Planning Period 2013 - 2033

Regional Wastewater Facilities Plan

City of Versailles, KY

GRW Project No. 4132

August 2014

engineering | architecture | geospatial

GRW | 801 Corporate Drive | Lexington, KY 40503 | 859.223.3999

WASTEWATER FACILITIES PLAN UPDATE
CITY OF VERSAILLES, KENTUCKY

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Bart Miller

Utility Manager

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WASTEWATER FACILITIES PLAN UPDATE
CITY OF VERSAILLES, KENTUCKY

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WASTEWATER FACILITIES PLAN UPDATE
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Section 1

SECTION 1
REGIONAL FACILITIES PLAN SUMMARY

A. Purpose of the Facilities Plan

The purpose of this Regional Wastewater Facilities Plan is to develop a cost effective and environmentally sound strategy for improving the wastewater collection and treatment systems in the City of Versailles's Planning Area, to accommodate existing needs and projected growth during the Planning Period of 2013 to 2033.

The City of Versailles was notified by the Division of Water of an update to regulation 401 KAR 5:006 "Wastewater Planning Requirement for Regional Planning Agencies" which requires either an update to their existing Facilities Plan (because it is over ten years old), or the submission of an Asset Inventory Plan. Because the City is currently planning an expansion (of greater than 30% of their existing averaged daily design capacity) to their Wastewater Treatment Plant, which also requires the Facilities Plan be updated, the City elected to proceed with the full Facilities Plan update. GRW Engineers was selected and contracted by Versailles to prepare the update to their Facilities Plan.

The major areas (or goals) to be considered in this Facilities Plan include:

- Review and evaluation of the City's wastewater collection system and wastewater treatment plant to assess their current physical condition, capacity and improvement needs;

- Review of current compliance with U.S. EPA Clean Water Act regulations, KPDES permit discharge limitations as well as with future anticipated limits and other associated requirements;

- Evaluate impacts of wastewater loads on the City's wastewater collection and treatment facilities from areas outside of the current wastewater Planning Area;

- Study alternatives to expand and improve the capacity and effectiveness of the wastewater treatment facilities to meet current and future requirements;

- Develop a Capital Improvements Plan to meet the future needs of the wastewater collection and treatment system so that such improvements can be funded and implemented in accordance with a schedule that matches the future requirements of the system;

- Ensure that public participation is included in the development of the recommended plan for wastewater collection and treatment system improvements;

- Address anticipated adverse environmental impacts of the proposed improvements, as identified by state and federal agencies that have reviewed this Plan.

B. Background

The existing Versailles Wastewater Treatment Plant (WWTP) in Versailles, Kentucky is located at 338 Kentucky Avenue on the western side of the City. The plant discharges at mile point 12.4 of Glenns Creek which is a wet weather tributary to the Kentucky River. The plant currently has an average treatment capacity of 3.0 million gallons per day (MGD) with a peak hydraulic capacity of 9.0 MGD. The plant was constructed in 1992 and the most recent plant upgrade was completed in 2005.

The Versailles wastewater collection system is considered "separate" as opposed to a "combined" system, which means that there are separate pipes dedicated to transporting storm and sanitary flows. The sewer system has expanded to accommodate the City's population growth. Due to the topography of Versailles, the system is primarily gravity flow, with neighborhood pump stations collecting flow and pumping into trunk sewers which carry the wastewater to the treatment plant.

Two previous wastewater Facilities Plans have been prepared for the City of Versailles. The original plan was completed in 1978 and an update was provided in 2001. Both plans were prepared for a regional wastewater Planning Area that encompassed the City of Versailles and most of central Woodford County.

The City of Versailles entered into an Agreed Order with the Kentucky Energy and Environment Cabinet Division of Enforcement in August 2009 (See Appendix A) due to permit limit violations for total suspended solids (TSS), total ammonia nitrogen (NH3-N), dissolved oxygen (DO) and sanitary sewer overflows (SSOs). Remedial measures listed in the Agreed Order included: immediate reporting of spills, SSOs, and bypasses; maintaining monitoring, calibration and maintenances records; the development and implementation of a Sanitary Sewer Overflow Plan (SSOP); and the development and implementation of a Sewer System Evaluation Survey (SSES).

Since the execution of the Agreed Order, the City of Versailles has been maintaining proper records and notifying the Energy and Environment Cabinet of spills, bypasses or other discharges as outlined. An SSOP has also been developed and submitted to the KDEP Division of Enforcement in December 2009. This SSOP has been implemented and the City continues to follow the outlined protocol. The City has also completed the Sewer System Evaluation Survey (SSES). The rehabilitation work included in the SSES is currently being completed and submitted to the Division of Water.

The treatment plant is expected to receive increased flows during the Planning Period due to increased residential and commercial/industrial growth within the Planning Area. By 2033, the treatment plant is expected to receive an average daily flow of 4.5 MGD and a peak flow of 12.5 MGD.

C. Recommended Alternatives Chosen

This Regional Wastewater Facilities Plan includes a series of projects in the wastewater collection system and at the treatment plant in order to provide increased capacity for current and future wastewater flows from customers within the Planning Area. As stated hereinbefore, the wastewater collection system rehabilitation work included in this Plan resulted from the City's SSES recommendations. The rehabilitation work within the SSES is divided into five (5) phases with the intent for one phase to be completed each year. The SSES rehabilitation work includes approximately 308,000 LF of closed-circuit TV (CCTV), 132,000 LF of line rehabilitation, 605 manhole repairs and 4 lift station rehabilitations. The SSES rehabilitation work is included within the 0-10 year planning period. At the time of this report, approximately $5,710,000 has been financed by the City to pay for the first three phases of the SSES rehabilitation work and part of the fourth phase.

The Recommended Plan also calls for construction of projects at the wastewater treatment plant which will provide increased treatment capacity. After considering the four (4) alternatives for upgrading and expanding the plant (including a No Action Alternative), three viable treatment and disinfection alternatives were evaluated from a monetary (present worth) and non-monetary standpoint. The non-monetary analysis included five (5) factors: Environmental Impact, Engineering Evaluation, Implementability, Regionalization and Public Support. The improvements to the wastewater treatment plant are included within the 0-10 year planning period.

In regards to the four (4) disinfection alternatives compared, **Disinfection Alternative 1 - Ultraviolet Light** is recommended due to its low present worth cost and its proven history of reliability. Other advantages of using UV disinfection include: elimination of 1-ton cylinders of chlorine and associated health hazards in the area of the wastewater treatment plant.

Regarding the four (4) treatment alternatives evaluated, **Treatment Alternative 2 - Sequencing Batch Reactor (SBR)** was selected as the preferred treatment alternative due to its lower present worth cost, its non-monetary analysis and its proven history of reliability. The recommended Treatment Alternative 2 - SBR includes the following components:

- New influent Parshall Flume

- Two (2) new stacked tray vortex grit removal units, each rated at 6.25 MGD with grit classifying, washing and dewatering.

- New Preliminary Treatment Building:
  - Approximately 1,800 square feet.
  - One (1) new ¼" mechanically cleaned fine screen with washing press and compactor, each rated at 12.5 MGD.
  - One (1) manual bar rack and one bypass channel

- New 12.5 MGD Influent Pump Station including submersible pumps, wet well and valve vault.

- One (1) new concrete SBR unit divided into four (4) basins using common wall construction, one (1) new blower building and one (1) influent valve box for flow distribution to the SBR basins. The SBR system includes mixers, WAS pumps, decanters, blowers, diffusers, valves and control system.

- Demolition of existing clarifiers and their mechanical equipment. Conventional clarifiers are no longer needed with SBR technology.

- Peak 12.5 MGD capacity Ultraviolet Disinfection System including a new structure, gates, fixed weir, jib crane, Parshall flume and ultrasonic flow measurement. The ultraviolet disinfection system would replace chlorine gas as the disinfection method.

- Modifications & improvements to the existing Belt Filter Press and Polymer Feed system including two (2) new sludge feed pumps (WAS).

- Rehabilitation of the three (3) blowers for the existing aerated sludge holding tanks. New aeration diffusers and piping are included as well as improvements to the drain sump.

- Existing lagoons to be dewatered and backfilled with soil. Existing sludge to be hauled away.

- Site piping, road work, and miscellaneous equipment.

- New Emergency Generator & Electrical Control Building

- Lab/administration building modifications including new lab equipment.

- New non-potable water pumping station.

- Solids disposal via transportation and landfill.

The City has elected to take another advantage of the recommended SBR alternative. The existing oxidation ditches that will be abandoned will be converted to equalization basins for wet weather flow storage. The oxidation ditches can store approximately 3.0 million gallons. Flows in excess of the peak hydraulic capacity of 12.5 MGD would be diverted to the converted EQ basins and then returned for treatment at a controlled rate as the wet weather flow subsides.

The Sludge Handling facilities were revamped during the 2005 construction project which was designed to handle the future flows. The improvement to the sludge handling facilities included one (1) 1.3 million gallon aerated sludge holding basin, which was divided into two (2) basins; a new sludge blower building; two (2) 200 gpm progressive cavity sludge pumps; a new sludge polymer feed system; and a new belt filter press.

Due to the age of the sludge management facilities, some upgrades to the existing equipment are necessary to facilitate efficient operations. The proposed upgrades and their associated costs are included with each Treatment Alternative. The proposed upgrades include the following components:

- Replace sludge feed pumps

- Upgrade polymer feed system

- Replace aeration diffusers and air piping

- Rehabilitate aeration blowers

- Drain sump improvements for better cleaning

In addition to the SSES rehabilitation work, additional collection system improvements are recommended within the 11-20 year planning period. The Sycamore Estates subdivision, located in the eastern portion of the Planning Area, is currently served by septic systems. It is proposed that the City would receive wastewater flow from Sycamore Estates subdivision and the surrounding area upon the completion of a sewer system expansion project. The cost for construction of this project would be borne by Woodford County and the residents within the impacted area. The proposed sewer system expansion would include the construction of 8-inch gravity sewers, 4-inch and 8-inch force mains and four (4) additional pump stations.

D. Summary of Estimated Cost

The Estimated Project Costs for the Recommended Plan are outlined in Table 1-1. The Estimated Project Costs include estimated construction, engineering, administrative and legal costs, expressed in 2013 dollars.

Table 1-1 **Estimated Project Costs** **Recommended Plan**	
Project	**Estimated Cost**
0-10 Year Planning Period	
SSES Collection System Rehabilitation - Phases 4 & 5	*$2,115,000*
Treatment Plant Improvement - SBR & UV	*$19,827,840*
Treatment Plant Wet Weather Storage	*$1,083,300*
0-10 Year Estimated Cost	***$23,026,140***
11-20 Year Planning Period	
Sycamore Estates Collection System Expansion	*$6,439,669*
11-20 Year Estimated Cost	***$6,439,669***
Total Estimated Project Costs	***$29,465,809***

E. Environmental Impacts

Correspondence was exchanged with various state and federal agencies that relate to potential adverse impacts of the Recommended Plan. The responses from these agencies indicate that the Recommended Plan does not have a negative impact on surface and groundwater, threatened or endangered species, air quality, floodplains and wetlands, historical or archaeological sites, important prime farmland, or any other applicable environmentally sensitive areas. See Appendix K for documentation.

F. Institutional Structure

There are no changes required to the existing institutional structure of the City of Versailles as a result of the Recommended Plan. Other than a revised user charge system for paying debt service and the annual operating and maintenance costs for the Recommended Plan, no new ordinances or regulations are needed to implement the Recommended Plan.

G. Funding Plan

A preliminary funding plan has been prepared for the Recommended Plan. This includes an assessment of potential funding sources and preliminary estimates for potential user rates. The funding plans are based on the estimated projects costs and annual operating and maintenance costs of the projects in this plan. These costs are evaluated against a combination of funding options to provide estimated annual debt service and annual O&M costs that must be paid by the wastewater system customers as monthly sewer service rates. It should be noted that the calculations presented in the funding plan are preliminary and will require revision once the actual construction costs are known (from contractor's bids for the projects in this Plan) and the amounts and availability of grants and loans have been confirmed. Therefore, this information is presented to provide a preliminary order of magnitude for sewer service rates, and the City will need to conduct a separate User Charge Study to determine the actual rates needed to pay for the Recommended Plan.

As outlined in Table 1-1, the estimated cost for the projects in the 0-10 year planning period is $23,026,140. Funding options have only been considered for the 0-10 year planning period as a result of discussion with City personnel. Three (3) Funding Options were considered in this Recommended Plan. Funding Option 1 evaluates a 20-year payback period, and Options 2 & 3 evaluates 30- and 40-year payback periods, respectively.

The shorter payback period will require larger annual debt service costs than the longer periods, but will result in total interest costs being lower. For the 20 year loan, user rates will have to increase by approximately 55.62%. For the 30 year loan, the increase would be 47.52%, and for the 40 year loan, an increase of 43.12% is required. Detailed discussion of these options is included in Section 10.

H. Schedule and Method of Implementation

The schedule for implementation of the Recommended Plan is a function of factors, such as the timing of approval of this Regional Facilities Plan by the KDOW, the dates when funds are secured for the projects within this plan, and the respective dates for completion of design and construction of the projects.

At the time that this Regional Facilities Plan was prepared, these dates were not known. However, for the purpose of this Plan, the preliminary schedule, located below, has been developed. This schedule is subject to revision over time as the estimated dates of the aforementioned factors are updated. Table 1-2, located on the following page, outlines the preliminary implementation schedule for the Recommended Plan.

Table 1-2 Preliminary Implementation Schedule for Versailles Regional Wastewater Facilities Plan	
Estimated Date	**Event**
August 2014	Submit Draft Plan to KDOW for review and comment
September 16, 2014	Public Meeting for Plan, Approval of Plan by City of Versailles
October 2014	Submit Final Plan to KDOW for review and comment
December 2014	Approval of Plan by KDOW
December 2014	Initiate Design of Wastewater Treatment Plant
December 2015	Complete Design of Wastewater Treatment Plant
December 2015	Submit Design of Wastewater Treatment Plant to KDOW
July 2015 - September 2017	Phase 4 of Collection Rehabilitation Program
February 2016	Approval of WWTP Design by KDOW
March 2016	Advertisement for Bids for Wastewater Treatment Plant
April 2016	Receipt of Bids, Securing of Funds for Wastewater Treatment Plant
May 2016	Award of Construction Contract for Wastewater Treatment Plant
July 2016 - September 2018	Phase 5 of Collection Rehabilitation Program
March 2018	Complete Construction of Wastewater Treatment Plant Improvements

Section 2

SECTION 2
STATEMENT OF PURPOSE AND NEED

A. Need for the Facilities Plan

The purpose of this report is to evaluate the current and future wastewater collection and treatment needs for the City of Versailles Planning Area in accordance with Section 401 of the Kentucky Administrative Regulation (KAR) 5:006.

The City of Versailles was notified by the Department for Environmental Protection's Division of Water, that due to updates to regulation 401 KAR 5:006 "Wastewater Planning Requirement for Regional Planning Agencies" on June 3, 2011, the City was required to either update their existing Facilities Plan (because their current plan was over ten years old) or prepare an asset Inventory Plan.

The City of Versailles elected to update their facilities plan to meet the new requirements as outlined by 401 KAR 5:006 for the following reasons:

- The current Facilities Plan is over 10 years old and new requirements indicate a Facilities Plan (or asset inventory) must be completed.
- The City is planning an expansion to their existing wastewater treatment facility that will increase their average daily flow by more than 30%.

B. Compliance Background

The City of Versailles entered into an Agreed Order with the Kentucky Energy and Environment Cabinet Division of Enforcement in August 2009 (See Appendix A) due to permit limit violations for total suspended solids (TSS), total ammonia nitrogen (NH_3-N), dissolved oxygen (DO) and sanitary sewer overflows (SSOs). Remedial measures listed in the Agreed Order included: immediate reporting of spills, SSOs, and bypasses; maintaining monitoring, calibration and maintenances records; the development and implementation of a Sanitary Sewer Overflow Plan (SSOP); and the development and implementation of a Sewer System Evaluation Survey (SSES).

Since the execution of the Agreed Order, the City of Versailles has been maintaining proper records and notifying the Energy and Environment Cabinet of spills, bypasses or other discharges as outlined. An SSOP has also been developed and submitted to the KDEP Division of Enforcement in December 2009. This SSOP has been implemented and the City continues to follow the outlined protocol. The City has also completed the

Sewer System Evaluation Survey (SSES) and submitted it to the Division of Water. The rehabilitation work resulting from the SSES is ongoing.

C. Purpose

This study will develop a plan for the most environmentally sound, cost-effective and implementable wastewater collection and treatment system improvements. This planning document will investigate the effectiveness of the existing treatment plant, treatment alternatives, the proposed treatment plant expansion and the ability of the collection system to meet all applicable Federal, State and local requirements. Specifically, this planning document shall objectively evaluate the combined effect of a two component analysis: 1) Cost Effective Analysis and 2) Non-monetary Effectiveness Analysis.

Each alternative under consideration was evaluated using a systematic approach to obtain a ranking for each of the two analysis components. The systematic approach for evaluating alternatives within the framework of each component consisted of:

1. Cost Effective Analysis

The Cost Effective Analysis involved comparing the cost associated with each alternative based on the present-worth cost analysis method.

2. Non-monetary Effectiveness Analysis

The Non-monetary Effectiveness Analysis includes both the Environmental Impact Analysis and the Implementation Analysis.

The Facilities Plan will develop a recommended course of action for wastewater service for the City of Versailles and its wastewater system customers for the period of 2013 to 2033.

Section 8 contains the evaluation of alternates considered in the Planning document.

Section 3

SECTION 3
PHYSICAL CHARACTERISTICS OF THE PLANNING AREA

A. Purpose

The purpose of this section is to delineate the planning area boundaries and describe the key geographic, topographic and natural (or man-made) features within the planning area.

B. Geographic Area

The City of Versailles is geographically located approximately 13 miles west of Lexington, Kentucky, and approximately 15 miles southeast of Frankfort, Kentucky. Versailles is the county seat of Woodford County in Central Kentucky. A map of Woodford County is shown in Exhibit 3-1. The county is located in the Bluegrass area of the state and is bounded on the north by Franklin and Scott Counties, the south by Mercer and Jessamine Counties, the west by Anderson County, and the east by Fayette County. Woodford County has an area of 191 square miles (122,240 acres). The City of Versailles (established in 1792) is centrally located in the county, and has an incorporated area of approximately 5.2 square miles (3,328 acres).

The Versailles Planning Area was originally delineated by the Kentucky Department of Natural Resources and Environmental Protection, and the U.S. EPA for the planning study prepared in 1978. The detailed planning area was later reduced by the City of Versailles in the 2001 Facilities Plan Update prepared by GRW Engineers. The detailed planning area boundary has not been modified for the purposes of this current study. Exhibit 3-2 illustrates the City of Versailles' city limits, urban service area and 20-year planning area.

C. Topography of the Area and Geographic Features

Woodford County lies in the Kentucky River drainage basin. The topography of Versailles is gently rolling with few areas that would limit development. Exhibit 3-3 contains a seven and one-half minute USGS topographic map of the area and showcases the location of the Wastewater Treatment Plant as well as the Water Treatment Plant locations.

As would be expected, the existing Versailles sanitary sewer collection and treatment systems were designed to work with the natural terrain and follow the existing drainage patterns of the area. Pump stations and force mains are used to aid the gravity sewers as a

result of the sinkholes and smaller drainage basins present within the planning area. The gravity lines flow toward the older downtown area and then west to the treatment plant. The highest elevations in the system are approximately 996 feet with the downtown area of Versailles having a typical elevation of 900 feet. The discharge from the treatment plant (approximate elevation of 830.5 feet) flows northwest via Glenns Creek to the Kentucky River.

The Planning Area can be divided into four subwatersheds or drainage basins: Glenns Creek, Griers Creek, Upper Clear Creek and South Elkhorn.

The majority of the Planning Area is underlain by the Cynthiana Rock Formation with various limestone members. Million shale and Griers limestone members are present along with Alluvium and Fluvial deposits.

The Planning Area is also subjected to unusual geologic formations: the Sinking Creek System and a crypto-explosive structure in the eastern section of the Planning Area. These formations generally resist weathering and erosion to the extent that the construction costs of sewage collection systems are often prohibitive without proper planning.

D. Floodplains

Floodplains are of high significance to wastewater systems since it is common for sewers to convey wastewater to larger collection and interceptor sewers located along the banks of streams. These sewers often convey the wastewater to treatment facilities that are also located along stream banks. Sewers and treatment facilities located in low-lying areas are subject to flooding if flood protection is not provided. Therefore, it is necessary to identify floodplains in order to avoid the costly need to provide flood protection for the sewer system and treatment facilities.

The flood hazard areas located within the Planning Area are shown in Exhibit 3-4. This exhibit indicates that the area along Glenns Creek, Sports Man Creek, and Griers Creek have been identified by the Federal Emergency Management Agency (FEMA) as being within the 100-year floodplain.

The FEMA flood mapping also indicates that the Versailles Wastewater Treatment Plant is located within the Special Flood Hazard Area (100-year floodplain) – Zone “A”. The Zone “A” indicates that “No base flood elevation has been determined”. Discussions with City employees (some with over 45 years of service) regarding historical high water information resulted in no one seeing the water raise out of the banks at the Treatment Plant. This could be related to the fact that Glenns Creek originates on the Wastewater Treatment Plant property from a spring with fairly steady flows. The KDOW Floodplain Management Section will be consulted regarding any work within the 100-year flood elevation.

E. Existing and Proposed Land Use

An understanding of current and projected land use is significant in wastewater system planning in order to analyze the anticipated wastewater flows that are expected to be received by the collection system and treatment plant. The most significant land use category for wastewater system planning is residential land use as a result that within most communities residential wastewater discharge to the collection system composes the majority of the flow. Flow from industries, commercial establishments, schools and other customers that use significant amounts of water generally comprise the remaining flow handled by a wastewater system. Identifying the location of residential areas, industries, other significant water users and areas of future growth is vital to properly planning for the capacity of the wastewater collection and treatment facilities.

The existing land use for the City of Versailles has been recorded by the planning and zoning department. Table 3-1 summarizes the existing land use within Versailles's Urban Service Boundary (USB).

The most intensive land use development has occurred in and around the population centers where the greatest demand for non-agricultural uses typically occur and on properties suitable for development where infrastructure (roads and utilities) are available. This has led to the conversion of formerly used agricultural land for the development of residential subdivisions and strip commercial development along roadways within or near the Versailles Corporate Limits where water and sewer are also available.

Land zoned as agriculture equine preservation bound the northern limits of the planning area. This area is not expected to see growth in this planning period.

Table 3-1
Existing Land Use

Existing Land Use Designation	Existing Acreage	% of Total Area
Residential	1,531.31	34.3%
Multi-Family Residential	177.77	3.9%
Mobile Home	11.3	0.3%
Commercial	118.54	2.7%
Public and Semi-Public	419.56	9.4%
Industrial	384.6	8.6%
Institutional	116.37	2.6%
Professional	48.67	1.1%
Agriculture	1,407.22	31.5%
Agriculture Preserve	25.47	0.6%
Vacant	221.17	5.0%
Total Area	**4,461.98**	**100.0%**

Source: 2011 Versailles Comprehensive Plan Land Use Table 54

Exhibit 3-5 is a copy of the existing land use prepared for the 2011 Versailles-Midway-Woodford County Comprehensive Plan Update.

Future land use recommendations, beyond agricultural use, were also determined within the 2011 Comprehensive Plan. Exhibit 3-6 is a copy of the Land Use Districts for the Urban Service Area of Versailles as established in the Comprehensive Plan. Land Use

Districts were delineated to describe the type of land use that would be desirable for the undeveloped regions. These district boundaries are used as planning tools by the City. Any proposed development in these areas will be processed through the typical review by the Planning Director and Commission and which are subject to approval on a case-by-case basis.

The 20-year planning area for the purposes of this study generally followed these land area districts. Meetings were held with City officials and members of the Planning and Zoning Department to further break these districts down, approximate their future sanitary sewer contributions as well as estimate when each area would be expected to be developed. Areas outside the current Urban Service Area but located within the Facilities Planning area were also discussed. Section 7 includes additional information regarding these efforts to project the future sewage demand for the Planning Area.

Woodford County

EXHIBIT 3-1
WOODFORD COUNTY MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DATE: **March, 2014**
SCALE
SHEET NO. **3-1**

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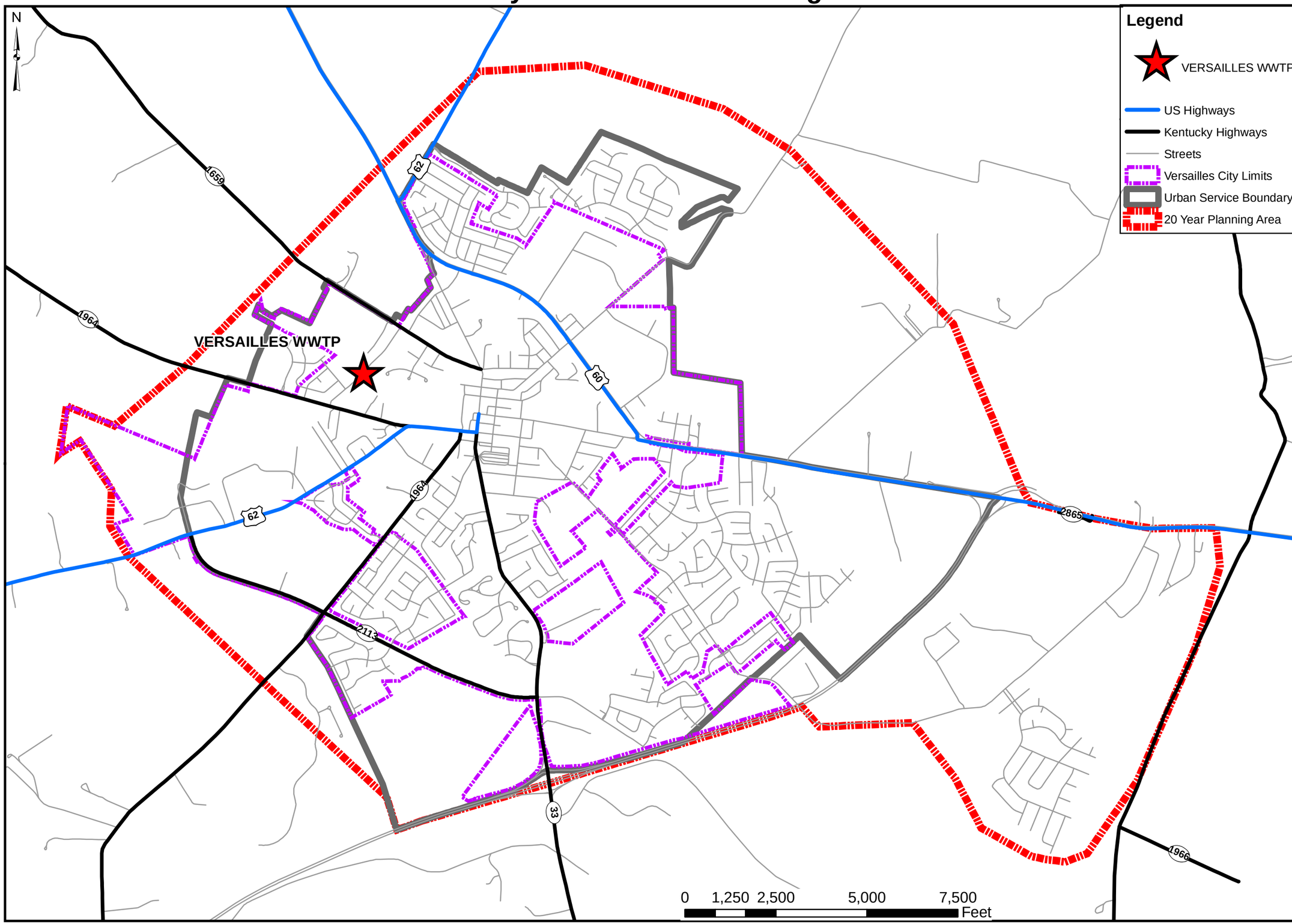
City of Versailles: Planning Area



Legend

- VERSAILLES WWTP
- US Highways
- Kentucky Highways
- Streets
- Versailles City Limits
- Urban Service Boundary
- 20 Year Planning Area

DATE: March, 2014

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EXHIBIT 3-2
PLANNING AREA MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

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City of Versailles: USGS Topographic Map

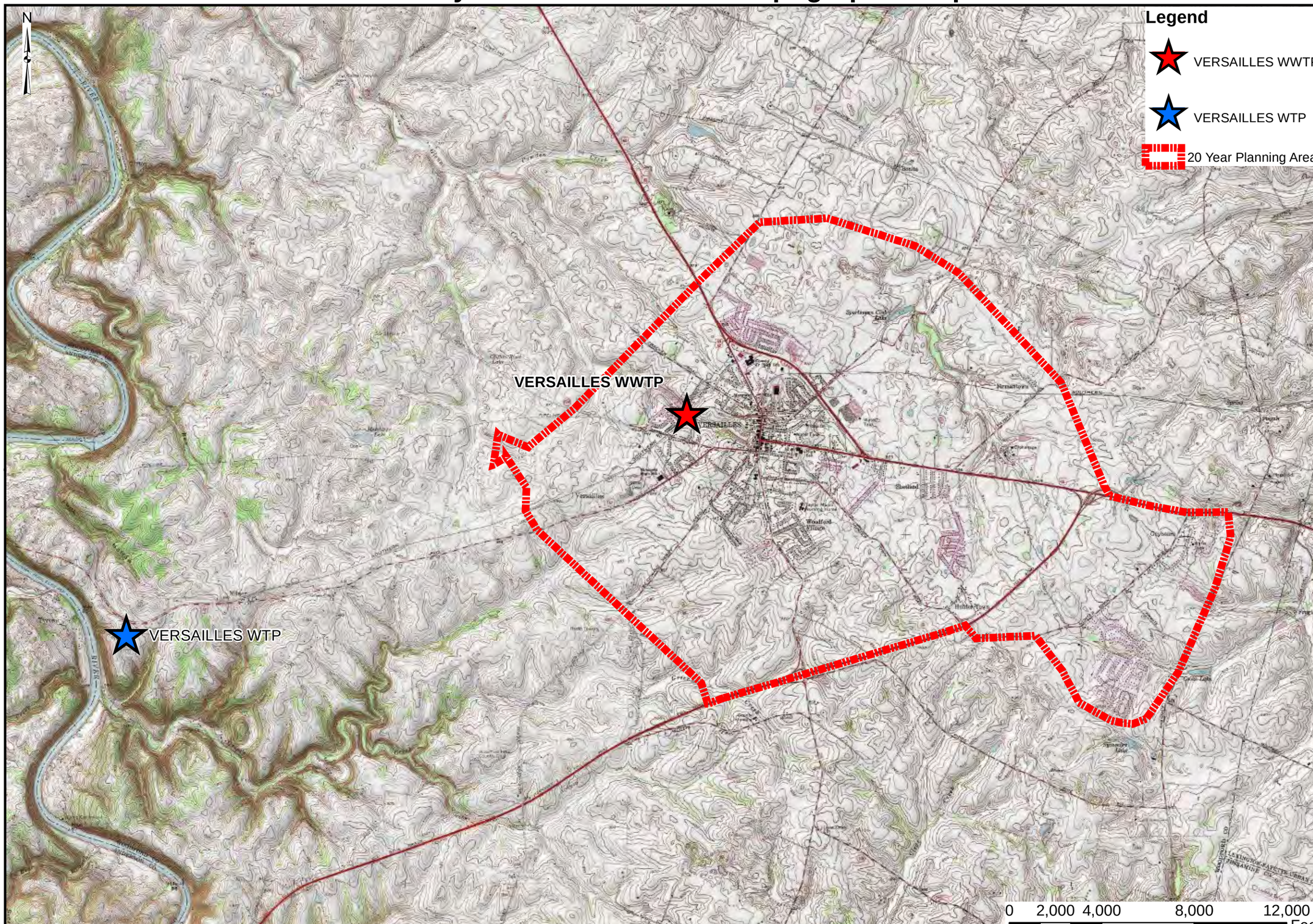

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EXHIBIT 3-3
USGS TOPOGRAPHIC MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

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City of Versailles: Flood Plain Map

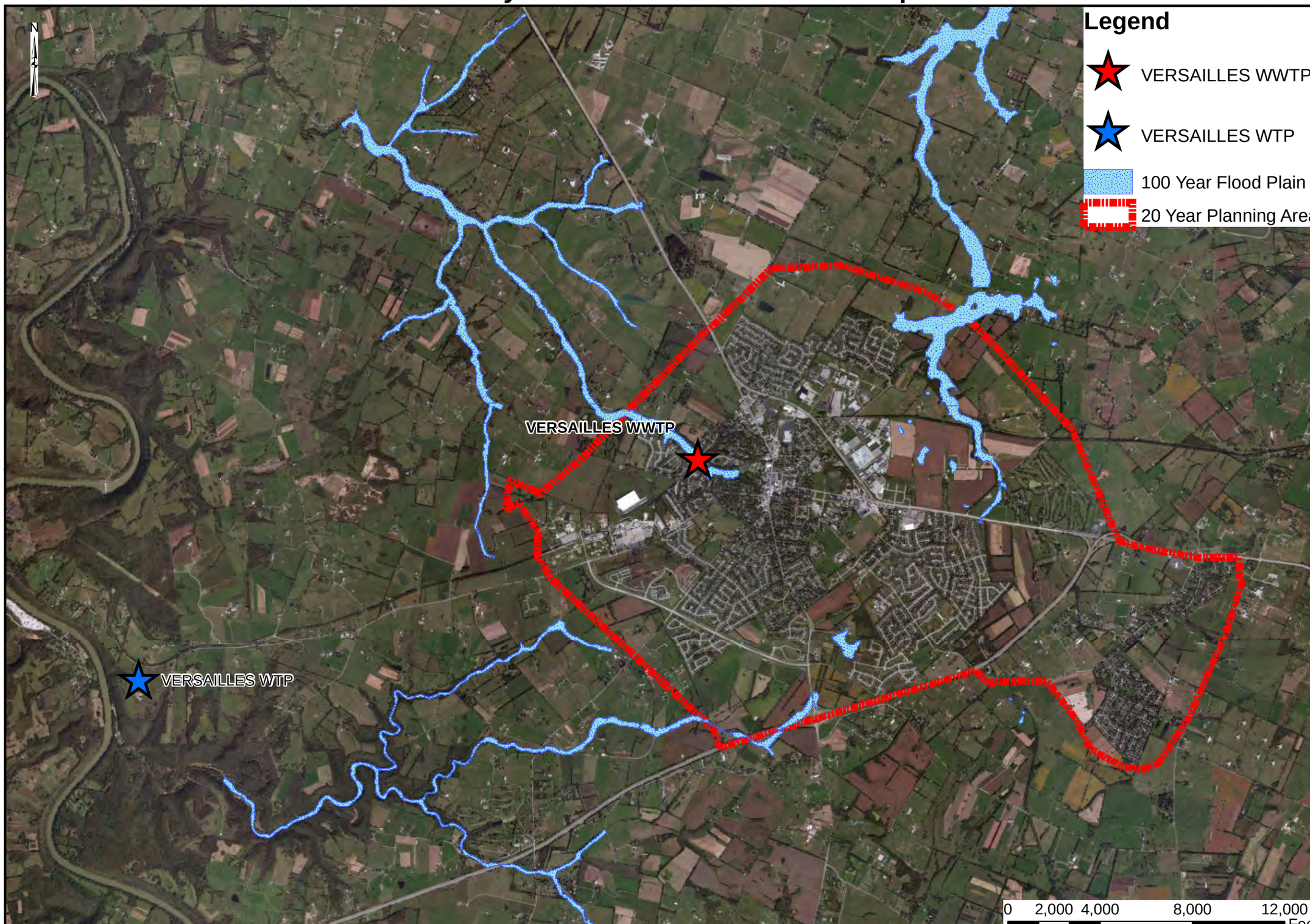

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EXHIBIT 3-4
FLOOD PLAIN MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

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REVISIONS

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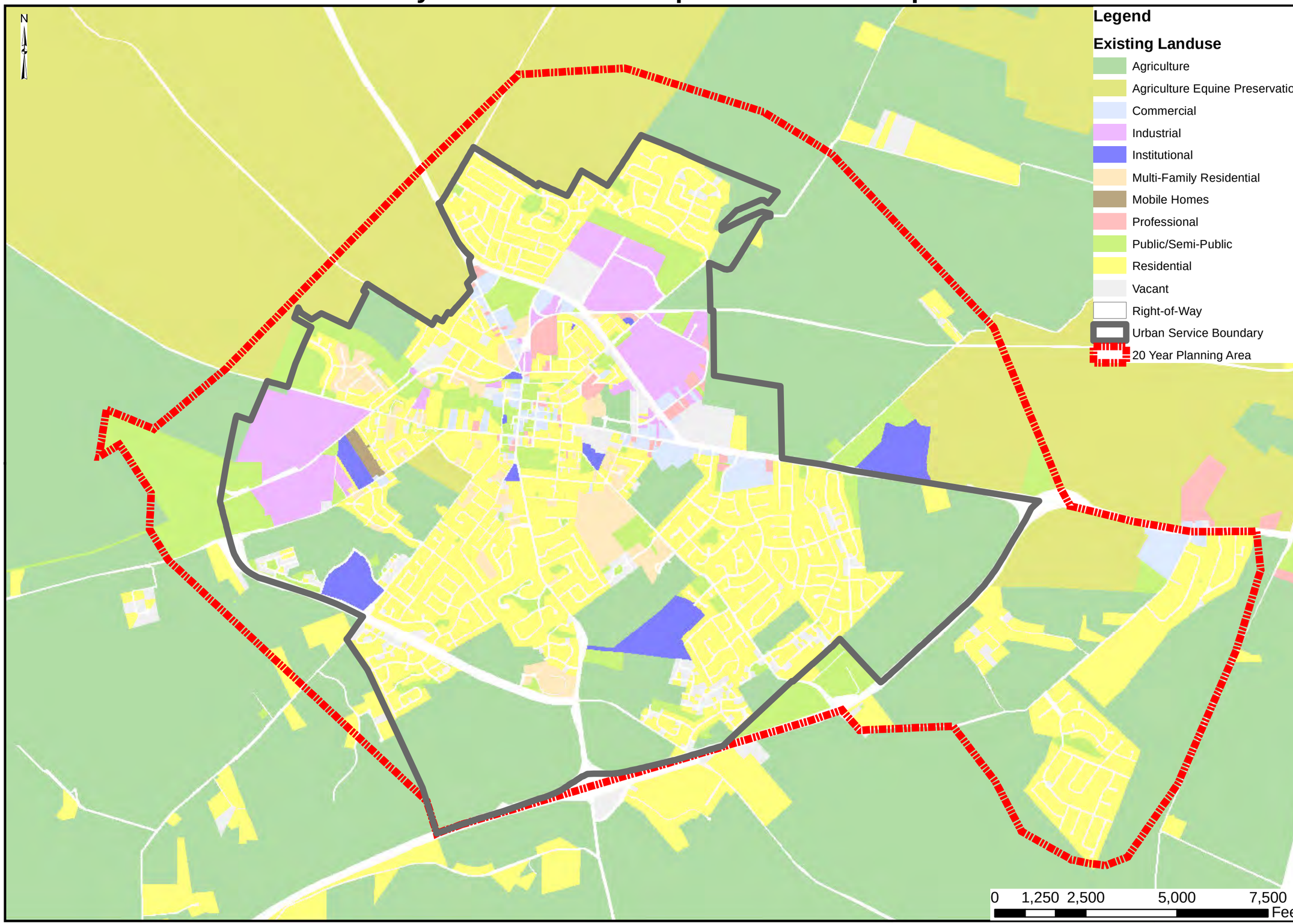
SCALE: 1" = 4000'

City of Versailles: Comprehensive Plan Update



DATE: March, 2014

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EXHIBIT 3-5
2011 EXISTING LAND USE MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

GRW PROJECT NO. 4132

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REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 2500'

Versailles Urban Area - Land Use Districts

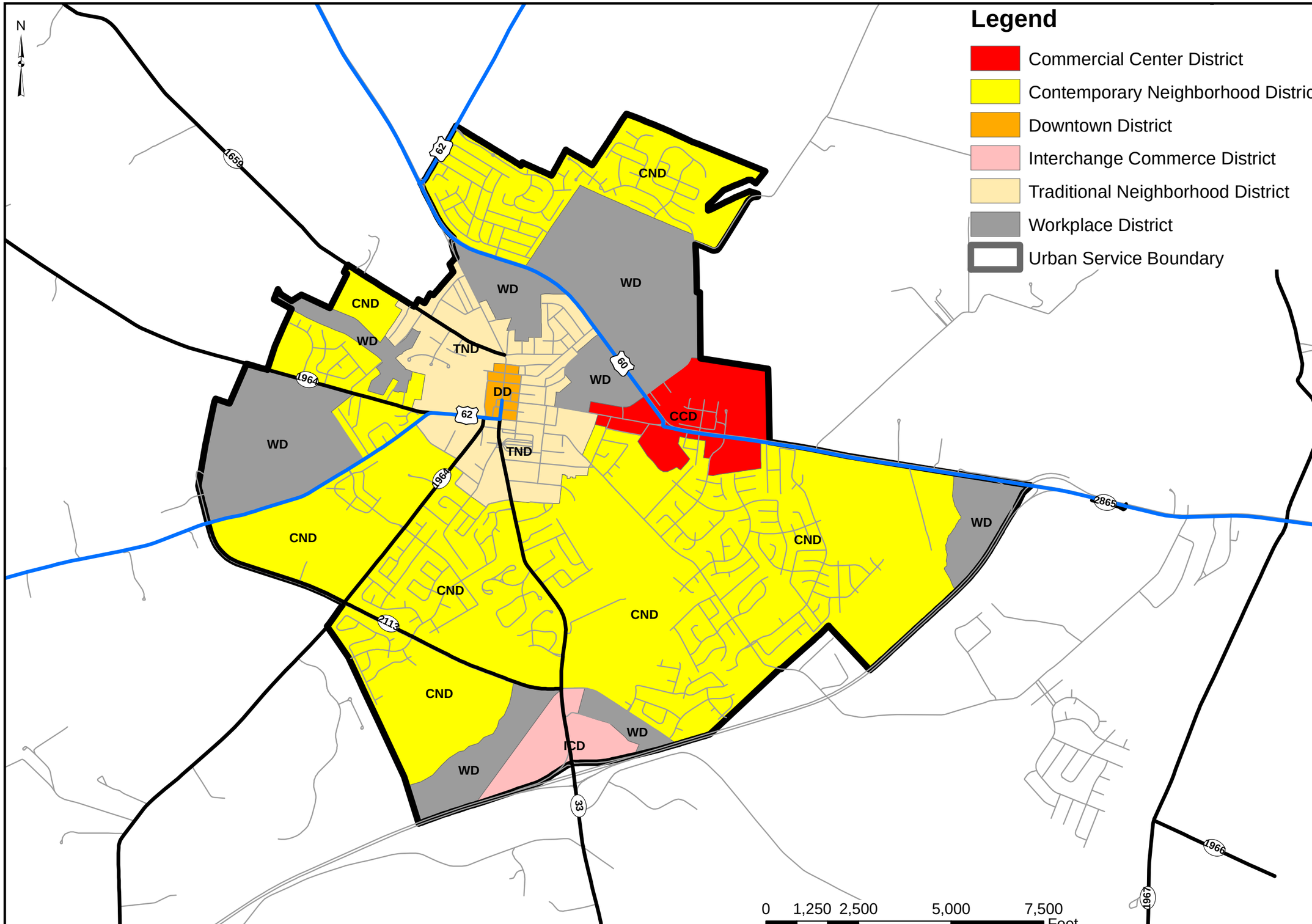

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EXHIBIT 3-6
VERSAILLES URBAN AREA - LAND USE DISTRICTS
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

NO.	DESCRIPTION	DATE	BY

REVISIONS

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

SCALE: 1" = 2500'

Section 4

SECTION 4
SOCIOECONOMIC CHARACTERISTICS OF THE PLANNING AREA

A. Purpose

The purpose of this section is to review the current population trends in the Versailles Wastewater Planning Area and summarize future population projections for the Planning Period of 2013 to 2033.

The current socioeconomic conditions, labor force, income and poverty conditions are also presented.

B. Population Trends within the Planning Area

Population projections are important, as estimated flows for the wastewater collection system and treatment plant are based on the population served. A completely accurate procedure to develop long-term population projections does not exist, as factors such as changes in economic development can alter long-range estimates. The standard procedure for projecting population estimates is to review past population growth patterns (trends) for the area in question and utilize these patterns, along with expected land use designations and specific development knowledge, to project future growth. Population trends have been developed based on census data for Woodford County and the City of Versailles, as well as forecasts from the Kentucky State Data Center (KSDC). Table 4-1 includes historic population data as well as the percent of change in population for Woodford County, and the City of Versailles.

Table 4-1
Population Trends In Versailles and Woodford Co
1980 – 2010

	Population				Percent Change			Avg % Change
Area	**1980**	**1990**	**2000**	**2010**	**'80-'90**	**'90-'00**	**'00-'10**	
Versailles	6,427	7,269	7,511	8,568	13.1	3.3	14.1	10.2
Woodford County	17,778	19,955	23,208	24,939	12.2	16.3	7.5	12.0

Source: 2011 Versailles Comprehensive Plan Land Use Table 11 and 12

Based on the above information, we have assumed that on average Versailles is growing at the same rate as Woodford County.

The 2010 U.S. Census reported a population of 8,568 for the City of Versailles. The 2010 Versailles population predicted by the 2001 Versailles Wastewater Facilities Plan was 8,116, so the City has actually grown at a faster rate than what was predicted in 2001. The growth is expected to continue in the City at rates comparable to those of Woodford County.

The U.S. Census Bureau Population Division, via the Kentucky State Data Center, has also issued population projections for five-year intervals at the State and County level through the year 2050. The Versailles-Midway-Woodford County Planning Commission's 2011 Comprehensive Plan has issued population projections for ten-year intervals at the City level through the year 2030. The 2010 Census population data, the five-year and ten-year population projections were used to develop Kentucky, Woodford County and Versailles population projections for each year through 2040.

The estimates for the years between the five-year State and County population projections and the City ten-year projections, were interpolated with each year growing by the same number of people. The population estimates for the City of Versailles beyond the 2030 projection by the Comprehensive plan were determined by applying the growth percentages for Woodford County to the City through 2040, which assumes that Versailles will grow at the same rate as the county for this time period. The population projections are provided in Exhibit 4-1.

Additional information regarding flow projection based on these population trends will be discussed in Section 7.

C. Socioeconomic Conditions

1. Employment

The U. S. Department of Labor provides employment statistics for Woodford County; however this data is not totally reliable as much of the Woodford County residents are employed in either Frankfort or Lexington. According to the 2011 Versailles-Midway-Woodford County Comprehensive Plan Update (Chapter II Section D) in 2009 only 46 percent of the 12,149 Woodford County residents worked within Woodford County. This percentage has been slowly trending up in more recent years.

The county's civilian labor force was estimated as 13,071 persons by the US Census Bureau for the 2007-2011 time frames. Of the total, 12,228 were employed and 843 were unemployed, for an unemployment rate of 6.4 percent. The City of Versailles civilian labor force (for the same time period) was estimated as 4,192 persons with 3,928 employed and 264 unemployed, for an unemployment rate of 6.3 percent.

Table 4-2 reflects the number of employees in Woodford County in the 2000 and 2010 for eight employment classifications (numbers provided by the U.S Department of Labor, Bureau of Labor Statistics). Also reflected in this table is the forecasted number of employees for each classification for year 2020 and 2030 using a 2 percent rate of growth.

Table 4-2
Employment in Woodford Co
Actuals 2000 & 2010
Forecasted 2020 & 2030

	Actual		Forecasted	
Industry	**2000**	**2010**	**2020**	**2030**
Farming, Forestry, Mining	1,092	1,090	1,112	1,134
Construction	852	897	915	933
Manufacturing	2,356	1,935	1,974	2,013
Transportation Comm Utilities	793	614	626	639
Wholesale and Retail Trade	1,493	1,349	1,376	1,414
Finance, Insurance Real Estate	685	714	728	743
Services	4,277	5,067	5,168	5,271
Government	948	829	846	863
Total	**12,496**	**12,495**	**12,745**	**13,000**

S

Source: 2011 Versailles Comprehensive Plan Land Use Table 37

2. Major Employers in the Planning Area

Table 4-3 lists the major employers in the planning area based on the 2011 Comprehensive Plan.

Table 4-3
2010 Major Employers in the Planning Area

Firm	Product	Employees	Established
Osram Sylvania	Fluorescent Lamps	500-999	1964
Quad Graphics	Book Publishing	500-999	1962
Pilkington	Automobile Window/Glass	300-499	1987
YH America, Inc - Div 1	Automobile Air Conditioning & Hoses	300-499	1989
Ruggles Sign Co	Sign Manufacturing and Installation	10-100	1964
McCauley Brothers Inc.	Horse Feed & Supply	10-100-	1938
YH America, Inc - Div 2	Sealants and Primers	10-100	1998
Woodford Feed Company	Feed and Fertilizer	10-100	1940
Woodford Reserve	Distilled Liquors	10-100	1812
Suran Systems, Inc	Document Binding and Mailing	10-100	1991
Nisshin Automotive Tubing	Stainless Steel Auto Tubing	10-100	2005

Source: 2011 Versailles Comprehensive Plan Land Use Table 37

3. Income

The 2010 census reported that Woodford County had a per capita income of $28,816 with 13.4 percent of the people living below the poverty rate. In 2010, Versailles had a poverty rate of 25.3 percent with a per capita income of $22,759. This rate is more than the State of Kentucky's poverty rate of 18.1 percent.

D. Economic and Social Benefit to the Community

The availability of a well operated and maintained wastewater system, with available capacity that allows for the community's projected growth during the next 20 years, provides the backbone for economic growth and development. When combined with the community's Comprehensive Plan, as well as the implementation of other infrastructure and social projects, this Regional Wastewater Facilities Plan establishes a means to attract new businesses to the Planning Area, which in turn equates to improved socioeconomic conditions and to an environment that supports expanded residential growth.

Exhibit 4-1
Kentucky, Woodford County and City of Versailles Population Estimates and Projections

Year	Kentucky		Woodford County*		City of Versailles	
	Population	% Change	Population	% Change	Population	% Change
2010	4,339,367 [1]		24,939 [1]		8,568 [1]	
		0.78%		0.81%		0.60%
2011	4,373,379 [4]		25,140 [4]		8,620 [4]	
		0.78%		0.80%		0.60%
2012	4,407,392 [4]		25,341 [4]		8,671 [4]	
		0.77%		0.79%		0.60%
2013	4,441,404 [4]		25,541 [4]		8,723 [4]	
		0.77%		0.79%		0.59%
2014	4,475,417 [4]		25,742 [4]		8,775 [4]	
		0.76%		0.78%		0.59%
2015	4,509,429 [3]		25,943 [3]		8,827 [4]	
		0.72%		0.67%		0.59%
2016	4,542,094 [4]		26,118 [4]		8,878 [4]	
		0.72%		0.67%		0.58%
2017	4,574,759 [4]		26,293 [4]		8,930 [4]	
		0.71%		0.66%		0.58%
2018	4,607,424 [4]		26,467 [4]		8,982 [4]	
		0.71%		0.66%		0.58%
2019	4,640,089 [4]		26,642 [4]		9,033 [4]	
		0.70%		0.66%		0.57%
2020	4,672,754 [3]		26,817 [3]		9,085 [2]	
		0.63%		0.51%		0.47%
2021	4,702,281 [4]		26,953 [4]		9,128 [4]	
		0.63%		0.50%		0.47%
2022	4,731,808 [4]		27,089 [4]		9,170 [4]	
		0.62%		0.50%		0.46%
2023	4,761,336 [4]		27,224 [4]		9,213 [4]	
		0.62%		0.50%		0.46%
2024	4,790,863 [4]		27,360 [4]		9,255 [4]	
		0.62%		0.50%		0.46%
2025	4,820,390 [3]		27,496 [3]		9,298 [4]	
		0.54%		0.35%		0.46%
2026	4,846,548 [4]		27,591 [4]		9,341 [4]	
		0.54%		0.35%		0.46%
2027	4,872,705 [4]		27,686 [4]		9,383 [4]	
		0.54%		0.34%		0.45%
2028	4,898,863 [4]		27,782 [4]		9,426 [4]	
		0.53%		0.34%		0.45%
2029	4,925,020 [4]		27,877 [4]		9,468 [4]	
		0.53%		0.34%		0.45%
2030	4,951,178 [3]		27,972 [3]		9,511 [2]	
		0.45%		0.13%		0.12%
2031	4,973,609 [4]		28,008 [4]		9,523 [5]	
		0.45%		0.13%		0.12%
2032	4,996,039 [4]		28,044 [4]		9,534 [5]	
		0.45%		0.13%		0.12%
2033	5,018,470 [4]		28,079 [4]		9,546 [5]	
		0.45%		0.13%		0.12%
2034	5,040,900 [4]		28,115 [4]		9,557 [5]	
		0.44%		0.13%		0.12%
2035	5,063,331 [3]		28,151 [3]		9,569 [5]	
		0.39%		-0.03%		-0.03%
2036	5,083,123 [4]		28,142 [4]		9,566 [5]	
		0.39%		-0.03%		-0.03%
2037	5,102,915 [4]		28,132 [4]		9,563 [5]	
		0.39%		-0.03%		-0.03%
2038	5,122,708 [4]		28,123 [4]		9,560 [5]	
		0.39%		-0.03%		-0.03%
2039	5,142,500 [4]		28,113 [4]		9,557 [5]	
		0.38%		-0.03%		-0.03%
2040	5,162,292 [3]		28,104 [3]		9,554 [5]	

* Woodford County population estimates and projections include City of Versilles population
[1] 2010 Census Data, U.S. Census Bureau
[2] Versailles-Midway -Woodford County 2011 Comprehensive Plan Update
[3] Total Population, Census 2000 and 2010 with Projections 2015 - 2040, Kentucky State Data Center, University of Louisville, as of 2012
[4] Interpolated
[5] Extrapolated from Woodford County projected growth rates

Section 5

SECTION 5
EXISTING ENVIRONMENT IN THE PLANNING AREA

A. Purpose

This chapter provides information on the existing physical, biological, cultural and other resource features within the planning area, and also reviews data on land features, floodplains, general climate and precipitation conditions, wetlands, air quality, and archaeological resources as it relates to the Facilities Plan.

B. Physical Features

1. Topography & Physiography

The topography of Woodford County can vary significantly depending on location – from the steeply sloped areas adjoining the Kentucky River to the gently rolling landscapes of the northern part of the County. Within the Planning Area, the slopes range from gently rolling (less than 6%) to moderately sloping (6-12%).

The Planning Area is located within the Inner Bluegrass subdivision of the Bluegrass Physiographic Region. The inner Bluegrass consists of the outcrop of areas of the Cynthiana formation (Ordovician) and older Ordovician strata.

Most of the underlying rock is limestone that has been subjected to considerable erosion. Most of the drainage is underground where in some places it surfaces to form springs. The area is considered to contain karst and have numerous sinkholes. Due to the multitude of sinkholes and drainage basins in the Planning Area, it is difficult to gravity flow wastewater to the existing wastewater treatment plant without the aid of pump stations.

2. Geology and Soils

The majority of the Planning Area is underlain by the limestone and shale of the Ordovician age, specifically of the Tanglewood Limestone Member of the Lexington Limestone Formation. Brannon Member of the Lexington Limestone Formation is present along with Alluvium and Fluvial deposits.

The Planning Area is composed of two (2) major soil associations: the Maury-McAfee Association and the McAfee-Fairmont-Maury Association. The Maury-

McAfee Association consists of moderate to deep soils that are well-drained and generally occur on gently rolling uplands. The McAfee-Fairmont-Maury Association has similar characteristics to the Maury-McAfee Association, except that they are composed of shallow to deep, well-drained clayey soils on rolling uplands.

3. Floodplains and Wetlands

Floodplains within the planning area were discussed in detail in Section 3. Exhibit 3-4 shows these floodplain areas as have been identified by the Federal Emergency Management Agency (FEMA). These areas are important to identify as gravity sewer systems tend to parallel these natural drainage paths just out of the flooding limits. These flood prone areas are also generally prohibited from development which is important when planning for future sewer flows. For parts of the system that are already in the floodplain, measures need to be incorporated to protect them from flood-impaired operation.

Wetlands are those areas that are not deep enough to be referred to as lakes, but are either covered with water or contain saturated soil for at least part of the year. A wetlands area which supports shrubs and/or trees is considered a swamp. Those wet areas that are treeless but support grasses, rushes and sedges are referred to as marshes. Other areas which are included in the wetlands category are bogs, sloughs, potholes, backwaters and mud flats.

The National Wetlands Inventory Map was reviewed for the presence of wetlands in the Planning Area. According to the National Wetlands Inventory Map, a small number of freshwater emergent wetlands exist in the southern portion of the City. Furthermore, to the west of the WWTP, a freshwater forested wetland exists. However, this study did not locate any wetland that would be impacted within the Planning Area.

4. Water Sources and Supply

The City of Versailles owns and operates a water treatment plant (WTP) and a water distribution system that serves customers within Versailles as well as the Northeast and South Woodford County Water Districts. The two (2) water districts purchase water from the City of Versailles and distribute it to their own customers. The Versailles WTP is rated to a capacity of 10.0 MGD and receives its raw water supply from the Kentucky River, located near Mile 85.1. The WTP provides potable water via a well-gridded, looped system consisting of water mains and water storage tanks.

5. Surface Water and Groundwater

The Planning Area can be divided into four drainage basins: Glenns Creek, Grier Creek, Upper Clear Creek and South Elkhorn. Additional drainage occurs at sinkholes which are scattered throughout the Planning Area.

Woodford County contains three (3) water bodies on the 2010 303(d)/305(b) list of Integrated Reports to Congress on Water Quality in Kentucky: South Elkhorn Creek, Kentucky River and Beals Run. However, as shown in Exhibit 5-1, each of these three (3) water bodies are outside of the Planning Area.

The amount of ground water supply available varies directly with the type of rock formation or aquifer from which it is obtained. The water is considered hard or very hard, and may contain salt or hydrogen sulfide. Ground water contamination can occur when faulty septic tanks or sewers leak raw sewage into the soil. Currently, no ground water contamination is known to exist in the Versailles Planning Area, therefore, no remedial measures are being taken.

6. Climate & Precipitation

The Planning Area's climate is temperate with moderately cold winters and warm, humid summers. Periods of dry or wet weather do occur. Annual snowfall is variable from year to year; however, the average annual snowfall is approximately eight (8) inches. The average number of days with one (1) inch or more of snow is approximately eleven (11) days.

Precipitation is fairly well-distributed throughout the year with September having the least rainfall and May the most. Total annual precipitation is approximately forty-five (45) inches.

The annual mean temperature is 55°F with an average high of 87°F and an average low of 26°F.

7. Air Quality

Air quality in the Planning Area is not categorized as a problem. Air quality problems are normally associated with urban areas or certain industrial sites. The Planning Area contains no traffic congestion problems or any significant industrial polluters that could seriously affect the areas air quality.

Currently, the State of Kentucky has only two (2) non-attainment areas: Northern Kentucky/Greater Cincinnati (Kenton, Boone & Campbell Counties) and the Greater Louisville area (Jefferson & Bullitt Counties).

C. Biological Features

Plant and animal life in the Planning Area are typical of the Bluegrass Region of Kentucky. The two major types of plant communities in the Planning Area are open areas and woodlands.

Open areas are composed of well-kept grazing areas on farms, row crop lands and abandoned pastures. The abandoned pastures are in various stages of succession and are composed of a variety of herbaceous plants, scrub woodland trees, and woody vines and briers. There are no known vascular plants which are rare or endangered.

The woodlands are generally of the oak-hickory type. There are three variations of this type: the rolling upland woodland, the steep slope woodland and the swampy woodland.

The wildlife population of the Planning Area is composed of those typical of the Bluegrass Region of Kentucky. However, Table 5-1 outlines the species of plants and animals that are classified as endangered, threatened or candidate species.

Table 5-1
Endangered, Threatened and Candidate Species

Group	Species	Common Name	Status
Clams	*Pleurobema clava*	Clubshell	Endangered
Clams	*Cyprogenia stegaria*	Fanshell	Endangered
Clams	*Epioblasma torulosa rangiana*	Northern riffleshell	Endangered
Clams	*Obovaria retusa*	Ring pink	Endangered
Clams	*Pleurobema plenum*	Rough pigtoe	Endangered
Flowering Plants	*Physaria globosa*	Short's Bladderpod	Proposed Endangered
Flowering Plants	*Trifolium stoloniferum*	Running Buffalo Clover	Endangered
Insects	*Pseudanophthalmus caecus*	Clifton Cave Beetle	Candidate
Mammals	*Myotis sodalis*	Indiana Bat	Endangered
Mammals	*Myotis grisescens*	Gray Bat	Endangered

Sources: U.S. Fish and Wildlife Service, Environmental Conservation Online System (12/5/2013)

The more abundant species of animals present in the Planning Area are:

- Gray Squirrel
- Fox Squirrel
- Raccoon
- Mink
- Muskrat
- White-tail Deer
- Cottontail Rabbit
- Bob-White Quail
- Mourning Dove

D. Cultural Features

1. Historic Districts

Versailles and Woodford County have a rare combination of historic and cultural resources. A number of these historic buildings and districts are listed on the National Park Service's National Register of Historic Districts and Places. Presently, thirty-seven (37) sites are listed as Historic with the National Register. They are as follows:

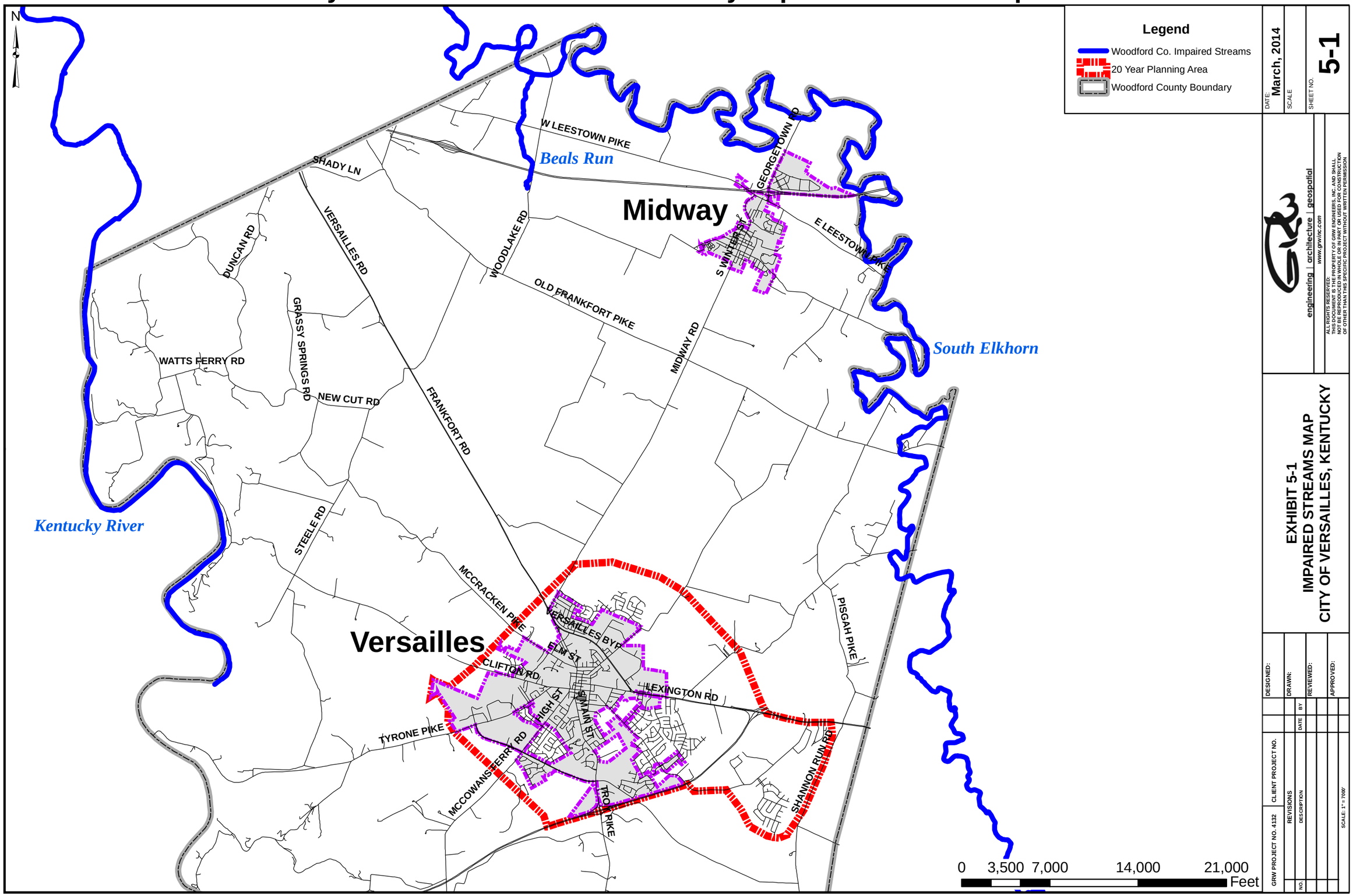
- Airy Mount
- Arnold-Wooldidge House
- Big Spring Church
- Charles Black Farm
- Lucas Broadhead Home
- Buck Pond
- Bullock Site
- Marquis Calmes Tomb
- Carter House
- Cleveland House
- Clifton Country Club
- Clifton-McCraken Rural Historic District
- Confederate Monument
- Downtown Versailles Historic District
- Edgewood
- A.T. Harris House
- Hogan Quarters
- Humphries Estate Quarters
- Capt. Jack Jouett House
- Lee's Tavern
- Thomas Lyne House
- Margaret Hall
- George F. Moore Place
- Morgan Street Historic District
- Moss Side
- Munday's Landing
- Claiborne W. Nuckols Farmstead
- Pisgah Presbyterian Church
- Pisgah Rural Historic District
- Pleasant Lawn
- Rose Hill Historic District
- Scearce House
- South Main St. Historic District
- W.B. Spring House
- Welcome Hall
- Benjamin Wilson House
- Wyndehurst

Currently, none of the listed historic sites will be impacted by the proposed projects within the Planning Area.

E. Other Resource Features

There are no national or state parks or recreational areas within the Planning Area. The Planning Area does not include USDA-designated important Farmland or other environmentally sensitive areas.

City of Versailles: Woodford County Impaired Streams Map



DATE: March, 2014

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EXHIBIT 5-1
IMPAIRED STREAMS MAP
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

GRW PROJECT NO. 4132
CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 7000'

Section 6

SECTION 6
EXISTING WASTEWATER SYSTEM

A. Purpose

The purpose of this section is to describe the existing wastewater collection and wastewater treatment plant (WWTP) in the Planning Area. Also included is information on existing on-site disposal systems (septic tanks and tile fields), the methods of disposal of by-products from wastewater treatment and a description of problems with operation, maintenance and compliance of the wastewater system.

B. Existing Sewage Collection System

The Versailles wastewater collection system was originally constructed in the 1930's. The collection system is considered "separate" as opposed to "combined", which means that there are separate pipes dedicated to transporting storm and sanitary flows. Due to the topography within Versailles, the collection system consists primarily of gravity flow. The collection system generally flows into the older downtown areas, then flows through one of two trunk sewers west across Big Sink Park to the WWTP. A full size map of the collection system is located in Appendix B.

In general, the physical condition of the existing collection system, including gravity sewer lines and pump stations, allows the system to perform well during dry weather, but creates issues during wet weather events. The City completed a Sanitary Sewer Overflow Plan (SSOP) in 2009, which identifies troublesome wet weather areas within the system. Since the report in 2009, several improvements have been made to the system which eliminated most of these overflows. The report also provides a response plan in the event of a sanitary sewer overflow. A copy of the SSOP report is included in Appendix C.

The collection system is aging and reaching its design capacity in several areas. Portions of the collection system are deteriorating and will need to be replaced or rehabilitated in the near future. The City has completed a Sewer System Evaluation Survey (SSES), which outlines the City's plan to rehabilitate or replace portions of their collection sewer system. Included in Appendix D is a portion of this report, which covers the summary, recommendation and schedule for repairs.

The wastewater collection system within the Planning Area consists of the following components:

1. Sewers Manholes

The wastewater collection system consists of approximately 2,116 manholes. The City recently completed a system wide manhole inspection project which included Global Positioning System (GPS) locations of their manholes. This data has been included in the City's base Geographic Information Systems (GIS) mapping. The manhole defects that were identified during this investigation have been included in the SSES report and corrective actions will be addressed per the SSES recommendations.

2. Gravity Sewers

The wastewater collection system consists of approximately 465,696 linear feet of gravity sewer line ranging in size from 6-inch to 30-inch. Table 6-1 gives a summary of the collection pipe sizes (or diameters) with their associated lengths.

Table 6-1
Versailles Collection System
Pipe Diameter Summary

Pipe Diameter (in)	Length (LF)	% of Total Length
30	8,976	1.9%
24	9,504	2.0%
21	2,640	0.6%
18	4,752	1.0%
15	4,752	1.0%
12	21,648	4.7%
10	13,728	3.0%
8	394,416	84.7%
< 8	5,280	1.1%
Total Length	**465,696**	**100%**

Source: City of Versailles GIS

A half-sized map of the system is presented in Exhibit 6-1, with a full size map located in Appendix B.

The City has begun Closed Circuit Television (CCTV) inspections of their sewer system. The 105,504 feet that was inspected in 2012 (23 percent of the total system), consisted of approximately 27 percent (28,560 feet) of PVC pipe, 65 percent (68,163 feet) of VCP pipe, 3 percent (2,704 feet) of RCP, 1 percent (979 feet) of DI and the remaining 4 percent (5,097 feet) being unknown. The City will continue to gather this information on the system and update their GIS database. The areas that have been inspected are identified in Exhibit 6-2.

3. Pump Stations

The City currently operates twenty-one (21) wastewater pump stations as summarized in the following Table 6-2 and shown in Exhibit 6-1. Please note that the City will soon assume ownership of the Sugartree Station, which is currently owned and operated by a private developer.

Table 6-2
Versailles Wastewater Pump Stations

Pump Station Name	Motor Size	Capacity		Pump Station Name	Motor Size	Capacity
Station No. 1**	30 HP	800 GPM		Dan Drive	5 HP	*
Station No. 2**	30 HP	1075 GPM		Hellard Trailer Park	5 HP	80 GPM
Station No. 3**	70 HP	1550 GPM		Homestead	7.5 HP	90 GPM
Station No. 4**	70 HP	1850 GPM		Huntertown Glenn	5 HP	80 GPM
Adena Woods***	7.5 HP	180 GPM		Lanes View	10 HP	150 GPM
Ball Park***	10 HP	600 GPM		Locust Grove	20 HP	100 GPM
Bryanwood	5 HP	100 GPM		Merewood	10 HP	225 GPM
Cedar Ridge	7.5 HP	100 GPM		Methodist Home	10 HP	225 GPM
Charmil	10 HP	500 GPM		Stonegate	20 HP	475 GPM
Colony 1	15 HP	300 GPM		Woodland	5 HP	100 GPM
Crossfield Dr.	7.5 HP	125 GPM		Sugartree****	*	*

*Information not available

**Stations with Backup Generators

***Stations with quick connections for portable pumps

**** Sugartree Pump Stations is currently the Developers Station and has not been given to the City.

The SSES report identified four (4) of the pump stations as needing rehabilitation work; Charmil, Stonegate, Woodland, and the Methodist Home. The renovation of these pump stations will be included in collection system rehabilitation projects per the schedule in the SSES report. Below is a brief description of the condition of each of the City's pump stations:

a. **Pump Stations Nos. 1 – 4** have recently been placed into service. These pump stations are equipped with a security fence, variable frequency drives (VFDs), flow meters, telemetry and standby generators with automatic transfer switches. The pump stations report alarm conditions to the Water Treatment Plant (WTP) rather than the WWTP because the WTP is staffed longer each day. Pump stations No. 1 and 3 also have the ability to supply odor control chemicals into the wet wells. Structurally, all these pump stations are in good condition. The design capacity of these stations has not been realized and thus they are expected to handle future flows with little additional improvements.

b. **Adena Woods Pump Station** was constructed in 2006. The station is in good working order and has easy access for maintenance behind a wooden privacy fence. Both the wet well and valve vault structures are in good condition, with the exception of the valve vault pipe supports which were constructed from wood and are starting to rot. Emergency backup power (i.e., generator) is not provided; however, the 4-inch force main does have a flanged quick connection to accommodate a portable pump.

c. **Ball Park Pump Station** was replaced in 2009 by the City. The station appears to be in good condition with no operational issues being reported by the City. Emergency backup power (i.e., generator) is not provided; however, the 6-inch force main does have a flanged quick connection to accommodate a portable pump. Some minor items noted at this pump station were no security fence, the valve vault drain line was missing and the vault for the portable pump quick connect located downstream of the valve vault had been displaced, making access to the valve difficult.

d. **Bryanwood Pump Station**, located between a house and a drainage ditch, has no access road for maintenance vehicles. Maintenance crews access the pump station by walking across a yard near a drainage ditch. In addition to the poor access for maintenance vehicles, the pump station has no security fence, no emergency backup power (or emergency transfer switch) and no quick connection point for a portable pump. However, setting these issues aside, the City reports this pump station is operating well, but does experience larger flows during rain events. The valve vault and piping is in good shape with the exception of no quick connection point for a portable pump.

e **Cedar Ridge Pump Station** was constructed around 2002. The pump station can be easily accessed for maintenance and is in good condition with no operational concerns expressed by the City. It was noted that the pump station has no security fence at the site, no connection point for backup power or a quick connection for a portable pump on the force main.

f. **Charmil Pump Station** was renovated last in 2008 and is easily accessible behind a wooden 4-plank fence. The City reported that this pump station does receive high amounts of infiltration and inflow (I&I), which they suspect is due to privately owned sump pumps in the area. Despite having I&I issues, the City reported that the pump station operates well. Additionally, no backup power or bypass pumping capabilities on the 6-inch force main is provided.

g. **Colony 1 Pump Station** is accessed by a paved entrance off McCowans Ferry Road. The City has recently (2013) replaced one of the two pumps and rebuilt the other pump. The pump guide rails are extremely corroded and scheduled to be replaced before the end of 2014. Some items noted at this station included the site is unfenced and there is no backup power or bypass pumping quick connections. Additionally, the pump station had no valve vault; the check valves appear to be buried outside the wet well and the buried isolation valves are operated from above ground through valve boxes.

h. **Crossfield Drive Pump Station** is located just behind the sidewalk between two commercial businesses. It is a very small site with little room for any security type fence. The pump station was updated in the winter of 2012/spring of 2013 with a new control panel, new pumps and rails, and fall protection grating. The City noted that this station doesn't see large amounts of I&I and is operating well following the recent work. A few items noted while at the station was that there is no backup power or bypass pumping quick connections. Additionally the pump station had no valve vault; it appears the check valves are buried as well as the isolation valves which are operated through valve boxes.

i. **Dan Drive Pump Station** is located between the road curb and the sidewalk which allows easy access for maintenance. However, it also leaves the pump station vulnerable to damage should a vehicle jump the curb or vandalism from people walking past. The electrical disconnect is located on a pole approximately 100 feet away in a small drainage ditch. No security fence, emergency power provisions or pump quick connection ability is provided. Additionally, the flap valve on the drain line between the valve vault and the wet well was stuck in the open position and the pump rails were corroded as were the 3-inch diameter discharge piping and valves. The City noted that this pump station does experience I&I during rain events. It was noted that the City had purchased several lots in the area due to storm water flooding. These storm water flooding issues have been addressed, thus providing site options to relocate the pump station if need in the future.

j. **Hellard Trailer Park Pump Station** is located in the right-of-way of Mobile Home Park Road. The site is not fenced which allows for easy maintenance. The City reported that the pump station operates well. The pump guide rails are

starting to corrode in the wet well. In addition, no backup power or bypass pumping capabilities on the 4-inch force main are provided.

k. **Huntertown Glenn Pump Station** was constructed in 2005 and is still in good working order and is located off Huntertown Road behind a wooden privacy fence. The pump station experiences little I&I and the 4-inch force main piping is equipped with a valve and blind flange for emergency pumping needs. The wet well structure is in good condition and has a fall protection netting at the hatch. The piping in the valve vault and the pump guide rails are beginning to corrode. The electrical conduit has separated prior to the control panel, thus exposing the wiring.

l. **Lanes View Pump Station** was constructed in 1992 and is located off Chestnut Lane near highway 62. The pump station site is easily accessible and has no security fence but sits well off the road. The wet well was in good condition. The valve vault drain line was installed above the floor allowing water to pool, which is assisting in the corrosion of the 4-inch valves and piping. In addition, no backup power or bypass pumping capabilities are provided. The City indicated that other than some grease issues, the pump station operates well with no I&I issues.

m. **Locust Grove Pump Station** is located off Huntertown Road behind a wooden privacy fence. The pump station experiences little I&I and the 4-inch force main piping is equipped with a valve and blind flange for emergency pumping needs. The wet well structure is in good condition.

n. **Merewood Pump Station** was constructed in 1999 and is located off Highway 62. Adequate accessibility is provided; however, the access road is narrow and stops short of the station. Additionally, working on the pumps or valve vault is made difficult by the slope of the ground between the access road and the station as well as the existing electrical equipment. No security fencing is provided, but the station is located well off the road. The wet well was in good condition. Also, the City indicated that the pumps will not automatically alternate run cycles, however, the second pump does automatically come on in a high level alarm situation. No backup power is provided, but the 6-inch force main does have a quick connect coupling to accommodate a portable pump. The pump station experiences no excessive I&I issues.

o. **Methodist Home Pump Station** was constructed in 2000 and is located off the east right of way of Paynes Mill Road behind a chain link security fence. The flow into this pump station is conveyed by two gravity lines, one of which belongs to the City and one that is a private line. It is suspected that the private line may contribute to the large amounts of I&I observed at this station. The wet well and valve vault structures are both in good condition. The pumps are

operating well, as they were rebuilt in September 2013. The automatic pump alteration system fails to operate properly, thus requiring the City to alternate the pump operation manually. However, the City reported that the high level alarm does switch the backup pump on in an alarm situation.

p. **Stonegate Pump Station** was renovated in 2007 and is accessed through a private residence driveway that splits off behind the home and follows a separate concrete drive which then parallels a small creek to the pump station. The creek has washed away the subgrade of a section of the concrete access driveway, leaving the potential for the concrete to collapse. While the station is out of site to the general population, it has no security fence. The City's operators stated that the site can be difficult to access if the creek level is high. The City's operators reported that this pump station does have I&I issues. The wet well itself is a prefabricated steel well which is rusted around the top section of the well. There is also a fist size hole on the side of the wet well just under the steel plate top. The City reported that the pumps and controls operate satisfactory. The valve vault and piping are in sufficient condition and a quick connection for emergency pumping is provided. Some electrical items noted were that the power utility support cable has pulled away from the power pole, there were no surge suppressors and the ground connections were corroded.

q. **Woodland Pump Station** has adequate accessibility, however, no security fencing is provided. The valve vault and piping is in suitable condition. The pumps have recently been replaced (2012) and are operating satisfactory. The wet well is also in suitable condition. However, it does not have fall protection and there were signs that the pump station surcharges. The pump station experiences excessive I&I, but has no emergency connection point for bypass pumping or standby power.

r. **Sugartree Pump Station** is presently owned and operated by a private developer, but the City will assume ownership in the future. We did a quick look at this station and made the following observations. The valve vault drain line was missing a check valve in the wet well. The structures are in suitable condition as would be expected. The wet well had fall protection netting and the valve vault had a quick connection with a blind flange on the 3-inch force main. The station has a wooden privacy fence tightly placed around the site that could be troublesome for possible future major maintenance at the pump station.

s. Additionally, it was noted that a majority of these stations had similar electrical issues such as, broken electrical conduit, corroded control enclosure, unsealed conduits, no surge or transient voltage surge suppression (TVSS) in the panel and no emergency standby power provision.

4. Existing Sewer Collection System Hydraulic Model

A hydraulic computer model of the City's sewage collection system was created utilizing InfoWorks CS modeling software to aid in the capacity evaluation of the existing collection system. This model included the City's interceptor sewers (12-inch in diameter and larger), selected smaller diameter gravity sewer main (as needed, depending on their significance to the modeling process) and selected pump stations with their associated force mains.

The model was developed from survey data provided by the City for the selected sewers and pump stations. Manhole rim and invert elevations, pipe lengths, pipe diameters, slopes, and materials were also confirmed by record drawings, when available, for the sewer lines and manholes that were modeled. Wet well volumes, elevations, pump curves, float levels, and pump station run time information was also provided by the City for the modeled pump stations. Exhibit 6-3 shows the portions of the collection system which were included in the modeling efforts.

a. Model Calibration

Once the collection system model was constructed, various calibration scenarios for both dry and wet weather situations were performed in efforts to match the modeled results to actual flow data collected by the City between March 6, 2012 and May 5, 2012. During this period the City collected data at nine (9) flow meter locations in their system. A portion of the flow monitoring results can be found in Appendix E. Four (4) metered locations were used to analyze the model including locations near 330 Kentucky Avenue (FM 2), the intersection of the Versailles Bypass and Big Sink Road (FM 3), the intersection of Douglas Street and Amsden Avenue (FM 4), and the manhole located next to the City maintenance garage at 331 Kentucky Avenue (FM 9) to identify dry weather periods and corresponding dry weather flows.
The existing collection system was divided into drainage subcatchments contributing runoff and inflow to each of the modeled sewer lines, which are depicted in Exhibit 6-4. Wastewater flows were based upon each subcatchment's population. Existing land use and parcel shapefiles were analyzed using ArcGIS to assign population information to each subcatchment. Typical population density values for various land use types were used to estimate the population of each subcatchment. A flow of 100 gallons per capita per day (gpcd) was used to estimate the flow contributions.

The total flows estimated from the existing subcatchments, however, were much larger than the observed dry weather flows. Therefore, the estimated flows from each subcatchment were determined by adjusting values of each subcatchments population to match the observed dry weather flow at each meter. Dry weather flows were calibrated by starting at the most upstream flow meter site and working downstream to each consecutive flow meter.

To simulate variation of inflow during each hour of the day, a daily diurnal curve was constructed by averaging the flows for the dry weather period and comparing the average daily flow with the flow measured during each hour. The model was simulated over a 24-hour period and the modeled average flows at each flow meter site were within 10% of the actual observed average flows. Likewise, average flows coming into the plant were within 10% of the observed flows, therefore the dry weather flows were considered calibrated.

b. Model Calibration for Wet Weather Flow

In conjunction with the March 6, 2012 to May 5, 2012 flow study, a precipitation gauge was placed on the roof of the Versailles Municipal Building located at 196 Main Street. Wet weather peak flows were calibrated to match peak flows of four (4) storms including a storm on March 8, 2012 during which 1.27-inches of precipitation fell over a 9.25-hour period, March 17, 2012 during which 0.83-inches of precipitation fell over a 1-hour period, April 4, 2012 during which 0.83-inches of precipitation fell over a 5-hour period, and April 21, 2012 during which 1.96-inches of precipitation fell over a 7.75-hour period. These storms were among the largest storms recorded during the time period of the flow monitoring study.

In order to determine storm runoff flows for each subcatchment, the average dry weather flow was subtracted from the flow meter results of the calibration storm event. Initially, modeled runoff flow volumes were much higher than observed runoff volumes at each subcatchment. The wet weather flows were calibrated by adjusting a percentage of subcatchment area contributing to runoff infiltration until the modeled peak flow matched the observed peak flow at each flow meter site.

Currently, the City has no continuous influent flow metering ability at the WWTP, recording only instantaneous readings, making it difficult to calibrate the modeled peak flow through the plant to existing conditions.

Once the collection system model was setup and calibrated to actual dry and wet weather events, multiple model scenarios were completed to simulate the system response to varying future flows in both dry and wet weather contributions to determine the additional system capacity requirements.

c. 2033 Dry Weather Flows

Future dry weather flow projections were used to determine populations for each modeled subcatchment. The future wastewater flow projections can be found in Exhibit 7-1, and discussed in more detail in Chapter 7. The future wastewater flow projections were divided up and distributed to each subcatchment based upon the subcatchment's size and intended land use. Each dry weather flow was

also given a diurnal flow pattern matching the observed dry weather flow pattern at each meter.

Future dry weather modeled scenario does not reflect any improvements to the collection system. Under these conditions, the main sewer lines did not exceed their design capacity and did not surcharge. As a result, no manhole overflows were predicted during future dry weather flow conditions.

d. 2033 Wet Weather Flows (Design Storm)

Models for future wet weather events utilized a synthetic 2-year, 24-hour storm event, which is a typical design storm used in planning documents, to analyze the existing sewer system capacity and determining necessary improvements were also performed. The Soil Conservation Service (SCS) method and Type-II rainfall pattern type curve were used to determine rainfall increments for a synthetic 2-year, 24-hour storm in the Versailles area. During an SCS Type-II storm, approximately 60% of the total rainfall amount occurs within two hours at the center of the storm's distribution. The synthetic storm was based on the total rainfall of 3.05-inches during the 2-year, 24-hour storm for the Versailles area, obtained from NOAA Atlas 14, Volume 2, Version 3.

Results of the future wet weather flow model scenario (the future dry weather flow plus the 2-year, 24-hour storm) did result in the main sewer lines exceeding their design capacity and surcharges occurring i.e., manhole overflows were predicted. The model results predict that SSO's can be found in all basins except basin 4, and basin 9.

e. Proposed Collection System Improvements

The City is currently undergoing improvements to the sewer system as a part of a Sanitary Sewer System Evaluation Survey (SSES) project. The goal of the SSES project is to reduce Inflow and Infiltration throughout the system to reduce sanitary sewer overflows (SSOs). The City expects the SSO's will be eliminated by improvements made as a part of the SSES project. A more complete description of the improvements and rehabilitation projects made as part of the SSES project is located in Section 8. The City has elected to delay additional improvements to the system until the SSES Improvements are completed. The system will be evaluated at that time to determine if additional measures are required.

C. Existing Wastewater Treatment Facilities

The existing Wastewater Treatment Plant (WWTP) in Versailles is located in the northwest portion of the City off Kentucky Avenue near the intersection of the Oak Street. The treatment plant was originally constructed in 1990 with a capacity of 3.0 MGD average daily flow (ADF) and a hydraulic peak of 9.0 MGD. In 2005 the City of Versailles

upgraded the sludge management facilities by adding (2) Aerated Sludge Holding Basins, a Blower Building and Equipment, Digested Sludge Pumps, Belt Filter Press/Gravity Belt Thickener, and a Truck Loading Station. Additionally, improvements to their screenings building and clarifiers were made. The wastewater treatment plant discharge is located at mile point 12.4 of Glenns Creek.

Exhibit 6-5 shows the operating and design conditions and design criteria for the WWTP. The existing operating conditions are based on the monthly operating reports from January 2010 thru December 2012 as shown in Table 6-4. The existing operating conditions can be summarized as follows:

- The peak hydraulic capacity is exceeded by 2.0 MGD.
- The daily influent TSS exceeds the design conditions.
- The daily influent BOD exceeds the design conditions.
- The daily influent NH_3-N is less than the design conditions.
- The mechanical bar screen operates within the design criteria.
- The oxidation ditches operate within the design criteria.
- The surface overflow rate of the final clarifiers exceed the design criteria.
- The chlorine contact basin operates within the design criteria.
- The aerated sludge holding basins operate within the design criteria.
- The gravity belt thickener/belt filter press operates within the design criteria.

Exhibit 6-6 depicts the flow schematic of the existing wastewater treatment facilities.

Major treatment components include:

1. Screening Building

Influent flow is conveyed to the wastewater treatment facilities by either a 24-inch gravity sewer or a 14-inch force main. The flow enters the plant at the screening building where it passes through either a mechanical bar screen or a manually cleaned coarse bar screen, each rated for 9 MGD. These screens serve to protect equipment downstream in the treatment process. In 2005 the City added a screen press to their mechanical bar screen to compact and dewater the screenings. The screenings removed from the wastewater is deposited into a container adjacent to the screening building for off-site disposal at an approved landfill.

2. Influent Flow Measurement

The City utilizes a staff gauge in the influent channel to measure the influent flow. This requires a manual reading and reflects only a snap shot of the influent flows at that specific moment. Thus the City is unable to record influent flows over a period of time to determine the exact peak flow to the WWTP.

3. Oxidation Ditch Distribution Box

Raw wastewater flows from the Screenings Building via a 30-inch gravity line into the Oxidation Ditch Distribution Box which distributes flow to the two (2) existing oxidation ditches. Flow is controlled by two (2) slide gates that split the discharge between the oxidation ditches. The Oxidation Ditch Distribution Box slide gates and concrete appear to be in satisfactory condition.

Return Activated Sludge (RAS) is also discharged (via an 8-inch force main) into this Distribution Box, mixing with the raw sewage. The Distribution Box has the capability to route the influent wastewater and RAS to either of the oxidation ditches.

4. Oxidation Ditches

The Versailles WWTP has two (2) existing oxidation ditches for the purpose of biological treatment. Oxidation ditches utilize the extended aeration activated sludge treatment process for organics removal and nitrification. The screened raw wastewater/RAS mixture enters the oxidation ditches, where it is aerated by vertical aerators and circulates at a velocity of approximately 1 to 2 feet per second, which prevents the sedimentation of solids.

Each of the oxidation ditches holds 1.45 million gallons, being roughly 96 feet wide and 186 feet long from each of its radial ends along with a 12 feet deep channel. Each ditch has two 60 HP vertical aerators to provide aeration and mixing are operating satisfactorily. The condition of the concrete in the ditches is showing no signs of deterioration.

5. Final Clarifiers

The oxidation ditches effluent flows by gravity through a 24-inch pipe to one of two 75-foot diameter clarifiers. There is not a distribution box between the ditches and the clarifiers. The 24-inch gravity lines off each of the ditches combine into a common 24-inch line for a short section of pipe before separating again into two (2) 24-inch lines, each line having a plug valve that would allow isolation of the clarifiers for maintenance. The clarifiers have a side water depth of 13-feet.

Recently the City has had issues with clarifier No. 1. While attempting to do maintenance on this clarifier, the pressure relief valves (PRV's) in the slab failed to open causing excessive ground water forces under the slab. These forces heaved the concrete just enough to cause the equipment to be pushed out of plumb and cracks to develop in the bottom slab. This movement prevented the equipment from operating correctly as well as ground water to enter thru the cracked slab. Division of Water (DOW) was not notified of this incident. The City was able to dewater the site

enough to allow the PRV's in the slab to be cleaned and/or replaced, the concrete to be grouted, the equipment to be leveled and the unit to be placed back into service.

It is assumed that clarifier No. 2 will need to have similar maintenance performed on the PRV's and could also have similar cracking in the bottom.

In addition to the poor structural condition of the bottom slab of the clarifiers, the mechanical equipment, such as gear reducers, bridges, weirs, and scum scrapers/skimmers, has aged and should be considered for replacement.

A portion of the sludge that accumulates in the clarifiers is returned to the oxidation ditches as return activated sludge (RAS) and a portion is wasted from the clarifiers as waste activated sludge (WAS). The sludge is withdrawn using telescoping valves at the center of each clarifier via a 16-inch line or an 8-inch drain line off the bottom sump. Scum collected off the surface of the clarifiers is drawn into skimmer hoppers and sent to a common scum pump station, where it is mixed with WAS and pumped to one of the two aerated sludge holding basins.

6. Return Activated Sludge (RAS/WAS) Pump Station

Sludge enters the RAS/WAS pump station concrete wet well through a 16-inch gravity sewer fed by the telescoping valves located at each clarifier. The RAS/WAS is then lifted by one of three submersible pumps to the RAS valve vault where flow passes through a flow meter then through an 8-inch force main that is discharged into the oxidation ditch distribution box. The RAS mixes with incoming raw sewage in distribution box and is then distributed to the oxidation ditches, initiating the secondary biological treatment process.

The common pump discharge header was constructed in such a way that by opening and closing valves, one of the three pumps can be used to pump sludge to the Scum Pump Station. Here the sludge is mixed with scum from the clarifiers and sent to one of two aerated sludge holding basins. The RAS/WAS pump station appears to be in generally good condition.

7. Chlorine Contact Basin

The clarifiers effluent flows by gravity via 24-inch diameter lines into a clarifier collection box and then into the chlorine contact basin. The chlorine contact basin is a four (4) chambered, baffled unit that provides serpentine flow of the process water. Each chamber is 55-feet long by 6-feet wide with a side water depth of 12.5-feet. Chlorine gas is stored in two (2) one ton cylinders. Disinfection utilizes a 100 pound per day (ppd) and a 200 ppd chlorinator that disperses chlorine as a solution to the disinfection basin.

Connected to the end of the chlorine contact basin is another channel which allows for post aeration, dechlorination, and effluent flow measurement.

The concrete basin structure and equipment is in good condition, however the City has expressed interest in options other than chlorine gas for disinfection.

8. Post Aeration

The dissolved oxygen concentration in the final effluent is increased by utilizing diffused air fed through two self-aspirating submersible aerators. The post aeration chamber is 6-feet wide by 33-feet long with a side water depth of 12.5-feet.

9. Dechlorination

Dechlorination utilizes sulfur dioxide to reduce chlorine concentrations in the final effluent to acceptable levels. The sulfur dioxide is stored in one ton cylinders and supplied through one 50 ppd and one 100 ppd sulfonator to a feed point at the end of the disinfection basin.

10. Effluent Flow Measurement

Effluent flow monitoring is provided by an 18-inch Parshall Flume with an ultrasonic flow meter. The Parshall Flume is located after the post aeration basin and just prior to the WWTP outfall.

The ultrasonic flow meter is capable of reading flow up to 8 MGD at which point the meter counter rolls over and starts reading again at zero. In order for the plant operators to record their flows in excess of 8 MGD, they add 8 MGD to their ultrasonic reading.

11. Sludge Handling

The Sludge Handling facilities were revamped during the 2005 construction project which was designed to handle the future flows. The improvement to the sludge handling included one (1) 1.3 million gallon aerated sludge holding basin, which was divided into two basins; a new sludge blower building; two (2) 200 gpm progressive cavity sludge pumps; a new sludge polymer feed system; and a new belt filter press.

While the sludge equipment is relatively new, the operators have noted several items such as the belt filter press and polymer feed systems that are in need of an overhaul. Additionally, newer technologies were discussed that exist now which may allow for replacement of these 8-year old systems for more efficient and effective units saving the City on operational and disposal costs.

The wastewater treatment plant's Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. is KY 0020621, a copy of which can be found in Appendix F. Table 6-3, located on the following page, gives a summary of the Permit limits. Table 6-4 gives a summary of the Monthly Operating Reports (MOR's) for 2010 thru 2012.

Table 6-3 Versailles Wastewater Pump KPDES Permit Current Discharge Limitations and Monitoring Requirements (Expires May 31, 2014)						
Effluent Characteristics	**Discharge Limitations**				**Monitoring Requirements**	
	(lbs/day)		**Other Units (Specify)**			
	Monthly Average	**Daily Max**	**Monthly Average**	**Daily Max**	**Measurement Frequency**	**Sample Type**
Effluent Flow (MGD)	Report	Report	N/A	N/A	Continuous	Recorder
Influent Flow (MGD)	Report	Report	N/A	N/A	1/Week	Instantaneous
Effluent $CBOD_5$ (mg/l)	500	751	20	30	1/Week	24 Hr Composite
Influent $CBOD_5$ (mg/l)	Report	Report	Report	Report	1/Week	24 Hr Composite
Percent Removal $COBD_5$			85% or Greater		1/Month	Calculated
Effluent TSS (mg/l)	751	1126	30	45	1/Week	24 Hr Composite
Influent TSS (mg/l)	Report	Report	Report	Report	1/Week	24 Hr Composite
Percent Removal TSS (%)			85% or Greater		1/Month	Calculated
Ammonia Nitrogen (mg/l N)						
May 1 – October 31	100	150	4.0	6.0	1/Week	24 Hr Composite
November 1 – April 30	250	375	10.0	15.0	1/Week	24 Hr Composite
Escherichia Coli (N/100 ml)	N/A	N/A	130	240	1/Week	Grab
Dissolved Oxygen (mg/L) Minimum	N/A	N/A	Not less than 7.0		1/Week	Grab
PH (Standard Units)	N/A	N/A	6.0 (min)	9.0 (max)	1/Week	Grab
Total Residual Chlorine (mg/l)	N/A	N/A	0.011	0.019	1/Week	Grab
Total Phosphorus (mg/l)	N/A	N/A	Report	Report	1/Week	24 Hr Composite
Total Nitrogen (mg/l)	N/A	N/A	Report	Report	1/Week	24 Hr Composite
Chronic Toxicity (TUc)	N/A	N/A	N/A	1.00	1/Quarter	3 – 24 Hr Composite

Table 6-4
Peformance Characteristics
City of Versailles Wastewater Treatment Plant

Year	Month	Influent Flow			Eff Flow	Influent TSS			Effluent TSS		Influent BOD			Effluent BOD		Effluent pH			AVG NH_3-N		AVG Phosphorus		AVG Eff. DO (mg/l)	AVG Eff. E. Coli (#/100ml)
		AVG	MAX	Peak Factor	AVG	AVG	MAX	AVG	AVG	AVG	AVG	MAX	AVG	AVG	AVG	AVG	MAX	MIN	Inf.	Eff.	Inf.	Eff.		
		(MGD)			(MGD)	(mg/l)		(lbs/day)	(mg/l)	(lbs/day)	(mg/l)		(lbs/day)	(mg/l)	(lbs/day)	(SU)			(mg/l)		(mg/l)			
2010	January	2.10	2.90	1.38	2.22	314	591	5,499	9	167	228	294	3,993	8	148	7.6	8.1	7.3	15.5	0.34	--	3.27	8.6	2.7
2010	February	2.50	3.50	1.40	2.17	111	201	2,314	12	217	158	186	3,294	7	127	8.3	8.5	6.6	18.0	0.40	--	2.03	9.4	7.5
2010	March	1.70	2.10	1.24	1.25	249	280	3,530	6	63	263	357	3,729	5	52	7.7	7.9	6.5	19.3	0.33	--	3.13	8.6	1.7
2010	April	1.90	1.90	1.00	1.71	325	909	5,150	7	100	218	258	3,454	7	100	7.5	7.8	6.7	21.2	0.51	--	3.91	8.1	1.0
2010	May	2.50	3.10	1.24	2.85	191	444	3,982	4	95	143	177	2,982	4	95	8.2	8.7	6.6	15.7	0.44	--	1.61	8.6	49
2010	June	2.10	2.60	1.24	2.05	104	220	1,821	5	85	151	210	2,645	5	85	7.6	8.0	6.9	17.9	0.33	--	2.36	7.1	1.7
2010	July	2.10	2.40	1.14	2.12	303	481	5,307	6	106	242	384	4,238	4	71	7.5	7.9	6.8	18.4	0.17	--	1520.66*	7.1	148.5*
2010	August	1.70	1.90	1.12	1.41	539	654	7,642	5	59	261	357	3,700	7	82	7.4	8.1	6.9	23.9	0.05	--	2.43	7.3	1.3
2010	September	1.60	1.60	1.00	1.61	402	654	5,364	7	94	228	264	3,042	3	40	6.5	6.9	7.0	26.5	0.05	--	3.02	7.1	6.0
2010	October	1.60	1.60	1.00	1.52	632	857	8,433	9	114	300	355	4,003	4	51	6.9	7.4	6.6	28.2	0.11	--	3.67	8.0	13.0
2010	November	1.70	1.80	1.06	1.77	1,197	2,954	16,971	8	118	314	387	4,452	5	74	8.1	8.7	6.7	29.5	0.05	--	3.54	7.6	5.0
2010	December	1.90	2.00	1.05	1.69	867	1,940	13,738	7	98	215	288	3,407	6	84	7.8	8.2	6.7	20.6	0.07	--	2.23	8.4	1.0
2011	January	1.90	2.00	1.05	1.48	682	847	10,807	3	37	176	315	2,789	5	62	7.1	7.5	6.5	23.3	0.09	--	1.83	8.6	5.5
2011	February	2.20	2.50	1.14	2.25	437	688	8,018	3	56	237	342	4,348	7	131	7.3	7.8	6.7	13.2	0.27	--	1.69	8.3	4.0
2011	March	2.90	4.50	1.55	2.97	213	432	5,152	4	99	128	174	3,096	8	198	7.3	7.6	6.7	12.2	2.09	--	26.84*	8.4	6.5
2011	April	4.10	10.00	2.44	3.11	287	574	9,814	4	104	131	176	4,479	8	207	7.1	7.7	6.7	13.7	0.91	--	0.94	8.4	707.5*
2011	May	3.10	4.00	1.29	2.54	117	176	3,025	4	85	84	120	2,172	5	106	6.8	7.6	4.1	11.7	0.27	--	0.91	7.9	610.5*
2011	June	2.10	2.60	1.24	1.15	130	211	2,277	3	29	129	180	2,259	3	29	6.4	6.5	7.0	23.7	0.05	--	2.89	7.5	4.0
2011	July	1.60	1.90	1.19	1.36	377	577	5,031	3	34	205	300	2,736	6	68	6.4	6.7	7.1	22.0	0.21	--	3.23	7.7	3.0
2011	August	1.70	1.80	1.06	1.39	445	590	6,309	5	58	215	252	3,048	6	69	6.5	6.6	6.6	22.4	0.06	--	2.61	7.8	13.0
2011	September	3.70	8.00	2.16	1.81	168	252	5,184	4	60	136	231	4,197	3	45	6.7	6.9	6.8	18.3	0.05	--	1.20	7.8	41.5
2011	October	1.70	2.00	1.18	1.71	245	354	3,474	4	57	206	252	2,921	3	43	6.6	7.2	6.9	22.2	0.28	--	1.97	7.7	1.5
2011	November	4.10	11.00	2.68	2.43	190	260	6,497	4	81	144	191	4,924	3	61	7.4	7.7	6.9	14.5	0.35	--	1.72	8.7	1211.5*
2011	December	4.60	8.90	1.93	2.48	128	216	4,911	6	124	148	190	5,678	4	83	7.3	7.8	5.8	15.3	0.69	--	0.46	7.4	2.0
2012	January	3.80	9.00	2.37	2.29	196	236	6,212	11	210	156	204	4,944	11	210	8.0	8.2	6.4	17.2	0.24	--	0.92	8.9	1.0
2012	February	2.10	2.40	1.14	1.66	91	123	1,594	4	55	181	306	3,170	4	55	7.5	7.7	6.4	20.0	0.18	--	0.83	8.6	33.0
2012	March	2.90	3.10	1.07	2.65	277	665	6,700	8	176	129	188	3,120	7	154	7.4	7.7	6.4	12.6	0.19	--	0.44	7.8	4.0
2012	April	1.90	2.10	1.11	1.53	295	427	4,675	4	51	224	234	3,550	4	51	7.5	7.7	6.6	20.8	0.28	--	1.31	--	2.8
2012	May	1.70	2.40	1.41	1.55	167	230	2,368	3	39	201	234	2,850	7	90	7.5	8.1	6.7	22.3	5.25	--	0.55	7.6	1.7
2012	June	1.60	1.90	1.19	1.28	176	219	2,349	8	85	214	330	2,856	3	4	7.4	7.5	7.0	26.1	0.19	--	6.66	8.2	61.9
2012	July	1.60	1.90	1.19	1.44	300	652	4,003	5	60	220	288	2,936	4	48	6.5	6.8	6.9	26.1	0.08	--	4.32	7.6	2.3
2012	August	1.70	1.90	1.12	1.41	316	790	4,480	5	59	223	318	3,162	4	47	7.2	7.6	7.0	18.7	0.19	--	3.53	7.9	1.25
2012	September	1.90	2.50	1.53	1.53	124	189	1,965	8	102	237	288	3,756	5	64	7.2	7.5	6.8	21.8	0.13	--	2.63	8.4	2.0
2012	October	1.60	1.90	1.19	1.40	138	170	1,841	5	10	186	230	2,482	4	47	7.1	7.4	6.7	23.2	0.06	--	2.46	8.8	96.0
2012	November	1.90	2.30	1.21	1.54	166	190	2,630	3	38	179	222	2,836	5	64	7.3	7.4	7.0	21.8	0.07	--	1.53	8.7	9.0
2012	December	2.90	3.90	1.34	2.70	289	728	6,990	7	158	165	192	3,991	3	68	7.2	7.5	7.0	14.4	0.18	--	0.96	7.9	12.7
Averages		**2.30**	**3.39**	**1.35**	**1.89**	**311**	**555**	**5,446**	**6**	**88**	**194**	**258**	**3,479**	**5**	**84**	**7.3**	**7.6**	**6.7**	**19.8**	**0.4**	**--**	**2.3**	**8.07**	**12**

* Numbers not included in calculation of the averages

D. Wastewater System Staff

The City of Versailles currently has a wastewater system staff of seven (7) to operate and maintain the treatment and collection system (3 for the collection system and 4 for the treatment plant). A table presenting the operators, their title, classification and their certification number is shown below.

Table 6-5
Versailles WWTP and
Collection System Staff

Name	Title	Cert. No.	Cert. Level
Wastewater Treatment Plant Certification			
Ralph Ortt	Superintendent	7718	III
Reggie Greenup	Pretreatment Coordinator	5733	IV
Stanley Green	Operator	8510	IV
Shaun Helton	Operator	26216	I
Collections System Certifications			
Ralph Ortt	Superintendent	25972	III
Stanley Green	Operator	26347	III
Wayne White	Operator	25640	II
James Dorough	Operator	26027	II
Clarence Pettyjohn	Operator	N/A	In Training

E. On-Site Disposal within the Planning Area (septic tanks)

The Woodford County Health Department was contacted to discuss the existence and condition of septic tanks in the Versailles Planning Area. Mr. Jay Smith with the Health Department said he was unaware of any septic tanks or straight pipe discharges located within the City's existing service area.

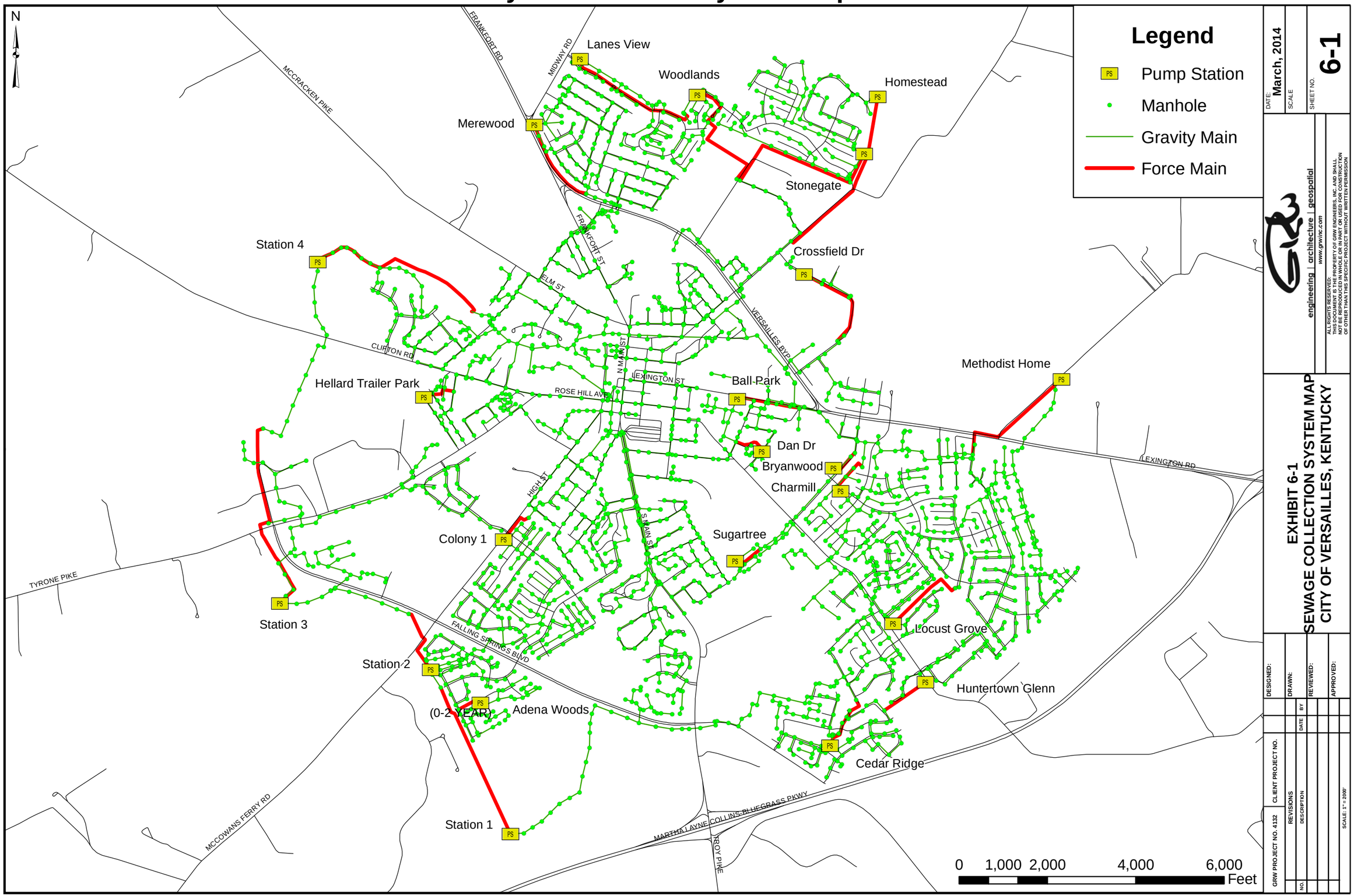
Also discussed with the Health Department was the condition of septic systems within the City's Planning Area. It is estimated that there are 358 homes with the Sycamore

Estates development that are on septic systems. There are an estimated 157 additional homes (or lots) near Sycamore Estates that are or would be on septic systems. Mr. Smith stated that he had been with the Health Department for two (2) years and has only had five (5) septic repairs in that time. He also stated that he reviewed their records and since 2000 he has had 52 septic repairs.

Mr. Smith with the Health Department did express concern over the size of the building lots that exist within the Sycamore area. He stated that if these systems do fail that there is little room to properly repair them and plans should be made for other options.

Exhibit 6-7 shows the existing residential areas in and around Sycamore Estates that are currently on septic sewer systems.

City of Versailles: System Map



DATE: March, 2014

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EXHIBIT 6-1
SEWAGE COLLECTION SYSTEM MAP
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

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GRW PROJECT NO. 4132

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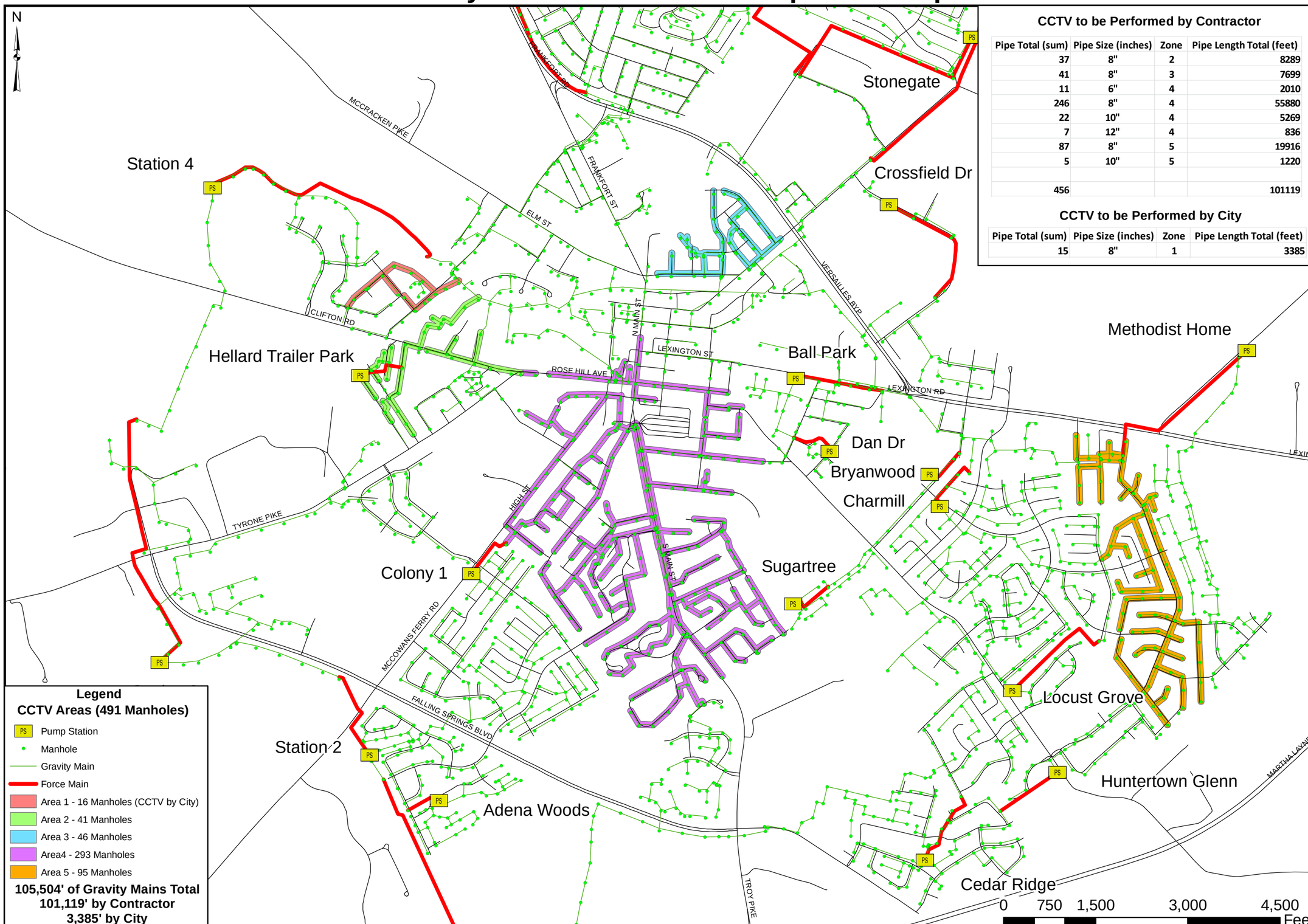
REVISIONS

SCALE: 1" = 2000'

City of Versailles: CCTV Inspection Map



Legend
CCTV Areas (491 Manholes)

- PS Pump Station
- Manhole
- Gravity Main
- Force Main
- Area 1 - 16 Manholes (CCTV by City)
- Area 2 - 41 Manholes
- Area 3 - 46 Manholes
- Area4 - 293 Manholes
- Area 5 - 95 Manholes

105,504' of Gravity Mains Total
101,119' by Contractor
3,385' by City

CCTV to be Performed by Contractor

Pipe Total (sum)	Pipe Size (inches)	Zone	Pipe Length Total (feet)
37	8"	2	8289
41	8"	3	7699
11	6"	4	2010
246	8"	4	55880
22	10"	4	5269
7	12"	4	836
87	8"	5	19916
5	10"	5	1220
456			101119

CCTV to be Performed by City

Pipe Total (sum)	Pipe Size (inches)	Zone	Pipe Length Total (feet)
15	8"	1	3385

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EXHIBIT 6-2
2012 CCTV INSPECTION
MAP INDEX
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

CLIENT PROJECT NO.

