

Appendix A – Compliance History

1. Enforcement Conference

- **April 7, 2015 Letter**

2. Notice of Violations

- **October 9, 2014 Letter**
- **January 27, 2014 Letter**

3. Conference Agreement

- **April 5, 2012 Letter**



STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF ENFORCEMENT
300 FAIR OAKS LANE
FRANKFORT KENTUCKY 40601
www.kentucky.gov

April 7, 2015

CERTIFIED MAIL No. 7014 1200 0002 0316 4186
Return Receipt Requested

City of Brodhead
Attn. Mr. Cash
7 West Main Street
Brodhead, KY 40409

Re: Enforcement Conference
AI Name Brodhead WWTP
AI No. 3852
Case No. DOW150019
Activity No. ERF20140001
Facility ID: KY0047431
Rockcastle County

Dear Mr. Cash:

Thank you for participating in the administrative conference with the Division of Enforcement on April 2, 2015. During the conference, the Division presented an offer of settlement for violations issued to the Brodhead WWTP. The following is a summary of the settlement offer presented.

The City of Brodhead shall enter into an Agreed Order with the Cabinet to resolve violations issued to the Brodhead WWTP. The Agreed Order shall require the completion of the following actions:

1. Within thirty (30) days of execution of the Agreed Order, Brodhead shall submit an updated Corrective Action Plan (CAP) addressing the reasons for the violations and a current timeline of the actions to be completed, as proposed in the November 2014 Plan of Action submitted to DOW.

As part of the updated CAP, Brodhead shall specifically address the following:

- a. A final compliance date for the installation of an influent flow meter for its system and when they will be reporting influent flow on its DMRs as required.
 - b. A final compliance date by which Brodhead shall have completed its approved facility project, as outlined in detail in the CAP, and shall be in compliance with the terms of its KPDES Permit and the Agreed Order.
2. At all times, Brodhead shall report spills and bypasses as required by 401 KAR Chapter 5 and its KPDES Permit.
 3. Brodhead shall submit its DMR results in the intervals specified by its KPDES Permit.

4. By October 1, 2015, Brodhead shall ensure that its sludge pumps and aerators are in working condition. *During the conference, GRW Engineers stated this remedial measure has been completed. The DOW London Regional Office will need to confirm this action is complete. Upon confirmation we can remove this item from the Agreed Order or consider it resolved.*
5. Within six (6) months of execution of the Agreed Order, Brodhead shall develop and submit to the Cabinet for review a Capacity Management Operations and Maintenance (CMOM) plan.
6. Following execution of the Agreed Order, Brodhead shall submit quarterly progress reports regarding repairs/upgrades to its system and its compliance with the terms of this Agreed Order.
7. For the violations, the Cabinet has assessed a civil penalty of ten thousand dollars (\$10,000). The civil penalty is to be paid thirty (30) days following execution of the Agreed Order. No penalty payment is due at this time. In addition, should Brodhead fail to meet any of the requirements of the Agreed Order, a stipulated penalty of one thousand dollars (\$1,000) may be assessed per non-compliance. The stipulated penalty shall be waived following termination of the Agreed Order.

If agreeable, the above terms shall be included in an Agreed Order and sent to the attention of the Brodhead Water Board for signature. If you would like to make a counter offer to the proposed settlement, please provide a response to the Cabinet by May 30, 2015. If we are unable to reach an agreement, it may be necessary to refer this case for formal legal action. If you have any questions, please contact me at (502) 564-2150, ext. 3286 or by email at Kari.Johnson@ky.gov.

Respectfully,

A handwritten signature in black ink that reads "Kari Johnson". The signature is written in a cursive, flowing style.

Kari Johnson
Environmental Enforcement Specialist
Division of Enforcement



STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

Division of Water
875 S Main St
London, KY 40741-1902
www.kentucky.gov

October 9, 2014

Certified No. 7011 0110 0002 3368 5570
Return Receipt Requested

City of Brodhead
7 West Main St
Brodhead, KY 40409

Re: Notice of Violation
AI ID: 3852
AI Name: Brodhead WWTP
Activity ID: ENV20140002
Permit No. KY0047431
Rockcastle County, KY

Dear Mayor Walter Cash :

The Kentucky Department for Environmental Protection (DEP) has issued the enclosed Notice of Violation for violations discovered at your facility during a Compliance Evaluation Inspection on September 29, 2014. Please review this Notice of Violation carefully to ensure that all remedial measures are completed by the specified deadlines.

Your cooperation and attention to this matter is appreciated. If you have any questions, please contact me at 606-330-2080.

Sincerely,

A handwritten signature in cursive script that reads "Rob Miller".

Mr. Rob Miller,
Environmental Control Supervisor
Division of Water

Enclosure

COMMONWEALTH OF KENTUCKY
ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water

NOTICE OF VIOLATION

To: City of Brodhead
7 West Main St
Brodhead, KY 40409

AI Name: Brodhead WWTP AI ID: 3852 Activity ID: ENV20140002
Discovery ID: CIN20140002 County: Rockcastle
Enforcement Case ID:
Date(s) Violation(s) Observed: 09/29/2014

This is to advise that you are in violation of the provisions cited below:

1 Violation Description for Subject Item AIOO0000003852():

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 includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. [40 CFR 122.41(e)] as incorporated by [401 KAR 5:065 Section 2(1)]

Description of Non Compliance:

The facility is not being properly operated and maintained as required.

Facility operators report discovering that both sludge pumps in the intermediate clarifier had not been working. At the time of the inspection one sludge pump remained out of operation.

One of the aerators was reported down in mid-September, but appeared to operational during the inspection.

Facility is consistently reporting effluent flow that exceeds the designed capacity of 0.15 MGD. Due to the high volume of water to be treated in exceedance of the design flow this plant is unable to provide adequate treatment of wastewater.

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must, at all times, properly operate & maintain the facility. With proper approval(s) from the Division of Water, upgrade/update the facility in order to meet the regulatory requirements and facility permit conditions. By November 14th, 2014, the permittee shall submit a written notification to the undersigned that the permittee complies with all requirements of its permit. This notification should include an explanation of actions taken to identify and address the lack of BOD removal in the treatment process. Also, the facility must resume submittal of the wastewater Monthly Operating Report (MOR) to the London Regional Office. The submittal is due by the 15th of month. Other actions as determined by the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

2 Violation Description for Subject Item AIOO0000003852():

The flow measuring device shall measure all flow received at the wastewater treatment plant. An indicating, recording, and totalizing flow measuring device shall be installed at each large wastewater treatment plant. [401 KAR 5:005 Section 12]

Description of Non Compliance:

The facility is not properly measuring and reporting influent flow as required by permit. Facility does not have an influent flow meter as required by the permit.

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must take all action necessary to ensure proper flow measurement and properly operate & maintain the facility. With proper approval(s) from the Division of Water, upgrade/update the facility in order to meet the regulatory requirements and facility permit conditions. By November 14th, 2014, the permittee shall submit a written notification to the undersigned that the permittee complies with all requirements of its permit. Other actions as determined by the Division of Enforcement. [401 KAR 5:005 Section 12]

3 Violation Description for Subject Item AIOO0000038520:

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and KRS 224 and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. [40 C.F.R. 122.41(a)]. [401 KAR 5:065 Section 2(1)]

Description of Non Compliance:

The facility has failed to comply with the effluent limitations contained in the permit.

DMR violations were present in the months of:

January 2014

BOD loading and concentration

February 2014

BOD loading, concentration and % removal

Flow not reported

March 2014

BOD loading, concentration and % removal

April 2014

BOD loading and concentration

No flow reported

May 2014

TSS loading and concentration

Ammonia loading and concentration

BOD loading, concentration and % removal

No flow reported

June 2014

TSS loading and concentration

Ammonia loading and concentration

E coli (7 day geomean)

BOD loading, concentration and % removal

July 2014

pH - minimum value exceeded

BOD loading, concentration and % removal

August 2014

BOD loading, concentration and % removal

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must comply with effluent limitations and all conditions of the KPDES permit. By November 14th, 2014, the permittee shall submit a written notification to the undersigned that the permittee complies with all requirements of its permit. This notification should include an explanation of actions taken to identify and address the lack of BOD removal in the treatment process. Also, the facility must submit all missing flow data to NetDMR by November 14, 2014. Other actions as determined by the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

Violations of the above cited statute(s) and/or regulation(s) are subject to a civil penalty per day per violation. Violations carry civil penalties of up to \$25,000 per day per violation depending on the statutes/regulations violated. In addition, violations may be concurrently enjoined. Compliance with remedial measures and their deadlines does not provide exemption from liability for violations during the period of remediation, nor prevent additional remedial measures from being required.

If you have questions or need further information, write or call the undersigned:

Division of Water
London Regional Office
875 S Main St
London, KY 40741-1902
606-330-2080 (8:00 AM – 4:30 PM)
Mr. Rob Miller, Environmental Control Supervisor

Issued By:



Mr. Rob Miller, Environmental Control Supervisor

Date: October 9, 2014

How Delivered: Certified

Certified/Registered # 7011 0110 0002 3368 5570

Energy and Environment Cabinet
Department for Environmental Protection
Division of Water
Wastewater Inspection Report

AI ID: 3852 **AI Type:** SANI-Wastewater Treatment & Collection (2213)
AI Name: Brodhead WWTP
AI Address: Ridge Rd
City: Brodhead, **State:** Kentucky **Zip:** 40409
County: Rockcastle **Regional Office:** London Regional Office
Latitude: 37.408056 **Longitude:** -84.42
Site Contact: Walter Cash
Title: Mayor **Phone #:**
Inspection Type: WW CEI-Minor Mun **Activity #:** CIN20140002
Incident IDs: N/A
Inspection Start Date: September 29, 2014 **Time:** 12:45 PM **End Date:** September 29, 2014 **Time:** 02:00 PM
Site/Permit ID: KY0047431

Lead DEP Investigator: Rob Miller
Other DEP Investigators: Walter Brumley; Eddie Paige
External Investigators:
Persons Interviewed: Robert Mullins; Shannon Cash

General Comments: Inspection of the facility finds that significant operational issues continue. Operators report that the sludge pumps in the intermediate clarifier were recently found to be inoperable. One pump has been restored, but the second pump remains down. It is unclear how well the intermediate clarifier is functioning at this time. A review of the DMRs indicates a serious problem with removal of BOD. Immediate efforts need to be made to eliminate the severe BOD issue.

Numerous DMR omissions for flow reporting were found during the review. Also, facility does not have an influent flow meter.

A quarterly report submitted by GRW for the facility indicates that efforts to reduce I/I continue to move forward.

Facility needs to resume submitting the Monthly Operating Report (MOR) to the London RO.

Overall Compliance Status: Out of Compliance- NOV

Investigation Results

SI: AIO03852

SI Description:

Inspector Comment:

Requirement: Does the facility hold the proper KPDES permit?. [401 KAR 5:055 Section 2]

Compliance Status: C-No Violations observed

Comment: KYR0047431

Requirement: Have all required permits been obtained from the Division of Water prior to the construction or modification of the facility? [401 KAR 5:005 Section 1]

Compliance Status: C-No Violations observed

Comment: KYR0047431

Requirement: Is the facility being operated under the supervision of a properly certified operator? [401 KAR 5:010 Section 1]

Compliance Status: C-No Violations observed

Comment: Devon Shelton is working as the Class II operator for the facility. Shannon Cash and Brian Mullins are training under Mr. Shelton to become operators.

Requirement: Is the collection system under the primary responsibility of an individual who holds an active collection system certification at the level appropriate for the size of the treatment facility receiving the waste? [401 KAR 5:010 Section 2]

Compliance Status: C-No Violations observed

Comment: Devon Shelton is certified as Class II for Collection System.

Requirement: Does the permittee retain records of all monitoring information including: the date, exact place, and time of sampling or measurements; the name of the individual who performed the sampling or measurements; the dates and times analyses were performed; the name of the individual who performed the analyses; the analytical techniques or methods used; the results of the analyses; 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 the period required by the cabinet and at a minimum of at least three (3) years from the date of the sample, measurement, report, or application? [401 KAR 5:065 Section 2(1)]

Compliance Status: I-No Violations obs-but impending viol trends obs

Comment: Facility is keeping a log of meter calibrations. The log sheet they are using is incomplete and should include information such as who is calibrating and details about the calibration standard(s).

Requirement: Is the facility required to prepare and implement a groundwater protection plan (GPP) as specified in regulation 401 KAR 5:037? If yes, does the facility have a GPP? [401 KAR 5:037 Section 3]

Compliance Status: C-No Violations observed

Comment: GPP was present and adequate

Requirement: Is the permittee reporting monitoring results to the cabinet at the intervals specified in the permit? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment: Facility is reporting monthly via NetDMR.

Requirement: Are the monitoring results reported to the cabinet on a Discharge Monitoring Report (DMR)? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment: Facility is reporting monthly via NetDMR.

Requirement: 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, are the results of this monitoring included in the calculation and reporting of the data submitted in the DMR? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment: Permittee only monitors and records what is required by the permit.

Requirement: Are the calculations for all limitations which require averaging of measurements utilizing an arithmetic mean unless otherwise specified by the Cabinet in the permit? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Is the permittee in compliance for the reporting of spills, bypasses, and non-compliance according 401 KAR 5:065 Section 2(1)

Compliance Status: C-No Violations observed

Comment: No spills or bypasses had been reported at the time of inspection.

Requirement: Did the facility notify the Division of Water by the most rapid means available whenever, by reason of emergency or accident, a spill or discharge occurs which results in pollution of the waters of the Commonwealth? [401 KAR 5:015 Section 2]

Compliance Status: C-No Violations observed

Comment: System has reported 12 manhole overflows since February 1, 2014.

Requirement: Is the facility being properly operated and maintained as specified in regulation 5:065? This includes:
(a) proper operation and maintenance of all facilities, systems of treatment and control, and related appurtenances which are installed or used by the permittee to achieve compliance with permit conditions;
(b) proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures;
(c) this provision also requires the

operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. [401 KAR 5:065 Section 2(1)]

Compliance Status: V-Out of Compliance-NOV

Comment: The facility is not being properly operated and maintained as required.

Facility operators report discovering that both sludge pumps in the intermediate clarifier had not been working. At the time of the inspection one sludge pump remained out of operation.

One of the aerators was reported down in mid-September, but appeared to operational during the inspection.

Facility is consistently reporting effluent flow that exceeds the designed capacity of 0.15 MGD. Due to the high volume of water to be treated in exceedance of the design flow this plant is unable to provide adequate treatment of wastewater.

Requirement: Are the disinfection unit(s) maintained and operated properly to allow for compliance with permit conditions? [401 KAR 5:005 Section 11]

Compliance Status: C-No Violations observed

Comment: Facility is using chorine gas to disinfect.

Requirement: Does the flow measuring device measure all flow received at the WWTP? For large wastewater facilities (average daily design capacity >50, 000 gpd), is flow measured by an indicating, recording, and totalizing flow measuring device? [401 KAR 5:005 Section 12]

Compliance Status: V-Out of Compliance-NOV

Comment: The facility is not properly measuring and reporting influent flow as required by permit. Facility does not have an influent flow meter as required by the permit.

Requirement: Is a source of water provided for cleanup? If potable water is used, is a backflow preventor installed to protect the water supply? [401 KAR 5:005 Section 10(6)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Has fencing with a lockable gate been installed around the wastewater treatment plant? [401 KAR 5:005 Section 10(7)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Has an all-weather access road been installed to allow access to the wastewater treatment plant? Is the road adequately maintained to allow access to the facility for operation and maintenance activity? [401 KAR 5:005 Section 10(8)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Sewage sludge. Did the facility meet the requirements governing the disposal of sewage sludge from publicly owned treatment works, in accordance with 40 CFR Part 503? [401 KAR 5:065 Section 2(4)]

Compliance Status: C-No Violations observed

Comment: Rightway Septic removes the sludge once a week.

Requirement: Is the effluent in compliance with KPDES permit limitations? Do the Discharge Monitoring Reports indicate KPDES permit violations? [401 KAR 5:065 Section 2(1)]

Compliance Status: V-Out of Compliance-NOV

Comment: The facility has failed to comply with the effluent limitations contained in the permit.

DMR violations were present in the months of:

January 2014

BOD loading and concentration

February 2014

BOD loading, concentration and % removal

Flow not reported

March 2014
BOD loading, concentration and % removal

April 2014
BOD loading and concentration
No flow reported

May 2014
TSS loading and concentration
Ammonia loading and concentration
BOD loading, concentration and % removal
No flow reported

June 2014
TSS loading and concentration
Ammonia loading and concentration
E coli (7 day geomean)
BOD loading, concentration and % removal

July 2014
pH - minimum value exceeded
BOD loading, concentration and % removal

August 2014
BOD loading, concentration and % removal

Requirement: Are samples taken in compliance with the monitoring requirements and taken at the following location(s): nearest accessible point after final treatment, but prior to actual discharge or mixing with receiving waters? Are the samples representative of plant flow? Are flow proportioned samples obtained when required by the KPDES permit? Are grab samples collected according to the KPDES permit requirements? Are composite samples collected and analyzed according to the KPDES permit conditions? Are samples collected according to KPDES permit requirements? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Are the facility sample collection procedures adequate? Are the samples collected in proper containers, preserved, and refrigerated properly? Are all samples analyzed within the allowed holding times? [401 KAR 5:065 Section 2(1)]

Compliance Status: C-No Violations observed

Comment:

Requirement: Is the facility sampling in accordance with sampling requirements specified for biomonitoring in the KPDES permit conditions? [401 KAR 5:065 Section 2(1)]

Compliance Status: N-Not Applicable

Comment:

Requirement: Have pollutants entered the waters of the Commonwealth? [KRS 224.70-110]

Compliance Status: D-Out of Compliance-Violations Documented

Comment: Pollutants have entered and contributed to the pollution of the waters of the Commonwealth. Numerous DMR violations were noted for the review period of January 2014 - August 2014. The DMR violations for BOD indicated levels that are several times greater than the permit limit. Dark sediment was noted immediately downstream of the outfall.

Requirement: Have surface waters been aesthetically or otherwise degraded? [401 KAR 10:031 Section 2]

Compliance Status: I-No Violations obs-but impending viol trends obs

Comment: Waters have not been aesthetically or otherwise degraded. Numerous DMR violations were noted for the review period of January 2014 - August 2014. The DMR violations for BOD indicated levels that are several times greater than the permit limit. Dark sediment was noted immediately downstream of the outfall.

Requirement: Is the permittee in compliance with all permit conditions? [401 KAR 5:065 Section 2]

Compliance Status: D-Out of Compliance-Violations Documented

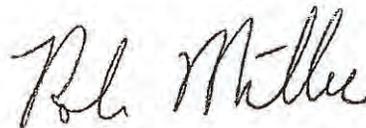
Comment: The facility has failed to comply with the terms of the permit.

Documentation

- Photos taken
- Documents obtained from facility
- Samples taken by outside source
- Request for Submission of Documents

- Record of visual determination of opacity
- Samples taken by DEP
- Regional office instrument readings taken
- Other documentation

Inspector:



Date: 10/09/2014

Received By: _____ **Title:** _____ **Date:** _____

Delivery Method: Certified Mail

Certified Mail Number: 7011 0110 0002 3368 5570



STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

Division of Water
875 S Main St
London, KY 40741-1902
www.kentucky.gov

January 27, 2014

Certified No. 7011 0110 0002 3368 5112
Return Receipt Requested

Brodhead WWTP
Ridge Rd
Brodhead, KY 40409

Re: Notice of Violation
AI ID: 3852
AI Name: Brodhead WWTP
Activity ID: ENV20140001
Permit No. KY0047431
Rockcastle County, KY

Dear Brodhead WWTP:

The Kentucky Department for Environmental Protection (DEP) has issued the enclosed Notice of Violation for violations discovered at your facility during an inspection on 1/15/14. Please review this Notice of Violation carefully to ensure that all remedial measures are completed by the specified deadlines.

Your cooperation and attention to this matter is appreciated. If you have any questions, please contact me at 606-330-2080.

Sincerely,

Mr. Tony Smith,
Environmental Inspector
Division of Water

Enclosure

COMMONWEALTH OF KENTUCKY
ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water

NOTICE OF VIOLATION

To: Brodhead WWTP
Ridge Rd
Brodhead, KY 40409

AI Name: Brodhead WWTP AI ID: 3852 Activity ID: ENV20140001
Discovery ID: CIN20140001 County: Rockcastle
Enforcement Case ID:
Date(s) Violation(s) Observed: 01/15/2014

This is to advise that you are in violation of the provisions cited below:

1 Violation Description for Subject Item AIOO00000038520:

Each wastewater system that accepts wastewater containing domestic sewage shall be operated under the supervision of an individual holding a Kentucky operator's certificate for at least the class of system supervised. [401 KAR 5:010 Section 1]

Description of Non Compliance:

The facility is not operated under the supervision of a properly certified operator. Roger Bray had retired from the facility. Shannon Cash is the new operator but he was not certified at the time of the inspection.

The remedial measure(s), and date(s) to be completed by are as follows:

By February 28, 2014, the permittee shall obtain the services of a properly certified operator to operate the facility, provide the operator information to the Kentucky Division of Compliance Assistance and submit a written notification to the undersigned that the facility is in compliance with the requirements of this regulation. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and/or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:010 Section 1]

2 Violation Description for Subject Item AIOO00000038520:

Each wastewater collection system which contains domestic sewage and consists of at least 5,000 linear feet of sewer line as described in 401 KAR 5:010 Section 2(1), (6), or (7)(a) or (e) shall be operated under the supervision of an individual holding a Kentucky collection system operator's certificate for at least the class of treatment or collection system supervised. [401 KAR 5:010 Section 2]

Description of Non Compliance:

The facility is not operated under the supervision of a properly certified collection system operator.

The remedial measure(s), and date(s) to be completed by are as follows:

By February 28, 2014, the permittee shall ensure the collection system is under the primary responsibility of an individual holding an active collection or treatment system certification at a level appropriate for the size of the collection or treatment facility receiving the sewage. The permittee shall submit written notification to the undersigned that the facility is in compliance with the requirements of this regulation. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and/or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:010 Section 2]

3 Violation Description for Subject Item AIOO00000038520:

Monitoring results shall be reported at the intervals specified in the permit. [401 KAR 5:065 Section 2(1)] as in [40 CFR 122.41(i)(4)].

Description of Non Compliance:

The facility has failed to submit monitoring results at intervals specified in the permit. The June and November 2013 DMR's have not been submitted.

The remedial measure(s), and date(s) to be completed by are as follows:

The facility must report the June and November 2013 DMR's to the Division of Water via NetDMR by **February 28, 2014**. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

4 Violation Description for Subject Item AIOO00000038520:

Monitoring results shall be reported on a Discharge Monitoring Report (DMR). [401 KAR 5:065 Section 2(1)] as in [40 C.F.R. 122.41 (i)(4)(i)].

Description of Non Compliance:

The facility has failed to report monitoring results on a DMR. DMR review period was from June 2013 to December 2013. The June and November 2013 DMRs have not been submitted. The December DMR was not due at the time of inspection. Facility did have a copy of the June DMR on site but had not submitted it. Facility is currently submitting using NetDMR as required.

The remedial measure(s), and date(s) to be completed by are as follows:

The facility must report the June and November 2013 DMR's to the Division of Water via NetDMR by **February 28, 2014**. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and or your company to an immediate referral to the Division of Enforcement. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

5 Violation Description for Subject Item AIOO00000038520:

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 includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. [40 CFR 122.41(e)]. [401 KAR 5:065 Section 2(1)]

Description of Non Compliance:

The facility is not being properly operated and maintained as required. Facility is consistently reporting effluent flow that exceeds the designed capacity of 0.15 MGD. Due to the high volume of water to be treated in exceedance of the design flow this plant is unable to provide adequate treatment of wastewater. As there has been no significant increase in the customer base served by this facility, it is apparent that inflow and infiltration (I & I) are responsible for the high flows to the plant, which make adequate treatment not possible. I & I are due to the lack of proper maintenance of the collection system. For 2013 elevated flow levels were reported in January, February, March, April, May, July, September and October. The June DMR has not been submitted and flow was not reported on the August DMR. In addition, facility is not reporting influent flow as required by the permit.

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must, at all times, properly operate & maintain the facility. Quarterly status reports on the collection system improvements were implemented by an office conference with the Division of Water London Regional Office on April 5, 2012. A copy of this agreement is enclosed. A status report was requested and received from GRW Engineers on 1/17/14. Failure to comply with the Office Conference Agreement may subject your facility to an immediate referral to the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

6 Violation Description for Subject Item AIOO00000038520:

The flow measuring device shall measure all flow received at the wastewater treatment plant. An indicating, recording, and totalizing flow measuring device shall be installed at each large wastewater treatment plant. [401 KAR 5:005 Section 12]

Description of Non Compliance:

The facility is not properly measuring and reporting influent flow as required by permit.

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must take all action necessary to ensure proper flow measurement and properly operate & maintain the facility. With proper approval(s) from the Division of Water, upgrade/update the facility in order to meet the regulatory requirements and facility permit conditions. **By February 28, 2014**, the permittee shall submit a written notification to the undersigned that the permittee complies with all requirements of its permit. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and/or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:005 Section 12]

7 Violation Description for Subject Item AIOO00000038520:

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and KRS 224 and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. [401 KAR 5:065 Section 2(1)] as in [40 C.F.R. 122.41(a)].

Description of Non Compliance:

The facility has failed to comply with the effluent limitations contained in the permit. DMR violations were present in the months of July, August, September, & October 2013.

July BOD reading

Permit Requirement. 12.5 30DA AVG

Sample = 75.74

Permit Req. 18.8 WKLY AVG.

Sample = 167.83

August Effluent Flow was not reported.

September BOD Reading

Permit Req. 12.5 30 DA AVG.

Sample = 18.06

Permit Req. 18.8 WKLY AVG.

Sample = 37.23

October BOD Reading

Permit Req. 12.5 30 DA AVG.

Sample = 97.32

Permit Req. 18.8 WKLY AVG.

Sample = 337.89

The remedial measure(s), and date(s) to be completed by are as follows:

The permittee must comply with effluent limitations and all conditions of the KPDES permit. By **February 28, 2014**, the permittee shall submit a written notification to the undersigned that the permittee complies with all requirements of its permit. Failure to comply with the remedial measures or repeated violations of this requirement may subject you and/or your company to an immediate referral to the Division of Enforcement. [401 KAR 5:065 Section 2(1)]

Violations of the above cited statute(s) and/or regulation(s) are subject to a civil penalty per day per violation. Violations carry civil penalties of up to \$25,000 per day per violation depending on the statutes/regulations violated. In addition, violations may be concurrently enjoined. Compliance with remedial measures and their deadlines does not provide exemption from liability for violations during the period of remediation, nor prevent additional remedial measures from being required.

If you have questions or need further information, write or call the undersigned:

Division of Water
London Regional Office
875 S Main St
London, KY 40741-1902
606-330-2080 (8:00 AM – 4:30 PM)
Mr. Tony Smith, Environmental Inspector

Issued By:



Mr. Tony Smith, Environmental Inspector
Date: January 27, 2014

Issued By:



Mr. Rob Miller, Environmental Control Supervisor
Date: January 27, 2014

How Delivered: Certified Mail Certified/Registered # 7011 0110 0002 3368 5112

**LONDON REGIONAL OFFICE
CONFERENCE AGREEMENT**

**with
Brodhead Wastewater Treatment Plant
47431
Rockcastle Co.**

A Regional Office Conference was held at the London Regional Office, Division of Water, on April 5, 2012, with representatives of Brodhead Wastewater Treatment Plant of Rockcastle County, Kentucky, regarding the Notice of Violations issued March 16, 2012, at which the following was agreed:

1. By May 15, 2012, the facility shall submit to the Division of Water a written plan of action to address the issues of I & I and treatment plant upgrade required to provide treatment in compliance with the KPDES permit. The plan will include a timeline of events to be completed in order to come into full compliance.
2. The city shall provide quarterly updates as to progress along this timeline to the London Regional Office of the Division of Water.

Walt Lee
Representative

4-5-12
Date

Ray V. Ty
Representative

4-5-12
Date

Rob Miller
Rob Miller, Supervisor

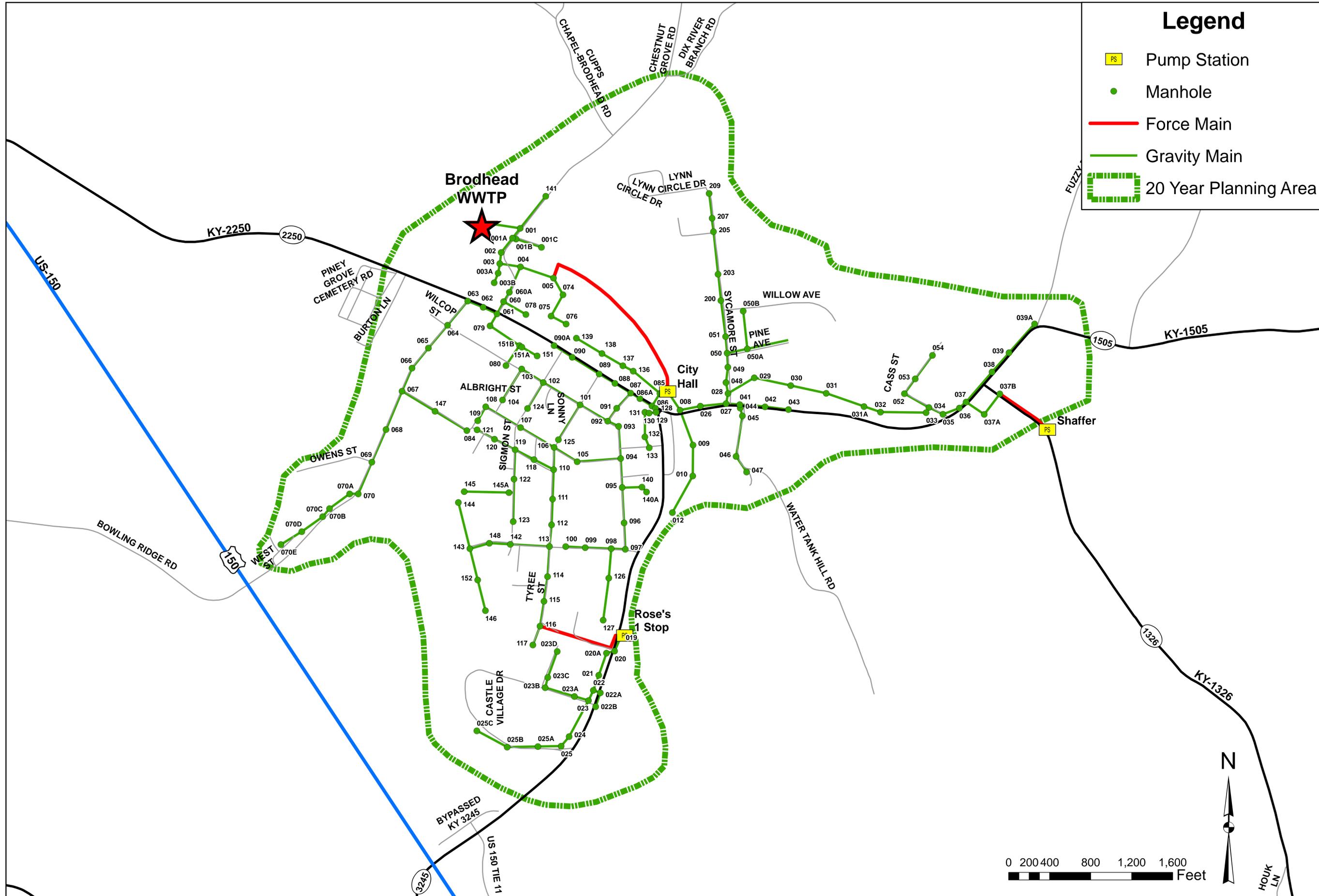
4/5/12
Date

Edgar H. Hayden
Edgar Hayden, Env. Insp.

4-5-12
Date

Appendix B
Sewer System Map

City of Brodhead: Sewage Collection System Map



Legend

- Pump Station
- Manhole
- Force Main
- Gravity Main
- 20 Year Planning Area

DATE: May, 2015
 SCALE: 1" = 400'
 SHEET NO. **B-1**



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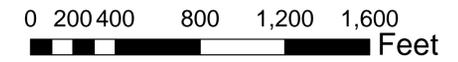
APPENDIX B-1 SEWAGE COLLECTION SYSTEM MAP WASTEWATER FACILITIES PLAN CITY OF BRODHEAD, KENTUCKY

DESIGNED:	DRAWN:	REVIEWED:	APPROVED:

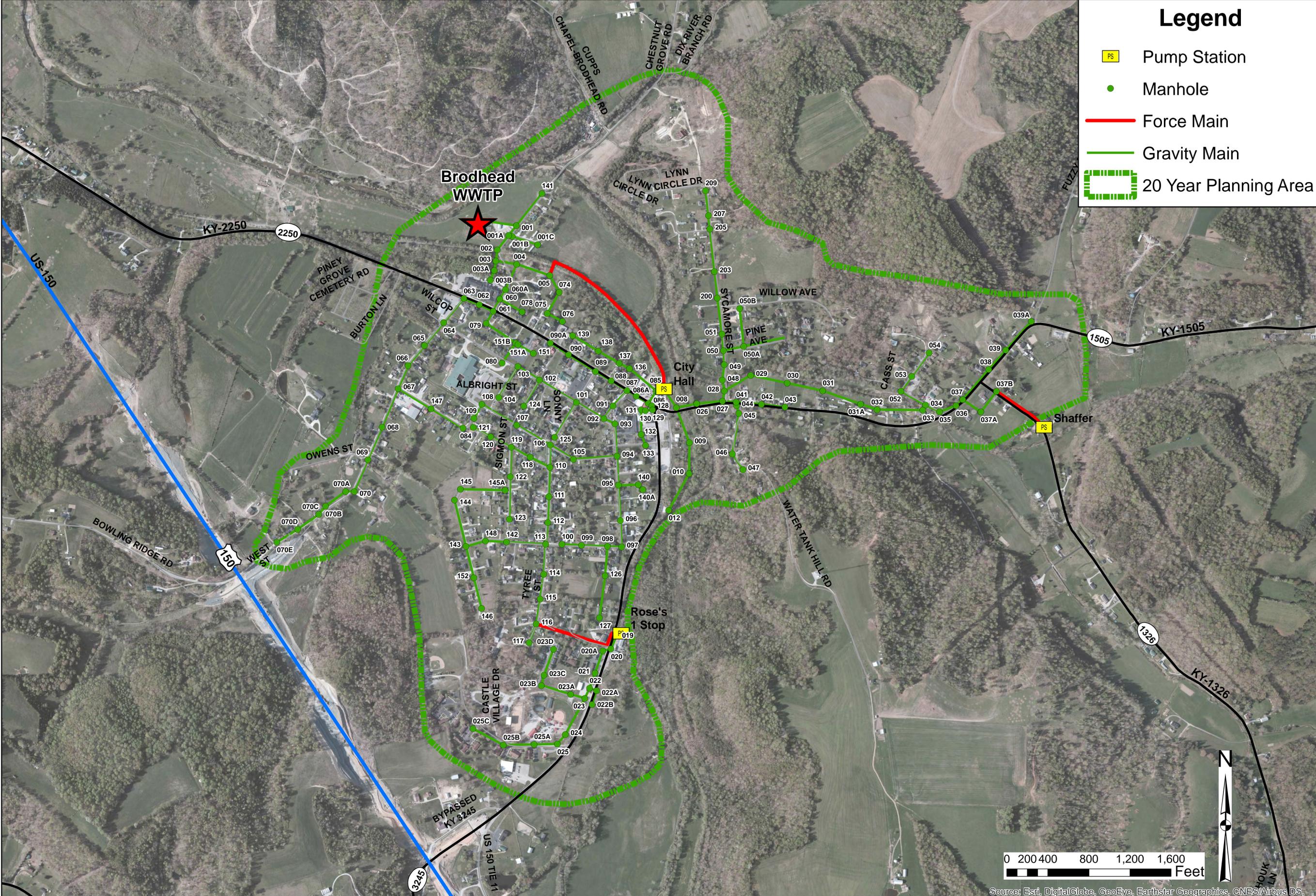
GRW PROJECT NO.	CLIENT PROJECT NO.
3929-01	

NO.	REVISIONS DESCRIPTION	DATE	BY

SCALE: 1" = 400'



City of Brodhead: Sewage Collection System Map



Legend

- Pump Station
- Manhole
- Force Main
- Gravity Main
- 20 Year Planning Area

DATE: May, 2015
 SCALE: 1" = 400'
 SHEET NO. **B-2**



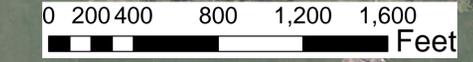
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APPENDIX B-2 SEWAGE COLLECTION SYSTEM MAP WASTEWATER FACILITIES PLAN CITY OF BRODHEAD, KENTUCKY

GRW PROJECT NO.	CLIENT PROJECT NO.	DESIGNED:	DRAWN:	REVIEWED:	APPROVED:
3929-01					
NO.	REVISIONS DESCRIPTION	DATE	BY		

SCALE: 1" = 400'



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS,

Appendix C

Sanitary Sewer Overflow Plan (SSOP)

GRW Project No. 3929-02

Sanitary Sewer Overflow Plans (SSOP) City of Brodhead, Kentucky

October, 2014



engineering | architecture | geospatial

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

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- 1. Introduction**
- 2. List of Know Sanitary Sewer Overflows (SSOs)**
- 3. Private Sources of Inflow**
- 4. Overflow Response Procedure**
- 5. Sewage Collection System Mapping**

Appendices

Appendix A – SSOP Outline provided by KY Division of Water

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

Appendix C – Private Sources of Inflow

Appendix D – Brodhead Sewer System Use Ordinance

Appendix E – Overflow Response Procedure

Appendix F – Brodhead Sewage Collection System Mapping

SANITARY SEWER OVERFLOW PLAN

CITY OF BRODHEAD, KY

1. Introduction

The City of Brodhead, Kentucky currently collect, pumps and treats wastewater flows from approximately 465 customers. The City's wastewater collection system consist of nearly 37,325 feet of mostly 8-inch diameter gravity sewers, 166 manholes and three (3) lift stations. The Wastewater Treatment Plant (WWTP) in Brodhead, Kentucky is located at 131 Chestnut Grove Road on the northwestern side of the City. The plant discharges at approximate mile point 78 of Dix River (Latitude 37° 24' 29.2"N; Longitude 84° 25' 16.5"W) which is a tributary to the Kentucky River. The plant currently is designed to treat an average daily flow of 150,000 gallons per day (GPD) with a peak hydraulic capacity of 375,000 GPD. The plant was constructed in 1972 and the most recent plant upgrade was completed in 1994.

