wastewater flow to that system.

2.0 Background

CH2M HILL utilized *InfoWorks* hydraulic models of five drainage areas to develop a Wastewater Master Plan Update for CCWRD, which was finalized and submitted in September 2011. The five modeled areas included the Loveland/Horner's Run/Branch Hill, O'Bannon Creek, Lower East Fork, Middle East Fork, and Nine Mile service areas. There are several versions of these models that include existing (2010) conditions as well as future (2020 and 2030) conditions that include projected changes in population for these areas. The 2010 and 2030 models of the LEF and MEF drainage areas were used for this evaluation.

A Preliminary Engineering Report completed for the County in 1999 by Santoro Engineering determined that the peak daily flow for the Newtonsville service area was 93,200 gpd. The CH2M HILL project team discussed whether to include any population growth or inflow/infiltration and decided to use the flow provided in the report rounded to 100,000 gpd because the Village has not experienced much growth since that time.

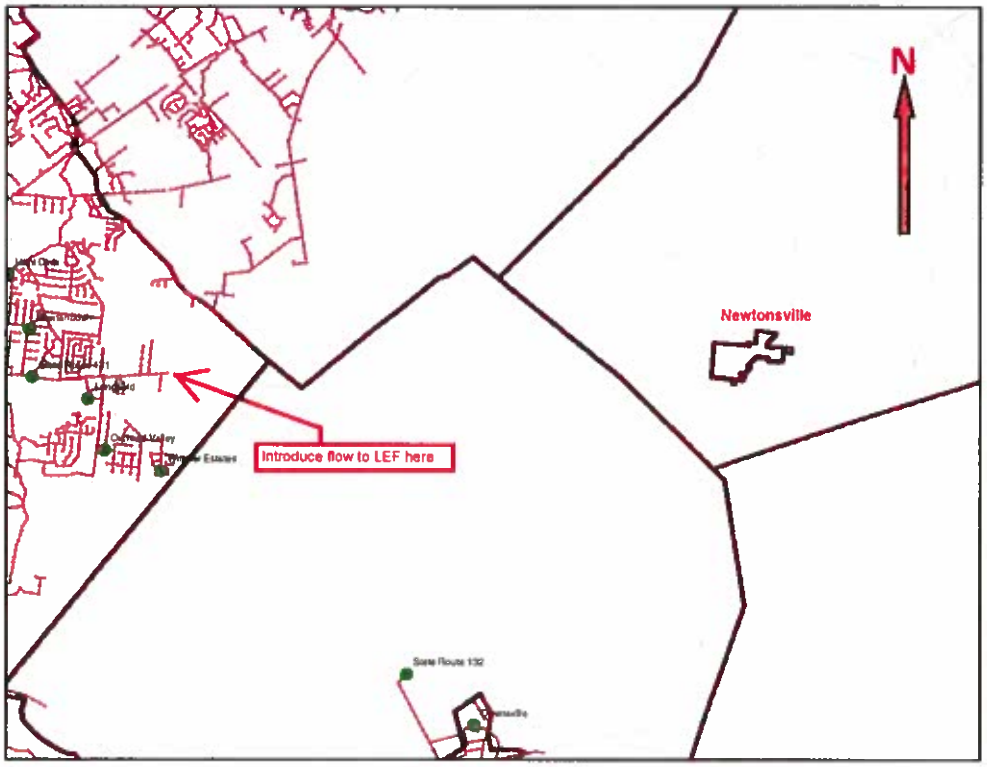
3.0 Analysis

The evaluation of available capacity for the LEF and MEF sewer systems was accomplished using a spreadsheet analysis in combination with the updated hydraulic models. The models of the LEF and MEF evaluated the larger conveyance elements used to route the flow to the existing wastewater treatment facilities systems and did not include all sewers. The unmodeled sewers are generally located on the periphery of the system and were considered unnecessary, at the time of the Wastewater Master Plan Update, to develop an understanding of the performance of the system. For the current analysis, these smaller peripheral sewers were evaluated using a spreadsheet analysis.

3.1 Lower East Fork Conveyance

The proposed location where the Newtonsville flow would discharge to the LEF system is shown spatially in **Exhibit 1**. A discharge point upstream of the Longfield Pump Station (LPS) along SR 131 is the closest and most direct alignment for pumping flows from Newtonsville to the LEF system. A baseline model run was performed, prior to introducing the Newtonsville flow, to see if there were any existing capacity problems in this portion of the LEF system. Results from this model run indicate that the LPS is under capacity for the existing flows; however, the sewers upstream of the pumping station from this direction were not modeled. A spreadsheet-type capacity analysis concluded that the sewers upstream of the LPS were not adequate to convey the flow from Newtonsville without surcharging; therefore, sewer replacement is needed at this location to accommodate the additional flow from Newtonsville.

Exhibit 1
Proposed Discharge Location in the Lower East Fork Service Area



3.1.1 Description of Work

This alternative would consist of the following work, which assumes the installation of a collection system within Newtonsville:

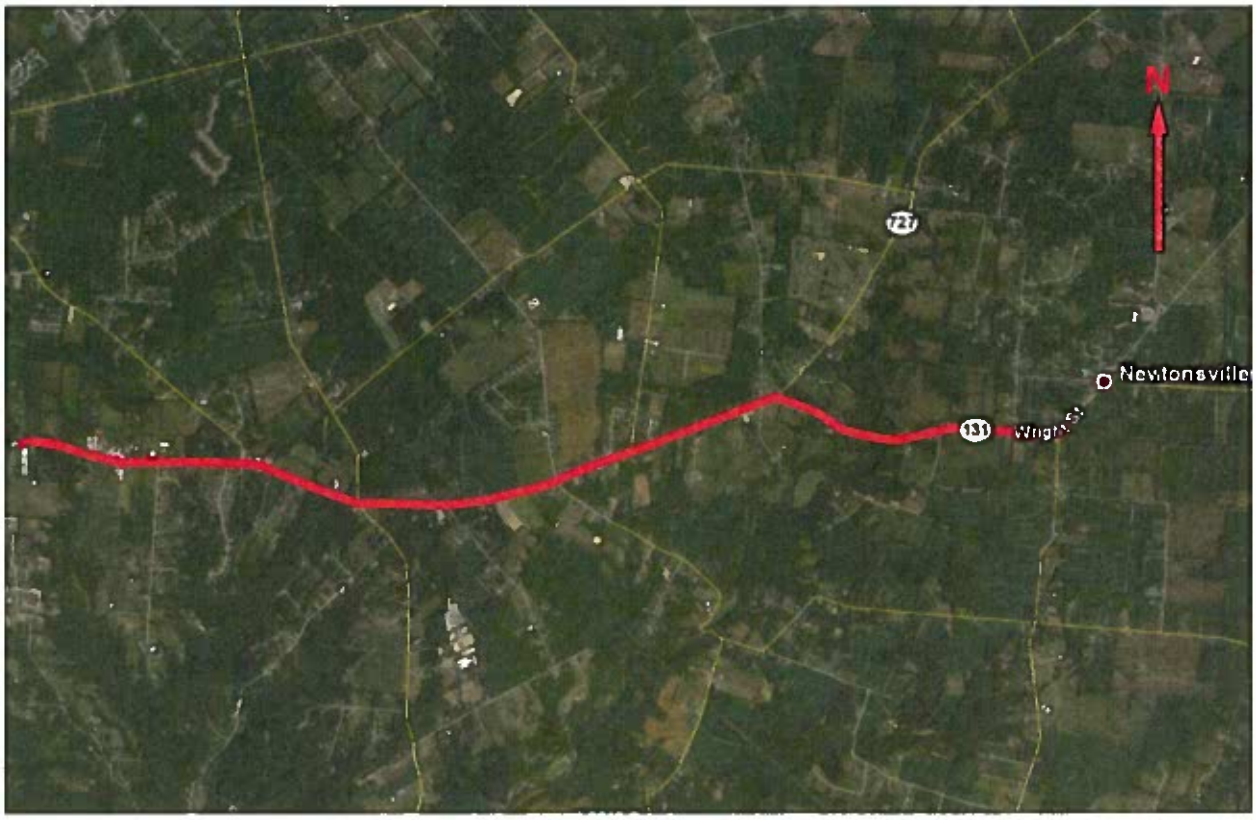
- Construction of a pumping station within the Newtonsville service area and construction of two booster pumping stations along the route of conveyance;
- Installation of a force main a distance of approximately six miles to convey Newtonsville wastewater to the LEF collection system;
- Upgrades to the LPS, as described in the 2011 Wastewater Master Plan Update (note that this does not include upgrades to the tributary sewers described in the Master Plan Update);
- Upgrades to the sewers between the Newtonsville force main discharge manhole and the LPS (not the same sewers described in the Master Plan Update).

3.1.1.1 Wastewater Conveyance

As part of this alternative, a single force main system is proposed, which would extend approximately six miles westward. The route of the proposed force main is illustrated in **Exhibit 2**. The proposed force main would be routed from Newtonsville west along SR 131. At Stonelick Creek, the force main would be installed under the stream using horizontal directional drilling (HDD) trenchless methods. The length of the HDD would be approximately 200 linear feet and would require one launch site and one receiving site on either side of the stream. Except for the stream crossing, the force main installation would be open cut. From the stream crossing,

the force main would continue west along SR 131 and terminate at a manhole at the east end of an existing 10-inch sanitary sewer at the intersection of Victory Park Drive and SR 131.

Exhibit 2
Proposed Alignment to Lower East Fork Service Area



The proposed routing of the force main is approximately 30,900 feet. Based on a minimum C-900 DR14 PVC force main diameter of 6 inches (per Clermont County Specification 3310) and a minimum force main velocity at design pumping rates of 2 feet per second (per Ten States Standards), a larger flow than the peak daily flow (0.1 mgd, or 70 gpm) is required.

Based on desktop analysis and a review of available data from submersible pump manufacturers named in Clermont County's Specification 3300, a firm pumping station design flow rate of 400 gpm is used. This design flow rate results in a velocity of 4.5 fps, which is adequate to re-suspend most materials that may settle in the force main between pump cycles. Based on this firm pumping station capacity, the total discharge head (TDH) is approximately 520 feet. This discharge head is too high for a single submersible pumping station of the proposed flow capacity.

In order to convey the proposed flow over this distance, two booster pumping stations are needed along the route of the force main. A total of three pumping stations in series would reduce the required TDH by one-third to 173 feet, which is attainable by a submersible pumping station.

The booster pumping stations would be located along the force main to ensure the discharge head of each pumping station is approximately the same. Odor and corrosion control facilities would be required at each pumping station to mitigate odor and hydrogen sulfide-induced corrosion along the long force main route.

The pipeline alignment is assumed to follow existing utility easements where they exist. Construction along SR 131 is presumed to occur entirely within the County rights-of-way. A maintenance easement of approximately 15 feet would be required along the entire length of the route. Temporary construction easements would likely be required at, as yet, unknown locations along the pipe route.

3.1.1.2 Pumping Stations

The new pumping stations are proposed to be submersible pumping stations constructed on property owned by Newtonsville or on property owned or acquired (purchase or permanent easement) by Clermont County. This type of pumping station is presently used by the County and requires no above ground construction except for a concrete slab, pump retrieval equipment, electrical panel, pump control equipment, and standby generator, all of which would be contained inside a fenced enclosure.

As described previously, the pumping stations would be designed for a firm capacity of 400 gpm. The proposed pumping stations would consist of two fully-redundant, 400 gpm, 60 hp pumps, such that only one pump is required to operate to achieve the station's design flow rate, which complies with Ten State Standards. Each pump would be equipped with a variable frequency drive to control the rate and cost of pumping. The design capacity of the wet well would be sufficient to prevent excessive pump cycling.

Each pumping station would require 480-volt electrical service. Emergency power would be provided to the pumping stations from standby generators, unless a second, independent 480-volt service can be brought to each pumping station.

3.1.1.3 Lower East Fork Collection System Impact Summary

This alternative conveys additional flow into the LEF service area, which impacts the existing system. The 2011 Wastewater Master Plan Update identified the Longfield Pump Station as being under capacity for existing 2010 flows. The sewers tributary to the LPS were identified as adequate to convey the projected flows through 2030; however, the addition of 0.1 mgd of flow from Newtonsville, delivered intermittently at a 400 gpm rate, will require sewer replacement between the discharge manhole at the intersection of Victory Park Drive and SR 131 and the LPS. The required upgrades to these sewers would include replacement of approximately 572 feet of 10-inch pipe with 12-inch pipe and approximately 4,254 feet of 10-inch with 15-inch pipe.

3.1.2 Preliminary Cost Estimate

The following key assumptions were made in the development of the preliminary cost estimate:

- The force main would consist of a 6-inch C-900 DR14 PVC pipe, approximately 30,900 linear feet long.
- The force main would be routed in the existing rights-of-way and would terminate at a manhole at the intersection of Victory Park Dr. and SR 131.
- The average force main depth would be 6 feet.
- The force main would have 40 manholes and five air release/vacuum relief valves.
- The force main would cross under Stonelick Creek and would be installed via horizontal directional drilling.
- The pumping stations would be submersible pumping stations with estimated depths of 15 feet.
- Odor and corrosion control facilities would be provided at each pumping station.
- The LPS would be upgraded to accommodate the additional flows and the projected 2030 flows as identified in the 2011 Wastewater Master Plan Update.
- The sewers tributary to the LPS from the discharge manhole at Victory Park Dr. and SR 131 would be upgraded, including replacement of 17 sanitary manholes. The total length of replaced sewer would be approximately 4,826 linear feet.

Based on the above assumptions, **Table 1** summarizes the preliminary cost estimate for the non-degradation alternative of pumping wastewater from Newtonsville to the LEF service area.

Table 1 Pumping Station/Force Main To Lower East Fork Service Area Preliminary Construction Cost Estimate [1]	
Item/Description	**Preliminary Cost Estimate**
New Pumping Stations and Force Mains	
(1) Stream Crossing	$273,000
(3) Pumping Stations	$2,559,000
Force Mains	$2,513,000
New Pumping Stations and Force Mains Subtotal	$5,345,000
Upgrade to Existing Longfield Pumping Station	$1,063,000
Upgrade to Existing LEF Collection System	$1,651,000
Total Estimated Construction Cost	**$8,059,000**

Note:

1. All estimates are in December 2013 US dollars. Current Cincinnati ENR Construction Cost Index used value of 8547. The cost estimates are considered a Class 4 – Planning Level estimate as defined by the Association for the Advancement of Cost Engineering International (AACE) 17r-97 and as designated in American Society for Testing and Materials (ASTM) E 2516-06. It is considered accurate to +50% to -30% based up to a 15% complete project definition.

3.2 Middle East Fork Conveyance

As with the previous LEF evaluation, the location where the Newtonsville flows would discharge to the MEF service area was determined by proximity to the Village as well as probable routing of the force main. The proposed location where the Newtonsville flow would discharge to the MEF system is shown spatially in **Exhibit 3**.

The closest point to discharge flows from Newtonsville to the MEF sewer system is in Owensville. Two options were considered. Option 1 would discharge the flow on the east side of Owensville along US 50. Option 2 would discharge the flow in the northern part of Owensville along Belfast-Owensville Road. The baseline model run for the MEF system showed that the Owensville Pump Station (OPS) has adequate capacity to convey the existing tributary flows. Additionally, the sewers downstream of the OPS were able to convey existing flows to the MEF WWTP without surcharge.

Each option was then analyzed with the addition of 400 gpm to the modeled subcatchment from each direction (separate model runs). The additional flow from Newtonsville did not cause any capacity problems in the modeled sewers in Owensville or at the OPS.

The sewers that were not included in the baseline model were evaluated for each option and were determined to require some sewer replacement to eliminate surcharging associated with the conveyance of the Newtonsville flow.

The future model of the MEF system with flows projected for the year 2030 was also used to evaluate the Newtonsville flow addition. The baseline run of the 2030 model showed capacity problems at the OPS and force main as well as at some sections of sewer downstream of Owensville. However, as noted previously, because the additional flow from Newtonsville did not cause any capacity issues at the OPS and force main according to the models, no upgrades to the OPS and force main are recommended at this time.

3.2.1 Description of Work

This alternative would consist of the following work assuming installation of a collection system within the Newtonsville service area:

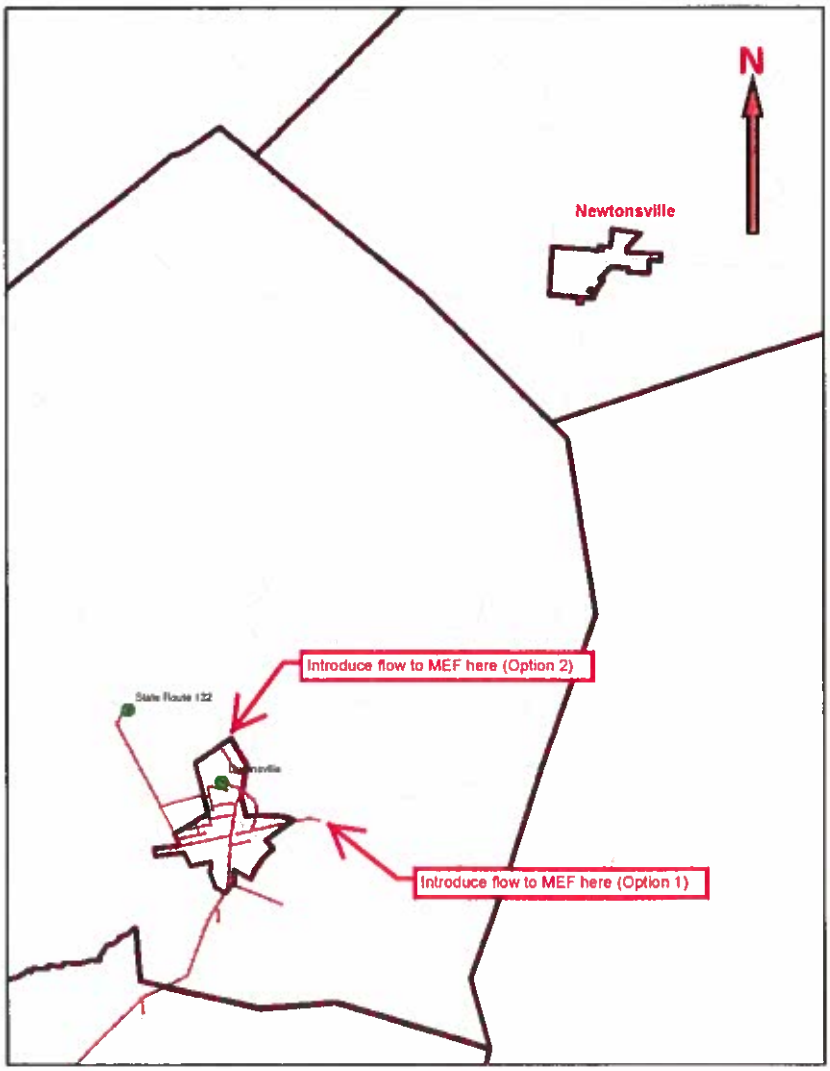
- Construction of a pumping station within the Newtonsville service area and construction of booster pumping stations along the route of conveyance;
- Installation of a force main a distance of approximately five miles to convey Newtonsville wastewater to the MEF service area;
- Upgrades to the un-modeled sewers between the Newtonsville force main discharge manhole and the OPS.