NO.	DESCRIPTION	DATE	BY

REVISIONS

GRW PROJECT NO. 4132

SCALE: 1" = 1500'

City of Versailles: Modeled Sections of the Sewer System

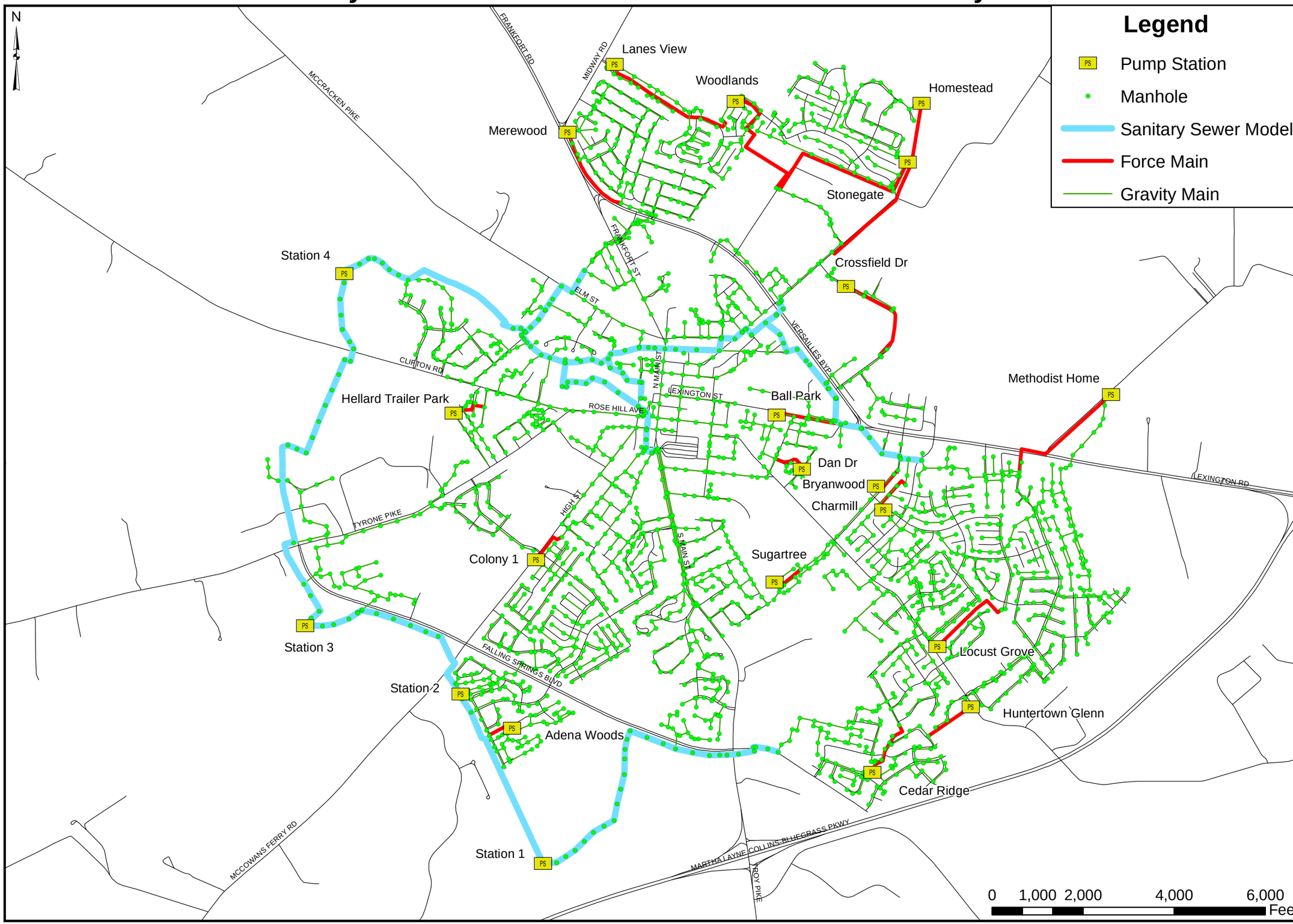

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EXHIBIT 6-3
MODELED SECTIONS OF THE SEWER SYSTEM
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

NO.	DESCRIPTION	DATE	BY

REVISIONS

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

SCALE: 1" = 2000'

City of Versailles: System Model Subcatchments

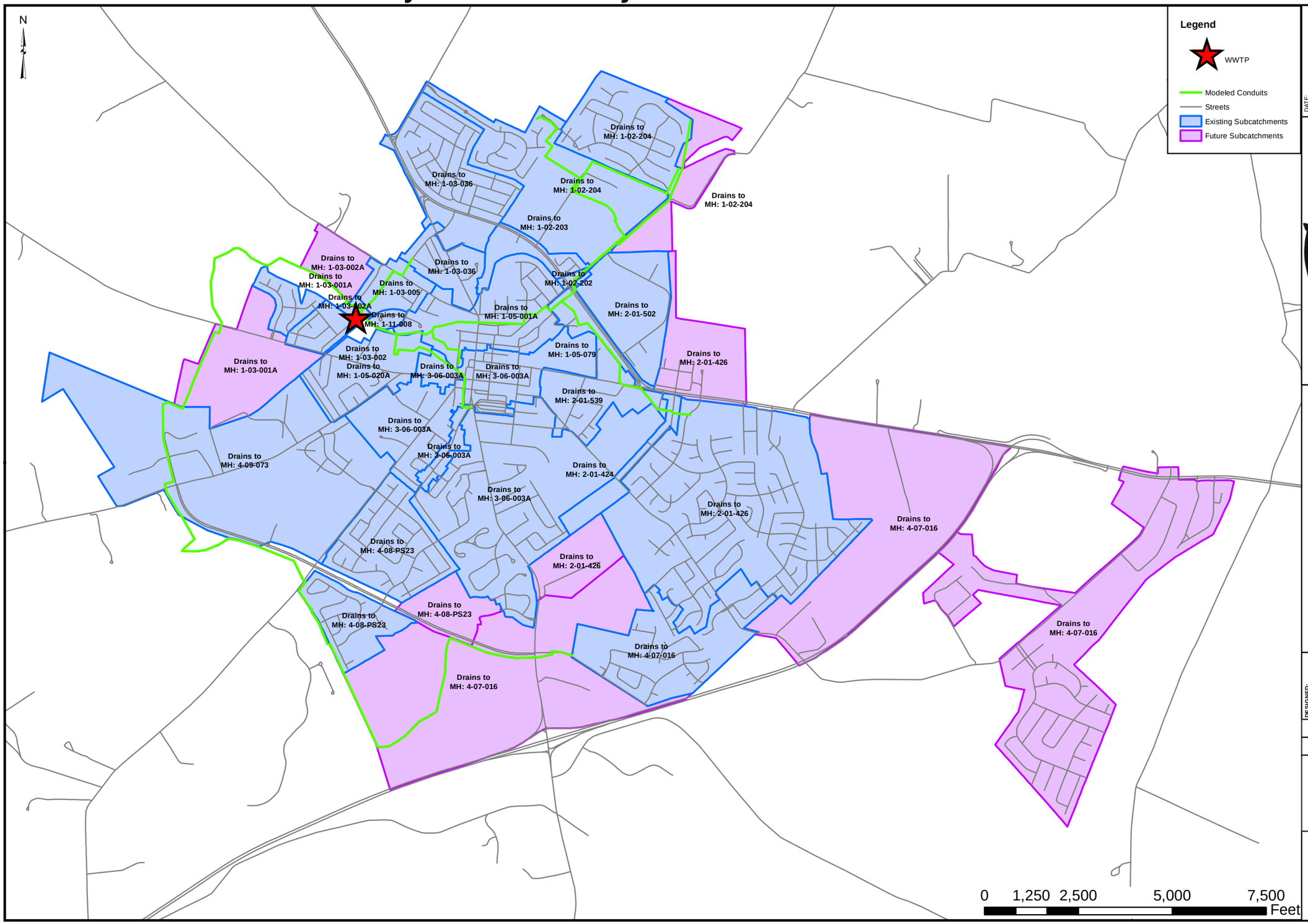

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EXHIBIT 6-4
SYSTEM MODEL SUBCATCHMENTS
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

GRW PROJECT NO. 4132

CLIENT PROJECT NO.

NO.	REVISIONS DESCRIPTION	DATE	BY

SCALE: 1" = 2500'

Exhibit 6-5
Evaluation of Existing Wastewater Treatment Plant

	Existing Conditions	Design Conditions	Design Criteria
Influent Characteristics:			
Flow	2.3 MGD	3.0 MGD	3.0 MGD
	11 MGD	9.0 MGD	9.0 MGD
BOD	194 mg/L (ADF)	200 mg/L (ADF)	200 mg/L (ADF)
	3,721 lbs/Day	5,000 lbs/Day	5,000 lbs/Day
TSS	311 mg/L (ADF)	200 mg/L (ADF)	200 mg/L (ADF)
	5,966 lbs/Day	5,000 lbs/Day	5,000 lbs/Day
NH_3-N	20 mg/L (ADF)	25 mg/L (ADF)	---
	384 lbs/Day	625 lbs/Day	---
Primary Treatment:			
Mechanical Bar Screen			
Hydraulic Loading	11 MGD (Peak)	12.5 MGD (Peak)	12.5 MGD (Peak)
Manual Bar Screen	11 MGD (Peak)	11 MGD (Peak)	11 MGD (Peak)
Biological Treeatment:			
Oxidation Ditches			
(2@ 1.45 M Gal)			
Hydraulic Loading			
Detention Time	30.3 Hrs	23.2 Hrs	24 Hrs
Oranic Loading	9.6 lbs of BOD/1000 CF	12.9 lbs of BOD/1000 CF	18 lbs of BOD/1000 CF
MLSS	3,000 mg/L	3,000 mg/L	3,000-5,000 mg/L
Food-To-Microorganism			
Ratio (F/M)	0.06	0.09	0.05-1.0
Aeration			
(4 Aerators @ 60 HP Each)			
Final Clarification:			
2 - 75' Dia. Circular Clarifiers			
Surface Overflow Rate	1,245 GPD/SF	1,019 GPD/SF	1,000 GPD/SF
Solids Loading Rate	40.9 lbs/Day/SF	38.2 lbs/Day/SF	35 lbs/Day/SF
Disinfection:			
Chlorine Contact Basin			
Vol = 123,420 Gal			
Hydraulic Detention Time	16.2 Min (Peak)	19.8 Min (Peak)	15 Min (Peak)
Post Aeration:			
Vol = 18,513 Gal			
2 - Self Aspiration Pumps			
Dissolved Oxygen	8.07 mg/L	7.0 mg/L	7.0 mg/L

Exhibit 6-5
Evaluation of Existing Wastewater Treatment Plant

	Existing Conditions	Design Conditions	Design Criteria
Sludge Digestion: 2-Aerated Sludge Holding Basins Vol (Total) = 1,346,400 Gal Detention Time @ 2.0% Volume/Population Equivalent	 86 Days 7.8 CF/PE	 64 Days 6.0 CF/PE	 60 Days 3.0 CF/PE
Aeration 3 - Positive Displacement Blowers (2 Duty, 1 Standby) 5 CFM/Blower = 4,500 SCFM Aeratin/Mixing	 50 SCFM/1000 CF	 50 SCFM/1000 CF	 50 SCFM/1000 CF
Sludge Dewatering: 1 - 2 Meter Combination Gravity Belt Thicker/ Belt Filter Press	 667 Dry lbs/Hr/Meter	 800 Dry lbs/Hr/Meter	 800 Dry lbs/Hr/Meter

City of Versailles: Flow Diagram

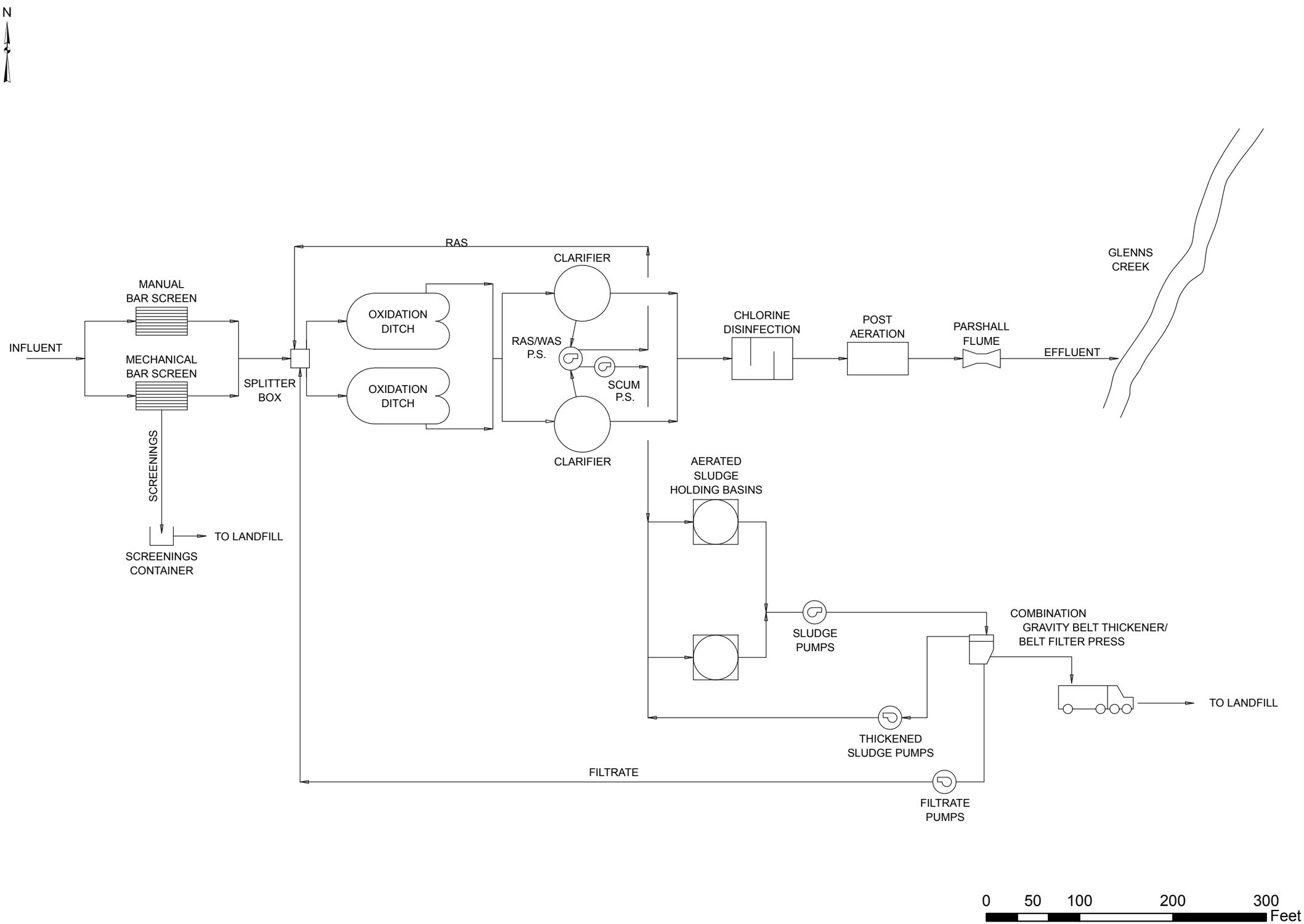

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EXHIBIT 6-6
FLOW DIAGRAM FOR THE EXISTING WASTEWATER TREATMENT PLANT
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

GRW PROJECT NO. 4132
CLIENT PROJECT NO.

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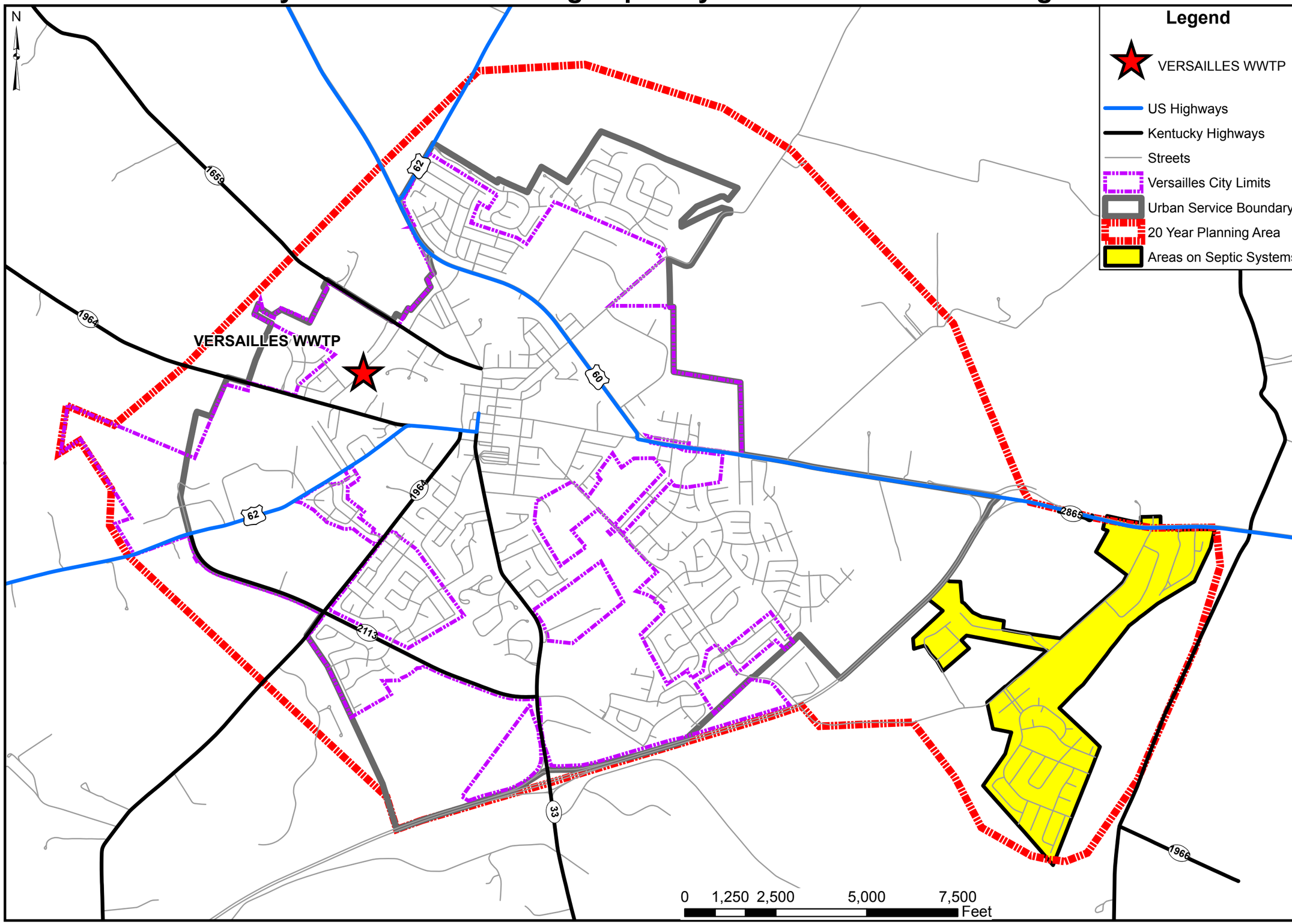
NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 100'

City of Versailles: Existing Septic Systems Within the Planning Area



Legend

- VERSAILLES WWTP
- US Highways
- Kentucky Highways
- Streets
- Versailles City Limits
- Urban Service Boundary
- 20 Year Planning Area
- Areas on Septic Systems

DATE: March, 2014

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EXHIBIT 6-7
EXISTING SEPTIC SYSTEMS
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 2500'

Section 7

SECTION 7
FORECASTED WASTEWATER FLOWS AND LOADS IN THE PLANNING AREA

A. Purpose

The purpose of this section is to project the flows and characteristics of wastewater generated within the Detailed Planning Area for the Planning Period from 2013 through 2033. These flow rates and characteristics will be used in the analysis and design of wastewater collection and treatment systems to meet Kentucky Pollutant Discharge Elimination System (KPDES) permit requirements and discharge limitations throughout the Planning Period. This section details the existing and projected wastewater flows and characteristics.

B. Existing Wastewater Flows

Wastewater in the City of Versailles is treated at the Versailles Wastewater Treatment Plant (WWTP) in the northwest portion of the City. The Versailles WWTP is currently rated for an average daily treatment capacity of 3.00 million gallons per day (MGD) and a peak hydraulic capacity of 9.0 MGD.

The average daily flow (ADF) to the Versailles WWTP over the last three years (January 2010 through December 2012) is 2.30 MGD and the peak day flow (PDF) during the same time period was 11.00 MGD in November 2011. Wet weather periods have also led to higher ADFs, for example in April of 2011, the ADF was 4.10 MGD, which is 136% of the rated plant hydraulic capacity of 3.00 MGD.

ADFs and PDFs for the last three years are provided in Table 7-1. The WWTP performance data for the same time period is tabulated in Table 6-4 from the previous section.

Table 7-1
Average and Peak Day Flows
Versailles WWTP

Year	Average Daily Flow (MGD)	Peak Day Flow (MGD)
2010	1.95	3.50
2011	2.81	11.00
2012	2.28	9.00

The City of Versailles has six (6) active permitted industrial dischargers to the City's wastewater system. All six of the industries, listed in Table 7-2, are considered Significant Industrial Users (SIUs), and are permitted by the City's Industrial Pretreatment Program. Versailles pretreatment program serves to control pollutants that may pass through, or interfere with, treatment processes. The program has been designed to protect the City's wastewater treatment plant.

Appendix G contains a copy of the City's Sewer Use Ordinance which includes information regarding both the SIUs (page 24) and Industrial Pretreatment Program (page 50).

Table 7-2
Industrial Average Daily Discharge

Industry	Flow (GPD)
OSRAM Glass	25,000
OSRAM Lamp	74,000
Pilkington	260,000
Quad Graphics	72,000
Y.H. America	7,000
Woodford Reserve	4,500
Total	**442,500**

C. Projected Wastewater Flows

To project the wastewater flows for this study, the planning area was divided into two categories, inside the existing service area and projected growth areas outside the existing service area.

1. Existing Service Areas Projected Wastewater Flows

The City of Versailles's average number of customers for the past three years was 5,256 in 2010, 5,301 in 2011 and 5,547 in 2012. These customers represent all types of customers both inside and outside of the City limits. The City has limited historical data for the number of customers within the City limits verses those outside the City limits, therefore, some assumptions were made to project the future flows. In undeveloped areas of the county where City sewers exist, wastewater flows were projected to increase at the same rate as undeveloped areas within the City Limits.

The average daily flow per customer (based on all customer types, residential, commercial and industrial) was calculated for each of the last three years based on

actual WWTP flows and customer counts provided by the City. These numbers were then averaged to produce the average daily flow per customer of 437.4 gpd. This flow rate was then multiplied by the number of projected customers to obtain the projected average wastewater flows inside the existing service area. These are reflected in the "Average Wastewater Flow" column of Exhibit 7-1.

2. Projected Wastewater Flows from Future Growth Areas

In addition to the existing service area, the City of Versailles has developed an organized approach for growth of the sanitary sewer system beyond their current system into phases for the expected expansion areas. In order to project wastewater flows in the expansion areas outside the existing service area, GRW consulted with the City regarding their Comprehensive Plan. Meetings between GRW, the City and the City/County Planning and Zoning department were held to review the Future Land Use District Maps from their Comprehensive Plan along with any preliminary development plans that had been submitted. These meetings resulted in estimated timeframes for each undeveloped area to develop within 0-2 years, 3-10 years or 11-20 years. The results from the work sessions can be visually seen on Exhibit 7-2.

The total area for each time period was then divided up per the Comprehensive Plan's corresponding Future Land Use, see Table 7-3.

Table 7-3
Future Land Use Development Area Per Period

Land Use	Expected Area (Ac) for 0-2 Year	Expected Area (Ac) for 3-10 Year	Expected Area (Ac) for 11-20 Year
Residential	0	482.2	608.2
Commercial	208	103.8	205
Industrial	0	43.7	0

The total area of these developments will not result in increased flow. It has been assumed that 70 percent of the total area is "usable area" for development, that is, will produce wastewater flow. The remaining 30 percent of these developable areas are assumed to be areas that would not produce wastewater flow, such as paved areas, retention basins, etc. Several sources are available for guidance on converting from area to wastewater flow, such as, The Louisville and Jefferson County Metropolitan Sewer District's (MSD's) Design Manual. It is the experience of GRW that flows can range from almost negligible to over 4,000 gallons per day per acre for industrial area. In keeping with the 2001 Facilities Plan, we have used the following conversions to estimate wastewater flow from the different types of protected land use areas; 1,000 gal/day/acre for residential; 1,500 gal/day/acre for

Commercial and 2,725 gal/day/acre for Industrial. This resulted in a total anticipated future flows within the planning area limits, but outside the existing service area as shown in Table 7-4.

Table 7-4
Future Land Use Projected Flows Per Planning Period

Land Use	Expected Area (Ac)	Useable Area (Ac)	Flow (Gal/Day/Acre)	Expected Average Flow (GPD)
0 to 2 Years				
Commercial	208	145.6	1,500	218,400
			Total 0-2 Yrs	**218,400**
3 to 10 Years				
Residential	482.2	337.54	1,000	337,540
Commercial	103.8	72.66	1,500	108,990
Industrial	43.7	30.59	2,725	83,357
			Total 3-10 Yrs	**529,887**
11 to 20 Years				
Residential	608.2	425.74	1,000	425,740
Commercial	205	143.5	1,500	215,250
			Total 11-20 Yrs	**640,990**

Note – Residential growth within the existing service area is accounted for in the population projections.

Exhibit 7-1, Wastewater Flow Projections, contains the flow rates (average and peak) projected from the present through 2033 (the end of the Planning Period). The average wastewater flow per day for the year 2033 is estimated to be 4.06 MGD. We have assumed 4.5 MGD which would allow for a modular expansion of the plant. The peaking factor, obtained from Figure 1 of Ten States Standards, is 2.97 based on the projected population in 2033. As a result, the peak hourly flow has been estimated at 12.5 million gallons per day.

Evaluations of treatment alternatives, to be discussed in Section 8, will be based on the following projected flows:

- Average Daily Flow = 4.5 MGD
- Peak Hourly Flow = 12.5 MGD

As was discussed in Section 6, the City has questionable influent flow metering/recording abilities at the Wastewater Treatment Plant. During the peak flows events, the metering capacities are exceeded thus raising questions to the actual existing peak flows. While the recorded peaking factor seem to be in line with the recommended amounts from Figure 1 of Ten States Standards (approximately 3); they did not align with the peak flows projected by the hydraulic model of the system, also discussed in section 6. The City is currently in process of installing more reliable influent flow metering. To account for the possibility that the peak flows may be greater than those listed above in this Facilities Plan, we have considered locations for possible future flow equalization. The costs associated with this equalization basin and pump station are not included at this time in the Facilities Plan. The City is working to confirm the peak flows prior to committing to additional flow equalization.

D. Waste Load Projections

From the plant's Monthly Operating Reports for 2010-2012 (Table 6-4), the projected daily average concentrations of CBOD, TSS, NH3-N and Phosphorus received at the treatment plant have been 194 mg/l, 311 mg/l, 20 mg/l and 8 mg/l respectively. It is not expected that these concentrations will change significantly over the planning period due to the addition of flows from future commercial and industrial customers.

On that basis, the following waste load projections for the design year average daily conditions will be used in Chapter 8 for evaluating alternative treatment approaches:

- CBOD load at 200 mg/l for 4.5 MGD = 7,506 pounds/day
- TSS at 311 mg/l for 4.5 MGD = 11,672 pounds/day
- NH3-N at 20 mg/l for 4.5 MGD = 751 pounds/day
- Total Phosphorus at 8 mg/l for 4.5 MGD = 300 pounds/day

E. Waste Load Allocation

As part of this Facilities Plan, the City requested that the Kentucky Division of Water (KDOW) perform a waste load allocation analysis for the future limits of the proposed wastewater treatment plant capacities of 4.5 MGD (ADF) and 12.5 MGD (PHF).

The KDOW responded to this request on January 24, 2014. Their proposed KPDES permit effluent limits and reliability requirements based on the waste load allocation analysis are presented in Appendix H. A summary of the proposed KPDES permit effluent limits and reliability requirements are presented in Table 7-5.

Table 7-5 Proposed Monthly Average KPDES Permit Limits and Reliability Requirements	
Effluent Parameter	**Value**
CBOD5	20 mg/l
TSS	30 mg/l
Ammonia-Nitrogen	4/10[A] mg/l
Total Phosphorus	Monitor[B]
Dissolved Oxygen (min.)	7 mg/l
Total Residual Chlorine	0.011 mg/l
Total Nitrogen	Monitor[B]
Reliability Classification	Grade C

Note A: 4 mg/l limit from May 1 to October 31, and 10 mg/l limit from November 1 to April 30.

Note B: Limits not determined by KDOW. Effluent must be monitored by City.

The proposed wastewater treatment plant upgrade will be designed to comply with the proposed KPDES effluent limits and reliability requirements. The plant does not currently have a Total Nitrogen or Phosphorus limit, but is required to monitor plant effluent levels. Should a Total Nitrogen or Phosphorus limit be added to the permit, additional treatment facilities beyond those recommended in this plan will be required.

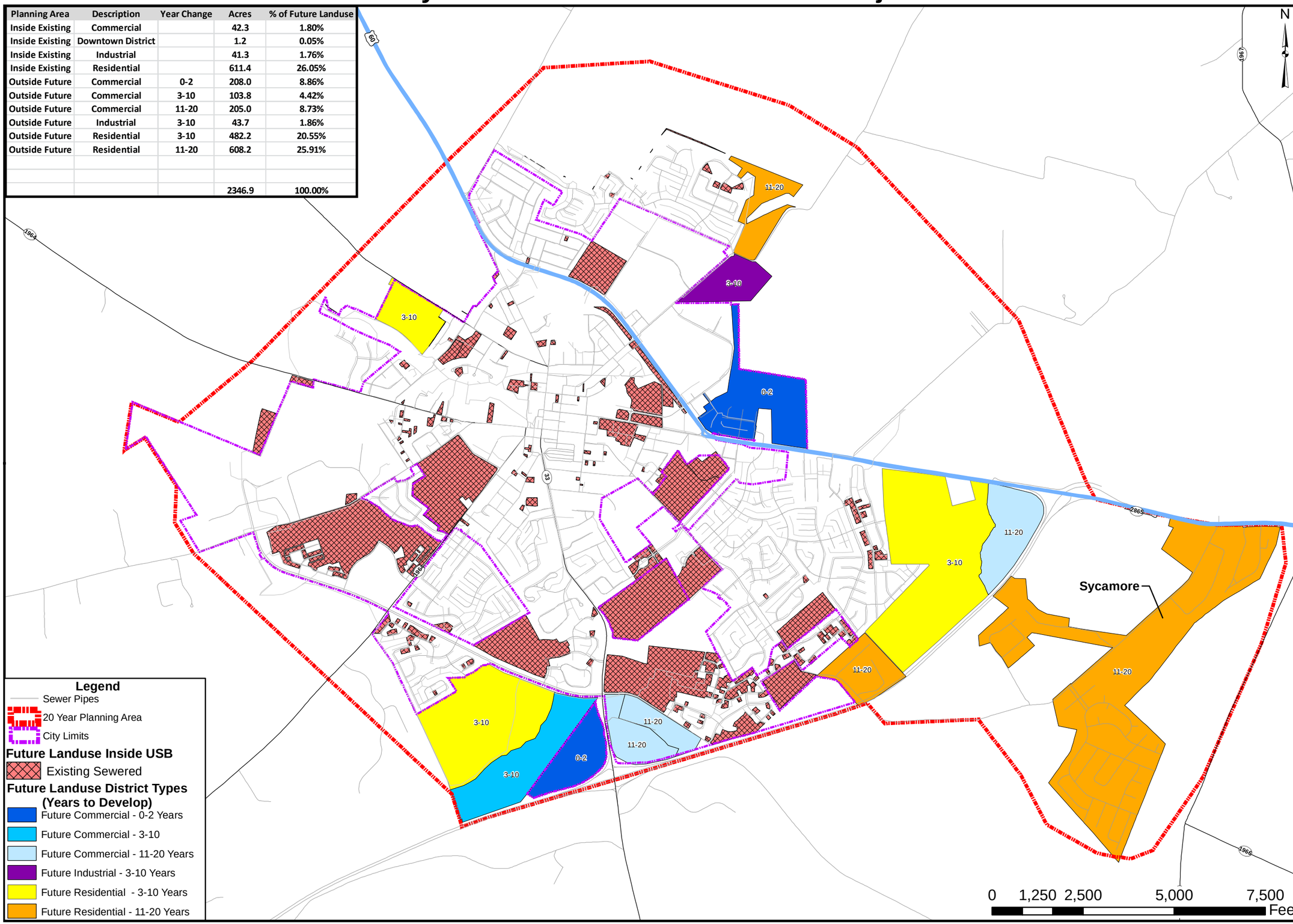
Exhibit 7-1
Wastewater Flow Projections
Planning Period 2013-2033

Year	Existing Service Area					0-2 Year Expansion Area No. 1 (gpd)	3-10 Year Expansion Area No. 2 (gpd)	11-20 Year Expansion Area No. 3 (gpd)	Avg. Design Flow (gpd)	Peak Design Flow**** (gpd)
	City of Versailles Population	% Change *	No. of Customers	Avg. Flow Per Customer** (gpd)	Avg. Wastewater Flow*** (gpd)					
2010	8,568		5,256	371.0	1,950,000	-	-	-	-	-
		0.61%								
2011	8,620		5,301	530.1	2,810,000	-	-	-	-	-
		0.59%								
2012	8,671		5,547	411.0	2,280,000	-	-	-	-	-
		0.60%								
2013	8,723		5,580	437.4	2,440,699	-	-	-	2,440,699	7,248,875
		0.59%								
2014	8,775		5,613	437.4	2,455,164	109,200	-	-	2,564,364	7,616,162
		0.59%								
2015	8,827		5,646	437.4	2,469,630	218,400	-	-	2,688,030	7,983,449
		0.59%								
2016	8,878		5,680	437.4	2,484,095	218,400	66,236	-	2,768,731	8,223,132
		0.58%								
2017	8,930		5,713	437.4	2,498,561	218,400	132,472	-	2,849,433	8,462,815
		0.58%								
2018	8,982		5,746	437.4	2,513,026	218,400	198,708	-	2,930,134	8,702,499
		0.58%								
2019	9,033		5,779	437.4	2,527,492	218,400	264,944	-	3,010,836	8,942,182
		0.57%								
2020	9,085		5,812	437.4	2,541,957	218,400	331,180	-	3,091,537	9,181,866
		0.47%								
2021	9,128		5,839	437.4	2,553,877	218,400	397,416	-	3,169,693	9,413,987
		0.47%								
2022	9,170		5,866	437.4	2,565,796	218,400	463,652	-	3,247,848	9,646,108
		0.46%								
2023	9,213		5,894	437.4	2,577,715	218,400	529,888	-	3,326,003	9,878,230
		0.46%								
2024	9,255		5,921	437.4	2,589,635	218,400	529,888	64,099	3,402,022	10,104,004
		0.46%								
2025	9,298		5,948	437.4	2,601,554	218,400	529,888	128,198	3,478,040	10,329,779
		0.46%								
2026	9,341		5,975	437.4	2,613,474	218,400	529,888	192,297	3,554,058	10,555,553
		0.46%								
2027	9,383		6,003	437.4	2,625,393	218,400	529,888	256,396	3,630,077	10,781,328
		0.45%								
2028	9,426		6,030	437.4	2,637,312	218,400	529,888	320,495	3,706,095	11,007,102
		0.45%								
2029	9,468		6,057	437.4	2,649,232	218,400	529,888	384,594	3,782,113	11,232,877
		0.45%								
2030	9,511		6,084	437.4	2,661,151	218,400	529,888	448,693	3,858,132	11,458,651
		0.12%								
2031	9,523		6,092	437.4	2,664,377	218,400	529,888	512,792	3,925,457	11,658,607
		0.12%								
2032	9,534		6,099	437.4	2,667,603	218,400	529,888	576,891	3,992,782	11,858,562
		0.12%								
2033	9,546		6,106	437.4	2,670,829	218,400	529,888	640,990	4,060,107	12,058,517

Note
* It is assumed that growth of the portion of the County currently served by the City's wastewater facilities will grow at the same rate as the City.
** The Average Flow Per Custumer in existing service area is based on historical data (Jan 2011 thru Dec 2012), and includes all types of customers both inside and outside the City limits of Versailles
*** Average WW Flow for 2010-2012 from MOR's. Flow after 2013 are based on population growth in Existing Service Area (City & County)
**** Hourly Peaking Factor derived from 10 States Standards is equal to 2.97 based on 2033 population

City of Versailles: Future Landuse Projections

Planning Area	Description	Year Change	Acres	% of Future Landuse
Inside Existing	Commercial		42.3	1.80%
Inside Existing	Downtown District		1.2	0.05%
Inside Existing	Industrial		41.3	1.76%
Inside Existing	Residential		611.4	26.05%
Outside Future	Commercial	0-2	208.0	8.86%
Outside Future	Commercial	3-10	103.8	4.42%
Outside Future	Commercial	11-20	205.0	8.73%
Outside Future	Industrial	3-10	43.7	1.86%
Outside Future	Residential	3-10	482.2	20.55%
Outside Future	Residential	11-20	608.2	25.91%
			2346.9	100.00%



DATE: March, 2014
SCALE
SHEET NO. 7-2

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EXHIBIT 7-2
FUTURE LANDUSE PROJECTIONS
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

GRW PROJECT NO. 4132
CLIENT PROJECT NO.

NO.	REVISIONS DESCRIPTION	DATE	BY

SCALE: 1" = 2500'

Section 8

SECTION 8
EVALUATION OF ALTERNATIVES

A. Purpose

The purpose of this section is to define and evaluate alternatives for the City of Versailles to address their wastewater treatment and collection system needs for the projected wastewater demands for the 2013 to 2033 Planning Period. This planning document shall objectively evaluate the combined effect of a two component analysis: 1) Cost Effective Analysis and 2) Non-monetary Effectiveness Analysis.

The cost effective analysis is based on a present worth analysis method and evaluates the cost effectiveness of the various alternatives. For the purposes of determining salvage values for structures, equipment, and piping, it was assumed that: structures were 40% of their original value after 20 years, equipment was 0% of its original value after 20 years, and piping was 50% of its original value after 20 years. A discount rate of 6% was used in the present worth analysis as set annually by the Department of the Interior's Bureau of Reclamation.

The non-monetary effectiveness criteria used in evaluating these alternatives includes environmental impact, engineering evaluation, implementability, public support and regionalization.

Evaluations were completed on the disinfection systems at the treatment plant, the treatment process at the plant and the collection system.

B. Disinfection Alternatives

Three disinfection alternatives were evaluated for the projected 4.5 MGD effluent flow from the expanded Versailles Wastewater Treatment Plant. The disinfection options that were evaluated are:

1. Disinfection Alternative 1 – Ultraviolet (UV) Light Disinfection

This alternative involves installation of an Ultraviolet (UV) Light disinfection system in a new channel parallel and adjacent to the existing chlorine contact tank. UV disinfection involves a bank of lamps emitting UV wavelength light which interacts with and disinfects the microbes in the water. The UV system (low pressure, high intensity) is capable of disinfecting certain bacteria and viruses (such as Cryptosporidium, Giardia lamblia, Coliform, Leptospira Interrogans, Salmonella Typhosa, Hepatitus, Influenza, etc.) without affecting the water's pH value. UV disinfection would eliminate the City's current need to store 1-ton cylinders of chlorine gas and sulfur dioxide at the plant and as a result would improve safety in the

vicinity of the plant. The UV lamps must be cleaned to prevent build-up of material on the lamps and the UV system is equipped with a lamp cleaning system (i.e., wipers). UV disinfection does require relatively large amounts of energy to power the UV lamps when compared to chlorination/dechlorination and replacement of UV lamps, ballasts, and cleaning systems (i.e., wipers) are required to maintain the UV system. The cost estimates and present worth analysis for the UV light disinfection alternative are contained in Exhibits 8-1 to 8-4. The Versailles WWTP would require three modules in series per channel with 40 lamps per module (5 rows with 8 lamps per row) for a total of 240 UV lamps.

2. Disinfection Alternative 2 – Sodium Hypochlorite Disinfection

This alternative involves installation of new sodium hypochlorite and sulfur dioxide disinfection system. This system would be housed in a new building structure and would include all new pumps, metering equipment (approximately 217 gpd of both sodium hypochlorite and sulfur dioxide), tanks, piping, etc. The existing chlorine contact tank has sufficient volume to meet the 15 minutes of contact time at the proposed peak flows and could be reused in this alternative. This method of disinfection would eliminate the City's current need to store 1-ton cylinders of chlorine gas at the plant and as a result would improve safety in the vicinity of the plant. The cost estimates and present worth analysis for the sodium hypochlorite and sulfur dioxide disinfection alternative are contained in Exhibits 8-5 to 8-8.

3. Disinfection Alternative 3 – Peracetic Acid Disinfection

This alternative involves installation of a new peracetic acid disinfection system. This system would be housed in a new building structure and would include all new pumps, metering equipment (approximately 51 gpd of peracetic acid), piping, etc. The peracetic acid would be purchased and stored in the original containers, eliminating the need for extra tanks and transfer pumps. The existing chlorine contact tank has sufficient volume to meet the 15 minutes of contact time at the proposed peak flows and could be reused in this alternate. This method of disinfection would eliminate the need to store 1-ton cylinders of chlorine gas and sulfur dioxide at the plant and as a result would improve safety in the vicinity of the plant. The cost estimates and present worth analysis for the peracetic acid disinfection alternative are contained in Exhibits 8-9 to 8-12.

4. Disinfection Alternative 4 – No Action to Disinfection

This alternative involves continuing to utilize the existing Chlorine gas system. This option would require the continued use and storage of chlorine gas and sulfur dioxide which pose a potential safety risk at the plant and in the vicinity of the plant. Chlorine is a corrosive chemical and has resulted in corrosion of doors, vents, ducts and other metal components at the plant. Due to the safety concerns associated with chlorine gas and the proximity of the nearby neighborhood, the City of Versailles has

indicated that they would prefer to discontinue the storage and use of chlorine gas, thus the "No Action" alternative was eliminated from further consideration.

5. Monetary (Present Worth) Analysis of Disinfection Alternative

Table 8-1 provides a cost summary of the present worth analysis of the disinfection alternatives that were evaluated.

Table 8-1
WWTP Disinfection Alternates
Monetary Analysis Summary

Analysis	Ultraviolet Light Disinfection	Sodium Hypochlorite Disinfection	Peracetic Acid Disinfection
Construction Cost	$643,484	$151,875	$123,750
Annual Operation & Maintenance Costs	$12,094	$104,389	$116,748
Salvage Value	$24,264	$48,300	$42,500
Present Worth	**$774,484**	**$1,333,875**	**$1,449,750**

6. Non-Monetary Analysis of Disinfection Alternative

In planning new wastewater treatment facilities, non-monetary effectiveness issues as well as monetary criteria need to be used in determining the preferred disinfection alternative.

This section includes a general evaluation of the three proposed disinfection alternatives to determine which solution will maximize non-monetary effectiveness. The discussion will focus on the following categories:

- Environmental Impact
- Engineering Evaluation
- Implementability
- Public Support

The following is a brief discussion of each of the above categories:

a. Environmental Impact

Each alternative was selected on the basis of its ability to achieve the planning area's wastewater treatment and water quality goals and objectives, and the ability to comply with requirements of the Kentucky Division of Water. The two primary periods when the environment could be damaged are during construction or during startup of the new treatment process.

All alternatives will result in the construction of additional structures. Disinfection Alternative 1 - Ultraviolet Light requires construction of the UV channel and Parshall flume, while Disinfection Alternative 2 - Sodium Hypochlorite and Disinfection Alternative 3 - Peracetic Acid will require construction of a new chemical feed building and piping to the existing contact basin.

Disinfection Alternative 1 - Ultraviolet Light will have deeper excavations and more below grade concrete work than the other alternatives. Disinfection Alternative 2 - Sodium Hypochlorite and Disinfection Alternative 3 - Peracetic Acid will require approximately the same amount of construction, new chemical feed building and piping. The chemical feed building would be constructed near the existing basin to minimize the amount of piping. All three construction alternatives would take place on the existing City owned WWTP site.

Construction procedures for all alternatives would include methods to safeguard the environment such as silt fences and proper material storage. The wastewater treatment plant is a reasonable distance from residential and commercial facilities and construction noise, dust, odor and traffic are not anticipated to be problems.

Disinfection Alternative 1 - Ultraviolet Light and Disinfection Alternative 2 - Sodium Hypochlorite are well established disinfection processes. While Alternative 3 - Peracetic Acid is a relatively new chemical used in the wastewater disinfection process, the application of the chemicals and the use of chemical feed pumps is a well-known process. The plant operators are familiar with each alternative and are fully capable of operating and maintaining either alternative.

Overall, there is not expected to be a significant difference between each of the disinfection alternatives to be evaluated regarding environmental impact.

b. Engineering Evaluation

The primary goal of the engineering evaluation is to provide the most cost effective, environmentally sound and implementable wastewater treatment plant disinfection alternative capable of achieving the Versailles Planning Area's water quality and service goals. The cost effectiveness of these disinfection alternatives were discussed above, see Table 8-1. Below we will focus on functionalization and environmental soundness of these options.

Disinfection Alternatives 1 through 3 are all fully capable of meeting the requirements of the Planning Area. Disinfection Alternative 1 - Ultraviolet Light and Disinfection Alternative 2 - Sodium Hypochlorite have a proven history of reliability with multiple successful installations across the state. Disinfection Alternative 3 - Peracetic Acid has less history in the municipal treatment industry, but has had good success in the industrial market.

The reliability of each of the alternatives is based on the long term operation of the various components of the mechanical systems which comprise the treatment process. The reliability of these systems is dependent on the quality of the manufacturer's equipment, the quality of initial installation and the implementation of satisfactory maintenance and preventive maintenance programs by the City of Versailles. Assuming that each of these considerations is addressed, each alternative will have the capability of long term reliability for the design life of the project.

Disinfection Alternative 1 - Ultraviolet Light would require pretesting of the City's wastewater prior to the UV being selected at the beginning of design to determine that there were no UV inhibitors in the waste stream that would prevent the UV system from effectively disinfecting the plant effluent. Assuming that the waste stream contains no UV inhibitors, Alternatives 1 through 3 are all fully capable of effective disinfection for the Planning Area. However, Disinfection Alternative 1 - Ultraviolet Light and Disinfection Alternative 2 - Sodium Hypochlorite have shown long-term reliability based on the multiple installations within Kentucky.

c. Implementation Capability

The ability to implement each alternative from both constructability and operational perspectives was considered in the evaluation of each of the respective alternatives.

From a constructability perspective, the implementation of Disinfection Alternative 2 - Sodium Hypochlorite and Disinfection Alternative 3 - Peracetic Acid, both which reuse the existing chlorine contact basin, would result in a minimal amount of required construction as well as minimal disruption to the current plant operations. Disinfection Alternative 1 - Ultraviolet Light requires new construction in close proximity to the existing chlorine contact basin. However, in each alternative, construction would need to be completed before flow can be diverted from the existing chlorine contact basin to the new disinfection system.

The advantage of Disinfection Alternative 2 - Sodium Hypochlorite, is that the operators would have the ability to slowly transition from chlorine gas to sodium hypochlorite. The sodium hypochlorite could be set up as the primary disinfectant and the chlorine gas utilized as a backup system until the operators were satisfied with the sodium hypochlorite system.

Implementation of Disinfection Alternative 3 - Peracetic Acid would be very similar to the startup and operation of Disinfection Alternative 2 - Sodium Hypochlorite. However, the operators are less familiar with handling this chemical and would require additional training at startup. Therefore, plant

operators may require additional training regarding Disinfection Alternative 3 - Peracetic Acid.

d. Public Support

In order to address the public's interest, the City plans to conduct a public meeting to inform the public of the needs of the treatment disinfection system and to discuss the proposed alternatives. At the meeting, projected construction and operations costs and their projected effect on sewer rates will be presented. The minutes and attendance roster of the public meeting will be included in Appendix I.

7. Summary of Non-monetary Effectiveness Analysis

Table 8-2 provides non-monetary effectiveness rankings for each disinfection alternative and compares the alternatives based on non-monetary effectiveness units (NEUs).

Table 8-2
Disinfection Process Selection Analysis

Non- Monetary Factor		**Alternative 1 - Ultraviolet**		**Alternative 2 - Sodium Hypo**		**Alternative 3 - Peracetic Acid**	
	Weight	*Rating*	*Score*	*Rating*	*Score*	*Rating*	*Score*
Environmental Impact	1.0	8	8	9	9	9	9
Engineering Evaluation	1.0	10	10	10	10	10	10
Implementability	0.9	9	8.1	10	9	9	8.1
Regionalization	0.7	10	7	10	7	10	7
Public Support	0.8	10	8	9	7.2	9	7.2
Total Score		41.1		42.2		41.3	
Total Present Worth		$774,484.00		$1,333,875.00		$1,449,750.00	
NEU		18,843.89		31,608.41		35,102.91	

The **Weight** of each factor is a measure of the City's relative concerns of that factor compared to other factors, on a scale of 0 to 1, with the highest weight given to those that are considered the most critical.

The **Rating** is a measure of the relative implementation concern of that alternative compared to other alternatives on a scale of 0 to 10, with the highest rating given to the alternative that best satisfies that factor.

The **NEU** (Non-monetary Effectiveness Unit) is a measure of the relative implementation concern due to construction and operation of each alternative.

8. Disinfection Process Alternative Selection

Alternative 1 - Ultraviolet Light Disinfection was selected as the preferred disinfection alternative due to its low present worth cost and its proven history of reliability. Other advantages of using UV disinfection include: elimination of 1-ton cylinders of chlorine and associated health hazards in the area of the wastewater treatment plant. The costs for the selected disinfection method will be included in the total cost of each of the following treatment alternatives considered in this report.

C. Sludge Management Facilities

New sludge management facilities were installed in 2005 and were designed based on the approved Versailles Wastewater Facilities Plan Update, 2001. Sludge management alternatives evaluated for cost-effectiveness included the following:

- Aerobic Digestion with Landfarm (Class B) Disposal.
- Alkaline Stabilization with Landfarm (Class A) Disposal.
- Heat-Assisted Alkaline Stabilization with Landfarm (Class A) Disposal

Aerobic Digestion with Landfarm (Class B) Disposal was the selected sludge management plan to address current and future needs. The City elected to construct the new facilities in 2005, which the design was based on the future expansion of the WWTP. Therefore, with the exception of replacing or upgrading equipment, no additional sludge storage or additional dewatering equipment is needed for the future expansion of the WWTP.

The current sludge management facilities consist of:

- A 1.3 MGAL aerobic sludge digester, divided with a common wall for independent operation. The digested sludge meets the requirements of Process to Significantly Reduce Pathogens (PSRP), commonly known as Class B biosolids. The City has several permitted landfarms available for disposal, but is currently hauling and disposing the sludge to an approved landfill.
- Three (3) blowers, two (2) duty and one (1) standby, supply air for the coarse bubble diffused aeration system mounted on the floor of each digester.
- Two (2) rotary lobe sludge pumps pump the digested sludge to the combination gravity belt thickener/belt filter press.
- One (1) combination gravity belt thickener/belt filter press unit dewaters the sludge to approximately 15%-17% solids concentration prior to disposal. Normal operations consist of pumping digested sludge to the gravity belt thickener, which is mounted on top of the belt filter press. The thickened sludge is then dewatered by the belt filter press. Either system can be bypassed, if needed.
- Two (2) polymer feed units feed polymer independently to either the gravity belt system or to the belt filter system.

Due to the age of the sludge management facilities, some upgrades to the existing equipment are necessary to facilitate efficient operations. Below shows the proposed upgrades and associated costs and these costs are included with each treatment alternative:

Description	Quantity	Unit	Unit Cost	Cost
1. Replace sludge feed pumps	2	EA	$25,000	$50,000
2. Upgrade polymer feed system	1	LS	$75,000	$75,000
3. Replace aeration diffusers and air piping	2	EA	$50,000	$100,000
4. Rehabilitate aeration blowers	3	EA	$20,000	$60,000
5. Drain sump improvements for better cleaning	2	EA	$50,000	$100,000
6. Equipment installation	1	LS	$176,000	$176,000
Sludge Management Upgrades Cost Estimate				**$561,000**

D. Treatment Process Alternatives

The following four (4) treatment process alternatives were evaluated:

- Treatment Alternative 1 – Oxidation Ditch
- Treatment Alternative 2 – Sequencing Batch Reactor
- Treatment Alternative 3 – Integrated Fixed-Film Activated Sludge
- Treatment Alternative 4 – No Action

Included in each alternative is the cost of construction of a new headwork's facility, consisting of a Parshall flume, mechanically cleaned fine screen with washing press and compactor and grit removal equipment. In addition to the headworks, included in each alternative is the cost of the selected disinfection method, discussed above, as well as upgrades to the existing sludge handling processes.

The treatment alternatives considered should meet the anticipated discharge limitations indicated in Section 7. Table 8-3 below summarizes the treatment discharge limits represented in the Department for Environmental Protection's January 24, 2014 waste load allocation letter for the proposed design average daily discharge rate of 4.5 MGD and the hydraulic peak flow rate of 12.5 MGD.

Table 8-3 Proposed Monthly Average KPDES Permit Limits and Reliability Requirements	
Effluent Parameter	**Value**
CBOD5	20 mg/l
TSS	30 mg/l
Ammonia-Nitrogen	4/10[A] mg/l
Total Phosphorus	Monitor[B]
Dissolved Oxygen (min.)	7 mg/l
Total Residual Chlorine	0.011 mg/l
Total Nitrogen	Monitor[B]
Reliability Classification	Grade C

Note A: 4 mg/l limit from May 1 to October 31, and 10 mg/l limit from November 1 to April 30.

Note B: Limits not determined by KDOW. Effluent must be monitored by City.

9. Treatment Alternative No. 1 – Oxidation Ditch

The current wastewater treatment plant utilizes two (2) oxidation ditches, and two (2) clarifiers for secondary biological treatment. Treatment Alternative No. 1 – Oxidation Ditch consists of expanding the existing treatment processes to include the construction of one (1) new oxidation ditch and one (1) new clarifier to supplement the existing plant. The new oxidation ditch would allow the plant to treat the future flows to the plant. Additionally, the new ditch would include separate anaerobic and anoxic chambers upstream of the oxidation ditches in order for the plant to provide Biological Nutrient Removal (BNR) to meet future anticipated effluent limits. Phosphorous removal would be accomplished primarily with biological treatment, but polishing with chemical feed would also be required. The existing oxidation ditches would need to be renovated and retrofitted to accommodate biological nutrient removal. The existing clarifiers and their equipment will be completely demolished and replaced with two (2) new 75-ft clarifiers. Furthermore, a new 75-ft clarifier will need to be constructed.

These new structures would be located in the area of the existing lagoons at the northwest end of the treatment plant site. The lagoons would need to be dewatered, the sludge pressed and hauled to the landfill, then the remaining lagoons backfilled.

This alternative is the simplest option from an operations standpoint based on the fact that the existing plant already employs the same technology.

See Appendix J for more information on the Oxidation Ditch equipment. Exhibit 8-13 shows the plant layout and Exhibits 8-14 to 8-17 provide the financial analysis for treatment Alternative 1 - Oxidation Ditch. Treatment Alternative 1 - Oxidation Ditch includes the following components:

- New influent Parshall Flume

- New Preliminary Treatment Building:
  - Approximately 1,800 square feet.
  - One (1) new ¼" mechanically cleaned fine screen with washing press and compactor, each rated at 12.5 MGD.
  - One (1) manual bar rack and one bypass channel

- Two (2) new stacked tray vortex grit removal units, each rated at 6.25 MGD with grit classifying, washing and dewatering.

- Modifications and improvements to existing Oxidation Ditch Distribution Box

- One (1) new Oxidation Ditch with Biological Nutrient Removal (1.5 MG) including mixers and two (2) 60 HP aerators with VFD's. The new Oxidation Ditch will have a similar configuration to the two (2) existing Oxidation Ditches.

- Replace rotors, aerators and mixers in the two (2) existing oxidation ditches. Repair concrete as needed in the two (2) existing ditches.

- The location for a future chemical phosphorus removal system has been delineated in this alternative; however, no construction costs were included as the waste load allocation did not require removal at this time. Should future permit discharge limits dictate phosphorus removal, a 150 square foot chemical feed system building, a chemical storage tank, containment, chemical feed pumps and a phosphorous meter would be installed. Ferric chloride, ferrous chloride or aluminum sulfate (alum) could be used as the polishing chemical in the future.

- One (1) new concrete Clarifier Flow Splitter Box

- Replacement and renovation of the existing two (2) 75-ft clarifiers. Existing clarifiers and equipment are to be demolished. Replacement clarifiers include mechanical equipment, launder covers, current density baffles, effluent weirs and scum baffles.

- One (1) new 75-ft clarifier. Clarifier includes mechanical equipment, launder covers, current density baffles, effluent weirs and scum baffles. New Clarifier to have similar configuration to two (2) existing Clarifiers.

- One (1) new 6.75 MGD capacity RAS pumping station. New RAS pumping station includes all necessary interior piping, fittings and valves.

- Peak 12.5 MGD capacity Ultraviolet Disinfection System including a new structure, gates, fixed weir, jib crane, Parshall flume and ultrasonic flow measurement. The ultraviolet disinfection system would replace chlorine gas as the disinfection method.

- Modifications & improvements to the existing Belt Filter Press and Polymer Feed system including two (2) new progressive cavity sludge feed pumps (WAS).

- Rehabilitation of the three (3) blowers for the existing aerated sludge holding tanks. New aeration diffusers and piping are included as well as improvements to the drain sump.

- Existing lagoons to be dewatered and backfilled with soil. Existing sludge to be hauled away.

- Site piping, road work, and miscellaneous equipment.

- New Emergency Generator & Electrical Control Building

- Lab/administration building modifications including new lab equipment.

- New non-potable water pumping station.

- Solids disposal via transportation and landfill.

10. Treatment Alternative No. 2 – Sequencing Batch Reactor (SBR)

A Sequencing Batch Reactor (SBR) provides both biological treatment and clarification in the same tanks. The proposed SBR for the City of Versailles consists of four (4) separate basins. The basins cycle between filling, mixing, aerating, settling and decanting modes on a timed basis to provide the necessary secondary biological treatment. A new concrete SBR tank will need to be constructed. Fine bubble diffusers would be installed in each SBR basin and new blowers would be installed to provide oxygen to the diffusers. The necessary piping, valves, WAS pumps, mixers, decanters, weirs, scum skimmers and controls would also be installed in each SBR basin as needed.

Enhanced Biological Nutrient Removal (EBNR) to remove phosphorus and nitrogen in the future, if needed, could be accomplished in the SBR system by controlling the amount of aeration in the various cells of the SBR. SBRs eliminate the need for conventional clarifiers and thus eliminates the need of a RAS pump station.

See Appendix J for more information on the Sequencing Batch Reactor (SBR). Exhibit 8-18 provides the plant layout and Exhibits 8-19 to 8-22 provides the financial analysis for Treatment Alternative 2 - Sequencing Batch Reactor. Treatment Alternative 2 – Sequencing Batch Reactor includes the following components:

- New influent Parshall Flume

- New Preliminary Treatment Building:
  - Approximately 1,800 square feet.
  - One (1) new ¼" mechanically cleaned fine screen with washing press and compactor, each rated at 12.5 MGD.
  - One (1) manual bar rack and one bypass channel

- Two (2) new stacked tray vortex grit removal units, each rated at 6.25 MGD with grit classifying, washing and dewatering.

- New 12.5 MGD Influent Pump Station including submersible pumps, wet well and valve vault.

- One (1) new concrete SBR unit split into four (4) basins using common wall construction, one (1) new blower building and one (1) influent valve box for distribution to the SBR basins. The SBR system includes mixers, WAS pumps, decanters, blowers, diffusers, valves and control system.

- The location for a future chemical phosphorus removal system has been delineated in this alternative; however no construction costs were included as the waste load allocation did not require removal at this time. Should future permit discharge limits dictate phosphorus removal, a 150 square foot chemical feed system building, a chemical storage tank, containment, chemical feed pumps and a phosphorous meter would be installed. Ferric chloride, ferrous chloride or alum could be used as the polishing chemical in the future.

- Demolition of existing clarifiers and their mechanical equipment. Conventional clarifiers are no longer needed with SBR technology.

- Peak 12.5 MGD capacity Ultraviolet Disinfection System including a new structure, gates, fixed weir, jib crane, Parshall flume and ultrasonic flow measurement. The ultraviolet disinfection system would replace chlorine gas as the disinfection method.

- Modifications & improvements to the existing Belt Filter Press and Polymer Feed system including two (2) new progressive cavity sludge feed pumps (WAS).

- Rehabilitation of the three (3) blowers for the existing aerated sludge holding tanks. New aeration diffusers and piping are included as well as improvements to the drain sump.

- Existing lagoons to be dewatered and backfilled with soil. Existing sludge to be hauled away.

- Site piping, road work, and miscellaneous equipment.

- New Emergency Generator & Electrical Control Building

- Lab/administration building modifications including new lab equipment.

- New non-potable water pumping station.

- Solids disposal via transportation and landfill.

Treatment Alternative 2 - Sequencing Batch Reactor provides flexibility for including wet weather flow storage. As a result of the SBR system providing both treatment and clarification within the same basins, the two (2) existing oxidation ditches are no longer needed for biological treatment and could be converted to equalization (EQ) basins. The converted EQ basins would provide approximately 3 MG of wet weather flow storage. In order to convert to EQ basins, renovation would include repairs to existing oxidation ditch concrete structures, demolition of the baffle walls in the ditches, four (4) 15 HP surface aerators, additional wet weather pumping capacity in the influent pump station/force main as well as a separate return line from the converted EQ basins to the influent pump station. It should be noted that the optional EQ basin work and associated costs have not been included in this treatment comparison in an effort to keep the scope of each alternative similar.

11. Treatment Alternative No. 3 – Integrated Fixed –Film Activated Sludge (IFAS)

An Integrated Fixed-Film Activated Sludge (IFAS) process is typically installed as a retrofit solution for conventional activated sludge systems that at are at or beyond capacity. The IFAS process is a continuous flow through, non-clogging bio-film reaction containing media that encourages the growth of biomass and enhance the biological treatment process. The media does not require backwashing or cleaning. The two (2) existing oxidation ditches would be retrofitted into a four (4) train IFAS system. Each train comprises of two (2) anaerobic selectors, one (1) pre-anoxic zone, one (1) IFAS zone for BOD removal and nitrification, and one (1) aerobic activated sludge zone for final polishing. The renovation of the existing oxidation ditches to the IFAS system will require demolition of the channel walls and concrete turning veins

as well as the construction of dividing walls. At the conclusion of treatment, flow will then go through clarification. The two (2) existing clarifiers are to be replaced. Furthermore, one (1) new 75-ft clarifier is to be constructed to accommodate the enhanced capacity.

See Appendix J for more information on the Integrated Fixed-Film Activated Sludge (IFAS). Exhibit 8-23 provides the plant layout and Exhibits 8-24 to 8-27 provide the financial analysis for Alternative 3 - Integrated Fixed-Film Activated Sludge. Alternative 3 - Integrated Fixed-Film Activated Sludge includes the following elements:

- New influent Parshall Flume

- New Preliminary Treatment Building:
  - Approximately 1,800 square feet.
  - One (1) new ¼" mechanically cleaned fine screen with washing press and compactor, each rated at 12.5 MGD.
  - One (1) manual bar rack and one bypass channel

- Two (2) new stacked tray vortex grit removal units, each rated at 6.25 MGD with classifying, washing and dewatering.

- Modifications and improvements to the existing Oxidation Ditch Distribution Box

- The location for a future chemical phosphorus removal system has been delineated in this alternative; however, no construction costs were included as the waste load allocation did not require removal at this time. Should future permit discharge limits dictate phosphorus removal, a 150 square foot chemical feed system building, a chemical storage tank, containment, chemical feed pumps and a phosphorous meter would be installed. Ferric chloride, ferrous chloride or alum could be used as the polishing chemical in the future.

- Renovation of existing two (2) oxidation ditches to IFAS system. IFAS system is composed of four (4) trains, each consisting of two (2) anaerobic selectors, one (1) pre-anoxic zone, one (1) IFAS zone for BOD removal and nitrification, and one (1) aerobic activated sludge zone for final polishing. Sparging and aeration blowers, anaerobic and anoxic mixers, and MLSS recycle wall pumps are included in the IFAS system.

- New 3,750 square foot Blower and Electrical Building for IFAS system.

- One (1) new concrete Clarifier Flow Splitter Box

- Replacement and renovation of the existing two (2) 75-ft clarifiers. Existing clarifiers and equipment are to be demolished. Replacement clarifiers include mechanical equipment, launder covers, density current baffles, effluent weirs and scum baffles.

- One (1) new 75-ft clarifier. Clarifier includes mechanical equipment, launder covers, density current baffles, effluent weirs and scum baffles. New Clarifier to have similar configuration to two (2) existing Clarifiers.

- Peak 12.5 MGD capacity Ultraviolet Disinfection System including a new structure, gates, fixed weir, jib crane, Parshall flume and ultrasonic flow measurement. The ultraviolet disinfection system would replace chlorine gas as the disinfection method.

- One (1) new 6.75 MGD capacity RAS pumping station. New RAS pumping station includes all necessary interior piping, fittings and valves.

- Modifications & improvements to the existing Belt Filter Press and Polymer Feed system including two (2) new progressive cavity sludge feed pumps (WAS).

- Rehabilitation of the three (3) blowers for the existing aerated sludge holding tanks. New aeration diffusers and piping are included as well as improvements to the drain sump.

- Existing lagoons to be dewatered and backfilled with soil. Existing sludge to be hauled away.

- Site piping, road work, and miscellaneous equipment.

- New Emergency Generator & Electrical Control Building

- Lab/administration building modifications including new lab equipment.

- New non-potable water pumping station.

- Solids disposal via transportation and landfill.

12. Treatment Alternative 4 – No Action

Treatment Alternative 4 - No Action, would not provide any treatment improvements during the Planning Period. If no action is taken, the plant's current rated capacity (3.0 MGD) will be surpassed within 5± years. Additionally, without adding flow equalization capacity to store high flows during wet weather periods, the plant will be subject to periodic hydraulic overloads which may cause solids to "wash out" of the

plant, decreasing the ability of the plant to provide effective treatment and resulting in discharges that exceed the permit limitations for extended periods until the plant's treatment processes are restored to their required performance level. These conditions would likely lead to the Division of Enforcement imposing legal action which would require corrective action by the City, necessitating the expenditure of funds for design and construction at a later point in the Planning Period.

13. Monetary (Present Worth) Analysis of Treatment Alternative

Table 8-4 provides a cost summary of the present worth analysis of the treatment alternatives that were evaluated.

Table 8-4
WWTP Treatment Alternates
Monetary Analysis Summary

Analysis	Oxidation Ditch	Sequencing Batch Reactor (SBR)	Integrated Fixed-Film Activated Sludge (IFAS)
Construction Cost	$20,515,080	$19,827,840	$23,379,960
Annual Operation & Maintenance Costs	$751,460	$793,598	$728,222
Salvage Value	$2,292,830	$1,991,410	$2,136,077
Present Worth	**$28,419,080**	**$28,309,840**	**$31,066,960**

14. Non-Monetary Effectiveness Analysis

In planning new wastewater treatment facilities, non-monetary effectiveness issues as well as monetary criteria are used in determining the preferred alternative.

This section includes a general evaluation of the proposed biological treatment alternatives to determine which solution will maximize non-monetary effectiveness. The discussion will focus on the following categories:

- Environmental Impact
- Engineering Evaluation
- Implementability
- Regionalization
- Public Support

The non-monetary effectiveness ratings for each of the four biological treatment alternatives can be found in Table 8-5. Following is a brief discussion of each of the above categories:

a. Environmental Impact

Each treatment alternative evaluated was selected on the basis of its ability to achieve the planning area's wastewater treatment and water quality goals and objectives, and the ability to comply with requirements of the Kentucky Division of Water. The two primary periods when the environment could be damaged are during construction or during a major treatment process upset (assuming all alternatives considered will consistently meet permit discharge limits). Treatment Alternatives 1, 2 and 3 require approximately the same amount of construction and all construction for these three options would take place on the existing plant site.

For all treatment alternatives, construction procedures would include methods to safeguard the environment, such as silt fences and proper material storage. The wastewater treatment plant is a reasonable distance from residential and commercial facilities and construction noise, dust, odor and traffic are not anticipated to be problems. The existing treatment facilities would remain fully operational during construction of either Treatment Alternative 1 - Oxidation Ditch or Treatment Alternative 2 - Sequencing Batch Reactor, and no treatment operations would be bypassed or turned off while the new facilities are being built, tested and commissioned. Treatment Alternative 3 - IFAS would require the construction to take place during the dry summer months with lower flows as one of the oxidations ditches would need to be removed from service to be retrofitted with the IFAS system.

Regarding plant upsets, Treatment Alternative 1 - Oxidation Ditch is a well-established process that the plant operators are familiar with and plant upsets are not expected to pose a significant problem. Treatment Alternative 2 - Sequencing Batch Reactor and Treatment Alternative 3 - IFAS are processes that plant operators are not as familiar with and this unfamiliarity could result in more frequent upsets, plant operators are more familiar with the flow through process represented by Treatment Alternative 1 - Oxidation Ditch.

Overall, there is not expected to be a significant difference between Treatment Alternative 1- Oxidation Ditch and Treatment Alternative 2 - SBR regarding environmental impact, with Treatment Alternative 3 - IFAS having a slightly higher risk.

b. Engineering Evaluation

The primary goal of the selected alternative is to provide the most cost effective, environmentally sound and implementable wastewater treatment plant capable of achieving the Versailles Planning Area's water quality and service goals.

Treatment alternatives 1 through 3 are all fully capable of meeting the requirements of the Planning Area. Each treatment alternative is based on a

proven process. Treatment Alternative 3 - SBR has more built-in flexibility than the other alternatives for compliance with new/future effluent parameters and/or more stringent effluent limits on existing parameters.

The reliability of each of the treatment alternatives is based on the long term operation of the various components of the mechanical systems which comprise the treatment process. The reliability of these systems is dependent on the quality of the manufacturer's equipment, the quality of initial installation and the implementation of satisfactory maintenance and preventive maintenance programs by the City of Versailles. Assuming that each of these considerations is addressed, each treatment alternative will have the capability of long term reliability for the design life of the project.

Treatment Alternative 1 - Oxidation Ditch has a proven history of reliability at this facility. The WWTP Operators are very comfortable with the process and the operation.

Treatment Alternative 2 - SBR is considered to be equally as reliable as Treatment Alternative 1 - Oxidation Ditch with successful installations at similar sized WWTP in other areas. The SBR process here would require training for the plant operators who are not as familiar with this batch operated process (as opposed to the flow through processes represented by Treatment Alternative 1 - Oxidation ditch and Treatment Alternative 3 - IFAS.

Treatment Alternative 3 - IFAS is considered a newer technology with fewer installations at other WWTPs. The City and GRW visited a recently installed IFAS system that has obtained good quality effluent results. Similar to Treatment Alternative 2 - SBR, the plant operators are not as familiar with the IFAS process as opposed to Treatment Alternative 1 - Oxidation Ditch.

c. Implementability

The ability to implement each alternative from both constructability and operational perspectives was considered in the evaluation of each of the respective alternatives. From a constructability perspective, the implementability of Treatment Alternative 2 - SBR is considered to be the best as the existing system could operate without any hindrances until the construction of the SBR basins are completed. Once the construction is finalized, flow will then be sent to the SBR and the existing system could be taken out of service.

Treatment Alternative 1 - Oxidation Ditch is considered to be the next most implementable alternative from a constructability standpoint. The existing system would continue to operate until the construction of the new oxidation ditch is completed. After construction of the new oxidation ditch, one of the existing oxidation ditches would be taken out of service for repairs. Once repairs are finalized, the renovated oxidation ditch would be put back into service and the

other existing oxidation ditch would be removed from service for repairs. After all repairs are completed, the system would operate as planned with all three oxidation ditches. Treatment Alternative 1- Oxidation Ditch is more difficult to implement than Treatment Alternative 2 - SBR due to the phasing of repairs and construction.

Treatment Alternative 3 - IFAS is considered to be less implementable than the other alternatives as a result of it utilizing the existing oxidation ditches. One of the existing oxidation ditches must be taken out of service to be retrofitted with the IFAS equipment. At this point, capacity is limited due to the operation of only one of the oxidation ditches. Once retrofitted, a similar situation will occur with the other existing oxidation ditch. Treatment Alternative 3 - IFAS is considered to be least implementable due to the phasing of retrofitting of the IFAS equipment and the limitation on capacity.

From an operational perspective, Treatment Alternative 1 - Oxidation Ditch and Treatment Alternative 2 - SBR are all highly implementable as there will be little to no limitation on capacity during construction. However, Treatment Alternative 3 - IFAS is considered to be slightly less implementable from an operational perspective due to the limitation of capacity during construction, construction scheduling and the requirement of phasing during construction.

d. Regionalization

The existing plant provides regionalized wastewater treatment for customers within the Planning Area as well as for other customers in Woodford County. The plant will continue to serve as a regional treatment facility during the Planning Period. All alternatives contribute to regionalization by providing wastewater collection and treatment service to the regional Planning Area. All alternatives are considered equivalent for this category.

e. Public Support

In order to address the public's interest, the City plans to conduct a public meeting to inform the public of the needs of the treatment system and to discuss the proposed alternatives. At the meeting, projected construction and operations costs and their projected effect on sewer rates will be presented. The minutes and attendance roster of the public meeting will be included in Appendix I.

The public acceptability of treatment Alternatives 1 to 3 are similar because the City’s wastewater infrastructure needs would be met by all three options.

15. Summary of Non-Monetary Effectiveness Analysis

Table 8-5 provides non-monetary effectiveness rankings for each treatment alternative and compares the alternatives based on non-monetary effectiveness units (NEUs).

Table 8-5
Treatment Process Selection Analysis

Non- Monetary Factor		Alternative 1 - Oxidation Ditch		Alternative 2 - SBR		Alternative 3 - IFAS	
	Weight	*Rating*	*Score*	*Rating*	*Score*	*Rating*	*Score*
Environmental Impact	1.0	9	9	9	9	8	8
Engineering Evaluation	1.0	10	10	10	10	10	10
Implementability	0.9	9	8.1	10	9	8	7.2
Regionalization	0.7	10	7	10	7	10	7
Public Support	0.8	10	8	10	8	10	8
Total Score		42.1		43		40.2	
Total Present Worth		$28,419,080.00		$28,309,840.00		$31,066,960.00	
NEU		675,037.53		658,368.37		772,809.95	

The **Weight** of each factor is a measure of the City's relative concerns of that factor compared to other factors, on a scale of 0 to 1, with the highest weight given to those that are considered the most critical.

The **Rating** is a measure of the relative implementation concern of that alternative compared to other alternatives on a scale of 0 to 10, with the highest rating given to the alternative that best satisfies that factor.

The **NEU** (Non-monetary Effectiveness Unit) is a measure of the relative implementation concern due to construction and operation of each alternative. The NEU is the Total Present Worth divided by the Total Score. The alternative with the lowest NEU is the most capable of implementation.

16. Treatment Process Alternative Selection

Regarding the four treatment alternatives presented above, only Treatment Alternative 4 - No Action could be eliminated from further consideration due to reasons stated earlier. Without action by the City regarding the treatment facilities, the City will become non-compliant with their KPDES permit. Of the remaining alternatives, **Treatment Alternative 2 - Sequencing Batch Reactor (SBR)** was selected as the preferred treatment alternative due to its low present worth cost, its non-monetary analysis and its proven history of reliability.

The City has elected to take another advantage of selecting Treatment Alternative 2 - SBR. The existing oxidation ditches that were to be abandoned will be converted to EQ basins for wet weather flow storage. The oxidation ditches can store approximately 3.0 MGAL. Flows in excess of the peak hydraulic capacity of 12.5 MGD would be diverted to the converted EQ basins and then returned for treatment at a control rate as the wet weather flow subsides. A detailed description of renovations necessary to convert the abandoned oxidation ditches to EQ basins is described earlier with Treatment Alternative 2 - SBR. Exhibit 8-28 includes a detailed project cost estimate for the optional wet weather storage (approximate cost for the 3 MG EQ basins is $1,100,000.

Exhibits 8-29 and 8-30 show the plant layout and flow schematic, respectively, of the selected treatment alternative, Treatment Alternative 2 - SBR.

C. Collection System Alternatives

The purpose of this section is to define and evaluate the available alternatives for upgrading the existing wastewater collection system to accommodate the projected 2033 wastewater flows to be transported by the sewage collection system. As shown in the following sections, several segments of the existing collection system, including pump stations, gravity sewers and force mains, are recommended to be upgraded and new gravity collector sewers are proposed in currently un-served areas to accommodate projected peak flows by the end of the planning period.

Three collection system upgrade alternatives were considered for accommodating Versailles's projected peak flows. The collection system upgrade alternatives that were considered include: 1) Conventional Gravity Collection System, 2) Vacuum Collection System, and 3) Low Pressure Collection System.

1. Collection System Alternative 1 – Conventional Gravity Collection System

Traditionally, wastewater collection systems consist of gravity sewers, pump stations and force mains. Although considered "low technology" when compared to alternative forms of waste collection, it is a tried-and-true method which a majority of municipalities employ. Versailles's current system is comprised of conventional gravity sewer, pump stations and force mains in all but one small development where they have low pressure sewers.

2. Collection System Alternative 2 – Vacuum Collection System

Vacuum sewage transport utilizes differential air pressure to create flow, as opposed to the gravity induced flow of conventional wastewater collection systems. A vacuum sewer system consists of three major components: the valve pit installation; vacuum collection and transmission conduits (service lines, branch lines, and mains), and the vacuum collection station. When a preset quantity of sewage flows into the valve pit, a pneumatic signal is sent to the controller mounted on the interface valve,

which is then opened by the vacuum. The valve stays open for a preset amount of time allowing the sewage to be drawn into the vacuum lines. Sewage is propelled through the lines at a velocity of 15-18 feet per second by energy created from the sewage/air mixture. The propulsive force's magnitude declines noticeably when the valve closes, but remains important as the admitted air continues to expand. Within seconds, friction slows the sewage and flow continues under the influence of gravity. Eventually, all motion ceases until the next valve cycles.

Sewage is drawn into the vacuum mains and into a collection tank by vacuum pumps. The collection tank and vacuum pumps are located in the vacuum collection/pumping station. As the tank fills, sensing rods activate the sewage pumps which, in turn, pump the sewage to a gravity interceptor sewer, wastewater pumping station, or wastewater treatment plant.

The vacuum collection system is most practical for small communities that lie on hilly terrain.

3. Collection System Alternative 3 – Low Pressure Collection System

The low pressure collection system is also most practical for small communities that lie on hilly terrain. Each house has an individual grinder pump that reduces waste to a finely ground slurry. The waste is then pumped through a common force main to a wastewater treatment facility. More often than not, there is no need for any lift or auxiliary pumping stations. In addition, infiltration and inflow problems are often eliminated, and the high efficiency pumps used require lower power operating costs than many typical major home appliances. Versailles currently has one development under construction, Wooldridge Gardens, which utilizes this method of collections sewers.

4. Collection System Alternative 4 – No Action

Presently, the system maintains the capacity to transport the projected wastewater flows for the 20-year planning period. However, the current collection system experiences heavy amounts of inflow and infiltration (I&I) during wet weather events. Similarly, several pump stations are experiencing sanitary system overflows (SSOs) during wet weather events. Collection System Alternative 4 - No Action would potentially result in overflows in the collection system during future wet weather events. Therefore, Collection System Alternative 4 - No Action is eliminated from further consideration.

5. Collection System Alternative Selection

Although vacuum and low pressure wastewater collection systems can be sound alternatives to a conventional gravity sewer system, they were not considered to be viable alternatives for the Versailles collection system. The reasons are that the City of Versailles has had a conventional gravity sewer system since the early 1930s, and

to convert to an alternate form of technology would be both time consuming and expensive. In addition, maintenance on a new type of system would require additional training of a staff that is already experienced with the existing conventional gravity system. Therefore, the selected wastewater collection system alternative will consist of additions and upgrades to the existing gravity sewer system.

6. Proposed Collection System Improvements

There are two main projects being proposed for improvements to the collection system. The first is rehabilitation of the existing sewer system as outlined in the Sanitary Sewer Evaluation Survey (SSES). The second project would provide sewer service to the Sycamore Estates subdivision area. This project would require participation from Woodford County Fiscal Court and the residents of the area to assume responsibility for constructing the project.

a. Rehabilitation Improvements within the Existing System

As was discussed in the hydraulic modeling portion of Section 6, the existing collection system maintains the capacity to transport the projected average daily wastewater flows for the 20-year planning period. However, the sewers are experiencing large amounts of I&I during wet weather events. The City has begun an aggressive sewer rehabilitation program to reduce the I&I from their collection system based on the recommendations in the SSES. Improvements to be included in the rehabilitation consist of Cured-in-Place (CIPP) pipe, sewer point repairs, manhole rehabilitation and sewer line replacements. The City will also continue with the inspections of the existing gravity sewers with a closed circuit television (CCTV) camera, which will form the basis for subsequent phases of the project.

In addition to the collection system improvements, the City has identified four (4) of their twenty-one (21) pump stations that are currently in need of rehabilitation work. These are the Charmill Pump Station, the Stonegate Pump Station, the Woodlands Pump Station, and the Methodist Home Pump Station. These pump stations will be evaluated for capacity, code regulations and Division of Water requirements. Improvements may include pump replacement, electrical improvements, backup pumping and power, and increased storage, in accordance with “Ten States Standards”. Some options for achieving the required back-up capabilities are adding backup generators for each station or having sufficient portable generators; providing dual electrical feeds from separate substations; providing backup (emergency) pumps at each station; and assuring that there are two (2) hours of storage capacity in the wet well and associated piping. The City has elected to provide an emergency generator receptacle and double throw switch at each pump station site to accommodate the use of portable generators.

The SSES divides the proposed rehabilitation into 5 Phases over a 5-year period. Phase 1 started in September, 2013 and is scheduled to conclude by November, 2014. The final phase, Phase 5, is scheduled to start in July, 2016 and completed in September, 2018.

Phase 1 of the rehabilitation program includes the evaluation of the line sections that were investigated in the SSES. In addition, the recommended first phase includes preparing a detailed schedule of work and ultimately a construction project based on the approximately 106,000 linear feet of sewer that has been CCTV inspected as part of the SSES (Parts of Basins 1, 6, and 10). The Phase 1 project includes 35,000 linear feet of rehabilitation, along with various associated repairs. The City is including manhole repairs and the rehabilitation of Charmill and Stonegate pump stations in Phase 1.

The remaining approximately 203,000 linear feet of sewer line to be investigated has been divided into four (4) phases. Each phase would generally span 26 months with tasks and projects overlapping. This allows for city personnel to CCTV lines year-round following periods of wet weather, and provides the opportunity of on-going review of video information so that severe defects can be handled quickly when found. The detailed schedule can be found in Appendix D. Both basin sizes as well as potential for defects were considered when separating basins into phases.

Phase 1 will include part of the areas that were CCTV inspected as part of the SSES report (Basins 1, 6 & 10) as well as two (2) pump station repairs. Phase 2 would include the reminder of the needed repairs determined from the Phase 1 CCTV inspections, manhole repairs and one (1) pump station repair as well as repairs in areas of Basins 4 & 5. Phase 3 includes completing repairs in areas of Basins 1, 4, 5 & 10 and one (1) pump station repair. Phase 4 includes Basins 3, 11, 12, and areas of Basin 1. Phase 5 would include remaining areas of the system that are considered “problem” or “potential problem” areas. The total estimated cost for the collection system rehabilitation is $7,825,000. The city has obtained financing to complete the planned projects through Phase 3. The estimated remaining costs for the rehabilitation program amount to $2,115,000.

Table 8-6 outlines the phasing and costs of the collection system rehabilitation program.

Table 8-6 Versailles Wastewater Collection System Rehabilitation Program						
Phase	**1**	**2**	**3**	**4**	**5**	**Total**
LF CCTV	105,903	51,000	51,000	51,000	50,000	308,903
LF Rehab	35,000	24,500	32,900	20,000	20,000	132,400
Line Rehab Cost	**$1,380,000**	**$1,102,000**	**$1,343,000**	**$1,000,000**	**$900,000**	**$5,725,000**
MH Repairs	121	90	112	252	30	605
MH Repairs Cost	**$170,000**	**$98,000**	**$125,000**	**$223,000**	**$35,000**	**$651,000**
Lift Station Rehab	2	1	1	0	0	4
Lift Station Rehab Cost	**$200,000**	**$100,000**	**$100,000**	**$0**	**$0**	**$400,000**
Basins	1, 6, 10	1, 4, 5, 6	1, 4, 5, 10	1, 3, 11, 12	Remaining areas	1, 3, 4, 5, 6, 10, 11, 12
Schedule	Sept. 2013 – Nov. 2014	July 2013 – Sept. 2015	July 2014 – Sept. 2016	July 2015 – Sept. 2017	July 2016 – Sept. 2018	Sept. 2013-Sept. 2018
Total Estimated Construction Costs	**$1,750,000**	**$1,300,000**	**$1,568,000**	**$1,223,000**	**$935,000**	**$6,776,000**
Other Project Costs	**$240,000**	**$210,000**	**$250,000**	**$194,000**	**$155,000**	**$1,049,000**
Total Estimated Project Cost	***$1,990,000***	***$1,510,000***	***$1,818,000***	***$1,417,000***	***$1,090,000***	***$7,825,000***

b. Collection System Improvements in the Sycamore Estates Area

As shown in Exhibit 6-7, the Sycamore Estates subdivision, located in the eastern portion of the Planning Area, is currently served by septic systems. The Facilities Plan has taken into account receiving wastewater flows from Sycamore Estates and the surrounding areas in the 11-20 year time frame. Exhibit 8-31 illustrates the proposed sanitary sewer expansion that would need to be constructed in order to collect and transport the wastewater from Sycamore Estates and the surrounding area to the City's existing facilities. The capital costs for constructing these new facilities are expected to be borne by Woodford County Fiscal Court and the residents within the impacted area. As seen in Table 8-7, the proposed expansion includes the construction of 8-inch gravity sewers, 4-inch and 8-inch force mains and four (4) additional pump stations. The total estimated cost for the Sycamore Estates sanitary sewer expansion is approximately $6,440,000.

Table 8-7 Sycamore Estates Subdivision Sanitary Sewer Expansion				
Description	**Quantity**	**Unit**	**Unit Cost**	**Cost**
8" PVC Gravity Sewer	56,335	LF	$55	$3,098,425
Manhole	225	EA	$3,000	$675,000
4" PVC Force Main	6,775	LF	$8	$54,200
8" PVC Force Main	15,900	LF	$25	$397,500
8" Road Bore under Bluegrass Pkwy in 14" Steel Casing	1	EA	$55,000	$55,000
New Pump Station #V	1	EA	$80,000	$80,000
New Pump Station #VI	1	EA	$80,000	$80,000
New Pump Station #VII	1	EA	$80,000	$80,000
New Pump Station #VIII	1	EA	$250,000	$250,000
Total Construction Cost Estimate				*$4,770,125*
Non-Construction Costs (35%)				*$1,669,544*
Total Project Cost Estimate				***$6,439,669***

Exhibits 8-1 – 8-4

Disinfection Alternative 1

Ultraviolet (UV) Light

Exhibit 8-1
Disinfection Facilities
Alternative 1
Ultraviolet Light Disinfection
Construction Cost Estimate

Description	Quantity	Unit	Unit Cost	Cost
Equipment:				
Ultraviolet Disinfection System	1	LS	$280,000	$280,000
1 Ton JIB Crane	1	LS	$50,000	$50,000
Parshall Flume & Ultrasonic Flow Measurement	1	LS	$25,000	$25,000
Handwheel Operated Slide Gate 2' Wide x 6' High	4	EA	$4,500	$18,000
Equipment Installation (10%)	1	LS	$37,300	$37,300
Electrical Installation (25%)	1	LS	$93,250	$93,250
Subtotal				**$503,550**
New UV Channel Structure:				
Reinforced Concrete Slab	41	CY	$450	$18,417
Reinforced Concrete Walls	55	CY	$600	$32,800
Reinforced Elevated Slab	13	CY	$750	$9,444
Soil Excavation	123	CY	$15	$1,842
Rock Excavation	164	CY	$75	$12,278
Crushed Stone	16	CY	$25	$393
Backfill - Earthwork	31	CY	$15	$471
1-1/2" Diameter Handrail	91	LF	$40	$3,640
1-1/2" Fiberglass Grating	340	SF	$5	$1,700
Aluminum Weir Plate	2	EA	$1,500	$3,000
Subtotal				**$83,984**
Contractor OH&P (15% of Equipment)	1	LS	$55,950	**$55,950**
Total Construction Cost				**$643,484**

Exhibit 8-2 Disinfection Facilities Alternative 1 Ultraviolet Light Disinfection *Operation and Maintenance Cost*			
Design Conditions:			
Average Flow	4.5	mgd	
Peak Flow	12.5	mgd	
Quantity of Lamps:			
Lamp/1.0 MGD of Peak Flow	19.2	lamps	
Quantity of Lamps	240	lamps	
Power Usage at Average Flow:			
Average Power Draw	13.2	kw	
Operating Hours/Day	24	hrs/day	
Operating Days	365	days/year	
Annual Power Usage	115,632	kw-hr/yr	
Cost per kw-hr	$0.07	/ kw-hr	
Total Annual Power Cost			**$8,094**
Replacement Parts:			
Annual Percent of Lamp Replacements	25%		
Number of Lamps Replaced	60	lamps	
Cost Per Lamp	$25	/ lamp	
Number of Ballasts Replaced	10	ballasts	
Cost Per Ballast	$150	/ ballast	
Total Annual Replacement Cost			**$3,000**
Miscellaneous:			
Annual Lamp Cleaning Cost	$1,000		
Total Annual Miscellaneous			**$1,000**
Total Annual Operating and Maintenance Cost			**$12,094**

Exhibit 8-3
Disinfection Facilities
Alternative 1
Ultraviolet Light Disinfection
Salvage Value

Description	Cost	Salvage Value
Ultraviolet Disinfection System	$280,000	$0
1 Ton JIB Crane	$50,000	$0
Parshall Flume & Ultrasonic Flow Measurement	$25,000	$0
Reinforced Concrete Slab	$60,661	$24,264
Total Salvage Cost		**$24,264**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-4 Disinfection Facilities Alternative 1 Ultraviolet Light Disinfection *Present Worth Analysis*			
Capital Cost:			**$643,484**
Present Worth of Annual Operating Cost Calculation:			
Annual Operating Cost	$12,094	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Annual Operating Cost			**$139,000**
Present Worth of Salvage Value:			
Salvage Value	$24,264		
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Salvage Value			**$8,000**
Total Present Worth			**$774,484**

Exhibits 8-5 – 8-8

Disinfection Alternative 2

Sodium Hypochlorite

Exhibit 8-5
Disinfection Facilities
Alternative 2
Sodium Hypochlorite Disinfection
Construction Cost Estimate

Description	Quantity	Unit	Unit Cost	Cost
Equipment:				
Sodium Hypochlorite Bulk Tank - 5,000 Gallon	1	EA	$12,000	$12,000
Sodium Hypochlorite Day Tank - 250 Gallon	1	EA	$2,500	$2,500
Chemical Feed Pump	2	EA	$8,000	$16,000
Chemical Transfer Pump	2	EA	$4,000	$8,000
Chemical Storage Building	625	SF	$150	$93,750
Equipment Installation (10%)	1	LS	$3,850	$3,850
Site Piping	1	LS	$10,000	$10,000
Subtotal				**$146,100**
Contractor OH&P (15% of Equipment)	1	LS	$5,775.00	**$5,775**
Total Construction Cost				**$151,875**

Exhibit 8-6
Disinfection Facilities
Alternative 2
Sodium Hypochlorite Disinfection
Operation and Maintenance Cost

Design Conditions:			
Average Flow	4.5	mgd	
Peak Flow	12.5	mgd	
Influent Fecal Coliform	10,000,000	/ 100 mL	
Effluent Fecal Coliform	200	/ 100 mL	
Sodium Hypochlorite Usage at Average Flow:			
Chlorine Feed Rate	6	mg/L	
Daily Sodium Hypochlorite Dosage @ 12.5%	217	gpd	
Sodium Hypochlorite Cost	$1.00	/ gal	
Days in Operation	365	days	
Total Annual Sodium Hypochlorite Cost			**$79,030**
Sulfur Dioxide Usage at Average Flow:			
Effluent Chlorine Residual	5.2	mg/L	
Sulfur Dioxide/Chlorine Ratio	0.99		
Sulfur Dioxide Concentration	5.1	mg/L	
Daily Sulfur Dioxide Usage	193	lb/day	
Sulfur Dioxide Cost	$0.36	/ lb	
Days in Operation	365	days	
Total Annual Sulfur Dioxide Cost			**$25,359**
Total Annual Operating and Maintenance Cost			**$104,389**

Exhibit 8-7
Disinfection Facilities
Alternative 2
Sodium Hypochlorite Disinfection
Salvage Value

Description	Cost	Salvage Value
Sodium Hypochlorite Bulk Tank - 5,000 Gallon	$12,000	$4,800
Sodium Hypochlorite Day Tank - 250 Gallon	$2,500	$1,000
Chemical Feed Pump	$16,000	$0
Chemical Transfer Pump	$8,000	$0
Chemical Storage Building	$93,750	$37,500
Site Piping	$10,000	$5,000
Total Salvage Cost		**$48,300**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-8 Disinfection Facilities Alternative 2 Sodium Hypochlorite Disinfection *Present Worth Analysis*			
Capital Cost:			**$151,875**
Present Worth of Annual Operating Cost Calculation:			
Annual Operating Cost	$104,389	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Annual Operating Cost			**$1,197,000**
Present Worth of Salvage Value:			
Salvage Value	$48,300		
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Salvage Value			**$15,000**
Total Present Worth			**$1,333,875**

Exhibits 8-9 – 8-12

Disinfection Alternative 3

Peracetic Acid

Exhibit 8-9
Disinfection Facilities
Alternative 3
Peracetic Acid Disinfection
Construction Cost Estimate

Description	Quantity	Unit	Unit Cost	Cost
Equipment:				
Chemical Feed Pump	2	EA	$8,000	$16,000
Chemical Storage Building	625	SF	$150	$93,750
Equipment Installation (10%)	1	LS	$1,600	$1,600
Site Piping	1	LS	$10,000	$10,000
Subtotal				**$121,350**
Contractor OH&P (15% of Equipment)	1	LS	$2,400.00	**$2,400**
Total Construction Cost				**$123,750**

Exhibit 8-10 Disinfection Facilities Alternative 3 Peracetic Acid Disinfection *Operation and Maintenance Cost*			
Design Conditions:			
Average Flow	4.5	mgd	
Peak Flow	12.5	mgd	
Influent Fecal Coliform	10,000,000	/ 100 mL	
Effluent Fecal Coliform	200	/ 100 mL	
Peracetic Acid Usage at Average Flow:			
Peracetic Acid Feed Rate @ 15%	1.5	mg/L	
Daily Peracetic Acid Dosage	51	gpd	
Peracetic Acid Cost	$6.25	/ gal	
Days in Operation	365	days	
Total Annual Peracetic Acid Cost			**$116,748**
Total Annual Operating and Maintenance Cost			**$116,748**

Exhibit 8-11
Disinfection Facilities
Alternative 3
Peracetic Acid Disinfection
Salvage Value

Description	Cost	Salvage Value
Chemical Feed Pump	$16,000	0
Chemical Storage Building	$93,750	$37,500
Site Piping	$10,000	$5,000
Total Salvage Cost		**$42,500**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-12 Disinfection Facilities Alternative 3 Peracetic Acid Disinfection *Present Worth Analysis*			
Capital Cost:			**$123,750**
Present Worth of Annual Operating Cost Calculation:			
Annual Operating Cost	$116,748	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Annual Operating Cost			**$1,339,000**
Present Worth of Salvage Value:			
Salvage Value	$42,500		
Discount Rate	6.0%		
Life of Project	20	years	
Total Present Worth of Salvage Value			**$13,000**
Total Present Worth			**$1,449,750**

Exhibits 8-13 – 8-17

Treatment Alternative 1

Oxidation Ditch

Oxidation Ditch Alternate

DATE: March, 2014

SCALE

SHEET NO. 8-13

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EXHIBIT 8-13
ALT. 1 - NEW OXIDATION DITCH & RETROFITTING EXISTING DITCHES
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

GRW PROJECT NO. 4132
CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 100'

Exhibit 8-14
Versailles WWTP Expansion
Alternative 1
Oxidation Ditch with Existing WWTP
Total Project Cost Estimate

Note: All Equipment Prices Include 15% for Contractor OH&P

Description	Quantity	Unit	Unit Cost	Cost	Sum
Influent Flow Measurement System					
Parshall Flume	1	LS	$23,000	$23,000	
Equipment Installation (10%)	1	LS	$2,300	$2,300	
Soil Excavation	124	CY	$15	$1,860	
Rock Excavation	124	CY	$75	$9,300	
Crushed Stone	30	CY	$25	$750	
Reinforced Concrete Slab	12	CY	$450	$5,400	
Reinforced Concrete Walls	25	CY	$600	$15,000	
Handrail	1	LS	$1,500	$1,500	
Subtotal					**$59,000**
Preliminary Treatment Building					
Screening Building (note: Does NOT include mechanical/electrical cost)	1,800	SF	$100	$180,000	
Soil Excavation	200	CY	$15	$3,000	
Rock Excavation	1,200	CY	$75	$90,000	
Crushed Stone	300	CY	$25	$7,500	
Reinforced Concrete Slab	100	CY	$450	$45,000	
Reinforced Concrete Walls	150	CY	$600	$90,000	
Reinforced Elevated Concrete Slab	10	CY	$750	$7,500	
Backfill - Earthwork	200	CY	$15	$3,000	
Subtotal					**$426,000**
Screening Equipment					
Mechanical Bar Screen with Washer Compactor	1	EA	$273,125	$273,125	
Manual Bar Rack	1	EA	$10,000	$10,000	
Gates - 3'-0" Wide	10	EA	$3,500	$35,000	
Gates - 4'-0" Wide	7	EA	$4,500	$31,500	
Equipment Installation (15%)	1	LS	$52,444	$52,444	
Subtotal					**$402,000**
Grit Removal System					
Grit Removal System with Pumping, Classifying, Washing & Dewatering	1	LS	$529,000	$529,000	
Equipment Installation (20%)	1	LS	$105,800	$105,800	
Soil Excavation	117	CY	$15	$1,760	
Rock Excavation	88	CY	$75	$6,600	
Crushed Stone	12	CY	$25	$311	
Reinforced Concrete Walls	73	CY	$600	$43,556	
Reinforced Concrete Slab	12	CY	$450	$5,600	
Subtotal					**$693,000**

Exhibit 8-14
(Continued)

Oxidation Ditch Distribution Box Modifications					
Gates	1	EA	$23,000	$23,000	
Equipment Installation (20%)	1	LS	$4,600	$4,600	
Reinforced Concrete Slab	5	CY	$450	$2,250	
Reinforced Concrete Walls	15	CY	$600	$9,000	
Grating	1	LS	$1,000	$1,000	
Handrail	1	LS	$1,500	$1,500	
Subtotal					**$41,000**
Oxidation Ditch with Biological Nutrient Removal (1.5 MG)					
Proposed Equipment - (2) 60 HP impeller aerators & Mixers	1	LS	$237,667	$237,667	
Proposed Equipment - VFD's, Insrumentation and Controls	1	LS	$164,833	$164,833	
Equipment Installation (20%)	1	LS	$80,500.0	$80,500	
Soil Excavation	100	CY	$15	$1,500	
Rock Excavation	400	CY	$75	$30,000	
Crushed Stone	1,500	CY	$25	$37,500	
Reinforced Concrete Slab	800	CY	$450	$360,000	
Reinforced Concrete Walls	600	CY	$600	$360,000	
Reinforced Elevated Concrete Slab	115	CY	$750	$86,250	
Subtotal					**$1,358,000**
Existing Oxidation Ditches Renovations					
Proposed Equipment - (4) 60 HP impeller aerators & Mixers	1	LS	$475,333	$475,333	
Proposed Equipment - VFD's, Insrumentation and Controls	1	LS	$329,667	$329,667	
Equipment Installation (20%)	1	LS	$161,000.0	$161,000	
Repair Existing Concrete Ditches	1	LS	$30,000	$30,000	
Reinforced Concrete Walls	143	CY	$600	$85,800	
Reinforced Elevated Concrete Slab	187	CY	$750	$140,250	
Demolish Exisiting Oxidations Ditch Walls	2	LS	$30,000	$60,000	
Subtotal					**$1,282,000**
Clarifier Flow Splitter Box					
Gates (New Splitter Box)	4	EA	$23,000	$92,000	
Equipment Installation (20%)	1	LS	$18,400	$18,400	
Reinforced Concrete Slab	13	CY	$450	$6,000	
Reinforced Concrete Walls	228	CY	$600	$136,533	
Reinforced Elevated Concrete Slab	14	CY	$750	$10,667	
Grating	1	LS	$10,000	$10,000	
Handrail	1	LS	$2,500	$2,500	
Subtotal					**$276,000**
Aerated Sludge Holding Tank Modifications					
New Aeration Diffusers and Piping	2	EA	$50,000	$100,000	
Rehabilitation of the Existing Blowers	3	EA	$20,000	$60,000	
Drain Sump Improvements	2	EA	$50,000	$100,000	
Equipment Installation (20%)	1	LS	$32,000	$32,000	
Subtotal					**$292,000**

Exhibit 8-14
(Continued)

Existing Clarifier Nos. 1 and 2 (75-ft Diameter)- Replacement					
Demolish Exisiting Claifiers and Equipment	2	EA	$50,000	$100,000	
Replace Existing Mechanical Equipment	2	EA	$230,000	$460,000	
Equipment Installation (25%)	1	LS	$115,000	$115,000	
Reinforced Concrete Slab	600	CY	$450	$270,000	
Reinforced Concrete Walls	400	CY	$600	$240,000	
Soil Excavation	2,525	CY	$15	$37,878	
Rock Excavation	0	CY	$75	$0	
Crushed Stone	1,850	CY	$25	$46,243	
Backfill - Earthwork	2,525	CY	$15	$37,875	
Effluent Weirs and Scum Baffles (FRP)	2	EA	$12,000	$24,000	
Covers	2	EA	$52,710	$105,420	
Subtotal					**$1,436,000**
New Clarifier No. 3 (75-ft Diameter)					
New Mechanical Equipment	1	EA	$230,000	$230,000	
Equipment Installation (25%)	1	LS	$57,500	$57,500	
Reinforced Concrete Slab	300	CY	$450	$135,000	
Reinforced Concrete Walls	200	CY	$600	$120,000	
Soil Excavation	200	CY	$15	$3,000	
Rock Excavation	800	CY	$75	$60,000	
Crushed Stone	1,850	CY	$25	$46,250	
Effluent Weirs and Scum Baffles (FRP)	1	EA	$12,000	$12,000	
Covers	1	EA	$52,710	$52,710	
Subtotal					**$716,000**
Disinfection Facilities					
Ultraviolet Disinfection System	1	LS	$280,000	$280,000	
1 Ton JIB Crane	1	LS	$50,000	$50,000	
Parshall Flume & Ultrasonic Flow Measurement	1	LS	$25,000	$25,000	
Handwheel Operated Slide Gate 2' Wide x 6' High	4	EA	$4,500	$18,000	
Equipment Installation (10%)	1	LS	$37,300	$37,300	
Electrical Installation (25%)	1	LS	$93,250	$93,250	
Reinforced Concrete Slab	41	CY	$450	$18,417	
Reinforced Concrete Walls	55	CY	$600	$32,800	
Reinforced Elevated Slab	13	CY	$750	$9,444	
Soil Excavation	123	CY	$15	$1,842	
Rock Excavation	164	CY	$75	$12,278	
Crushed Stone	16	CY	$25	$393	
Backfill - Earthwork	31	CY	$15	$471	
1-1/2" Diameter Handrail	91	LF	$40	$3,640	
1-1/2" Fiberglass Grating	340	SF	$5	$1,700	
Aluminum Weir Plate	2	EA	$1,500	$3,000	
Subtotal					**$588,000**

Exhibit 8-14
(Continued)

Biosolids Dewatering					
Progressive Cavity Sludge Feed Pumps (WAS)	2	EA	$25,000	$50,000	
Belt Filter Press/Polymer Feed Modifications	1	EA	$75,000	$75,000	
Equipment Installation (15%)	1	LS	$18,750	$18,750	
Subtotal					**$144,000**
RAS Pumping Station (6.75 MGD Capacity)					
RAS Pumps (submersible)	4	EA	$60,000	$240,000	
Access Hatches (36"x36")	6	EA	$2,300	$13,800	
Interior Piping and Fittings	1	LS	$31,625	$31,625	
Valves	1	LS	$40,250	$40,250	
Equipment Installation (15%)	1	LS	$48,851	$48,851	
20" Force Main	380	LF	$80	$30,400	
Soil Excavation	72	CY	$20	$1,449	
Crushed Stone	31	CY	$25	$786	
Rock Excavation	109	CY	$50	$5,444	
Reinforced Concrete Walls (Pump Sta and Valve Vault)	313	CY	$500	$156,333	
Reinforced Concrete Slab (Pump Sta and Valve Vault)	12	CY	$450	$5,433	
Reinforced Elevated Concrete Slab (Pump Sta and Valve Vault)	12	CY	$750	$9,056	
Subtotal					**$583,000**
Lagoons No. 2 & No. 3 Closures					
Dewater, Dredge, Press and Haul Away Existing Sludge	2	EA	$225,000	$450,000	
Soil Backfill Lagoon No. 2	13,175	CY	$10	$131,750	
Soil Backfill Lagoon No. 3	18,260	CY	$10	$182,600	
Subtotal					**$764,000**
Miscellaneous					
Lab/Admin. Building Modifications Including New Lab Equipment	1	LS	$400,000	$400,000	
Non-Potable Water Pump Sta.-Does NOT include mechanical/elect cost	1	LS	$135,000	$135,000	
Road Work	1	LS	$50,000	$50,000	
New Electrical Control Building (25' by 15')	375	SF	$125	$46,875	
Emergency Generator and Electrical Building (35' by 35')	1	LS	$828,125	$828,125	
Demolition Existing NPW pump Station	1	LS	$20,000	$20,000	
Demolition Existing Screenings Building	1	LS	$50,000	$50,000	
Demolition Existing Chlorine Contract Basin	1	LS	$20,000	$20,000	
Removal of Previously Abandoned Structures	1	LS	$100,000	$100,000	
30-Inch Yard Piping (0' to 10' Deep)	100	LF	$350	$35,000	
24-Inch Yard Piping (0' to 10' Deep)	2,860	LF	$300	$858,000	
12-Inch Yard Piping (0' to 10' Deep)	300	LF	$100	$30,000	
14-Inch Force Main	430	LF	$110	$47,300	
New 4' Diameter Manhole	7	EA	$2,500	$17,500	
Subtotal					**$2,638,000**

Exhibit 8-14
(Continued)

Construction Cost Subtotal				***$11,698,000***
Additional Yard Piping (25%) of the miscellaneous piping above	1	LS	$243,000	**$243,000**
Mechanical, Electrical, & Instrumentation (25%)	1	LS	$2,925,000	**$2,925,000**
Subtotal				***$14,866,000***
Construction Contingencies (15%)				**$2,229,900**
Total Construction Cost Estimate				***$17,095,900***
Engineering, Legal, Administration (20%)				**$3,419,180**
Total Project Cost Estimate				***$20,515,080***

Exhibit 8-15
Versailles WWTP Expansion
Alternative 1
Oxidation Ditch with Existing WWTP
Annual Operation and Maintenance Cost

Item					Annual Cost
Labor Cost					
Salaries (4 Employees)	$166,500				
Overtime	$4,000				
Payroll Taxes	$15,000				
Employee Insurance	$18,650				
Retirement	$32,900				
Total Annual Labor Cost					**$237,050**
General Cost					
Vehicle Operation (Fuel, oil, etc.)	$2,000				
Vehicle Maintenance and Repair	$1,500				
Equipment Maintenance and Repair	$45,000				
Laboratory Fees	$15,000				
Screenings Hauling and Disposal	$2,500				
Gas and Heating	$2,700				
Uniforms	$800				
Telephone	$1,700				
Training and Travel	$3,000				
Building and Equipment Insurance	$23,000				
Professional and Technical Services	$5,000				
Miscellaneous	$2,000				
Total Annual General Cost					**$104,200**
Electrical Power Usage (avg flow / normal operation)	hp/unit	units	hrs/day	hp*hrs/day	
Mechanically Cleaned Bar Screens	0.5	1	12	6	
Washer Compactor	0.75	1	12	9	
Grit Dewatering	0.5	2	12	12	
Grit Pumps	10	2	12	240	
Oxidation Ditch Aerators	60	6	24	8,640	
Oxidation Ditch Mixers	5	6	24	734	
Clarifiers	0.5	3	24	36	
RAS Pumping Station	30	1	24	720	
WAS Pumping Station	10	1	8	80	
Non-Potable Water Pumping Station	75	1	12	900	
*Total Horsepower*Hours/Day*				*11,377*	
Daily Power Usage	8,488		kw-hr/day		
Annual Power Usage	3,097,952		kw-hr/yr		
Power Cost	$0.07		per kw-hr		
Total Annual Power Cost					**$216,857**

Exhibit 8-15
(Continued)

Disinfection Cost - UV (See Disinfection Alt. 1)					
Annual Power Cost	$8,094				
Annual Equipment Replacement Cost	$3,000				
Annual Miscellaneous Expenses	$1,000				
Total Annual Disinfection Cost					**$12,094**
Dewatering Cost - Belt Filter Press					
Electrical Power Cost	hp/unit	units	hrs/day	hp*hrs/day	Annual Cost
Belt Filter Press	1.5	1	8	12	$229
Belt Filter Press Feed Pumps	10	1	8	80	$1,525
Polymer Feed System	0.25	1	8	2	$38
Sludge Holding Tank Blowers	250	2	8	4,000	$76,241
Annual Electrical Power Cost	*$78,033*				
Belt Replacement Cost					
Life of Belt	5	years			
Cost of Replacement Belt	$45,000				
Annual Belt Replacement Cost	*$9,000*				
Polymer Usage					
Polymer Feed Rate	11	lbs/ton dry solids			
Biosolids Production (dry lbs/day)	7,816	dry lbs/day			
Biosolids Production (dry tons/day)	3.9	dry tons/day			
Daily Polymer Usage	43	lbs/day			
Cost of Polymer	$2.50	/ lb			
Days of Operation	365				
Annual Polymer Cost	*$39,227*				
Total Annual Dewatering Cost					**$126,259**
Solids Disposal Cost - Transportation and Landfill Belt Filter Press					
Annual Hauling and Disposal Cost	$55,000				
Total Annual Solids Disposal Cost					**$55,000**
Total Annual Operating and Maintenance Cost					**$751,460**

Exhibit 8-16
Versailles WWTP Expansion
Alternative 1
Oxidation Ditch with Existing WWTP
20- Year Salvage Value

Description	Cost	Salvage Value
Influent Flow Measurement System		
Parshall Flume	$23,000	$9,200.0
Reinforced Concrete Slab	$5,400	$2,160.0
Reinforced Concrete Walls	$15,000	$6,000.0
Handrail	$1,500	$0.0
Preliminary Treatment Building		
Screening Building (note: Does NOT include mechanical/electrical cost)	$180,000	$72,000.0
Reinforced Concrete Slab	$45,000	$18,000.0
Reinforced Concrete Walls	$90,000	$36,000.0
Reinforced Elevated Concrete Slab	$7,500	$3,000.0
Screening Equipment		
Mechanical Bar Screen with Washer Compactor	$273,125	$0
Manual Bar Rack	$10,000	$0
Gates - 3'-0" Wide	$35,000	$0
Gates - 4'-0" Wide	$31,500	$0
Grit Removal System		
Grit Removal System with Pumping, Classifying, Washing & Dewatering	$529,000	$0
Reinforced Concrete Walls	$43,556	$17,422
Reinforced Concrete Slab	$5,600	$2,240
Oxidation Ditch Distribution Box Modifications		
Gates	$23,000	$0
Reinforced Concrete Slab	$2,250	$900
Reinforced Concrete Walls	$9,000	$3,600
Grating	$1,000	$0
Handrail	$1,500	$0
Oxidation Ditch with Biological Nutrient Removal (1.5 MG)		
Proposed Equipment - (2) 60 HP impeller aerators & Mixers	$237,667	$0
Proposed Equipment - VFD's, Insrumentation and Controls	$164,833	$0
Reinforced Concrete Slab	$360,000	$144,000
Reinforced Concrete Walls	$360,000	$144,000
Reinforced Elevated Concrete Slab	$86,250	$34,500

Exhibit 8-16
(Continued)

Existing Oxidation Ditches Renovations		
Proposed Equipment - (4) 60 HP impeller aerators & Mixers	$475,333	$0
Proposed Equipment - VFD's, Insrumentation and Controls	$329,667	$0
Reinforced Concrete Walls	$85,800	$34,320
Reinforced Elevated Concrete Slab	$140,250	$56,100
Clarifier Flow Splitter Box		
Gates (New Splitter Box)	$92,000	$0
Reinforced Concrete Slab	$6,000	$2,400
Reinforced Concrete Walls	$136,533	$54,613
Reinforced Elevated Concrete Slab	$10,667	$4,267
Grating	$10,000	$0
Handrail	$2,500	$0
Existing Clarifier Nos. 1 and 2 (75-ft Diameter)- Replacement		
Replace Existing Mechanical Equipment	$460,000	$0
Reinforced Concrete Slab	$270,000	$108,000
Reinforced Concrete Walls	$240,000	$96,000
Effluent Weirs and Scum Baffles (FRP)	$24,000	$9,600
Covers	$105,420	$42,168
New Clarifier No. 3 (75-ft Diameter)		
New Mechanical Equipment	$230,000	$0
Reinforced Concrete Slab	$135,000	$54,000
Reinforced Concrete Walls	$120,000	$48,000
Effluent Weirs and Scum Baffles (FRP)	$12,000	$4,800
Covers	$52,710	$21,084
RAS Pumping Station (6.75 MGD Capacity)		
RAS Pumps (submersible)	$240,000	$0
Access Hatches (36"x36")	$13,800	$0
Interior Piping and Fittings	$31,625	$15,813
Valves	$40,250	$0
20" Force Main	$30,400	$15,200
Reinforced Concrete Walls (Pump Sta and Valve Vault)	$156,333	$62,533
Reinforced Concrete Slab (Pump Sta and Valve Vault)	$5,433	$2,173
Reinforced Elevated Concrete Slab (Pump Sta and Valve Vault)	$9,056	$3,622

Exhibit 8-16
(Continued)

Disinfection Facilities		
Ultraviolet Disinfection System	$280,000	$0
1 Ton JIB Crane	$50,000	$0
Parshall Flume & Ultrasonic Flow Measurement	$25,000	$10,000
Handwheel Operated Slide Gate 2' Wide x 6' High	$18,000	$7,200
Reinforced Concrete Slab	$18,417	$7,367
Reinforced Concrete Walls	$32,800	$13,120
Reinforced Elevated Slab	$9,444	$3,778
1-1/2" Diameter Handrail	$3,640	$0
1-1/2" Fiberglass Grating	$1,700	$0
Aluminum Weir Plate	$3,000	$0
Biosolids Dewatering		
Progressive Cavity Sludge Feed Pumps (WAS)	$50,000	$0
Belt Filter Press/Polymer Feed Modifications	$75,000	$0
Aerated Sludge Holding Tank Modifications		
New Aeration Diffusers and Piping	$100,000	$0
Rehabilitation of the Existing Blowers	$60,000	$0
Drain Sump Improvements	$100,000	$0
Miscellaneous		
Lab/Admin. Building Modifications Including New Lab Equipment	$400,000	$160,000
Non-Potable Water Pump Sta.-Does NOT include mechanical/elect cost	$135,000	$0
New Electrical Control Building (25' by 15')	$46,875	$18,750
Emergency Generator and Electrical Building (35' by 35')	$828,125	$331,250
30-Inch Yard Piping (0' to 10' Deep)	$35,000	$17,500
24-Inch Yard Piping (0' to 10' Deep)	$858,000	$429,000
12-Inch Yard Piping (0' to 10' Deep)	$30,000	$15,000
14-Inch Force Main	$47,300	$23,650
New 4' Diameter Manhole	$17,500	$7,000
Additional Yard Piping (25%) of the miscellaneous piping above	$243,000	$121,500
Total Salvage Value		**$2,292,830**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-17 Versailles WWTP Expansion Alternative 1 Oxidation Ditch with Existing WWTP Present Worth Analysis			
Total Project Cost			**$20,515,080**
Present Worth of Annual Operating Cost Calculation			
Annual Operating Cost	$751,460	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Annual Operating Cost			**$8,619,000**
Present Worth of Salvage Value			
Salvage Value	$2,292,830		
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Salvage Value			**$715,000**
Total Present Worth			**$28,419,080**