Recently, the City of Brodhead has received Notice of Violations (NOV) from the Commonwealth of Kentucky Department for Environmental Protection, Division of Water's Enforcement Branch (DOW). One of the items noted in the violation relates to excessive wastewater flows at the Wastewater Treatment Plant (WWTP) and within the City's sewer collection system due to Inflow and Infiltration (I&I). The excessive I&I results in peak flows at the WWTP exceeding the rated capacity as well as sanitary sewer overflows within the collection system. The City has met with the DOW to discuss the issues listed in the NOV and have agreed to take the necessary actions to address the items listed in the violation. The City's first step in this process is 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 City of Brodhead's SSOP was developed based on this outline.

2. List of Known Sanitary Sewer Overflows (SSOs)

A list of known sanitary sewer overflows (SSOs) identified by the City of Brodhead 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.

3. Private Sources of Inflow

Private sources of inflow can contribute greatly to the amount of wet weather flow entering the City's wastewater collection system. Appendix C contains information regarding Brodhead's approach regarding the prevention and elimination of private sources of inflow. Also included in Appendix C is 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.

Much of this information was obtained from the City of Brodhead's Sewer System Use Ordinance, which is included 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.

4. Overflow Response Procedures

The Overflow Response Procedures developed for the City of Brodhead to follow when responding to an SSO can be found in Appendix E.

5. Sanitary Sewer Collection System Mapping

Appendix F contains maps of the Brodhead sanitary sewer collection system. These maps have been constructed from multiple sources including record drawings, GPS data (collected while inspecting the manholes) as well as CCTV data. These maps represent the best available information regarding the layout of the city's collection system.

Map F-1 shows the entire network, including gravity sewer lines (with flow directions noted), force mains, lift stations, manholes, the wastewater treatment plant, the locations of known sanitary sewer overflows (SSOs), and the tributary drainage area of the system. In addition to the map of the entire system, enlarged and more detailed maps, F-2 and F-3, have been included which better depicts the known SSOs locations.

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.
8. 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 B

City of Brodhead List of Known Sanitary Sewer Overflows (SSOs)

Known Sanitary Sewer Overflows (SSOs) Brodhead, Kentucky

SSO Number	Location	Line Size	Type of Overflow	Status/ Comments
1	Chestnut Grove Rd Manhole 003	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the WWTP pumps. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
2	Chestnut Grove Rd Manhole 003A	8-inch	Manhole	Cause of overflow has been contributed to ragging from the nearby nursing home in addition to the excessive I&I entering the system and overwhelming the WWTP pumps. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
3	Chestnut Grove Rd Manhole 003B	8-inch	Manhole	Cause of overflow has been contributed to ragging from the nearby nursing home in addition to the excessive I&I entering the system and overwhelming the WWTP pumps. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
4	Highway 1505 Manhole 008	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
5	Main Street Manhole 086	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
6	Main Street Manhole 086A	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
7	Main Street Manhole 128	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
8	Main Street Manhole 129	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.

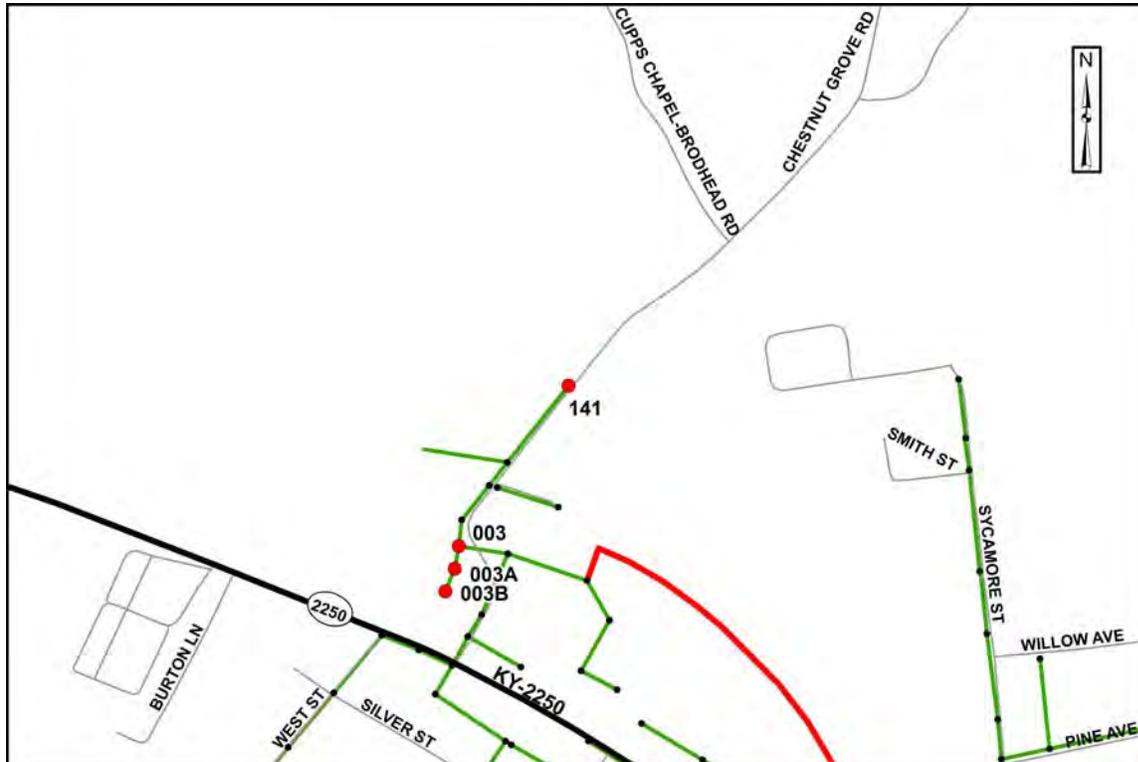
SSO Number	Location	Line Size	Type of Overflow	Status/ Comments
9	Main Street Manhole 130	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the City Hall Pump Station. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
10	Chestnut Grove Rd Manhole 141	8-inch	Manhole	Cause of overflow has been assumed to be due to excessive I&I entering the system and overwhelming the WWTP pumps. This will be confirmed as part of the SSES and Facility Plan work. Suggested improvements from these studies will be implemented to eliminate the overflow.
11				
12				
13				
14				
15				

Sanitary Sewer Overflow (SSO) Information Sheet No. 1

Manhole 003

Location: - Chestnut Grove Road – Manhole 003. Also see Map F-2.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

This overflow point is the largest within the City's sewer system. Overflows have occurred at this location approximately five (5) times per year on average over the last three years. The overflows tend to occur in the months of March through May, following heavy rain events.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 1
Manhole 003
(continued)

Immediate Area and Downstream Land Use:

Manhole 003 is located in a rural residential area on the north end of the sewer system. Downstream of this area consists of a similar “land use”.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

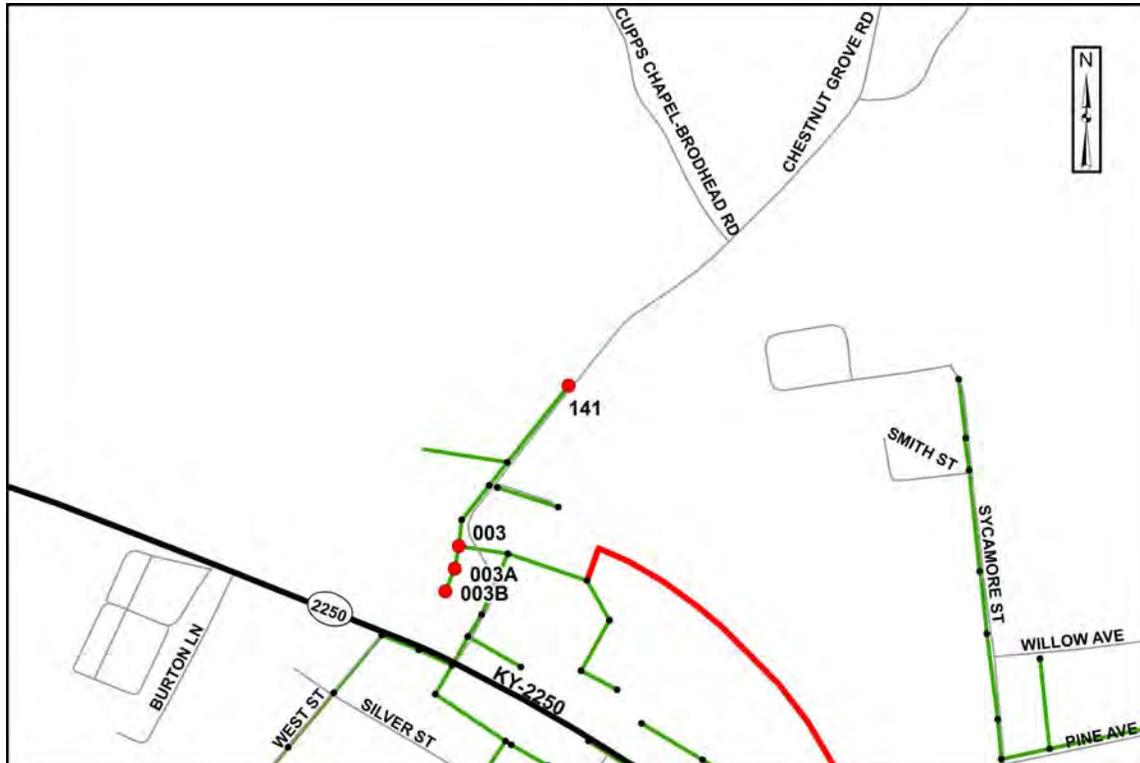
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 2 Manhole 003A

Location: - Chestnut Grove Road – Manhole 003A. Also see Map F-2.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

The last three years of data indicate that overflows occurred at this location on three separate occasions. All of which were occurred in 2014, during February, March and April.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 2
Manhole 003A
(continued)

Immediate Area and Downstream Land Use:

Manhole 003A is located in behind the nursing home at West Main St. and Chestnut Grove Rd. Downstream of this manhole is rural residential area.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

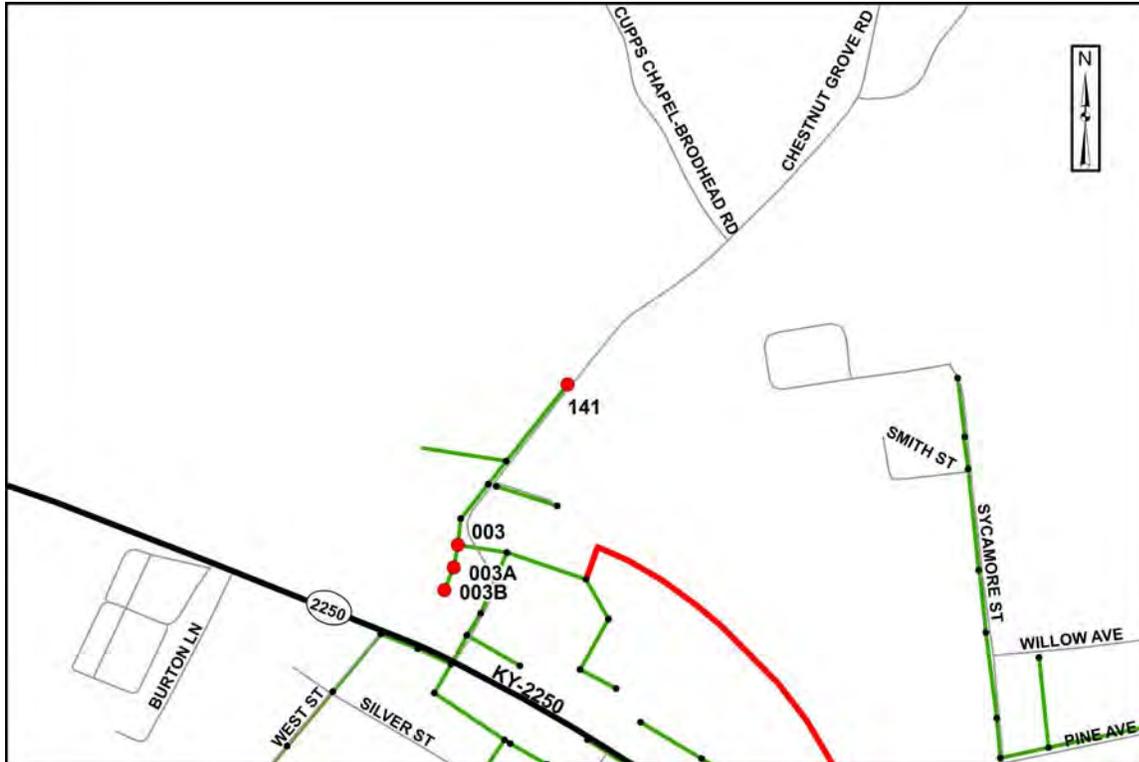
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 3 Manhole 003B

Location: - Chestnut Grove Road – Manhole 003B. Also see Map F-2.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

The last three years of data indicate that overflows occurred at this location on two separate occasions. All of which were occurred in 2014, during February and April.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 3
Manhole 003B
(continued)

Immediate Area and Downstream Land Use:

Manhole 003B is located in behind the nursing home at West Main St. and Chestnut Grove Rd. Downstream of this manhole is rural residential area.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

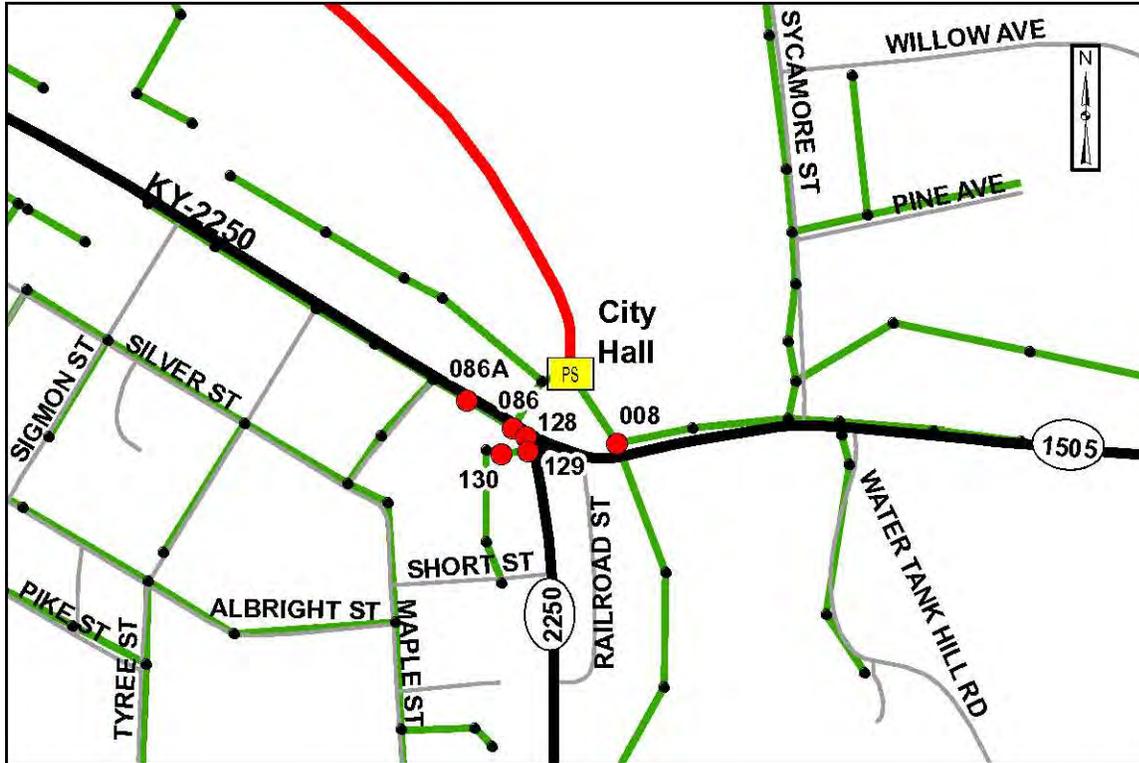
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 4 Manhole 008

Location: - North of Highway 1505 & east of Fire Station – Manhole 008. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

Overflows occurred at this location on three separate occasions over the last three years. Two overflows occurred in April of 2014, and one in July of 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 4
Manhole 008
(continued)

Immediate Area and Downstream Land Use:

Manhole 008 is located along the eastern bank of the Dix River just behind the Fire Department near the Highway 1505 road crossing. Overflows from this manhole will enter into the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

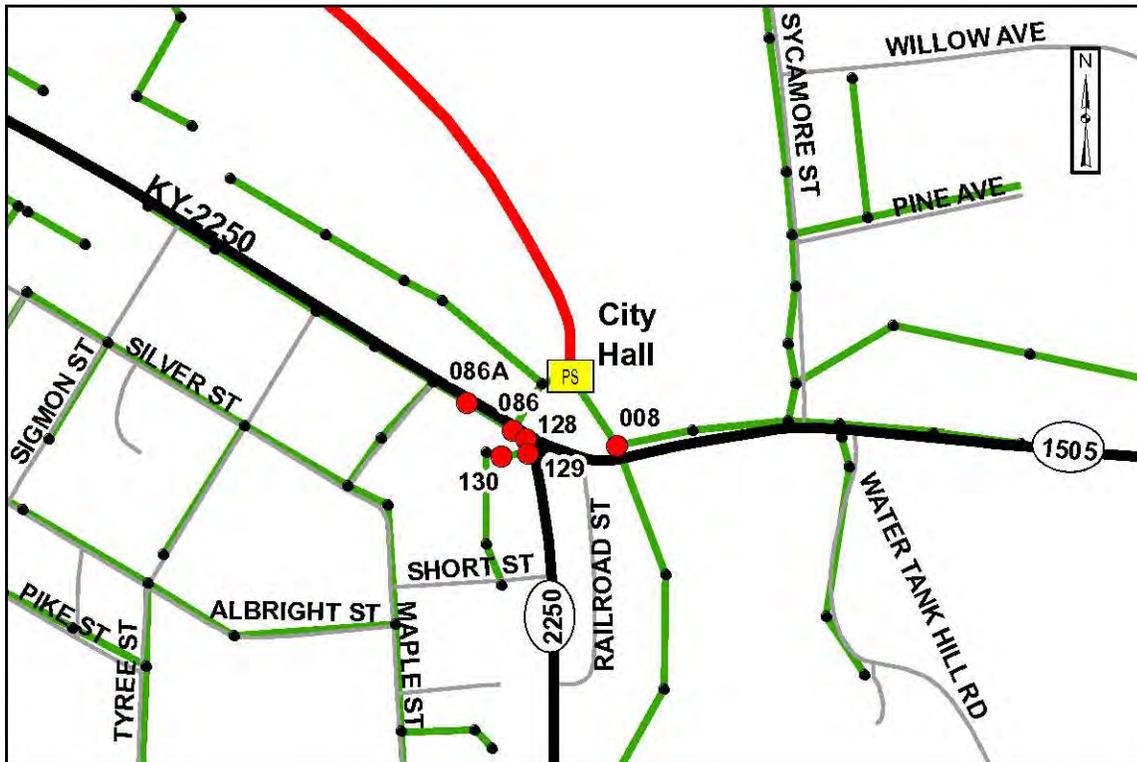
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 5 Manhole 086

Location: - West Main Street near the intersection with KY 1505 – Manhole 086. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

Overflows occurred at this location on three separate occasions over the last three years. One overflow occurred in February 2011, the other two overflows occurred in April 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 5
Manhole 086
(continued)

Immediate Area and Downstream Land Use:

Manhole 086 is located in pavement of Main Street near City Hall. The area downstream of this overflow is commercial. Also located near the manhole are storm drain inlets that drain to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

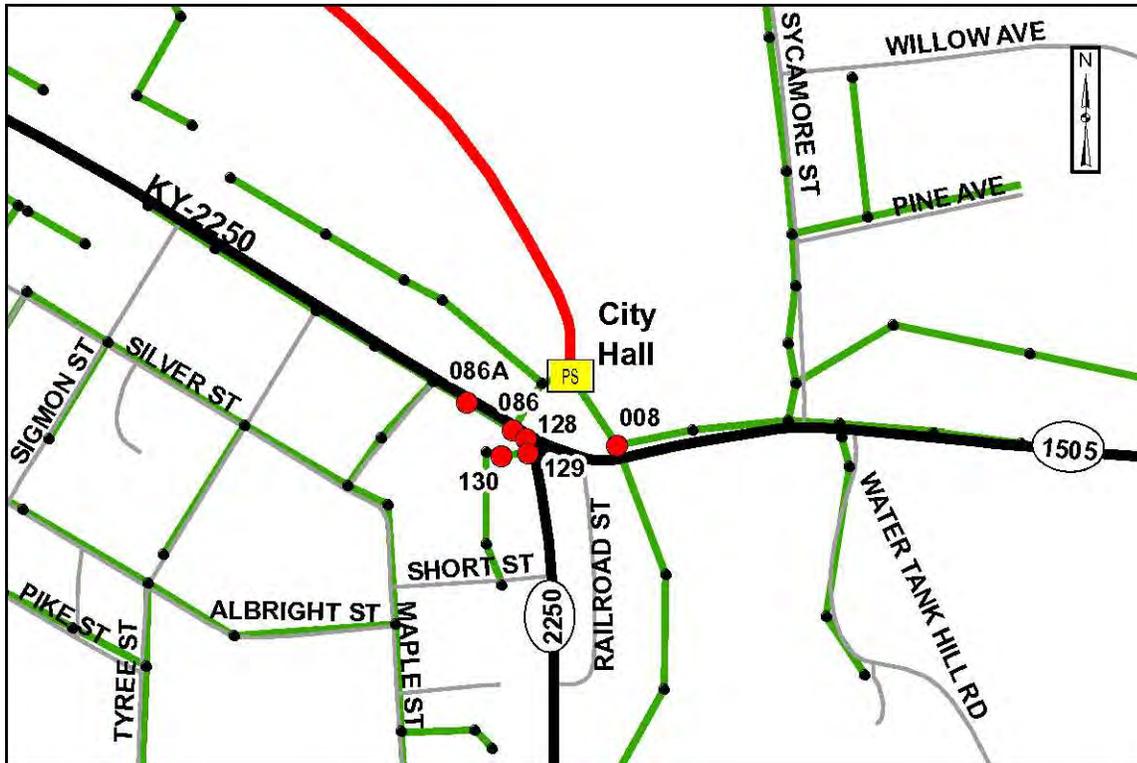
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 6 Manhole 086A

Location: - West Main Street near the intersection with KY 1505 – Manhole 086A. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

Overflows occurred at this location on two separate occasions over the last three years. Both overflow occurred in April 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 6
Manhole 086A
(continued)

Immediate Area and Downstream Land Use:

Manhole 086A is located in pavement of Main Street near City Hall. The area downstream of this overflow is commercial. Also located near the manhole are storm drain inlets that drain to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

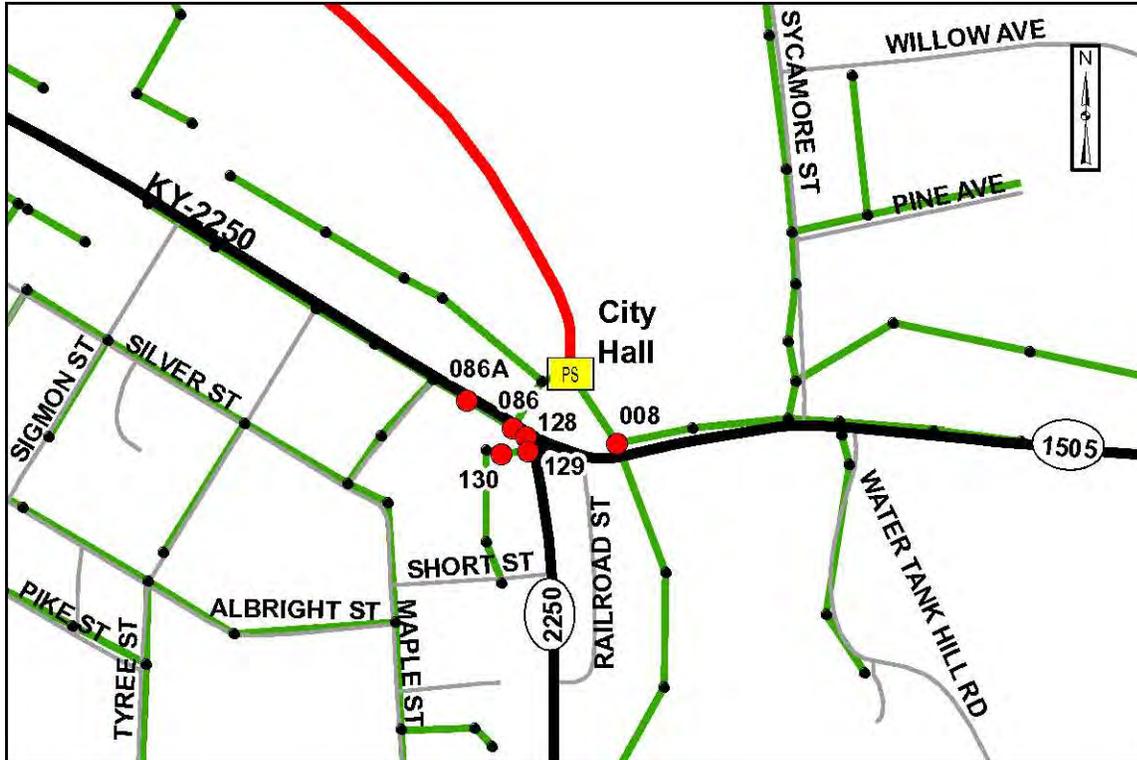
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 7 Manhole 128

Location: - West Main Street near the intersection with KY 1505 – Manhole 128. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

An overflow occurred at this location once over the last three years. This occurred on April 29, 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 7
Manhole 128
(continued)

Immediate Area and Downstream Land Use:

Manhole 128 is located in pavement of West Main Street near City Hall. The area downstream of this overflow is commercial. Also located near the manhole are storm drain inlets that drain to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

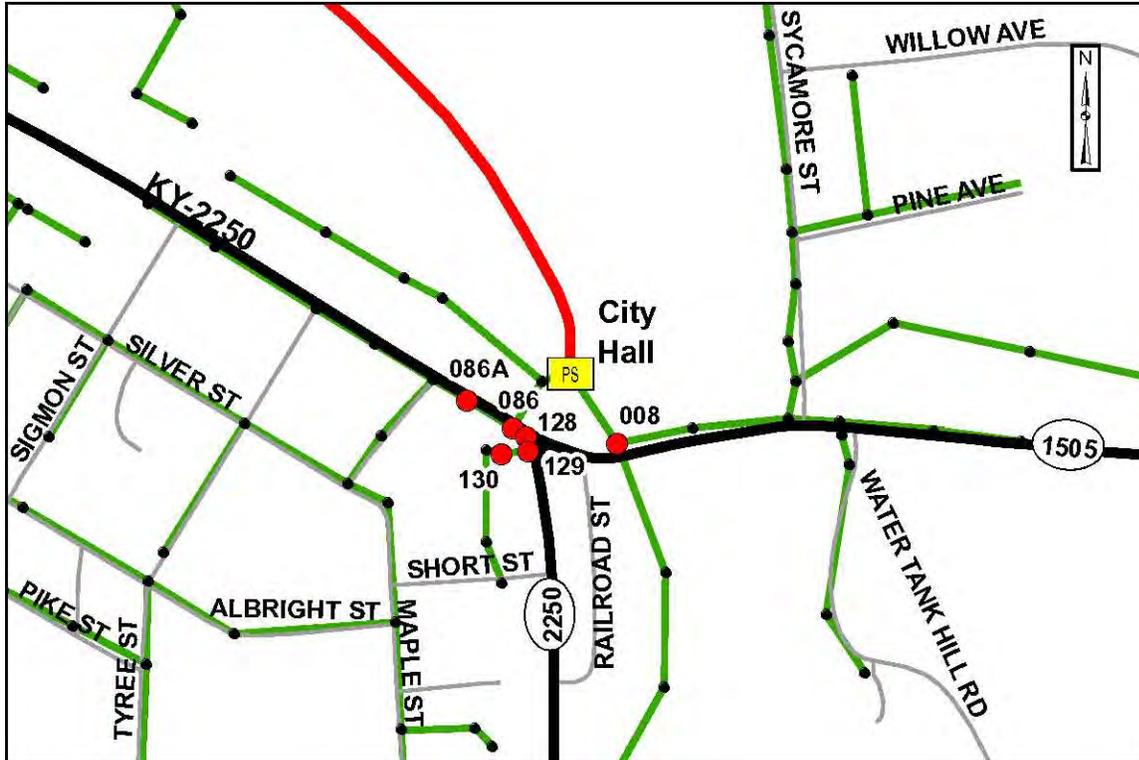
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 8 Manhole 129

Location: - South Main Street near the intersection with KY 1505 – Manhole 129. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

An overflow occurred at this location once over the last three years. This occurred on April 29, 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 8
Manhole 129
(continued)

Immediate Area and Downstream Land Use:

Manhole 129 is located in pavement of South Main Street near City Hall. The area downstream of this overflow is commercial. Also located near the manhole are storm drain inlets that drain to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

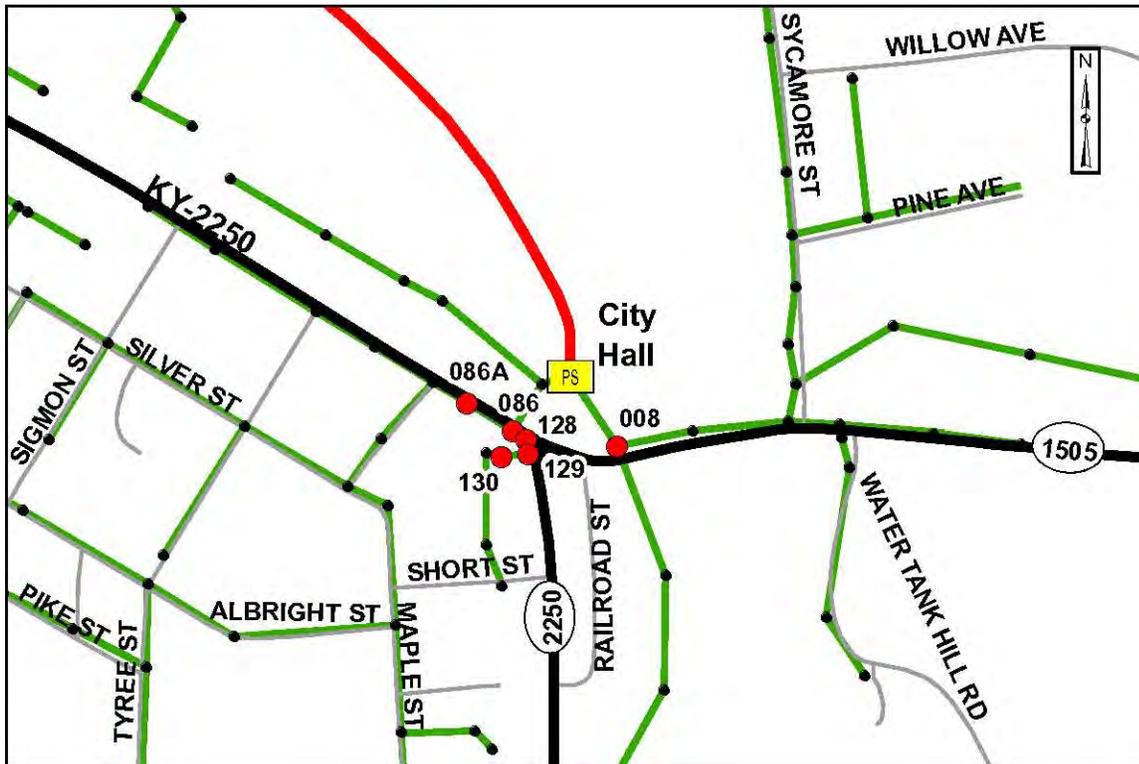
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 9 Manhole 130

Location: - In the gravel parking area behind Brodhead Farm Equipment off South Main Street near the intersection with KY 1505 – Manhole 130. Also see Map F-3.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

An overflow occurred at this location once over the last three years. This occurred on April 29, 2014.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 9
Manhole 130
(continued)

Immediate Area and Downstream Land Use:

Manhole 130 is located in a gravel parking area behind the Brodhead Farm Equipment store at the intersection of South Main Street and KY 1505 across from City Hall. The area downstream of this overflow is commercial. Also located near the manhole are storm drain inlets that drain to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

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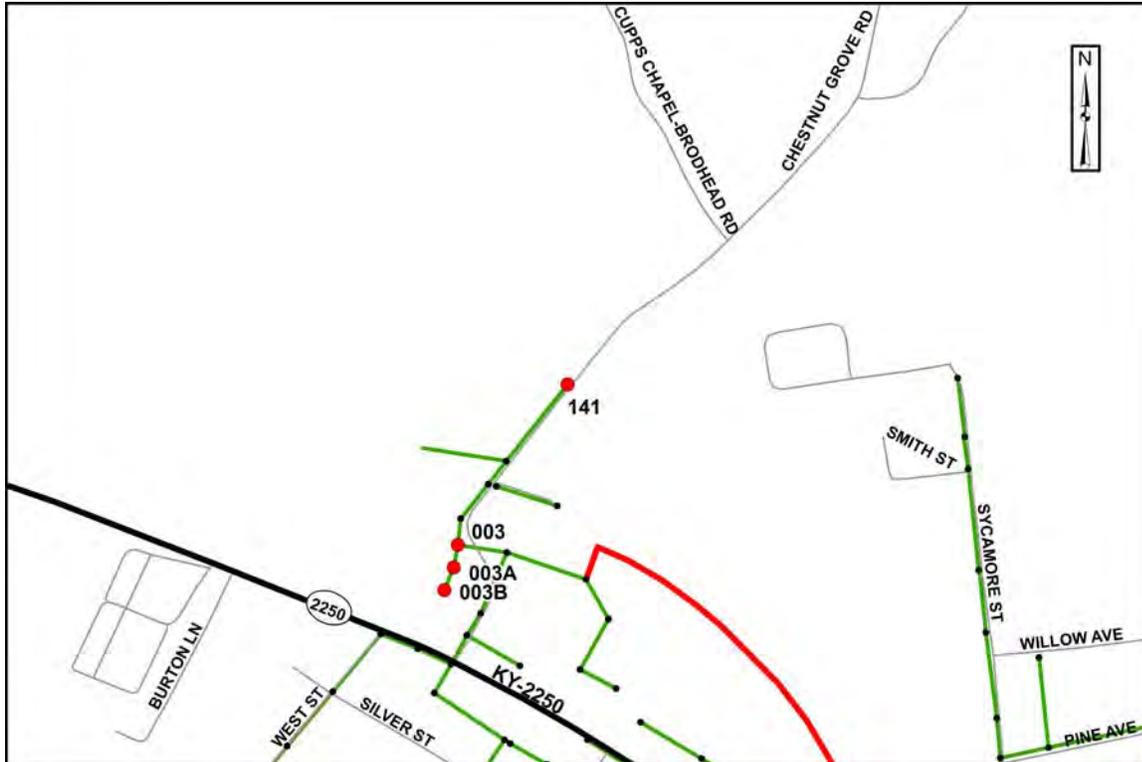
Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Sanitary Sewer Overflow (SSO) Information Sheet No. 10 Manhole 141

Location: - Chestnut Grove Road – Manhole 141. Also see Map F-2.

Line Size: - 8-inch gravity sewer inlet pipes



Overflow Frequency:

An overflow occurred at this location once over the last three years. This occurred on March 24, 2012.

Estimate of Annual Volume of Overflow:

Historically the City has not recorded the estimated amounts of flow (volume) escaping the sewer system during an overflow event; only noted the duration of which the overflow occurred. Without knowing intensity of the overflow we have no way of estimating the amount of sewage lost per occurrence.

Type of Overflow: - Manhole

Receiving Stream: - Dix River

Sanitary Sewer Overflow (SSO) Information Sheet No. 10
Manhole 141
(continued)

Immediate Area and Downstream Land Use:

Manhole 141 is located in a rural residential area on the north end of the sewer system. Downstream of this area consists of a similar “land use.” This area drains to the Dix River.

Previous, Current or Proposed Studies to investigate the Overflow:

The City is currently working on a Sanitary Sewer Evaluation Study (SSES) and a Facilities Plan Update. The City has completed Smoke Testing (2013), CCTV Inspections of the gravity sewers lines (2014) and manhole inspections (2013, including GPS locations). The City will also be evaluating their pumping stations and Wastewater Treatment Plan in 2014. These investigations/inspections have been done in an effort to find the causes and reduce the sources of I&I entering the system which should eliminate the overflows that have occurred at this location.

Previous, Current or Proposed Rehabilitation or Construction work to remediate or eliminate the Overflow:

The City is currently seeking funding for two (2) proposed sewer system projects.

The Phase 1 – Sewer Rehabilitation project has been partially funded by KIA’s CWSRF Loan (A15-010). This project is to include rehabilitation of the sewer lines/manholes, a new wet weather pump station, and a new equalization tank. It is estimated that this project will be constructed in the summer of 2015, provided additional funding (CDBG, SRF) can be secured.