3.2.1.1 Wastewater Conveyance

As part of this alternative, a single force main system was initially assumed. Two alternative routes were considered and are described below.

3.2.1.1.1 Route Option 1 assumes that the force main terminates at a discharge manhole on the east side of Owensville along US 50. The route of the proposed force main is illustrated in **Exhibit 4**. The force main would extend southwest along SR 131, turn south along Newtonsville Road (which turns into Newtonsville-Hutchinson Road), then turn west onto US 50, and terminate at a manhole at the east end of an existing 8-inch sanitary sewer approximately 500 ft east of the intersection of Brushy Fork Road and US 50.

Exhibit 3
Proposed Tie-in Location Within the Middle East Fork Service Area



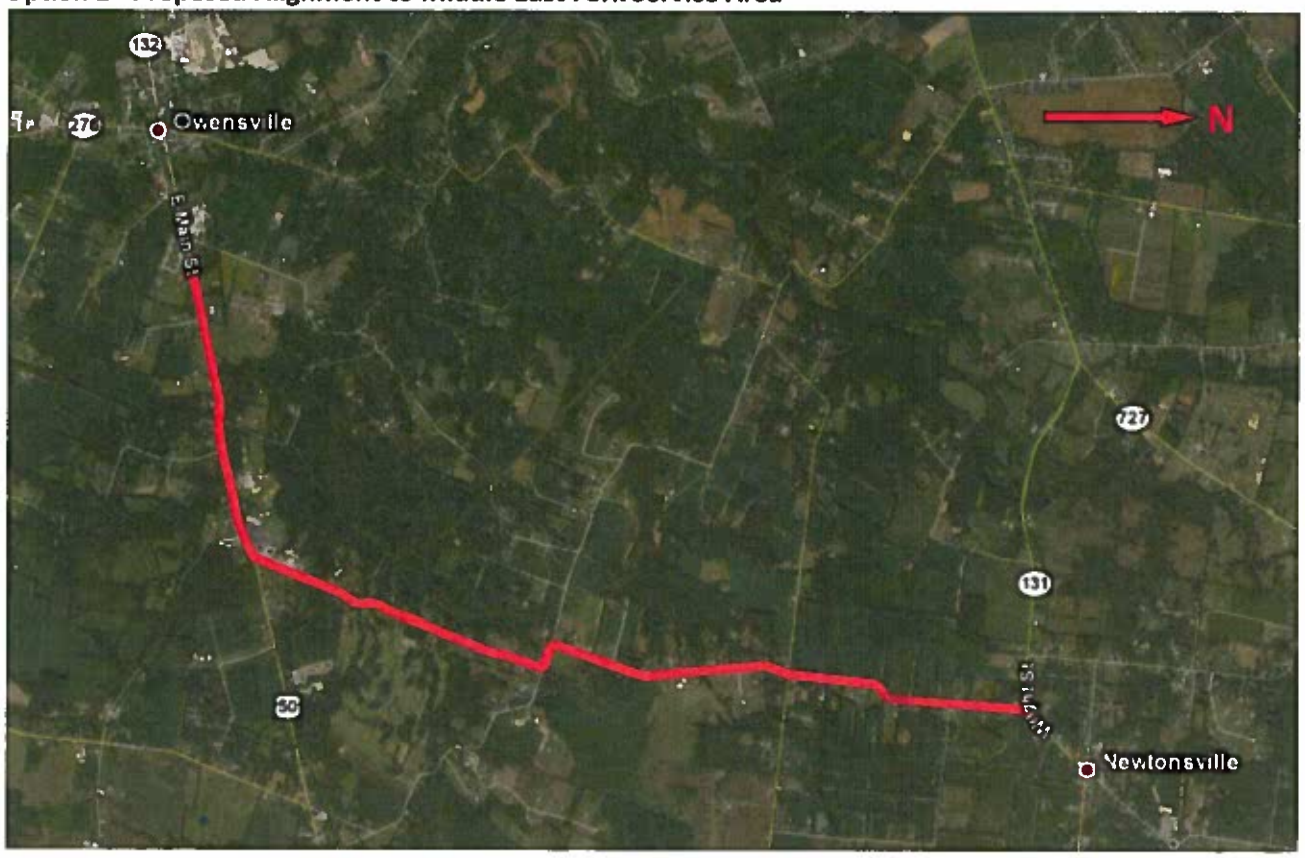
Two stream crossings are assumed necessary: one crossing at 1.53 miles and the second crossing at 4 miles from Newtonsville, respectively. The stream crossings would be installed under the stream using HDD trenchless methods. The length of each HDD would be approximately 100 linear feet and require a launch site and receiving site on either side of the stream. Except for these stream crossings, the force main would be open cut.

The proposed Option 1 routing of the force main is approximately 26,200 feet. As with the previous LEF analysis and using a minimum C-900 DR14 PVC force main diameter of 6 inches (per Clermont County Specification 3310) and a minimum force main velocity at design pumping rates of 2 feet per second (per Ten States Standards), a larger flow than the peak daily flow (0.1 mgd, or 70 gpm) is required.

Based on desktop analysis and a review of data available from the submersible pump manufacturers named in Clermont County's Specification 3300, a firm pumping station design flow rate of 400 gpm is used. This design flow rate results in a velocity of 4.5 fps where the force main is flowing full. The analysis also shows that (because of the likely changes in force main elevation as it generally follows the elevation profile of the route) significant portions of the force main would drain in between pumping cycles. The result is that any pumps designed and

selected would run out too far on their curves and the pipe would not likely be able to flow full at any time because the active volume of the wet well would not be large enough to fill the entire volume of the force main. For these reasons, Option 1 would be a combination of force mains and gravity sewers.

Exhibit 4
Option 1 - Proposed Alignment to Middle East Fork Service Area



Using the force main design criteria listed in the previous paragraph, Option 1 is proposed to have a total of three pumping stations (Newtonsville PS and two booster PS). The pumping station horsepower, location, force main length and the length of gravity sewer downstream of the force mains are summarized in **Table 2**. Odor and corrosion control facilities would be required at each pumping station to mitigate odor and hydrogen sulfide-induced corrosion along the pipe route.

Table 2
Pumping Station/Force Main
To Middle East Fork Basin – Route Option 1
Pumping Stations, Force Mains, and Gravity Sewer Information

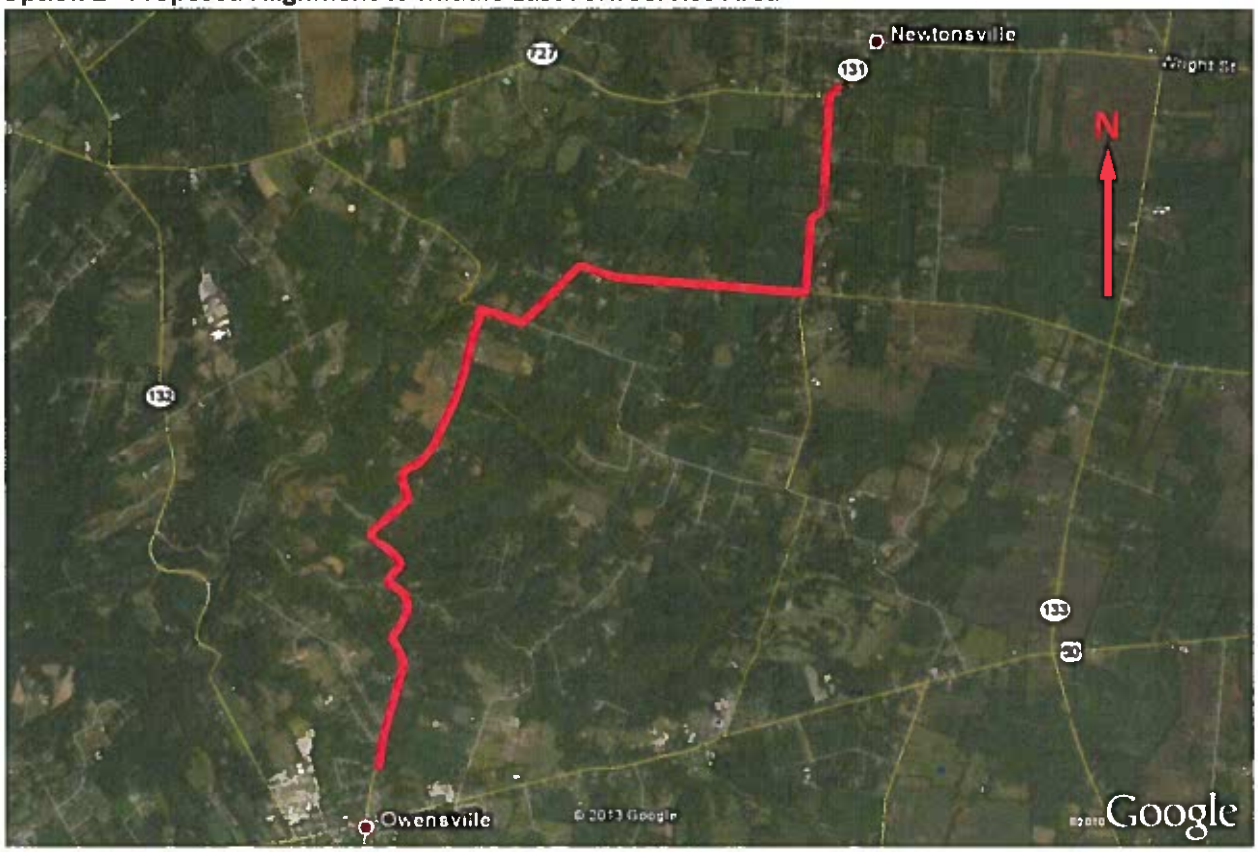
Pumping Station	Approx. Location	Approx. Force Main Length (ft)	Approx. Gravity Sewer Length
Newtonsville PS – Two pumps @ 30 hp each	0+00	8,800	6,300
Booster PS No. 1 – Two pumps @ 25 hp each	150+00	3,300	4,100
Booster PS No. 2 – Two pumps @ 15 hp each	225+00	3,650	— [1]

Notes:
1. Force main terminates at manhole at end of Option 1 route.

The pipeline alignment would follow existing utility easements where they exist. Construction is presumed to occur entirely within the County rights-of-way. A maintenance easement of approximately 15 feet would be required along the entire length of the route. Temporary construction easements would likely be required at, as yet, unknown locations along the pipe route.

3.1.1.1.2 Route Option 2 assumes that the force main terminates at a discharge manhole on the north side of Owensville along North Broadway Street. The route of the proposed force main is illustrated in **Exhibit 5**. The force main would run southwest along SR 131 from Newtonsville, turn south along Newtonsville Road, turn west at Weaver Road, turn west at Bergen Road, turn south at Belfast-Owensville Road (which turns into North Broadway Street), and then terminate at a manhole at the intersection of Maplewood Drive and North Broadway Street. Two stream crossings are assumed necessary—one at 4.7 miles and the second at 4.9 miles from Newtonsville, respectively. The stream crossings would be installed underneath the stream using HDD trenchless methods. The length of each HDD would be approximately 150 linear feet and require a launch site and receiving site on either side of the stream. Except for these stream crossings, the force main would be open cut.

Exhibit 5
Option 2 - Proposed Alignment to Middle East Fork Service Area



The proposed routing of the force main for Option 2 is approximately 29,800 feet. Using a minimum C-900 DR14 PVC force main diameter of 6 inches (per Clermont County Specification 3310) and a minimum force main velocity at design pumping rates of 2 feet per second (per Ten States Standards), a larger flow than the peak daily flow (0.1 mgd, or 70 gpm) is required.

Based on desktop analysis and on a review of data available from the submersible pump manufacturers named in Clermont County's Specification 3300, a firm pumping station design flow rate of 400 gpm is used. This design flow rate results in a velocity of 4.5 fps where the force main is flowing full. The analyses also show that because of the likely changes in force main elevation as it generally follows the elevation profile of the route, significant portions of the force main would drain in between pumping cycles. The result is that any pumps designed and selected so that the entire pipe length is a force main would run out too far on their curves and the pipe would

not likely be able to flow full at any time because the active volume of the wet well would not be enough to fill the entire volume of the force main. For these reasons, Option 2 would be a combination of force mains and gravity sewers.

Using the force main design criteria listed in the previous paragraph, Option 2 is proposed to have a total of four pumping stations (Newtonsville PS and three booster PS). Because Option 2 has one more pumping station than Option 1, Option 2 is no longer considered an economically feasible option.

3.2.1.2 Pumping Stations

The new pumping stations are proposed to be submersible pumping stations constructed on property owned by Newtonsville or on property owned or acquired (purchase or permanent easement) by Clermont County. This type of pumping station is presently used by the County and requires no above ground construction except for a concrete slab, pump retrieval equipment, electrical panel, pump control equipment, and standby generator.

As described previously, the pumping stations would be designed for a firm capacity of 400 gpm. The proposed pumping stations would consist of two fully-redundant, 400 gpm pumps, such that only one pump is required to operate to achieve the station's design flow rate, which complies with Ten State Standards. The horsepower of each pump is listed in **Table 2** above. Each pump would be equipped with variable frequency drives to control the rate and cost of pumping. The design capacity of the wet well would be sufficient to prevent excessive pump cycling.

Each pumping station will require 480-volt electrical service. Emergency power would be provided to each pumping station from a standby generator, unless a second, independent 480-volt service can be brought to each pumping station, all of which would be installed inside a fenced enclosure.

3.2.1.3 Middle East Fork Collection System Impact Summary

This alternative conveys additional flows into the MEF service area, which impacts the existing system. The 2011 Wastewater Master Plan Update identified the OPS as having adequate capacity for the year 2010 flows, but the pumping station, force main, and some sections of sewer downstream of Owensville had capacity issues at the projected year 2030 flows. With the addition of 0.1 mgd of flow from Newtonsville, delivered intermittently at a rate of 400 gpm, the OPS and force main are adequate for the additional flow, but the sewers between the discharge manhole adjacent to the intersection of Brushy Fork Road and US 50 will need to be upgraded. These upgrades would include the replacement of approximately 2,535 feet of 8-inch pipe with 10-inch pipe.

3.2.2 Preliminary Cost Estimate

The following key assumptions were made in the development of the preliminary cost estimate:

- The force main portions of the pipeline would consist of a single 6-inch C-900 DR14 PVC pipe. The total length of the force main segments is approximately 15,750 linear feet.
- The gravity sewer portions of the pipeline would consist of a single 10-inch PVC pipe, in compliance with Clermont County Specification 3110, including 31 sanitary manholes. The total length of the gravity sewer segments is approximately 10,400 linear feet.
- The average force main depth would be 6 feet.
- The force mains would have 21 manholes, and five air release/vacuum relief valves.
- The stream crossings would be installed via horizontal directional drilling.
- The pumping stations would be submersible pumping stations with estimated depths of 15 feet.
- Odor and corrosion control facilities would be provided at each pumping station.
- The sewers tributary to the OPS from the discharge manhole at Brushy Fork Road and US 50 would be upgraded, including replacement of eight sanitary manholes. The total length of replaced sewer would be approximately 2,535 linear feet.

Based on the above assumptions, **Table 3** summarizes the preliminary cost estimate for the alternative to pump from Newtonsville to the MEF service area.

Table 3 Pumping Station/Force Main To Middle East Fork Service Area Preliminary Construction Cost Estimate [1]	
Item/Description	**Preliminary Cost Estimate**
New Pumping Stations, Force Mains, and Gravity Sewers	
(2) Stream Crossings	$272,000
(3) Pumping Stations	$2,559,000
Force Mains	$1,268,000
Gravity Sewers	$2,143,000
New Pumping Stations, Force Mains, and Gravity Sewers Subtotal	$6,242,000
Upgrade to Existing MEF Collection System	$781,000
Total Estimated Construction Cost	**$7,023,000**

Note:

1. All estimates are in December 2013 US dollars. Current Cincinnati ENR Construction Cost Index used value of 8547. The cost estimates are considered a Class 4 – Planning Level estimate as defined by the Association for the Advancement of Cost Engineering International (AACE) 17r-97 and as designated in American Society for Testing and Materials (ASTM) E 2516-06. It is considered accurate to +50% to -30% based up to a 15% complete project definition.

4.0 Conclusions

The evaluations demonstrate that the LEF and MEF service areas are able to accept the Newtonsville flow under existing service area conditions, but only after significant upgrades are made to the existing sewer systems.

Lower East Fork Conveyance - Approximately 4,826 feet of sewers tributary to the LPS would require replacement with 12-inch and 15-inch PVC sewer pipe, and the LPS would have to be upgraded. Pumping wastewater from Newtonsville to the LEF service area would require a new force main, a pumping station in the Netwonsville service area, and two booster pumping stations along the force main. The new force main would consist of approximately 30,900 linear feet of 6-inch C-900 DR14 PVC pipe. The three pumping stations would be submersible pumping stations, each rated at a firm capacity of 400 gpm. The total construction cost of the force mains, pumping stations, LPS upgrade and the sewer replacement tributary to the LPS is estimated to be $8,059,000.