Exhibits 8-18 – 8-22

Treatment Alternative 2

Sequencing Batch Reactor (SBR)

SBR Alternate

DATE: March, 2014

SCALE

SHEET NO. 8-18

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EXHIBIT 8-18
ALT. 2 - SBR
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

GRW PROJECT NO. 4132

CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 150'

Exhibit 8-19
Versailles WWTP Expansion
Alternative 2
SBR with Existing WWTP
Total Project Cost Estimate

Note: All Equipment Prices Include 15% for Contractor OH&P

Description	Quantity	Unit	Unit Cost	Cost	Sum
Influent Flow Measurement System					
Parshall Flume	1	LS	$23,000	$23,000	
Equipment Installation (10%)	1	LS	$2,300	$2,300	
Soil Excavation	200	CY	$15	$3,000	
Rock Excavation	150	CY	$75	$11,250	
Crushed Stone	30	CY	$25	$750	
Reinforced Concrete Slab	12	CY	$450	$5,400	
Reinforced Concrete Walls	25	CY	$600	$15,000	
Handrail	1	LS	$1,500	$1,500	
Subtotal					**$62,000**
Preliminary Treatment Building					
Screening Building (note: Does NOT include mechanical/electrical cost)	1,800	SF	$100	$180,000	
Soil Excavation	300	CY	$15	$4,500	
Rock Excavation	1,250	CY	$75	$93,750	
Crushed Stone	300	CY	$25	$7,500	
Reinforced Concrete Slab	100	CY	$450	$45,000	
Reinforced Concrete Walls	150	CY	$600	$90,000	
Reinforced Elevated Concrete Slab	10	CY	$750	$7,500	
Backfill - Earthwork	200	CY	$15	$3,000	
Subtotal					**$431,000**
Screening Equipment					
Mechanical Bar Screen with Washer Compactor	1	EA	$273,125	$273,125	
Manual Bar Rack	1	EA	$10,000	$10,000	
Gates - 3'-0" Wide	10	EA	$3,500	$35,000	
Gates - 4'-0" Wide	7	EA	$4,500	$31,500	
Equipment Installation (15%)	1	LS	$52,444	$52,444	
Subtotal					**$402,000**
Grit Removal System					
Grit Removal System with Pumping, Classifying, Washing & Dewatering	1	LS	$529,000	$529,000	
Equipment Installation (20%)	1	LS	$105,800	$105,800	
Soil Excavation	150	CY	$15	$2,250	
Rock Excavation	100	CY	$75	$7,500	
Crushed Stone	12	CY	$25	$311	
Reinforced Concrete Walls	73	CY	$600	$43,556	
Reinforced Concrete Slab	12	CY	$450	$5,600	
Subtotal					**$694,000**

Exhibit 8-19
(Continued)

Lagoons No. 2 & 3 Closures					
Dewater, Dredge, Press and Haul Away Existing Sludge	2	EA	$225,000	$450,000	
Soil Backfill Lagoon No. 2	9,848	CY	$10	$98,481	
Soil Backfill Lagoon No. 3	28,812	CY	$10	$288,119	
Subtotal					**$837,000**
Disinfection Facilities					
Ultraviolet Disinfection System	1	LS	$280,000	$280,000	
1 Ton JIB Crane	1	LS	$50,000	$50,000	
Parshall Flume & Ultrasonic Flow Measurement	1	LS	$25,000	$25,000	
Handwheel Operated Slide Gate 2' Wide x 6' High	4	EA	$4,500	$18,000	
Equipment Installation (10%)	1	LS	$37,300	$37,300	
Electrical Installation (25%)	1	LS	$93,250	$93,250	
Reinforced Concrete Slab	41	CY	$450	$18,417	
Reinforced Concrete Walls	55	CY	$600	$32,800	
Reinforced Elevated Slab	13	CY	$750	$9,444	
Soil Excavation	123	CY	$15	$1,842	
Rock Excavation	164	CY	$75	$12,278	
Crushed Stone	16	CY	$25	$393	
Backfill - Earthwork	31	CY	$15	$471	
1-1/2" Diameter Handrail	91	LF	$40	$3,640	
1-1/2" Fiberglass Grating	340	SF	$5	$1,700	
Aluminum Weir Plate	2	EA	$1,500	$3,000	
Subtotal					**$588,000**
SBR & Blower Building					
SBR Equipment (Blowers, Mixers, Decanters, etc.)	1	LS	$2,142,109	$2,142,109	
Equipment Installation (20%)	1	LS	$428,422	$428,422	
Soil Excavation	800	CY	$15	$12,000	
Crushed Stone	1,000	CY	$25	$25,000	
Reinforced Concrete Walls	575	CY	$600	$345,000	
Reinforced Concrete Slab	1,250	CY	$450	$562,500	
Blower Building (60' by 50')	3,000	SF	$125	$375,000	
Subtotal					**$3,890,000**
SBR Valve Box					
Modulating Valves & Equipment	4	EA	$36,000	$144,000	
Equipment Installation (20%)	1	LS	$28,800	$28,800	
Reinforced Concrete Walls	33	CY	$600	$20,000	
Reinforced Concrete Slab	19	CY	$450	$8,333	
Grating	1	LS	$10,000	$10,000	
Handrail	1	LS	$2,500	$2,500	
Subtotal					**$214,000**

Exhibit 8-19
(Continued)

Influent Pump Station (12.5 MGD Capacity)					
12.5 MGD Capacity Pump Station, Wet Well & Valve Vault	1	LS	$750,000	$750,000	
Subtotal					**$750,000**
Biosolids Dewatering					
Progressive Cavity Sludge Feed Pumps (WAS)	2	EA	$25,000	$50,000	
Belt Filter Press/Polymer Feed Modifications	1	EA	$75,000	$75,000	
Equipment Installation (15%)	1	LS	$18,750	$18,750	
Subtotal					**$144,000**
Aerated Sludge Holding Tank Modifications					
New Aeration Diffusers and Piping	2	EA	$50,000	$100,000	
Rehabilitation of the Existing Blowers	3	EA	$20,000	$60,000	
Drain Sump Improvements	2	EA	$50,000	$100,000	
Equipment Installation (20%)	1	LS	$32,000	$32,000	
Subtotal					**$292,000**
Miscellaneous					
Lab/Admin. Building Modifications Including New Lab Equipment	1	LS	$400,000	$400,000	
Non-Potable Water Pump Sta.-Does NOT include mechanical/elect cost	1	LS	$135,000	$135,000	
Road Work	1	LS	$50,000	$50,000	
New Electrical Control Building (25' by 15')	375	SF	$125	$46,875	
Emergency Generator and Electrical Building (35' by 35')	1	LS	$828,125	$828,125	
Demolish Existing Clarifiers and Equipment	2	EA	$50,000	$100,000	
Demolition Existing NPW Pump Station	1	LS	$20,000	$20,000	
Demolition Existing Screenings Building	1	LS	$50,000	$50,000	
Demolition Existing Chlorine Contract Basin	1	LS	$20,000	$20,000	
Removal of Previously Abandoned Structures	1	LS	$100,000	$100,000	
30-Inch Yard Piping (0' to 10' Deep)	150	LF	$350	$52,500	
24-Inch Yard Piping (0' to 10' Deep)	4,000	LF	$300	$1,200,000	
12-Inch Yard Piping (0' to 10' Deep)	275	LF	$100	$27,500	
14-Inch Force Main	430	LF	$110	$47,300	
New 4' Diameter Manhole	7	EA	$2,500	$17,500	
Subtotal					**$3,095,000**

Exhibit 8-19 (Continued)				
Construction Cost Subtotal				**$11,399,000**
Additional Yard Piping (25%) of the miscellaneous piping above	1	LS	$119,000	**$119,000**
Mechanical, Electrical, & Instrumentation (25%)	1	LS	$2,850,000	**$2,850,000**
Subtotal				***$14,368,000***
Construction Contingencies (15%)				**$2,155,200**
Total Construction Cost Estimate				***$16,523,200***
Engineering, Legal, Administration (20%)				**$3,304,640**
Total Project Cost Estimate				***$19,827,840***

Exhibit 8-20
Versailles WWTP Expansion
Alternative 2
SBR with Existing WWTP
Annual Operation and Maintenance Cost

Item					Annual Cost
Labor Cost					
Salaries (4 Employees)	$166,500				
Overtime	$4,000				
Payroll Taxes	$15,000				
Employee Insurance	$18,650				
Retirement	$32,900				
Total Annual Labor Cost					**$237,050**
General Cost					
Vehicle Operation (Fuel, oil, etc.)	$2,000				
Vehicle Maintenance and Repair	$1,500				
Equipment Maintenance and Repair	$45,000				
Laboratory Fees	$15,000				
Screenings Hauling and Disposal	$2,500				
Gas and Heating	$2,700				
Uniforms	$800				
Telephone	$1,700				
Training and Travel	$3,000				
Building and Equipment Insurance	$23,000				
Professional and Technical Services	$5,000				
Miscellaneous	$2,000				
Total Annual General Cost					**$104,200**
Electrical Power Usage (avg flow / normal operation)	hp/unit	units	hrs/day	hp*hrs/day	
Mechanically Cleaned Bar Screens	0.5	1	12	6	
Washer Compactor	0.75	1	12	9	
Grit Dewatering	0.5	2	12	12	
Grit Pumps	10	2	12	240	
Influent Pumping Station (12.5 MGD Capacity)	45	1	20	900	
SBR 24" Modulating Valves	0.5	1	24	12	
SBR Mixers	62	1	12	745	
SBR Blowers	224	4	12	10,755	
WAS Pumping Station	1	1	12	9.25	
Non-Potable Water Pumping Station	75	1	12	900	
*Total Horsepower*Hours/Day*				*13,588*	
Daily Power Usage	10,137		kw-hr/day		
Annual Power Usage	3,699,919		kw-hr/yr		
Power Cost	$0.070		per kw-hr		
Total Annual Power Cost					**$258,994**

Exhibit 8-20
(Continued)

Disinfection Cost - UV (See Disinfection Alt. 1)					
Annual Power Cost	$8,094				
Annual Equipment Replacement Cost	$3,000				
Annual Miscellaneous Expenses	$1,000				
Total Annual Disinfection Cost					**$12,094**
Dewatering Cost - Belt Filter Press					
Electrical Power Cost	hp/unit	units	hrs/day	hp*hrs/day	Annual Cost
Belt Filter Press	1.5	1	8	12	$229
Belt Filter Press Feed Pumps	10	1	8	80	$1,525
Polymer Feed System	0.25	1	8	2	$38
Sludge Holding Tank Blowers	250	2	8	4,000	$76,241
Annual Electrical Power Cost	*$78,033*				
Belt Replacement Cost					
Life of Belt	5 years				
Cost of Replacement Belt	$45,000				
Annual Belt Replacement Cost	*$9,000*				
Polymer Usage					
Polymer Feed Rate	11	lbs/ton dry solids			
Biosolids Production (dry lbs/day)	7,816	dry lbs/day			
Biosolids Production (dry tons/day)	3.9	dry tons/day			
Daily Polymer Usage	43	lbs/day			
Cost of Polymer	$2.50	/ lb			
Days of Operation	365				
Annual Polymer Cost	*$39,227*				
Total Annual Dewatering Cost					**$126,259**
Solids Disposal Cost - Transportation and Landfill Belt Filter Press					
Annual Hauling and Disposal Cost	$55,000				
Total Annual Solids Disposal Cost					**$55,000**
Total Annual Operating and Maintenance Cost					**$793,598**

Exhibit 8-21
Versailles WWTP Expansion
Alternative 2
SBR with Existing WWTP
20- Year Salvage Value

Description	Cost	Salvage Value
Influent Flow Measurement System		
Parshall Flume	$23,000	$9,200
Reinforced Concrete Slab	$5,400	$21,600
Reinforced Concrete Walls	$15,000	$6,000
Handrail	$1,500	$0
Preliminary Treatment Building		
Screening Building (note: Does NOT include mechanical/electrical cost)	$180,000	$72,000
Reinforced Concrete Slab	$45,000	$18,000
Reinforced Concrete Walls	$90,000	$36,000
Reinforced Elevated Concrete Slab	$7,500	$3,000.0
Screening Equipment		
Mechanical Bar Screen with Washer Compactor	$273,125	$0
Manual Bar Rack	$10,000	$0
Gates - 3'-0" Wide	$35,000	$0
Gates - 4'-0" Wide	$31,500	$0
Grit Removal System		
Grit Removal System with Pumping, Classifying, Washing & Dewatering	$529,000	$0
Reinforced Concrete Walls	$43,556	$17,422
Reinforced Concrete Slab	$5,600	$2,240
SBR Valve Box		
Modulating Valves & Equipment	$144,000	$0
Reinforced Concrete Walls	$20,000	$8,000
Reinforced Concrete Slab	$8,333	$3,333
Grating	$10,000	$0
Handrail	$2,500	$0
Disinfection Facilities		
Ultraviolet Disinfection System	$280,000	$0
1 Ton JIB Crane	$50,000	$0
Parshall Flume & Ultrasonic Flow Measurement	$25,000	$10,000
Handwheel Operated Slide Gate 2' Wide x 6' High	$18,000	$7,200
Reinforced Concrete Slab	$18,417	$7,367
Reinforced Concrete Walls	$32,800	$13,120
Reinforced Elevated Slab	$9,444	$3,778
1-1/2" Diameter Handrail	$3,640	$0
1-1/2" Fiberglass Grating	$1,700	$0
Aluminum Weir Plate	$3,000	$0

Exhibit 8-21
(Continued)

SBR & Blower Building		
SBR Equipment (Blowers, Mixers, Decanters, etc.)	$2,142,109	$0
Reinforced Concrete Walls	$345,000	$138,000
Reinforced Concrete Slab	$562,500	$225,000
Blower Building (60' by 50')	$375,000	$150,000
Influent Pump Station (12.5 MGD Capacity)		
12.5 MGD Capacity Pump Station, Wet Well & Valve Vault	$750,000	$0
Biosolids Dewatering		
Progressive Cavity Sludge Feed Pumps (WAS)	$50,000	$0
Belt Filter Press/Polymer Feed Modifications	$75,000	$0
Aerated Sludge Holding Tank Modifications		
New Aeration Diffusers and Piping	$100,000	$0
Rehabilitation of the Existing Blowers	$60,000	$0
Drain Sump Improvements	$100,000	$0
Miscellaneous		
Lab/Admin. Building Modifications Including New Lab Equipment	$400,000	$160,000
Non-Potable Water Pump Sta.-Does NOT include mechanical/elect cost	$135,000	$0
New Electrical Control Building (25' by 15')	$46,875	$18,750
Emergency Generator and Electrical Building (35' by 35')	$828,125	$331,250
30-Inch Yard Piping (0' to 10' Deep)	$52,500	$26,250
24-Inch Yard Piping (0' to 10' Deep)	$1,200,000	$600,000
12-Inch Yard Piping (0' to 10' Deep)	$27,500	$13,750
14-Inch Force Main	$47,300	$23,650
New 4' Diameter Manhole	$17,500	$7,000
Additional Yard Piping (25%) of the miscellaneous piping above	$119,000	$59,500
Total Salvage Value		**$1,991,410**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-22
Versailles WWTP Expansion
Alternative 2
SBR with Existing WWTP
Present Worth Analysis

Total Project Cost			**$19,827,840**
Present Worth of Annual Operating Cost Calculation			
Annual Operating Cost	$793,598	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Annual Operating Cost			**$9,103,000**
Present Worth of Salvage Value			
Salvage Value	$1,991,410		
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Salvage Value			**$621,000**
Total Present Worth			**$28,309,840**

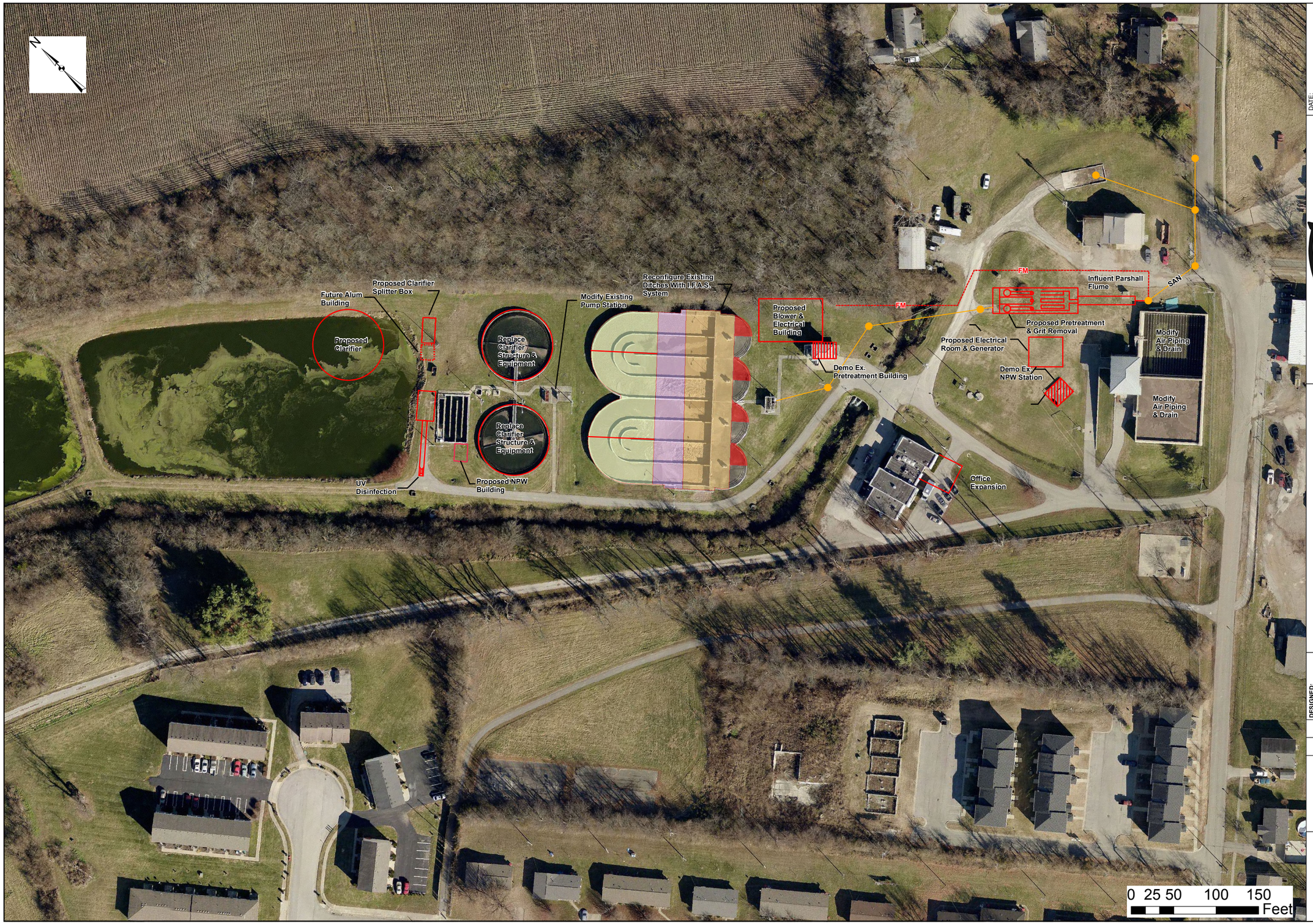
Exhibits 8-23 – 8-27

Treatment Alternative 3

Integrated Fixed-Film Activated Sludge

(IFAS)

IFAS Alternate



DATE: March, 2014

SCALE

SHEET NO. 8-23

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EXHIBIT 8-23
ALT. 3 - IFAS IN EXISTING DITCHES
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

GRW PROJECT NO. 4132 CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 50'

Exhibit 8-24
Versailles WWTP Expansion
Alternative 3
IFAS with Existing WWTP
Total Project Cost Estimate

Note: All Equipment Prices Include 15% for Contractor OH&P

Description	Quantity	Unit	Unit Cost	Cost	Sum
Influent Flow Measurement System					
Parshall Flume	1	LS	$23,000	$23,000	
Equipment Installation (10%)	1	LS	$2,300	$2,300	
Soil Excavation	124	CY	$15	$1,860	
Rock Excavation	124	CY	$75	$9,300	
Crushed Stone	30	CY	$25	$750	
Reinforced Concrete Slab	12	CY	$450	$5,400	
Reinforced Concrete Walls	25	CY	$600	$15,000	
Handrail	1	LS	$1,500	$1,500	
Subtotal					**$59,000**
Preliminary Treatment Building					
Screening Building (note: Does NOT include mechanical/electrical cost)	1,800	SF	$100	$180,000	
Soil Excavation	200	CY	$15	$3,000	
Rock Excavation	1,200	CY	$75	$90,000	
Crushed Stone	300	CY	$25	$7,500	
Reinforced Concrete Slab	100	CY	$450	$45,000	
Reinforced Concrete Walls	150	CY	$600	$90,000	
Reinforced Elevated Concrete Slab	10	CY	$750	$7,500	
Backfill - Earthwork	200	CY	$15	$3,000	
Subtotal					**$426,000**
Screening Equipment					
Mechanical Bar Screen with Washer Compactor	1	EA	$273,125	$273,125	
Manual Bar Rack	1	EA	$10,000	$10,000	
Gates - 3'-0" Wide	10	EA	$3,500	$35,000	
Gates - 4'-0" Wide	7	EA	$4,500	$31,500	
Equipment Installation (15%)	1	LS	$52,444	$52,444	
Subtotal					**$402,000**
Grit Removal System					
Grit Removal System with Pumping, Classifying, Washing & Dewatering	1	LS	$529,000	$529,000	
Equipment Installation (20%)	1	LS	$105,800	$105,800	
Soil Excavation	117	CY	$15	$1,760	
Rock Excavation	88	CY	$75	$6,600	
Crushed Stone	12	CY	$25	$311	
Reinforced Concrete Walls	73	CY	$600	$43,556	
Reinforced Concrete Slab	12	CY	$450	$5,600	
Subtotal					**$693,000**

Exhibit 8-24
(Continued)

Oxidation Ditch Distribution Box Modifications					
Gates	1	EA	$23,000	$23,000	
Equipment Installation (20%)	1	LS	$4,600	$4,600	
Reinforced Concrete Slab	5	CY	$450	$2,250	
Reinforced Concrete Walls	15	CY	$600	$9,000	
Grating	1	LS	$1,000	$1,000	
Handrail	1	LS	$1,500	$1,500	
Subtotal					**$41,000**
Renovate Existing Oxidation Ditches to IFAS					
IFAS Equipment	1	LS	$2,461,000	$2,461,000	
Equipment Installation (20%)	1	LS	$492,200	$492,200	
Repair Existing Concrete Ditches	1	LS	$30,000	$30,000	
Reinforced Concrete Walls	794	CY	$600	$476,667	
Demolish Existing Oxidations Ditch Walls	2	LS	$30,000	$60,000	
Subtotal					**$3,520,000**
Clarifier Flow Splitter Box					
Gates (New Splitter Box)	4	EA	$23,000	$92,000	
Equipment Installation (20%)	1	LS	$18,400	$18,400	
Reinforced Concrete Slab	13	CY	$450	$6,000	
Reinforced Concrete Walls	228	CY	$600	$136,533	
Reinforced Elevated Concrete Slab	14	CY	$750	$10,667	
Grating	1	LS	$10,000	$10,000	
Handrail	1	LS	$2,500	$2,500	
Subtotal					**$276,000**
Disinfection, Sampling, and Effluent Flow Monitoring					
Ultraviolet Disinfection System	1	LS	$280,000	$280,000	
1 Ton JIB Crane	1	LS	$50,000	$50,000	
Parshall Flume & Ultrasonic Flow Measurement	1	LS	$25,000	$25,000	
Handwheel Operated Slide Gate 2' Wide x 6' High	4	EA	$4,500	$18,000	
Equipment Installation (10%)	1	LS	$37,300	$37,300	
Electrical Installation (25%)	1	LS	$93,250	$93,250	
Reinforced Concrete Slab	41	CY	$450	$18,417	
Reinforced Concrete Walls	55	CY	$600	$32,800	
Reinforced Elevated Slab	13	CY	$750	$9,444	
Soil Excavation	123	CY	$15	$1,842	
Rock Excavation	164	CY	$75	$12,278	
Crushed Stone	16	CY	$25	$393	
Backfill - Earthwork	31	CY	$15	$471	
1-1/2" Diameter Handrail	91	LF	$40	$3,640	
1-1/2" Fiberglass Grating	340	SF	$5	$1,700	
Aluminum Weir Plate	2	EA	$1,500	$3,000	
Subtotal					**$588,000**

Exhibit 8-24
(Continued)

Biosolids Dewatering					
Progressive Cavity Sludge Feed Pumps (WAS)	2	EA	$25,000	$50,000	
Belt Filter Press/Polymer Feed Modifications	1	EA	$75,000	$75,000	
Equipment Installation (15%)	1	LS	$18,750	$18,750	
Subtotal					**$144,000**
Aerated Sludge Holding Tank Modifications					
New Aeration Diffusers and Piping	2	EA	$50,000	$100,000	
Rehabilitation of the Existing Blowers	3	EA	$20,000	$60,000	
Drain Sump Improvements	2	EA	$50,000	$100,000	
Equipment Installation (20%)	1	LS	$32,000	$32,000	
Subtotal					**$292,000**
Existing Clarifier Nos. 1 and 2 (75-ft Diameter)- Replacement					
Demolish Exisiting Claifiers and Equipment	2	EA	$50,000	$100,000	
Replace Existing Mechanical Equipment	2	EA	$230,000	$460,000	
Equipment Installation (25%)	1	LS	$115,000	$115,000	
Reinforced Concrete Slab	600	CY	$450	$270,000	
Reinforced Concrete Walls	400	CY	$600	$240,000	
Soil Excavation	2,525	CY	$15	$37,878	
Rock Excavation	0	CY	$75	$0	
Crushed Stone	1,850	CY	$25	$46,243	
Backfill - Earthwork	2,525	CY	$15	$37,875	
Effluent Weirs and Scum Baffles (FRP)	2	EA	$12,000	$24,000	
Covers	2	EA	$52,710	$105,420	
Subtotal					**$1,436,000**
New Clarifier No. 3 (75-ft Diameter)					
New Mechanical Equipment	1	EA	$230,000	$230,000	
Equipment Installation (25%)	1	LS	$57,500	$57,500	
Reinforced Concrete Slab	300	CY	$450	$135,000	
Reinforced Concrete Walls	200	CY	$600	$120,000	
Soil Excavation	200	CY	$15	$3,000	
Rock Excavation	800	CY	$75	$60,000	
Crushed Stone	1,850	CY	$25	$46,250	
Effluent Weirs and Scum Baffles (FRP)	1	EA	$12,000	$12,000	
Covers	1	EA	$52,710	$52,710	
Subtotal					**$716,000**

Exhibit 8-24
(Continued)

RAS Pumping Station (6.75 MGD Capacity)					
RAS Pumps (submersible)	4	EA	$60,000	$240,000	
Access Hatches (36"x36")	6	EA	$2,300	$13,800	
Interior Piping and Fittings	1	LS	$31,625	$31,625	
Valves	1	LS	$40,250	$40,250	
Equipment Installation (15%)	1	LS	$48,851	$48,851	
20" Force Main	380	LF	$80	$30,400	
Soil Excavation	72	CY	$20	$1,449	
Crushed Stone	31	CY	$25	$786	
Rock Excavation	109	CY	$50	$5,444	
Reinforced Concrete Walls (Pump Sta and Valve Vault)	313	CY	$500	$156,333	
Reinforced Concrete Slab (Pump Sta and Valve Vault)	12	CY	$450	$5,433	
Reinforced Elevated Concrete Slab (Pump Sta and Valve Vault)	12	CY	$750	$9,056	
Subtotal					**$583,000**
Lagoons No. 2 & No. 3 Closures					
Dewater, Dredge, Press and Haul Away Existing Sludge	2	EA	$225,000	$450,000	
Soil Backfill Lagoon No. 2	13,175	CY	$10	$131,750	
Soil Backfill Lagoon No. 3	18,260	CY	$10	$182,600	
Subtotal					**$764,000**
Blower & Electrical Building					
Blowers	3	EA	$150,000	$450,000	
Equipment Installation (20%)	1	LS	$90,000	$90,000	
Building (50' by 75')	3,750	SF	$125	$468,750	
Soil Extraction	300	CY	$15	$4,500	
Rock Extraction	0	CY	$75	$0	
Crushed Stone	100	CY	$25	$2,500	
Subtotal					**$1,016,000**
Miscellaneous					
Lab/Admin. Building Modifications Including New Lab Equipment	1	LS	$400,000	$400,000	
Non-Potable Water Pump Sta.-Does NOT include mechanical/elect cost	1	LS	$135,000	$135,000	
Road Work	1	LS	$50,000	$50,000	
New Electrical Control Building (25' by 15')	375	SF	$125	$46,875	
Emergency Generator and Electrical Building (35' by 35')	1	LS	$828,125	$828,125	
Demolition Existing NPW pump Station	1	LS	$20,000	$20,000	
Demolition Existing Screenings Building	1	LS	$50,000	$50,000	
Demolition Existing Chlorine Contract Basin	1	LS	$20,000	$20,000	
Removal of Previously Abandoned Structures	1	LS	$100,000	$100,000	
30-Inch Yard Piping (0' to 10' Deep)	100	LF	$350	$35,000	
24-Inch Yard Piping (0' to 10' Deep)	2,200	LF	$300	$660,000	

Exhibit 8-24
(Continued)

Miscellaneous (continued)					
12-Inch Yard Piping (0' to 10' Deep)	300	LF	$100	$30,000	
14-Inch Force Main	430	LF	$110	$47,300	
New 4' Diameter Manhole	7	EA	$2,500	$17,500	
Subtotal					**$2,440,000**
Construction Cost Subtotal				***$13,396,000***	
Additional Yard Piping (25%) of the miscellaneous piping above	1	LS	$197,000	**$197,000**	
Mechanical, Electrical, & Instrumentation (25%)	1	LS	$3,349,000	**$3,349,000**	
Subtotal				***$16,942,000***	
Construction Contingencies (15%)				**$2,541,300**	
Total Construction Cost Estimate				***$19,483,300***	
Engineering, Legal, Administration (20%)				**$3,896,660**	
Total Project Cost Estimate				***$23,379,960***	

Exhibit 8-25
Versailles WWTP Expansion
Alternative 3
IFAS with Existing WWTP
Annual Operation and Maintenance Cost

Item		Annual Cost
Labor Cost		
Salaries (4 Employees)	$166,500	
Overtime	$4,000	
Payroll Taxes	$15,000	
Employee Insurance	$18,650	
Retirement	$32,900	
Total Annual Labor Cost		**$237,050**
General Cost		
Vehicle Operation (Fuel, oil, etc.)	$2,000	
Vehicle Maintenance and Repair	$1,500	
Equipment Maintenance and Repair	$45,000	
Laboratory Fees	$15,000	
Screenings Hauling and Disposal	$2,500	
Gas and Heating	$2,700	
Uniforms	$800	
Telephone	$1,700	
Training and Travel	$3,000	
Building and Equipment Insurance	$23,000	
Professional and Technical Services	$5,000	
Miscellaneous	$2,000	
Total Annual General Cost		**$104,200**

Electrical Power Usage (avg flow / normal operation)	hp/unit	units	hrs/day	hp*hrs/day
Mechanically Cleaned Bar Screens	0.5	1	12	6
Washer Compactor	0.75	1	12	9
Grit Dewatering	0.5	2	12	12
Grit Pumps	10	2	12	240
Clarifiers	0.5	3	24	36
RAS Pumping Station	30	1	8	240
WAS Pumping Station	10	1	8	80
IFAS Sparging Blowers	3	4	12	144
IFAS Anaerobic Mixers	2.3	6	24	331
IFAS Anoxic Mixers	10	1	24	240
IFAS MLSS Recycle Wall Pumps	7.5	4	24	720
IFAS Aeration Blowers	150	2	24	7,200
Non-Potable Water Pumping Station	75	1	12	900
*Total Horsepower*Hours/Day*				*10,158*

Exhibit 8-25
(Continued)

Electrical Power Usage (continued)					
Daily Power Usage	7,578	kw-hr/day			
Annual Power Usage	2,765,976	kw-hr/yr			
Power Cost	$0.070	per kw-hr			
Total Annual Power Cost					**$193,618**
Disinfection Cost - UV (See Disinfection Alt. 1)					
Annual Power Cost	$8,094				
Annual Equipment Replacement Cost	$3,000				
Annual Miscellaneous Expenses	$1,000				
Total Annual Disinfection Cost					**$12,094**
Dewatering Cost - Belt Filter Press					
Electrical Power Cost	hp/unit	units	hrs/day	hp*hrs/day	Annual Cost
Belt Filter Press	1.5	1	8	12	$229
Belt Filter Press Feed Pumps	10	1	8	80	$1,525
Polymer Feed System	0.25	1	8	2	$38
Sludge Holding Tank Blowers	250	2	8	4,000	$76,241
Annual Electrical Power Cost	*$78,033*				
Belt Replacement Cost					
Life of Belt	5	years			
Cost of Replacement Belt	$45,000				
Annual Belt Replacement Cost	*$9,000*				
Polymer Usage					
Polymer Feed Rate	11	lbs/ton dry solids			
Biosolids Production (dry lbs/day)	7,816	dry lbs/day			
Biosolids Production (dry tons/day)	3.9	dry tons/day			
Daily Polymer Usage	43	lbs/day			
Cost of Polymer	$2.50	/ lb			
Days of Operation	365				
Annual Polymer Cost	*$39,227*				
Total Annual Dewatering Cost					**$126,259**
Solids Disposal Cost - Transportation and Landfill					
Belt Filter Press					
Annual Hauling and Disposal Cost	$55,000				
Total Annual Solids Disposal Cost					**$55,000**
Total Annual Operating and Maintenance Cost					**$728,222**

Exhibit 8-26
Versailles WWTP Expansion
Alternative 3
IFAS with Existing WWTP
20- Year Salvage Value

Description	Cost	Salvage Value
Influent Flow Measurement System		
Parshall Flume	$23,000	$9,200
Reinforced Concrete Slab	$5,400	$2,160
Reinforced Concrete Walls	$15,000	$6,000
Handrail	$1,500	$0
Preliminary Treatment Building		
Screening Building (note: Does NOT include mechanical/electrical cost)	$180,000	$72,000
Reinforced Concrete Slab	$45,000	$18,000
Reinforced Concrete Walls	$90,000	$36,000
Reinforced Elevated Concrete Slab	$7,500	$3,000
Screening Equipment		
Mechanical Bar Screen with Washer Compactor	$273,125	$0
Manual Bar Rack	$10,000	$0
Gates - 3'-0" Wide	$35,000	$0
Gates - 4'-0" Wide	$31,500	$0
Grit Removal System		
Grit Removal System with Pumping, Classifying, Washing & Dewatering	$529,000	$0
Reinforced Concrete Walls	$43,556	$17,422
Reinforced Concrete Slab	$5,600	$2,240
Oxidation Ditch Distribution Box Modifications		
Gates	$23,000	$0
Reinforced Concrete Slab	$2,250	$900
Reinforced Concrete Walls	$9,000	$3,600
Grating	$1,000	$0
Handrail	$1,500	$0
Renovate Existing Oxidation Ditches to IFAS		
IFAS Equipment	$2,461,000	$0
Reinforced Concrete Walls	$476,667	$190,667

Exhibit 8-26
(Continued)

Clarifier Flow Splitter Box		
Gates (New Splitter Box)	$92,000	$0
Reinforced Concrete Slab	$6,000	$2,400
Reinforced Concrete Walls	$136,533	$54,613
Reinforced Elevated Concrete Slab	$10,667	$4,267
Grating	$10,000	$0
Handrail	$2,500	$0
Existing Clarifier Nos. 1 and 2 (75-ft Diameter)- Replacement		
Replace Existing Mechanical Equipment	$460,000	$0
Reinforced Concrete Slab	$270,000	$108,000
Reinforced Concrete Walls	$240,000	$96,000
Effluent Weirs and Scum Baffles (FRP)	$24,000	$9,600
Covers	$105,420	$42,168
New Clarifier No. 3 (75-ft Diameter)		
New Mechanical Equipment	$230,000	$0
Reinforced Concrete Slab	$135,000	$54,000
Reinforced Concrete Walls	$120,000	$48,000
Effluent Weirs and Scum Baffles (FRP)	$12,000	$4,800
Covers	$52,710	$21,084
RAS Pumping Station (6.75 MGD Capacity)		
RAS Pumps (submersible)	$240,000	$0
Access Hatches (36"x36")	$13,800	$0
Interior Piping and Fittings	$31,625	$15,813
Valves	$40,250	$0
20" Force Main	$30,400	$15,200
Reinforced Concrete Walls (Pump Sta and Valve Vault)	$156,333	$62,533
Reinforced Concrete Slab (Pump Sta and Valve Vault)	$5,433	$2,173
Reinforced Elevated Concrete Slab (Pump Sta and Valve Vault)	$9,056	$3,622
Disinfection Facilities		
Ultraviolet Disinfection System	$280,000	$0
1 Ton JIB Crane	$50,000	$0
Parshall Flume & Ultrasonic Flow Measurement	$25,000	$10,000
Handwheel Operated Slide Gate 2' Wide x 6' High	$18,000	$7,200
Reinforced Concrete Slab	$18,417	$7,367
Reinforced Concrete Walls	$32,800	$13,120
Reinforced Elevated Slab	$9,444	$3,778
1-1/2" Diameter Handrail	$3,640	$0
1-1/2" Fiberglass Grating	$1,700	$0
Aluminum Weir Plate	$3,000	$0

Exhibit 8-26
(Continued)

Biosolids Dewatering		
Progressive Cavity Sludge Feed Pumps (WAS)	$50,000	$0
Belt Filter Press/Polymer Feed Modifications	$75,000	$0
Aerated Sludge Holding Tank Modifications		
New Aeration Diffusers and Piping	$100,000	$0
Rehabilitation of the Existing Blowers	$60,000	$0
Drain Sump Improvements	$100,000	$0
Blower & Electrical Building		
Blowers	$450,000	$0
Building (50' by 75')	$468,750	$187,500
New Electrical Control Building (25' by 15')	$46,875	$18,750
Emergency Generator and Electrical Building (35' by 35')	$828,125	$331,250
Miscellaneous		
Lab/Admin. Building Modifications Including New Lab Equipment	$400,000	$160,000
30-Inch Yard Piping (0' to 10' Deep)	$35,000	$17,500
24-Inch Yard Piping (0' to 10' Deep)	$660,000	$330,000
12-Inch Yard Piping (0' to 10' Deep)	$30,000	$15,000
14-Inch Force Main	$47,300	$23,650
New 4' Diameter Manhole	$17,500	$7,000
Additional Yard Piping (25%) of the miscellaneous piping above	$197,000	$98,500
Total Salvage Value		**$2,136,077**

Note: Equipment is assumed to have a salvage value of 0% after 20 years, structures are assumed to have a salvage value of 40% after 20 years, and pipe is assumed to have a salvage value of 50% after 20 years.

Exhibit 8-27
Versailels WWTP Expansion
Alternative 3
IFAS with Existing WWTP
Present Worth Analysis

Total Project Cost			**$23,379,960**
Present Worth of Annual Operating Cost Calculation			
Annual Operating Cost	$728,222	per year	
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Annual Operating Cost			**$8,353,000**
Present Worth of Salvage Value			
Salvage Value	$2,136,077		
Discount Rate	6.0%		
Life of Project	20	years	
Present Worth of Salvage Value			**$666,000**
Total Present Worth			**$31,066,960**

Exhibit 8-28

Wet Weather Storage for

Treatment Alternative 2 (SBR)

Total Project Cost Estimate

Exhibit 8-28
Versailles WWTP Expansion
Wet Weather Storage for Alternative 2 (SBR)
Total Project Cost Estimate

Description	Quantity	Unit	Unit Cost	Cost	Sum
Renovate Existing Oxdation Ditchs to EQ Basins					
Surface Aerator (15 HP)	4	EA	$15,000	$60,000	
Equipment Installation (20%)	1	LS	$12,000	$12,000	
Repair Existing Concrete Oxidation Ditches	1	LS	$30,000	$30,000	
Demolition of Baffle Walls	2	LS	$30,000	$60,000	
Lean Concrete Slab	1,800	CY	$150	$270,000	
Subtotal					**$432,000**
Wet Weather Pump Station (3 MGD Capacity) & Piping					
3 MGD Capacity Pump Station, Wet Well & Valve Vault	1	LS	$150,000	$150,000	
14-Inch Force Main	1,000	LF	$110	$110,000	
21-Inch Return Yard Piping (0' to 10' Deep)	1,000	LF	$250	$250,000	
Subtotal					**$510,000**
Construction Cost Subtotal				**$942,000**	
Construction Contingencies (15%)				**$141,300**	
Total Construction Cost Estimate				***$1,083,300***	

Selected Treatment Alternative

DATE: March, 2014

SCALE

SHEET NO. 8-29

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EXHIBIT 8-29
SELECTED TREATMENT ALTERNATIVE
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

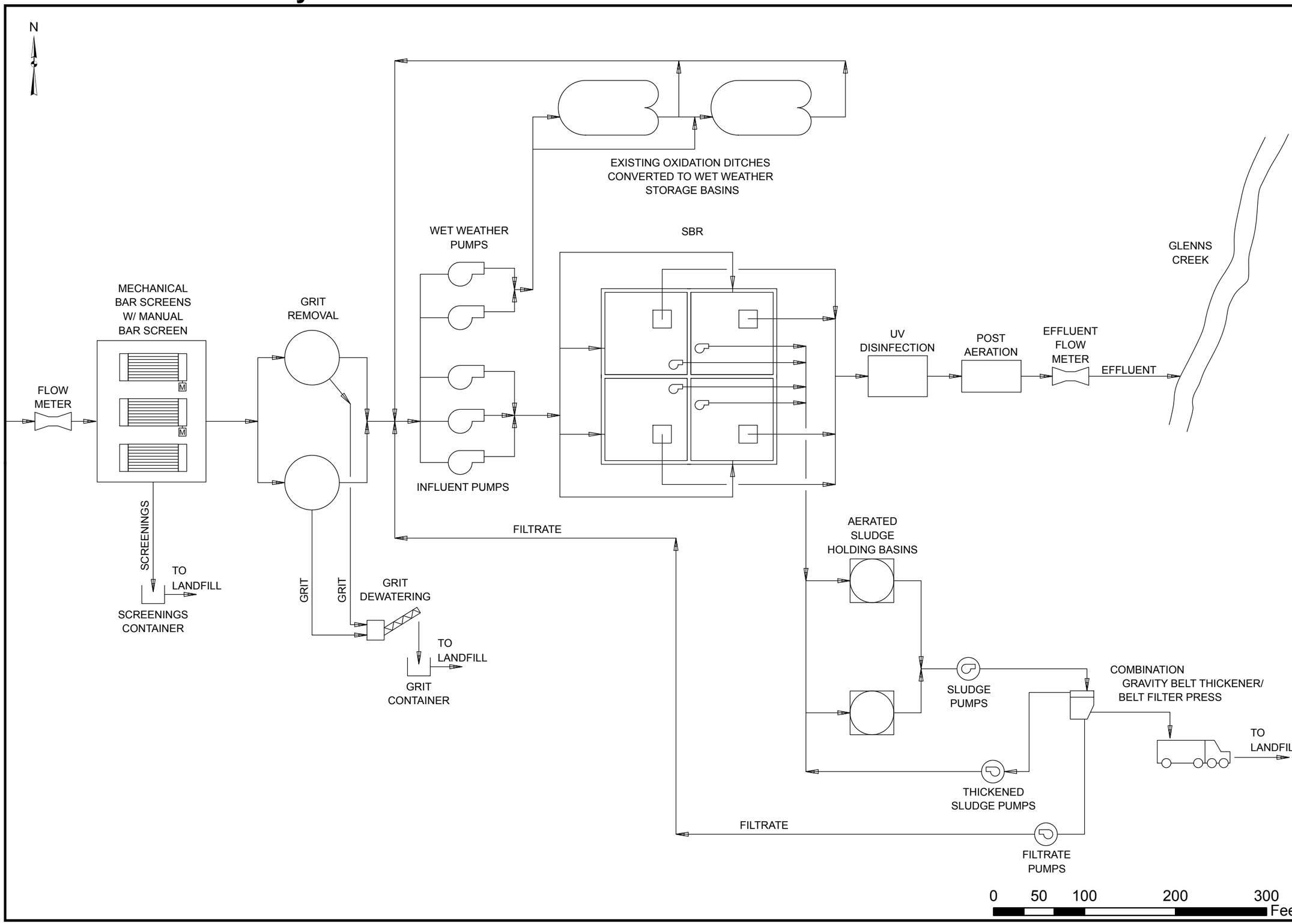
GRW PROJECT NO. 4132
CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 150'

City of Versailles: Selected Treatment Alternative Flow Schematic



DATE: March, 2014
SCALE
SHEET NO. 8-30

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EXHIBIT 8-30
SELECTED TREATMENT ALTERNATIVE FLOW SCHEMATIC FOR THE EXISTING WASTEWATER TREATMENT PLANT
CITY OF VERSAILLES, KENTUCKY

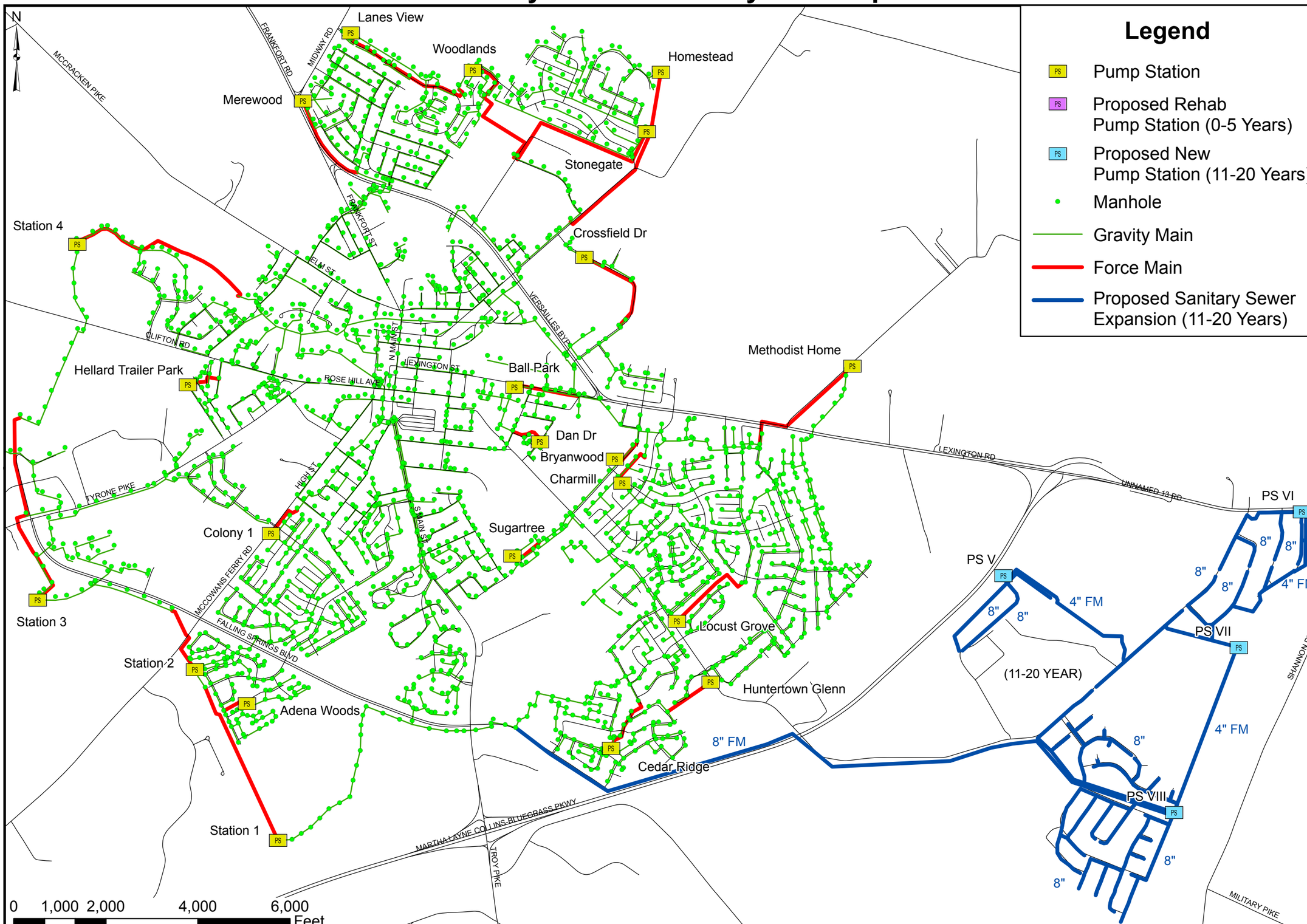
DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

NO.	DESCRIPTION	DATE	BY

REVISIONS

GRW PROJECT NO. 4132
CLIENT PROJECT NO.
SCALE: 1" = 100'

City of Versailles: System Map



DATE: March, 2014

SCALE

SHEET NO. 8-31

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EXHIBIT 8-31
SEWAGE COLLECTION SYSTEM MAP WITH PROPOSED EXPANSION
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

SCALE: 1" = 2000'

Section 9

SECTION 9
CROSS-CUTTER CORRESPONDENCE AND MITIGATION

A. Introduction

During the preparation of this Facilities Plan, an exchange of correspondence was completed with several agencies responsible for environmental concerns related to the construction and operation of wastewater collection and treatment facilities. Termed "Cross-Cutter" correspondence, the associated agencies were:

- Threatened and Endangered Species: The U.S. Fish and Wildlife Service, Kentucky Ecological Services Field Station, and the Kentucky Department of Fish and Wildlife Resources.

- Historical Resources: The Kentucky Heritage Council (State Historic Preservation Office)

- Aquatic Resources: The U.S. Army Corps of Engineers (Louisville District)

- Agricultural Resources: The Natural Resources Conservation Service

Copies of the "Cross-Cutter" correspondence are provided in Appendix K. The letter to each agency contained a detailed description of the proposed projects, supported by location maps and other information. A summary of the results of this exchange of correspondence is provided in this chapter. When an agency's response indicates the potential adverse impact on a resource as a result of the proposed project, and an alternate method of installation or implementation cannot be used, a mitigation approach is presented to compensate for the adverse impact.

B. Threatened and Endangered Species

The US Fish and Wildlife Service reviewed the areas that are anticipated to be affected by future projects that are discussed in this Facilities Planning document. Their response indicated the possible presence of four federally listed species. These are the Indiana bat (Myotis sodalist) and the gray bat (Myotis grisescens), both of which are endangered, and running buffalo clover (Trifolium stoloniferum) and globe bladderpod (Tesquerella globosa), of which the clover is endangered and the bladderpod is a candidate.

The agency advised a more detailed review of the various project areas when the projects were imminent in order to determine the need for further surveys, protection methods and/or possible mitigation requirements.

The Kentucky Department of Fish and Wildlife Resources stated that there are two state-listed species that are known to be present in the planning area, but will not be impacted by the proposed projects. These are the Bobolink (Dolichonyx oryzivorus) and Henslow's Sparrow (Ammodramus henslowii).

Both agencies advised the use of strict erosion control measures during and after construction in order to protect aquatic habitats.

C. Historical Resources

The State Historic Preservation Office of the Kentucky Heritage Council stated that the proposed projects have the potential to impact historic properties eligible for or listed on the National Register of Historic Places. They directed that as each project was prepared for implementation, it be submitted individually for review by the Heritage Council.

D. Aquatic Resources

The Department of the Army, US Army Corps of Engineers stated that "waters of the United States" are located within the planning area. They recommended submittal of detailed information for each project prior to construction in order to determine if a Department of the Army Permit will be required.

E. Agricultural Resources

The United States Department of Agriculture Natural Resources Conservation Service review of the proposed projects concluded that they will not affect prime, unique or statewide important farmlands. However, they stated that the determination does not apply to any lands beyond the boundary of existing right-of-way, areas not already previously disturbed, or lands outside of urban areas.

SECTION 10
EVALUATION OF RECOMMENDED REGIONAL FACILITY PLAN

A. Introduction

This chapter summarizes the critical components of the Recommended Plan, including environmental impacts, institutional structure requirements, the funding plan and the implementation schedule.

B. Environmental Impacts

Section 9 refers to Cross-Cutter Correspondence with various state and federal agencies that relate to potential adverse impacts of the Recommended Plan. The responses from these agencies (included in Appendix K) indicated that the Recommended Plan does not have a negative impact on surface and groundwater, threatened or endangered species, air quality, floodplains and wetlands, historical or archaeological sites, important prime farmland, or any other applicable environmentally sensitive areas. The implementation of the projects in the Recommended Plan will have a positive impact on water quality in Glenn's Creek.

C. Institutional Structure

There are no changes to the existing institutional structure of the City of Versailles as a result of the Recommended Plan. Other than a revised user charge system for paying debt service and annual Operation and Maintenance costs for the recommended plan, no new ordinances or regulations are needed to implement the recommended plan.

D. Funding Plan

The purpose of this section is to provide a preliminary funding plan for the Recommended Plan. This includes an assessment of potential funding sources and a preliminary estimate of potential user rates. This funding plan is based on the estimated project cost and annual operating and maintenance cost of the plan, as presented in Section 8. These costs are then evaluated against a combination of funding options (i.e., grants and loans) to provide estimated annual debt service and annual O&M costs that must be paid by the wastewater system customers as monthly sewer service rates. It should be noted that the calculations presented in this section are preliminary and will

require revision once the actual construction costs are known (from contractor's bids for the projects in this Plan) and the sources, amounts and availability of grants and loans have been confirmed. Therefore, this information is presented to provide a preliminary order of magnitude for sewer service rates, and the City will need to conduct a separate User Charge Study to determine the actual rates needed to pay for the Recommended Plan.

The following paragraphs describe the City's current wastewater system revenue and funding, as well as the revenue and funding for the 0-10 year proposed improvements.

Current Wastewater System Revenue and Funding

In July, 2011 the City of Versailles passed an ordinance (Ordinance 2011-12 & 2011-13) that adjusted the sewer service rates for its customers. Table 10-1 summarizes the current sewer service rates.

Table 10-1

Versailles Monthly Sewer Service Rates

(Effective August 1, 2013)

Monthly Water Use (in Gal.)	**Monthly Charge (per gallon)**	
	Inside City	*Outside City*
<1,000*	$7.64*	$9.73*
1,001 – 149,999	$4.14	$5.60
150,000 – 999,999	$3.69	$4.96
>1,000,000	$3.63	$4.95

* Minimum Quantity Measured & Charged

The selected treatment plan, Alternative 2 – SBR is recommended to be implemented in the 0-10 year planning phase. The estimated total construction cost for the plant upgrade is $20,911,140 ($19,827,840 for the treatment system improvements and $1,083,300 for the wet weather storage). As outlined in Section 8, the collection system rehabilitation improvements are broken into five (5) phases, all recommended to be implemented in the 0-10 year planning phase. Currently, the City of Versailles has sold bonds for approximately $5,710,000 in order to pay for the first three (3) phases of the collection system rehabilitation program. The remaining cost needed to complete phases four & five of the collection system rehabilitation program is approximately $2,115,000. Therefore, the total amount needed to be funded is $23,026,140.

GRW compared the City's 2013 (annual) sewer operation and maintenance (O&M) budget with the projected O&M budget for the selected alternative. The replacement of

the chlorine disinfection process with ultraviolet treatment will result in much lower chemical costs, but a higher electricity cost. The increased effectiveness of the new SBR treatment process will result in a greater amount of solids removal, so the cost of sludge disposal will increase. The total estimated O&M cost for the selected alternative results in an increase of $87,000 to the annual O&M budget. This amount will be added to the debt service required to fund the project to obtain the amount of additional required revenue needed.

As requested, GRW analyzed three (3) different options for project funding. Each option considers a different payback period. Option 1 evaluates a 20-year payback period, whereas Options 2 & 3 evaluate 30- and 40-year payback periods, respectively. The projected rate increase calculations can be found in Exhibits 10-1 through 10-3.

Funding Option 1 considers a 20-year payback period for a bond issue at market rates and a 20% debt service coverage as well as the $87,000 increase in O&M costs. The total additional annual revenue required in Option 1 is $1,647,000 Resulting in an increase of 55.62% in required revenue. The rates for an average usage of 4,000 gallons per month will need to be increased from $20.06 to $31.22 for inside city customers and from $26.53 to $41.29 for outside city customers to cover the projected required additional revenue.

Funding Option 2 considers a 30-year payback period for a bond issue at market rates and a 20% debt service coverage as well as the $87,000 increase in O&M costs. The total additional annual revenue required in Option 2 is $1,407,000. Therefore, an increase of 46.58% of revenue is required. The rates for 4,000 gallons per month will need to be increased from $20.06 to $29.59 for inside city customers and from $26.53 to $39.14 for outside city customers to cover the projected required additional revenue.

Funding Option 3 considers a 40-year payback period, a 3.00% interest rate and 10% debt service coverage as well as the $87,000 increase in O&M costs. The total additional annual revenue required in Option 3 is $1,276,715. Therefore, an increase of 43.12% is needed to obtain the required revenue. The charge for 4,000 gallons per month will need to be increased from $20.06 to $28.71 for inside city customers and from $26.53 to $37.97 for outside city customers to cover the projected required additional revenue.

It is noted that the funding scenarios and projected rate increases discussed in this section are conceptual and will need to be revised once the recommended projects are designed and the funding agencies have been involved in determining the availability of loans and grants.

E. Traditional Financing Methods

As mentioned earlier, there are traditional methods of financing that the City of Versailles will also need to explore. These include, but are not limited to, State Revolving Fund loans, USDA Rural Development loans, general obligation bonds, and revenue bonds.

1. SRF Loans

Basic infrastructure — water, sewer, solid waste facilities, etc. — is a necessity for economic growth. Many Kentucky communities do not have that infrastructure available to their citizens, due in large part to the high costs of these services. The Kentucky Infrastructure Authority (KIA) was created in 1988 to provide the mechanism for funding construction of local public works projects. The Federally Assisted Wastewater Revolving Loan, or Fund A, is the program administered through KIA that is applicable to wastewater.

Fund A currently has a standard interest rate of 2.75%, a non-standard interest rate of 1.75%, and non-standard hardship interest rate of 0.75%. Hardship rates require a community to be below the state median household income, be considered regional, or the project must assist the system to achieve compliance with an order or judgment addressing environmental non-compliance. If a project is only going to service a portion of the community, the hardship rate requirements apply only to that portion. Fund A also has a loan service fee of 0.20% of the unpaid loan balance to be paid annually.

Repayment must be within 20 years of completion of a project, and must commence within one year of project completion. Priority of loan awards is based on project rankings from the water management council, and eligible projects must be for wastewater treatment facilities that comply with the Clean Water Act. An approved Facilities Plan must include the project for which funding is requested. Communities wishing to apply must submit an application along with a preliminary engineering report (PER).

2. USDA Rural Development (RD) Loan

Formerly known as the "Farmers Home Administration Program" (FmHA), the RD program is administered by the United States Department of Agriculture (U.S.D.A.). The RD program is primarily for rural residents, small cities, and towns with populations of 10,000 or less. The program uses low interest loan funds and grant funds to assist in the funding of water and sanitary sewer projects. Interest rates are adjusted quarterly and may be obtained from any RD office. Due to the median income of the City of Versailles, the interest rate would be the market rate of 4.625%. If awarded, grant assistance, in some instances, can be up to 75% of eligible project costs. In actuality, grant funds would typically be much lower than the 25% limit, particularly for large projects, and due to the

City's median household income level, the probability of obtaining grant funds is not very feasible. Eligibility requirements for grant assistance are the same as for direct loans. Payback periods for debt service can be as long as 40 years; however, no repayment period will exceed State statutes or the useful life of the facility.

Similar to the SRF program, RD requires an application submittal along with a Preliminary Engineering Report (PER). Upon approval, a financing package of loans and grants is developed based on the community's income level and its ability to meet a certain user rate. The RD program estimates an acceptable user rate for the community based on median income levels and rates of similar systems. Consequently, the program typically does not provide grant assistance to projects that would have rates below the acceptable user rate. RD considers acceptable user rates to be in the range of $55 to $65 per month.

The RD program is allocated a certain amount of money each year. Once the demand has exhausted the supply, the applicants are prioritized based on several factors including income levels, service population, health hazards, and violations of local health ordinances.

3. General Obligation Bonds

General obligation bonds offer investors a relatively safe vehicle for investment, while providing the necessary funds for community improvements to local governments. These bonds are backed by the full faith and credit of the issuing municipality, meaning that the municipality commits its full resources to paying bondholders. This includes general taxation and the ability to raise more funds through credit. The ability to back up these types of bond payments with tax funds is what makes them distinct from revenue bonds, which are repaid using the revenue generated by the specific project the bonds are issued to fund (i.e. sewer use fees).

The default risk of general obligation bonds is low due to the fact that the municipality has the option of raising taxes to meet its obligations. In addition, it is possible for municipalities to repay bondholders by borrowing more money. By calling a bond issue when interest rates fall, the municipality is stating that they will repay the principal before the bond matures. They can then re-fund the debt by making a new bond issue at a lower rate of interest, saving money in the process.

General obligation bonds give municipalities a tool with which to raise funds for projects that will not provide direct sources of revenue. As a result, they are typically used to fund projects that will serve an entire community. Revenue bonds, on the other hand, are used to fund projects that serve specific populations, who provide the revenue to repay the debt through user fees.

4. Revenue Bonds

Revenue bonds make up the vast majority of municipal bonds, and are available in a variety of issues. They are a type of municipal bond that is secured by a specific income of the issuer, which distinguishes them from general obligation bonds.

These types of bonds finance income-producing projects, and the income generated by these projects pays revenue bondholders their interest and principal. Projects funded by these types of bonds serve only that portion of a community that pays for it. In contrast, general obligation bonds do not produce income, but provide services for the entire community.

Most revenue bonds are sold in $5,000 units and mature in 20 to 30 years. However, not all the bonds in an issue necessarily mature at the same time — they may be staggered. The types of bonds with staggered maturity dates are called serial bonds.

Income from a municipal enterprise is placed into a revenue fund. From this fund, operations expenses are paid first. Only after this has occurred do revenue bondholders receive their payments.

Unlike general obligation bonds, revenue bonds are secured by specific collateral — the income produced by the projects they fund. The revenues (i.e. sewer use fees) produced are then used to pay investors.

Revenue bonds offer higher interest rates than general obligation bonds. This is because the income from the projects they fund cannot be predicted with absolute certainty, which adds to the perception of lower safety. If the projects do not produce enough revenue, the bonds may default.

Ratings firms rate revenue bond issuers for their ability to pay back both interest and principal. Bond analysts study the issuer's ability to produce income sufficient enough to make payments. They also evaluate the cash flow of the income source, since the success of a bond ultimately depends on the project's ability to produce revenue.

F. Implementation Schedule

The schedule for implementation of the Recommended Plan is a function of factors, such as the timing of approval of this Regional Facilities Plan by the KDOW, the dates when funds are secured for the projects within this plan, and the respective dates for completion of design and construction of the projects.

At the time that this Regional Facilities Plan was prepared, these dates were not known. However, for the purpose of this Plan, the preliminary schedule, located below, has been

developed. This schedule is subject to revision over time as the estimated dates of the aforementioned factors are updated.

Table 10-2 Preliminary Implementation Schedule for Versailles Regional Wastewater Facilities Plan	
Estimated Date	**Event**
August 2014	Submit Draft Plan to KDOW for review and comment
September 16, 2014	Public Hearing for Plan, Approval of Plan by City of Versailles
October 2014	Submit Final Plan to KDOW for review and comment
December 2014	Approval of Plan by KDOW
December 2014	Initiate Design of Wastewater Treatment Plant
December 2015	Complete Design of Wastewater Treatment Plant
December 2015	Submit Design of Wastewater Treatment Plant to KDOW
July 2015 - September 2017	Phase 4 of Collection Rehabilitation Program
February 2016	Approval of WWTP Design by KDOW
March 2016	Advertisement for Bids for Wastewater Treatment Plant
April 2016	Receipt of Bids, Securing of Funds for Wastewater Treatment Plant
May 2016	Award of Construction Contract for Wastewater Treatment Plant
July 2016 - September 2018	Phase 5 of Collection Rehabilitation Program
March 2018	Complete Construction of Wastewater Treatment Plant Improvements

Exhibit 10-1
Versailles Facilities Plan
Proposed Rate Schedules
Funding Option 1 - 20 year Payback Schedule
0-10 Year Planning Period

Total Project Cost - WWTP		$20,911,140
Total Project Cost - Collection System (0-10 Years)		$2,115,000
	Total	*$23,026,140*
Grant Money		$0
Proposed Bond Amount		$26,285,000
Annual Debt Service		$1,300,000
Loan Debt Service Coverage (20 % of Annual Debt Service)		$260,000
	Total Debt Service	*$1,560,000*
Estimated Annual O & M Increase		$87,000
Total Additional Annual Revenue Required		**$1,647,000**

Total Additional Annual Revenue Required		$1,647,000
2013 Total Billed Revenue	÷	$2,961,006
Percentage Rate Increase		***55.62%***

	2013 Existing Rates		Proposed Rates	
	Inside City	*Outside City*	*Inside City*	*Outside City*
Min. Rate	$7.64	$9.73	**$11.89**	**$15.14**
1,001 - 149,999	$4.14	$5.60	**$6.44**	**$8.71**
150,000 - 999,999	$3.69	$4.96	**$5.74**	**$7.72**
>1,000,000	$3.63	$4.95	**$5.65**	**$7.70**

	Current	**Proposed**
Inside city charge for 4,000 gallons/month	$20.06	**$31.22**
Outside city charge for 4,000 gallons/month	$26.53	**$41.29**

Exhibit 10-2
Versailles Facilities Plan
Proposed Rate Schedules
Funding Option 2 - 30 year Payback Schedule
0-10 Year Planning Period

Total Project Cost - WWTP		$20,911,140
Total Project Cost - Collection System (0-10 Years)		$2,115,000
	Total	*$23,026,140*
Grant Money		$0
Proposed Bond Amount		$25,930,000
Annual Debt Service		$1,100,000
Debt Service Coverage (20 % of Annual Debt Service)		$220,000
	Total Debt Service	*$1,320,000*
Estimated Annual O & M Increase		$87,000
Total Additional Annual Revenue Required		**$1,407,000**

Total Additional Annual Revenue Required		$1,407,000
2013 Total Billed Revenue	÷	$2,961,006
Percentage Rate Increase		***47.52%***

	2013 Existing Rates		Proposed Rates	
	Inside City	*Outside City*	*Inside City*	*Outside City*
Min. Rate	$7.64	$9.73	**$11.27**	**$14.35**
1,001 - 149,999	$4.14	$5.60	**$6.11**	**$8.26**
150,000 - 999,999	$3.69	$4.96	**$5.44**	**$7.32**
>1,000,000	$3.63	$4.95	**$5.35**	**$7.30**

	Current	**Proposed**
Inside city charge for 4,000 gallons/month	$20.06	**$29.59**
Outside city charge for 4,000 gallons/month	$26.53	**$39.14**

Exhibit 10-3
Versailles Facilities Plan
Proposed Rate Schedule
Funding Option 3 - (40-Year, 3% Interest)
0-10 Year Planning Period

Total Project Cost - WWTP		$20,911,140
Total Project Cost - Collection System (0-10 Years)		$2,115,000
	Total	*$23,026,140*
Grant Money		$0
Proposed Bond Total		$25,000,000
Annual Debt Service		$1,081,559
40 years @	3.00%	
Loan Debt Service Coverage (10 % of Annual Debt Service)		$108,156
	Total Debt Service	*$1,189,715*
Estimated Annual O & M Increase		$87,000
Total Additional Annual Revenue Required		**$1,276,715**

Total Additional Annual Revenue Required		$1,276,715
2013 Total Billed Revenue	÷	$2,961,006
Percentage Rate Increase		***43.12%***

	2013 Existing Rates		Proposed Rates	
	Inside City	*Outside City*	*Inside City*	*Outside City*
Min. Rate	$7.64	$9.73	**$10.93**	**$13.93**
1,001 - 149,999	$4.14	$5.60	**$5.93**	**$8.01**
150,000 - 999,999	$3.69	$4.96	**$5.28**	**$7.10**
>1,000,000	$3.63	$4.95	**$5.20**	**$7.08**

	Current	**Proposed**
Inside city charge for 4,000 gallons/month	$20.06	**$28.71**
Outside city charge for 4,000 gallons/month	$26.53	**$37.97**

Section 11

SECTION 11
DOCUMENTATION OF PUBLIC PARTICIPATION

A. Purpose

The purpose of this chapter is to discuss the efforts by the City of Versailles to encourage public participation throughout the course of the plan preparation. The City considers the input of the public vital to the development of a functional plan consistent with the goals and objectives discussed in previous chapters. This chapter also presents the city resolution adopting the plan and the Statement of Authority and Resources for the plan.

B. Facilities Plan Development

The City of Versailles has actively participated throughout the development of this study. In an effort to secure maximum participation, various agencies including the Kentucky Division of Water, US Fish and Wildlife, Kentucky Fish and Wildlife, US Army Corps of Engineers, State Historic Preservation Office, US Natural Resource Conservation Service, the Local Health Department and Planning and Zoning were contacted to assist in the evaluation of the planning area.

Meetings were held regularly, throughout the development of the Plan with the City of Versailles's Public Works Director, Utility Manager, and Wastewater Treatment Plant Operators. The public support ratings for the Non-Monetary Effectiveness calculations used in Chapter 8 were results of these meetings.

A presentation regarding the progress of the Facilities Plan were also made to the Versailles Water and Sewer Committee on _____, 2014.

C. Public Meeting

On _____ a public meeting was held at the Versailles City Council chambers to present and discuss the Wastewater Facilities Plan update. Public meeting notices were published in the local newspaper in order to secure public participation. Appendix I contains the public meeting presentation, minutes, questions and answers, sign-in sheet, newspaper notices and affidavits from the newspaper showing the notice dates.

1. **Summary of the Public Meeting**

2. **Summary of the Comments and Responses from the Public Meeting**

Section 12

SECTION 12
REGIONAL FACILITIES PLAN
COMPLETENESS CHECKLIST AND FORMS

A. Introduction

This section includes the Facilities Plan Checklist, indicating the page numbers related to items that are addressed in the Plan (Exhibit 12-1). This section also includes summaries of the unit process design criteria (Exhibit 12-2) and of the design flows and concentrations for the treatment plant (Exhibit 12-3).

This Plan is submitted in two (2) hard copies, one (1) copy of the Plan certified by a professional engineer licensed in Kentucky and one (1) non-certified copy of the Plan and the Planning Area shapefile on a Compact Disc (CD).

Section 12: Regional Facility Plan Completeness Checklist and Forms

Requirements: Two (2) hard copies, one certified by a professional engineer licensed in Kentucky and one (1) non-certified digital copy of the regional facility plan and the planning area shapefile on a Compact Disc (CD) shall be submitted to the Cabinet. This completeness checklist should be completed and submitted with each regional facility plan.

Regional Planning Agency Name: City of Versailles

Date: March 2014

		PAGE #
SECTION 1		
REGIONAL FACILITY PLAN SUMMARY- This section shall provide a brief summary of the information provided in the facility plan, including the following:		
1.	Purpose of the plan and major problems evaluated in the plan.	Pg. 1-1
2.	Recommended alternative chosen to remediate or correct the problems and/or serve the area of need identified in the plan. Also, include any institutional arrangements necessary to implement the recommended alternative(s).	Pg. 1-3
3.	Estimated cost of implementing the proposed plan (including user fees) and the proposed funding method to be used.	Pg. 1-5
4.	Planning agency commitments necessary to implement the plan.	Pg. 1-6
5.	Schedule of implementation for projects.	Pg. 1-7
SECTION 2		
STATEMENT OF PURPOSE AND NEED- This section shall contain a brief description of the purpose and need for a submitting the facility plan.		Pg. 2-1 Pg. 2-2
SECTION 3		
PHYSICAL CHARACTERISTICS OF THE PLANNING AREA- This section shall delineate the planning area boundaries and describe key topographic, geographic and pertinent natural or man-made features of the area. Digital or electronic submission of the planning area boundary shapefile in a standard GIS format shall also be included. This section shall also include the following maps:		
1.	One (1) up-to-date map, suitable for photocopying, indicate the planning area boundary, service area boundary, watershed boundaries, county lines, populated places, cities and/or towns and project areas or proposed planning period phases.	Exh. 3-1 Exh. 3-2
2.	One (1) up-to-date map, suitable for photocopying, include locations of wastewater treatment facilities (including package treatment plants), discharge location(s), collection lines (gravity, force main, interceptors), pump stations, public drinking water intake points and groundwater supply areas [Source Water Area Protection Plans (SWAPP) and/or Wellhead Protection Areas (WHPA)].	Exh. 3-3 Exh. 6-1 App. B
3.	One (1) seven and one-half (7 ½) minute USGS topographic map including the location of wetlands, delineation of the 100-year floodplain, surface water(s), and topography.	Exh. 3-3 Exh. 3-4

4.	If available, a local planning and zoning land use map. Exh 3-5 &	Exh 3-6
	SECTION 4	
SOCIOECONOMIC CHARACTERISTICS OF THE PLANNING AREA- The following characteristics of the planning area shall be discussed:		
1.	Historical, current, and projected population in the planning area including wastewater contributions from industrial and commercial sources.	Pg. 4-1 Exh. 4-1
2.	Current and projected population in the existing service area and unsewered parts of the planning area	Exh. 4-1
3.	Economic or social benefit to the affected community	Pg. 4-4
	SECTION 5	
EXISTING ENVIRONMENT IN THE PLANNING AREA- Describe existing physical, biological, cultural, and other resource features within the planning area with an emphasis on those that may be impacted by the proposed plan or projects, including the following:		
1.	Physical features such as surface and groundwater quality, water sources and supply, wetlands, lakes, streams, air pollution, floodplains, soils, geology, and topography	Pg. 5-1
2.	Biological: Identify plant and animal communities in the planning area with an emphasis upon endangered and threatened species likely to be impacted	Pg. 5-4
3.	Cultural: Describe archaeological and historical resources that may be affected by the proposed project	Pg. 5-5
4.	Other Resource Features such as national and state parks, recreational areas, USDA Designated Important Farmland, and any other applicable environmentally sensitive areas	Pg. 5-6
	SECTION 6	
EXISTING WASTEWATER SYSTEM- This section shall be prepared by a Professional Engineer licensed in Kentucky. A description of the existing facilities within the planning area shall include the following:		
1.	On-site systems in the planning area Pg. 6-18 &	Exh. 6-6
2.	Physical condition of the existing wastewater treatment plant(s) including the type, age, design capacity, process units, peak and average wastewater flows, current discharge permit limits, schematic layout of treatment plant. Include a narrative description of the capacity of the treatment plant to meet reliability and redundancy requirements as outlined in regulation 401 KAR 5:005, Section 13.	Pg. 6-11 Exh. 6-5
3.	Existing collection and conveyance system and its condition Pg. 6-1 &	Exh. 6-1
4.	Existing biosolids disposal method	Pg. 6-14
5.	Existing operation, maintenance and compliance issues	Pg. 6-11
	SECTION 7	
FORECASTS OF FLOWS AND WASTE LOADS IN THE PLANNING AREA- This section shall be prepared by a professional engineer licensed in Kentucky and shall include:		
1.	Current and projected commercial, industrial and residential growth for the proposed planning period	Pg. 7-1 Exh. 7-1
2.	A copy of the waste load allocation (WLA) issued by the DOW for new or expanded treatment plant projects	App. H

SECTION 8		
EVALUATION OF ALTERNATIVES- This section shall be prepared by a professional engineer licensed in Kentucky and include an assessment of alternatives to determine the appropriate facilities that will meet the wastewater needs of the planning area and provide benefits that are cost-effective and environmentally sound. The section shall include:		
1.	No-action alternative	Pg. 8-16
2.	Optimization of existing facilities	Pg. 8-8
3.	Regionalization	Pg. 8-8
4.	Other alternatives	Pg. 8-8
5.	Detailed cost analysis along with 20 year present worth analysis for each alternative	Pg. 8-16 + Exh. 8-13 to 8-27
6.	Recommended alternative	Pg. 8-21 + Exh. 8-29, 30
SECTION 9		
CROSS-CUTTER CORRESPONDENCE AND MITIGATION- Each facility plan shall include cross-cutter correspondences to and from each agency related to the following four environmental and cultural concerns:		
1.	Threatened and Endangered Species: The U.S. Fish and Wildlife Service- Kentucky Ecological Services Field Station and the Kentucky Department of Fish and Wildlife Resources	Pg. 9-1 App. K
2.	Historical Resources: The Kentucky Heritage Council State Historic Preservation Office	Pg. 9-2 + App. K
3.	Aquatic Resources: The US. Army Corps of Engineers (Louisville, Nashville, or Huntington Districts).	Pg. 9-2 App. K
4.	Agricultural Resources: The local office of the Natural Resources Conservation Service (NRCS) or USDA Service Center	Pg. 9-2 App. K
SECTION 10		
EVAULATION OF RECOMMENDED REGIONAL FACILITY PLAN- This section of the facility plan shall summarize the critical components of the recommended plan.		
1.	Environmental impacts	Pg. 10-1
2.	Institutional structure	Pg. 10-1
3.	Funding plan	Pg. 10-1
4.	Current and projected residential user charge rate based on 4,000 gallon usage per month	Pg. 10-2 + Exh. 10-1,2,3
5.	Implementation schedule	Pg. 10-7
SECTION 11		
DOCUMENTATION OF PUBLIC PARTICIPATION- The section shall include a copy of the newspaper advertisement/proof of publication, attendance sheet, and public comments.		Pg. 11-1

Exhibit 12-2 Versailles WWTP Expansion Process Unit Design Criteria			
Process	**Number of Units**	**Flow / Unit (MGD)**	**Design Criteria**
Influent Screen, Washer, Compactor	1	12.5 MGD	Treat Peak Flow of 12.5 MGD
Stacked Tray Vortex Grit Removal	2	6.25 MGD	Treat Peak Flow of 12.5 MGD
Influent Pump Station	2 Pumps (1 Backup Pump)	6.25 MGD	Pump Peak Flow of 12.5 MGD
Sequencing Batch Reactor (SBR)	4 Basins	3.125 MGD	Treat Average Flow of 4.5 MGD Treat Peak flow of 12.5 MGD
Ultraviolet (UV) Light Disinfection	1	12.5 MGD	Min. Flow of 2.0 MGD Peak Flow of 12.5 MGD
WAS Pumps	2	6.25 MGD	Pump Peak Flow of 12.5 MGD
Equalization (EQ) Basin	2	1.5 MG Storage	Shave off peak flows
Wet Weather Pump Station	2 Pumps (1 Backup Pump)	1.5 MGD	Shave off peak flows
Aerated Sludge Holding Tank	1	180,000 Gal.	SRT of 60 Days @ 15°C
Belt Filter Press	1	N/A	600 lbs/hr/meter

Exhibit 12-3 Versailles WWTP Expansion Design Flow & Concentration Form											
Design Flows & Organic Concentrations	**Flows (MGD)**	**BOD_5 (mg/l)**	**BOD_5 (lb/day)**	**SS (mg/l)**	**SS (lb/day)**	**NH_3-N (mg/l)**	**NH_3-N (lb/day)**	**TKN (mg/l)**	**TKN (lb/day)**	**P (mg/l)**	**P (lb/day)**
Average Daily											
Domestic Portion	3.97	200	6,629	311	10,308	20	663	40	1,326	8	265
Industrial Portion	0.53	200	877	311	1,364	20	88	40	175	8	35
Total	**4.5**	**200**	**7,506**	**311**	**11,672**	**20**	**751**	**40**	**1,501**	**8**	**300**
Population Equivalent	**0.045**										
Peak Hourly											
Domestic Portion	11.04	72	6,629	112	10,308	7.2	663	14.4	1,326	2.9	265
Industrial Portion	1.46	72	877	112	1,364	7.2	88	14.4	175	2.9	35
Total	**12.5**	**72**	**7,506**	**112**	**11,672**	**20**	**751**	**40**	**1,501**	**8**	**300**
Peak Daily	**12.5**										
Peak Instantaneous	**12.5**										

Appendix A

Appendix A

Versailles Agreed Order

FILED
AUG 17 2009
Office of Administrative Hearings

COMMONWEALTH OF KENTUCKY
ENERGY AND ENVIRONMENT CABINET
DIVISION OF ENFORCEMENT
CASE NO. DOW 070212

IN RE: Versailles Wastewater Treatment Plant
Versailles, Kentucky 40383
Agency Interest 4246
Activity ID ERF 20070001

RECEIVED
AUG 19 2009
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF ENFORCEMENT

AGREED ORDER

* * * * * * * * * * * *

WHEREAS, the parties to this Agreed Order, the Energy and Environment Cabinet (hereinafter "Cabinet") and the City of Versailles (hereinafter "City" or "Defendant"), state:

STATEMENTS OF FACT

1. The Cabinet is charged with the statutory duty of enforcing KRS Chapter 224 and the regulations promulgated pursuant thereto;

2. The City owns and operates a sewage system, as that term is defined in KRS 224.01-010(25), comprised of sewage collection lines (hereinafter "collection system") and a waste water treatment plant (hereinafter "WWTP"), that provides sewage service to the residents of Versailles, Woodford County, Kentucky. The WWTP and collection system are hereinafter collectively referred to as the "facility".

3. The City holds Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0020621 which was renewed on April 16, 2009.

4. On August 23, 2006, authorized representatives of the Cabinet identified the following violations of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above:

a. 401 KAR 5:065 Section 1(12)(d): facility failed to submit Discharge Monitoring Reports (DMRs) that were postmarked on or before the 28th day of the month following the monitoring period; and

b. 401 KAR 5:065 Section 1(12)(d): facility was late in submitting for November and December 2005;

c. 401 KAR 5:065 Section 1(12)(d): facility was late in submitting for February, April, May and June 2006.

6. On September 29, 2006, the Cabinet issued the City a Letter of Warning for the violations described in paragraph 5 above;

7. On October 25, 2006, authorized representatives of the Cabinet identified the following violations of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above:

a. 401 KAR 5:015 Section 2; failure to report a spill or bypass to the Division of Water by the most rapid means available;

b. KRS 224.70-110: pollutants have entered the waters of the Commonwealth, which violated standards and regulations of the Commonwealth; and

c. 401 KAR 5:031 Section 2: degrading the waters of the Commonwealth.

8. On November 9, 2006, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 7 above;

9. On January 16, 2007, authorized representatives of the Cabinet identified the following violations of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above:

a. 401 KAR 5:065 Section 1(1)(a): failure to comply with the KPDES permit limit for WET as determined by the test completed on December 11, 2006;

b. 401 KAR 5:065 Section 1(1)(a): failure to submit a valid WET retest.

10. On January 22, 2007, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 9 above;

11. On April 25, 2007, authorized representatives of the Cabinet identified the following violations of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above:

a. 401 KAR 5:015 Section 2: failure to report a spill or bypass to the Division of Water by the most rapid means available;

b. KRS 224.70-110: pollutants have entered the waters of the Commonwealth, which violated standards and regulations of the Commonwealth; and

c. 401 KAR 5:031 Section 2: degrading the waters of the Commonwealth.

12. On April 25, 2007, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 11 above;

13. On May 14, 2007, authorized representatives of the Cabinet identified the following violations of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above:

a. 401 KAR Section 2: failure to report a spill or bypass to the Division of Water by the most rapid means available;

b. 401 KAR 5:065 Section 1(10)(b): failure to retain records of all monitoring information, including all calibration and maintenance records and all

original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit for a period of three years from the date of the sample, measurement, report, or application;

c. 401 KAR 5:065 Section 1(12)(f): failure to orally report any noncompliance which may endanger health or the environment; within twenty-four hours from the time the permittee becomes aware of the circumstances; and

d. 401 KAR 5:065 Section 1(5): failure to provide proper operation and maintenance.

14. On May 25, 2007, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 13 above;

15. On June 28, 2007 authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Total Suspended Solids (TSS) at Outfall 001-1 during the month of March 2007;

16. On July 3, 2007, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 14 above;

17. On August 14, 2007, authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Total Ammonia Nitrogen (TAN) at Outfall 001-1 during the month of June 2007;

18. On August 20, 2007, the Cabinet issued the City a Notice of Violation for the

violations described in paragraph 17 above;

19. On December 13, 2007, authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Dissolved Oxygen (DO) at Outfall 001-1 during the months of July and August 2007;

20. On December 21, 2007, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 19 above;

21. On February 22, 2008 authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Total Suspended Solids (TSS) at Outfall 001-1 during the month of December 2007;

22. On February 25, 2008, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 21 above;

23. On May 15, 2008, authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Dissolved Oxygen (DO) at Outfall 001-1 during the month of March 2008;

24. On May 19, 2008, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 23 above;

25. On August 26, 2008, authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Dissolved

Oxygen (DO) at Outfall 001-1 during the month of May of 2008;

26. On August 29, 2008, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 25 above;

27. On November 19, 2008, authorized representatives of the Cabinet identified the following violation of KRS Chapter 224 and the regulations promulgated pursuant thereto at the facility described in paragraph 2 above: failure to meet KPDES permit limits for Total Ammonia Nitrogen (TAN) at Outfall 001-1 during the month of September of 2008;

28. On November 24, 2008, the Cabinet issued the City a Notice of Violation for the violations described in paragraph 27 above;

29. Representatives of the City attended an administrative conference at the Cabinet's Division of Enforcement in Frankfort, Kentucky on May 27, 2009, and admitted all the violations described in this Agreed Order.

NOW THEREFORE, in the interest of settling all civil claims and controversies involving the violations described above, the parties hereby consent to the entry of this Agreed Order and agree as follows:

REMEDIAL MEASURES

30. Commencing immediately, the City shall report to the Cabinet all spills, bypass discharges, upset condition discharges or other releases of substances from its facility identified above which would result in or contribute to the pollution of the waters of the Commonwealth, including emergency and accidental releases, in accordance with KRS 224.01-400, 401 KAR 5:015, and 401 KAR 5:065. The City shall make its primary reports of the above discharges or releases by telephoning the Cabinet's 24-hour notification telephone number, 800-928-2380 or 502-564-2380.

31. Commencing immediately, the City shall maintain records of all monitoring information, calibration and maintenance records and all reports as required by the KPDES Permit. The City shall ensure that all record keeping information is up-to-date and accurate at all times.

32. Commencing immediately, the City shall provide proper operation and maintenance to its sewage collection system and WWTP in accordance with 401 KAR 5:065 and the conditions noted in KPDES Permit No. KY0020621.

33. By August 30, 2009, the City shall submit to DENF for distribution to the appropriate party for review and acceptance, a Sanitary Sewer Overflow Plan, with a time schedule for implementation and completion for all pump and lift stations in the Versailles wastewater collection system. This plan shall address options to replace and expand the capacity of such facilities or otherwise alleviate recurring pump and lift station SSOs and illegal bypasses and minimize the I/I into the system. If the Division of Water accepts the Sanitary Sewer Overflow Plan, then the City shall submit plans and specifications to the Division of Water for any approvals required to accomplish such corrective action. If the Division of Water does not accept the Sanitary Sewer Overflow Plan, the City shall, upon receipt of notice of such deficiencies, resubmit, within thirty (30) days, the revised Sanitary Sewer Overflow Plan with any Cabinet comments addressed and the Cabinet's noted deficiencies corrected;

34. By June 18, 2009, the City shall secure the services of a professional engineer and submit to DENF for distribution to the proper party for review and acceptance, a written plan for a Sewer System Evaluation Survey (SSES) of the entire collection system, as set forth in 401 KAR 5:005. The SSES shall: 1) identify all significant sources of I/I into the sewage collection system; 2)

contain a compliance schedule and description of corrective actions to be undertaken for correcting all cost-effective sources within the sewage collection system; 3) contain detailed maps, sketches and schematic diagrams of the current sewage collection system; and 4) determine whether or not it is more cost effective to remove or to transport and treat the I/I. If the Division of Water does not accept the written SSES plan, modifications to the report, including the compliance schedule contained therein, shall be made in accordance with Division of Water specifications. The modified written SSES report shall be resubmitted within thirty (30) days of receipt of the aforementioned specifications from the Division of Water. The City shall, within thirty (30) days of receipt of the Division of Water's written acceptance of the written SSES report and its compliance schedule, initiate the I/I corrective actions in accordance with the compliance schedule. The City WWTP shall complete the rehabilitation or modification set forth in the approved I/I study no later than three years from the execution of this Order.

35. By December 31, 2012, the City shall be in full compliance with all conditions of KRS Chapter 224, 401 KAR Chapter 5, this Agreed Order, and KPDES Permit No. KY0020621.

36. All submittals shall be sent to the address noted below for distribution to the appropriate party:

Division of Enforcement
C/o Mr. Greg Wilson
300 Fair Oaks Lane
Frankfort, KY 40601

PENALTIES/STIPULATED PENALTIES

37. The City shall pay the Cabinet a civil penalty in the amount of five thousand five hundred dollars ($5,500.00), for the violations described above. The amount of the civil penalty

shall be tendered by the City to the Cabinet with the return of this signed Agreed Order. Note "Case No. DOW 070212 on the instrument of payment.

38. The City shall pay the Cabinet a stipulated penalty in the amount of ten thousand dollars ($10,000), within fifteen (15) days of receipt of written notice from the Cabinet for each failure to comply with the remedial measures noted in paragraphs 30 - 35 above. This penalty is in addition to, and not in lieu of, any other penalty that could be assessed. The stipulated penalty will be waived upon termination of this Agreed Order, if the City has complied with all requirements of paragraphs 30 – 35.

39. If the City believes the request for payment of a stipulated penalty is erroneous or contrary to law, the City may request a hearing in accordance with KRS 224.10-420(2). The request for hearing does not excuse timely payment of the penalty. If an order is entered pursuant to KRS 224.10-440 that excuses payment, the Cabinet will refund the payment. Failure to make timely payment shall constitute an additional violation.

40. Payment of civil penalties shall be by cashier's check, certified check, or money order, made payable to "Kentucky State Treasurer" and sent to the attention of the Director, Division of Enforcement, Department for Environmental Protection, 300 Fair Oaks Lane, Frankfort, Kentucky 40601.

MISCELLANEOUS PROVISIONS

41. This Agreed Order addresses only the violations specifically described above. Other than those matters resolved by entry of this Agreed Order nothing contained herein shall be construed to waive or to limit any remedy or cause of action by the Cabinet based on statutes or regulations under its jurisdiction and the Defendant reserves its defenses thereto. The Cabinet

expressly reserves its right at any time to issue administrative orders and to take any other action it deems necessary that is not inconsistent with this Agreed Order, including the right to order all necessary remedial measures, assess penalties for violations, or recover all response costs incurred, and the Defendant reserves its defenses thereto.

42. This Agreed Order shall not prevent the Cabinet from issuing, reissuing, renewing, modifying, revoking, suspending, denying, terminating, or reopening any permit to the City. The City reserves its defenses thereto, except that the Defendant shall not use this Agreed Order as a defense.

43. The City waives its right to any hearing on the matters admitted herein. However, failure by the City to comply strictly with any or all of the terms of this Agreed Order shall be grounds for the Cabinet to seek enforcement of this Agreed Order in Franklin Circuit Court and to pursue any other appropriate administrative or judicial action under KRS Chapter 224 and the regulations promulgated pursuant thereto.

44. The Agreed Order may not be amended except by a written order of the Cabinet's Secretary or his designee. The City may request an amendment by writing the Director of the Division of Enforcement at 300 Fair Oaks Lane, Frankfort, Kentucky 40601 and stating the reasons for the request. If granted, the amended Agreed Order shall not affect any provision of this Agreed Order unless expressly provided in the amended Agreed Order.

45. The Cabinet does not, by its consent to the entry of this Agreed Order, warrant or aver in any manner that the City's complete compliance with this Agreed Order will result in compliance with the provisions of KRS Chapter 224 and the regulations promulgated pursuant thereto. Notwithstanding the Cabinet's review and approval of any plans formulated pursuant to this Agreed Order, the City shall remain solely responsible for compliance with the terms of KRS Chapter 224

and the regulations promulgated pursuant thereto, this Agreed Order and any permit and compliance schedule requirements.

46. The City shall give notice of this Agreed Order to any purchaser, lessee or successor in interest prior to the transfer of ownership and/or operation of any part of its now-existing facility occurring prior to termination of this Agreed Order, shall notify the Cabinet that such notice has been given, and shall follow all statutory and regulatory requirements for a transfer. Whether or not a transfer takes place, The City shall remain fully responsible for payment of all civil penalties identified in this Agreed Order.

47. The Cabinet agrees to allow the performance of the above-listed remedial measures and payment of civil penalty by the City to satisfy the City's obligations to the Cabinet generated by the violations described above.

48. This Agreed Order shall be of no force and effect unless and until it is entered by the Secretary or his designee as evidenced by his signature thereon. If this Agreed Order contains any date by which the City is to take any action or cease any activity, and the Secretary enters the Agreed Order after that date, then the City is nonetheless obligated to have taken the action or ceased the activity by the date contained in this Agreed Order.

TERMINATION

49. This Agreed Order shall terminate upon the City's completion of all requirements described in this Agreed Order. The City may submit written notice to the Cabinet when it believes all requirements have been performed. The Cabinet will notify the City in writing of whether it intends to agree with or object to termination within sixty days of such notice. The Cabinet reserves

its right to enforce this Agreed Order, and the City reserves its right to file a petition for hearing pursuant to KRS 224.10-420(2) contesting the Cabinet's determination.

CASE NO. DOW 070212

AGREED TO BY:

Mayor Fred Siegelman
City of Versailles

7-27-09
Date

APPROVAL RECOMMENDED BY:

Jeffrey A. Cummins, Acting Director
Division of Enforcement

8/4/09
Date

Mary Stephens, Attorney Manager
Environmental Protection Legal Division

8·10·09
Date

C. Michael Haines, Executive Director
Office of General Counsel

8.10.09
Date

CASE NO. DOW 070212

ORDER

Wherefore, the foregoing Agreed Order is entered as the final Order of the Energy and Environment Cabinet this 17th day of August, 2009.

ENERGY AND ENVIRONMENT CABINET

LEONARD K. PETERS, SECRETARY

CERTIFICATE OF SERVICE

I hereby certify that a true and accurate copy of the foregoing **AGREED ORDER** was mailed, postage prepaid, to the following this 17th day of August, 2009.

City of Versailles
Attention: Mr. Bruce Southworth
Public Works Director
196 South Main Street
P.O. Box 625
Versailles, Kentucky 40383

and mailed, messenger to:

Jeffrey A. Cummins, Acting Director
Division of Enforcement
300 Fair Oaks Lane
Frankfort, Kentucky 40601

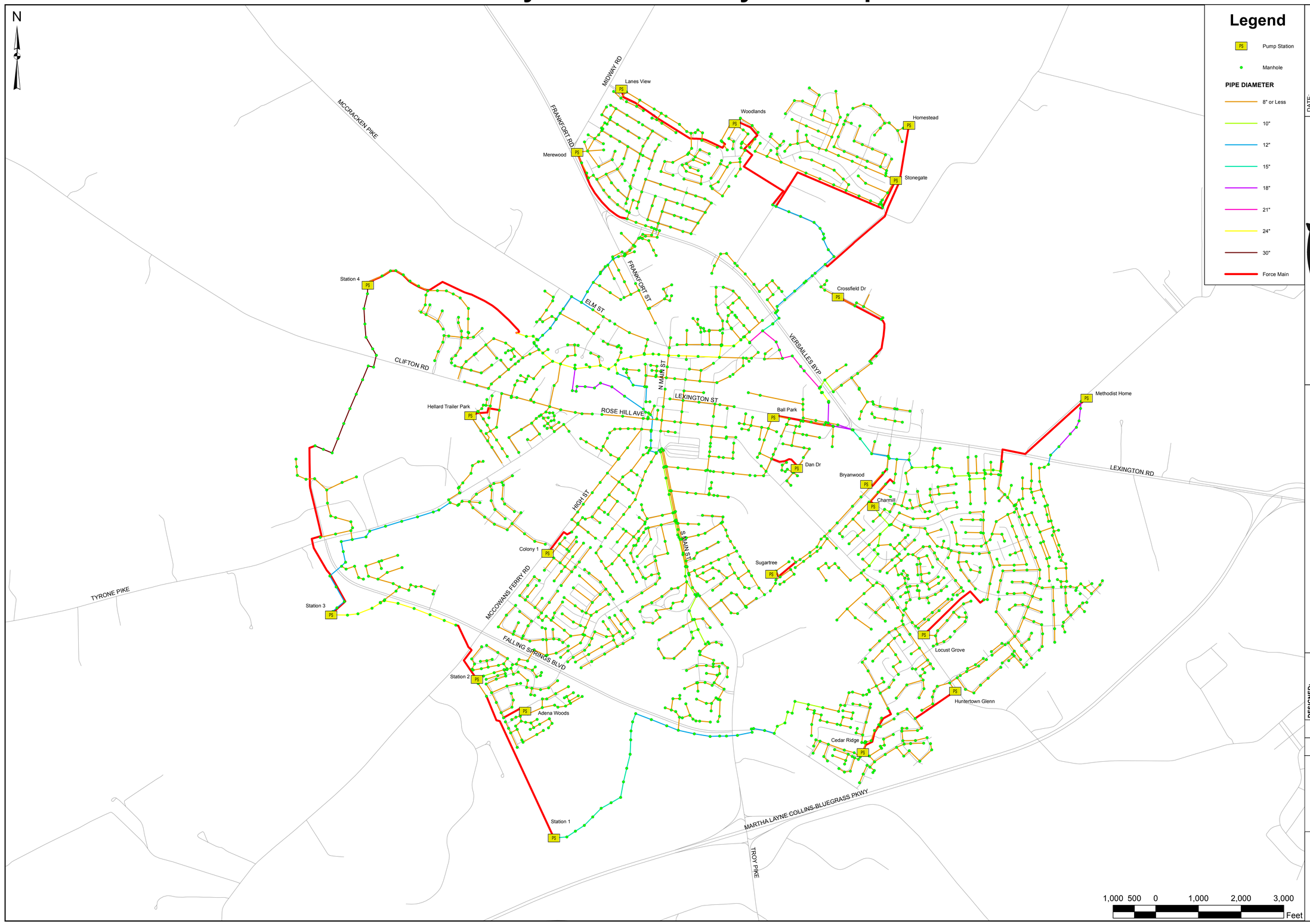
Mary Stephens, Attorney
Environmental Protection Legal Division
200 Fair Oaks Lane
Frankfort, Kentucky 40601

Karen B. McDonald
DOCKET COORDINATOR

Distribution:
DOW
LTS
GDM
FBT
S/H

Appendix B

City of Versailles: System Map



DATE: March, 2014

SCALE

SHEET NO. APPENDIX B

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APPENDIX B
SEWAGE COLLECTION SYSTEM MAP
CITY OF VERSAILLES, KENTUCKY

DESIGNED:

DRAWN:

REVIEWED:

APPROVED:

NO.	DESCRIPTION	DATE	BY

REVISIONS

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

SCALE: 1" = 1000'

Appendix C

Appendix C

Sanitary Sewer Overflow Plan (SSOP)

GRW | engineers | architects | planners | www.grwinc.com

Sanitary Sewer Overflow Plan (SSOP)

City of Versailles, Kentucky

Agreed Order Dated August 17, 2009,
DOW Case No. 070212

November 2009

VERSAILLES, KENTUCKY
EST. 1792

Engineers · Architects · Planners
801 Corporate Drive • Lexington, KY 40503
859-223-3999 • www.grwinc.com

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Appendix B – List of Known Sanitary Sewer Overflows (SSOs)

Appendix C – Private Sources of Inflow

Appendix D – Versailles Sewer System Use Ordinance

Appendix E – Overflow Response Procedure

Appendix F – Versailles Sewage Collection System Mapping

I. Introduction

The City of Versailles, Kentucky has signed an Agreed Order with the Commonwealth of Kentucky to address issues at the wastewater treatment plant and in the sewage collection system (Agreed Order dated August 17, 2009 - DOW Case No. 070212). Item 33 on page 7 of the Agreed Order requires the City to develop a Sanitary Sewer Overflow Plan (SSOP) and to submit the plan to the Kentucky Department for Environmental Protection - Division of Enforcement. The Division of Enforcement has published a two page outline for an SSOP, a copy of which is contained in Appendix A. The Versailles SSOP was developed based on this outline.

The City of Versailles compiled a list of known sanitary sewer overflows (SSOs) that have occurred in their system over the last three years. Seventeen overflow locations were identified throughout the City's wastewater collection system. Many of the identified locations have experienced only minor overflow problems. These locations only experienced one small overflow incident in three years that resulted from either a heavy rain event or a downstream blockage. Other locations had more significant overflow volumes with reoccurring overflow incidents.

Many of the identified overflow locations will be eliminated upon completion of the Interceptor Sewers and Lift Stations project that began construction in 2005 and is expected to be completed and in-service in 2010. This extensive project will eliminate a few pump stations that are locations of known overflows, and will relieve many of the gravity lines in the downtown area where overflows have occurred, as flow will be diverted to the new facilities.

Remaining overflow locations that will not be eliminated by the new interceptors and lift stations will be investigated in the up-coming Sanitary Sewer Evaluation Study (SSES) of the entire Versailles collection system. The SSES is also required by the Agreed Order, per item 34 on pages 7 and 8. This evaluation study of the collection system will be completed by December 31, 2012, to be in compliance with the Agreed Order. The SSES will recommend rehabilitation and/or improvements to the collection system that will eliminate each of the remaining SSOs identified herein not eliminated by the Interceptor Sewers and Lift Stations.

II. List of Known Sanitary Sewer Overflows (SSOs)

A list of known sanitary sewer overflows (SSOs) identified by the City of Versailles is located in Appendix B. In addition, an individual data sheet for each known SSO location is provided in Appendix B. The information in Appendix B contains the following information for each known SSO as obtained by City personnel: frequency of overflow; estimate of annual volume of the overflow; type of overflow (i.e. manhole or pump station); receiving stream; description of immediate area and downstream land use including potential for public health concerns; description of any previous (within the last 5 years), current or proposed studies to investigate the overflow; description of any previous (within the last 5 years), current or proposed

rehabilitation or construction work to remediate or eliminate the overflow; and a schedule to eliminate the overflow.

III. Private Sources of Inflow

Appendix C contains information regarding the approach the City of Versailles is taking regarding prevention and elimination of private sources of inflow. Much of this information was obtained from the City of Versailles Sewer System Use ordinance, which is given in Appendix D. This document addresses the City's regulations on discharging unpolluted water into sanitary sewers, prohibited connections to the sewer system, design, installation and inspection of approved sewer connections, and enforcement actions and penalties for any sewer use violation.

Appendix C contains the following information pertaining to private sources of inflow: description of methods the City uses for locating downspouts, sump pumps, roof drains, and other illegal connections to the sewer system; ordinances and procedures for eliminating these illegal connections; penalties for violation of ordinances or procedures and method of enforcement; a plan and schedule to address existing illegal connections; and a plan to prevent further illegal connections to the sewage collection system.

IV. Overflow Response Procedure

Appendix E contains the Overflow Response Procedure that the City of Versailles uses when responding to an SSO.

V. Sewage Collection System Mapping

Mapping for the Versailles wastewater collection system is provided in Appendix F. Map A shows the entire network, including gravity sewer lines with flow direction noted, force mains, pump stations, manholes, the wastewater treatment plant, locations of known sanitary sewer overflows (SSOs), and the tributary drainage area to each SSO. In addition to the map of the entire system, the system was broken into six areas and more detailed maps of each of these areas are provided in Appendix F. These area maps, Area 1 through Area 6, contain the same information as the main map with the addition of the gravity sewer line sizes.

Also included in Appendix F is Map B, a map of the Versailles collection system after the Interceptor Sewers and Lift Stations project in service. This map shows pump stations that will be removed from service upon completion of the new interceptors and lift stations, and the tributary areas to the new facilities. As mentioned, many of the Sanitary Sewer Overflows will be eliminated by the new interceptors and lift stations either by removing a pump station that is a known SSO location or by relieving overloaded gravity lines by diverting flow south to the new interceptors and lift station. Map B shows the areas that are being diverted away from existing infrastructure to the new facilities.

Appendix A

Sanitary Sewer Overflow Plan (SSOP) Outline

provided by

Division of Enforcement

SANITARY SEWER OVERFLOW PLAN

1. Submit a map for the entire collection system, including any satellite systems which discharge flow to this system. The map should show all sewer lines except service laterals, indicating the size and directional flow of each line, the location of all known SSOs and the areas and sewer lines that are tributary to each SSO, all manholes in the system and all pump stations in the system. A list of SSOs and pump stations should accompany the map, and the list of SSOs should contain the information described in 2. through 9., below
2. Indicate the frequency of the overflows.
3. Provide an estimate of the annual volume of the overflows.
4. Describe the type of overflow, i.e. manhole, pump station, constructed overflow pipe, etc.
5. Identify the receiving stream.
6. Describe the immediate area and downstream land use, including potential for public health concerns.
7. Describe any previous (within the last 5 years), current or proposed studies to investigate the overflows.

B. Describe any previous (within the last 5 years), current or proposed rehabilitation or construction work to remediate or eliminate the overflows.

9. Provide a schedule for the elimination of the overflows.
10. Attach an appendix that addresses the City's approach to private sources of inflow. This would include:

a. Methods for locating down spouts, sump pumps, roof drains and other illegal connections to the sewer system.

b. Ordinances and procedures for eliminating these illegal connections,

c. Penalties for violation of ordinances or procedures and method of enforcement.

d. Plan and schedule to address existing illegal connections.

e. Plan to prevent further illegal connection to the system (final building inspection etc.).

If these items are not available or do not exist, a plan to complete items 10a-10e above needs to be submitted.

Revised 7/14/2006

Appendix D

Appendix D

Sanitary Sewer Evaluation Survey (SSES)

VERSAILLES SANITARY SEWER EVALUATION SURVEY

I. Introduction

A. Description of Study

The Sanitary Sewer Evaluation Survey (SSES) is an investigation of a Utility's collection system in order to evaluate the deficiencies and needs of the system and the cost effectiveness of repairs and improvements. The Survey includes various investigative methods such as Manhole Inspections, Smoke Testing, Flow Monitoring, Dye Tracing and Video Inspection by closed circuit television camera. The information obtained from the investigations is studied and compared to determine the significance of the various components and their relationships within the system.

B. City's Need for Study

The City has been experiencing the effects of rain events on their wastewater facilities for several years. The flows at the Wastewater Treatment Plant increase significantly during wet weather, and there are several locations in the system where wet weather induced overflows occur on a regular basis. In 2009, the City requested GRW to prepare a Sanitary Sewer Overflow Plan which identified seventeen (17) known overflow points and proposed plans to eliminate them. By the end of 2010, three (3) of the overflow points were eliminated by maintenance and repair efforts. The southwest interceptor and pump stations project was constructed and placed in service in 2012, and those new facilities resulted in the elimination of seven (7) of the overflow points, by rerouting the flow of the sewage. Seven (7) overflow points remain, with five (5) of these considered "problem" overflows. These are the Charmill, Woodlands, Stonegate and Cedar Ridge Pump Stations, and Manhole 3-06-002 at the Big Spring City Park. While the elimination of these overflow points is a great improvement, the impact and significance of the wet weather flows that are transported to the Treatment Plant are still a concern.

II. Sewer System Mapping

The City of Versailles began upgrading the Sewer System Map in 2010, locating and labeling manholes by GIS methods referenced to state plane coordinates. This was performed in conjunction with the Manhole Inspection program. They now have a digital map and database of their system. The system was divided into four (4) zones, and then into drainage basins within each zone, with a total of thirteen (13) drainage basins. The manholes were identified by the zone number, the basin number and an individual number. Appendix A contains the Wastewater Collection System Map.

III. Manhole Inspections

Manhole inspections were performed by City forces using the standard report form included in Appendix B. Two thousand one hundred sixteen (2,116) manholes were identified, with sixteen (16) of these being inaccessible or otherwise unable to be inspected. One thousand sixteen (1,016) manholes were reported as having no defects. All drainage basins contain manholes with identified defects, although they may or may not contribute to the wet weather inflow & infiltration problem. The types of defects that were identified are as follows:

1	No rehabilitation	14	Plug Vent Holes in MH Lid
2	Replace MH Lid	15	Plaster and Waterproof Brick MH Walls
3	Raise MH Lid/Frame	16	Seal Joint Sections of Precast MH
4	Replace Frame	17	Repair MH/Pipe Connection (Internal)
5	Reset Frame to MH	18	Repair MH/Pipe Connection (External)
6	Grout MH Interior	19	Repair MH/Drop Pipe Connection (Internal)
7	Install _____ MH Steps	20	Repair MH/Drop Pipe Connection (External)
8	Reconstruct Trough/Aprons	21	Repair MH/Service Line Connection(Internal)
9	Replace MH Cone	22	Repair MH/Service Line Connection(External)
10	Replace MH Barrel	23	Clean MH
11	Construct New MH	24	Other Utilities Passing Through MH
12	Remove MH Obstruction/Rots	25	Replace MH Riser
13	Plug Lift Hole In Precast MH		

The following table lists the totals and the types of defects in each basin. A detailed list of each manhole with associated defect codes for each basin is included in Appendix B.

Manhole Defect Summary by Basin

Defect Description	Defect Code	Basin 01	Basin 02	Basin 03	Basin 04	Basin 05	Basin 06	Basin 07	Basin 08	Basin 09	Basin 10	Basin 11	Basin 12	Basin 13	# of Defects
No Defect	**1**	277	58	70	7	60	161	105	70	45	41	3	30	89	**1016**
Replace MH Lid	**2**	4	0	1	0	2	4	0	0	0	2	0	0	1	**14**
Raise MH Lid/Frame	**3**	1	0	1	0	2	1	3	3	1	0	0	0	8	**20**
Replace Frame	**4**	8	3	1	0	2	12	2	0	2	3	0	0	2	**35**
Reset Frame to MH	**5**	187	93	37	14	25	77	9	24	23	14	6	15	6	**530**
Grout MH Interior	**6**	22	4	0	11	2	6	13	0	1	0	0	1	1	**61**
Install MH Steps	**7**	7	0	0	0	0	4	2	3	0	2	0	0	2	**20**
Reconstruct Trough/Aprons	**8**	28	8	12	6	5	16	3	2	3	5	0	3	1	**92**
Replace MH Cone	**9**	6	3	2	2	6	15	2	0	1	4	0	0	0	**41**
Replace MH Barrel	**10**	7	3	2	2	1	11	0	0	1	4	0	0	0	**31**
Construct New MH	**11**	2	14	9	1	0	5	1	0	0	1	0	2	0	**35**
Remove MH Obstruction	**12**	12	19	9	0	3	5	1	0	3	2	1	0	6	**61**
Plug Lift Hole in Precast MH	**13**	1	1	0	0	0	0	1	0	0	0	0	0	0	**3**
Plug Vent Holes in MH Lid	**14**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Plaster & Waterproof Brick MH Walls	**15**	6	0	3	0	2	0	0	0	0	1	0	0	1	**13**
Seal Joint Sections in Precast MH	**16**	9	0	3	0	0	1	15	0	4	2	0	0	0	**34**
Repair MH/Pipe Connection - Internal	**17**	15	6	10	5	0	11	4	0	1	1	0	0	1	**54**
Repair MH/Pipe Connection - External	**18**	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Repair MH/Drop Pipe Connection - Internal	**19**	1	0	1	1	0	0	0	0	0	0	0	0	0	**3**
Repair MH/Drop Pipe Connection - External	**20**	0	0	0	0	0	0	0	0	0	0	0	1	1	**2**
Repair MH/Service Line Connection - Internal	**21**	15	7	2	1	5	6	3	2	2	1	0	1	0	**45**
Repair MH/Service Line Connection - External	**22**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Clean MH	**23**	85	57	52	6	15	80	25	2	41	9	1	16	5	**394**
Other Utilities Passing Through MH	**24**	1	0	0	0	0	4	0	0	0	0	0	0	0	**5**
Replace MH Riser	**25**	93	22	27	2	7	31	2	2	14	3	3	7	3	**216**
TOTAL NUMBER OF DEFECTS		**787**	**298**	**242**	**58**	**137**	**450**	**192**	**108**	**142**	**95**	**14**	**76**	**127**	

Each manhole defect was assigned a “corrective action”, with some defects being grouped together into one category. For the identified twenty-five (25) defects, there are eleven (11) corrective actions, or types of repairs. The corrective action was assigned an estimated cost, and the total repair cost estimate for each manhole was calculated.

Corrective Action	Estimated Cost
Replace Frame and Lid	$750
Reset Frame	$400
Seal Interior Joints/Cracks	$800
Install MH Steps	$500
Reconstruct Trough	$1,000
Replace Cone or Barrel	$1,500
Replace Manhole	$4,000
Clean Manhole	$350
Seal Pipe Connections	$600
Other Utilities in Manhole	$3,000
Replace MH Riser	$600

The detailed cost information for each manhole in all basins is presented in Appendix B. The following tables present a summary of the corrective actions for each drainage basin, and the total estimated cost per basin for repairing all manhole defects.

Corrrective Action Summary by Basin

Basin Number	No Action Required	Replace Frame and Lid	Reset Frame	Seal Interior Joints/Cracks	Install MH Steps	Reconstruct Trough	Replace Cone or Barrel	Replace Manhole	Clean Manhole	Seal Pipe Connections	Other Utilities in Manhole	Replace MH Riser	Total No. of Repairs
Basin 01	277	11	187	38	7	28	10	2	97	29	1	93	**503**
Basin 02	58	3	93	5	0	8	4	14	67	12	0	22	**228**
Basin 03	70	3	37	6	0	12	2	9	52	12	0	27	**160**
Basin 04	7	0	14	11	0	6	2	1	6	6	0	2	**48**
Basin 05	60	4	25	4	0	5	6	0	17	5	0	7	**73**
Basin 06	161	15	77	7	4	16	16	5	84	16	4	31	**275**
Basin 07	105	5	9	19	2	3	2	1	26	6	0	2	**75**
Basin 08	70	3	24	0	3	2	0	0	2	2	0	2	**38**
Basin 09	45	3	23	5	0	3	2	0	43	3	0	14	**96**
Basin 10	41	4	14	3	2	5	5	1	11	2	0	3	**50**
Basin 11	3	0	6	0	0	0	0	0	2	0	0	3	**11**
Basin 12	30	0	15	1	0	3	0	2	16	2	0	7	**46**
Basin 13	89	11	6	2	2	1	0	0	9	1	0	3	**35**
TOTAL	**1016**	**62**	**530**	**101**	**20**	**92**	**49**	**35**	**432**	**96**	**5**	**216**	**1638**

Cost Estimate by Basin

	Number of Repairs	Estimated Cost
Basin 01	503	**$278,100**
Basin 02	228	**$157,300**
Basin 03	160	**$114,450**
Basin 04	48	**$34,300**
Basin 05	73	**$43,350**
Basin 06	275	**$179,250**
Basin 07	75	**$47,450**
Basin 08	38	**$18,450**
Basin 09	96	**$46,700**
Basin 10	50	**$35,350**
Basin 11	11	**$4,900**
Basin 12	46	**$28,800**
Basin 13	35	**$19,800**
TOTAL	**1638**	**$1,008,200**

IV. Flow Monitoring

A. Flow Meters

Flow Monitoring was performed in the spring of 2012 for sixty-six (66) days from March 6 to May 11. Meters were installed at nine (9) locations. A rain gauge was installed at City Hall to record the amounts and duration times of rainfall events. All flow meters showed evidence of increased flows during wet weather events. The most extreme effect was observed for Flow Meter Location 1, which recorded flows from Basin 4 and Basin 12, an area near the WWTP. The second highest increase in flow was at Flow Meter Location 2, which recorded flows from Basin 3, a neighborhood at the north end of the service area. All areas of the

collection system appear to contribute increased flows during wet weather events. The Flow Meter location map showing the metered areas corresponding to each flow meter is in Appendix C. Also included is a map that illustrates the relationship between the flow-metered areas and the drainage basins, with the dry day flows and the maximum flows for each flow metered area, as tabulated below.