The Phase 2 project is a Wastewater Treatment Plant Expansion and will also require the City to secure funding to proceed with the project. This project is expected to be ready to go to construction in 2017.

We feel that this overflow will be eliminated upon the completion of the proposed rehabilitation projects.

Schedule to Eliminate the Overflow:

The City is expecting to have their SSES, SSOP and Facility Plan studies completed by the end of 2014. The rehabilitation work would be expected to be under construction during the Summer of 2015.

Appendix C

Private Sources of Inflow

Private Sources of Inflow

1. Method for Locating Illegal Connections to Sanitary Sewer System

The City of Brodhead uses smoke testing to identify private sources of inflow such as downspouts, roof drains, sump pumps, yard drains, area drains and other illegal connections to the sanitary sewer system. Smoke testing results are used to eliminate the illegal connections.

The City completed smoke test of their full sewer system in September 2013.

2. Ordinances and Procedures for Eliminating Illegal Connections

Article V of the City of Brodhead's Sewer System Use Ordinance (see Appendix D) relates to the "Building Sewers and Connections." In this article, the city addresses the permits, fees, design standards and codes.

Section 7 prohibit the connection of roof, foundation, areaway, parking lot, roadway or other surface runoff or groundwater drains to any sanitary sewer.

Article VI, Section 1 states that any storm water, surface water, groundwater, roof runoff, subsurface or other waters not required to be treated shall be connect to the storm water facilities. Any connection listed above shall be deemed to be in violation if connected to the wastewater sewers.

The City of Brodhead uses Article V and Article VI of the Sewer System Use Ordinance as a tool to eliminate illegal connections to the sanitary sewer system.

3. Penalties for Violation of Ordinances or Procedures and Method of Enforcement

Article II Section 4, 5 and 6 discusses the Notice of Violations and Violations enforcement procedures. Penalties for any sewer user who violates any provision of the Ordinance range from fines of \$5 to \$25 per day that the violations continue after being notified or may be subject to disconnection from the City's wastewater facilities. Reconnection will not be made until all fees, charges and penalties have been made in addition to the \$30 reconnect fees.

When an illegal connection to the sanitary sewer system is identified the owner(s) of the building with an illegal connection will bear all costs incidental to removal of the connection.

4. Plan and Schedule to Address Existing Illegal Connections

Although the City of Brodhead recognizes that illegal connections exist in their sanitary sewer system, the City is currently unaware of any specific locations with private sources of inflow. The upcoming Sanitary Sewer Evaluation Study of the entire collection system will identify illegal connections into the system and will contain a compliance schedule and description of corrective actions for removing these illegal sources of inflow.

5. Plan to Prevent Further Illegal Connections to the Sanitary Sewer System

Article II Sections 11 and Article IV Sections 3 of the Brodhead Sewer System Use Ordinance (see Appendix D) are used to prevent further illegal connections to the sanitary sewer system. Article V Sections 1 requires a building sewer permit for either residential service or service to commercial and industrial establishments. Article V Sections 5 through 8 gives details on the design and installation of acceptable sanitary sewer building connections. Article II Section 7 and Article V Section 9 requires all building sewers to be inspected and tested when the building sewer is completed. The building sewer permit and final inspection will allow the City to enforce the illegal connections provisions of the Sewer System Use Ordinance for new buildings and prevent further illegal connections to the sanitary sewer system

Appendix D

City of Brodhead, Kentucky Sewer System Use Ordinance No. 2-95.01

**CITY OF BRODHEAD
SEWER USE ORDINANCE
ORDINANCE NUMBER 2-95.01**

SEWER ORDINANCE PREAMBLE

AN ORDINANCE regulating the use of public and private sewers and drains, private wastewater disposal, the installation and connection of building sewers, and the discharge of water and wastes into the public sewer system(s) and providing penalties for violations thereof: WHEREAS, the federal government has enacted and amended the Federal Water Pollution Control Act now known as the Federal Clean Water Act (33 U.S.C. 1150 et seq.), and the City of Brodhead desires to remain in compliance therewith, and

WHEREAS, the City of Brodhead desires to ensure that the use of the public wastewater system operated by it will conform to the best sanitary engineering practices, and

WHEREAS, the City of Brodhead desires to regulate the use of the public wastewater system operated by it:

NOW, THEREFORE, BE IT ORDAINED and enacted by the City Council of the City of Brodhead, County of Rockcastle, State of Kentucky, as follows:

ARTICLE I: DEFINITIONS

SECTION 1. SPECIFIC DEFINITIONS. Unless the context of usage indicates otherwise, the meaning of specific terms in this ordinance shall be as follows:

Act shall mean the Federal Clean Water Act, as amended.

A *STM* shall mean the American Society for Testing and Materials.

BOD (denoting biochemical oxygen demand) shall mean the quantity of oxygen used in the biochemical oxidation of organic matter under standard laboratory procedure during days at 20°C, expressed in milligrams per liter.

City shall mean the City of Brodhead.

Commercial User (Class II) shall include any property occupied by a nonresidential establishment not within the definition of an "Industrial User (Class III)", and which is connected to the wastewater facilities.

Day shall mean the 24-hour period beginning at 12:01 a.m.

Easement shall mean an acquired legal right for the specific use of land owned by others.

EPA Shall mean the United States Environmental Protection Agency.

Garbage shall mean the solid animal and vegetable wastes resulting from the domestic or commercial handling, storage, dispensing, preparation, cooking, and serving of foods.

Groundwater shall mean water within the earth.

Industrial User (Class III) shall mean any nonresidential user identified in Division A, B, D, E, or I of the Standard Industrial Classification Manual. Class III also shall include any user that discharges wastewater containing toxic or poisonous substances as defined in Section 307 and Section 502 of the Clean Water Act, or any substance(s) causing interference in the wastewater facilities. Class III shall include any nonresidential user who: (1) is subject to national categorical pretreatment standards, (2) has a nondomestic flow of 25,000 gallons or more per average work day, (3) contributes more than 5% of the average dry weather capacity of the wastewater facility or, (4) is determined by the state regulatory agency or the manager to have the potential to adversely affect the wastewater facility.

Interference shall mean inhibition or disruption of any sewer system, wastewater treatment process, sludge disposal system, or their operation, which substantially contributes to a violation of applicable discharge permits.

Manager shall mean the superintendent of the City's wastewater system or an authorized designee of the City.

"*May*" is permissible, "*shall*" is mandatory.

Natural Outlet shall mean any outlet into a watercourse, pond, ditch, lake, or any other body of surface or groundwater.

NPDES shall mean National Pollutant Discharge Elimination System permit program, whether administered by the EPA or by the State of Kentucky.

Owner shall mean the person or persons who legally own, lease, or occupy private property with wastewater facilities that discharge, or will discharge, to the Brodhead wastewater facilities.

Person shall mean any individual, firm, company, association, society, partnership, corporation, municipality, or other similar organization, agency, or group.

pH shall mean the logarithm of the reciprocal of the hydrogen in concentration expressed in grams per liter of solution, as determined by *Standard Methods*.

Pretreatment shall mean the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater before discharge from the City of Brodhead wastewater facilities.

Properly Shredded Garbage shall mean garbage that has been shredded such that all particle swill be carried freely under flow conditions, normally prevailing in the wastewater sewers, with no particle greater than 1/2 inch in any dimension.

Residential User (Class I) shall mean all premises used only for human residency and that are connected to the wastewater facilities.

Sanitary Wastewater shall mean wastewater discharged from the sanitary conveniences of dwellings, office buildings, industrial plants, or institutions.

Standard Methods shall mean the latest edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, Water Pollution Control Federation, and American Water Works Association.

State means the Commonwealth of Kentucky.

Storm Water shall mean a sewer for conveying storm, surface, and other waters, that are not intended to be transported to a treatment facility.

Surface Water shall mean water that occurs when the rate of precipitation exceeds the rate at which water may percolate into the soil.

Suspended Solids shall mean the total suspended matter that either floats on the surface of, or is in suspension in, water or wastewater, as determined by 40 CFR 136.

Toxics shall mean any of the pollutants designed by federal regulations pursuant to Section 307(a)(1) of the Act.

Wastewater shall mean a combination of liquid and water-carried wastes from residences, commercial buildings, industries, and institutions, together with any groundwater, surface water, or storm water that may be present.

Wastewater Facility shall mean the combination of wastewater sewers and treatment facilities.

Wastewater Sewer shall mean the structures, processes, equipment, and arrangements necessary to colleq and transport wastewaters to the treatment facility.

Wastewater Treatment Facility shall mean the structures, processes, equipment, and arrangements necessary to treat and discharge wastewaters.

WEF shall mean the Water Environment Federation.

ARTICLE II: GENERAL PROVISIONS

SECTION I. PURPOSE. The purpose of this Ordinance is to provide for the maximum possible beneficial public use of the Brodhead wastewater facilities through regulation of sewer construction, sewer use, and wastewater discharges; to provide for equitable distribution of the costs of the City's wastewater facilities; and to provide procedures for complying with the requirements contained herein.

SECTION 2. SCOPE. (a) The definition of terms used in this ordinance are found in Article I. The provisions of this ordinance shall apply to the discharge of all wastewater to facilities of the City. This ordinance provides for use of the City's wastewater facilities, regulation of sewer construction, control of the quantity and quality of wastewater discharged, wastewater pretreatment, equitable distribution of costs, sewer construction plans, issuance of wastewater discharge permits, minimum sewer construction standards and conditions, and penalties and other procedures in cases of violation of this ordinance.

(b) This ordinance shall apply to the City of Brodhead and to persons outside the City who are, by contract or agreement with the City, users of the City's wastewater sewers or wastewater treatment facilities.

SECTION 3. ADMINISTRATION. Except as otherwise provided herein, the manager of the City's wastewater systems shall administer, implement, and enforce the provisions of this ordinance.

SECTION 4. NOTICE OF VIOLATION. Any person found in violation of this ordinance or any requirement of a permit issued hereunder, may be served with a written notice stating the nature of the violation and providing a reasonable time limit for compliance. Any such notice given shall be in writing and served in person or by registered or certified mail. The notice shall be sent to the last address of the violator known to the manager. When the address is unknown, service may be made on the owner of record of the property involved. If satisfactory action is not taken in the time allotted by the notice, Section 5 of this Article shall be implemented.

SECTION 5. VIOLATIONS. (a) Any person who continues to violate the discharge provisions of this ordinance beyond the time limit, provided in Section 4 above, may be charged with commission of a misdemeanor and, after conviction thereof, shall be fined not less than \$5 or not more than \$25, for each day the violation continues, or may be subject to disconnection from the City's wastewater facilities.

(b) Each day or portion thereof a violation continues shall constitute a separate violation.

SECTION 6. FEES AND CHARGES. (a) All fees and charges payable under the provisions of this ordinance shall be paid to the City. Such fees and charges shall be set forth herein or as established in the latest edition of the City's wastewater service charge ordinance.

(b) All fees, penalties, and charges collected under this ordinance, and the wastewater service charge ordinance, shall be used for the sole purpose of constructing, operating or maintaining the wastewater facilities of the City, or the retirement of debt incurred for same required pursuant to federal law.

(c) All fees and charges payable under the provisions of this ordinance are due and payable on the receipt of notice of charges. Unpaid charges shall become delinquent and shall be subject to penalty and interest charges as outlined for in the latest edition of the City's wastewater service charge ordinance.

(d) Any termination of sewer services that results in water or sewer cut-off shall not be reconnected until all charges, penalties and a \$30 reconnection fee is paid to the City.

(e) The performance of cleaning-out a private sewer line shall be borne by the private entity at the rate of \$20/hour with a minimum of one hour.

SECTION 7. INSPECTIONS. (a) The manager, bearing proper credentials and identification, shall be permitted to enter properties at any reasonable time for the purposes of inspection, observation, measurement, and sampling of the wastewater discharge to ensure that discharge to the City's wastewater facilities is in accordance with the provisions of this ordinance.

(b) The manager, bearing proper credentials and identification, shall be permitted to enter all private property at reasonable times, through which the City holds an easement for the purposes of inspection, observation, measurement, sampling, repair, and maintenance of any of the City's wastewater facilities within the easement. All entry and any subsequent work on the easement shall be done in full accordance with the terms of the easement pertaining to the private property involved.

(c) While performing the necessary work on private properties referred to in Section 7(a) and (b) above, the manager shall observe all safety rules established by the owner or occupancy of the property and applicable to the premises.

(d) During the performance on private properties of inspections, wastewater sampling, or other similar operations referred to in Sections 7(a) and (b) above, the owner and occupant shall be: (1) held harmless for personal injury or death of the manager and the loss of or damage to City supplies or equipment; (2) indemnified against loss of or damage to property of the owner or occupant by the manager; and (3) indemnified against liability claims asserted against the owner or occupant for personal injury or death of the manager or for loss of or damages to the owner or occupant to maintain safe conditions as required by Article VII of this ordinance.

SECTION 8. VANDALISM. No person shall maliciously, willfully, or negligently break, damage, destroy, uncover, deface, or tamper with any structure, appurtenance, or equipment that is part of the City's wastewater facilities. Any person who violates this section shall be guilty of a misdemeanor and, upon conviction, is punishable by a fine not to exceed \$500.

SECTION 9. SEVERABILITY. A finding by any court or other jurisdiction that any part or provision of this ordinance is invalid shall not affect the validity of any other part or provision of this ordinance that can be implemented without the invalid parts or provisions.

SECTION 10. AMENDMENTS OF THE ORDINANCE. Public notice shall be given in accordance with applicable provisions of the City charter, other City ordinances, or state and federal law before adoption of any amendments of this ordinance.

SECTION 11. SEWER CONNECTIONS. That no sewer taps (breaking or entering into sewer lines of the City) shall be made by any person, firm or corporation except the City. The City will, upon application to the City and payment of any tapping or connection fee, as may be prescribed by the City, tap the City sewer and run a lateral to the property line of any applicant where sewers are available, and any and all installations or attachments thereto shall be made by the applicant under the directions and supervision of the City, provided that nothing herein shall be construed as requiring the City to furnish a sewer connection or sewer services to any premises where a City sewer is not available at the time that the application is made. Additional construction costs for running a lateral to a previously unsewered site shall be borne by the applicant at an actual cost basis.

Sewer connection charges shall be \$250.

ARTICLE III: USE OF City's WASTEWATER FACILITIES

SECTION 1. WASTE DISPOSAL. 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 of Brodhead, or in any area under the jurisdiction of said City, any human or animal excrement, garbage, or other objectionable waste.

SECTION 2. WASTEWATER DISCHARGES. Wastewater discharges to the City's wastewater facilities are not authorized unless approved by the Manager in accordance with provisions of this ordinance.

SECTION 3. WASTEWATER DISPOSAL. Except as provided in this ordinance, 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.

SECTION 4. CONNECTION TO SEWER REQUIRED. The owner of any house, building or property used for human occupancy, employment, recreation, or other purposes under the jurisdiction of this ordinance and abutting on any street, alley, or rights-of-way in which there is or may be located a wastewater sewer connected to the treatment facility of the City, is required at the owner's expense to install suitable toilet facilities therein and to connect such facilities directly to the proper sewer in accordance with the provisions of this ordinance, within 90 days after date of official notice to do so provided the proper wastewater sewer is within 100 feet of the property line. This section shall not apply to any person served by a privately constructed, owned, operated, or maintained wastewater sewer and wastewater treatment facility that discharges directly to a natural outlet in accordance with the provisions of this ordinance and applicable state and federal laws.

ARTICLE IV: PRIVATE WASTEWATER DISPOSAL

SECTION 1. EXCLUSIONS. Article IV shall not apply to any private system that discharges to wastewater facilities of the City of Brodhead or that discharges directly to a natural outlet by authority of a separate NPDES permit and in compliance with applicable state and federal laws.

SECTION 2. PRIVATE SYSTEM REQUIRED. All houses, buildings, or properties that are required by other authority to have sanitary or industrial wastewater facilities, are subject to the jurisdiction of this ordinance, and are located where a proper wastewater sewer is not available as specified by the provisions of Article III, Section 4, of this ordinance, shall be equipped at the owner's expense with suitable wastewater facilities connected to a private wastewater disposal system, which complies with the provisions of this article.

SECTION 3. CONSTRUCTION PERMIT. Before beginning construction of a private wastewater disposal system required under Section 2 above, the owner shall first obtain a written construction permit signed by the manager. The application for such permit shall be made on a form furnished by the City, which the applicant shall supplement by any plans, specifications, and other information relevant to wastewater discharges as are deemed necessary by the manager. A permit and inspection fee of \$25 shall be paid to the City at the time the application is filed.

SECTION 4. DESIGN REQUIREMENTS. The type, capacities, location, and layout of a private wastewater disposal system shall comply with all requirements of the Department of Public Health of the State of Kentucky, or applicable federal law. No permit shall be issued for any private wastewater disposal system employing subsurface soil disposal facilities where the area of the lot is less than 200 square feet. Septic tank or cesspool discharges require the use of subsurface disposal. This requirement excludes deep well disposal as defined by state and federal laws.

SECTION 5. OPERATING PERMIT. Before beginning of operation of a private wastewater disposal system, the owner shall first obtain a written operating permit signed by the manager. The operating permit shall not become effective until the installation is completed to the satisfaction of the manager. The manager shall be allowed to inspect the work at any stage of construction, and, in any event, the applicant for the operating permit shall notify the manager when the work is ready for final inspection and before any underground portions are covered. The inspection shall be made within 40 normal business hours after receipt of notice by the manager.

SECTION 6. CONNECTION TO BRODHEAD'S SYSTEM WHEN AVAILABLE. At such time as a wastewater sewer becomes available, as defined in Article III, Section 4, to a property served by a private wastewater disposal system, a direct connection shall be made to the wastewater sewer within 90 days, and any septic tanks, cesspools, and similar wastewater disposal facilities shall be emptied as prescribed by local regulations and filled with suitable material.

SECTION 7. SANITARY OPERATION REQUIRED. The owner shall operate and maintain the private wastewater disposal facilities in a sanitary manner at all times in accordance with the conditions of the operating permit and at no expense to the City. Such facilities shall be subject to inspection by the manager at reasonable times.

SECTION 8. FURTHER REQUIREMENTS. No statement contained in this article shall be construed to interfere with any additional requirements that may be imposed by the county health officer, or other applicable authority.

ARTICLE V: BUILDING SEWERS AND CONNECTIONS

SECTION 1. CONNECTION PERMIT. (a) No unauthorized person shall uncover, make any connection with or opening into, use, alter, or disturb any wastewater sewer or storm sewer without first obtaining a written permit from the manager.

(b) There shall be three (3) classes of permits for connections to Brodhead's wastewater facilities: Class I - residential, Class II - commercial, and Class III - industrial. In all cases, the owner shall make application for a permit to connect the City's wastewater facilities on a special form furnished by the City. The permit application shall be supplemented by wastewater information required to administer this ordinance. A permit and inspection fee of \$25 for a Class I, \$25 for a Class II, and \$50 for a Class III connecting permit shall be paid to the City at the time the application is filed.

(c) Connections to a storm sewer shall be subject to a permit and inspection fee of \$25. Such connections shall be subject to the provisions of this ordinance and the approval of the manager.

SECTION 2. CONNECTION COSTS. The costs and expenses incidental to the building sewer installation and connection to the City's wastewater facilities shall be borne by the owner. The owner shall indemnify the City from any loss or damage that directly or indirectly may result from the installation of the building sewer.

SECTION 3. SEPARATE CONNECTIONS REQUIRED. A separate and independent building sewer shall be provided for every building, except when 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, court-yard, or driveway. In such cases, the building sewer serving the front building may be extended to the rear building and the whole considered as one building sewer. The City assumes no obligation or responsibility for damage caused by or resulting from any single building sewer that serves two buildings.

SECTION 4. EXISTING BUILDING SEWERS. Existing building sewers may be used for connection of new buildings only when they are founded, after examination and test by the manager, to meet the requirements of this ordinance.

SECTION 5. BUILDING SEWER DESIGN. The size, slope, alignment, construction materials, trench excavation and backfill methods, pipe placement, jointing, and testing methods used in the construction and installation of a building sewer shall conform to the

building and plumbing code or other applicable requirements of the City. In the absence of code provisions or in amplification thereof, the materials and procedures set forth in appropriate specifications of the ASTM and WEF shall apply.

SECTION 6. BUILDING SEWER ELEVATION. Whenever practical, the building sewer shall be brought to a building at an elevation below the basement floor. In buildings in which any building drain is too low to permit gravity flow to the City's wastewater sewer, wastewater carried by such building drain shall be lifted by an approved means and discharged to a building sewer draining to the City sewer.

SECTION 7. SURFACE RUNOFF AND GROUNDWATER DRAINS. (a) No person shall connect roof, foundation, areaway, parking lot, roadway, or other surface runoff or groundwater drains to any sewer that is connected to a wastewater treatment facility unless such connection is authorized in writing by the manager.

(b) Except as provided in Section 7(a) above, roof, foundation, areaway, parking lot, roadway, or other surface runoff or groundwater drains shall discharge to natural outlets or storm sewers.

SECTION 8. CONFORMANCE TO APPLICABLE CODES. (a) The connection of a building sewer into a wastewater sewer shall conform to the requirements of the building and plumbing code or other applicable requirements to the City or to the procedures set forth in appropriate specifications of the ASTM or the WEF. The 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 manager before installation.

(b) The connection of a surface runoff or groundwater drain to a storm sewer or natural outlet designed to transport surface runoff or groundwater drainage shall conform to the requirements of the applicable building code or other applicable requirements of the City. The connection of any such drain to a wastewater sewer under special permit as provided under Section 7(a) of Article V shall conform to the requirements specified by the manager as a condition of approval of such permit.

SECTION 9. CONNECTION INSPECTION. The applicant for a building sewer or other drainage connection permit shall notify the manager when such sewer or drainage connection is ready for inspection before its connection to the City's facilities. Such connection and testing, as deemed necessary by the manager, shall be made under the supervision of the manager.

SECTION 10. EXCAVATION GUARDS AND PROPERTY RESTORATION. Excavation for building sewer installation shall be adequately guarded with barricades and lights 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.

SECTION 11. PROTECTION OF CAPACITY FOR EXISTING USERS. The manager shall not issue a permit for any class of connection to the City's wastewater sewers or wastewater treatment facilities unless there is sufficient capacity not legally committed to other users in the

wastewater sewers and treatment facilities to convey and adequately treat the quantity of wastewater that the requested connection will add to the system. The manager may permit such a connection if there are legally binding commitments to provide the needed capacity.

ARTICLE VI: CONDITIONS TO USE THE City's WASTEWATER SEWERS

SECTION 1. SPECIAL USES OF WASTEWATER SEWERS. All uncontaminated discharges of storm water, surface water, groundwater, roof runoff, subsurface drainage, or other waters not required to be treated in the treatment facility shall be made to storm sewers or natural outlets designed for such discharges, except as authorized under Article V, Section 7(a). Any connection, drain, or arrangement that will permit such waters to enter any other wastewater sewer shall be deemed to be in violation of this section and this ordinance.

SECTION 2. RESTRICTED DISCHARGES. (a) No person shall discharge or cause to be discharged to any of the City's wastewater facilities any substances, materials, waters, or wastes in quantities or concentrations that will:

1. Create a fire or explosion hazard including, but not limited to, gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid, or gas;
2. Cause corrosive damage or hazard to structures, equipment, or personnel of the wastewater facilities, and in no case will discharges be allowed with a pH lower than 6.0 or greater than 10.
3. Cause obstruction to the flow in sewers, or other interference with the operation of wastewater facilities due to accumulation of solid or viscous materials;
4. Constitute a rate of discharge or substantial deviation from normal rates of discharge ("slug discharge") sufficient to cause interference in the operation and performance of the wastewater facilities;
5. Contain heat in amounts that will accelerate the biodegradation of wastes, causing excessing amounts of hydrogen sulfide to form in the wastewater sewer, or inhibit biological activity in the wastewater treatment facilities, and in no case shall the discharge of heat cause the temperature in the City wastewater sewer to exceed 58°C (150°F) or the temperature of the influent to the treatment facilities to exceed 40°C (104°F) unless the facilities can accommodate such heat;
6. Contain more than 100 milligrams per liter of nonbiodegradable oils of mineral or petroleum origin;
7. Contain floatable oils, fat, or grease;
8. Contain noxious, malodorous gas or substance in quantities that create a public nuisance or a hazard to life;
9. Contain radioactive wastes in harmful quantities as defined by applicable state and federal guidelines;
10. Contain any garbage that has not been properly shredded to a size or shape that causes no operational problems;
11. Contain any odor or color-producing substances exceeding concentration limits that may be established by the manager and the City's NPDES permit.

(b) If in establishing discharge restrictions, discharge limits, or pretreatment standards pursuant to this article, the Manager establishes concentration limits to be met by an industrial user, the manager in lieu of concentration limits may establish mass limits of comparable stringency for an individual industrial user at the request of such user.

SECTION 3. FEDERAL CATEGORICAL PRETREATMENT STANDARDS. (a) No person shall discharge or cause to be discharged to any wastewater facilities, wastewaters containing substances in excess of the quantity prescribed by the applicable Federal Categorical Pretreatment Standard promulgated by EPA, except as otherwise provided in this section. Compliance with such applicable pretreatment standards shall be met within 3 years of the date the standard is promulgated for existing systems; however, compliance with a categorical pretreatment standard for new sources shall be required upon connection to the POTW.

(b) Upon application by a Class III user, the manager shall revise any limitation on substances specified in the applicable pretreatment standards to reflect removal of the substances by the wastewater treatment facility. The revised discharge limit for specified substances shall be derived in accordance with federal law.

(c) Upon application by a Class III user, the manager shall adjust any limitation on substances specified in the applicable pretreatment standards to consider factors relating to such users that are fundamentally different from the factors considered by EPA during the development of the pretreatment standard. Requests for and determinations of fundamentally different adjustments shall be in accordance with federal law.

(d) The manager shall notify any Class III user affected by the provisions of this section and establish an enforceable compliance schedule for each.

SECTION 4. SPECIAL AGREEMENTS. Nothing in this Article shall be constructed as preventing any special agreement or arrangement between the City and any user of the wastewater facilities, whereby wastewater of unusual strength or character is accepted into the system and specially treated subject to any applicable payments or user charges.

SECTION 5. WATER AND ENERGY CONSERVATION. The conservation of water and energy shall be encouraged by the manager. In establishing discharge restrictions for industrial users, the manager shall consider already implemented or planned conservation steps revealed by the Class III user. At the manager's request, each industrial user will provide pertinent information showing that the quantities of substances or pollutants have not been nor, will be, increased as a result of the conservation steps. After such a showing is deemed satisfactory, the manager shall adjust the discharge restrictions, which have been asked on concentrations, to reflect the conservation steps.

ARTICLE VII: CLASS III - INDUSTRIAL DISCHARGES

SECTION 1. INFORMATION REQUIREMENTS. (a) All Class III discharges shall file with the City all wastewater information deemed necessary by the manager for determination of compliance with this ordinance, the City's NPDES permit conditions, and state and federal law.

Such information shall be provided by completion of a questionnaire designed and supplied by the manager and by supplements thereto as necessary. Information requested in the questionnaire and designated by the discharger as confidential is subject to the conditions of confidentiality as set forth in Section 1(c) of this Article.

(b) A person who owns, operates, or occupies properties designated as a Class III discharger at more than one location shall submit separate information for each location as may be required by the manager.

(c) The manager shall implement measures to ensure the confidentiality of information by a Class III discharger pursuant to this ordinance. In no event shall the manager delegate this responsibility or disclose any claimed confidential information to any person without prior written notice to the owner and without providing the owner the opportunity to protect such confidential information, including the right to seek judicial relief.

SECTION 2. PROVISION FOR MONITORING. (a) When required by the manager, the owner of any property serviced by a building sewer carrying Class III wastewater discharges shall provide suitable access and necessary meters and other appurtenances in the building sewer to facilitate observation, sampling, and measurements of the wastewater. Such access shall be in a readily and safely accessible location and shall be provided in accordance with plans approved by the manager. The access shall be provided and maintained at the owner's expense to be safe and accessible at reasonable times.

(b) The manager shall consider such factors as the volume and strength of discharge, rate of discharge, quantities of toxic materials in the discharge, wastewater treatment facility removal capabilities, and cost effectiveness in determining whether access and equipment for monitoring Class III wastewater discharges shall be required.

(c) When the manager determines access and equipment for monitoring or measuring Class III wastewater discharges are not practicable, reliable, or cost effective, the manager may specify alternative methods of determining the characteristics of the wastewater's discharge that will, in the manager's judgment, provide an equitable measurement.

SECTION 3. DETERMINATION OF WASTEWATER CHARACTERISTICS. (a) Measurements, tests, and analyses of the characteristics of wastewater to which reference is made in this ordinance, shall be determined in accordance with 40 CFR 136 methods approved by the manager and shall comply with state and federal law. Sampling locations, times, durations, and frequencies shall be determined on an individual basis subject to approval by the manager. The discharger shall have the option to use, at his own expense, more complete approved sampling methods, locations, times, durations, and frequencies than specified by the manager. Any additional results beyond those required are also to be reported to the control authority.

(b) Measurements, tests, and analyses of the characteristics of wastewater required by this ordinance shall be performed by a qualified laboratory approved by the manager. when such analyses are required of a discharger, the discharger may, in lieu of using the City's laboratory,

make arrangement with any qualified laboratory, including that of the discharger, to perform such analyses.

(c) Monitoring of wastewater characteristics necessary for determining compliance with applicable pretreatment standards shall be conducted on the basis of the schedule below, unless more frequent monitoring is required by authority other than this ordinance, or if the manager determines that the characteristics of the specific discharge warrant more frequent monitoring.

Average Actual Discharge	Monitoring Frequency
less than 100,000 gpd	semi-annually
100,000 - 999,999 gpd	quarterly
more than 999,999 gpd	monthly

(d) Monitoring of wastewater characteristics for any purpose other than determining compliance with pretreatment standards shall be conducted on a frequency deemed necessary by the manager.

(e) Upon demonstration by any person that the characteristics of the wastewater discharged by that person are consistent, the manager may reduce the monitoring frequency as may be required by authority other than this ordinance. In no case shall the frequency of monitoring be less than semi-annual for determining compliance with pretreatment standards.

(f) In determining the discharge characteristics, factors such as continuous, batch, or seasonal operation, as well as the information requirements of other provisions in this ordinance, shall be considered by the manager. The manager may obtain wastewater samples are required to verify the consistency of discharge characteristics.

(g) Fees for any given measurement, test, or analysis of wastewater required by this ordinance and performed by the City shall be the same for all classes of dischargers, regardless of the quantity or quality of the discharge, and shall reflect only direct cost. Costs of analyses performed by an independent laboratory at the option of the discharger shall be borne directly by the discharger.

SECTION 4. COSTS OF DAMAGE. If the drainage or discharge from any establishment causes a deposit, obstruction, or damage to any of the City's wastewater facilities, the manager shall cause the deposit or obstruction to be promptly removed or cause the damage to be promptly repaired. The cost for such work, including materials, labor, and supervision, shall be borne by the person causing such deposit, obstruction, or damage.

ARTICLE VIII: PRETREATMENT

SECTION 1. WASTEWATER WITH SPECIAL CHARACTERISTICS. (a) The manager should initially rely on the Federal Categorical Pretreatment Standards of Section 3, Article VI,

to protect wastewater facilities or receiving waters; however, if any wastewater that contains substances or characteristics shown to have deleterious effect on the wastewater facilities, processes, equipment, or receiving waters, or that constitutes a public nuisance or hazard is discharged or proposed for discharge to the wastewater sewers, the manager may:

- Require pretreatment to a condition acceptable for discharge to the wastewater sewers;
- Require control over the quantities and rates of discharges;
- Require payment to cover added cost of handling and treating the wastewaters not covered by existing fees and charges;
- Require the development of compliance schedules to meet any applicable treatment requirements;
- Require the submission of reports necessary to ensure compliance with applicable pretreatment requirements;
- Carry out all inspection, surveillance, and monitoring necessary to determine compliance with applicable pretreatment requirements;
- Obtain remedies for noncompliance by any user. Such remedies may include injunctive relief, the civil penalties specified in Article II of this ordinance, or appropriate criminal penalties, or
- Reject the wastewater if scientific evidence indicates the discharge will create unreasonable hazards or have unreasonable deleterious effects on the wastewater facilities.

(b) When considering the above alternatives, the manager shall ensure that conditions of the City's NPDES permit are met. The manager also shall consider the cost effectiveness and the economic impact of the alternatives on the discharger. If the manager allows the pretreatment or equalization of wastewater flows, the installation of necessary facilities shall be subject to review. The manager shall review and recommend any appropriate changes to the program, within 60 days of submittal.

(c) Where pretreatment or flow-equalizing facilities are provided or required for any wastewater, they shall be maintained continuously in satisfactory and effective operation at the owner's expense.

SECTION 2. COMPLIANCE WITH PRETREATMENT REQUIREMENTS. Persons required to pretreat wastewater in accordance with Section 1 above, shall provide a statement to be reviewed by an authorized representative of the user and certified by a qualified person. Such statement shall indicate whether applicable pretreatment requirements are being met on a consistent basis and, if not, describe the additional operation and maintenance or additional pretreatment needed for the user to meet the pretreatment requirements. If additional pretreatment or O&M will be required to meet the pretreatment requirements, the user shall submit a plan, including schedules, to the manager. The plan, including schedules, shall be consistent with applicable conditions of the City's NPDES permit or other local, state or federal laws.

SECTION 3. MONITORING REQUIREMENTS. Discharges of wastewater to the City's wastewater facilities from the facilities of any user shall be monitored in accordance with the

provisions of Article VII, Sections 2 and 3 of this ordinance. SECTION 4. EFFECT OF FEDERAL LAW. If the federal government promulgates a regulation for a given new or existing user in a specific industrial subcategory that establishes pretreatment standards or establishes that such a user is exempt from pretreatment standards, such federal regulations shall immediately supersede Section 1(a) of this article.

SECTION 5. REVISION OF PRETREATMENT STANDARDS. The manager shall promptly apply for and obtain authorization from the EPA to revise discharge limitations for those substances listed in the federal categorical pretreatment standards for which consistent removal occurs in the wastewater treatment facilities of the City. The manager shall not adopt or enforce discharge limitations more stringent than the requested limitations until the state or EPA acts on the application.

ARTICLE IX: WASTEWATER SERVICE CHARGES

SECTION 1. WASTEWATER SERVICE CHARGE. Charges and fees for the use of the public wastewater facilities shall be based upon the actual use of such system or contractual obligations for use in excess of current actual use. Property value may be used to collect the amount due as permitted by federal law.

SECTION 2. DETERMINATION OF SYSTEM USE. (a) The use of the City's wastewater facilities shall be based on actual measurement and analysis of each user's wastewater discharge, in accordance with provisions of Article VII, Sections 2 and 3, to the extent such measurement and analysis are considered by the manager to be feasible and cost effective.

(b) Where measurement and analysis are not considered feasible, each user's use of the facilities shall be determined by the quantity of water used, whether purchased from a public waster utility or obtained from a private source, or by an alternative means as provided by Section (c) below.

(c) The manager, when determining actual use of the City's wastewater facilities based on water use, shall consider consumptive, evaporative, or other water use that results in a significant difference between a discharger's water use and wastewater discharge. When appropriate, such consumptive water use may be metered to aid in determining actual use of the wastewater facilities. The type of meters used to measure such water uses and their installation shall be approved by the manager. The actual average water use by each residential user (Class I) during the three months of January, February, and March shall be used to measure each respective residential user's actual use of the sewer system throughout the year.

NOTE: If the discharger makes a claim that any information requested on this form is confidential, such information shall be submitted on a separate sheet of paper.

ARTICLE X: EFFECTIVE DATE

That all ordinances, orders, resolutions, motions, or parts thereof, insofar as same may be in conflict herewith, are repealed, and this Ordinance shall take effect from and after its adoption, approval and publication as provided by law.

This ordinance shall be in full force from the date of its passage, approval and publication, as provided by law:

Adopted on this 13 day of February, 1995

City OF BROADHEAD, KENTUCKY

By Billy B. Bussell
Mayor, City of Broadhead

Attest:
[Signature]
City Clerk

CERTIFICATE

I, Rebecca Bussell, hereby certify that I am the duly qualified and acting City Clerk of the City of Broadhead, Kentucky, that the foregoing Ordinance is a true copy of an Ordinance duly adopted by the Board of Trustees of said City of February 13, 1995, that said Ordinance has been ordered to be published as required by law, and that said Ordinance appears as a matter of public record in the City Ordinance Book.

IN WITNESS WHEREOF, I have hereto set my hand as City Clerk and the official

Seal of the City on this 13 day of February, 1995.

[Signature]
City Clerk

(Seal of City)

Appendix E

Overflow Response Procedure

Overflow Response Procedure

1. Purpose

The purpose of this Overflow Response Procedure is to define the steps for identifying, responding to, and reporting sanitary sewer overflows (SSOs) in the Brodhead Sanitary Sewer System. The plan should be updated as necessary to keep the contents current.

2. SSO Identification

Overflows are identified by two methods: 1) reports by the public, and 2) reports by City employees. The City monitors weather conditions and when a rain event in excess of 3/4 inches occurs the City begins monitoring all known SSO locations. Collection system locations where blockage-related overflows have occurred frequently in the past are also monitored during wet weather conditions in excess of 3/4 inches.