Middle East Fork Conveyance - Approximately 2,535 feet of sewers tributary to the OPS would require replacement with 10-inch PVC sewer pipe. Pumping wastewater from Newtonsville to the MEF service area would require a new pipeline consisting of force main and gravity sewer segments, a pumping station in the Newtonsville service area, and two booster pumping stations. The force main segment would consist of approximately 15,750 linear feet of 6-inch C-900 DR14 PVC pipe and the gravity sewer segment would consist of approximately 10,450 linear feet of 10-inch PVC pipe. The three pumping stations would be submersible pumping stations, each rated at a firm capacity of 400 gpm. The total construction cost of the force mains and gravity sewers, pumping stations, and the replacement of sewers tributary to the OPS is estimated to be $7,023,000

5.0 Recommendations

Based upon the above analysis, the more feasible "no treatment option" is to pump Newtonsville wastewater to the Middle East Fork service area. This recommendation is based upon the use of Class 4 construction cost estimates and does not incorporate other factors, including but not limited to, site visits of the proposed pipe

alignments, property records search, topographic surveys, stakeholder input, *et. al.*, that may affect the conclusions and recommendations of this memo.

OFFICIAL MASTER TALLY

Summary

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road Average Score	Candidate Site 2 Wright Street Average Score	Candidate Site 3 State Route 131 Average Score
PROXIMITY TO WATER BODY		52.50	39.38	57.75
TOPOGRAPHY/FLOOD PROTECTION		31.50	35.00	24.50
VEGETATIVE BUFFER		40.50	47.25	46.13
PROPERTY ACQUISITION CAPABILITY		104.50	76.00	66.50
COMMUNITY IMPACT		61.63	50.75	68.88
CONSTRUCTION IMPACT		14.00	17.00	22.50
PROJECT COSTS		82.00	94.00	38.00
TOTAL SCORE		386.63	359.38	324.25
SITE RANK		1	2	3

1
Stakeholder: Don Wilson
Affiliation: Village of Newtonsville
Date: 3/19/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road GRADE	SCORE	Candidate Site 2 Wright Street GRADE	SCORE	Candidate Site 3 State Route 131 GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	A	65.63	C	39.38	C	39.38
TOPOGRAPHY/FLOOD PROTECTION	8.75	C	26.25	C	26.25	C	26.25
VEGETATIVE BUFFER	11.25	C	33.75	B	45.00	C	33.75
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	F	23.75	D	47.50
COMMUNITY IMPACT	18.13	C	54.38	D	36.25	D	36.25
CONSTRUCTION IMPACT	5.00	C	15.00	B	20.00	B	20.00
PROJECT COSTS	20.00	A	100.00	B	80.00	D	40.00
TOTAL SCORE			390.00		270.63		243.13
SITE RANK		1		2		3	

2
Stakeholder: Scott Kramer
Affiliation: Village of Newtonsville
Date: 3/19/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road GRADE	SCORE	Candidate Site 2 Wright Street GRADE	SCORE	Candidate Site 3 State Route 131 GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	A	65.63	C	39.38	C	39.38
TOPOGRAPHY/FLOOD PROTECTION	8.75	C	26.25	C	26.25	C	26.25
VEGETATIVE BUFFER	11.25	C	33.75	B	45.00	C	33.75
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	F	23.75	D	47.50
COMMUNITY IMPACT	18.13	C	54.38	D	36.25	D	36.25
CONSTRUCTION IMPACT	5.00	C	15.00	B	20.00	B	20.00
PROJECT COSTS	20.00	A	100.00	B	80.00	D	40.00
TOTAL SCORE			390.00		270.63		243.13
SITE RANK		1		2		3	

3
Stakeholder: Jason Ritter
Affiliation: Wayne Township
Date: 2/19/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road GRADE	SCORE	Candidate Site 2 Wright Street GRADE	SCORE	Candidate Site 3 State Route 131 GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	B	52.50	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	A	43.75	C	26.25
VEGETATIVE BUFFER	11.25	A	56.25	A	56.25	A	56.25
PROPERTY ACQUISITION CAPABILITY	23.75	A	118.75	C	71.25	C	71.25
COMMUNITY IMPACT	18.13	A	90.63	C	54.38	C	54.38
CONSTRUCTION IMPACT	5.00	D	10.00	C	15.00	A	25.00
PROJECT COSTS	20.00	C	60.00	A	100.00	D	40.00
TOTAL SCORE			423.13		393.13		338.75
SITE RANK		1		2		3	

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	B	52.50	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	A	43.75	C	26.25
VEGETATIVE BUFFER	11.25	A	56.25	A	56.25	A	56.25
PROPERTY ACQUISITION CAPABILITY	23.75	A	118.75	C	71.25	C	71.25
COMMUNITY IMPACT	18.13	A	90.63	C	54.38	C	54.38
CONSTRUCTION IMPACT	5.00	D	10.00	C	15.00	A	25.00
PROJECT COSTS	20.00	C	60.00	A	100.00	D	40.00
TOTAL SCORE			423.13		393.13		338.75
SITE RANK		1		2		3	

4
Stakeholder: Duplicate Scoring Ballot
Affiliation: Wayne Township
Date: 2/19/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	C	39.38	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	C	26.25	C	26.25	D	17.50
VEGETATIVE BUFFER	11.25	C	33.75	B	45.00	A	56.25
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	C	71.25	C	71.25
COMMUNITY IMPACT	18.13	B	72.50	B	72.50	A	90.63
CONSTRUCTION IMPACT	5.00	C	15.00	C	15.00	B	20.00
PROJECT COSTS	20.00	B	80.00	A	100.00	F	20.00
TOTAL SCORE			375.00		369.38		341.25
SITE RANK		1		2		3	

5
Stakeholder: Tom Eigel
Affiliation: Clermont County
Asst County Administrator
Date: 2/20/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	C	39.38	C	39.38	B	52.50
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	B	35.00	C	26.25
VEGETATIVE BUFFER	11.25	B	45.00	B	45.00	C	33.75
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	A	118.75	C	71.25
COMMUNITY IMPACT	18.13	C	54.38	C	54.38	B	72.50
CONSTRUCTION IMPACT	5.00	C	15.00	C	15.00	B	20.00
PROJECT COSTS	20.00	A	100.00	A	100.00	D	40.00
TOTAL SCORE			383.75		407.50		316.25
SITE RANK		2		1		3	

6
Stakeholder: Lyle Bloom
Affiliation: Clermont County WRD
Director Utilities
Date: 2/19/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	C	39.38	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	A	43.75	C	26.25
VEGETATIVE BUFFER	11.25	C	33.75	A	56.25	C	33.75
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	C	71.25	C	71.25
COMMUNITY IMPACT	18.13	C	54.38	C	54.38	A	90.63
CONSTRUCTION IMPACT	5.00	C	15.00	C	15.00	A	25.00
PROJECT COSTS	20.00	A	100.00	B	80.00	C	60.00
TOTAL SCORE			385.63		360.00		372.50
SITE RANK		1		3		2	

7
Stakeholder: Chris Rowland
Affiliation: Clermont County WRD
Asst Sanitary Enginer
Date: 2/20/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	C	39.38	D	26.25	B	52.50
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	B	35.00	B	35.00
VEGETATIVE BUFFER	11.25	C	33.75	C	33.75	A	56.25
PROPERTY ACQUISITION CAPABILITY	23.75	B	95.00	A	118.75	C	71.25
COMMUNITY IMPACT	18.13	C	54.38	D	36.25	B	72.50
CONSTRUCTION IMPACT	5.00	B	20.00	C	15.00	A	25.00
PROJECT COSTS	20.00	B	80.00	A	100.00	D	40.00
TOTAL SCORE			357.50		365.00		352.50
SITE RANK		2		1		3	

8
Stakeholder: Paul Braasch
Affiliation: Clermont County OEQ Director
Date: 2/24/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	D	26.25	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	C	26.25	B	35.00	D	17.50
VEGETATIVE BUFFER	11.25	C	33.75	B	45.00	A	56.25
PROPERTY ACQUISITION CAPABILITY	23.75	A	118.75	B	95.00	C	71.25
COMMUNITY IMPACT	18.13	D	36.25	C	54.38	A	90.63
CONSTRUCTION IMPACT	5.00	D	10.00	B	20.00	A	25.00
PROJECT COSTS	20.00	C	60.00	A	100.00	F	20.00
TOTAL SCORE			337.50		375.63		346.25
SITE RANK		3		1		2	

9
Stakeholder: Jim Gagnon
Affiliation: CH2MHILL
Date: 2/20/2014

SITE EVALUATION CRITERIA	Weight Factor	Candidate Site 1 Cedarville Road		Candidate Site 2 Wright Street		Candidate Site 3 State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY	13.13	B	52.50	C	39.38	A	65.63
TOPOGRAPHY/FLOOD PROTECTION	8.75	B	35.00	B	35.00	D	17.50
VEGETATIVE BUFFER	11.25	B	45.00	B	45.00	B	45.00
PROPERTY ACQUISITION CAPABILITY	23.75	A	118.75	B	95.00	C	71.25
COMMUNITY IMPACT	18.13	C	54.38	C	54.38	A	90.63
CONSTRUCTION IMPACT	5.00	C	15.00	B	20.00	B	20.00
PROJECT COSTS	20.00	B	80.00	A	100.00	D	40.00
TOTAL SCORE			400.63		388.75		350.00
SITE RANK		1		2		3	

10
Stakeholder: Alan Smith
Affiliation: CH2MHILL
Date: 2/18/2014

OFFICIAL MASTER TALLY

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	13.13
TOPOGRAPHY/FLOOD PROTECTION	8.75
VEGETATIVE BUFFER	11.25
PROPERTY ACQUISITION CAPABILITY	23.75
COMMUNITY IMPACT	18.13
CONSTRUCTION IMPACT	5.00
PROJECT COSTS	20.00
SUM	100.00

Summary

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	20
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	10
PROPERTY ACQUISITION CAPABILITY	20
COMMUNITY IMPACT	20
CONSTRUCTION IMPACT	0
PROJECT COSTS	20
SUM	100

1

Stakeholder Name: Don Wilson

Affiliation: Village of Newtonsville

Date: 3/19/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	20
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	10
PROPERTY ACQUISITION CAPABILITY	20
COMMUNITY IMPACT	20
CONSTRUCTION IMPACT	0
PROJECT COSTS	20
SUM	100

2

Stakeholder Name: Scott Kramer

Affiliation: Village of Newtonsville

Date: 3/19/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	5
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	10
PROPERTY ACQUISITION CAPABILITY	30
COMMUNITY IMPACT	25
CONSTRUCTION IMPACT	5
PROJECT COSTS	15
SUM	100

3
Stakeholder Name: Jason Ritter
Affiliation: Wayne Township
Date: 2/19/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	5
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	10
PROPERTY ACQUISITION CAPABILITY	30
COMMUNITY IMPACT	25
CONSTRUCTION IMPACT	5
PROJECT COSTS	15
SUM	100

4
Stakeholder Name: Duplicate Scoring Ballot
Affiliation: Wayne Township
Date: 2/19/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	20
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	5
PROPERTY ACQUISITION CAPABILITY	20
COMMUNITY IMPACT	15
CONSTRUCTION IMPACT	10
PROJECT COSTS	20
SUM	100

5
Stakeholder Name: Tom Eigel
Affiliation: Clermont County
Asst County Administrator
Date: 2/20/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	15
TOPOGRAPHY/FLOOD PROTECTION	5
VEGETATIVE BUFFER	15
PROPERTY ACQUISITION CAPABILITY	20
COMMUNITY IMPACT	20
CONSTRUCTION IMPACT	5
PROJECT COSTS	20
SUM	100

6

Stakeholder Name: Lyle Bloom

Affiliation: Clermont County WRD Director Utilities

Date: 2/19/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	10
TOPOGRAPHY/FLOOD PROTECTION	10
VEGETATIVE BUFFER	10
PROPERTY ACQUISITION CAPABILITY	20
COMMUNITY IMPACT	10
CONSTRUCTION IMPACT	10
PROJECT COSTS	30
SUM	100

7

Stakeholder Name: Chris Rowland

Affiliation: Clermont County WRD Asst Sanitary Enginer

Date: 2/20/2014

SITE EVALUATION CRITERIA	WEIGHTING FACTOR
PROXIMITY TO WATER BODY	10
TOPOGRAPHY/FLOOD PROTECTION	5
VEGETATIVE BUFFER	20
PROPERTY ACQUISITION CAPABILITY	30
COMMUNITY IMPACT	10
CONSTRUCTION IMPACT	5
PROJECT COSTS	20
SUM	100

8

Stakeholder Name: Paul Braasch

Affiliation: Clermont County OEQ Director

Date: 2/24/2014

CLERMONT COUNTY WATER RESOURCES DEPARTMENT
NEWTONSVILLE SITE EVALUATION AND SELECTION
WEIGHTING FACTOR DETERMINATION BALLOT

SITE EVALUATION CRITERIA	WEIGHTING FACTOR SCORE
PROXIMITY TO WATER BODY	
TOPOGRAPHY/FLOOD PROTECTION	
VEGETATIVE BUFFER	
PROPERTY ACQUISITION CAPABILITY	
COMMUNITY IMPACT	
CONSTRUCTION IMPACT	
PROJECT COSTS	
SUM (must equal 100)	

PLEASE READ:

The weighting factor for each of the site evaluation criteria will be determined using the average of the results from all valid responses.

Weighting factor scoring shall consist of assigning a numerical value to each of the criteria ranging from 0 to 30 in multiples of 5.

To be considered valid, the sum of the weight factors shall be equal to 100 and no weight factor shall be assigned a value greater than 30.

Non-conforming or non-responsive evaluations shall be disregarded in the computation of averaging.

Stakeholder Name

Print _____

Signature _____

Representating: _____

Date: _____

CLERMONT COUNTY WATER RESOURCES DEPARTMENT
NEWTONSVILLE SITE EVALUATION AND SELECTION
GRADING BALLOT - SITE EVALUATION CRITERIA

SITE EVALUATION CRITERIA	WEIGHTING FACTOR	SITE 1-Cedarville Road		SITE 2-Wright Street		SITE 3-State Route 131	
		GRADE	SCORE	GRADE	SCORE	GRADE	SCORE
PROXIMITY TO WATER BODY							
TOPOGRAPHY/FLOOD PROTECTION							
VEGETATIVE BUFFER							
PROPERTY ACQUISITION CAPABILITY							
COMMUNITY IMPACT							
CONSTRUCTION IMPACT							
PROJECT COSTS							
TOTAL SCORE							

PLEASE READ:

The grading procedure consists of assigning a letter grade (A, B, C, D or F) to each of the criteria for each site.

Before assigning any grades, read and understand what each of the site evaluation criteria represents in the attached.

Please refer to the location of each proposed treatment site shown on the attached map.

Grades are to be judged as follows:

A = Excellent (5 points)
B = Good (4 points)
C = Average (3 points)
D = Below Average (2 points)
F = Poor (1 point)

The grades will be used to calculate a score for each of the site evaluation criteria as follows: Score = Weighting Factor x Grade

The individual scores for each proposed treatment site submitted by each stakeholder will be determined by the County's consultant.

The individual scores will be used to rank each proposed treatment site based on the highest score.

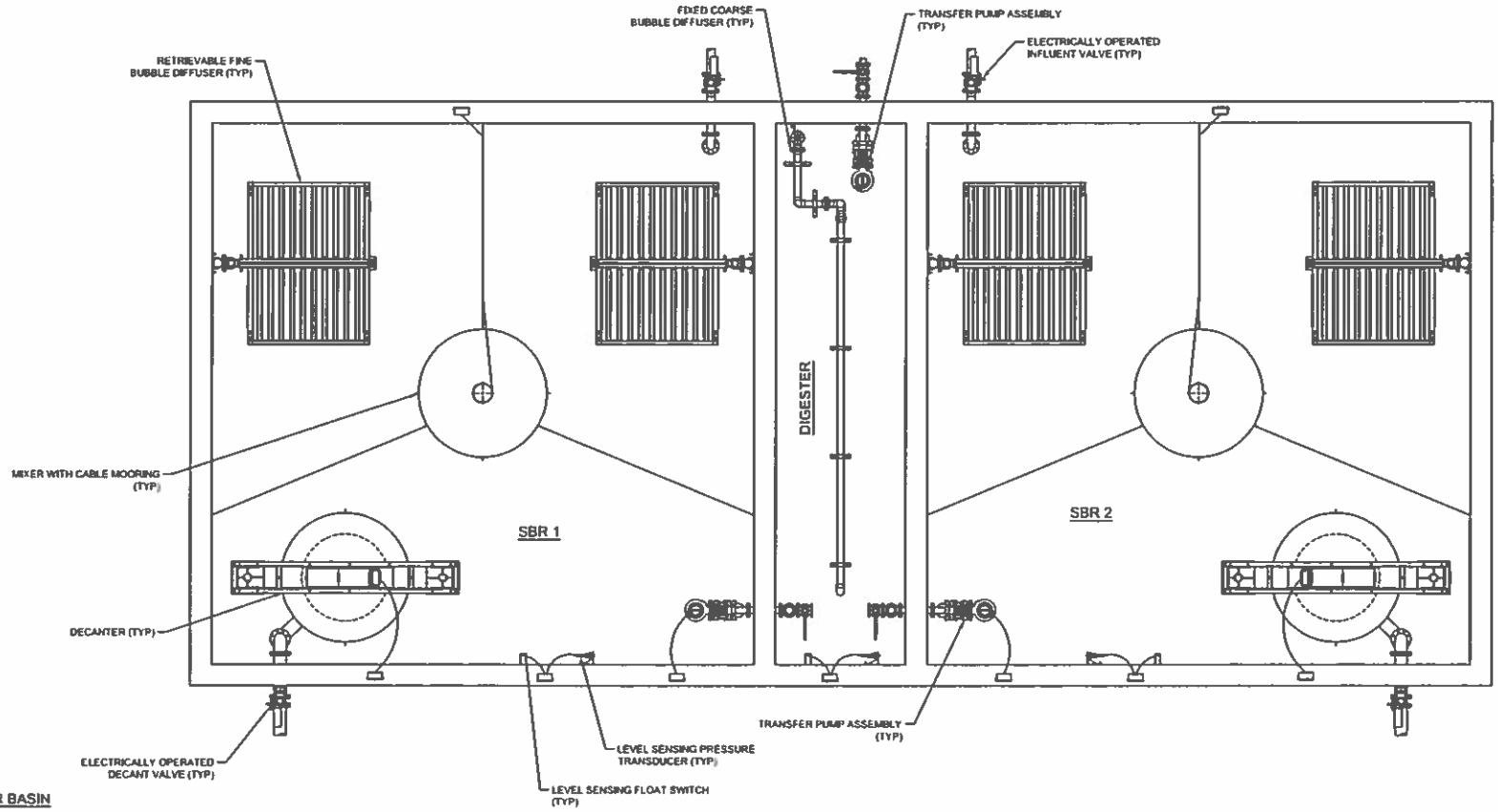
Stakeholder Name:

Print _____

Signature _____

Representating: _____

Date: _____



SBR BASIN

25.0' X 25.0'
13.8' BASIN DEPTH
11.8' MAXIMUM WATER DEPTH
9.0' MINIMUM WATER DEPTH

DIGESTER BASIN

8.0' X 25.0'
13.8' BASIN DEPTH
11.8' MAXIMUM WATER DEPTH
8.3' MINIMUM WATER DEPTH

NOTE: ALL VALVE VAULTS, DISCONNECT BOXES, INFLUENT PIPING, EFFLUENT PIPING, SLUDGE / TRANSFER PIPING, AND WALKWAYS ARE SHOWN FOR REFERENCE ONLY AND ARE TO BE SUPPLIED AND INSTALLED BY OTHERS.
NOTE: BASIN OVERFLOWS MUST BE PROVIDED.
NOTE: INFLUENT VALVE ISOLATION OR BY-PASS MUST BE PROVIDED BY THE INSTALLING CONTRACTOR.
NOTE: VENTING OF DECANT LINE MAY BE REQUIRED DEPENDING ON DOWN STREAM CONDITIONS.