Flow Meter Number	Maximum Dry Day Flow (gpm)	Maximum Recorded Flow (gpm)
1	40	650
2	170	1200
3	560	1200
4	870	2800
5	50	340
6	125	210
7	120	500
8	125	500
9	1740	4600

B. Pump Stations

City Utilities staff routinely record the “run-time” of the pumps at each pump station in the system, if the station is equipped with run-time meters. This is useful to monitor the capacities of the pump stations, and to see if the two pumps are alternating and operating fairly equally. This data was used to compare daily run times with rain gauge data during the period of March 6 through May 11, 2012. Many of the pump stations exhibited a direct effect of increased run time with a recorded rain event, which indicates that wet weather flows are entering those particular areas of the collection system. Appendix D contains the graphical comparisons of run times to rainfall events for each of the twenty-one (21) pump stations for which the City had recorded data.

The following table lists the City's pump stations and their capacities:

Versailles Wastewater Pumping Stations		
Pump Station Name	**Motor Size**	**Capacity (gpm)**
Lift Station No. 1	30 HP	800
Lift Station No. 2	30 HP	1,075
Lift Station No. 3	70 HP	1,550
Lift Station No. 4	70 HP	1,850
Adena Woods	7.5 HP	180
Ball Park	10 HP	600
Bryanwood	5 HP	100
Cedar Ridge	7.5 HP	100
Charmill	10 HP	500
Colony 1	15 HP	300
Crossfield	7.5 HP	125
Dan Drive	5 HP	Unknown
Hellard Trailer Park	5 HP	80
Homestead	7.5 HP	90
Huntertown Glenn	5 HP	80
Lanes View	10 HP	150
Locust Grove	2 HP	100
Merewood	10 HP	225
Methodist Home	10 HP	225
Stonegate	20 HP	475
Woodland	5 HP	100

V. Smoke Testing

Based on the recommendations of City personnel, several areas of the collection system were designated to be included in Phase I of the smoke testing investigation. These areas are known to City personnel as chronic problem areas, and were determined to be a priority for the smoke testing investigation. Smoke testing is performed using a blower and "artificial" smoke, a harmless chemically-induced vapor that is blown into the sewer manholes and lines. During periods of dry weather, the smoke may find its way to the surface through openings in the collection system. This method can result in a visual demonstration of general locations of cracks, defects or unauthorized connections to the system. Smoke testing was performed in six (6) basins of

the system, resulting in the location of one hundred thirty-seven (137) defects. The sources of the defects are as follows:

Type	Number
Private Property	70
Roof Drains	13
Storm Sewer	12
Main Line	16
Manhole	26
TOTAL	**137**

It was observed that eleven (11) of the manholes that were identified by smoke testing as defective were not noted as defective in the Manhole Inspection. A summary of the number of defects in each basin and their rate of severity is shown below. A detailed list of each of the defects is in Appendix E, along with a map showing the locations of the discovered defects.

Summary of Smoke Defects				
Basin	**Severe**	**Moderate**	**Minimal**	**Totals**
2	6	3	2	11
3	20	11	9	40
5	11	4	6	21
6	32	19	6	57
10	3	1	0	4
13	1	3	0	4
TOTALS	73	41	23	137

VI. Video Inspection of Sewer Lines

A. General

Video Inspection is performed by a heavy-duty closed circuit television (CCTV) camera that is slowly advanced through the cleaned sewer pipe. The operator of the camera equipment is trained through the Pipeline Assessment Certification Program (PACP) in the observation and analysis of the pipe conditions. These are noted and recorded per industry standards. CCTV investigation may typically show such conditions as cracked, broken, or collapsed pipe, offset or leaking pipe joints, roots that have penetrated the joints or cracks, service connection defects, obstructions, and misalignment and sags in the pipe line.

B. Video Inspection of Versailles Collector Lines

The video inspection that was performed by an outside contractor in 2012 included areas of Basin 1, Basin 5, Basin 6, and Basin 10. These particular areas were determined by City personnel to be the ones in greatest need of inspection and repair. A map showing the areas that were video-inspected is included in Appendix F. The pipes in Basin 6 in particular were discovered to be in bad condition, with many locations of roots obstructing the lines, and structural issues of cracks and collapses. Additionally, city forces performed video inspection of areas in Basin 4.

As video inspection was taking place defects were compiled in a database. Along with this database a report was created for each section of line that was inspected. This information was used to verify the condition of the pipe as well as make decisions on what work would be needed to rehabilitate the line. The following table is a quantity breakdown of all the proposed work to be done within the areas that were video inspected. Without reviewing each video the severity of certain defects such as broken pipe and large joint offset were assumed to have been severe enough to require point repairs prior to installing a cured in place pipe liner. It was assumed that service connections with medium roots or root balls would need to be replaced instead of being cured in place. It was also assumed that one out of every five break-in (or “hammer”) taps would need to be cured in place. Following a future, more detailed review of videos, the amount of point repairs and service connection

replacements could be reduced depending on the severity of breaks and offsets as well as the size of the roots. The following table presents estimated costs of various repairs:

Corrective Action	Estimated Cost
6” dia. CIPP	$27 per lf
8” dia. CIPP	$27 per lf
CIPP spot repairs	$2,200 ea.
CIPP service connection	$2,000 ea.
Replace service connection (open cut)	$2,000 ea.
Point repair (open cut)	$3,000 ea.
Replace service connection in 6” dia. main	$1,800
Lateral reinstatement–CIPP	$100

The detailed cost information for each inspected line in the five basins is presented in Appendix G. The following tables present a summary of the corrective actions for each drainage basin, and the total estimated cost per basin for repairing all mainline defects.

Summary of Rehab Line Work by Basin						
Type of Repair	**Basin Number**					
	1	**4**	**5**	**6**	**10**	**Total**
6” CIPP (lf)				2,256		**2,256**
8” CIPP (lf)	8,675	2,785	4,409	34,376	2,171	**52,416**
Spot Repairs (CIPP)	14	0	7	29	14	**64**
CIPP Service Connection	11	1	11	77	9	**109**
Replace Service Connection (open cut)	7	3	7	6	2	**25**
Point Repair (open cut)	32	20	12	136	10	**109**
Replace Service Connection in 6” dia. (open cut)	0	0	0	23	0	**23**
Lateral Reinstate (CIPP)	151	28	75	603	45	**902**

Summary of Line Repairs for Inspected Lines (does not include manholes or other project costs)	
Basin Number	**Estimated Cost**
Basin 1	$412,138.50
Basin 4	$146,003.10
Basin 5	$213,945.70
Basin 6	$1,690,688.30
Basin 10	$146,333.20
TOTAL	**$2,609,108.80**

For this study approximately 570 sections of line, totaling 116,000 linear feet of sewer line, were included in the video inspection project. This is approximately 25 percent of the total length of 438,211 linear feet of lines in the Versailles sewer collection system. Due to obstructions, bends, or other issues, 22,000 linear feet were not accessible, so the actual inspection reports are for 94,000 feet of sewer line. The lines that were not accessible should be included in the first construction project for further investigation.

During the video inspection of the five basins, multiple discrepancies between existing mapping and actual conditions of the collection system were found. The table below contains a list of previously unidentified manholes that were found during the inspection, along with their upstream and downstream manholes. In addition to new manholes being found during video inspection, two additional discrepancies were found regarding lines that are shown on the existing mapping. The existing mapping shows Manhole 1-05-092 as being an upstream manhole flowing into two lines, one to MH 1-05-091 and one to 1-05-92A. During inspection, it was observed that both manholes -091 and -092A had lines going toward MH -092, which seemed to agree with the mapping, however, it was discovered that flow was actually from MH -092 to MH -091 and both lines leading toward each other out of manholes -092 and -92A were only short stubbed sections of lines. A similar issue occurred at MH 1-05-089A. Flow is actually going into MH 1-05-088 with stub lines out of MH 1-05-089A and MH 1-05-89, toward each other. These

discrepancies were reported to the City/County GIS coordinator for amendment of the mapping and database.

New Manholes Located During Video Inspection of Basins 1, 4, 5, 6, & 10		
New Manhole	**US MH**	**DS MH**
3-10-900DS	3-10-014	3-10-010
3-06-075B	3-06-126	3-06-075
3-06-063A	3-06-063	3-06-061
3-10-9000RM	3-10-029	3-10-030
3-06-096A	3-06-096	3-06-095
3-06-067A	3-06-067	3-06-065
3-06-078A		3-06-077
1-05-091A	1-05-091	1-05-077
3-06-900055	3-06-249	3-06-247
3-06-9000JC	3-06-144	3-06-143
3-06-9002JC	3-06-167	3-06-9003JC
3-06-9003JC	3-06-9002JC	3-06-166
3-06-9001JS	3-06-181	3-06-181
3-06-9007JC	3-06-050	3-06-049
3-06-900JSC	3-06-110	3-06-108

Several areas within this study were both video inspected and smoke tested. A map of these areas can be found in Appendix H. For line sections where both were completed, locations with mainline smoke testing defects were further reviewed to look for a possible cause. Following the review it appeared that there is one mainline smoke testing

defect in the area that had both TV and smoke testing data. This defect appeared close to the location of an intruding hammer tap which is likely faulty. Based on previous experience it is likely that other mainline smoke testing defects are the results of faulty taps, fractured and broken pipe, or collapsed pipe.

VII. Summary, Conclusions and Recommendations

A. Inspection Results

Flow monitoring results indicate significant wet weather Inflow and Infiltration in Basins 4 and 3. Pump Station Run Time records indicate that all the pump stations are affected by rainfall events, with the most significant being Bryanwood and Methodist Home, serving Basin 1, and Stonegate and Woodlands, serving Basin 2. The Manhole Inspection program that was performed resulted in the following list of basins with the highest proportion of manholes in need of repair:

Basin 4: 73%
Basin 11: 70%
Basin 2: 67%
Basin 3: 58%
Basin 1: 51%

Smoke Testing and CCTV Inspections were performed in Basins 1, 2, 3, 4, 5, 6, 10 and 13.

Based on these inspection results and the City's and GRW's observations, we have proposed a priority list of the areas and tasks that are recommended as part of the City's master sewer collection system rehabilitation plan. Because we have the video inspection results for areas in Basins 1, 4, 5, 6, and 10, we would proceed with preparing a construction/repair project for those lines as the first project in the rehabilitation program. Basins 1, 2, 3, 4, 6, 11, and 12 appear to be the basins most in need of repair. Areas in those basins would be the priority for CCTV investigation and evaluation for a second construction project.

The City of Versailles has acquired state of the art CCTV equipment and software, and have trained the utilities personnel in the PACP techniques

and codings. The intent of this program is to have a continuous schedule for investigating the sewer lines over the next several years. These inspection results would be evaluated by the engineer as they are received from the City, to determine the scope of the future construction projects.

Considering the newer age of the facilities in Basins 7, 8, 9, and 13, we would assume that no further investigation of these areas will be required. Those areas contain 96,397 linear feet of collector sewer, which will be subtracted from the total to be evaluated. It is also reasonable to assume that some areas of the remaining basins will not need investigation, perhaps because they are newer, or have been repaired in the recent past. For this study, we have designated an average amount of 10% of the remaining areas to be subtracted from the total line length to be investigated. This amount could be adjusted from basin to basin as more field data is obtained in future phases. Reports of current field data can be found in Appendix J on the attached DVD. This includes reports for Smoke Testing, Manhole Inspections, and CCTV.

B. Sewer System Rehabilitation Schedule

Approximately 116,120 linear feet of the collection system was designated for CCTV inspection as part of this SSES Report. Assuming the elimination of Basins 7, 8, 9, and 13 from the project, and the 10% reduction discussed above, there remains approximately 203,125 linear feet of sewer to be inspected. As part of Division of Water requirements, the City of Versailles must complete all rehabilitation work on their system in the next 5 years. In order to meet this deadline a recommended project schedule has been prepared. This schedule can be found in Appendix I. The schedule is based on performing one construction project per year, so the system rehabilitation program has five (5) phases.

The first phase of the schedule includes the investigation and evaluation included in this Sanitary Sewer Evaluation Study. In addition the recommended first phase includes preparing a detailed schedule of work and ultimately a construction project based on the 116,120 linear feet of sewer that has been CCTV inspected as part of this report (Parts of Basins 1, 4, 5, 6, and 10). The preliminary evaluation indicates that repairs are needed on 47% of the lines that were inspected. This would result in a project that includes 55,520 linear feet of rehabilitation, along

with various associated repairs. The scope of work of such a project may be excessive in terms of the City's capital improvements plan, so it may be wiser to divide it into two construction projects, one of which would be planned for Phase 2. We would also recommend a manhole repair project and pump station rehabilitation in Phase 1.

The remaining 203,124 linear feet of sewer line has been divided into four phases. Each phase would generally span 26 months with tasks and projects overlapping. This allows for city personnel to CCTV lines year-round following periods of wet weather, and provide the opportunity of on-going review of video information so that severe defects can be handled quickly when found. The detailed schedule can be found in Appendix I. Both basin sizes as well as potential for defects were considered when separating basins into phases.

Phase 1 will include part of the areas that were CCTV inspected as part of the SSES report. Phase 2 would include the reminder of the needed repairs determined from the Phase 1 CCTV inspections, manhole repairs and pump station repairs. Phase 3 would include remaining areas of Basins 4, 5, 10, and Basin 2. Phase 4 would include Basins 3, 11, 12, and areas of Basin 1. Phase 5 would include remaining areas of the system that are considered "problem" or "potential problem" areas.

C. Sewer System Rehabilitation Schedule

Following a preliminary review of the CCTV information, which includes inspection of 116,120 linear feet of line, it appears approximately 47% of the system needs to be rehabilitated with Cured-in-Place (CIPP) pipe. Based on this review an approximate budget to complete all CIPP pipe, point repairs, spot repairs, and service connection replacements from the CCTV inspection done for the SSES would cost $2,609,108. We have divided this work into two construction projects, designated as Phase 1 and Phase 2.

Preliminary budgets for remaining mainline rehabilitation have been created. These budgets can be found in the table below. We have assumed that future areas of the system will not need the amount of repair work that the first two phases will, based on the knowledge that the pipelines are newer, and the City's experience with "problem" areas. This estimate does not include costs for CCTV work that would be done by a contractor, manhole rehabilitation costs, or design costs. It is assumed

that CCTV work for each phase would be completed by the City personnel throughout the year during periods of wet weather.

Preliminary Budgeting Line Rehabilitation - Construction	
Phase	**Estimated Cost**
Phase 1	$1,349,783
Phase 2	$1,148,400
Phase 3	$1,480,500
Phase 4	$900,000
Phase 5	$900,000
TOTAL	**$5,778,683**

D. Manhole Rehabilitation

Manhole Inspections that were performed resulted in the identification of defects in 1,031 manholes. The total cost estimate of $1,008,200 presented in Section III and Appendix B assumes repair of 100% of the defects that were identified. From the standpoint of evaluating the extent of inflow and infiltration to the system from the manhole sources, it can be assumed that only certain types and/or locations of defects actually contribute to the wet weather flow issues. Other types of defects may have very little effect on the operation or performance of the collection system and can be considered low priorities. For example, replacing or resetting manhole frames would be a task to be performed by city forces, and not included in a construction project. These determinations will be made during the design phase of the construction project preparation.

From the numbers of the types of repairs in our summary and from past experience, we can estimate that 40% of the cost of the manhole repairs will be determined to be unrelated to wet weather flow contribution or such low priority as to be eliminated from the rehabilitation program. The resulting $600,000 cost of manhole repairs would be divided up among the proposed phases of the rehabilitation program.

Preliminary Budgeting Manhole Repair - Construction	
Phase	**Estimated Cost**
Phase 1	$90,000
Phase 2	$127,000
Phase 3	$125,000
Phase 4	$223,000
Phase 5	$35,000
TOTAL	**$600,000**

E. Pump Station Rehabilitation

As of the spring of 2013, the Versailles Collection System has twenty-one (21) pump stations in operation. These stations were listed in a table in Section IV. The Crossfield Drive Pump Station was rehabilitated in 2013. Four other stations are in need of repairs and/or improvements. These are the Cedar Ridge PS, the Colony 1 PS, the Woodlands PS, and the Methodist Home PS. These pump stations will be evaluated for capacity, code regulations and Division Of Water requirements. Improvements may include pump replacement, electrical improvements, backup pumping and power, and increased storage, in accordance with "Ten States Standards". Some options for achieving the required back-up capabilities are adding backup generators for each station or having sufficient portable generators; providing dual electrical feeds from separate substations; providing backup (emergency) pumps at each station; and assuring that there are two hours of storage capacity in the wet well and associated piping. A preliminary average cost estimate for the rehabilitation of these pump stations is $100,000 each.

F. Summary

The Sanitary Sewer Evaluation Study was performed in order to determine the sources of wet weather inflow and infiltration and to identify repairs

and improvements needed for the purpose of reducing overflow incidents and excessive influent flows at the Wastewater Treatment Plant. Mapping of the entire collection system was updated and incorporated into a GIS database. Manhole inspections were performed on 98% of the manholes in the system, excluding only those that were inaccessible at the time, or unknown manholes that were found during smoke testing and CCTV investigation. Smoke testing of 46% of the collection system was performed. Approximately 25% of the lines in the system have been video-inspected. Flow and rainfall events during the spring of 2012 were monitored and recorded. These investigative and evaluative methods were used to examine the system's structural, hydraulic, and capacity characteristics.

The purpose of the Sanitary Sewer Evaluation Survey is to discover the sources of wet weather inflow and infiltration (I&I) and the extent of the repairs needed to the system. Upon obtaining this information, an evaluation of the amount of wet weather flow that a source or defect contributes versus the cost of repair is considered. The goal is to eliminate sanitary sewer overflows to the environment, and to reduce the amount of wet weather flow to the WWTP. Upon achieving the elimination of overflows, the cost of further repairs for the purpose of reducing I&I are compared to the cost of allowing the I&I to continue to enter the system and flow to the treatment plant.

The conclusions obtained will result in recommendations for repair work that will have a significant impact on the reduction of overflows and wet weather flows to the WWTP, and on the performance of the collection system, while considering the cost effectiveness of the repairs.

G. Recommendations

Taking into consideration the results of the sanitary sewer investigations, the evaluation of found conditions of investigated areas, the projection and estimation of conditions of the remainder of the collection system, the imposed schedule for completion of the rehabilitation program, and the realities of scheduling and budget, a five-phase Rehabilitation Program is recommended. The following tables list the details of each phase, and a summary of work per basin. Upon completion of the program, approximately 73% of the total collection system will be investigated and evaluated, and an estimated 30% of the total will be rehabilitated.

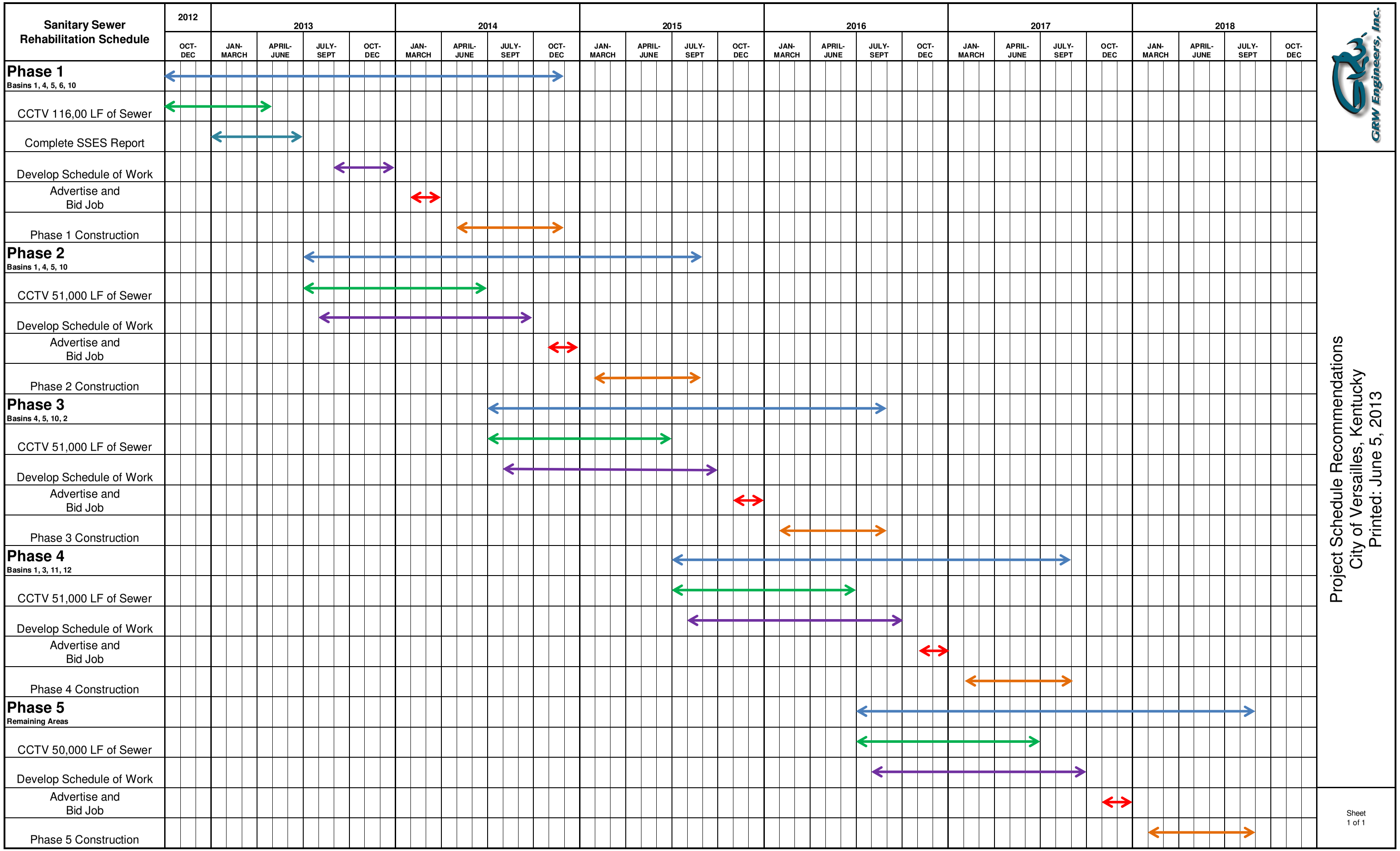
Versailles Sanitary Sewer Collection System Recommended Rehabilitation Program			
Phase	**% of system investigated**	**% of system repaired**	**Estimated Project Cost**
1	36.36	6.9	$1,773,992
2	15.98	5.9	$1,588,404
3	15.98	7.7	$1,959,474
4	15.98	4.8	$1,417,723
5	15.67	4.7	$1,090,235
Totals	**72.79**	**30**	**$7,829,828**

Versailles Wastewater Collection System Rehabilitation Program						
Phase	**1**	**2**	**3**	**4**	**5**	**Total**
LF CCTV	116,000	51,000	51,000	51,000	50,000	319,000
LF Rehab	30,000	25,520	32,900	20,000	20,000	128,420
Line Rehab Cost	**$1,349,783**	**$1,148,400**	**$1,480,500**	**$900,000**	**$900,000**	**$5,778,683.00**
MH Repairs	82	132	112	252	30	608
MH Repairs Cost	**$90,000**	**$127,000**	**$125,000**	**$223,000**	**$35,000**	**$600,000.00**
Lift Station Rehab	1	1	1	1		4
Lift Station Rehab Cost	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$0**	**$400,000.00**
Basins	1, 4, 5, 6, 10	1, 4, 5, 10,	4, 5, 10, 2	1, 3, 11, 12	Remaining areas	1, 2, 3, 4, 5, 6, 10, 11, 12
Schedule	Sept. 2013 – Nov. 2014	July 2013 – Sept. 2015	July 2014 – Sept. 2016	July 2015 – Sept. 2017	July 2016 – Sept. 2018	Sept. 2013- Sept. 2018
Total Estimated Construction Costs	**$1,539,783**	**$1,375,400**	**$1,705,500**	**$1,223,000**	**$935,000**	**$6,778,683**
Other Project Costs	**$234,209**	**$213,004**	**$253,974**	**$194,723**	**$155,235**	**$1,051,145**
Total Estimated Project Cost	***$1,773,992***	***$1,588,404***	***$1,959,474***	***$1,417,723***	***$1,090,235***	**$7,829,828**

Versailles Wastewater Collection System Rehabilitation Program

Basin Summary

Basin	Manholes	Total Basin Line Length	Line Length CCTV Inspected in Phase 1	% CCTV Complete	Line Length Smoke Tested in Phase 1	% of Lines Smoke Tested	Number of MH's with Defects	% of Defective MH's	Proposed Phase 2 CCTV	Proposed Phase 3 CCTV	Proposed Phase 4 CCTV	Proposed Phase 5 CCTV	Proposed % CCTV Complete
1	**620**	123,485	21,826	18%	10,613	9%	315	51%	38,000		26,000	27,200	92%
2	**210**	50,333		0%	45,579	91%	140	67%		41,000		4,600	91%
3	**179**	38,779		0%	38,035	98%	104	58%			17,057	18,200	91%
4	**30**	6,005	3,023	50%		0%	22	73%	1,200	1,300			92%
5	**119**	26,154	8,422	32%	23,630	90%	51	43%	9,000	6,000			90%
6	**344**	72,200	73,880	102%	61,349	85%	165	48%					102%
7	**178**	35,234		0%		0%	65	37%					0%
8	**104**	17,031		0%		0%	30	29%					0%
9	**106**	14,000		0%		0%	52	49%					0%
10	**77**	16,032	8,970	56%	16,473	103%	30	39%	2,800	2,700			90%
11	**10**	4,348		0%	186	4%	7	70%			3,913		90%
12	**57**	4,478		0%		0%	24	42%			4,030		90%
13	**121**	30,132		0%	7,863	26%	26	21%					0%
Total	**2,155**	**438,211**	**116,120**	**26%**	**203,728**	**46%**	**1,031**	**48%**	**51,000**	**51,000**	**51,000**	**50,000**	**73%**


Sanitary Sewer Rehabilitation Schedule
2012
2013
2014
2015
2016
2017
2018
OCT-DEC
JAN-MARCH
APRIL-JUNE
JULY-SEPT
OCT-DEC
Phase 1
Basins 1, 4, 5, 6, 10
CCTV 116,00 LF of Sewer
Complete SSES Report
Develop Schedule of Work
Advertise and Bid Job
Phase 1 Construction
Phase 2
Basins 1, 4, 5, 10
CCTV 51,000 LF of Sewer
Develop Schedule of Work
Advertise and Bid Job
Phase 2 Construction
Phase 3
Basins 4, 5, 10, 2
CCTV 51,000 LF of Sewer
Develop Schedule of Work
Advertise and Bid Job
Phase 3 Construction
Phase 4
Basins 1, 3, 11, 12
CCTV 51,000 LF of Sewer
Develop Schedule of Work
Advertise and Bid Job
Phase 4 Construction
Phase 5
Remaining Areas
CCTV 50,000 LF of Sewer
Develop Schedule of Work
Advertise and Bid Job
Phase 5 Construction
GRW Engineers, Inc.
Project Schedule Recommendations
City of Versailles, Kentucky
Printed: June 5, 2013
Sheet
1 of 1

Appendix E

Appendix E

Flow Monitoring Report

FLOW METERING REPORT
Versailles, KY

June 2012

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

June 1, 2012

Mitzi Delius
City of Versailles
196 S. Main St.
Versailles, KY 40385

RE: Versailles, KY – Flow Monitoring Report

Dear Mitzi:

Hydromax USA is pleased to provide you with this Flow Monitoring Report for Versailles, KY. Hydromax USA installed and maintained 9 flow meter sites for a period of 60 days.

Included in this deliverable are digital copies of the data files, including hydrographs, scatterplots, site sheets, and excel files containing raw and polished data from the meters.

Should you have any questions or comments regarding this report, please contact me at your earliest convenience. Thank you for giving Hydromax the opportunity to work with you on this project, and we look forward to teaming with you again in the near future.

Sincerely,

Tony Bischoff, PE
(502) 500-1399

Introduction

GRW, Inc. retained Hydromax USA to install temporary flow monitoring equipment for portions of the sewer system throughout the City of Versailles, KY. This report summarizes the process and data results from this flow monitoring study.

In the Versailles area, Hydromax USA installed and performed site maintenance on 9 flow monitor sites from 3/6/2011 through 5/11/2011. Sigma 910 Area/Velocity meters were installed to collect 5 minute level and velocity readings. GRW approved the locations for the flow meters.

The flow monitors were maintained and serviced weekly by Hydromax personnel until their removal. Maintenance included checking the battery power and desiccants, cleaning off the sensor, downloading data collected during the previous time period onto a laptop computer, and comparing level and velocity readings from the flow meter to physically measured real-time readings. Hydromax staff also diagnosed and repaired any malfunctions with the meters when necessary.

Throughout this project, the overall meter uptime has been calculated to be 99.99%. This is calculated from the total metering time of approximately 12960 hours and the total hours when any meters were not functioning properly. For this project, the total meter downtime was approximately 65 minutes of metering time. The meter is considered "up" when the meter is properly recording both level and velocity, or when only level or velocity is recording, but the relationship between the two allows for polishing with a high degree of confidence.

When field crews first installed the flow monitoring equipment in a manhole they rated the site with an "A", "B", or "C" grade depending on the flow level, hydraulic conditions, and the presence of any potentially hazardous conditions, such as heavy traffic or difficult access issues. The grades are given based on past flow monitoring experience and match the following conditions:

1. Site Grade = A is for a site with ideal hydraulics and access conditions.
2. Site Grade = B is for a site with acceptable hydraulics and access conditions, but may be expected to encounter problems.
3. Site Grade = C is for a site with either poor hydraulic conditions or poor access conditions. While this type of site is not desirable, it may be the best available for a necessary location.

The collected data was reviewed by a Professional Engineer, experienced in evaluating flow monitoring data, and was polished when needed. The data was reviewed to look for changes in flow patterns and potential equipment problems. Patterns were checked using both hydrographs and scatter plots.

Hydrographs visually depict time versus measured depth, velocity, and calculated flow at each monitoring location and provide an easily visible means for evaluating sewer system

flows. During dry conditions, hydrographs exhibit a cyclical pattern, where flows increase during the day from normal residential or industrial use and fall off at night from limited sewer use. This pattern is typically referred to as diurnal flow.

The scatter plot is another visual tool which displays velocity versus level data. These plots typically show distinct and insightful patterns to allow an assessment of the flow conditions in a sewer.

It should be noted that a minimum of 1.5”-2” of flow is required to provide stable velocity and level readings. Any data gathered with the level measuring 1.5” or less has a calculated rather than measured velocity. If the level is measured less than 1.5”, the Area/Velocity meters extrapolate an expected velocity based on the last level greater than 1.5” and its corresponding velocity reading. When this extrapolation occurs, it is not uncommon for a bend or line shape to appear in the data charted on the scatter plot.

Deliverables are being provided digitally. The deliverable information, including site sheets, graphs, site summaries, and data are in separate folders designated by site ID.

Digital data in 5-minute intervals is included in the site specific folder in Microsoft Excel format. There are two worksheets in each Microsoft Excel file. One has the raw dataset (“*Raw Data*” worksheet) collected from the flow meter and the other (“*Polished Data*” worksheet) contains the polished dataset. All data is collected and presented in Eastern Standard Time with no daylight savings time adjustments. The hydrographs and scatter plots in this report show the data averaged over one-hour intervals. The hydrographs are presented by month.

The raw data provided with this report exactly matches the values that the equipment collected. The polished dataset was finalized by incorporating changes into the data to correct for actual crew measurement, offset settings, silt observations, and flow balance considerations with nearby flow meter sites.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM1 - City Maintenance Garage

This flow meter was installed on 3/1/2012 in manhole 1-03-002A. This manhole is located in gravel at the back left corner of City Maintenance Garage at 331 Kentucky Ave, in a 12" round pipe. The dry weather flow depths typically ranged between 0.6" – 2.6" with a daily dry weather flow typically ranging between 5 gpm and 40 gpm. On 4/29/12, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 650 gpm. This site was given a grade of "C" at the time the monitor was installed due to debris, low flow, and installing in the outgoing pipe.

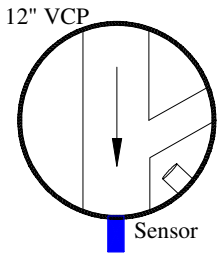
Velocity readings tended to drop out overnight and were adjusted upward in the polished dataset. Velocity dropped out for extended stretches on March 16th and April 27th through 30th and was recreated based on level data and a stochastic process.

The line sees quick spikes in level, accompanied by backwater and reverse flow. The correlation between level and velocity is weak, and backwater is evident on the scatterplot above 2.5". However, there is no evidence of surcharging at this site. The maximum flow associated with a rain event was 350 gpm on March 23rd, accompanied by a 0.59" rain event that lasted 4.3 hours.

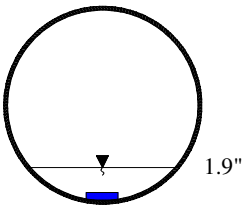
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

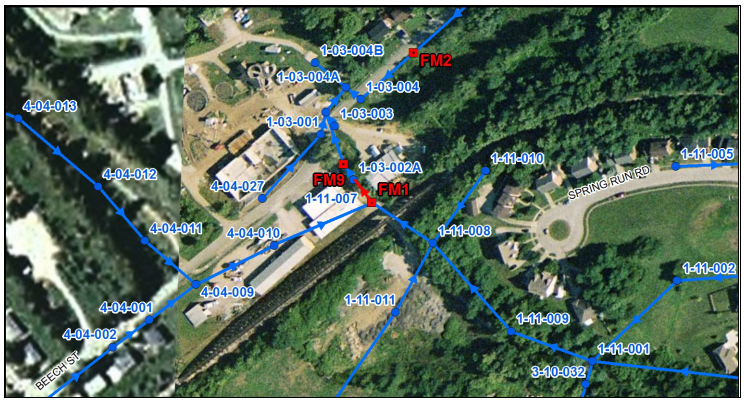
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 1-03-002A	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 12
Site # / Site Name:	**FM1 / City Maintenance Garage**		MH Depth (ft): 5
Site Quality: C	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits in gravel at back left corner of City Maintenance Garage located near 331 Kentucky Ave

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	1.9
Portable Vel. (fps):	1
Cycle (minutes):	5

Real-time Readings

Level (in):	1.823
Velocity (fps):	0.65
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Installed at proposed location but mapping is wrong, line does not intersect with trunk line, instead it flows parallel with trunk. City is to verify this via CCTV.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Had to install in 12" outgoing line because band would not fit into incoming line due to layout of MH. 12 o'clock incoming line has very little flow and there is debris in the channel.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM1 / City Maintenance Garage** ***Site Photos***

FM1 - Area Photo

FM1 - Manhole Photo

FM1 - Connection Photo

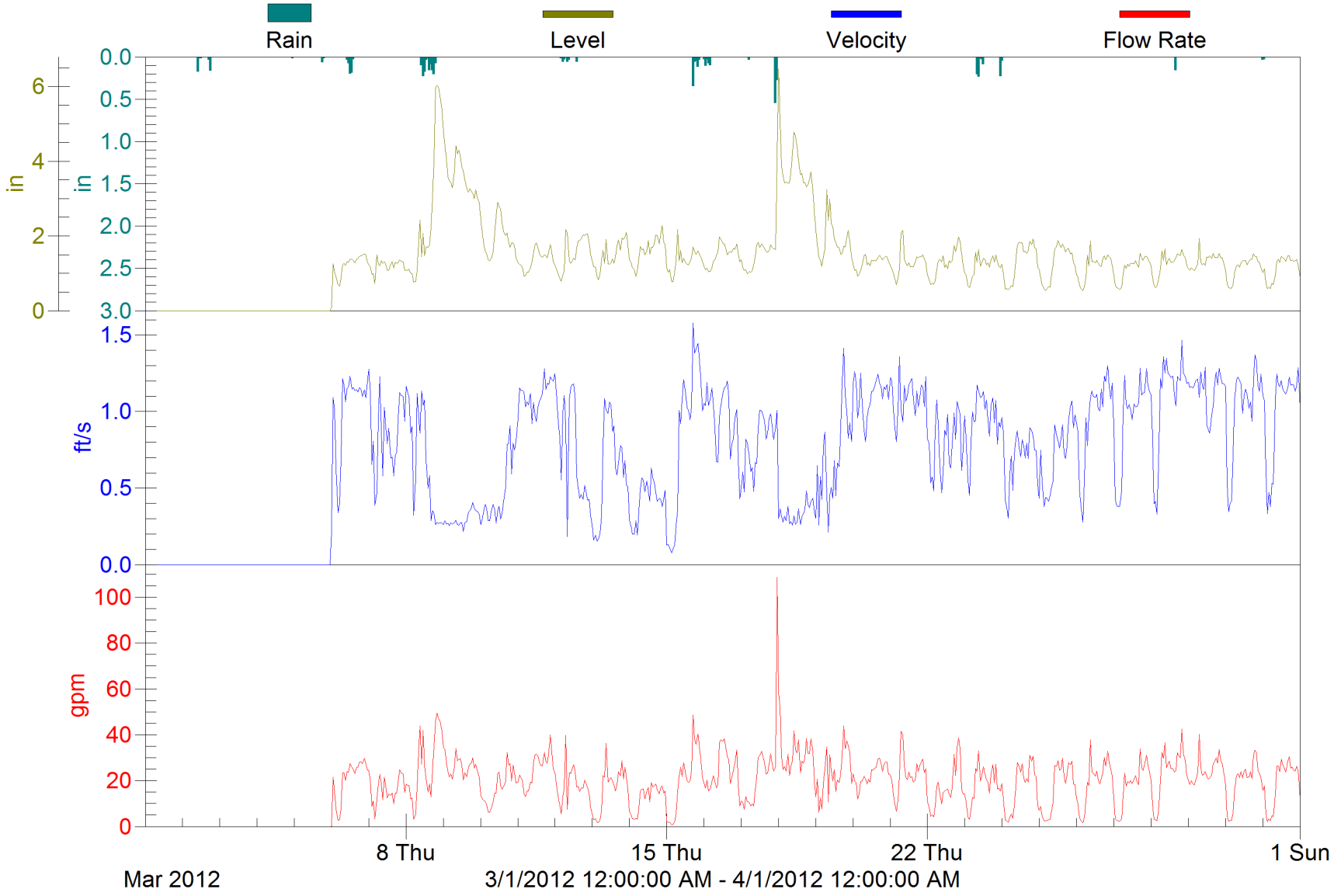
FM1 - Pipe Zoom Photo

FM1 - Measurement Photo

FM1 - Downstream Pipe Zoom Photo

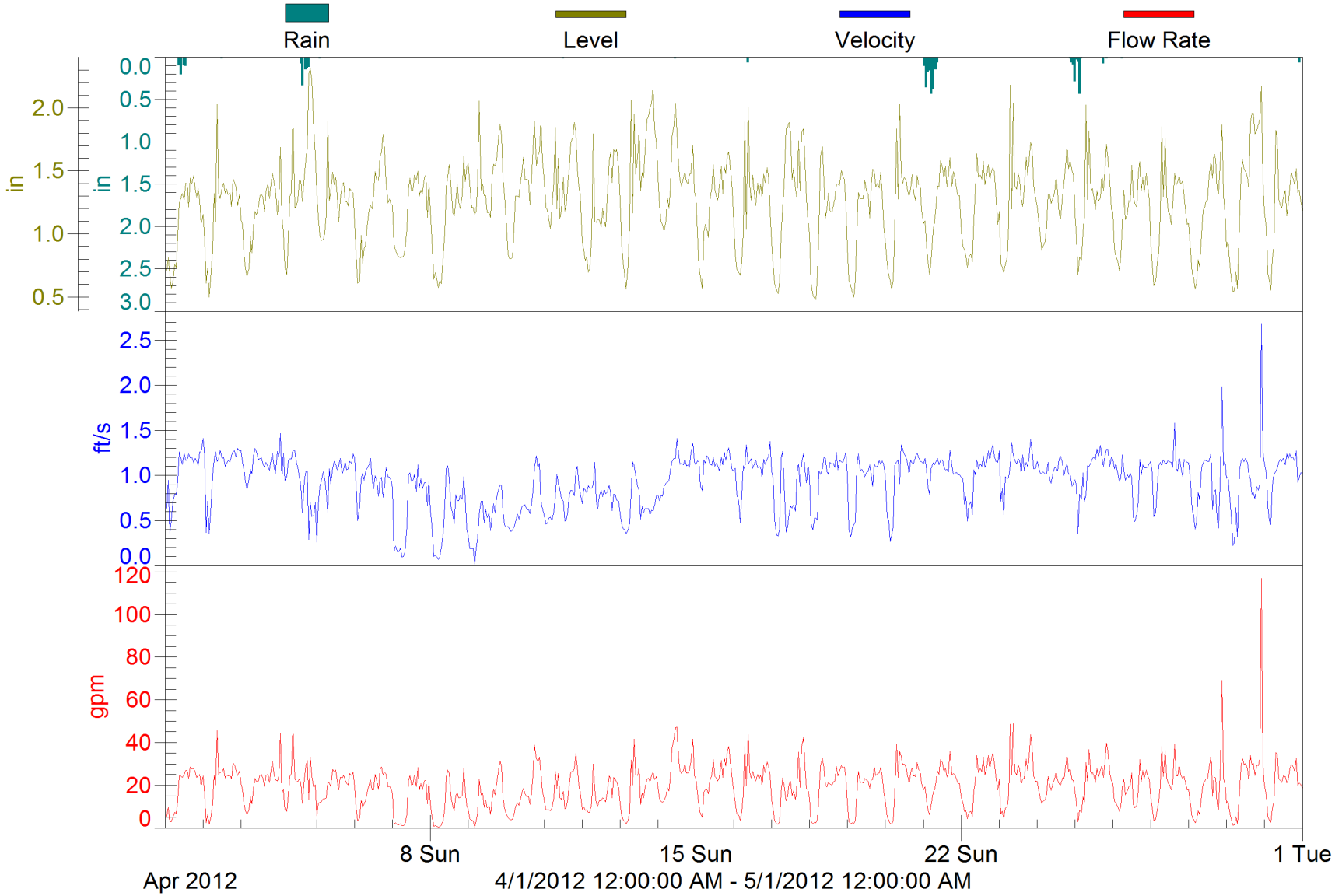
FM1 - City Maintenance Garage

Hydrograph



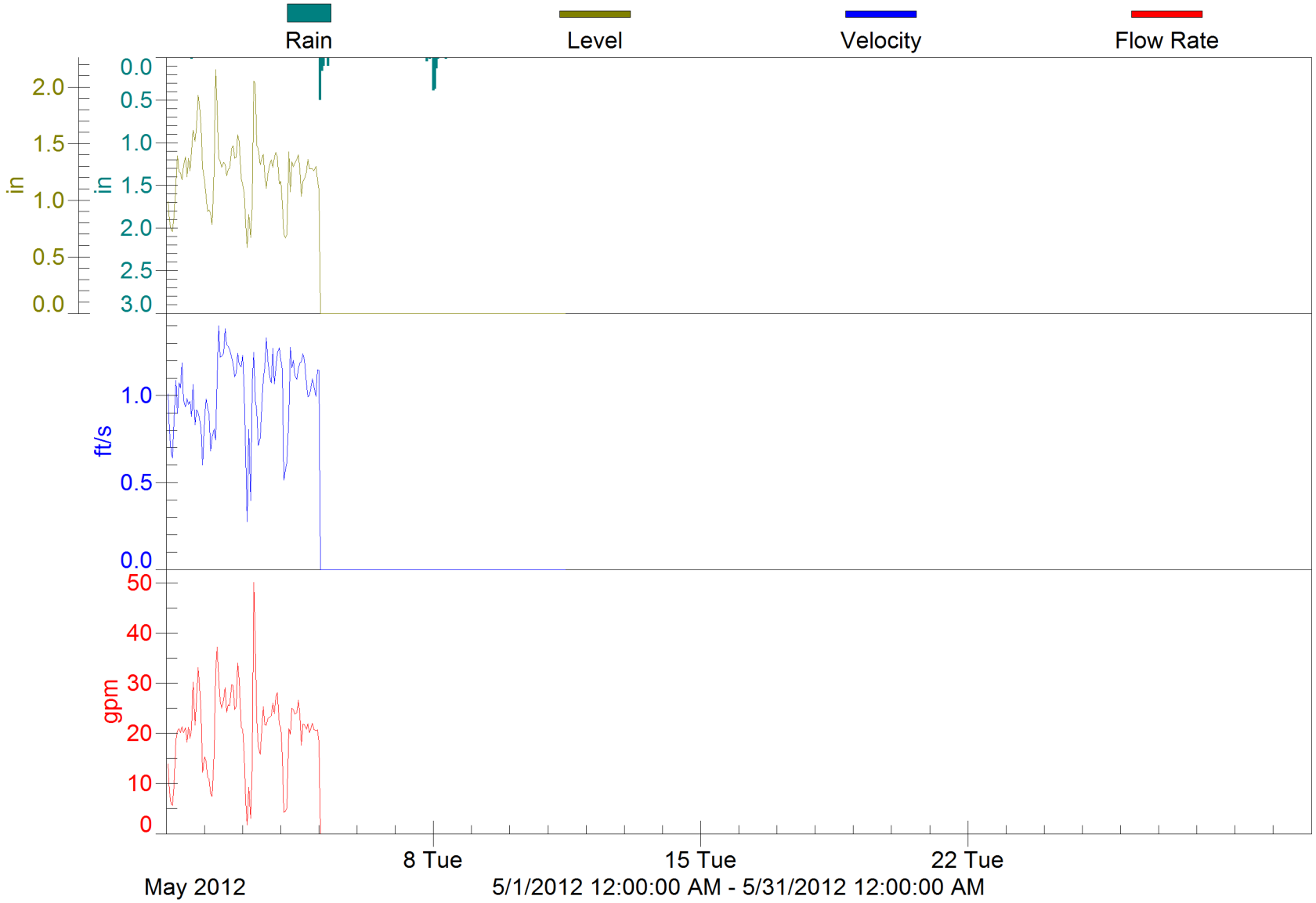
FM1 - City Maintenance Garage

Hydrograph



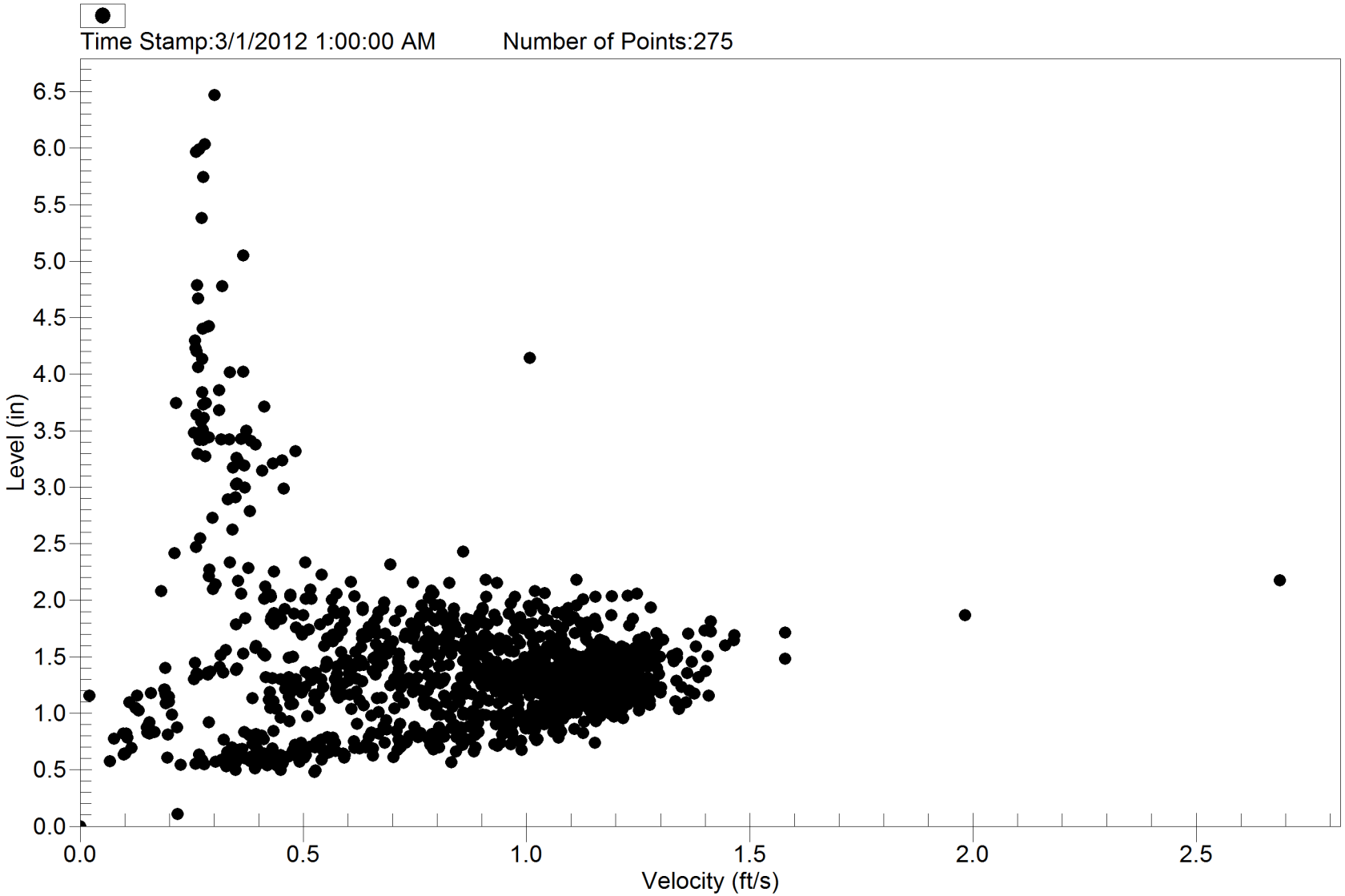
FM1 - City Maintenance Garage

Hydrograph



FM1 - City Maintenance Garage

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM2 - 330 Kentucky Ave

This flow meter was installed on 3/1/2012 in manhole 1-03-005. This manhole is located in the street near 330 Kentucky Ave., in a 12" round pipe. The dry weather flow depths typically ranged between 1.5" – 3.7" with a daily dry weather flow typically ranging between 15 gpm and 170 gpm. Beginning 3/17/12, approximately 0.83" of precipitation was recorded by the rain gauge over 1 hour. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 1200 gpm. This site was given a grade of "B" at the time the monitor was installed due to due to minor turbulence.

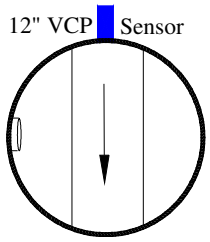
The meter malfunctioned during the first week of the collection period. An extra week of data has been added at the end (and the first week removed) to account for this. A few velocity dropouts were corrected in the data.

There were major pumpstation effects observed at this site. The hydrograph shows evidence of some backwater during the rain events on April 4th and March 17th. The scatterplot shows a generally strong correlation between level and velocity.The hydrograph shows fast and large responses to rain events.

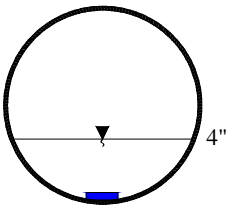
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

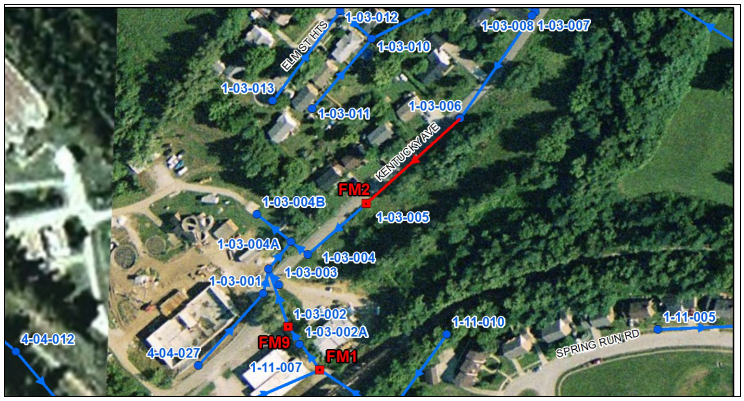
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 1-03-005	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 12
Site # / Site Name:	**FM2 / 330 Kentucky Ave**		MH Depth (ft): 6
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits in street at 330 Kentucky Ave

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	4
Portable Vel. (fps):	2.12
Cycle (minutes):	5

Real-time Readings

Level (in):	4.032
Velocity (fps):	2.05
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Moved Flow Meter one manhole upstream from proposed location for better flow.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Good flow at this site but minor turbulence.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM2 / 330 Kentucky Ave** ***Site Photos***

FM2 - Area Photo

FM2 - Manhole Photo

FM2 - Connection Photo

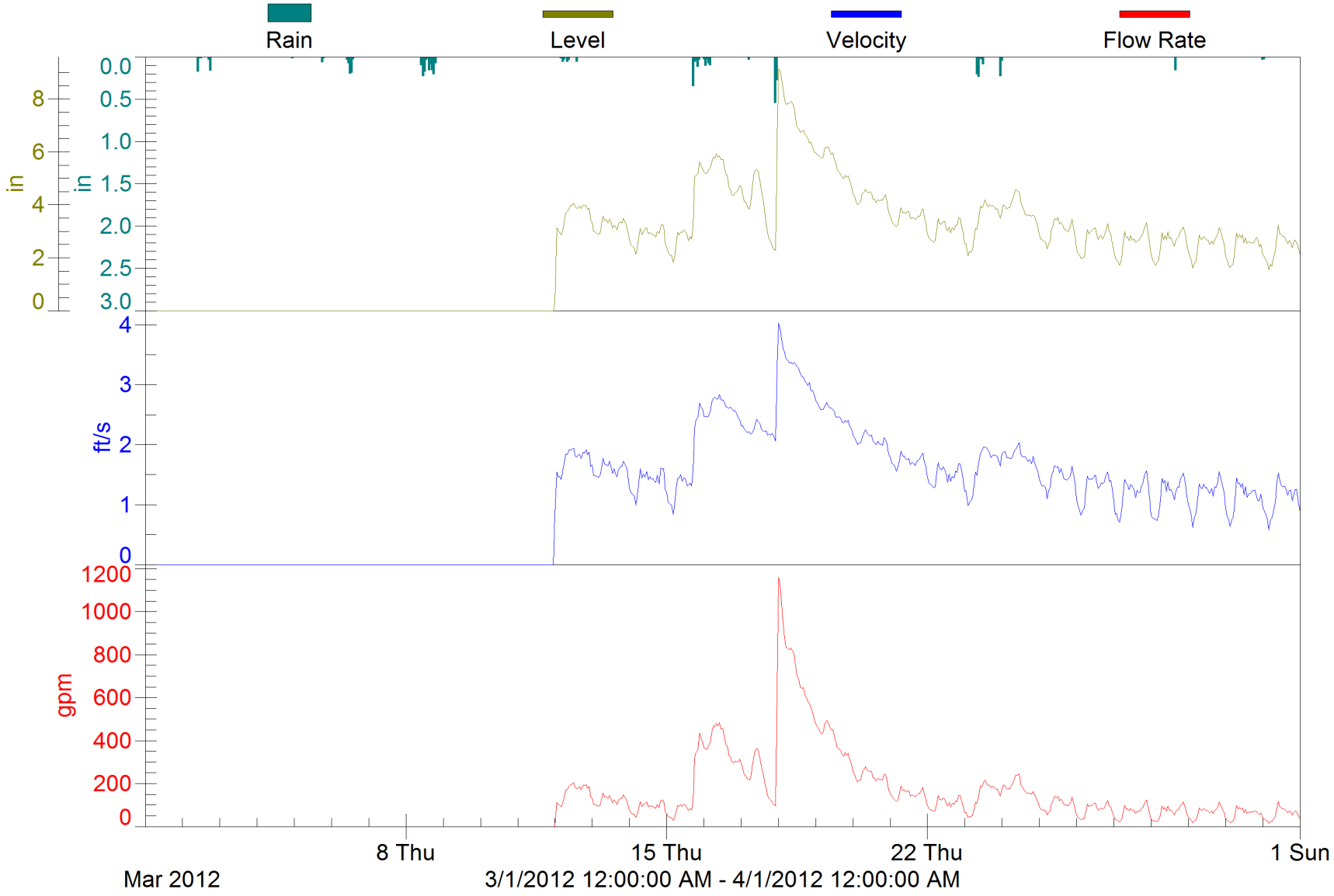
FM2 - Pipe Zoom Photo

FM2 - Measurement Photo

FM2 - Downstream Pipe Zoom Photo

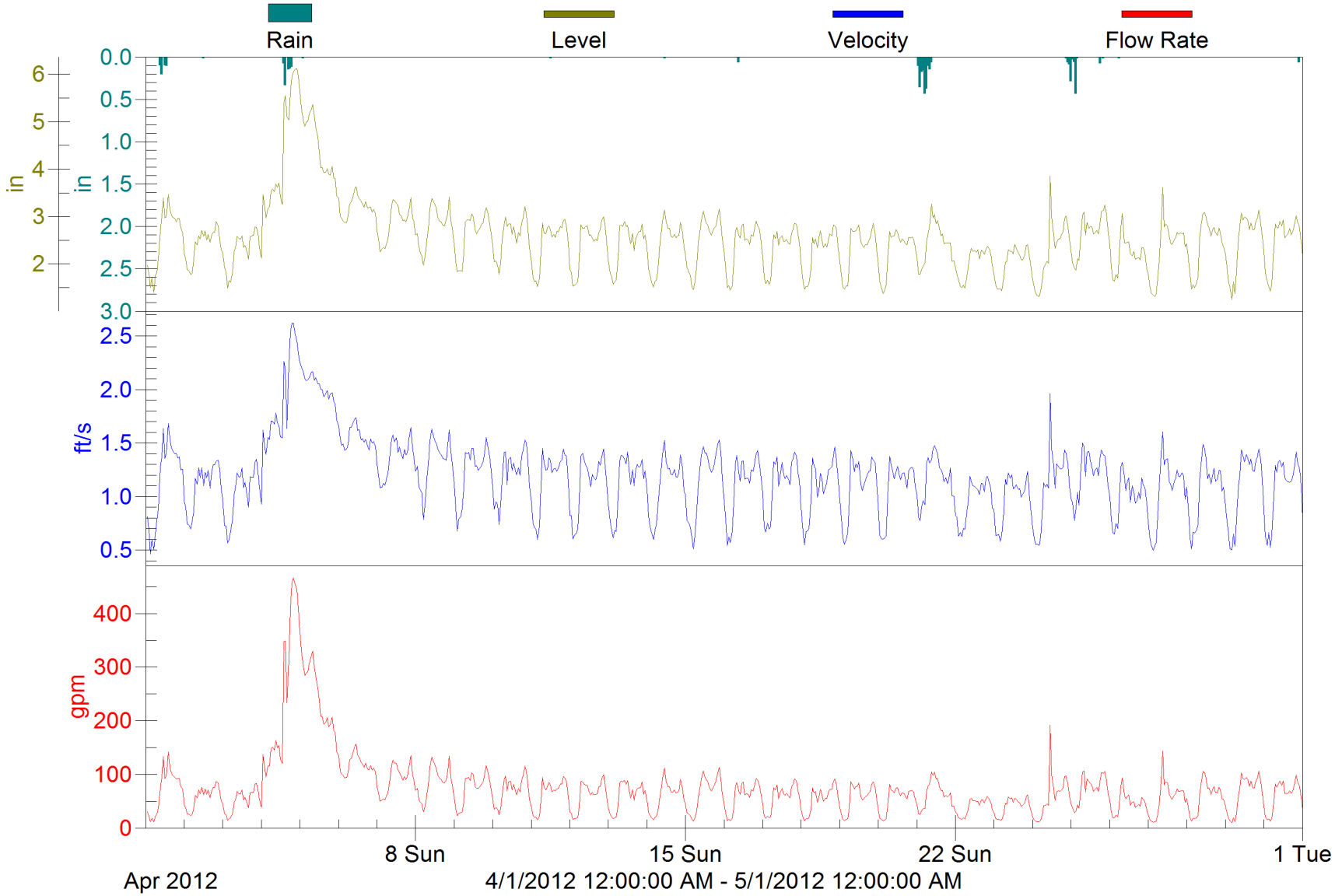
FM2 - 330 Kentucky Ave

Hydrograph



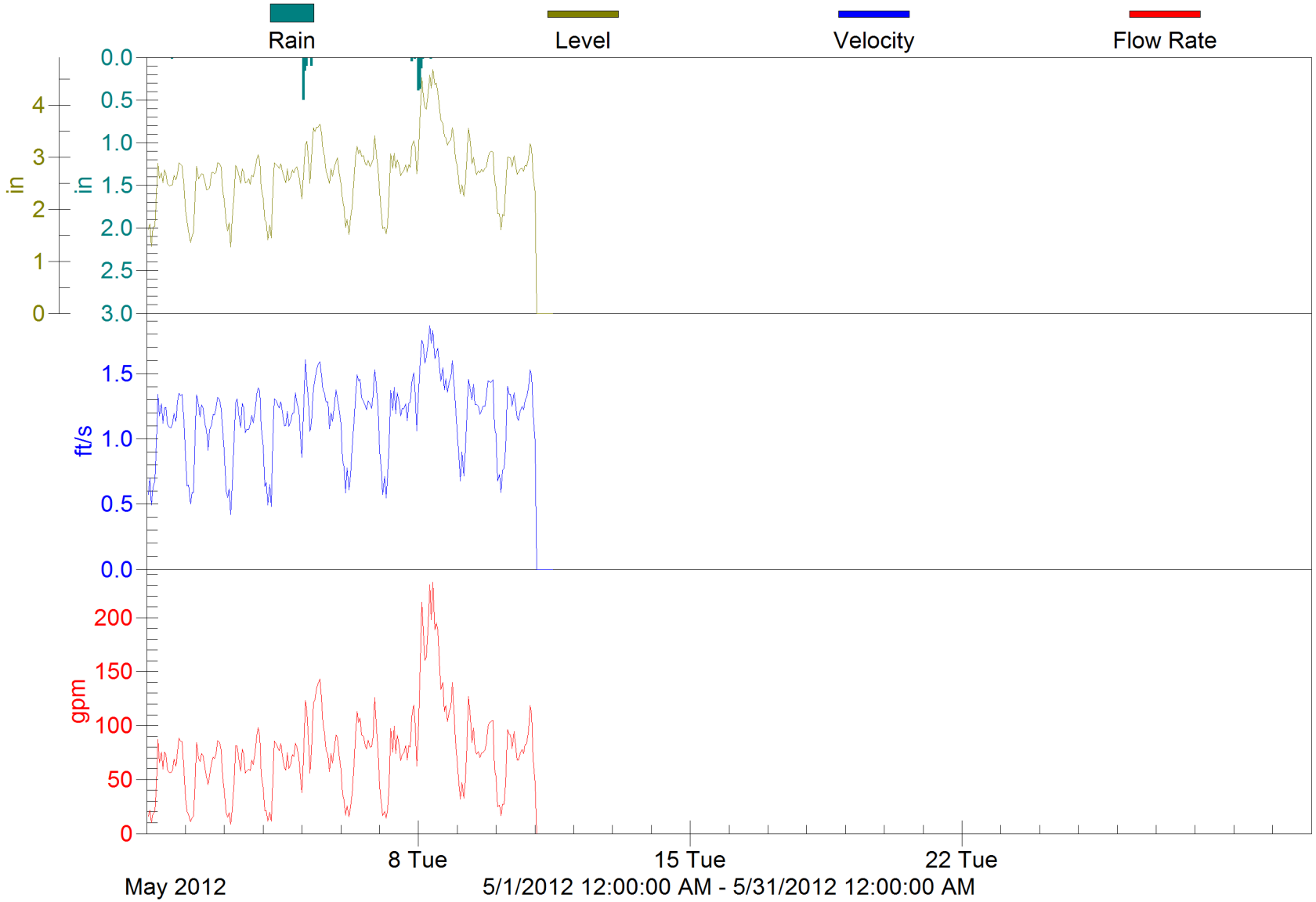
FM2 - 330 Kentucky Ave

Hydrograph



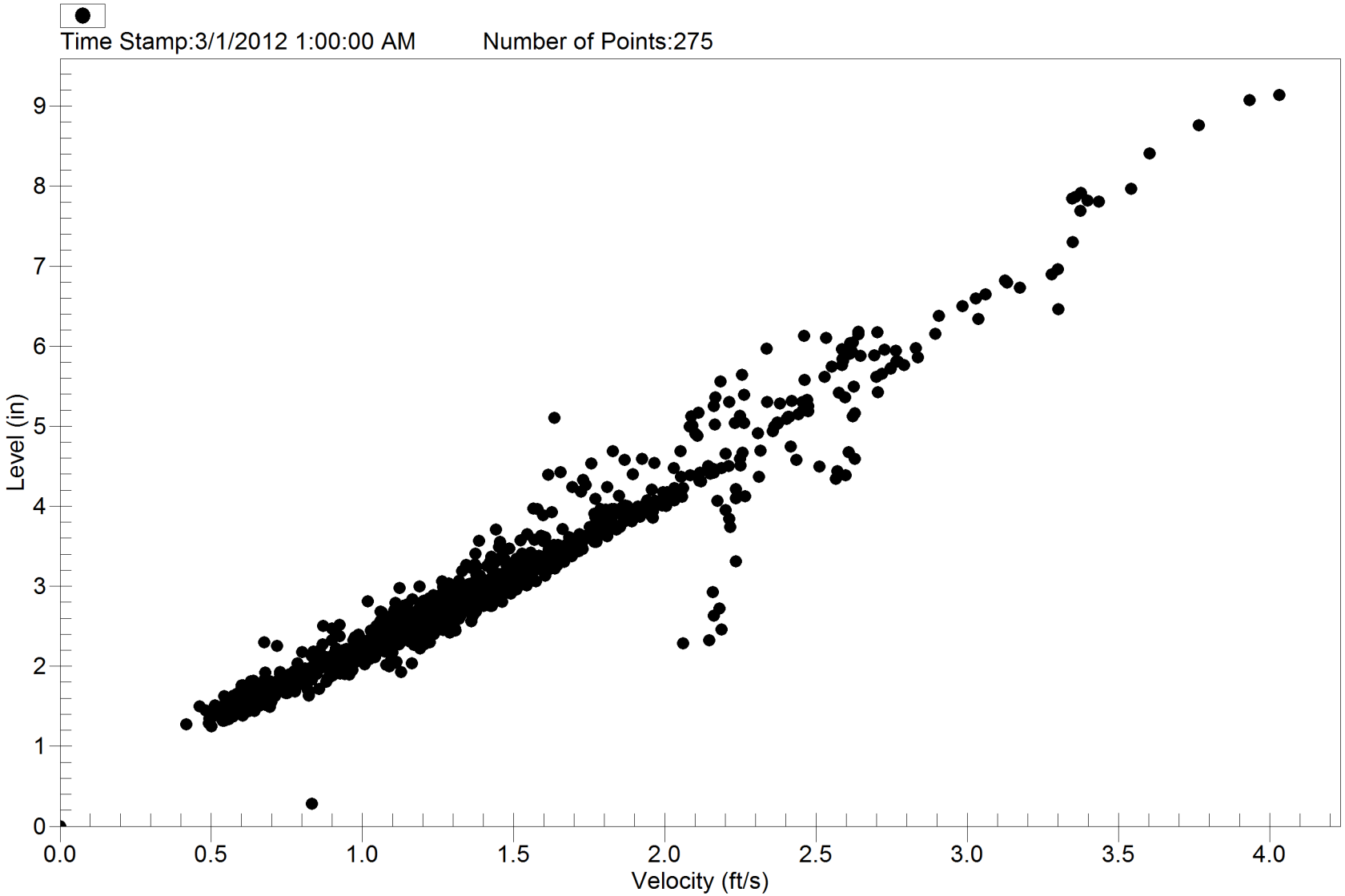
FM2 - 330 Kentucky Ave

Hydrograph



FM2 - 330 Kentucky Ave

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM3 - Fire Station

This flow meter was installed on 3/1/2012 in manhole 2-01-528. This manhole is located in a storm ditch near the back right corner of the Fire Station off of Big Sink Rd inside the tree line., in a 12" round pipe. The dry weather flow depths typically ranged between 2.7" – 4.1" with a daily dry weather flow typically ranging between 230 gpm and 560 gpm. Beginning 3/17/12, approximately 0.83" of precipitation was recorded by the rain gauge over 1 hours. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 1200 gpm. This site was given a grade of "B" at the time the monitor was installed due to due to high velocity, plus evidence of hydrogen sulfide and surcharging. The flow also changes direction due to a bend within this manhole.

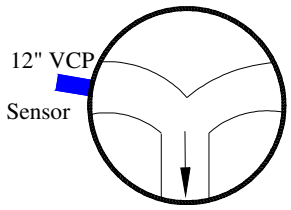
This site experienced severe issues with level measurement between April 24th and May 3rd. Level dropped to zero for extended periods of time. New data for level was calculated with a stochastic process for these periods based on the velocity measurements. The site experienced level drift between April 7th and April 9th, April 9th and April 16th, and April 16th and April 27th (there was a jump back upward after cleaning between these periods) which has been proportionally corrected. This was probably due to debris issues at the site. Velocity dropouts were edited to match the overall pattern. The meter was inoperative for short periods on April 16th and May 3rd due to equipment malfunction.

There was no evidence of surcharging at this site, but there are indications of backwater after the rain event of 3/17.

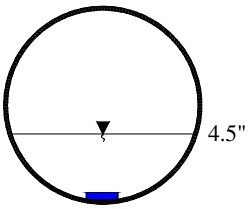
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

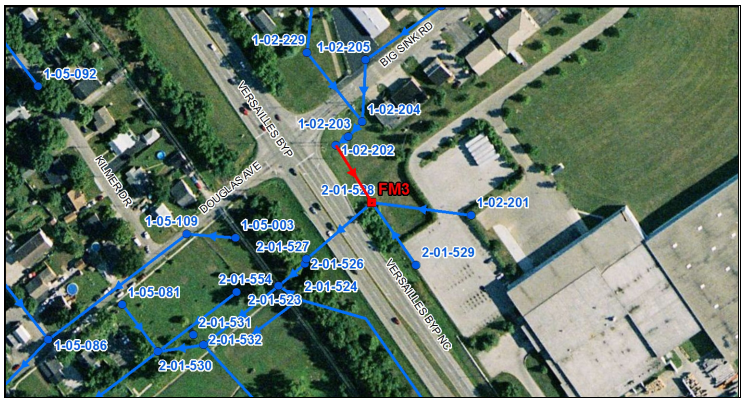
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 2-01-528	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 12
Site # / Site Name:	**FM3 / Fire Station**		MH Depth (ft): 8
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Go to intersection of Versailles Bypass and Big Sink Rd, go NE on Big Sink, take right into drive to factory, MH sits on top of band near tree line at back right corner of fire station property at storm ditch

Site Hazards

Heavy Traffic?	No
H2S?	Yes
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

H2S is present in this manhole, use extreme caution when entering

Meter Setup

Measure Depth (in):	4.5
Portable Vel. (fps):	5.97
Cycle (minutes):	5

Real-time Readings

Level (in):	4.518
Velocity (fps):	6.06
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Moved upstream of proposed location due to Flow Meter dumping into manhole and downstream site having backwash.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Flow looks good, high velocity though.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM3 / Fire Station**

Site Photos

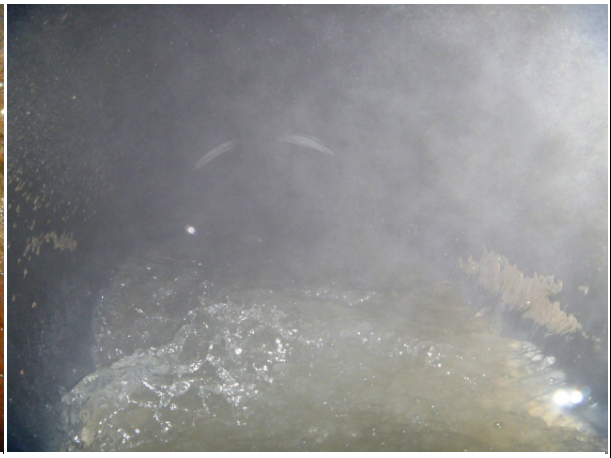
FM3 - Area Photo

FM3 - Manhole Photo

FM3 - Connection Photo

FM3 - Pipe Zoom Photo

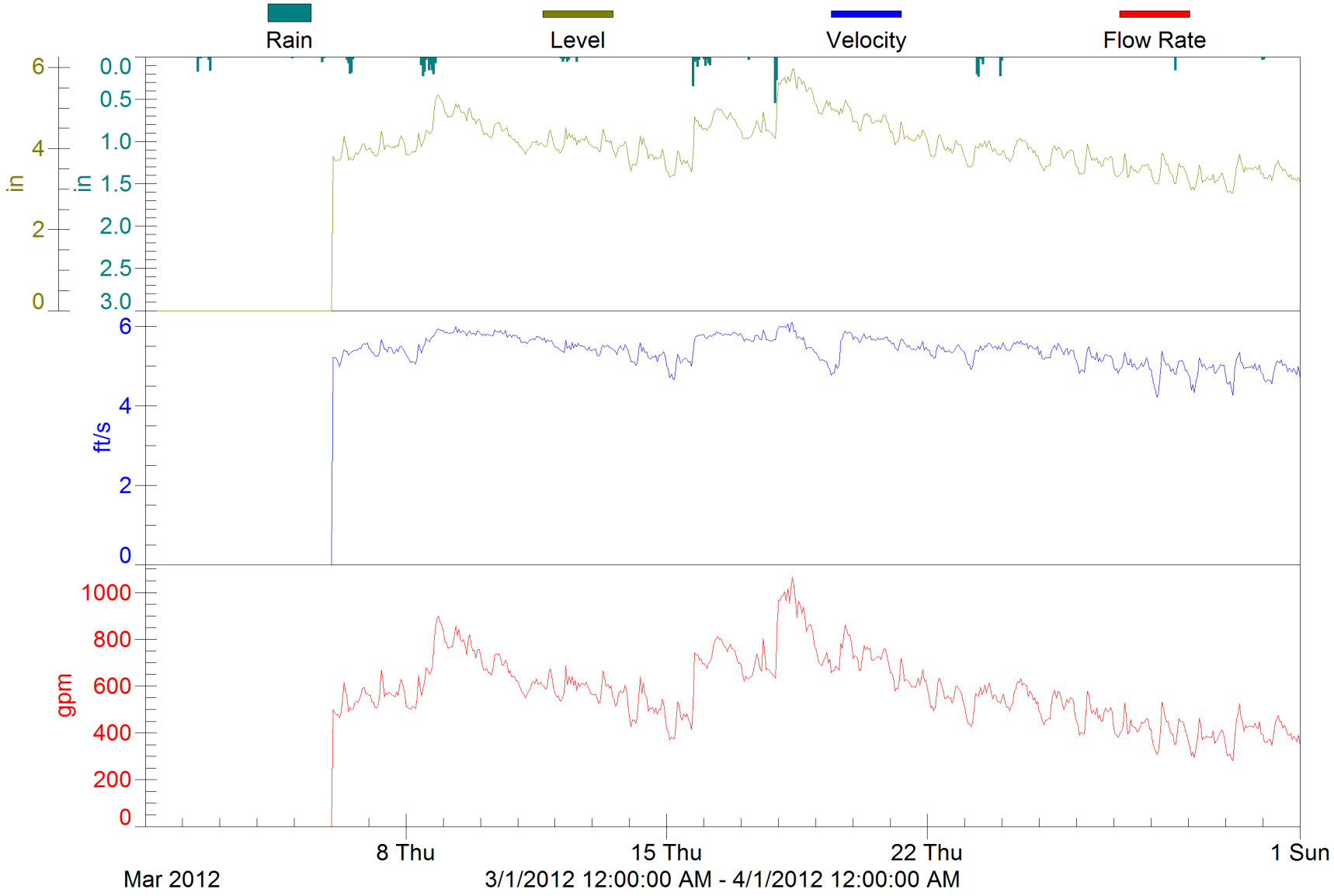
FM3 - Measurement Photo

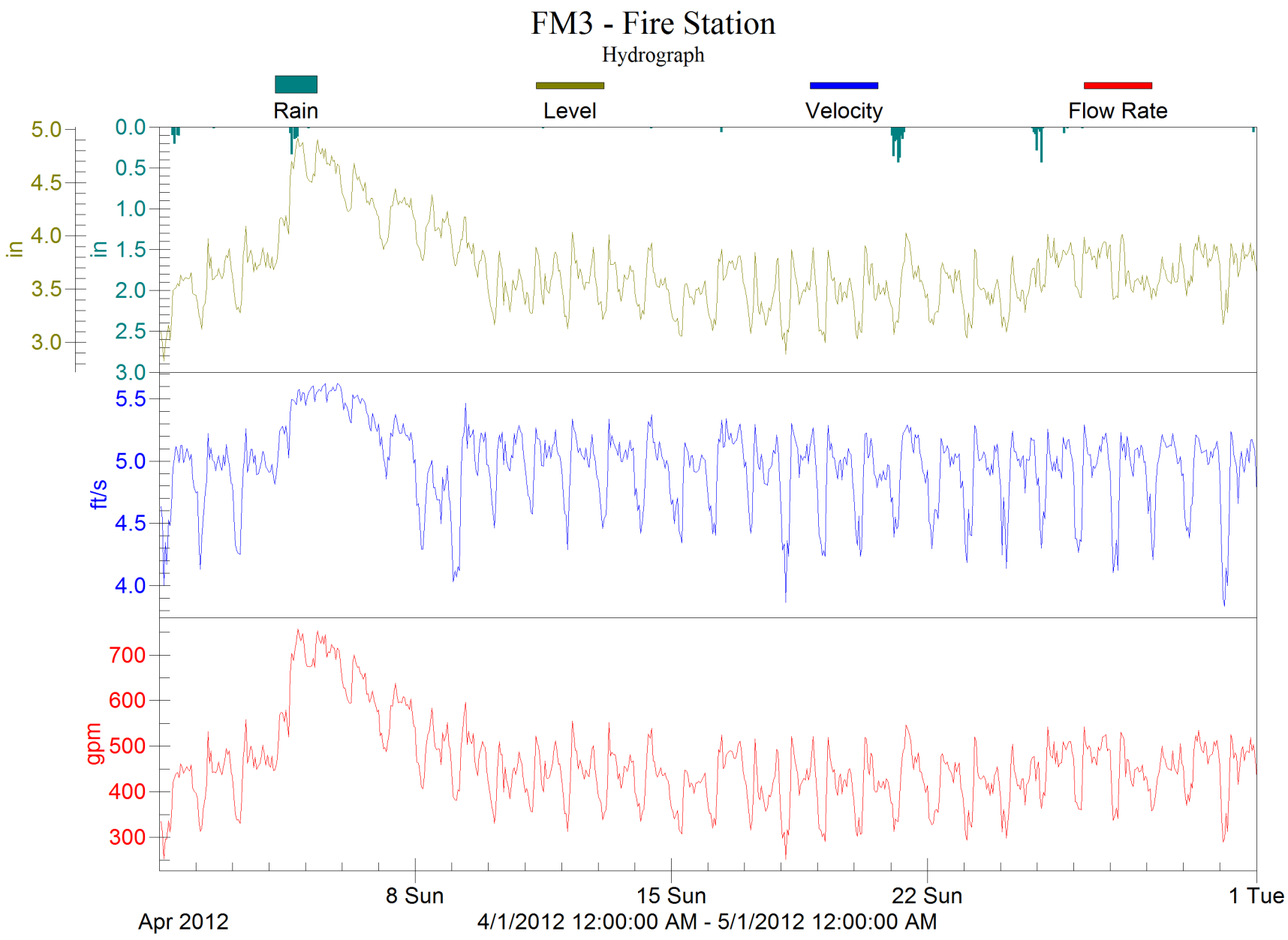


FM3 - Downstream Pipe Zoom Photo

FM3 - Fire Station

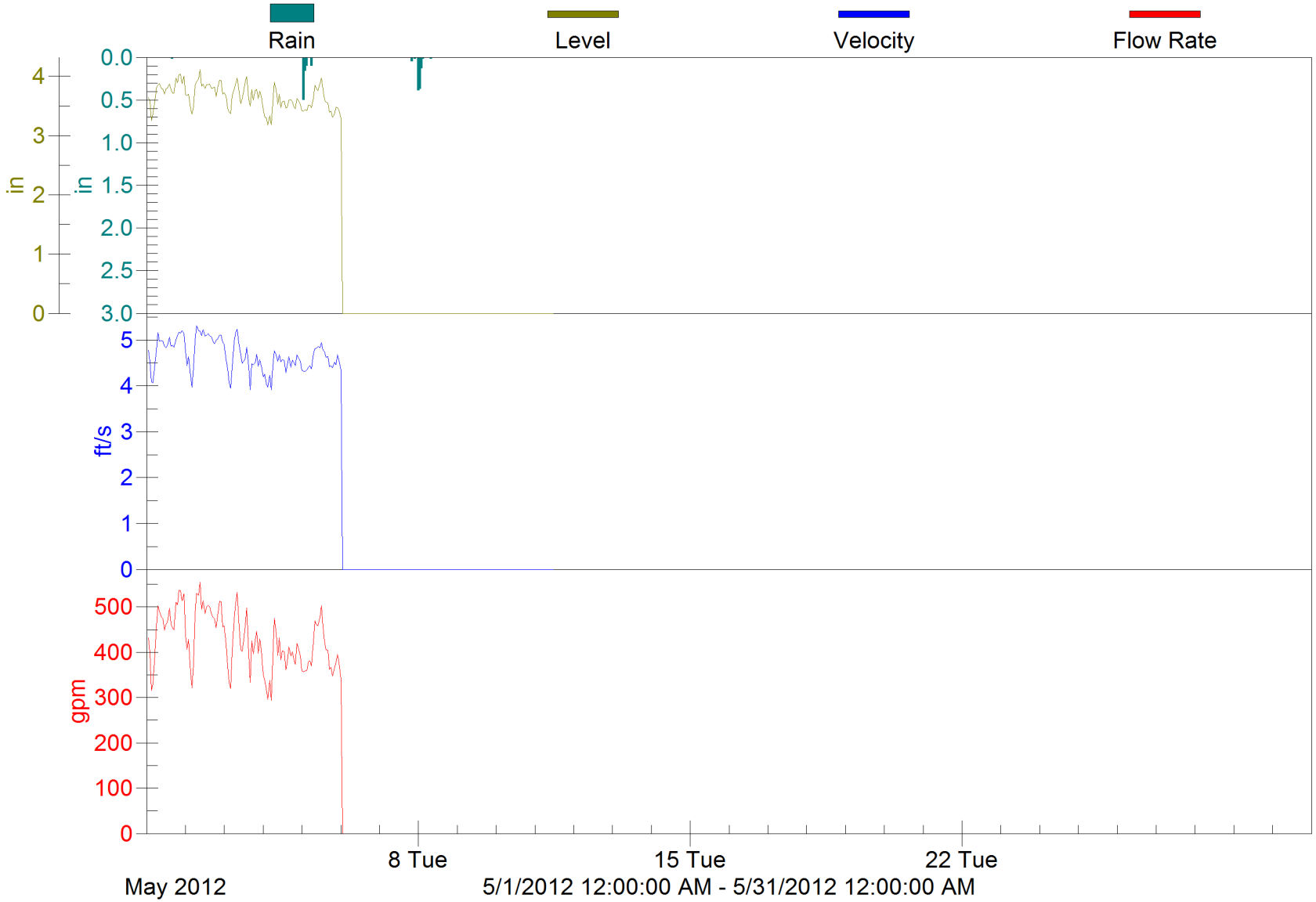
Hydrograph




FM3 - Fire Station
Hydrograph
Rain
Level
Velocity
Flow Rate
in
5.0
4.5
4.0
3.5
3.0
in
0.0
0.5
1.0
1.5
2.0
2.5
3.0
ft/s
5.5
5.0
4.5
4.0
gpm
700
600
500
400
300
8 Sun
15 Sun
22 Sun
1 Tue
Apr 2012
4/1/2012 12:00:00 AM - 5/1/2012 12:00:00 AM

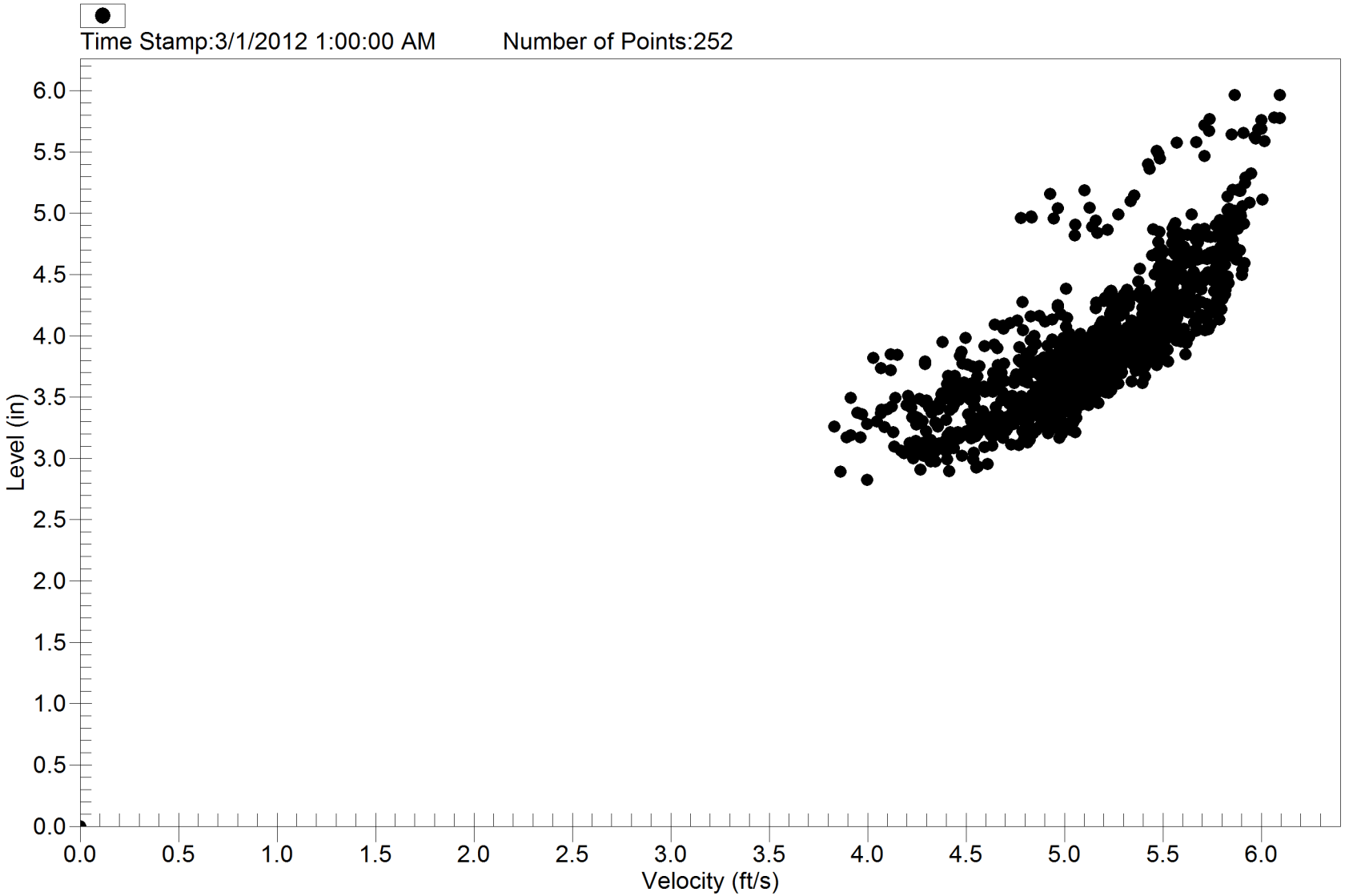
FM3 - Fire Station

Hydrograph



FM3 - Fire Station

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM4 - Douglas St

This flow meter was installed on 3/1/2012 in manhole 1-05-107. This manhole is located at the intersection of Douglas St. and Amsden, in a 21" round pipe. The dry weather flow depths typically ranged between 4.1" – 6.8" with a daily dry weather flow typically ranging between 270 gpm and 870 gpm. Beginning 3/17/12, approximately 0.83" of precipitation was recorded by the rain gauge over 1 hour. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 2800 gpm. This site was given a grade of "B" at the time the monitor was installed due to being installed in swift water inside the 3 o'clock pipe with a 12 o'clock pipe present.

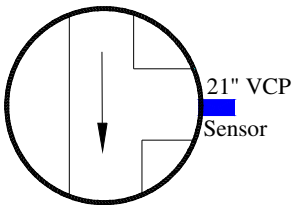
Outliers in level and velocity were adjusted to match the prevailing diurnal pattern. A debris issue on 3/18/12 was corrected.

Some small pump station effects are evident in the 5-minute data. Inflow and infiltration are evident after rain events. There are no indications of backwater or surcharging on the scatterplot.

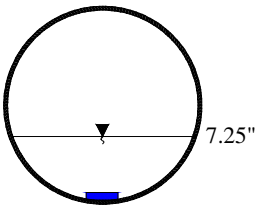
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

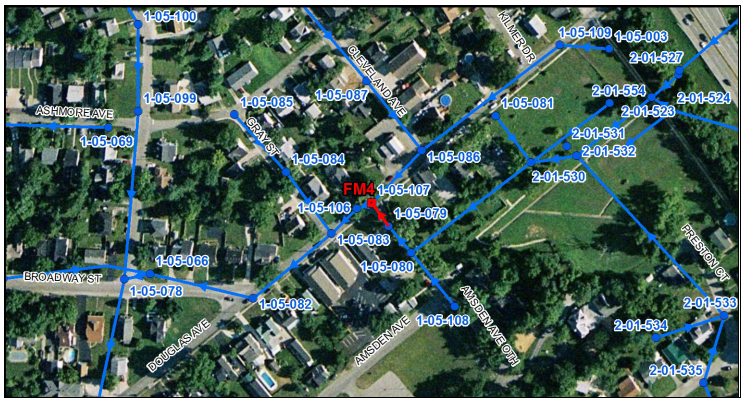
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 1-05-107	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 21
Site # / Site Name:	**FM4 / Douglas St**		MH Depth (ft): 12
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits on Douglas at intersection with Amsden

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	7.25
Portable Vel. (fps):	3.34
Cycle (minutes):	5

Real-time Readings

Level (in):	7.386
Velocity (fps):	3.15
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Moved meter downstream one manhole from proposed location for better flow. Mapping is wrong, line does not go to first manhole shown downstream in GIS data, it goes to Douglas.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

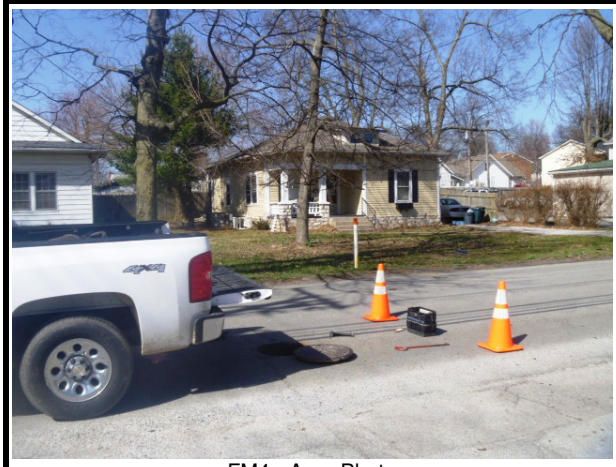
Good flow.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

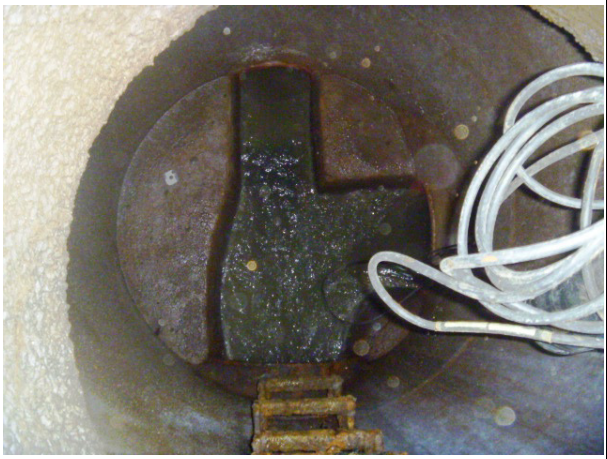
FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM4 / Douglas St**

Site Photos



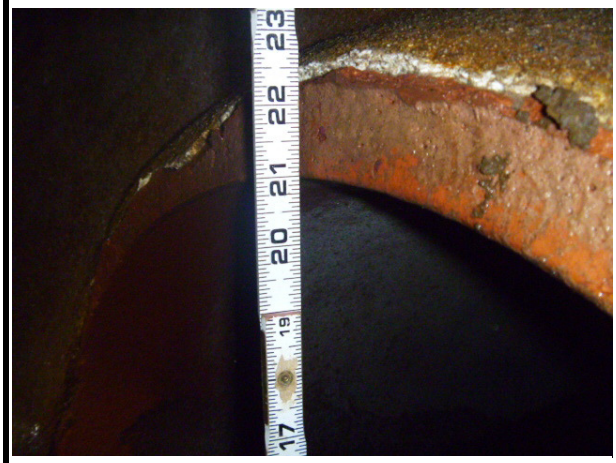
FM4 - Area Photo



FM4 - Manhole Photo

FM4 - Connection Photo

FM4 - Pipe Zoom Photo

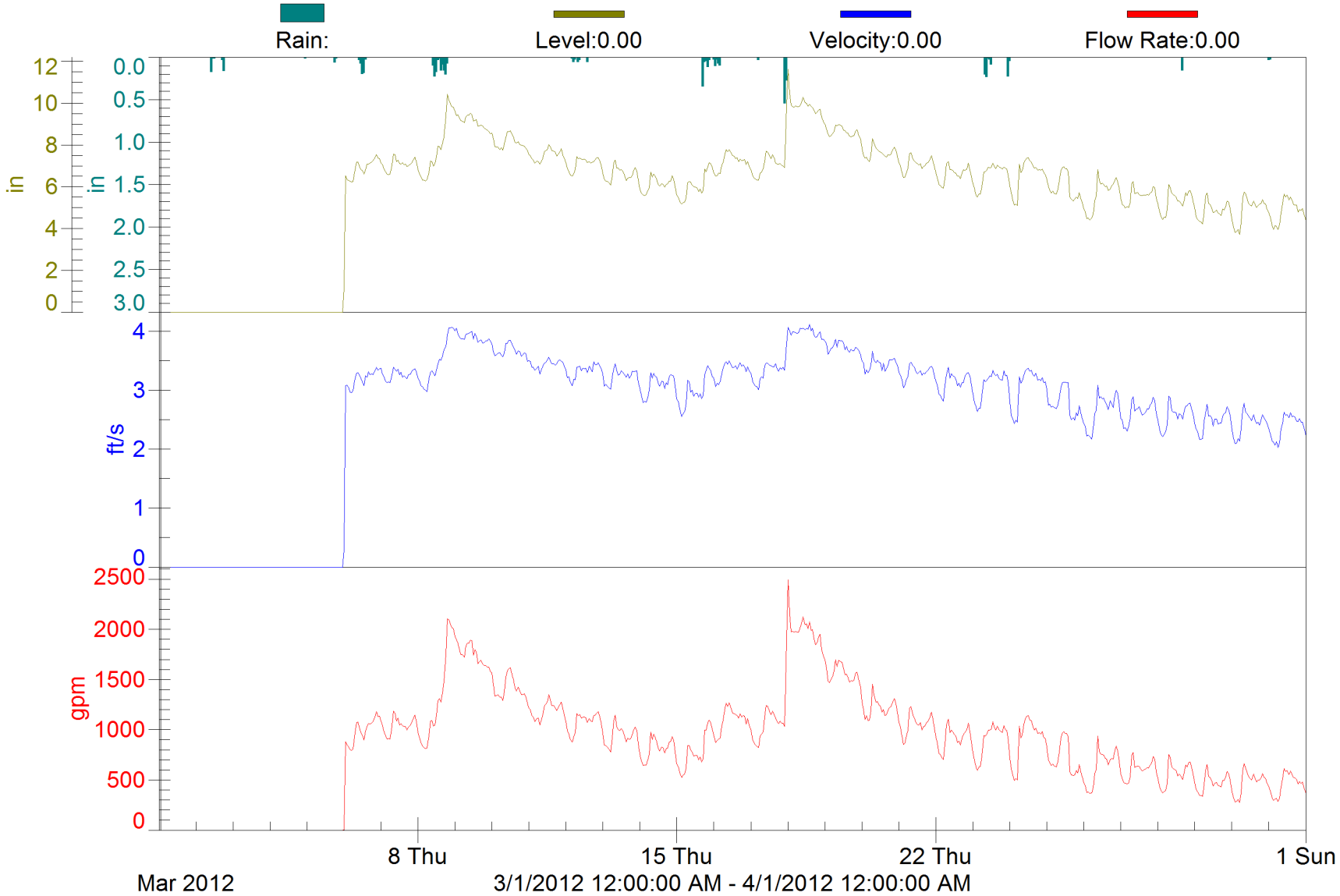


FM4 - Measurement Photo

FM4 - Downstream Pipe Zoom Photo

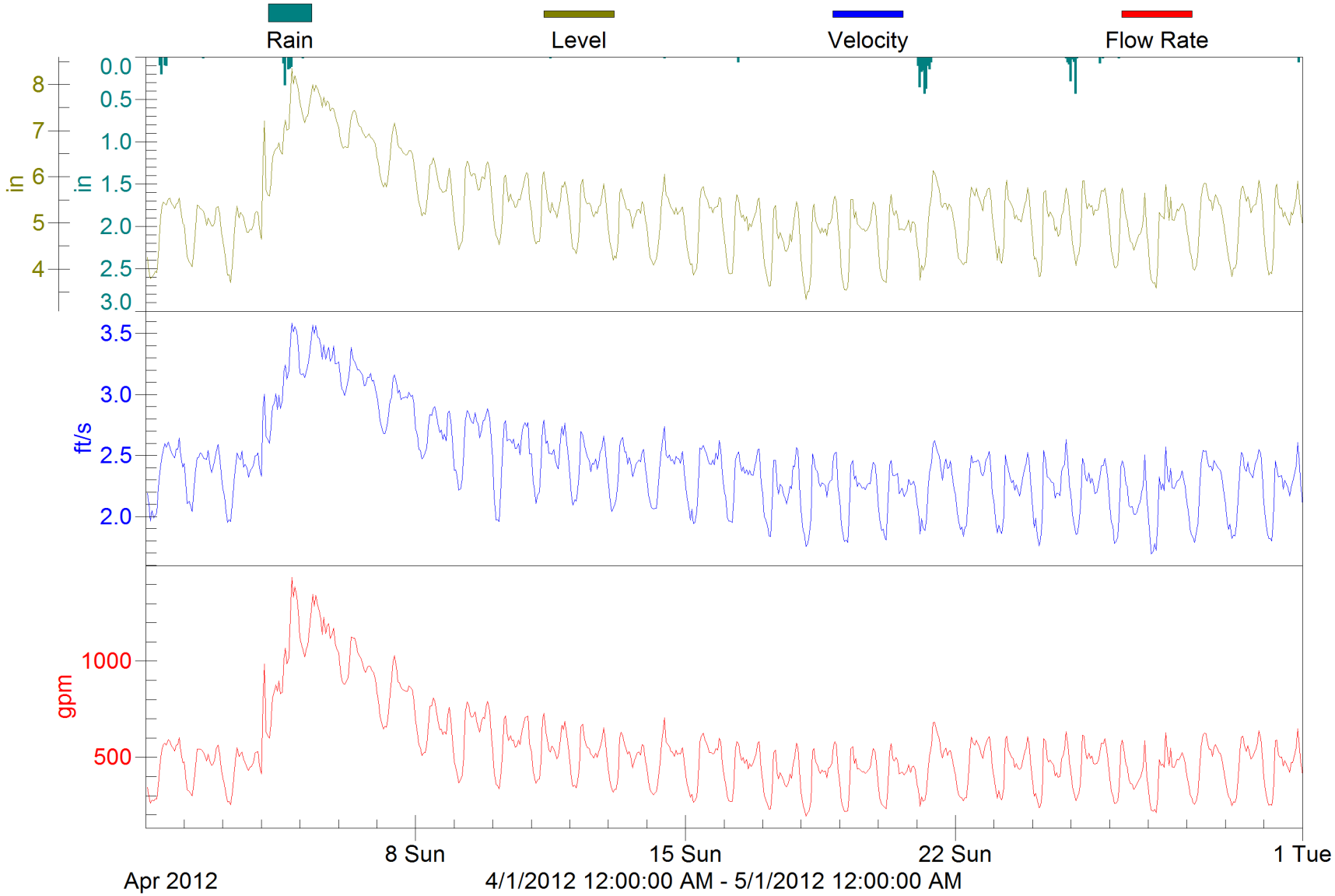
FM4 - Douglas St

Hydrograph



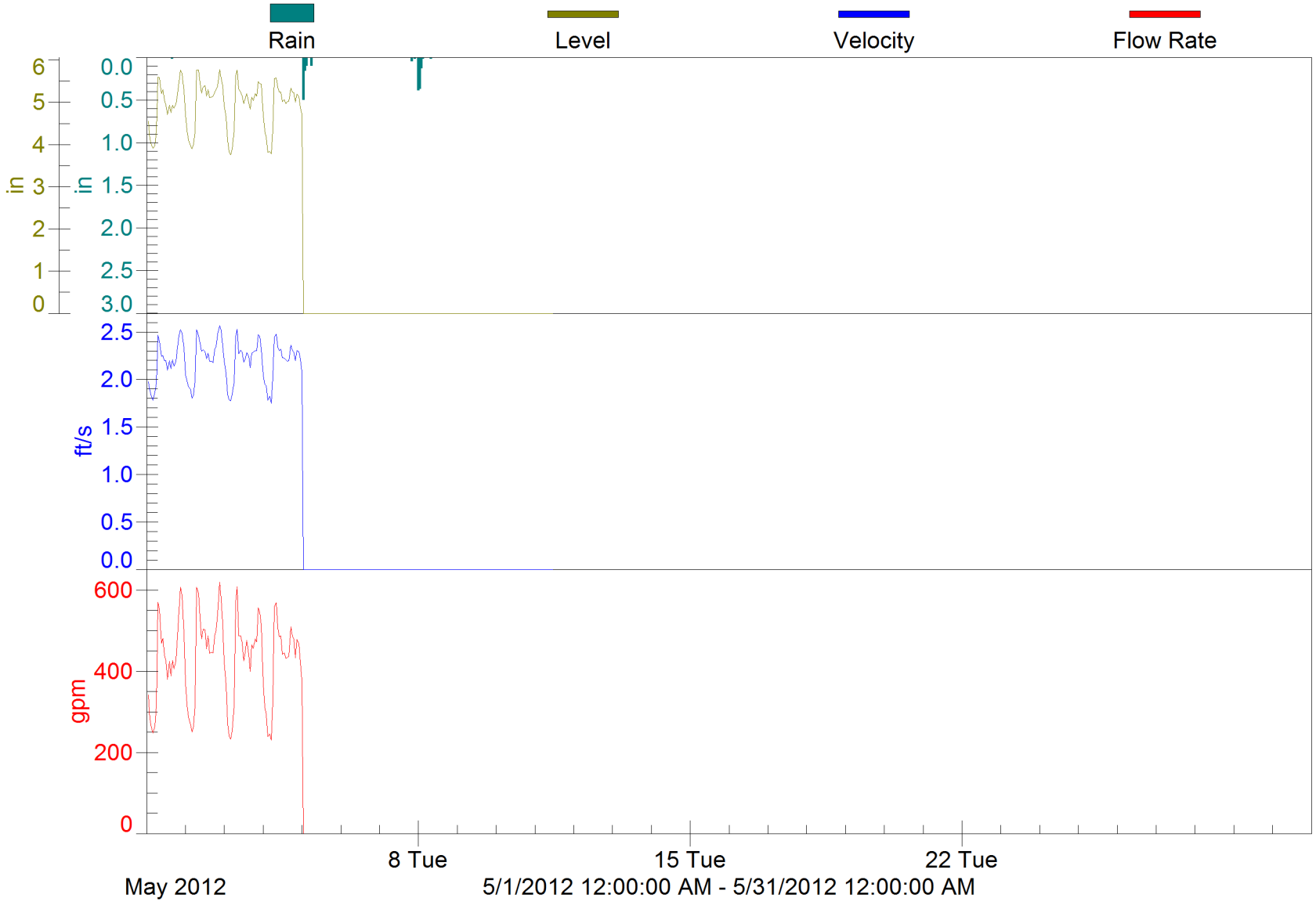
FM4 - Douglas St

Hydrograph



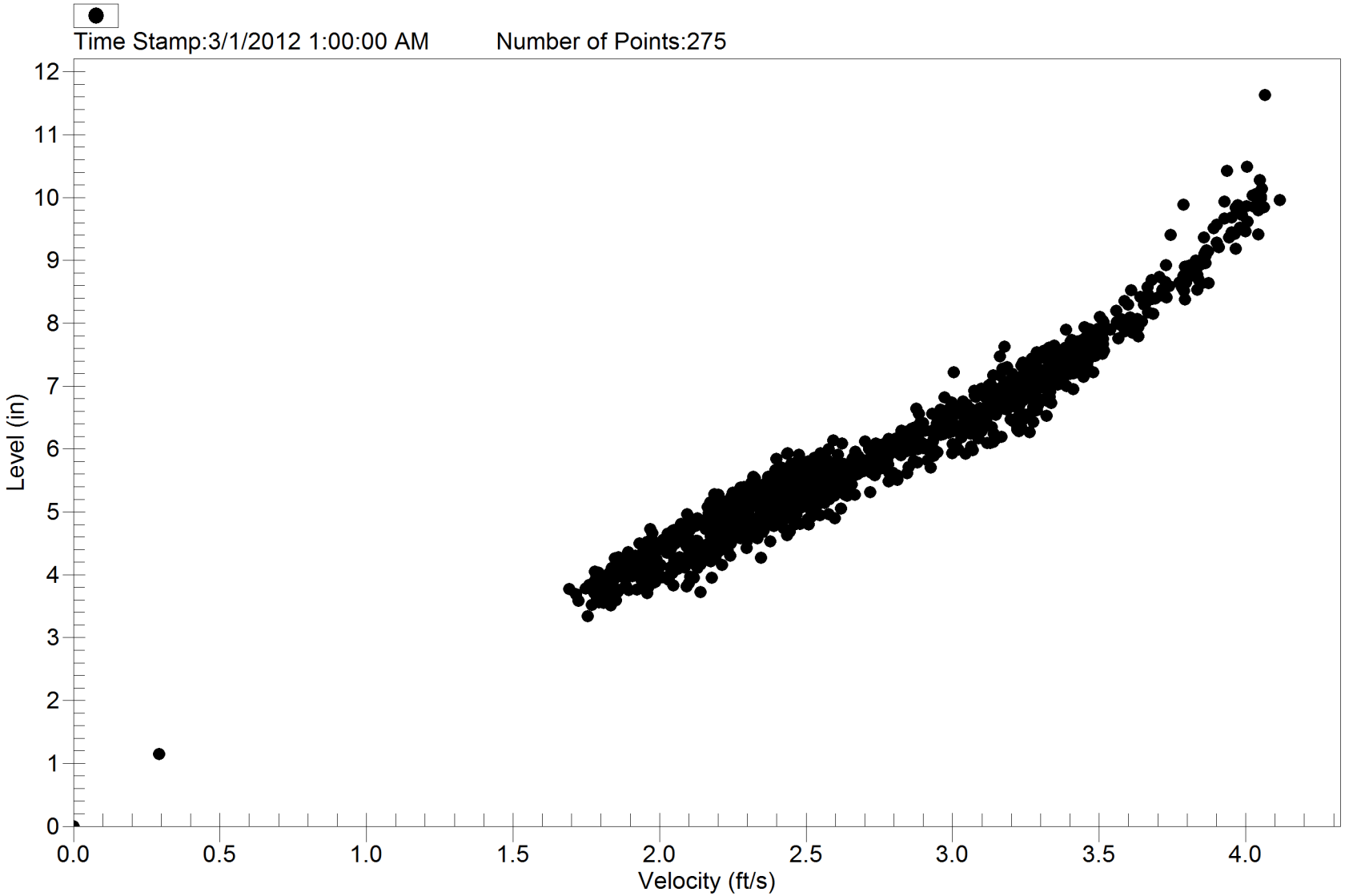
FM4 - Douglas St

Hydrograph



FM4 - Douglas St

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM5 - 121 Rose Hill Ave

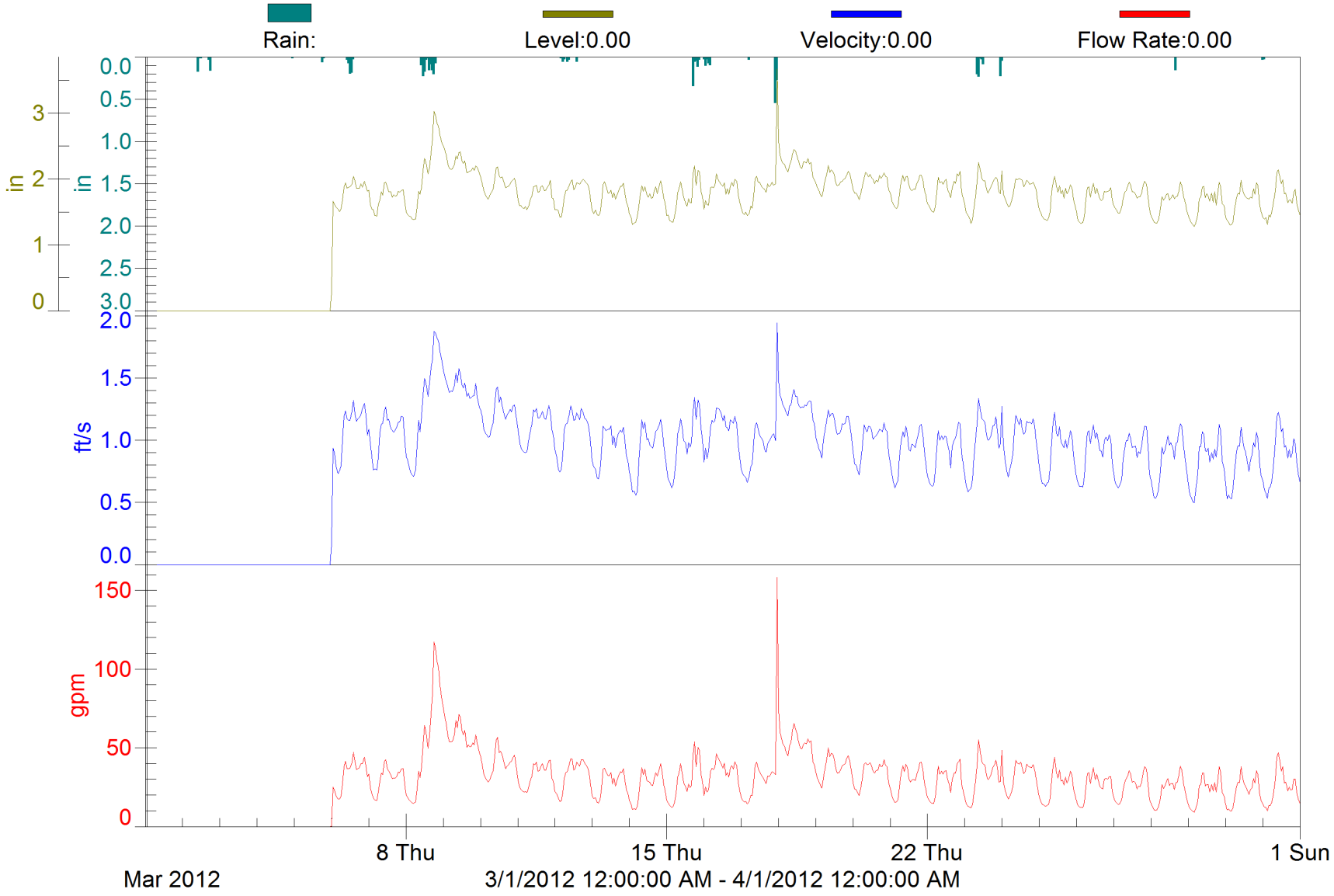
This flow meter was installed on 3/1/2012 in manhole 3-06-009. This manhole is located in the street across from 121 Rose Hill Ave., in a 10" round pipe. The dry weather flow depths typically ranged between 1.3" – 2.2" with a daily dry weather flow typically ranging between 9 gpm and 50 gpm. Beginning 3/17/12, approximately 0.83" of precipitation was recorded by the rain gauge over 1 hour. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 340 gpm. This site was given a grade of "B" at the time the monitor was installed due to a bend in the flow direction within the manhole.

Several velocity dropouts were edited to match the overall trend.

There is no evidence of backwater or surcharging at this site. There is some indication that water is flowing onto the bench during the day. The scatterplot indicates this site experienced free flow conditions.