3. SSO Response

When the City becomes aware of a sanitary sewer overflow (SSO) event the following procedure is implemented in responding to the overflow:

- A. Dispatch a City crew to respond to the overflow. Proper safety equipment is to be worn and used at all times by City personnel when responding to an overflow.
- B. Isolate the overflow area from public access as necessary using traffic cones, barricades, caution tape, saw horses, vehicles, equipment, safety fencing, etc. The method of blocking public access depends on the location of the overflow.
- C. Take immediate steps to contain the overflow and prevent the overflow from reaching surface waters (to the maximum extent possible). A short duration overflow may be contained using a vacuum truck, sandbags, etc. Long duration overflows caused by a collapsed pipe, pump station failure, etc. may require by-pass pumping using portable pumps or other more significant measures to contain the overflow.
- D. Determine the cause of the overflow (e.g. blockage, pump station failure, collapsed pipe, excessive rainfall, etc.).
- E. Take immediate steps to stop the overflow (e.g. clear blockages, repair the pump station, repair collapsed pipe, etc.). Blockages (i.e. cardboard, concrete, grease, paper, plastic, rags, rocks, rubber, wood, etc.) will be removed and disposed of in an appropriate manner.

- F. If the overflow is on private property (i.e. basement, yard, etc.), the responsibility for correcting the situation may be with the property owner. The City crew will evaluate the cause of the overflow and determine if the City or property owner is responsible. In either case, the City crew should work to mitigate the overflow and assist in the cleanup of the wastewater to the extent deemed necessary by the City. The City crew should enter private property only after receiving permission from the property owner. Article II Section 6 (e) of the Sewer Use Ordinance allows the City to charge a fee of \$20 per hour (1 hr minimum) for assisting with sewer cleaning of private facilities.
- G. Monitor each overflow site in a rotating order until each overflow event has ended and there is no longer a probability of an overflow occurring.
- H. Record the location/manhole number, duration (start/end times), cause, city response, and any additional comments relating to the overflow in the Overflow Log Book being maintained by the City. The Overflow Log Book that is maintained by the City includes: 1) Overflow Response Procedure, 2) sewer system mapping (including location of known SSOs), and 3) overflow recording forms.
- I. If it is raining, record the start and end of the rain event and the total rainfall amount on the overflow recording forms in the Overflow Log Book.
- J. As soon as possible after the overflow has stopped, the remnants of the overflow (i.e. cardboard, grease, paper, plastic, ponded water, rags, rubber, sewage solids, etc.) are to be removed from the overflow area and disposed of properly. Where the overflow has ponded, pump the pond dry and dispose of the sewage properly. If the ponded area contains sewage which can't be pumped dry, it may be treated with lime, HTH or other disinfecting agents. After picking up solids to the maximum extent possible, flush the area with clean water to remove any residual sewage solids, where practical. Contain and dispose of wash-down water in an appropriate manner. Equipment used to remove remnants from the overflow area may include: rakes, shovels, wheelbarrows, buckets, vacuum/jet trucks, pickup trucks, dump trucks, etc.
- K. As soon as possible after the overflow remnants have been removed, the area impacted by the overflow is to be disinfected by the application of lime or HTH as appropriate (be careful not to disinfect in a manner that would result in disinfectant being discharged to a body of water that may contain fish or other aquatic life).

4. SSO Reporting

Within 24 hours of becoming aware of an overflow the City will report the overflow to the Kentucky Division of Water (KDOW) as follows:

Contact the KDOW 24-hour notification number in Frankfort at 800-928-2380 or 606-330-2080.

Overflow reporting calls made to KDOW will be recorded on the overflow reporting forms in the Overflow Log Book. See below for overflow log sheet. The City will address all overflow follow-up procedures, including written reports, which are required by KDOW.

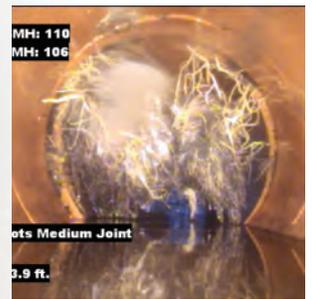
Appendix D

Sanitary Sewer Evaluation Survey (SSES)

GRW Project No. 3929-02

Sanitary Sewer Evaluation Survey City of Brodhead, Kentucky

December, 2014



engineering | architecture | geospatial

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

SANITARY SEWER EVALUATION SURVEY CITY OF BRODHEAD, KENTUCKY

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- 4. Line Work Cost Estimate
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SANITARY SEWER EVALUATION SURVEY

CITY OF BRODHEAD, KY

A. Introduction

1. 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, Draw Down Tests, 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. This survey included Manhole Inspections, Smoke Testing, Draw Down Tests, and Video Inspection

2. City's Need for Study

The City of Brodhead has received Notice of Violations (NOV) from the Commonwealth of Kentucky Department for Environmental Protection, Division of Water's Enforcement Branch (DOW). One of the items noted in the violation relates to excessive wastewater flows at the Wastewater Treatment Plant (WWTP) and within the City's sewer collection system due to Inflow and Infiltration (I&I). The excessive I&I results in peak flows at the WWTP exceeding the rated treatment capacity of the plant as well as sanitary sewer overflows within the collection system. Following multiple Notices of Violations, the City entered into a Conference Agreement with the Division of Water London Regional Office on April 5, 2012. The result of this conference required the City of Brodhead to submit a Plan of Action to the Division of Water to address the issues of I&I within the Collection System and at the Wastewater Treatment Plant. The initial Plan of Action was submitted May 11, 2012 and included requirements to complete this Sanitary Sewer Evaluation Survey in addition to a Wastewater Facilities Plan Update and a Sanitary Sewer Overflow Plan. Since that submission the City has been submitting quarterly updates to the Division of Water.

B. Sewer System Mapping

The City of Brodhead began upgrading the Wastewater Collection System Map in 2010, locating and labeling manholes by Global Positioning System (GPS) methods referenced

to state plane coordinates. This work was performed by the Kentucky Rural Water Association (KRWA) in conjunction with a Manhole Inspection and a Smoke Testing program. The City now has a digital map and database, Geographic Information System (GIS), of their sewer system. The system was divided into four (4) drainage basins. Appendix 1 contains the Wastewater Collection System Map.

C. Manhole Inspections

Manhole inspections were performed by KRWA forces. One hundred fifty-four (154) manholes were identified, with twenty-five (25) of these being inaccessible or otherwise unable to be inspected. Thirty-six (36) manholes were reported as having no defects. Following the inspections by KRWA an additional twelve (12) manholes were located or identified for a total of one hundred sixty-six (166). These newly located manholes have not yet been inspected. The types of defects noted for the inspections completed are shown in table C-1 below.

TABLE C-1 Manhole Defect Categories
Dirty
Chimney Infiltration
Surcharged
Frame Corroded
No Steps
Corroded Steps
Runoff Potential
Damaged or No Pipe seals
Leak at Joint in MH
Damaged or No MH Trough
Infiltration on Bench

Each manhole defect was assigned a “corrective action” with the exception of the defect “surcharged”. For the identified eleven (11) defects, there are ten (10) corrective actions, or types of repairs. Table C-2 shown below lists the total number of defects for each type and its associated corrective action.

TABLE C-2 Manhole Inspection Summary		
Defect	Number of Occurrences	Corrective Action
Dirty	18	Clean Manhole
Chimney Infiltration	69	Install Chimney Seal
Surcharged	30	N/A
Frame Corroded	7	Replace Frame and Lid
No Steps	19	Install Steps
Corroded Steps	27	Replace Steps
Runoff Potential	73	Install Infiltration Dish
Damaged or No Pipe seals	14	Seal Pipe Connections
Leak at Joint in MH	34	Seal Manhole Joint
Damaged or No MH Trough	11	Reconstruct MH Trough
Infiltration on Bench	9	Seal Leak on Bench

Each corrective action was assigned an estimated cost shown below in table C-3. The quantities from table C-2 and estimated costs from table C-3 were used to approximate a total manhole rehabilitation cost shown below in table C-4. Manhole inspection reports along with defect summaries and cost summaries can be found in Appendix 2.

TABLE C-3 Manhole Unit Cost Summary	
Corrective Action	Approximate Cost
Clean Manhole	\$350
Install Chimney Seal	\$500
Replace Frame and Lid	\$750
Install Steps	\$500
Replace Steps	\$500
Install Infiltration Dish	\$50
Seal Pipe Connections	\$600
Seal Manhole Joint	\$800
Reconstruct MH Trough	\$1000
Seal Leak on Bench	\$800

TABLE C-4 Manhole Defect Repair Summary			
Defect	Number of Occurrences	Cost	Total
Dirty	18	\$350.00	\$6,300.00
Chimney Infiltration	69	\$500.00	\$34,500.00
Frame Corroded	7	\$750.00	\$5,250.00
No Steps	19	\$500.00	\$9,500.00
Corroded Steps	27	\$500.00	\$13,500.00
Runoff Potential	73	\$50.00	\$3,650.00
Damaged or No Pipe seals	14	\$600.00	\$8,400.00
Leak at Joint in MH	34	\$800.00	\$27,200.00
Damaged or No MH Trough	11	\$1,000.00	\$11,000.00
Infiltration on Bench	9	\$800.00	\$7,200.00
		Total	\$126,500.00

D. Lift Station Inspection and Draw Down Tests

The City of Brodhead has three (3) pump stations in their system, an inspection and a draw down test were completed on each of these pump stations. Table D-1 shown below lists the City's pump stations with their drawdown test capacities.

Table D-1 Brodhead Wastewater Pump Stations		
Pump Station Name	Station Design Capacity (gpm)	Drawdown Pump Test Capacity (gpm)
City Hall Pump Station	250	
Pump One - (Rehabilitated in 2014)		200
Pump Two		30
Both Pumps Operating		255
Rose's 1 Stop Pump Station	Unknown	
Pump One		30
Pump Two		Unknown*
Both Pump Operating		50
Shaffer Pump Station	Unknown	Unknown**
<p>* Pump station control issue prevents pump two (2) from operating/starting alone.</p> <p>** No drawdown test performed as there was no flow entering this station (only serves two (2) homes).</p>		

E. Smoke Testing

Approximately 34,000 linear feet of the collection system was smoke tested. 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 the general locations of cracks, defects or unauthorized connections to the system. Smoke testing completed by KRWA, resulted in the location of one hundred fourteen (114) defects. The sources of the defects are shown below in table E-1.

TABLE E-1 Smoke Testing Defect	
Defect Location	Occurrences
Cap	32
Cap/Riser	8
Downspout	4
Lateral	33
Manhole	11
Other	2
Plumbing	13
Riser	1
Storm Drain	2
Sewer Main	8
Customer Responsibility Defect Total	90
System Responsibility Defect Total	24
Total Defects	114

Defects were further described by the intensity of the visible smoke. Intensity of the smoke can be a visual representation of the severity of defects. A summary of the intensity is shown below in table E-2. A detailed list of each of the defects along with a map showing the locations of the discovered defects is in Appendix 3.

TABLE E-2 Smoke Testing Intensity	
Smoke Intensity	Occurrences
Heavy	24
Medium	34
Light	56

The locations of the smoke testing defects attributed to the sewer main were cross referenced to the information from video inspection. As shown in table E-1 there were eight (8) locations where smoke testing indicated a defect on the sewer main. Table E-3

shown below lists locations of these smoke testing defects and any defects at the location as seen on the TV inspections.

TABLE E-3 Smoke Testing Identified Sewer Main Defects			
Upstream Manhole	Downstream Manhole	Distance from USMH	Defect
114	113	7	No Visible Defect
110	106	26	No Visible Defect
34	33	8	No Visible Defect
107	106	37	No Visible Defect
106	105	216	Roots
080	151B	231	Defective Pipe Repair
151A	151B	22	Fractures
151A	151B	2	Fractures

Following this reference there appeared to be a slight correlation between defects and smoke appearing at the surface near the same location. This can be used to assume that there are pipe defects at some of the thirty-three (33) locations where smoke testing defects were attributed to service laterals.

F. Video Inspection of Sewer Lines

1. 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. Defects 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, misalignment, and sags in the pipe line.

2. Video Inspection of Brodhead Sewer System

The video inspection of the entire system was performed by an outside contractor in 2014. A map showing the system can be found in Appendix A. The pipes in Brodhead’s sewer system were discovered to be in particularly bad condition, with many locations of water infiltrating the lines at joints and service connections.

As video inspections were 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 will be used to document the condition of the pipe for future reference, as well as make decisions on what work would be needed to rehabilitate the line. In order to create a construction cost estimate without reviewing each video, the severity of certain defects such as “Pipe Broken” and “Joint Offset Large” 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 six taps would need to be repaired by the cured-in-place method. Following a future, more detailed review of videos, the number 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. Table F-1 shown below presents estimated costs of various repairs:

TABLE F-1 Estimated CIPP Unit Costs	
Corrective Action	Estimated Cost
8” dia. Cured-in-place Pipe	\$ 33 per lf
CIPP spot repairs	\$2,400 ea.
CIPP service connection	\$2,200 ea.
Replace service connection (open cut)	\$2,100 ea.
Point repair (open cut)	\$3,000 ea.
Lateral reinstatement–CIPP	\$100 ea.

Table F-2 presents a summary of the estimated quantities for each corrective action and the total estimated cost for repairing all mainline defects. The detailed cost information for each inspected line is presented in Appendix 4. These costs are estimated based on review of the TV contractor’s database file. A more thorough review of inspection project will be required to confirm quantity and location of work prior to a construction project.

TABLE F-2 Estimated CIPP Repair Costs			
Corrective Action	Estimated Quantity	Unit Cost	Total Cost
8" dia. Cured-in-place Pipe (LF)	14,636	\$ 33 per lf	\$482,988.00
CIPP spot repairs (EA)	60	\$2,400 ea.	\$144,000.00
CIPP service connection (EA)	103	\$2,200 ea.	\$226,600.00
Replace service connection (open cut) (EA)	34	\$2,100 ea.	\$71,400.00
Point repair (open cut) (EA)	47	\$3,000 ea.	\$141,000.00
Lateral reinstatement-CIPP (EA)	214	\$100 ea.	\$21,400.00
		Total	\$1,087,388.00

G. Summary, Recommendations and Conclusion

1. Summary

The Sanitary Sewer Evaluation Study was performed in order to determine the sources of wet weather inflow and infiltration (I&I) and to identify repairs or improvements needed for the purpose of reducing overflow incidents and excessive influent flows at the Wastewater Treatment Plant (WWTP). Mapping of the entire collection system was updated and incorporated into a GIS database. Manhole inspections and smoke testing were performed on 93% of the sewer system, limited only by manhole access issues. The entire sewer system was then video-inspected by CCTV.

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, transport that flow to the treatment plant and then treat the wet weather flow. 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 at the WWTP, and on the performance of the collection system, while considering the cost effectiveness of the repairs.

2. Manhole Rehabilitation

Manhole Inspections that were performed resulted in the identification of defects in 93 manholes. The total cost estimate of \$126,500 presented in Section C and

Appendix 2 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. These determinations will be confirmed during the design phase of the sewer system rehabilitation construction project. The following preliminary repair quantities shown in table G-1 are based upon the review of the manhole inspection reports collected as part of the field investigations. These recommendations represent the manhole repair items required to reduce the amount of water entering the manholes due to inflow and infiltration and do not address all operations and maintenance (O&M) types of defects.

TABLE G-1			
Phase 1 - Manhole Repair Cost Summary			
Defect	Number of Occurrences	Cost	Total
Install Chimney Seal	69	\$500.00	\$34,500.00
Replace Frame and Lid	7	\$750.00	\$5,250.00
Install Infiltration Dish	73	\$500.00	\$3,650.00
Seal Pipe Connections	14	\$50.00	\$8,400.00
Seal Manhole Joint	34	\$600.00	\$27,200.00
Reconstruct MH Trough	11	\$800.00	\$11,000.00
Seal Leak on Bench	9	\$1,000.00	\$7,200.00
		Total	\$97,200

3. Sewer Line Rehabilitation

Following a preliminary review of the CCTV summary report information, which includes inspection of 37,425 linear feet of sewer line, it appears approximately 40% of the system needs to be rehabilitated with Cured-in-Place Pipe (CIPP). This would result in a rehabilitation project including 14,636 linear feet of cured-in-place pipe, along with various associated repairs. Based on this review an approximate budget to complete all CIPP lining, point repairs, spot repairs, and service connection replacements resulting from the CCTV inspection would cost \$1,087,388.00 as shown in Table F-2. The following repair quantities shown in Table G-2 are recommended to be completed as a priority in order to reduce the amount of storm water inflow. These quantities include repairs where significant infiltration was noted or the structural integrity of the sewer line was of concern. These recommendations do not address all structural or O&M defects within the system. The estimated costs shown in Table G-2 are construction cost only and do not include costs for any manhole rehabilitation, engineering or inspection costs.

TABLE G-2			
Phase 1 - CIPP Repair Costs Summary			
Corrective Action	Estimated Quantity	Unit Cost	Total Cost
8" dia. Cured-in-place Pipe (LF)	9,653	\$ 33 per lf	\$318,549
CIPP spot repairs (EA)	39	\$2,400 ea.	\$93,600
CIPP service connection (EA)	49	\$2,200 ea.	\$107,800
Replace service connection (open cut) (EA)	31	\$2,100 ea.	\$65,100
Point repair (open cut) (EA)	27	\$3,000 ea.	\$81,000
Lateral reinstatement-CIPP (EA)	147	\$100 ea.	\$14,700
Surface Restoration	1	\$70,000 LS.	\$70,000
		Total	\$750,749

4. Pump Station Rehabilitation

City of Brodhead's collection system has three (3) pump stations in operation. These stations were listed in table D-1. The Shaffer Pump Station is the most recently constructed and is operating adequately. The other two pump stations, City Hall and Rose's 1 Stop, are in need of repairs and/or improvements. 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 abilities, and increased storage, in accordance with "Ten States Standards". Some options for achieving the required back-up power capabilities are adding backup generators for each stations or having sufficient portable generators; providing dual electrical feeds from separate substations; providing backup (emergency) pumps at each station; and confirming that there is two hours of storage capacity in the wet well and associated piping.

A preliminary cost estimate for the rehabilitation of the Rose's 1 Stop pump station is \$150,000. This would include new pumps and controls to be placed in the existing wet well structure. The backup power requirement would be met by installing a portable generator connection and throw switch.

A preliminary cost estimate for the rehabilitation of the City Hall Pump Station is \$250,000. This would include a complete replacement of the existing pump station adjacent to the existing pump station. The new station would be constructed deeper allowing for better run times on the pumps. Backup power would also be added via a portable generator connection.

5. Wet Weather Detention Basin

In addition to rehabilitation of the sewer lines and manholes in the collection system, a wet weather detention basin would provide additional buffering in order to reduce peak flows seen at the wastewater treatment plant. These peak flows have been the cause of some of the EPA issued Notice of Violations. A 500,000 gallon tank built on the existing treatment plant site would reduce the excessive flow peaks from the sewer system at the treatment plant by providing temporary storage. A preliminary cost estimate for a new Wet Weather Detention Basin is \$775,000. This would include a new pre-stressed concrete tank, a new overflow pump station adjacent to the City Hall Pump Station, and a new force main from the pump station to the tank.

6. Rehabilitation Schedule

Approximately 37,425 linear feet of the collection system was CCTV inspected as part of this SSES Report. Taking into consideration the results of the sanitary sewer investigations, the evaluation of found conditions within the service areas, the schedule for completion of the rehabilitation program, and the realities of scheduling and budget, a three-phase Rehabilitation Program is recommended. Phase 1 would be completed as a priority in order to reduce overflows within the sewer system and excessive flow at the WWTP. Phase 2 would include rehabilitation of the pump stations and a new wet weather detention system as part of a Wastewater Treatment Plant Expansion project. Phase 3 would be completed following construction of a new WWTP if excessive I&I is still an issue.

The first phase of the schedule includes preparing a detailed scope of work and ultimately a construction project based on the 37,425 linear feet of sewer that has been CCTV inspected. The preliminary evaluation indicates that repairs are needed on approximately 40% of the lines that were inspected. Phase 1 will include a reduced scope to include repairing the line sections with the most serious defects and infiltration problems. The initial scope would result in a project with the approximate quantities as shown in Table G-2. Phase 1 would also include manhole repairs as indicated in Table G-1. Additionally a new influent flow meter for the WWTP will be included in order to meet requirement outlined in the Notice of Violations.

Following the Phase 1 rehabilitation project, Phase 2 funding would be sought. Phase 2 is expected to include pump station rehabilitations as outlined in section G-4, wet weather detention facilities as outlined in section G-5, in addition to the Wastewater Treatment Plant Expansion project.

Phase 3 would include remaining rehabilitation work to the sewer system's lines and manholes. It is recommended that the City re-evaluate the amount of inflow and infiltration entering these areas. Additional flow micro-monitoring may be needed to determine the final scope of work.

A revised project schedule has been prepared for these phase of work and can be found in Appendix 5. This is based on the Plan of Action Schedule as submitted to the Division of Water (DOW), London Regional Office as required in the DOW's Conference Agreement.

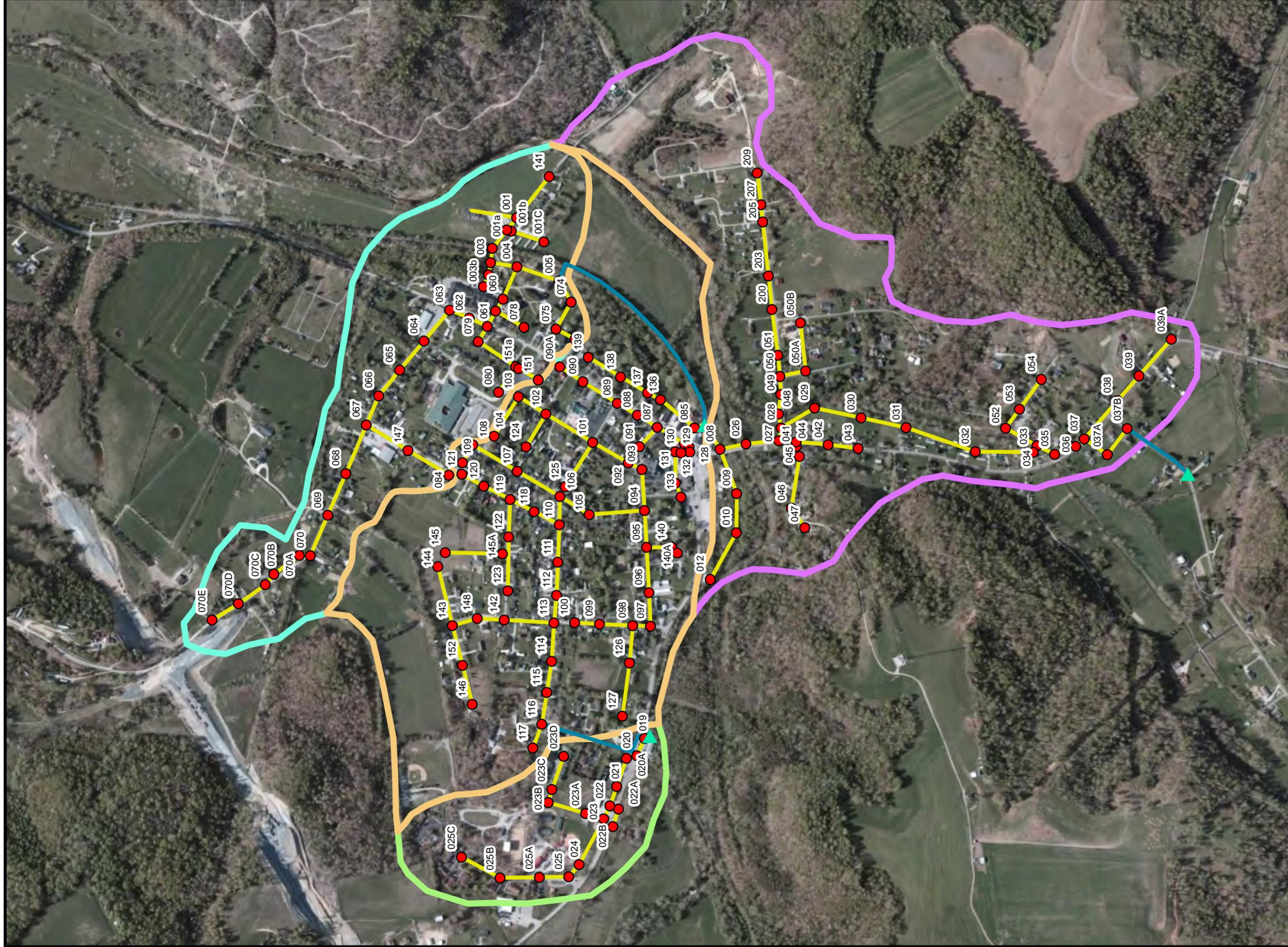
7. Conclusion

Following review of data from each of the field inspections it appears that rehabilitation of the collection system could have a significant effect on reducing the amount of storm water entering the system and reaching the wastewater treatment plant. The pipes in Brodhead's sewer system were discovered to be in particularly bad condition, with many locations experiencing major water infiltration into the sewer lines. Manholes were in average condition with infiltration in some locations and opportunities for inflow. Repairing and upgrading the pump stations within the collection system in order to convey wastewater more efficiently to plant could alleviate capacity issues and help prevent overflows. Additionally adding a wet weather detention basin would help reduce peak flow rates to the treatment plant. Table G-3 summarizes the construction costs associated with rehabilitation to the sewer system and the general order (Phases) in which they are expected to occur.

TABLE G-3 Cost Estimates per Construction Phase			
Phase	1	2	3
Line Rehabilitation	\$750,749.00		\$406,632.00
Manhole Rehabilitation	\$97,200.00		
Pump Station Rehabilitation		\$400,000.00	
Wet Weather Detention Facilities		\$775,000.00	
Wastewater Treatment Plant Upgrade *		\$2,750,000.00	
Influent Flow Meter	\$30,000.00		
Totals	\$877,949.00	\$3,925,000.00	\$406,632.00
*The detail design options for the Wastewater Treatment Plant are still being evaluated and the associated cost is subject to change. The Facilities Plan will have final recommended WWTP cost estimate.			

APPENDIX 1

Wastewater Collection System Map



Legend

- Lift_Station
- MH_Inspection
- FORCED
- GRAVITY
- FLOW_ZONE 1
- FLOW_ZONE 2
- FLOW_ZONE 3
- FLOW_ZONE 4

WASTEWATER COLLECTION SYSTEM CITY OF BRODHEAD, KY



Appendix 2
Manhole Defect Summary

Manhole Number	Defect 1	Defect 2	Defect 3	Defect 4	Defect 5	Defect 6	Defect 7
001	Surcharged	Runoff Potential					
001a	Needs Cleaned	Surcharged	Runoff Potential				
001b	Needs Chimney Seal	Surcharged	No Steps	Corroded Steps	Runoff Potential		
002	Needs Cleaned	Surcharged	Corroded Steps	Seal Leak on Bench			
003	Needs Cleaned	Surcharged					
003A	Needs Cleaned	Surcharged	Frame Corroded	Corroded Steps	Seal Manhole Joint		
005	Needs Cleaned	Needs Chimney Seal	Surcharged	Frame Corroded	Corroded Steps		
010	Needs Chimney Seal	Reconstruct MH Trough					
019	Needs Cleaned	Surcharged	Corroded Steps				
020	Needs Cleaned	Surcharged	Frame Corroded	Corroded Steps	Runoff Potential		
020a	Needs Chimney Seal	Surcharged	Corroded Steps	Runoff Potential	Seal Manhole Joint		
021	Needs Chimney Seal	Surcharged	Corroded Steps	Runoff Potential	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough
022	Needs Chimney Seal	Runoff Potential					
022a	Runoff Potential						
023	Needs Cleaned	Needs Chimney Seal	Surcharged	Runoff Potential	Seal Leak on Bench		
023a	Needs Chimney Seal	Seal Pipe Connections	Seal Manhole Joint				
023b	Seal Pipe Connections						
023c	Needs Chimney Seal						
023e	Needs Chimney Seal	Runoff Potential	Seal Pipe Connections	Seal Manhole Joint			
024	Needs Cleaned	Needs Chimney Seal	Seal Pipe Connections	Seal Manhole Joint	Seal Leak on Bench		
025	Needs Chimney Seal	Surcharged	No Steps	Runoff Potential			
025a	Needs Cleaned	Surcharged	No Steps	Seal Manhole Joint	Reconstruct MH Trough		
025b	Needs Cleaned	Needs Chimney Seal	No Steps	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough	
025c	Needs Chimney Seal	Runoff Potential	Seal Manhole Joint				
027	Corroded Steps						
028	Corroded Steps						
029	Needs Chimney Seal	Surcharged	Runoff Potential				
030	Needs Chimney Seal	Surcharged	Corroded Steps				
032	Needs Chimney Seal	Seal Pipe Connections					
034	Needs Chimney Seal	No Steps					
035	No Steps	Runoff Potential	Seal Pipe Connections	Seal Manhole Joint			
036	Needs Chimney Seal	Runoff Potential	Seal Manhole Joint				
037	Needs Chimney Seal	Runoff Potential	Seal Manhole Joint				
037a	Needs Chimney Seal	Frame Corroded	No Steps	Seal Pipe Connections	Seal Manhole Joint		
037b	Needs Chimney Seal	No Steps	Runoff Potential	Seal Pipe Connections	Seal Manhole Joint		
038	Needs Chimney Seal	Runoff Potential					
039	Needs Chimney Seal	Seal Manhole Joint					
039a	Needs Chimney Seal	Seal Manhole Joint	Seal Leak on Bench				
043	Runoff Potential	Seal Manhole Joint	Seal Leak on Bench				
044	Needs Chimney Seal	Seal Manhole Joint					
045	Needs Chimney Seal						
048	Frame Corroded	Runoff Potential					
049	Needs Cleaned	Surcharged	No Steps	Runoff Potential			
049a	Needs Chimney Seal	Runoff Potential	Seal Pipe Connections				
052	Needs Chimney Seal	No Steps	Seal Manhole Joint				
053	No Steps	Seal Pipe Connections					
060	Needs Chimney Seal	Runoff Potential					
060A	Needs Chimney Seal	Corroded Steps	Runoff Potential	Seal Pipe Connections			
062	Needs Chimney Seal	No Steps	Seal Manhole Joint				
063	Needs Chimney Seal	No Steps	Runoff Potential	Seal Manhole Joint	Reconstruct MH Trough		
064	Corroded Steps	Runoff Potential					
065	Corroded Steps						
066	Runoff Potential	Seal Manhole Joint					
067	Needs Chimney Seal	Runoff Potential	Seal Manhole Joint				
069	Runoff Potential						
071_old	Runoff Potential						
074	Needs Chimney Seal						
075	Needs Chimney Seal						
076	Needs Chimney Seal						
079	Needs Cleaned	Runoff Potential	Reconstruct MH Trough				
080	Needs Cleaned	Needs Chimney Seal	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough		
084	Runoff Potential						
085	Surcharged	No Steps	Runoff Potential				
086	Needs Chimney Seal	Surcharged	No Steps	Runoff Potential			
086A	Needs Chimney Seal	Surcharged	Runoff Potential				
087	Needs Cleaned	Surcharged	Runoff Potential	Reconstruct MH Trough			
089	Needs Chimney Seal	Corroded Steps	Runoff Potential	Seal Manhole Joint			
090	Needs Chimney Seal	Corroded Steps	Seal Manhole Joint				
091	Needs Chimney Seal	Surcharged	Frame Corroded	Corroded Steps	Runoff Potential		
092	Needs Chimney Seal	Surcharged	Runoff Potential				
094	Runoff Potential						
095	Corroded Steps	Runoff Potential					
096	Runoff Potential						
097	Runoff Potential						
098	Runoff Potential						
099	Runoff Potential						
100	No Steps	Runoff Potential					
101	Needs Chimney Seal	Corroded Steps	Runoff Potential				
102	Runoff Potential						
103	Needs Chimney Seal	Corroded Steps	Seal Manhole Joint				
104	Runoff Potential						
105	Surcharged	Runoff Potential					
106	Needs Chimney Seal	Surcharged	Runoff Potential				
107	Needs Chimney Seal						
108	Seal Manhole Joint						
110	Needs Chimney Seal	Corroded Steps					
111	Corroded Steps	Seal Leak on Bench					

Appendix 2
Manhole Defect Summary

112	Corroded Steps	Runoff Potential				
113	Needs Chimney Seal	Corroded Steps	Runoff Potential			
114	Needs Chimney Seal	Runoff Potential				
115	Runoff Potential	Seal Manhole Joint				
116	Corroded Steps	Runoff Potential				
119	Needs Chimney Seal	Runoff Potential				
120	Runoff Potential	Seal Manhole Joint				
121	Corroded Steps	Runoff Potential				
123	Runoff Potential					
124	Needs Chimney Seal	Runoff Potential				
125	Runoff Potential					
126	Needs Chimney Seal	Corroded Steps	Seal Leak on Bench			
128	Needs Cleaned	Needs Chimney Seal	Surcharged	No Steps	Runoff Potential	
129	Needs Chimney Seal	No Steps	Runoff Potential			
131	Runoff Potential	Reconstruct MH Trough				
133	Needs Chimney Seal	Runoff Potential				
136	Needs Cleaned	Needs Chimney Seal	Surcharged			
137	Needs Chimney Seal	Seal Manhole Joint	Seal Leak on Bench			
138	Needs Chimney Seal	Seal Manhole Joint				
141	Needs Cleaned	Surcharged	Runoff Potential			
142	Needs Chimney Seal					
143	Needs Chimney Seal	Runoff Potential	Seal Leak on Bench			
144	Needs Chimney Seal	Seal Manhole Joint	Reconstruct MH Trough			
145	Needs Chimney Seal	Reconstruct MH Trough				
145a	Needs Chimney Seal	No Steps				
146	Needs Chimney Seal	Surcharged				
147	Needs Chimney Seal	Runoff Potential				
148	Runoff Potential					
151	Runoff Potential					
151	Runoff Potential					
151a	Needs Chimney Seal	Frame Corroded	Seal Manhole Joint			
152	Needs Chimney Seal	Surcharged	Runoff Potential			

Manhole Number	Clean Manhole	Install Chimney Seal	Replace Frame and Lid	Install Step	Replace Steps	Install Infiltration Dish	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough	Seal Leak on Bench	Approximate MH Cost
Unit Cost	350	500	750	500	500	50	600	800	1000	800	
001						1					\$50.00
001a	1					1					\$400.00
001b		1		1	1	1					\$1,550.00
002	1				1					1	\$1,650.00
003	1										\$350.00
003A	1		1		1			1			\$2,400.00
003b											\$0.00
004											\$0.00
005	1	1	1		1						\$2,100.00
008											\$0.00
009											\$0.00
010		1							1		\$1,500.00
012											\$0.00
019	1				1						\$850.00
020	1		1		1	1					\$1,650.00
020a		1			1	1		1			\$1,850.00
021		1			1	1	1	1	1		\$3,450.00
022		1				1					\$550.00
022a						1					\$50.00
022b											\$0.00
023	1	1				1				1	\$1,700.00
023a		1					1	1			\$1,900.00
023b							1				\$600.00
023c		1									\$500.00
023e		1				1	1	1			\$1,950.00
024	1	1					1	1		1	\$3,050.00
024a											\$0.00
025		1		1		1					\$1,050.00
025a	1			1				1	1		\$2,650.00
025b	1	1		1			1	1	1		\$3,750.00
025c		1				1		1			\$1,350.00
027					1						\$500.00
028					1						\$500.00
029		1				1					\$550.00
030		1			1						\$1,000.00
031											\$0.00
032		1					1				\$1,100.00
034		1		1							\$1,000.00
035				1		1	1	1			\$1,950.00
036		1				1		1			\$1,350.00
037		1				1		1			\$1,350.00
037a		1	1	1			1	1			\$3,150.00