GROUTING:
NOTE:IF BASINS WITH SLOPED FLOORS EXCEEDING 1/2" ARE UTILIZED, SUPPLY OF MINIMUM 4000 PSI TYPE GROUT PADS BENEATH THE PROPOSED EQUIPMENT SUCH AS: BASE PLATES, BRACKETS, MOORING POSTS, ETC. WILL BE REQUIRED TO PROVIDE FOR A LEVEL INSTALLATION FOR THE EQUIPMENT. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR / PURCHASER TO PROVIDED THE GROUT SYSTEM FOR THIS EQUIPMENT.

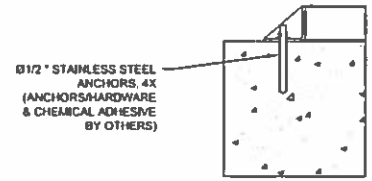
DIFFUSED AIR SYSTEM:
NOTE: DEPENDING ON THE ACTUAL YARD PIPING FROM THE BLOWERS TO THE DIFFUSER SYSTEM AND THE HEAT LOSSES ASSOCIATED WITH THE YARD PIPING, ADDITIONAL PROVISIONS FOR COOLING OF THE AIR (I.E. INCORPORATING HEAT EXCHANGERS) AND/OR MODIFICATION OF IN-BASIN PIPING AND/OR DIFFUSER SLEEVE MATERIAL MAY BE REQUIRED. AQUA-AEROBIC SYSTEMS, INC. RESERVES THE RIGHT TO MODIFY THE FOLLOWING EQUIPMENT OFFERING TO ENSURE COMPATIBILITY OF ALL IN-BASIN COMPONENTS WITH ACTUAL AIR TEMPERATURES.

RETRIEVABLE FINE BUBBLE DIFFUSER:
NOTE: BLOWER DISCHARGE MANIFOLD AND PIPING LOSSES ARE ASSUMED AT 0.50 psi. FROM TERMINATION FLANGE OF THE BLOWER TO THE DIFFUSER ISOLATION VALVE. ENGINEER TO VERIFY ACTUAL LINE LOSSES DO NOT EXCEED THE ABOVE. INLET LOSSES ARE ASSUMED AT 0.25 PSI FOR INLET SILENCER AND A CLEAN FILTER. NO INLET LOSSES HAVE BEEN ASSUMED FOR INLET FILTER PIPING, AND IT IS ASSUMED THAT THE FILTER IS LOCATED ON EACH BLOWER.

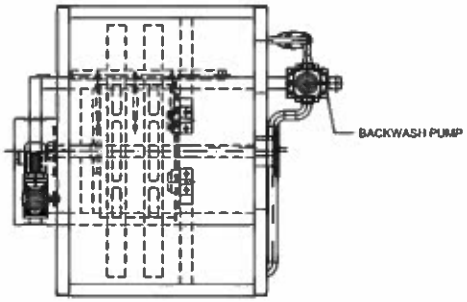
FIXED COARSE BUBBLE DIFFUSER:
NOTE: BLOWER DISCHARGE MANIFOLD AND PIPING LOSSES ARE ASSUMED AT 0.30 psi. FROM TERMINATION FLANGE OF THE BLOWER TO THE DIFFUSER RISER PIPE TERMINATION FLANGE. ENGINEER TO VERIFY ACTUAL LINE LOSSES DO NOT EXCEED THE ABOVE. INLET LOSSES ARE ASSUMED AT 0.25 PSI FOR INLET SILENCER AND A CLEAN FILTER. NO INLET LOSSES HAVE BEEN ASSUMED FOR INLET FILTER PIPING. AND IT IS ASSUMED THAT THE FILTER IS LOCATED ON EACH BLOWER.

JOB NAME: NEWTONSVILLE WWTP	AQUA-AEROBIC SYSTEMS, INC.
JOB LOCATION: OH	
DO NOT SCALE DRAWING	
DRAWN BY: AMG	DATE: 2014-02-24
SBR PLAN VIEW	81131493001
SCALE	REV D

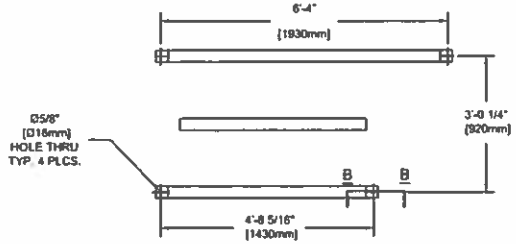
1. MATCH DRILL ANCHORS AFTER FINAL PLACEMENT OF UNIT IS DETERMINED
2. ANCHOR SIZE, EMBEDMENT, AND FASTENING METHOD MAY REQUIRE MODIFICATION DEPENDING ON SEISMIC REQUIREMENTS.
3. FOLLOW ANCHOR MANUFACTURERS GUIDELINES FOR SPECIFIC INSTALLATION REQUIREMENTS INCLUDING ANCHOR EMBEDMENT AND EDGE DISTANCE. UNLESS OTHERWISE SPECIFIED BY ENGINEERING CONTRACT DRAWINGS, ALL ANCHOR BOLTS SHOWN SHALL UTILIZE EPCON C6 (ITW RAMSET/REDHEAD) EPOXY ADHESIVE ANCHORING SYSTEM ICC ER-4285.
4. ALL ANCHORS AND FASTENERS TO BE STAINLESSSTEEL. APPLY ANTI-SEIZE TO ALL CONNECTIONS.



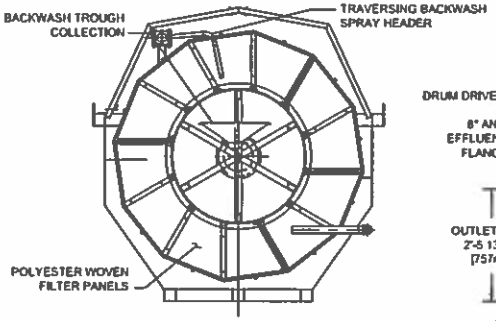
SECTION B-B
ANCHOR DETAIL
NTS



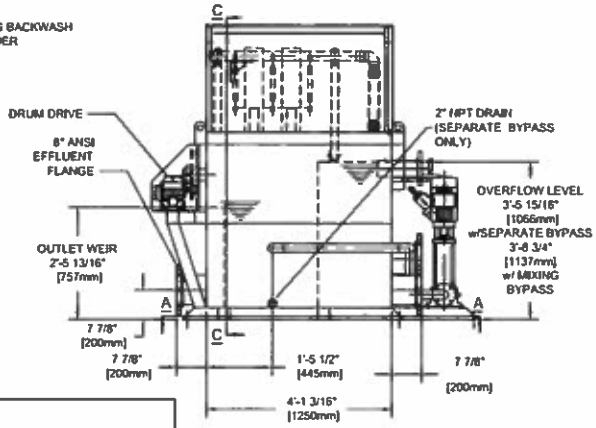
PLAN VIEW



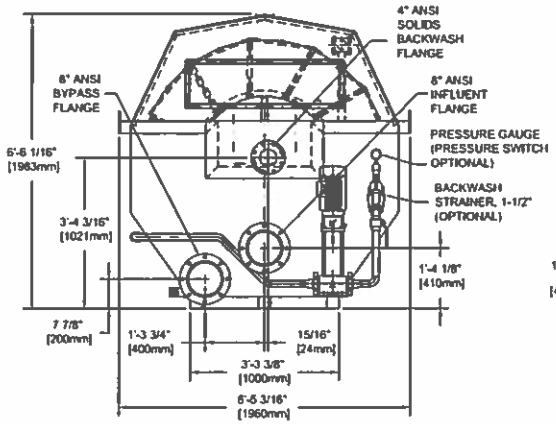
SECTION A-A



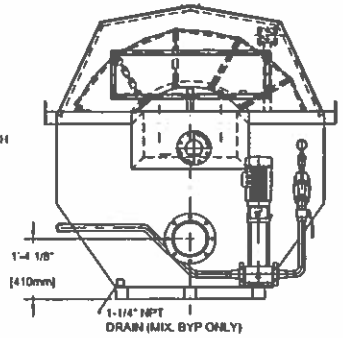
SECTION C-C



SIDE ELEVATION
(2 DISC MODEL SHOWN)



INFLUENT ELEVATION
OPTIONAL EXTERNAL BYPASS



INFLUENT ELEVATION
STANDARD MIXING BYPASS

NOTES:
1. QUANTITY OF FILTER DISKS: MODEL 1702 = 2 (24 FILTER PANELS)
   MODEL 1702/1=1 (12 FILTER PANELS)
2. UNIT WEIGHT (DRY) = 2,090 LBS (950 KG) APPROX.
3. UNIT WEIGHT(OPERATIONAL) = 6,160 LBS (2,800 KG) APPROX.
4. BACKWASH PUMP: MODEL 1702 = GRUNDFOS CR3-10, 2 HP, 480V/3PH/60HZ
   MODEL 1702/1= GRUNDFOS CR1-10, 1 HP, 480V/3PH/60HZ
5. DRIVE MOTOR: SEW EURODRIVE, 480V/3PH/60HZ, 0.75 HP
6. INLET, OUTLET & BYPASS CONNECTIONS: SLIP ON PLATE FLANGE, BOLT PATTERN MATCHES 8" ANSI B16.5. (OTHER SIZES AVAILABLE)
   FLANGE MATERIAL = GALVANIZED
   FLANGE STUB END MATERIAL = AISI 304
7. BACKWASH FLANGE CONNECTION: SLIP ON PLATE FLANGE, BOLT PATTERN MATCHES 4" ANSI B16.5
   FLANGE MATERIAL = GALVANIZED
   FLANGE STUB END MATERIAL = AISI 304
8. DRUM, WALLS & FRAME MATERIAL= AISI 304 (AISI 316-OPTIONAL)
9. COVER MATERIAL: ALUMINUM COVERS w/AISI 304 FRAME (AISI 316 COVERS/FRAME-OPTIONAL)
10. DIMENSIONS IN [ ] ARE MILLIMETERS
11. WORK PLATFORM GRATING AND SUPPORT NOT ATTACHED TO FILTERS AND DESIGNED/PROVIDED BY OTHERS. DO NOT SUPPORT PLATFORMS OR OTHER LOAD BEARING MEMBERS FROM THE DISCFILTER.
12. RECOMMEND 24" MINIMUM MAINTENANCE ACCESS AROUND ENTIRE PERIMETER OF DISCFILTER.

PRELIMINARY
(NOT FOR CONSTRUCTION)

REV	DESCRIPTION	DRAWN	APPR	DATE
0	RELEASED	CDP	.	10.30.09

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KRÜGER

STANDARD

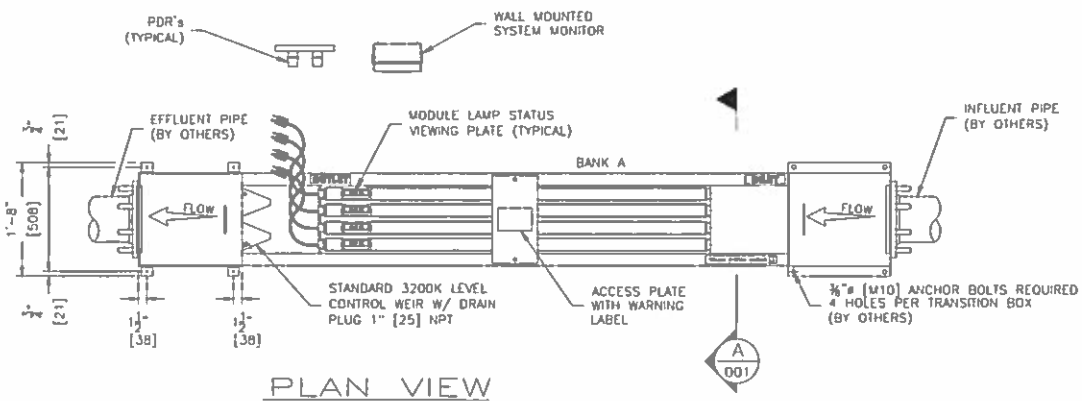
DISCFILTER
MODEL 1702-1F
UNIT DETAILS

DRAWN	CHECKED	SCALE	DRAWING NO	SHEET	REV
CDP		1 : 32	1702-1F-STD	1 of 1	0

TROJAN UV3000™ PTP

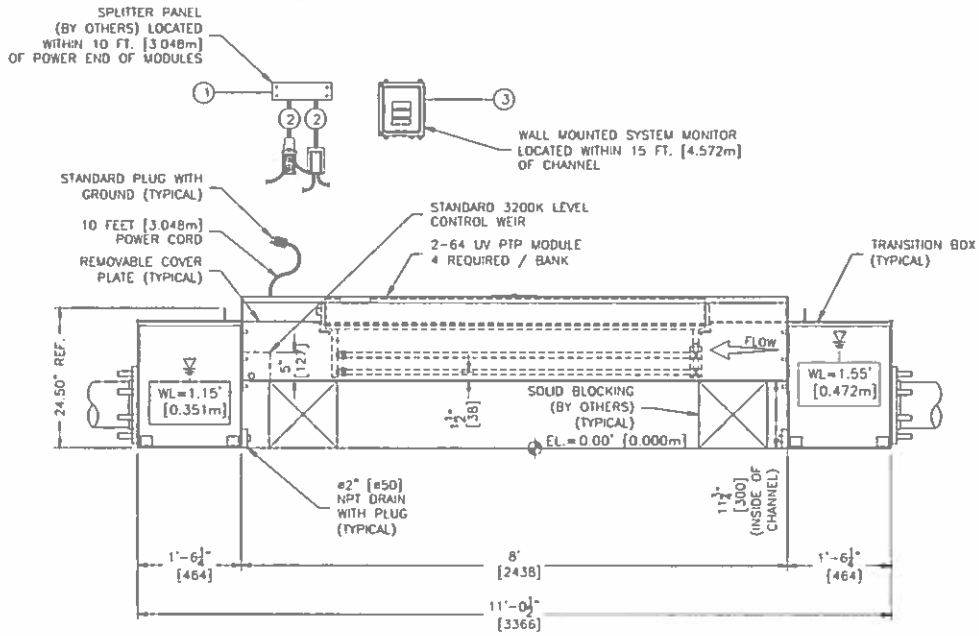
EQUIPMENT INTERCONNECTIONS

No.	DESCRIPTION	FROM	TO
1	SPLITTER PANEL POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 6.4 AMPS / SPLITTER PANEL	DISTRIBUTION PANEL (DP) (NOT SHOWN) (BY OTHERS)	SPLITTER PANEL (BY OTHERS)
2	POWER DISTRIBUTION RECEPTACLE (PDR) POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 3.2 AMPS / PDR	SPLITTER PANEL (BY OTHERS)	PDR
3	SYSTEM MONITOR POWER SUPPLY 120V, 1 PHASE, 2 WIRE, 5 AMPS	DP (NOT SHOWN) (BY OTHERS)	SYSTEM MONITOR



PLAN VIEW

SCALE: AS SHOWN

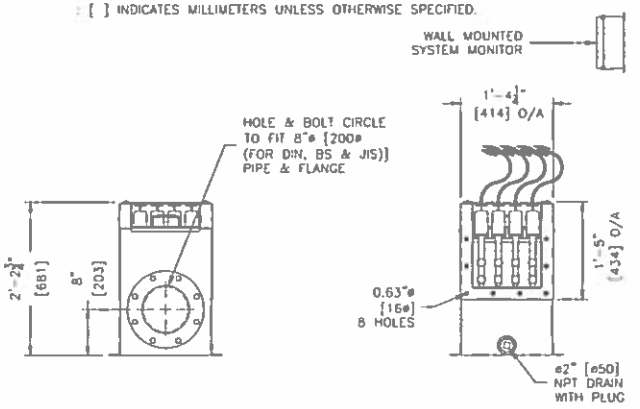


FRONT VIEW

SCALE: AS SHOWN

NOTES:

- DO NOT SLOPE CHANNEL FLOOR.
- CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR − ¼" [6].
- ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES. BOLTS, WASHERS & NUTS FOR CONNECTION OF CHANNEL TO TRANSITION BOXES ARE PROVIDED BY TROJAN TECHNOLOGIES
- SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS. ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY. ELECTRICAL INRUSH FACTOR TO BE ADDED AS PER LOCAL CODE.
- ANY EXTRA OUTLETS NOT BEING USED BY TROJAN EQUIPMENT HAVE NOT BEEN INCLUDED IN THE INTERCONNECT AMPERAGE.
- CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
- ACCESS IS REQUIRED FOR MODULE REMOVAL – NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED TO ALL MODULES.
- DO NOT ENCASE THE STEEL CHANNEL IN CONCRETE.
- [ ] INDICATES MILLIMETERS UNLESS OTHERWISE SPECIFIED.



END VIEW (TYPICAL)

SCALE: AS SHOWN

A D01 SECTION

SCALE: AS SHOWN

NOTE: PDR NOT SHOWN FOR CLARITY

MULTIPLE CHANNELS IN PARALLEL (OPTION):

- ADDITIONAL UNITS CAN BE INSTALLED PARALLEL TO THE UNIT SHOWN.
- ACCESS BETWEEN EVERY 2 PARALLEL CHANNELS IS REQUIRED FOR MODULE REMOVAL – NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED BETWEEN TRANSITION BOXES AND CHANNELS.
- ACCESS BETWEEN A MAXIMUM OF 2 CHANNELS IS NOT REQUIRED FOR MODULE REMOVAL. TRANSITION BOXES CAN BE INSTALLED ADJACENT TO EACH OTHER.