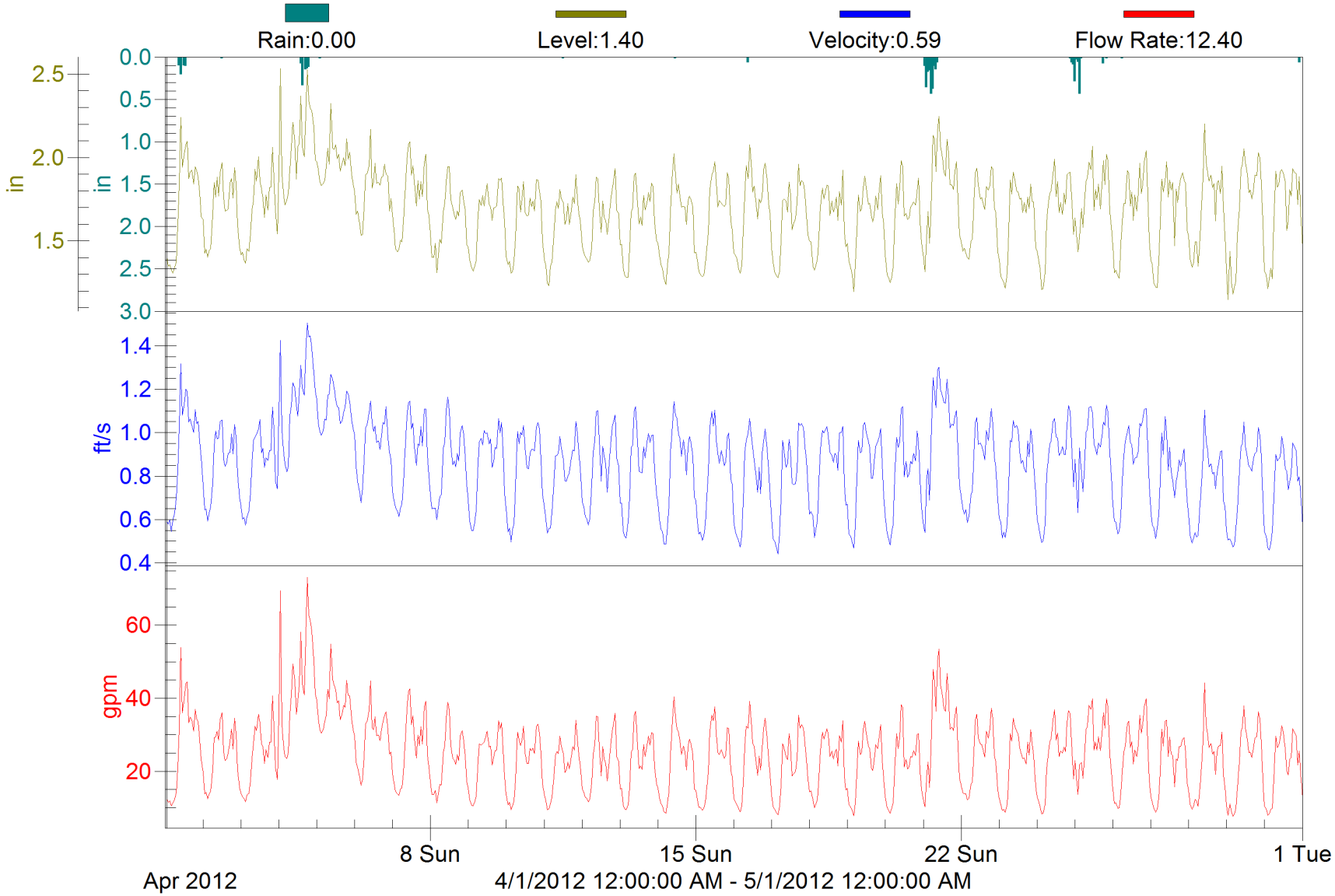
FM5 - 121 Rose Hill Ave

Hydrograph



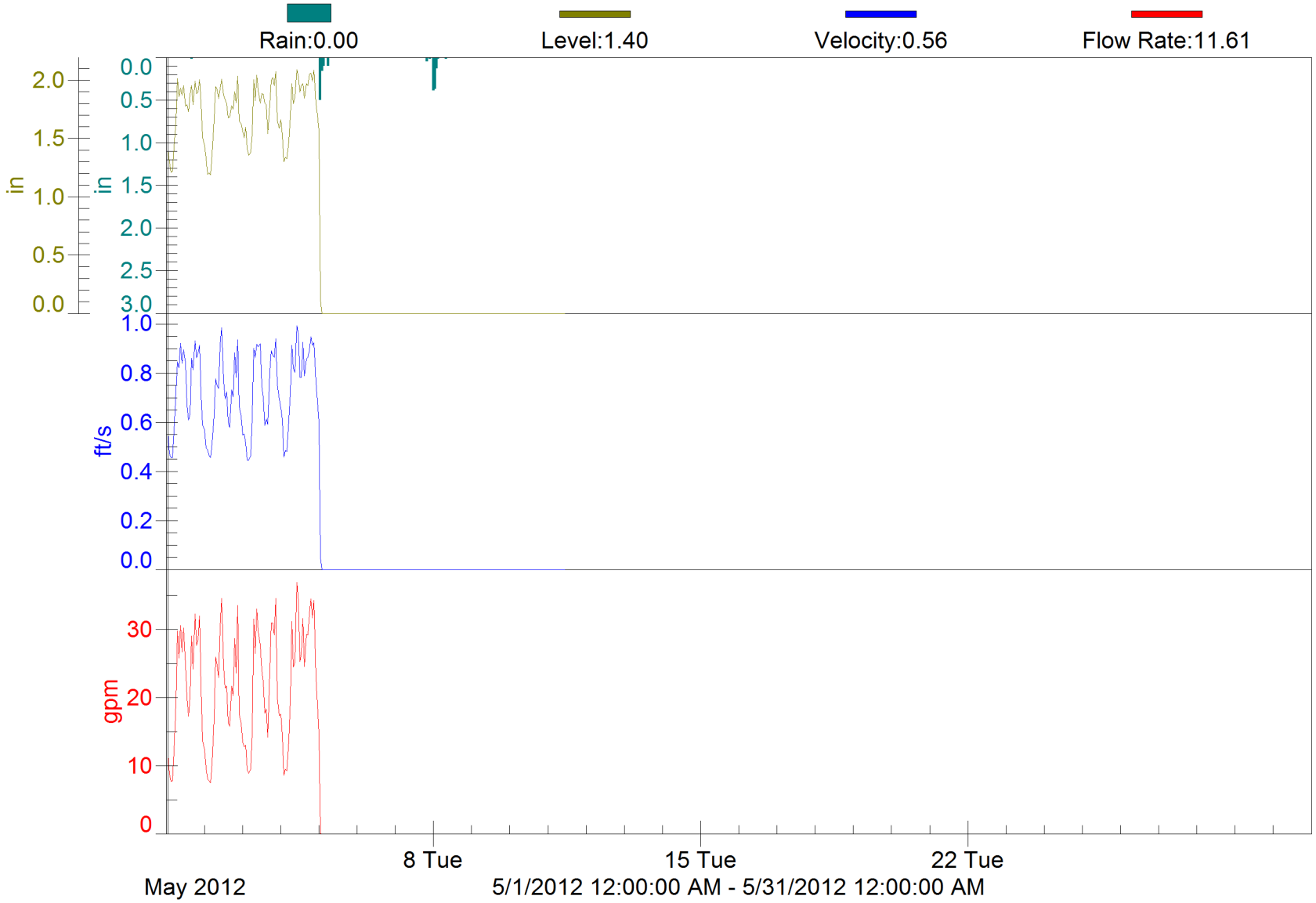
FM5 - 121 Rose Hill Ave

Hydrograph



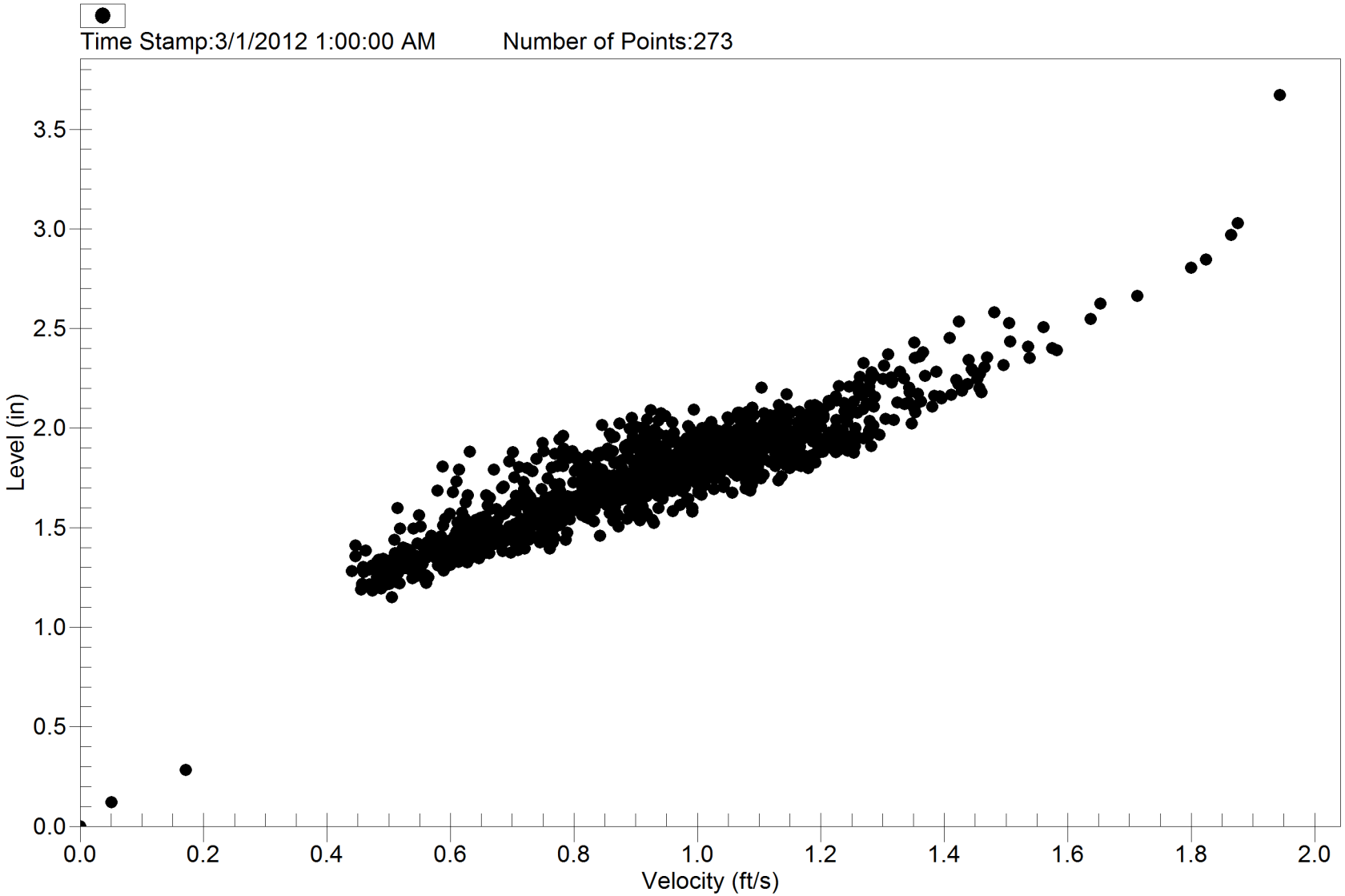
FM5 - 121 Rose Hill Ave

Hydrograph



FM5 - 121 Rose Hill Ave

Scatterplot

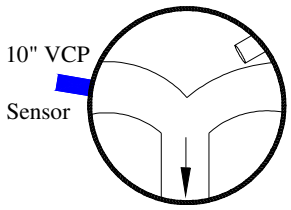


3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

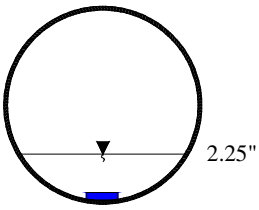
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

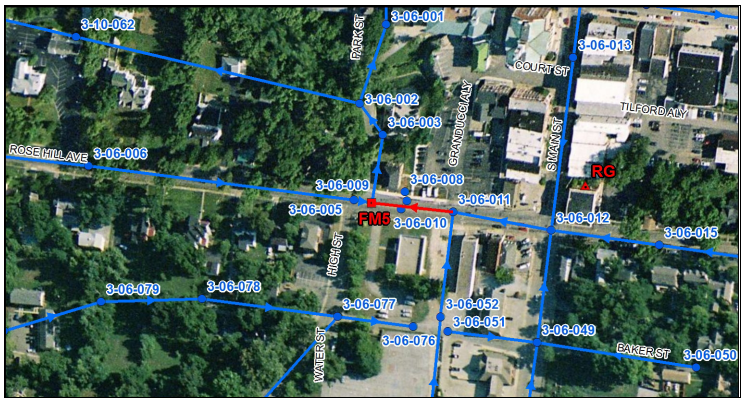
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 3-06-009	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 10
Site # / Site Name:	**FM5 / 121 Rose Hill Ave**		MH Depth (ft): 9
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits in street at 121 Rose Hill Ave

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	2.25
Portable Vel. (fps):	1
Cycle (minutes):	5

Real-time Readings

Level (in):	2.188
Velocity (fps):	1
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Installed in proposed manhole.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Good flow.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

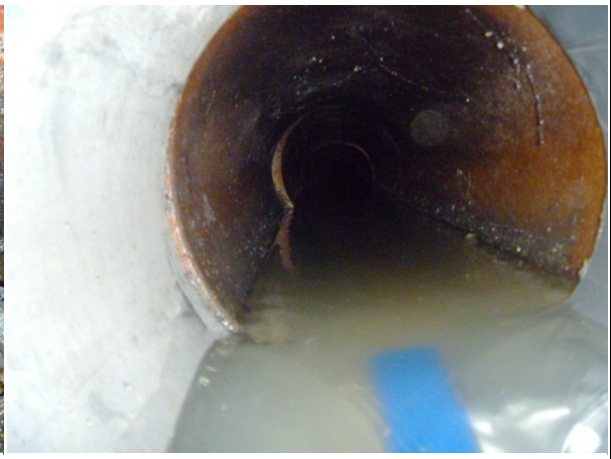
Site # / Site Name: **FM5 / 121 Rose Hill Ave**

Site Photos

FM5 - Area Photo

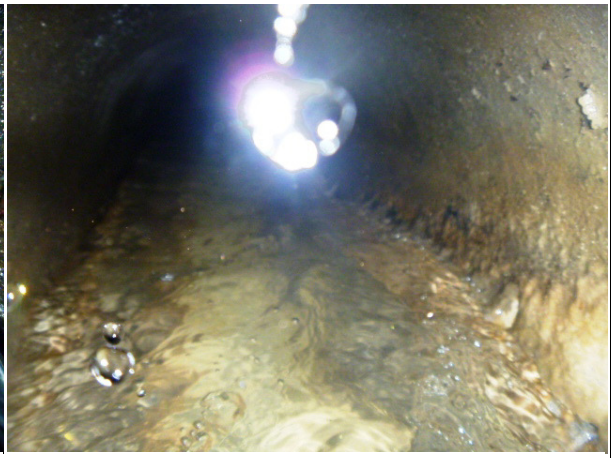
FM5 - Manhole Photo

FM5 - Connection Photo



FM5 - Pipe Zoom Photo

FM5 - Measurement Photo



FM5 - Downstream Pipe Zoom Photo

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM6 - 133 Macey Blvd

This flow meter was installed on 3/1/2012 in manhole 3-06-164. This manhole is located at the church entrance at 133 Macey Blvd., in an 8" round pipe. The dry weather flow depths typically ranged between 0.5" – 3.5" with a daily dry weather flow typically ranging between 1 gpm and 125 gpm. Beginning 3/8/12, approximately 1.27" of precipitation was recorded by the rain gauge over 9.33 hours. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 210 gpm. This site was given a grade of "C" at the time the monitor was installed due to drop lines and an inability to get the band entirely into the pipe.

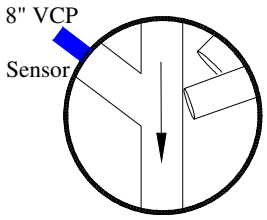
Overnight level and velocity dropouts were corrected.

There are some signs of pump station influence, especially overnight. The scatterplot shows a good correlation between level and velocity, with no indication of surcharging or backwater.

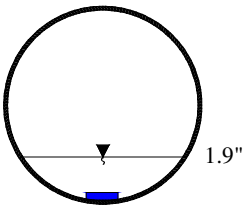
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

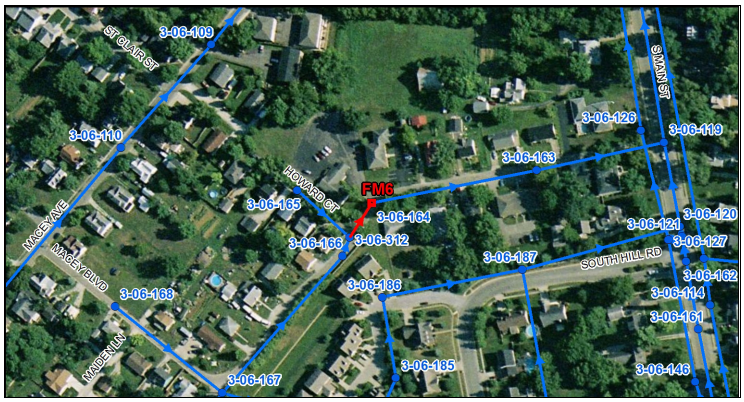
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 3-06-164	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 8
Site # / Site Name:	**FM6 / 133 Macey Blvd**		MH Depth (ft): 7
Site Quality: C	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits at entrance to Kingdom Hall at 133 Macey Blvd

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	1.9
Portable Vel. (fps):	1.25
Cycle (minutes):	5

Real-time Readings

Level (in):	1.81
Velocity (fps):	1.11
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Proposed site dropped into manhole and had very bad flow, downstream manhole from proposed was a drop line. We installed one manhole upstream of proposed location. Could not get band all the way in pipe due to pipe joint offset but it is secure.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

There are a couple drop lines coming into this manhole, be careful to not get showered on when visiting.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM6 / 133 Macey Blvd**

Site Photos

FM6 - Area Photo

FM6 - Manhole Photo

FM6 - Connection Photo

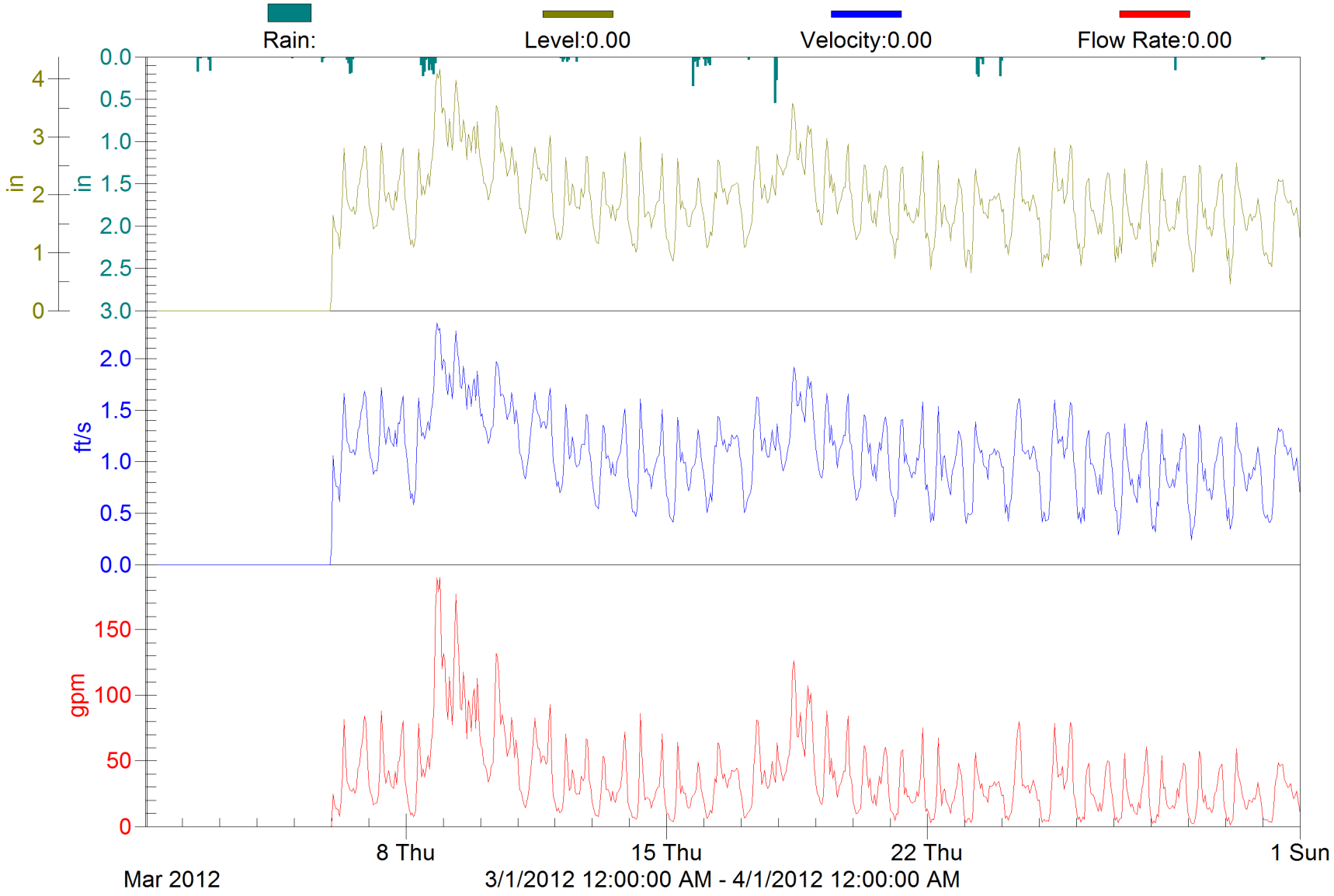
FM6 - Pipe Zoom Photo

FM6 - Measurement Photo

FM6 - Downstream Pipe Zoom Photo

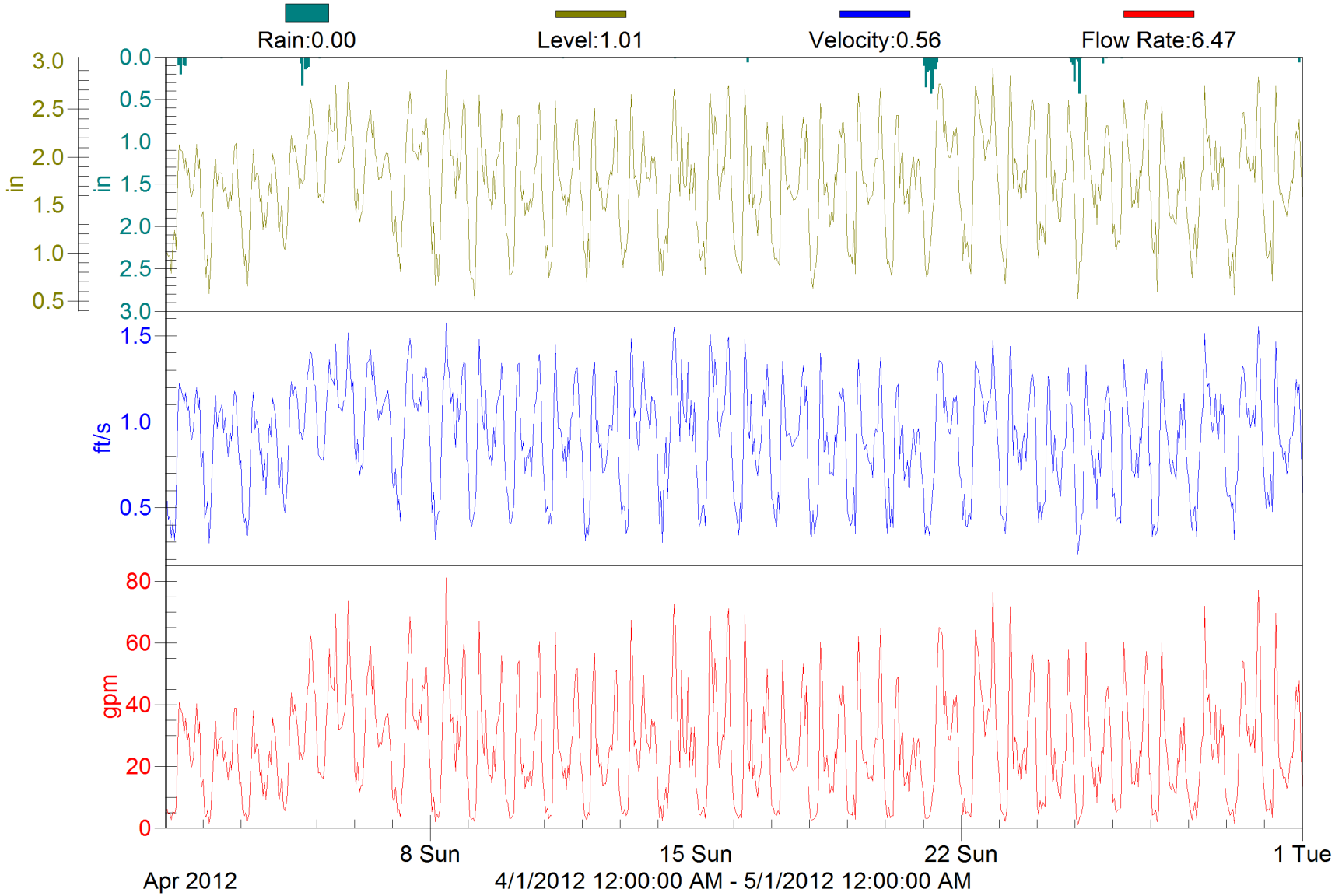
FM6 - 133 Macey Blvd

Hydrograph



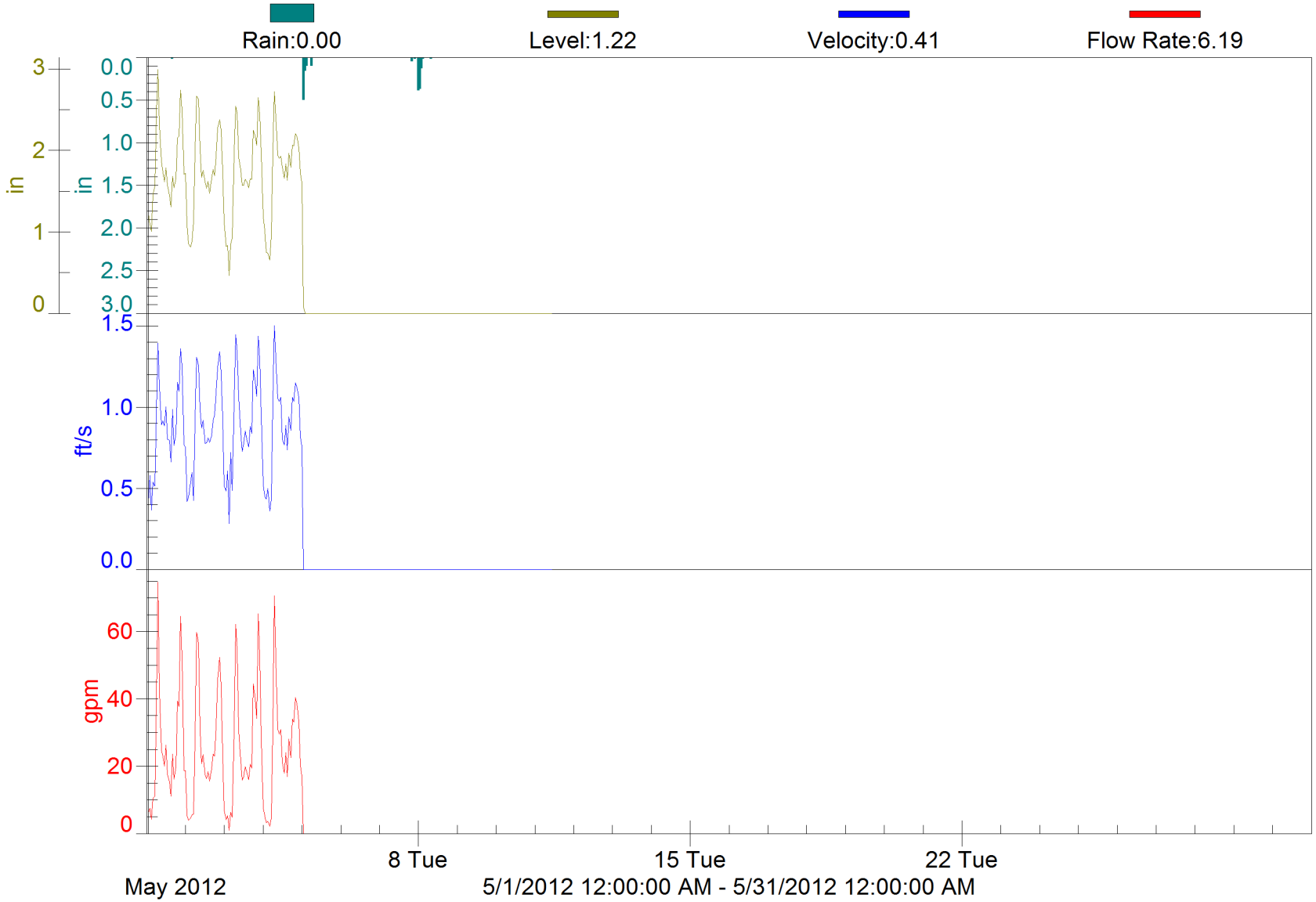
FM6 - 133 Macey Blvd

Hydrograph



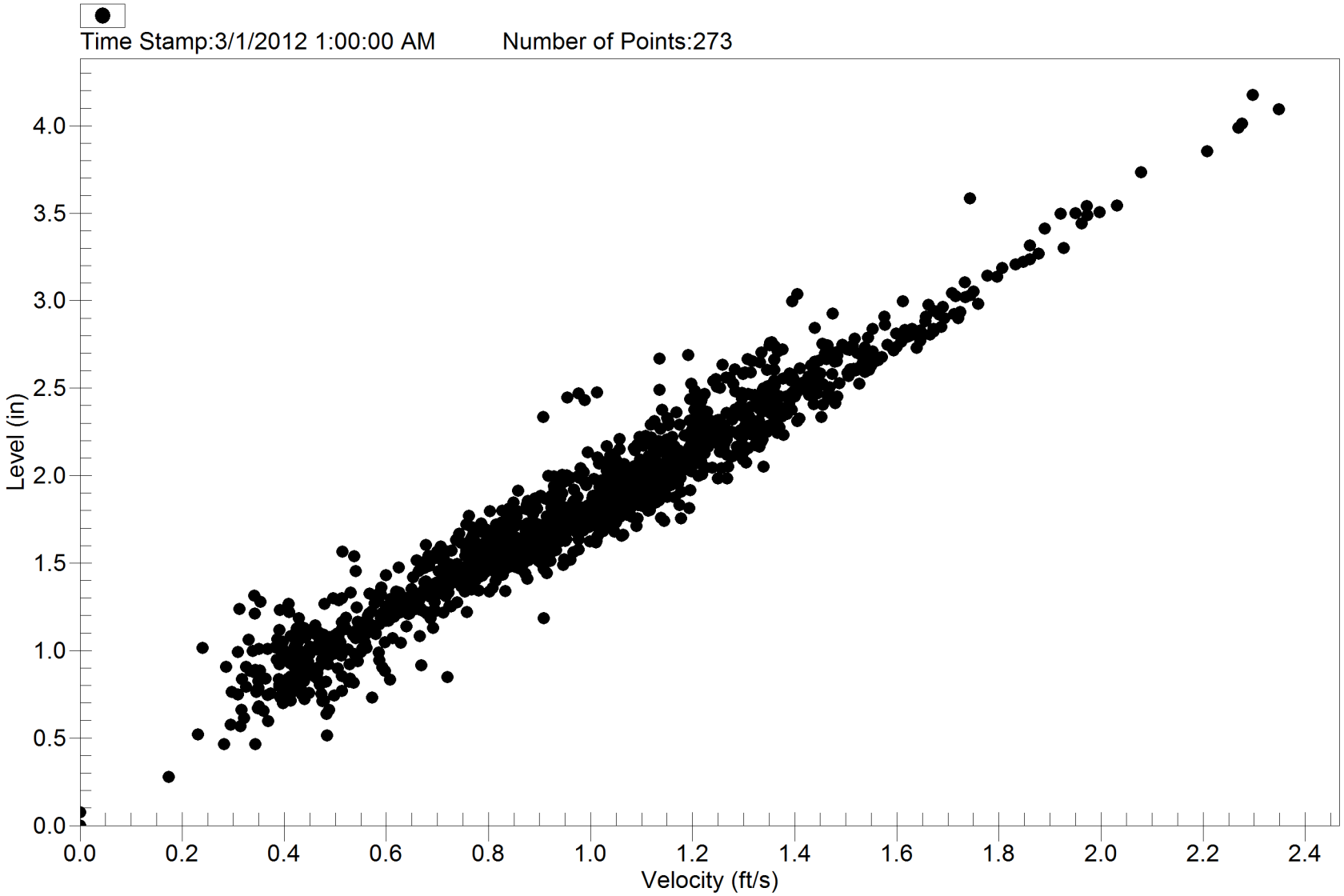
FM6 - 133 Macey Blvd

Hydrograph



FM6 - 133 Macey Blvd

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM7 - 515 Royal Ridge Ct

This flow meter was installed on 3/1/2012 in manhole 2-01-277. This manhole is located in the back right corner of 515 Royal Ridge Ct., in a 10" round pipe. The dry weather flow depths typically ranged between 0.8" – 3" with a daily dry weather flow typically ranging between 8 gpm and 120 gpm. Beginning 4/4/12, approximately 0.83" of precipitation was recorded by the rain gauge over 5 hours. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 500 gpm. This site was given a grade of "B" at the time the monitor was installed due to evidence of inflow and infiltration in the manhole itself and a second incoming line.

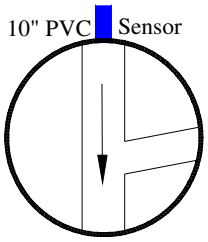
Level and velocity were both volatile. The level often fell below the 2" minimum threshold required to collect quality readings. The furthest outliers have been edited to be closer to the overall trend.

It appears that the pump station activates overnight during the lowest flows. The scatterplot shows a strong correlation between level and velocity, with no hint of surcharging or backwater. The maximum flow occurs during a quick spike a little before the rain event on April 4th begins. The next highest flow is 430 gpm during the rain event on March 8th.

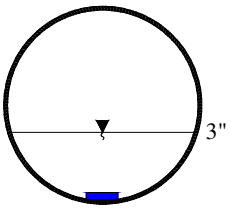
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

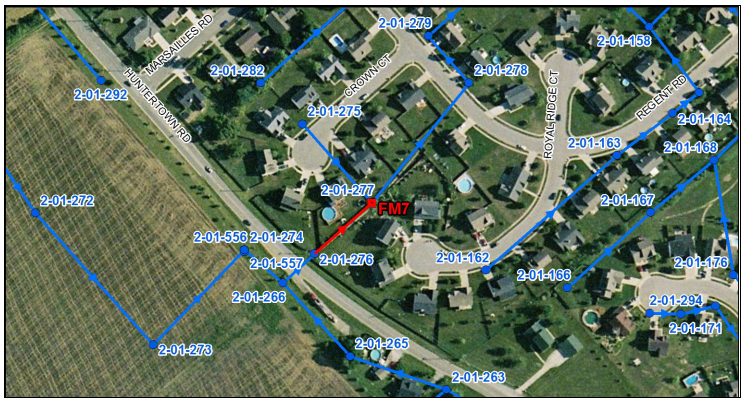
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 2-01-277	Pipe Shape: Round	Pipe Mat PVC	Pipe Size (in): 10
Site # / Site Name:	**FM7 / 515 Royal Ridge Ct.**		MH Depth (ft): 6
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits in back right of 515 Royal Ridge Ct

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	3
Portable Vel. (fps):	2.38
Cycle (minutes):	5

Real-time Readings

Level (in):	3.008
Velocity (fps):	2.27
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Installed in proposed manhole.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

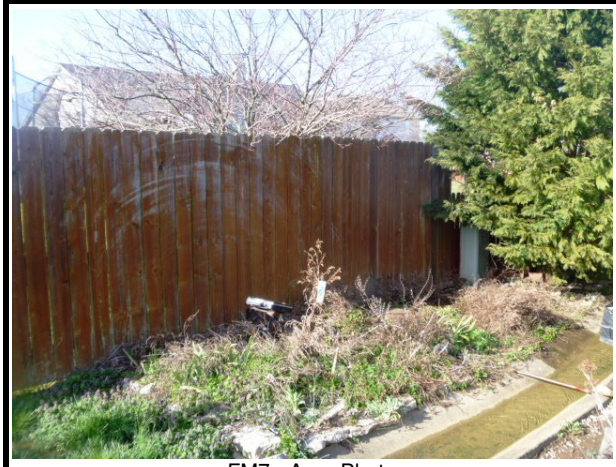
Comments:

Inflow and infiltration occur in Manhole, good flow.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM7 / 515 Royal Ridge Ct.** ***Site Photos***

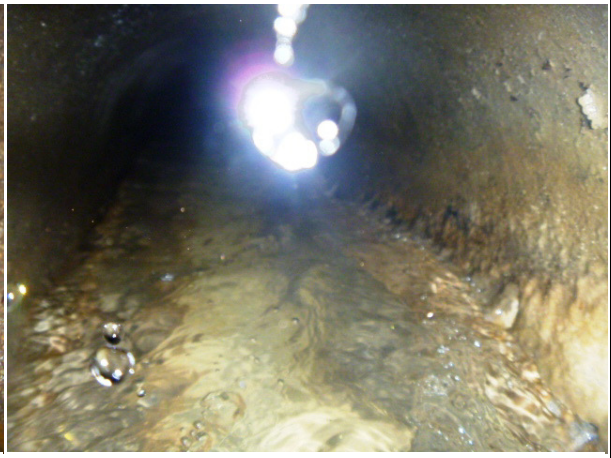

FM7 - Area Photo

FM7 - Manhole Photo

FM7 - Connection Photo

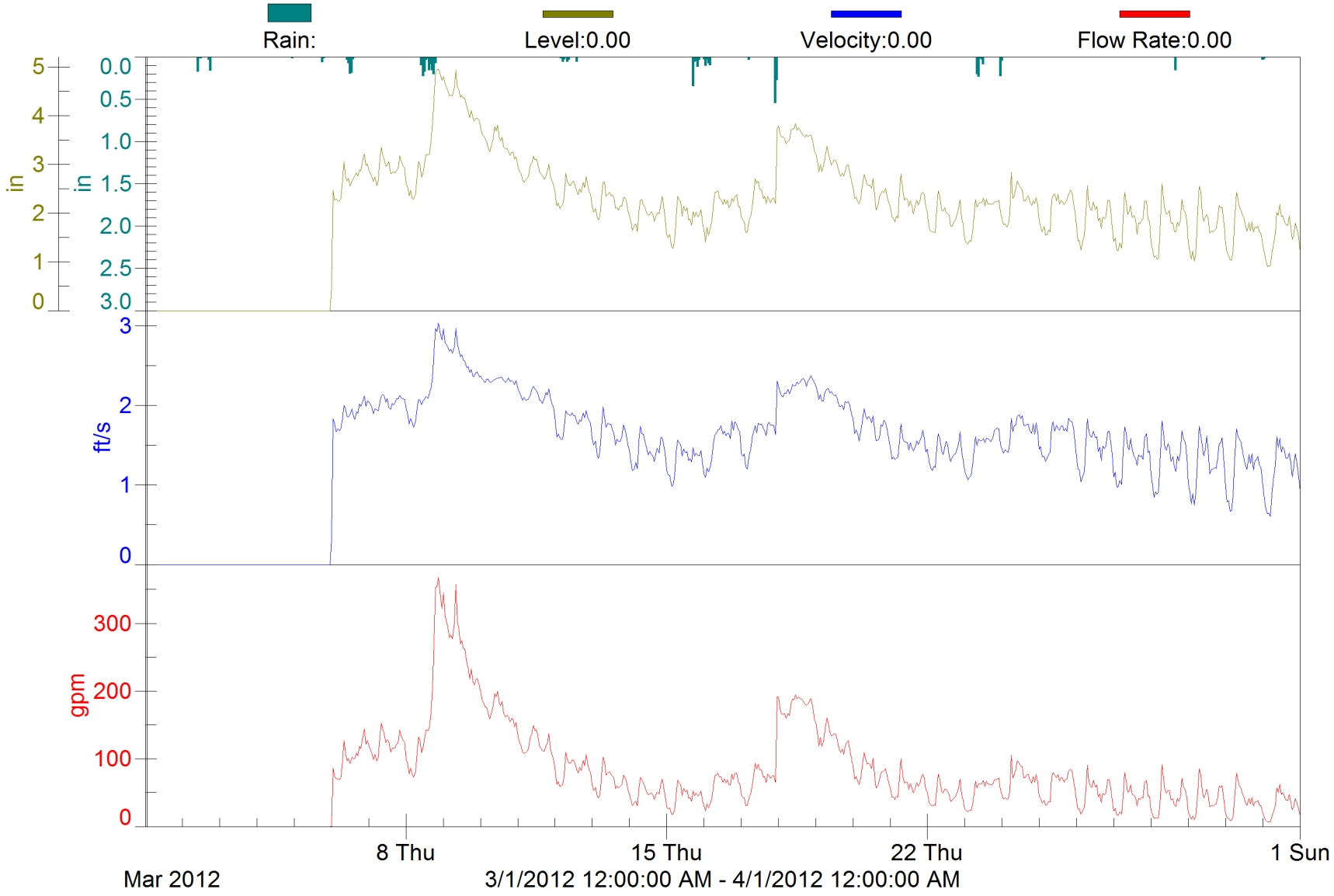
FM7 - Pipe Zoom Photo

FM7 - Measurement Photo


FM7 - Downstream Pipe Zoom Photo

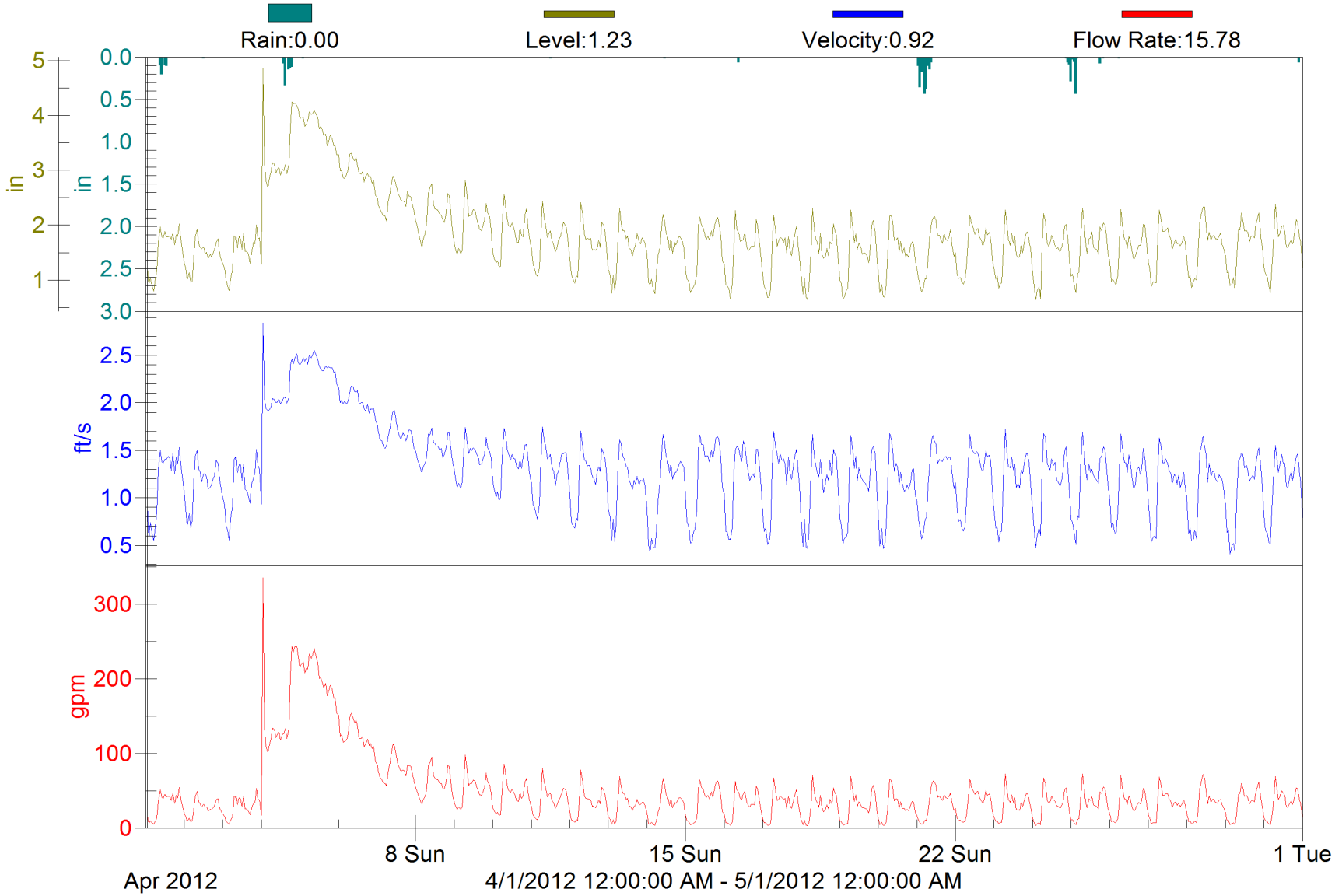
FM7 - 515 Royal Ridge Ct

Hydrograph



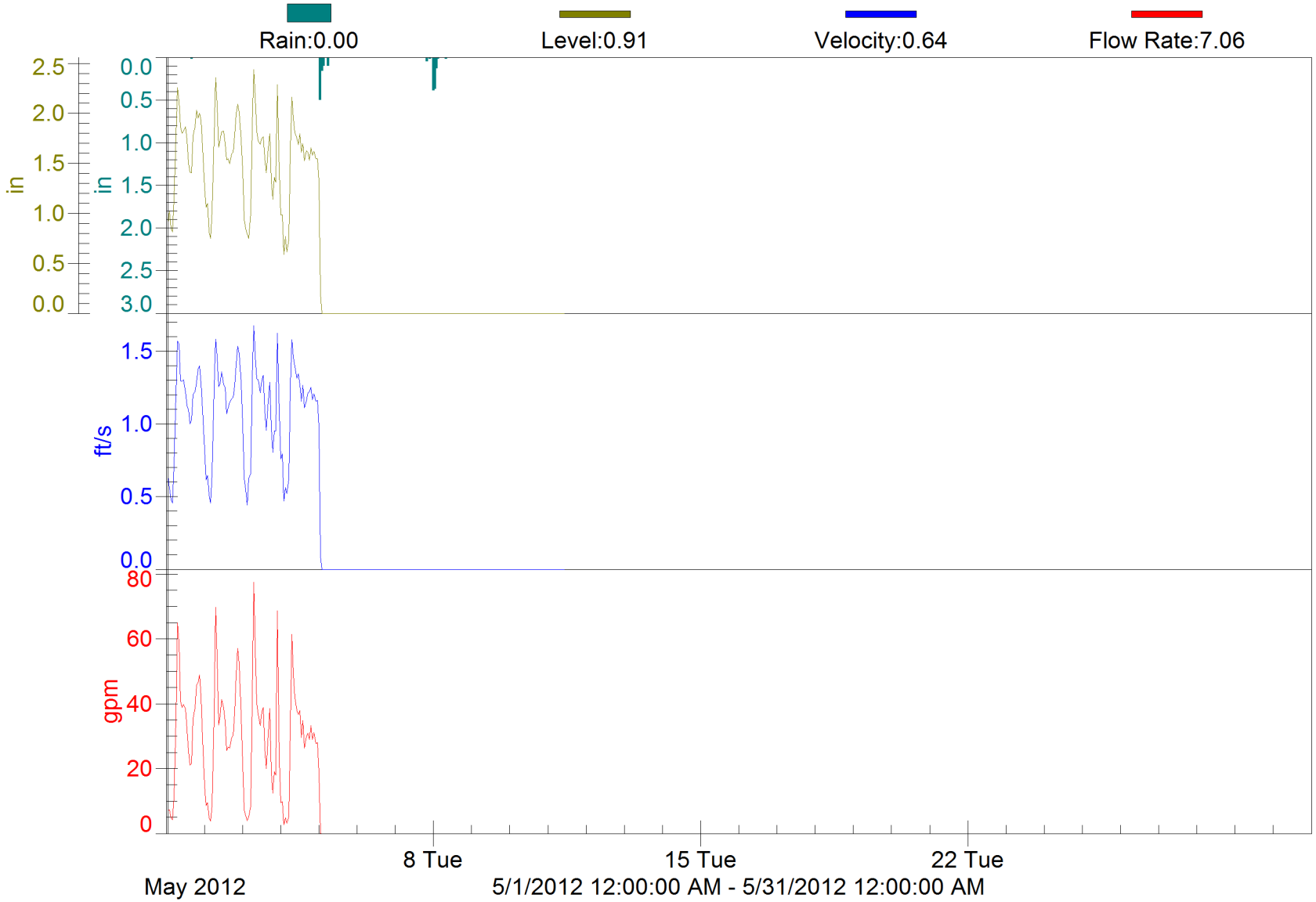
FM7 - 515 Royal Ridge Ct

Hydrograph



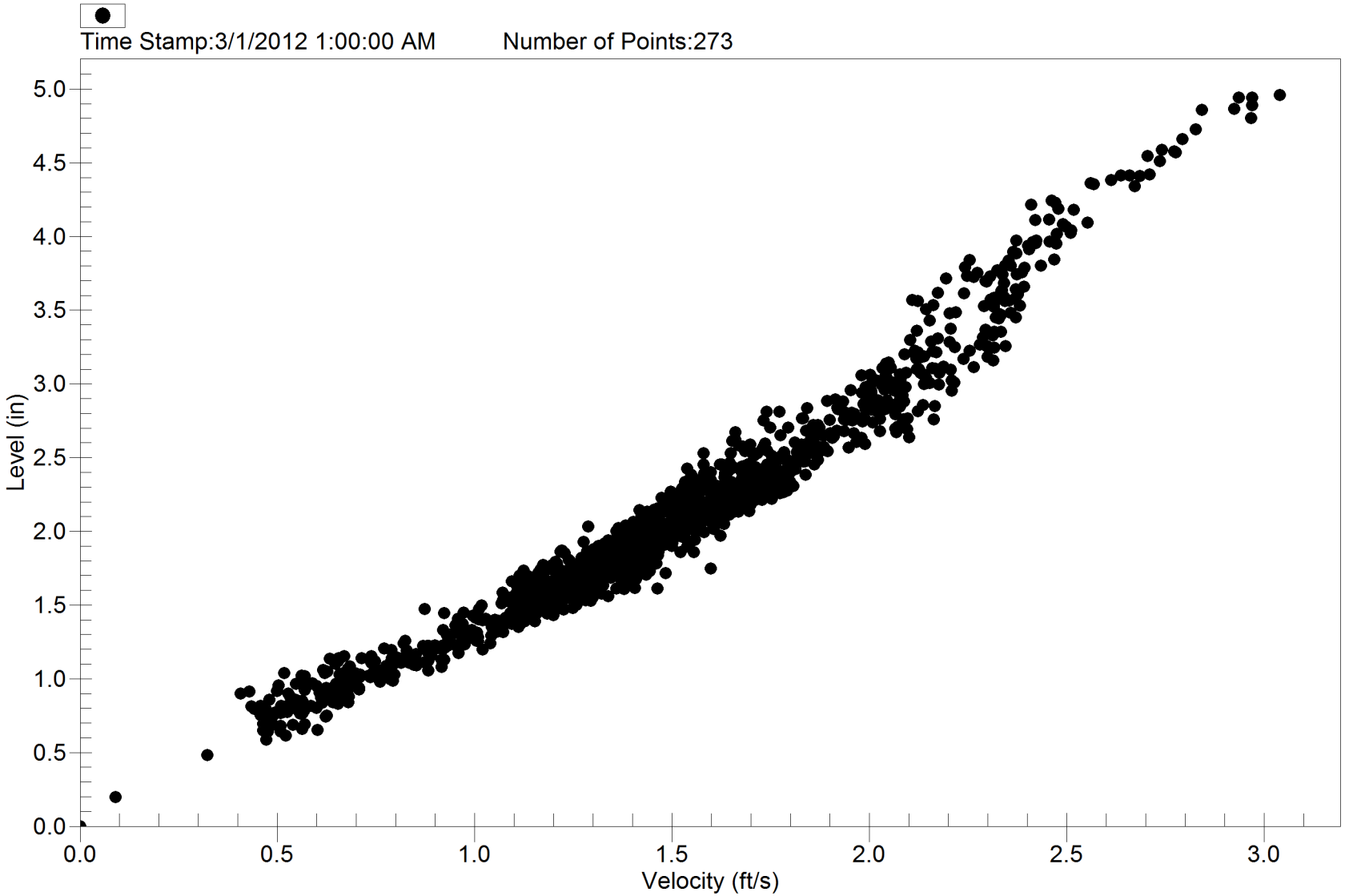
FM7 - 515 Royal Ridge Ct

Hydrograph



FM7 - 515 Royal Ridge Ct

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM8 - Paynes Mill Rd

This flow meter was installed on 3/1/2012 in manhole 2-01-375. This manhole is located in a field to the right of the lift station near the intersection of Paynes Mill Rd. and Lexington Rd., in an 18" round pipe. The dry weather flow depths typically ranged between 1.6" – 3.4" with a daily dry weather flow typically ranging between 30 gpm and 215 gpm. Beginning 3/8/12, approximately 1..27" of precipitation was recorded by the rain gauge over 9.3 hours. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 500 gpm. This site was given a grade of "B" at the time the monitor was installed because of potential backup from lift station.

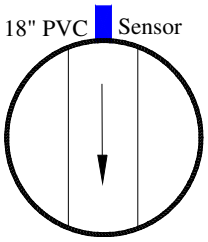
Outliers in level and velocity were manually adjusted to match the overall trend. An extended velocity dropout on April 5th was revised upward. Debris issues on April 16th and 17th were corrected by substituting in data from the same time frame on a similar day. A dip in velocity on the 8th and 9th of April was also revised upward.

There is no evidence of surcharging at this site, and only two instances of backwater, when the level exceeds 5" on March 8th and April 26th.

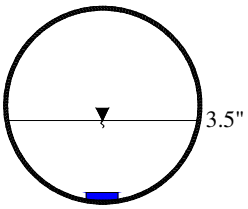
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

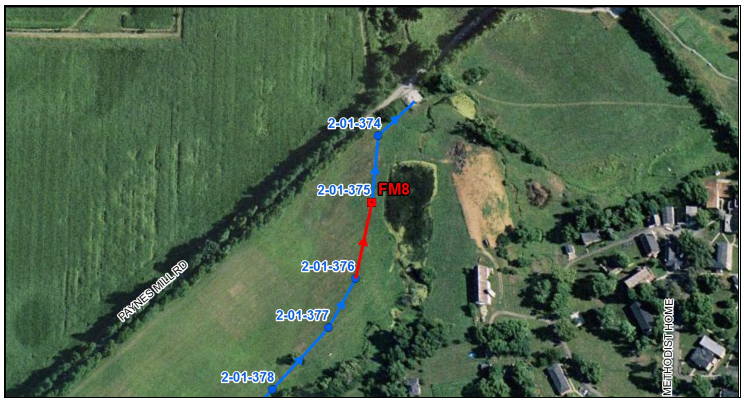
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 2-01-375	Pipe Shape: Round	Pipe Mat PVC	Pipe Size (in): 18
Site # / Site Name:	**FM8 / Paynes Mill Rd**		MH Depth (ft): 8
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Go to intersection of Paynes Mill Rd and Lexington Rd, turn onto Paynes Mill, go to lift station on your right, go into field on right side of LS and walk toward building on top of hill, you will see MH in field

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	3.5
Portable Vel. (fps):	1.87
Cycle (minutes):	5

Real-time Readings

Level (in):	3.409
Velocity (fps):	1.94
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Meter installed one manhole upstream from proposed location.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Decent flow, could experience backup from Lift Station.

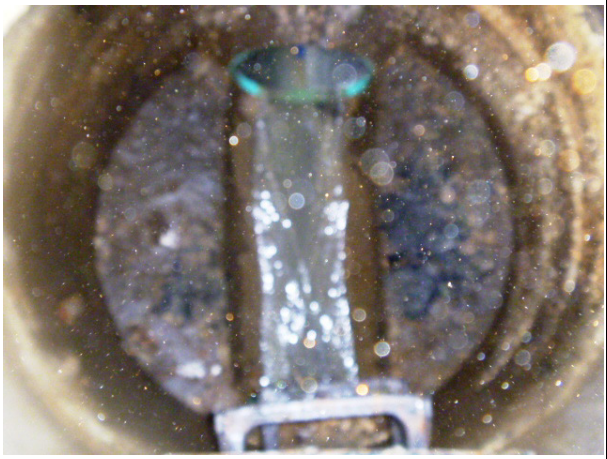
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM8 / Paynes Mill Rd**

Site Photos

FM8 - Area Photo



FM8 - Manhole Photo

FM8 - Connection Photo

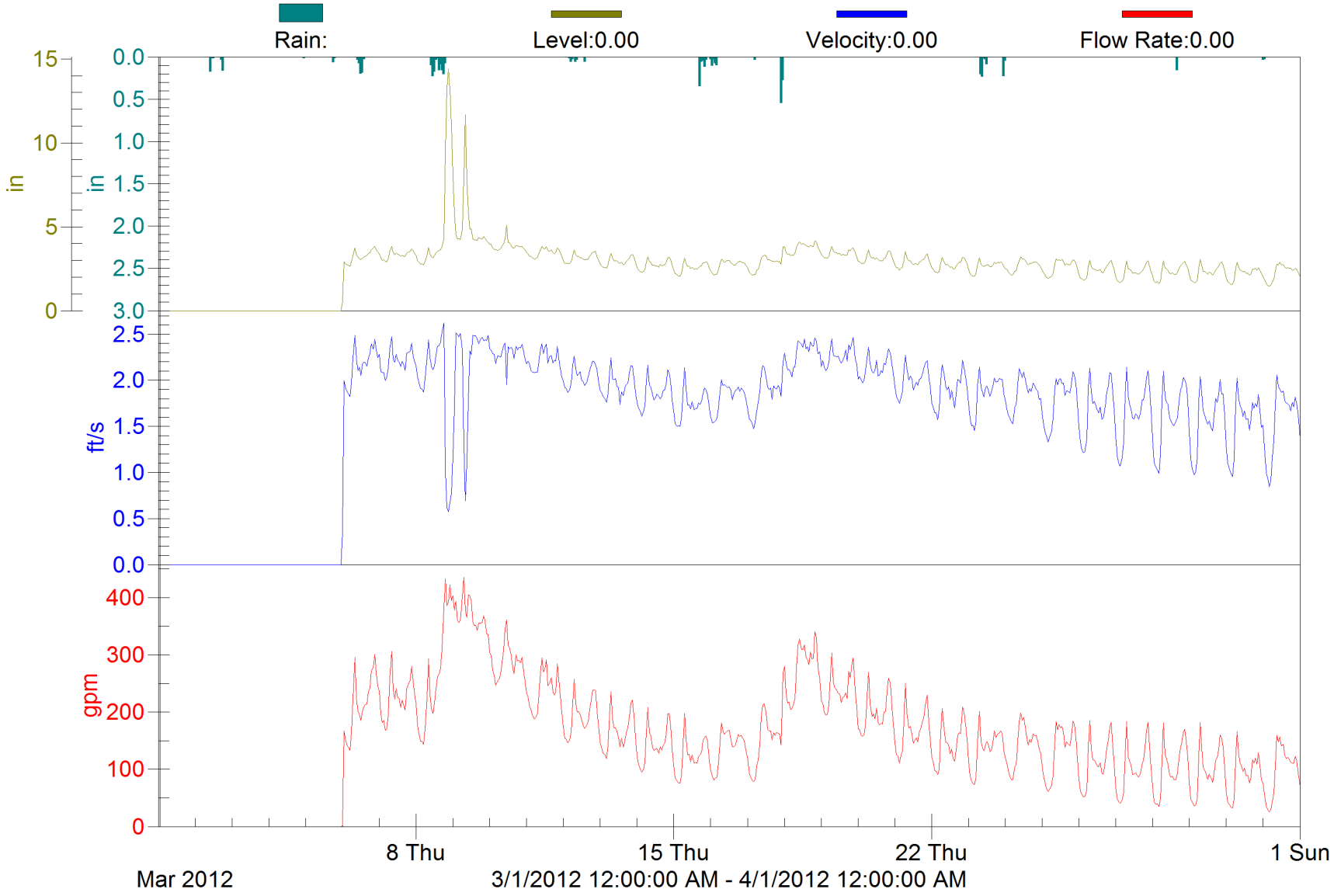
FM8 - Pipe Zoom Photo

FM8 - Measurement Photo

FM8 - Downstream Pipe Zoom Photo

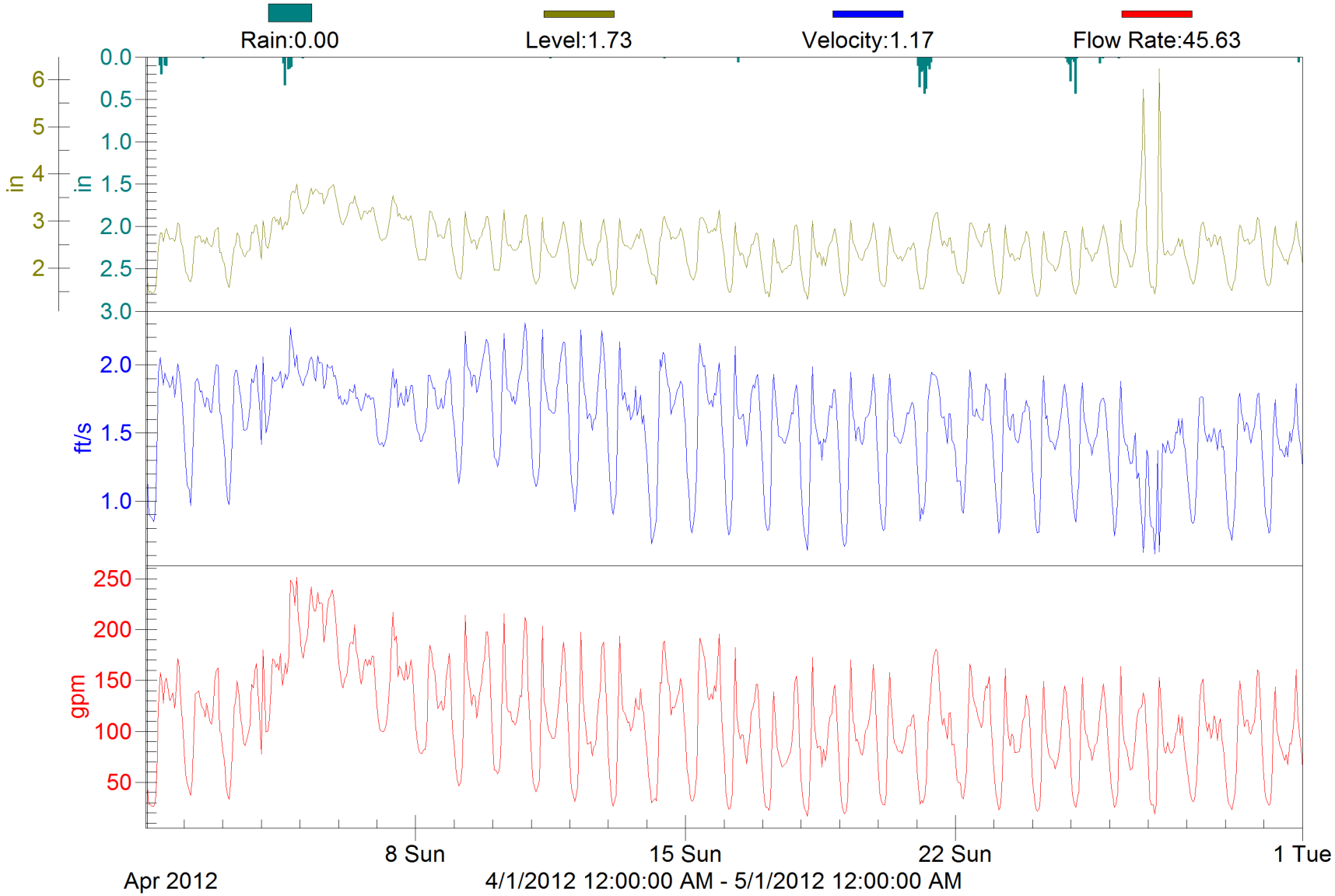
FM8 - Paynes Mill Rd

Hydrograph



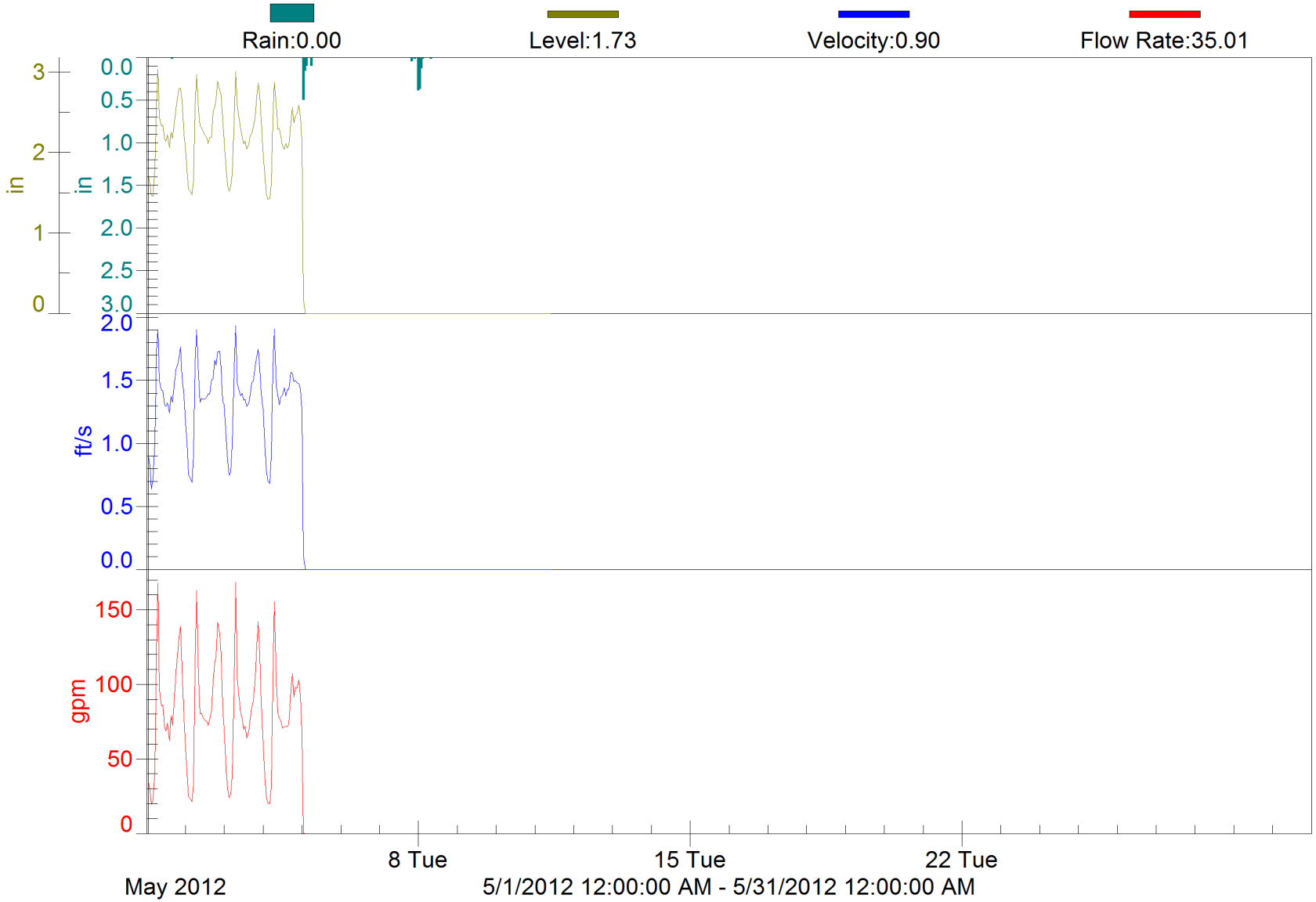
FM8 - Paynes Mill Rd

Hydrograph



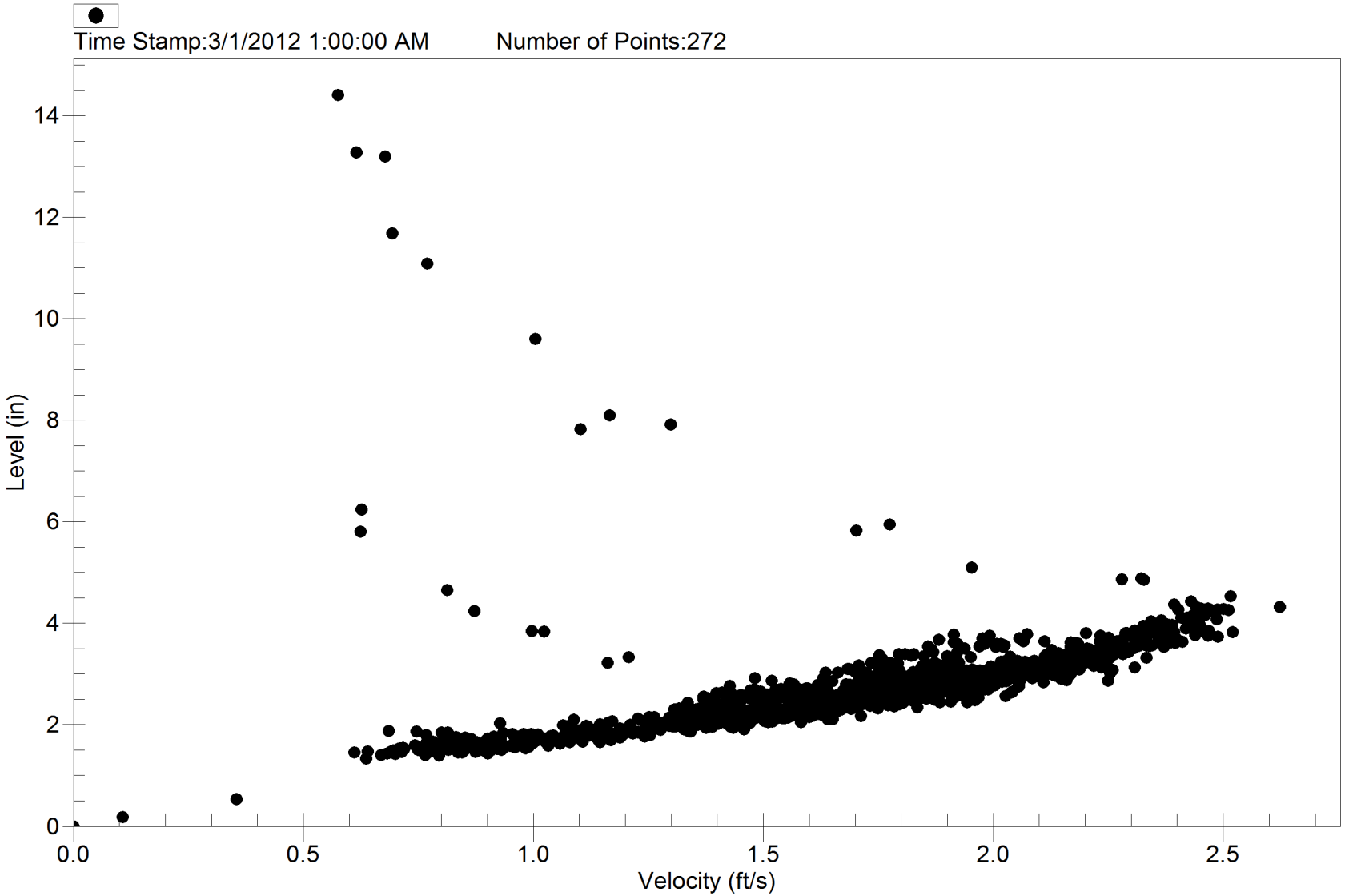
FM8 - Paynes Mill Rd

Hydrograph



FM8 - Paynes Mill Rd

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

FM9 - Maintenance Garage Gate

This flow meter was installed on 3/1/2012 in manhole 1-03-002. This manhole is located at the gate in the gravel road behind the City Maintenance Garage at 331 Kentucky Ave., in a 23" round pipe. The dry weather flow depths typically ranged between 4.2" – 7.9" with a daily dry weather flow typically ranging between 540 gpm and 1740 gpm. Beginning 3/17/12, approximately 0.83" of precipitation was recorded by the rain gauge over 1 hour. During this wet weather event, the meter recorded depth and velocity measurements that corresponded to a maximum flow rate of 4600 gpm. This site was given a grade of "B" at the time the monitor was installed due to some turbulence and a half-full monitored line.

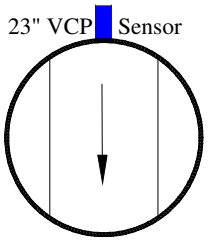
Several velocity outliers were adjusted to more closely match the overall trend.

There is evidence of backwater when the level exceeds 10" at this site during rain events in the collection period, but no surcharging. This evidence is apparent in both the hydrographs and the scatterplot.

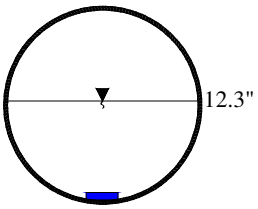
HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER OPENING SITE SHEET

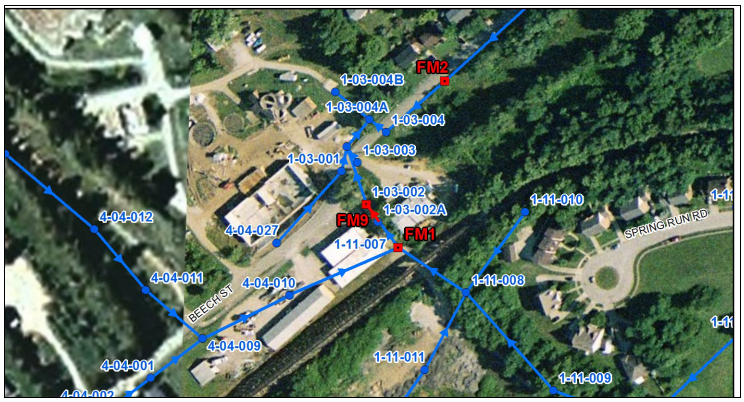
Project #: 1405	City Versailles, KY	Date: 3/1/2012	Installed By: DHTR
MH #: 1-03-002	Pipe Shape: Round	Pipe Mat VCP	Pipe Size (in): 23
Site # / Site Name:	**FM9 / Maintenance Garage Gate**		MH Depth (ft): 4
Site Quality: B	Meter Type: Sigma 910	Flow Meter Basin:	



Planar



Profile



Describe MH Location

(Roadway, Easement, Field, Sidewalk)

Manhole sits in gravel road at gate going behind the City Maintenance Garage near 331 Kentucky Ave

Site Hazards

Heavy Traffic?	No
H2S?	No
Insufficient O2?	No
LEL Exceeded?	No
Steps Hazardous?	No

Describe any potential hazards

Meter Setup

Measure Depth (in):	12.3
Portable Vel. (fps):	3.28
Cycle (minutes):	5

Real-time Readings

Level (in):	12.287
Velocity (fps):	3.17
Battery (volts):	6
Sensor Offset (in):	0
Meter Running?	Yes

Comments:

Moved Upstream from proposed location for better flow. We are now picking up only the flow from the opposite side of FM1. City is to verify this via CCTV.

Site Conditions

Surcharge Evidence?	Yes
Depth of Surcharge (ft):	0
Depth of Silt (in):	0

Comments:

Flow looks good but line is running half-full.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

FLOW METER
OPENING SITE SHEET

Site # / Site Name: **FM9 / Maintenance Garage Gate** ***Site Photos***

FM9 - Area Photo

FM9 - Manhole Photo

FM9 - Connection Photo

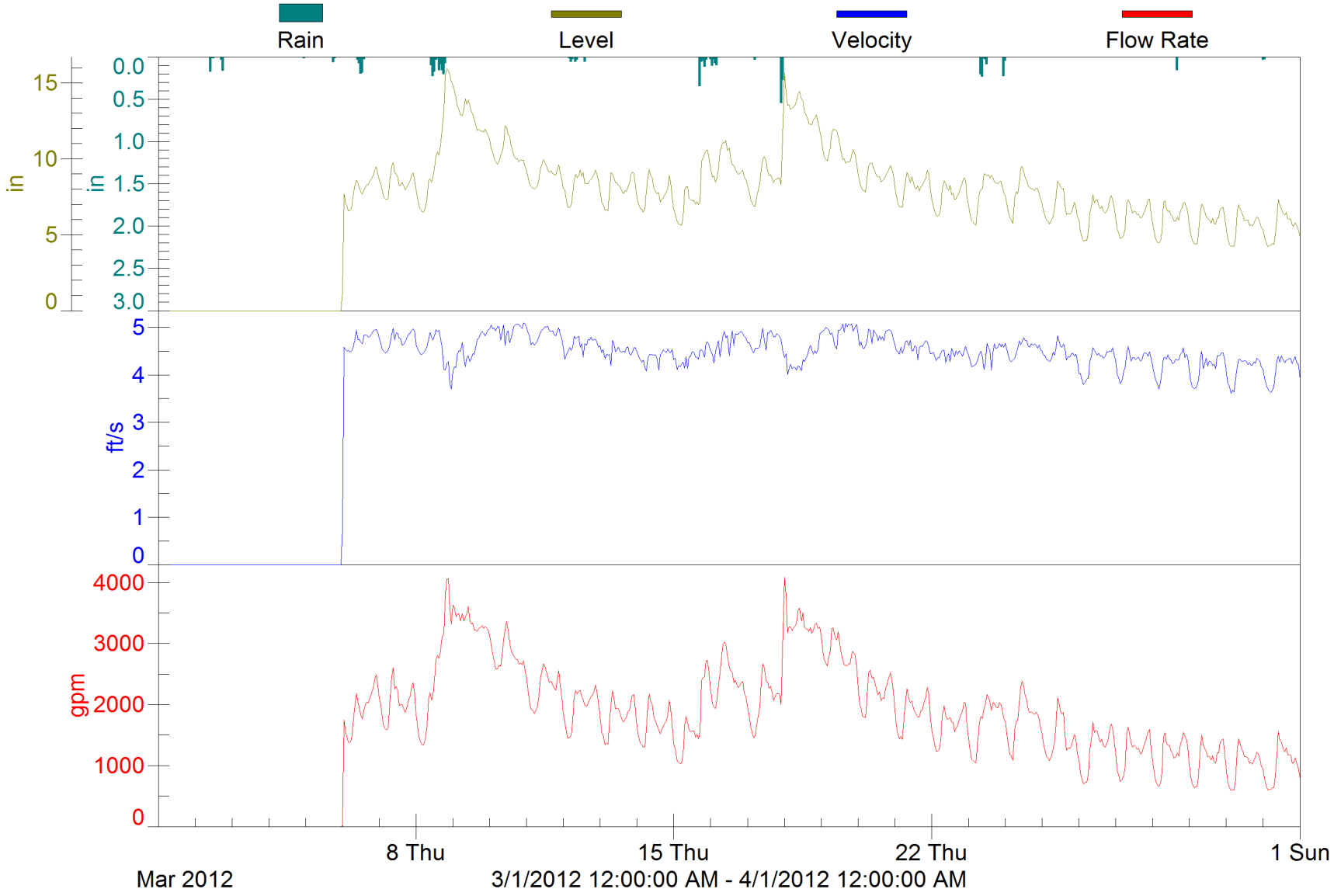
FM9 - Pipe Zoom Photo

FM9 - Measurement Photo

FM9 - Downstream Pipe Zoom Photo

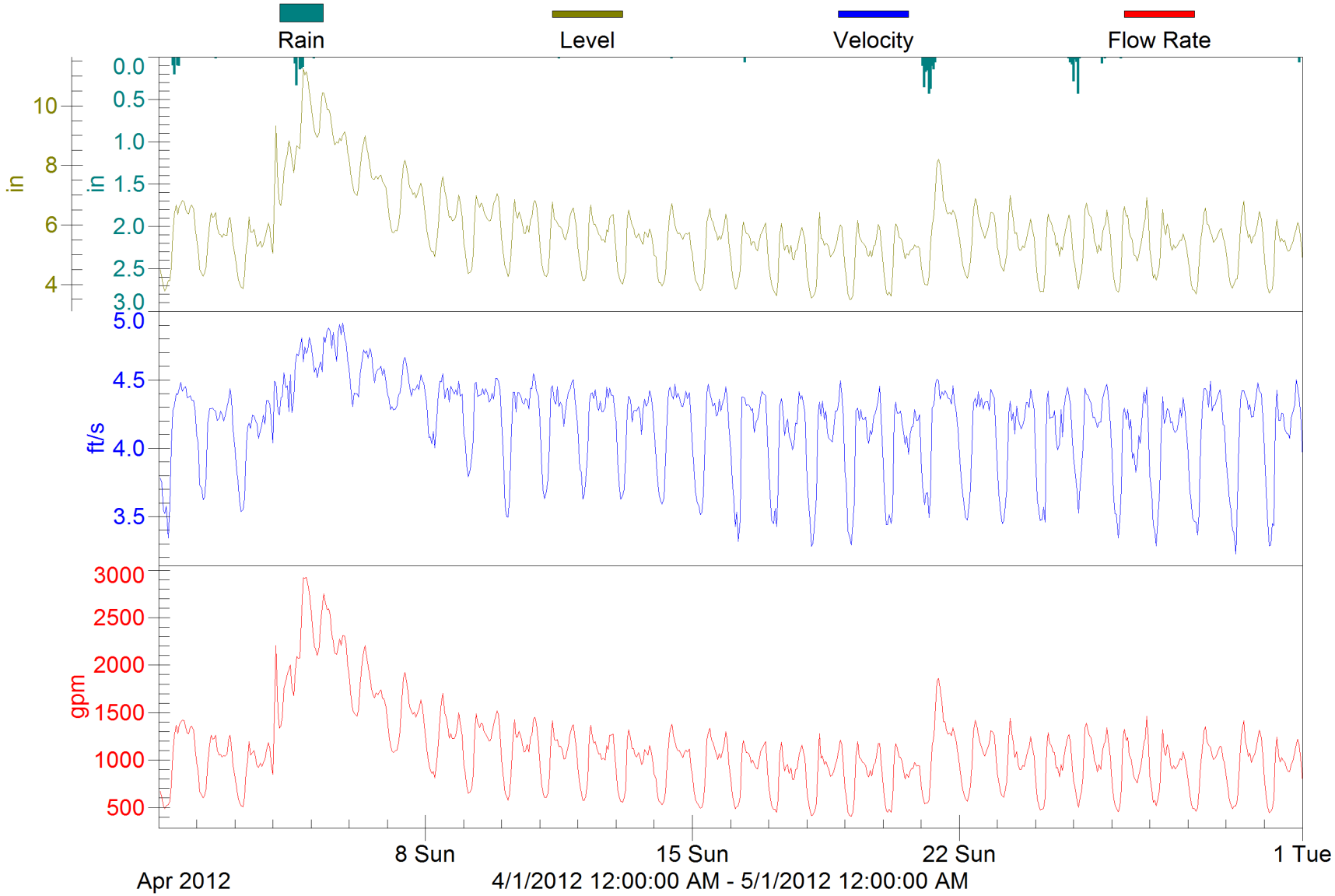
FM9 - Maintenance Garage Gate

Hydrograph



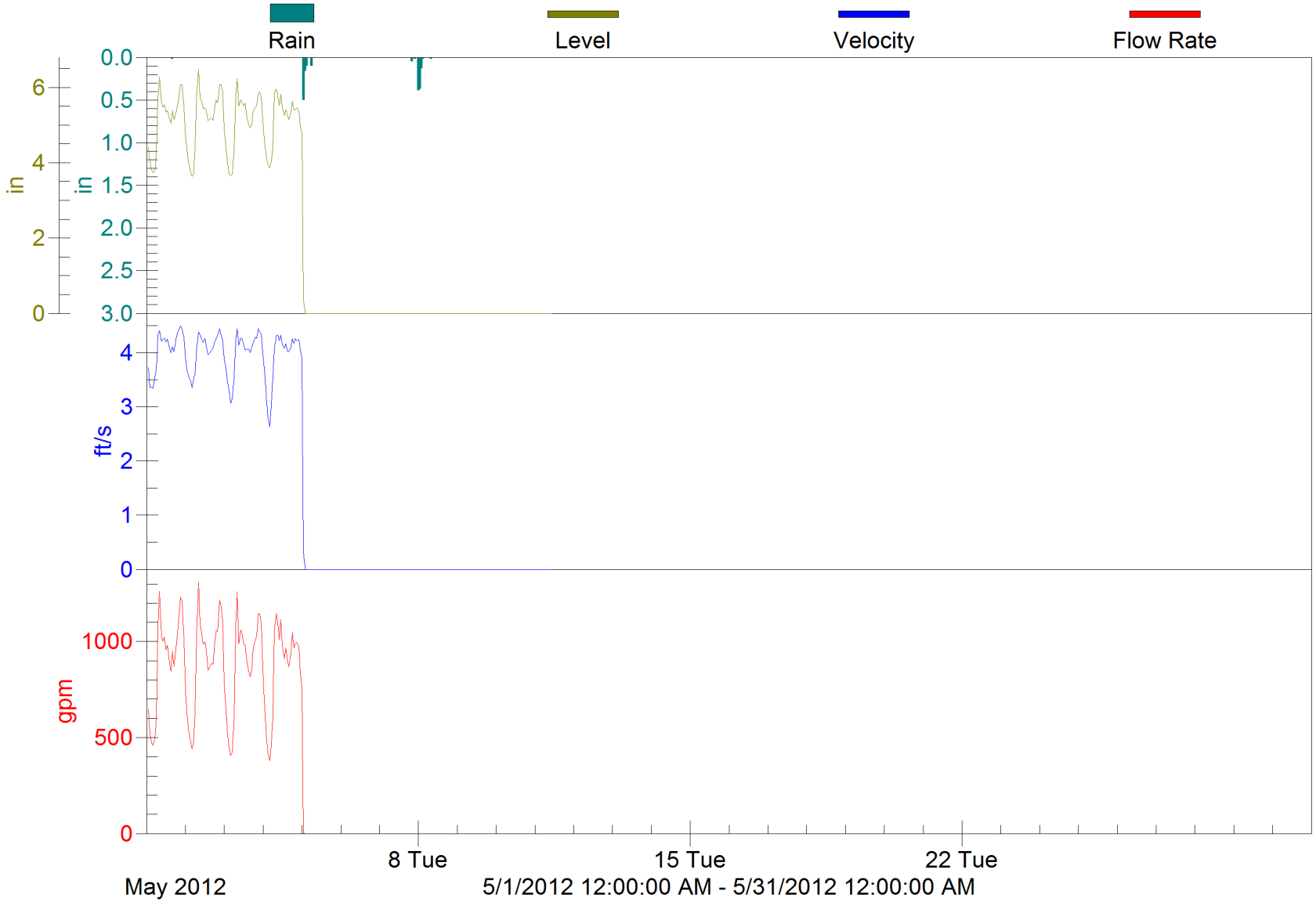
FM9 - Maintenance Garage Gate

Hydrograph



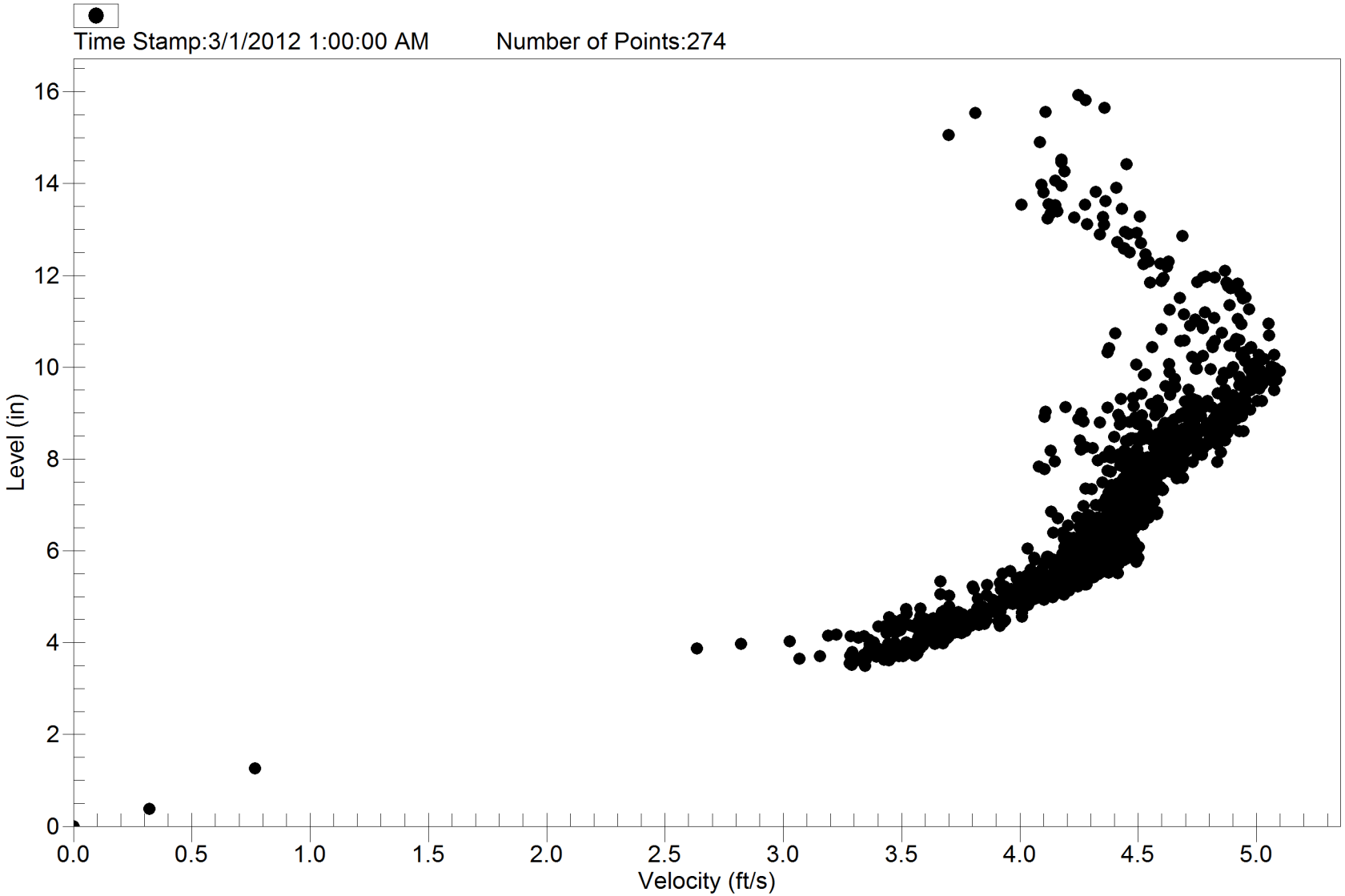
FM9 - Maintenance Garage Gate

Hydrograph



FM9 - Maintenance Garage Gate

Scatterplot



3/1/2012 12:00:00 AM - 6/1/2012 12:00:00 AM

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

SITE SUMMARY

Rain Gauge - 196 Main St.

This rain gauge meter was installed on 3/1/2012. The gauge was located on the roof of the utility office building at 196 Main St. There were 9 wet weather events that exceeded 0.5".

One of the wet weather events recorded during the monitoring period had a return frequency equal to or greater than one year. The rainfall of 4/21/12 occurred over approximately 7.75 hours. This is a 1 year return frequency event according to Technical Paper No. 40, produce by the U.S. Dept. of Commerce Weather Bureau

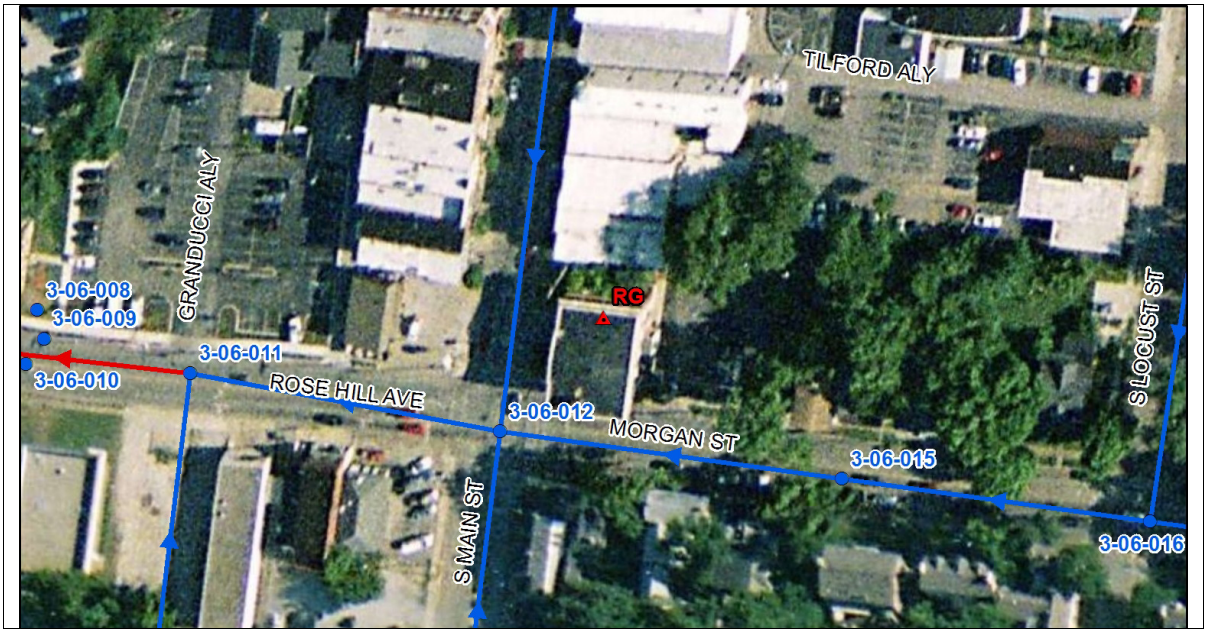
- Beginning 3/6/2012, 0.55" of precipitation fell over a 5 hour period.
- Beginning 3/8/2012, 1.27" of precipitation fell over a 9.25 hour period.
- Beginning 3/15/2012, 0.97" of precipitation fell over an 11.25 hour period.
- Beginning 3/17/2012, 0.83" of precipitation fell over a 1 hour period.
- Beginning 3/23/2012, 0.59" of precipitation fell over a 4.25 hour period.
- Beginning 4/1/2012 , 0.52" of precipitation fell over a 4.5 hour period.
- Beginning 4/4/2012, 0.83" of precipitation fell over a 5 hour period.
- Beginning 4/21/2012, 1.96" of precipitation fell over a 7.75 hour period. (1-year Event)
- Beginning 4/23/2012, 1.02" of precipitation fell over a 6.75 hour period.

HYDROMAX USA
Advanced Water and Wastewater Pipeline Data Collection

RAIN GAUGE
OPENING SITE SHEET

Project #: 1405	City: Versailles, KY	Date: 3/1/2012	Installed By: DHTR
Site # / Location Name:	Rain Gauge / 196 Main St.		

Site Description:	Site Hazards:	Site Condition Comments:
Rain Gauge sits on the roof of the utility office building located at 196 Main St	Use ladder for roof access from the closet located up the main stairs.	



Appendix F

Appendix F

KPDES Permit

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

April 15, 2009

Mr. Roy C. Ferguson
City of Versailles
196 South Main Street
Versailles, Kentucky 40384

Re: Versailles Wastewater Treatment Plant
KPDES No.: KY0020621
AI No.: 4246
Woodford County, Kentucky

Dear Mr. Ferguson:

Enclosed is the Kentucky Pollutant Discharge Elimination System (KPDES) permit for the above-referenced facility. This action constitutes a final permit issuance under 401 KAR 5:075, pursuant to KRS 224.16-050.

This permit will become effective on the date indicated in the attached permit provided that no request for adjudication is granted. All provisions of the permit will be effective and enforceable in accordance with 401 KAR 5:075, unless stayed by the Hearing Officer under Sections 11 and 13.

Any demand for a hearing on the permit shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470 and any regulations promulgated thereto. Any person aggrieved by the issuance of a permit final decision may demand a hearing, pursuant to KRS 224.10-420(2), within thirty (30) days from the date of the issuance of this letter. Two (2) copies of request for hearing should be submitted in writing to the Energy and Environment Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Energy and Environment Cabinet, Division of Water, 200 Fair Oaks Lane, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

If you have any questions regarding the KPDES decision, please contact Dan Juett, Operational Permits Section, Surface Water Permits Branch, at (502) 564-8158, extension 4894.

Further information on procedures and legal matters pertaining to the hearing request may be obtained by contacting the Office of Administrative Hearings at (502) 564-7312.

Sincerely,

Sandra L. Gruzesky, Director
Division of Water

SLG:TJB:tjb
Enclosure
c: Division of Water

KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0020621
AI NO.: 4246

AUTHORIZATION TO DISCHARGE UNDER THE KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

City of Versailles
196 South Main Street
Versailles, Kentucky 40384

is authorized to discharge from a facility located at

Versailles Wastewater Treatment Plant
338 Kentucky Avenue
Versailles, Woodford County, Kentucky

to receiving waters named

Glenns Creek at mile point 12.4

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, III, IV, and V hereof. The permit consists of this cover sheet, and Part I 2 pages, Part II 6 pages, Part III 5 pages, Part IV 3 pages, and Part V 3 pages.

This permit shall become effective on June 1, 2009.

This permit and the authorization to discharge shall expire at midnight, May 31, 2014.

April 15, 2009
Date Signed

Sandra L. Gruzesky, Director
Division of Water

A1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 001 - Sanitary Wastewater (Design Flow = 3.0 MGD)

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS (lbs/day) Monthly Avg.	Daily Max.	Other Units (Specify) Monthly Avg.	Daily Max.	MONITORING REQUIREMENTS Measurement Frequency	Sample Type
Effluent Flow (MGD)	Report	Report	N/A	N/A	Continuous	Recorder
Influent Flow (MGD)	Report	Report	N/A	N/A	1/Week	Instantaneous
Effluent $CBOD_5$ (mg/l)	500	751	20	30	1/Week	24 Hr Composite
Influent $CBOD_5$ (mg/l)	Report	Report	Report	Report	1/Week	24 Hr Composite
Percent Removal $CBOD_5$ (%)			85 or greater		1/Month	Calculated
Effluent TSS (mg/l)	751	1126	30	45	1/Week	24 Hr Composite
Influent TSS (mg/l)	Report	Report	Report	Report	1/Week	24 Hr Composite
Percent Removal TSS (%)			85 or greater		1/Month	Calculated
Ammonia Nitrogen (as mg/l N)						
May 1 - October 31	100	150	4.0	6.0	1/Week	24 Hr Composite
November 1 - April 30	250	375	10.0	15.0	1/Week	24 Hr Composite
Escherichia Coli (N/100 ml)	N/A	N/A	130	240	1/Week	Grab
Dissolved Oxygen (mg/l) (minimum)	N/A	N/A	Not less than 7.0		1/Week	Grab
pH (standard units)	N/A	N/A	6.0 (min)	9.0 (max)	1/Week	Grab
Total Residual Chlorine (mg/l)	N/A	N/A	0.011	0.019	1/Week	Grab
Total Phosphorus (mg/l)	N/A	N/A	Report	Report	1/Week	24 Hr Composite
Total Nitrogen (mg/l)	N/A	N/A	Report	Report	1/Week	24 Hr Composite
Chronic Toxicity (TU_c)	N/A	N/A	N/A	1.00	1/Quarter	3 24 Hr Composite

The abbreviation $CBOD_5$ means Carbonaceous Biochemical Oxygen Demand (5-day).
The abbreviation TSS means Total Suspended Solids.
The abbreviation N/A means Not Applicable.
The effluent limitations for $CBOD_5$ and TSS are Monthly (30 day) and Weekly (7 day) Averages.
The effluent limitations for *Escherichia Coli* are thirty (30) day and seven (7) day Geometric Means.
Total Nitrogen is to be reported as the summation of the analytical results for Total Nitrates, Total Nitrites, and Total Kjeldahl Nitrogen.
There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with all requirements on the effective date of this permit.

STANDARD CONDITIONS FOR KPDES PERMIT

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

The following KPDES permit conditions apply to all discharges authorized by this permit pursuant to 401 KAR 5:065, Section 1.

(1) Duty to comply.

(a) General requirement.

The permittee shall comply with all conditions of this permit. Any permit noncompliance shall constitute a violation of KRS Chapter 224, among which shall be the following remedies: enforcement action, permit revocation, revocation and reissuance, or modification; or denial of a permit renewal application.

(b) Specific duties.

1. The permittee shall comply with effluent standards or prohibitions established under 40 CFR Part 129 as of July 1, 2001, as adopted without change, within the time provided in the federal regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

2. Any person who violates a permit condition as set forth in the KPDES administrative regulations shall be subject to penalties under KRS 224.99-010(1) and (4).

(2) Duty to reapply.

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit as required in 401 KAR 5:060, Section 1.

(3) Need to halt or reduce activity not a defense.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

(4) Duty to mitigate.

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(5) Proper operation and maintenance.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control and related appurtenances which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also shall include adequate laboratory controls, and appropriate quality assurance procedures. This provision shall require the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only if the operation is necessary to achieve compliance with the conditions of the permit.

(6) Permit actions.

The permit may be modified, revoked and reissued, or revoked for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or revocation, or a notification of planned changes or anticipated noncompliance, shall not stay any permit condition.

(7) Property rights.

This permit shall not convey any property rights of any kind, or any exclusive privilege.

(8) Duty to provide information.

The permittee shall furnish to the cabinet, within a reasonable time, any information which the cabinet may request to determine whether cause exists for modifying, revoking and reissuing, or revoking this permit, or to determine compliance with this permit. The permittee shall also furnish to the cabinet, upon request, copies of records required to be kept by this permit.

(9) Inspection and entry.

The permittee shall allow the cabinet, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records pertinent to the KPDES program are or may be kept;

(b) Have access to and copy, at reasonable times, any records that are required to be kept under the conditions of this permit;

(c) Inspect at reasonable times any facilities, equipment, including monitoring and control equipment, practices, or operations regulated or required under this permit; and

(d) Sample or monitor at reasonable times, for the purposes of assuring KPDES program compliance or as otherwise authorized by KRS Chapter 224, any substances or parameters at any location.

(10) Monitoring and records.

(a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the cabinet at any time.

(c) Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The individuals who performed the sampling or measurements;
3. The dates analyses were performed;
4. The individuals who performed the analyses;
5. The analytical techniques or methods used; and
6. The results of the analyses.

(d) Monitoring shall be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit.

(e) Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be subject to penalties under KRS 224.99-010(4).

(11) Signatory requirement.

All applications, reports, or information submitted to the cabinet shall be signed and certified as indicated in 401 KAR 5:060, Section 9. Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be subject to penalties under KRS 224.99-010(4).

(12) Reporting requirements.

(a) Planned changes.

The permittee shall give notice to the cabinet as soon as possible of any planned physical alteration or additions to the permitted facility. Notice shall be required only if:

1. The alteration or addition to a permitted facility may meet one (1) of the criteria for determining whether a facility is a new source in 401 KAR 5:080, Section 5; or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification only applies to pollutants which are subject either to effluent limitations in the permit, or to notification requirements under 401 KAR 5:080, Section 5.

(b) Anticipated noncompliance.

The permittee shall give advance notice to the cabinet of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) Transfers.

The permit shall not be transferable to any person except after notice to the cabinet. The cabinet may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate other requirements as may be necessary under KRS Chapter 224.

(d) Monitoring reports.

Monitoring results shall be reported at the intervals specified in the permit. Monitoring results shall be reported as follows:

1. Monitoring results shall be reported on a Discharge Monitoring Report (DMR).

2. If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

3. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the cabinet in the permit.

(e) Compliance schedules.

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date.

(f) Twenty-four (24) hour reporting.

The permittee shall follow the provisions of 401 KAR 5:015 and shall orally report any noncompliance which may endanger health or the environment, within twenty-four (24) hours from the time the permittee becomes aware of the circumstances. This report shall be in addition to and not in lieu of any other reporting requirement applicable to the noncompliance. A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The cabinet may waive the written report on a case-by-case basis if the oral report has been received within twenty-four (24) hours. The following shall be included as events which shall be reported within twenty-four (24) hours:

1. Any unanticipated bypass which exceeds any effluent limitation in the permit, as indicated in subsection (13) of this section.
2. Any upset which exceeds any effluent limitation in the permit.
3. Violation of a maximum daily discharge limitation for any of the pollutants listed by the cabinet in the permit to be reported within twenty-four (24) hours, as indicated in Section 2(7) of this administrative regulation.

(g) Other noncompliance.

The permittee shall report all instances of noncompliance not reported under paragraphs (d), (e), and (f) of this subsection, when monitoring reports are submitted. The reports shall contain the information listed in paragraph (f) of this subsection.

(h) Other information.

Where the permittee becomes aware that it failed to submit any relevant fact in a permit application, or submitted incorrect information in a permit application or in any report to the cabinet, it shall promptly submit these facts or information.

(13) Occurrence of a bypass.

(a) Bypass not exceeding limitations.

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. This type of bypass shall not be subject to the provisions of paragraphs (b) and (c) of this subsection.

(b) Notice.

1. Anticipated bypass.

If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of the bypass. Compliance with this requirement constitutes compliance with 401 KAR 5:015, Section 1.
2. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in subsection (12)(f) of this section, twenty-four (24) hour notice. Compliance with this requirement constitutes compliance with 401 KAR 5:015, Section 4.

(c) Prohibition of a bypass.

1. Bypassing shall be prohibited, and the cabinet may take enforcement action against a permittee for bypass, unless:

a. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition shall not be satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The permittee submitted notices as required under paragraph (b) of this subsection.

2. The cabinet may approve an anticipated bypass, after considering its adverse effects, if the cabinet determines that it will meet the three (3) conditions listed in subparagraph 1a, b, and c of this paragraph.

(14) Occurrence of an upset.

(a) Effect of an upset.

An upset constitutes an affirmative defense to an action brought for noncompliance with technology-based permit effluent limitations if the requirements of paragraph (b) of this subsection are met.

(b) Conditions necessary for a demonstration of an upset.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the permittee can identify the causes of the upset;
2. The permitted facility was at the time being properly operated;
3. The permittee submitted notice of the upset as required in subsection (12)(f) of this section; and
4. The permittee complied with any remedial measures required under subsection (4) of this section.

(c) Burden of proof.

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset shall have the burden of proof.

(15) Additional conditions applicable to specified categories of KPDES permits.

The following conditions, in addition to others set forth in this administrative regulation, shall apply to all KPDES permits within the categories specified below:

(a) Existing manufacturing, commercial, mining, and silvicultural dischargers.

In addition to the reporting requirements under subsections (12), (13), and (14) of this section, any existing manufacturing, commercial, mining, and silvicultural discharger shall notify the cabinet as soon as it knows or has reason to know:

1. That any activity has occurred or will occur which would result in the discharge on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"

a. 100 micrograms per liter (100 µg/l);

b. 200 micrograms per liter (200 µg/l) for acrolein and acrylonitrile; 500 micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one (1) milligram per liter (1 mg/l) for antimony;

c. Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 401 KAR 5:060, Section 2(7);

d. The level established by the cabinet in accordance with Section 2(6) of this administrative regulation.

2. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"

a. 500 micrograms per liter (500 µg/l);

b. One (1) milligram per liter (1 mg/l) for antimony;

c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 401 KAR 5:060, Section 2(7); or

d. The level established by the cabinet in accordance with Section 2(6) of this administrative regulation.

(b) POTWs.

1. POTWs shall provide adequate notice to the cabinet of the following:

a. Any new introduction of pollutants into that POTW from an indirect discharger which would be subject to the KPDES administrative regulations if it were directly discharging those pollutants; or

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

2. For purposes of this paragraph, adequate notice shall include information on the quality and quantity of effluent introduced into the POTWs and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

F. Outfall Signage

The permittee shall post a permanent marker at all discharge locations and/or monitoring points. The marker shall be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and shall be posted as near as possible to the actual sampling location.

G. Necessity to Develop and Implement a Pretreatment Program

POTWs which meet one or more of the following criteria are required to develop, submit for approval, and implement specific Pretreatment Program Requirements.

A POTW or combination of POTWs operated by the same authority, with a total design flow greater than five (5) million gallons per day (MGD) and receiving from industrial users which pass through interfere with the operation of the POTW, or are otherwise subject to pretreatment standards.

A POTW with a design flow of five (5) MGD or less shall develop a pretreatment program if the cabinet determines that the nature or volume of the industrial wastewater, treatment process upsets, violation of the POTW effluent limitations, contamination of municipal sludge or other circumstances warrant to prevent interference with the POTW or pass through.

The permittee shall conduct annual sewer user surveys to determine if conditions warrant the development and implementation of a pretreatment program. An annual report listing the industrial users, the manufacturing processes, the nature and volume of flow and any problems caused by the users shall be submitted no later than December 31 of each year, unless otherwise specified by the Division of Water.

H. Prohibited Discharges

The following are prohibit from being discharged to the POTW.

Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW);

Pollutants which will cause corrosive structural damage to the POTW, but in no case, discharges with a pH lower than 5.0;

Solid or viscous pollutants in amounts which will cause obstruction to the flow in sewers, or other interference with operation of the POTW;

Any pollutant, including oxygen demanding pollutants (BOD_5, etc.), released in a discharge at such a volume or strength as to cause interference in the POTW;

Heat in amounts, which will inhibit biological activity in the POTW, but in no case, heat in such quantities that the influent to the sewage treatment works exceeds 104° F (40° C);

Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass-through;

Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and,

Any trucked or hauled waste except, at discharge points designated by the POTW.

I. Approved Pretreatment Program

In accordance with the requirements of 401 KAR 5:057, Section 8 the Division of Water approved the Pretreatment Program developed by the permittee on June 11, 1990. Therefore pursuant to the requirements of 401 KAR 5:057, Section 6(3) the conditions of the approved pretreatment program are hereby incorporated into the permit as enforceable conditions of the permit.

PART III

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each monitoring period must be reported on a preprinted Discharge Monitoring Report (DMR) Form that will be mailed to you. The completed DMR for each monitoring period must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the monitoring period for which monitoring results were obtained.

Division of Water
Frankfort Regional Office
643 Teton Trail, Suite B
Frankfort, Kentucky 40601
ATTN: Supervisor

Division of Water
Surface Water Permits Branch
Permit Support Section
200 Fair Oaks Lane
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 through 5:086, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

C. Sludge Disposal

The disposal or final use of sewage sludge generated during the treatment of domestic sewage in a treatment works shall be disposed of in accordance with federal requirements specified in 40 CFR Part 503 and state requirements specified in Division of Waste Management regulations 401 KAR Chapter 45.

D. Certified Operators

This wastewater system shall be operated under the supervision of a Class III Kentucky Certified Operator who shall be reasonably available at all times. All other operators employed by the system shall hold a Kentucky Certificate or shall be in the process of obtaining a Kentucky Certificate. The certificates of each operator shall be prominently displayed on the wall of the system office.

E. Monthly Operating Reports

In addition to the monitoring of effluent as specified by the permit the permittee shall conduct process control monitoring on a daily basis and record the data on a Monthly Operating Report (MOR) which shall be submitted with the Discharge Monitoring Reports. Process control monitoring is that monitoring performed by the operators of the wastewater treatment plant to determine if the wastewater system is operating at its optimum efficiency. This monitoring includes but is not limited to influent and effluent quality and quantity monitoring, chemical usage, sludge monitoring including volume produced, wasted, and disposed, and monitoring of internal units such as aeration basins and oxidation ditches.

I. Approved Pretreatment Program - continued

Program Requirements

1. The permittee shall be responsible for the performance of all pretreatment requirements contained in 401 KAR 5:057, Section 6, and pursuant to 40 CFR Part 403, and shall be subject to enforcement actions, penalties, fines, and other remedies by the state, as provided in the Clean Water Act (hereafter the "Act"). The permittee shall implement and enforce its approved POTW pretreatment program. The permittee's approved POTW pretreatment program is hereby made an enforceable condition of this permit. The state may initiate enforcement action against a POTW and against an industrial user for noncompliance with applicable standards and requirements as provided in KRS 224.16-050(1), 224.70-110, and 224.73-120, and pursuant to the Act.

2. The permittee shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(b) of the Act. The permittee shall cause industrial users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge.

Program Requirements

3. The permittee shall perform the pretreatment functions as required in 401 KAR 5:057, Section 6 and 40 CFR Part 403 including, but not limited to:

   a. Implement the necessary legal authorities as provided in 401 KAR 5:057, Section 6(4)(a). This includes, among other things, the authority to:

      (1) Deny or condition new or increased contributions of pollutants or changes in the nature of pollutants (401 KAR 5:057, Section 6(4)(a)(1));
      (2) Require compliance with applicable pretreatment standards (401 KAR 5:057, Section 6(4)(a)(2));
      (3) Control through permit to ensure compliance (401 KAR 5:057, Section 6(4)(a)(3));
      (4) Require the development of compliance schedules and submission of reports (401 KAR 5:057, Section 6(4)(a)(4));
      (5) Carry out inspection, surveillance, and monitoring procedures (401 KAR 5:057, Section 6(4)(a)(5));
      (6) Obtain remedies for noncompliance by industrial users (401 KAR 5:057, Section 6(4)(a)(6)).

   b. Implement the programmatic functions as provided in 401 KAR 5:057, Section 6(4)(b). This includes:

      (1) An industrial waste survey (401 KAR 5:057, Section 6(4)(b)(1 and 2));
      (2) Notification of appropriate federal, state and/or local standards or limitations (401 KAR 5:057, Section 6(4)(b)(3));
      (3) Receipt and analysis of self-monitoring reports and other notices, (401 KAR 5:057, Section 6(4)(b)(4));
      (4) POTW compliance sampling and analysis (401 KAR 5:057, Section 6(4)(b)(5));
      (5) Noncompliance investigations and enforcement (401 KAR 5:057, Section 6(4)(b)(6));
      (6) Public participation (401 KAR 5:057, Section 6(4)(b)(7)).

   c. Provide the required funding, equipment, and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3) and 403.9(b)(4).

I. Approved Pretreatment Program - continued

4. The permittee shall adopt and enforce local limits that will protect the treatment works against interference, pass-through, and sludge contamination. Local limits shall be revised as necessary by the permittee as provided in 40 CFR 122.21 and CFR 403.5.

Semi-Annual Reporting

1. The permittee shall submit semi-annually a pretreatment report to the state. The report due on March 1st shall describe the permittee's pretreatment program activities over the previous year and shall cover the period January through December. The report due on September 1st shall describe the permittee's pretreatment program activities over the previous six (6) months and shall cover the period January through June. In the event that the permittee is not in compliance with any conditions or requirements of this permit, then the permittee shall also include the reasons for noncompliance and state how and when the permittee shall comply with such conditions and requirements. Each report shall contain, but not be limited to, the following information:

Semi-Annual Reporting - continued

a. Analytical results of the POTW's influent, effluent, and sludge (including sludge from lagoons) annually, by the 28th of January, for those pollutants identified under Section 307(a) of the Act which are known or suspected to be discharged by industrial users, and for any non-priority pollutants which the permittee believes may be causing or contributing to interference, pass-through, or adversely impacting sludge quality. The report shall include all pollutants identified in Part D of Form A (Revised November 2003). The frequency of analysis shall not exceed twelve months.

b. A discussion of upset, interference, or pass-through incidents, if any, at the POTW treatment plant which the permittee knows or suspects were caused by industrial users of the POTW system. The discussion shall include the reasons why the incidents occurred, the corrective actions taken and, if known, the name and address of the industrial user(s) responsible.

c. The cumulative number of industrial users that the permittee has notified regarding baseline monitoring reports and the cumulative number of industrial user responses.

d. An updated list of the permittee's industrial users including their names and addresses, or a list of deletions and additions keyed to a previously submitted list. The permittee shall provide a brief explanation for each deletion. The list shall identify the industrial users subject to federal categorical standards and which set(s) of standards are applicable. The permittee shall characterize the compliance status of each industrial user by employing the following descriptions:

(1) In compliance with baseline monitoring report requirements (where applicable);
(2) Consistently achieving compliance;
(3) Inconsistently achieving compliance;
(4) Significantly violated applicable pretreatment requirements as defined by 40 CFR 403.8(f)(2)(vii);
(5) On a compliance schedule to achieve compliance (include the date final compliance is required);
(6) Not achieving compliance and not on a compliance schedule;
(7) The permittee does not know the industrial user's compliance status (with explanation).

I. Approved Pretreatment Program - continued

e. A summary of the inspection and sampling activities conducted by the permittee during the past six (6) months to gather information and data regarding industrial users. The summary shall include:

(1) The names of industrial users subject to surveillance by the permittee and an indication of whether they were inspected, sampled, or both and the frequency of these activities at each user; and
(2) The conclusions or results from the inspection or sampling of each industrial user.

Semi-Annual Reporting - continued

f. A summary of the compliance and enforcement activities during the past six (6) months, the summary shall include the names of the industrial users affected by the following actions:

(1) Warning letter or notices of violation;
(2) Administrative orders;
(3) Civil actions;
(4) Criminal actions;
(5) Assessment of monetary penalties. For each industrial user identify the amount of the penalties;
(6) Restriction of flow to the POTW; or
(7) Disconnection from discharge to the POTW.

g. A description of any significant changes in operating the pretreatment program which differ from the information in the permittee's approved pretreatment program including, but not limited to changes concerning: the program's administrative structure; local industrial discharge limitations; monitoring program or monitoring frequencies; legal authority or enforcement policy; funding mechanisms; resource requirements; or staffing levels.

h. A summary of the semi-annual pretreatment budget, including the cost of pretreatment program functions and equipment purchases.

i. A summary of public participation activities to involve and inform the public. This shall include a copy of the annual publication of significant violations, if such publication was needed to comply with 40 CFR 403.8(f)(2)(vii).

H. Approved Pretreatment Program - continued

j. A description of any changes in sludge disposal methods and a discussion of any concerns not described elsewhere in the report.

k. Any other information deemed as pertinent by the state in effectively administrating an approved pretreatment program.

2. A signed copy of this report shall be submitted by the due dates to the state at the address shown below:

Division of Water
Surface Water Permits Branch
Construction and Compliance Section
200 Fair Oaks Lane
Frankfort, Kentucky 40601

PART IV

BEST MANAGEMENT PRACTICES

SECTION A. GENERAL CONDITIONS

1. Applicability

These conditions apply to all permittees who use, manufacture, store, handle, or discharge any pollutant listed as: (1) toxic under Section 307(a)(1) of the Clean Water Act; (2) oil, as defined in Section 311(a)(1) of the Act; (3) any pollutant listed as hazardous under Section 311 of the Act; or (4) is defined as a pollutant pursuant to KRS 224.01-010(35) and who have ancillary manufacturing operations which could result in (1) the release of a hazardous substance, pollutant, or contaminant, or (2) an environmental emergency, as defined in KRS 224.01-400, as amended, or any regulation promulgated pursuant thereto (hereinafter, the "BMP pollutants"). These operations include material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas.