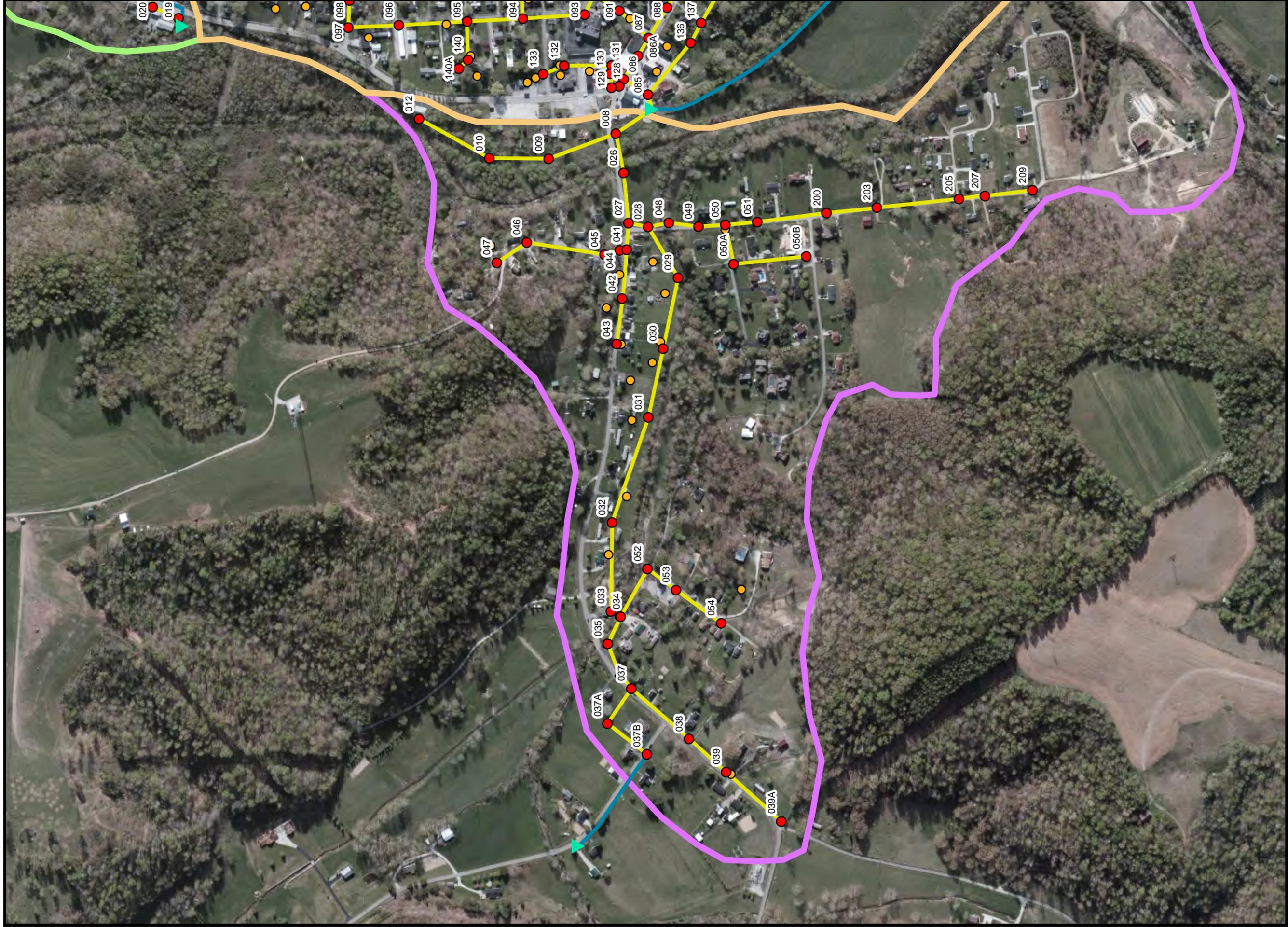
Manhole Number	Clean Manhole	Install Chimney Seal	Replace Frame and Lid	Install Step	Replace Steps	Install Infiltration Dish	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough	Seal Leak on Bench	Approximate MH Cost
Unit Cost	350	500	750	500	500	50	600	800	1000	800	
037b		1		1		1	1	1			\$2,450.00
038		1				1					\$550.00
039		1						1			\$1,300.00
039a		1						1		1	\$2,100.00
041											\$0.00
042											\$0.00
043						1		1		1	\$1,650.00
044		1						1			\$1,300.00
045		1									\$500.00
046											\$0.00
047											\$0.00
048			1			1					\$800.00
049	1			1		1					\$900.00
049a		1				1	1				\$1,150.00
052		1		1				1			\$1,800.00
053				1			1				\$1,100.00
060		1				1					\$550.00
060A		1			1	1	1				\$1,650.00
061											\$0.00
062		1		1				1			\$1,800.00
063		1		1		1		1	1		\$2,850.00
064					1	1					\$550.00
065					1						\$500.00
066						1		1			\$850.00
067		1				1		1			\$1,350.00
068											\$0.00
069						1					\$50.00
070											\$0.00
071											\$0.00
071_old						1					\$50.00
072											\$0.00
072_old											\$0.00
073											\$0.00
073_old											\$0.00
074		1									\$500.00
075		1									\$500.00
076		1									\$500.00
078											\$0.00
079	1					1			1		\$1,400.00
080	1	1					1	1	1		\$3,250.00
084						1					\$50.00
085				1		1					\$550.00

Manhole Number	Clean Manhole	Install Chimney Seal	Replace Frame and Lid	Install Step	Replace Steps	Install Infiltration Dish	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough	Seal Leak on Bench	Approximate MH Cost
Unit Cost	350	500	750	500	500	50	600	800	1000	800	
086		1		1		1					\$1,050.00
086A		1				1					\$550.00
087	1					1			1		\$1,400.00
088											\$0.00
089		1			1	1		1			\$1,850.00
090		1			1			1			\$1,800.00
090A											\$0.00
091		1	1		1	1					\$1,800.00
092		1				1					\$550.00
093											\$0.00
094						1					\$50.00
095					1	1					\$550.00
096						1					\$50.00
097						1					\$50.00
098						1					\$50.00
099						1					\$50.00
100				1		1					\$550.00
101		1			1	1					\$1,050.00
102						1					\$50.00
103		1			1			1			\$1,800.00
104						1					\$50.00
105						1					\$50.00
106		1				1					\$550.00
107		1									\$500.00
108								1			\$800.00
109											\$0.00
110		1			1						\$1,000.00
111					1					1	\$1,300.00
112					1	1					\$550.00
113		1			1	1					\$1,050.00
114		1				1					\$550.00
115						1		1			\$850.00
116					1	1					\$550.00
117											\$0.00
119		1				1					\$550.00
120						1		1			\$850.00
121					1	1					\$550.00
122											\$0.00
123						1					\$50.00
124		1				1					\$550.00
125						1					\$50.00
126		1			1					1	\$1,800.00

Manhole Number	Clean Manhole	Install Chimney Seal	Replace Frame and Lid	Install Step	Replace Steps	Install Infiltration Dish	Seal Pipe Connections	Seal Manhole Joint	Reconstruct MH Trough	Seal Leak on Bench	Approximate MH Cost
Unit Cost	350	500	750	500	500	50	600	800	1000	800	
127											\$0.00
128	1	1		1		1					\$1,400.00
129		1		1		1					\$1,050.00
130											\$0.00
131						1			1		\$1,050.00
132											\$0.00
133		1				1					\$550.00
136	1	1									\$850.00
137		1						1		1	\$2,100.00
138		1						1			\$1,300.00
139											\$0.00
140											\$0.00
140a											\$0.00
141	1					1					\$400.00
142		1									\$500.00
143		1				1				1	\$1,350.00
144		1						1	1		\$2,300.00
145		1							1		\$1,500.00
145a		1		1							\$1,000.00
146		1				1					\$550.00
147		1				1					\$550.00
148						1					\$50.00
151						1					\$50.00
151											\$0.00
151a		1	1					1			\$2,050.00
152		1				1					\$550.00
										Total	\$126,500.00

APPENDIX 3

Smoke Testing Map
and Defect Reports



- Legend**
-  Lift_Station
 -  MH_Inspection
 -  Smoke_Test
 -  FORCED
 -  GRAVITY
 -  FLOW_ZONE 1
 -  FLOW_ZONE 2
 - FLOW_ZONE 3
 - FLOW_ZONE 4

SMOKE TESTING DEFECTS CITY OF BRODHEAD, KY



APPENDIX 4

Line Work Cost Estimates

Appendix 4
Line Rehabilitation Summary

US_MH	DS_MH	Section_Length	Section #	CIPP	Cost to CIPP	Point Repairs	CIPP Spot Repairs	CIPP SC	SC Replacement	Service Connection Reinstatement	Point Repairs Cost	CIPP Spot Repairs Cost	CIPP SC Cost	SC Replacement Cost	SC Reinstatement cost	Total Cost
022	021	158.0	022_021	no	\$0.00	0	1	0	0	0	\$0.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$2,400.00
022A	022	72.4	022A_022	no	\$0.00	0	1	0	0	0	\$0.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$2,400.00
022B	022A	252.9	022B_022A	No	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
023	022	113.2	023_022	yes	\$3,735.60	0	0	1	0	1	\$0.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$6,035.60
023A	023	145.7	023A_023	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
023B	023A	302.3	023B_023A	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
023C	023B	105.2	023C_023B	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
023D	023C	129.6	023D_023C	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
023D	023E	145.8	023D_023E	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
024	024A	216.0	024_024A	yes	\$7,128.00	0	0	0	0	1	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$7,228.00
024A	023	154.9	024A_023	yes	\$5,111.70	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,111.70
025	024	141.5	025_024	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
025B	025	553.9	025B_025	no	\$0.00	1	1	1	0	0	\$3,000.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$7,600.00
025C	025B	339.9	025C_025B	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
028	027	99.8	028_027	yes	\$3,293.40	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,293.40
029	028	294.0	029_028	yes	\$9,702.00	0	0	0	0	2	\$0.00	\$0.00	\$0.00	\$0.00	\$200.00	\$9,902.00
030	029	364.0	030_029	no	\$0.00	1	2	1	1	0	\$3,000.00	\$4,800.00	\$2,200.00	\$2,100.00	\$0.00	\$12,100.00
031	030	352.4	031_030	no	\$0.00	1	2	1	0	0	\$3,000.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$10,000.00
031A	031	402.4	031A_031	yes	\$13,279.20	3	0	1	1	5	\$9,000.00	\$0.00	\$2,200.00	\$2,100.00	\$500.00	\$27,079.20
032	031A	168.6	032_031A	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
033	032A	274.9	033_032A	no	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
034	033	51.7	034_033	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
035	034	153.6	035_034	no	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
036	035	170.1	036_035	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
037	036	84.0	037_036	no	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
037A	037	213.4	037A_037	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
037B	037A	251.3	037B_037A	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
038	037	389.0	038_037	no	\$0.00	2	0	1	0	0	\$6,000.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$8,200.00
039	038	249.6	039_038	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
039A	039	374.6	039A_039	no	\$0.00	1	2	0	1	0	\$3,000.00	\$4,800.00	\$0.00	\$2,100.00	\$0.00	\$9,900.00
041	027	132.3	041_027	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
042	041	247.6	042_041	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
043	042	228.7	043_042	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
044	041	30.1	044_041	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
045	044	80.8	045_044	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
045A	045	162.3	045A_045	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
046	045A	190.0	046_045A	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
047	046	110.5	047_046	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
047A	047	100.2	047A_047	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
048	028	103.8	048_028	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
049	048	153.3	049_048	yes	\$5,058.90	0	0	1	0	2	\$0.00	\$0.00	\$2,200.00	\$0.00	\$200.00	\$7,458.90
050	049	124.8	050_049	yes	\$4,118.40	1	0	0	1	0	\$3,000.00	\$0.00	\$0.00	\$2,100.00	\$0.00	\$9,218.40

Appendix 4
Line Rehabilitation Summary

US_MH	DS_MH	Section_Length	Section #	CIPP	Cost to CIPP	Point Repairs	CIPP Spot Repairs	CIPP SC	SC Replacement	Service Connection Reinstatement	Point Repairs Cost	CIPP Spot Repairs Cost	CIPP SC Cost	SC Replacement Cost	SC Reinstatement cost	Total Cost
050A	050	506.2	050A_050	yes	\$16,704.60	0	0	1	0	5	\$0.00	\$0.00	\$2,200.00	\$0.00	\$500.00	\$19,404.60
051	050	170.5	051_050	yes	\$5,626.50	0	0	1	2	4	\$0.00	\$0.00	\$2,200.00	\$4,200.00	\$400.00	\$12,426.50
052	034	275.8	052_034	no	\$0.00	0	1	1	1	0	\$0.00	\$2,400.00	\$2,200.00	\$2,100.00	\$0.00	\$6,700.00
053	052	177.3	053_052	no	\$0.00	2	1	0	0	0	\$6,000.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$8,400.00
054	053	283.6	054_053	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
060	004	249.4	060_004	no	\$0.00	1	1	1	0	0	\$3,000.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$7,600.00
060A	060	105.9	060A_060	yes	\$3,494.70	1	0	0	0	1	\$3,000.00	\$0.00	\$0.00	\$0.00	\$100.00	\$6,594.70
061	060A	135.6	061_060A	yes	\$4,474.80	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$7,474.80
062	061	147.2	062_061	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
063	062	164.4	063_062	no	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
064	063	306.7	064_063	no	\$0.00	0	1	0	1	0	\$0.00	\$2,400.00	\$0.00	\$2,100.00	\$0.00	\$4,500.00
065	064	291.0	065_064	yes	\$9,603.00	0	0	1	0	8	\$0.00	\$0.00	\$2,200.00	\$0.00	\$800.00	\$12,603.00
066	065	252.6	066_065	yes	\$8,335.80	0	0	1	2	4	\$0.00	\$0.00	\$2,200.00	\$4,200.00	\$400.00	\$15,135.80
067	066	244.2	067_066	yes	\$8,058.60	0	0	2	0	4	\$0.00	\$0.00	\$4,400.00	\$0.00	\$400.00	\$12,858.60
068	067	195.5	068_067	yes	\$6,451.50	1	0	0	1	4	\$3,000.00	\$0.00	\$0.00	\$2,100.00	\$400.00	\$11,951.50
069	068	350.0	069_068	yes	\$11,550.00	0	0	0	3	6	\$0.00	\$0.00	\$0.00	\$6,300.00	\$600.00	\$18,450.00
070	069	330.2	070_069	yes	\$10,896.60	1	0	1	0	2	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$200.00	\$16,296.60
070A	070	82.3	070A_070	yes	\$2,715.90	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,715.90
070B	070A	243.7	070B_070A	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
070C	070B	100.6	070C_070B	yes	\$3,319.80	0	0	1	0	2	\$0.00	\$0.00	\$2,200.00	\$0.00	\$200.00	\$5,719.80
070D	070C	251.1	070D_070C	no	\$0.00	0	1	0	0	2	\$0.00	\$2,400.00	\$0.00	\$0.00	\$200.00	\$2,600.00
070E	070D	238.5	070E_070D	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
075	074	235.3	075_074	yes	\$7,764.90	0	0	0	0	3	\$0.00	\$0.00	\$0.00	\$0.00	\$300.00	\$8,064.90
076	075	166.9	076_075	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
078	060A	249.6	078_060A	no	\$0.00	0	1	1	1	0	\$0.00	\$2,400.00	\$2,200.00	\$2,100.00	\$0.00	\$6,700.00
079	061	135.2	079_061	yes	\$4,461.60	1	0	1	0	3	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$9,961.60
080	151B	232.0	080_151B	yes	\$7,656.00	0	0	1	0	3	\$0.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$10,156.00
084	147	365.4	084_147	yes	\$12,058.20	0	0	0	5	10	\$0.00	\$0.00	\$0.00	\$10,500.00	\$1,000.00	\$23,558.20
086	085	143.8	086_085	no	\$0.00	0	1	0	0	0	\$0.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$2,400.00
086A	086	139.9	086A_086	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
087	086A	103.3	087_086A	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
088	087	125.9	088_087	yes	\$4,154.70	2	0	1	0	1	\$6,000.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$12,454.70
089	088	222.6	089_088	yes	\$7,345.80	0	0	0	0	2	\$0.00	\$0.00	\$0.00	\$0.00	\$200.00	\$7,545.80
090	089	311.6	090_089	yes	\$10,282.80	1	0	1	0	4	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$400.00	\$15,882.80
090A	090	210.4	090A_090	yes	\$6,943.20	0	0	1	0	4	\$0.00	\$0.00	\$2,200.00	\$0.00	\$400.00	\$9,543.20
091	087	198.8	091_087	yes	\$6,560.40	1	0	0	1	2	\$3,000.00	\$0.00	\$0.00	\$2,100.00	\$200.00	\$11,860.40
092	091	152.1	092_091	yes	\$5,019.30	1	0	1	0	1	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$10,319.30
093	092	125.0	093_092	yes	\$4,125.00	0	0	0	0	1	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$4,225.00
094	093	295.1	094_093	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
095	094	284.2	095_094	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
096	095	347.0	096_095	yes	\$11,451.00	2	0	1	0	5	\$6,000.00	\$0.00	\$2,200.00	\$0.00	\$500.00	\$20,151.00
097	096	260.9	097_096	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00

Appendix 4
Line Rehabilitation Summary

US_MH	DS_MH	Section_Length	Section #	CIPP	Cost to CIPP	Point Repairs	CIPP Spot Repairs	CIPP SC	SC Replacement	Service Connection Reinstatement	Point Repairs Cost	CIPP Spot Repairs Cost	CIPP SC Cost	SC Replacement Cost	SC Reinstatement cost	Total Cost
098	097	137.9	098_097	yes	\$4,550.70	0	0	1	0	2	\$0.00	\$0.00	\$2,200.00	\$0.00	\$200.00	\$6,950.70
099	098	255.1	099_098	yes	\$8,418.30	0	0	1	0	4	\$0.00	\$0.00	\$2,200.00	\$0.00	\$400.00	\$11,018.30
100	099	193.3	100_099	yes	\$6,378.90	0	0	1	0	5	\$0.00	\$0.00	\$2,200.00	\$0.00	\$500.00	\$9,078.90
101	092	317.7	101_092	Yes	\$10,484.10	0	0	1	0	5	\$0.00	\$0.00	\$2,200.00	\$0.00	\$500.00	\$13,184.10
102	101	419.4	102_101	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
103	102	254.0	103_102	yes	\$8,382.00	1	0	1	0	3	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$13,882.00
104	103	354.9	104_103	yes	\$11,711.70	0	0	1	0	3	\$0.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$14,211.70
106	105	217.6	106_105	yes	\$7,180.80	3	0	1	1	0	\$9,000.00	\$0.00	\$2,200.00	\$2,100.00	\$0.00	\$20,480.80
107	106	376.9	107_106	no	\$0.00	0	3	1	0	0	\$0.00	\$7,200.00	\$2,200.00	\$0.00	\$0.00	\$9,400.00
108	107	396.2	108_107	yes	\$13,074.60	0	0	1	1	6	\$0.00	\$0.00	\$2,200.00	\$2,100.00	\$600.00	\$17,974.60
109	108	157.9	109_108	yes	\$5,210.70	0	0	1	0	6	\$0.00	\$0.00	\$2,200.00	\$0.00	\$600.00	\$8,010.70
110	106	217.6	110_106	Yes	\$7,180.80	0	0	0	0	1	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$7,280.80
111	110	285.8	111_110	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
112	111	253.9	112_111	no	\$0.00	0	2	2	0	0	\$0.00	\$4,800.00	\$4,400.00	\$0.00	\$0.00	\$9,200.00
113	112	214.9	113_112	yes	\$7,091.70	0	0	1	0	5	\$0.00	\$0.00	\$2,200.00	\$0.00	\$500.00	\$9,791.70
114	113	291.8	114_113	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
115	114	242.5	115_114	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
116	115	246.2	116_115	yes	\$8,124.60	0	0	2	1	8	\$0.00	\$0.00	\$4,400.00	\$2,100.00	\$800.00	\$15,424.60
117	116	188.5	117_116	yes	\$6,220.50	0	0	1	0	3	\$0.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$8,720.50
118	110	217.7	118_110	no	\$0.00	1	1	1	0	0	\$3,000.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$7,600.00
119	118	204.9	119_118	yes	\$6,761.70	2	0	1	0	4	\$6,000.00	\$0.00	\$2,200.00	\$0.00	\$400.00	\$15,361.70
120	119	225.5	120_119	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
121	120	192.9	121_120	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
122	119	354.6	122_119	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
123	122	347.7	123_122	yes	\$11,474.10	0	0	1	0	8	\$0.00	\$0.00	\$2,200.00	\$0.00	\$800.00	\$14,474.10
124	102	297.1	124_102	yes	\$9,804.30	0	0	2	0	8	\$0.00	\$0.00	\$4,400.00	\$0.00	\$800.00	\$15,004.30
126	098	284.8	126_098	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
127	126	416.7	127_126	no	\$0.00	0	3	1	0	0	\$0.00	\$7,200.00	\$2,200.00	\$0.00	\$0.00	\$9,400.00
128	086	40.9	128_086	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
129	128	39.1	129_128	no	\$0.00	1	1	0	0	0	\$3,000.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$5,400.00
130	129	72.8	130_129	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
131	130	40.9	131_130	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
132	131	241.9	132_131	yes	\$7,982.70	0	0	1	0	8	\$0.00	\$0.00	\$2,200.00	\$0.00	\$800.00	\$10,982.70
133	132	111.2	133_132	yes	\$3,669.60	1	0	1	0	3	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$9,169.60
136	085	339.1	136_085	no	\$0.00	0	3	1	0	0	\$0.00	\$7,200.00	\$2,200.00	\$0.00	\$0.00	\$9,400.00
137	136	114.7	137_136	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
138	137	233.2	138_137	yes	\$7,695.60	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$7,695.60
139	138	275.1	139_138	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
140	095	174.3	140_095	yes	\$5,751.90	0	0	1	0	1	\$0.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$8,051.90
140A	140	100.8	140A_140	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
142	113	383.1	142_113	no	\$0.00	0	2	1	0	0	\$0.00	\$4,800.00	\$2,200.00	\$0.00	\$0.00	\$7,000.00
143	148	198.2	143_148	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00

Appendix 4
Line Rehabilitation Summary

US_MH	DS_MH	Section_Length	Section #	CIPP	Cost to CIPP	Point Repairs	CIPP Spot Repairs	CIPP SC	SC Replacement	Service Connection Reinstatement	Point Repairs Cost	CIPP Spot Repairs Cost	CIPP SC Cost	SC Replacement Cost	SC Reinstatement cost	Total Cost
144	143	473.7	144_143	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
145	145A	438.2	145_145A	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
145A	TEE	48.2	145A_TEE	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
146	143	638.0	146_143	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
147	067	375.0	147_067	yes	\$12,375.00	1	0	1	1	5	\$3,000.00	\$0.00	\$2,200.00	\$2,100.00	\$500.00	\$20,175.00
148	142	208.3	148_142	no	\$0.00	0	1	1	0	0	\$0.00	\$2,400.00	\$2,200.00	\$0.00	\$0.00	\$4,600.00
151	151A	2.6	151_151A		\$0.00	0	0	0	0	1	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$100.00
151A	151B	30.9	151A_151B	yes	\$1,019.70	0	0	0	0	1	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$1,119.70
151B	079	342.3	151B_079	yes	\$11,295.90	1	0	1	0	10	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$1,000.00	\$17,495.90
200	051	354.3	200_051	no	\$0.00	0	1	0	0	0	\$0.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$2,400.00
203	200	256.2	203_200	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
205	094	421.5	205_094	yes	\$13,909.50	0	0	1	7	5	\$0.00	\$0.00	\$2,200.00	\$14,700.00	\$500.00	\$31,309.50
205	203	417.4	205_203	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
207	205	131.2	207_205	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
209	207	239.8	209_207	no	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
Stub Out	043	6.6	Stub Out_043	no	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
001	WWTP	279.8999939	001_WWTP	No	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
002	001A	177.1000061	002_001A	No	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
003	002	106.6999969	003_002	Yes	\$3,521.10	0	0	1	0	1	\$0.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$5,821.10
004	003	226.1999969	004_003	Yes	\$7,464.60	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$7,464.60
005	004	317.3999939	005_004	No	\$0.00	1	2	0	0	0	\$3,000.00	\$4,800.00	\$0.00	\$0.00	\$0.00	\$7,800.00
008	PS	240.8000031	008_PS	No	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
009	008A	194.6000061	009_008A	No	\$0.00	1	0	0	0	0	\$3,000.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,000.00
010	009	109.9000015	010_009	Yes	\$3,626.70	1	0	5	0	5	\$3,000.00	\$0.00	\$11,000.00	\$0.00	\$500.00	\$18,126.70
012	010	231.8999939	012_010	Yes	\$7,652.70	0	0	0	2	0	\$0.00	\$0.00	\$0.00	\$4,200.00	\$0.00	\$11,852.70
019	PS	38.5	019_PS	Yes	\$1,270.50	1	0	0	0	1	\$3,000.00	\$0.00	\$0.00	\$0.00	\$100.00	\$4,370.50
020	019	140.1000061	020_019	Yes	\$4,623.30	1	0	0	0	1	\$3,000.00	\$0.00	\$0.00	\$0.00	\$100.00	\$7,723.30
021	020A	225.1999969	021_020A	Yes	\$7,431.60	0	0	2	0	3	\$0.00	\$0.00	\$4,400.00	\$0.00	\$300.00	\$12,131.60
027	008	383.5	027_008	No	\$0.00	0	2	0	0	0	\$0.00	\$4,800.00	\$0.00	\$0.00	\$0.00	\$4,800.00
074	005	187.6000061	074_005	No	\$0.00	0	2	0	0	0	\$0.00	\$4,800.00	\$0.00	\$0.00	\$0.00	\$4,800.00
085	PS	93.40000153	085_PS	No	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
141	001	398.7999878	141_001	Yes	\$13,160.40	0	0	1	0	3	\$0.00	\$0.00	\$2,200.00	\$0.00	\$300.00	\$15,660.40
001A	001	115.6999969	001A_001	No	\$0.00	0	1	0	0	0	\$0.00	\$2,400.00	\$0.00	\$0.00	\$0.00	\$2,400.00
001B	001A	33.59999847	001B_001A	No	\$0.00	0	0		0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
001C	001B	261.7999878	001C_001B	No	\$0.00	0	0	1	0	0	\$0.00	\$0.00	\$2,200.00	\$0.00	\$0.00	\$2,200.00
003A	003	57.40000153	003A_003	Yes	\$1,894.20	0	0	1	0	2	\$0.00	\$0.00	\$2,200.00	\$0.00	\$200.00	\$4,294.20
003B	003A	60.40000153	003B_003A	Yes	\$1,993.20	0	0		0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,993.20
008A	008	124.5999985	008A_008	Yes	\$4,111.80	1	0	1	0	1	\$3,000.00	\$0.00	\$2,200.00	\$0.00	\$100.00	\$9,411.80
020A	020	80.59999847	020A_020	No	\$0.00	0	0	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total															\$1,087,381.40	

APPENDIX 5

Project Schedule

**BRODHEAD WASTEWATER SYSTEM IMPROVEMENTS PROGRAM
PLAN OF ACTION SCHEDULE
5/21/15**

<u>Task/Milestone</u>	<u>Schedule</u>
1. Planning Phase Interim Financing Loan Through KY Rural Water	
- Funding Application	Submitted 12/15/10
- Completion of Audits	4/30/2013
- KRW Funding Committed to Brodhead	6/5/2013
2. Wastewater Collection System Field Investigations	
- Smoke Testing of Lines	Completed 9/2013
- Manhole Inspections	Completed 9/2013
- Sewer line Internal (CCTV) Inspection	Completed 9/2014
3. Planning Studies	
- Wastewater Facilities Plan	6/2014 – 6/2015~95% Complete
- Sanitary Sewer Evaluation Survey (SSES)	5/2014 – 7/2014 – Complete
- Sanitary Sewer Overflow Plan (SSOP)	5/2014 – 7/2014 – Complete
- Capacity, Management , Operation and Maintenance Program (CMOM)	8/2015 – 2/2016 (Estimated Dates Pending Agreed Order)
4. KY DOW Review of Brodhead Wastewater Facilities Plan †	6/2015 – 12/2015
5. Funding Applications Phase 1 ††	7/2015 (Expected Approval of KIA Board)
- Kentucky Infrastructure Authority (Loan #A15-010)	
6. Project Design Phase 1	7/2015 – 10/2015
- Collection System Rehabilitation -	
7. Environmental Review & Approval Phase 1	9/2015 – 12/2015
8. KYDOW Approval of Construction Plans & Specifications Phase 1	10/2015 – 12/2015
9. Phase 2 Project Profile Update – KIA Call for Projects	10/2015 – 5/2016
10. Advertise/Bid/Award Phase 1 Construction Contracts	1/2016 – 3/2016
11. Project Construction Phase 1	4/2016 – 10/2016
12. Apply for Interim Funding for Phase 2 Design	
- Kentucky Rural Water	6/2016 – 10/2016

- | | | |
|-----|--|------------------------|
| 13. | Funding Applications Phase 2 * | |
| | - Kentucky Infrastructure Authority (KIA) | 8/1/2016 – 4/1/2017 |
| | - Community Development Block Grant (CDBG) | 8/1/2016 – 4/1/2017 |
| | - Appalachian Regional Commission Grant (ARC) | 12/1/2016 – 6/1/2017 |
| 14. | Flow Monitor (2 months) | 1/2017 – 3/2017 |
| 15. | Project Design Phase 2 | 10/10/2016 – 7/10/2017 |
| | - WWTP Expansion and Wet Weather Storage | |
| | - Wet Weather Pump Station & Force Main | |
| | - Pump Station Renovation | |
| 16. | KY DOW Approval of Construction Plans & Specifications Phase 2 | 7/10/2017 – 9/10/2017 |
| 17. | Environmental Review & Approved Phase 2 | 7/10/2017 – 9/10/2017 |
| 18. | Easements Phase 2 | 7/10/2017 – 9/10/2017 |
| 19. | Finalize Project Funding (KIA, CDBG & ARC)* | 6/1/2017 – 9/10/2017 |
| 20. | Advertise/Bid/Award Phase 2 | 10/1/2017 – 1/1/2018 |
| 21. | Project Construction Phase 2 | 2/15/2018 – 2/15/2019 |

† CDBG Application Requires KYDOW Approval of Wastewater Facilities Plan for Phase 2

†† City has accepted KIA Loan (# A15-010) for Phase 1 Rehab. We are waiting on loan approval by KIA Board and for the funds to be made available before Phase 1 can begin.

* It has been assumed that the Funding for the project will be granted. If items 13 and 19 above are not awarded, the City will require additional time to fund the estimated \$5 million dollar project.

Appendix E
KPDES Permit

KPDES



KENTUCKY POLLUTANT
DISCHARGE ELIMINATION
SYSTEM

PERMIT

PERMIT NO.: KY0047431

AI NO.: 3852

**AUTHORIZATION TO DISCHARGE UNDER THE
KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM**

Pursuant to Authority in KRS 224,

City of Brodhead
P.O. Box 556
Brodhead, Kentucky 40409

is authorized to discharge from a facility located at

Brodhead Wastewater Treatment Plant
131 Chestnut Grove Road
Brodhead, Rockcastle County, Kentucky

to receiving waters named

Dix River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit shall become effective on April 1, 2013.

This permit and the authorization to discharge shall expire at midnight, March 31, 2018.

February 6, 2013

Date Signed

A handwritten signature in black ink, appearing to read 'Sandra L. Gruzesky', located above the signature line.

**Sandra L. Gruzesky, Director
Division of Water**

**DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water, 200 Fair Oaks Lane, Frankfort, Kentucky 40601**

1. EFFLUENT AND MONITORING REQUIREMENTS

1.1. Monitoring Locations

The following table lists the outfalls authorized by this permit, the latitude and longitude of each and the DOW assigned KPDES outfall number.

MONITORING LOCATIONS			
Number	Type	Latitude	Longitude
001	Effluent	37°24'29.2"N	84°25'16.5"W
		Treated Domestic Wastewater	

1.2. Effluent Limitations and Monitoring Requirements

Beginning on the effective date and lasting through the term of this permit discharges from Outfall 001 shall comply with the effluent limitations.

Effluent Characteristic	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS				
	Loadings (lbs/day)		Concentrations (specify units)		Monitoring		Sample Type		
	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	Maximum		Location	Frequency
Flow (Design 0.150 MGD)	Report	Report	N/A	N/A	N/A	N/A	Effluent	Continuous	Recorder
Flow (MGD)	Report	Report	N/A	N/A	N/A	N/A	Influent	Continuous	Recorder
CBOD ₅	12.5	18.8	N/A	10 mg/l	15 mg/l	N/A	Effluent	1/Week	24-Hr Composite
CBOD ₅	Report	Report	N/A	Report (mg/l)	Report (mg/l)	N/A	Influent	1/Week	24-Hr Composite
Percent Removal CBOD ₅	N/A	N/A	N/A	85%	N/A	N/A	N/A	1/Month	Calculated
TSS	37.5	56.3	N/A	30 mg/l	45 mg/l	N/A	Effluent	1/Week	24-Hr Composite
TSS	Report	Report	N/A	Report (mg/l)	Report (mg/l)	N/A	Influent	1/Week	24-Hr Composite
Percent Removal TSS	N/A	N/A	N/A	85%	N/A	N/A	N/A	1/Month	Calculated
Ammonia (as NH ₃ N) May 1 – October 31	5.01	7.51	N/A	4.0 mg/l	6.0 mg/l	N/A	Effluent	1/Week	24-Hr Composite
Ammonia (as NH ₃ N) November 1 – April 30	12.5	18.8	N/A	10 mg/l	15 mg/l	N/A	Effluent	1/Week	24-Hr Composite
E. Coli (colonies/100 ml) ¹	N/A	N/A	N/A	130	240	N/A	Effluent	1/Week	Grab
Dissolved Oxygen	N/A	N/A	7.0 mg/l	N/A	N/A	N/A	Effluent	1/Week	Grab
pH (Standard Units)	N/A	N/A	6.0	N/A	N/A	9.0	Effluent	1/Week	Grab
Total Residual Chlorine	N/A	N/A	N/A	0.011 mg/l	0.019 mg/l	N/A	Effluent	1/Week	Grab
Total Phosphorus	N/A	N/A	N/A	Report (mg/l)	Report (mg/l)	N/A	Effluent	1/Week	24-Hr Composite

Effluent Characteristic	EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS				
	Loadings (lbs/day)		Concentrations (specify units)			Monitoring		Sample Type	
	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	Maximum	Location		Frequency
Total Nitrogen	N/A	N/A	N/A	Report (mg/l)	Report (mg/l)	N/A	Effluent	1/Week	24-Hr Composite
Hardness (as mg/l CaCO ₃)	N/A	N/A	N/A	Report	Report	N/A	Effluent	1/Quarter	24-Hr Composite
Total Recoverable Copper	N/A	N/A	N/A	Report (mg/l)	Report (mg/l)	N/A	Effluent	1/Quarter	24-Hr Composite

¹The effluent limitations for *Escherichia Coli* are 30 day and 7 day Geometric Means.

Total Nitrogen is the summation of the analytical results for Total Nitrates, Total Nitrites, and Total Kjeldahl Nitrogen

1.3. Standard Effluent Requirements

The discharges to waters of the Commonwealth shall not produce floating solids, visible foam or a visible sheen on the surface of the receiving waters.

Samples and measurements taken in accordance with the requirements of specified Section 1.2 shall be representative of the volume and nature of the monitored discharge and shall be taken at nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

2. STANDARD CONDITIONS**2.1. Schedule of Compliance**

The permittee shall attain compliance with all requirements of this permit on the effective date of this permit unless otherwise stated.

2.2. Standard Conditions for KPDES Permit**2.2.1. Other Permits**

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.

2.2.2. Sufficiently Sensitive Analytical Methods

Analytical methods utilized to demonstrate compliance with the effluent limitations established in this permit shall be sufficiently sensitive to detect pollutant levels at or below the required effluent limit, i.e. the Method Detection Limit (MDL) shall be at or below the effluent limit. In that instance where an EPA-approved method does not exist that has an MDL at or below the established effluent limitation, the permit shall: (1) use the method specified in the permit; or (2) the EPA-approved method with an MDL that is nearest to the established effluent limit.

2.2.3. Antidegradation

For those discharges subject to the provisions of 401 KAR 10:030, Section 1(3)(b)5, the permittee shall install, operate, and maintain wastewater treatment facilities consistent with those identified below:

Aeration Basins, Surge Tank, Clarification, Aerobic Digester, Activated Sludge, Chlorine Disinfection, Dechlorination, Sludge Drying Beds

2.2.4. Conditions Applicable to All Permits

The following conditions apply to all KPDES permits.

2.2.4.1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of KRS Chapter 224 and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. Any person who violates applicable statutes or who fails to perform any duty imposed, or who violates any determination, permit, administrative regulation, or order of the cabinet promulgated pursuant thereto shall be liable for a civil penalty as provided at KRS 224.99.010.

2.2.4.2. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit.

2.2.4.3. 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.

2.2.4.4. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

2.2.4.5. 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 includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2.2.4.6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

2.2.4.7. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

2.2.4.8. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

2.2.4.9. Inspection and Entry

The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

- (1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- (2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- (3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- (4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

2.2.4.10. Monitoring and Records

- (1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
- (2) Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 401 KAR 5:065 Section 2(10) [40 CFR 503]), 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 Director at any time.
- (3) Records of monitoring information shall include:
 - (i) The date, exact place, and time of sampling or measurements;
 - (ii) The individual(s) who performed the sampling or measurements;
 - (iii) The date(s) analyses were performed;
 - (iv) The individual(s) who performed the analyses;
 - (v) The analytical techniques or methods used; and
 - (vi) The results of such analyses.

(4) Monitoring must be conducted according to test procedures approved under 401 KAR 5:065 Section 2(8) [40 CFR 136] unless another method is required under 401 KAR 5:065 Section 2(9) or (10) [40 CFR subchapters N or O].

(5) KRS 224.99-010 provides that any person who knowingly violates KRS 224.70-110 or other enumerated statutes, or who knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall be guilty of a Class D felony and, upon conviction, shall be punished by a fine of not more than \$25,000, or by imprisonment for not more than one (1) year, or both. Each day upon which a violation occurs shall constitute a separate violation.

2.2.4.11. Signatory Requirement

- (1) All applications, reports, or information submitted to the Director shall be signed and certified pursuant to 401 KAR 5:060, Section 4 [40 CFR 122.22].
- (2) KRS 224.99-010 provides that any person who knowingly provides false information in any document filed or required to be maintained under KRS Chapter 224 shall be guilty of a Class D felony and upon conviction thereof, shall be punished by a fine not to exceed twenty-five thousand dollars (\$25,000), or by imprisonment, or by fine and imprisonment, for each separate violation. Each day upon which a violation occurs shall constitute a separate violation

2.2.4.12. Reporting Requirements**2.2.4.12.1. Planned Changes**

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- (i) 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 KRS 224.16-050 [40 CFR 122.29(b); or

- (ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under KRS 224.16-050 [40 CFR 122.42(a)(1)].
- (iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

2.2.4.12.2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

2.2.4.12.3. Transfers

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under KRS 224 [CWA; see 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory].

2.2.4.12.4. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

- (i) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.
- (ii) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 401 KAR 5:065 Section 2(8) [40 CFR 136], or another method required for an industry-specific waste stream under 401 KAR 5:065 Section 2(9) or (10) [40 CFR subchapters N or O], the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.
- (iii) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

2.2.4.12.5. 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.

2.2.4.12.6. Twenty-four-Hour Reporting

- (i) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 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 reoccurrence of the noncompliance.

- (ii) The following shall be included as information which must be reported within twenty-four (24) hours under this paragraph.

(A) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See §122.41(g)).

(B) Any upset which exceeds any effluent limitation in the permit.

(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within twenty-four (24) hours.

(iii) The Director may waive the written report on a case-by-case basis for reports under paragraph (1)(6)(ii) of this section if the oral report has been received within twenty-four (24) hours.