TROJAN UV

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DESCRIPTION: LAYOUT, UV3000PTP--UV3200K 1 CHANNEL 1 BANK 2 LAMPS WEIR		STANDARD DRAWING NO. 3M0512
DRAWN BY : LZ/JMM/SPM	DATE : 12JN21	REFERENCE NO. N/A
CHECKED BY : SAH	DATE : 12JN22	
APPROVED BY : CAP	DATE : 12JN22	DWG NO. D01 / REV. D
SCALE (8½x11) NOT TO SCALE	LOG NUMBER : N/A	

TO:	Alan Smith, P.E. Project Manager CH2MHILL
FROM:	RA Consultants, LLC
DATE:	September 19, 2014
RE:	Newtonsville WWTP and Collection System Project Phase 1 – Planning and Conceptual Design Wastewater Collection and Conveyance

Background and Purpose

The purpose of this technical memorandum is to evaluate alternative conveyance systems in support of Clermont County's current 5-Year Wastewater Capital Improvement Plan (2012-2016) to provide wastewater treatment and collection facilities to serve the Village of Newtonsville. As of this report, a limited geotechnical investigation, field data collection, treatment facility site selection and conceptual design of the treatment facility have been completed.

Beginning in the 1980s, the Clermont County General Health District (Health District) has tracked the issue of failing septic systems and the potential need to construct a centralized sewer systems in the Village of Newtonsville. Beginning in 1996, Clermont County began a comprehensive stream sampling and analytical program. Data collected by the County through its Office of Environmental Quality provides a basis for tracking trends in water quality over time and providing support for planning and management programs. The Newtonsville area was included as part of the dry weather sampling program in 2007 due to suspected water quality impacts resulting from failed home sewage treatment systems (HSTS). Sampling of the Newtonsville area sites was recently completed by the County in August 2013. The results indicate very high levels of E. Coli. bacteria, ammonia, total phosphorus and low levels of dissolved oxygen.

The Health District distributed a letter to residents in the Newtonsville Area on October 30, 2012. The letter stated that "the situation [of failing onsite sewage treatment systems] has gone on long enough and now is the time to make the decision to either replace all of the failing systems or to move forward with centralized sewers." The October 30, 2012 letter was supported by a basic field survey of onsite systems conducted by the Health District in April, 2011. The survey consisted of a pass/fail rating applied to systems – with a fail noted when sewage was detected at the surface. 171 onsite systems were considered within Newtonsville and the immediate surrounding area. At 21 sites the property owners declined the Health District's visit, 97 sites passed, and 53 failed. If the 21 sites that declined a review are indeed failing, then the rate of failure for systems in the Newtonsville Area is 43%. If the 21 sites are removed from consideration, then there is still a 35% rate of failure. The same letter from the Health district noted that the normal rate of failure for all onsite systems in the County is 14%.

The soils underlying Newtonsville are poorly drained with high groundwater tables, which are not conducive to the ideal operation of onsite disposal systems. Alternatives to address the failing systems were discussed at a Clermont County Commissioners' Work Session meeting on 2/9/11. Attempts to improve onsite systems or dealing with certain systems could result in a never-ending chase to catch the next failing system. Clermont County's 5-Year Wastewater Capital Improvement Plan (2012-2016) calls for a new collection system and wastewater treatment plant in the Newtonsville Area. The assessment

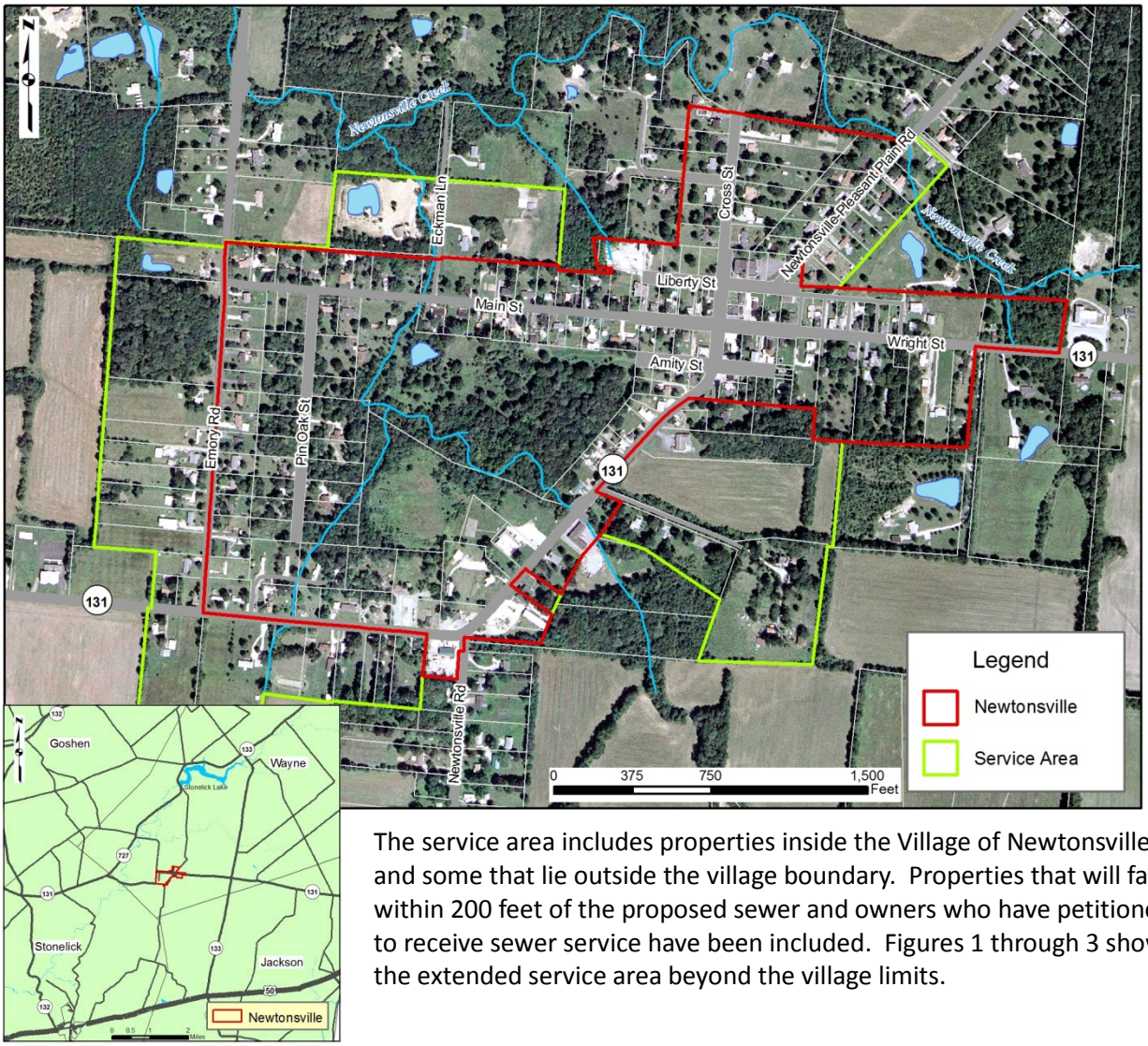
project will place a financial burden on impacted residents; however, it will significantly enhance public health by mitigating surfacing sewage and by reducing the occurrence of E. Coli in local streams.

Project Overview

Project Location

The Village of Newtonsville, Ohio lies in the broad, nearly level till plains of northeastern Clermont County, located in Wayne Township. The 2010 U.S. Census reports that Newtonsville has a population of 392. There are approximately 140 housing units in the 160-acre village – which yields a density of a little over one acre per housing unit. The Village is largely residential with several businesses along State Route 131 and near the intersection of Main Street and Cross Street.

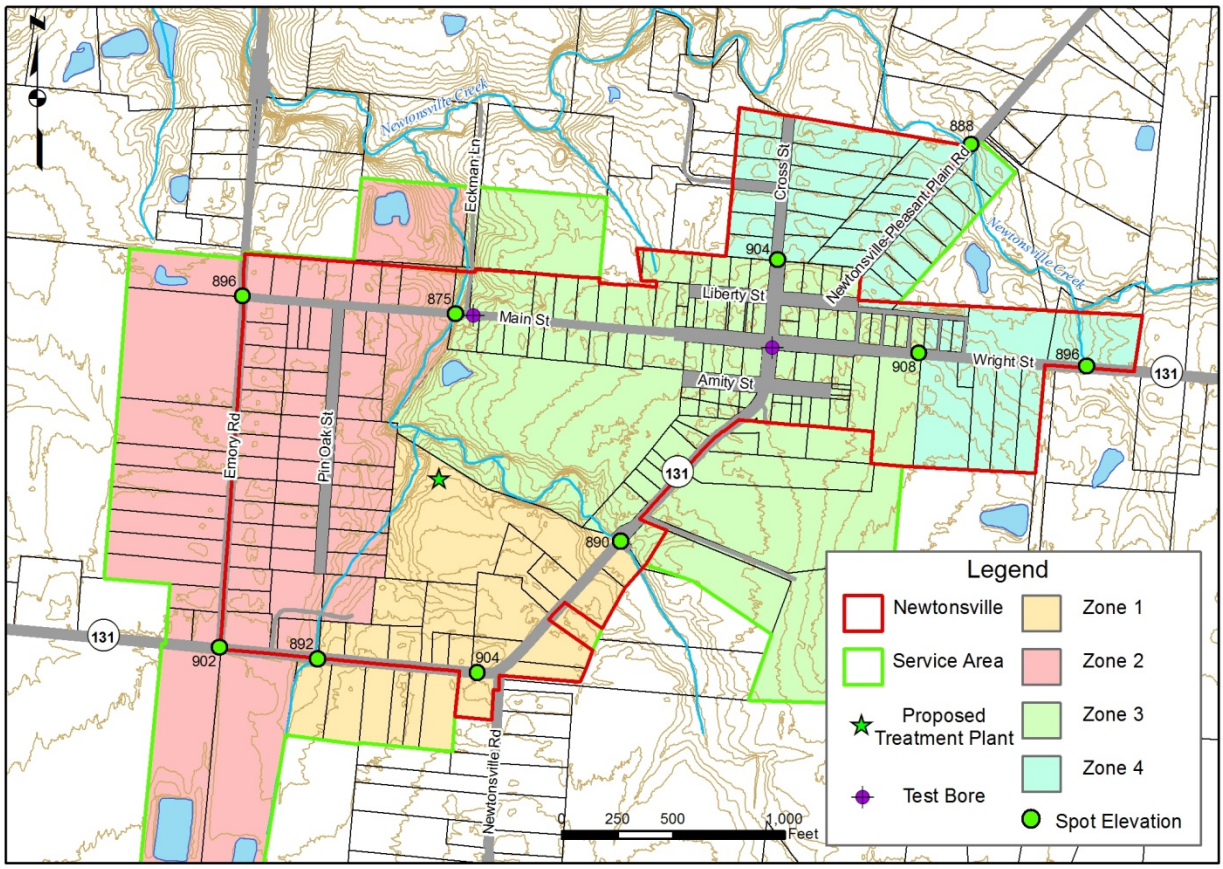
Figure 1: Location Map



The service area includes properties inside the Village of Newtonsville and some that lie outside the village boundary. Properties that will fall within 200 feet of the proposed sewer and owners who have petitioned to receive sewer service have been included. Figures 1 through 3 show the extended service area beyond the village limits.

For convenience, the village has been divided into 4 Zones along property lines, roughly by the high and low elevations as illustrated in Figure 2: Zone 1 is on the south side of town, between the forks of the stream; Zone 2 is west of the stream; Zone 3 is north and east of the stream to Liberty Street; Zone 4 extends north of Liberty Street and east to the service area limits.

Figure 2: Zone and Topographic Map



Existing Conditions

<u>Topography Overview</u>

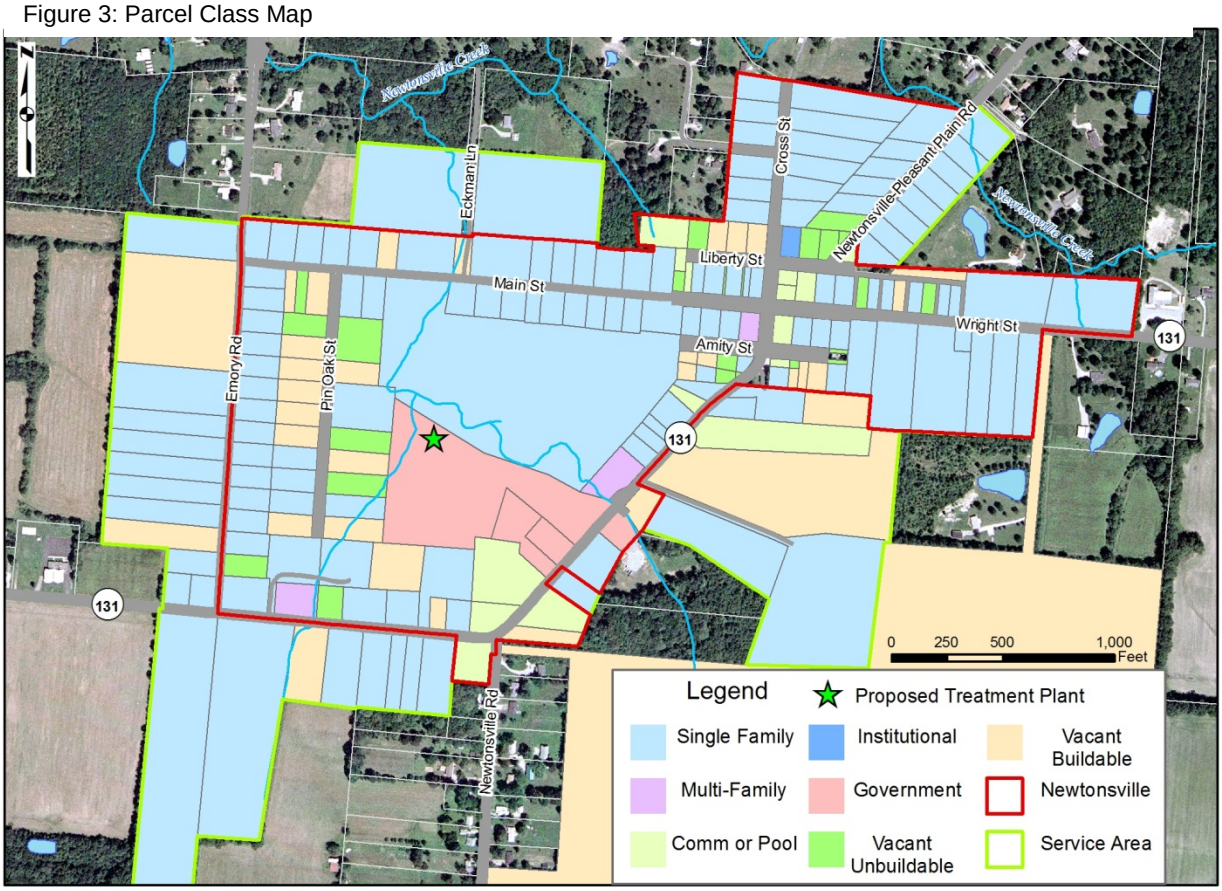
In general, elevations range from 896 in the northwest corner of the village then increase gradually to the south to about 902, and to the east to about 908 (Roughly 0.40% slope across the village). Several natural water courses flow in and around the village. Drainage generally runs from east to west in Newtonsville Creek (a perennial stream) along the Village's northern boundary. Just west of Cedarville Road, Newtonsville Creek is joined by an intermittent stream flowing up from the southeast. The stream has two forks that extend from the center of the village through the south side of the limits. This intermittent stream crosses under Main Street near Eckman Lane at an elevation of 875. The east fork of this stream crosses under State Route 131 south of Blackhawk Drive at an elevation of 890. The west fork crosses State Route 131 east of Never Rest Lane at an elevation of 892. Spot elevations shown in Figure 2 illustrate the depth of the streams through the otherwise level terrain. With any centralized treatment system, traversing across and/or along these streams will be required.

Geotechnical Overview

Two test bores were performed as a part of the analysis to identify types of soil and bedrock location. According to the geotechnical report provided by Thelen Associates, medium stiff fill material consisting of sandy silty clay with gravel can be expected for the first 4 to 7 feet. This is underlain by brown, moist, stiff to very stiff glacial clay. A layer of residual clay containing limestone fragments was encountered before hitting bedrock at a depth of 10 to 16 feet. The bedrock consists of interbedded gray, moist, very weak, weathered shale and gray, strong limestone, which is representative of the Sunset and Oregonia members of the Arnheim Geologic Formation. Per the Geotechnical Engineers experience, ground water will typically be encountered as seepage along the limestone layers within the bedrock or as perched water just above the bedrock. Excavations through the native clays and fill can be performed with conventional track-mounted equipment. Due to the preponderance of limestone layers within the bedrock system, larger rigs would be required and potentially need to be equipped with a rock-ripper. The Geotechnical Report is included in **Appendix A.** For the purposes of this technical memorandum, it is assumed that bedrock will be encountered at a depth of 10 feet and that the rock can be excavated by a rig with ripping teeth. It should be noted however that rock hardness can increase with depth and a full geotechnical report should be conducted during the project design.

Service Area Overview

Figure 3: Parcel Class Map



A majority of the properties are residential ranging from 0.15 to approximately 7 acres. According to the County Auditors site, homes range in value from $11,000 to $180,000 and were constructed typically in the 1950's or more recently. About 10% of the parcels are commercial and another 7% are exempted (municipal or church). These non-residential lots extend along State Route 131 and near the intersection

of Cross Street and Main Street. The buildings in these areas of town generally are close to the Right-of-Way line, whereas the residential parts of town have larger frontages. The parcel classes are depicted in Figure 3.

The lots are intermixed with wooded and clear land. Driveways are generally gravel or asphalt, but concrete drives are dotted throughout the community. Landscaping, fencing and retaining walls are generally sparse. On the whole, restoration costs should be below average for rerouting on-lot household sewage treatment systems.

Most lots currently have septic tank/leach field systems, although mound systems have also been identified. Field data of the locations and elevations of septic tanks on 31 properties were collected and analyzed. This effort focused on the location of the septic tanks, laterals and general system features. This resultant information was used to understand system elevations at critical design points (the most distant from the treatment facility and deepest laterals). This field work revealed around 84% of the properties included in this work have septic systems located in rear yards. Therefore, routing of laterals to the conveyance system from these location will likely increase lot area disturbance.