2. BMP Plan

The permittee shall develop and implement a Best Management Practices (BMP) plan consistent with 401 KAR 5:065, Section 2(10) pursuant to KRS 224.70-110, which prevents or minimizes the potential for the release of "BMP pollutants" from ancillary activities through plant site runoff; spillage or leaks, sludge or waste disposal; or drainage from raw material storage. A Best Management Practices (BMP) plan will be prepared by the permittee unless the permittee can demonstrate through the submission of a BMP outline that the elements and intent of the BMP have been fulfilled through the use of existing plans such as the Spill Prevention Control and Countermeasure (SPCC) plans, contingency plans, and other applicable documents.

3. Implementation

If this is the first time for the BMP requirement, then the plan shall be developed and submitted to the Division of Water within 90 days of the effective date of the permit. Implementation shall be within 180 days of that submission. For permit renewals the plan in effect at the time of permit reissuance shall remain in effect. Modifications to the plan as a result of ineffectiveness or plan changes to the facility shall be submitted to the Division of Water and implemented as soon as possible.

4. General Requirements

The BMP plan shall:

a. Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps.

b. Establish specific objectives for the control of toxic and hazardous pollutants.

(1) Each facility component or system shall be examined for its potential for causing a release of "BMP pollutants" due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

(2) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances which could result in a release of "BMP pollutants," the plan should include a prediction of the direction, rate of flow, and total quantity of the pollutants which could be released from the facility as result of each condition or circumstance.

c. Establish specific Best Management Practices to meet the objectives identified under paragraph b of this section, addressing each component or system capable of causing a release of "BMP pollutants."

d. Include any special conditions established in part b of this section.

e. Be reviewed by plant engineering staff and the plant manager.

5. Specific Requirements

The plan shall be consistent with the general guidance contained in the publication entitled "NPDES Best Management Practices Guidance Document," and shall include the following baseline BMPs as a minimum.

a. BMP Committee
b. Reporting of BMP Incidents
c. Risk Identification and Assessment
d. Employee Training
e. Inspections and Records
f. Preventive Maintenance
g. Good Housekeeping
h. Materials Compatibility
i. Security
j. Materials Inventory

6. SPCC Plans

The BMP plan may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 151, and may incorporate any part of such plans into the BMP plan by reference.

7. Hazardous Waste Management

The permittee shall assure the proper management of solid and hazardous waste in accordance with the regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1978 (RCRA) (40 U.S.C. 6901 et seq.) Management practices required under RCRA regulations shall be referenced in the BMP plan.

8. Documentation

The permittee shall maintain a description of the BMP plan at the facility and shall make the plan available upon request to NREPC personnel. Initial copies and modifications thereof shall be sent to the following addresses when required by Section 3:

Division of Water
Frankfort Regional Office
643 Teton Trail, Suite B
Frankfort, Kentucky 40601
ATTN: Supervisor

Division of Water
Surface Water Permits Branch
Permit Support Section
200 Fair Oaks Lane
Frankfort, Kentucky 40601

9. BMP Plan Modification

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility which materially increases the potential for the ancillary activities to result in the release of "BMP pollutants."

10. Modification for Ineffectiveness

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of "BMP pollutants," then the specific objectives and requirements under paragraphs b and c of Section 4, the permit, and/or the BMP plan shall be subject to modification to incorporate revised BMP requirements. If at any time following the issuance of this permit the BMP plan is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to resolve the concerns.

SECTION B. SPECIFIC CONDITIONS

Periodically Discharged Wastewaters Not Specifically Covered By Effluent Conditions

The permittee shall include in this BMP plan procedures and controls necessary for the handling of periodically discharged wastewaters such as intake screen backwash, meter calibration, fire protection, hydrostatic testing water, water associated with demolition projects, etc.

PART V - BIOMONITORING - CHRONIC CONCERNS

In accordance with PART I of this permit, the permittee shall initiate, within 30 days of the effective date of this permit, or continue the series of tests described below to evaluate wastewater toxicity of the discharge from Outfall 001.

TEST REQUIREMENTS

The permittee shall perform one short-term static-renewal fathead minnow (Pimephales promelas) growth test and one short-term static-renewal water flea (Ceriodaphnia dubia) life-cycle test. Tests shall be performed on a series of 24 hour composite samples collected as described in 1.B. below. In addition to use of a control, effluent concentrations for the tests must include the permitted limit, (i.e., 100% effluent) and at least four additional effluent concentrations. For a permit limit of 100% effluent, test concentrations shall be 20%, 40%, 60%, 80% and 100%. If the permit limit is less than 100% effluent and greater than or equal to 75% effluent, the test concentrations shall include the permitted limit, two concentrations below the limit that are based on a 0.5 dilution factor, and two concentrations above the limit (to include 100% and mid-point between the permit limit and 100%). If the permit limit is less than 75% effluent, test concentrations shall include the permit limit concentration, two concentrations below the limit based on a 0.5 dilution factor, and two concentrations above the limit based on a 0.5 dilution factor if possible, otherwise to include 100% and mid-point between the permit limit and 100% . Selection of different effluent concentrations must be approved by the Division prior to testing. Testing of the effluent shall be initiated within 36 hours of completing each 24 hour composite sample. Controls shall be tested concurrently with effluent testing using synthetic water. The analysis will be deemed reasonable and good only if the minimum control requirements are met, (i.e. For the Ceriodaphnia test: at least 80% survival of all control organisms and an average of 15 or more young per surviving female in the control solutions; and 60% of surviving control females must produce three broods. For the fathead minnow test: at least 80% survival in controls and the average dry weight per surviving organism in control chambers equals or exceeds 0.25 mg. Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the IC_{25} (inhibition concentration) for reproduction or growth is less than 100% effluent.

Tests shall be conducted on both species at the frequency specified in PART I of this permit.

A minimum of three 24 hour composite samples shall be collected at a frequency of one 24 hour composite every other day. For example, the first sample would be used for test initiation on day 1 and for test solution renewal on day 2. The second sample would be used for test solution renewal on days 3 and 4. The third sample would be used for test solution renewal on days 5, 6, and 7. Each 24 hour composite shall be collected using a refrigerated automatic sampler. Each 24 hour composite sample shall consist of not less than 48 discrete aliquots of effluent. Aliquots shall be of equal volume and time-proportional unless effluent flow is expected to vary by more than 10% from one hour to another or by 50% over the 24 hour collection period (as predicted from historical trends, significant rainfall events, etc.). With anticipated effluent flow variation of greater than 10% per hour or 50% overall, the frequency, and volume of each aliquot shall be flow-proportional. The lapsed time from collection of the last aliquot of the composite and its first use for test initiation or for test solution renewal shall not exceed 36 hours.

PART V - BIOMONITORING - CHRONIC CONCERNS

TEST REQUIREMENTS

Composite samples shall be refrigerated and maintained at not greater than 6°C during collection, storage, transport and until used in the test by the laboratory.

If after at least six consecutive toxicity tests, it can be determined that Ceriodaphina dubia or the Fathead minnow is more sensitive and all tests have passed, a request for testing with only the most sensitive species can be submitted to the Division. Upon approval, that most sensitive species may be considered as representative and all subsequent compliance tests can be conducted using only that species unless directed at any time by the Division to change or revert to both.

REPORTING REQUIREMENTS

Results of all toxicity tests conducted with any species shall be reported according to the most recent format provided by the Division of Water. Notification of failed test shall be made to the Division's Water Quality Branch within five days of test completion. Test reports shall be submitted to the Division's Water Quality Branch within thirty days of completion.

Chronic Toxicity

If noncompliance with the toxicity limit occurs in an initial test, (i.e., the IC_{25} for reproduction of water fleas or growth of minnows is less than 100% effluent), the permittee must repeat the test using a new set of three 24 hour composite samples. Sampling must be initiated within 15 days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by the Division. Results of the second round of testing will be used to evaluate the possible need for a Toxicity Reduction Evaluation (TRE).

If the second round of testing also demonstrates noncompliance with the toxicity limit, the permittee will be required to perform accelerated testing as specified in the following paragraphs.

Complete four additional rounds of testing to evaluate the frequency and degree of toxicity within 60 days of completing the second round of failed testing. Results of the initial and second rounds of testing specified above, plus the four additional rounds of testing will be used in deciding if a TRE shall be required.

If results from any two of the six rounds of testing show a significant noncompliance with the chronic limit (i.e., $\geq$1.2 times the TU_c), or results from any four of the six tests show chronic toxicity (as defined in 1.A), a TRE will be required.

The permittee shall provide written notification to the Division of Water within five (5) days of completing accelerated testing stating that: (1) toxicity persisted and that a TRE will be initiated; or (2) that toxicity did not persist and the normal testing will resume.

Should toxicity prove not to be persistent during the accelerated testing period, but reoccur within 12 months of the initial failure at a level $\geq$ 1.2 times the TU_c, then a TRE shall be required.

PART V - BIOMONITORING - CHRONIC CONCERNS

TOXICITY REDUCTION EVALUATION (TRE)

Having determined that a TRE is required, the permittee shall initiate &/or continue at least monthly testing with both species until such time as a specific TRE plan is approved by the Division. A TRE plan shall be developed by the permittee and submitted to the Division within thirty days of determining a TRE is required. The plan shall be developed in accordance with the most recent EPA and Division guidance. Questions regarding this process may be submitted to the Division's Water Quality Branch.

The TRE plan shall include Toxic Identification Evaluation (TIE) procedures, treatability studies, and evaluations of: chemical usage including changes in types, handling and suppliers; operational and process procedures; housekeeping and maintenance activities; and raw materials. The TRE plan will establish an implementation schedule to begin immediately upon approval by the Division, to have duration of at least six months, and not to exceed 24 months. The implementation schedule shall include quarterly progress reports being submitted to the Division's Water Quality Branch, due the last day of the month following each calendar quarter.

Upon completion of the TRE, the permittee shall submit a final report detailing the findings of the TRE and actions taken or to be taken to prevent the reoccurrence of toxicity. This final report shall include: the toxicant(s), if any are identified; treatment options; operational changes; and the proposed resolutions including an implementation schedule not to exceed 180 days.

Should the permittee determine the toxicant(s) and/or a workable treatment prior to the planned conclusion of the TRE, the permittee will notify the Division's Water Quality Branch within five days of making that determination and take appropriate actions to implement the solution within 180 days of that notification.

TEST METHODS

All test organisms, procedures and quality assurance criteria used shall be in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (Fourth Edition), EPA-821-R-02-013, the most recent edition of this publication, or as approved in advance by the Division of Water.

Toxicity testing for compliance to KPDES discharge limits shall be performed by a laboratory approved by the Division of Water to conduct the required toxicity tests. Within each toxicity report to the Division of Water, the permittee must demonstrate successful performance of reference toxicant testing by the laboratory that conducts their effluent toxicity tests. Within 30 days prior to initiating an effluent toxicity test, a reference toxicant test must be completed for the method used; alternatively, the reference toxicant test may be run concurrent with the effluent toxicity test. In addition, for each test method, at least 5 acceptable reference toxicant tests must be completed by the laboratory prior to performing the effluent toxicity test. A control chart including the most recent reference toxicant test endpoints for the effluent test method (minimum of 5, up to 20 if available) shall be part of the report.

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

FACT SHEET

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT TO DISCHARGE TREATED WASTEWATER INTO WATERS OF THE COMMONWEALTH

KPDES No.: KY0020621 **Permit Writer:** Dan Juett **Date:** April 15, 2009
AI No.: 4246

1. **SYNOPSIS OF APPLICATION**

a. Name and Address of Applicant

City of Versailles
196 South Main Street
Versailles, Kentucky 40384

b. Facility Location

Versailles Wastewater Treatment Plant
338 Kentucky Avenue
Versailles, Woodford County, Kentucky

c. Description of Applicant's Operation

City

d. Design Capacity

3.0 MGD

e. Description of Existing Pollution Abatement Facilities

Treatment consists of bar screens, oxidation ditches, aeration, clarifiers, chlorine disinfection, dechlorination, and post aeration. Sludge Solids are thickened, aerobic digestion, belt press, and hauled to city permitted land farm, Permit No. KY120-00005.

f. Permitting Action

This is a reissuance of a major KPDES permit for a municipally/regional planning authority owned wastewater treatment plant serving a municipality.

2. **RECEIVING WATER**

a. Name/Mile Point

Facility discharges to Glenns Creek at mile point 12.4.

b. Stream Segment Use Classification

Pursuant to 401 KAR 5:026, Section 5, Glenns Creek carries the following classifications: warm water aquatic habitat, primary contact recreation, secondary contact recreation, and domestic water supply.

c. Stream Segment Categorization

Pursuant to 401 KAR 5:030, Section 1 Glenns Creek is categorized as a "High Quality Waters".

d. Stream Low Flow Condition

The 7-day, 10-year low flow and harmonic mean conditions of Glenns Creek are 0.0 and 0.4 cfs, respectively.

3. REPORTED DISCHARGE AND PROPOSED LIMITS

Serial Number 001 - Sanitary Wastewater (Design Flow = 3.0 MGD)

Effluent Characteristics	Reported Discharge Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
Effluent Flow (MGD)	1.94	3.82	Report	Report	401 KAR 5:065, Section 2(8)
Influent Flow (MGD)	N/A	N/A	Report	Report	401 KAR 5:065, Section 2(8)
Effluent $CBOD_5$ (mg/l)	3.85	7.5	20	30	401 KAR 5:031, Section 4 401 KAR 5:045, Sections 3 and 5
Influent $CBOD_5$ (mg/l)	199	326	Report	Report	401 KAR 5:065, Section 2(8)
Percent Removal $CBOD_5$ (%)	97.9	99	85 or greater		40 CFR 133.102(a)(4)
Effluent TSS (mg/l)	6.42	16.2	30	45	401 KAR 5:031, Section 4 401 KAR 5:045, Sections 2 and 3
Influent TSS (mg/l)	264	534	Report	Report	401 KAR 5:031, Section 4
Percent Removal TSS (%)	97.1	99.6	85 or greater		40 CFR 133.02(b)(3)
Fecal Coliform (N/100 ml)	27	160	Removing from permit		401 KAR 5:080, Section 1(2)(c)2
Escherichia Coli (N/100 ml)	NR	NR	130	240	401 KAR 5:031, Section 7 401 KAR 5:045, Section 4 401 KAR 5:080, Section 1(2)(c)2
Ammonia Nitrogen (as mg/l N)					
May 1 - October 31	0.65	2.34	4.0	6.0	401 KAR 5:031, Section 4
November 1 - April 30	0.85	4.62	10.0	15.0	401 KAR 5:045, Sections 3 and 5
Dissolved Oxygen (mg/l) (minimum)	7.2	8	Not less than 7.0		401 KAR 5:031, Section 4 401 KAR 5:045, Sections 3 and 5
pH (standard units)	7.07	7.42	6.0 (min)	9.0 (max)	401 KAR 5:031, Section 4 401 KAR 5:045, Section 4

3. REPORTED DISCHARGE AND PROPOSED LIMITS - SANITARY FACILTY

Serial Number 001 - Sanitary Wastewater (Design Flow = 3.0 MGD)

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Total Residual Chlorine (mg/l)	<0.01	0.036	0.011	0.019	401 KAR 5:031, Section 4(k)
Total Phosphorus (mg/l)	1.84	4.83	Report	Report	401 KAR 5:065, Section 2(8)
Total Nitrogen (mg/l)	N/A	N/A	Report	Report	401 KAR 5:065, Section 2(8)
Chronic Toxicity (TU_c)	N/A	2.13	N/A	1.00	401 KAR 5:029, Section 4 401 KAR 5:031, Sections 2 and 4

The data contained under the reported discharge columns is not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the previous permit.

The abbreviation $CBOD_5$ means Carbonaceous Biochemical Oxygen Demand (5-day).
The abbreviation TSS means Total Suspended Solids.
The abbreviation N/A means not applicable.
The abbreviation NR means not reported on the Discharge Monitoring Report (DMR).
The effluent limitations for $CBOD_5$ and TSS are Monthly (30 day) and Weekly (7 day) Averages.
The effluent limitations for *Escherichia Coli* are thirty (30) day and seven (7) day Geometric Means.
Total Nitrogen is to be reported as the summation of the analytical results for Total Nitrates, Total Nitrites, and Total Kjeldahl Nitrogen.

4. **METHODOLOGY USED IN DETERMINING LIMITATIONS**

a. Serial Number

Outfall 001 Sanitary Wastewater (Design Flow = 3.0 MGD)

b. Effluent Characteristics

Flow, $CBOD_5$ (Influent/Effluent), TSS (Influent/Effluent), Fecal Coliform Bacteria, *Escherichia Coli*, pH, Ammonia Nitrogen, Dissolved Oxygen, Total Residual Chlorine (TRC), Total Phosphorus, Total Nitrogen, and Chronic Toxicity.

c. Pertinent Factors

This facility treats municipal wastewater and has an approved pretreatment program. The City of Versailles 201 Facility Plan recognizes the wastewater treatment plant, WWTP, as the regional facility.

d. Monitoring Requirements

Influent sampling shall be conducted at the nearest accessible point in the collection system but prior to commencement of treatment.

Effluent sampling shall be conducted at the nearest point after final treatment but prior to discharge to or mixing with the receiving waters.

Effluent Flow monitoring shall be conducted continuously by recorder.

Influent Flow monitoring shall be conducted instantaneously once per week.

$CBOD_5$ (Influent/Effluent) and TSS (Influent/Effluent) monitoring shall be conducted once per week by 24 hour composite sampling.

Percent Removal shall be determined monthly by calculation.

Ammonia Nitrogen, Total Phosphorus and Total Nitrogen shall be monitored once per week by 24 hour composite sampling.

Escherichia Coli, pH, Dissolved Oxygen and Total Residual Chlorine shall be monitored once per week by grab sample.

Chronic Toxicity shall be monitored quarterly by three (3) 24 hour composite samples collected every other day.

e. Justification of Conditions

The Kentucky regulations cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

Escherichia Coli and Fecal Coliform Bacteria
The limits for *Escherichia Coli* are consistent with the requirements of 401 KAR 5:031, Section 7, 401 KAR 5:045 Section 4 and 401 KAR 5:080, Section 1(2)(c) 2. The removal of Fecal Coliform Bacteria is consistent with the requirements of 401 KAR 5:080k Section 1 (2) (c)2. Although Fecal Coliform Bacteria has been used as an indicator of fecal contamination, it does contain other species that are not necessarily fecal in origin. EPA recommends *Escherichia Coli*, which is specific to fecal material from warm-blooded animals, as the best indicator of health risk from contact with recreational waters. Therefore, it is the "Best Professional Judgment "BPJ" of the Division of Water that *Escherichia Coli* replace Fecal Coliform Bacteria on this permit.

Flow (Influent/Effluent)
The monitoring requirements for this parameter are consistent with the requirements of 401 KAR 5:065, Section 2(8).

Influent $CBOD_5$, Influent TSS, and Percent Removal
The monitoring requirements for influent $CBOD_5$ and influent TSS are consistent with the requirements of 401 KAR 5:065, Section 2(8). The raw influent values of these two parameters are necessary to determine compliance with the 85 percent removal requirement specified by 40 CFR 133.102 (a)(4) and (b)(3).

$CBOD_5$, Ammonia Nitrogen, and Dissolved Oxygen
The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4, and 401 KAR 5:045, Sections 3 and 5. Section 4 of 5:031 establishes water quality criteria for the protection of Kentucky's waters. Section 5 of 5:045 requires biochemically degradable wastewaters to receive treatment in excess of secondary treatment if the Cabinet determines that the receiving water would not satisfy applicable water quality standards as a result of a facility discharge or discharges from multiple facilities

Total Suspended Solids
The limits for this parameter are consistent with the requirements of 401 KAR 5:031, Section 4 and 5:045, Sections 2 and 3. Section 4 of 5:031 establishes water quality criteria for the protection of Kentucky's waters. Sections 2 and 3 of 5:045 require biochemically degradable wastewaters to receive secondary treatment.

pH
The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4 and 5:045, Section 4. Section 4 of 5:031 establishes water quality criteria for the protection of Kentucky's waters. Section 4 of 5:045 establishes the acceptable levels of these parameters for biochemically degradable wastewaters.

Total Residual Chlorine
The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4.

Total Phosphorus and Total Nitrogen
The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8)(a). Total Nitrogen is TKN (as N) and nitrate/nitrite (as N).

Chronic Toxicity
The requirements for this parameter are consistent with the requirements of 401 KAR 5:029, Section 4 and 401 KAR 5:031, Sections 2 and 4.

5. ANTIDEGRADATION

The conditions of 401 KAR 5:029, Section 1 have been satisfied by this permit action. Since this permit action involves reissuance of an existing permit, and does not propose an expanded discharge, a review under 401 KAR 5:030 Section 1 is not applicable.

6. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

The permittee will comply with all effluent limitations by the effective date of the permit.

7. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

SLUDGE DISPOSAL

The disposal or final use of sewage sludge generated during the treatment of domestic sewage in a treatment works is subject to federal requirements specified in 40 CFR Part 503 and state requirements specified in Division of Waste Management regulations 401 KAR Chapter 45.

GENERAL PRETREATMENT REQUIREMENTS

All Publicly Owned Treatment Works (POTWs) are subject to the requirements of 401 KAR 5:057.

Publicly Owned Treatment Works (POTWs) means any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a State or municipality. This definition includes any sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Municipality means a city, village, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial waste, other wastes, or Indian tribe or authorized Indian tribal organization, or a designated and approved management agency under Section 208 of CWA.

Prohibited Discharges

Pursuant to 401 KAR 5:057, Section 3(2) the permittee is to prevent discharges by any user to the POTW which would cause pass-through or interference. Specific prohibitions include: (1) flammable or explosive pollutants; (2) corrosive pollutants; (3) amounts of solid or viscous pollutants which could cause an obstruction; (4) pollutants including oxygen demanding pollutants discharged at a flow rate or concentration which would interfere with the POTW; (5) heat in amounts which would inhibit biological activity, but no heat in quantities such that the temperature at the POTW treatment plant exceeds 104 °F (40 °C); (6) amounts of petroleum oil, non-biodegradable cutting oil or products of mineral oil origin that would cause pass through or interference; (7) pollutants which cause toxic gases, vapors, or fumes; and (8) trucked or hauled pollutants except at discharge points designated by the POTW.

Necessity to Develop and Implement a Pretreatment Program

Pursuant to Section 6(1) POTWs which meet one or more of the following criteria are required to develop, submit for approval, and implement specific Pretreatment Program Requirements.

1. A POTW or combination of POTWs operated by the same authority, with a total design flow greater than five (5) million gallons per day (MGD) and receiving from industrial users which pass through interfere with the operation of the POTW, or are otherwise subject to pretreatment standards.

2. A POTW with a design flow of five (5) MGD or less shall develop a pretreatment program if the cabinet determines that the nature or volume of the industrial wastewater, treatment process upsets, violation of the POTW effluent limitations, contamination of municipal sludge or other circumstances warrant to prevent interference with the POTW or pass through.

Consistent with the requirements of 401 KAR 5:057, Section 6(1) and 401 KAR 5:080, Section 1(2)(c)2 the permittee shall conduct annual sewer user surveys to determine if conditions warrant the development and implementation of a pretreatment program. This condition is representative of the Division of Water's "Best Professional Judgment" that such surveys are necessary to demonstrate compliance with 401 KAR 5:057, Section 6(1).

7. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

APPROVED PRETREATMENT PROGRAMS

In accordance with the requirements of 401 KAR 5:057, Section 8 the Division of Water approved the Pretreatment Program developed by the permittee on June 11, 1990. Therefore pursuant to the requirements of 401 KAR 5:057, Section 6(3) the conditions of the approved pretreatment program are hereby incorporated into the permit as enforceable conditions of the permit.

Pretreatment Program Requirements

The conditions of this section of the permit are consistent with the requirements of 401 KAR 5:057, Section 6 - Pretreatment Program Requirements.

Semi-Annual Reporting

The conditions of this section of the permit are consistent with the requirements of 401 KAR 5:057, Section 9 - Reporting Requirements for POTWs and Industrial Users.

Best Management Practices (BMP) Plan

Pursuant to 401 KAR 5:065, Section 2(10), a BMP requirement shall be included: to control or abate the discharge of pollutants from ancillary areas containing toxic or hazardous substances or those substances which could result in an environmental emergency; where numeric effluent limitations are infeasible; or to carry out the purposes and intent of KRS 224. The facility has several areas where support activities occur which have a potential of the discharge of such substances through storm water runoff or spillage. Some of these areas will drain to present wastewater treatment plants, others will not.

Certified Operators

Pursuant to 401 KAR 5:010, Section 2(1) wastewater systems shall be operated under the supervision of a certified operator who holds a Kentucky Certificate equivalent to the class of system being supervised. All other operators employed by the system shall hold a Kentucky Certificate or shall be in the process of obtaining a Kentucky Certificate.

Pursuant to 401 KAR 5:010, Section 8 wastewater systems shall be classified as follows:

- Class I: Systems with a design capacity of less than or equal to 50,000 gpd
- Class II: Systems with a design capacity of more than 50,000 gpd but less than or equal to 2.0 MGD
- Class III: Systems with a design capacity of more than 2.0 MGD but less than or equal to 7.5 MGD
- Class IV: Systems with a design capacity of more than 7.5 MGD

Section 2(2) of 401 KAR 5:010 require the certified operator to be reasonably available if not physically present while the system is operating.

Section 2(3) of 401 KAR 5:010 require the Kentucky Certificate shall be displayed on the wall of wastewater system office.

Monthly Operating Reports (MOR)

Pursuant 401 KAR 5:065, Section 2(8)3 the permit shall incorporate monitoring requirements as appropriate to assure compliance with the permit limitations. In addition to the monitoring of effluent as specified by the permit the permittee shall conduct process control monitoring on a daily basis and record the data on a Monthly Operating Report (MOR) which shall be submitted with the Discharge Monitoring Reports. Process control monitoring is that monitoring performed by the operators of the wastewater treatment plant to determine if the wastewater system is operating at its optimum efficiency. This monitoring includes but is not limited to influent and effluent quality and quantity monitoring, chemical usage, sludge monitoring including volume produced, wasted, and disposed, and monitoring of internal units such as aeration basins and oxidation ditches.

Outfall Signage

As a member of ORSANCO (Ohio River Valley Sanitation Commission) the Commonwealth of Kentucky through the Division of Water implements a requirement that the permittee post a permanent marker at each discharge point to the Ohio River. It is the Best Professional Judgment of the Division of Water, 401 KAR 5:080, Section 1(2)(c)2, that all permittees post a marker at all discharge locations and/or monitoring points. The ORSANCO requirements for the marker specify it to be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and is to be posted as near as possible to the actual sampling location.

8. **PERMIT DURATION**

Five (5) years. This facility is in the Kentucky Basin Management Unit as per the Kentucky Watershed Management Framework.

9. **PERMIT INFORMATION**

The application, draft permit, fact sheet, public notice, comments received, and additional information is available from the Division of Water at 200 Fair Oaks Lane, Frankfort, Kentucky 40601.

10. **REFERENCES AND CITED DOCUMENTS**

All material and documents referenced or cited in this fact sheet are a part of the permit information as described above and are readily available at the Division of Water Central Office. Information regarding these materials may be obtained from the person listed below.

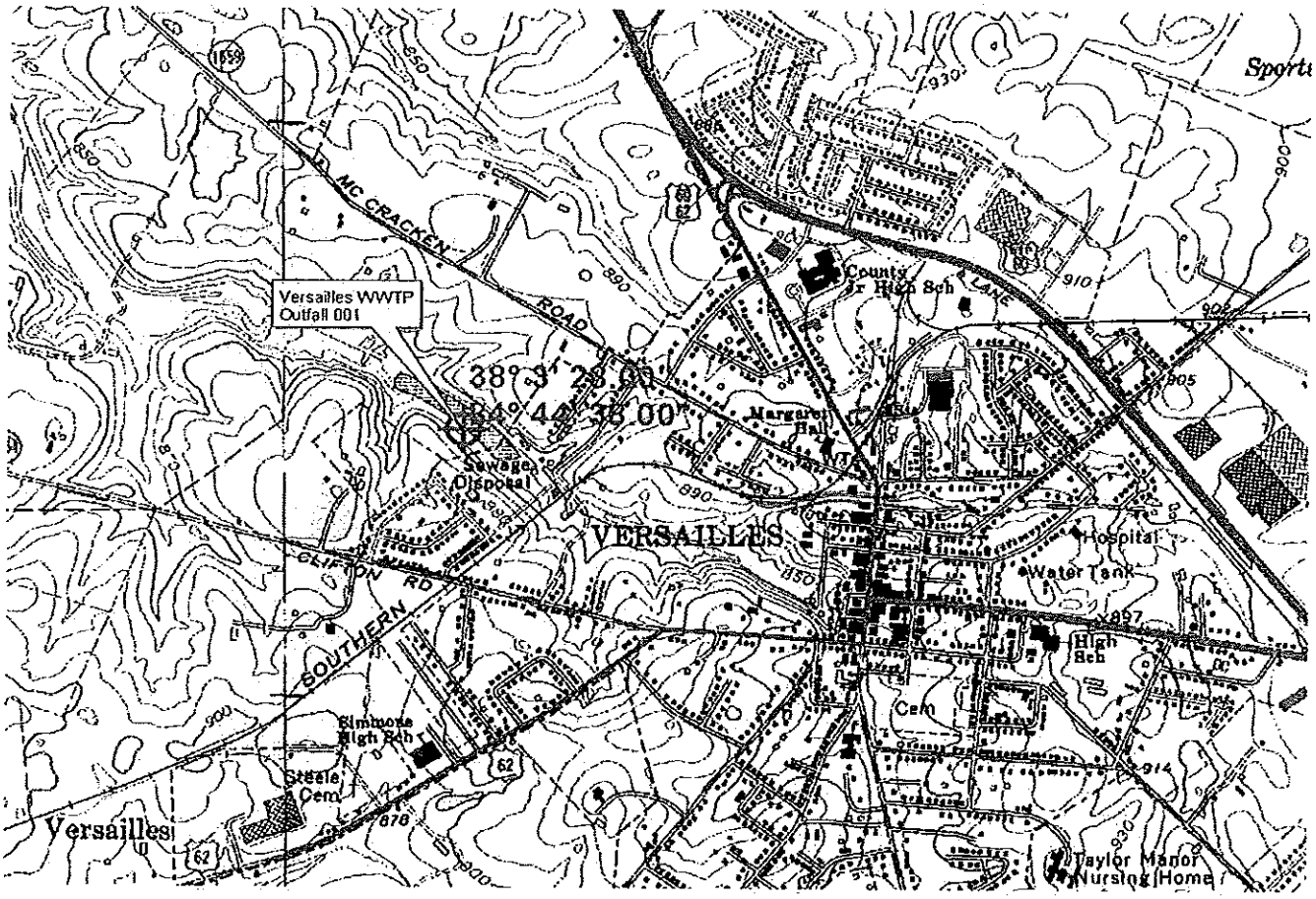
11. **CONTACT**

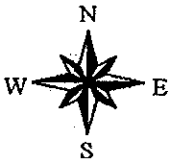
For further information on the draft permit or comment process, contact the individual identified on the Public Notice or the Permit Writer - Dan Juett at (502) 564-8158, extension 4894, or email Dan.Juett@ky.gov.

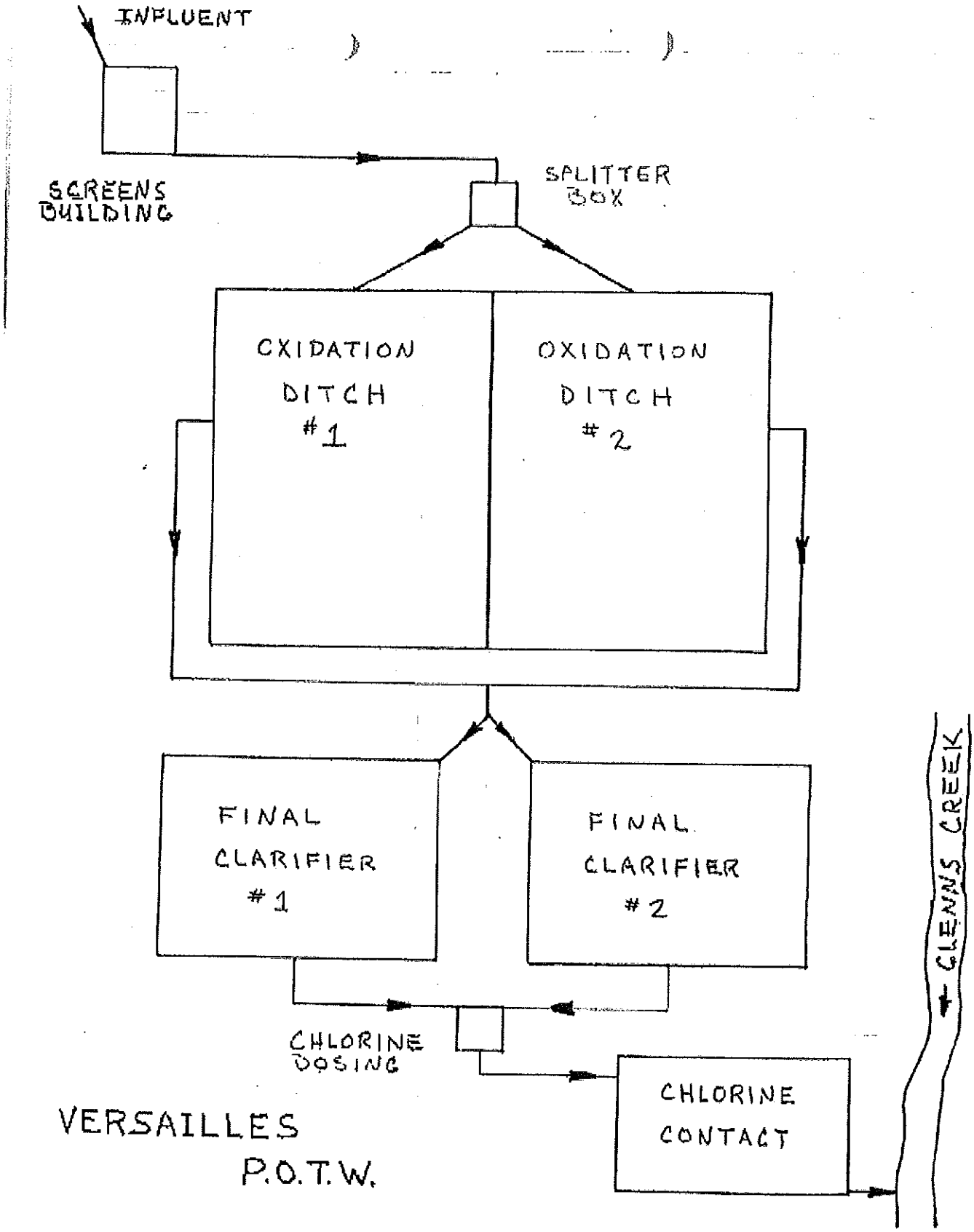
12. **PUBLIC NOTICE INFORMATION**

Please refer to the attached Public Notice for details regarding the procedures for a final decision, deadline for comments and other information required by 401 KAR 5:075, Section 4(2)(e).

City of Versailles
Versailles WWTP







VERSAILLES P.O.T.W.

Appendix G

Appendix G

Sewer Use Ordinance

CHAPTER 51: SEWER SYSTEM USE

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GENERAL PROVISIONS

§ 51.01 PURPOSE AND POLICY.

(A) This chapter sets forth uniform requirements for direct and indirect contributors into the wastewater collection and treatment system for the city and enables the city to comply with all applicable State and Federal laws required by the Clean Water Act of 1977 and the general Pretreatment Regulations (40 CFR, Part 403).

(B) The objectives of this chapter are:

(1) To prevent the introduction of pollutants into the municipal wastewater system which will interfere with the operation of the system or contaminate the resulting sludge;

(2) To prevent the introduction of pollutants into the municipal wastewater system which will pass through the system, inadequately treated, into receiving waters or the atmosphere or otherwise be incompatible with the system;

(3) To improve the opportunity to recycle and reclaim wastewaters and sludges from the system; and

(4) To provide for equitable distribution of the cost of the municipal wastewater system.

(C) This chapter provides for the regulation of direct and indirect contributors to the municipal wastewater system through the

issuance of permits to certain non-domestic users, enforcement of general requirements for all users, authorizes monitoring and enforcement activities, requires industrial user reporting, and provides for the setting of fees for the equitable distribution of costs resulting from the program established herein.

(D) This chapter shall apply to the city and to persons outside the city who are, by contract or agreement with the city, users of the city's publicly owned treatment works (POTW). Except as otherwise provided herein, the superintendent of the city's POTW shall administer, implement and enforce the provisions of this chapter. (Ord., passed 8-20-91)

§ 51.02 DEFINITIONS.

Unless the context specifically indicates otherwise, the following terms and phrases, as used in this chapter, shall have the meanings hereinafter designated:

"ACT" or "THE ACT." The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et. seq.

"APPROVAL AUTHORITY." The Secretary of the Kentucky Natural Resources and Environmental Protection Cabinet and/or any authorized representative thereof.

"AUTHORIZED REPRESENTATIVE." An authorized representative of a user may be: (i) a principal executive officer of at least the level of vice-president, if the industrial user is a corporation; (ii) a general partner or proprietor if the user is a duly authorized representative of the individual designated above if such representative is responsible for the overall operation of the facilities from which the indirect discharge originates. An authorized representative of the city may be any person designated by the city to act on its behalf.

"AVAILABLE." As used in connection with this chapter means a public sewer located at the property line or point at which connection may be made with the city sanitary sewage collection facilities.

"BEST MANAGEMENT PRACTICES (BMPs)." Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the prohibitions listed in 40 CFR 403.5. BMPs include, but are not limited to, treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.

"BIOCHEMICAL OXYGEN DEMAND (BOD)." The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures, five (5) days at 20 Centigrade expressed in terms of weight and concentration in milligrams per liter (mg/l).

"BUILDING SEWER." The extension from the building drain to the public sewer or other place of disposal, also called "house connection".

"BUILDING SEWER PERMIT." As set forth in "Building Sewers and Connections" (§§ 51.30 through 51.34).

"CATEGORICAL STANDARDS." National Categorical Pretreatment Standards or Pretreatment Standard. Any regulations containing pollutant discharge limits promulgated by the EPA in accordance with Section 307 (b) and (c) of the Act (33 U.S.C. 1347) and 40 CFR 403 which applies to a specific category of individual users.

"CITY." The City of Versailles, its city council or commission, or the commission board or the superintendent of the POTW or his/her designee.

"COMBINED SEWER." Any conduit carrying both sanitary sewage and storm water or surface water.

"COMPATIBLE POLLUTANT." Biochemical oxygen demand, suspended solids and fecal coliform bacterial; plus additional pollutants that the POTW is designed to treat and, in fact, does treat to the degree required by the POTW's NPDES/KPDES permit.

"COMPOSITE WASTEWATER SAMPLE." A combination of individual samples of water or wastewater taken at selected intervals, based on quantity of flow for some specified period, to minimize the effect of variability of the individual sample. Individual samples may have equal volume or may be proportioned to the flow at the time of the sampling.

"CONTROL AUTHORITY." The term shall refer to the "Approval Authority" defined hereinabove; or the superintendent of the POTW or his/her designee if the city has an approved pretreatment program under the provisions of 40 CFR, 403.11.

"COOLING WATER." The water discharged from any use such as air conditioning, cooling or refrigeration or to which the only pollutant added is heat.

"COUNTY HEALTH DEPARTMENT." The health department for Woodford County.

"DILUTION STREAM." Any wastewater not generated by a process regulated for the specific pollutant by a categorical standard under 40 CFR, Subchapter N.

"DIRECT DISCHARGE." The discharge of treated or untreated wastewaters directly to the waters of the Commonwealth of Kentucky.

"EASEMENT." An acquired legal right for the specific use of land owned by others.

"ENVIRONMENTAL PROTECTION AGENCY" or "EPA." The U.S. Environmental Protection Agency, or where appropriate the term may also be used as a designation for the Administrator or his/her duly authorized representative of said agency.

"EQUIPMENT." All movable, non-fixed items necessary to the wastewater treatment process.

"FEDERAL PRETREATMENT STANDARDS." Federal regulations for pretreatment of industrial wastewater under 40 CFR, Subchapter N and any applicable regulations, as amended.

"GARBAGE." The animal and vegetable waste resulting from the handling, preparation, cooking, and serving of foods.

"GRAB SAMPLE." A sample which is taken from a wastestream on a one-time basis with no regard to the flow in the wastestream and without consideration of time.

"HOLDING TANK WASTE." Any waste from holding tanks such as vessels, chemical toilets, campers, trailers, septic tanks and vacuum-pump tank trucks.

"INCOMPATIBLE POLLUTANT." The pollutant other than compatible pollutants as defined in this section.

"INDIRECT DISCHARGE." The discharge or the introduction of pollutants into a POTW from any source regulated under section 307 (b), (c) or (d) of the Act and including holding tank wastes discharged into the system.

"INDUSTRIAL USER." A source of indirect discharge.

"INDUSTRIAL WASTES." The wastewaters from industrial or commercial processes as distinct from domestic or sanitary wastes.

"INTERCEPTOR." A device designed and installed so as to separate and retain deleterious, hazardous, and undesirable matter from domestic wastes while permitting domestic sewage, sewer system or drainage system by gravity. Interceptor as defined herein is commonly referred to as grease, oil, or sand trap.

"INTERFERENCE." The inhibition or disruption of the POTW treatment processes or operations or that which contributes to a violation of any requirement of the city's NPDES/KPDES permit. The term includes prevention of sewage sludge use or disposal by the POTW in accordance with Section 405 of the Act (33 U.S.C. 1345) or any criteria, guidelines or regulations developed pursuant to the Solid Waste Disposal Act (SWDA), the Clean Air Act, the Toxic Substance Control Act, or more stringent state criteria (including those obtained in any state sludge management plan prepared pursuant to Title IV or SWDA) applicable to the method of disposal or use employed by the POTW.

"MAXIMUM DAILY CONCENTRATION." The maximum concentration per day of a pollutant based on the analytical results obtained from a twenty-four (24) hour composite sample.

"MAY." This is permissive.

"NATIONAL CATEGORICAL PRETREATMENT STANDARD" or "PRETREATMENT STANDARD." Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with Section 307(b) and (c) of the Clean Water Act which applies to a specific category of industrial users. This term includes the prohibitive discharge limits established pursuant to 40 CFR 403.

"NATIONAL (OR KENTUCKY) POLLUTANT DISCHARGE ELIMINATION SYSTEM OR NPDES/KPDES PERMIT." A permit issued pursuant to Section 402 of the Act (33 U.S.C. 1332), or a permit issued by the Commonwealth of Kentucky under this authority and referred to as KPDES.

"NATURAL OUTLET." Any outlet, including storm sewers, into a watercourse, pond, ditch, lake or other body of surface or groundwater.

"NEW SOURCE." Any source, the construction of which is commenced after the publication of proposed regulations prescribing a Section 307 (c) (33 U.S.C. 1317) categorical pretreatment standard which will be applicable to the source, if the standard is thereafter promulgated within one-hundred twenty (120) days of proposal in the Federal Register. Where the standard is promulgated later than one-hundred twenty (120) days after a proposal, a new source means any source, the construction of which is commenced after the date of promulgation of the standard.

"OPERATION AND MAINTENANCE EXPENSES." All annual operation and maintenance expenses including replacement cost related directly to operating and maintaining the sewage works as shown by annual audit.

"PASS THROUGH." A discharge of a pollutant which cannot be treated adequately by the POTW, and therefore exits into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES/KPDES permit (including an increase in the magnitude or duration of a violation).

"PERSON." Any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity or any other legal entity, or their legal representatives, agents, or assigns. The masculine gender shall include the feminine, and the singular shall include the plural where indicated by the context.

"Ph." The logarithm of the reciprocal of the hydrogen ion concentration. The concentration is the weight of hydrogen ions, in grams, per liter of solution.

"POLLUTANT." Any dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural wastes discharged into water.

"POLLUTION." The man-made or man-induced alteration of the chemical, physical, biological, and/or radiological integrity of water.

"POTW TREATMENT PLANT." That portion of the POTW designed to provide treatment to wastewater.

"PRETREATMENT" or "TREATMENT." The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. The reduction or alteration can be obtained by physical, chemical or biological processes, or process change(s), or other means, except as prohibited by 40 CFR Section 403.6 (d).

"PRETREATMENT REQUIREMENTS." Any substantive or procedural requirement related to pretreatment, other than a National Pretreatment Standard imposed on a significant user.

"PROHIBITIVE DISCHARGE STANDARD." Any regulation developed under the authority of 307 (b) of the Act and 40 CFR 403.5.

"PROPERLY SHREDDED GARBAGE." The wastes from the preparation, cooking, and dispensing of food that has been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half (½) inch in any dimension.

"PUBLICLY OWNED TREATMENT WORKS (POTW)." A treatment works as defined by Section 212 of the Act, (33 U.S.C. 1292) which is owned in this instance by the city. This definition includes any sewers that convey wastewater to the POTW treatment plant but does not include pipes, sewers, or other conveyance not connected to a facility providing treatment. For the purpose of this chapter, "POTW" shall also include any sewers that convey wastewaters to the POTW from persons outside the jurisdiction of the city who are users of the city's POTW.

"PUBLIC SEWERS." A common sewer controlled by a governmental agency or public utility. In general, the public sewer shall include the main sewer in the street and the service branch to the curb or property line, or a main sewer on private property and the service branch to the extent of ownership by public authority.

"REPLACEMENT." Expenditure for obtaining and installing equipment, accessories or appurtenances which are necessary during the service life of the treatment works to maintain the capacity and performance for which such works were designed and constructed.

"SANITARY SEWER." A sewer that carries liquid and waterborne wastes from residences, commercial buildings, industrial plants, and institutions.

"SEWAGE." The spent water of a community. Domestic or sanitary waste shall mean the liquid or waterborne wastes from residences, commercial buildings and institutions and is distinct from industrial sewage. The terms "sewage" and "wastewater" are used interchangeably.

"SEWAGE SYSTEM" or "WORKS." All facilities for collecting, transporting, pumping, treating and disposing of sewage and sludge, namely the sewage system and POTW.

"SEWER." A pipe or conduit that carries wastewater or drainage water.

"SEWER USER CHARGES." A system of charges levied on users of a POTW for the cost of operation and maintenance, including replacement, of such works.

"SHALL." This is mandatory.

"SIGNIFICANT INDUSTRIAL USER." Any user of the city's wastewater disposal system who: (i) is subject to Categorical Pretreatment Standard(s) under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or (ii) has a discharge flow of 25,000 gallons or more per average work day; or (iii) has a flow greater than five percent (5%) of the flow in the city's wastewater treatment system; or (iv) has in its wastewaters toxic pollutants as defined pursuant to Section 307 of the Act or state statutes or rules; or (v) is found by the city, state approval authority, or the U.S. Environmental Protection Agency (EPA) to have significant impact, either singly or in combination with other contributing users, on the wastewater treatment system, the quality of the sludge, the system's effluent quality or air emissions generated by the system.

(1) The city may determine that an industrial user subject to categorical pretreatment standards is a NON-SIGNIFICANT CATEGORICAL INDUSTRIAL USER rather than a SIGNIFICANT INDUSTRIAL USER on a finding that the industrial user never discharges more than 100 gallons per day (gpd) of total categorical wastewater (excluding sanitary, non-contact cooling and boiler blowdown wastewater, unless specifically included in the pretreatment standard) and the following conditions are met: (1) The industrial user, prior to the city's finding, has consistently complied with all applicable categorical pretreatment standards and requirements; (2) the industrial user annually submits the certification statement required in 40 CFR 403.12(q) together with any additional information necessary to support the certification statement; and (3) the industrial user never discharges any untreated concentrated process wastewater.

(2) Upon a finding that a user meeting the criteria in this section has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement,

the city may at any time, on its own initiative or in response to a petition received from an industrial user, and in accordance with procedures in 40 CFR 403.8(f)(6), determine that such user should not be considered a SIGNIFICANT INDUSTRIAL USER.

"SIGNIFICANT NONCOMPLIANCE." A violation that meets one or more of the following criteria:

(1) Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent (66%) or more of all of the measurements taken during a six (6) month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter;

(2) Technical Review Criteria (TRC) - violations, defined here as those in which thirty-three percent (33%) or more of all of the measurements for each pollutant parameter taken during a six (6) month period that equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC = 1.4 for BOD, TSS, fats, and O&G and 1.2 for all other pollutants except pH);

(3) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) and/or a violation of best management practices that the Superintendent determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of POTW personnel or the general public);

(4) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority to halt or prevent such a discharge;

(5) Failure to meet, within ninety (90) days after the scheduled date, a compliance schedule milestone contained in a wastewater discharge permit or other order issued hereunder for starting construction, completing construction, or attaining final compliance;

(6) Failure to provide, within thirty (30) days after the due date, required reports such as baseline monitoring reports, ninety (90) day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules;

(7) Failure to accurately report noncompliance; or

(8) Any other violation or group of violations which may include a violation of best management practices, that the Superintendent determines will adversely affect the operation or implementation of the local pretreatment program.

"SLUG DISCHARGE." Any discharge of a non-routine episodic nature, including but not limited to an accidental spill or non-customary batch discharge and/or any discharge of water or wastewater in which the

concentration of any given constituent or the quantity of flow exceeds for any period of duration longer than fifteen (15) minutes more than five (5) times the average twenty-four (24) hour concentration or flow rate during normal operation and/or adversely affects the POTW.

"STANDARD INDUSTRIAL CLASSIFICATION (SIC)." A classification pursuant to the Standard Industrial Classification Manual issued by the Executive Office of the President, U.S. Bureau of the Budget, 1972.

"STATE." The Commonwealth of Kentucky.

"STORM DRAIN" or "STORM SEWER." A drain or sewer for conveying water, groundwater, surface water, or unpolluted water from any source.

"STORM WATER." Any flow occurring during or following any form of natural precipitation and resulting therefrom.

"SUPERINTENDENT." The superintendent of wastewater facilities, and/or of wastewater treatment works, and/or of water pollution control of the city or his/her authorized deputy, agent, or representative.

"SURCHARGE." A charge for service in addition to the basic sewer user and debt service charge, for those users whose contribution contains biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS) or ammonia nitrogen (N-NH) in concentrations which exceed limits specified herein for such pollutants.

"SUSPENDED SOLIDS (TSS)." Total suspended matter that either floats on the surface of, or is in suspension in water, wastewater, or other liquids, and that is removable by laboratory filtering as prescribed in "Standard Methods for the Examination of Water and Wastewater" and referred to as nonfilterable residue.

"TOXIC POLLUTANT." Any pollutant or combination of pollutants listed as toxic in regulations promulgated by the Administrator of the Environmental Protection Agency under the provisions of CWA Section 307 (a) or other Acts.

"UNPOLLUTED WATER." Water of quality equal to or better than the treatment works effluent criteria in effects or water that would not cause violation of receiving water quality standards and would not be benefitted by discharge to the sanitary sewers and wastewater treatment facilities provided.

"USER." Any person who contributes, causes or permits the contribution of wastewater into the POTW. See definition of "Person".

"USER CHARGE." The charge levied on all users, including but not limited to, persons, firms, corporations, or governmental entities that discharge, cause, or permit the discharge of sewage into the POTW.

"WASTEWATER." The spent water of a community. Sanitary or domestic wastes shall mean the liquid and water-carried wastes from residences, commercial buildings and institutions as distinct from industrial waste.

"WASTEWATER CONTRIBUTION PERMIT." As set forth in §§ 51.50 through 51.60 of this chapter.

"WASTEWATER FACILITIES." The structures, equipment and processes required to collect, carry away, and treat domestic and industrial wastes and dispose of the effluent.

"WASTEWATER TREATMENT WORKS." An arrangement of devices and structures for treating domestic wastewaters, and sludges. Sometimes used synonymously with "waste treatment plant" or "sewage treatment plant".

"WATERCOURSE." A natural or artificial channel for the passage of water either continuously or intermittently.

"WATERS OF THE COMMONWEALTH." All streams, lakes, ponds, marshes, water courses, water ways, wells, springs, reservoirs, aquifers, irrigation system, drainage system and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the Commonwealth or any portion thereof.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.03 ABBREVIATIONS.

The following abbreviations shall have the designated meanings:

ADMI - American Dye Manufacturers Institute.
BOD - Biochemical oxygen demand.
CFR - Code of Federal Regulations.

VERSAILLES - SEWER SYSTEM USE

"WASTEWATER." The spent water of a community. Sanitary or domestic wastes shall mean the liquid and water-carried wastes from residences, commercial buildings and institutions as distinct from industrial waste.

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BOD - Biochemical oxygen demand.
CFR - Code of Federal Regulations.

VERSAILLES - SEWER SYSTEM USE

CWA - Clean Water Act of 1979.
EPA - Environmental Protection Agency.
KPDES - Kentucky Pollution Discharge Elimination System.
l - Liter.
mg - Milligram.
mg/l - Milligrams per liter.
NPDES - National Pollutant Discharge Elimination System.
POTW - Publicly Owned Treatment Works.
SIC - Standard Industrial Classification.
SWDA - Solid Waste Disposal Act, 42 USC 6901, et. seq.
TSS - Total suspended solids.
USC - United States Code.
(Ord., passed 8-20-91)

USE OF PUBLIC SEWERS

§ 51.10 MANDATORY SEWER CONNECTION.

(A) The owner(s) of all houses, buildings, or properties used for human occupancy, employment, recreation, or other purposes, situated within the city and abutting on any street, alley, or right-of-way in which there is now located or may in the future be located a public sanitary sewer of the city, is hereby required at the owner's expense to install suitable toilet facilities therein, and to connect the facilities directly with the proper public sewer in accordance with the provisions of this chapter, within thirty (30) days after date of official notice to do so provided that the public sewer is within one hundred (100) feet of the property line.

(B) It shall be unlawful to construct or maintain any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of wastewater where public sanitary sewer service is available, as defined in subsection (A), except as provided for in §§ 51.20 - 51.21). The existence within the city; wherever the services of the city sanitary sewage collection, treatment and disposal facilities are available, or may hereafter be made available; of septic tanks, seepage laterals, privies, earth pits, cesspools, sanitary waste vaults, sewage drainage fields, private sewage disposal systems, or any other facilities or works for the disposition of sanitary sewage wastes other than the facilities of the city, is hereby declared to be a menace to the public health, safety, and general welfare of the citizens and inhabitants of the city and is hereby determined and declared to constitute a public nuisance. The existence of such facilities as toilets, sinks, wash basins, showerbaths, bathtubs, any commercial or industrial machinery or device producing a liquid waste product, etc., in or upon any improved property or premises in the city where the facilities of the city's sewage collection, treatment, and disposal system are available or may hereafter be made available, is similarly declared to be a menace to the public health and general welfare of the city and its inhabitants, unless the facilities are connected to the city sewage collection, treatment and disposal system. The superintendent may prescribe the type and manner of connection to the facilities, and may require that

each connection be supervised and inspected by an authorized and qualified agent of the city sewer department.

(C) When a public sewer becomes available to a property served by a private wastewater disposal system, a direct connection shall be made to the public sewer system in compliance with this chapter, and any septic tanks, cesspools and similar private wastewater disposal facilities shall be cleaned of sludge and filled with suitable material or salvaged and removed.
(Ord., passed 8-20-91)

§ 51.11 UNLAWFUL DISCHARGE TO STORM SEWERS OR NATURAL OUTLETS.

(A) It shall be unlawful for any person to place, deposit, or permit to be deposited in any unsanitary manner on public or private property within the city, or in any area under the jurisdiction of the city or into any sewer which connects to the storm sewer system of the city, any objectionable wastewater or industrial wastes.

(B) It shall be unlawful to discharge to any natural outlet within the city or in any area under the jurisdiction of the city, any wastewater or other polluted waters, except where suitable treatment has been provided in accordance with subsequent provisions of this chapter. No provision of this chapter shall be construed to relieve the owner of a discharge to any natural outlet of the responsibility for complying with applicable state and federal regulations governing the discharge.
(Ord., passed 8-20-91)

§ 51.12 COMPLIANCE WITH LOCAL, STATE, AND FEDERAL LAWS.

The discharge of any wastewater into the public sewer system by any person is unlawful except in compliance with the provisions of this chapter, and any more stringent state or federal standards promulgated pursuant to the Federal Water Pollution Control Act Amendments of 1972, the Clean Water Act of 1977, and subsequent amendments.
(Ord., passed 8-20-91)

§ 51.13 DISCHARGE OF UNPOLLUTED WATERS INTO SEWER.

(A) No person(s) shall discharge or cause to be discharged through any leak, defect, or connection any unpolluted waters such as stormwater, groundwater, roof runoff, subsurface drainage, or cooling water to any sanitary sewer, building sewer, building drain or building plumbing. The superintendent or his representative shall have the right, at any time, to inspect the inside or outside of buildings or smoke test for connections, leaks, or defects to building sewers and require disconnection or repair of any pipes carrying such water into the building sewer. The waters shall not be removed through the dual use of a sanitary drain sump or a sump pump to a building sanitary sewer. Discharge of waters by a manual switch-over from sanitary sewer to storm drainage will not be an acceptable method

of separation. In case both storm and sanitary sewage is present, separate drainage or pumping system shall be included.

(B) Stormwater, groundwater and all other unpolluted drainage may be discharged to the sewers as are used as storm sewers approved by the superintendent. Under no circumstances shall sanitary sewage be discharged to a storm sewer.

(C) The owner(s) of any building sewers having such connections, leaks, or defects shall bear all costs incidental to removal of such sources.
(Ord., passed 8-20-91)

§ 51.14 SUBSTANCES WHICH INTERFERE.

No user shall contribute or cause to be contributed, directly or indirectly, any pollutant or wastewater which will interfere with the operation or performance of the POTW or cause pass-through of a pollutant(s) to the receiving stream. These general prohibitions apply to all users of a POTW whether or not the user is subject to Federal Categorical Pretreatment Standards or any other federal, state, or local pretreatment standards or requirements. A user shall not contribute the following substances to the POTW:

(A) Any liquids, solids or gasses which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the POTW or to the operation of the POTW. At no time shall a wastestream exhibit a closed cup flashpoint of less than one-hundred forty degrees (140°) Fahrenheit (sixty (60°) degrees Centigrade) using the test methods specified in 40 CFR 261.21. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and any other substances which have a closed cup flash point of one-hundred forty (140°) degrees Fahrenheit (sixty (60°) degrees Centigrade) or less, and any substance which the city, the state, or EPA has notified the user is a fire hazard or a hazard to the sewer system.

(B) Any waters or wastes having a Ph lower than six (6) or higher than nine (9) or having any other corrosive property(s) capable of causing damage or hazard to structures, equipment, and personnel of the POTW.

(C) Any slug load or pollutants, including oxygen demanding pollutants, released at a flow or concentration that will cause interference with the POTW's operation.

(D) Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers, or other interference with the proper operation of the wastewater facilities.

(E) Any wastewater having a temperature which will inhibit biological activity in the POTW treatment plant resulting in interference, but in no case wastewater with a temperature at the introduction into the POTW that will result in a treatment plant influent temperature which exceeds one-hundred and four (104°) degrees Fahrenheit (forty (40°) degrees C).

(F) Any pollutant(s) which, either alone or by interaction with other substances, produce toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems.

(G) Any substance which may cause the POTW's effluent or any other product of the POTW such as residues, sludges, or scum to be unsuitable for reclamation and reuse or to interfere with the reclamation process where the POTW is pursuing a reuse and reclamation program. In no case shall a substance discharged to the POTW cause the POTW to be in non-compliance with sludge use or disposal criteria, guidelines or regulations developed under Section 405 of the Act; any criteria, guidelines, or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act, or state criteria applicable to the sludge management method being used.

(H) Any substance which causes the POTW to violate its NPDES/KPDES permit, sludge disposal permit or the water quality standards of the receiving stream.

(I) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference of pass-through at the POTW.

(J) Any trucked or hauled pollutants, except at discharged points designated by the superintendent.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

PRIVATE WASTEWATER DISPOSAL

§ 51.20 PUBLIC SEWER NOT AVAILABLE.

(A) Where a public sanitary sewer is not available under the provisions of §§ 51.10 through 51.14 of this chapter, the building sewer shall be connected, until the public sewer system is available, to a private wastewater disposal system complying with the provisions of applicable local and state regulations.

(B) The owner shall operate and maintain the private sewage disposal facilities in a sanitary manner at all times, at no expense to the city. When it becomes necessary, the sludge may be disposed of only as approved by the city, by operators licensed by the city for such purposes.

(C) No statement contained in this subchapter shall be construed to interfere with any additional requirements that may be imposed by applicable local, state or federal regulations.

(D) Industries with current NPDES/KPDES permits may discharge at permitted discharge points provided they are in compliance with the conditions of the permit.
(Ord., passed 8-20-91)

§ 51.21 REQUIREMENTS FOR INSTALLATION.

(A) The type, capacity, location, and layout of a private sewage disposal system shall comply with all local or state regulations. Before commencement of construction of a private sewage disposal system, the owner shall first obtain a written permit issued by the Woodford County Health Department after approval of the system by the local and state authorities if required. The application for the permit shall be made on a form furnished by the Woodford County Health Department which the applicant shall supplement by any plans, specifications, and other information as are deemed necessary by the Woodford County Health Department.

(B) A permit for private sewage disposal system shall not become effective until the installation is completed to the satisfaction of the local and state authorities, if required. These authorities shall be allowed to inspect the work at any stage of construction, and in any event the applicant for the permit shall notify the superintendent when the work is ready for final inspection and before any underground portions are covered.
(Ord., passed 8-20-91)

BUILDING SEWERS AND CONNECTIONS

§ 51.30 PERMITS.

(A) There shall be two (2) classes of building sewer permits required: (1) for residential and (2) for service to commercial and industrial establishments. In either case, the owner(s) or his agent shall make application on a special form furnished by the city. Applicants for service to commercial and industrial establishments shall be required to furnish information about all waste-producing activities, wastewater characteristics and constituents. The permit application shall be supplemented by any plans, specifications, or other information considered pertinent in the judgment of the Public Works Director. Details regarding commercial and industrial permits include but are not limited to those required by this chapter. Permit and inspection fees shall be paid to the city at the time the application is filed.

(B) Users shall notify the city at least thirty (30) days in advance of any new introduction of wastewater constituents or any substantial change in the volume or character of the wastewater being introduced into the POTW. The Superintendent may deny or condition the new introduction or change in discharge based on the information submitted in the notification or additional information as may be requested.

(C) No unauthorized person(s) shall uncover, plug or make, any connections with or opening into, use, alter, or disturb any public

sewer or appurtenance thereof without first obtaining a written permission from the Public Works Director.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.31 PROHIBITED CONNECTIONS.

(A) No person shall make connection of roof downspouts, basement wall seepage or floor seepage, exterior foundation drains, areaway drains, or other sources of surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer. Any such connections which already exist on the effective date of this ordinance shall be completely and permanently disconnected within sixty (60) days of the effective date of this ordinance. The owners of any building sewers having such connections, leaks or defects shall bear all costs incidental to removal of such sources. Pipes, sumps and pumps for such sources of ground and surface water shall be separate from wastewater facilities. Removal of such sources of water without presence of separate facilities shall be evidence of drainage to public sanitary sewer.

(B) Floor, basement or crawl space drains which are lower than ground surfaces surrounding the building shall not be connected to the building sanitary sewer. No sanitary inlet which is lower than six (6) inches above the top of the lowest of the two adjacent public sanitary sewer manholes shall be connected by direct drainage to the building sanitary sewer.
(Ord., passed 8-20-91)

§ 51.32 DESIGN AND INSTALLATION.

(A) A separate and independent building sewer shall be provided for every building; except where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, courtyard, or driveway, the sewer from the front building may be extended to the rear building and the whole considered as one building sewer, but the city does not and will not assume any obligation or responsibility for damage caused by or resulting from any such single connection aforementioned.

(B) Old building sewers may be used in connection with new buildings only when they are found, on examination and test by the Public Works Director, to meet all requirements of this chapter. Permit and inspection fees for new buildings using existing building sewers shall be the same as for new building sewers. If additional sewer consumers are added to the old building sewers, additional sewer tap fees shall be charged accordingly even though no new sewer tap is actually made into the city system.

(C) Extension of customer service lines from any point on the customers side of the tap for delivery of waste from any location other than that of the customer in whose name the tap is registered shall not be permitted.

(D) The size, slope, alignment, materials of construction of a building sewer, and the methods to be used in excavating, placing of the pipe, jointing, testing, and backfilling the trench, shall all conform to the requirements of the local and state building and plumbing codes and other applicable rules and regulations of the city. In the absence of local code provisions or in amplification thereof, the materials and procedures set forth in appropriate specifications of the ASTM and WPCF Manual of Practice No. 9 shall apply.

(E) All costs and expenses incidental to the installation and connection of the building sewer shall be borne by the owner(s). The owner(s) shall indemnify the city for any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer. Fees for connection shall be as established by the city.

(F) The owner shall ensure that all excavations for building installation shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways, and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the city.

(G) In all buildings in which any sanitary facility drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such drain shall be lifted by an approved means and discharged to the building sewer. Drain pipe and sump for collection of such sanitary drainage shall be above basement floor or in separately watertight or drained sump or channel.

(H) All building sanitary sewer lines will be installed so as to meet or exceed the most current revision of the State Plumbing Code.

(I) All persons performing maintenance on city sewers shall use methods and equipment approved by the Public Works Director.

(J) All necessary cleaning of house connections, including root removal, and the removal of stoppages, from the building to the public sewer shall be the responsibility of the property owner.
(Ord., passed 8-20-91)

§ 51.33 INSPECTION.

(A) All sewer taps shall be inspected after the connection is made to the public sewer and before the connection is covered. The applicant for the building sewer permit shall notify the Public Works Director when the building sewer connection is ready for inspection. The connection and testing shall be made under the supervision of the Public Works Director or his representative. All connections shall be made gastight and watertight and verified by proper testing. Any deviation from the prescribed procedures and materials must be approved in writing by the Public Works Director before installation. The applicant's failure to have the connection inspected pursuant to this section shall authorize the Public Works Director to discontinue

water and sewer service to the subject property until an appropriate inspection has been conducted.

(B) All building sewers shall be smoke tested through the wye branch at the public sewer connection, with public sewer tightly plugged off, after connections at both ends are made and after all pipe is properly bedded and backfilled at least to top of pipe and if backfill is completed, within two weeks after completion of backfill. At time of test any openings into the building drain inside the building shall be water trapped or plugged. Any leakage of smoke from building sewer or building drain and plumbing shall be located at test and repaired to stand repetition of smoke test without leakage. When smoke testing is completed, the temporary flow line plug shall be removed and a permanent water-tight plug shall be placed in branch of test wye-branch and carefully backfilled by hand and tamped to at least six inches above the top of the branch.
(Ord., passed 8-20-91; Am. Ord. 2000-3, passed 1-4-00)

POLLUTANT DISCHARGE LIMITS

§ 51.40 GENERAL CONDITIONS.

The following described substances, materials, waters, or waste set out in this subchapter shall be limited in discharge to municipal systems to concentrations or quantities which will not harm either the sewers, wastewater treatment process or equipment will not have an adverse effect on the receiving stream, or will not otherwise endanger lives, limb, public property, or constitute a nuisance. The superintendent may set additional limitations or limitations more stringent than those established in these regulations if, in his opinion, more severe limitations are necessary to meet the above objectives. In forming his opinion as to the acceptability, the superintendent shall give consideration to such factors as the quantity of subject waste in relation to flows and velocities in the sewers, materials of construction of the sewers, the wastewater treatment process employed, capacity of the wastewater treatment plant, and other pertinent factors.
(Ord., passed 8-20-91)

§ 51.41 RESTRICTED DISCHARGES.

(A) Wastewater containing more than fifty (50) milligrams per liter of petroleum oil, non-biodegradable cutting oils, or products of mineral oil origin.

(B) Wastewater from industrial plants, commercial business or other non-domestic connections containing floatable oils, fat, or grease, whether emulsified or not, in excess of fifty (50) milligrams per liter or containing substances which may solidify or become viscous at temperatures between thirty-two (32°) and one hundred fifty (150°) degrees Fahrenheit (0-65 degrees. C).

(C) Any garbage that has not been properly shredded. Garbage

grinders may be connected to sanitary sewers from homes, motels, institutions, restaurants, hospitals, catering establishments or similar places where garbage originates from the preparation of food in kitchens for the purpose of consumption on the premises or when served by caterers.

(D) Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interactions with other pollutants, to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters of the POTW, or to exceed the limitations set forth in a Federal Pretreatment Standard. A toxic pollutant shall include but not be limited to any pollutant identified pursuant to Section 307(a) of the Act.

(E) Any radioactive wastes or isotopes of such half-life or concentration as may exceed limits established by the superintendent in compliance with applicable state and federal regulations.

(F) Any water or wastes which, by interaction with other water or wastes in the public sewer system, release obnoxious gases, form suspended solids which interfere with the collection system, or create a condition deleterious to structures and treatment processes.

(G) Any wastewater with objectionable color not removable in the POTW, but in no case, wastewater with a color at the introduction into the POTW that exceeds three hundred (300) ADMI units.

(H) Water or wastes containing substances which are not amenable to treatment or reduction by the wastewater treatment process employed, or amenable to treatment only to the degree that the wastewater treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving stream of the POTW.

(I) Any water or waste which has characteristics based on a twenty-four (24) hour composite sample, grab, or a shorter period composite sample if more representative, which exceed the following normal maximum domestic wastewater parameter concentrations:

Parameter	Daily Maximum Allowable Concentration Without Surcharge
BOD	350 mg/l
TSS	350 mg/l
NH-N	25 mg/l

Discharges greater than these concentrations may be subject to penalties contained in the enforcement response plan for the city, in addition to a surcharge.

(J) The city has received authority through U.S. EPA and state statutes to enforce the requirements of 40 CFR Chapter I, Subchapter N, Parts 405-471 and 40 CFR 403. All users shall comply with the requirements of those regulations as well as with all articles of this chapter. The POTW Superintendent and/or his or her designee may

develop best management practices (BMPs), by ordinance or in individual wastewater discharge permits to implement local limits and the requirements of this chapter.

(K) Any waste or wastewater classified as a hazardous waste by the Resource Conservation and Recovery Act (RCRA) without, at least, a sixty (60) day period notification of the discharge to the superintendent of the POTW. This notification must include the name of the waste, EPA hazardous waste number, type of discharge, volume/mass of discharge and time of occurrence. The superintendent may deny or condition this discharge at any time.

(L) (1) The Superintendent of the POTW is authorized to establish local limits pursuant to 40 CFR 403.5(c). The following limitations are established for characteristics of any wastewaters to be discharged into the municipal sewer system:

Pollutant	Daily Maximum (in milligrams per litter)
Oil & Grease, total	100.0 mg/l
Oil & Grease, hydrocarbon	50.0 mg/l
Ph	6.0 - 10.0
Arsenic, total	0.03 mg/l
Cadmium, total	0.02 mg/l
Chromium, total	2.69 mg/l
Copper	0.38 mg/l
Lead, total	0.13 mg/l
Mercury	0.0005 mg/l
Nickel	0.18 mg/l
Zinc	0.80 mg/l
Silver	0.09 mg/l
Phenols, total	1.52 mg/l
Chlorides	400.0 mg/l
Chromium, Hex.	0.11 mg/l
Color	300 ADMI*
Cyanide	0.07 mg/l
Iron, total	5.33 mg/l
Molybedenum, total	3.76 mg/l
Selenium, total	0.02 mg/l
Total Toxic Organics	2.13 mg/l

*American Dye Manufacturer's Institute (ADMI)

(2) The city does reserve the right to modify these local limits in the future should such a modification prove necessary as a result of changes in SIU status, state or federal regulations, WWTP performance or other conditions. The City will enforce all limits in order to insure that the purpose of the Pretreatment Program is fully met. (Ord., passed 8-20-91; Am. Ord., passed 6-1-93; Am. Ord. 95-18, passed 11-21-95; Am. Ord. 2000-40, passed 1-3-01; Am. Ord. 2008-28, passed 11-4-08; Am. Ord. 2011-35, passed 1-3-12)

§ 51.42 DILUTION OF WASTEWATER DISCHARGE.

No user shall ever increase the use of process water or, in any way attempt to dilute a discharge as a partial or complete substitute

for adequate treatment to achieve compliance with the limitations contained in the Federal Categorical Pretreatment Standards, or for any other pollutant-specific limitation developed by the city or the Commonwealth of Kentucky.
(Ord., passed 8-20-91)

§ 51.43 GREASE, OIL, AND SAND INTERCEPTORS.

Grease, oil and sand interceptors shall be provided when, in the opinion of the superintendent they are necessary for the proper handling of liquid wastes containing floatable oil and/or greases in excessive amounts, or any flammable wastes, sand or other harmful ingredients; except that interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the superintendent and shall be

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located as to be readily and easily accessible for cleaning and inspection. In the maintaining of these interceptors, the owner(s) shall be responsible for the proper removal and disposal by appropriate means of the captured material and shall maintain records of the dates, and means of disposal. The city may require reporting of information for their review. Any removal and hauling of the collected materials not performed by owner's personnel must be performed by currently licensed waste disposal firms. Interceptors shall also comply with applicable regulations of the Woodford County Health Department.
(Ord., passed 8-20-91)

§ 51.44 SPECIAL INDUSTRIAL PRETREATMENT REQUIREMENTS.

(A) Pursuant to the requirements imposed on publicly owned wastewater treatment works by the Federal Water Pollution Control Act Amendments of 1972 and later amendments, all pretreatment standards promulgated by the U.S. EPA under 40 CFR Subchapter N, and 40 CFR 403 for new and existing industrial discharge which violates these EPA Pretreatment Standards shall be in violation of this chapter.

(B) Where pretreatment or flow equalizing facilities are provided or required for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation by the owner(s) at his expense.

(C) Any person who transports septic tank contents, seepage pit or cesspool contents, liquid industrial waste or other batch liquid waste and wishes to discharge the waste to the public sewer system shall first obtain permission for the discharge from the superintendent. All persons receiving permission shall abide by all applicable provisions of this chapter, and any other special provisions that may be established by the superintendent as necessary for the proper operation and maintenance of the sewerage system. Waste haulers who have been granted permission to discharge to the public sewer system shall pay fees for the discharge in accordance with a fee schedule established by the superintendent and approved by the city. It shall be illegal to discharge any batch liquid waste into any manhole or other part of the public sewer system, or any building sewer or other facility that discharges to the public sewer system, except as points of discharge designated by the superintendent for such purposes. Any liquid waste hauler illegally discharging to the public sewer system shall be subject to immediate revocation of discharge privileges (if granted) and further subject to the penalties and enforcement actions prescribed in §51.99. Nothing in this chapter shall relieve waste haulers of the responsibility for compliance with county health department, state or federal regulations.
(Ord., passed 8-20-91)

§ 51.45 PROTECTION FROM ACCIDENTAL AND SLUG DISCHARGES.

(A) (1) Each significant industrial user shall provide protection from accidental and/or slug discharges of prohibited

materials or other substance regulated by this chapter. Facilities to prevent accidental and slug discharges of prohibited materials shall be provided and maintained at the owner or user's own cost and expense. Once every two (2) years the superintendent will determine whether each significant industrial user needs to develop a plan to control slug discharges. If the superintendent decides that a slug control plan is needed, the plan shall contain the following:

(a) description of discharge practice.
(b) description of stored chemicals.
(c) procedures for notifying the POTW
(d) prevention procedures for spills

(2) In the case of all possible or actual accidental and/or slug discharges, it is the responsibility of the user to immediately telephone and notify the POTW of the incident. The notification shall include the location of discharge, type of waste, concentration and volume and corrective actions taken.

(B) Within five (5) days following an accidental and/or slug discharge, the user shall submit to the superintendent a detailed written report describing the cause of the discharge and the measures to be taken by the user to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability which may be incurred as a result of a damage to the POTW, fish kills or any other damage to person or property; nor shall such notification relieve the user of any fines, civil penalties, or other liability which may be imposed by this article, the enforcement response plan or other applicable law or regulation.

(C) A notice shall be permanently posted on the user's bulletin board or other prominent place advising employees whom to call in the event of a dangerous discharge. Employers shall insure that all employees who may cause or suffer such dangerous discharges to occur are advised of the emergency notification procedures.
(Ord., passed 8-20-91)

§ 51.46 STATE REQUIREMENTS.

State requirements and limitations on discharges shall apply in any case where they are more stringent than federal regulations and limitations or those in this chapter.
(Ord., passed 8-20-91)

§ 51.47 CITY'S RIGHT OF REVISION.

The city reserves the right to establish, by a majority vote of its commissioners, more stringent limitations or requirements on discharges to the POTW at the recommendation of the superintendent or if deemed necessary to comply with the objectives presented in this chapter.
(Ord., passed 8-20-91)

§ 51.48 FEDERAL CATEGORICAL PRETREATMENT STANDARDS.

Upon the promulgation of the federal categorical pretreatment standards for a particular industrial subcategory, the federal standard, if more stringent than limitations imposed under this chapter for sources in that subcategory, shall immediately supersede the limitations imposed under this chapter. The superintendent shall notify all affected users of the applicable reporting requirements under 40 CFR, 403.12.
(Ord., passed 8-20-91)

PRETREATMENT PROGRAM ADMINISTRATION

§ 51.50 WASTEWATER DISCHARGES.

It shall be unlawful to discharge to any natural outlet within the city, or in any area under the jurisdiction of the city and/or to the POTW any wastewater except as authorized by the superintendent in accordance with the provisions of this chapter. Any agency and/or industries outside the jurisdiction of the city that wish to contribute wastewaters to the POTW must first sign (through an authorized representative) an inter-jurisdictional agreement whereby the agency and/or industrial user agrees to be regulated by all provisions of this chapter, state and federal regulations. An industrial user discharge permit may then be issued by the superintendent in accordance with § 51.51.
(Ord., passed 8-20-91)

§ 51.51 INDUSTRIAL USER DISCHARGE PERMITS.

(A) General. All significant industrial users proposing to connect to or to contribute to the POTW shall obtain an industrial user discharge permit before connecting to or contributing to the POTW. All existing significant industrial user connected to or contributing to the POTW shall apply for an industrial user discharge permit within thirty (30) days of the effective date of the chapter.

(B) Permit application. Users required to obtain an industrial user discharge permit shall complete and file with the city an application in the form prescribed by the city. Existing users shall apply for an industrial user discharge permit within thirty (30) days of the effective date of the chapter, and proposed new users shall apply at least ninety (90) days prior to connecting to or contributing to the POTW. In support of the application, the user shall submit in units and terms appropriate for evaluation the following information, in addition to any other information the superintendent may desire:

(1) Name, address, and location of facility, and owner(s) if different from that given;

(2) SIC number(s) according to the Standard Industrial Classification Manual, United States Bureau of the Budget, 1972, as

Amended;

(3) Wastewater constituents and characteristics as determined by an analytical laboratory acceptable to the city; sampling and analysis shall be performed in accordance with procedures established by the EPA pursuant to Section 304 (g) of the Act and contained in 40 CFR, 136, as amended; and 40 CFR 261;

(4) Time and duration of contribution;

(5) Daily average and maximum wastewater flow rates, including daily, monthly and seasonal variations if any;

(6) Site plans, floor plans, mechanical and plumbing plans and details to show all sewers, sewer connections, and appurtenances by the size, location and elevation;

(7) Description of activities, facilities and plant processes on the premises, including all materials which are or could be discharged.

(8) Where known, the nature and concentration of any pollutants in the discharge which are limited by any city, state or federal pretreatment standards, and a statement regarding whether or not the pretreatment standards are being met on a consistent basis and, if not, whether additional pretreatment is required for the user to meet applicable pretreatment standards;

(9) If additional pretreatment will be required to meet the pretreatment standards, the shortest schedule by which the user will provide such additional pretreatment. The completion date in this schedule shall not be later than the compliance date established for the applicable pretreatment standards. The following conditions shall apply to this schedule:

(a) The schedule must be acceptable to the city.

(b) The schedule shall contain increments of progress in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the user to meet the applicable pretreatment standards.

(c) Not later than fourteen (14) days following each date in the schedule and the final date for compliance, the user shall submit a progress report to the superintendent including, as a minimum, whether or not it complied with the increment of progress to be met on such date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the user to return the construction to the schedule established.

(10) Each product produced by type, amount, process and rate of production;

(11) Type and amount of raw materials processed (average and maximum per day);

(12) Number of employees, and hours of operation of plant and proposed or actual hours of operation of pretreatment system;

(13) A copy of the industry's written environmental control program, comparable document, or policy; and

(14) Any other information as may be deemed by the city to be necessary to evaluate the permit application.

(C) Issuance of industrial user discharge permit.

(1) The Superintendent shall evaluate the data furnished by the user and may require additional information. After evaluation and acceptance of the data furnished, the Superintendent may issue an industrial user discharge permit subject to terms and conditions provided in this subchapter. The industrial user discharge permit must be issued prior to commencement of discharge. The Superintendent may withhold or discontinue water service until the discharge permit is issued. All new source categorical industries shall be capable of achieving compliance with this chapter upon commencement of discharge.

(2) The Superintendent shall provide notice to each significant industrial user of the issuance of the user's industrial user discharge permit. Any person, including the user, may petition the Superintendent to reconsider the terms of a permit within fifteen (15) days of notice of its issuance.

(a) Failure to submit a timely petition for review shall be deemed to be a waiver of the administrative appeal.

(b) In its petition, the appealing party must indicate the permit provisions objected to, the reasons for this objection and the alternative condition, if any, it seeks to place in the permit.

(c) The effectiveness of the permit shall not be stayed during the appeal.

(d) The Superintendent may forward the appeal to the Mayor. If the Superintendent and/or the Mayor fail to act within thirty (30) days of receipt of the appeal, a request for reconsideration shall be deemed to be denied. Decisions not to reconsider a permit, not to issue a permit, or not to modify a permit shall be considered final administrative actions for purposes of judicial review.

(e) Aggrieved parties seeking judicial review of the final administrative action and/or the permit must do so by filing a complaint with the Woodford County Circuit Court in accordance with the appropriate procedures of that court and any statute of limitations. (Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.52 PERMIT MODIFICATIONS.

The Superintendent may modify an industrial user discharge permit for good cause, including, but not limited to, the following reasons:

(A) To incorporate any new or revised federal, state or local pretreatment standards or requirements;

(B) To address significant alterations or additions to the user's operation, processes or wastewater volume or character since the time of the individual wastewater discharge permit issuance;

(C) A change in the POTW that requires either a temporary or permanent reduction or elimination of the authorized discharge;

(D) Information indicating that the permitted discharge poses a threat to the city POTW, personnel, biosolids disposal and/or the receiving stream;

(E) Violation of any terms or conditions of the industrial user discharge permit;

(F) Misrepresentations of failure to fully disclose all relevant facts in the wastewater discharge permit application or in any required reporting;

(G) Revision of or a grant of variance from categorical pretreatment standards pursuant to 40 CFR 403.13; or

(H) To correct typographical or other errors in the discharge permit.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.53 PERMIT CONDITIONS.

(A) Industrial user discharge permits shall be expressly subject to all provisions of this chapter and all other applicable regulations, user charges and fees established by the city. Permits may contain the following:

(1) The unit charge or schedule of user charges and fees for the wastewater to be discharged to the public sewer system;

(2) Effluent limits, including best management practices, on the average and/or maximum wastewater constituents and characteristics;

(3) Limits on average and maximum rate and time of discharge or requirements for flow regulations and equalization;

(4) Requirements for installation and maintenance of inspection and sampling facilities;

(5) Specifications for monitoring programs which may include sampling locations, frequency of sampling to be performed, types and standards of analysis and reporting schedules;

(6) Compliance schedules;

(7) Requirements for maintaining and retaining all records relating to wastewater discharge as specified by the city for a minimum of three (3) years, and afford city access thereto;

(8) Requirements for notification of the city of any new introduction of wastewater constituents or any substantial change in the volume or character of the wastewater constituents being introduced into the city's wastewater treatment system;

(9) Requirements for notification of slug discharges;

(10) Requirements for the user to reimburse the city for the expenses related to monitoring, sampling, and testing performed at the direction of the Superintendent and deemed necessary by the city to verify that the user is in compliance with the permit;

(11) Any other conditions as deemed appropriate by the Superintendent and/or the city to ensure compliance with this chapter;

(12) Requirements for submission of technical reports or discharge reports;

(13) A statement that indicates the industrial user discharge permit issuance date, expiration date and effective date;

(14) A statement that the industrial user permit is nontransferable;

(15) Requirements to control slug discharge if determined by the Superintendent to be necessary; and

(16) A statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule. Such schedule may not extend the time for compliance beyond that required by applicable federal, state or local law.

(B) Where an effluent from an industrial process is mixed prior to treatment with wastewaters other than those generated by the regulated process, fixed alternative discharge limits may be derived for the discharge permit by the Superintendent. These alternative limits shall be applied to the mixed effluent. These alternative limits shall be calculated using the combined wastestream formula and/or flow-weighted average formula given in 40 CFR 403.6(e). Where the effluent limits in a categorical pretreatment standard are expressed only in terms of mass of pollutants per unit of production (production-based standard), the Superintendent may convert the limits to equivalent limitations expressed either as mass of pollutant discharged per day or of effluent concentration for purposes of calculating effluent permit limitations applicable to the permittee. The permittee shall be subject to all permit limits calculated in this manner under 40 CFR 403.6(c) and must fully comply with these

alternative limits. All categorical industrial users subject to production-based standards must report production rates annually so that alternative permit limits can be calculated if necessary. The categorical user must notify the Superintendent thirty (30) days in advance of any change in production levels that might effect the flow or other data used to calculate the effluent limits in the discharge permit.

(C) When a categorical pretreatment standard is expressed only in terms of pollutant concentrations, an industrial user may request that the city convert the limits to equivalent mass limits. The determination to convert concentration limits to mass limits is within the discretion of the Superintendent. The Superintendent may establish equivalent mass limits only if the industrial user meets all the conditions set forth as follows:

(1) To be eligible for equivalent mass limits, the industrial user must: (i) employ, or demonstrate that it will employ, water conservation methods and technologies that substantially reduce water use during the term of its industrial user discharge permit; (ii) currently use control and treatment technologies adequate to achieve compliance with the applicable categorical pretreatment standard, and not have used dilution as a substitute for treatment; (iii) provide sufficient information to establish the facility's actual average daily flow rate for all wastestreams, based on data from a continuous effluent flow monitoring device, as well as the facility's long-term average production rate. Both the actual average daily flow rate and the long-term average production rate must be representative of current operating conditions; (iv) not have daily flow rates, production levels, or pollutant levels that vary so significantly that equivalent mass limits are not appropriate to control the discharge; and (v) have consistently complied with all applicable categorical pretreatment standards during the period prior to the industrial user's request for equivalent mass limits.

(2) An industrial user subject to equivalent mass limits must: (i) maintain and effectively operate control and treatment technologies adequate to achieve compliance with the equivalent mass limits; (ii) continue to record the facility's flow rates through the use of a continuous effluent flow monitoring device; (iii) continue to record the facility's production rates and notify the superintendent whenever production rates are expected to vary by more than twenty percent (20%) from its long-term average production rates. Upon notification of a revised production rate, the Superintendent will reassess the equivalent mass limit and revise the limit as necessary to reflect changed conditions at the facility; and (iv) continue to employ the same or comparable water conservation methods and technologies as those implemented pursuant to division (C)(1)(i) of this section so long as it discharges under an equivalent mass limit.

(3) When developing equivalent mass limits, the Superintendent shall: (i) calculate the equivalent mass limit by multiplying the actual average daily flow rate of the regulated process(es) of the industrial user by the concentration-based daily

maximum and monthly average standard for the applicable categorical pretreatment standard and the appropriate unit conversion factor; (ii) upon notification of a revised production rate, will reassess the equivalent mass limit and recalculate the limit as necessary to reflect changed conditions at the facility; and (iii) may retain the same equivalent mass limit in subsequent individual user discharge permit terms if the industrial user's actual average daily flow rate was reduced solely as a result of the implementation of water conservation methods and technologies, and the actual average daily flow rates used in the original calculation of the equivalent mass limit were not based on the use of dilution as a substitute for treatment.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.54 PERMIT DURATION.

Industrial user discharge permits shall be issued for a specified time period, not to exceed five (5) years. A permit may be issued for a period less than a year or may be stated to expire on a specific date. The user shall apply for permit reissuance a minimum of one hundred twenty (120) days prior to the expiration of the user's existing permit. The terms and conditions of the permit may be subject to modification by the city during the term of the permit as limitations or requirements as identified in §§ 51.40 through 51.48 are modified or other just cause exists. The user shall be informed of any proposed changes in their permit at least thirty (30) days prior to the effective date of change. Any changes or new conditions in the permit shall include a reasonable time frame for compliance.
(Ord., passed 8-20-91)

§ 51.55 PERMIT TRANSFER.

Industrial user discharge permits are issued to a specific user for a specific operation. An industrial user discharge permit shall not be reassigned or transferred or sold to a new owner, new user, different premises, or a new or changed operation without, at a minimum, a thirty (30) day prior notification of the change to the superintendent and provision of a copy of the existing permit to the new owner. The superintendent may deny the transfer of the permit if it is deemed necessary to comply with all provisions of this chapter.
(Ord., passed 8-20-91)

§ 51.56 REPORTING REQUIREMENT FOR PERMITTEE.

(A) Within ninety (90) days following the date for final compliance with applicable pretreatment standards or, in the case of a new user, following commencement of the introduction of wastewater into POTW, any user subject to federal categorical pretreatment standards and requirements shall submit to the Superintendent a report indicating the nature and concentration of all pollutants in the discharge from the regulated process or processes which are limited by categorical pretreatment standards and requirements and the average and maximum daily flow for these process units in the user's facility which are limited by such categorical standards and requirements. The report shall state whether the applicable categorical pretreatment standards

and requirements are being met on a consistent basis and, if not, what additional pretreatment equipment and time schedule are necessary to bring the user into compliance with the applicable categorical standard or requirement. This statement shall be signed by an authorized representative of the user. Where compliance schedules are required, the following conditions shall apply:

(1) The schedule shall contain progress increments in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the user to meet the applicable Pretreatment Standards (such events include, but are not limited to, hiring an engineer, completing preliminary and final plans, executing contracts for major components, commencing and completing construction, and beginning and conducting routine operation);

(2) No increment referred to above shall exceed nine (9) months; and

(3) The user shall submit a progress report to the Superintendent no later than fourteen (14) days following each date in the schedule and the final date of compliance including, at a minimum, whether or not it complied with the increment of progress, the reason for any delay, and, if appropriate, the steps being taken by the user to return to the established schedule.

(B) Periodic compliance reports.

(1) All significant industrial users shall submit to the superintendent during the months of June and December, unless required more frequently by a pretreatment standard, or the industrial user discharge permit, a report indicating the nature and concentration of pollutants in the effluent which are limited by such pretreatment standards or the industrial user discharge permit. The report shall also include the chain-of-custody (COC) forms, field data and any other information required by the Superintendent. In addition, this report shall include a record of all daily flows or the average daily flow. At the discretion of the superintendent and in consideration of factors as local high or low flow rates, holidays, budget cycles, etc., the Superintendent may agree to alter the months during which the above reports are to be submitted. All periodic compliance reports must be signed and certified in accordance with 40 CFR 403.12 and § 52.61 of this chapter.

(2) All wastewater samples must be representative of the user's discharge. Wastewater monitoring and flow measurement facilities shall be properly operated, kept clean and maintained in good working order at all times. The failure of a user to keep its monitoring facility in good working order shall not be grounds for the user to claim that sample results are unrepresentative of its discharge. All analyses shall be performed by a laboratory acceptable to the city. Analytical procedures shall be in accordance with procedures established by the U.S. EPA pursuant to Section 304(g) of the Act and contained in 40 CFR 136 and amendments thereto or with any

other test procedures approved by the U.S. EPA. Sampling shall be performed in accordance with the techniques approved by the U.S. EPA. Except as indicated in divisions (B)(2)(a) and (B)(2)(b) below, the user must collect wastewater samples using 24-hour flow-proportional composite sampling techniques, unless time-proportional composite sampling or grab sampling is authorized by the Superintendent. Where time-proportional composite sampling or grab sampling is authorized by the Superintendent, the samples must be representative of the discharge. Using protocols (including appropriate preservation) specified in 40 CFR 136 and appropriate EPA guidance, multiple grab samples collected during a 24-hour period may be composited prior to the analysis as follows: for cyanide, total phenols and sulfides, the samples may be composited in the laboratory or in the field; for volatile organics and oil and grease, the samples may be composited in the laboratory. Composite samples for other parameters unaffected by the compositing procedures as documented in approved EPA methodologies may be authorized by the Superintendent, as appropriate. In addition, grab samples may be required to show compliance with instantaneous limits.

(a) Samples for oil and grease, temperature, pH, cyanide, total phenols, sulfides and volatile organic compounds must be obtained using grab collection techniques.

(b) For sampling required in support of baseline monitoring and 90-day compliance reports required in 40 CFR 403.12(b) and (d), a minimum of four (4) grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide and volatile organic compounds for facilities for which historical sampling data do not exist; for facilities for which historical sampling data are available, the Superintendent may authorize a lower minimum. For the reports required by 40 CFR 403.12(e) and (h), the industrial user is required to collect the number of grab samples necessary to assess and assure compliance with applicable pretreatment standards and requirements.

(3) Where 40 CFR 136 does not include a sampling or analytical technique for the pollutant in question, sampling and analysis shall be performed in accordance with the procedures set forth in the EPA publication "Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants," April 1977, and amendments thereto, or with any other sampling and analytical procedures approved by the U.S. EPA.

(4) All industrial users shall retain all pretreatment records for a minimum of three (3) years, as required by 40 CFR 403.12(o)(2).

(C) (1) A baseline monitoring report (BMR) must be submitted to the Superintendent by all categorical industrial users at least ninety (90) days prior to initiation of discharge to the sanitary sewer. The BMR must contain, at a minimum, the following:

(a) Production data including a process description, SIC code number, raw materials used, chemicals used, and final

product(s) produced; pretreatment industrial category (if applicable), and a schematic which indicates points of discharge to the sewer system.

(b) Identifying information to include name, address of facility, owner(s), contact person and any other environmental permits held by the facility.

(c) Wastewater characteristics such as total plant flow, types of discharges, average and maximum flows from each process.

(d) Nature and concentration of pollutants discharged to the public sewer system that are regulated by this chapter, state and/or federal pretreatment standards and sample type and location (all analyses must conform with 40 CFR 136 and amendments thereto).

(e) Information concerning any pretreatment equipment used to treat the facility's discharge.

(f) Compliance certification. A statement, reviewed by the user's authorized representative and certified by a qualified professional, indicating whether pretreatment standards are being met on a consistent basis, and, if not, whether additional operation and maintenance (O&M) and/or additional pretreatment is required to meet the pretreatment standards and requirements.

(g) Compliance schedule. If additional pretreatment and/or O&M will be required to meet the pretreatment standards, the shortest schedule shall not be later than the compliance date established for the applicable pretreatment standard. A compliance schedule pursuant to this section must meet the requirements set out in § 51.53(F) of this chapter.

(2) All new sources of industrial discharge must be in compliance with all provisions of this chapter prior to commencement of discharge.

(3) Compliance schedule progress reports. The following conditions shall apply to all compliance schedules required by this chapter:

(a) The schedule shall contain progress increments in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the user to meet the applicable pretreatment standards.

(b) No increment referred to above shall exceed nine (9) months;

(c) The user shall submit a progress report to the Superintendent no later than fourteen (14) days following each date in the schedule and the final date of compliance including, as a minimum, whether or not it complied with the increment of progress, the reason for any delay, and, if appropriate, the steps being taken by the user

to return to the established schedule; and in no event shall more than nine (9) months elapse between such progress reports to the Superintendent.

(4) Users subject to the reporting requirements of this chapter shall retain, and make available for inspection and copying, all records of information obtained pursuant to any monitoring activities required by this chapter, any additional records of information obtained pursuant to monitoring activities undertaken by the user independent of such requirements and documentation associated with best management practices as may be required. Records shall include the date, exact place, method and time of sampling and the name of the person(s) taking the samples; the dates analyses were performed; who performed the analyses; the analytical techniques or methods used and the results of such analyses. These records shall remain available for a period of at least three (3) years. This period shall automatically be extended for the duration of any litigation concerning the user or the city or where the user has been specifically notified of a longer retention by the Superintendent.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.57 PERMIT VIOLATIONS.

All significant industrial users must notify the superintendent within twenty-four (24) hours of first becoming aware of a permit violation. This notification shall include the date of the violation, the parameter violated and the amount in exceedance. Within thirty (30) days of first becoming aware of a permit violation, the significant industrial user must resample analysis to the superintendent, unless the superintendent, on behalf of the city, conducts monitoring of this parameter within that thirty (30) day period.

§ 51.58 MONITORING FACILITIES.

(A) The city shall require significant industrial users to provide and operate at the user's own expense, monitoring facilities to allow inspection, sampling, and flow measurement of the building sewer and/or internal drainage system. The monitoring facility should normally be situated on the user's premises, but the city may, when such a location would be impractical or cause undue hardship on the user, allow the facility to be constructed in a public right-of-way. The superintendent shall review and approve the location, plans, and specifications for such monitoring facilities and may require them to be constructed to provide for the separate monitoring and sampling of industrial waste and sanitary sewage flows. There shall be ample room in or near such sampling manhole or facility to allow accurate sampling and preparation of samples for analysis. The facility, sampling and measuring equipment shall be maintained at all times in a safe and proper operating condition at the expense of the user. Whether constructed on public or private property, the sampling and monitoring facilities shall be provided in accordance with the city's requirements and all applicable local construction standards and specifications. Construction shall be completed within ninety (90) days following approval of the location plans and specifications.

(B) All sampling analyses done in accordance with approved U.S. EPA procedures by the significant industrial user during a reporting period shall be submitted to the superintendent, regardless of whether or not that analysis was required by the user's discharge permit.

(C) The significant industrial user must receive the approval of the superintendent before changing the sampling point and/or monitoring facilities to be used in all required sampling.
(Ord., passed 8-20-91)

§ 51.59 INSPECTION AND SAMPLING.

The superintendent shall inspect the facilities of any user to ascertain whether the purpose of this chapter is being met and all requirements are being complied with. Persons or occupants of premises where wastewater is created or discharged shall allow the city or its representative ready access at all reasonable times to all parts of the premises for the purpose of inspection, sampling, copying records examination, or in the performance of any of their duties. "Reasonable times" shall include any time during which the user is discharging to the public sewer system and/or operating any manufacturing process. The city approval authority and U.S. EPA shall have the right to set up on the user's property devices necessary to conduct sampling, inspections, compliance monitoring and/or metering operations. Where a user has security measures in force which would require proper identification and clearance before entry into their premises, the user shall make necessary arrangements for their security guards so that, upon presentation of suitable identification, personnel from the city approval authority and U.S. EPA will be permitted to enter, without delay, for the purpose of performing their specific duties.
(Ord., passed 8-20-91)

§ 51.60 PRETREATMENT.

(A) All significant industrial users shall provide necessary wastewater treatment as required to comply with this chapter and shall achieve compliance with all applicable federal categorical pretreatment standards within the time limits as specified by the Federal Pretreatment Regulations. The city may require the development of a compliance schedule for installation of pretreatment technology and/or equipment by any significant industrial user that is not meeting discharge limits established in the user's industrial user discharge permit. Any facilities required to pretreat wastewater to a level acceptable to the city shall be provided, operated, and maintained at the user's expense. Detailed plans showing the pretreatment facilities and operating procedures shall be submitted to the superintendent for review, and shall be acceptable to the superintendent before construction of the facility. The review of such plans and operating procedures will in no way relieve the user from the responsibility of modifying the facility as necessary to produce an effluent acceptable to the city under the provisions of this chapter. Any subsequent changes in the pretreatment facilities or method of operation shall be reported to and be acceptable to the city prior to the user's initiation of the change.

(B) The city is required by federal regulations to keep the public informed of all cases of significant violations. To accomplish this, the city shall annually publish in a newspaper of general circulation that provides meaningful public notice within the jurisdictions served by the POTW, a list of the users which were in significant noncompliance with any pretreatment requirements or standards. "SIGNIFICANT NONCOMPLIANCE" is any significant violation that meets one or more of the following conditions:

(1) Results in the exercise of emergency authority by the superintendent;

(2) Remains uncorrected forty-five (45) days after notice of noncompliance is given;

(3) Involves failure to report noncompliance accurately;

(4) Wastewater violations:

(a) Chronic violations - Sixty-six (66) percent or more of all measurements taken during a six (6) month period exceed, by any magnitude, the daily maximum limit or the monthly average limit for same pollutant parameter;

(b) Technical Review Criteria (TRC) violations - Thirty-three percent (33%) or more of all measurements for each pollutant parameter taken during a six (6) month period equal or exceed the product of the daily maximum limit or the monthly average limit multiplied by the applicable TRC (TRC = 1.4 for BOD, TSS, fats oils and grease and 1.2 for all other pollutants except pH).

(c) Any violation of a pretreatment effluent limit that the superintendent believes has caused alone or in combination with other discharges, interference or pass through or has endangered the health of the POTW personnel or the public.

(d) Any discharge causing imminent endangerment to human health or to the environment or resulting in the superintendent's use of his emergency authority to halt or prevent such a discharge.

(e) Violations of compliance schedule milestones, failure to comply with schedule milestones for starting or completing construction or attaining final compliance by ninety (90) days or more after the scheduled date.

(f) Failure to provide required reports within thirty (30) days of the due date.

(g) Any violation or group of violations which may include a violation of best management practices, which the Superintendent determines will adversely effect the operation or implementation of the local pretreatment program. The public notification shall also summarize any enforcement actions taken against the user(s) during the same twelve (12) months. All records relating

to the pretreatment program of the city shall be made available to officials of the U.S. EPA or approval authority and the general public upon request. All records shall be maintained for a minimum of three (3) years in accordance with 40 CFR 403.12 (o)(2).

(C) All applications, reports or information submitted to the city shall be signed and certified in accordance with the following requirements. Written designation of the signatory official must be received by the city prior to acceptance of any application or other required document.

(1) All permit applications shall be signed:

(a) For a corporation: by a principal executive officer of at least the level of vice president.

(b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

(2) All other correspondence, reports and self-monitoring reports shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(a) The authorization is made in writing by a person described above; and

(b) The authorization specifies either an individual or a position having facility or activity, such as the position of plant manager, manager or position of equivalent responsibility.

(3) Certification.

(a) Any person signing a document under this section shall make the following written certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

(b) A facility determined to be a non-significant categorical industrial user by the Superintendent pursuant to § 51.02 DEFINITIONS of this chapter must annually submit the following certification statement signed in accordance with the signatory requirements in this section. This certification must accompany any alternative report required by the Superintendent:

"Based on my inquiry of the person or persons directly responsible for managing compliance with the Categorical Pretreatment Standards under 40 CFR [Part], I certify that, to the best of my knowledge and belief that during the period from [month/day], [year] to [month/day], [year]:

(A) The facility described as [Facility Name] met the definition of a Non-Significant Categorical Industrial User as described in § 51.02 DEFINITIONS of this chapter;

(B) The facility complied with all applicable Pretreatment Standards and Requirements during this reporting period; and

(C) The facility never discharged more than 100 gallons of total categorical wastewater on any given day during this reporting period."

(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.61 CONFIDENTIAL INFORMATION.

Information and data on a user obtained from reports, questionnaires, permit applications, permits and monitoring programs and from inspections shall be available to the public or other governmental agency without restriction unless the user specifically requests in writing and is able to demonstrate to the satisfaction of the city that the release of the information would divulge information, processes, or methods of production entitled to protection as trade secrets of the user. When requested by the person furnishing a report, the portions of a report which might disclose trade secrets or secret processes shall not be made available for inspection by the public but shall be made available to all governmental agencies for uses related to this chapter, the NPDES/KPDES permit, sludge disposal system permit, and/or the pretreatment program upon request of the agency. Such portions of a report shall be available for use by the state or any state agency in judicial review or enforcement proceedings involving the person furnishing the report. Wastewater constituents and characteristics shall not be recognized as confidential information and shall be available to the public without restriction.
(Ord., passed 8-20-91)

FEES

§ 51.70 PURPOSE.

This article provides for the recovery of costs from users of the POTW for the implementation and conduct of the pretreatment program established herein. The applicable charges or fees shall be set forth in the city's schedule of charges and fees.
(Ord., passed 8-20-91)

§ 51.71 CHARGES AND FEES.

(A) The city may adopt charges and fees which may include the following:

(1) Fees for reimbursement of costs of setting up and operating the city's pretreatment program;

(2) Fees for monitoring, inspections and surveillance procedures;

(3) Fees for reviewing accidental discharge procedures and construction;

(4) Fees for permit application;

(5) Fees for filing appeals;

(6) Fees for consistent removal by the POTW of excessive strength conventional pollutants;

(7) Other fees as the city may deem necessary to carry out the requirements contained in this chapter;

(8) Fees for the connection of a discharge (residential or other). These fees relate solely to the matters covered by this chapter and are separate from all other fees chargeable by the city.

(B) Charges shall be comprised of a system of excessive strength surcharges and a system of charges for debt services, operation and maintenance costs including normal replacement costs.
(Ord., passed 8-20-91)

POWERS AND AUTHORITY OF INSPECTORS

§ 51.80 RIGHT TO ENTER PREMISES.

The superintendent and other duly promulgated employees and representatives of the city and authorized representatives of applicable federal and state regulatory agencies bearing proper credentials and identification shall be permitted to enter all properties at any reasonable time for the purpose of, but not limited to, inspection, observation, measurement, sampling, and testing of discharges to the public sewer system and inspection and copying of all records in accordance with the provisions of this chapter.
(Ord., passed 8-20-91)

§ 51.81 RIGHT TO OBTAIN INFORMATION REGARDING DISCHARGE.

Duly authorized employees and representatives of the city are authorized to obtain information concerning character, strength and quantity of industrial wastes which have a direct bearing on the kind and source of discharge to the wastewater collection system.
(Ord., passed 8-20-91)

§ 51.82 ACCESS TO EASEMENT.

Duly authorized employees and representatives of the city bearing proper credentials and identification shall be permitted to enter all

private properties through which the city holds a duly negotiated easement for the purpose of, but not limited to, inspection, observation, measurement and sampling, repair and maintenance of any portion of the wastewater facilities lying within said easement. All entry and subsequent work, if any, on said easement shall be done in full accordance with the terms of the duly negotiated easement pertaining to the private property involved.
(Ord., passed 8-20-91)

§ 51.83 SAFETY.

While performing the necessary work on private properties referred to in § 51.80, all duly authorized employees of the city shall observe all safety rules applicable to the premises established by the facility and the company shall be held blameless for any injury or death to the city employee. The city shall secure the company against loss or damage to its property by city employees and against liability claims and demands for personal injury or property damage asserted against the company and growing out of the gauging and sampling operation, except as such may be caused by negligence or failure of the company to maintain safe conditions as required by this chapter.
(Ord., passed 8-20-91)

§ 51.84 HAULED WASTEWATER.

(A) Septic tank waste may be introduced into the sewer system (POTW) only at locations designated by the W.W.T.P. Supervisor, and at such times established by the Supervisor. Such waste shall not violate Article V or any other requirements of the Versailles Sewer Use Ordinance. Waste haulers may be required by the W.W.T.P. Supervisor to obtain a discharge permit.

(B) Haulers of industrial waste shall obtain a wastewater discharge permit. Generators of the industrial waste may be required to obtain a discharge permit.

(C) The W.W.T.P. Supervisor may collect samples of each hauled load to ensure compliance with applicable regulations. The hauler may be required to provide an analysis of any load prior to discharge.

(D) ~~Fees for hauled septic waste shall be as follows:~~

~~(1) 1,000 gallons or less $25.00~~

~~(2) Each 100 gallons over 1,000 $ 2.50~~

~~(3) Industrial waste hauled will be considered on a by case basis.~~

S ~~(4) Industrial waste is subject to surcharge fees established in the Versailles Sewer Use Ordinance.~~
~~(Ord. 96-8, passed 4-16-96)~~

See attached Ordinance Amendments at the end of this section.

ENFORCEMENT

§ 51.90 INFORMAL NOTICE TO INDUSTRIAL USERS.

(A) (1) The city, through the Superintendent or his or her designee, to insure compliance with this chapter, and as permitted through 40 CFR Subchapter N, 401 through 471, and 401 KAR 5:055, Section 9, may take the following enforcement steps against users in non-compliance with this chapter. The remedies available to the Superintendent include injunctive relief, civil and criminal penalties, immediate discontinuance of discharges and/or water service and the publishing of the list of significant violators annually. The enforcement authority shall be vested in the Superintendent of the POTW or his or her designee. The Superintendent may suspend the wastewater treatment service and/or industrial user discharge permit when such suspension is necessary, in the opinion of the Superintendent, in order to stop an actual or threatened discharge which presents or may present an imminent or substantial endangerment to the health or welfare of persons, to the environment, causes interference to the POTW or causes the POTW to violate any condition of its NPDES/KPDES permit.

(2) Any user notified of a suspension of the wastewater treatment service and/or the industrial user discharge permit shall immediately stop or eliminate the wastewater discharge. In the event of a failure of the user to comply voluntarily with the suspension order, the city shall take such steps as deemed necessary including immediate severance of the sewer connection and/or water service to prevent or minimize damage to the POTW system or endangerment to any individuals. The city may reinstate the industrial user discharge permit and/or the wastewater treatment service upon proof of the elimination of the non-complying discharge. A detailed written statement submitted by the user describing the causes of the harmful contribution and the measures taken to prevent any future occurrence shall be submitted to the city within fifteen (15) days of the date of occurrence.

(B) All violations of requirements of this chapter must be reviewed and responded to by the Superintendent or his or her representative. In general, the Superintendent shall notify the industrial user when a violation occurs. For all violations, the Superintendent shall receive an explanation and, as appropriate, a plan from the industrial user to correct the violation within a specific time period. If the violation(s) persist or the explanation and/or plan are not adequate, the Superintendent's response shall be more formal and commitments or schedules, as appropriate, for compliance will be established in an enforceable document. The enforcement response selected will be related to the seriousness of the violation. Enforcement responses will be escalated if compliance is not achieved expeditiously after the initial action. A significant violation will require a formal enforcement action. The full scale of enforcement actions will be as detailed in the city's pretreatment program enforcement response plan. The enforcement actions and remedies provided for in this chapter are not exclusive. The Superintendent may take any, all, or combination of these actions against a noncompliant

user. However, the Superintendent may take other action against any user when the circumstances warrant. Further the Superintendent is empowered to take more than one enforcement action against any noncompliant user.
(Ord., passed 8-20-91; Am. Ord. 2011-35, passed 1-3-12)

§ 51.91 ENFORCEMENT ACTIONS.

(A) Informal notice - These actions include statements made to the industrial user during sampling and/or inspection visits, telephone calls to the appropriate company official, informal meetings, warning or reminder letters. These informal notices shall be used for minor violations.

(B) Formal actions - These actions include the following:

(1) Notice of violation - Any person found to be violating any provision of this chapter, wastewater discharge permit or any order issued hereunder shall be served by the POTW superintendent with a written notice stating the nature of the violation. The offender must permanently cease all violations.

(2) Administrative orders/fines.

(a) Any person who, after receiving a notice of violation, shall continue to discharge in violation of this chapter to other pretreatment standard or requirement or is determined to be a chronic or persistent violator shall be ordered to appear before the superintendent. At the appearance, a compliance schedule will be given to the violating user and an administrative fine assessed. The fine shall be determined on a case-by-case basis which shall consider the type, severity, duration and number of violations, severity of impact on the POTW, impact on human health, user's economic benefit from violation, past history of the user, and good-faith efforts made by the user. The fine shall be non-arbitrary but appropriate amount.

(b) Users desiring to dispute such fines shall file with the superintendent a request for the city to reconsider the fine within ten (10) days of being notified of the fine. The city shall convene a hearing on the matter within fifteen (15) days of receiving such a request from the user.

(c) The administrative order may take any of the following four forms:

(i) Consent Order - The superintendent is hereby empowered to enter into consent orders, assurances of voluntary compliance, or other similar documents establishing an agreement with the industrial user responsible for the noncompliance. The orders will include specific action to be taken by the industrial user to correct the noncompliance within a time period also specified in the order. Consent orders shall have the same force and effect as all other administrative orders.

(ii) Compliance Order - When the superintendent finds that an industrial user has violated or continues to violate this chapter or permit or order issued hereunder, he may issue an order to the industrial user responsible for the violation directing that following a specified time period, sewer service shall be discontinued unless adequate treatment facilities, devices or other related appurtenances have been installed and are properly operated. Orders may also contain other requirements reasonably necessary and appropriate to address the noncompliance, including the installation of pretreatment technology, additional self-monitoring and management practices.

(iii) Cease and Desist Order - When the superintendent finds that an industrial user has violated or continues to violate this chapter or any permit or order issued hereunder, the superintendent may issue an order to cease and desist all violations to the user and direct those persons in noncompliance to:

(a) Comply forthwith;

(b) Take such appropriate remedial or preventative action as may be needed to properly address a continuing or threatened violation, including halting operations and terminating the discharge.

(iv) Show Cause Hearing - The superintendent may issue to the user who causes or contributes to violations of this chapter, discharge permit or order issued hereunder, an order to appear and show cause why more severe enforcement action should not be taken. A notice shall be served on the user specifying the time and place of the hearing to be held by the superintendent regarding the violation, the reasons why the action is to be taken, the proposed enforcement action and directing the user to show cause before the superintendent why more severe enforcement action should not be taken. The notice of the hearing shall be served personally or by registered or certified mail (return receipt requested) at least ten (10) days before the hearing. Service may be made on any agent or officer of the facility. Whether or not a duly notified industrial user or its representative appears, immediate enforcement action may be pursued. The city itself may conduct the hearing and take evidence or may designate a representative to:

(a) Issue in the name of the city notices of hearings requesting the attendance and testimony of witnesses and the production of evidence relevant to any matter involved in such hearings;

(b) Take the evidence; or

(c) Transmit a report of the evidence and

hearing, including transcripts and other evidence, together with recommendations to the city for action thereon. At the hearing held pursuant to this chapter, testimony taken must be under oath and recorded steno-graphically. The transcript, so recorded, will be made available to any member of the public or any party to the hearing upon payment of the usual charges thereof. After the city has reviewed the evidence, it may issue an order to the user responsible for the violation directing that, following a specified time period, the sewer service be discontinued unless adequate treatment facilities, devices or other related appurtenances are installed and properly operated. Further orders and directives as are necessary and appropriate may be issued.

§ 51.99 PENALTIES.

(A) Written Notice. Any user found to be violating any provision of this chapter or a discharge permit or other issued hereunder shall be served by the superintendent or his representative with written notice stating the nature of the violation. The violator shall permanently cease all violations upon receipt of this notice. As contained §§ 51.90 - 51.91, the notice may be of several forms. Penalties of various forms set out in §§ 51.90 - 51.91 may be levied against users for violations of this chapter. The penalties shall range from publication of violators to fines of at least one thousand dollars ($1,000) per day per violation.

(B) Continued Violation. Any user who shall violate any provision of this chapter, a discharge permit or other order issued hereunder shall be guilty of a violation of this chapter and shall be liable to the superintendent for a civil penalty of at least one thousand dollars ($1,000) per violation for each day on which the violation occurs. Each day on which a violation occurs shall be deemed a separate offense.

(C) Revocation of permit. Any user violating any of the provisions of this chapter or discharge permit or other order issued hereunder shall be subject to termination of its authority to discharge sewage into the public sewer system. The termination shall be immediate if necessary for the protection of the POTW. The user may also have water service terminated. Any user who violates any condition(s) of this chapter, discharge permit, order or applicable state or federal regulations is subject to having its industrial user discharge permit revoked in accordance with the procedures of this chapter. Violations resulting in immediate permit revocation shall include, but not be limited to, the following:

(1) Failure of a user to factually report the wastewater constituents and characteristics of its discharge;

(2) Failure of the user to report significant changes in operations, processes, wastewater constituents and characteristics;

(3) Refusal of reasonable access to the user's premises for

the purpose of inspection and sampling; and

(4) Violation(s) of any condition of the industrial user discharge permit.

(D) Liability. Any user violating any of the provisions of this chapter, discharge permit or other order issued hereunder shall become liable to the city for any expense, loss or damage occasioned by the city by reason of the violation. This civil liability is as provided by state and federal regulations.