2.2.4.12.7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Sections 2.2.4.12.1, 2.2.4.12.4, 2.2.4.12.5, and 2.2.4.12.6, at the time monitoring reports are submitted. The reports shall contain the information listed in Section 2.2.4.12.6.

2.2.4.12.8. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

2.2.4.13. Bypass

2.2.4.13.1. Definitions

(i) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(ii) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2.2.4.13.2. Bypass Not Exceeding Limitations

The permittee may allow any bypass which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Section 2.2.4.13.1.

2.2.4.13.3. Notice

(i) 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.

(ii) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section 2.2.4.12.6.

2.2.4.13.4. Prohibition of Bypass

(i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(A) 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 is not 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 Section 2.2.4.13.3.

(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three (3) conditions listed above in Section 2.2.4.13.3.

2.2.4.13.5. Upset

2.2.4.13.5.1. Definition

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2.2.4.13.5.2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Section 2.2.4.13.5.3 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2.2.4.13.5.3. Conditions Necessary for a Demonstration of 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:

- (i) An upset occurred and that the permittee can identify the cause(s) of the upset;
- (ii) The permitted facility was at the time being properly operated; and
- (iii) The permittee submitted notice of the upset as required in Section 2.2.4.12.6; and
- (iv) The permittee complied with any remedial measures required under Section 2.2.4.4.

2.2.4.13.5.4. Burden of Proof

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

2.3. 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 postmarked no later than the 28th day of the month following the monitoring period for which monitoring results were obtained.

Division of Water

Surface Water Permits Branch
Permits Support Section
200 Fair Oaks Lane
Frankfort, Kentucky 40601
Attention: DMR Coordinator

2.4. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved in accordance with 401 KAR 5:050 through 5:080, 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.

This permit may be reopened to implement the findings of a reasonable potential analysis performed by the Division of Water.

This permit shall be reopened if Division of Water determines surface waters are aesthetically or otherwise degraded by substances that:

- (a) Settle to form objectionable deposits;
- (b) Float as debris, scum, oil, or other matter to form a nuisance;
- (c) Produce objectionable color, odor, taste, or turbidity;
- (d) Injure, are chronically or acutely toxic to or produce adverse physiological or behavioral responses in humans, animals, fish, and other aquatic life;
- (e) Produce undesirable aquatic life or result in the dominance of nuisance species; or
- (f) Cause fish flesh tainting.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

3. SPECIAL CONDITIONS

3.1. Pretreatment Program

At the present time neither the current wastewater treatment system operated by the permittee nor the current users meet the conditions necessitating the development and implementation a pretreatment program. Although current conditions do not warrant a pretreatment program the permittee shall continue to enforce the general and specific prohibitions listed in Sections 3.1.1 and 3.1.2 respectively of this permit. The permittee shall at a minimum conduct annual industrial wastes surveys to determine if there has been changes to the industrial users' discharges that would necessitate the development an implementation of a pretreatment program. In the event the permittee becomes aware of a new industrial user or modification to an existing industrial user the permittee shall require the submission of an industrial waste survey fore evaluation. Should any industrial waste survey indicate that a pretreatment program is required the permittee shall notify DOW within 30 days of this determination and provide a schedule not to exceed one year for development and implementation of the pretreatment program. The permittee shall submit to DOW an annual report by January 28th of the following year detailing the results of the annual and any other industrial waste surveys reviewed.

3.1.1. General Prohibitions

No user is to introduce to a POTW any pollutant or pollutants that will cause pass through or interference even if the user is not subject to National Pretreatment Standards or any national, state, or local requirements. A user shall have an affirmative defense against a violation of the general prohibitions where the user can demonstrate that:

- (1) It did not know or have reason to know that its discharge singly or in conjunction with other discharges would result in pass through or interference with the POTW; and
- (2) The discharge met the local limit designed to prevent pass through or interference or in the case of no local limit the user's discharge did not substantially change in nature or substance during the occurrence from the pre-occurrence conditions.

3.1.2. Specific Prohibitions

No user is to introduce to a POTW any of the following pollutants:

- (1) Pollutants which create a fire or explosion hazard, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 °F (60 °C);
- (2) Pollutants which will cause corrosive structural damage or have a pH less than 5.0 standard units unless the POTW is designed to accommodate such pH levels;
- (3) Solid or viscous pollutants in amounts that would obstruct the flow to the POTW thus resulting in interference;
- (4) Any pollutant released in a discharge at such a volume or strength as to cause interference in the POTW;
- (5) Heat in amounts that will inhibit biological activity in the POTW thus resulting in interference. In no case heat in such quantities that the temperature at the POTW treatment plant exceeds 104 °F (40 °C) unless the POTW requests and the Approval Authority grants alternate temperature limits;
- (6) Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass-through;
- (7) 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,
- (8) Any trucked or hauled waste except, at discharge points designated by the POTW

3.2. Mixing Zone

The permittee did not request a mixing zone.

3.3. Best Management Practices**3.3.1. BMP - General Conditions****3.3.1.1. BMP - 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.

3.3.1.2. 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.

3.3.1.3. BMP - 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.

3.3.1.4. BMP - 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.

3.3.1.5. BMP - 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

3.3.1.6. BMP - 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.

3.3.1.7. BMP - 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.

3.3.1.8. BMP - Documentation

The permittee shall maintain a description of the BMP plan at the facility and shall make the plan available upon request to EEC personnel. Initial copies and modifications thereof shall be sent to the following addresses when required by Section 3.3.1.9:

Division of Water
 Surface Water Permits Branch
 Operational Permits Section
 200 Fair Oaks Lane
 Frankfort, Kentucky 40601

3.3.1.9. BMP - Modification

The permittee shall amend the BMP plan whenever there is a change in the operation of 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."

3.3.1.10. BMP - 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.

3.3.2. BMP - Specific Conditions

3.3.2.1. BMP - 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.

4. STATE CONDITIONS**4.1. Outfall Signage**

The KPDES permit establishes monitoring points, effluent limitations, and other conditions to address discharges from the permitted facility. In an effort to better document and clarify these locations the permittee should place and maintain a permanent marker at each of the monitoring locations.

4.2. Discharge and Monitoring Point Accessibility

As previously stated in Section 2.2.4.9, the permittee shall allow authorized agency representatives to inspect the facility and collect samples to determine compliance. In order for such monitoring to be conducted either by the permittee or authorized agency personnel all monitoring and discharge points required by this permit shall be readily and safely accessible in all weather conditions.

4.3. Certified Operators

Pursuant to 401 KAR 5:010 the POTW's treatment plant shall be under the primary responsibility of a certified operator holding an active Class 2 treatment certificate: A treatment plant with a design capacity of more than 50,000 gallons per day, but less than or equal to two (2) million gallons per day shall be under the primary responsibility of a certified operator holding an active Class II, III, or IV treatment certificate.

4.3.1. Monthly Operating Reports

The permittee shall maintain daily process control monitoring reports. These reports shall be summarized monthly and submitted with the DMRs to DOW on forms approved by DOW by the 28th day of the month following the monitoring period.

4.3.2. Application Monitoring

To ensure that sufficient samples are collected and analyzed DOW is imposing annual sampling and reporting for those parameters in Sections A.12 and B.6 of KPDES Form A. The results of the application monitoring shall be submitted on an annual DMR and summarized on the renewal application.

5. ABBREVIATIONS, ACRONYMS AND DEFINITIONS

Abbreviation or Acronym	Full Phrase	Definition
MGD	Million Gallons Per Day	A measure of flow
cfs	cubic feet per second	A measure of flow
SU	Standard Units	A measure of pH
mg/l	milligrams per liter	A measure of pollutant concentration (1000 milligrams = 1 gram)
µg/l	micrograms per liter	A measure of pollutant concentration (1000 micrograms = 1 milligram)
°F	Degrees Fahrenheit	A measure of temperature
°C	Degrees Centigrade or Celsius	A measure of temperature
N/A	Not Applicable	
lbs/day	pounds per day	A measure of pollutant loading
Grab	Grab Sample	A sample taken from a wastestream on a one-time basis without consideration of the flow rate of the wastestream and without consideration of time.
24-Hr Composite	24-hour Composite Sample	Sample composed of discrete equal volume aliquots (100 ml minimum) collected every 15 minutes over a 24-hour period and aggregated by an automated sampling device. The aggregate sample will reflect the average water quality of the compositing or sample period.

Appendix F

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

November 6, 2014

Michael Jacobs, P.E.
Project Engineer
GRW Engineers, Incorporated
801 Corporate Drive
Lexington, Kentucky 40503

Re: Brodhead Wastewater Facilities Plan
Waste Load Allocation Request
KPDES No.: KY0047431
Rockcastle County, Kentucky

Dear Mr. Jacobs:

This is in response to your September 18, 2014 letter (attached), requesting a waste load allocation (WLA) for expansion of the subject wastewater treatment plant (WWTP) from 0.15 MGD to 0.25 MGD. Discharge is to remain at 84°25'16.5" W longitude and 37°24' 29.2" N latitude, National Hydrography Dataset (NHD) River Mile (RM) 79.32 of the Dix River, segment 04033. The requested WLA information will be utilized in drafting a Regional Wastewater Facility Plan update.

Considering the above-mentioned information, applicable effluent limitations are provided below.

Design Capacity = 0.25 MGD / Discharge to NHD RM 79.32 of the Dix River

<u>Parameter</u>	<u>May 1 - October 31</u>	<u>November 1 - April 30</u>
CBOD ₅	10 mg/l	10 mg/l
Total Suspended Solids	30 mg/l	30 mg/l
Ammonia Nitrogen	4 mg/l	8 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	0.019 mg/l

Reliability Classification = Grade C

Mr. Michael Jacobs
Brodhead Wastewater Facilities Plan
Page Two

In addition to the above requirements, the monthly average and weekly maximum 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 concentration. 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 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,



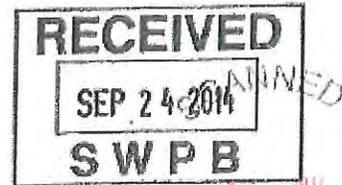
Courtney Seitz, WLA Coordinator
Wet Weather Section
Surface Water Permits Branch
Division of Water

CS:cs

c: Cindy McDonald, Water Infrastructure Branch
Compliance and Technical Assistance
Branch, London Section
TEMPO



GRW | engineers | architects | planners
801 Corporate Drive • Lexington, KY 40503
859.223.3999 • www.grwinc.com



September 18, 2014

Mr. Courtney Seitz
Wet Weather Section
Surface Water Permits Branch
Division of Water
200 Fair Oaks Lane, 4th Floor
Frankfort, KY 40601

Re: **Brodhead Wastewater Facilities Plan** QC
Wasteload Allocation Request
GRW Project No. 3929-01

Dear Mr. Seitz:

This letter is to request the preliminary design discharge limits for updating the City of Brodhead's Wastewater Facilities Plan. The Facility Plan flow projections call for an upgrade of the Wastewater Treatment Plant from the current designed average daily flow rate of 0.15 MGD to 0.25 MGD. The basis for the proposed 0.25 MGD average flow rate has been derived from population projections, the current average WWTP flows (which currently exceeds the rated design capacity of the WWTP on a regular basis) and the projected average flow in the 20 year planning.

The current discharge permit (No. KY0047431) for Brodhead's WWTP became effective April 1, 2013. The discharge outfall of the plant is located at 37° 24' 29.2" N latitude, 84° 25' 16.5" W longitude or mile point 78 of Dix river, (please confirm mile point).

We have included a USGS topo map showing the location of the current WWTP outfall.

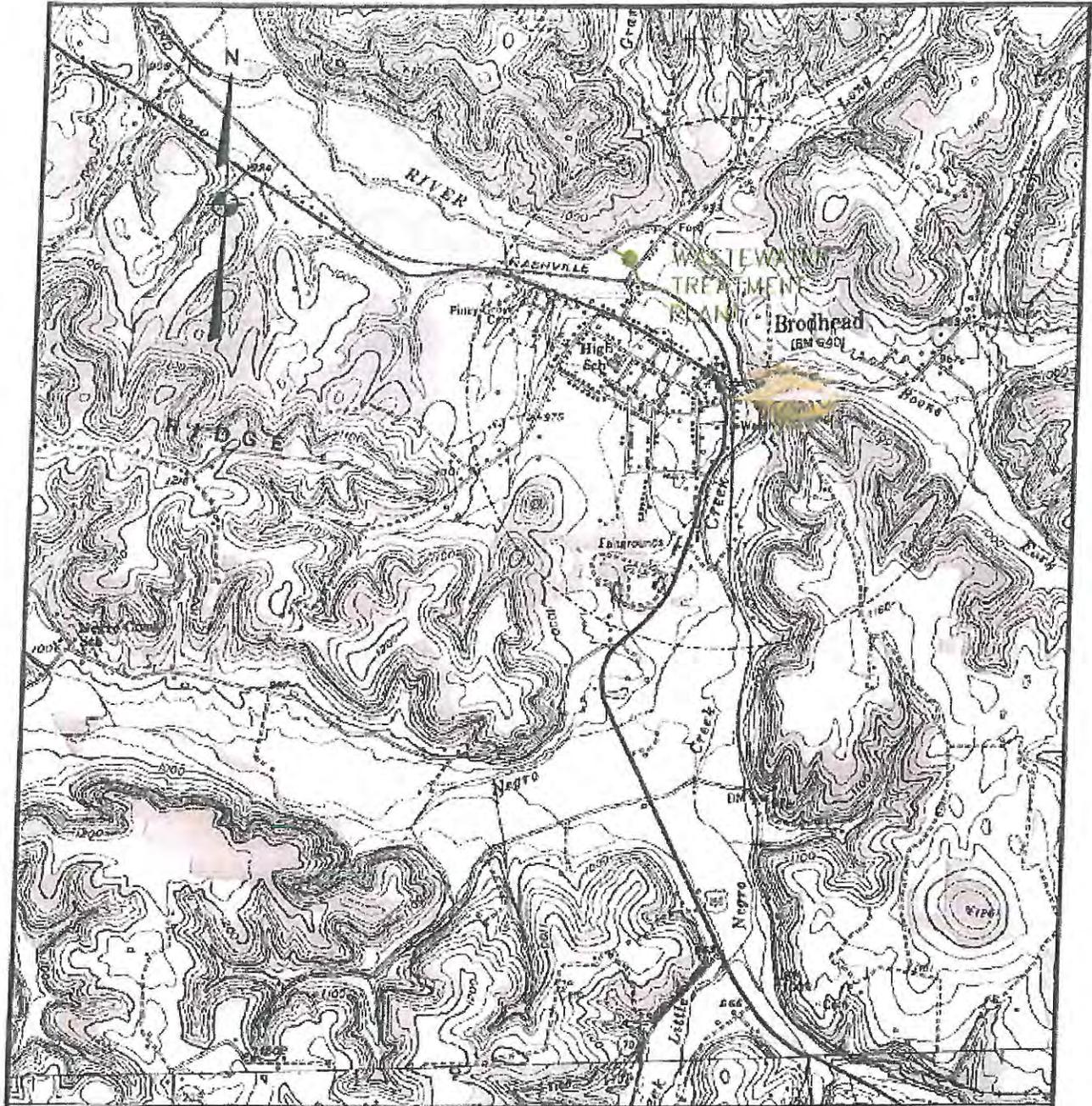
If you should have any questions or concerns, please do not hesitate to contact me at 859-223-3999, or email mjacobs@grwinc.com.

Sincerely,

Michael Jacobs, P.E.,
Project Engineer

Enclosure: USGS Topo Map with location of outfalls

Cc: Mayor Walter Lee Cash, City of Brodhead
Bob Smallwood, GRW



**TOPO MAP
WASTEWATER TREATMENT PLANT
FACILITIES PLAN UPDATE
BRODHEAD, KENTUCKY**



GRW Engineers, Inc.
Engineers, Architects, Planners

MEMPHIS COVINGTON HARTSVILLE BOWLING GREEN

DESIGNED: MLJ	DATE: 9/18/16
DRAWN: M.J	SCALE: 1" = 200'
REVIEWED: MLP	SHEET NO. 1
APPROVED: RCS	

Appendix G
Public Support Documentation

NOTE:

**Appendix G Information will be included
following the Public Meeting**

Appendix H

Sludge Management Evaluation



engineering | architecture | geospatial
 801 Corporate Drive • Lexington, Kentucky 40503
 Phone: 859-223-3999 • Fax: 859-223-8917

Memorandum

To:	Shannon Cash, Brian Mullins	Date:	4/14/2015
	City of Brodhead	Project No.:	3929-01
From:	David C. Osborne		
Subject:	Sludge Management Evaluation		

At the request of the City of Brodhead, GRW Engineers, Inc. has evaluated four (4) sludge management alternatives for the Wastewater Facility Plan. Presently, the City of Brodhead utilizes a private hauling company to transport sludge from the wastewater treatment plant (WWTP) to a private land farm. The annual costs for each sludge management alternative were calculated and can be found on Page 3 of this memorandum.

The first sludge management alternative evaluated is the continuance of utilizing the private hauling company to transport sludge to a private land farm. Currently, the City of Brodhead hires Rite-Way to provide this service. Rite-Way has quoted a price of \$0.12/gallon of sludge. Based on an incoming BOD concentration of 150 mg/l and an average flow of 0.1 million gallons/day (MGD), approximately 125 lbs. of sludge will be produced per day. Sludge would need to be at 2% solids before hauling. Therefore, approximately 750 gallons of sludge per day will be produced. With sludge being hauled once every 6 months, Rite-Way would need to haul approximately 150,000 gallons. At the quoted cost of \$0.12/gal, the City of Brodhead would pay \$18,000 per 6 months. Therefore, the total annual cost associated with Alternative 1 is \$36,000.

The second sludge management alternative evaluated concerns hiring a private hauling company to transport sludge to a landfill. The difference between Alternative 1 and Alternative 2 is that in Alternative 1, the private hauling company (Rite-Way) owns and operates their own land farm. In Alternative 2, sludge will be transported to a landfill, thus requiring a tipping fee for every haul. H&A Resource Management, LLC. has provided budgetary quotes for sludge hauling and transportation. Including tipping fees and hauling, the City of Brodhead would pay \$26,000 per 6 months. Therefore, the total annual cost associated with Alternative 2 is \$52,000.

The third sludge management alternative evaluated is the financing and operation of a city owned sludge press. In Alternative 3, a sludge press would be purchased by the city and will be operated by wastewater treatment personnel. Sludge from the press would be transported to a landfill by wastewater treatment personnel in an existing city dump truck. A sludge press sized appropriately for the City of Brodhead's flow and sludge production costs an estimated \$500,000. As a result of such a high capital investment, the sludge press will need to be financed over a number of years. Assuming an interest rate of 3.5% and a loan life of 20 years, the annual debt service will be approximately \$35,000 for 20 years. In addition to the annual debt service, operation and maintenance expenses of \$20,000/year are estimated. The operation and maintenance expenses include the annual cost of chemicals, power, water, labor, maintenance and repairs required for sludge press operation. As stated hereinbefore, the transportation of sludge to a landfill requires a tipping fee. It is estimated that the annual tipping fee for the City of Brodhead will be approximately \$26,000. An estimated cost of \$5,000/year for wastewater treatment personnel to transport the sludge to the landfill covers fuel, labor, repairs, etc. Therefore, the total annual cost associated of Alternative 3 approximately \$86,000.

The fourth sludge management alternative evaluated is similar to Alternative 3. A sludge press will be financed by the city and will require the same debt service and operation and maintenance expenditures as Alternative 3. However, Alternative 4 evaluates the costs associated with having the sludge hauled by a private company to a landfill versus the transportation of the sludge by wastewater treatment personnel. Republic Services has quoted prices to haul the pressed sludge to a landfill. They quote a hauling cost of \$5,300 per 6 months and a landfill tipping cost of \$13,000 per 6 months. Therefore, with the additional debt service and maintenance costs associated with owning and operating a sludge press, the total annual cost of Alternative 4 is approximately \$91,600.

It is GRW's recommendation that the City of Brodhead continue to utilize sludge management Alternative 1. Alternative 1 presents the lowest estimated annual cost in addition to the fact that wastewater treatment personnel are already familiar with this process. A benefit of Alternative 1 is that a landfill tipping fee is not needed since Rite-Way disposes of sludge on a privately owned land farm, thus saving the City of Brodhead money each year. As stated hereinbefore, costs for each sludge management alternative are found on the following page.

Sludge Management Alternative 1 – Private Sludge Hauling Company to Land Farm (Rite-Way)

Sludge Volume = 150,000 gallons at 2% solids per 6 months

Quoted Hauling Cost = \$0.12/gallons of sludge hauled

Cost = \$18,000 per 6 months

Total Annual Cost = \$36,000

Sludge Management Alternative 2 – Private Sludge Hauling Company to Land Fill (H&A Resource Management)

Sludge Volume = 150,000 gallons at 2% solids per 6 months

Quoted Dewatering Cost = \$10,000 per 150,000 gallons

Annual Dewatering Cost = \$20,000

Quoted Hauling & Mobilization Cost = \$3,000 per 6 months

Annual Hauling & Mobilization Cost = \$6,000

Quoted Landfill Tipping Cost = \$13,000 per 6 months

Annual Landfill Tipping Cost = \$26,000

Total Annual Cost = \$52,000

Sludge Management Alternative 3 – Sludge Press & City Wastewater Personnel Hauling to Landfill

New Sludge Press Capital Cost = \$500,000

Annual Debt Service (i = 3.5%) = \$35,000 over 20 years

Annual O&M Cost = \$20,000

Annual Hauling Cost = \$5,000 (fuel, labor, repairs etc.)

Landfill Tipping Cost = \$13,000 per 6 months

Annual Landfill Tipping Cost = \$26,000

Total Annual Cost = \$86,000

Sludge Management Alternative 4 – Sludge Press & Company Hauling to Landfill (Republic Services)

New Sludge Press Capital Cost = \$500,000

Annual Debt Service (i = 3.5%) = \$35,000 over 20 years

Annual O&M Cost = \$20,000

Sludge Volume = 17,000 gallons at 16% solids per 6 months

Sludge Tonnage = 80 tons per 6 months

Quoted Hauling Cost (includes 27.51% surcharge) = \$66 per wet ton

Hauling Cost = \$5,300 per 6 months

Annual Hauling Cost = \$10,600

Landfill Tipping Cost = \$13,000 per 6 months

Annual Landfill Tipping Cost = \$26,000

Total Annual Cost = \$91,600

Appendix I
Treatment Process Equipment
Documentation



THE CROM CORPORATION

PRESTRESSED CONCRETE TANKS

James D. Copley, PE, CEO
H. E. Puder
James A. Neff, PE
Lars O. Baick, Jr., PE
Gerald C. Bevis, PE
Jeffery D. Malpass, PE
Joseph C. Swann, PE

Walter R. Carlton, CPA
Robert G. Oyenarte, PE
James M. Wornick
Talmadge B. Mincey, PE
J. Brandon Lawhern, PE
Stephen M. Crawford, PE

May 25, 2012

Via Email: mjacobs@grwinc.com

Mr. Michael Jacobs, PE
GRW Engineers, Inc.
801 Corporate Drive
Lexington, KY 40503

Re: Preliminary Estimates
Prestressed Open-Top Wet Weather Storage Tanks
Burkesville, Cumberland County, Kentucky
CEN 2012-E-113

Dear Michael:

We are pleased to prepare the following Crom tank estimates for your upcoming project. The estimates are based on open-shop labor conditions with our crews performing construction in 2012.

- One 500,000-Gallon Open-Top Prestressed Concrete Tank
65'-0" ID x 21'-2" SWD including 1'-0" Freeboard \$271,000
- Adder: Exterior Coating Consisting of Two Coats
Tnemec Series 156 Modified Waterborne Acrylate \$ 10,322
- One 750,000-Gallon Open-Top Prestressed Concrete Tank
80'-0" ID x 21'-0" SWD including 1'-0" Freeboard \$335,800
- Adder: Exterior Coating Consisting of Two Coats
Tnemec Series 156 Modified Waterborne Acrylate \$ 11,535

Please Note: The above-priced tanks include prevailing wages rates per KY120105 for Heavy Construction and KY120030 Building Construction.

The above estimates include the complete design and construction of the tank structure with standard 4" thick membrane floor and prestressed concrete wall. Tank design includes accommodation of 2' wet uniform backfill. Also included in the estimates are the following accessories and features:

- Aluminum accessories including exterior ladder and top of wall stand-off platform with perimeter handrail.
- Stainless steel accessories including access wall manhole and 8" wall sleeve with modular-seals.
- Fall protection in compliance with OSHA requirements for the exterior ladder.

The preliminary pricing does not include the costs of subsurface exploration, piles, site preparation, piping, interior or exterior coatings, mechanical or electrical equipment, material testing, instrumentation, final landscaping or dewatering. These costs, of course, need to be included in your overall budget estimate.

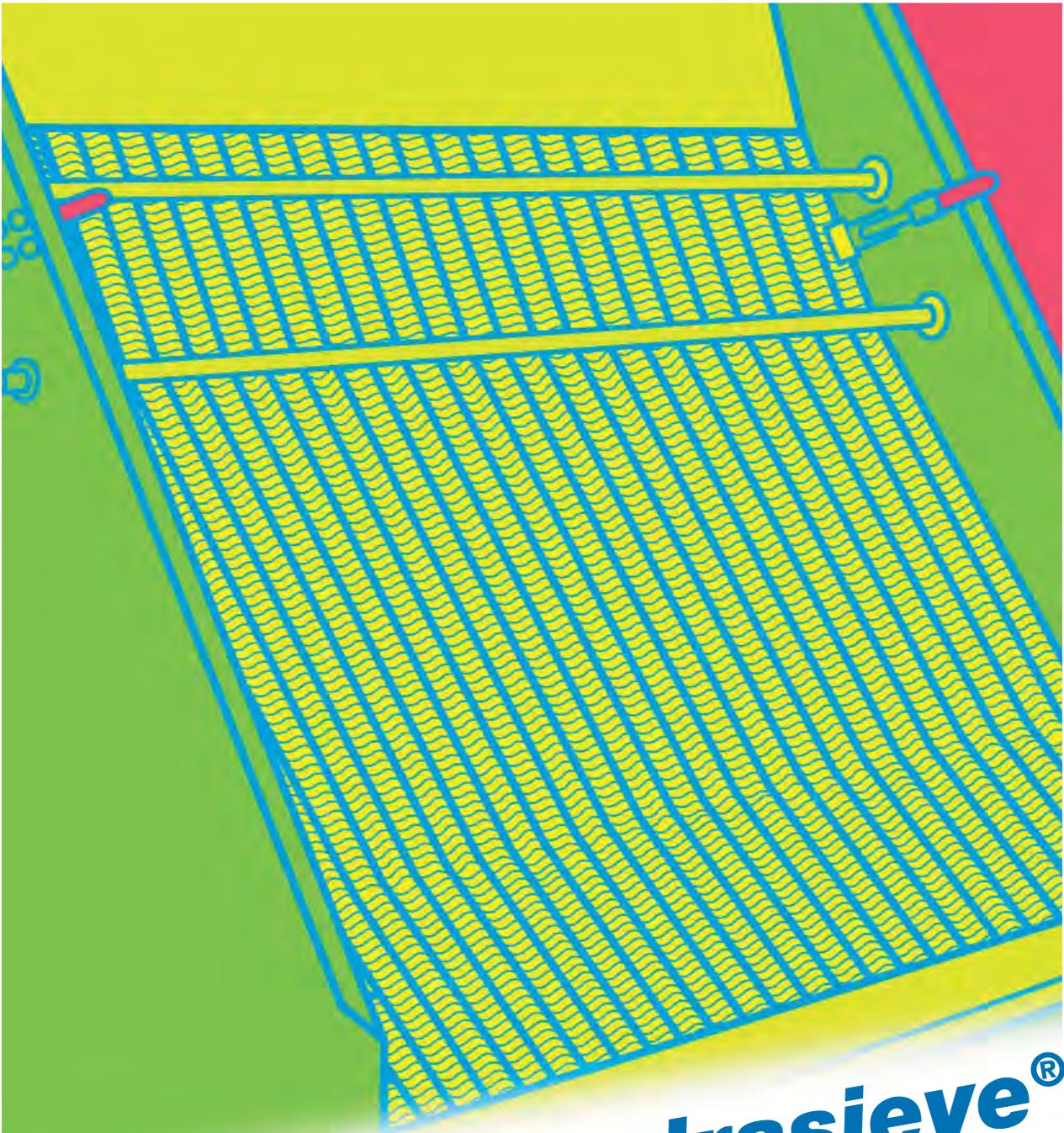
We look forward to working with you as this project progresses. If you need additional information or have questions regarding the inclusions or exclusions in our pricing, please contact me directly at 352.262.4121 or via email at tbm@cromcorp.com.

Sincerely,

THE CROM CORPORATION

Talmadge B. Mincey, PE
Vice President

/das



Hydrasieve®

Static screen for solid/liquid separation

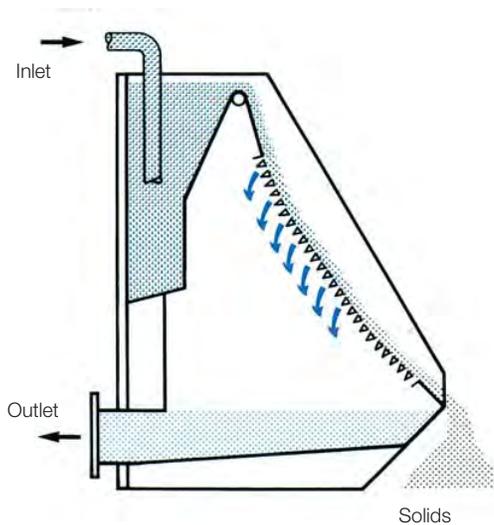
Operating principle

PRINCIPLE

The HYDRASIEVE® is a simple, highly efficient screen, designed for solid/liquid separation. Thousands of worldwide installations on all types of applications prove its efficiency. Its operation is based on the Coanda effect. This means that the liquid to be screened forms a hydraulic attachment to the bars of the screen plate. These bars, with triangular section, have rounded angles and have a wave configuration, as opposed to being straight. Thus, the liquid passes through the slots while the separated solids stay on the front face of the screen plate.

The screen plate has three distinct angles. This arrangement ensures:

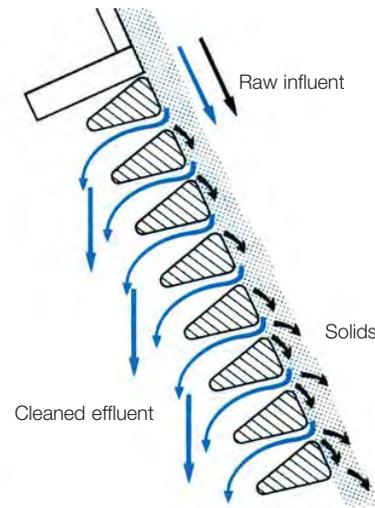
- elimination of the majority of the liquid
- deceleration of the screenings
- drainage



The screen plate is supported by a frame which initially ensures quietness and even distribution of the effluent on the whole width of the unit and then accelerates the liquid down the screen plate. The filtered liquid is then collected in the screen base.

The screen plate and the frame constitute the **HYDRASIEVE®**. The simple design and robust construction of the **HYDRASIEVE®** give trouble-free operation with the following advantages:

1. No moving parts, no motor
2. Very low installation costs; no maintenance
3. Only requires periodic cleaning
4. Quiet operation



Wave shape of the bars give the HYDRASIEVE® its self-cleaning effect.



Typical photograph of the front face of a HYDRASIEVE® being used on slaughterhouse raw sewage. Notice clearly that the waste is concentrated at the bottom of the waves.

DISTINGUISHING FEATURE OF THE HYDRASIEVE®

The distinguishing feature of these screens is the wave configuration of the bars. This provides an important operational advantage over static screens with straight bars (see above photographs). The wave formation concentrates the liquid at the low point of the waves moving it away from the rear vertical reinforcement bars.

The result is:

- blinding reduction
 - total or partial continuous self-cleaning due to the sideways movement of the liquid.
- The utilization of wave bars in place of straight bars, thus gives the following advantages:
- higher retention rate
 - increased flow capacity
 - possibility of selecting a finer slot size
 - reduced cleaning frequency

Standard construction and options

Frames are made in AISI 304 L or 316 L stainless steel. The screen plate is always in AISI 316 L stainless steel. The incoming fluid is delivered via an open pipe or a flange. The outlet consists of either a rear flange or a bottom opening. In all cases the upper feed box is fitted with a drainage hole. Additional options are available in order to improve the operation of the screen: rotating or motorised spray system or protective cover.

The standard range includes 6 widths of screen: 12" (305 mm), 24" (610 mm), 48" (1 219 mm), 60" (1 524 mm) and 72" (1 829 mm).

Slot sizes are: 0.006" (0,15 mm), 0.01" (0,25 mm), 0.02" (0,5 mm), 0.03" (0,75 mm), 0.04" (1 mm) and 0.06" (1,5 mm).



Motorised spray system

Applications

MUNICIPAL SEWAGE

- Domestic sewage
- Storm water screening
- Wash water from sand filters
- Sewer cleaning matters

RAW INTAKE WATER

- Screening industrial intake water
- Screening fire sprinkler water

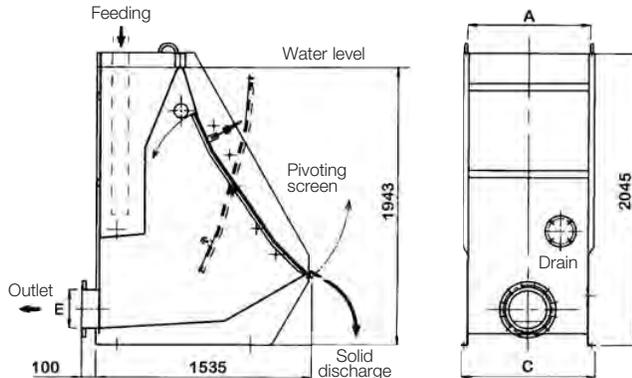
INDUSTRIAL EFFLUENTS

- Fruit and vegetable canning
- Wine producers and distilleries

- Meat and processed meals industry
- Slaughterhouse
- Fish processing
- Breweries and dairies
- Pig manure
- Textiles and laundries
- Tanneries and fellmongeries
- Chemical, pharmaceutical, refineries
- Pulp and paper
- Industrial effluents
- Recycling transport water

This application list is not exhaustive. For other applications, consult Andritz.

Dimensions - Type of frames



WIDTH	A (mm)	C (mm)	E (mm)	Net weight (kg)	Gross weight (kg)
12"	305	405	200	190	335
24"	610	710	200	250	540
48"	1219	1319	250	355	935
60"	1524	1624	300	415	1140
72"	1829	1929	300	465	1335

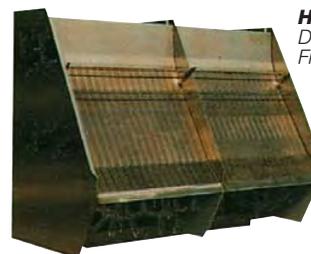
This drawing shows the model 554 with inlet pipe and rear outer flange. Other combinations are possible including rear inlet flange and bottom outlet.



HYDRASIEVE®
Stainless 554 -
Frame with pivoting screen



HYDRASIEVE®
Stainless 254 - Frame on
bottom tank with fixed screen



HYDRASIEVE®
Double stainless 554 -
Frame with pivoting screen

Flow capacity chart

Flow (m³/h) for various slot openings

Screen width		SLOT OPENING (mm)					
inches	mm	0,15	0,25	0,50	0,75	1,00	1,50
12"	305	10	20	25	30	35	40
24"	610	20	40	45	55	65	75
48"	1219	40	80	90	110	125	150
60"	1524	50	100	115	140	160	190
72"	1829	60	120	140	170	195	230

Given flows are for a municipal effluent containing up to 200 mg/l of suspended solids.
For other applications, consult Andritz.

Installations



Screening of wine industry rejects.
Stainless 254 - 24" frame on bottom belt.



Slaughterhouse raw sewage - Stainless 554 - 48" frame.
Rotating front and rear spray system with cover.



Thickening of paper millstock.
2 x 48" stainless 554 frame.



Raw municipal sewage.
Stainless 554 frame - 3 x 96" and 2 x 72".

France

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U.S.A.

Andritz Ruthner, Inc.
1010 Commercial Blvd. South
Arlington, Texas 76017
Tel. +1 817 465611
Fax +1 817 4683961



Proposal For:
Brodhead WWTP

Equipment:
Landy7™ Slow Speed Surface Aerators
CleanFlo™ All in One

Engineer:
GRW

Represented By:
Eco-Tech, Inc.
51 Fara Lane
London, KY 40741
Contact: Ms. Katie Avera
Cell: 606-682-0887
kavera@eco-tech.net

Furnished By:
WesTech Engineering, Inc.
Salt Lake City, Utah 84115
Phone: 801.265.1000
Fax: 801.265.1080

WesTech Proposal: 1460596
Wednesday, November 26, 2014

ITEM "A" - Two (2) Landy7™ Slow Speed Surface Aerators WesTech Equipment Model Number AES2A3

The Biological Treatment Equipment will consist of:

- Two (2) 15HP Slow Speed Surface Aerator,
- Two (2) 15HP Variable Frequency Drive

WesTech has also included anchors and fasteners, drawings, startup services, a 1 Year Warranty, and O&M Manuals.

TWO (2) MECHANICAL SURFACE AERATORS

A 15 HP TEFC, inverter duty, drive motor suitable for 460 VAC, 3 phase, 60 Hz supply power, 1800 rpm with a service factor of 1.15 on the sine wave power (1.0 on inverter power). The motor will be rated at 40°C ambient with class F insulation and shall comply with the applicable provision of NEMA with a minimum of B-10 bearing life of 200,000 hours. Each motor will be supplied with a thermostatic heat protection device and a 120 VAC space heater.

A high efficiency helical gear type reducer sized with a minimum service factor of 2.5 times the motor HP, equipped with a dry well, 120 VAC oil immersion heater, and low oil cutout switch. All bearings will have a minimum B-10 bearing life of 100,000 hours, except the bearing attached to the output shaft will have a bearing life of 250,000 hours.