A total of 161 properties will be serviced with this project. The costs for new on-lot components for these 161 are included in the costs estimates. The mains have been sized to accept flow from 30 buildable lots within the service area which are currently undeveloped; however, no on-lot components will be extended to these properties.

Public Right-of-Way

The majority of roads are two-lane asphalt-paved with no curb and gutter, with Wright Street/Main Street having concrete sidewalks on either side. There are several utilities that are in the road corridor outside of the pavement, including water, overhead electric, overhead telephone and cable. The streets mostly have utility poles on either side. Drainage is natural for the most part with the only storm conveyance structures located for drainage swales/streams to cross under roadways.

For this study, to maintain minimum clearances with existing utilities, the majority of the improvement alignments were located within the road. Newtonsville is incorporated, so the village has jurisdiction over restoration, including State Route 131. The village chooses to default to Clermont County's restoration requirements which includes controlled density fill (CDF) backfill where edge of trench falls within 3 feet of edge of pavement.

Technical Considerations

Due to the requirements of Clermont County's 5 Year Wastewater Capital Improvement Plan, the Health Department is requiring Newtonsville to reduce the quantities of sewage reaching the surface and E. coli in the local waterways. Based on the density of homes and location of the village, a centralized treatment system will be provided as part of this project. The proposed wastewater treatment facilities will be located on property owned by the Village of Newtonsville at 794 Wright Street.

The location of the proposed wastewater treatment facility is in the center of town near the fork of the intermittent stream and the northwest corner of Zone 1 and is shown in Figures 2 and 3. The ground elevation in this location is approximately 896. This is higher than the grade elevation in several locations throughout the service area.

Alternative Analysis

To provide conveyance to the proposed treatment plant, the following alternatives are being considered and summarized in this technical memorandum:

1-A: Gravity Conveyance, Routing Inside Right-of-Way
1-B: Gravity Conveyance, Routing Outside Right-of-Way/Following Topography
2: Low Pressure Conveyance
3: Vacuum System Conveyance
4: Septic Tank Effluent Pumping/Gravity
5: Hybrid/Combination Conveyance (Low Pressure Conveyance to gravity sewers)

General requirements

Each alternative was analyzed in detail as part of this study. All alternatives were laid out in accordance with the following standards:

- Clermont County Water Resources Department's Rules and Regulations Governing the Design, Construction and Use of the Water Distribution and Wastewater Collection (latest edition)
- Clermont County Water Resources Department's Standard Specifications (latest edition)
- Clermont County Water Resources Department's Standard Drawings (latest edition)
- GLUMRB's Recommended Standards for Wastewater Facilities (2004)

Where possible, sanitary lines have been assumed to be constructed a minimum of 10-feet horizontally and 18-inches vertically from Water mains and 5-feet horizontally and 18-inches vertically from all other utilities. Where easements are needed, a 30' perpetual easement has been assumed to be required.

Non-Cost Factor Comparison

A conceptual layout has been provided for each alternative, with the layouts and technologies compared based on the following criteria:

- Constructability (based on depth of excavation and traffic control requirements)
- Easements Required
- Environmental Impact (general considerations and number of stream crossings)
- Homeowner Impact (based on components they will maintain/own vs. County)
- System Reliability
- Local Use Precedent (based on widespread usage and history of similar installations)

Cost Comparison

Class 4 costs estimates with a range of +40% to -20% have been developed as classified by AACE International's *Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*. Costs were developed based recent bid outcome from CCWRD and various suppliers and contractors, RSMeans and local market knowledge.

Cost of constructing the conveyance system and on-lot components were generated based on the conceptual layout. Operation and Maintenance costs were determined for the conveyance type, quantity and type of pumps/valves and other pertinent components such as lift stations. This data was used to develop life cycle costs using net present value techniques. The year 2017 was used for Construction of the system, with a 3% inflation rate, and a 5% interest rate on a life cycle of 60 years. Information from the Water Environment Research Foundation (WERF) was utilized as the basis to determine life cycle costs.

Gravity Conveyance Overview (Alternatives 1-A and 1-B)

In general, a gravity system consists of a series of sanitary sewers and appropriately placed manholes. For this alternative, laterals from each home would be intercepted prior to the septic tank and routed to the sewer. The overall system is laid out to minimize depth of excavation and easements required. Two routing alternatives were prepared for this type of system, the first (Alternative 1-A) maintained an alignment within the Right-of-Way (minimal easements) and the second (Alternative 1-B) maintained an alignment that generally follows the topography with use of easements.

Centralized pump stations are commonly included in gravity conveyance systems to minimize sewer depths. For both gravity conveyance alternatives, potential pump stations were reviewed to minimize costs. Where beneficial, a pump station was included. Because both gravity alternatives have general similarities, the common components are summarized.

General Requirements

Gravity sewers are sized according to flow quantities from Clermont County Water Resources Department's Standard Specifications *Appendix A Suggested Sewage Flow Guide*. The minimum size is eight inches nominal diameter. Gravity sewers are required to be four feet below basement floor elevation for any building it serves. This causes the invert to start at a depth just above potential bedrock. For the purposes of this analysis, we assumed bedrock at 10 feet deep. Manholes are spaced at intervals of no greater than 400 feet for sewers 15-inch and under at pipe slope changes, junctions and changes in direction.

Alternative 1-A Overview

In this alternative, the alignment was maintained within the limits of the Right-of Way (with exception of routing to the proposed treatment facility along the northeast edge of Zone 1). This is to minimize the number of easements required and the impact to property owners. Appendix B shows the selected alignment. This alternative is based on intercepting flow from each property lateral prior to entering the septic tank. The lateral would be intercepted and rerouted to the new sewer located in front of the property. Most sewers are laid out under the roadway due to congested right-of-way.

Figure 4: Gravity Conveyance, Routing Inside Right-of-Way

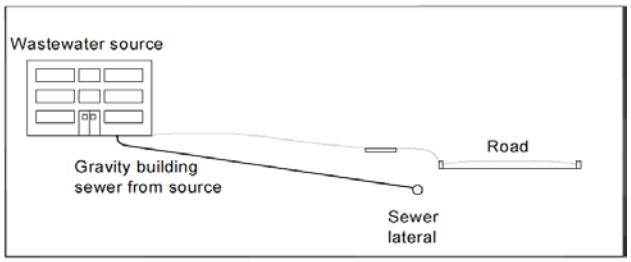


Image Source: WERF Fact Sheet C1 Collection Series Gravity Sewer Systems

The surface elevation of the proposed plant, where the gravity system terminates, is one of the higher elevations in the village. In addition, the surface topography generally slopes upward toward the center of town, where the gravity system converges. Maintaining minimum requirements (sewer slope) yields sewer depths in excess of 30 feet in the center of town, up to 20 feet of which is assumed to be in rock. Construction of sewers to these depths would require trench protection and possibly benching and shoring. The ultimate excavation width would likely result in road closures on Main Street and State Route 131 throughout the duration of construction. Due to the proximity of the buildings to the Right-of-Way at this intersection, special consideration would need to be made to protect the structures/foundations.

As the alignment continues along State Route 131 along Zone 3 toward Zone 1, a 30-foot depth is maintained. A similar depth occurs in Zone 2 as sections of sewer would be aligned against grade from the north end through the southeast corner of town and into Zone 1. The sewers converge at the east end of Zone 1 and follow the east fork of the stream to the treatment plant. The depth through this stretch of sewer would be in excess of 40 feet. A lift station would be required at the treatment facility.

Two additional locations for lift stations were reviewed, at the intersection of Cross Street and Main Street in the center of town and just after the creek crossing from Zone 2 to Zone 1 along State Route 131. This review, however, did not reveal any cost savings.

This gravity conveyance alternative consists of over 13,500 linear feet of pipe ranging from 8 to 10 inch diameter at depths ranging from 8 to 40 feet and slopes generally between 0.45% and 1.00%. A minimum of 44 manholes would be required and a single lift station would be required at the plant.

Constructability

The three main constructability issues for this alternative are related to excavation depths. Due to topography of the area relative to the plant location, several stretches of sewer are laid against grade, resulting in excavation depths greater than 30 feet. Several of these excavations are located in areas where buildings are in close proximity. In addition, the restoration requirements within the roadway will require tens of thousands of cubic yards of CDF with the displaced spoils hauled away. Finally, the borings drilled with the preliminary geotechnical study did not extend to the depths noted with this alternative. Harder rock, if discovered at depth, may require greater effort (special equipment such as a hoe ram) than is estimated here.

Easements Required

Only one easement is anticipated along the north edge of Zone 1, where the sewer alignment parallels the property line located along the east fork of the stream. In general this easement is for the last stretch of pipe from the system to the treatment plant.

Environmental Impact

There are three stream crossings; two are along State Route 131, one on each fork of the stream. The third crossing is at Never Rest Lane. The alignment leading to the treatment plant site starts south of the intersection of the east fork and runs along the stream heading west.

Homeowner Impact

In general, gravity conveyance options have the lowest overall owner impact because residents are only responsible to maintain the lateral from the home to the right-of-way. Construction of the lateral may impact landscaping and other yard features, but this issue is common to each alternative under consideration.

System Reliability

Gravity conveyance systems in general have the best overall system reliability. This is due to proven design standards and reliance on gravity rather than mechanical systems for the conveyance of the wastewater.

Local Use Precedent

Gravity conveyance is the most common and widely used type of conveyance throughout Clermont County. It has a proven performance record and is typically the most favorable system where costs are affordable.

Opinion of Probable Costs

Based on the challenges described in this terrain the construction cost opinion **exceeded $4.7 million**. This includes the conveyance system and one lift station. Significant cost items are the CDF at $2.35 Million, the lift station at $175,000, hauling away excess material at $500,000. The cost analysis does not include on-lot construction and traffic control. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Sewer maintenance ($19,600, annual) and electrical/maintenance of one lift station ($7,300, annual).

Base Construction: $5,206,000 / With 25% Contingency: $6,507,500
Life Cycle: $6,110,000 (60-year design life) / With 25% Contingency: $7,637,500

Alternative 1-B Overview

In this alternative, the alignment was generally determined by minimizing depth of the gravity sewer by following the terrain, though, where practical, the alignment was maintained within Right-of-Way. The goal was to reduce several cost factors and constructability issues, including, rock excavation and road excavation. The conceptual layout is included in Appendix B.

Figure 5: Gravity Conveyance, Routing Outside

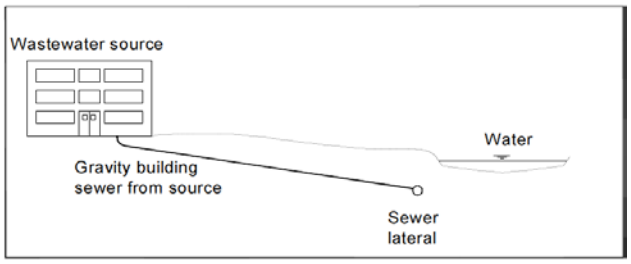


Image Source: WERF Fact Sheet C1 (Modified by RA)
Collection Series Gravity Sewer Systems

An engineering report and facilities plan for wastewater collection and treatment in the Newtonsville Area was drafted by Santoro Engineering in 1999. The report considered a larger service area with 72 more buildings, about 7,000 linear feet of additional pipe, and 1,000 linear feet of additional force main. Accounting for these differences and multiplying by a factor of 1.7 to account for 18 years of 3% inflation, the Santoro estimate is 46% less than our estimate. Some reasons for the variance include:

- The Santoro alignment was generally aligned within local stream beds. Our alignment typically avoided being under streams and therefore created deeper excavations offset from the streams.
- Santoro used $30 per linear foot for sewer mains and $15 per linear foot on force main. Even with a factor of inflation, recent Clermont County bid tabulations have shown unit costs almost twice as high.
- The 1999 study did not show costs for CDF when in pavement or for rock excavation.

The piping within Zone 1 was aligned in two pathways from the high point in the southeast corner toward the proposed treatment facility. Heading west from the high point, the sewer is about seven feet deep. The connections from Zone 2 tie in north of where the west fork of the stream crosses State Route 131. This stream crossing requires the pipe depth to be approximately 19 feet deep. The depth continues to increase to about 24 feet at the proposed plant site. From the high point, heading northeast, the seven foot sewer depth is maintained until combining with the alignment from Zone 3 just south of where the east fork of the stream crosses under State Route 131. The depth increases from 19 to nearly 25 feet as the alignment approaches the treatment facility. A lift station would be required at the proposed treatment facility.

Zone 2 utilizes two sewer alignments to serve the north and south sections. The piping connects to Zone 1 toward the South end of Pin Oak Street and from Never Rest Lane respectively. Depths along the alignment are expected to reach 18 feet.

Zone 3 conveyance was accomplished with two mainline sections. The east section conveys flow from the area surrounding the Cross Street and Main Street intersection and slopes south along State Route 131 to Zone 1. The proposed alignment is expected to reach a maximum of 18 feet deep through this section of town. The west section serves the properties along Main Street and the creek and slopes north along Eckman Lane to the pump station. This pump station would deliver flow south along the creek to the proposed treatment facility. By including a pump station in this location, the sewer depth is reduced by more than ten feet compared to Alternative 1-A.

Conveyance within Zone 4 slopes away from Zone 3, toward the edges of town at depths of eight to ten feet. An alignment following Newtonsville Creek conveys this flow along the North edge of town to a pump station at the north end of Eckman Lane. Proposed sewer depths through this stretch generally range from 10 to 15 foot, but reach 21 feet on either side of a swale just east of the pump station location. Five to ten feet of rock excavation can be expected for much of the sewer alignment. Slopes exceeding 15% will be encountered along the creek, making construction difficult.

This proposed alternative includes over 18,500 linear feet of pipe ranging from 8 to 10 inch diameter at depths ranging from 8 to 25 feet and slopes generally between 0.45% and 1.00%. A minimum of 65 manholes would be required. Two lift stations are required, one at the plant and another at the north end of Eckman Lane. About 1,850 feet of force main is required to get flow from the Eckman Lane station, south to the proposed treatment plant.

Constructability

The construction issues presented in Alternative 1-A are reduced with this alternative as the sewer depths would be reduced significantly. In turn, an additional pump station and over a mile of additional sewer would be required.

Easements Required

Approximately 15 properties will require easements where sewers from Zone 4 run along Newtonsville Creek to the Eckman Lane lift station. Two easements would be needed to continue the force main from the intersection of Eckman Lane and Main to the proposed treatment plant. Two to three easements would be needed from the dead-ends of Pin Oak Street and Never Rest Lane across the west fork of the stream located between Zones 1 and 2. Up to four more properties will need easements in Zone 1, as the alignments parallel each fork of the stream. Approximately 24 easements are required in total for this alternative.

Environmental Impact

A total of six stream crossings would be required for this alternative. The crossings are located in the eastern half of the service area: two on each fork of the stream; one near the intersection of Eckman Lane and Main Street; and one just east of the pump station at the north end of Eckman Lane. In addition, this alignment parallels the stream and portions of Newtonsville creek. There may be an impact to several trees within the riparian zone based on this alignment.

Homeowner Impact

In general, gravity conveyance options have the lowest overall owner impact because residents are only responsible for maintaining the lateral from the home to the right-of-way.

System Reliability

Gravity conveyance systems in general have the best overall system reliability. This is due to the proven design standards and reliance on gravity rather than mechanical systems for the conveyance of the wastewater. Reliability is decreased as pump stations are included in the system. This alternative would be considered less reliable than alternative 1-A since an additional pump station would be needed. It would also have a higher operation and maintenance cost than alternative 1-A due to an additional mile of piping, more manholes, and a force main.

Local Use Precedent

Gravity conveyance is the most widespread form of conveyance throughout the US and Clermont County. It has a proven performance record and is typically the most favorable system when affordable.

Costs

The cost opinion includes conveyance and two lift stations. This yielded a **Cost Opinion that exceeded $4.1 million**. Though the pipe was shallower than Alternative 1-A, the additional 5,000 length of piping and trenching required drive costs closer to the deeper sewer held within Right-of Way. The acquisition of easements would further increase costs. Significant cost items are the CDF at $1.33 Million, the lift stations at $350,000, hauling away excess material at $320,000. The cost analysis does not include on-lot construction and traffic control. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Sewer maintenance ($26,900 annual) and electrical/maintenance of two lift stations ($14,700, annual).

Base Construction: $4,141,000 / With 25% Contingency: $5,176,000
Life Cycle: $5,537,000 (60-year design life) / With 25% Contingency: $6,921,000

Alternative 2: Low Pressure Conveyance (Grinder Pumps)

In general, low pressure conveyance systems use package systems, located on the properties they serve, to force flow through the collection system (using positive pressure). Flow is intercepted prior to the septic tank and routed from the new lateral to a package pump station. The package system stores, grinds and pumps the sewage throughout a manifolded pressurized system to the treatment plant.

Figure 6: Low Pressure Conveyance

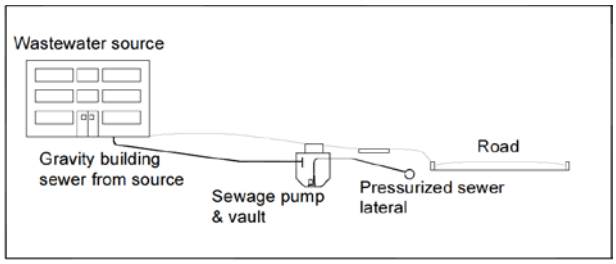


Image Source: WERF Fact Sheet C2
Collection Series Pressure Sewer Systems

There are options that include either one package system per property served, or systems where one system is shared with each property. Units can be located inside the home at the basement level, or in the yard. There are cases where the property owner owns the package pump system as well as options where the sewer utility owns the package system. For the basis of comparison of this option, it is assumed that the County would own/maintain the package system, one system would be provided per homeowner and the system would be located outside the home.

The package system typically includes the following components:

- Dual compartment tank with dry upper section for access to core (pump) and electrical disconnect and lower wet well section.
- Pump (core): two options are available specific to manufacturer (progressive cavity pump or centrifugal pump). For the basis of comparison, the Environment One (progressive cavity pump) system was selected.
- Level sensors: for pump on/off, malfunction and high level alarms.
- Piping and valves within unit
- Individual force main (from unit to network)
- Piping network

Alternative 2 Overview:

For the basis of comparison for this alternative, a single unit would be provided for each property. Environment One provided a system layout and system quotation for this alternative. This proposed layout was finalized and included in Appendix B.

Figure 7: E-One Grinder Pump

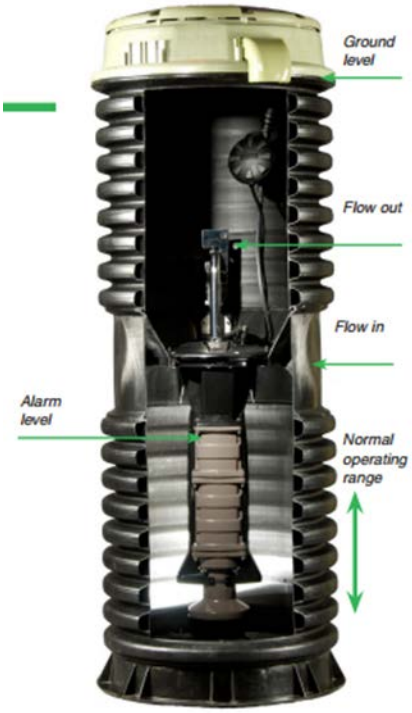


Image Source: E-One. Sewer Anywhere. Informational Brochure. E-One Sewer Systems

Based on the layout, service branches are 1 ½ inches, and main lines within the Village will range from 2 to 4 inches. These size pipes can be installed by a variety of methods, including; open cut, trenching and horizontal directional drilling (HDD). Because the main lines are proposed to be within the roadway, HDD may be more cost effective than open cut, but open cut was used as the basis of cost. Additional consideration may be given to HDD if the design progresses for this alternative.

Because the main is pressurized, Schedule-80 PVC pipe would be utilized and the minimum depth is 48 inches (60 inches at creek crossing) to be below frost depths as per Clermont County Specifications. In addition, the pressurized main could follow the topography, virtually eliminating the deep excavations into bedrock required as part of the gravity options. Also, the proposed alignment would be maintained within right-of-way, minimizing the number of easements.

This alignment would consists of nearly 14,000 linear feet of conduit ranging in diameter from 2 to 4 inches at depths ranging from 4 to 5 feet. No manholes are required and two to four air release valves are anticipated at mainline high points throughout the system. The highest total dynamic head expected within the system is 89 feet.

Constructability

The construction effort of the main lines is much easier than gravity conveyance alternatives as the piping is only four to five feet deep. The use of trenchless technologies may reduce the impact on traffic and restoration. The constructability issues are more challenging because home owner coordination is needed to locate the package system within the property boundary and power has to be run from each home to the package system.

Easements Required

One easement will be needed where the main line parallels the property line located along the east fork of the stream within Zone 1. 161 easements will be needed to cover each property served, so a total of 162 easements will be needed for this alternative.

Environmental Impact

There are three stream crossings; two are along State Route 131, one on each fork of the stream, the third is at Never Rest Lane.

Homeowner Impact

The homeowner would be responsible for maintaining the lateral to the pump vault and supplying power to the pump. Pumps operate with 1 horsepower, 240 volt, single phase motors requiring 30 amp service per the manufacturer. Older homes in the community may have to upgrade their electric in order to be connected into the system. The costs of the electrical upgrades would be borne by the property owner. Residents should expect to see increases in their electric bill of $19 to $24 per year based on $0.0639 per kWh (Duke Energy *Price to Compare*) and 0.8 to 1 kWh per day expected usage.

The County would install on-lot components, including: rerouting the lateral to the pump vault; installing the pump vault; the service line to the main; the alarm panel and electrical connection from the panel to the pump. The County would retain ownership and be responsible for the maintenance of all system components except the lateral to the pump vault.

System Reliability

The system is dependent on properly functioning pumps at the individual home level. If an electric outage would occur in part or all of the service area the individual homes impacted by the outage would be out of sewer service, but the rest of the system would continue to function. The pump vaults have a 70 gallon total capacity which offers some storage volume. If the loss of service is due to a power outage, water usage would be expected to be reduced. The systems have been designed for ease of maintenance, but because they are reliant on pumps, electricity and controls, the system is less reliable than a gravity collection system.

Pumps are prone to blockages and mechanical breakdowns, which could lead to sewage buildup in the vault. If sewage in the tank reaches a volume exceeding the design capacity, an alarm would alert the property owner that service is required. Due to the grinding action, pumps can expect to be rebuilt about every 5 to 8 years and replaced every 15 years. As many as 20 service calls per year per 100 served have been indicated by Shelby County, Ohio. The most common reason for calls is inappropriate waste (such as cleaning wipes or grease) entering the vault and binding the pump. By recording trends of service calls (reason for call, resolution, etc.), the County can flag potential system abusers to recover repair or replacement costs. This tracking can help control maintenance costs.

Local Use Precedent

Communities that utilize this method include Greene County Sanitary Department, (Ohio); Indian Lake in Logan County (Ohio); Waynoka Regional Water and Sewer (Ohio) and Bruceville (Indiana). Phone interviews were conducted with Operators at the Bruceville and Shelby County locations. Questions included:

- How many connections are there to the system?
- Who owns the vault? Who owns the pump?
- How long the system has been in service?
- What maintenance efforts have they experienced?
- How many service calls per year per 100 served? Reasons for call?
- How is power supplied?
- How often does the pump require being rebuilt? Replaced?
- How does this compare to other systems in their network?
- Would they be willing to accommodate a visit from the design team and/or our client?

Bob Rogers with Bruceville, IN indicated their system had 80 to 85 E-One pumps. The vaults and pumps are owned by the municipality, but he did not indicate how long they had been in service. Issues with grease entering the system, ants building nests in the vaults and replacing sensors were the most common maintenance issues and the cause of the service calls (number of service calls not provided). The homeowner is responsible for providing the power, though he did not note the age of the system and stated it was too early to tell how often the pumps would need to be rebuilt/replaced. Mr. Rogers did not comment on system preferences, but he would be willing to accommodate a site visit.

John Bruns with Shelby County stated 135 grinder pumps and vaults were owned by the County. The initial 30 grinder pumps were installed about 25 years ago. John receives a service call nearly every 2 weeks (or about 19 to 20 calls per year per 100 served) usually to unclog handi-wipes and baby wipes. Tanks that serve multiple homes have an independent meter service, but new homes have their own tanks and are connected to the resident's electric service. Each pump requires a rebuild or replacement every 3 to 5 years. John is willing to participate in a site visit.

Additional Considerations

Effluent received from grinder pumps would be expected to have less odor and be less septic. The resulting higher strength sewage would be better suited for bio-P removal. However the grind/release action generally increases centralized treatment needs. Front-end screening and tertiary filtration would likely be required at the plant.

Opinion of Probable Costs

This yielded a **Cost Opinion that exceeded $2.5 million**. This estimate was based on costs received from E-One and updated with RSMeans data. Some of the significant cost items were the pumps vaults and controls at $686,100 service connections at $102,700, hauling excess material $115,000, CDF $363,200, pavement restoration of $300,000. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Maintenance ($22,000, annual), rebuild pumps ($123,200, 8 years after installation/replacement), replace pumps ($554,200, 15 years).

Base Construction: $2,535,000 / With 25% Contingency: $3,169,000
Life Cycle: $4,463,000 (60-year design life) / With 25% Contingency: $5,579,000

Alternative 3: Vacuum System Conveyance

Vacuum sewers use negative pressure to draw waste to a central vacuum station. A small valve pit stores wastewater near the source. When the level of fluid reaches a predetermined level in the pit, the vacuum valve opens and the pressure difference draws the wastewater into the system. The wastewater forms a "plug" in the line that the air pressure pushes to the vacuum station tank. The waste is then pumped to the treatment facility. This system must remain watertight, as any air leakage reduces the vacuum of the system.

Figure 8: Vacuum System Conveyance

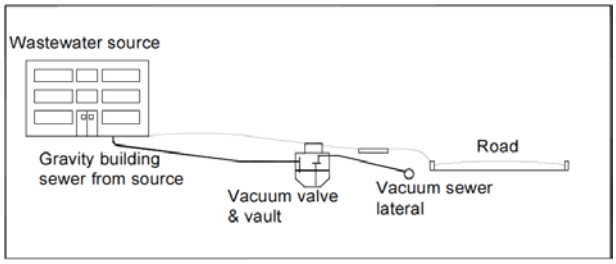


Image Source: WERF Fact Sheet C4 Collection Series Vacuum Sewer Systems

The leading provider of vacuum systems is AirVac. They provided a schematic layout for this project which is included in Appendix B. Based on their requirements, service branches are 3-inch diameter and main lines range from 4 to 6 inches in diameter. The major component of the system is the vacuum station. This station has a maximum system radius reach of 15,000 linear feet, therefore, it can be located nearly anywhere in the Newtonsville system. The limiting factor for the vacuum system is head loss due to the static losses in the lifts and friction losses in the pipe. For the conceptual layout, the station was located at the proposed treatment plant site.

Figure 9: AirVac Vacuum System Layout

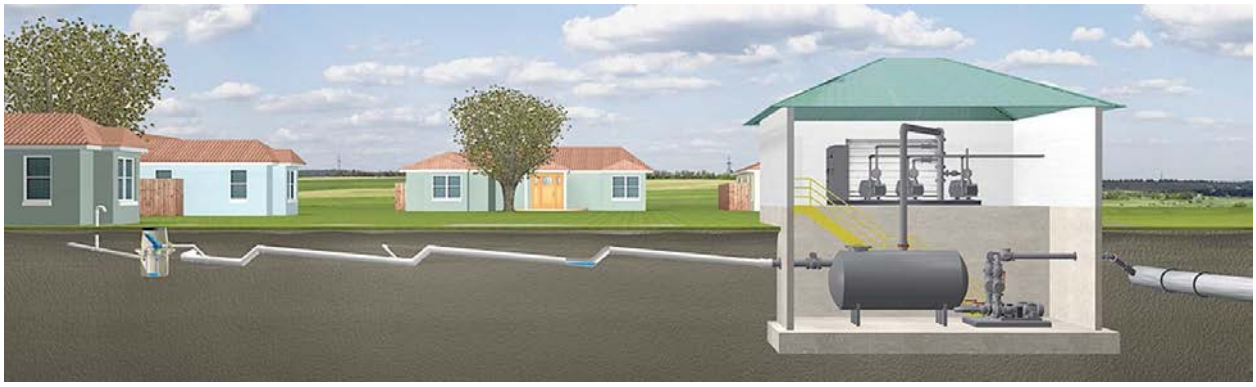


Image Source: AirVac. Newtonsville, OH AIRVAC Estimate #2013-127.

In general, the main lines follow topography, but they utilize a saw-tooth profile where wastewater flows by gravity to a low point in the line. A short lift of one to one and a half feet (typical) causes the wastewater to form a "plug" in the line. When a valve upstream of this plug opens, the pressure differential propels the wastewater up the lift and continues through the pipe. Where elevation changes are required due to slope changes or topographical features, the main line depth may need to be adjusted to make up the elevation change over a series of "saw-tooth" adjustments or lifts. Though shorter spacing is acceptable, AirVac recommends 125 feet minimum spacing between lifts. A maximum distance of 500 feet is allowed between saw-tooth lifts.

Because the main is pressurized, the sewer only needs to have 48-inches of cover (60-inches at creek crossing) to be below frost depths as per Clermont County Specifications. This means that following a stream crossing, the invert of the sewer can "climb" back up to minimum cover because of these lifts.

The alignment of this alternative mimics Alternative 2, within right of way, minimizing the number of easements.

Alternative 3 Overview:
Per the conceptual layout provided in Appendix B, flow from Zone 4 would be routed toward the intersection of Cross Street and Main Street. The saw-tooth lifts are closer together (anywhere from 50 to 125 feet) in order to "climb" up slope. Flow from Zone 3 would begin near the intersection of Eckman Lane and Main Street and heads east to State Route 131. Due to the elevation at the head end of this segment, the sewer must "climb" 8 feet. The flow would combine with that of Zone 4 and continues south along State Route 131 into Zone 1. Because the terrain falls through this stretch, the lift sections are further apart, about 300 to 500 feet. The slope for the last segment in Zone 3 would be steeper than minimum slope due to the stream elevation.

Zone 2 would collect flow from Pin Oak Street and Main Street west of the stream and routes it south on Cedarville Road. The head end on Main Street must overcome about 8 foot of rise. The sewer would continue east on 131, where it picks up flow from Never Rest Lane. The slope must increase greater than minimum to cross the stream into Zone 1. Zone 1 would carry the flow from Zone 2 at the west fork of the stream and must rise 12 feet as the sewer traverses to the high point at the southeast corner of Zone 1. About 5 feet of rock excavation can be expected in this area. Slopes must increase as the sewer continues toward the northeast to combine with Zone 3. The alignment would continue westward along the east fork and must climb about 7 feet to the vacuum station. From the station, flow would be pumped to the proposed treatment plant.

This alignment would consist of nearly 14,000 linear feet of conduit ranging in diameter from 4 to 6 inches at depths ranging from 4 to 15 feet and would generally slope from 0.20% to 1.00%. An estimated 16 isolation valves would be required to section off portions of the sewer for servicing.

Constructability
Of the systems evaluated in this report, vacuum sewers are the most sensitive to construction flaws. Poor seals between joints or damage to the pipe caused by construction activities, ground shifts or poor bedding could lead to leaks that drive up operation and maintenance costs, while reducing system performance. In general, the overall depths are less than those required for gravity systems, but slightly deeper than low pressure and STEP systems. Where low pressure and STEP systems can be installed via trenchless technologies, due to the saw-tooth steps for a vacuum system, open cut installation methods are more common.

Easements Required
One easement will be needed where the main line parallels the property line located along the east fork of the stream within Zone 1. 161 easements will be needed to cover each property served, so a total of 162 easements will be needed for this alternative. Should an alternative site be selected for the vacuum station, the number and location of easements would need to be assessed.

Environmental Impact
There are three stream crossings: two are located along State Route 131, one on each fork of the stream; the third is at Never Rest Lane.

Homeowner Impact
On-lot components consist of rerouting the lateral to the vacuum valve vault, the valve vault and the vacuum service to the main line.

System Reliability
The valves function on the system pressure, so there would be no electrical components for the on-lot facilities on the head end of the system. The valves could periodically get stuck in the open or closed position, typically due to a clog at the valve or, during cold winters, the valve becoming frozen. Two to six service calls per year per 100 served have been reported.

When stuck in the open position, the system effectively has a leak and would not operate as intended. Leaks would be detected at the vacuum station due to the continuous running of the vacuum pumps triggering an alarm. Leaks would have to be resolved immediately in order to keep the system functioning. When the valve is stuck in the closed position, the property owner must notify the County to resolve the issue. The only impact of a valve stuck closed, is to the individual property served and does not reduce system performance. A backup generator would be required at the vacuum station.

Local Use Precedent
Communities that utilize this technology include Foxcliff and Mapleturn in Martinsville, IN; Bruceville, IN; and Shelby County, OH. As with the low pressure system, operators were contacted. The same set of questions were asked (with the exception of electric service), but this time about the vacuum system.

Randy (last name not given), a manager for Martinsville's Sewer District, indicated 37 connections on their vacuum system. The system is over 28 years old and the municipality owns the components and vault. Early on in the system, maintenance was poor which led to several repairs. Once it became routine, maintenance took little effort. Damage to the system is detected immediately and repairs are easily accessible. Approximately 2 calls a year (equal to about 6 per year per 100 served) are received for the valves sticking. Valves have been operating for over 20 years now. Randy said he liked this system in certain situations when asked to compare it to their other systems, and he would be willing to accommodate a visit.

Bob Rogers from Bruceville (same person interviewed for low pressure) has 240 homes operating off of 2 central tanks. Vaults and valves are owned and maintained by the municipality and has been operating for 5 years. He receives about 5 calls in 6 months (or 4 calls per year per 100 served). As with Bruceville's pressure system, grease from owners and ants in the controls are the leading causes. Generally maintenance consists of checking valve pits one day a week. Bob experienced a $6,000 repair of a main line. Since the system was only 5 years old, he felt it was too early to determine how often the valve components would need to be replaced. As before, Bob did not provide comparisons of the system, and would show this system as well on a site visit.

John Bruns with Shelby County also has a vacuum system in addition to the low pressure system. The County owns 90 vacuum vaults and valves throughout their network which has been in service for almost 8 years. Service calls happen about twice per year for a stuck valve. John did not indicate any rebuilding or replacement of any valves. He would recommend the system for the right application

Opinion of Probable Costs
The cost opinion includes the total conveyance system costs including on-lot components and vacuum station. This yielded a **Cost Opinion that exceeded $3.4 million**. However, the village can opt for

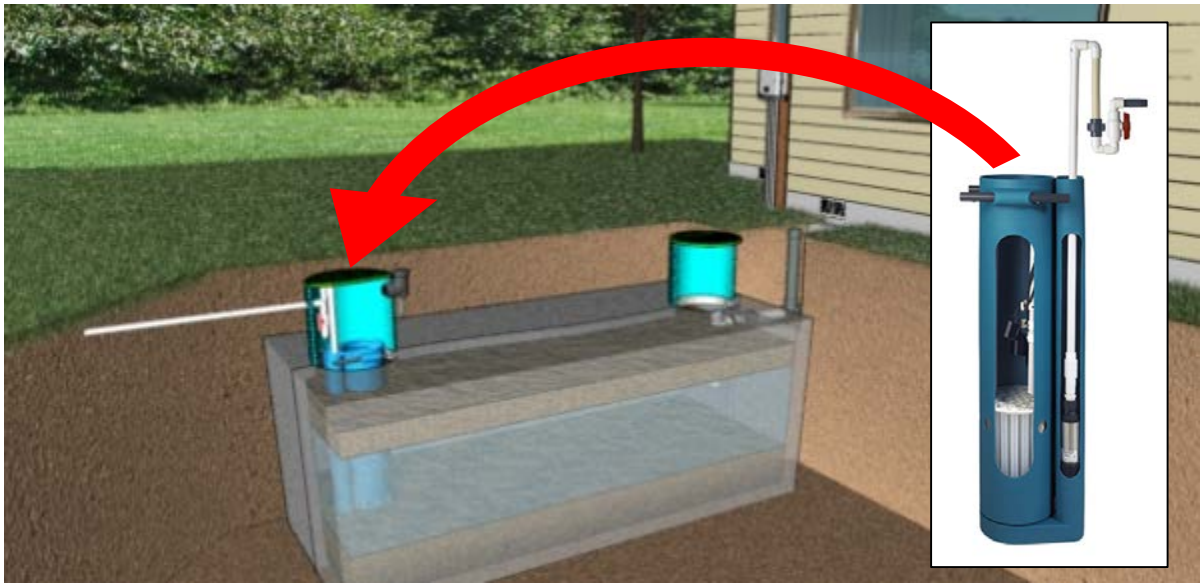
connecting two services to a single Valve Pit. This would result in an estimated reduction of $230,000. Significant cost items were the CDF at $459,000, pavement restoration at $323,000, Vacuum Station at $433,800, 161 Valve Pits at $809,000, Service Laterals at $192,000. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Maintenance & electric ($22,000, annual), rebuild controllers ($7,100, 5 years), rebuild valves ($7,100, 10 years), replace pumps ($74,600, 15 years), control equipment ($16,900, 20 years), collection tank ($27,000, 30 years).

Base Construction: $3,491,000 / With 25% Contingency: $4,364,000
Life Cycle: $4,449,000 (60-year design life) / With 25% Contingency: $5,561,000

Alternative 4: Septic Tank Effluent Pumping (STEP)

The collection equipment used in STEP systems can vary from one manufacturer to another, but all incorporate a screen designed to filter out solids over a certain dimension – typically 1/16" before being pumped. The equipment is designed to be installed in the outlet end of a septic tank and to draw from middle portion, or "clear zone" of the tank. This minimizes disturbance to solids which settle out in the bottom of the tank. Fats, oils and greases can rise to the surface.

Figure 10: STEP System Layout



STEP systems initially were developed to eliminate the requirement of a separate pump chamber when a pump was needed. Today these devices still serve that initial function, but are sometimes used in conjunction with separate pump tanks, or in tanks with a baffled second compartment. In these instances, the additional tanks or baffling are redundant features designed to increase the overall factor of safety of the system.

A STEP vault in a properly operating single compartment tank provides sufficient screening capacity to manage solids with a maintenance interval of between 2 and 5 years. It is important to note that a STEP system located inside of a septic tank will raise and lower the internal water elevation by several inches over the course of its pump cycle.

Due to the unknown structural integrity of existing septic tanks within the Village of Newtonsville and the risk of introducing ground water infiltration to the system, this analysis assumes new septic tanks will be installed on each occupied property. Providing new septic tanks supports the goal of this project by providing a long lasting system. Use of existing septic tanks can be evaluated during detailed design if the County requests.

Effluent sewers work similarly to low pressure systems. One main difference is that the septic tanks perform primary treatment at the source. The solids that are separated remain in the tank to be digested. Only the "clear zone" water portion flows into the conveyance network to the treatment plant. The pumping system is a fabricated unit complete with pump, electrical components, instrumentation and controls and is positioned into the access portal of the discharge end of the septic tank. The septic

tank also serves as a storage unit in the case of system failure due to power loss or mechanical issues. The water from the "clear zone" has few, if any, solids so the pumps in a STEP system are typically ½ HP.

For this option, it is assumed that the County would own/maintain the system beyond the lateral. Each septic tank would receive a filtered STEP vault which screens the septic tank effluent for solids before the effluent reaches the pump. A control system would respond to the water level in the septic tank and would automatically activate and deactivate the pump at pre-set levels. Each connection would require a heavy duty valve box with a shut-off valve and check valve near the force main at the street.

The package system typically includes the following components:

- STEP unit complete with pump, piping and valves
- Septic tank
- Level sensors: for pump on/off, malfunction and high level alarms.
- Individual force main (from unit to network)

An electrical connection is required for the STEP system and the homeowner would be responsible for electric costs.

Alternative 4 Overview

STEP collection networks utilize individual pumps at each household to deliver septic tank effluent along a series of force mains to the proposed treatment plant. Service connection lines of 1-inch diameter would connect each household pump system to the force main network. Approximately 108 properties would be serviced by the North Route through Zones 3 and 4. Approximately 53 properties would be serviced by the South Route through Zones 1 and 2. A map showing this preliminary layout is included in Appendix B.

Based on this layout, a 2-inch line size would be sufficient to serve the majority of the force mains in the network. The North Route and South Route would join together to complete the path to the proposed treatment plant site. This combined line is 3-inch diameter. The approximate length of the various lines is 14,000 linear feet. Two to four air release valves are anticipated at mainline high points throughout the system

The mains are proposed to be constructed of PVC Schedule-80 per CCWRD's standard specifications. As with low pressure force mains, it is important that the mains be sealed against leakage or infiltration and pressure rated. The system would require a minimum pressure rating of 200 psi.

<u>Constructability</u>

The construction effort of the main lines is much easier than gravity conveyance alternatives as the piping is only four to five feet deep. The use of trenchless technologies may reduce the impact on traffic and restoration and will be evaluated during design if this alternative is selected. The constructability issues are more challenging because homeowner coordination is needed to locate the package system within the property boundary and power has to be run from each home to the package system.

Easements Required

One easement will be needed where the main line parallels the property line located along the east fork of the stream within Zone 1. 161 easements will be needed to cover each property served, so a total of 162 easements will be needed for this alternative.

Environmental Impact

There are three stream crossings; two are along State Route 131, one on each fork of the stream, the third is at Never Rest Lane.

Homeowner Impact

The homeowner is responsible for the lateral to the new septic tank. The County requires the electronic control service to have a 30 amp fused disconnect 120/240 volt for the pump. Older homes in the community may have to upgrade their electric in order to be connected into the system. The costs of the electrical upgrades would be borne by the property owner. Residents should expect to see increases in their electric bill of $12 to $14 per year based on $0.0639 per kWh (Duke Energy *Price to Compare*) and 0.5 to 0.6 kWh per day expected usage.

The County would install on-lot components, including: routing the lateral to the septic tank, the septic tank and pump system, the service line to the main, the alarm panel, and electrical connection from the panel to the pump. The County would retain ownership and be responsible for the maintenance of all system components except the lateral to the septic tank.

System Reliability

The system is dependent on properly functioning pumps and controls. If an electric outage occurs in part or all of the service area the individual homes impacted by the outage would be out of power to their sewer service, but the rest of the system would function. The septic tanks have various storage volumes depending on size, which is estimated to be more than 24-hours (per manufacturer) based on water usage. If the outage is due to a power outage, water usage is typically less than normal.

Local Use Precedent

Septic Tank Effluent Pump (STEP) Systems have been in existence and gaining credibility in the United States since the 1970's. The technology has been endorsed by U.S. EPA, Electric Power Research Institute (EPRI), Water Environment Federation (WEF), and others as a viable, sustainable, and economical alternative to conventional sewer systems. Clermont County currently has Septic Tank Effluent sewers within their jurisdiction.

Additional Considerations

An added advantage to this conveyance method is no screening is needed at the treatment plant. This is approximately a $60,000 reduction to the facility construction costs (reduction incorporated in the construction cost noted below).

STEP systems produce lower strength effluent which virtually eliminates the opportunity to utilize bio-P removal at the wastewater treatment plant. The anaerobic septic tank effluent has the potential to be more odorous, however CCWRD has not noticed/received odor complaints in the Bethel/Amelia areas where septic tank effluent systems are in operation.

Opinion of Probable Costs

The opinion of probable construction cost includes new septic tanks, pumps, vaults, valve assemblies and the force main and installation. The **Total Cost Opinion is $2.69 million**. Some of the significant cost items were the septic tanks and risers at $333,400, pumps vaults and controls at $557,800, service connections at $102,700, hauling excess material $107,900, CDF $342,000, pavement restoration of $283,000. Significant cost saving may be made if horizontal and directional drilling can be used for significant portions of the force main installation. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Maintenance ($22,200, annual), service pumps ($21,300, biennial), pump out septic tanks ($21,300, 4 years), replace pumps ($450,500, 20 years).

Base Construction: $2,690,000 / With 25% Contingency: $3,362,500
Life Cycle: $4,454,000 (60-year design life) / With 25% Contingency: $5,567,500

Alternative 5: Hybrid/Combination Conveyance (Low Pressure Conveyance to Gravity Sewers)

This alternative evaluates the utility and cost effectiveness of combining two or more conveyance systems. As a result, gravity was utilized from the proposed treatment plant location to the furthest extents possible such that excavation did not exceed 12 feet except in isolated areas. This was to minimize rock excavation. The gravity system was extended by utilizing small diameter sewers with low slopes that receive septic tank effluent gravity (STEG) flow. Upstream of these extents the system utilizes STEP technology.

STEG systems are similar to STEP systems in that the home owner's lateral is directed to a septic tank where solids are settled, but instead of discharging from the tank with a pump, the "clear zone" flow is able to discharge to the public sewer via a gravity lateral. The flow from a STEG system has minimal solids, so the public sewers are able to be constructed with a flat slope (0.05% used for the preliminary analysis) and reduced diameter (6-inch sewers are used in STEG zones).

Alternative 5 Overview:
In the hybrid option, an effort was made to minimize the number of properties connected via a pump. Pumps can require electrical upgrades for home owners, become an additional maintenance point for CCWRD staff, become a surcharge on home owners' electrical bills, and are disrupted by power outages.

The following logic guided the hybrid system layout:

- A goal was set to achieve a 10-foot to 12-foot sewer depth at the intersection of Main Street and State Route 131. This is the area with the highest population density and greatest opportunity to reduce the number of pumping systems.
- Stream crossings were set to have 4 feet of cover. This helped to extend conventional gravity service to Pin Oak Street in Zone 2 – as the sewer was sufficiently deep after flowing under the stream on the south end of the street.
- Once conventional gravity service was extended to the limit of where it could be laid at 10 feet to 12 feet of depth at minimum slopes, the public main was transitioned to STEG service at minimum slopes to extend the gravity service as far as possible. Once the STEG main reached about 6-foot depth or a depth indicated by the septic tank elevation surveys from earlier in the project, the public main was transitioned to STEP service.

Flow in the collection system starts in the low-lying northern reaches as STEP where pressure mains deliver septic tank effluent to the furthest extent of the STEG mains. The low-lying reaches cannot be served through grinder pumps because the pressure mains must discharge to the small diameter, low-slope mains of the STEG system. Most of the residents in Zone 4 and the northern extents of Zones 3 and 4 will be served via STEP system.

The STEG sewers serve as a transition for the collection system on the eastern and western extents of Newtonsville and the Village's core area at the intersection of Main Street and State Route 131. Flow moves through the STEG zones toward the wastewater treatment plant in the center of the service area. The STEG system transitions to conventional gravity as guided by the third bullet noted above. The southern portion of Zone 3, nearly all of Zone 1, and the eastern portion of Zone 2 are able to be served by a conventional gravity sewer system. Sewers from the eastern and western portions of the service area parallel minor streams as they enter the Village's park parcel and combine at a pump station adjacent to the wastewater treatment plant.

This alignment would consist of about 2,700 linear feet of 2-inch diameter force main for the low pressure system at depths ranging from 4 to 5 feet following the slope of the terrain. No air release valves would be required. There would also be approximately 6,500 linear feet of 6-inch diameter gravity main in the STEG system and 5,500 linear feet of conventional 8-inch gravity main at depths of 10 to 15 feet.

Future expansion could be accommodated through the connection of pressure sewers or STEP pumps to the system in virtually any location.

Constructability

The constructability of the force mains is much simpler than conventional gravity sewers due to the shallow depth and small diameter pipe. The gravity sewer is generally in the range of 10 to 12 feet deep, so it will be more challenging to install than force main, but substantially easier than the deep sewers seen with Alternatives 1-A and 1-B.

Easements Required

Two to three easements would be needed from the dead-ends of Pin Oak Street and Never Rest Lane across the west fork of the stream located between Zones 1 and 2. Up to four more properties would need easements in Zone 1, as the alignments would parallel each fork of the stream. 119 easements will be needed for the STEG and STEP properties. Overall, about 126 easements will be needed for the hybrid option.

Environmental Impact

There are three stream crossings; one is along State Route 131, at the east fork of the stream. The others would be at Never Rest Lane and east of the south end of Pin Oak Street. The alignment would parallel both forks of the stream as sewers approach the plant site.

Homeowner Impact

The homeowner is responsible for the lateral to the new septic tank in STEP areas. The county requires the electronic control service to have a 30 amp fused disconnect 120/240 volt for the pump. Older homes in the community may have to upgrade their electric in order to be connected into the system. The costs of the electrical upgrades would be borne by the property owner. Residents on STEP systems would expect to see increases in their electric bill of $12 to $14 per year based on $0.0639 per kWh (Duke Energy *Price to Compare*) and 0.5 to 0.6 kWh per day expected usage.

42 properties (26%) would be served by conventional gravity and 78 properties (48%) would receive STEG service. These properties would not be subject to electric requirements imposed by those with pumps. This may cause a divide in the community, as some residents would be expected to pay for additional electric costs while others do not.

System Reliability

The system is dependent on properly functioning pumps and controls. If an electric outage occurs in part or all of the STEP properties the individual homes impacted by the outage will be out of power to their sewer service, but the rest of the system will function. The septic tanks have various storage volumes depending on size, which is estimated to be more than 24-hours (per manufacturer) based on water usage. If the outage is due to a power outage, water usage is typically less than normal.

Gravity sections are the most reliable section of the system. Reliability is decreased due to the pump station at the treatment facility.

Local Use Precedent

As these newer technologies become more prominent, integration into long established gravity infrastructure has developed. As a result, Hybrid systems have become more common throughout the United States. In Bethel and Amelia, CCWRD has experience with STEG and STEP systems.

Additional Considerations

The STEP-only system was able to eliminate the need for screening at the wastewater treatment plant. The contribution of conventional gravity flow to the hybrid system will restore the need for screening at the plant. The reduced sewage strength because of the STEP and STEG systems will still virtually eliminate the opportunity to utilize bio-P removal at the wastewater treatment plant. The anaerobic septic tank effluent has the potential to be more odorous, however CCWRD has not noticed/received odor complaints in the Bethel/Amelia areas where septic tank effluent systems are in operation.

Opinion of Probable Costs

As noted in the Overview section, there was an effort to reduce the number of pumps in the system with the hybrid option. There is, however, a premium paid in the capital construction of the hybrid option. To extend the gravity sewers further they become two to three times deeper in the majority of the service area, nominally wider, and therefore require more CDF backfill. The gravity sewers will require straight runs connected directly from manhole to manhole. The pressure sewer alternatives would have force mains with the ability to bend and more easily avoid obstructions. The hybrid option also requires a publically maintained pump station at the wastewater treatment plant site.

The engineer's estimate includes new pipe and manholes for the gravity portion and septic tanks, pumps, vaults, valve assemblies and the force main and installation. The capital cost of the hybrid option **($3.23 million)** is 20% higher than the capital cost of the STEP-only Alternative 4. Basically, all residents will be asked to pay a 20% surcharge on their assessment to take 120 of 161 properties off a pump. About 78 of the properties will not require a pump, but will still require a STEG system (and therefore a septic tank). The remaining 42 properties will connect via a conventional gravity sewer lateral connection. Significant cost items were the septic tanks and risers at $213,000, pump vaults and controls at $84,000, the lift station at $175,000, and CDF at $800,000.

CCWRD stands to benefit from the long term operational cost of the hybrid system compared to the STEP-only Alternative 4. The present worth value of operating costs and replacement costs is about 20% lower for the hybrid option primarily because there are significantly fewer pumps to maintain. The cash flow factors influencing the life cycle costs include the following (2017 value, recurrence): Sewer and force main maintenance ($23,000, annual), service pumps ($6,150, biennial), pump out septic tanks ($17,850, 4 years), replace pumps ($130,000, 20 years), and electrical/maintenance of one lift station ($7,300, annual).

Base Construction: $3,232,000 / With 25% Contingency: $4,040,000
Life Cycle Cost: $4,640,000 (60-year design life) / With 25% Contingency: $5,800,000

Conclusions

The six alternatives were provided a qualitative score of 1-6 (Low to High/Most Favorable to Least Favorable) relative to the other alternatives for each of the following criteria:

- Constructability
- Easements
- Environmental Impact
- Home Owner Impact
- System Reliability
- Local Use Precedent
- Costs

A more detailed description of the ranking process for each item is included below:

Constructability:
The constructability score was based on depth of excavation, slopes and restoration. For the low pressure, STEP and vacuum systems, ranking considered work performed on homeowner property as well.

Easements:
This ranking was based on the number of easements required. The greater the number of easements required, the higher the score.

Environmental Impact:
Based on the number of stream crossings required. The more stream crossings required, the higher the score.

Home Owner Impact:
Based on on-site construction, home owner O&M costs and maintenance frequency for on-site items. The more perceived impact on the homeowner, the higher the score.

System Reliability:
Based on survey of similar systems, industry knowledge, and reliance on mechanical systems. Systems more reliant on mechanical systems, systems with more required maintenance, and systems more susceptible to construction issues received higher scores.

Local Use Precedent:
Based on Clermont County Water Resources Department familiarity with similar systems.

Costs:
Based on the life cycle cost analysis of the system (see Appendix C).

Summary

Figure 11 summarizes the results of the comparative ranking of each alternative. Based on this analysis, Alternative 5 (Hybrid/Combination Conveyance) is the most favorable alternative for the Village of Newtonsville. The overall score of the hybrid option was close to that for STEP, but the significantly reduced number of pumps reduced the home owner impact and tipped the recommendation towards hybrid. It scored at or in the top 50% in all categories except easements. The 126 easements estimated for the alternative will take some time and effort to acquire. There was also a moderate score on reliability because it utilizes mechanical systems. Based on all factors considered, it is recommended that the County proceed with design of the hybrid system presented as Alternative 5.

Figure 11: Alternatives Ranking Summary

	Alternative	Constructability	Easements	Environmental Impact	Home Owner Impact	System Reliability	Local Use Precedent	Expandability	Cost	Overall Score
1-A	Gravity Conveyance, Inside Right-of-Way	6	1	5	1	1	1	6	6	27
1-B	Gravity Conveyance, Outside Right-of-Way/Following Topography	5	2	6	1	2	1	6	5	28
2	Low Pressure Conveyance (Grinder Pumps)	1	6	1	6	5	6	1	1	27
3	Vacuum System Conveyance	4	6	1	5	6	6	5	2	35
4	Septic Tank Effluent Pumping	2	6	1	5	4	3	1	1	23
5	Hybrid/Combination Conveyance (STEP to STEG to gravity sewers)	2	5	2	3	3	3	1	1	20