(E) Misrepresentation and/or Falsifying Documents. Any user who knowingly and/or negligently makes any false statements, representation or certification of any application, record, report, plan or other document filed or required to be maintained pursuant to this chapter, or industrial user discharge permit or who falsifies, tampers with or knowingly and/or negligently renders inaccurate any monitoring device or method required under this chapter, shall be punished by a fine of at least one thousand dollars ($1,000) or by imprisonment for not more than twelve (12) months, or by both.

(F) Destruction of POTW and Legal Action. No person(s) shall maliciously, willfully, or negligently break, damage, destroy, uncover, deface, or tamper with any structure, appurtenance, or equipment which is part of the POTW. Any person(s) violating this provision shall be subject to immediate arrest under charge of disorderly conduct. It shall be noted that the Clean Water Act does not require proof of specific intent to obtain conviction.

(G) Judicial Action. If any person(s) discharges sewage, industrial wastes or other wastes into the city's wastewater disposal system contrary to the provisions of the chapter, discharge permit, any order of the superintendent or the city, or federal or state pretreatment requirements, the city may commence an action for appropriate legal and/or equitable relief in the appropriate court of this jurisdiction. In addition to the penalties provided herein, the city may recover reasonable attorney's fees, court costs, court reporter's fees and other expenses of litigation by appropriate suit at law against the person(s) found to have violated this chapter or the orders, rules regulations and permits issued hereunder.

(H) Termination of Service. The superintendent may suspend the wastewater treatment service and/or wastewater discharge permit of an industrial user whenever such suspension is necessary in order to stop an actual or threatened discharge presenting or causing an imminent or substantial endangerment to the health or welfare of the public, the POTW or the environment. Any user notified of a suspension of the wastewater treatment service and/or the discharge permit shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the superintendent shall take such steps as deemed necessary including immediate severance of the sewer connection, to prevent or minimize damage to the POTW, its receiving stream, or endangerment to

any individuals. Any industrial user which is responsible, in whole or in part, for imminent endangerment shall submit a detailed written statement describing the causes of the harmful contribution and the measures taken to prevent any future occurrence to the superintendent.

(I) Criminal Prosecution. Any industrial user who willfully or negligently violates any provisions of this chapter, any orders or permits issued hereunder, or any other pretreatment requirements shall, upon conviction, be guilty of a misdemeanor, punishable by a fine of not more than one thousand dollars ($1,000) per violation per day or imprisonment for not more than one year or both.
(Ord., passed 8-20-91)

VERSAILLES - SEWER SYSTEM USE

CITY OF VERSAILLES
ORDINANCE NO. 2012-17

AN ORDINANCE AMENDING THE RATES CHARGED FOR TREATING HAULED WASTEWATER AND SETTING THE RATE FOR TREATMENT OF COOKING GREASE.

WHEREAS, the Versailles City Council has determined that it is necessary and advisable to adjust the rates charged for processing of hauled wastewater at the City's wastewater treatment facility.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY OF VERSAILLES, KENTUCKY AS FOLLOWS:

SECTION ONE: The rates charged for treatment of hauled wastewater as set forth on City Ordinance Section 51.84(D) are hereby amended as follows:

(D) Fees charged for hauled septic waste shall be as follows:

(1) 1,000 gallons or less	$ ~~25.00~~	37.50
(2) Each 100 gallons over 1,000	$ ~~2.50~~	3.75
(3) Cooking grease per 1000 gallons, or portion thereof	$ 40.00	

(~~3~~ 4) Industrial waste hauled will be considered on a by case basis.

(~~4~~ 5) Industrial waste is subject to surcharge fees established in the Versailles Sewer Use Ordinance.

SECTION TWO: This ordinance shall become effective October 1, 2012 and will be published as required by law.

Introduced and given first reading at a meeting of the City Council of the City of Versailles, Kentucky, held on the 21st day of August, 2012, and fully adopted after the second reading at a meeting of said council held on the 4th day of September, 2012.

THE CITY OF VERSAILLES
Fred Siegelman
FRED SIEGELMAN, MAYOR

ATTEST:
Allison B. White
ALLISON B. WHITE, CITY CLERK

CITY OF VERSAILLES
ORDINANCE NO. 2013-25

AN ORDINANCE AMENDING THE RATES CHARGED FOR WATER SERVICE FOR USERS LOCATED INSIDE THE CITY LIMITS

WHEREAS, the Versailles City Council has determined that it is necessary and advisable to adjust the rates charged for water service to persons living inside of the City limits,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY OF VERSAILLES, KENTUCKY AS FOLLOWS:

SECTION ONE: The water rates charged for water service provided to users within the city limits as set forth on City Ordinance Section 50.25 are hereby amended as follows:

Gallons of Water Used Per Month	**Monthly Charge Per 1,000 Gallons**	
Minimum monthly charge (incl. 1,000 gallons)	$7.20	
Per 1,000 Gallons		
Kentucky River Authority Withdraw fee	~~$ 0.10~~	$ 0.17
1,000 to 150,000 gallons	$3.91	
Next 850,000	$3.78	
All over 1,000,000	$3.75	

SECTION TWO: The rates set forth in Section One of this ordinance shall take effect with the meter reading for the month of July, 2013.

Introduced and given first reading at a meeting of the City Council of the City of Versailles, Kentucky, held on the 4th day of June, 2013, and fully adopted after the second reading at a meeting of said council held on the 18th day of June, 2013.

THE CITY OF VERSAILLES

FRED SIEGELMAN, MAYOR

ATTEST:

Allison B. White

ALLISON B. WHITE, CITY CLERK

CITY OF VERSAILLES
ORDINANCE NO. 2013-26

AN ORDINANCE AMENDING THE RATES CHARGED FOR WATER SERVICE FOR USERS LOCATED OUTSIDE THE CITY LIMITS

WHEREAS, the Versailles City Council has determined that it is necessary and advisable to adjust the rates charged for water service to persons living outside of the City limits,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY OF VERSAILLES, KENTUCKY AS FOLLOWS:

SECTION ONE: The water rates charged for water service provided to users outside the city limits as set forth on City Ordinance Section 50.27 are hereby amended as follows:

Gallons of Water Used Per Month	**Monthly Charge Per 1,000 Gallons**
Minimum monthly charge (incl. 1,000 gallons)	$ 8.65
Per 1,000 Gallons	
Kentucky River Authority Withdraw fee	~~$ 0.10~~ $ 0.17
1,000 to 150,000 gallons	$ 4.58
Next 850,000	$ 4.32
All over 1,000,000	$ 4.22

SECTION TWO: The rates set forth in Section One of this ordinance shall take effect with the meter reading for the month of July, 2013.

Introduced and given first reading at a meeting of the City Council of the City of Versailles, Kentucky, held on the 4th day of June, 2013, and fully adopted after the second reading at a meeting of said council held on the18th day of June, 2013.

THE CITY OF VERSAILLES

FRED SIEGELMAN, MAYOR

ATTEST:

Allison B. White

ALLISON B. WHITE, CITY CLERK

CITY OF VERSAILLES
ORDINANCE NO. 2011-12

AN ORDINANCE AMENDING THE RATES CHARGED FOR SEWER SERVICE FOR USERS LOCATED INSIDE THE CITY LIMITS

WHEREAS, the Versailles City Council has determined that it is necessary and advisable to adjust the rates charged for sewer service to persons living inside of the City limits,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY OF VERSAILLES, KENTUCKY AS FOLLOWS:

SECTION ONE: The sewer rates charged for sewer service provided to users within the city limits as set forth on City Ordinance Section 50.29(A) are hereby amended as follows:

Gallons of Water Used Per Month	**Monthly Charge Per 1,000 Gallons**	
Minimum monthly charge (incl 1,000 gallons)	~~$7.20~~	$7.34
Per 1,000 Gallons of Water usage		
1,000 - 150,000 gallons	~~$ 3.90~~	$ 3.98
Next 850,000	~~$ 3.48~~	$ 3.55
All over 1,000,000	~~$ 3.42~~	$ 3.49

SECTION TWO: The rates set forth in Section One of this ordinance shall take effect with the meter reading for the month of July, 2011.

Introduced and given first reading at a meeting of the City Council of the City of Versailles, Kentucky, held on the 24th day of May, 2011, and fully adopted after the second reading at a meeting of said council held on the 31st day of May, 2011.

THE CITY OF VERSAILLES

FRED SIEGELMAN, MAYOR

ATTEST:

Allison B. White

ALLISON B. WHITE, CITY CLERK

CITY OF VERSAILLES
ORDINANCE NO. 2011-13

AN ORDINANCE AMENDING THE RATES CHARGED FOR SEWER SERVICE FOR USERS LOCATED OUTSIDE THE CITY LIMITS

WHEREAS, the Versailles City Council has determined that it is necessary and advisable to adjust the rates charged for sewer service to persons living outside of the City limits,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY OF VERSAILLES, KENTUCKY AS FOLLOWS:

SECTION ONE: The sewer rates charged for sewer service provided to users outside the city limits as set forth on City Ordinance Section 50.29(B) are hereby amended as follows:

Gallons of Water Used Per Month	**Monthly Charge Per 1,000 Gallons**	
Minimum monthly charge (incl 1,000 gallons)	~~$9.17~~	$ 9.35
Per 1,000 Gallons of Water usage		
1,000 - 150,000 gallons	~~$ 5.27~~	$5.38
Next 850,000	~~$ 4.67~~	$4.76
All over 1,000,000	~~$ 4.66~~	$4.75

SECTION TWO: The rates set forth in Section One of this ordinance shall take effect with the meter reading for the month of July, 2011.

Introduced and given first reading at a meeting of the City Council of the City of Versailles, Kentucky, held on the 24th day of May, 2011, and fully adopted after the second reading at a meeting of said council held on the 31st day of May, 2011.

APPROVED:

FRED SIEGELMAN, MAYOR

ATTEST:

Allison B. White

ALLISON B. WHITE, CITY CLERK

Appendix H

Appendix H

Waste Load Allocation

STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

January 24, 2014

Mike Jacobs, P.E.,
Project Engineer
GRW Engineers, Incorporated
801 Corporate Drive
Lexington, Kentucky 40503

Re: Waste Load Allocation Request
Versailles Wastewater Facilities Plan Update
KPDES No.: KY0020621
Woodford County, Kentucky

Dear Mr. Jacobs:

This is in response to your April 8, 2013 letter (attached), requesting a waste load allocation (WLA) for expansion of the subject wastewater treatment plant (WWTP) from 3.0 MGD to 4.5 MGD. Discharge is to remain near mile point (mp) 12.4 of Glenns Creek [National Hydrogaphy Dataset (NHD) mp 12.74], segment 04013. Per your correspondence, the requested WLA information will be utilized in drafting a Regional Wastewater Facilities Plan Update.

Considering the above-mentioned information, applicable effluent limitations are provided below.

Design Capacity = 4.5 MGD / Discharge near NHD mp 12.74 of Glenns Creek

Parameter	May 1 - October 31	November 1 - April 30
$CBOD_5$	20 mg/l	20 mg/l
Total Suspended Solids	30 mg/l	30 mg/l
Ammonia Nitrogen	4 mg/l	10 mg/l
Dissolved Oxygen	7 mg/l	7 mg/l
Total Phosphorus	Monitor, mg/l	Monitor, mg/l
Total Nitrogen	Monitor, mg/l	Monitor, mg/l
Total Residual Chlorine	0.011 mg/l	0.011 mg/l

Reliability Classification = Grade C

In addition to the above requirements, the monthly average and weekly average values of E. coli shall be at or below 130 colonies per 100 milliliters or 240 colonies per 100 milliliters, respectively, the year around. If a form of chlorine is proposed to disinfect the wastewater, then de-chlorination will likely be needed to achieve the chlorine residual effluent limitation. Additional effluent limitations and water quality standards are contained in 401 KAR Chapter 5 and 401 KAR Chapter 10.

These preliminary design effluent limitations are valid for one (1) year from the date of this letter, and are subject to change as a result of additional information which may be presented during the public notice phase of the Kentucky Pollutant Discharge Elimination System (KPDES) permitting process. As such, this letter does not convey any authorization or approval to proceed with the construction or operation of the proposed WWTP. Construction and KPDES permit applications must be submitted to request such authorization or approval. Nor does this letter ensure issuance of either permit. During the review processes of these permits the Division of Water will further evaluate the viability of the project.

Should you have any questions regarding this letter, please contact me at (502) 564-3410, extension 4914 or E-mail at Courtney.Seitz@ky.gov.

Sincerely,

Courtney Seitz

Courtney Seitz, WLA Coordinator
Wet Weather Section
Surface Water Permits Branch
Division of Water

CS:cs
c: Cindy McDonald, Water Infrastructure Branch
Compliance and Technical Assistance
Branch, Frankfort Section
TEMPO

801 Corporate Drive
Lexington, KY 40503
Tel 859 / 223-3999
Fax 859 / 223-0917

GRW Engineers, Inc.

Engineering
Architecture
Planning
GIS
Aviation Consultants

Arlington, TX
Cincinnati, OH
Columbus, OH
Indianapolis, IN
Knoxville, TN
Louisville, KY
Nashville, TN

April 8, 2013

Mr. Courtney Seitz
Wet Weather Section
Surface Water Permits Branch
Division of Water
200 Fair Oaks Lane, 4th Floor
Frankfort, KY 40601

Re: Versailles Wastewater Facilities Plan
Wasteload Allocation Request
GRW Project No. 4132

Dear Mr. Seitz:

This letter is to request the preliminary design discharge limits for updating the City of Versailles's Wastewater Facilities Plan. The current discharge permit (No. KY0020621) for Versailles's WWTP became effective April 15, 2009. The Plan calls for an upgrade of the Wastewater Treatment Plant from a rated average daily flow of 3.0 MGD to 4.5 MGD and from a rated peak flow of 9 MGD to 12.5 MGD.

Presently, the discharge outfall of the plant is located at mile point 12.4 of Glenns Creek. We have included a USGS topo map showing the location of the current WWTP outfall.

If you should have any questions or concerns, please do not hesitate to contact me at 859-223-3999, or mjacobs@grwinc.com.

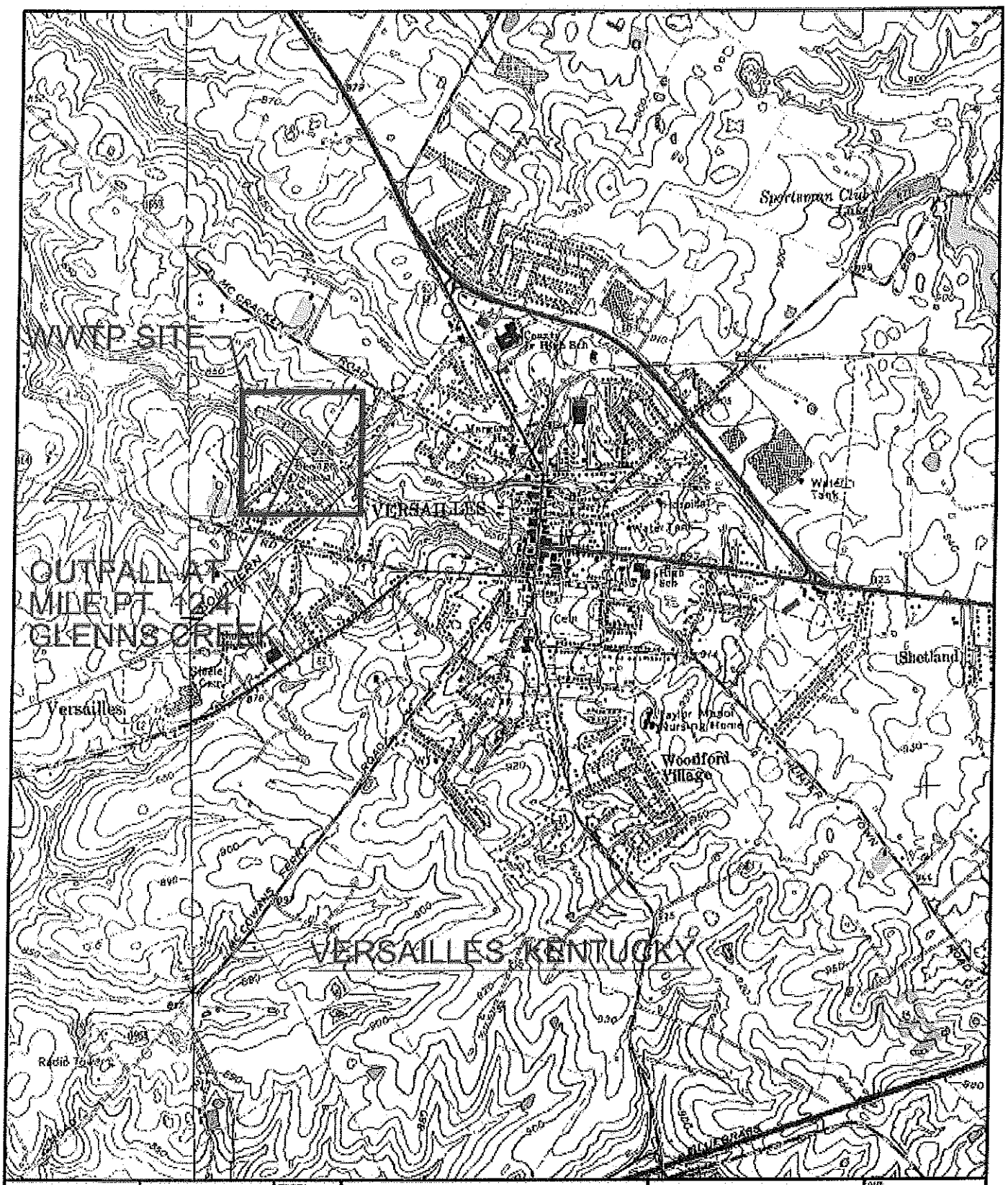
Sincerely,

Michael Jacobs, P.E.,
Project Engineer

Enclosure: USGS Topo Map with location of outfalls

Cc: Bart Miller, Versailles Director of Public Works
Mitzi Delius, Versailles Utilities Manager
John Martin, GRW

Printed on recycled paper



GRW PROJECT NO. 4132	CLIENT PROJECT NO.	FILE NO.
REVISIONS		DRAWN
NO. DESCRIPTION DATE BY		CHECKED
		APPROVED

WASTEWATER TREATMENT
PLANT SITE
CITY OF VERSAILLES, KENTUCKY

GRW
ENGINEERS - ARCHITECTS - PLANNERS
www.grwinc.com

ALL RIGHTS RESERVED

DATE APRIL, 2013
SCALE 1" = 2000'
SHEET NO. 1

Appendix I

Appendix I

Public Support Documentation

Appendix J

Appendix J

Treatment Process Equipment Documentation

Duperon® PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES | Now, there's an easier way!℠

DATE: September 30, 2013

Mechanically Cleaned Bar Screen
Budgetary Proposal Number P7157
Versailles WWTP, KY

To:
John Martin
GRW, Inc
Phone: (859) 223-3999
801 Corporate Dr
jmartin@grwinc.com

Sales Rep:
Jason Bivins
Delaney & Associates, Inc.
Phone: (859) 342-4944
jason@delaneyandassociatesinc.com

From:
Mark Nelson
Estimator
Duperon Corporation
Phone: (800) 383-8479
mnelson@duperon.com

Lorene Bruns
Regional Sales Manager
Duperon Corporation
Phone: (989) 754-8800
lbruns@duperon.com

Picture may not reflect this specific project

Scope of Supply:

1 each Mechanical Bar Screen - Link Driven, Front Cleaning, Front Return

- FlexRake® Model
  - FPFS, Full Penetration, Fine Screen
- SSTL304 side fabrications, dead plate and cross members
- SSTL304 full enclosure covering from deck to discharge
- SSTL304 enclosure access panels
- SSTL304 FlexLinks
- Drive Head:
  - Drive Sprockets coated cast iron with ductile cast iron end casting
  - Drive Shaft steel

Design criteria

- 1:1 UHMW to SSTL scraper ratio
- 1.00 ft of head differential structural design
- 0.25 inch x 0.75 inch x 0.13 inch SSTL316 tear shaped bar screen
- 3.17 ft from operating deck to top of washer compactor hopper rim
- 70.00 mph wind design
- 30.00 degree from vertical
- 0.25 inch clear opening
- 16.00 ft nominal length of FlexLink and scraper system
- 6.00 ft from channel invert to top of operating deck
- 6.00 ft channel height
- 3.00 ft channel width
- 4,200 lbs estimated weight

Hydraulic performance model

- 25.00 percent assumed blinding
- 12.50 MGD channel flow
- 5.00 ft upstream water level
- 4.84 ft downstream water level
- 4.34 inch head loss
- 1.29 fps approach velocity
- 4.26 fps slot velocity
- 1.39 fps downstream velocity

Clarifications/Exceptions/By Others

- The bar screen will be shipped fully assembled, if modular construction is needed because of site constraints, please see our Modular Construction notes below
- Bar screens will need a minimum of 1.00 ft of water level to prevent galling of the moving SSTL parts. Modifications that may be needed in the channel, for example, a downstream weir are not included in this proposal
- Some minor field welding is required at the top of the channel and/or operating deck anchor points.
- Field assembly of SSTL screen enclosure required
- Spreader bar may be required for unloading
- Crane may be required for unloading
- Anchor Bolts, per bar screen

  Bolts for anchor toes and plates
  - (8) 1/2 inch dia x 4-1/2 inch Embed HAS Rods w/ Hilti RE-500 SD Adhesive

  Bolts for Return Guide / Closeout
  - (12) 3/8 inch dia x 3-3/8 inch Embed HAS Rods w/ Hilti RE-500 SD Adhesive

1 each Duperon® Washer Compactor 30X.2 SSTL304 - Dual Auger System

- SSTL304,11 gauge compactor housing
- SSTL304 augers 0.375 inch thick and 4.00 inch flight pitch
- SSTL17-4 spur gears

Discharge chute design

- 10.00 ft long, (1) bends

Water supply and drain criteria

- Non-Clog Flood Washing
- Utilizes filtered effluent or municipal water
- Consumes 3 to 5 gallons per minute at 40 to 60 PSI
- 3.00 inch NPT male drain connection
- 0.50 inch NPT water supply connection

Clarifications/Exceptions/By Others

- Some minor field assembly required
- Water supply and discharge piping
- Mounting hardware

1 each Controls Package, Main Panel

- Main disconnect for 480/3/60 incoming power
- Wall mount NEMA 4X SSTL Enclosure
- Enclosure for Indoor Controlled Environment, to include
    - (1) bar screen
    - (1) washer compactor
    - (1) Unitronics PLC with built-in HMI
    - Pilot lights, push buttons and selector switches on front door
    - Terminal blocks, ETM's, breakers, and relays where required
    - Hard contact SCADA Interlock(s)
    - Adjustable on/off cycle timers
    - Load and line reactors
- AC Tech VFD drive for speed control, for
    - (1) 1/2HP Bar Screen Motor
    - (1) 3/4HP Washer Compactor Motor

Instrumentation

- Differential Level Control
    - (2) Siemens Sitran Probe LU Ultrasonic Level Transducers
    - (1) Intrinsically safe hand-held programmer

Local to equipment mounted devices

- (2) Three hole N7 PB enclosures for E-Stop, Forward and Reverse

Controls Clarifications/Exceptions/By Others

- See our Controls Selection Guide to customize controls.
- All conduit and field wiring between the equipment
- Mounting hardware

Screen Spare Parts

- (1) Drive Clevis Pin
- (10) Snap Rings
- (4) Link Clevis Pins
- (4) Hex Head Cap Screw
- (4) Scraper Nut
- (1) Never Seez
- (1) Snap Ring Tool
- (1) 14 oz. Tube Shur Stick

Washer Compactor Spare Parts

- (1) Upper/Lower Support: Auger
- (1) Side Support: Auger
- (12) FHCS: 0.25-20x1
- (12) 0.25 Flat Washer SAE
- (12) 0.25 Nylock Nut
- (1) AntiSeize Lubricant
- (1) Never Seez: 1oz Tube

On Site Technical Assistance

- (1) Trip(s)
- (1) Technician
- (2) 8 hour man-days
- *If additional Technical Service days are required, please add per the rates included in the Clarifications section of this scope of supply.*

Operation and Maintenance Manuals

- (6) Hard Copies

Warranty

- One Year Standard material and workmanship

Freight to Jobsite

Price: $237,356

Modular Construction Notes:

- The bar screen will be shipped from the factory fully assembled with the exception of the operating deck enclosure(s) and intermediate deck side shields, if there are any specified.
- If this installation requires modular construction, please be guided by the following:
- The installation contractor will need to dissemble the bar screen at the site and in locations directed by Duperon and approved for during the submittal process. The contractor will then reassemble the bar screen in the facility. The contactor is required to provide all material, equipment and labor for this process.
- The overall bar screen unit will be fabricated so that it can be split into disassembled segments at the project site. Precise segments depend on site constraints and bar screen dimensions. Each segment will have the exploded sidefab detail as illustrated in our installation guide. The weights of the sections will be proportioned from the overall weight listed in the proposal.
- The drive head assembly may need to be removed if site constraints, for example navigating around a corner, require it.
- The FlexLink and scraper system will need to be removed in segments of approximately six links, or about 6 ft each. The FlexLinks have a snap ring holding the FlexLink pin. These FlexLinks will need to be marked so that the contractor knows what FlexLink connects to what FlexLink during the reassembly process.
- The enclosures and or side shields for the operating deck and intermediated deck, if required will be shipped unassembled. These will comprise anywhere from 10 to 20 pieces per bar screen. These pieces of SSTL sheet metal will need to be bolted together once the bar screen is installed.
- Duperon contact: If any have further questions on our modular construction process, please contact our application engineer, Jan LaFave at 800.383.8479
- Disclaimer: Duperon cautions the contractor, whom we assume is familiar with bar screens that an allowance for the disassembly should be accounted for in their bid. Without knowing the skill set, rigging provisions, and manpower the selected contractor will apply, it is difficult for us to provide specific details on this subject. The above language is only made as an approximation and is not guaranteed.

Clarifications:

- Prices are valid for 30 days
- Submittals: 4 weeks after approved purchase order
- Equipment Delivery: 8-12 weeks after approval
- Scope of supply and pricing above does not include additional structure for seismic, additional head differential or high wind conditions
- See Duperon Contractor Installation Guides for guidance in estimating these costs.
- Duperon requires 2 week's advanced notice in writing to schedule field service technician on site.
- Field Services will be provided as outlined in this proposal. Duperon field service rate is $750 per day plus travel and per diem expenses. If field service personnel arrive on site as scheduled and the project is not ready for intended services to be performed, Duperon will invoice for additional days, if required. If the time required is greater than the time listed in this proposal, Duperon will invoice at the above rates.
- The specifications listed are the only specifications which shall apply to this proposal either directly or by reference. Any additional specifications, with equipment or requirements specified therein, that are not specifically included as part of this offer are excluded from this proposal.

Not Included:

- Anything not specifically stated in this Proposal.
- Bonding, tariffs, permits, taxes, liquidated damages.
- Construction and /or installation work of any kind at the jobsite.
- On-site conditions affecting the work described or which affects the installation.
- Conduit, stands, control mounting wiring, junction boxes, or other accessories.
- Any site work or installation tasks (ie, unloading, placement, dewatering, diving, clearing the forebay, wiring, provision of concrete structure, etc.), equipment (such as cranes, hammer drills, etc.), or anchor bolts.
- Pre-installation tasks such as touch-up painting, checking bolts for tightness, removal of shipping containment devices, etc.
- Engineering: Does not include drawings other than those for the FlexRake.
- Additional structure for seismic or high wind conditions.
- Offloading or handling of delivered equipment.
- Union labor for all field support services.
- Controls not specifically listed above.
- Videotaping of the training sessions
- Release of proprietary information.
- Insulation or weather proofing.
- Site/field painting or touch up.
- Vibration and noise testing.
- Anchor Bolts by others.
- Discharge system.
- Stilling wells.

Proposal Terms:

- This offer is subject to the enclosed Duperon Corporation Terms and Conditions page unless alternate terms and conditions are specifically negotiated in writing and are signed/accepted by Duperon Corporation at the time of purchase.
- May be subject to material price escalation.
- This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements.
- Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.

Right to Refuse:

This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements. This information may be relied upon and used for project estimating purposes only. Note In the event of cancellation of a purchase order or contract, Duperon Corporation will be compensated for all costs that it or its subcontractors have incurred for performance of work in good faith. Due to the current volatility of the steel market, prices may be impacted at time of order. Please be advised that Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.

Hydraulic Performance Model

DATE: September 30, 2013
Budgetary Proposal Number P7157
Versailles WWTP, KY

Exhibit A

INPUT: Channel Physics

Flow in MGD	12.50	MGD
Upstream water level	5.00	ft
Channel width	3.00	ft
Channel depth	6.00	ft
Degree of blinding	25%	

INPUT: Screen Physics

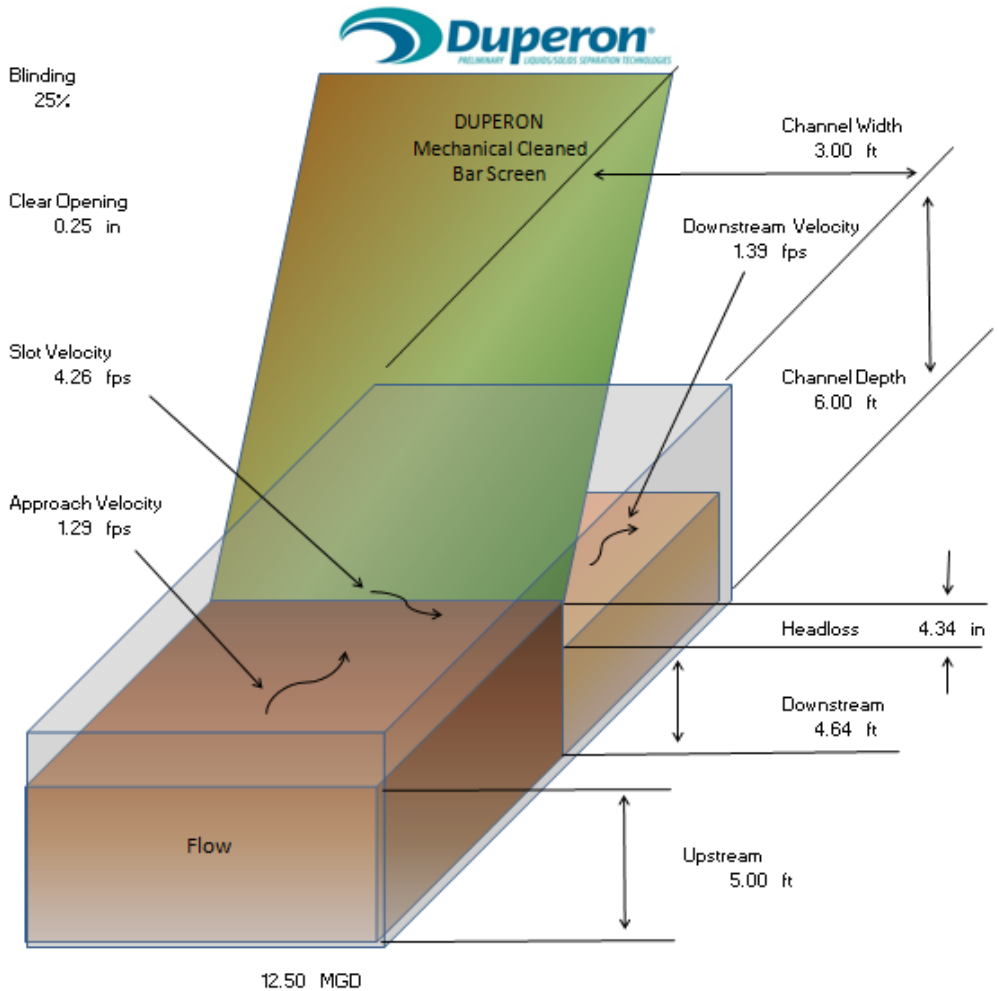
Clear Opening	0.25	in
Bar thickness	0.25	in
Thickness of side fab and closeout (2)	0.58	ft

Calculations

Side fab & closeout area	2.9000	sft
Flow are between side fab & closeouts	12.1000	sft
Number of bars	58.0000	ea
Flow area taken up by bars	6.0417	sft
Total Channel flow without screen	15.0000	sft
Flow area after screen area and blinding taken out	4.5438	sft
Approach Velocity	1.2892	fps
Slot Velocity	4.2558	fps
Downstream Velocity	1.3898	fps
Downstream Depth	4.6380	ft
Head Loss	4.3442	in

Bernoulli Calculations

Velocity thru bar scren	4.2558	fps
Velocity upstream of bar screen	1.2892	fps
Gravitational acceleration (constant)	32.2000	fps
Frictional coefficient (constant)	0.8400	c
Headloss	0.3620	ft
Headloss	4.3442	inches



These calculations are an estimation based upon the information available. Flow channel hydraulics are highly dependent on water levels and the degree of blinding.
The calculations above are a snapshot of only one condition. To fully analyze the hydraulics please contact your local Duperon representative.
Like most SSTL bar screens, Duperon recommends a minimum of 1.00 ft water depth when the unit is in operation to keep the SSTL FlexLinks lubricated and prevent galling.

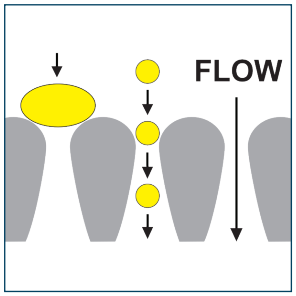
Robust Simplicity In The Industry's Most Efficient Fine Screen—Plus Thru-Bar™ Cleaning

FlexRake®
FPFS
Mechanically Cleaned
Bar Screens

Robustly simple front cleaning, front return Duperon® FlexRake® technology. Utilizes stainless steel tear shaped bars with 1/4 inch, 3/8 inch or 1/2 inch openings.

- Simple With Few Parts and Little Maintenance—Just Runs
- Unique in the Industry: Thru-Bar™ Stainless Steel Scrapers Clean 3 Sides of the Bar as well as the Cross Members
- No Tight Clearances to Bind or Jam
- Engineered for 100% Reliable Alignment of Scrapers Into Bars
- Eliminates Need for Confined Space Entries and In-Channel Maintenance With No Lower Sprockets, Bearings, Tracks or Guides to Foul or Jam
- Five-Year Warranty for Wastewater Applications

Jam Evasion™ with Patented FlexLink™ Technology Protects Your Investment — Lifts or Pivots Around Debris



Tear Shaped Bars—
Highest Efficiency
in the Industry,
25% - 50% More Efficient

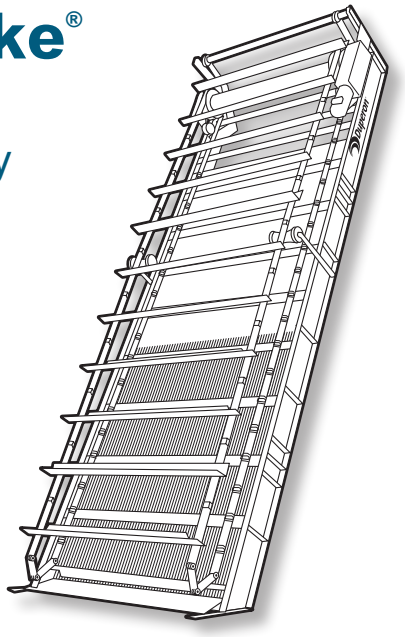
Duperon®
PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES

Now, there's an easier way!℠

Duperon®
PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES

Now, there's an easier way!℠

FlexRake®
FPFS
Mechanically Cleaned Bar Screens



TYPICAL APPLICATIONS
Wastewater, combined sewer overflows and prison applications. Also used in pulp/paper mills, raw water intakes, and other applications where debris is susceptible to wrapping and clinging on the bar screen.

UNIT WIDTH
2 feet to 10 feet
Single Strand FlexRake® configuration available for channel widths of 18 inches to 24 inches.

UNIT LENGTH
10 feet to 100 feet

ANGLE OF INSTALLATION
Range from vertical to 45 degrees, dependent upon site conditions.

STANDARD MATERIALS OF CONSTRUCTION
Standard: 304 Stainless Steel
Available in: 316 Stainless Steel

BAR OPENING
1/4 inch, 3/8 inch and 1/2 inch

STANDARD SCRAPER SPACING
Every 2nd link

SCRAPER CONFIGURATION
3:1 UHMW-PE staging scraper/stainless steel Thru-Bar™ teeth ratio. Scraper positioned every 21 inches.

TYPICAL MOTOR
1/2 HP, 1 PH/3 PH explosion proof, inverter-duty motor

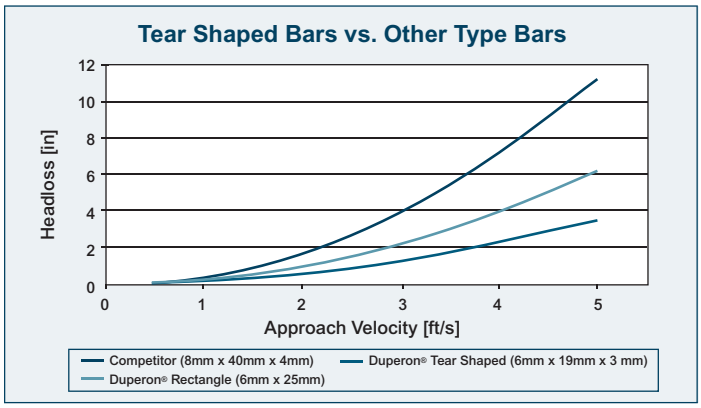
STANDARD OPERATING SPEED
0.5 RPM
Can be increased to 2.2 RPM in high flow conditions.
1 discharge/minute on low, 4 discharges/minute on high
Scrapers move 28 inches/minute

SHIPPING DATA
Ships fully assembled or can be provided in modular form

STANDARD CONTROLS OPTIONS
Packages range from simple start/stop to sophisticated automation. Motor overload protection provided. Contact Duperon® for further details and assistance in selecting the perfect package for your site.

OPERATION OPTIONS
Continuous/Manual.
Automatic with timer, float, SCADA, differential/high level sensing options with I/O as needed.

- Tear Shaped Bars—What is Larger Than the Openings Stays on Screen to Be Removed; What is Smaller Passes Through Due to Shape of Bars
- Cleans to Bottom of Channel—Bottom Plate Eliminates Debris Accumulation at Base
- Easy To Install and Easy To Operate



Duperon's First Law of Simplicity: One part doing the work of many; two parts, one too many.

1200 Leon Scott Court | Saginaw, MI 48601 | P 989.754.8800 | F 989.754.2175 | TF 800.383.8479 | www.duperon.com

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1622/06/12/2.5

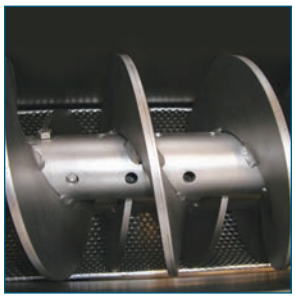
The Reliable, No Hassle Way To Reduce Landfill Costs

WASHER COMPACTOR

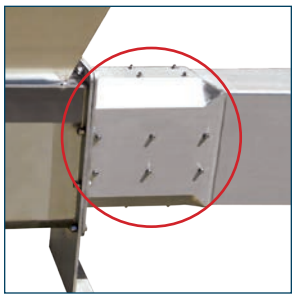
Positive Displacement, Dual-Auger System

Robustly simple, high-efficiency non-batching process machine that cleans and compacts screenings less than 4 inches. Final discharge point up to 10 feet.

- Positive Displacement—What Goes In, Comes Out
- Up To 84% Volume Reduction, Up To 60% Dry Solids—Reduces Landfill Costs
- Self-Regulating Compaction Housing Means Consistent Dry Solids Regardless of Debris Volume Fluctuations
- Accepts Non-Standard Wastewater Debris (Rocks, Clothing, Concrete, Metal) Up to 4 inches (Note: electronic "idle" prevents damage from larger debris)



No Agitation or Batching, Runs when FlexRake® Operates



Compresses Debris with up to 3,500 lbs. of Pressure

Duperon®
PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES

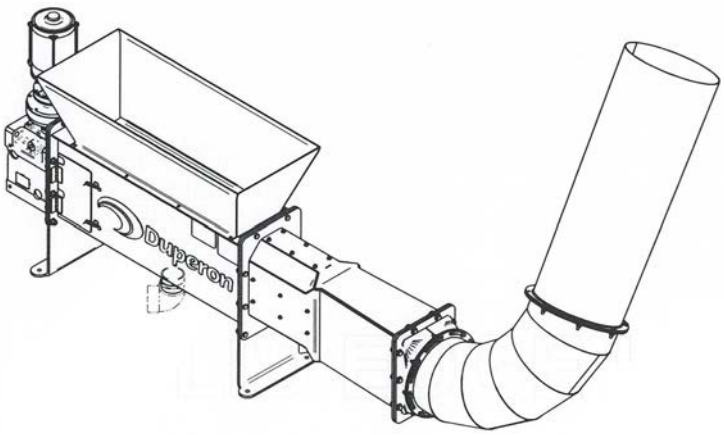
Now, there's an easier way!℠

Duperon®
PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES

Now, there's an easier way!℠

WASHER COMPACTOR

Positive Displacement, Dual-Auger System



WATER

Utilizes filtered effluent or municipal water
Washer consumes 3-5 gallons per minute
Requires 40 PSI-60 PSI
Drain connection is 3" NPT female
Supply connection is 1/2" NPT

UTILITY

120/240 volt, single phase
240/480 volt, three phase
Requires .4 KWH

DRIVE

3/4 HP inverter duty motor
Power consumption of 576 watts
Screw output: 2.2 RPM

MATERIALS OF CONSTRUCTION

304 SSTL or 316 SSTL
SSTL spur gears (17- 4 PH)
Self-lubricating main auger bearings

PERFORMANCE DATA

Up to 60% dry solids
Up to 60% mass/weight reduction
Up to 84% volume reduction (6:1 ratio)
Significantly decreases odor and fecal content

CAPACITY

Average: 30 cu. ft/hour
Maximum: 60 cu. ft/hour

MAINTENANCE

Five years: Recommended gearbox service

- Housing Geometry Controls Potential For "Slip Flow" When Processing Grease, Septage and Other Highly-Fluid Debris
- Self-Cleaning Dual Augers Mean No Debris Wrapping
- Non-Clog Flood Wash Port—Ideal for Non-Potable Water

Self-Balancing Auger Design Eliminates Damaging Side-Loading

1200 Leon Scott Court | Saginaw, MI 48601 | P 989.754.8800 | F 989.754.2175 | TF 800.383.8479 | www.duperon.com

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1765/06/12

Budget Pricing Estimate

Project Name:	Versailles, KY WWTP	Date Prepared:	July 17, 2013
Project Number:	13-3154-B	Engineer:	GRW

Equipment	Quantity	Price
Primary Grit Removal 6.25 mgd/unit		
9 ft. 6 Tray 106 micron Eutek HeadCell® Grit Removal unit	2	
Eutek HeadCell® inlet flow distribution header, 304 Stainless Steel	2	
Grit slurry underflow collector, 304 Stainless Steel	2	
Grit Classifying and Washing		
24" Eutek TeaCup®: 304 Stainless Steel,	2	
Valves, gauges, plumbing, and single-point water connection	2	
Grit Dewatering		
1.0 yd^3/hr Eutek Grit Snail®: 304 Stainless Steel, 6" Belt, 60" Clarifier	2	
Complete with drive unit, valves and controls, VFD	2	
Control Panel		
NEMA 4X, 304 Stainless Steel Enclosure, 480 VAC, Three Phase, VFD	2	
Freight		
Freight to jobsite	1	
Start-up		
One (1) factory representative for two (2) trips for a total of four (4) days	1	
Total Proposal Budget Price:		**$460,000.00**

Budget Deduct Summary

Alternate Grit Classifying and Washing		
30" GritCup™: 304 Stainless Steel, Reg-U-Flo Valve	2	
Alternate Grit Dewatering		
0.75 yd^3/hr SpiraSnail™: 304 Stainless Steel, 12" Screw, 66" Clarifier	2	
Complete with drive unit, valves	2	
		($51,000.00)

Terms & Conditions: As defined by Hydro International standard Terms & Conditions.

PROCESS DESIGN REPORT

AQUA-AEROBIC SYSTEMS, INC.

VERSAILLES WWTP KY

Design#: 135455

Option: New SBR Basins Preliminary Design: FFB Option

Designed By Tatiana Mazzei on Wednesday, October 23, 2013

The enclosed information is based on preliminary data which we have received from you. There may be factors unknown to us which would alter the enclosed recommendation. These recommendations are based on models and assumptions widely used in the industry. While we attempt to keep these current, Aqua-Aerobic Systems, Inc. assumes no responsibility for their validity or any risks associated with their use. Also, because of the various factors stated above, Aqua-Aerobic Systems, Inc. assumes no responsibility for any liability resulting from any use made by you of the enclosed recommendations.

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Design Notes

Pre-SBR

- Neutralization is recommended/required ahead of the SBR if the pH is expected to fall outside of 6.5-8.5 for significant durations.

- Coarse solids removal/reduction is recommended prior to the SBR.

SBR

- A maximum design flow of 6.25 MGD has been assumed.

- The maximum flow, as shown on the design, has been assumed as a hydraulic maximum and does not represent an additional organic load.

- When flows are in excess of the maximum daily flow of 6.25 MGD, the SBR system has been designed to advance cycles in order to process a peak hydraulic flow of 12.5 MGD.

- Depending upon the magnitude and duration of the peak flow, effluent quality may be degraded.

- The four basin SBR has been designed to receive flow such that each basin's fill period comprises the first 25% of the cycle.

- The decanter performance is based upon a free-air discharge following the valve and immediately adjacent to the basin. Actual decanter performance depends upon the complete installation including specific liquid and piping elevations and any associated field piping losses to the final point of discharge. Modification of the high water level, low water level, centerline of discharge, and / or cycle structure may be required to achieve discharge of full batch volume based on actual site installation specifics.

Aeration

- The aeration system has been designed to provide 1.50 lbs. O2/lb. CBOD applied and 4.6 lbs. O2/lb. TKN applied at the design average loading conditions.

Process/Site

- An elevation of 835 ft has been given as displayed on the design. Summer waste temperature of 25°C has been given. Winter waste temperature has been assumed at 10°C. Ambient temperatures have been assumed at 85°F and 30°F.

- The anticipated effluent total nitrogen requirement is predicated upon an influent waste temperature of 10° C or greater. While lower temperatures may be acceptable for a short-term duration, nitrification and denitrification below 10° C can be unpredictable, requiring special operator attention.

- Sufficient alkalinity is required for nitrification, as approximately 7.1 mg alkalinity (as CaCO3) is required for every mg of NH3-N nitrified. If the raw water alkalinity cannot support this consumption, while maintaining a residual concentration of 50 mg/l, supplemental alkalinity shall be provided (by others).

Anticipated

- The effluent total nitrogen limit of 10 mg/l has been assumed.

- The effluent total nitrogen limit of 10 mg/l has been assumed to be comprised of 2 mg/l organic nitrogen, 6 mg/l NOx-N, and 2 mg/l NH3-N.

Filtration

- To achieve the effluent monthly average total phosphorus limit, the biological process and chemical feed systems need to be designed to facilitate optimum performance.

- A minimum of twelve (12) daily composite samples per month (both influent and effluent) shall be obtained for total phosphorus analysis.

- Influent to the biological system is a typical municipal wastewater application with a TP range of 6–8 mg/l. Influent TP shall be either in a particle associated form or in a reactive soluble phosphate form or in a soluble form that can be converted to reactive phosphorus in the biological system. Soluble hydrolyzable and organic phosphates are not removable by chemical precipitation with metal salts. A water quality analysis is required to determine the phosphorus speciation with respect to soluble and insoluble reactive, acid hydrolyzable and total phosphorus at the system influent, point(s) of chemical addition, and final effluent.

- Chemical feed lines (i.e. metal salts) shall be furnished to each reactor, aerobic digester and dewatering supernatant streams as necessary. Metal salts shall be added to each reactor during the React phase of the cycle.

- pH monitoring of the upstream biological reactor is required when adding metal salts.

Equipment

- The basin dimensions reported on the design have been assumed based upon the required volumes and assumed basin geometry. Actual basin geometry may be circular, square, rectangular or sloped with construction materials including concrete, steel or earthen.

- Rectangular or sloped basin construction with length to width ratios greater than 1.5:1 may require alterations in the equipment recommendation.

- The basins are not included and shall be provided by others.

- Influent is assumed to enter the reactor above the waterline, located appropriately to avoid proximity to the decanter, splashing or direct discharge in the immediate vicinity of other equipment.

- If the influent is to be located submerged below the waterline, adequate hydraulic capacity shall be made in the headworks to prevent backflow from one reactor to the other during transition of influent.

- A minimum freeboard of 2.0 ft. is recommended for diffused aeration.

- Influent slide gates are by others.

- Aqua-Aerobic Systems, Inc. (AASI) is familiar with the Buy American provision of the American Recovery and Reinvestment Act of 2009 as well as other Buy American provisions (i.e. FAR 52.225, EXIM Bank, USAid, etc.). AASI can provide a system that is in full compliance with Buy American provisions. As the project develops AASI can work with you to ensure full compliance with a Buy American provision, if required. Please contact the factory should compliance with a Buy American provision be required.

AquaSBR - Sequencing Batch Reactor - Design Summary

DESIGN INFLUENT CONDITIONS

Avg. Design Flow	= 4.5 MGD	= 17034 m3/day
Max Design Flow	= 6.25 MGD	= 23659 m3/day
Peak Hyd. Flow	= 12.5 MGD	= 47318 m3/day (with advancing cycles)

DESIGN PARAMETERS

	Influent	mg/l	Effluent Required	<= mg/l	Effluent Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	CBOD	200	CBOD	10	CBOD	10
Total Suspended Solids:	TSS	315	TSS	30	TSS	30
Total Kjeldahl Nitrogen:	TKN	40	TKN	4	TKN	4
Ammonia Nitrogen:	--	--	NH3-N	2	NH3-N	2
Oxidized Nitrogen:	--	--	NOx-N	6	NOx-N	6
Total Nitrogen:	--	--	TN	10	TN	10
Total Inorganic Nitrogen:	--	--	TIN	8	TIN	8
Phosphorus:	Total P	8	Total P	1	Total P	1

SITE CONDITIONS

	Maximum		Minimum		Design		Elevation (MSL)
Ambient Air Temperatures:	85 F	29.4 C	30 F	-1.1 C	85 F	29.4 C	835 ft
Influent Waste Temperatures:	77 F	25.0 C	50 F	10.0 C	77 F	25.0 C	254.5 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 4 Square Basin(s)		**Min**	= 15.4 ft	= (4.7 m)	**Min**	= 0.849 MG	= (3,215.1 m³)
Freeboard:	= 2.0 ft	= (0.6 m)	**Avg**	= 19.4 ft	= (5.9 m)	**Avg**	= 1.074 MG	= (4,066.8 m³)
Length of Basin:	= 86.0 ft	= (26.2 m)	**Max**	= 21.0 ft	= (6.4 m)	**Max**	= 1.162 MG	= (4,398.1 m³)
Width of Basin:	= 86.0 ft	= (26.2 m)						

Number of Cycles:	= 5 per Day/Basin	
Cycle Duration:	= 4.8 Hours/Cycle	
Food/Mass (F/M) ratio:	= 0.059 lbs. CBOD/lb. MLSS-Day	
MLSS Concentration:	= 4500 mg/l @ Min. Water Depth	
Hydraulic Retention Time:	= 0.955 Days @ Avg. Water Depth	
Solids Retention Time:	= 15.0 Days	
Est. Net Sludge Yield:	= 0.984 lbs. WAS/lb. CBOD	
Est. Dry Solids Produced:	= 7383.2 lbs. WAS/Day	= (3349.0 kg/Day)
Est. Solids Flow Rate:	= 300 GPM (88527 GAL/Day)	= (335.1 m³/Day)
Decant Flow Rate @ MDF:	= 4340.0 GPM (as avg. from high to low water level)	= (273.8 l/sec)
LWL to CenterLine Discharge:	= 2.0 ft	= (0.6 m)
Lbs. O2/lb. CBOD	= 1.50	
Lbs. O2/lb. TKN	= 4.60	
Actual Oxygen Required:	= 18165 lbs./Day	= (8239.4 kg/Day)
Air Flowrate/Basin:	= 2824 SCFM	= (80.0 Sm3/min)
Max. Discharge Pressure:	= 10.7 PSIG	= (74 KPA)
Avg. Power Required:	= 3100.2 KW-Hrs/Day	

DESIGN INFLUENT CONDITIONS

Avg. Design Flow	= 4.5 MGD	= 17,034.4 m³/day
Max Design Flow	= 6.25 MGD	= 23,658.8 m³/day
Peak Hyd. Flow	= 12.5 MGD	= 47,250.0 m³/day

		Conc. mg/l	Mass lb/day	kg/day
Bio/Chemical Oxygen Demand:	CBOD	200	7,506	3,404.7
Total Suspended Solids:	TSS	315	11,822	5,362.4
Total Kjeldahl Nitrogen:	TKN	40	1,501.2	680.9
Total Phosphorus:	Total P	8	300.2	136.2

SITE CONDITIONS

	Maximum		Minimum		Design	
Ambient Air Temperatures:	85 F	29.4 C	30 F	-1.1 C	85 F	29.4 C
Influent Waste Temperatures:	77 F	25.0 C	50 F	10.0 C	77 F	25.0 C
Elevation (Mean Sea Level):	835 ft	255 m				

EFFLUENT OBJECTIVES

		Conc. mg/l	Mass lb/day	kg/day
Bio/Chemical Oxygen Demand:	CBOD	10	375.3	170.2
Total Suspended Solids:	TSS	30	1,125.9	510.7
Total Kjeldahl Nitrogen:	TKN	4	150.1	68.1
Ammonia Nitrogen:	NH3-N	2	75.1	34.0
Oxidized Nitrogen:	NOx-N	6	225.2	102.1
Total Nitrogen:	TN	10	375.3	170.2
Total Inorganic Nitrogen:	TIN	8	300.2	136.2
Total Phosphorus:	Total P	1	37.5	17.0

BASIN SIZING CALCULATIONS

1. **Mass of Bio-Solids necessary for treatment (lbs MLSS)**

   Based upon an F/M ratio of 0.059/day, the mass of mixed liquor suspended solids (MLSS) is:

   lb MLSS = (lb CBOD/day) / (F/M) = 127,491.5 lb MLSS = (57,829.2 kg)

2. **Total Reactor Volume at Low Level (Vlwl-T)**

   Based upon an MLSS concentration of 4,500 mg/l measured at the lowest water level, the total React Volume at low water level (Vlwl) is:

   Vlwl-T = lb MLSS/(MLSS mg/l x 8.34 lb/gal) = 3.397 MG-Total = 454,151.7 ft³-Total = (12,860.2 m³-Total)

3. **Reactor Volume for each Basin at Low Level (Vlwl/basin)**

   The AquaSBR shall utilize a 4 reactor system. The resultant unit volume for each reactor at the minimum water depth is:

   Vlwl/basin = (Vlwl-T)/(Number of Reactors) = 0.849 MG/basin = 113,537.9 ft³/basin = (3,215.1 m³/basin)

4. Average Decantable Volume for each basin (ADV)

Each AquaSBR basin shall perform treatment via 5 Cycle(s)/Day with each cycle comprising 288 Minutes (4.8 Hours). At the average daily flow (ADF) of 4.50 MGD, the batch volume at average conditions is:

ADV = ADF/(No. of Basins x No. Cycles/Day/Basin) = 225,000 gal = (851.8 m³)

5. Reactor Volume per basin at Average Flow Conditions (Vawl/Basin)

Vawl/Basin = Vlwl/Basin + ADV = 1.074 MG/basin = 143,618.1 ft³/basin = (4,066.8 m³/basin)

6. Maximum Decantable Volume for each basin (MDV)

The AquaSBR has been specifically designed to maintain 5 Cycle(s)/Day/Basin up to the Maximum Daily Flow stated above. Based upon the Maximum Daily Flow (MDF) of 6.3 MGD, the batch volume at maximum conditions is:

MDV = MDF/(No. of Basins x No. Cycles/Day/Basin) = 312,500 gal = (1,183.0 m³)

7. Reactor Volume per basin at Maximum Flow Conditions (Vhwl/Basin)

The maximum volume of each basin in the AquaSBR system is:

Vhwl/Basin = Vlwl/Basin + MDV = 1.162 MG/basin = 155,316 ft³/Basin = (4,398.1 m³/basin)

8. Minimum Sidewater Depth (Min. SWD)

The minimum sidewater depth (Min. SWD) must allow proper storage of sludge during the settle phase while providing a reasonable maximum water level. Based upon the design MLSS, the lowest operating water level is:

Min. SWD = 15.4 ft = (4.68 m)

9. Selection of reactor geometry and dimensional requirements

The AquaSBR can be configured for a variety of reactor geometries, quantities, and materials of construction. Typical construction may employ circular, square, or rectangular tanks in concrete, steel, or earthen-sloped basins. The following has been either assumed by Aqua or designated based upon supplied information:

Number of Basins (Nb):	= 4	
Selected Reactor Geometry:	= Square	
Length of Reactor:	= 86 ft	= (26.2 m)
Width of Reactor:	= 86 ft	= (26.2 m)
Minimum Water Depth:	= 15.4 ft	= (4.7 m)
Average Water Depth:	= 19.4 ft	= (5.9 m)
Maximum Water Depth:	= 21 ft	= (6.4 m)
Minimum Reactor Volume/Basin:	= 0.849 MG	= (3,215.058 m³)
Average Reactor Volume/Basin:	= 1.074 MG	= (4,066.840 m³)
Maximum Reactor Volume/Basin:	= 1.162 MG	= (4,398.089 m³)

PROCESS CALCULATIONS

Cycle Structure

1. Cycle Configuration

In order to perform the necessary physical and biological treatment for the specified conditions, the following treatment phases shall be used:

A.) Mixed-Fill	- True anoxic mixing, independent of aeration, with influent.
B.) React-Fill	- Aeration/Anoxic mixing with presence of influent.
C.) React	- Aeration/Anoxic mixing under true Batch conditions.
D.) Settle	- Quiescent solids/liquid separation.
E.) Decant/Idle	- Effluent withdrawal via solids excluding, dual control decanter.
F.) Sludge Waste	- Removal of excess biological sludge.

2. Cycle Times

The following process segments have been determined specifically for this application based upon a combination of empirical data and established kinetic models adapted for the AquaSBR. The following summarizes the process conditions:

A.) No. Of Cycles (Ncdb)	= 5	E.) Mixing (Tmix)	= 1.35 Hours/Cycle
B.) Total Cycle Time (Tc)	= 4.8 Hours	F.) Settling (Tset)	= 0.75 Hours/Cycle
C.) Filling Time/Cycle (Tf)	= 1.2 Hours	G.) Decanting (Tdec)	= 1.20 Hours/Cycle
D.) Aeration (Tair)	= 1.5 Hours/Cycle	H.) Sludge Waste (Tsig)	= 14.8 Minutes/Cycle

Hydraulic Rentention Time (HRT)

1. Hydraulic Retention @Average Design Conditions (HRT-avg)

Based upon an average volume of 1.074 MG/Reactor and 4 reactor(s), the HRT at an average flow of 4.500 MGD is:

HRT-avg = (Vawl/Reactor x # Reactors)/ADF = 0.96 days (22.9 hours)

2. Hydraulic Retention @ Maximum Design Conditions (HRT-mdf)

Based upon a maximum volume of 1.162 MG/Reactor and 4 reactors, the HRT at a maximum flow of 6.250 MGD is:

HRT-mdf = (Vhwl/Reactor x # Reactors)/ADF = 0.74 days (17.9 hours)

Sludge Production

1. Net Sludge Yield (Yn)

Based upon the design MLSS concentration, influent loading, and volume requirements stated above, the AquaSBR shall produce a certain quantity of sludge, as is typical of Activated Sludge Processes. The sludge yield factor, Yn is:

Yn = 0.984 lb Waste Activated Sludge/lb CBOD/Day

Please note that the calculated sludge yield, Yn, was estimated via a kinetic model which accounts for the influent organic and inorganic TSS as well as the developed Active, Endogenous, Inert-Organic, and Inert-Inorganic fractions of the MLSS.

2. Net Sludge Production (lb WAS/Day)

The net sludge production (dry solids basis) is:

lb WAS/Day = lb CBOD/Day x Yn = 7,383.2 lb WAS/day = (3,349.0 kg/day)

3. Sludge Volume (Vs)

The volume of sludge produced, assuming a settled sludge concentration of 1.00% is:

Vs = lb WAS/Day/(Sludge Conc. x 8.34) = 88527 gpd = (335.1 m^3/day)

4. Mean Cell Retention Time (Ts)

The mean cell retention time (sludge age, Ts) of the proposed system necessary to attain the specified effluent objectives is:

Ts = lb MLSS/(lb WAS/Day + lb TSSe/Day) = 15.0 days

5. Oxygen Utilization Rates for Synthesis, Oxidation & Nitrification

Based upon a kinetic evaluation of the influent data with respect to the proposed design considerations, the estimated oxygen uptake rate (OUR) at average conditions is 48.0 mg/l/Hour. The process oxygen required is:

OUR lb/Hour = OUR mg/l/Hour x Vawl/Basin x 8.34 = 429.9 lb O2/hr/basin = (195.0 kg/hr/basin)

AERATION SYSTEM EQUIPMENT REQUIREMENTS

Actual Oxygen Requirement (AOR)

1. Oxygen Required For Organic Reduction (Rb)

The aeration system shall be designed to provide 1.50 lb O2 for each lb CBOD, as influent to the SBR system. This oxygen provision shall account for the oxygen utilization for synthesis, as well as endogenous respiration.

Rb = 1.50 lb O2/lb CBOD x lb CBOD Applied/Day = 11259.0 lb O2/day = (5,107.0 kg/day)

2. Oxygen Required For Nitrification (Rn)

Additional oxygen may be necessary for Nitrification of TKN to NO3-N. While an effluent requirement may or may not exist, it may be difficult to prevent Nitrification from exerting an oxygen demand (when nitrogen is present in the influent). Nitrification requires 4.60 lb O2 to oxidize each lb of TKN to NO3-N.

Rn = lb O2/lb TKN x lb TKN Applied/Day = 6,905.5 lb O2/day = (3,132.3 kg/day)

3. Carbon Stabilized via Denitrification (Rd)

No credits for oxygen recovery via denitrification have been taken (Rd = 0)

4. Total Actual Oxygen Requirement (AORt)

The total oxygen demand under process (field) conditions is:

AORt = Rb + Rn – Rd = 18,164.5 lb O2/day (total) = (8,239.3 kg/day)

5. Hourly Actual Oxygen Requirement (AORh)

Based on 1.50 hours of aeration per cycle, 5 Cycles/Day/Basin, and 4 Basin(s), the hourly AORh is:

AORh = 605.5 lb O2/hr/basin = (274.6 kg/hr/basin)

6. Actual Aeration Time Required To Meet Average Demand (At)

The aeration system has been designed to meet the design maximum oxygen requirement in 1.50 Hours/Cycle/Basin. Since average conditions will not require as much oxygen, the actual aeration time shall be adjusted to generate a power draw reflective of average conditions. The aeration time required at average conditions is:

At = (OUR/AOR) x Design Aeration/Basin/Cycle = 1.1 hr/basin/Cycle

Process Wastewater Conditions (FINE BUBBLE DIFFUSERS)

1. **Field Oxygen Transfer Factor (FTF)**

While the AOR quantifies the necessary oxygen to satisfy the biochemical reactions, the process water possesses inherent characteristics that typically inhibit oxygen transfer as it compares to tap (clean) water. The FTF coefficient adjusts the oxygen transfer requirements in Field (dirty) conditions to Standard (clean) water conditions as follows:

FTF = Alpha x Theta^(T-20) x [(Beta x Csm) – Cr]/Cstm = 0.568

Where:

Alpha = Ratio of mass transfer rate of O2 in process water to clean water = 0.75

Beta = Ratio of saturation of O2 in process water to clean water = 0.95

Theta = Temperature correction factor for O2 transfer = 1.024

T = Design Reactor Temperature = 25.0 C

Cstm = Saturation DO at Mid-Depth and Standard Conditions = 11.55 mg/l

Csm = Cstm corrected for site Elevation and Temperature = 10.28 mg/l

Cr = Residual Dissolved Oxygen Concentration = 2.0 mg/l

Standard Conditions

1. **Standard Oxygen Requirement (SORh)**

The oxygen transferred at Standard conditions necessary to satisfy the required process oxygen demand at Field conditions is:

SORh = AORh / FTF = 1,066.9 lb O2/hr/basin = (483.9 kg/hr/basin)

2. **Standard Cubic Feet of Air per Minute (SCFM)**

The ability to transfer oxygen into the water under standardized conditions is:

SCFM = (SOR lb/Hour/Basin)/(60 x 0.0175 x SOTE/ft x Dsub) = 2,824 SCFM = (80.0 m³/M)

Where:

0.0175 = lb O2 per cubic foot of air at standard conditions.

SOTE/FT = Standard Oxygen Transfer Efficiency per foot submergence = 1.95%/ft = (6.41%/M)

Dsub= Average Diffuser Submergence = 18.4 ft = (5.6 m)

Blower Inlet Conditions

1. **Actual Inlet Pressure (Pa due to elevation and inlet filter/silencer/piping losses)**

Note: An assumed inlet loss due to blower fittings/piping of 0.25 psig has been assumed.

Pa = 14.696 – (Elevation, ft/2116.3) – 0.25 = 14.05 P.S.I.A. = (96.95 KPA)

2. **Blower Inlet Air Temperature in Degrees Rankine**

Ta = Ambient Air Temp (Deg F) + 460 = 545.0 Degrees R = (302.4 K)

3. **Inlet Cubic Feet of Air per Minute (ICFM)**

From the perfect gas law, the universal gas constant (MR) can relate standard conditions to inlet conditions, as:

ICFM = SCFM x (14.696 x Ta)/(Pa x 528) = 3,048.6 ICFM/basin = (85.9 m³/basin)

Blower Discharge Conditions

1. **Discharge Pressure (Pd)**

The discharge pressure includes the static pressure above the diffusers and dynamic losses from the blower discharge through the diffusers, as expressed by:

Pd = (0.4333 x Diffuser Submergence, ft) + System Losses, PSIG,

Where the assumed system losses account for 0.20 PSIG blower discharge losses, 0.50 PSIG piping losses from blower to diffuser, and 1.30 PSIG diffuser losses.

Average Discharge Pressure (Pda) = 9.98 PSIG = (68.86 KPA)

Maximum Discharge Pressure (Pdm) = 10.67 PSIG = (73.62 KPA)

Average Blower Power Estimate

1. Estimated Average Power Draw (BHP)

The following is a general equation that estimates the power draw of the blower at the average oxygen demand and average pressure. While the actual blower selection shall be made from manufacturer supplied curves, programs, or recommendations at maximum conditions, this equation shall be used to estimate the annual average aeration power. Unless stated otherwise, a blower efficiency (e) of 0.70 shall be used (typical range 0.60 to 0.70).

BHP = 0.227 x ICFM x [((Pa + Pda)/Pa)^0.283 – 1]/e = 159.8 BHP = (119.1 kW)

2. Estimated Daily Power Required for Blowers (Pwa)

Pwa = (BHP x 0.7457 x At x Ncdb x Nb) = 2,537.6 kW-hr/day

Blower Selection

1. Blower Recommendation

The actual blower and motor sizing must consider inlet conditions under operating temperature and pressure extremes. Motor size, for example, must be selected to handle inlet air at maximum density, which occurs at lowest operating temperatures. Blower size must be selected to deliver the required air volume at minimum density (maximum operating temperature) throughout the range of pressures. The following has been recommended to meet the design extremes:

Number of Blowers Operating/Basin:	= 2	
Number of Total Blower Operating:	= 4	
Number of Standby Units:	= 1	
Total Number of Installed Units:	= 5	
Motor Size of Each Blower:	= 125 HP	= 93.2 kW
Airflow Capacity of Each Blower:	= 1,412 SCFM	= 40.0 m³/min
Maximum Design Discharge Pressure:	= 10.7 PSIG	= 73.6 KPA

MIXING SYSTEM EQUIPMENT REQUIREMENTS

1. Energy Requirements (Hp-mix)

To provide uniform mixing of biological solids to a level typically encountered in activated sludge, approximately 25.0 HP/MG is necessary with the AquaDDM mixer. The mixing level required is:

Hp-mix = 25.0 HP/MG x Vawl/Basin = 26.9 HP = (20.0 kW)

Based upon the above approximate energy requirements, recommend: (1) - 30.0 NPHP AquaDDM Mixer(s)

2. Reactor Turnover Time (Tm)

To confirm the unit has been selected appropriately, the reactor contents must be completely mixed within 5 minutes. The selected mixer shall produce a recirculated flow (Qr) of 546,000 GPM, resulting in a turnover time:

Tm = Vawl/Basin x 10^6/Qr = 2.0 Minutes

3. Average Power Estimation (Pwm)

Pwm = NPHP x Lm x 0.7457 x Mixing hrs/cyc. x Nb x Ncdb = 555.7 kW-hr/day

Where:

Lm is the motor loading, typically 88-92% of full nameplate horsepower.

EFFLUENT DECANTING EQUIPMENT REQUIREMENTS

1. Decant Flow Rate Required at Maximum Design Flow (Qdec)

The decanter shall remove effluent via gravity flow, reducing the water level from the maximum depth to the minimum depth in the design decant phase time (Tdec). The Decant flow required is:

Qdec = MDV/(Ncdb x Nb x Tdec) = 4,340 GPM = (273.8 l/sec)

The flow rate calculated above is the average rate (from high water level to low water level) at maximum design conditions. The actual decant flow rate will vary depending on the prevailing driving head, assuming the effluent valves are not throttled, flow is not pumped, or an orifice plate has not been employed. Refer to design notes for further decanter notes.

SLUDGE REMOVAL SYSTEM REQUIREMENTS

1. Sludge Flow Rate required at Average Design Flow (ADF)

Sludge Flow Rate (Qs):

Sludge will be removed at the end of each cycle at the following rate:

Qs = Vs/(Ncdb x Nb x Tslg) = 300 GPM = (18.9 l/sec)

2. Sludge Energy Required (Hp-sludge)

Based upon an estimated average driving head of 15.0 ft and an assumed pump efficiency of 60%, the sludge removal energy required is:

Hp-sludge = (Flowrate x head)/(3,960 x efficiency) = 1.894 BHP = (1.41 kW)

3. Average Power Estimation (Pws)

Pws = BHP x Tslg x Ncdb x Nb x 0.7457 = 6.946 kW-hr/day

Note: Power estimation assumes sludge is pumped. Refer to design notes for discussion if gravity sludge wasting is employed.

AQUA-AEROBIC SYSTEMS, INC.
Partnering for Solutions

Project: Versailles, KY (112959)

Introduction:

The Aqua MixAir® system provides separation of aeration and mixing in a system. The floating direct drive AquaDDM® mixer provides a powerful downflow discharge for maximum solids suspension and aeration enhancement throughout the basin. Mixing efficiency can be double that of jet mixers or submerged horizontal mixers, and 2-4 times more efficient than a diffuser system utilized for mixing.

The use of the AquaDDM® mixer also enables the AquaSBR® to control filamentous organisms by providing a mixed, non-aerated anoxic environment during selected phases of operation, it also enables the system to be operated for nutrient removal. Separate zones sectioned off using baffles, walls or separate basins are not required.

Anoxic/Anaerobic Mixing

Aerobic Mixing

The mixer allows the system to be operated in DO control mode with no risk of unwanted solids settling even at under loaded conditions. DO control and optimization allows for more efficient blower usage and resultant power consumption savings. This mode of operation also ensures that that excess DO concentrations are not reached in the basin, giving the operator better control of the process.

Energy savings can be experienced by turning the aeration off at low loading conditions. Additional power savings can be experienced when the system is underloaded and anoxic conditions are created in the system which allows for denitrification. By reducing BOD denitrification helps reduce the oxygen demand that must be met using aeration.

6306 N. Alpine Rd. Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 www.aqua-aerobic.com

Project: Versailles, KY (112959)

Different options for diffuser systems are available for the Aqua MixAir® system. This includes fixed or retrievable configurations. There are advantages for each option. The retrievable diffuser configuration offers ease of maintenance without stopping the system operation and without the need of doing expensive and time consuming dewatering the basins. The fixed disks configuration offers full floor coverage and a better transfer efficiency.

Retrievable Fine Bubble Diffusers

Fixed Fine Bubble Disk Diffusers

Analysys of Estimated Power Usage and Annual Costs for the Aqua MixAir System:

The following analysis demonstrates the power usage and annual power costs for the AquaSBR® system as a function of varying organic loading to the system. Due to the inherent turn-down capability of the blowers in the AquaSBR® system, overall power usage will be reduced at organic loadings below the design loading. The following analysis demonstrates the power usage and annual power costs for the AquaSBR® system as a function of varying organic loading to the system.

Two scenarios are presented:

1) Retrievable fine bubble diffusers with an AquaDDM® mixer
2) Fixed fine bubble disk diffusers with an AquaDDM® mixer.

AQUA-AEROBIC SYSTEMS, INC.
Partnering for Solutions

Project: Versailles, KY (112959)

ESTIMATED kW-HOURS AND ANNUAL COSTS:

1) Aqua MixAir® system with Retrievable Diffuser Racks

Note that for this option, the AquaDDM® mixer operates for the same portion of each cycle, regardless of loading, the mixer power consumption remains independent of loading.

Average Flow (MGD)	% Design Flow	Mixer (kW-hr/day)	WAS Pump (kW-hr/day)	Blowers (kW-hr/day)	Total (kW-hr/day)	Operating Cost/year
0.450	10.0%	1173.1	0.003	437.5	1610.7	$58,789
0.900	20.0%	1173.1	0.03	875.1	2048.2	$74,759
1.350	30.0%	1173.1	0.13	1312.6	2485.7	$90,729
1.800	40.0%	1173.1	0.4	1750.1	2923.2	$106,698
2.250	50.0%	1173.1	1.1	2187.6	3360.8	$122,668
2.700	60.0%	1173.1	2.1	2625.2	3798.3	$138,638
3.150	70.0%	1173.1	3.5	3062.7	4235.8	$154,608
3.600	80.0%	1173.1	5.0	3500.2	4673.4	$170,577
4.050	90.0%	1173.1	6.3	3937.7	5110.9	$186,547
4.500	100.0%	1173.1	6.9	4375.3	5555.4	$202,770

NOTE: Power costs are based on a rate of: $ **0.10** per kW-hr.

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Project: Versailles, KY (112959)

2) Aqua MixAir® System with Fixed Fine Bubble Disk Diffuser system.

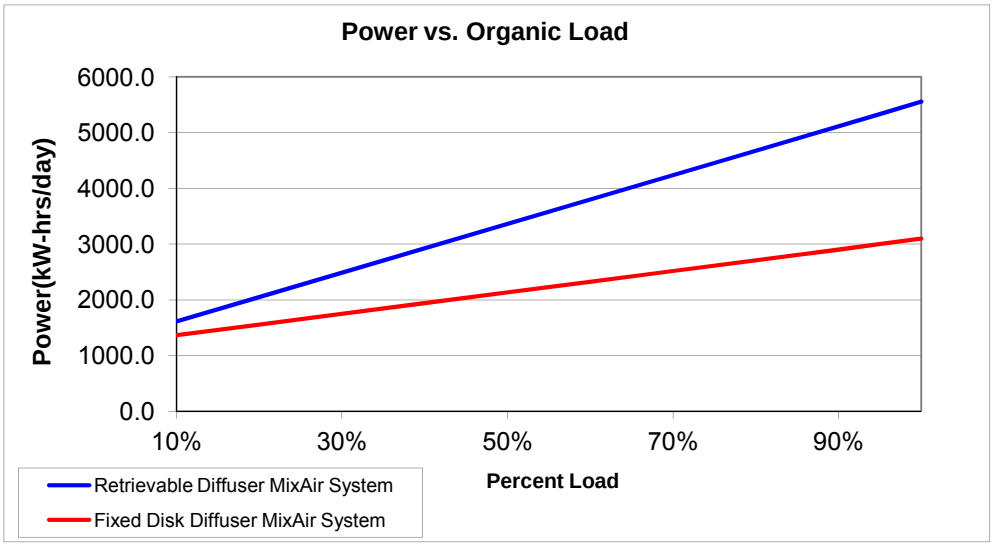
Note that for this option, since the configuration of the diffuser system provides full floor coverage, the AquaDDM® mixer will be turned off during the aeration periods.

Average Flow (MGD)	% Design Flow	Mixer (kW-hr/day)	WAS Pump (kW-hr/day)	Blowers (kW-hr/day)	Total (kW-hr/day)	Operating Cost/year
0.450	10.0%	1111.4	0.003	253.8	1365.2	$49,828
0.900	20.0%	1049.6	0.03	507.5	1557.2	$56,837
1.350	30.0%	987.9	0.13	761.3	1749.2	$63,845
1.800	40.0%	926.2	0.4	1015.0	1941.2	$70,854
2.250	50.0%	864.4	1.1	1268.8	2133.2	$77,863
2.700	60.0%	802.7	2.1	1522.6	2325.2	$84,871
3.150	70.0%	740.9	3.5	1776.3	2517.3	$91,880
3.600	80.0%	679.2	5.0	2030.1	2709.3	$98,889
4.050	90.0%	617.4	6.3	2283.9	2901.3	$105,897
4.500	100.0%	555.7	6.9	2537.6	3100.3	$113,160

NOTE: Power costs are based on a rate of: $ **0.10** per kW-hr.

Note: The power required at 100% of Design Flow is based upon the estimated oxygen utilization rate (OUR) at the given design conditions, as determined through kinetic calculations. This power estimate does not include safety factors on the oxygen supply that would normally be applied to account for the maximum daily O2 demand.

Project: Versailles, KY (112959)



Per Metcalf and Eddy, to allow for complete mixing with diffused aeration in activated sludge plants the aeration provided should be greater than 10-15 CFM/1000ft^3. Based on the energy needed to re-suspend settled solids after the settle and decant period Aqua-Aerobic Systems has traditionally used the figure of 15 CFM/1000ft^3. Below this design point the CFM required to properly mix the basin is greater than that required for oxygen demand and therefore there is no further available aeration turndown for a system without separate mixers. This results in a constant power demand for the aeration only system down to 10% of design load.

Metcalf and Eddy, Inc. Wastewater Engineering Treatment and Reuse. 4th ed. New York: McGraw-Hill, 2003. 448.

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OVIVO
Bringing water to life

July 25, 2013

John Martin
GRW
1600 Scripps Center
312 Walnut Street
Cincinnati, OH 45202

Subject: Versailles, Kentucky Carrousel ® System Retrofit Opportunity

Dear John,

Please find attached calculations and a scope of supply for retrofitting two of the existing basins and building a third train for a total build out flow of 4.5 MGD (1.5 MGD/train). The aerobic zone will be sized for 18 # BOD/kft3/day or less, which will provide an adequate aerobic SRT.

We propose to retrofit the existing trains and build a third train according to our AlternatIR design, which allows for anaerobic conditions to develop in the first zone based on an installed ORP probe that controls the IR gate and therefore nitrate delivery. This design saves significantly on construction costs as additional anaerobic zones and associated equipment are not required. The aerators are controlled by an installed DO probe.

Ovivo typically provides VFDs for the aerators, instrumentation (DO and ORP probes) and our Oculus control system.

Note that we have used our standard *alphas*, etc, but we have maintained the 1.5 carbonaceous O2 coefficient required by the State of Kentucky.

Should you have any questions, please feel free to contact me at (801) 931 3242.

Sincerely,

Tom Leland, P.E.
Group Product Manager
Carrousel® Systems

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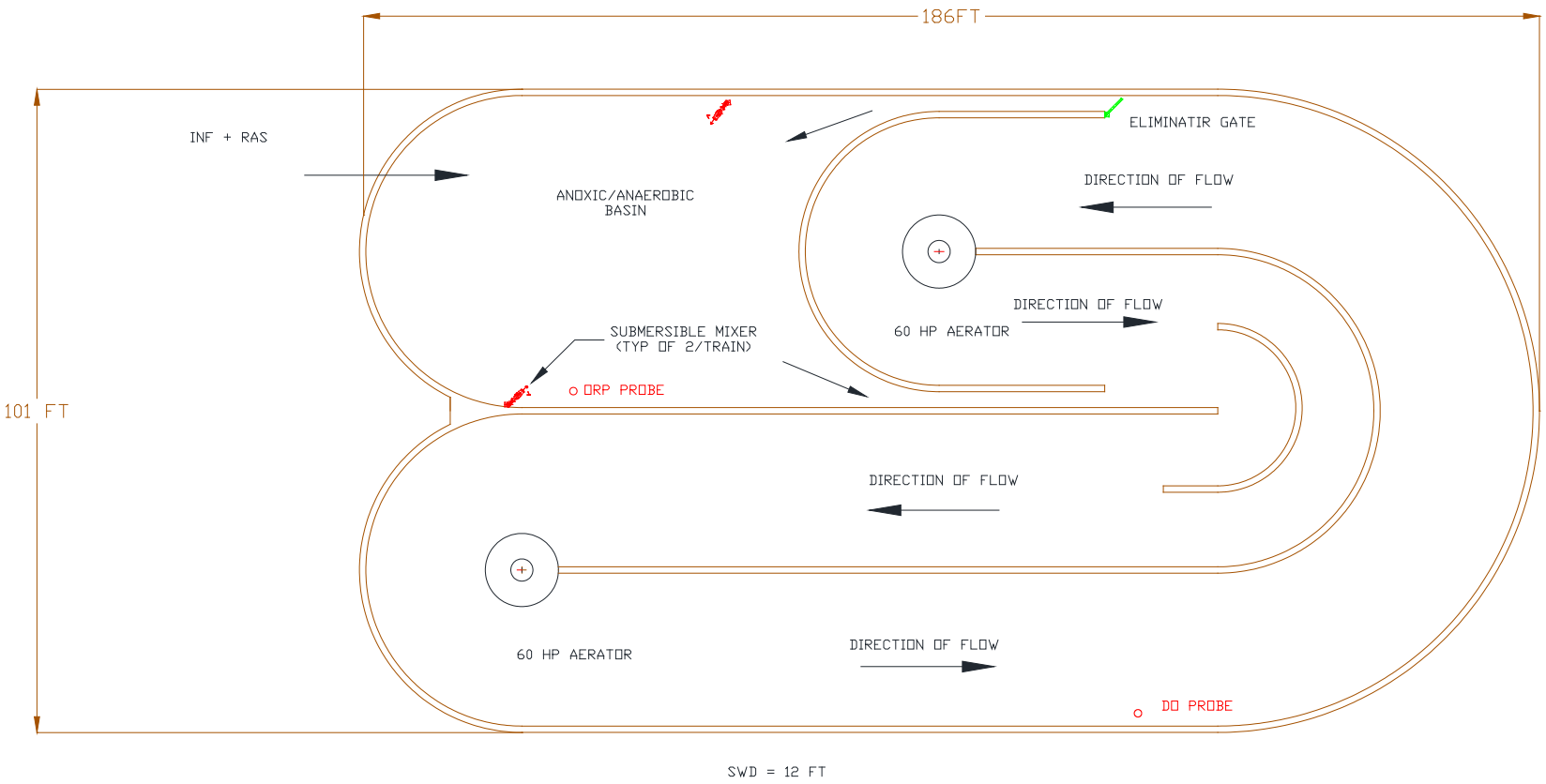

Versailles, KY (one of three trains shown)
NTS
7/25/13

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SCOPE OF SUPPLY: Date: 7/25/2013

Process Type: AlternatIR

Qty 6
- 60HP Excell Aerator II w/ Excell Velocity Enhancer (EVE)
- Single speed 1800 motor, 460 V/60Hz/3 Ph, Inverter duty, 1.15 SF on sine wave power, TEFC.
- Motor includes thermostats and space heater (120 V, 119 W).
- Reducer w/ minimum 2.5 SF, Mechanical Oil Pump, Low oil Pressure switch.
- A36 Impellers, shaft, mounting, Zinc Plated Jackstuds.

Qty 6
- 60 HP VFD(s), 6-pulse, 115 VAC control power transformer
- Not included: Harmonic, DV/dT filters, Bypass, Load reactor, surge Suppressor.
- Ethernet communication module and 115v for control interface.
- Configurable isolated I/O, digital operator interface module w/LCD digital display.

Qty 1
- Control System Type: Oculus w/ VFD, dedicated 480V/3 Ph/60 Hz feed.
- NEMA 1 MCC, installed in climate controlled building.
- PLC is a CompactLogix.
- HMI is a 15in Windows HMI.
- (3) DO Analyzer w/ (3) Probe(s).
- (3) ORP Analyzer w/ (3) Probe(s).

Qty 6
- 5.1 HP Submersible mixer for Anoxic/Anaerobic Basins.
- Single speed motor, 460 V/60 Hz/ 3 ph, Sealed,Inverter duty, 1.15 SF.
- Motor includes over temperature protection
- Planetary gearbox with mechanical seals and moisture sensors
- PUR 3 Blade Propeller.
- 304 SS rail, 304 SS Hoist and mounting components, 304 SS Anchors.

Qty 3
- EliminatIR Gate, End Pivot design.
- Electric Actuator drive, 90 degree total travel.
- A36 Stl Stand, A36 Stl Shaft, A36 Stl Gate, 304 SS Assembly bolts, 304 SS Anchors.
- Surface Finish: SSPC-SP-10, one shop coat of Tnemec 161-1211 3-5 mils D.F.T.

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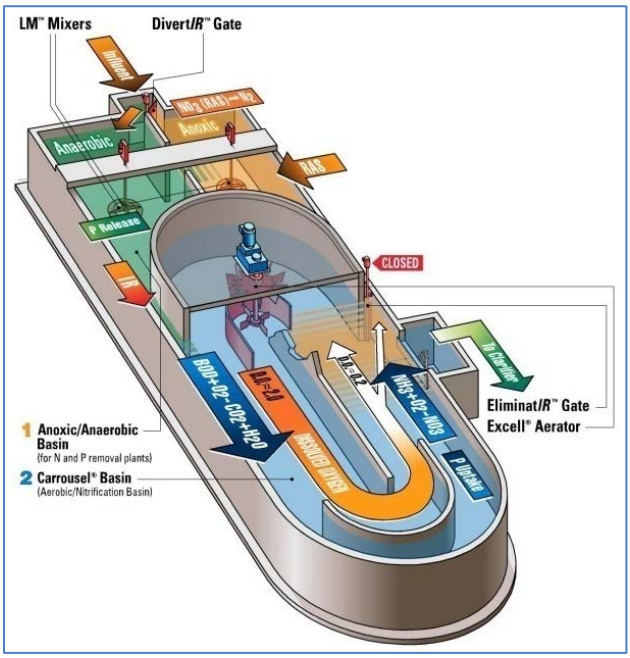
The Carrousel® Alternat*IR*™ System

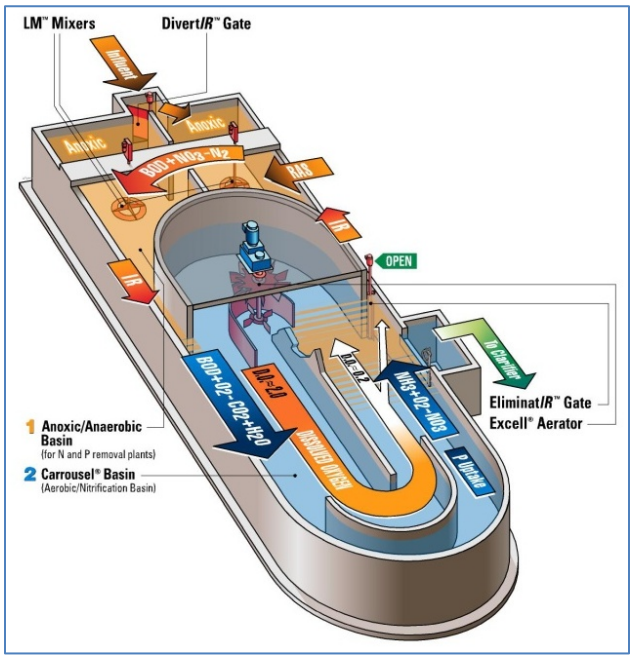
Included ☒

Total Nitrogen Removal and Biological P Removal In One Basin

The Carrousel Alternat***IR*** System is based on the successful Carrousel denit***IR***® process which allows for large internal recycle (IR) rates from the Carrousel basin to an up-front basin that receives the entire influent load. In the Alternat***IR*** System, the internal recycle rates are incrementally adjusted throughout the day using the Eliminat***IR***™ gate and the Oculus™ Control System. This allows the upfront basin to alternate between anaerobic (bio-P) and anoxic (denitrification) mode. The process is controlled with one nitrate or ORP (oxidation reduction potential) probes. Anaerobic selector basins are eliminated!

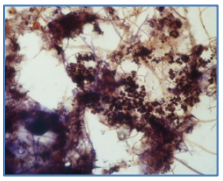


Carrousel® Alternat*IR*™ System in Bio-P Mode

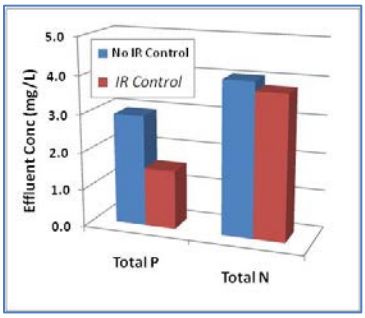


Carrousel® Alternat*IR*™ System in Denitrification Mode

Simsbury, CT



The creation of both anaerobic zones and anoxic zones by controlling internal recycle rates was demonstrated at the Simsbury, CT Carrousel Plant. Effluent phosphorus was reduced by 50% while maintaining total nitrogen removal at this facility, which was operating at full load *without* anaerobic selectors or chemical addition. Phosphorus accumulating organisms were present in significant quantities, based on analysis performed by Dr. Jenkins or the University of California, Berkeley.



Simsbury, CT Carrousel® System

Ovivo is pleased to offer this cost-saving technology for nutrient removal plants!

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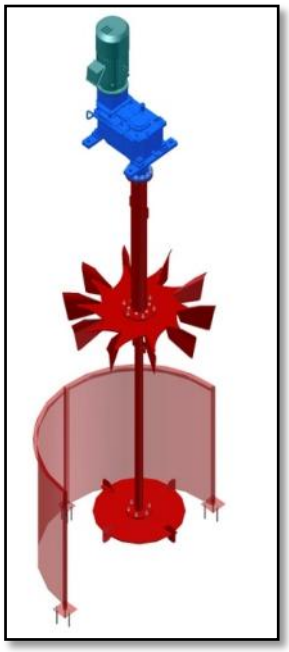
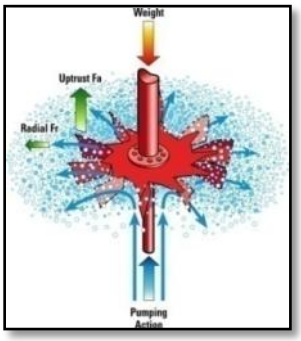
The Excell®Aerator

Included ☒

Aeration and Propulsion



The Excell®Aerator, located at one or more of the channel turns in the Carrousel® Basin, uses the most efficient aerating surface impeller available. The clean water oxygen transfer efficiency is a minimum of 3.65 lb O_2/motor HP-hr (3.85 lb O_2/shaft HP-hr). Because the Excell®Aerator operates with alpha values of 0.9 or higher and with a high degree of denitrification, the actual oxygen transfer efficiency in wastewater is equivalent to that of diffused air systems of similar depth. The Excell®Aerator has been approved by DHV, B.V., the singular authority for testing and certifying aerators for use in Carrousel Systems.



The 10-bladed surface impeller acts as a pump, efficiently maintaining propulsion in the channel zones. The unique star plate design to which the blades are welded acts as a stabilizer, transferring low loads to the mechanical equipment that drive the unit.

The optional lower turbine is driven by the same mechanical equipment that drives the surface impeller and requires no additional bearings. The lower turbine with the velocity enhancement baffle is an excellent option for plants that receive periods of very low influent flows during significant periods, for example at night or during the first few years of operation. The lower turbine is connected to the surface impeller by 6 bolts and can be removed at any time, for example, if flows increase.

Maintenance Friendly

All Ovivo aeration equipment is run by 96% premium efficiency motors and gear reducers with high service factors exceeding 2.5. Maintenance is limited to annual oil changes and monthly greasing, all performed from clean concrete decks.

Power Turndown

Power turndown is critical for operation of biological nutrient removal facilities. A properly designed Carrousel System equipped with the Excell®Aerator allows for power turndown of 80-90% *without* mixing limitations!

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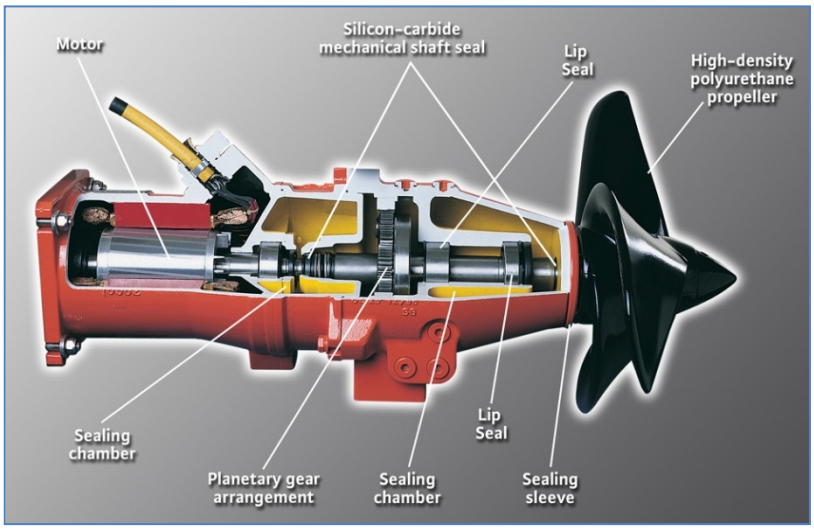
EWT™ Submersible Mixers for Anaerobic and Anoxic Mixing

Included ☒

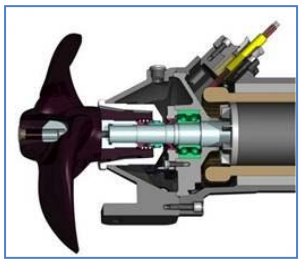
A Proven Technology

Submersible mixers have become commonplace as mixing equipment in anaerobic and anoxic basins of biological nutrient removal (BNR) systems. Ovivo has installed submersible mixers in over 50 Carrousel BNR systems. It is important to realize, however, that not all mixers are created equal. The construction, reliability, mixing efficiency, and power use vary tremendously among submersible mixer providers.



Key Features

Propellers: Each EWT Submersible Mixer uses a high-efficiency, molded, chemical resistant, polyurethane (PUR) propeller. Unlike steel, PUR can be molded into the most efficient shape. This shape creates a completely horizontal flow pattern. By eliminating radial flow energy, mixing efficiency is improved resulting in a lower HP per unit volume requirement. Additionally, there is no need for impeller shroud rings, which pose a threat of ragging.



Seals: Silicon carbide mechanical seals are used as a standard. Maintenance concerns associated with grease lubrication is not an issue.

Moisture Protection: Each mixer features one or more oil-filled pre-chambers equipped with a moisture sensor. This provides the greatest level of protection against moisture intrusion into the motor and gearbox.

Coating: Each mixer is coated with a layer of ceramic material specifically designed for submerged application in chemically and biologically harsh environments.

Gear Reduction: For larger anaerobic and anoxic basins, mixers featuring planetary gearboxes are used to operate at lower speeds, increasing efficiency and lowering floc shear potential.

While lower cost submersible mixers may be available, they will not provide the same performance in terms of efficiency, reliability, and future maintenance costs.

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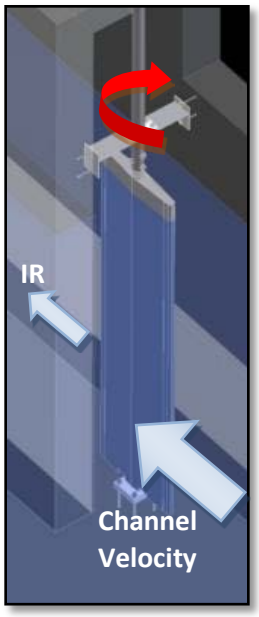
The Eliminat*IR*™ Gate

Included ☒

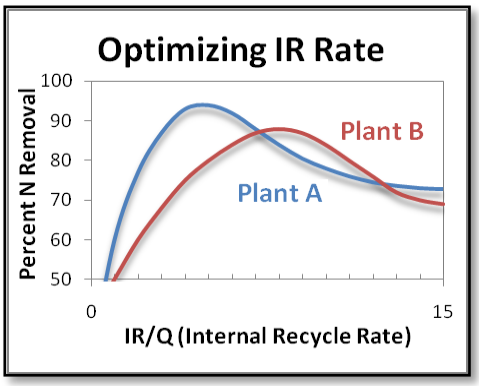
Eliminates Expensive and Energy Intensive IR Pumps



Placed at the entry to the internal recycle (IR) channel of the Carrousel® denit***IR***® System, the Eliminat***IR***™ Gate controls the nitrate recycle delivered to the anoxic zone. The denit***IR*** Carrousel System uses the channel velocity already created by the Excell®Aerator and provides a free IR ranging from 0-15Q. The Eliminat***IR*** gate opens and closes incrementally to vary the internal recycle flow. Energy use from a high volume recycle pump is eliminated.

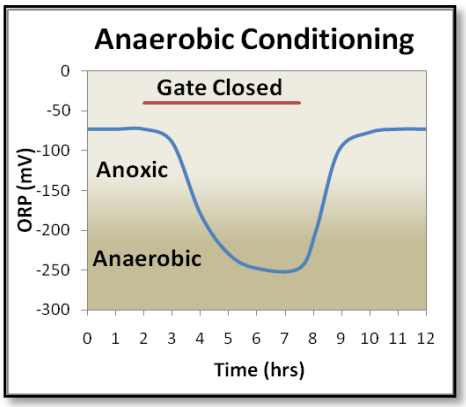
Eliminates Nutrients

The position of the Eliminat***IR*** Gate may be set to match instantaneous nitrate delivery to nitrate removal capacity. When combined with the OCULUS™ System, the Eliminat***IR*** Gate automatically opens and closes incrementally, efficiently achieving a high degree of biological nitrogen removal.

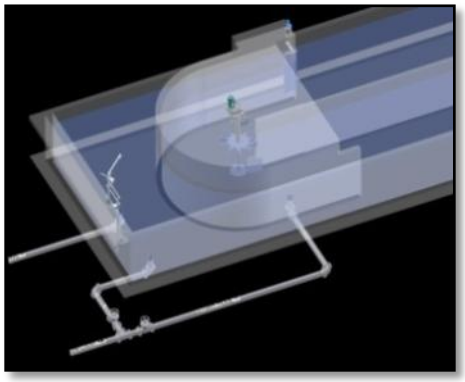


The University of Cape Town (UCT) Process – The Eliminat***IR*** Gate brings the UCT process for biological phosphorus removal into the Carrousel Family. All sources of nitrate, including RAS, are brought to the anoxic basin where the Eliminat***IR*** gate maintains the proper *overall* loading of nitrates to the anoxic basin. A separate nitrate-free recycle is then directed to the anaerobic basins. The UCT process is an option for retrofits as well as greenfield sites.

Phosphorus reduction – The Eliminat***IR*** Gate also brings varying levels of phosphorus removal to the Carrousel denit***IR*** system without dedicated anaerobic selectors (Alternat***IR™*** System). By strategically closing the Eliminat***IR*** Gate completely on a regular basis, anaerobic conditions temporarily develop in the anoxic basin, promoting the development of phosphate accumulating organisms (PAOs).



Eliminates Worry



Where the ability exists to bypass the influent stream around the anoxic zone and directly into the aeration zone, the Eliminat***IR*** Gate can be automated for a ***Storm Flow Mode***. This feature automatically closes the Eliminat***IR*** gate and effectively converts the anoxic zone into a temporary sludge holding tank, which dampens the shift of solids into the clarifiers. This all can happen at night, automatically, while you sleep peacefully.

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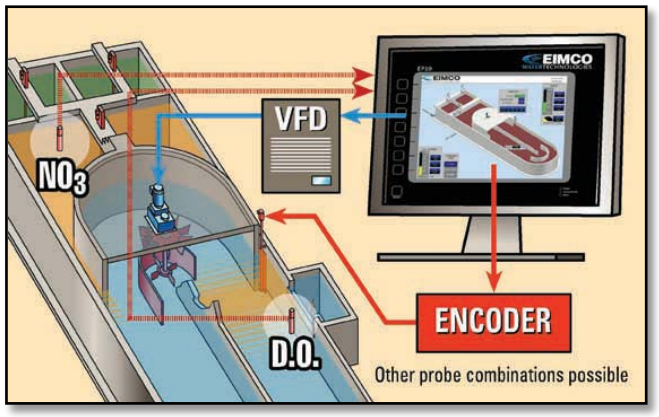
The Oculus™ System

Included ☒

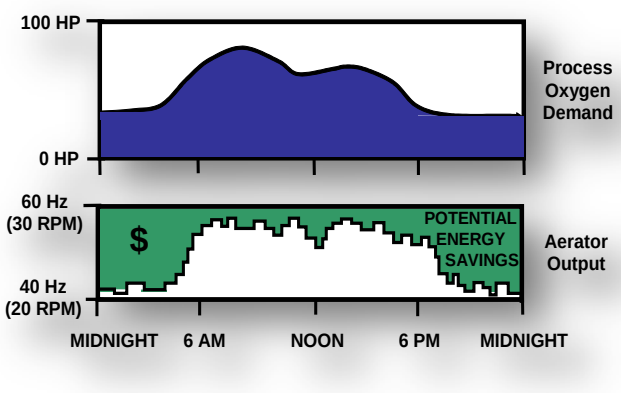


Ovivo's new Oculus System is the "all-seeing eye" that maximizes nutrient removal, minimizes power costs, and monitors selected process variables and equipment. The Oculus System analyzes and reports signals from a combination of dissolved oxygen (DO), oxidation-reduction (ORP), ammonia (NH_4-N) and nitrate (NO_3-N) probes to control the Excell®Aerator power input and the Eliminat***IR***™ gate position in the Carrousel® System. The Oculus System also tracks equipment maintenance schedules and power usage. The ExcellAerator VFDs and mixer starters are included as part of the Oculus System and are economically combined into one motor control center (MCC). The operator can access all control functions, setpoints, and trendcharting from a custom, touch-screen interface. Each Oculus System can be equipped with a modem for on-line monitoring and quick access to our industry-leading and free process support team.

Optimizes Nutrient Removal

Two key requirements for optimizing nutrient removal are (1) providing adequate nitrate delivery to the anoxic zone and (2) protecting all anoxic and anaerobic tanks from excessive D.O. Through the use of ORP or nitrate monitoring, the Oculus System efficiently meets the first requirement by regularly adjusting the position of the Eliminat***IR*** gate. This allows for control of nitrate delivery from the aerobic zone to the anoxic zone in response to diurnal fluctuations as well as nitrate loading from other sources, such as return activated sludge (RAS) and digester decants. This is especially critical for P removal plants, which must prevent both continuous and slug loads of nitrate from entering anaerobic zones.

Minimizes Power Costs



Minimizing the aeration energy required in the activated sludge process is the most effective way to reduce power costs in a wastewater treatment plant. Using proper D.O. set points determined from EWT's extensive experience with Carrousel® nutrient removal plants, the Oculus System balances the need to minimize power consumption with the overarching need for adequate aeration capacity. Ammonia probes may also be added for continuous feedback of nitrification performance.

The Automated Control of Energy (ACE®) System, a simplified and economical solution, is still available for plants that require D.O. control without nutrient removal control.

Carrousel® is a registered trademark of DHV, B.V.

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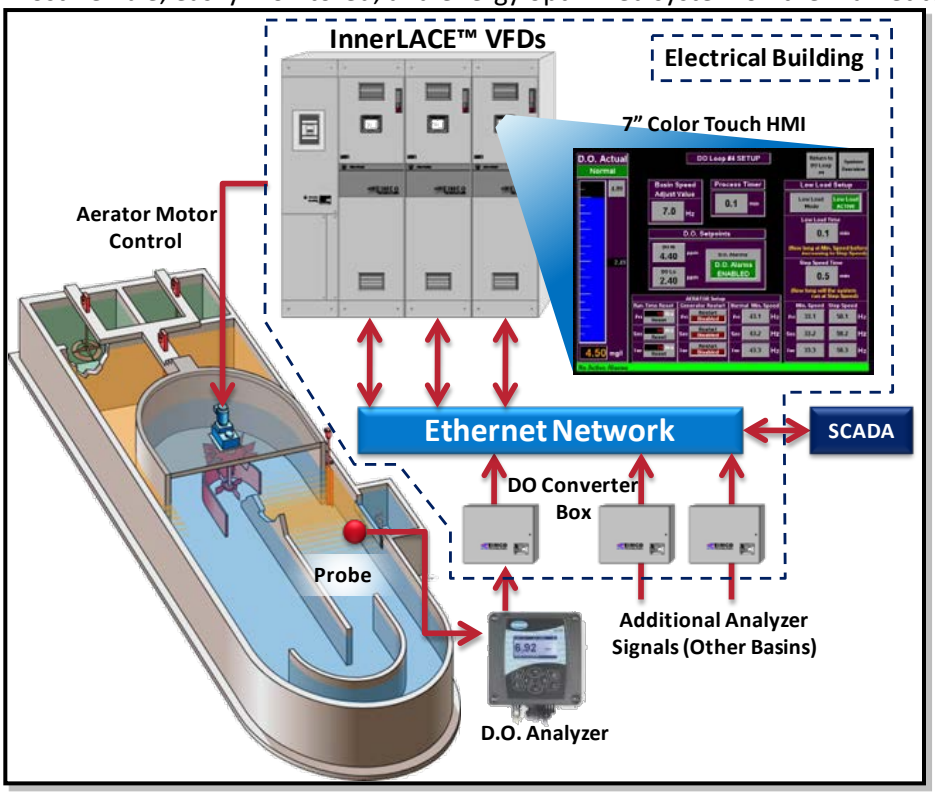
The InnerLACE™ VFD

Included ☒

The InnerLACE™ VFD represents the latest technology in wastewater aeration control and efficiency. Conceived from our goal to minimize power usage and maintain simplicity, this unique approach incorporates aeration monitoring and control in a single unit. Each InnerLACE™ VFD is equipped with a 7" color touch HMI, programmed specifically with wastewater aeration optimization and tracking in mind. For BOD removal and ammonia oxidizing systems, the InnerLACE™ VFD paired with a reliable D.O. probe is all that is required for a fully automated aeration control and monitoring system. For nutrient removal systems, the InnerLACE™ VFD can be easily combined with the Oculus™ system, providing the most flexible, easily monitored, and energy optimized system on the market today.



Redundancy

Each InnerLACE™ VFD is built with the same hardware and programming. As a result, in multiple aerator systems any VFD can operate as Primary, Secondary, or Tertiary. This not only provides control redundancy, but allows operators the flexibility to configure their controls optimally for their specific site.

Simplicity

As mentioned, each InnerLACE™ VFD has D.O. control logics completely integrated. This setup simplifies wiring and hardware setup, reducing the chance for installation errors and miscommunications. Additionally, EWT will be able to maintain sole source responsibility, simplifying any post installation troubleshooting, should any be needed. Both stand-alone and MCC style configurations of the InnerLACE™ VFD are available.

Support & Accessibility

The InnerLACE™ VFD supports full connectivity. Each unit is fully capable of direct access to general process parameters, kW usage, and trending data over Ethernet. This feature allows operators to easily investigate which operating strategy is most efficient for their specific site. Additionally, each unit is configured with remote access capabilities opening the door for real time support from our process team.

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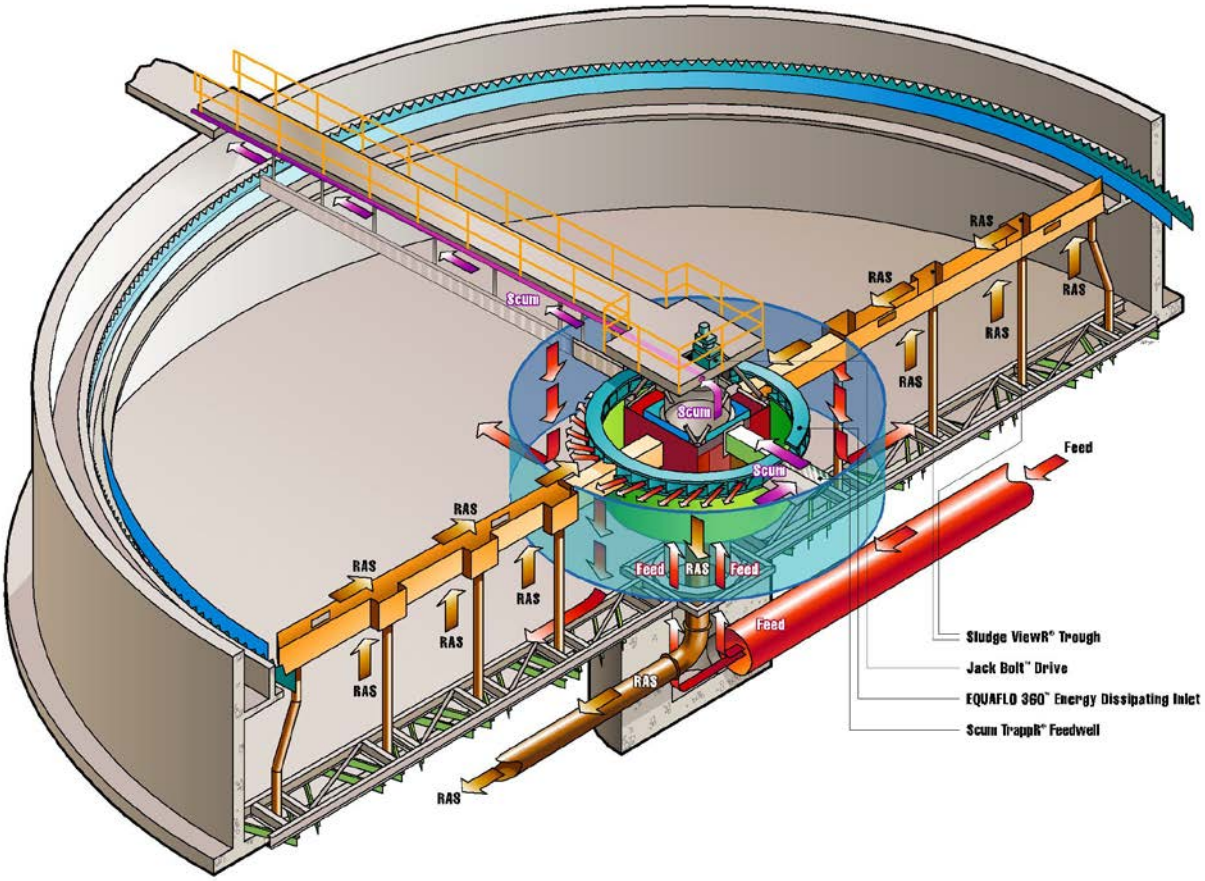
The Carrousel® ProSet™ Clarifier

Included ☐

To maximize biological nutrient removal (BNR), Ovivo's Carrousel ProSet clarifier combines efficient flocculation with the rapid withdrawal of sludge. Both owners and engineers appreciate the innovative scum capture, the visual access to RAS at each point of withdrawal, and the ability to work on the clarifier drive without dewatering.



SludgeViewR™ RAS System

The SludgeViewR™ design offers many advantages over other sludge removal options. The design provides rapid RAS removal across the full diameter of the tank, which helps to minimize denitrification (and associated surface clumping) and the release of phosphorous in the sludge blanket. The SludgeViewR™ also provides operators with the ability to visually monitor the RAS being collected from each of the withdrawal tubes in the open top header trough. If clogs are observed in any of the tubes, another user-friendly concept is the ease with which the straight tubes can be quickly unclogged from the access bridge.

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Equaflo 360 EDI™ Inlet Well

This energy dissipating inlet (EDI) differs substantially from conventional practice by using the entire EDI circumference to discharge flow instead of just a few openings in the EDI shell. The resulting quiescent flow provides a uniform velocity profile and promotes flocculation within the feedwell. Another advantage of the Equaflo 360™ design is that feedwell depths can be minimized, which helps avoid scouring of the sludge blanket as flow goes beneath the lower edge of the feedwell.

ScumTrappR™ Scum Control System

Conventional scum removal relies on capturing scum at the tank periphery, maximizing the potential for TSS impacts due to scum carrying over the effluent weir. The ScumTrappR™ design captures the majority of scum as it enters the tank, thereby eliminating the need to capture scum at the tank perimeter and minimizing the potential for scum to negatively impact effluent TSS. The resulting clean clear expanse of clarifier surface is an aesthetic benefit appealing to both plant operators and plant visitors.

Jackbolt™ Clarifier Drive

The Jackbolt™ clarifier drive is the ONLY clarifier drive that allows replacement of drive components without dewatering the clarifier tank – the Jackbolt™ design allows a plant operator to replace major drive components from the center platform using an engine hoist without removing any water from the basin. The drive also utilizes a precision bearing design and a cast iron housing for maximum bearing life and superior corrosion resistance. Simply put, the Jackbolt™ drive is a one of a kind design available only from Ovivo.