A plate-style impeller with equally spaced blades of 3/16 inch minimum steel plate. The impeller shall be of sufficient size to withstand the design torque and hydraulic loading and to develop the minimum channel velocity required and specified oxygen transfer efficiency.

Four (4) A307 ZP jack studs will be provided for a minimum of 6" vertical adjustment of the aerator.

Two (2) steel mounting bars for mounting the drive unit to the jackstuds.

INSTRUMENTATION

Two (2) Hach DO probe and two (2) DO controllers with mounting equipment will be installed, each ditch will be with one (1) DO and one (1) controller, for controlling the speed of the aerator.

TWO (2) VARIABLE FREQUENCY DRIVE

VFD will be housed in a Hoffman NEMA 4 mild steel enclosure with door-mounted selector switches, potentiometers, and status lights. The panel will include a 1kVA control power transformer to provide 120 VAC for internal controls. The panel will come complete with line reactors, all necessary relays, terminal blocks, and support components. The control panel is wired to accept a single 480 VAC, 3 phase, 60 Hz power feed from the customer. A 3-pole circuit breaker with padlockable disconnect handle is provided for short-circuit protection. All wiring for field connections will be brought to a terminal strip. All interconnecting wiring is by others.

• SURFACE PREP AND PAINT

All ferrous metal surfaces, except motors, speed reducers, and stainless steel, will be factory prepped in accordance with SSPC-SP10 and coated with two (2) coats of Tnemec Polyamidoamine Epoxy. The motors and gear reducers will be supplied with manufacturer's standard coating system.

• TOTAL SERVICE

Two (2) trips and four (4) days for inspection, start-up, and instruction of plant personnel included.

• SPARE PARTS

None

• CLARIFICATIONS/COMMENTS

The proposed system is 100% redundancy, with one (1) train being able to handle 100% design flow while the other train is down for any reason.

The proposed system was designed based on the information provided and WesTech's standard equipment. The proposed equipment is backed by a 1 Year warranty.

NOTE: ANY ITEM NOT LISTED ABOVE TO BE FURNISHED BY OTHERS.

OPTIONAL ITEMS

"A-1" Adder for Equipment to Handle Future TN Limit

TWO (2) FLOW CONTROL GATES

A handwheel-driven gear reducer that allows 112.5° of travel in the forward and reverse direction. The unit will include a 16" aluminum hand wheel, stand, gear reducer, rotating shaft, locking mechanism with 1 5/8° increments, guide bearings, A36 steel flow vane and stops, with 304SS fasteners and anchor bolts.

TWO (2) SUBMERSIBLE MIXERS FOR USE IN THE ANOXIC ZONE

The submersible mixers will be of the closed coupled design and include one (1) 1.0 HP (nominal) motor wired for 480V, 3Ph, 60 Hz with a service factor of 1.15. The mixer will include an axial-pumping stainless steel impeller, 30-ft power cable and 30-ft lifting cable (316SS), stainless steel guide rails with floor mounted brackets. Each mixer will include a portable crane assembly with a manual winch and a 316SS platform socket.

ITEMS NOT BY WESTECH

Electrical wiring, conduit or electrical equipment, piping, valves, or fittings, lubricating oil or grease, shop or field painting, field welding, erection, performance testing, unloading, storage, concrete work, field service (except as specifically noted).

This proposal section has been reviewed for accuracy and is approved for issue:

By: SEN MA

Date: November 26, 2014

ITEM: "B" - One (1) CleanFlo™ All in One Model TSF2-10

EACH UNIT FURNISHED COMPLETE BY WESTECH WITH THE FOLLOWING COMPONENTS:

BASIS OF DESIGN

Application:	Domestic Sewage Screening and Grit Removal
Dry Weather Peak Flow:	250,000 gpd
Wet Weather Peak:	600,000 gpd
Screen Opening:	¼ inch
Opening Type:	Perforated
Grit Capture @ Max Dry Weather Flow:	95% of grit >50 mesh in size 85% of grit 50-70 mesh in size 65% of grit 70-100 mesh in size
Grit Capture @ Max Wet Weather Flow:	80% of grit 70 mesh and greater in size
Grit Specific Gravity:	2.65
Grit Tank Air Requirement:	9 -18 cfm @ 2.6 psi
WashWater Requirement:	2.1 gpm @ 40 psi
Influent Connection:	6 inch flanged
Effluent Connection:	6 inch flanged



COMBINED HEADWORKS SYSTEM

- Integral screen tank from type 304 stainless steel including inlet connection. Tank includes mount for ultrasonic level sensor and vent connection. Hinged access door supplied with safety microswitch.
- Screenings basket from type 304 stainless steel.
- Screen conveyor tube with wear bars from type 304 stainless steel.
- Shaftless spiral screw from high strength alloy steel with protective primer coating and brushes attached in the basket area. Brushes are supplied in sections each covering 180° of the spiral and shall have nylon bristles molded into a plastic core and attached to the screw with stainless steel fasteners.
- Screen dual chambered dewatering and discharge zone from type 304 stainless steel with hinged access door and safety microswitch.
- Automatic screen dewatering zone drain flush spray system from type 304 stainless steel including manual control valve.
- Drain piping from screen compaction zone to direct pressate back into integral tank.
- Integral grit tank from type 304 stainless steel with effluent weir, flanged effluent connection and capped 3" drain. Removable bolted covers provide fully enclosed system and allow for operator access.

- Horizontal and inclined grit shaftless spiral screws from high strength alloy steel with protective primer coating.
- Drive units with 1 HP screen motor, 1/2 HP horizontal grit conveyor motor, and 1/2 HP inclined grit conveyor motor suitable for 480/3/60 electrical supply.

HARDWARE

- Assembly fasteners and anchor rods from type 304 stainless steel.

CONTROLS AND ELECTRICAL DEVICES

- One (1) NEMA 4X stainless steel main control panel suitable for 480/3/60 electrical supply. Control panel shall contain the following devices for operation of the unit:
 1. Main disconnect with through door interlock handle.
 2. Step down control transformer.
 3. Branch circuit protection.
 4. Screen motor starter – reversing.
 5. Horizontal and inclined grit drive motor starters.
 6. Emergency stop pushbutton.
 7. Screen, horizontal grit, inclined grit and compaction flush HOA switches.
 8. Screen FOR Switch – spring return to Off from Reverse.
 9. Current monitor for overload protection of each motor.
 10. Hour meter for each motor.
 11. Control power and run indicating lights.
 12. Alarm lights indicating overcurrent and starter overload.
 13. Alarm reset pushbutton.
 14. Programmable control relay for screen control logic functions.
 15. Run and alarm auxiliary contacts.
- One (1) NEMA 4X local Emergency Stop pushbutton for field mounting at the unit.
- Three (3) NEMA 4X safety microswitches mounted to the screen tank and screen dewatering/discharge access door.
- One (1) 2-way 120V solenoid brass body valve to control water spray function to the screen.
- One (1) Milltronics Pointek ULS200 ultrasonic level sensor.

SPARE PARTS

- One (1) set of spare brushes.

FIELD SERVICE

- One (1) trip and one (1) day for installation inspection, start up, and instruction of plant personnel.

CLARIFICATIONS/COMMENTS

- Unit anchorage designed around RedHead A7 adhesive system. Adhesive and applicator by others.
- Due to size constraints, the unit will ship with some field assembly required. Typically breakdown consists of:
 1. Screen tank and grit tank. Fully assembled or shipped in 15-30' lengths. Flanges are provided at connection points for assembly.
 2. Screen and grit conveyor tube extension supports bolt to top of grit tank.
 3. Screen conveyor tube and spiral assembly must be mounted to screen tank.
 4. Grit conveyor tube and spiral assembly must be mounted to grit tank.
 5. Discharge chute extensions must be bolted to screen and grit discharge points.
 6. Adjustable foot pads mounted to tank and adjusted to level equipment.

OPTIONAL ITEMS

- Item B-1: Continuous bagger assembly to collect material at screen and grit discharges with refillable bag cassettes.
- Item B-2: Blower - One (1) PD blower package with acoustic cover to provide air supply to grit tank diffusers. Includes addition of necessary controls including motor starter to control panel.

NOTE: ANY ITEM NOT LISTED ABOVE TO BE FURNISHED BY OTHERS:

ITEMS NOT BY WESTECH: Electrical wiring, conduit or electrical equipment, piping, valves, or fittings, shimming material, lubricating oil or grease, shop or field painting, field welding, erection, detail shop fabrication drawings, performance testing, unloading, storage, concrete work, hoist or lifting apparatus, grating, platforms, stairs, handrailing, or field service (except as specifically noted).

This proposal section has been reviewed for accuracy and is approved for issue:

By: Stephen Rioux Date: November 26, 2014

BUDGET PRICING

ITEM	EQUIPMENT	PRICE (U.S.)
"A"	(2) Landy7™ Slow Speed Surface Aerators	\$165,500
"A-1"	Adder for Equipment to Handle Future TN Limit	\$34,400
"B"	(1) CleanFlo™ All in One Model TSF2-10	\$110,000
"B-1"	Continuous Bagger	\$3,000
"B-2"	Blower	\$7,500

The above mentioned equipment was designed according to the information which we received. The dimensions may vary slightly depending on the plant's actual design parameters. Assumed values may have been used, therefore, all information shall be verified by the Engineer.

Unless otherwise indicated, prices listed are for equipment only. All optional items will be offered with the purchase of the scoped equipment only. No optional items will be sold separately.

Prices are for a period not to exceed 30 days from date of proposal.

Warranty: A written supplier's warranty will be provided for the equipment specified in this section. The warranty will be for a minimum period of (1) year from start-up or 18 months from time of equipment shipment, whichever comes first. Such warranty will cover all defects or failures of materials or workmanship which occurs as the result of normal operation and service except for normal wear parts (i.e. squeegees, skimmer wipers, etc.).

Terms: Terms for equipment are 15 percent payment of the purchase price with submittal drawings, 35 percent upon release for fabrication, and 50 percent net **30 days** from shipment. Retentions are not allowed.

Sales Tax: No sales taxes, use taxes, or duties have been included in our pricing.

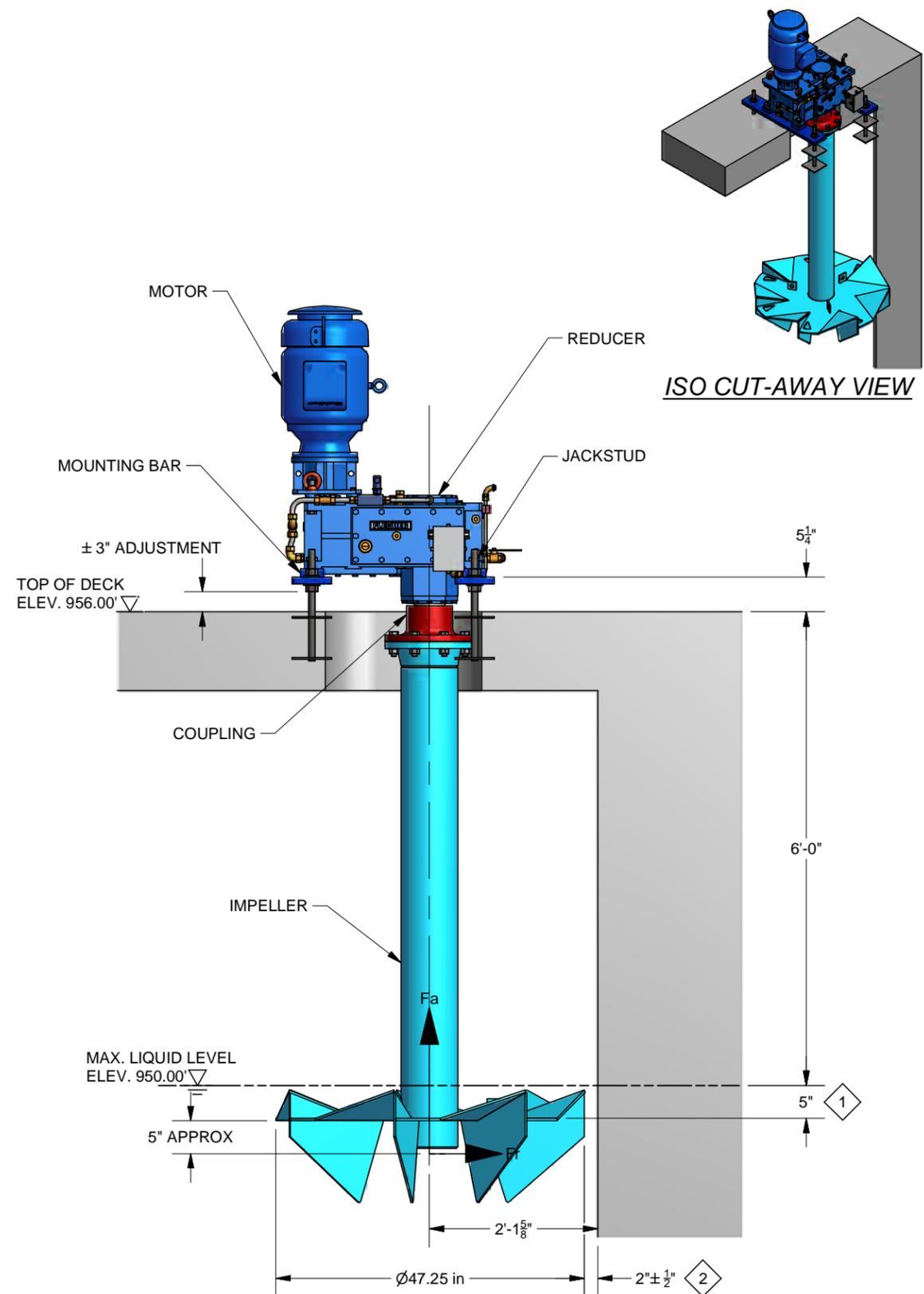
Freight: Prices quoted are **F.O.B. shipping point** with freight allowed to a readily accessible location nearest to jobsite. All claims for damage or loss in shipment shall be initiated by purchaser.

Submittals: Submittals will be made approximately **6 to 8 weeks** after purchase order is received in our office.

Shipment: Estimated shipment time is **18 to 20 weeks** after approved submittal drawings are received in our office.

Field Service: Prices do not include field service unless noted in equipment description. Additional field service is available at \$960.00 per day plus expenses.

Paint: If your equipment has paint included in the price, please take note of the following. Primer paints are designed to provide only a minimal protection from the time of application (usually for a period not to exceed 30 days). Therefore, it is imperative that the finish coat be applied within 30 days of shipment on all shop primed surfaces. Without the protection of the final coatings, primer degradation may occur after this period, which in turn may require renewed surface preparation and coating. If it is impractical or impossible to coat primed surfaces within the suggested time frame, WesTech strongly recommends the supply of bare metal, with surface preparation and coating performed in the field. All field surface preparation, field paint, touch-up and repair to shop painted surfaces are not by WesTech.



MOTOR:

HORSEPOWER: 15 HP
 SERVICE FACTOR: 1.15
 INSULATION: CLASS F
 ENCLOSURE: TEFC
 SPEED: 1800 RPM (1775 rpm FULL LOAD)
 460V/3 PH/60 Hz
 B10 BEARING LIFE: 200,000 Hrs
 CONDENSATE DRAINS
 SPACE HEATER (120 V)
 AMBIENT TEMP: 40°C
 N/C THERMOSTAT
 MOTOR WEIGHT: 380 lbs (approx.)

REDUCER:

GEAR RATIO: 25.142:1
 SERVICE FACTOR: 2.5
 B10 BEARING LIFE: 100,000 HRS MIN. INPUT SHAFT
 250,000 HRS MIN. OUTPUT SHAFT
 CONSTRUCTION: CAST IRON
 DIPSTICK & OIL DRAIN w/ VALVE (1")
 EFFICIENCY: 97% MIN.
 IMMERSION HEATER
 MECHANICAL OIL PUMP w/LOW OIL SWITCH
 REDUCER WEIGHT: 827 lbs (DRY) (approx.)

IMPELLER:

MANUFACTURER: WESTECH
 MODEL: LANDY-7 1200
 TYPE: 7-BLADE
 IMPELLER SHAFT SIZE: 8"
 OPERATIONAL SPEED: 70.60 RPM
 DIRECTION OF OPERATION: 1 CW; 0 CCW
 MATERIAL: A36 STEEL, 5/16" MIN PLATE
 IMPELLER WEIGHT: 491 lbs (approx.)

JACKSTUDS:

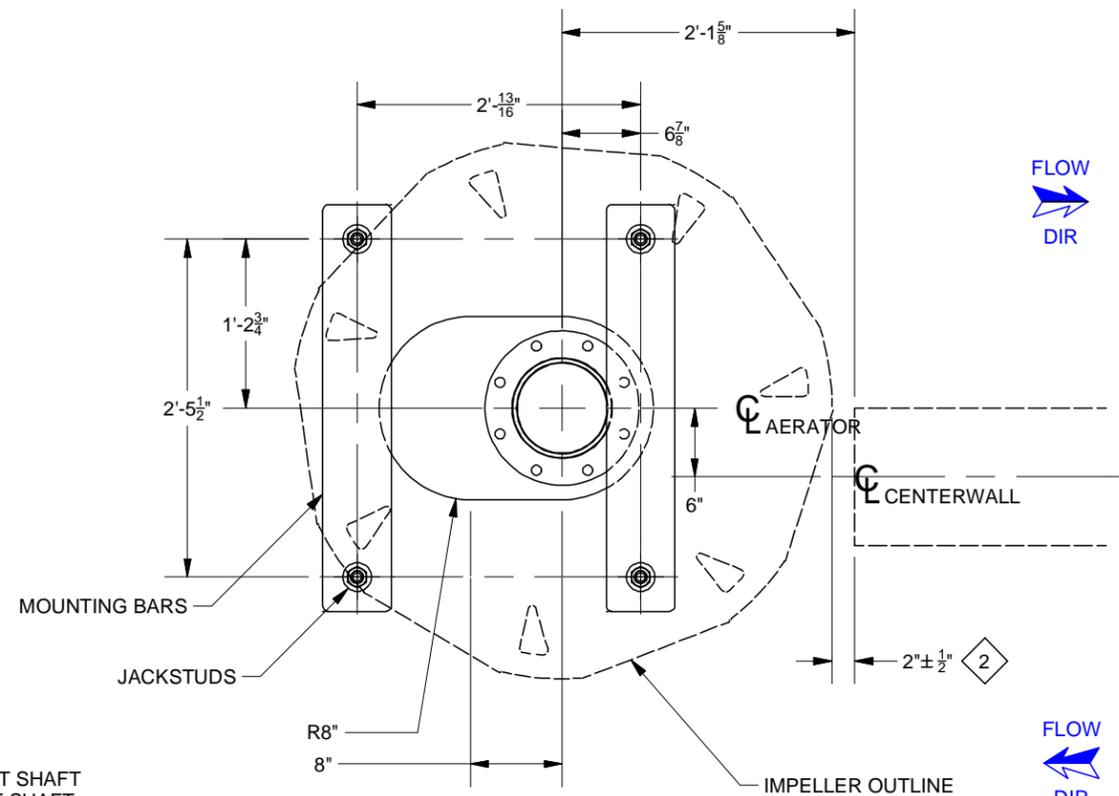
DIAMETER: 1"
 PROJECTION: 9 1/2"
 MATERIAL: A307 ZP
 WEIGHT: 10 lbs each (approx.)
 ADJUSTMENT: ±3"

COUPLING:

SIZE: 8" PIPE FLANGE
 MATERIAL: CAST IRON
 WEIGHT: 140 lbs

MOUNTING BARS:

THICKNESS: 1"
 MATERIAL: A36 STEEL
 WEIGHT: 134 lbs



JACKSTUD LAYOUT

CLOCKWISE ROTATION SHOWN
 MIRROR ABOUT CENTERWALL CENTERLINE FOR COUNTER-CLOCKWISE

FOR SUBMITTAL ONLY
 NOT FOR FABRICATION
 OR FIELD ASSEMBLY

NOTES:

- IMPELLER SUBMERGENCE, AS SHOWN, IS THE MAXIMUM OPERATING LIQUID LEVEL AND MAXIMUM OXYGEN TRANSFER. EQUIPMENT SHOULD BE OPERATED AT OR BELOW THIS LEVEL AS NECESSARY TO ACHIEVE OPTIMAL DISSOLVED OXYGEN LEVEL. FOR OPERATING LEVEL, PLEASE REFER TO PERFORMANCE CURVES.
- WALL CLEARANCE OF 2"±1/2" IS CRITICAL AND MUST BE HELD.
- TOTAL WEIGHT OF EQUIPMENT: 2016 lbs.
 WEIGHT OF SINGLE HEAVIEST ITEM: 827 lbs.

PROJECT 1460596
 BRODHEAD WWTP
 BRODHEAD, KY

WestTech

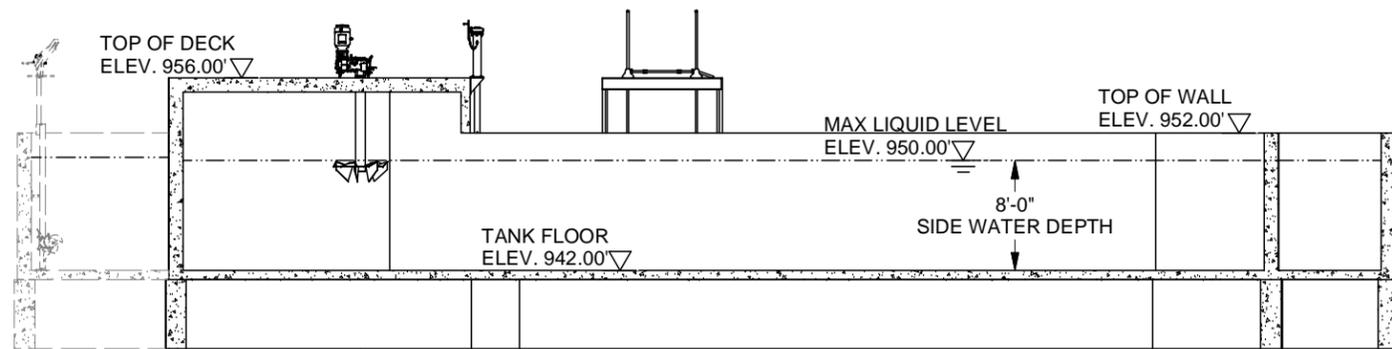
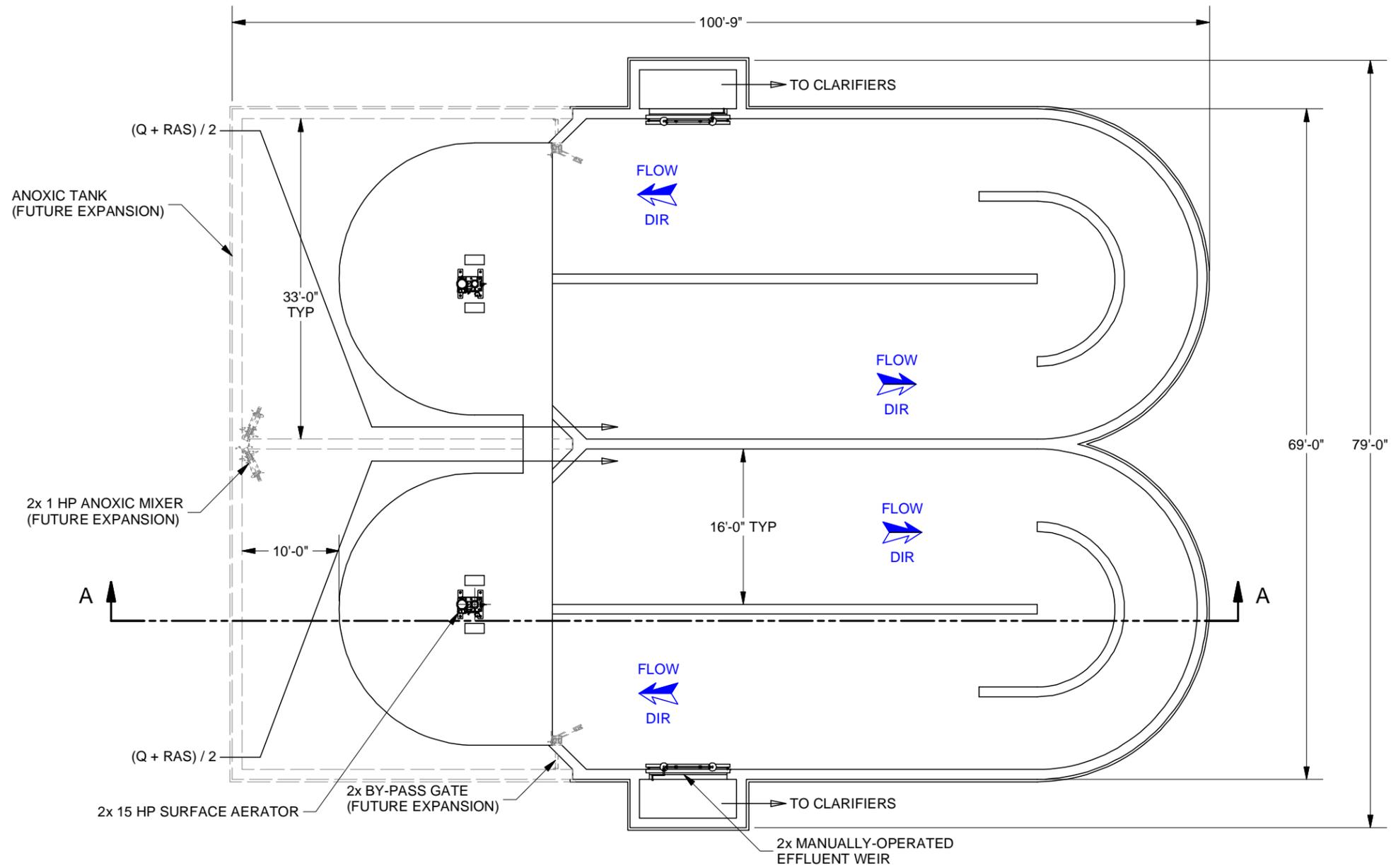
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TITLE **OxySTREAM - GENERAL ARRANGEMENT**
 AES2A3
 15 HP

DESIGNER	CHECKER	APPROVER	DATE
VA23			2014-11-24

DOCUMENT NUMBER	SHEET	REV
1460596-1001	1 OF 3	-

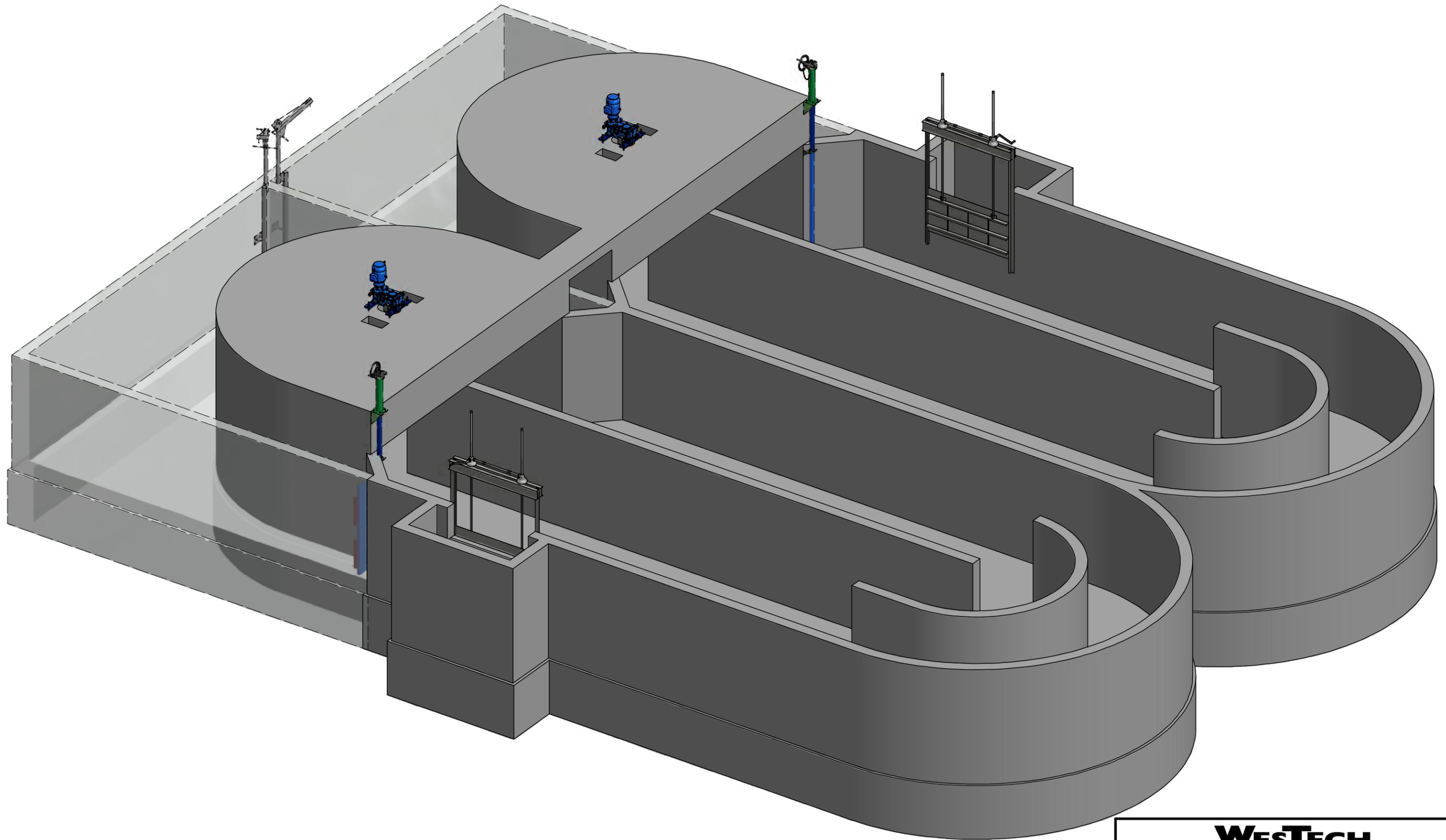
REV	REVISION DESCRIPTION	ECN	DESIGNER	APPROVER	DATE	REFERENCE DOCUMENTS
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SECTION A-A

TANK CONCRETE VOLUME INCLUDING FOOTINGS:
 550 yd³ (APPROXIMATE)
 695 yd³ (INCLUDING FUTURE ANOXIC)

PROJECT		1460596 BRODHEAD WWTP BRODHEAD, KY	
WESTECH			
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TITLE		OxySTREAM - GENERAL ARRANGEMENT AES2A3 15 HP	
DESIGNER	CHECKER	APPROVER	DATE
VA23			2014-11-24
DOCUMENT NUMBER		SHEET	REV
1460596-1001		2 OF 3	-



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TITLE **OxySTREAM - GENERAL ARRANGEMENT**
 AES2A3
 15 HP

DESIGNER	CHECKER	APPROVER	DATE
VA23			2014-11-24
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1460596-1001			3 OF 3
			REV
			-



Wastewater Technology Fact Sheet Fine Bubble Aeration

DESCRIPTION

In wastewater treatment processes, aeration introduces air into a liquid, providing an aerobic environment for microbial degradation of organic matter. The purpose of aeration is two-fold: 1) to supply the required oxygen to the metabolizing microorganisms and 2) to provide mixing so that the microorganisms come into intimate contact with the dissolved and suspended organic matter.

The two most common aeration systems are subsurface and mechanical. In a subsurface system, air is introduced by diffusers or other devices submerged in the wastewater. A mechanical system agitates the wastewater by various means (e.g., propellers, blades, or brushes) to introduce air from the atmosphere.

Fine pore diffusion is a subsurface form of aeration in which air is introduced in the form of very small bubbles. Since the energy crisis in the early 1970s, there has been increased interest in fine pore diffusion of air as a competitive system due to its high oxygen transfer efficiency (OTE). Smaller bubbles result in more bubble surface area per unit volume and greater OTE.

APPLICABILITY

Saukville Wastewater Treatment Plant, Saukville, Wisconsin

The Saukville Wastewater Treatment Plant (SWTP) uses fine bubble aeration to increase treatment efficiency and oxygen transfer, as well as reduce power costs. Initially, the plant used stainless-steel coarse bubble diffusers requiring two centrifugal

blowers. Although these diffusers required little maintenance, oxygen transfer was inadequate to meet process needs, and power requirements were excessive.

In an attempt to reduce power costs and increase treatment plant efficiency, the plant was retrofitted with a combination of coarse bubble and fine bubble ceramic diffusers in 1985. One of the two treatment cells was retrofitted with fine bubble ceramic diffusion, and the second retained its coarse bubble diffusion system. This reduced power requirements by eliminating the need for one blower.

After start-up, it was noticed that the mixed liquor dissolved oxygen (DO) levels were not as high in the fine bubble cell as in the coarse bubble cell, due to uneven air distribution between cells. To correct this, a positive displacement blower was added to the fine bubble cell. To reduce fouling of the ceramic diffusers, an in-place gas-cleaning system was installed to inject anhydrous hydrochloric acid into the air stream while the system was in operation.

In 1990, the plant switched to fine bubble membrane diffusers, which were interchangeable with the ceramic diffusers. The ceramic and membrane efficiencies were comparable, so few adjustments in air rate were needed. The SWTP was awarded the U.S. Environmental Protection Agency Award of Excellence in 1991 based on overall energy savings and optimized operations and maintenance practices.

Renton Wastewater Treatment Plant, Renton, Washington

The Renton Wastewater Treatment Plant serves the urban and suburban areas east, south, and north of Lake Washington, just east of Seattle. Rising power costs created a need for modification of its coarse bubble aeration system.

Perforated membrane fine bubble diffusers were selected for an in-plant study in 1982. These diffusers were placed in the first two passes of one aeration tank, while the other tanks retained their coarse bubble units. DO was compared in the two systems, and it was determined that the perforated membrane diffusers required 30 to 40% less air than coarse bubble diffusers to maintain a comparable mixed liquor DO. Total energy consumption decreased from 390 to 355 kW/1,000 m³ after installation of the fine bubble diffusers.

Ridgewood Wastewater Treatment Plant, Ridgewood, New Jersey

The Ridgewood Wastewater Treatment Plant (RWTP) was retrofitted from coarse bubble diffusion to a fine pore diffusion aeration system in 1983. Fine pore aeration would allow the use of one blower and maintain the same oxygen utilization rate as provided by the coarse bubble system. Oxygen transfer studies were performed on the fine pore ceramic dome diffusers in order to compare results with the coarse bubble diffusers.

The results showed that the coarse bubble diffuser had an average standard oxygen transfer efficiency (SOTE) under field conditions of 4.8% with an average alpha (α) of 0.55. In contrast, with two tanks in operation, the fine pore system had an average SOTE under field conditions of about 9.5% and an average α of 0.4 during normal daytime high-load operation. Alpha is defined as the ratio of KLa (volumetric mass transfer coefficient) of a clean diffuser in process water to the KLa of the same diffuser in clean water.

Two methods of cleaning were used at the RWTP: anhydrous hydrochloric acid brushing and water hosing. Installation of the fine pore aeration system achieved the oxygen utilization desired, reduced

power consumption by approximately 28%, and resulted in a significant improvement in effluent quality with respect to nitrification.

ADVANTAGES AND DISADVANTAGES

Some advantages and disadvantages of various fine pore diffusers are listed below:

Advantages

- Exhibit high OTEs.
- Exhibit high aeration efficiencies (mass oxygen transferred per unit power per unit time).
- Can satisfy high oxygen demands.
- Are easily adaptable to existing basins for plant upgrades.
- Result in lower volatile organic compound emissions than nonporous diffusers or mechanical aeration devices.

Disadvantages

- Fine pore diffusers are susceptible to chemical or biological fouling, which may impair transfer efficiency and generate high head loss. As a result, they require routine cleaning. (Although not totally without cost, cleaning does not need to be expensive or troublesome.)
- Fine pore diffusers may be susceptible to chemical attack (especially perforated membranes). Therefore, care must be exercised in the proper selection of materials for a given wastewater.
- Because of the high efficiencies of fine pore diffusers at low airflow rates, airflow distribution is critical to their performance and selection of proper airflow control orifices is important.
- Because of the high efficiencies of fine pore diffusers, required airflow in an aeration

basin (normally at the effluent end) may be dictated by mixing - not oxygen transfer.

- Aeration basin design must incorporate a means to easily dewater the tank for cleaning. In small systems where no redundancy of aeration tanks exists, an in-situ, nonprocess-interruptive method of cleaning must be considered.

DESIGN CRITERIA

Diffusers

In the past, various diffusion devices have been classified based on their OTE as either fine bubble or coarse bubble. Since it is difficult to clearly demarcate or define between fine and coarse bubbles, diffused aeration systems have been classified based on the physical characteristics of the equipment. Diffused aeration systems can be classified into three categories:

- Porous (fine bubble) diffusers: Fine pore diffusers are mounted or screwed into the diffuser header pipe (air manifold) that may run along the length or width of the tank or on a short manifold mounted on a movable pipe (lift pipe). These diffusers come in various shapes and sizes, such as discs, tubes, domes, and plates.
- Nonporous (coarse bubble) diffusers: The common types of nonporous diffusers are fixed orifices (perforated piping, spargers, and slotted tubes); valved orifices; and static tubes. The bubble size of these diffusers is larger than the porous diffusers, thus lowering the OTE.
- Other diffusion devices: These include jet aerators (which discharge a mixture of air and liquid through a nozzle near the tank bottom); aspirators (mounted at the basin surface to supply a mixture of air and water); and U tubes (where compressed air is discharged into the down leg of a deep vertical shaft).

Types of fine pore diffusers

Fine pore diffusers (discs, tubes, domes, and plates) are usually made from either ceramics, plastics, or flexible perforated membranes. Although many materials can be used to make fine pore diffusers, only these few are being used due to cost considerations, specific characteristics, market size, and other factors.

Ceramic media diffusers have been in use for many years and have essentially become the standard for comparison since, in the past, they were the primary media in the fine pore aeration market. Ceramic, plastic, and flexible materials are resistant to the chemicals used in wastewater treatment. Discussed below are common types of fine bubble diffusers. However, recent advances in technology have resulted in modifications to these types, which are shown in Figure 1.

3Disc diffusers

Disc diffusers are relatively flat and range from approximately 18 to 24 cm in diameter with thicknesses of 13 to 19 mm. Materials for discs include ceramics, porous plastics, and perforated membranes. Therefore, thicknesses vary, as do construction features. Currently, manufacturers provide plenums or base plates that will accept all materials.

The disc is mounted on a plastic saddle-type base plate, and either a center bolt or a peripheral clamping ring is used to secure the media and the holder together. More commonly, the disc is attached to the holder via a screw-on retainer ring. Disc diffusers are designed to have an airflow range of 0.25 to 1.5 L/s per diffuser.

Tube/flexible sheath diffusers

A typical tube diffuser is either a rigid ceramic or plastic hollow cylinder (tube) or a flexible membrane secured by end plates in the shape of a tube. A tube diffuser has a media portion up to 200 cm long. The thickness of the diffuser varies, but the outside diameter is approximately 6.4 to 7.6 cm. The various components of a tube diffuser are made of stainless steel or durable plastic. Threaded rods are used with ceramic or porous plastic. The rod is threaded into the feed end of the holder with a hexagonal nut secured on the rod to hold the assembly in place. Air flows through tube diffusers in the range of 1 to 5 L/s.

Dome diffusers

Made from ceramics or porous plastics, dome diffusers are typically circular, 18 cm in diameter, and 3.8 cm high. The media is about 15 mm thick on the edges and 19 mm on the horizontal or flat surface. The dome diffuser is mounted on either a polyvinyl chloride or a steel saddle-type base plate. The airflow rate for dome diffusers is usually 0.5 L/s with a range of 0.25 to 1 L/s.

Plate diffusers

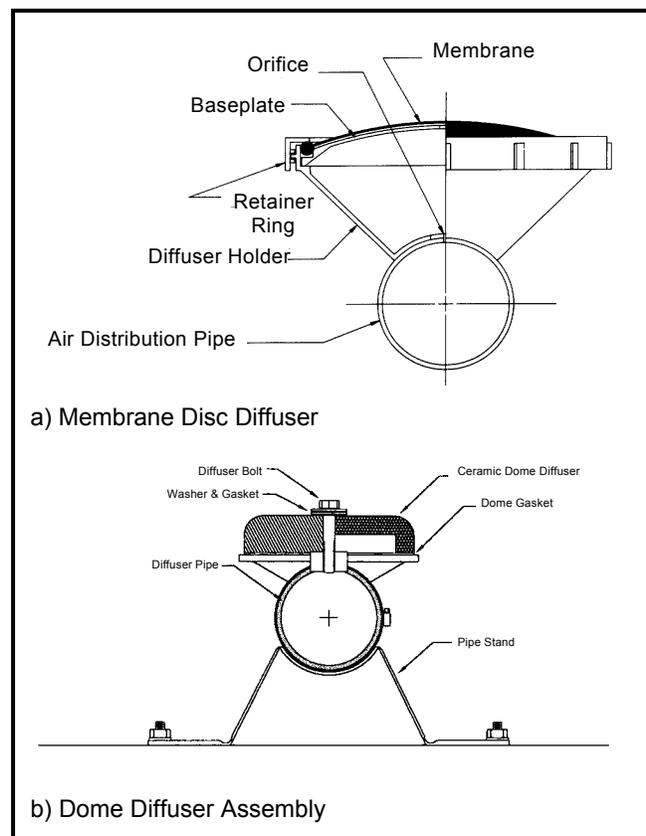
Plate diffusers are flat and rectangular, approximately 30 cm² in area, and 2.5 to 3.8 cm

thick. They are normally made from ceramic or membrane materials. Installation involves either grouting the plates into recesses in the floor, cementing them into prefabricated holders, or clamping them into metal holders. Air plenums run under the plates and supply air from headers. Plate diffusers have largely been replaced by porous discs, domes, and tubes in new installations.

PERFORMANCE

The performance of diffused aeration systems under normal operating conditions is directly related to the following parameters:

- Fouling.
- Wastewater characteristics.
- Process type and flow regime.



Source: SANITAIRE brand products, reprinted with permission by the Water Pollution Control Corporation, Brown Deer, Wisconsin, 1999.

FIGURE 1 SCHEMATIC OF VARIOUS FINE BUBBLE DIFFUSERS

- Loading conditions.
- Basin geometry.
- Diffuser type, size, shape, density, and airflow rate.
- Mixed liquor dissolved oxygen (DO) control and air supply flexibility.
- Mechanical integrity of the system.
- Operator expertise.
- The quality of the preventive operation and maintenance (O&M) program.

The wastewater characteristics that establish the oxygen demand placed on a fine pore aeration system are the influent flow rate, biochemical oxygen demand load, and ammonia-nitrogen ($\text{NH}_3\text{-N}$) load.

Fouling is generally classified as one of two types: Type I and Type II. Characteristics of Type I fouling are clogging of the diffuser pores, either by airborne particulates clogging the air side, or metal hydroxides and carbonates clogging the liquid side. Type II is characterized by a biofilm layer forming and growing on the surface of the diffuser. In practice, it can be difficult to distinguish between the two types because they occur together, with one or the other dominating.

Historically, the rate of fouling was measured by monitoring the rise in backpressure. However, this proved to be a crude and qualitative method because significant fouling can occur without much increase in backpressure, but with great reductions in OTE.

The presence of constituents such as surfactants, dissolved solids, and suspended solids can affect bubble shape and size and result in diminished oxygen transfer capability. In general, ceramic domes and discs yield slightly higher clean water transfer efficiencies than typical porous plastic tubes or flexible sheath tubes in a grid placement. Other key parameters that have an effect on the performance characteristics of a fine pore media

diffuser are permeability, uniformity, dynamic wet pressure, and strength.

Effective long-term process control depends on appropriate selection and integration of the solids' retention time, the food-to-microorganisms loading, and the wastewater flow regime. Short-term, day-to-day variables at the disposal of the operator include control of diffuser airflow rate and mixed liquor DO concentration. It is essential to understand how each of these parameters affects aeration efficiency in order to develop optimum short- and long-term operating procedures.

OPERATION AND MAINTENANCE

The main operational objective is to achieve acceptable effluent quality while maximizing the aeration efficiency. It is essential that diffusers be kept clean through cost-effective preventive maintenance procedures. Preventive maintenance can virtually eliminate air-side (blower filtration system) particulate fouling of fixed fine pore diffusers.

Filtration equipment maintenance entails cleaning and changing filter media. Calibration and/or zeroing of meters is necessary as part of preventive maintenance because accurate airflow and DO measurements are a critical part of monitoring aeration systems.

Preventive maintenance is needed to keep an aeration system operating at the required level of performance and to decrease the need for corrective maintenance. In addition, preventive maintenance will reduce the number of interruptions in the air supply, thus preventing solids from entering the air distribution system.

The cleaning methods used to restore diffuser efficiency are either process interruptive (aeration basin out of service) or process noninterruptive (access to basin not needed). Diffusers can be cleaned by removing them from the basin (ex-situ) or onsite inside the basin (in-situ). Some cleaning techniques used are acid washing, alkaline washing, gas injection, high-pressure water jetting, and air bumping.

When placing an empty aeration basin into service, all recommended operational steps for start-up and shutdown should be followed. If a basin is put into service during cold weather, care must be exercised to prevent any damage from buoyant forces exerted by ice trying to float. Aeration basins must not be drained during freezing weather unless absolutely necessary because ice and frost can cause serious damage. In the event that an aeration basin should stand idle for more than 2 weeks, it should be drained and cleaned thoroughly.

COSTS

The aeration system consumes approximately 50 to 65% of the net power demand for a typical activated sludge wastewater treatment plant. Therefore, the designer is responsible for selecting a system that will meet the mixing and oxygen requirements for the process at the lowest cost possible. Once the requirements for aeration are determined, comparative costs for different types of aeration systems can be estimated and the final equipment configuration selected to best match the requirements of the job.

Construction cost items mainly consist of aeration basins, air piping and headers as appropriate, aeration devices and their supports, air cleaning equipment, blowers, and buildings to house these items. O&M costs are primarily for power, cleaning, and replacement.

Operational costs are determined in part by the OTE of the fine bubble aeration system being used, as well as the characteristics of the influent wastewater. Aerator cleaning costs depend on the aerator type; how easily the aerators can be removed, cleaned, or replaced; and the plant's O&M procedures.

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For more information contact:

Municipal Technology Branch
U.S. EPA
Mail Code 4204
401 M St., S.W.
Washington, D.C., 20460

Rec'd 12/11/2014

Joe Strehl

From: Joann Riedl <JRiedl@aqua-aerobic.com> on behalf of Julian Rodriguez <JRodriguez@aqua-aerobic.com>
Sent: Tuesday, December 09, 2014 3:53 PM
To: 'Joe Strehl'
Cc: Joann Riedl; Julian Rodriguez; Tatiana Mazzei; Steve Stanish; File Archive
Subject: Brodhead WWTP KY 102516B -- Preliminary Design
Attachments: 2014-12-09 139102 Prelim SBR Design.pdf

Joe,

Please see attached, for your review, preliminary Design #139102 for the referenced project. Based on the information provided, we are recommending two (2) 30' x 30' AquaSBR® Sequencing Batch Reactor basins to treat a Max. Design Flow of 0.5 MGD, and also having the capacity to advance cycles in the event of a Peak Hydraulic Flow of 0.6 MGD. Note that we also included Retrievable Fine Bubble Diffusers and Aerzen Positive Displacement Blowers for this design.

Preliminary budget price for the equipment in this design, including freight to the jobsite and our standard start-up supervision services, is \$344,945.

Please let us know if you have any questions, or if additional information is required.

Thank you,

Julian Rodriguez
Application Engineer

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PROCESS DESIGN REPORT



**AQUA-AEROBIC
SYSTEMS, INC.**

BRODHEAD WWTP KY

Design#: 139102

Option: Preliminary SBR Design

Designed By: Julian Rodriguez on Tuesday, December 9, 2014

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.
- Elevated concentration of Hydrogen Sulfide can be detrimental to both civil and mechanical structures. If anaerobic conditions exist in the collection system, steps should be taken to eliminate Hydrogen Sulfide prior to the treatment system.

SBR

- 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 0.5 MGD, the SBR system has been designed to advance cycles in order to process a peak hydraulic flow of 0.6 MGD.
- Depending upon the magnitude and duration of the peak flow, effluent quality may be degraded.
- 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 1.5 lbs. O₂/lb. BOD₅ applied and 4.6 lbs. O₂/lb. NH₃-N applied at the design average loading conditions.

Process/Site

- Elevation and Temperatures have been assumed as displayed on the design.
- The anticipated effluent NH₃-N 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 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).

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.

- 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 = 0.25 MGD = 946 m3/day
 Max Design Flow = 0.5 MGD = 1893 m3/day
 Peak Hyd. Flow = 0.6 MGD = 2271 m3/day (with advancing cycles)

DESIGN PARAMETERS

	Influent	mg/l	Required	Effluent		
				<= mg/l	Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	BOD5	200	BOD5	10	BOD5	10
Total Suspended Solids:	TSS	200	TSS	30	TSS	30
Total Kjeldahl Nitrogen:	TKN	20	--	--	--	--
Ammonia Nitrogen:	--	--	NH3-N	4	NH3-N	4

SITE CONDITIONS

	Maximum		Minimum		Design		Elevation (MSL)
Ambient Air Temperatures:	90 F	32.2 C	25 F	-3.9 C	90 F	32.2 C	940 ft
Influent Waste Temperatures:	68 F	20.0 C	50 F	10.0 C	68 F	20.0 C	286.5 m

SBR BASIN DESIGN VALUES

			Water Depth		Basin Vol./Basin		
			Min		Min		
No./Basin Geometry:	= 2 Square Basin(s)		Min	= 13.6 ft = (4.1 m)	Min	= 0.091 MG	= (345.9 m³)
Freeboard:	= 2.0 ft = (0.6 m)		Avg	= 17.3 ft = (5.3 m)	Avg	= 0.116 MG	= (440.5 m³)
Length of Basin:	= 30.0 ft = (9.1 m)		Max	= 21.0 ft = (6.4 m)	Max	= 0.141 MG	= (535.2 m³)
Width of Basin:	= 30.0 ft = (9.1 m)						

Number of Cycles: = 5 per Day/Basin
 Cycle Duration: = 4.8 Hours/Cycle
 Food/Mass (F/M) ratio: = 0.061 lbs. BOD5/lb. MLSS-Day
 MLSS Concentration: = 4500 mg/l @ Min. Water Depth
 Hydraulic Retention Time: = 0.931 Days @ Avg. Water Depth
 Solids Retention Time: = 18.8 Days
 Est. Net Sludge Yield: = 0.723 lbs. WAS/lb. BOD5
 Est. Dry Solids Produced: = 301.4 lbs. WAS/Day = (136.7 kg/Day)
 Est. Solids Flow Rate: = 40 GPM (3613 GAL/Day) = (13.7 m³/Day)
 Decant Flow Rate @ MDF: = 781.0 GPM (as avg. from high to low water level) = (49.3 l/sec)
 LWL to CenterLine Discharge: = 1.0 ft = (0.3 m)
 Lbs. O2/lb. BOD5 = 1.50
 Lbs. O2/lb. TKN = 4.60
 Actual Oxygen Required: = 817 lbs./Day = (370.7 kg/Day)
 Air Flowrate/Basin: = 208 SCFM = (5.9 Sm³/min)
 Max. Discharge Pressure: = 10.7 PSIG = (74 KPA)
 Avg. Power Required: = 224.3 KW-Hrs/Day

Equipment Summary

AquaSBR

Influent Valves

- 2 Influent Valve(s) will be provided as follows:
- 6 inch electrically operated plug valve(s).

Mixers

- 2 AquaDDM Direct Drive Mixer(s) will be provided as follows:
- 5 HP Aqua-Aerobic Systems Endura Series Model FSS DDM Mixer(s).

Mixer Mooring

- 2 Mixer pivotal mooring assembly(ies) consisting of:
- 304 stainless steel pivotal mooring arm(s).
 - #12 AWG-four conductor electrical service cable(s).
 - Electrical cable strain relief grip(s), 2 eye, wire mesh.
- 2 Mixer De-Watering Support(s) will be provided as follows:
- Enter Design Description
 - Galvanized steel support angle(s).
 - 304 stainless steel anchors.

Decanters

- 2 Decanter assembly(ies) consisting of:
- 6x4 Aqua-Aerobics decanter(s) with fiberglass float, 304 stainless steel weir, galvanized restrained mooring frame, and painted steel power section with #14-10 conductor power cable wired into a NEMA 4X stainless steel junction box with terminal strips for the single phase, 60 hertz actuator and limit switches.
 - 8 inch diameter decant hose assembly.
 - 4" schedule 40 galvanized steel mooring post.
 - 8 inch electrically operated butterfly valve(s) with actuator.

Transfer Pumps/Valves

- 2 Submersible pump assembly(ies) consisting of the following items:
- 2.4 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
 - Manual plug valve(s).
 - 3 inch diameter swing check valve.
 - Galvanized steel slide rail assembly(ies).

Retrievable Fine Bubble Diffusers

- 4 Retrievable Fine Bubble Diffuser Assembly(ies) consisting of:
- 10 diffuser tubes consisting of two flexible EPDM porous membrane sheaths mounted on a rigid support pipe with 304 stainless steel band clamps.
 - 304 stainless steel manifold weldment.
 - 304 stainless steel leveling angles.
 - 304 stainless steel leveling studs.
 - Galvanized vertical support beam.
 - Galvanized vertical air column assembly.
 - Galvanized upper vertical beam and pulley assembly.
 - Galvanized top support bracket.
 - 3" EPDM flexible air line with ny-glass quick disconnect end fittings.
 - Galvanized threaded flange.
 - 3" manual isolation butterfly valve with cast iron body, EPDM seat, aluminum bronze disk and one-piece steel shaft.

- Ny-glass quick disconnect cam lock adapter.
- 304 stainless steel adhesive anchors.
- Brace angles.

1 Diffuser Electric Winch(es) will be provided as follows:

- Portable electric winch.

Positive Displacement Blowers

3 Positive Displacement Blower Package(s), with each package consisting of:

- Aerzen 10HP Rotary Positive Displacement Blower(s).
- Manual butterfly valve(s).
- 304 stainless steel anchors.

Air Valves

2 Air Control Valve(s) will be provided as follows:

- 3 inch electrically operated butterfly valve(s) with actuator.

Level Sensor Assemblies

2 Pressure Transducer Assembly(ies) each consisting of:

- Submersible pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).
- 304 stainless steel anchors.

2 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- 304 stainless steel anchors.

Controls

Controls wo/Starters

1 Controls Package(s) will be provided as follows:

- NEMA 12 panel enclosure suitable for indoor installation and constructed of painted steel.
- Fuse(s) and fuse block(s).
- Allen Bradley 1769-L30ER Compactlogix integral programmable controller.
- Operator interface(s).
- Remote Access Ethernet Modem.

Jacobs, Mike

From: Todd Stephens <todd@hresource.net>
Sent: Monday, December 15, 2014 1:30 PM
To: Smallwood, Bob
Cc: mark@hresource.net
Subject: Broadhead Dewatering Estimates

Categories: Filed by Newforma

Bob,

Our budgetary cost estimate for dewatering at Broadhead would be around \$10,000 per event (150,000 gallon estimate). This price is based on the following assumptions:

1. The facility would require two dewatering events per year with approximately 150,000 gallons per event.
2. The facility would have a 480 III phase power connection and a water source capable of supplying 80-100 gallon per minute. These sources should be within approximately 100' of the set up area.
3. The ability to accept filtrate from the press at a minimum of 200 gallons per minute.

The pricing is based on processing close to or more than 150,000 gallons per event. Should volume be smaller – say 125,000 or less, a price increase would have to be made to cover mobilization.

This price does not include trucking or landfill tipping fee. For us to bring down a couple trucks and haul to the landfill it would be estimated at an additional \$3,000. If they are able to aerate in the digester for such an extended period, land application may also be an option for them to consider. We can provide more information on that if you are interested.

Thank you for contacting us and let me know if you need anything else.

Todd

G. Todd Stephens
President
H&A Resource Management, LLC.
103 Fieldview Drive
Versailles, KY 40383
(859) 873-3331 Office
(859) 873-4611 Fax
(859) 983-6217 Cell
todd@hresource.net **email**
www.hresource.net **website**

Appendix J

Cross-Cutter Correspondence



GRW | engineering | architecture | geospatial

801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

May 19, 2015

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 Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Ms. Devine:

On behalf of the City of Brodhead, 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 2014 to 2034. 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 rehabilitation and a 500,000 gallon wet weather detention basin that are both expected to be constructed within the 0-5 year timeframe as indicated in Exhibit 12-1. The collection system improvements will also include a new force main, constructed parallel with the existing force main in easements or along existing road rights-of-way, or on property that is owned by the City. The wet weather detention basin is to be located at the wastewater treatment plant site. The work for these projects will generally be built on areas that have been previously disturbed by past construction of other projects.

The treatment plant project (see Exhibit 8-10), 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 Dix River at mile point 78.0 (Longitude 84°25'16.5"W, Latitude 37°24'29.3"N) discharging to the Kentucky River. The average daily discharge rate is projected to increase from its current flow rate of approximately 0.15 MGD (million gallons per day) to 0.25 MGD by 2034.



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801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

Ms. Leanne Devine

May 19, 2015

Page 2

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.

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.

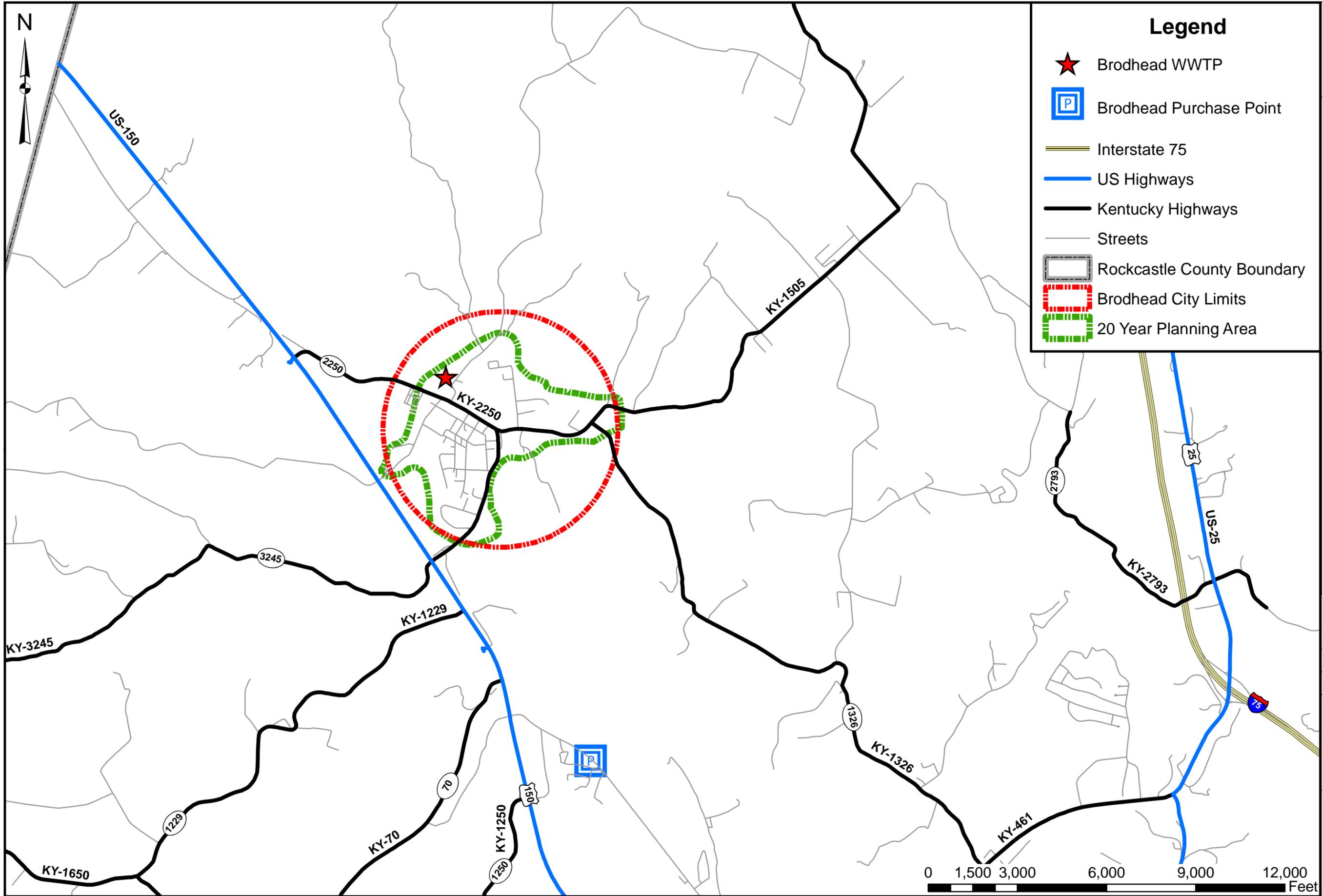
Please don't hesitate to contact me if you have any questions on this matter. I may be reached at (859) 223-3999 or at DOsborne@grwinc.com.

Sincerely,

A handwritten signature in blue ink, appearing to read 'David C. Osborne'.

David C. Osborne
Project Engineer

City of Brodhead: Planning Area



Legend

- Brodhead WWTP
- Brodhead Purchase Point
- Interstate 75
- US Highways
- Kentucky Highways
- Streets
- Rockcastle County Boundary
- Brodhead City Limits
- 20 Year Planning Area

DATE: May, 2015
 SCALE: 1" = 3,000'
 SHEET NO. 3-2

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

GRW PROJECT NO. 3929-01	CLIENT PROJECT NO.	DESIGNED:	DRAWN:	REVIEWED:	APPROVED:
NO.	REVISIONS DESCRIPTION	DATE	BY		

SCALE: 1" = 3,000'

City of Brodhead: Sewage Collection System Map

Legend

- Pump Station
- Manhole
- Force Main
- Gravity Main
- 20 Year Planning Area



DATE: May, 2015
 SCALE: 1" = 800'
 SHEET NO. **6-1**

GIS
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EXHIBIT 6-1 SEWAGE COLLECTION SYSTEM MAP WASTEWATER FACILITIES PLAN CITY OF BRODHEAD, KENTUCKY

GRW PROJECT NO.	CLIENT PROJECT NO.	DESIGNED:	DRAWN:	REVIEWED:	APPROVED:
3925-01					
NO.	REVISIONS	DATE	BY		
	DESCRIPTION				

SCALE: 1" = 800'



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801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

May 19, 2015

Mr. Chris Garland
Kentucky Department of Fish and Wildlife
#1 Sportsman Lane
Frankfort, KY 40601

RE: Cross-Cutter Correspondence
City of Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Mr. Garland:

On behalf of the City of Brodhead, 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 2014 to 2034. 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 rehabilitation and a 500,000 gallon wet weather detention basin that are both expected to be constructed within the 0-5 year timeframe as indicated in Exhibit 12-1. The collection system improvements will also include a new force main, constructed parallel with the existing force main in easements or along existing road rights-of-way, or on property that is owned by the City. The wet weather detention basin is to be located at the wastewater treatment plant site. The work for these projects will generally be built on areas that have been previously disturbed by past construction of other projects.

The treatment plant project (see Exhibit 8-10), 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 Dix River at mile point 78.0 (Longitude 84°25'16.5"W, Latitude 37°24'29.3"N) discharging to the Kentucky River. The average daily discharge rate is projected to increase from its current flow rate of approximately 0.15 MGD (million gallons per day) to 0.25 MGD by 2034.



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Mr. Chris Garland

May 19, 2015

Page 2

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.

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 DOsborne@grwinc.com.

Sincerely,

A handwritten signature in blue ink, appearing to read 'David C. Osborne'.

David C. Osborne
Project Engineer



GRW | engineering | architecture | geospatial

801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

May 19, 2015

Mr. Craig A. Potts
Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601

RE: Cross-Cutter Correspondence
City of Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Mr. Potts:

On behalf of the City of Brodhead, 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 2014 to 2034. 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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Mr. Craig A. Potts

May 19, 2015

Page 2

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David C. Osborne
Project Engineer



GRW | engineering | architecture | geospatial

801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

May 19, 2015

Mr. Steve Jacobs
USDA Natural Resources Conservation Services
1925 Old Main Street, Suite 2
Maysville, KY 41056

RE: Cross-Cutter Correspondence
City of Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Mr. Jacobs:

On behalf of the City of Brodhead, 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 2014 to 2034. 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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Mr. Steve Jacobs

May 19, 2015

Page 2

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Sincerely,

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David C. Osborne
Project Engineer



GRW | engineering | architecture | geospatial

801 Corporate Drive | Lexington, KY 40503

859.223.3999 | www.grwinc.com

May 19, 2015

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 Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Mr. Andrews:

On behalf of the City of Brodhead, 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 2014 to 2034. 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

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Mr. Virgil Lee Andrews, Jr.

May 19, 2015

Page 2

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Sincerely,

A handwritten signature in blue ink, appearing to read 'David C. Osborne'.

David C. Osborne
Project Engineer



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/>
May 29, 2015

Operations Division
Regulatory Branch (South)
ID No. LRL-2015-445

Mr. David C. Osborne
GRW Engineering
801 Corporate Drive
Lexington, Kentucky 40503

Dear Mr. Osborne:

This is in regard to your letter dated May 19, 2015, requesting comments on behalf of the City of Brodhead, Kentucky for the Regional Wastewater Facilities Plan. The wastewater collection and treatment projects would be constructed at the existing facility and system in the city of Brodhead in Rockcastle County, Kentucky.

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 those that may be susceptible for use in interstate or foreign commerce. "Waters of the U.S." include hydrologically connected lakes, rivers, and stream channels exhibiting an Ordinary High Water Mark (OHWM), wetlands, sloughs, wet meadows, and wetlands adjacent to "waters of the U.S."

Based on the information provided by you in the above-referenced request, it appears as though a Department of the Army (DA) Permit MAY BE REQUIRED if the projects result in a discharge of fill material into "waters of the U.S." The mapping you provided shows proposed work in or near what appears to be "waters of the U.S." These waters include unnamed tributaries to Negro Creek and Boone Creek of the Dix River. When applying for a DA Permit, provide 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).

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-OPF-S, or by calling me at (502) 315-6683.

Sincerely,



Todd E. Hagman
Project Manager
South Section
Regulatory Branch



**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

Gregory K. Johnson
Commissioner

19 June 2015

GRW

Attn: David Osborne
801 Corporate Drive
Lexington, KY 40503

RE: Cross-Cutter Correspondence
City of Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

Dear Mr. Osborne:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information pertaining to the subject project. The Kentucky Fish and Wildlife Information System indicates that the federally-listed Northern Long-eared bat (*Myotis septentrionalis*) and Cumberland Bean (*Villosa trabilis*) are known to occur within 10 miles of the project area. The Barn Owl (*Tyto alba*) and Dark-eyed Junco (*Junco hyemalis*) are additional state-listed species known to occur near the project area. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

This project does not occur within known bat habitat according to the U.S. Fish and Wildlife Service Kentucky Field Office (USFWS). If any tree clearing is required for the projects (trees above 3" dbh) or tree-roosting bat species are encountered during the project, please contact the USFWS to discuss ways to minimize impacts to these species.

To minimize impacts to the aquatic environment, the KDFWR 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,

A handwritten signature in black ink, appearing to read "Dan Stoelb". The signature is written in a cursive style with a large initial 'D'.

Dan Stoelb
Environmental Scientist

Cc: Environmental Section File



STEVEN L. BESHEAR
GOVERNOR

**TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL**

BOB STEWART
SECRETARY

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CRAIG A. POTTS
EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

June 12, 2015

Mr. David Osborne
Project Engineer
GRW
801 Corporate Drive
Lexington, KY 40503

**Re: Cross-Cutter Correspondence
City of Brodhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01**

Dear Mr. Osborne:

Thank you for your letter concerning the above-referenced proposed project. A review of our files indicates that the proposed project areas have not been surveyed for archaeological resources. Investigations of projects in similar environmental contexts have resulted in the identification of a large number of sites, some of which have been determined eligible for listing in the National Register.

Therefore, I recommend that the proposed project areas *that extend outside previously disturbed areas*, specifically the WWTP improvements to the south of the existing facility and the new force main, be surveyed by a professional archaeologist and that the resulting report of these investigations be submitted to our office for review and comment. Where a given project area or portions thereof have been disturbed by prior construction, the applicant may file documentation of that disturbance with the State Historic Preservation Officer and may request an opinion concerning the need of an archaeological survey. Note that agricultural activity, such as plowing, is not sufficient disturbance to preclude the need for an archaeological survey. The State Historic Preservation Officer must review and approve the survey reports generated from these surveys.

Should you have any questions, feel free to contact Nick Laracuente of my staff at 502.564.7005, extension 122.

Sincerely,

Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP:nrl KHC # 44158



To: David C. Osborne, Project Manager
GRW Engineering
801 Corporate Drive
Lexington, KY 40503

June 1, 2015

Re: Cross-Cutter Correspondence
City of Broadhead, Kentucky
Regional Wastewater Facilities Plan
GRW Project 3929-01

M. Osborne,

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 to existing facilities, on existing easements, or property currently owned by the city. All areas are within the City of Broadhead, KY. These areas are already considered as converted farmlands and not affecting new or additional farmlands. This office does not have any additional concerns at this time.

If needed, additional information on the soils of Rockcastle County, KY is available on-line through USDA's Web Soil Survey for Rockcastle County, KY.

If this office may be of additional assistance, please do not hesitate to contact my office in Maysville Ky. or contact the NRCS Supervisory Natural Resource Manager at 606-256-2541.

Steve Jacobs
Resource Soil Scientist, NRCS, Maysville, KY.
steve.jacobs@ky.usda.gov

cc: Randall Templeman, NRCS District Conservationist, Mt. Vernon, KY
randall.templeman@ky.usda.gov



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
June 2, 2015



Mr. David Osborne
GRW Engennees
801 Corporate Drive
Lexington, KY 40503

Re: FWS 2015-B-0482; City of Broadhead Wastewater Facilities Plan Update; Rockcastle County, Kentucky

Dear Mr. Osborne:

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.*; additional development, roads, structures, pump stations, etc.) 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	<i>Myotis sodalis</i>	Indiana bat	E
	<i>Myotis septentrionalis</i>	Northern long-eared bat	T
	<i>Corynorhinus townsendii virginianus</i>	Virginia big-eared bat	E

* 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

Based on your correspondence, potential summer habitat (suitable forested areas) for the federally endangered Indiana bat occurs within the project area. Furthermore, the proposed project is within the swarming range of "Waterfall" hibernaculum. Prior to hibernation, Indiana bats utilize the forest habitat around the hibernacula, where they feed and roost until temperatures drop to a point that forces them into hibernation. This "fall swarming" period lasts, depending on weather conditions in a particular year, from about August 16 to about November 15. This is a critical time for Indiana bats, since they are acquiring additional fat reserves and mating prior to hibernation. Another critical time for Indiana bats utilizing this swarming range is during spring emergence (~April 1 - ~May 14) from the hibernacula. During this time, bats utilize the swarming range to forage prior to migrating to their respective summering areas. It should also be noted that some bats may continue to utilize this swarming area year round; however, these are typically adult males.

We have the following recommendations relative to Indiana 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 habitat for Indiana 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 Indiana bat habitat by this office.
- The project proponent can design or modify the proposed project to eliminate impacts to trees that provide roosting and foraging habitat for Indiana bats.

If tree removal is necessary for the proposed project, the Service would typically recommend seasonal tree clearing or the completion of a mist net survey to provide presence/absence information before construction activities take place. However, we already know that Indiana bats are present because previous surveys have identified the proposed project area as being within the swarming range of a known Indiana bat hibernacula. And, clearing trees while the bats associated with this swarming range are hibernating could still result in indirect and/or cumulative effects by changing the landscape and removing potential foraging and roosting habitat.

In order to address these concerns of proposed tree removal and be in compliance with the ESA, we recommend one of the following options:

- The project proponent can conduct an indirect and cumulative effects analysis by a qualified biologist. This analysis assesses the quantity and quality of the suitable habitat within the project area and area surrounding the project area to determine the effects of the removal.
- The project proponent can request formal section 7 consultation through the lead Federal Action Agency associated with the proposed project.

- The project proponent may choose to 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 in project timing 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.

Northern long-eared bat (*Myotis septentrionalis*)

The proposed project is located in known summer roosting (summer 1) habitat for the Northern long-eared bat. Northern long-eared bats winter in caves, rockshelters, abandoned underground mines, and other structures. During the summer they roost in trees and forage in and around forested habitat. 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) 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 Northern long-eared 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 and/or northern long-eared bat by this office.
- (2) This species utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Suitable roost trees are greater than 3 inches diameter at breast height (DBH), can be living or dead, and exhibit any of the following characteristics: exfoliating bark, cavities of dead and live trees, broken limbs, broken tops, cracks, and crevices.

To address potential impacts to the northern long-eared bats summer roosting and foraging habitat, the following options are available:

- The project proponent can modify the proposed project to eliminate or reduce impacts to suitable habitat, thus avoiding impacts. A habitat assessment may be useful in determining if suitable summer roosting or foraging habitat is present in the action area of the proposed project.
- The project proponent can survey the project area to determine the presence or likely absence of the Northern long-eared bats within the project area in an effort to determine if potential effects are likely. A qualified biologist who holds the appropriate collection permits must undertake such surveys in accordance with our most current survey guidance, which is available at the following link:

https://www.fws.gov/frankfort/indiana_bat_procedures.html

If any Indiana bats or northern long-eared bats are captured, we request written notification of such occurrence(s) and further coordination and consultation. We do not recommend using surveys to support probable absence of a northern long-eared bat because it has already been identified as present in the area.

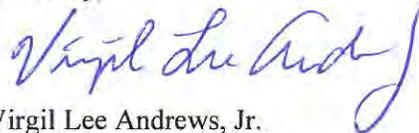
- The project proponent can request formal section 7 consultation through the lead federal action agency associated with the proposed project. To request formal consultation, the project proponent would need to submit a Biological Assessment that describes the action and evaluates the effects of the 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 identifies actions 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 northern long-eared bats. By entering into a Conservation MOA with the Service, Cooperators gain flexibility with regard to the removal of suitable. In exchange for this flexibility, the Cooperator provides recovery-focused conservation benefits to the species through the implementation of minimization and mitigation measures that are described in the Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky. For additional information about this option, please contact our office.

Virginia big-eared bat

Virginia big-eared bats occur in isolated populations in eastern Kentucky, and live in caves year-round. They prefer caves in karst regions (*i.e.*, areas underlain with limestone bedrock and many caves and sink holes). They are often associated with clifflines and sandstone shelters in forests dominated by oak-hickory or beech-maple-hemlock; and, they tend to feed along the edges of forested areas. Because the project area is within a known karst region, and because forested areas exist within the project area, the Service has reason to believe that potentially suitable summer roosting and winter hibernacula habitat for the Virginia big-eared bat could occur onsite. Therefore, we request that the project area be assessed for any caves, rockshelters, and/or abandoned mines, and access their potential as Virginia big-eared bat summer/winter habitat. If potential summer/winter habitat is identified, additional surveys of these areas may be required.

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 Jonathan Baxter at (502) 695-0468 extension 111.

Sincerely,



Virgil Lee Andrews, Jr.
Field Supervisor