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Calculations for Biological Basins

1. DESIGN CONDITIONS

Design Parameter	Design Value	Design Effluent	Notes
Flow (MGD)	1.5	-	(PER TRAIN)
BOD – Biochemical Oxygen Demand (mg/L)	200	5	
TSS – Total Suspended Solids (mg/L)	315	5	After filtration
TKN – Total Kjeldahl Nitrogen (mg/L)	40	2	
NH_3-N – Ammonia Nitrogen (mg/L)	-	1	
NO_3-N – Nitrate Nitrogen (mg/L)	-	4	
TN – Total Nitrogen (mg/L)	-	6	Includes estimated refractory organic nitrogen
TP – Total Phosphorus (mg/L)	8	1	May require chemical polishing and effluent filtration

2. DESIGN ASSUMPTIONS

Design Parameter	Design Value
Process SRT – Nitrification (days)	12
Minimum Wastewater Temperature (°C)	12
Maximum Wastewater Temperature (°C)	25
MLSS Concentration (mg/L)	3400
Net Yield (lb TSS/lb $BOD_{removed}$)	1.06
Oxygen Coefficient	
lb O_2 / lb $BOD_{removed}$	1.5
lb O_2 / lb $N_{oxidized}$	4.60
Alpha (α)	0.91
Beta (β)	0.98
Elevation (feet above sea level)	835

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a. AERATION VOLUME

BOD Removal $= Q \times (BOD_{in} - BOD_{eff}) \times 8.34$

$= 1.5 \times (200 - 5) \times 8.34$

$= 2439.45 \ {}^{\text{lbs BOD}}/_{\text{day}}$

Sludge Production $= Y \times Q \times (BOD_{in} - BOD_{eff}) \times 8.34$

$= 1.06 \times 1.5 \times (200 - 5) \times 8.34$

$= 2585.817 \ {}^{\text{lbs TSS}}/_{\text{day}}$

System Mass $= SRT \times Y \times Q \times (BOD_{in} - BOD_{eff}) \times 8.34$

$= 12 \times 1.06 \times 1.5 \times (200 - 5) \times 8.34$

$= 31029.804 \text{ lbs TSS}$

Carrousel Volume $= \dfrac{SRT \times Y \times Q \times (BOD_{in} - BOD_{eff})}{MLSS}$

$= \dfrac{12 \times 1.06 \times 1.5 \times (200 - 5)}{3400}$

$= 1.0942941176 \text{ M. G.}$

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b. AERATION POWER

Nitrogen Synthesis $= 5.2382525721\%$ of WAS

$= 10.827468067\ {}^{mg}/_{L}$

Nitrogen Oxidized (N_{ox}) $= TKN_{in} - TKN_{eff} - N_{assimilation}$

$= 40 - 2 - 10.827468067$

$= 27.172531933\ {}^{mg}/_{L}$

$= 339.92837449\ {}^{lbs \cdot N}/_{day}$

Actual Oxygen Requirement @ $1.5\ {}^{lbs\ O_2}/_{lbs\ BOD_{removed}}$ & $4.60\ {}^{lbs\ O_2}/_{lbs\ N_{oxidized}}$

AOR $= (1.5 \times 2439.45) + (4.60 \times 339.92837449)$

$= 5222.8455226\ {}^{lbs\ O_2}/_{day}$

STD O_2 Requirement $= AOR \times \dfrac{9.02}{\alpha \times (\beta \times C_{SW} - C_0)} \times 1.024^{(20-TMAX)}$

$\alpha = 0.91 \quad \beta = 0.98 \quad C_0 = 2$

C_{SW} at 25°C and 835 feet elevation $= 7.92515625\ {}^{mg}/_{L}\ O_2$

SOR $= 5222.8455226 \times \dfrac{9.02}{0.91 \times (0.98 \times 7.92515625 - 2)} \times 1.024^{(20-25)}$

$= 7973.495664\ {}^{lbs\ O_2}/_{day}$

Power Required $= \dfrac{7973.495664}{3.65 \times 24}$

$= 91.02164$ HP 2 @ 60 HP = 120 HP Installed

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Denitrification Credit @ 2.86 $^{\text{lbs } O_2}/_{\text{lbs } NO_3\text{-}N_{reduced}}$

$$\text{lbs } NO_3\text{-}N_{reduced} = (TKN_{in} - TKN_{eff} - N_{assimilation} - NO_3\text{-}N_{eff}) \times Q \times 8.34$$

$$= (40 - 2 - 10.827468067 - 4) \times 1.5 \times 8.34$$

$$= 289.88837449 \ ^{\text{lbs}}/_{\text{day}}$$

$$O_2\text{Credit} = 2.86 \times (\text{lbs } NO_3 - N_{reduced})$$

$$= 829.08075103 \ ^{\text{lbs } O_2}/_{\text{day}}$$

$$\text{SOR Credit} = O_2\text{Credit} \times \frac{9.02}{\alpha(\beta \times C_{SW} - C_0)} \times 1.024^{(20-TMAX)}$$

$$= \frac{1265.7221072}{3.65 \times 24}$$

$$\text{Horsepower Credit} = (15.068120324 \text{ HP})$$

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c. ANOXIC/ANAEROBIC VOLUME

NO_3-N Reduced in Carrousel Basin $\left({}^{mg}/_{L}\right) = 0$

$\left({}^{lbs}/_{day}\right) = \text{Not Considered}$

Active Biomass $= 2550\ {}^{mg\ VSS}/_{L}$

Specific Denitrification Rate SDNR $= 0.0407\ {}^{gNO_3\text{-}N}/_{gVSS \cdot day}$

$$\text{lb } NO_3\text{-}N_{reduced} = (TKN_{in} - TKN_{eff} - NO_3\text{-}N_{reduced\ in\ Carrousel} - NO_3\text{-}N_{eff}) \times Q \times 8.34$$

$$= (40 - 2 - 10.827468067 - 0 - 4) \times 1.5 \times 8.34$$

$$= 289.88837449\ {}^{lbs}/_{day}$$

$$\text{Anoxic Volume} = \frac{\text{lb } NO_3\text{-}N_{reduced}}{SDNR \times MLVSS \times 8.34}$$

$$= \frac{289.88837449}{0.0407 \times 2550 \times 8.34}$$

$$= 0.33458677368\ \text{M. G.}$$

Enviroquip® Rapid Sludge Removal Clarifiers

Providing superior features to improve plow clarification

Key features & benefits

- Non-clogging clarifiers
- Open RAS troughs provide sludge viewing for easy operation
- Adjusts to changing process conditions
- Constructed in galvanized mild steel or 304, 316 type stainless steel

How we create value

- Handles up to 200% of average flow
- 95% of scum removed inside the influent well
- Low construction costs
- Minimal maintenance costs

Enviroquip® Rapid Sludge Removal Clarifiers

Advantages

Why use rapid removal clarifiers?
Properly designed Rapid Sludge Removal Clarifiers provide superior features to improve the plow clarification process.

- Higher return sludge rates, capable of handling 200% of average flow
- Rapid return of activated sludge to aeration basin for process rejuvenation
- Better control of sludge blanket levels in the clarifier
- Lower concrete construction costs
- Flexibility to adjust to changing process conditions (temporary or permanent)

Non-clogging clarifiers
Engineers and owners certify that our SS Series Clarifiers are truly non-clogging.

We have eliminated clogging by:

- Drawing sludge from the floor through straight tubes into an open SludgeViewR® trough at the clarifier surface
- Eliminating bent tubes or underwater orifices
- Utilizing equal length draw tubes, eliminating the requirement for flow control devices and providing balanced sludge removal

Open SludgeViewR® troughs allow viewing of sludge

- Providing the operator with the opportunity to view the sludge return from each tube, ensuring that pumping rates are as required
- Can also be provided with individual sections of troughs for each sludge return tube
- Controls can be provided to change the head characteristics and suction rate for each tube if the operator needs to vary the sludge flow from the system flow

Images clockwise: RAS Troughs,
All hot dip galvanized construction,
All stainless steel construction.

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Effective Scum Removal

Center pier design provides versatility
Center piers can be designed to accommodate a variety of functions. Scum and return sludge are kept separate by using multiple collection boxes.

This provides the design engineer with the option of removing scum and gross inorganic floatables at the source and returning them to the headworks, or removing them from the system independently.

A rotating scum beach can be incorporated into the center pier design to achieve this, and the scum can be either discharged down through the center pier or out along the bridge by use of a small submersible pump.

95% of scum is removed inside the influent well
Ovivo's ScumTrappR™ design includes a stationary bridge mounted scum wiper. This is located inside the influent well and pushes gross inorganic floatables and scum into a separate rotating collection box for removal from the system. Thus, 95% of the floatables are captured inside the influent well. This also eliminates the need for scum to travel across the full surface of the entire clarifier.

The remaining 5% of the biological scum (or floating sludge) which does surface outside the influent well is returned with the activated sludge for further treatment.

Drive design minimizes maintenance problems
Our exclusive Jackbolt™ drive mechanism eliminates the need to take the clarifier offline for bearing or gear replacement. The complete assembly can be replaced in hours using only a small portable hoist, instead of a more costly motor crane required by other drive mechanisms.

"Same Plant
Same Flows
Same Time"

Top down: Theirs and ours

OVIVO™
Bringing water to life℠

Improved Performance

Current reducing flocculating inlet well baffles improve clarifier performance
Octagonal shaped uplifting inlet baffles with floors reduce and redirect currents. This prevents sludge blanket disturbance, while simultaneously directing scum to the water surface inside the clarifier flocculating well for effective scum removal, using the patented ScumTrappR. Additional foam suppressing spray nozzles emulsify scum foam for effective scum pumping.

Current reducing baffles provide:
- Inlet current reduction
- Inlet flow redirection
- Improves scum collection
- Enhanced mixed liquor flocculation for improved settling rates

Materials of construction
Clarifiers are available in galvanized mild steel, types 304 or 316 stainless steel for corrosion free, maintenance free equipment.

Available through:
Ovivo
2404 Rutland Drive
Austin TX 78758
Tel: 512.834.6000

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KRÜGER

The City of Versailles (GRW)

Versailles, KY

1/20/2014

AnoxKaldnes™ IFAS

Kruger Project No.: 5700117305

Submitted to:

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Submitted by:

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AnoxKaldnes Applications Engineer
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VEOLIA WATER
Solutions & Technologies

KRÜGER

Introduction

I Kruger Inc is pleased to present this revised budgetary proposal for our AnoxKaldnes IFAS System.

In order to upgrade the existing ditch system to achieve the effluent NH_3-N, TN, and TP concentrations, Kruger proposes to retrofit the existing oxidation ditches into a four (4) train Hybas system. Each train comprises of two (2) anaerobic zones, one (1) pre anoxic zone, one (1) aerobic media zone for BOD removal and nitrification, and one (1) aerobic activated sludge zone for final polishing.

From Kruger's extensive design and modeling experience – and based on the preliminary influent information provided – Versailles' TN limit will require relatively low dissolved oxygen (DO) in the proposed activated sludge (A/S) reactors due to the low BOD/TKN ratio in the influent. In fact, our modeling suggests the DO returned via the internal mixed liquor recycle stream to the primary anoxic zone should be controlled below 1.5 to 2 mg/L. Kruger is therefore proposing coarse bubble aeration to minimize the DO in the A/S reactors and will integrate a pulsing aeration strategy to cycle the aeration ON/OFF in the second oxic zone. Kruger also recommends that provisions for the future installation of submersible mixers in these zones be installed should there be difficulty meeting the target TN due to either lower BOD or higher DO than anticipated during design. At a minimum, these provisions would include spare electrical conduit capacity between the MCC and the second oxic zones and empty MCC buckets to accommodate up to four mixers (one per A/S reactor). These mixers are not currently included in Kruger's scope and price, but could be added at the city's request.

For bio-p removal, the Block and Hong anaerobic selector comprises of a two stage selector. The return activated sludge (RAS) is returned to the first stage of the anaerobic selector where nitrates that are present in the return stream will be removed in this stage. The influent wastewater typically enters the second stage. As such, a suitable concentration gradient of available BOD, as well as true anaerobic conditions, is maintained in the second stage of the selector. As a result, optimal biological phosphorus removal is realized without the dosing of costly chemicals. Additionally, sludge bulking in the secondary clarifier is eliminated. Superior sludge-settling characteristics result from the inhibition of filamentous bacteria and the increased density of the mixed liquor caused by the biological phosphorus removal mechanism.

Please note that the existing oxidation ditches will require demolition of the channel walls and concrete turning veins and the construction of dividing walls in order to retrofit the Hybas trains.

We appreciate the opportunity to provide this proposal to you. If you have any questions or need further information, please contact our local representative, Gary Lubin of Henry P. Thompson Company, Inc., or our Regional Sales Manager, Tony Freed at 229-516-0570 (tony.freed@veoliawater.com).

cc: CT, AJF, LGW, CS, project file (Kruger)
Gary Lubin (Henry P. Thompson Company)

Revision	Date	Process Eng.	Comments
0	09/05/13	LFO	Initial, budgetary proposal.
1	01/16/14	CS	Revised, added equipment, CB diffusers (pulsed air; provisions for mixers in A/S Zone; no mixers incl in A/S Zone)

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We Know Water

I. Kruger Inc. (Kruger) is a water and wastewater solutions provider specializing in advanced and differentiating technologies. Kruger provides complete processes and systems ranging from biological nutrient removal to mobile surface water treatment. The ACTIFLO® Microsand Ballasted Clarifier, BioCon® Dryer, BIOSTYR® Biological Aerated Filter (BAF) and NEOSEP™ MBR are just a few of the innovative technologies offered by Kruger. Kruger is a subsidiary of Veolia Water, a world leader in engineering and technological solutions in water treatment for industrial companies and municipal authorities.

Veolia Water Solutions & Technologies, the fully-owned subsidiary of **Veolia Water**, is the world leader in water and wastewater treatment with over 155 years of experience. As an experienced design-build company and a specialized provider of technological solutions in water treatment, Veolia combines proven expertise with unsurpassed innovation to offer technological excellence to our industrial customers. Based on this expertise, we believe that we have developed the best solution for your application. Below is a brief description of the proposed project.

Energy Focus

Kruger, along with Veolia Water Solutions & Technologies (VWS) is dedicated to delivering sustainable and innovative technologies and solutions.

We offer our customers integrated solutions which include resource-efficient technology to improve operations, reduce costs, achieve sustainability goals, decrease dependency on limited resources, and comply with current and anticipated regulations.

Veolia's investments in R&D outpace that of our competition. Our focus is on delivering

- neutral or positive energy solutions
- migration towards green chemicals or zero chemical consumption
- water-footprint-efficient technologies with high recovery rates

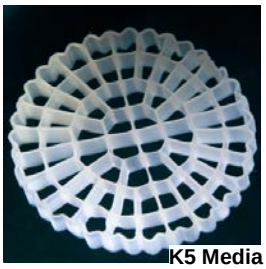
Our carbon footprint reduction program drives innovation, accelerates adoption and development of clean technologies, and offers our customers sustainable solutions.

Kruger is benchmarking its technologies and solutions by working with our customers and performing total carbon cost analysis over the lifetime of the installation.

By committing to the innovative development of clean and sustainable technologies and solutions worldwide, Kruger and VWS will continue to maximize the financial benefits for every customer.

Process Description

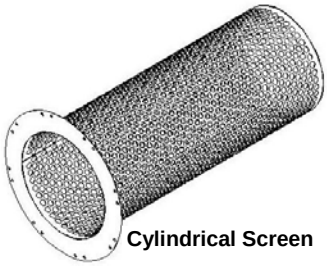
AnoxKaldnes MBBR and IFAS


K5 Media

Kruger's AnoxKaldnes process design is based on more than 20 years of experience with Moving Bed Biological Reactors (MBBR) and Integrated Fixed Film Activated Sludge (IFAS) systems. Our knowledge is supported by lab and pilot scale studies and data from more than 475 AnoxKaldnes operating systems for BOD, nitrification, and TN removal.

The MBBR and IFAS (or Hybas™ – Hybrid Biofilm Activated Sludge) processes are continuous flow through, non-clogging bio-film reactors containing "carrier elements" or media with a high specific surface. The media does not require backwashing or cleaning.

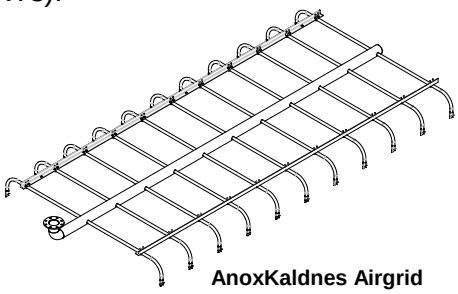
The biomass that treats the wastewater is attached to the surfaces of the media. The media is designed to provide a large protected surface area for the biofilm and optimal conditions for biological activity when suspended in water. Media of different shapes and sizes provide flexibility to use the most suitable type depending on wastewater characteristics, discharge standards and available volumes. AnoxKaldnes media is made from polyethylene and has a density slightly less than water.


Cylindrical Screen

In the MBBR process, all of the biomass is attached to the media and retained in the reactor, with no returned sludge. In the Hybas process, the reactor contains both free-floating biomass (activated sludge) and biomass attached to the media. The free-floating biomass passes through the reactor, is settled and recycled back to the reactor. The media and attached biofilm remain in the reactor as in a MBBR.

The Hybas process is often considered for upgrading existing conventional activated sludge systems within the existing tankage for either maintaining nitrification at new higher flow rates or loads or upgrading a plant to meet new nitrification requirements. It is accomplished by adding the media directly into the activated sludge reactors to enhance the growth of the autotrophic bacteria. The Hybas system is capable of meeting these new effluent requirements at low solids retention times (SRTs) and short hydraulic retention times (HRTs).

The mixing of the media within MBBR and Hybas reactors is provided by AnoxKaldnes' medium bubble aeration system in aerobic application, whereas specially designed submersible mixers are used in anoxic environments for denitrification.


AnoxKaldnes Airgrid

Kruger's minimum scope of supply for MBBR and Hybas systems includes the AnoxKaldnes media, screen assemblies (to keep media in each reactor), medium bubble aeration grid assemblies and submersible mixers for the anoxic zones. In cases where they are needed, Kruger also provides the blowers, instrumentation and controls, SCADA, and field instruments (dissolved oxygen, nitrate, ammonia, etc.) for single source responsibility.

AnoxKaldnes IFAS System Configuration

For upgrading the ditch system, Kruger proposes to retrofit the existing oxidation ditches into four (4) Hybas trains consisting of two anaerobic selector zones, one (1) pre anoxic zone, one (1) aerobic media zone, and one (1) aerobic non media zone per train.

Design Summary

The proposed design is based on the following influent wastewater characteristics and incorporating peak flow conditions for screen design purposes only. The design assumes that the raw influent wastewater is biodegradable, no toxic compounds are present, sufficient alkalinity is available to avoid pH depressions, that the COD/BOD ratio is between 1.7 and 2.3, and that none of the equipment provided would be used in a classified area (e.g. Class 1, Division 1 or Class 1, Division 2).

Facilities with primary clarification will require screening with a maximum of 6 mm (1/4 inch) openings for removal of particulate matter (rags, debris, etc.) prior to entering the AnoxKaldnes IFAS treatment reactors. Facilities that lack primary clarification will require screening with a maximum of 3 mm (1/8 inch) openings.

Table 1: Influent Design Basis

Parameter	Units	Values
Flow, Design	MGD	4.5
Flow, Peak Hourly	MGD	12.5
BOD_5, Design Flow	mg/L	200
TSS, Design Flow	mg/L	315
TKN, Design Flow	mg/L	40
NH_4-N, Design Flow	mg/L	
TP	mg/L	8
Elevation	ft	1,000*
Min/Max Temperature	°C	10/25*

*Assumed values.

Table 2: Effluent Objectives

Parameter	Units	Values
$sBOD_5$ (mg/L)	mg/L	≤ 10
NH_3-N (mg/L)	mg/L	≤ 2
TN (mg/L)	mg/L	≤ 10[x]
TP (mg/L)	mg/L	≤ 1[*,x]

* Provisions for backup chemical trimming should be made.

[x] See discussion on pulsed air strategy in Introduction.

Table 3: Process Design Summary

Parameter	Units	Values
Number of Process Trains	-	4
Number of Anaerobic Reactors per Train	-	2
Number of Pre-Anoxic Reactors per Train	-	1
Number of Hybas Reactors per Train	-	1
Number of Activated Sludge Reactors per Train	-	1
Anaerobic Reactor		
Dimensions (Each)	ft	See Layout x 12 SWD
Total Volume (All Reactors, Per Train)	ft^3	9,216
Total Volume (All Reactors, All Train)	ft^3	36,864
Number of Mixers Per Reactor	-	1
Rated Mixer Power	hp	2.3
Total Number of Mixers (All Reactors, All Trains)	-	8
Pre-Anoxic Reactor		
Dimensions (Each)	ft	54 L × 50 W × 12 SWD
Volume (Each)	ft^3	32,400
Total Volume (All Reactors, All Trains)	ft^3	129,600
Number of Mixers Per Reactor	-	1
Rated Mixer Power	hp	9.8
Total Number of Mixers (All Reactors, All Trains)	-	4
Hybas Reactor		
Dimensions (Each)	ft	35 L × 50 W × 12 SWD
Volume (Each)	ft^3	21,000
Total Volume (All Reactors, All Trains)	ft^3	84,000
Media Type:	-	K5
Media Protected Surface Area	ft^2/ft^3	243.8
Fill of Biofilm Carriers	%	35
Media Volume (All Reactors, All Trains)	ft^3	29,380

Parameter	Units	Values
Total Effective Surface Area (All Reactors, All Trains)	ft^2	7,198,903
Aeration System Type	-	Medium Bubble
Residual DO, Max. Month	mg/L	4 - 5
AOR, Max. Month (Total)	lbsO2/hr	331
Total Process Air Requirement (All Reactors, All Trains)	SCFM	4,900
Total Mixing Air Requirement (All Reactors, All Trains)	SCFM	4500
Discharge Pressure (From Top of Drop Pipe)	psi	5.3
Activated Sludge Reactor		
Dimensions (Each)	ft	See Layout × 12 SWD
Volume (Each)	ft^3	34,500
Total Volume (All Reactors, All Trains)	ft^3	138,000
Aeration System Type	-	Coarse Bubble
Residual DO, Max. Month	mg/L	1.0 - 1.5
AOR, Max. Month (Total)	$lbsO_2/hr$	80
Total Process Air Requirement (All Reactors, All Trains)	SCFM	1,000
Discharge Pressure (From Top of Drop Pipe)	psi	5.3
Mixer Type	-	See discussion in Introduction.
Number of Mixers Per reactor	-	See discussion in Introduction.
Rated Mixer Power	hp	See discussion in Introduction.
MLSS, Max. Month	mg/L	~ 3,000 – 3,500
IMLR, Max. Month	%	~ 300 - 400
RAS, Max. Month	%	50-100
Recommended Freeboard	ft	2-3
Sludge Production, Max. Month	lb/day	~ 8,500

Scope of Supply

Kruger is pleased to present our scope of supply which includes process engineering design, equipment procurement, and field services required for the proposed treatment system, as related to the equipment specified. The work will be performed to Kruger's high standards under the direction of a Project Manager. All matters related to the design, installation, or performance of the system shall be communicated through the Kruger representative giving the Engineer and Owner ready access to Kruger's extensive capabilities.

Process and Design Engineering

Kruger will provide process engineering and design support for the system as follows:

- Process Engineering consisting of aeration system sizing and configuration, sieve and outlet design.
- Review and approval of P&I Diagram for the AnoxKaldnes IFAS portion of the process. Preliminary General Arrangement Drawings and review and approval of final General Arrangement Drawings for the process. Review of reactor drawings with respect to penetrations and dimensions, excluding structural design.
- Equipment installation instructions for all equipment supplied by Kruger.

Field Services

Kruger will furnish a Service Engineer to perform the following tasks:

- Inspect installation of key pieces of equipment during construction.
- Inspect the completed system prior to startup.
- Assist the Contractor with initial startup of the system.
- Train the Owner's staff in the proper operation and maintenance of the AnoxKaldnes IFAS system.
- Test and start any Kruger-supplied control equipment, including PLC programming and SCADA systems.

AnoxKaldnes IFAS System Equipment – Limited to In-Basin Equipment Only

Process and Mechanical Equipment Items	Qty	Description
AnoxKaldnes K5 Media, (ft^3)	29,380	High density polyethylene carrier elements.
Cylindrical Screen Assemblies	40	Ten (10) per reactor. 304L SS. 23" ø perforated plate pipes terminated in ANSI flanges for mounting directly to the tank wall.
Wall Screen Assemblies	12	Perforated plate retention screen assemblies in 304L SS will be provided in each anoxic reactor.
Air scour system	Yes	An air sparging system in 304L SS will be provided to scour the screens.

Process and Mechanical Equipment Items	Qty	Description
Process Blowers	3	PD blowers for Process air. Blowers will be rated for 3,000 SCFM and 125 name plate HP
Regenerative Blowers	2	Regenerative blowers for screen air sparging. Blowers will be rated for 300 SCFM and 6.5 name plate HP.
Medium Bubble Aeration system	1	304L SS including header, lateral piping, and hardware (excluding anchor bolts).
Coarse Bubble Aeration system	1	PVC MaxAir Simplex diffusers including header, lateral piping, and hardware (excluding anchor bolts).
Submersible Mixers	12	One (1) for each anaerobic and pre anoxic reactor. Submersible Propeller Mixer, 304SS Rails, Hoist, and Receiving Bracket.
IMLR Wall Pumps	4	One (1) per train rated at 4.5 MGD @ 3 feet TDH.
Modulating Airflow Control Valves	8	One (1) actuated BFV for each aerobic reactor.

Instrumentation and Controls Equipment Items	Qty	Description
PLC Control Panel	1	NEMA 12 Freestanding or Wall Mount Control Panel (For Indoor Use). ControlLogix PLC; Panelview HMI; 120V Feed
High Level Float Switch	4	One (1) for each media zone.
DO Probe (LDO)	8	One (1) for each Aerobic zone. Aerobic Zone DO Monitoring
Thermal Mass Flowmeter	8	One (1) for each Aerobic zone.

Notes Regarding System Design and Installation

- For any MBBR or IFAS system, regardless of manufacturer, the quality and finish of reactor surfaces is important for the long-term longevity of the system. AnoxKaldnes has years of experience in the design and manufacture of MBBR and IFAS systems, with the quality and texture of the finished reactor walls is important. It is particularly important to prevent chipping, holidays, or rough areas that would leave open any annular spaces around media retention screens.

Scope of Supply BY INSTALLER/PURCHASER

The contractor's scope of supply for the AnoxKaldnes IFAS system should include, but is not limited to, the following items:

- All civil/site and electrical work.
- A concrete foundation for the tanks.
- Reactors to house the MBBR treatment equipment.
- All provisions for interconnecting piping.
- Unloading, storage and installation of equipment.
- Centrate equalization tanks
- Cover for reactor tanks

Design Options

In addition to the proposed system as detailed herein, Kruger is able to further incorporate our process and controls expertise into wastewater treatment plants, allowing municipalities to meet stringent effluent requirements and future plant upgrades. Kruger is also able to offer our instrumentation and controls expertise to build upon the proposed system by providing a **customized plant-wide SCADA system** or designing a **Motor Control Center (MCC)**, providing clients a single source responsibility for plant controls. Please contact Kruger if the options above are of interest or to be included in the current proposed system or future upgrades. ***Please note that the design options listed above are not included in the pricing noted herein.*

Schedule

- Shop drawings will be submitted within 6-8 weeks of receipt of an executed contract by all parties.
- All equipment will be delivered within 18-20 weeks after receipt of written approval of the shop drawings.
- Installation manuals will be furnished upon delivery of equipment.
- Operation and Maintenance Manuals will be submitted within 90 days after receipt of approved shop drawings.

Pricing

The price for the AnoxKaldnes IFAS system, as defined herein, including process and design engineering, field services, and equipment supply is: **$2,461,000.**

Pricing is FOB shipping point, with freight allowed to the job site. This pricing does not include any sales or use taxes. In addition, pricing is valid for ninety (90) days from the date of issue and is subject to negotiation of a mutually acceptable contract.

Please note that the above pricing is expressly contingent upon the items in this proposal and are subject to I. Kruger Inc. Standard Terms of Sale detailed herein.

Kruger Standard Terms of Payment

The terms of payment are as follows:

- 10% on receipt of fully executed contract
- 15% on submittal of shop drawings
- 75% on the delivery of equipment to the site

Payment shall not be contingent upon receipt of funds by the Contractor from the Owner. There shall be no retention in payments due to I. Kruger Inc. All other terms per our Standard Terms of Sale are attached.

All payment terms are net 30 days from the date of invoice. Final payment not to exceed 120 days from delivery of equipment.

I. Kruger Inc. Standard Terms of Sale

1. Applicable Terms. These terms govern the purchase and sale of the equipment and related services, if any (collectively, "Equipment"), referred to in Seller's purchase order, quotation, proposal or acknowledgment, as the case may be ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. Payment. Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation provides otherwise, freight, storage, insurance and all taxes, duties or other governmental charges relating to the Equipment shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval.

3. Delivery. Delivery of the Equipment shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, Delivery terms are F.O.B. Seller's facility.

4. Ownership of Materials. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Equipment. Buyer shall not disclose any such material to third parties without Seller's prior written consent.

5. Changes. Seller shall not implement any changes in the scope of work described in Seller's Documentation unless Buyer and Seller agree in writing to the details of the change and any resulting price, schedule or other contractual modifications. This includes any changes necessitated by a change in applicable law occurring after the effective date of any contract including these terms.

6. Warranty. Subject to the following sentence, Seller warrants to Buyer that the Equipment shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship. The foregoing warranty shall not apply to any Equipment that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other liability to Buyer under warranty, tort or any other legal theory. If Buyer gives Seller prompt written notice of breach of this warranty within 18 months from delivery or 1 year from beneficial use, whichever occurs first (the "Warranty Period"), Seller shall, at its sole option and as Buyer's sole remedy, repair or replace the subject parts or refund the purchase price therefore. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Equipment in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller). THE WARRANTIES SET FORTH IN THIS SECTION ARE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO SECTION 10 BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

7. Indemnity. Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

8. Force Majeure. Neither Seller nor Buyer shall have any liability for any breach (except for breach of payment obligations) caused by extreme weather or other act of God, strike or other labor shortage or disturbance, fire, accident, war or civil disturbance, delay of carriers, failure of normal sources of supply, act of government or any other cause beyond such party's reasonable control.

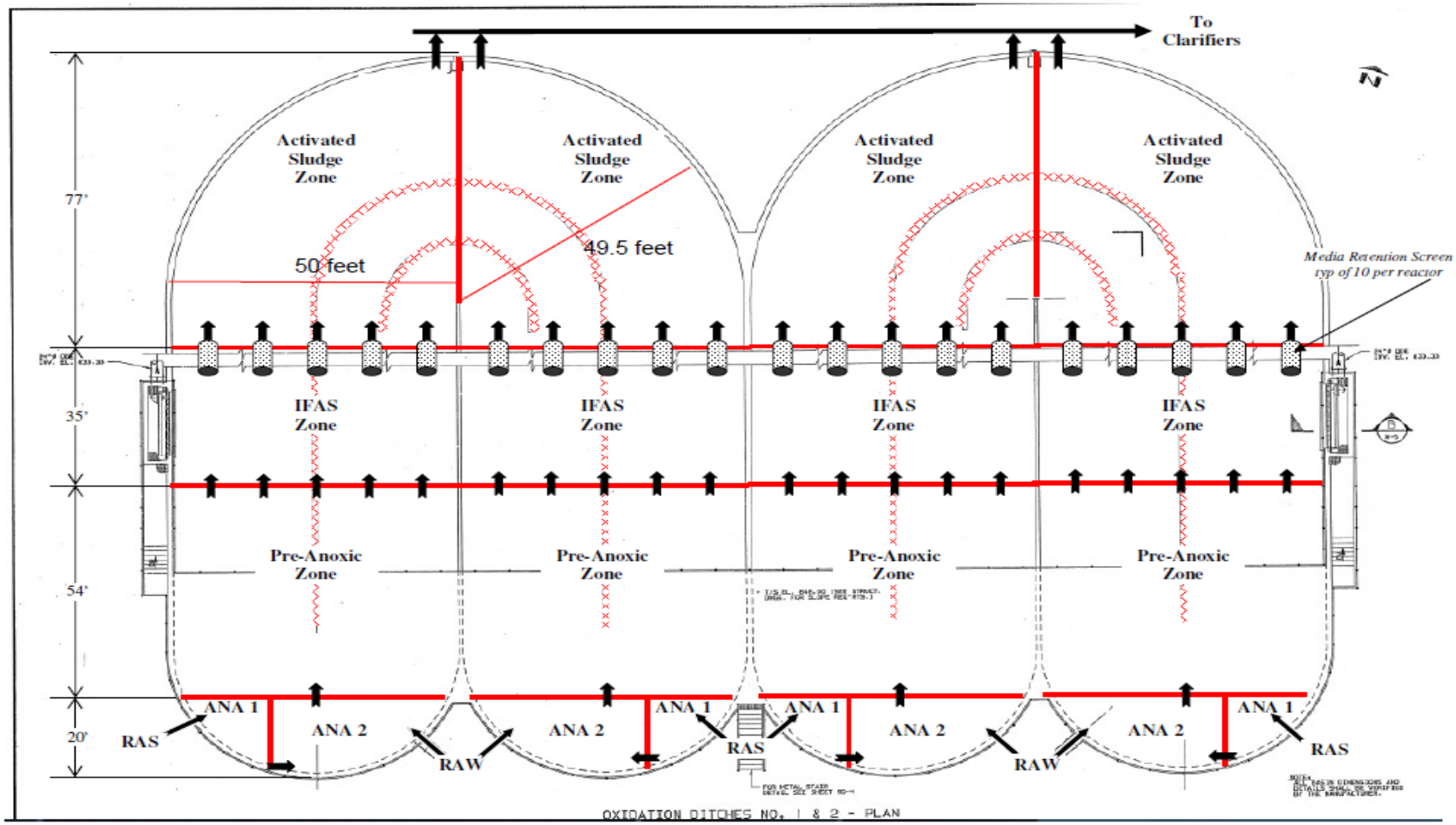
9. Cancellation. If Buyer cancels or suspends its order for any reason other than Seller's breach, Buyer shall promptly pay Seller for work performed prior to cancellation or suspension and any other direct costs incurred by Seller as a result of such cancellation or suspension.

10. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE EQUIPMENT SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE EQUIPMENT. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

Miscellaneous. If these terms are issued in connection with a government contract, they shall be deemed to include those federal acquisition regulations that are required by law to be included. These terms, together with any quotation, purchase order or acknowledgement issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. Buyer may not assign or permit any other transfer of the Agreement without Seller's prior written consent. The Agreement shall be governed by the laws of the State of North Carolina without regard to its conflict of laws provisions.

KRÜGER

Versailles, KY
AnoxKaldnes IFAS Layout Conceptual Sketch



All dimensions are approximate and shall be confirmed during design.

CONFIDENTIAL

Aquaray® 40 HO Vertical Lamp Ultraviolet Disinfection System

Budget Proposal
For
Versailles WWTP
Versailles, KY

October 1, 2013

OZONIA NORTH AMERICA, LLC
600 WILLOW TREE ROAD
LEONIA, NJ 07605 USA
TEL 201 676-2525 | FAX 201 346-5460

October 1, 2013

Re: Aquaray Vertical 40 HO Vertical Lamp System
Versailles WWTP
Versailles, KY

In accordance with your recent request, we are pleased to submit our proposal for the Aquaray® 40 HO Vertical Lamp ultraviolet disinfection system for the above referenced project. The Aquaray® 40 HO Vertical Lamp System has been proven through extensive use worldwide (over 400 Aquaray installations) to be a very effective and reliable UV disinfection system. The system's many features make operation and maintenance cost effective, easy, and safe. These features include:

- Third-Party validated (Hydroqual Inc.) UV system performance
- Fully automated operation. Only requires a 4-20 mA flow signal
- Easy maintenance without the need to remove equipment from channel for lamp and ballast replacement.
- Highest turndown of any UV system in the market. Automatic dose control is achieved turning on/off lamps in relation to a flow signal, ensuring that the plant is operated economically while still providing the required performance.
- Lowest lamp replacement cost of any UV system in the market ($25 per lamp)

If you have any questions or require any additional information, please don't hesitate to contact our Representative below or the writer.

Ozonia Sales Representative	Regional Manager
Jason Bivins, P.E. Delaney & Associates, Inc. 23 Erlanger Road Erlanger, KY 41018 Ph: 859-342-4944 FX: 859-342-8331 Email: jason@delaneyandassociatesinc.com	Mervyn Bowen Tel: 804-756-7786 Fax: 804-756-7643 Email: mervyn.bowen@infilcodegremont.com

Sincerely,
For OZONIA NORTH AMERICA

Pedro DaCruz
Sales Manager - UV

OZONIA NORTH AMERICA, LLC
600 WILLOW TREE ROAD
LEONIA, NJ 07605 USA
TEL 201 676-2525 | FAX 201 346-5460

DEGREMONT TECHNOLOGIES

Degremont Technologies is a world leader in the water and wastewater treatment market and offers a full array of integrated water solutions. The group is composed of several leading equipment companies such as ***Ozonia North America***, Infilco Degremont and Anderson Water Systems and is part of the larger Degremont Group, which employs more than 3,000 people in over 70 countries, serving over 1 billion people with water and wastewater solutions. Degremont is subsidiary of Suez Environnment, a the leading global water and waste services company with sales of over $17 billion.

Degremont Technologies provides solutions in the areas of headworks, biosolids, disinfection, membrane filtration, separations and biofiltration. ***Ozonia North America*** has its headquarters in Leonia, New Jersey and is the disinfection equipment and solutions provider for the group offering a wide range of UV and ozone products. Other companies within the group offer a variety of products with longstanding market names such as the Climber Screen® Mechanical Bar Screen, ABW® Traveling Bridge Filter, and Cannon® Digester Mixing System.

AQUARAY® 40 HO (High Output) SYSTEM DESCRIPTION

The Aquaray 40 "HO" system is latest generation and improvement of the previous Aquaray® VLS design which has been in use around the world since 1986. The Aquaray® 40 "HO" VLS System is based on the arrangement of the original Aquaray® 40 VLS "Type-B" design. The vertical lamp orientation and configuration has been proven, through general use and extensive pilot studies, to be a very effective form of disinfection. The system also has many features that make it easy and safe to operate and maintain.

The low pressure, low intensity lamps of the original Aquaray® 40 VLS have been replaced with new low pressure, high output lamps - requiring fewer lamps to treat the same capacity. Fewer lamps guarantee considerable savings on capital, operation, and maintenance costs.

UV DOSAGE ENHANCEMENT:

The ultraviolet dosage is the product of the ultraviolet intensity multiplied by the time (in seconds) that the water is in contact with that UV intensity. Based on completed bioassays, the Aquaray® HO VLS system can treat more than twice the flow compared to the standard low pressure low intensity lamps in an Aquaray® 40 configuration with the same UV dosage (uWatts-secs/cm^2) requirement. Flow deflection baffles have been added to enhance the disinfection performance capability of the Aquaray® HO VLS system.

HIGH OUTPUT LAMP ARRANGEMENT:

The ultraviolet lamps are mounted vertically so that all electrical connections are made out of the water and within the protection of a NEMA 4X stainless steel enclosure. Unlike other designs, all the lamps are easily accessed through the lid of this enclosure. Therefore, routine service such as lamp changes can be made without having to remove the lamp modules from the channel.

The lamps are also mounted in a uniform staggered array, three inch on center across the channel and five inch on center along the channel. This ensures a semi-tortuous path so that every particle of water will come into intimate contact with the most intense point of lamp output.

MODULE ARRANGEMENT:

The number and layout of the modules within the channel is determined based on the required UV dosage and a UV path for the water that eliminates any possibility of hydraulic short-circuiting.

See “DESIGN BRIEF” for details of module arrangement for this project.

CONTROL AND MONITORING:

Electronic lamp control is utilized to minimize power consumption. Electronic lamp control assemblies are conveniently mounted in the Aquaray® High Output Module’s NEMA-4X enclosure. This locates the assemblies close to the high output lamps, which minimizes the effect of outside interference such as radio waves, lightning, and voltage spikes.

With our Aquaray® High Output Module each individual lamp is monitored through the use of an on-board computer called a Data Controller Assembly (DCA). The DCA gathers and stores information relative to individual lamp hours and cycles. A non-volatile memory is included so that a possible relocation of the module will not result in a loss or misdirection of valuable lamp data.

The benefits of recording the individual lamp history may not be immediately apparent. UV lamps are guaranteed to provide a minimum operating life measured in terms of active operating hours, usually up to 13,000 hours. If a lamp fails electrically before the guarantee, our end-of-lamp life conditional warranty provides for a replacement at a cost pro-rated to the actual use achieved with the original lamp. For example, if a lamp fails at mid-life the replacement will be provided at half price.

A Power Distribution and Data Center (PDDC) included which houses the load center enclosure and GFCI Breakers for each high output module. The PDDC also includes the Allen CompactLogix PLC and Panelview 1000 Plus Operator Interface. Each Aquaray ® High Output module in the UV disinfection channel receives power from the load center locally mounted at the PDDC via a single power cable with waterproof plug-in connectors.

Each Aquaray® High Output module is fully independent and capable of automatic, fail safe operation in case of a control fault. This “default on” design ensures continuous disinfection even under emergency conditions.

FLOW PACING:

Flow Pacing is a system whereby lamp rows are switched on and off in relation to plant flow variations. The Aquaray® 40 HO System provides for very fine adjustments of the number of High Output lamps in service. Adjustments are made in direct proportion to the flow, with switching increments as low as 3%. To take full advantage of this feature we take a control signal, usually from the plant flow meter, and switch the lamps on or off as the flow changes.

The advantage of being able to switch the lamps by row is two fold:

- Energy Conservation
- Lamp Conservation

In our system each lamp requires 165 Watts. You realize immediate savings by activating only the minimum number of lamps required.

SYSTEM CLEANING:

Any UV system gradually accumulates a coating on the quartz sleeves housing the lamps. This routine fouling must be removed periodically. The Aquaray® 40 HO VLS System offers a fully automatic, in-channel cleaning system which reduces maintenance. The automatic wiping system is to be operated once daily and the wipers are to be replaced once every two years. This system is included in our proposal.

SERVICE:

Every piece of equipment within a wastewater plant requires service. The Aquaray® 40 HO VLS System has been developed to permit easy troubleshooting and quick replacement of components. The majority of maintenance activities can be carried out while the equipment is still located within the channel. The recommended spares included in this proposal will ensure that the system can be maintained efficiently and brought back to full operation in the shortest possible time.

AQUARAY® 40 "HO" VERTICAL LAMP SYSTEM

DESIGN BRIEF

PLANT INFORMATION AND DESIGN BASIS;

Plant Name ..... Versailles WWTP
Plant Location ..... Versailles, KY
Peak Flow ..... 12.5 MGD
Average Flow ..... 4.5 MGD
Minimum Flow ..... 2 MGD
UVT…… 65%
TSS…… ..... 30 mg/l average
Required Effluent, MPN/100ml:
Fecal Coliform ..... < 200 MPN (30-day geometric mean)

Minimum UV Dose ..... 30,000 uWatts-secs/cm^2

SUMMARY:

Based on the information in the design table below, the system proposed will provide a minimum UV dosage of 30,000 uWatts-secs/cm^2 at the peak flow with all UV modules in service. The dosage calculation takes into account several factors including the end of lamp life, the quartz sleeve transmittance factor, and the peak capacity.

Based on a peak flow of 12.5 MGD, we are proposing two (2) UV disinfection channels, each with three (3) Aquaray® 40 HO modules mounted one (1) across by three (3) banks in series. The total number of Aquaray® 40 HO UV modules is six (6)

Each Aquaray® 40 HO module includes 40 Low Pressure High Output Lamps, arranged in five rows of eight lamps each.

PROPOSED AQUARAY® 40 HO VERTICAL LAMP SYSTEM DESIGN:

Peak Flow, MGD	12.5 MGD
Average Flow, MGD	4.5 MGD
Minimum Flow, MGD	2 MGD
% UV Transmission	65%
Bioassay UV Dosage at Peak Flow, µwatt-secs/cm^2	>30,000
Number of Channels	2
Number of Modules Across (Modules per Bank)	1
Number of Modules in Series (Number of Banks)	3
Channel Width, in.	24.5 inches
Channel Length, ft.	21.5 feet
Channel Depth, in.	72 inches
Aquaray® Modules/Channel	3
Total Number of Modules	6
Number of Lamps/Module	40
Total Number of Lamps	240
Headloss across the modules, in.	4.03 inches @ 12.5 MGD 2.09 inches @ 4.5 MGD 0.41 inches @ 2 MGD
Power Consumption per Lamp, W	165 watts
Power Consumption	34.3 kW @ 12.5 MGD 13.2 kW @ 4.5 MGD 7.9 kW @ 2 MGD
Total Installed Power	39.6 kW

SPARE PART REPLACEMENT COST:

UV Lamps (13,000 hour warranty)	$25
Sleeves (5 year warranty)	$25
Ballasts (5 year warranty)	$150

SCOPE OF SUPPLY AND BUDGET PRICE

We propose to furnish the following equipment for the Aquaray® 40 HO Vertical Lamp ultraviolet disinfection system described in the previous sections

- Aquaray® 40 HO Vertical UV modules with Automatic Cleaning Wipers, 316L stainless steel components
- Mounting Rail/Eye Shields, 304 stainless steel
- Power Distribution & Data Center(s) (PDDC) – Includes Allen Bradley CompactLogix PLC with Panelview 1000 Plus Operator Interface
- Wireway
- Stepdown Transformer
- Interconnecting Cables between the Modules and the Data Control Center and between the Modules and Power Distribution Center(s)
- Lamp Row by Row Flow Pacing
- In-Channel Cleaning System (automatic cleaning wipers)
- Level Control Weir
- Cleaning Tank Liner
- Lifting Spreader Bar
- Anchor Bolts
- Recommended Spare Parts

The following will also be included:

- Freight to the jobsite
- Start-up service: five (5) days in two (2) trips
- Four (4) O&M manuals

<u>The following items are optional adders to our Scope of Supply:</u>

UVT On Line Analyzer-- $12,000

<u>Note that the following items are to be provided by others (unless indicated otherwise above)</u>:

- Jib Crane and Hoist (1/2 ton capacity)
- Channel Grating
- Slides Gates
- Remote Computer System
- Installation
- Embedded Conduits
- Sampling and Effluent Performance Testing

BUDGET PRICE: Our current budget estimating price, not including the optional adders above, is (PRICE TO BE PROVIDED BY OZONIA REPRESENTATIVE). This price will be valid for one (1) year; payment terms will be as below and commercial terms and conditions are given on the following page. The price is in accordance with the Scope of Supply and terms of this proposal and any changes may require the price to be adjusted.

Payment Terms:

10% Net Cash, Payable in thirty (30) days from date of submittal of initial drawings for approval;

80% Net Cash, Payable in progress payments thirty (30) days from dates of respective shipments of the Products;

10% Net Cash, Payable in thirty (30) days from Product installation and acceptance or Ninety (90) days after date of final Product delivery, whichever occurs first.

SCHEDULE: Approval drawings and data can be submitted approximately 6 weeks after agreement to all terms, as evidenced by OZONIA's receipt of this proposal, fully executed; or, in the event that Purchaser issues a Purchase Order, OZONIA's receipt of fully executed letter agreement. OZONIA estimates that shipment of the Products can be made in approximately 16-18 weeks after OZONIA has received from Purchaser final approval of all submittal drawings and data.

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Selkirk, MB

Peak Flow: 12 MGD

Number of Channels: 2

Number of Modules: 3 per channel (6 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Peekskill, NY

Peak Flow: 24 MGD

Number of Channels: 2

Number of Modules: 6 per channel (12 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Lawrenceburg, KY

Peak Flow: 14 MGD

Number of Channels: 2

Number of Modules: 3 per channel (6 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

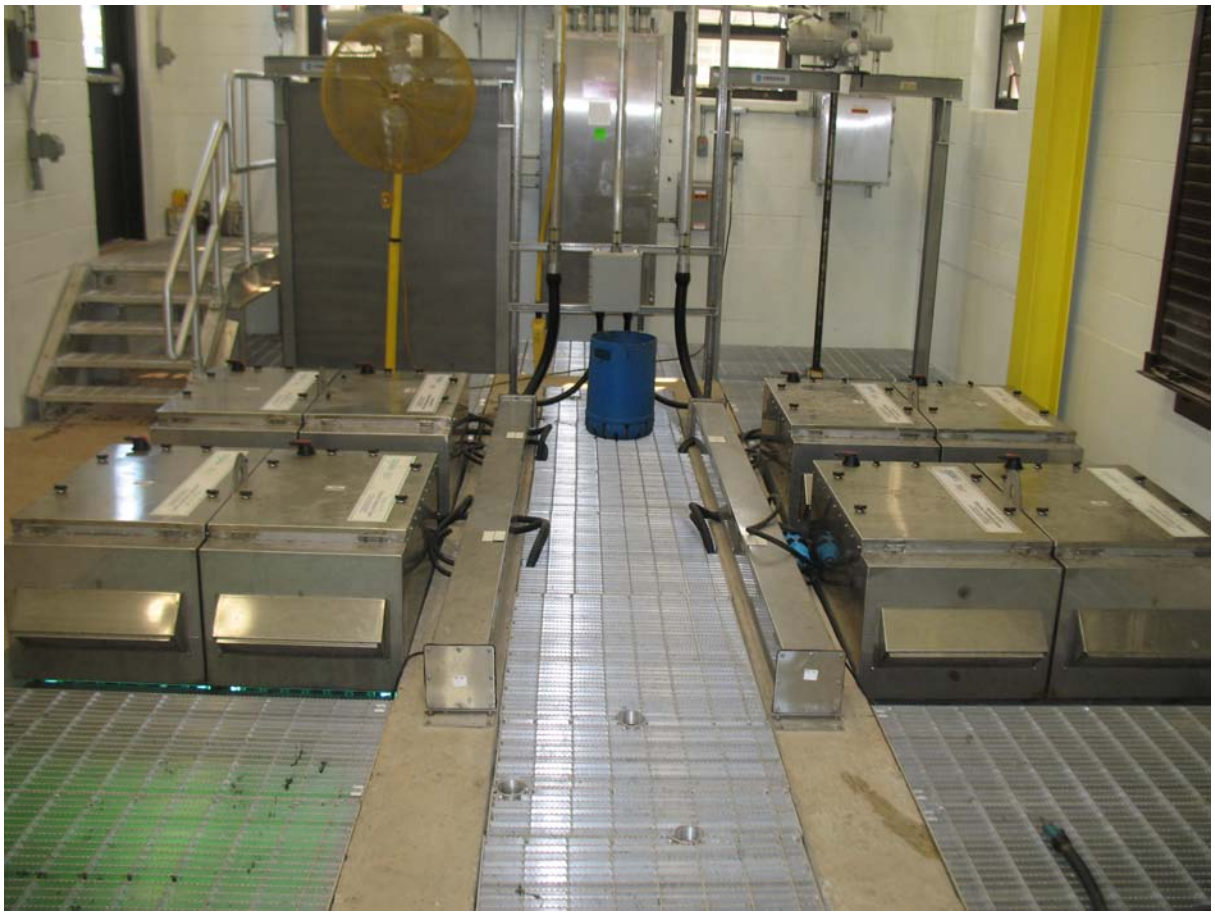
Plant Location: Broomfield, CO

Peak Flow: 18 MGD

Number of Channels: 3

Number of Modules: 3 per channel (9 total)

Typical Aquaray® 40 "HO" Vertical Lamp Ultraviolet Disinfection System Installations



Plant Location: Chalfont – New Britain, PA

Peak Flow: 20 MGD

Number of Channels: 2

Number of Modules: 4 per channel (8 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Empire, MN

Peak Flow: 30 MGD

Number of Channels: 3

Number of Modules: 6 per channel (18 total)

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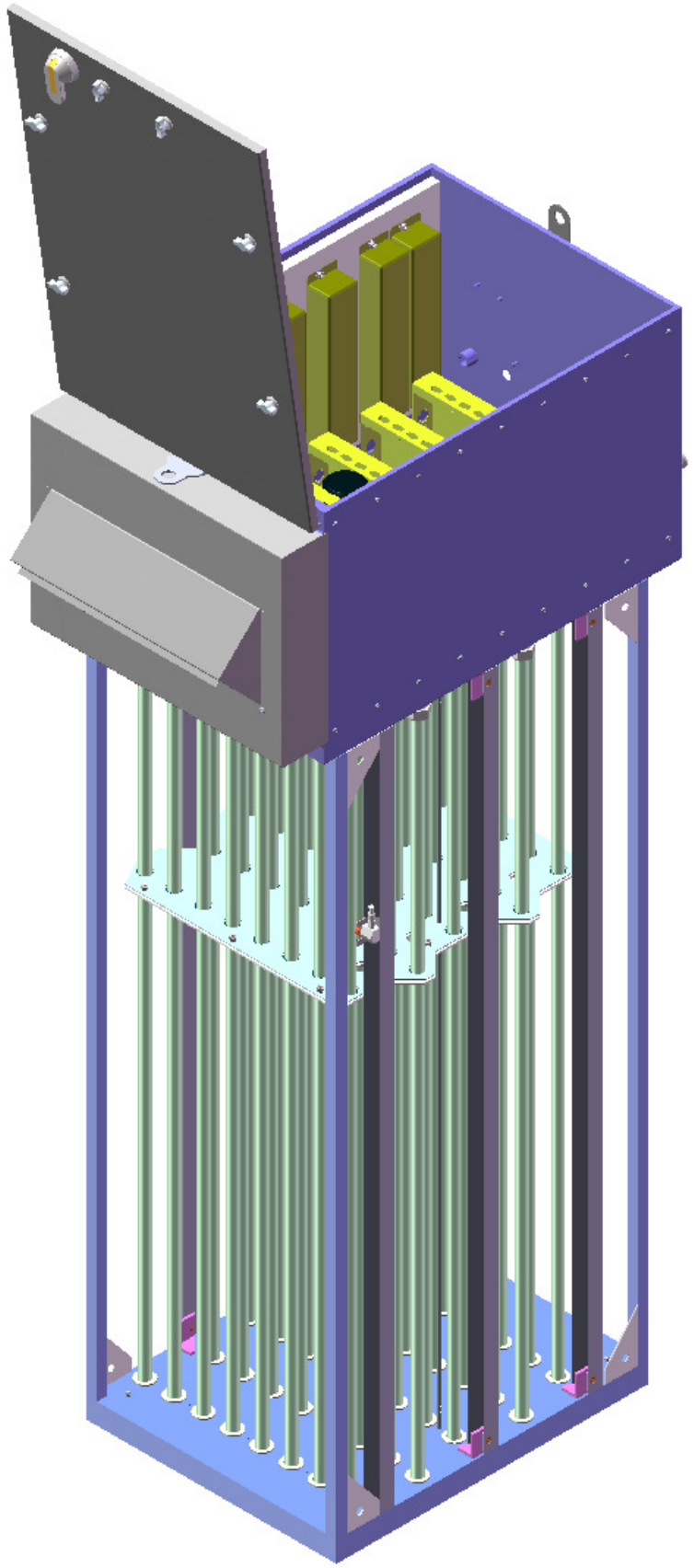
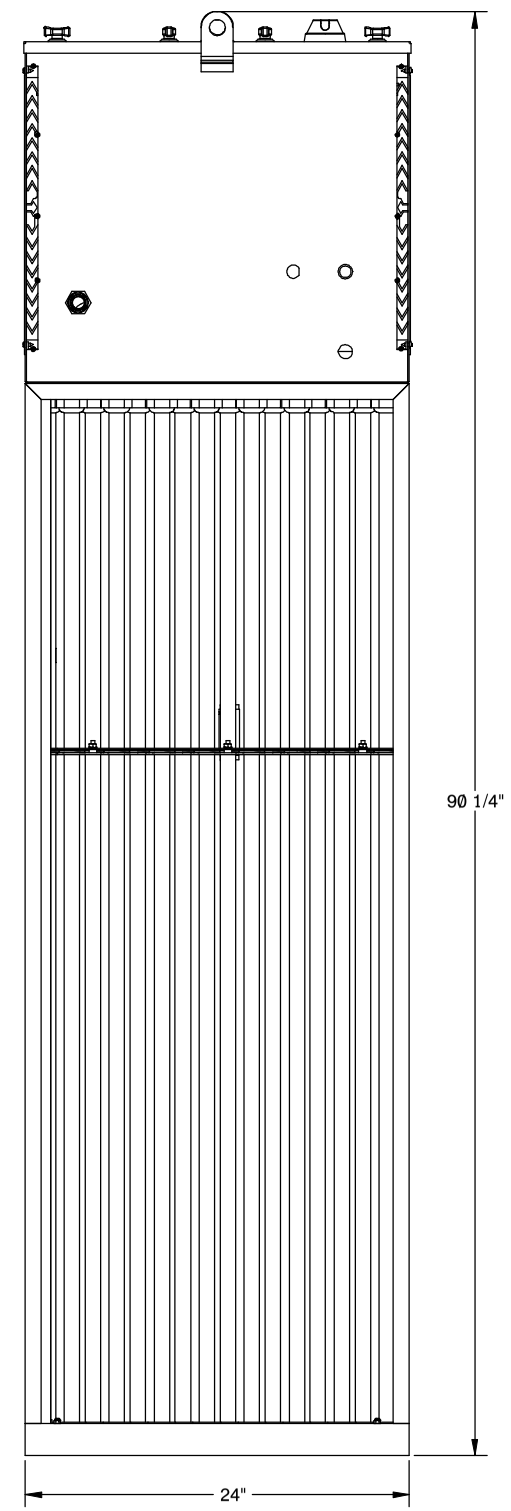
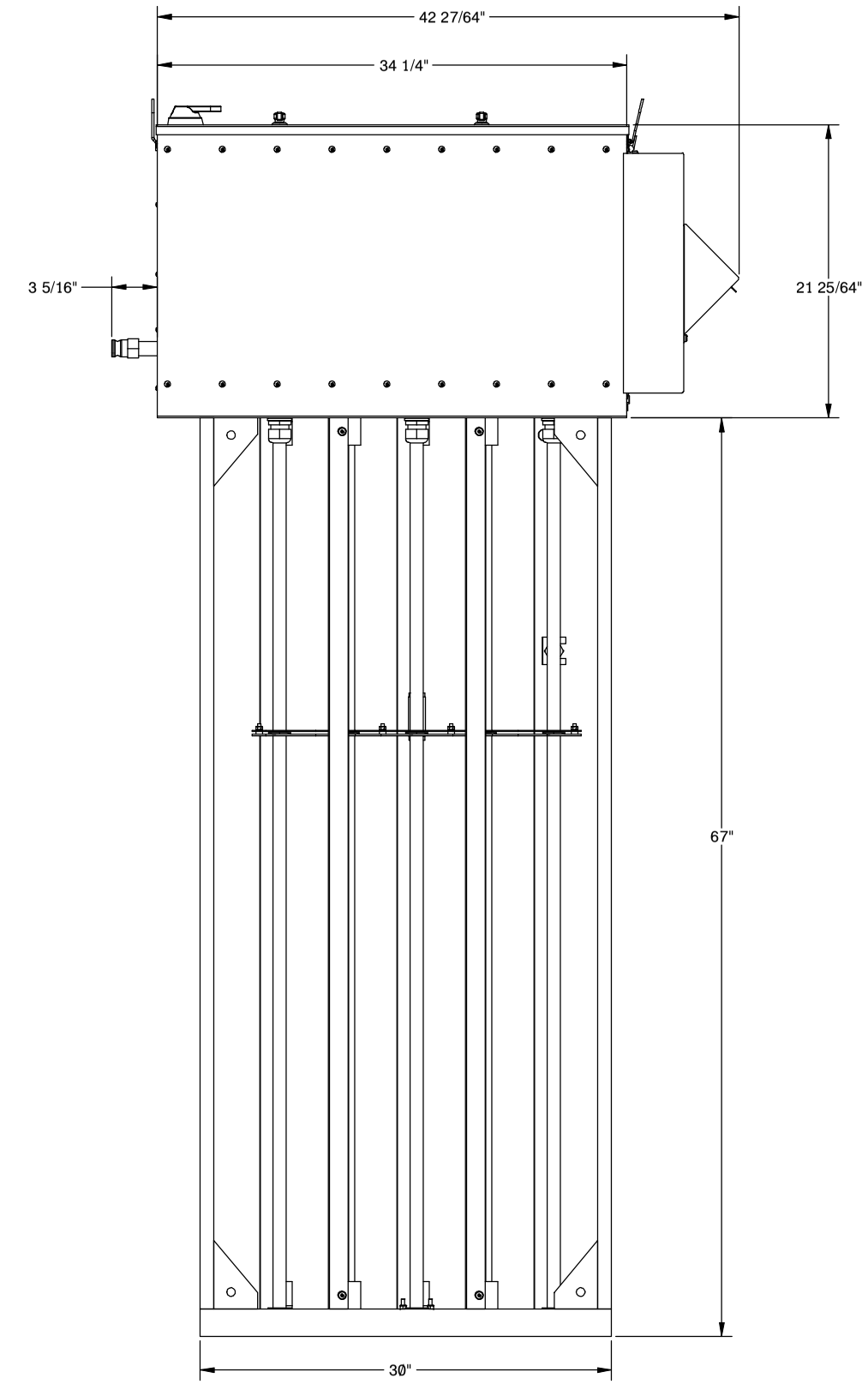


ISOMETRIC VIEW





X0030-H21

					SCALE: N.T.S	TITLE: AQUARAY "40" HO MODULE ASSEMBLY	OZONIA	OZONIA NORTH AMERICA Post Office Box 455 Elmwood Park, New Jersey 07407	SHT.: 2 OF 6
					DRAWN: 08/25/11 MDL		SIZE: D	DWG. NO.: X0030	REV.:
					CHECKED: 08/25/11 MDL				
REV.	DESCRIPTION	DRAWN	APPD.	DATE	APPROVED:				

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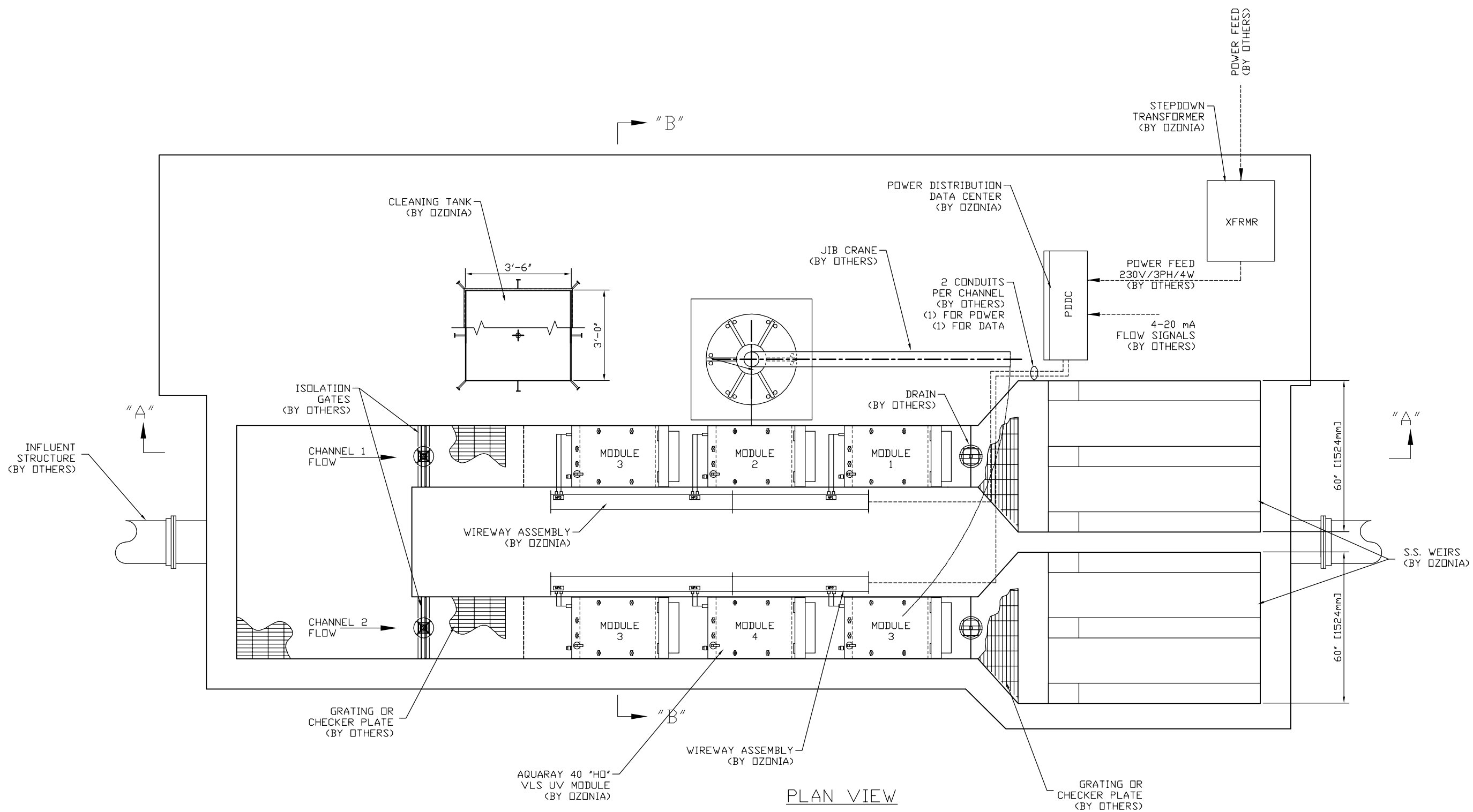
NOTES

1. FOR SECTION AND DETAILS SEE DRAWINGS SHT. 2 OF 3 AND SHT. 3 OF 3.
2. ALL DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.



PLAN VIEW

REV.	DESCRIPTION	DRAWN	APPD.	DATE

SCALE:	NONE
DRAWN:	11/02/11 JS
CHECKED:	11/02/11 JS
APPROVED:	

TITLE: SYSTEM LAYOUT
AQUARAY 40 HO MODULE
(TYPICAL)

OZONIA NORTH AMERICA
600 WILLOW TREE RD.
LEONIA, NEW JERSEY 07605

SHT.: 1 OF 2

SIZE: B

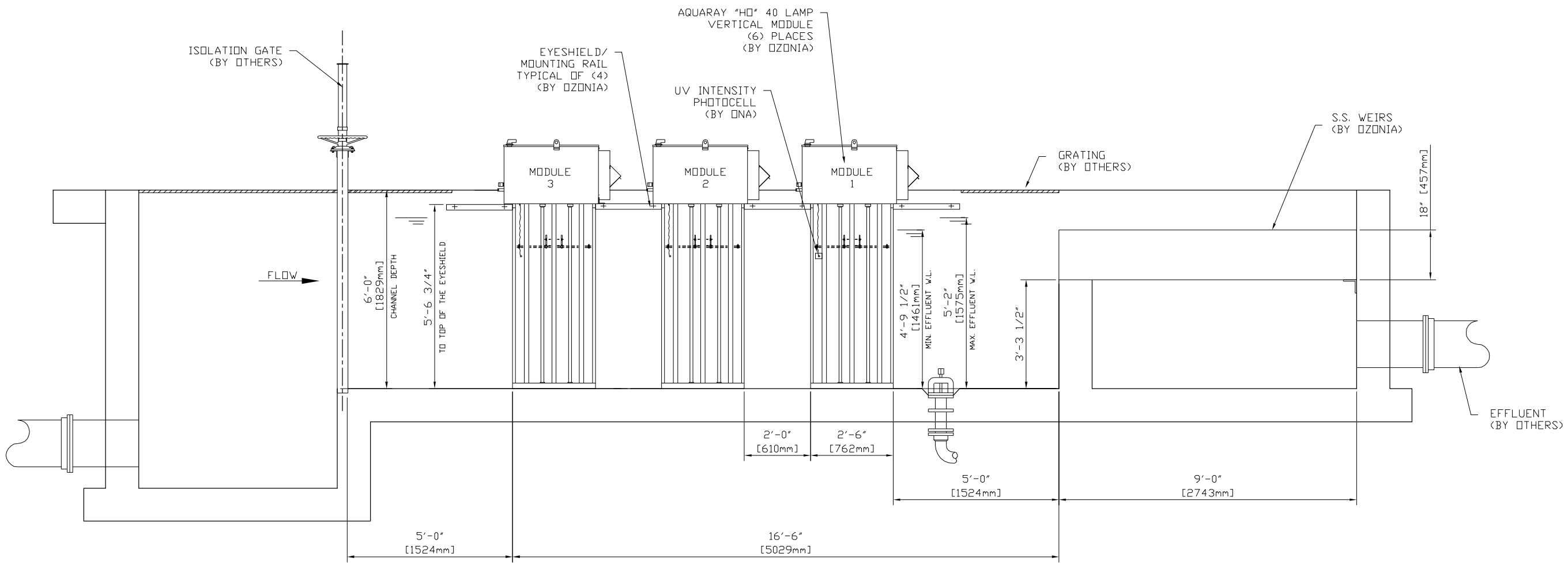
DWG. NO.: 18XXX-77-0201

REV.: -

THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO OZONIA NORTH AMERICA. IT IS SUBMITTED IN CONFIDENCE AND IS TO BE USED SOLELY FOR THE PURPOSE FOR WHICH IT IS FURNISHED AND RECEIVED. UNDER NO CIRCUMSTANCES IS THIS DRAWING AND SUCH INFORMATION TO BE REPRODUCED, TRANSMITTED, DISCLOSED OR USED OTHERWISE IN WHOLE OR INPART WITHOUT THE WRITTEN AUTHORIZATION OF OZONIA NORTH AMERICA

NOTES

1. FOR PLAN VIEW SEE DWG. SHT. 1 OF 1
2. FOR SECTIONS AND DETAILS VIEW SEE DWG. SHT. 2 OF 3 AND SGT. 3 OF 3.
3. ALL DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
4. CONTACT OZONIA NORTH AMERICA IF ADDITIONAL INFORMATION IS REQUIRED.



SECTION "A-A"

REV.	DESCRIPTION	DRAWN	APPD.	DATE

SCALE: NONE
DRAWN: 11/02/11 JS
CHECKED: 11/02/11 JS
APPROVED:

TITLE: SYSTEM LAYOUT
AQUARAY 40 HO MODULE
(TYPICAL)

OZONIA NORTH AMERICA
600 WILLOW TREE RD.
LEONIA, NEW JERSEY 07605

SHT.: 2 OF 3
SIZE: B
DWG. NO.: 18XXX-77-0201
REV.: –

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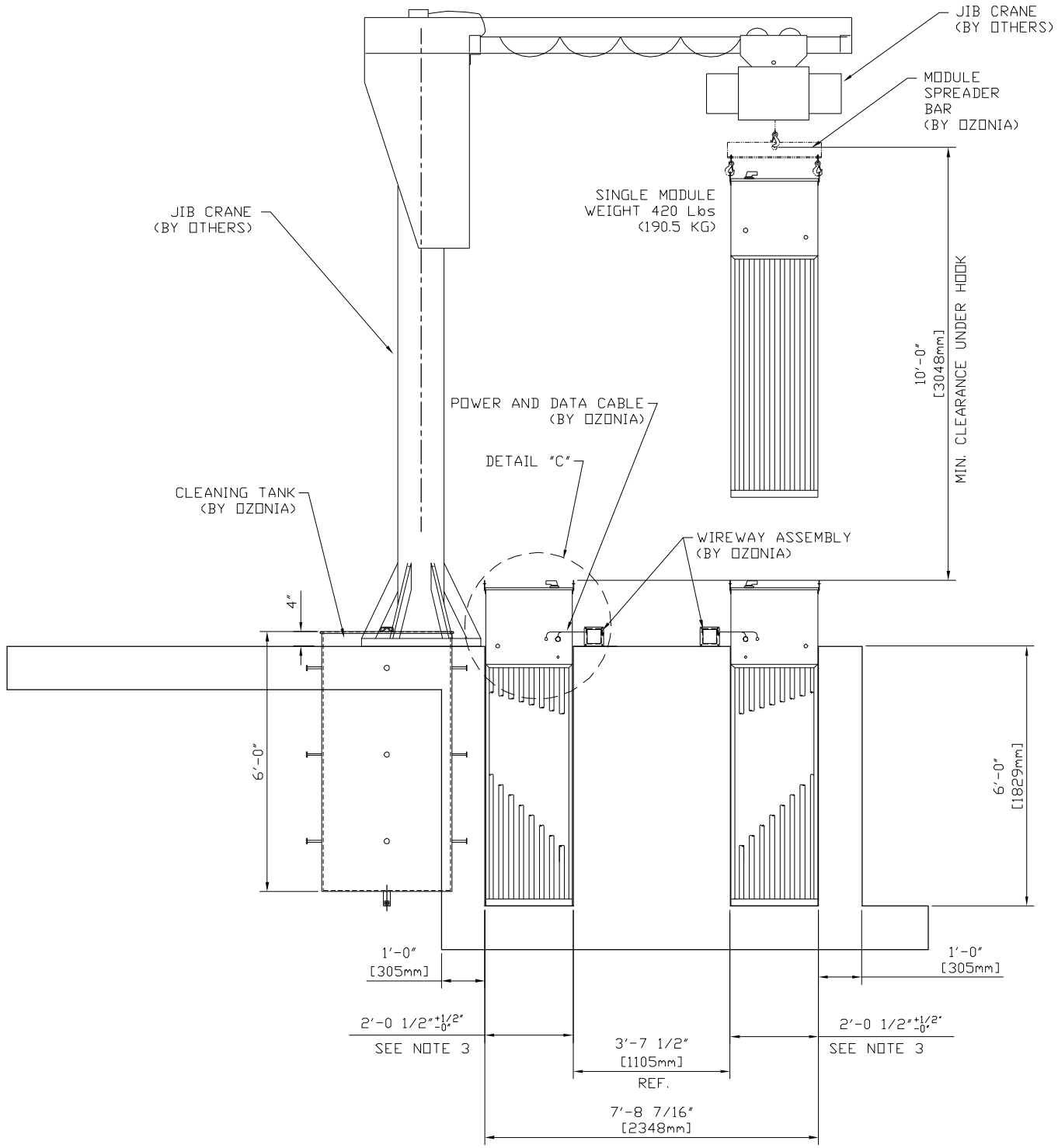


SECTION "B-B"

NOTES

1. FOR PLAN VIEW SEE DWG. SHT. 1 OF 1

   FOR SECTIONS AND DETAILS VIEW SEE DWG. SHT. 2 OF 3 AND SHT. 3 OF 3.

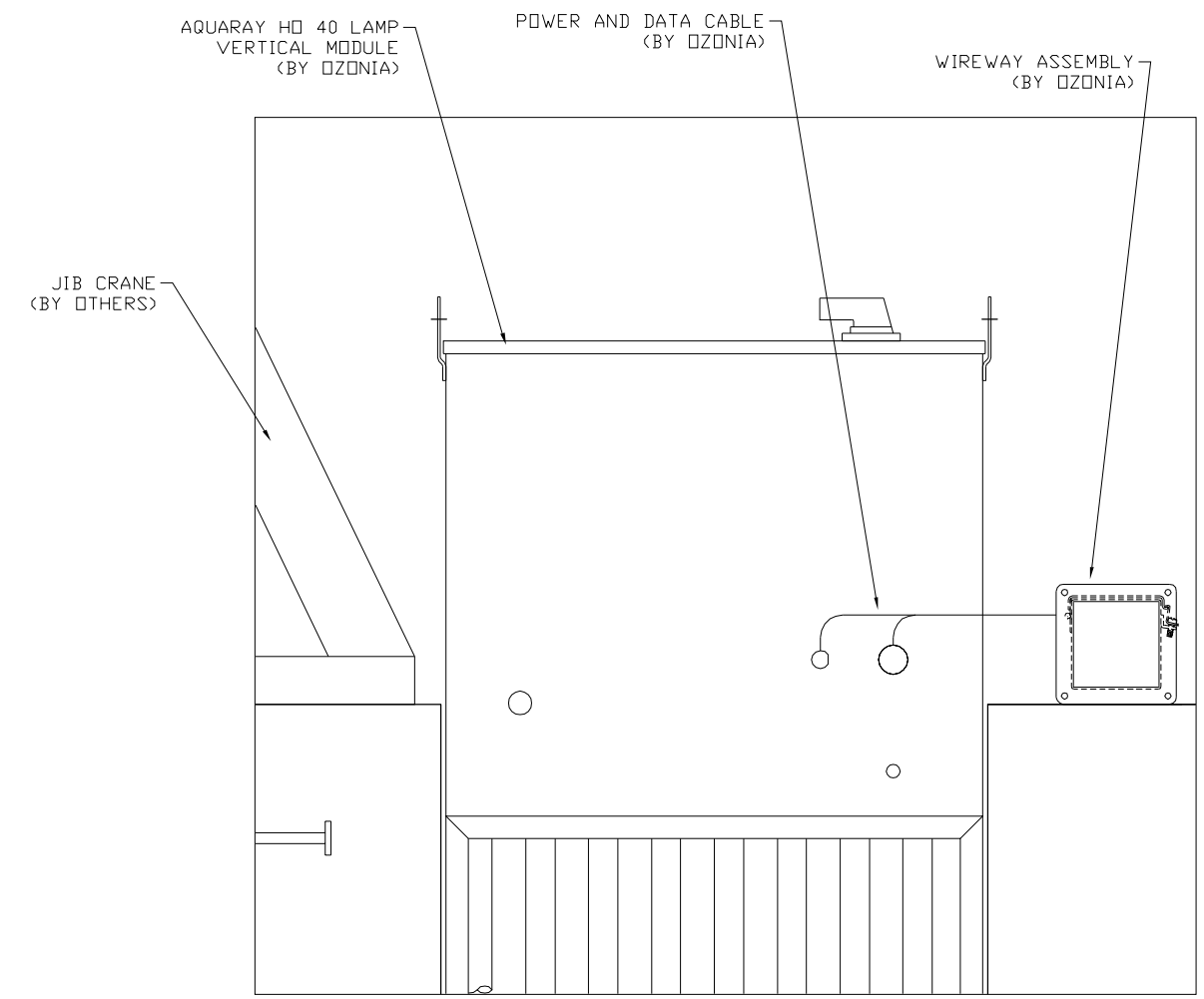
2. CABLES

   POWER - 3 CONDUCTOR POWER CABLE 1 PER EACH MODULE. CUT TO LENGTH AND TERMINATED AT PDDC POWER TERMINAL STRIP.

   DATA - DATA CABLE WITH DATA CONNECTOR REQUIRES CAUTION WHEN PULLING THROUGH CONDUIT. 3 CONDUCTOR CABLE CUT TO LENGTH & TERMINATE AT PDDC.

3. THIS DIMENSION IS THE MINIMUM WIDTH OF THE CHANNEL. EFFORT MUST BE MADE TO MAINTAIN WIDTH AND SQUARENESS TO ALLOW INSTALLATION OF MODULES WITHOUT INTERFERENCES.

4. ALL DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.



DETAIL "C"

REV.	DESCRIPTION	DRAWN	APPD.	DATE

SCALE: NONE
DRAWN: 11/02/11 JS
CHECKED: 11/02/11 JS
APPROVED:

TITLE: SYSTEM LAYOUT
AQUARAY 40 HO MODULE
(TYPICAL)

OZONIA NORTH AMERICA
600 WILLOW TREE RD.
LEONIA, NEW JERSEY 07605

SHT.: 3 OF 3
SIZE: B
DWG. NO.: 18XXX-77-0201
REV.: –

Appendix K

Appendix K

Cross-Cutter Correspondence

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

February 26, 2014

Mr. Craig A. Potts
Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Mr. Potts:

On behalf of the City of Versailles, we are preparing a Regional Wastewater Facilities Plan pursuant to the regulations of the Kentucky Division of Water, as required by 401 KAR 5:006. The purpose of this plan is to develop recommendations for a series of projects that will be constructed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. A map of the wastewater Planning Area is attached (Exhibit 3-2). Exhibit 6-1 illustrates the existing wastewater collection system.

The Plan includes a series of projects that will be completed over the next 20 years in phases. Some of these projects will be built within the wastewater collection system and some will be built at the treatment plant site.

The collection system projects include pump station rehabilitations that are expected to be constructed within the 0-5 year timeframe as indicated in Exhibit 8-1. The collection system improvements will also include new gravity sewers, new pump stations and force mains, constructed in easements or along existing road rights-of-way, or on property that is owned by the City in order to sewer the Sycamore Estates area. This new section of sewer is expected to be completed within the 11-20 year timeframe. The work for both these phases will generally be built on areas that have been previously disturbed by past construction of other projects.

The treatment plant project (see Exhibit 8-2.2.0), expected to be completed within 0-5 years, includes concrete treatment structures, buildings, buried pipes and similar features that are built on the existing plant site, and the demolition of some existing plant components that are no longer required for treatment. The locations for these proposed projects are on portions of the plant site that have been disturbed by previous construction during past plant expansions and modifications. The discharge of treated wastewater will remain at its existing location, which is on Glenn's Creek at mile point 12.4 discharging to the Kentucky River. The average daily discharge rate is projected to increase from its current flow rate of approximately 3.0 MGD (million gallons per day) to 4.5 MGD by 2033.

We would appreciate your advice of any concerns your office may have related to possible adverse effects of these projects as soon as possible. We need to incorporate your response in the Regional Facilities Plan, and also address your concerns regarding any potential adverse impacts of these projects, before the Plan is submitted to KDOW for approval.

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

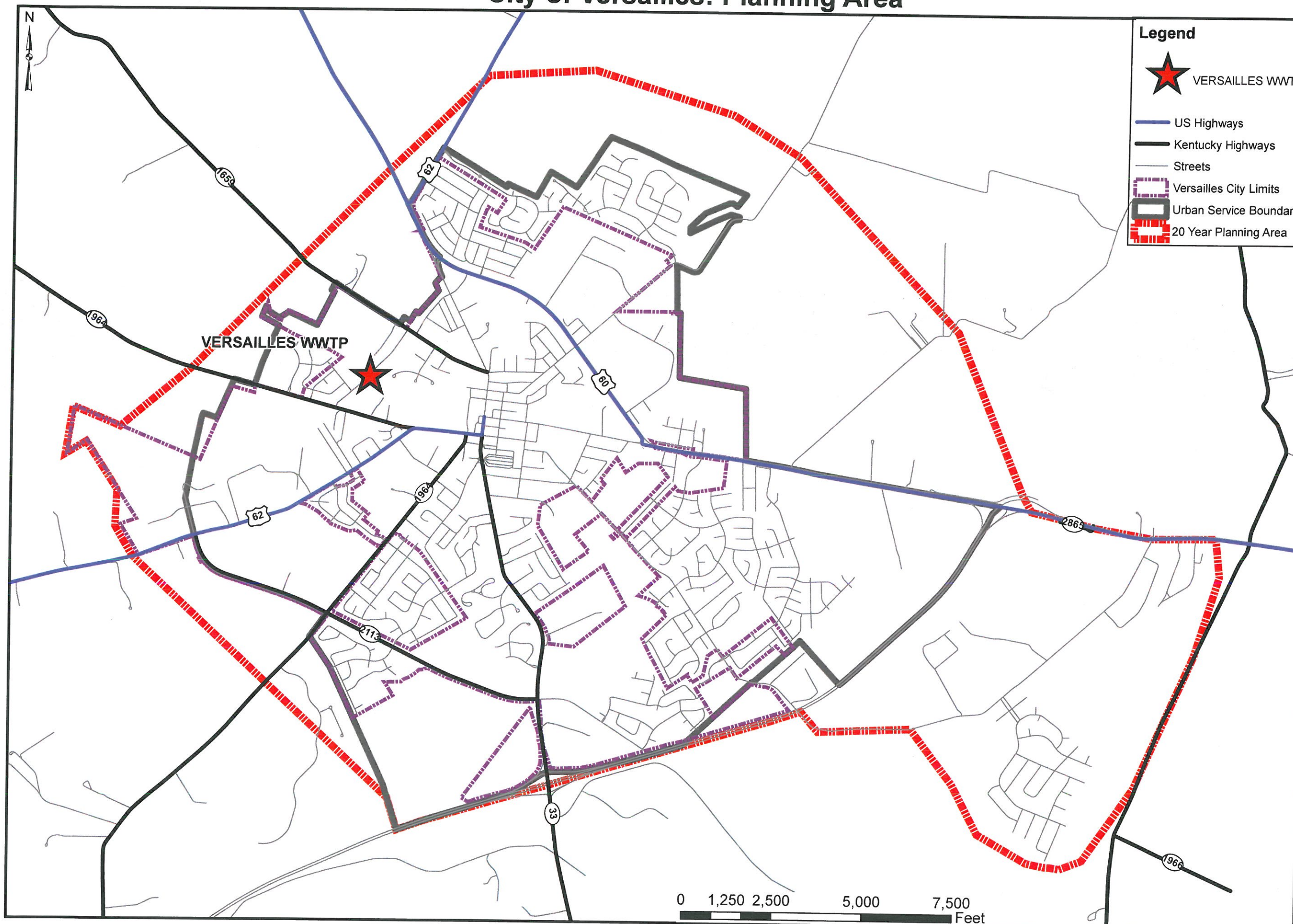
It is anticipated that these projects will be funded by a series of grants and loans, such as USEPA Community Block Grant Program, the USDA Rural Development Agency Grant and Loan Program, and the Kentucky Infrastructure Agency State Revolving Fund Loan Program.

Please don't hesitate to contact me if you have any questions on this matter. I may be reached at (859) 223-3999 or at MJacobs@grwinc.com.

Sincerely,

Michael Jacobs
Project Manager

City of Versailles: Planning Area



DATE: February, 2014
SCALE
SHEET NO. 3-2

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EXHIBIT 3-2
PLANNING AREA MAP
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

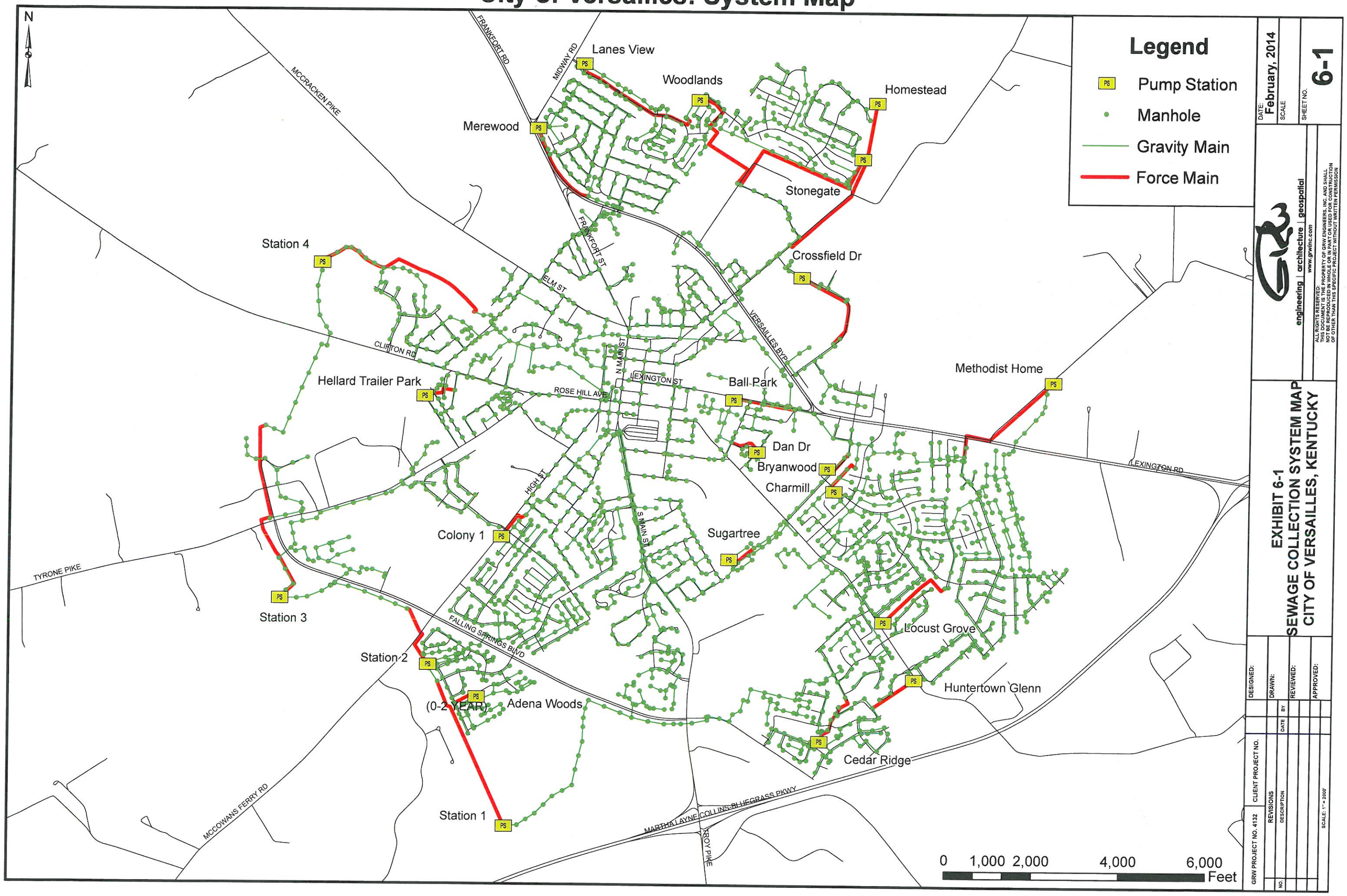
GRW PROJECT NO. 4132
CLIENT PROJECT NO.

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: 1" = 2500'

City of Versailles: System Map



DATE: February, 2014
SCALE
SHEET NO. 6-1

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EXHIBIT 6-1
SEWAGE COLLECTION SYSTEM MAP
CITY OF VERSAILLES, KENTUCKY

DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

NO.	DESCRIPTION	DATE	BY

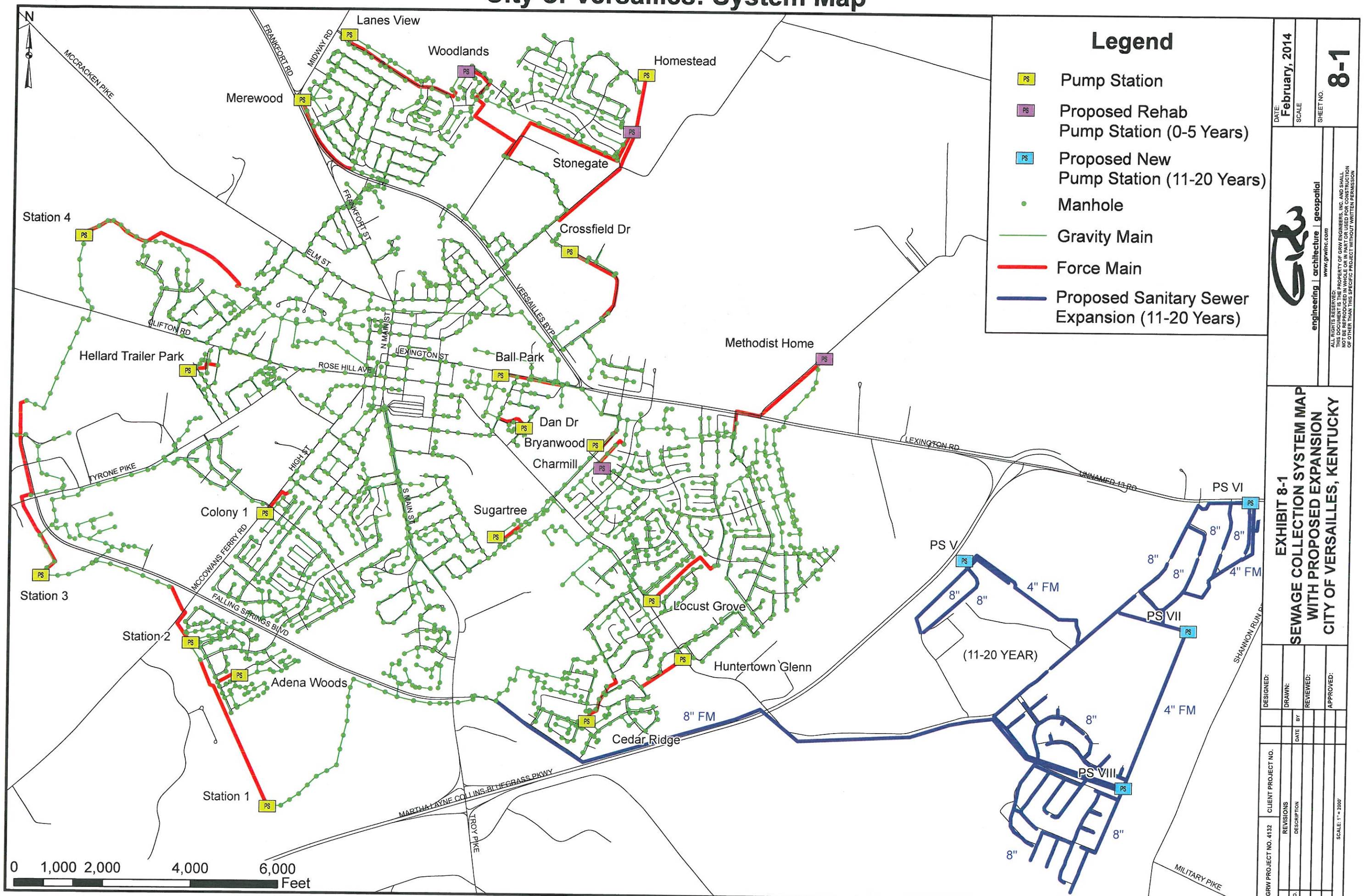
REVISIONS

CLIENT PROJECT NO.

GRW PROJECT NO. 4132

SCALE: 1" = 2000'

City of Versailles: System Map



DATE: February, 2014
SCALE
SHEET NO. 8-1

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EXHIBIT 8-1
SEWAGE COLLECTION SYSTEM MAP WITH PROPOSED EXPANSION
CITY OF VERSAILLES, KENTUCKY

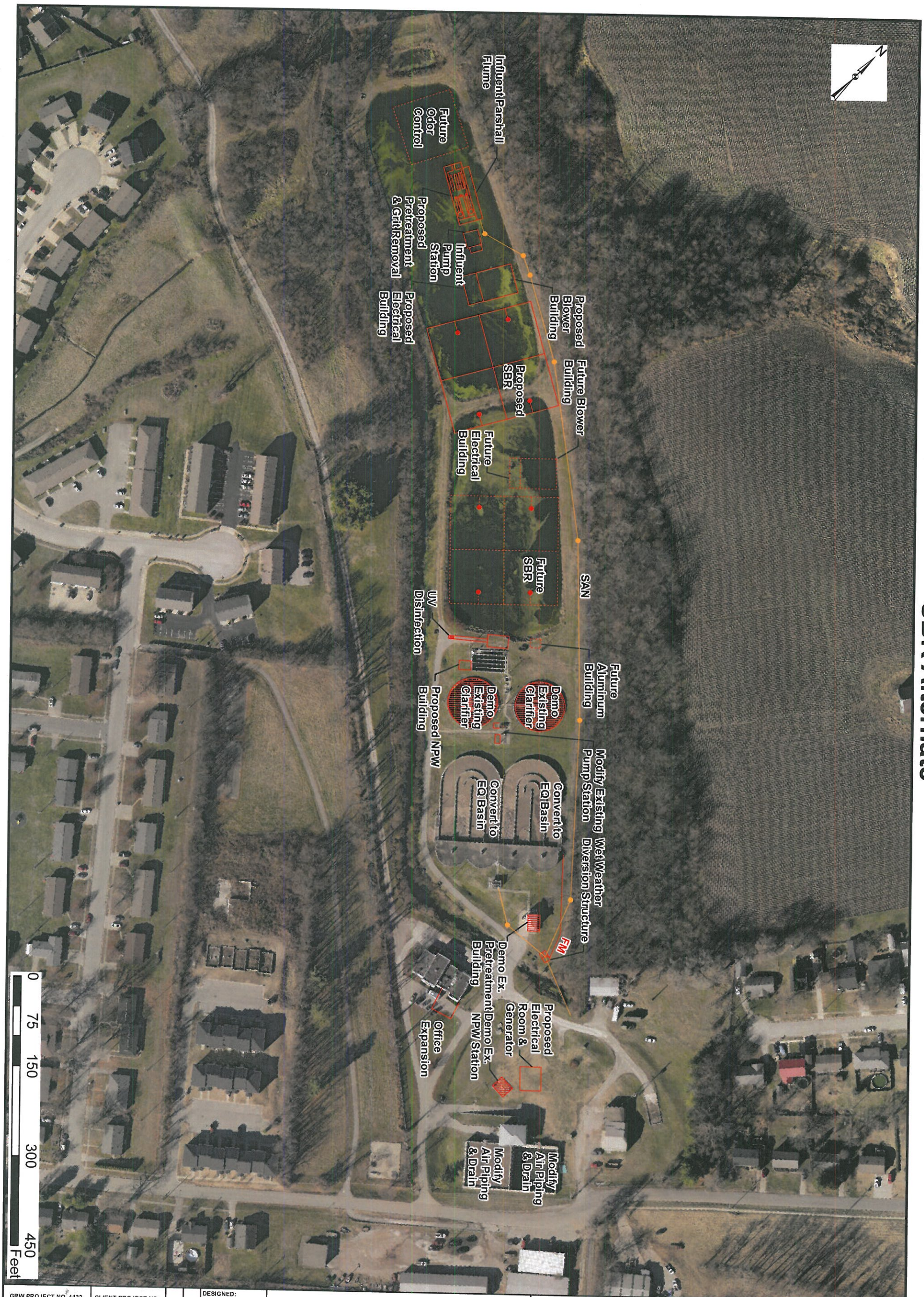
DESIGNED:
DRAWN:
REVIEWED:
APPROVED:

CLIENT PROJECT NO.
GRW PROJECT NO. 4132

NO.	REVISIONS DESCRIPTION	DATE	BY

SCALE: 1" = 2000'

SBR Alternate



GRW PROJECT NO. 4132	CLIENT PROJECT NO.			DESIGNED:
REVISIONS				DRAWN:
NO.	DESCRIPTION	DATE	BY	REVIEWED:
				APPROVED:
SCALE: 1" = 150'				

EXHIBIT 8-2.2.0
ALT. 2 - SBR
WASTEWATER FACILITIES PLAN
CITY OF VERSAILLES, KENTUCKY

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DATE: February, 2014
SCALE
SHEET NO. 8-2.2.0

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

February 26, 2014

Mr. Chris Garland
Kentucky Department of Fish and Wildlife
#1 Sportsman Lane
Frankfort, KY 40601

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Mr. Garland:

On behalf of the City of Versailles, we are preparing a Regional Wastewater Facilities Plan pursuant to the regulations of the Kentucky Division of Water, as required by 401 KAR 5:006. The purpose of this plan is to develop recommendations for a series of projects that will be constructed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. A map of the wastewater Planning Area is attached (Exhibit 3-2). Exhibit 6-1 illustrates the existing wastewater collection system.

The Plan includes a series of projects that will be completed over the next 20 years in phases. Some of these projects will be built within the wastewater collection system and some will be built at the treatment plant site.

The collection system projects include pump station rehabilitations that are expected to be constructed within the 0-5 year timeframe as indicated in Exhibit 8-1. The collection system improvements will also include new gravity sewers, new pump stations and force mains, constructed in easements or along existing road rights-of-way, or on property that is owned by the City in order to sewer the Sycamore Estates area. This new section of sewer is expected to be completed within the 11-20 year timeframe. The work for both these phases will generally be built on areas that have been previously disturbed by past construction of other projects.

The treatment plant project (see Exhibit 8-2.2.0), expected to be completed within 0-5 years, includes concrete treatment structures, buildings, buried pipes and similar features that are built on the existing plant site, and the demolition of some existing plant components that are no longer required for treatment. The locations for these proposed projects are on portions of the plant site that have been disturbed by previous construction during past plant expansions and modifications. The discharge of treated wastewater will remain at its existing location, which is on Glenn's Creek at mile point 12.4 discharging to the Kentucky River. The average daily discharge rate is projected to increase from its current flow rate of approximately 3.0 MGD (million gallons per day) to 4.5 MGD by 2033.

We would appreciate your advice of any concerns your office may have related to possible adverse effects of these projects as soon as possible. We need to incorporate your response in the Regional Facilities Plan, and also address your concerns regarding any potential adverse impacts of these projects, before the Plan is submitted to KDOW for approval.

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

It is anticipated that these projects will be funded by a series of grants and loans, such as USEPA Community Block Grant Program, the USDA Rural Development Agency Grant and Loan Program, and the Kentucky Infrastructure Agency State Revolving Fund Loan Program.

Please don't hesitate to contact me if you have any questions on this matter. I may be reached at (859) 223-3999 or at MJacobs@grwinc.com.

Sincerely,

Michael Jacobs
Project Manager

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

February 26, 2014

Ms. Leanne Devine
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-0059

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Ms. Devine:

On behalf of the City of Versailles, we are preparing a Regional Wastewater Facilities Plan pursuant to the regulations of the Kentucky Division of Water, as required by 401 KAR 5:006. The purpose of this plan is to develop recommendations for a series of projects that will be constructed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. A map of the wastewater Planning Area is attached (Exhibit 3-2). Exhibit 6-1 illustrates the existing wastewater collection system.

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801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

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Sincerely,

Michael Jacobs
Project Manager

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

February 26, 2014

Mr. Steve Jacobs
USDA Natural Resources Conservation Services
1925 Old Main Street, Suite 2
Maysville, KY 41056

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Mr. Jacobs:

On behalf of the City of Versailles, we are preparing a Regional Wastewater Facilities Plan pursuant to the regulations of the Kentucky Division of Water, as required by 401 KAR 5:006. The purpose of this plan is to develop recommendations for a series of projects that will be constructed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. A map of the wastewater Planning Area is attached (Exhibit 3-2). Exhibit 6-1 illustrates the existing wastewater collection system.

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GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

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Sincerely,

Michael Jacobs
Project Manager

GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com

February 26, 2014

Mr. Virgil Lee Andrews, Jr.
Field Office Supervisor
U.S. Department of Interior
Fish and Wildlife Service
J. C. Watts Federal Building
330 West Broadway, Suite 265
Frankfort, KY 40601

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Mr. Andrews:

On behalf of the City of Versailles, we are preparing a Regional Wastewater Facilities Plan pursuant to the regulations of the Kentucky Division of Water, as required by 401 KAR 5:006. The purpose of this plan is to develop recommendations for a series of projects that will be constructed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. A map of the wastewater Planning Area is attached (Exhibit 3-2). Exhibit 6-1 illustrates the existing wastewater collection system.

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Please don't hesitate to contact me if you have any questions on this matter. I may be reached at (859) 223-3999 or at MJacobs@grwinc.com.

Sincerely,

Michael Jacobs
Project Manager

STEVEN L. BESHEAR
GOVERNOR

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL

BOB STEWART
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
300 WASHINGTON STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

CRAIG A. POTTS
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

RECEIVED
MAR 26 2014
BY:

March 21, 2014

Michael Jacobs
GRW Engineers, Inc.
801 Corporate Drive
Lexington, KY 40503

RE: Proposed Regional Wastewater Facilities Plan, City of Versailles, Woodford County, Kentucky

Mr. Jacobs,

Thank you for submitting the above-mentioned correspondence for our review. Based on the information you have provided it is our understanding that the "regional wastewater facilities plan" for Versailles will propose a series of individual projects that will be conducted over a twenty-year period from 2013-2033. Unfortunately, we currently do not have enough information to determine each project's potential to impact sites listed or eligible for listing on the National Register of Historic Places. At this time we recommend that you provide individual submissions for each project proposed in the regional wastewater facilities plan. Please refer to the following website http://www.heritage.ky.gov/siteprotect/ where you will find three separate documents to assist you in submitting additional information to our office for review. Those documents include a memo outlining the standardized Section 106 submission process, a Section 106 Cover sheet that must be included with all submissions to our office, and instructions for the proper completion of the required cover sheet and associated information.

Should you have any questions, feel free to contact Yvonne Sherrick of my staff at 502- 564-7005 ext 113.

Sincerely,

CP:41073-2

Craig A. Potts
Executive Director and
State Historic Preservation Officer

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES

Steven L. Beshear
Governor

#1 Sportsman's Lane
Frankfort, Kentucky 40601
Phone (502) 564-3400
1-800-858-1549
Fax (502) 564-0506
fw.ky.gov

Bob Stewart
Secretary

31 March 2014

Michael Jacobs
Project Manager
GRW, Inc.
801 Corporate Drive
Lexington, KY 40503

RE: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Dear Mr. Jacobs:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information pertaining to the subject project. Upon review of the Kentucky Fish and Wildlife Information System, KDFWR does not foresee impacts to any federally or state-listed threatened/endangered species or any associated critical habitat as a result of this project. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

To minimize impacts to the aquatic environment the Kentucky Dept. of Fish & Wildlife Resources recommends that erosion control measures be developed and implemented prior to construction to reduce siltation into waterways located within the project area. Such erosion control measures may include, but are not limited to silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches. Erosion control measures will need to be installed prior to construction and should be inspected and repaired regularly as needed.

I hope this information is helpful to you, and if you have questions or require additional information, please call me at (502) 564-7109 extension 4453.

Sincerely,

Daniel Stoll

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE KY 40201-0059
FAX: (502) 315-6677
http://www.lrl.usace.army.mil/

March 26, 2014

Operations Division
Regulatory Branch (South)
ID No. LRL-2014-183-pjl

Mr. Michael Jacobs
GRW Incorporated
801 Corporate Drive
Lexington, Kentucky 40503

Dear Mr. Jacobs:

This is in regard to your letter dated February 26, 2014, for an environmental review on behalf of the City of Versailles, Kentucky, for the regional wastewater facilities plan proposed to improve wastewater collection and treatment in the City's Planning Area of the Planning Period of 2013 to 2033. The plan includes a series of projects that would be completed over the next 20 years in phases.

The U.S. Army Corps of Engineers (USACE) exercises regulatory authority under Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act, 1972 (33 USC 1344) for certain activities in "waters of the United States (U.S.)." These waters include all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce. "Waters of the U.S.," include hydrologically connected lakes, rivers, and stream channels (perennial, intermittent ephemeral)exhibiting an Ordinary High Water Mark (OHWM), wetlands, sloughs, wet meadows and wetlands adjacent to "waters of the U.S." Based on the submitted information, maps, and our records, "waters of the U.S." may be located within the project site.

We will need additional details regarding the project's design, scope, photos, construction methods, purpose and a delineation of all "waters of the U.S.," including the coordinates and locations of each "water" within the proposed project area and all impacts to waters (linear feet and acreage), before the USACE can verify the need for a Department of the Army (DA) Permit(s).

You are reminded that all drawings must be submitted on 8½ x 11-inch paper and be of reproducible quality.

Further information on the Regulatory program, including the DA permit application, can be obtained from our website located at: http://www.lrl.usace.army.mil/Missions/Regulatory.aspx. Please allow sufficient time in your preconstruction schedule for the processing of a DA permit application.

If you have any questions concerning this matter, please contact this office at the above address, ATTN: CELRL-OP-FS or call me at (502)315-6693.

Sincerely,

Pam Loeffler
Regulatory Specialist
Regulatory Branch

United States Department of Agriculture
NRCS Natural Resources Conservation Service

1925 Old Main Street
Suite 2
Maysville, KY. 41056
Ph: 606-759-5570

March 10, 2014

To: Michael Jacobs, Project Manager
GRW
801 Corporate Drive
Lexington, KY 40503

Re: Cross-Cutter Correspondence
City of Versailles, Kentucky
Regional Wastewater Facilities Plan
GRW Project 4132

Mr. Jacobs,

NRCS only provides information on the soils and/or impact to farmland according to the criteria set forth in 1985 National Food Security Act Manual.

According to the information in your request all work is to be performed within the City of Versailles, on existing highway right-a-ways, easements, existing facilities, or previously disturbed areas which are already considered as prior converted lands and not affecting farmlands. "This determination does not apply to any lands beyond the City of Versailles or the boundaries of the existing public and private right-of-ways or areas not already previously disturbed, and therefore designated as *Prior Converted*." This office does not have any additional concerns at this time.

If needed, additional information on the soils of Woodford County is available on-line through USDA's Web Soil Survey.

If this office may be of additional assistance, please do not hesitate to contact my office in Maysville Ky. or contact the NRCS District Conservationist at 859-254-5806.

Steve Jacobs
Resource Soil Scientist, NRCS, Maysville, KY.

cc: Charles Farmer, NRCS Lead District Conservationist, Lexington, KY

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

March 10, 2014

RECEIVED
MAR 12 2014
BY:

Mr. Michael Jacobs
GRW
801 Corporate Drive
Lexington, KY 40503

Re: FWS 2014-B-0309; GRW Project 4132; City of Versailles; Regional Wastewater Facilites Plan; located in Woodford County, Kentucky

Dear Mr. Jacobs:

Thank you for the opportunity to provide comments on the above-referenced project. The U.S. Fish and Wildlife Service (Service) has reviewed this proposed project and offers the following comments in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*). This is not a concurrence letter. Please read carefully, as further consultation with the Service may be required.

In accordance with the provisions of the Fish and Wildlife Coordination Act, the Service has reviewed the project with regards to the effects the proposed actions may have on wetlands and/or other jurisdictional waters. We recommend that project plans be developed to avoid impacting wetland areas and/or streams, and reserve the right to review any required federal or state permits at the time of public notice issuance. The U.S. Army Corps of Engineers should be contacted to assist you in determining if wetlands or other jurisdictional waters are present or if a permit is required.

In accordance to section 7 of the ESA, the Service must also consider the effects of actions interrelated and interdependent to the proposed project. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification and "interdependent actions" are those that have no independent utility apart from the action under consideration. Please inform us of any future actions and/or projects (*i.e.*; water tanks, water/sewer lines, electrical transmission lines, subdivisions, commercial development) that would reasonably occur as a result of the proposed project so that we may adequately analyze those effects.

In order to assist you in determining if the proposed project has the potential to impact protected species we have searched our records for occurrences of listed species within the vicinity of the proposed project. Based upon the information provided to us and according to our databases, we believe that the following federally listed species have the potential to occur within the project vicinity. The listed species are:

Group	Species	Common name	Legal* Status
Mammals	*Myotis sodalis*	Indiana bat	E
	Myotis grisescens	gray bat	E
	Myotis septentrionalis	Northern long-eared bat	P
Plants	*Trifolium stoloniferum*	running buffalo clover	E
	Physaria globosa	Short's bladderpod	P

** Key to notations: E = Endangered, T = Threatened, P = Proposed, C = Candidate, CH = Critical Habitat*

We must advise you that collection records available to the Service may not be all-inclusive. Our database is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitats and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality.

Indiana bat

The proposed project is located in Indiana bat "potential habitat," therefore we believe that: (1) caves, rockshelters, and abandoned underground mines in the vicinity of and in the project area may potentially provide suitable wintering habitat for the Indiana bat; and (2) forested areas in the vicinity of and in the project area may potentially provide suitable summer roosting and foraging habitat for the Indiana bat. In order to address the concerns and be in compliance with the ESA, we have the following recommendations relative to potential direct and/or indirect effects as a result of impacts to the habitats listed above:

(1) During hibernation, the Indiana bat prefers limestone caves, sandstone rockshelters, and abandoned underground mines with stable temperatures of 39 to 46 degrees F and humidity above 74 percent but below saturation. Prior to hibernation, Indiana bats utilize the forest habitat up to five miles from the hibernacula to feed and roost until temperatures drop to a point that forces them into hibernation. This "swarming" period is dependent upon weather conditions and lasts from about September 15 to about November 15. This is a critical time for Indiana bats, since they are acquiring additional fat reserves and mating prior to hibernation.

Based on the presence of numerous caves, rock shelters, and underground mines in Kentucky, we believe that it is reasonable to assume that other caves, rock shelters, and/or abandoned underground mines may occur within the project area, and, if they occur, they could provide winter habitat for Indiana bats. Therefore, we recommend that the project proponent survey the project area for caves, rock shelters, and underground mines, identify any such habitats that may exist on-site, and avoid impacts to those sites pending an analysis of their suitability as Indiana bat habitat by this office.

(2) The Indiana bat utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (*i.e.*, dead trees or dead portions of live trees). Trees in excess of 16 inches diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9

inches DBH appear to provide suitable maternity roosting habitat. Male Indiana bats have been observed roosting in trees as small as 5 inches DBH.

To address potential impacts to Indiana bat summer roosting and foraging habitat we recommend that the project proponent survey the project site to determine the presence or likely absence of Indiana bats within the project area in an effort to determine if potential effects are likely. A qualified biologist who holds the appropriate collection permits for the Indiana bat must undertake such surveys in accordance with our most current survey guidance. If any Indiana bats are identified, we would request written notification of such occurrence(s) and further coordination and consultation.

As an alternative to surveying, the following options are also available:

- The project proponent can modify the proposed project to eliminate or reduce impacts to suitable Indiana bat habitat, thus avoiding impacts. A habitat assessment may useful in determining if suitable Indiana bat summer roosting or foraging habitat is present in the action area of the proposed project.

- The project proponent can request formal section 7 consultation through the lead federal action agency associated with the proposed project. To request formal consultation, the project proponent would need to submit a Biological Assessment that describes the action and evaluates the effects of the action on the listed species in the project area. After formal consultation is initiated, the Service has 135 days to prepare a Biological Opinion that analyzes the effects of the action on the listed species and recommends strategies to minimize those effects.

- The project proponent may provide the Service with additional information through the informal consultation process, prepared by a qualified biologist, that includes site-specific habitat information and a thorough effects analysis (direct, indirect, and cumulative) to support a "not likely to adversely affect" determination. The Service will review this and decide if there is enough supporting information to concur with the determination.

- The project proponent may choose to assume presence of the species in the project area and enter into a Conservation Memorandum of Agreement (MOA) with the Service to account for the incidental take of Indiana bats. By entering into a Conservation MOA with the Service, Cooperators gain flexibility with regard to the removal of suitable Indiana bat habitat. In exchange for this flexibility, the Cooperator provides recovery-focused conservation benefits to the Indiana bat through the implementation of minimization and mitigation measures that are described in the Indiana Bat Mitigation Guidance for the Commonwealth of Kentucky. For additional information about this option, please notify our office.

Gray bat

Gray bats roost, breed, rear young, and hibernate in caves year round. They migrate between summer and winter caves and will use transient or stopover caves along the way. Gray bats eat a variety of flying aquatic and terrestrial insects present along streams, rivers, and lakes. Low-flow streams produce an abundance of insects and are especially valuable to the gray bat as foraging habitat. For hibernation, the roost site must have an average temperature of 42 to 52 degrees F. Most

of the caves used by gray bats for hibernation have deep vertical passages with large rooms that function as cold air traps. Summer caves must be warm, between 57 and 77 degrees F, or have small rooms or domes that can trap the body heat of roosting bats. Summer caves are normally located close to rivers or lakes where the bats feed. Gray bats have been known to fly as far as 12 miles from their colony to feed.

Because we have concerns relating to the gray bat on this project and due to the lack of occurrence information available on this species relative to the proposed project area, we have the following recommendations relative to gray bats.

- Based on the presence of numerous caves, rock shelters, and underground mines in Kentucky, we believe that it is reasonable to assume that other caves, rock shelters, and/or abandoned underground mines may occur within the project area, and, if they occur, they could provide winter/summer habitat for gray bats. Therefore, we would recommend that the project proponent survey the project area for caves, rock shelters, and underground mines, identify any such habitats that may exist on-site, and avoid impacts to those sites pending an analysis of their suitability as gray bat habitat by this office.

- Sediment Best Management Practices (BMPs) should be utilized and maintained to minimize siltation of the streams located within and in the vicinity of the project area, as these streams represent potential foraging habitat for the gray bat.

Northern long-eared bat

The Northern long-eared bat is currently proposed for federal listing under the ESA, and may be listed as early as October 2014. The entire state of Kentucky is considered potential habitat for the northern long-eared bat. During the summer, Northern long-eared bats typically roost singly or in colonies in a wide-variety of forested habitats, where they seek shelter during daylight hours underneath bark or in cavities/crevices of both live trees and snags, including relatively small trees and snags that are less than 5 inches in diameter at breast height (DBH). Northern long-eared bats have also been documented roosting in man-made structures (i.e., buildings, barns, etc.) during the summer. According to current winter occurrence data, Northern long-eared bats predominately winter in hibernacula that include caves, tunnels, and underground mine passages.

Your agency is required to confer with the Service if you determine that the proposed federal action is likely to jeopardize the continued existence of the Northern long-eared bat (50 CFR 402.10(a)). You may also voluntarily confer with the Service if the proposed action may affect a proposed species, like the Northern long-eared bat. At this time, no designated critical habitat has been proposed for the Northern long-eared bat. Although species proposed for listing are not afforded protection under the ESA, when a species is listed, the prohibitions against jeopardizing its continued existence and unauthorized take are effective immediately, **regardless of an action's stage of completion**. Therefore, to avoid significant project delays, we recommend that you contact our office to identify and resolve potential conflicts regarding the Northern long-eared bat in your project area.

Running buffalo clover

Running buffalo clover may occur within the proposed project site. This species requires periodic, moderate disturbances to reduce competition and maintain open or semi-open habitat conditions. Running buffalo clover is known to occur in habitats like stream banks and low mesic (moderately

moist) forests. It can also be found in disturbed areas that are grazed or mechanically maintained including old pastures, moderately grazed fields, road rights-of-way, power line rights-of-way, lawns, and cemetaries. If the proposed project(s) require alteration of habitat that coincides with the habitat required for this species, an on-site inspection or survey of the area should be conducted to determine if the listed species is present. Surveys and habitat assessments should be conducted by qualified personnel during the appropriate time of year during the plant's growing season, preferably around April and May when the plants are usually flowering. A survey for running buffalo clover would not be necessary if sufficient site-specific information was available that showed that: (1) there is no potentially suitable habitat within the project area or its vicinity or (2) the species would not be present within the project area or its vicinity due to site-specific factors.

Short's bladderpod

Short's bladderpod cress is currently proposed for federal listing under the ESA, and may be listed as soon as August 2014. Short's bladderpod is one of the rarest plants in Kentucky. It typically grows on steep, rocky, wooded slopes and talus areas and on areas associated with bluffs, usually near rivers or streams. Habitat loss, including transportation right-of-way-construction and maintenance, is believed to be one of the current threats to the species.

Your agency is required to confer with the Service if you determine that the proposed federal action is likely to jeopardize the continued existence of Short's bladderpod (50 CFR 402.10(a)). You may also voluntarily confer with the Service if the proposed action may affect a proposed species, like the Short's bladderpod. Although species proposed for listing are not afforded protection under the ESA, when a species is listed, the prohibitions against jeopardizing its continued existence and unauthorized take are effective immediately, **regardless of an action's stage of completion**. Therefore, to avoid significant project delays, we recommend conducting a habitat assessment and/or survey to provide more information about the presence or likely absence of the species within the proposed project area.

Thank you again for your request. Your concern for the protection of endangered and threatened species is greatly appreciated. If you have any questions regarding the information that we have provided, please contact Jessi Miller at (502) 695-0468 extension 104.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor