

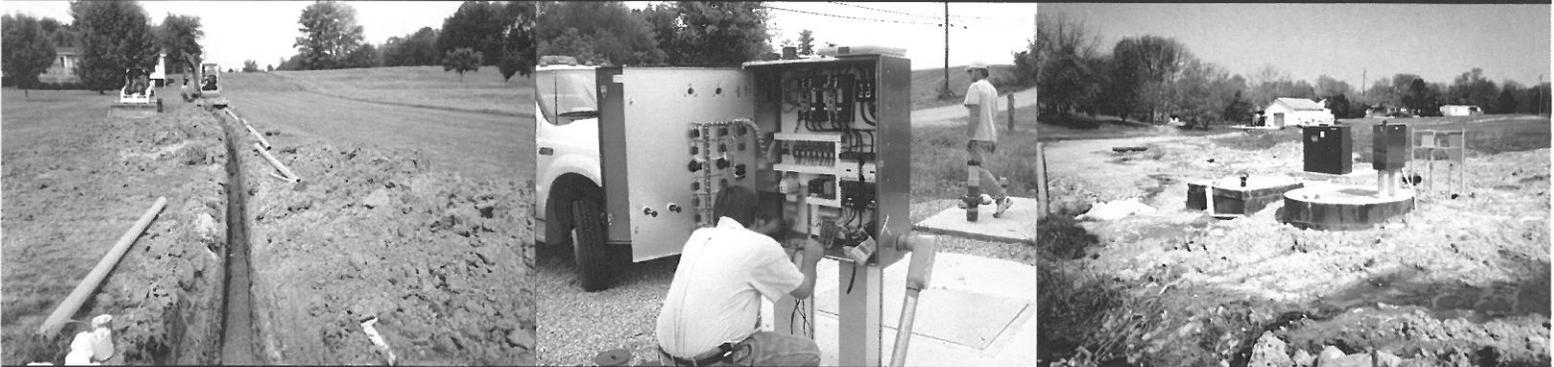


nesbitt engineering, inc.

June 2012

Northern Madison County Sanitation District Madison County, Kentucky

Regional Facility Plan Update



SUBMITTED TO:
Northern Madison County Sanitation District

PREPARED BY:
Nesbitt Engineering, Inc.
Offices in Lexington—Prestonsburg

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LETTER OF TRANSMITTAL

227 N. Upper Street
 Lexington, Kentucky 40507-1016
 (606) 233-3111 (Phone)
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Date: 06/05/12
Job No. 934-41

TO:
 Division of Water
 Water Infrastructure Branch
 Wastewater Municipal Planning Section
 200 Fair Oaks Lane
 Frankfort, KY 40601

SUBJECT:
 Northern Madison County Sanitation District
 Regional Facility Plan Update
 Submittal

WE ARE SENDING YOU:

Estimate _____ Plans _____ Change Order _____ Report _____
 Copy of Letter _____ Other x

COPIES	DATE	DESCRIPTION
1	06/05/12	Regional Facility Plan Update – Hard Copy, P.E. Certified
1	6/12	Regional Facility Plan Update – Hard Copy, Non-Certified
1	6/12	Regional Facility Plan Update – Digital Copy on CD, Non-Certified
1	6/12	Planning Area Shape File – Digital Copy on CD

THESE ARE TRANSMITTED AS CHECKED BELOW:

For approval Approved as Submitted For Your Information and Files
 For Your Use Approved as Noted For Your Necessary Action
 As Requested Returned for Corrections For Review and Comment

REMARKS: Please call if you have any questions. Thank you.
 The enclosed is being submitted on behalf of the Northern Madison County Sanitation District.
 Please address questions and comments to Mark Feibes, P.E., at (859) 685-4517,
mfeibes@nei-ky.com, or use the sender's address above.

COPY TO: Jim Rowe, Chairman, NMCSD (transmittal only)
 Elliott Turner, Manager, NMCSD (Sections 11 and 12 only – Insert into current copy.)

SIGNED: Mark H. Feibes, P.E.

If enclosures are not as noted, kindly notify us at once.



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Lexington, KY 40507-1016

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Section 1 Regional Facility Plan Summary

1. Purpose

The Northern Madison County Sanitation District (NMCS D), established in July of 1996, serves three regions:

- 1) The northern end of the county where sanitary flow is directed to the NMCS D Jacks Creek regional wastewater treatment plant; and
- 2) A region located near the Bluegrass Army Depot, extending along KY 52 north of the Depot where sanitary flow is directed to the City of Richmond (herein referred to as **Phase 1**);
- 3) and the area immediately southwest of the Depot, near the intersections of US 25 and US 421, where flow is directed to either the Battlefield WWTP or the Executive Park WWTP, both owned and operated by the NMCS D (herein referred to as **Phase 2**).

This Regional Facility Plan update proposes an expansion of the second region.

Of most immediate concern is the area north of KY 52, referred to as Greens Crossing (Phase 1). Currently, the NMCS D collects flow from Greens Crossing, and discharges it to the City of Richmond's sewage collection system (Richmond Utilities) via a master meter. In April 2007, the City of Richmond passed Ordinance No. 07-12, in which sewer rates for master meters outside of city limits would be raised through a series of eight discrete rate increases, the last being on July 1, 2014. Following that, every year on July 1, the rate will increase in proportion to the Consumer Price Index. Furthermore, per the 3/8/2005 Sewer Use Agreement between RU and the NMCS D, the district is limited to a total of 400 sewer connections. Currently there are 307 connections. Thus as it currently stands, the NMCS D has very limited ability to meet the sewerage demands in this region.

A detailed analysis of the impact of these rate increases is discussed in this Plan Update. In summary, unless the NMCS D increases their rates, or disconnects from Richmond Utilities, they will begin to lose money in 2012. For example, if no action is taken, by 2015 the NMCS D will lose an estimated \$4.46 per month per household. If the NMCS D increases their rates to cover the cost of Richmond Utilities' fees and their own O&M fees, the average monthly cost per household is estimated to be \$70.74 by 2015, with no end in sight to an annual CPI increase imposed by Richmond Utilities.

In addition to the existing Greens Crossing collection system, the Phase 1 area has three privately owned package wastewater treatment plants: Waco Elementary School, ByBee Grocery and B.P. Food Market. Phase 1 will extend sewer service to these three systems, thereby regionalizing the sewer system by bringing all of the flow to the proposed Muddy Creek WWTP for a single point of treatment and discharge. Phase 1 will also extend sewers to approximately 300 homes, largely concentrated in the Moberly and Waco neighborhoods. These homes are currently served by on-lot systems, many with shallow poorly draining soils leading to chronic failures.

Additionally, Phase 1 will result in much shorter sewage travel distances (reducing from up to nine miles without Phase 1 to about four with Phase 1), thus reducing pumping costs and the potential for odors.

As noted above, Phase 2 has two wastewater treatment plants, both owned and operated by the NMSCD: Executive Park and Battlefield Estates. Phase 2 will entail expansion of the Battlefield Estates WWTP, a sewer extension from Battlefield Estates to Executive Park, and decommissioning of the later. Phase 2 will also extend sewers to approximately 250 homes, largely concentrated in the neighborhood of Kingston. These homes are currently served by on-lot systems, with similar soil conditions to that discussed above.

2. Recommended Alternatives

The following treatment and collection alternatives are recommended.

A. Phase 1, 0-5 Years

1. Treatment

New Muddy Creek WWTP - Construct a 0.20 MGD concrete extended aeration wastewater treatment plant to serve an estimated 652 households. The WWTP will be located along the Muddy Creek on a property facing KY 52.

2. Collection

Reroute flow from Greens Crossing to the new Muddy Creek WWTP. Construct a gravity sewer system to serve the adjacent community of Waco, and nearby neighborhoods. This Phase will eliminate three small wastewater treatment plants: Waco Elementary, Bybee Grocery, and Waco BP Food Market.

B. Phase 2, 6 -10 Years

1. Treatment

Existing Battlefield Estates WWTP – Expand the existing Battlefield Estates steel extended aeration WWTP from a capacity of 0.114 MGD to 0.243 MGD to serve an estimated 791 households.

2. Collection

Decommission the Executive Park WWTP and reroute flow from it to the expanded Battlefield Estates WWTP. Construct a gravity sewer system to serve the adjacent Kingston neighborhood.

C. Institutional Requirements

As discussed below, the proposed first project can be self-funded through existing rates, and therefore, no user rate increase will be necessary. However, the project will require a loan, and future projects will likely involve application for grants and loans.

3. Cost

A. Project Costs

Table 1-1 summarizes the capital costs for the selected alternatives.

Table 1-1
Opinion of Probable Project Costs

Phase	Yrs	Description	Capital Cost
1	0-5	New Muddy Creek WWTP	\$ 790,000
		Reroute Greens Crossing to MCWWTP & Extend Sewers to the Region	\$ 4,390,000
2	6-10	Expand Battlefield WWTP	\$ 610,000
		Extend Sewers to Region	\$ 4,800,000
Total			\$ 10,590,000

Note: These figures are rounded to the nearest \$10,000 from the cost opinions developed in Section 8 of this document.

B. Funding Plan

The Funding Plan discussed herein addresses the initial projects proposed for the 0-5 Year Planning Area only. A funding plan for work beyond that timeframe would involve so many unknown variables (such as future rates, future construction costs, future customer base, interest rates, grant availability, etc.) that a funding analysis would not yield useful results at this time.

Phase 1, which is anticipated to be completed within five years will be constructed in several stages. The first stage will entail construction of the Muddy Creek WWTP and rerouting flow from the existing Greens Crossing collection system to the new WWTP, herein referred to as Phase 1A. Future sewer projects will be constructed each year to extend sewers into the outlying region as funds become available. Details and drawings of these phases and a detailed funding plan are provided in Section 10 of this Plan.

The opinion of probable project cost for Phase 1A is \$1,660,000. A conservative funding scenario was considered utilizing a 20-year State Revolving Fund loan at the current standard rate of 3%. It is anticipated that an income survey of the region would validate a non-standard lower interest rate and possibly a percentage of loan forgiveness, but for purposes of this analysis, the higher more conservative rate is used.

Coupled with this funding scenario, the anticipated annual income based on current usage rates was calculated and compared to the annual revenue requirement. As shown in Table 1-2, based on the current rate structure and number of customers, this project can be self-funded through a 100% loan.

Table 1-2
 Loan Analysis for Greens Crossing / Future Muddy Creek WWTP

Collection System	\$	870,000
WWTP	\$	790,000
Total loan amount	\$	1,660,000
Interest rate (Standard SRF rate)		3.00%
Number of years		20
Capital Recovery Factor		0.0672
Annual loan repayment	\$	111,578
KIA - Reserve Account - SLA	\$	8,265
Annual O&M, WWTP	\$	39,121
Annual O&M, sewers	\$	14,037
Total Annual Revenue Requirement	\$	173,001
Annual Income (2012)	\$	183,371
Annual Balance	\$	10,369

Table 1-3 summarizes the user fees through 2015. These fees are based on the current rate schedule as codified in NMCSO Resolution No. 11-30.

Table 1-3
 Current and Projected Residential User Charge Rate per Month
 Average Flow per Household

Historical Flow	Nominal Usage	
124	132	gpd
3,773	4,000	gal/mo
504	535	cu ft /mo

Average Monthly Sewer Bill

	2011	2012	2013	2014*	2015*
first 280 cu ft	\$ 34.50	\$ 37.95	\$ 41.75	\$ 42.79	\$ 43.86
rate > 280 cu ft per 100 cu ft	\$ 5.75	\$ 6.33	\$ 6.96	\$ 7.13	\$ 7.31
average monthly bill per hh based on historical flow	\$ 47.40	\$ 52.15	\$ 57.37	\$ 58.80	\$ 60.26
average monthly bill per hh based on 4,000 gal/mo	\$ 49.15	\$ 54.08	\$ 59.48	\$ 60.96	\$ 62.48

* Beginning in 2014 the NMCSO Sewer Use Ordinance calls for an automatic annual rate increase scaled to the CPI.

4. Planning Agency

The NMCS D will construct, own and operate the proposed facilities, all within their existing Planning Area, or within newly established Planning Area that is currently undesignated. Therefore, no inter-municipal agreements will be required. Furthermore, the improvements addressed in this Plan Update will not require any new site-specific rules or Sewer Use Ordinance changes.

5. Schedule

Table 1-4 is a proposed implementation schedule for the projects outlined in this report. Given the financial urgency to complete Phase 1A, and the ability to self-fund the project, Phase 1A will be implemented shortly after approval of this Plan Update. The ensuing phases of work are generally separated into moderately sized projects that can be quickly implemented due to their size.

Table 1-4
Proposed Implementation Schedule

Phase	Description	Completion Date	
		Design	Construction
1A	Reroute Greens X-ing and Construct Muddy Creek WWTP	July, 2012	July, 2013
1B	Sewer Extension to Waco School	Jan, 2013	Dec 2013
1C	Moberly Subdivision Sewers	Jan, 2014	Dec 2014
1D	South Subdivision (Caroline Drive) Sewers	Jan, 2015	Dec 2015
1E	East Sewer Extension to ByBee	Jan, 2016	Dec 2016
2A	Battlefield WWTP Expansion	Jan, 2018	Dec 2018
2B	Executive Park Sewer Extension	Jan, 2019	Dec 2019
2C	Kingston Subdivision Sewers Phase 1	Jan, 2020	Dec 2020
2D	Kingston Subdivision Sewers Phase 2	Jan, 2021	Dec 2021
2E	Kingston Subdivision Sewers Phase 3	Jan, 2022	Dec 2022

Section 2 Statement of Purpose and Need

1. Phase 1

The Northern Madison County Sanitation District has several incentives for Phase 1.

A. Relieving Financial Hardship

Currently the Northern Madison County Sanitation District (NMSCD) collects flow from the Phase 1 area, known as Greens Crossing, and discharges it to the City of Richmond's sewage collection system (Richmond Utilities) via a master meter. In April 2007, the City of Richmond passed Ordinance No. 07-12, in which sewer rates for master meters outside of city limits would be raised through a series of eight discrete rate increases, the last being on July 1, 2014. Following that, every year on July 1, the rate will increase in proportion to the Consumer Price Index.

The NMSCD bills their customers based on water usage. Their rates will also increase per Resolution No. 11-10, every year through a series of three discrete rate increases, the last being on January, 2013. Following that, every year in January, the rate will increase in proportion to the Consumer Price Index.

The total average daily flow delivered to Richmond Utilities (RU) in 2011 was 45,500 gpd. The total average daily metered water usage for Greens Crossing in 2011 was 36,344 gpd. This difference in flow, which is from infiltration and inflow (I/I), represents a variable that is dependent to some degree on weather conditions, and therefore, beyond the control of the NMSCD. Although the NMSCD has taken steps to minimize I/I, it is a factor endemic to all gravity sanitary sewers that cannot be eliminated entirely. Utilities typically design their sewage treatment facilities with this in mind, and therefore, the cost impact of I/I is relatively minimal if the utility is treating their own flow. In this case however, the cost of the additional flow from I/I substantially impacts the NMSCD as long as they continue to transport their flow to RU, and not treat the flow in their own wastewater treatment plant.

In order to cover their operating expenses, it is imperative that the NMSCD collect more in sewer fees than the amount they pay to RU. Table 1-1 analyzes the effect of the relative rate increases of the two entities over the next few years, based on the flows discussed above. As can be seen, each year the net income to the NMSCD progressively reduces until in 2014 it becomes negative. In fact, in 2012, the projected net income of \$5.99 per household is slightly less than the anticipated O&M cost for the Greens Crossing collection system of \$6.02 per household. Therefore, without this project, it will be necessary to increase rates beyond those stated in NMSCD Resolution 11-10. Any further rate increase will be a hardship to the residents of Greens Crossing, many of which are low to moderate income. By 2015, with this project, the average monthly bill per household will at most be \$60.26. It is conceivable, that with this project and the additional customers served, an economy of scale will stabilize the rates and minimize the need for future rate increases. On the other hand, without this project, the 2015 average monthly bill is projected to be \$70.74, with no end in sight to the annual CPI increases.

Table 2-1
Sewer Rates, Greens Crossing Neighborhood

The NMCSO collects flow from the Greens Crossing neighborhood and transports it to the Richmond Utilities (RU) sewer system via a master meter. RU billing is based on a wholesale rate, which per Ordinance, will increase on an annual basis. The NMCSO bills their customers based on water usage. Their bills will also increase per Resolution. This analysis looks at the impact the respective rate increases will have over the next few years.

Flow Basis for Wholesale Rates Imposed by Richmond Utilities - Metered Sewer Flow

average total daily flow, 2011	45,500	gpd
average total monthly flow	1,383,958	gal/mo
	185,021	cu ft/mo
number of households, 2011	293	

Current and Future Rates Imposed by Richmond Utilities, Effective July of Each Year
(Per City of Richmond Ordinance No. 07-12)

	2011	2012	2013	2014	2015*
wholesale rate per 100 cu ft	\$ 6.25	\$ 7.31	\$ 8.55	\$ 10.00	\$ 10.25
wholesale cost per month	\$ 11,564	\$ 13,525	\$ 15,819	\$ 18,502	\$ 18,963
avg mo. cost per household	\$ 39.47	\$ 46.16	\$ 53.99	\$ 63.15	\$ 64.72

Flow Basis for Rates Imposed by NMCSO on Their Customers - Water Usage Basis

average flow per household	124	gpd
	504	cu ft/mo
number of households, 2011	293	
average total daily flow	36,344	gpd
average total monthly flow	1,105,455	gal/mo
	147,788	cu ft/mo

Current and Future Rates Imposed by NMCSO (Residential Customers)
(Per NMCSO Resolution No. 11-10)

	2011	2012	2013	2014*	2015*
first 280 cu ft	\$ 34.50	\$ 37.95	\$ 41.75	\$ 42.79	\$ 43.86
rate > 280 cu ft per 100 cu ft	\$ 5.75	\$ 6.33	\$ 6.96	\$ 7.13	\$ 7.31
avg mo. bill per household	\$ 47.40	\$ 52.15	\$ 57.37	\$ 58.80	\$ 60.26

balance to NMCSO per HH	\$ 7.94	\$ 5.99	\$ 3.38	\$ (4.35)	\$ (4.46)
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Current annual O&M Cost, Greens Crossing	\$ 1,764
Current O&M Cost per customer, Greens Crossing	\$ 6.02

* Beginning in 2015 for RU and in 2014 for NMCSO, the RU Sewer Use Ordinance and NMCSO Resolution calls for an automatic annual rate increase scaled to the CPI. See CPI data table below.

From Bureau of Labor Statistics website
<http://www.bls.gov/cpi/#tables>
CPI Indices for past 10 years:

2002	2.4
2003	1.9
2004	3.3
2005	3.4
2006	2.5
2007	4.1
2008	0.1
2009	2.7
2010	1.5
2011	3.0
<hr/>	
avg	2.49

B. Regionalization

In addition to the existing Greens Crossing collection system, the Phase 1 area has three privately owned package wastewater treatment plants: Waco Elementary School, ByBee Grocery and B.P. Food Market. Phase 1 will extend sewer service to these three systems, thereby regionalizing the sewer system by bringing all of the flow to the proposed Muddy Creek WWTP for a single point of treatment and discharge.

C. Unserved Customers

Phase 1 will also extend sewers to approximately 300 homes, largely concentrated in the Moberly and Waco neighborhoods. These homes are currently served by on-lot systems. Given the proximity of these homes to Greens Crossing and the numerous failed septic systems that were uncovered during construction of the Greens Crossing sewer system, completed in 2004, it is reasonable to assume that the septic system serving these homes are in similar condition. Furthermore, as noted in Section 5 of Plan, much of the soil conditions in this region are poorly draining, i.e., are not conducive for septic systems.

D. Highly Restrictive Limit on Customers Without Phase 1

The most recent agreement between the City of Richmond and the NMCSO, dated March 8, 2005, sets a limit of 400 sewer connections. Currently there are 307 connections from Greens Crossing to the City of Richmond. The plan to regionalize the Phase 1 Area and to extend sewers to unserved customers simply cannot happen unless the PCSD builds their own WWTP.

2. Phase 2

Phase 2 will provide some of the same benefits to the region near the Battlefield Wastewater Treatment Plant, as Phase 1 does for the greater Greens Crossing area.

A. Regionalization

Phase 2 has two wastewater treatment plants, both owned by the NMSCD: Executive Park and Battlefield Estates. Phase 2 will extend sewer from Battlefield Estates to Executive Park, and the later will be decommissioned, thereby regionalizing the sewer system.

B. Unserved Customers

Phase 2 will also extend sewers to approximately 250 homes, largely concentrated in the neighborhood of Kingston. These homes are currently served by on-lot systems, with similar soil conditions to that discussed above.

C. Beneficial Reuse

Effluent from the Battlefield WWTP is used to irrigate the adjacent Battlefield Golf Course. Continued use of and focus on the Battlefield WWTP as a regional facility will ensure a long-term source of irrigation water for this beneficial reuse program.

Section 3 Physical Characteristics of the Planning Area

1. Planning Area Boundary

Dwg 3-1. *Overall Planning Area Map* (See report Pocket for a full-size drawing.), depicts the existing Planning Areas in Madison County. There are three public entities in this region: City of Richmond (Richmond Utilities), City of Berea, and the Northern Madison County Sanitation District (NMCS D).

The current NMCS D Planning Area covers three regions: The first region encompasses the northern end of the county, where sewers extend into several densely populated neighborhoods. Flow in this area is directed to the regional wastewater treatment plant located along Jacks Creek, owned and operated by the NMCS D. This Regional Facilities Plan Update does not concern this region.

The second region (also referred to as Phase 1 in this Plan Update) is located near the Bluegrass Army Depot, and covers a densely populated area known as Greens Crossing, bordering the north side of KY 52 directly across from the Depot.

The third region (also referred to as Phase 2 in this Plan Update) is located in the area directly southwest of the Depot, bordering and near the intersections of US 25 and US 421, known as Terrill, Battlefield Estates, Twin Lakes and Executive Park.

This Regional Facilities Plan Update proposes to expand the NMCS D Planning Area to encompass the area of and between the second and third regions to produce a contiguous Planning Area for all of the Northern Madison County Sanitation District.

The specific project areas discussed in this Plan are also identified on Dwg 3-1. For a more detailed map, these project areas are also shown on Dwg 3-2, *Project Areas Map* (See report Pocket for a full-size drawing.), in a larger scale.

2. Water Sources and Utilities in the Planning Area

Known public water sources and utilities in the Planning Area are identified on Dwg 3-1. There are public water intakes along the Kentucky River, but these are well beyond the influence of the proposed Planning Area extension.

3. USGS Topographic Map

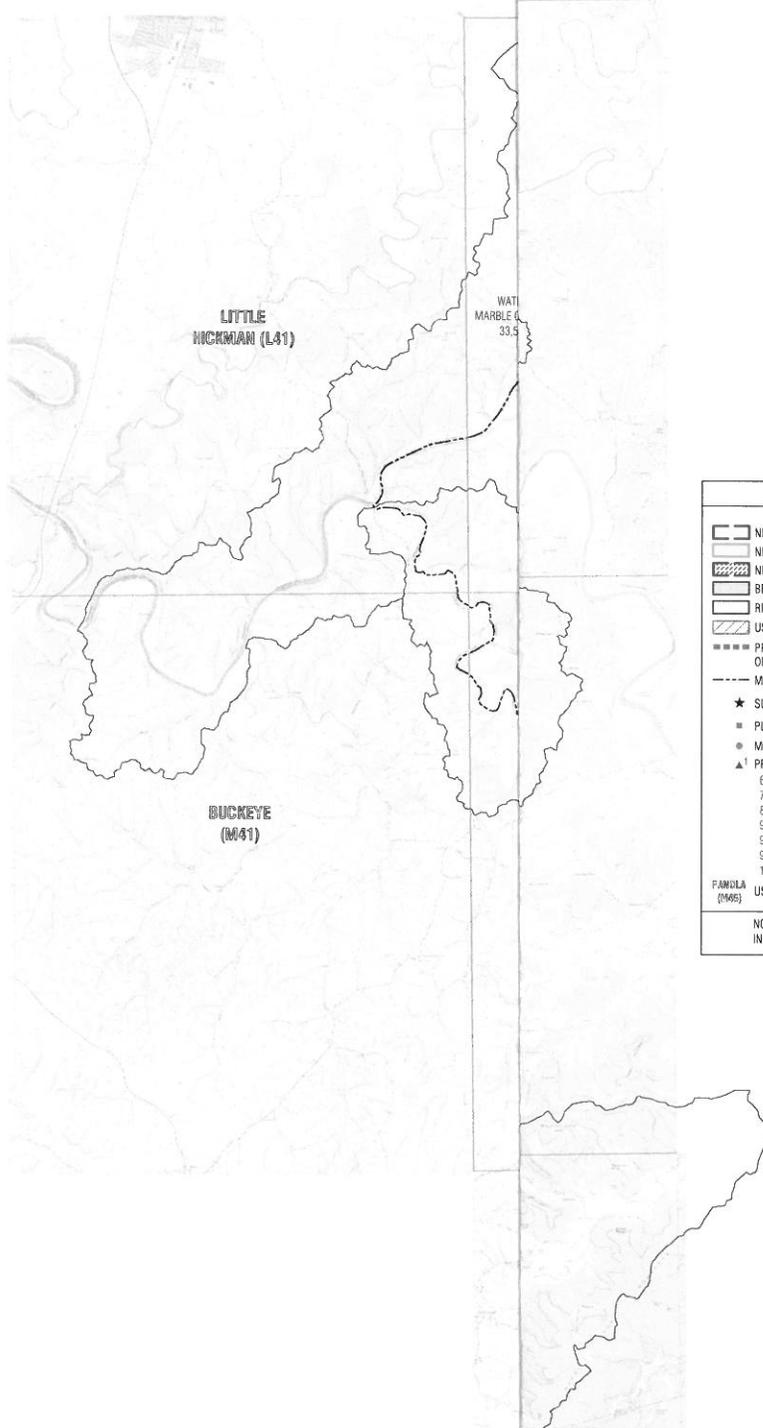
The base maps for Both Dwgs 3-1 and 3-2 were developed from USGS topographic maps. Specific USGS quadrants are noted on Dwg 3-1.

4. Floodplain Map

Dwgs 3-3 and 3-4, *Flood Insurance Rate Map (FIRM), Madison County, Kentucky, Panel 270 of 300 and Panel 270 of 425* respectively encompasses much of the proposed new Planning Area, with specific focus on the two project areas (See report Pocket for a full-size drawing.). As discussed in Sections 5 and 10 of this Plan Update, the only portions of the project property which potentially may be located in special flood hazard areas inundated by a 100-year flood are those directly adjacent to Hays Fork and Muddy Creek.

5. Planning and Zoning Land Use Map

Dwg 3-5, *Official Zoning, Madison County, Kentucky*, (See report Pocket for a full-size drawing.), was supplied by the Madison County Geographic Information Services Department. It has been scaled to cover the lower half of the county, which includes the proposed Planning Area extension. The majority of the two Project Areas are zoned agricultural and residential.



LEGEND

- NMCS D EXISTING PLANNING AREA
- NMCS D PROPOSED PLANNING AREA
- NMCS D EXISTING SEWERED AREA
- BERE A EXISTING SANITARY PLANNING AREA
- RICHMOND EXISTING SANITARY PLANNING AREA
- US ARMY DEPOT
- PROTECTED AREAS UPSTREAM AND DOWNSTREAM OF PUBLIC WATER INTAKES
- MADISON COUNTY BOUNDARY
- SUBDIVISIONS SINCE 1995
- PUBLIC DRINKING WATER SOURCE
- MUNICIPAL SEWAGE TREATMENT PLANT
- PRIVATE SEWAGE TREATMENT SYSTEM
- 6. PTRL, INC.
- 7. 76 TRUCK STOP (EXIT 97)
- 8. FORT BOONESBOROUGH STATE PARK
- 9. BYBEE QUICK STOP
- 9A. WACO FOOD MART
- 9B. WACO ELEMENTARY SCHOOL
- 10. EKV RIFLE RANGE
- USGS QUADRANGLE

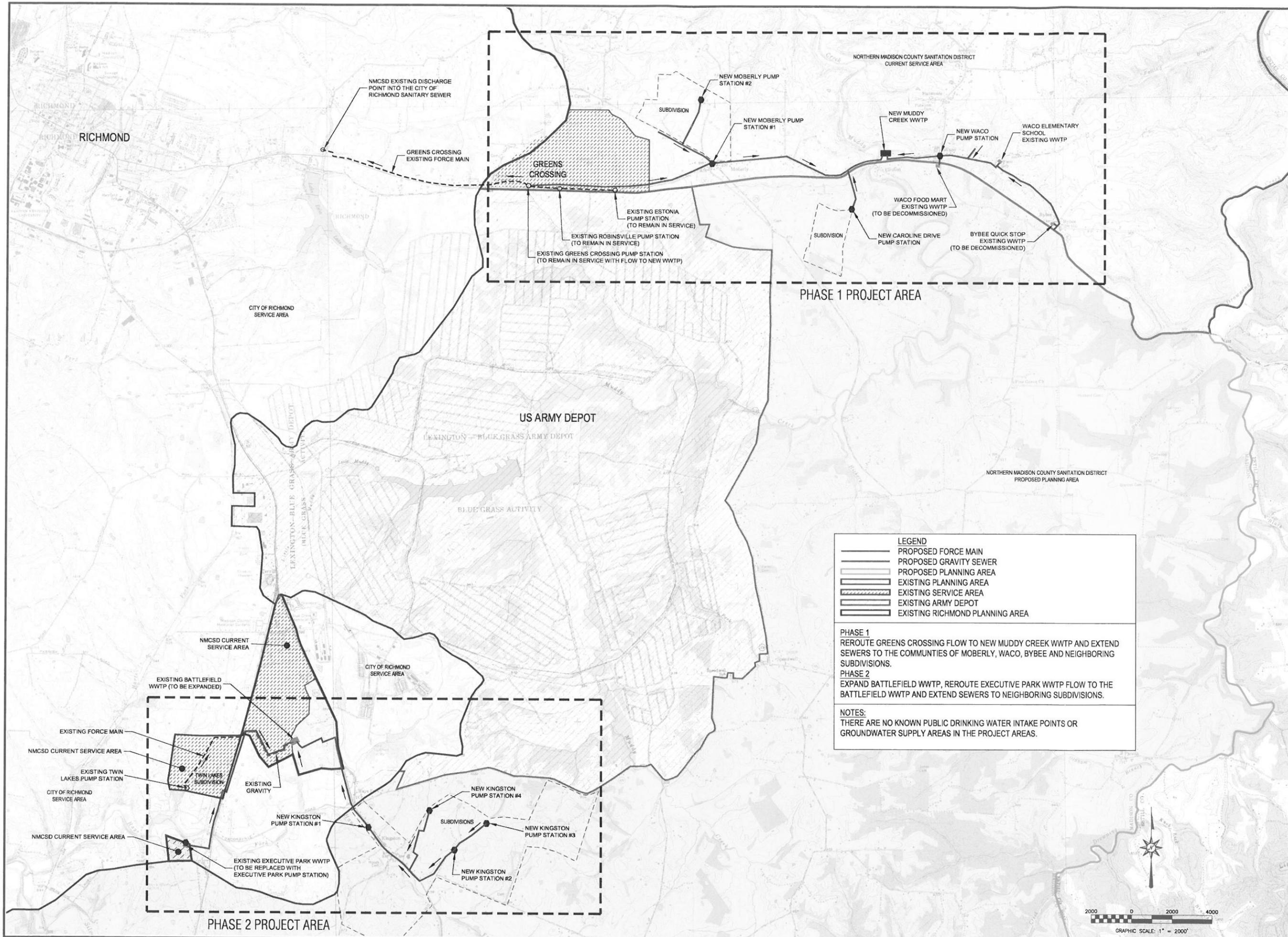
F:\MUNILA (1995)

NOTE: WATERSHED BOUNDARIES AND WATERSHED INFORMATION PROVIDED BY MADISON COUNTY GIS



GRAPHIC SCALE: 1" = 7000'
KENTUCKY NAD 83 SINGLE ZONE COORDINATES

<small>LAST PLOTTED:</small>	
<small>LAST SAVED:</small>	
<small>revision:</small>	
<p>NORTHERN MADISON COUNTY SANITATION DISTRICT 201 AQUEDUCT DRIVE, 8-13 PO BOX 67 RICHMOND, KENTUCKY 40476</p> <p style="text-align: center;">OVERALL PLANNING AREA MAP</p>	
<p>nesbitt engineering, inc. <small>providing proven solutions since 1976</small></p> <p style="text-align: center;">NORTHERN MADISON COUNTY SANITATION DISTRICT OVERALL PLANNING AREA MAP</p> <p>Drawn by: JCW job no.: 934.41 scale: 1" = 7000' <small>Rev. 04/03</small> Date: 4-03-12 Path: \DRAWINGS\PLANNING AREA.DWG</p>	 <p><small>sheet no.</small></p> <p>DWG 3-1</p>



LAST PLOTTED:
LAST SAVED:

NORTHERN MADISON COUNTY SANITATION DISTRICT
201 AQUEDUCT DRIVE, B-13
PO BOX 67
RICHMOND, KENTUCKY 40476
PROJECT AREAS MAP

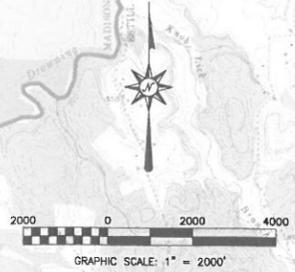
LEGEND

- PROPOSED FORCE MAIN
- PROPOSED GRAVITY SEWER
- ▭ PROPOSED PLANNING AREA
- ▭ EXISTING PLANNING AREA
- ▨ EXISTING SERVICE AREA
- ▭ EXISTING ARMY DEPOT
- ▭ EXISTING RICHMOND PLANNING AREA

PHASE 1
REROUTE GREENS CROSSING FLOW TO NEW MUDDY CREEK WWTP AND EXTEND SEWERS TO THE COMMUNITIES OF MOBERLY, WACO, BYBEE AND NEIGHBORING SUBDIVISIONS.

PHASE 2
EXPAND BATTLEFIELD WWTP, REROUTE EXECUTIVE PARK WWTP FLOW TO THE BATTLEFIELD WWTP AND EXTEND SEWERS TO NEIGHBORING SUBDIVISIONS.

NOTES:
THERE ARE NO KNOWN PUBLIC DRINKING WATER INTAKE POINTS OR GROUNDWATER SUPPLY AREAS IN THE PROJECT AREAS.



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NORTHERN MADISON COUNTY SANITATION DISTRICT
PROJECT AREAS MAP

drawn by: JCV
date: 4-03-12

plot no.: 934.41
scale: 1" = 2000'
file name: \DRAWINGS\MUDDY CREEK WWTP.DWG

sheet no. DWG 3-2

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

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NGS Information Services
NOAA, NINGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

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Based on updated topographic information, this map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unreviewed streams may differ from what is shown on previous maps.

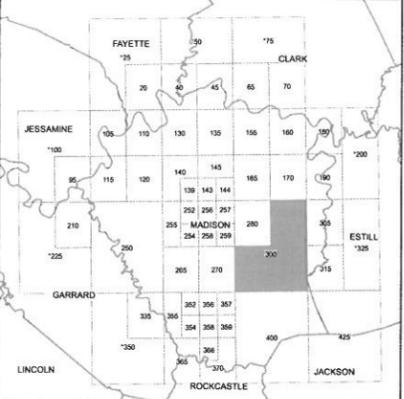
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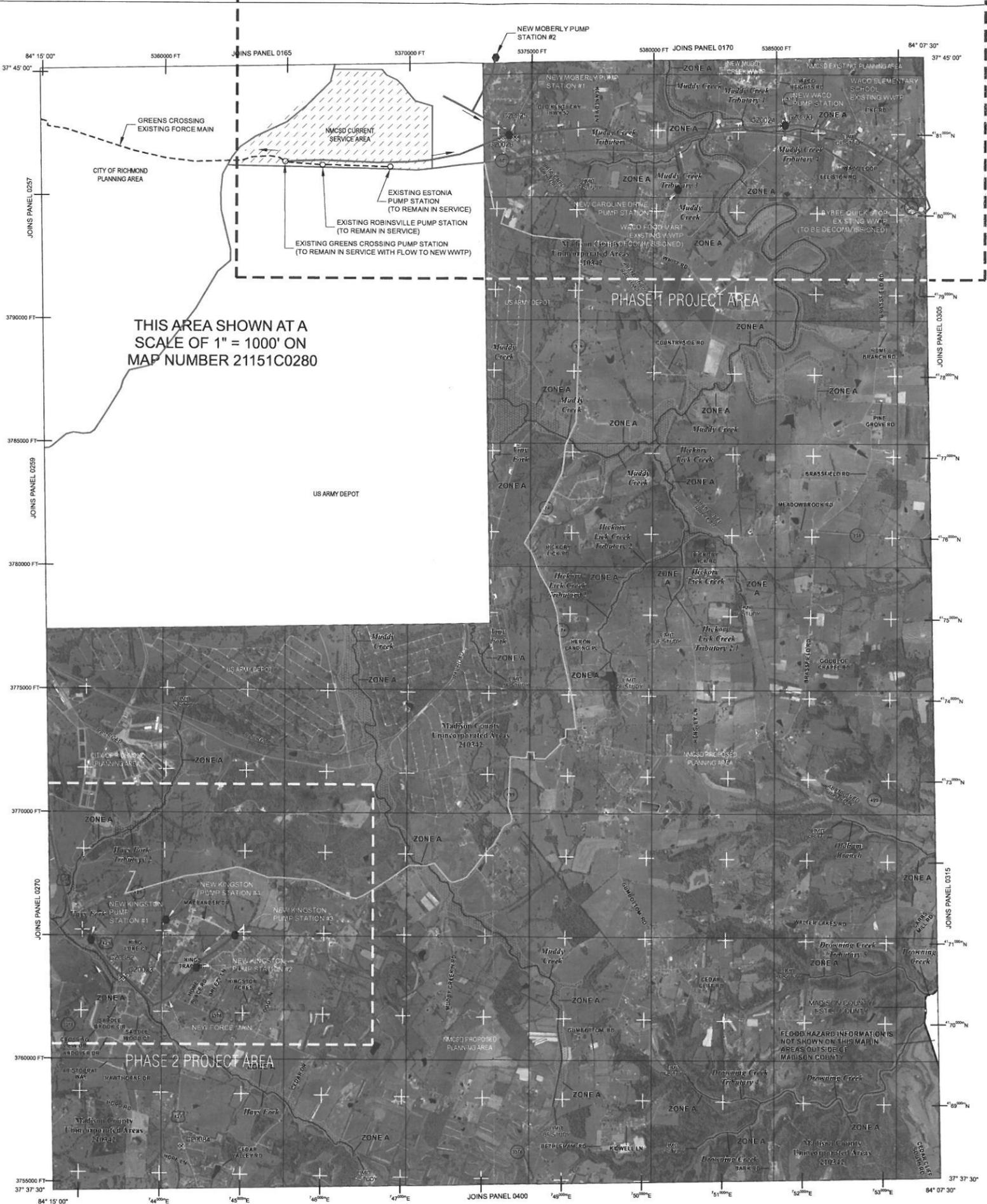
Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and for digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://msc.fema.gov/>.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2827) or visit the FEMA website at <http://www.fema.gov/business/nfip/>.

MADISON COUNTY, KY FIRM PANEL LOCATOR DIAGRAM



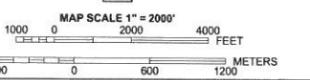
In cooperation with the Federal Emergency Management Agency (FEMA) and local communities in Kentucky, this Flood Insurance Rate Map was developed by the Kentucky Division of Water in a digital statewide format to assist communities in their efforts to minimize the loss of property and life through effectively managing development in flood-prone areas. The State of Kentucky has implemented a long term approach to floodplain management to reduce the impacts of flooding. This is demonstrated by the State's commitment to map floodplain areas at the local level. As part of this effort, the Kentucky Division of Water is working closely with FEMA as a Cooperating Technical Partner to produce and maintain this digital FIRM.



THIS AREA SHOWN AT A SCALE OF 1" = 1000' ON MAP NUMBER 21151C0280

LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
- The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined or areas of shallow flooding; velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently determined. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS**
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- CBRS and OPA boundary
- International, State, or County boundary
- Corporate, Extrajurisdictional, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- Base Flood Elevation line and value; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- (EL 987)
- Cross section line
- Transect line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 1000-meter Universal Transverse Mercator grid values, zone 16
- 600000 FT
- 5000-foot grid ticks: Kentucky State Plane coordinate system (FIPS 1600), Lambert Conformal Conic projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5
- River Mile
- Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
- Road or Railroad Bridge



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0300C

FIRM
FLOOD INSURANCE RATE MAP

MADISON COUNTY, KENTUCKY AND INCORPORATED AREAS

PANEL 300 OF 425
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	MADISON COUNTY	21042	0300	C

DWG 3-3

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

PRELIMINARY DATE: **SEPTEMBER 30, 2009** MAP NUMBER: **21151C0300C**

Kentucky
State of Kentucky
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

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NGS Information Services
NOAA, NIMS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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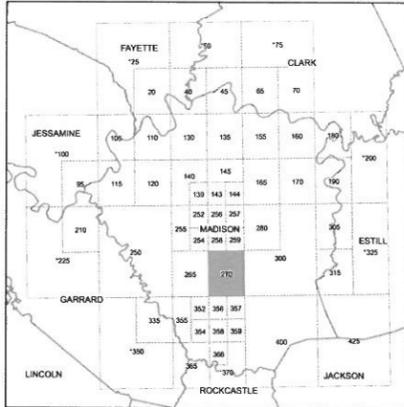
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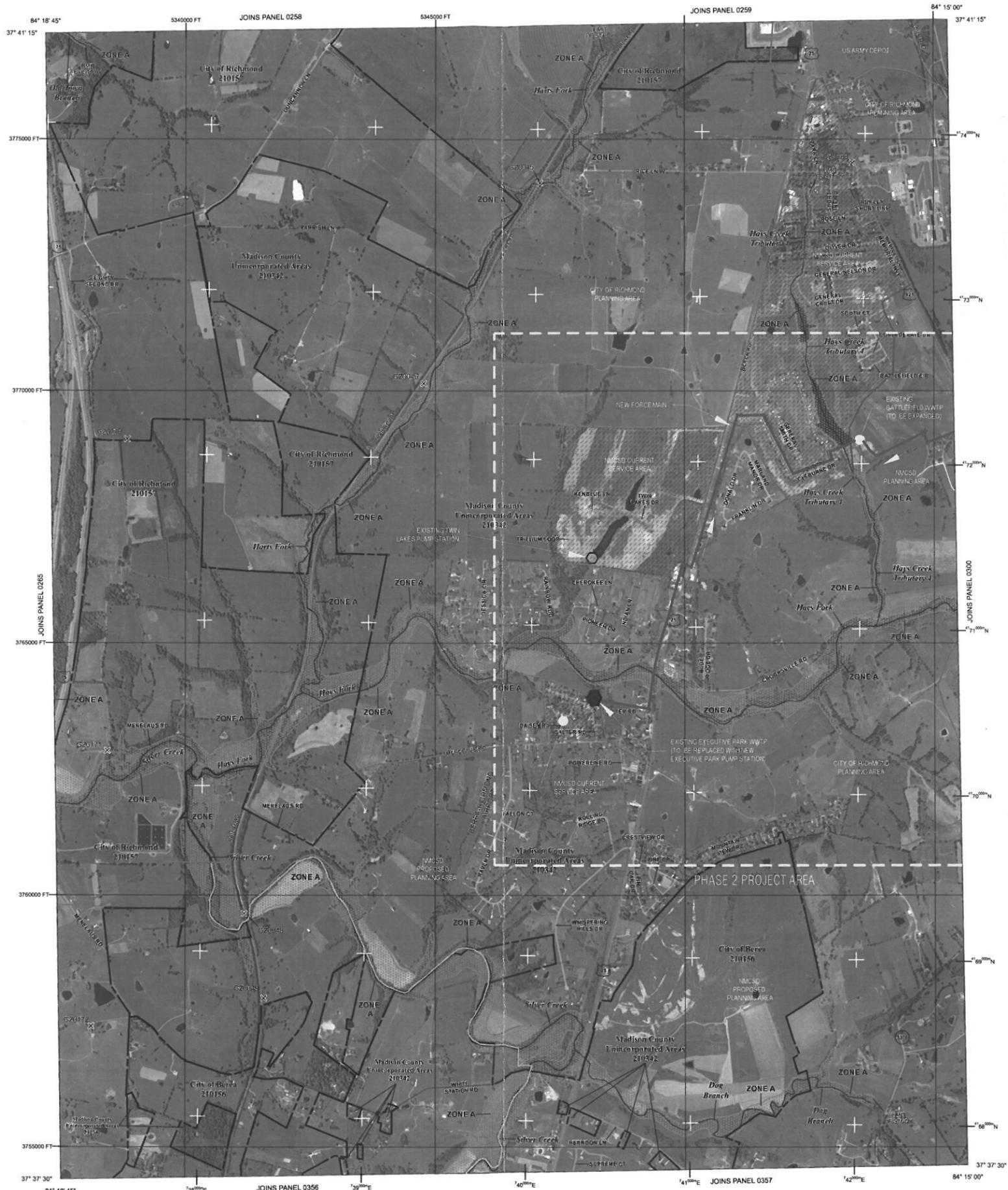
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MADISON COUNTY, KY FIRM PANEL LOCATOR DIAGRAM



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- Corporate, Extrajurisdictional, or Urban Growth boundary
- Area Not Included boundary
- Military Reservation, Native American Lands boundary
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988
- Cross section line
- Transsect line

87°07'45", 32°22'30"

42° 76' 00" E
600000 FT

DX5510 X
• M1.5

Aqueduct, Culvert, Flume, Penstock, or Storm Sewer
Road or Railroad Bridge

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0270C

FIRM FLOOD INSURANCE RATE MAP

MADISON COUNTY, KENTUCKY AND INCORPORATED AREAS

PANEL 270 OF 425
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SHEETS
BREA CITY OF	210156	0270 C	C
MADISON COUNTY	210342	0270 C	C
RICHMOND CITY OF	210157	0270 C	C

DWG 3-4

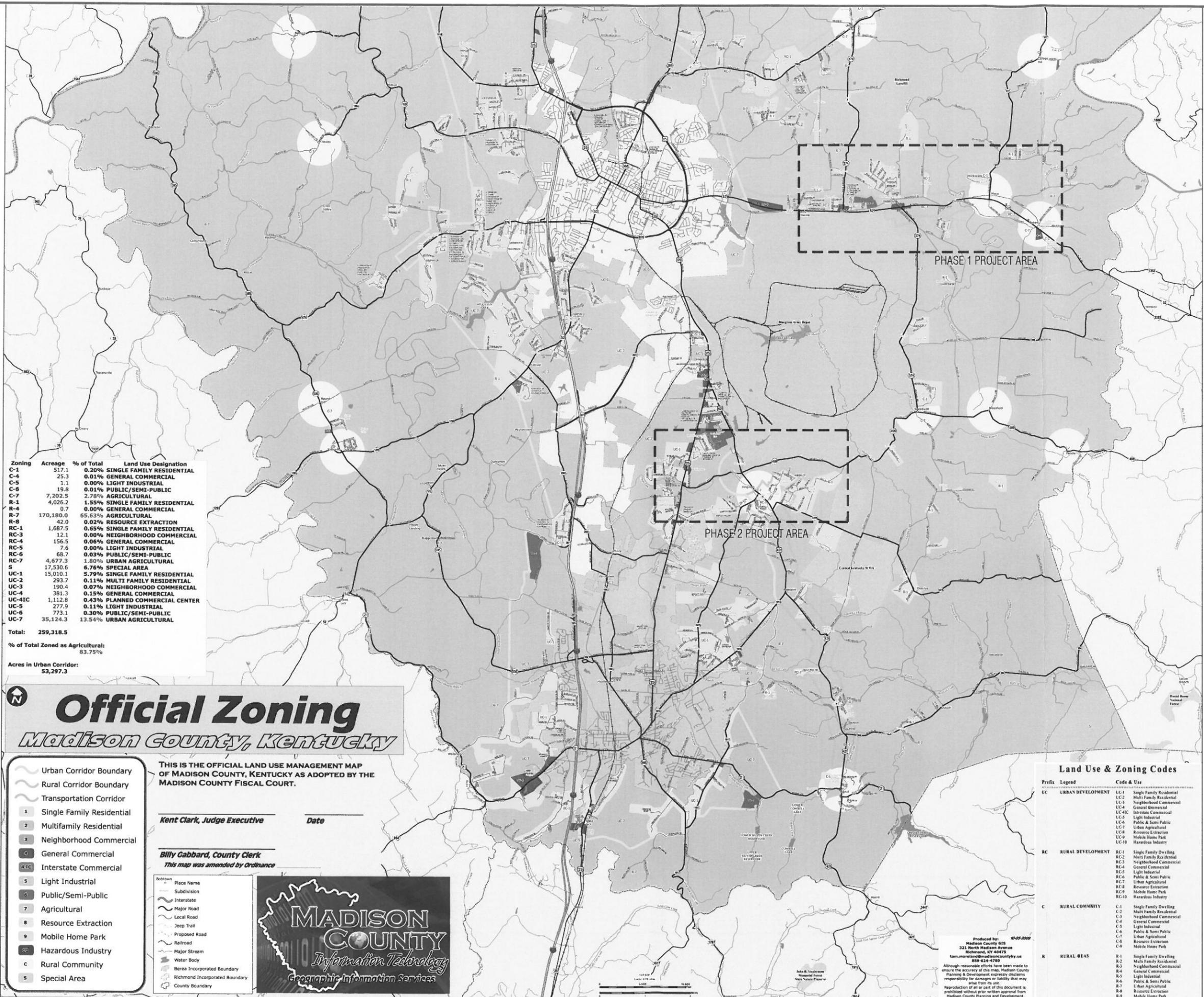
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PRELIMINARY DATE MAP NUMBER
SEPTEMBER 30, 2009 21151C0270C

Kentucky
State of Kentucky
Federal Emergency Management Agency

NORTHERN MADISON COUNTY SANITATION DISTRICT
201 AQUEDUCT DRIVE, B-13
PO BOX 67
RICHMOND, KENTUCKY 404076
MADISON COUNTY PLANNING & ZONING

nesbitt engineering, inc.
providing proven solutions since 1976
NORTHERN MADISON COUNTY SANITATION DISTRICT
MADISON COUNTY PLANNING & ZONING
934-41
1" = 5000'
JCW
4-03-12
DRAWINGS\PLANNING AND ZONING.DWG
DWG 3-5



Zoning	Acres	% of Total	Land Use Designation
C-1	517.1	0.20%	SINGLE FAMILY RESIDENTIAL
C-4	25.3	0.01%	GENERAL COMMERCIAL
C-5	1.1	0.00%	LIGHT INDUSTRIAL
C-6	19.8	0.01%	PUBLIC/SEMI-PUBLIC
C-7	7,202.5	2.78%	AGRICULTURAL
R-1	4,026.2	1.55%	SINGLE FAMILY RESIDENTIAL
R-4	0.7	0.00%	GENERAL COMMERCIAL
R-7	170,180.0	65.63%	AGRICULTURAL
R-8	42.0	0.02%	RESOURCE EXTRACTION
RC-1	1,687.5	0.65%	SINGLE FAMILY RESIDENTIAL
RC-3	12.1	0.00%	NEIGHBORHOOD COMMERCIAL
RC-4	156.5	0.06%	GENERAL COMMERCIAL
RC-5	7.6	0.00%	LIGHT INDUSTRIAL
RC-6	68.7	0.03%	PUBLIC/SEMI-PUBLIC
RC-7	4,677.3	1.80%	URBAN AGRICULTURAL
S	17,530.6	6.76%	SPECIAL AREA
UC-1	15,010.1	5.79%	SINGLE FAMILY RESIDENTIAL
UC-2	293.7	0.11%	MULTI FAMILY RESIDENTIAL
UC-3	190.4	0.07%	NEIGHBORHOOD COMMERCIAL
UC-4	381.3	0.15%	GENERAL COMMERCIAL
UC-4IC	1,112.8	0.43%	PLANNED COMMERCIAL CENTER
UC-5	277.9	0.11%	LIGHT INDUSTRIAL
UC-6	773.1	0.30%	PUBLIC/SEMI-PUBLIC
UC-7	35,124.3	13.54%	URBAN AGRICULTURAL
Total:	259,318.5		

% of Total Zoned as Agricultural:
83.75%

Acres in Urban Corridor:
53,297.3

Official Zoning

Madison County, Kentucky

THIS IS THE OFFICIAL LAND USE MANAGEMENT MAP OF MADISON COUNTY, KENTUCKY AS ADOPTED BY THE MADISON COUNTY FISCAL COURT.

Kent Clark, Judge Executive Date

Billy Gabbard, County Clerk
This map was amended by Ordinance

- Urban Corridor Boundary
- Rural Corridor Boundary
- Transportation Corridor
- 1 Single Family Residential
- 2 Multifamily Residential
- 3 Neighborhood Commercial
- 4C General Commercial
- 4IC Interstate Commercial
- 5 Light Industrial
- 6 Public/Semi-Public
- 7 Agricultural
- 8 Resource Extraction
- 9 Mobile Home Park
- RD Hazardous Industry
- c Rural Community
- S Special Area

- Place Name
- Subdivision
- Interstate
- Major Road
- Local Road
- Jeep Trail
- Proposed Road
- Railroad
- Major Stream
- Water Body
- Berea Incorporated Boundary
- Richmond Incorporated Boundary
- County Boundary



Prefix	Legend	Code & Use
UC	URBAN DEVELOPMENT	UC-1 Single Family Residential UC-2 Multi Family Residential UC-3 Neighborhood Commercial UC-4 General Commercial UC-4IC Interstate Commercial UC-5 Light Industrial UC-6 Public & Semi Public UC-7 Urban Agricultural UC-8 Resource Extraction UC-9 Mobile Home Park UC-10 Hazardous Industry
RC	RURAL DEVELOPMENT	RC-1 Single Family Dwelling RC-2 Multi Family Residential RC-3 Neighborhood Commercial RC-4 General Commercial RC-5 Light Industrial RC-6 Public & Semi Public RC-7 Urban Agricultural RC-8 Resource Extraction RC-9 Mobile Home Park RC-10 Hazardous Industry
C	RURAL COMMUNITY	C-1 Single Family Dwelling C-2 Multi Family Residential C-3 Neighborhood Commercial C-4 General Commercial C-5 Light Industrial C-6 Public & Semi Public C-7 Urban Agricultural C-8 Resource Extraction C-9 Mobile Home Park
R	RURAL REAS	R-1 Single Family Dwelling R-2 Multi Family Residential R-3 Neighborhood Commercial R-4 General Commercial R-5 Light Industrial R-6 Public & Semi Public R-7 Urban Agricultural R-8 Resource Extraction R-9 Mobile Home Park

Produced by 4/03/2012
Madison County GIS
322 North Madison Avenue
Richmond, KY 40475
tom.moreland@madisoncountky.gov
859-624-4780

Although reasonable efforts have been made to ensure the accuracy of this map, Madison County Planning & Development expressly disclaims responsibility for damages or liability that may arise from its use.

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Section 4 Socioeconomic Characteristics of the Planning Area

1. Historical and Current Population

The Phase 1 and Phase 2 areas largely serve as bedroom communities for the nearby cities of Richmond and Berea. In the last 50 years, the population growth of Madison County has been substantially greater than that of Kentucky. The presence of numerous small to moderately sized residential developments throughout the Phase 1 and Phase 2 areas support that data.

Table 4-1 summarizes data from the US Census Bureau.

**Table 4-1
Historical Population Data, Kentucky and Madison County**

	1960	1970	1980	1990	2000	2010
Kentucky	3,038,156	3,218,706	3,660,777	3,685,296	4,041,769	4,339,367
avg. annual % increase in previous 10 yrs.		0.6%	1.4%	0.1%	1.0%	0.7%
Madison County	33,482	42,730	53,352	57,508	70,872	82,916
avg. annual % increase in previous 10 yrs.		2.8%	2.5%	0.8%	2.3%	1.7%

2. Current and Projected Population

The Phase 1 and Phase 2 areas have many large open areas of gently sloping farmland, easily adaptable for development. Phase 1, centered along KY52, is a heavily trafficked road that connects Richmond to Irvine and to points east. Phase 2, centered along US 421, is also a heavily trafficked road that connects Richmond to Berea. These two roads form the north and west borders of the Bluegrass Army Depot, a significant employer in the region.

Despite the presence of chemical weapons stored at the Depot, as noted above there are already numerous residential developments along these two corridors. With the current process of chemical weapons destruction at the Depot underway, the desirability of this area can only increase, as the potential threat of a chemical release will be eliminated once all the weapons are safely destroyed.

Another factor that may support increased residential and commercial growth in the region is the completion of Exit 83 on Interstate 75 a few years ago. This exit feeds onto KY2872 (Duncannon Lane), which is a direct four-mile link between the interstate and the Depot.

Table 4-2 summarizes projected population data provided by the Kentucky State Data Center at the University of Louisville. The annual 1.7% increase in Madison County population over the past 10 years is consistent with the future projection of 1.5% per year over the next 20+ years. Compared to the previous 50-year period, these projections appear to be conservative.

**Table 4-2
Projected Population Data, Kentucky and Madison County**

	Census	Projections				
	2010	2015	2020	2025	2030	2035
Kentucky	4,339,367	4,509,429	4,672,754	4,820,390	4,951,178	5,063,331
total % increase since 2010		3.9%	7.7%	11.1%	14.1%	16.7%
avg. annual % increase since 2010		0.8%	0.8%	0.7%	0.7%	0.7%
Madison County	82,916	89,055	95,333	101,543	107,665	113,562
total % increase since 2010		7.4%	15.0%	22.5%	29.8%	37.0%
avg. annual % increase since 2010		1.5%	1.5%	1.5%	1.5%	1.5%

3. Current and Projected Industrial and Commercial Users

The Phase 1 and Phase 2 areas are largely residential, with minor commercial facilities, such as gas stations, small business, churches and a school. There are no major industrial sites in these two phases and there are no current indications or known public plans for significant industrial or commercial construction within these two phases. Therefore, for purposes of future flow projections, it is assumed no new industrial or commercial users will connect to the sewer within these areas.

4. Economic and Social Impact

This project will also stimulate the local economy by providing additional treatment capacity for residential growth. For example, the Phase 1 Area which currently serves 307 customers, is limited by agreement with Richmond Utilities, to a maximum of 400 connections. With the construction of the Muddy Creek WWTP, the Phase 1 Area will be able to grow well beyond the 400 connection limit. In the Phase 2 Area, the existing Battlefield Sewage Treatment Plant, with a treatment capacity of 0.114 MGD, already receives an average of 0.077 MGD, and thus is limited for future growth unless it is expanded.

As discussed In Section 2, without this project, the sewage disposal fees for the Phase 1 area will substantially increase as Richmond Utilities, per their Sewer Use Ordinance, continues to annually increase their out-of-city rates to the Northern Madison County Sanitation District (NMCS D). This cost increase, which will be passed on to the customers, will be an economic hardship particularly for the low to moderate income residents, many of which reside in the Greens Crossing area. This project will allow the NMCS D to take direct control of all their costs and thus maintain the best possible rates for their customers.

Finally, public sewer has a tendency to increase property values, particularly when replacing failing septic systems. Furthermore, public sewer will improve the desirability of the area thus encouraging residential growth and the boost to the local economy that comes with it.

Section 5 Existing Environment in the Planning Area

1. Physical Features

A. Surface Water Features and Quality

The proposed project is located within the Lower Kentucky sub-basin of the Kentucky River Basin. The Lower Kentucky sub-basin is located in Central Kentucky and covers approximately 23 counties and 3.8 million acres. Nearly three-fourths of the land in this sub-basin is characterized as agricultural land, mainly rolling hills utilized primarily as pastureland for livestock. Specifically, the project area is located within the Muddy Creek watershed. Sediment, pathogens, and nutrients are common contaminants affecting recreational and biological uses of waters in this watershed.

The Section 303(d) list of impaired waters contained in the 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky was accessed to determine if there are any impaired waterbodies in the vicinity of the project area. Section 303(d) is a part of the Clean Water Act and requires States to develop a list of waters not meeting water quality standards or which have impaired uses. These waters are identified as being impaired for one or more pollutants and do not meet one or more water quality standards. Impaired waters are identified through assessment and monitoring programs conducted by KDOW personnel, volunteer networks and other local, state and federal agencies. Causes of impairment include pathogens, siltation, flow alteration, turbidity, suspended solids, and low dissolved oxygen. The list contained in the 2010 report indicated that there is one impaired water body in the vicinity of the proposed project, which is listed as the following:

- Muddy Creek (0.0 to 20.2)
 - Impaired Use: Primary Contact Recreation Water (Nonsupport)
 - Pollutant: Fecal Coliform
 - Suspected Sources: Livestock (Grazing or Feeding Operations)

A Total Maximum Daily Load (TMDL) has not yet been developed for this stream, but monitoring was scheduled to begin in 2011.

B. Groundwater Quality

In Madison County, groundwater is hard to very hard and may contain salt or hydrogen sulfide, especially at depths greater than 100 feet. Salt water is found below fresh groundwater at variable depths throughout the entire state of Kentucky. Depths to the saline groundwater range from 50 feet or less down to 2,000 feet below land surface in Kentucky. In Madison County, the fresh-saline interface ranges in elevations of 400 feet mean sea level along the Kentucky River up to 900 feet in the hilly southeastern corner of the county.

C. Water Sources and Supply

In Madison County, public water is provided to approximately 92 percent of the county's residents. In areas not served by public water, approximately 20 percent of the households use wells and 80 percent use other sources. Groundwater yield to springs and wells is highly variable, but usually enough to meet domestic needs. The Muddy Creek watershed has moderate rates of groundwater drainage. The watershed lies partly above fractured shales through which groundwater can easily move but which stores very little water. Other sections of the watershed lie over easily weathered clay shales that store water but allow little groundwater flow. There are also areas of interbedded shales and limestones, through which water conduction is poor because of the clay content of the shale.

D. Wetlands

The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant; therefore, these previously disturbed areas of the project do not contain wetlands. In addition, information obtained from the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory wetlands mapper (<http://www.fws.gov/wetlands/Data/Mapper.html>) indicates that there are no wetlands mapped on the proposed WWTP property.

The United States Army Corps of Engineers (USACE) was contacted to determine the possibility of wetlands within or adjacent to the project site. A response was received from Ms. Jane Archer, Regulatory Specialist with the USACE. Ms. Archer indicated that to the knowledge of the agency, there has been no wetlands mapping done at the project site. She indicated that a jurisdiction determination must be completed if the proposed project would impact "waters of the U.S.". A copy of the correspondence from the USACE is included in Section 9 of this report.

E. Air Pollution

Currently, Madison County is designated in attainment with National Ambient Air Quality Standards (NAAQS) for six pollutants issued by the Environmental Protection Agency. These pollutants include ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, lead, and particulate matter less than or equal to ten microns.

Air quality issues associated with the project location were reviewed, and it is not anticipated that construction of the WWTP and associated collection system will cause a negative impact on air quality in this region of Madison County. It is anticipated that there will be little if any emissions to air during the construction and operation of the proposed wastewater system and that topographical or meteorological conditions will not hinder the dispersal of the emissions. During construction, a temporary increase in emissions will occur due to construction equipment; however, this level will decrease after the termination of the project. To control the amount of air emissions, it is expected that the contractors for the project will operate construction equipment in accordance with state and federal regulations.

F. Floodplains

According to the Flood Insurance Rate Map for the project area, Community Panel Number 2103420100B, and dated September 28, 1990, the majority of the project site is outside of and special flood hazard areas. The only portions of the project property which potentially may be located in special flood hazard areas inundated by a 100-year flood are those directly adjacent to Hays Fork and Muddy Creek.

G. Soils

The Natural Resources Conservation Service (NRCS) maintains a Web Soil Survey online (<http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>) and the website was accessed for this report to obtain information regarding the soils present at the project site. Soil types in both Phase 1 and Phase 2 of the project were obtained.

The following soil series make up the majority of the soils located within Phase 1 of the project area:

- Robertsville silt loam
- Lawrence silt loam
- Berea silt loam, 2 to 6 percent slopes
- Mercer silt loam, 6 to 12 percent slopes
- Mercer silt loam, 2 to 6 percent slopes
- Cynthiana-Rock outcrop complex, 12 to 30 percent slopes

The following soil series make up the majority of the soils located within Phase 2 of the project area:

- Mercer silt loam, 2 to 6 percent slopes
- Hagerstown silt loam, 2 to 6 percent slopes
- Lawrence silt loam
- Beasley silt loam, 6 to 12 percent slopes
- Lowell silt loam, 12 to 20 percent slopes
- Faywood silt loam, 12 to 30 percent slopes

The Robertsville silt loam and Lawrence silt loam are both poorly drained soils that are made up of old fine-silty alluvium derived from limestone, siltstone, and/or shale. The remaining soils listed above are moderately well drained to well drained and are made up of fine-silty or clayey alluvium weathered from limestone and/or shale.

H. Geology

The project site is located in flat-lying strata of Upper Ordovician to Quaternary in age. In the Phase 1 area of the project site, the surficial geologic formations include the Drakes Formation, the Crab Orchard Formation, the Boyle Dolomite, and the Irvine Formation. The Drakes Formation, of Upper Ordovician age, is composed of interbedded dolomite, shale, and limestone. The majority of the formation is dolomite, with shale and limestone being thinner bedded and much less common.

The Crab Orchard Formation is Lower and Middle Silurian in age and consists predominantly of shale that is thinly bedded and greenish gray to olive-gray in appearance. This formation ranges in thickness from thirty to sixty feet. The formation above the Crab Orchard Formation is the Boyle Dolomite, which is Middle Devonian in age. The Boyle Dolomite is a fine grained dolomite with massive, obscure bedding. Medium to light gray chert nodules are commonly found near the top of the formation, particularly when the formation thickness exceeds ten feet. The Irvine Formation is Tertiary or Quaternary in age and consists of sand and gravel.

In the Phase 2 area of the project site, the surficial geologic formations include the Ashlock Formation, the Drakes Formation, and Quaternary-aged alluvium. The Ashlock Formation is Upper Ordovician in age and consists primarily of limestone regularly interbedded with thin beds of shale. The limestone is typically fine to medium grained, and appears light to medium gray. The shales are typically thin bedded and dark gray in appearance. The alluvium is mainly found along the stream beds and consists of dark brown silt and clay interbedded with gravel.

I. Topography

Madison County predominantly lies in the Outer Blue Grass physiographic province of Kentucky, with the areas south and east of Berea being part of the Knobs region. The project site is located at the edge of the Outer Blue Grass region, with the Knobs region beginning just across Drowning Creek to the east in neighboring Estill County. The topography consists of broad, gently rolling plateaus incised by small stream valleys of moderate relief.

The Phase 1 area of the project site ranges in elevation from 910 ft. mean sea level, at the top of the plateaus, down to approximately 770 ft. msl in the vicinity of Elliston. The Phase 2 area of the project site ranges in elevation from 10200 ft. msl at the western edge of the area down to approximately 920 ft. msl along Hays Fork. The areas adjacent to the major streams exhibit the greatest topographic relief. The area adjacent to Muddy Creek typically displays a vertical relief of about 120 feet. Consequently, only the areas directly adjacent to Hays Fork and Muddy Creek would be prone to flooding. This is primarily due to the small size of the tributaries that drain the upland plateaus of the area.

2. Biological Features

The sewer system to the new and existing WWTPs will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package WWTP. Therefore impacts to existing plant and animal communities will not be a factor as these areas have already been disturbed. The proposed new WWTP site appears to have been previously farmed, but may have undisturbed land; therefore, the United State Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR) were contacted to determine if there were any federally or state listed threatened or endangered species in the vicinity of the project site. Responses were received from Mr. Daniel Stoelb of the KDFWR and Mr. Virgil Lee Andrews, Jr. of the

USFWS. Copies of the correspondence from these agencies are included in Section 9 of this report.

Mr. Stoelb (KDFWR) indicated that due to the nature of the project he did not anticipate impacts to listed species or any critical habitat, wetlands, special aquatic sites, or refuge areas. He recommended that to minimize indirect impacts to aquatic resources, strict erosion control measures such as silt fences, staked straw bales, brush barriers, sediment basins, and diversion ditches should be developed and implemented prior to construction. In addition, the KDFWR response recommended several measures for work that may occur within a stream such as laying pipe perpendicular to the stream bank, excavation during low flow periods, and replanting of disturbed areas.

Mr. Andrews (USFWS) indicated that two federally listed species have the potential to occur within the project vicinity, which are the Indiana bat and running buffalo clover. Mr. Andrews stated that since the Indiana bat utilizes caves, rock shelters, or underground mines for hibernation, he recommended that the project area be surveyed for these types of potential habitats. He also recommended that trees only be removed from the project area between October 15 and March 31 to avoid impacting summer roosting Indiana bats or between November 15 and March 31 if Indiana bat hibernacula are identified on the project site to avoid impacting "swarming" behavior. Mr. Andrews recommended that a survey for running buffalo clover be done by qualified personnel if the proposed project requires alteration of habitat that coincides with the habitat required for this species.

3. Cultural Features

The Kentucky Heritage Council was contacted regarding the possibility of historic and archaeological resources on or adjacent to the proposed project site. A letter was received from Mr. Lindy Casebier, the State Historic Preservation Officer (SHPO). Mr. Casebier indicated that the proposed project had the potential to impact sites eligible for listing or currently listed on the National Register of Historic Places. He recommended that a cultural historic survey and an archaeological survey be completed by qualified professionals prior to project implementation. An archaeological survey is scheduled to be completed at the site in late April or early May.

4. Other Resource Features

No streams or water bodies in the service area are classified as Outstanding Resource or other Special Waters. There are no national or state parks in the vicinity of the site, or other applicable environmentally sensitive areas. The NRCS was contacted to obtain information regarding USDA Designated Important Farmland on or adjacent to the project property. A response was received from Mr. Steve Jacobs, Resource Soil Scientist with the NRCS. Mr. Jacobs indicated that portions of the project site are considered prime farmland. A copy of the correspondence from this agency is included in Section 9 of this report.

Section 6 Existing Wastewater System

1. On-Site Disposal

The Madison County Health Department (MCHD) does not maintain a list of failing septic systems. However, periodically they receive complaints of failing systems and odors in the area. In such instances, the property owner is required to fix it. MCHD personnel report that the whole region has chronic drainage problems. They have also observed several instances of more than one home sharing a common septic system. Many of the systems are so old that there is no record of when they were constructed or where they are located. Based on MCHD employee observations, the poor soil conditions and seasonal high groundwater table in much of the region, the suspected incidence of failing or marginally operating septic systems is high.

Based on house counts, the number of homes per Area that are served by on-lot septic systems are listed below. There are no reported straight pipes. If one were discovered, the MCHD would require the property owner to install a septic system.

Phase 1 Area	311 homes
Phase 2 Area	249 homes

2. Wastewater Treatment Plants

Phase 1 Area

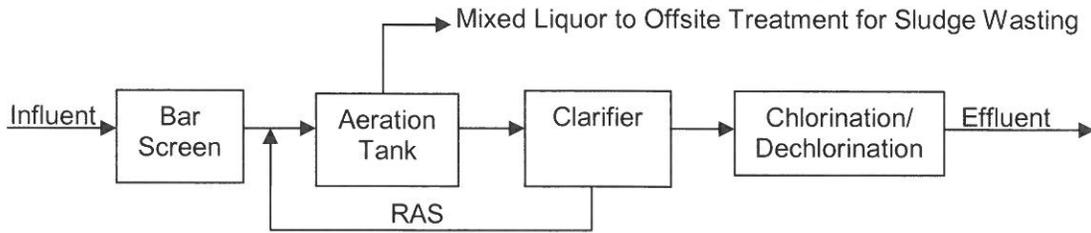
Sewage treatment plants in the Phase 1 Area are Waco Elementary School, Bybee Grocery and the BP Food Market.

A. Waco Elementary School

Type	Activated Sludge
Age	Unknown
Design Capacity	9,000 gpd
Process Units	Extended Aeration Clarification Chlorination/Dechlorination
Reliability Category	Unspecified in KPEDS Permit – Assumed Grade C
Average Daily Flow	7,878 gpd
Peak Daily Flow	unknown
Maximum Monthly Flow	13,688 gpd
Effluent Limits:	
CBOD ₅	30 / 45 mg/l (30-day avg / daily max)
TSS	30 / 45 mg/l (30-day avg / daily max)
NH ₃ -N	10 / 15 mg/l (30-day avg / daily max)

The age of the Waco Elementary Sewage Treatment plant is unknown. It consists of a extended aeration process involving aeration, settling and chlorine disinfection. The plant is in fair condition. A simplified process flow diagram of the treatment plant is shown in Figure 6-1 below.

Figure 6-1
Waco Elementary School WWTP – Process Flow Diagram



With respect to secondary treatment, the WWTP generally produces a high quality effluent. For example, in 2009 and 2010 the average effluent CBOD₅ and TSS were 15 mg/l and 7 mg/l respectively. However, the WWTP has had difficulty nitrifying the waste. For example, in 2009 and 2010 the monthly average effluent ammonia concentration exceeded the permit limit six out of eight times. The average effluent ammonia concentration of all eight quarters was 23 mg/l, far in excess of the monthly average limit of 10 mg/l.

During the same time frame, both the 30-day and the 7-day geometric mean effluent E. Coli counts also exceeded the permit limit six out of eight times. Tables 6-1 and 6-2, provide flow and analytical DMR data respectively.

Table 6-1
Waco Elementary School WWTP – Flow September 2010 thru May 2011

Month	Avg Daily Flow (gpd)
Sept	8,486
Oct	9,678
Nov	8,793
Dec	13,688
Jan	2,901
Feb	4,740
Mar	5,154
Apr	10,056
May	7,409
Average	7,878
Maximum	13,688

Note: Daily flows are based on the total monthly flow divided by the number of actual school days for a given month. Summer months, with minimal or no school days are excluded from this table.

Table 6-2
Waco Elementary School WWTP - Plant Performance Data, 2009-2010

	TSS				CBOD5			
	mo avg	max wk						
	(mg/l)	(mg/l)	(ppd)	(ppd)	(mg/l)	(mg/l)	(ppd)	(ppd)
1Q, 2009	4	4	0.23	0.23	<2	<2	<0.12	<0.12
2Q	4	4	0.07	0.07	2	2	0.03	0.03
3Q	4	4	0.02	0.02	<2	<2	<0.10	<0.10
4Q	7	7	0.41	0.41	25	25	1.46	1.46
1Q, 2010	8	8	0.48	0.48	13	13	0.78	0.78
2Q	16	16	0.96	0.96	<2	<2	<0.12	<0.12
3Q	5	5	0.30	0.30	12	12	0.72	0.72
4Q	4	4	0.24	0.24	21	21	1.26	1.26
Avg	7	7	0.34	0.34	15	15	0.85	0.85
Max	16	16	0.96	0.96	25	25	1.46	1.46
Limit	30	45	2.25	3.37	30	45	2.25	3.37
Violations	0	0	0	0	0	0	0	0

	NH3-N				pH - min	pH - max	D.O.
	mo avg	day max	mo avg	day max	mo	mo	mo min
	(mg/l)	(mg/l)	(ppd)	(ppd)	(S.U.)	(S.U.)	(mg/l)
2011							
1Q, 2009	46	46	2.69	2.69	7.7	7.7	9.5
2Q	20	20	0.33	0.33	7.1	7.1	10.0
3Q	<1	<1	<0.006	<0.006	7.6	7.6	8.2
4Q	21	21	1.23	1.23	7.8	7.8	8.5
1Q, 2010	37	37	2.28	2.28	7.4	7.4	10.0
2Q	12	12	0.74	0.74	7.0	7.0	7.9
3Q	7.2	7.2	0.43	0.43	7.8	7.8	5.5
4Q	20	20	1.23	1.23	7.1	7.1	7.3
Avg	23	23	1.28	1.28	---	---	8.4
Min	---	---	---	---	7.0	---	5.5
Max	46	46	2.69	2.69	---	7.8	10.0
Limit	10	15	0.75	1.12	6.0	9.0	7.0
Violations	6	5	4	4	0	0	1

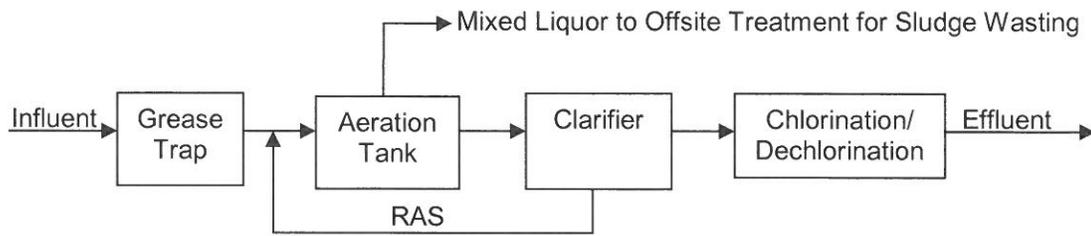
2011	Total Res. Chlorine		E-Coli	
	mo avg	day max	30-d G.M	7-d G.M
	(mg/l)	(mg/l)	(#/100 ml)	(#/100 ml)
1Q, 2009	<0.01	<0.01	>800	>800
2Q	<0.01	<0.01	800	800
3Q	<0.01	<0.01	7	7
4Q	<0.01	<0.01	2420	2420
1Q, 2010	<0.01	<0.01	1733	1733
2Q	<0.01	<0.01	1732	1732
3Q	<0.01	<0.01	2420	2420
4Q	<0.01	<0.01	1120	1120
Avg	<0.01	<0.01	---	---
Max	0.000	0.000	2420	2420
Limit	0.019	0.019	130	240
Violations	0	0	6	6

B. Bybee Grocery

Type	Activated Sludge
Age	Unknown
Design Capacity	1,000 gpd
Process Units	Extended Aeration Clarification Chlorination/Dechlorination
Reliability Category	Unspecified in KPEDS Permit – Assumed Grade C
Average Daily Flow	696 gpd
Peak Daily Flow	unknown
Maximum Monthly Flow	1,233 gpd
Effluent Limits:	
CBOD ₅	30 / 60 mg/l (30-day avg / daily max)
TSS	30 / 60 mg/l (30-day avg / daily max)
NH ₃ -N	10 / 20 mg/l (30-day avg / daily max)

The age of the Bybee Grocery Sewage Treatment plant is unknown. It appears to be about 20 years old. It consists of a extended aeration process involving aeration, settling and chlorine disinfection. The plant is in fair condition. A simplified process flow diagram of the treatment plant is shown in Figure 6-2 below.

Figure 6-2
Bybee Grocery WWTP – Process Flow Diagram



The WWTP generally produces a high quality effluent. For example, in 2011 the average effluent CBOD₅ and TSS were 9 mg/l and 7 mg/l respectively. Furthermore, no effluent violations occurred that year. Tables 6-3 and 6-4, provide flow and analytical DMR data respectively.

Table 6-3
Bybee Grocery WWTP – 2011 Flows

Month	Avg Daily Flow (gpd)
Jan	741
Feb	1233
Mar	940
Apr	861
May	798
Jun	389
Jul	758
Aug	455
Sept	563
Oct	627
Nov	524
Dec	458
Average	696
Maximum	1233

Table 6-4
Bybee Grocery WWTP –Performance Data, 2011

2011	TSS				CBOD5			
	mo avg (mg/l)	max wk (mg/l)	mo avg (ppd)	max wk (ppd)	mo avg (mg/l)	max wk (mg/l)	mo avg (ppd)	max wk (ppd)
1Q	8	8	0.030	0.030	8	8	0.030	0.030
2Q	<1	<1	<0.003	<0.003	<2	<2	<0.007	<0.007
3Q	5	5	0.020	0.020	18	23	0.070	0.140
4Q	<1	<1	<0.003	<0.003	2	2	0.007	0.007
Avg	7	7	0.025	0.025	9	11	0.04	0.06
Max	8	8	0.030	0.030	18	23	0.07	0.14
Limit	30	60	0.630	1.250	30	60	0.63	1.25
Violations	0	0	0	0	0	0	0	0

2011	NH3-N				pH - min	pH - max	D.O.
	mo avg (mg/l)	day max (mg/l)	mo avg (ppd)	day max (ppd)	mo (S.U.)	mo (S.U.)	mo min (mg/l)
1Q	<0.25	<0.25	<0.001	<0.001	7.3	7.3	8.1
2Q	0.57	0.57	0.002	0.002	7.3	7.3	8.4
3Q	<0.25	<0.25	<0.001	<0.001	7.2	7.2	7.3
4Q	0.59	0.59	0.002	0.002	7.1	7.1	7.7
Avg	0.6	0.58	0.002	0.002	---	---	7.9
Min	---	---	---	---	7.1	---	7.3
Max	0.6	0.59	0.0	0.00	---	7.3	8.4
Limit	10	20	0.21	0.42	6.0	9.0	7.0
Violations	0	0	0	0	0	0	0

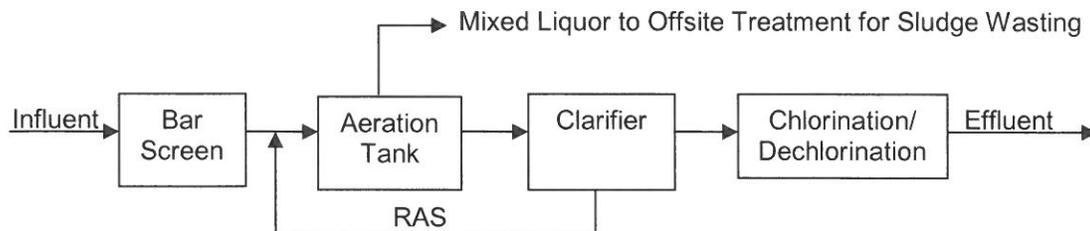
2011	Total Res. Chlorine		Fecal Coliform		E-Coli	
	mo avg	day max	30-d G.M	7-d G.M	30-d G.M	7-d G.M
	(mg/l)	(mg/l)	(#/100 ml)	(#/100 ml)	(#/100 ml)	(#/100 ml)
1Q	---	---	10	10	---	---
2Q	---	---	---	---	1	1
3Q	---	---	---	---	<1	<1
4Q	0.000	0.000	---	---	---	---
Avg	0.000	0.000	---	---	---	---
Max	0.000	0.000	10	10	1	1
Limit	0.011	0.019	200	400	130	240
Violations	0	0	0	0	0	0

C. Waco BP Food Market

Type	Activated Sludge
Age	Unknown
Design Capacity	1,000 gpd
Process Units	Extended Aeration Clarification Chlorination/Dechlorination
Reliability Category	Unspecified in KPEDS Permit – Assumed Grade C
Average Daily Flow	1,000 gpd
Peak Daily Flow	unknown
Effluent Limits:	
CBOD ₅	20 / 30 mg/l (30-day avg / max wk avg)
TSS	30 / 45 mg/l (30-day avg / max wk avg)
NH ₃ -N	10 / 20 mg/l (30-day avg / daily max)

The age of the Waco PB Food Market Sewage Treatment plant is unknown. It appears to be about 15 to 20 years old. It consists of an extended aeration process involving aeration, settling and chlorine disinfection. The plant is in fair condition. A simplified process flow diagram of the treatment plant is shown in Figure 6-3 below.

Figure 6-3
Waco BP Food Market WWTP – Process Flow Diagram



The WWTP generally produces a high quality effluent. For example, in 2011 the average effluent BOD₅ and TSS were 11 mg/l and 13 mg/l respectively. Furthermore, with the exception of one low effluent dissolved oxygen result (6.9 mg/l; permit limit is a minimum of 7.0 mg/l) no effluent violations occurred that year. Tables 6-5 provides analytical DMR data respectively. For an unknown reason, no DMR information was available for the second quarter. A flow table is not provided. Both the 30-day average and instantaneous maximum flows for the BP Food Market are consistently reported on the DMR's as 1,000 gpd.

Table 6-5
Waco BP Food Markert WWTP –Performance Data, 2011

2011	TSS				CBOD5			
	mo avg	max wk						
	(mg/l)	(mg/l)	(ppd)	(ppd)	(mg/l)	(mg/l)	(ppd)	(ppd)
1Q	15	15	0.125	0.125	4	4	0.033	0.033
2Q	---	---	---	---	---	---	---	---
3Q	16	16	0.133	0.133	18	18	0.150	0.150
4Q	8	8	0.067	0.067	12	12	0.100	0.100
Avg	13	13	0.108	0.108	11	11	0.094	0.094
Max	16	16	0.133	0.133	18	18	0.150	0.150
Limit	30	45	0.250	0.380	20	30	0.170	0.250
Violations	0	0	0	0	0	0	0	0

2011	NH3-N				pH - min	pH - max	D.O.
	mo avg	day max	mo avg	day max	mo	mo	mo min
	(mg/l)	(mg/l)	(ppd)	(ppd)	(S.U.)	(S.U.)	(mg/l)
1Q	8.60	8.60	0.072	0.072	7.1	7.1	7.1
2Q	---	---	---	---	---	---	---
3Q	6.30	6.30	0.053	0.053	7.3	7.3	6.9
4Q	2.62	2.62	0.022	0.022	7.4	7.4	7.4
Avg	6	6	0.05	0.05	---	---	7.1
Min	---	---	---	---	7.1	---	6.9
Max	9	9	0.07	0.07	---	7.4	7.4
Limit	10	15	0.08	0.13	6.0	9.0	7.0
Violations	0	0	0	0	0	0	1

2011	Total Res. Chlorine		E-Coli	
	mo avg	day max	30-d G.M	7-d G.M
	(mg/l)	(mg/l)	(#/100 ml)	(#/100 ml)
1Q	0.011	0.011	<1	<1
2Q	---	---	---	---
3Q	<0.01	<0.01	<1	<1
4Q	0.011	0.011	<1	<1
Avg	0.011	0.011	---	---
Max	0.011	0.011	0	0
Limit	0.011	0.019	130	240
Violations	0	0	0	0

Phase 2 Area

Sewage treatment plants in the Phase 2 Area are Battlefield Estates and the Executive Park.

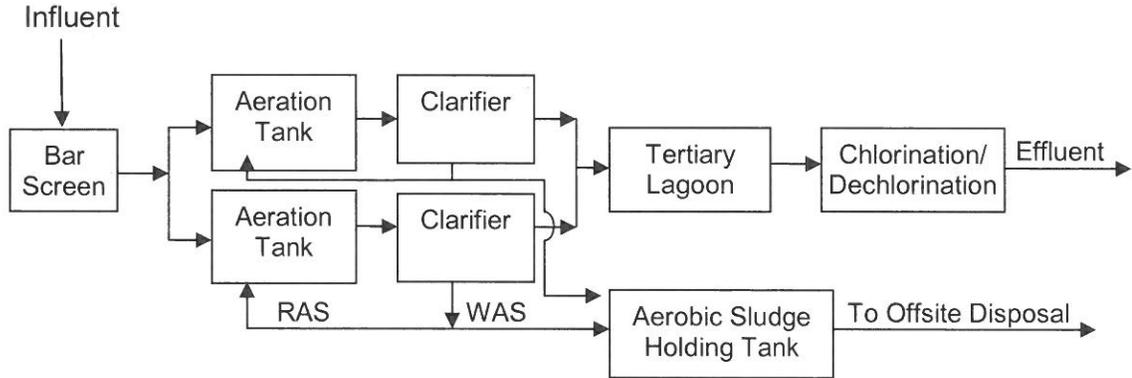
D. Battlefield Estates

Type	Activated Sludge
Age	Unknown
Design Capacity	0.114 MGD
Process Units	Manual Bar Screen Extended Aeration Clarification Polishing Pond (appx. 1.5 Mgal) Chlorination/Dechlorination Aerobic Digestion
Reliability Category	Grade C – WWTP has equipment in-place for plug-in connection of an auxiliary power source (portable electric generator).
Average Daily Flow	0.07 MGD
Peak Daily Flow	0.40 MGD
Maximum Monthly Flow	0.14 MGD
Effluent Limits:	
CBOD ₅	15 / 22.5 mg/l (30-day avg / daily max)
TSS	30 / 45 mg/l (30-day avg / daily max)
NH ₃ -N	10 / 15 mg/l (30-day avg / daily max)

The Battlefield Estates Sewage Treatment plant was constructed in 1999. It consists of a two parallel trains of extended aeration steel package treatment plants, followed by a

polishing pond. The package plant is in fair condition, exhibiting typical signs of wear for a steel plant of its age. A simplified process flow diagram of the treatment plant is shown in Figure 6-4 below.

Figure 6-4
Battlefield Estates WWTP – Process Flow Diagram



The WWTP produces a high quality effluent. For example, in 2011 the average effluent BOD₅ and TSS were 6 mg/l and 5 mg/l respectively. Only a single violation occurred that year, with a daily maximum BOD₅ of 32 mg/l exceeding the limit of 22.5 mg/l during the month of May. This violation most likely resulted from seasonal polishing pond turnover, and not an issue with the activated sludge process. Tables 6-6 and 6-7, provide flow and analytical DMR data respectively.

Table 6-6
Battlefield Estates WWTP – 2011 Flows

Month	Avg Daily Flow (gpd)
Jan	74,232
Feb	102,168
Mar	114,561
Apr	139,990
May	78,787
Jun	60,300
Jul	43,139
Aug	30,784
Sept	41,067
Oct	48,219
Nov	106,417
Dec	89,406
Average	77,422
Maximum	139,990

Table 6-7
Battlefield Estates WWTP –Performance Data, 2011

2011	TSS						
	mo avg			day max		mo avg	day max
	inf	eff	% rem	inf	eff	eff	eff
	(mg/l)	(mg/l)		(mg/l)	(mg/l)	(ppd)	(ppd)
Jan	200	9	96	146	13	5.18	7.70
Feb	155	11	93	252	14	6.84	8.26
Mar	186	4	98	274	8	2.90	6.54
Apr	117	4	96	148	6	3.65	6.10
May	248	3	99	420	4	1.53	2.90
Jun	184	4	98	206	6	2.17	4.55
Jul	231	3	98	298	4	1.31	1.53
Aug	219	3	98	252	4	0.94	1.30
Sep	198	5	97	220	6	1.90	3.55
Oct	582	4	99	702	4	1.18	1.30
Nov	204	5	98	260	7	2.20	3.09
Dec	187	6	97	317	7	5.80	10.30
Avg	226	5	97	291	7	2.97	4.76
Max	582	11	99	702	14	6.84	10.30
Limit	report	30	85	report	45	28.54	42.81
Violations	---	0	0	---	0	0	0

2011	CBOD5						
	mo avg			day max		mo avg	day max
	inf	eff	% rem	inf	eff	eff	eff
	(mg/l)	(mg/l)		(mg/l)	(mg/l)	(ppd)	(ppd)
Jan	203	4	98	230	5	2.14	2.71
Feb	185	7	96	255	8	4.58	6.76
Mar	205	4	98	233	5	2.32	4.09
Apr	147	7	95	166	15	6.73	15.26
May	209	14	93	250	32	8.86	23.22
Jun	251	6	98	375	12	2.72	3.90
Jul	315	4	99	421	7	1.81	3.56
Aug	227	6	97	258	14	1.55	3.39
Sep	275	3	99	512	1	0.96	1.78
Oct	978	3	100	1603	5	0.99	2.04
Nov	183	3	98	272	4	1.54	1.83
Dec	537	8	99	2079	16	5.82	12.54
Avg	310	6	97	555	10	3	7
Max	978	14	100	2079	32	9	23
Limit	report	15	85	report	22.5	14.27	21.40
Violations	---	0	0	---	1	0	1

2011	NH3-N				Total N-N		Total P-P	
	mo avg	max wk	mo avg	max wk	mo avg	max wk	mo avg	max wk
	eff	eff	eff	eff	eff	eff	eff	eff
	(mg/l)	(mg/l)	(ppd)	(ppd)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
Jan	1.3	2.2	0.87	1.55	27	51	2.033	2.100
Feb	0.4	0.7	0.24	0.38	32	65	1.920	2.140
Mar	1.5	1.9	0.88	1.36	22	34	1.358	1.700
Apr	2.3	3.0	1.96	2.75	15	26	1.563	1.700
May	0.8	1.4	0.49	1.04	11	24	2.045	2.420
Jun	1.0	1.5	0.46	0.79	<7.00	<7.00	3.650	4.200
Jul	0.7	1.3	0.30	0.60	9	11	2.690	4.100
Aug	1.4	1.7	0.38	0.45	13	21	3.210	3.910
Sep	1.9	2.3	0.73	1.38	9	12	1.750	2.280
Oct	0.9	1.4	0.29	0.43	9	12	1.070	1.880
Nov	0.6	0.9	0.27	0.40	28	34	1.420	1.660
Dec	2.3	4.7	1.55	2.61	10	14	1.060	2.030
Avg	1.3	1.9	0.70	1.15	17	28	1.981	2.510
Max	2.3	4.7	1.96	2.75	32	65	3.650	4.200
Limit	4.0	6.0	3.81	5.71	report	report	report	report
Violations	0	0	0	0	---	---	---	---

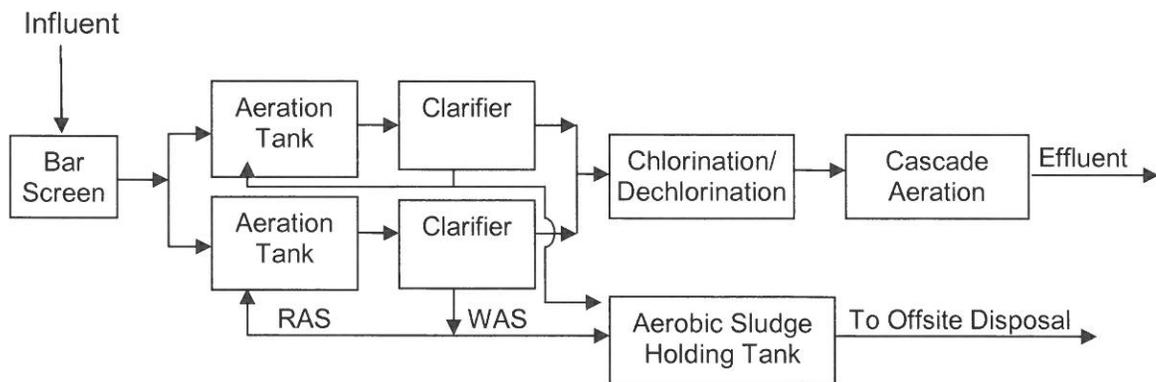
2011	pH - min	pH - max	D.O.	Total Res. Chlorine		E.Coli	
	mo	mo	mo min	mo avg	day max	30-d G.M	7-d G.M
	eff	eff	eff	eff	eff	eff	eff
	(S.U.)	(S.U.)	(mg/l)	(mg/l)	(mg/l)	(#/100 ml)	(#/100 ml)
Jan	7.2	7.6	11.0	0.000	0.000	1.0	1.0
Feb	7.5	8.7	9.6	0.000	0.000	1.0	1.0
Mar	7.1	7.9	8.1	0.000	0.000	1.0	1.0
Apr	7.3	8.2	7.4	0.000	0.000	1.0	1.0
May	7.3	8.2	7.4	0.000	0.000	1.0	1.0
Jun	7.0	7.8	7.0	0.000	0.000	<1.0	1.0
Jul	7.5	7.6	7.1	0.000	0.000	1.3	3.1
Aug	7.2	7.5	7.1	0.000	0.000	1.0	1.0
Sep	7.4	7.6	7.2	0.000	0.000	<1.0	<1.0
Oct	6.6	7.3	7.1	0.000	0.000	1.0	1.0
Nov	6.7	6.9	8.1	0.003	0.010	1.0	8.4
Dec	6.9	7.3	7.5	0.000	0.000	<1.0	<1.0
Avg	---	---	7.9	0.000	0.001	---	---
Min	7.0	---	7.0	---	---	---	---
Max	---	8.7	11.0	0.003	0.010	1.3	8.4
Limit	6.0	9.0	7.0	0.011	0.019	130	240
Violations	0	0	0	0	0	0	0

E. Executive Park

Type	Activated Sludge – Steel Package Plant (2 parallel trains)
Age	Unknown, most recently upgraded in 2010
Design Capacity	0.030 MGD
Process Units	Manual Bar Screen Extended Aeration Clarification Chlorination/Dechlorination Cascade Aeration Aerobic Digestion
Reliability Category	Grade C – WWTP has equipment in-place for plug-in connection of an auxiliary power source (portable electric generator).
Average Daily Flow	0.14 MGD
Peak Daily Flow	0.74 MGD
Maximum Monthly Flow	0.26 MGD
CBOD ₅	30 / 37.5 mg/l (30-day avg / max weekly avg)
TSS	30 / 45 mg/l (30-day avg / max weekly avg)
NH ₃ -N	10 / 15 mg/l (30-day avg / daily max)

The Executive Park Sewage Treatment plant was constructed in the early 1970's, with an upgrade completed in 2010. It consists of a two parallel trains of extended aeration steel package treatment plants. The package plants are in fair condition, exhibiting typical signs of wear for a steel plants of their age. A simplified process flow diagram of the treatment plant is shown in Figure 6-5 below.

Figure 6-5
Executive Park WWTP – Process Flow Diagram



The WWTP produces a high quality effluent. For example, in 2011 the average effluent BOD₅ and TSS were 7 mg/l and 5 mg/l respectively. Furthermore, no effluent violation occurred that year. Tables 6-8 and 6-9, provide flow and analytical DMR data respectively.

Table 6-8
Executive Park WWTP – 2011 Flows

Date	Flow	
	Mo. Avg (gpd)	Max Day (gpd)
Jan	10,258	15,000
Feb	13,607	57,000
Mar	16,548	58,000
Apr	25,700	74,000
May	13,581	57,000
Jun	10,900	22,000
Jul	12,000	29,000
Aug	11,323	21,000
Sept	13,733	21,000
Oct	12,742	22,000
Nov	13,533	29,000
Dec	11,774	22,000
Average	13,808	35,583
Maximum	25,700	74,000

Table 6-9
Executive Park WWTP –Performance Data, 2011

2011	TSS				CBOD5			
	mo avg	max wk	mo avg	max wk	mo avg	max wk	mo avg	max wk
	(mg/l)	(mg/l)	(ppd)	(ppd)	(mg/l)	(mg/l)	(ppd)	(ppd)
Jan	8	8	0.93	0.93	3	3	0.35	0.35
Feb	3	3	0.60	0.60	3	3	0.60	0.60
Mar	3	3	0.41	0.41	3	3	0.60	0.60
Apr	3	3	0.40	0.40	10	10	1.33	1.33
May	3	3	0.35	0.35	9	9	1.05	1.05
Jun	4	4	0.47	0.47	2	2	0.23	0.23
Jul	5	5	0.58	0.58	17	17	1.98	1.98
Aug	19	19	2.38	2.38	15	15	1.88	1.88
Sep	4	4	0.70	0.70	<2	<2	<3.50	<3.50
Oct	5	5	0.58	0.58	4	4	0.47	0.47
Nov	2	2	0.30	0.30	3	3	0.45	0.45
Dec	1	1	0.13	0.13	6	6	0.75	0.75
Avg	5	5	0.65	1	7	7	0.88	0.88
Max	19	19	2.38	2.38	17	17	1.98	1.98
Limit	30	45	7.5	11.25	25	37.5	6.26	9.39
Violations	0	0	0	0	0	0	0	0

2011	NH3-N			
	mo avg	day max	mo avg	day max
	(mg/l)	(mg/l)	(ppd)	(ppd)
Jan	<0.25	<0.25	<0.03	<0.03
Feb	2.10	2.10	0.41	0.41
Mar	1.40	1.40	0.28	0.28
Apr	<0.25	<0.25	<0.03	<0.03
May	<0.25	<0.25	<0.03	<0.03
Jun	0.63	0.63	0.07	0.07
Jul	0.93	0.93	0.11	0.11
Aug	2.15	2.15	0.27	0.27
Sep	<0.25	<0.25	<0.44	<0.44
Oct	0.30	0.30	0.04	0.04
Nov	<0.25	<0.25	<0.04	<0.04
Dec	0.35	0.35	0.04	0.04
Avg	1.44	1.44	0.23	0.23
Max	2.15	2.15	0.41	0.41
Limit	10.0	15.0	2.5	3.75
Violations	0	0	0	0

2011	pH - min	pH - max	D.O.	Total Res. Chlorine		E.Coli	
	mo	mo	mo min	mo avg	day max	30-d G.M	7-d G.M
	eff	eff	eff	eff	eff	eff	eff
	(S.U.)	(S.U.)	(mg/l)	(mg/l)	(mg/l)	(#/100 ml)	(#/100 ml)
Jan	7.1	7.1	10.0	0.000	0.000	1.0	1.0
Feb	7.1	7.1	9.4	0.000	0.000	1.0	1.0
Mar	7.1	7.1	10.0	0.000	0.000	1.0	1.0
Apr	7.1	7.1	8.6	0.000	0.000	1.0	1.0
May	7.1	7.1	8.1	0.000	0.000	1.0	1.0
Jun	7.0	7.0	8.1	0.000	0.000	1.0	1.0
Jul	7.1	7.1	7.6	0.000	0.000	<1.0	<1.0
Aug	7.1	7.1	7.2	0.000	0.000	8.5	8.5
Sep	7.1	7.1	7.1	0.000	0.000	<1.0	<1.0
Oct	7.4	7.4	8.2	0.000	0.000	1.0	1.0
Nov	7.5	7.5	8.1	0.000	0.000	4.1	4.1
Dec	7.7	7.7	10.0	0.000	0.000	21.1	21.1
Avg	---	---	8.5	0.000	0.000	---	---
Min	7.0	---	7.1	---	---	---	---
Max	---	7.7	10.0	0.000	0.000	21.1	21.1
Limit	6.0	9.0	7.0	0.011	0.019	130	240
Violations	0	0	0	0	0	0	0

3. Collection and Conveyance System

A. Waco Elementary School, Bybee Grocery, BP Food Market

These wastewater treatment plants all have direct gravity-fed lateral connections from their wastewater sources. Monthly average flows for the Waco Elementary School and for By-Bee Grocery are shown in Tables 6-1 and 6-3 respectively. Both the 30-day average and instantaneous maximum flows for the BP Food Market are consistently reported on the DMR's as 1,000 gpd.

B. Greens Crossing

The Greens Crossing collection system was constructed in 2003 and 2004 to provide sewer service to 307 homes on septic systems. It consists of about 36,000 feet of 8" PVC gravity sewer with 125 manholes, about 13,000 feet of 6" PVC pressure main, about 2,000 feet of 1½", 2" and 4" PVC pressure main, three duplex pump stations and eight residential grinder pump stations. Flow is discharged via a master meter to the Richmond Utilities' sewage collection system where it is treated at the Otter Creek WWTP.

All three pump stations are in good condition and capable of handling all flow conditions. Below is a summary of critical design criteria for each pump station.

Table 6-9
Greens Crossing Collection System Pump Stations

Pump Station	GPM	TDH	RPM	HP	Make and Model	Impeller Diameter
Greens Crossing	260	170'	3450	30	F.E. Myers 4RCX300M2-23	7.00"
Robinsville	122	29'	1150	3	F.E. Myers 4VHX30M6-23	8.50"
Estonia Estates	230	52'	1750	7 1/2	F.E. Myers 4VX75M4-23	8.00"

An Infiltration/Inflow (I/I) analysis was performed to numerically assess the flow patterns in the sewer system. Daily recorded flows and precipitation data (from the University of Kentucky Agricultural Weather website for the Berea weather station), were analyzed to calculate infiltration and inflow values. A detailed analysis is provided in Exhibit 6-1 at the end of this Section.

The I/I analysis involved the following analyses.

- Average Daily Flow
The average daily flow for 2011 is 45,500 gpd.
- Non-Rainfall Day

A non-rainfall day is defined as a day in which the precipitation is less than or equal to 0.1 inches. **The average non-rainfall flow is 42,700 gpd.**

- Base (Dry Weather) Flow Day

The base flow is the amount of wastewater excluding the contribution of any infiltration/inflow (I/I). Base flow days were identified as those in which the effects of I/I were considered negligible, i.e, there was no rainfall (less than or equal to 0.10 inch), and there did not appear to be any significant infiltration due to antecedent moisture conditions. **Based on the selected days, the average base flow is 34,600 gpd.**

- Peak Infiltration Day

Peak infiltration occurs during non-rainfall periods when the soils are saturated. These days typically occur during the late fall and early spring. **Based on the selected days, the average peak infiltration flow is 86,200 gpd.**

- Peak Infiltration and Inflow Day

Peak infiltration and Inflow occurs on rainy days when the soils are saturated. These days also typically occur during the late fall and early spring. **Based on the selected days, the average peak infiltration and inflow flow is 91,300 gpd.**

Using the values determined above, the following was calculated.

- **Average infiltration = average non-rainfall day – average base flow day = 8,100 gpd**
- **Average inflow = average daily flow – average non-rainfall day = 2,800 gpd**
- **Peak infiltration = average peak infiltration day – average base flow day = 51,600 gpd**
- **Peak rain induced inflow = average peak I/I day – peak infiltration day = 48,500 gpd**

And finally, based on 2010 Census figure of 2.45 persons per household for Madison County, and a service area of 307 residential customers:

- **Average daily flow per capita = 61 gpcd**
- **Peak rain induced inflow per capita = 158 gpcd.**

The U.S. EPA guidelines for determining excessive I/I are defined as follows:

- Infiltration – If the average daily flow to the WWTP is 120 gallons per capita per day (gpcd) or less, infiltration is considered non-excessive. If the average daily flow is greater than 120 gpcd, further investigation of flows is required. The average daily flow per household is 61 gpcd, and therefore the Greens Crossing collection system is not considered subject to excessive infiltration.

- Inflow – If the rainfall induced peak hydraulic flow rate at the WWTP exceeds 275 gpcd, the city shall perform a study of the sewer system to determine the quantity of excessive inflow and propose a rehabilitation program to eliminate excessive inflow. The peak inflow per household is 158 gpcd, and is therefore, not considered to be subject to excessive inflow.

The results of the above analysis are consistent with field observations made by NMCSD personnel. With the exception of broken laterals that are repaired as they are discovered (and suspected to be the primary source of inflow), the collection system appears to be in good condition.

C. Battlefield Estates

The Battlefield Estates collection system was built over several phases of residential construction. The oldest sections date to about 1999, with the most recent portions completed in 2008. It consists of about 46,700 feet of 8" PVC gravity sewer with 184 manholes, about 4700 feet of 6" PVC pressure main and one duplex pump station.

An Infiltration/Inflow (I/I) analysis was performed to numerically assess the flow patterns in the sewer system. Daily recorded flows and precipitation data (from the University of Kentucky Agricultural Weather website for the Berea weather station), were analyzed to calculate infiltration and inflow values. A detailed analysis is provided in Exhibit 6-2 at the end of this Section.

The I/I analysis involved the following analyses.

- Average Daily Flow
The average daily flow for 2011 is 77,000 gpd.

- Non-Rainfall Day

A non-rainfall day is defined as a day in which the precipitation is less than or equal to 0.1 inches. **The average non-rainfall flow is 74,000 gpd.**

- Base (Dry Weather) Flow Day

The base flow is the amount of wastewater excluding the contribution of any infiltration/inflow (I/I). Base flow days were identified as those in which the effects of I/I were considered negligible, i.e, there was no rainfall (less than or equal to 0.10 inch), and there did not appear to be any significant infiltration due to antecedent moisture conditions. **Based on the selected days, the average base flow is 45,000 gpd.**

- Peak Infiltration Day

Peak infiltration occurs during non-rainfall periods when the soils are saturated. These days typically occur during the late fall and early spring. **Based on the selected days, the average peak infiltration flow is 139,000 gpd.**

- Peak Infiltration and Inflow Day

Peak infiltration and Inflow occurs on rainy days when the soils are saturated. These days also typically occur during the late fall and early spring. **Based on the selected days, the average peak infiltration and inflow flow is 182,000 gpd.**

Using the values determined above, the following was calculated.

- **Average infiltration** = average non-rainfall day – average base flow day = **29,200 gpd**
- **Average inflow** = average daily flow – average non-rainfall day = **2,700 gpd**
- **Peak infiltration** = average peak infiltration day – average base flow day = **94,100 gpd**
- **Peak rain induced inflow** = average peak I/I day – peak infiltration day = **88,200 gpd**

And finally, based on 2010 Census figure of 2.45 persons per household for Madison County, and a service area of 472 residential customers:

- **Average daily flow per capita = 67 gpcd**
- **Peak rain induced inflow per capita = 187 gpcd.**

The U.S. EPA guidelines for determining excessive I/I are defined as follows:

- Infiltration – If the average daily flow to the WWTP is 120 gallons per capita per day (gpcd) or less, infiltration is considered non-excessive. If the average daily flow is greater than 120 gpcd, further investigation of flows is required. The average daily flow per household is 67 gpcd, and therefore the Greens Crossing collection system is not considered subject to excessive infiltration.
- Inflow – If the rainfall induced peak hydraulic flow rate at the WWTP exceeds 275 gpcd, the city shall perform a study of the sewer system to determine the quantity of excessive inflow and propose a rehabilitation program to eliminate excessive inflow. The peak inflow per household is 187 gpcd, and is therefore, not considered to be subject to excessive inflow.

The results of the above analysis are consistent with field observations made by NMCS D personnel. With the exception of broken cleanouts that are periodically discovered and corrected, the majority of the collection system appears to be in good condition.

D. Greens Crossing

The three pump stations in the Greens Crossing collection system are checked by a licensed operator five days per week. The master meter station, through which all flow from Greens Crossing passes on its way to Richmond Utilities' collection system, is also checked and recorded five days per week. This metering station also serves as a site for collecting a monthly composite sample. Odor control systems at the pump stations are checked and maintained during each visit. Once per week, floatable material is removed from each pump station. Overall, the system runs well.

E. Battlefield Estates

The Battlefield Estates WWTP and the one pump station in the collection system are visited by a licensed operator seven days per week. During each visit to the WWTP, process control analytical testing is performed and subsequent operational changes are made as needed. Routine operations are performed such as screen cleaning, clarifier scraping and general WWTP washdown. Biosolids are wasted from the activated sludge process five times per week. Overall, the system runs well and produces a high quality effluent, free of discharge limit violations.

F. Executive Park

The Executive Park WWTP and the one pump station in the collection system are visited by a licensed operator five days per week. During each visit to the WWTP, process control analytical testing is performed and subsequent operational changes are made as needed. Routine operations are performed such as screen cleaning, clarifier scraping and general WWTP washdown. Biosolids are wasted from the activated sludge process as needed based on the results of the analytical tests. Overall, the system runs well and produces a high quality effluent, free of discharge limit violations.

Exhibit 6-1

Northern Madison County Sanitation District
 Greens Crossing Collection System Flow History
 January 2011 through December 2011

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
01/01/11	50.3					0.41
01/02/11	50.3	50.3				0.00
01/03/11	50.3	50.3				0.00
01/04/11	30.0	30.0	30.0			0.00
01/05/11	35.3	35.3	35.3			0.00
01/06/11	35.3	35.3	35.3			0.00
01/07/11	38.2	38.2	38.2			0.03
01/08/11	34.5	34.5	34.5			0.08
01/09/11	34.5	34.5	34.5			0.00
01/10/11	34.5	34.5	34.5			0.00
01/11/11	35.1	35.1	35.1			0.05
01/12/11	31.4	31.4	31.4			0.01
01/13/11	34.9	34.9	34.9			0.00
01/14/11	30.6	30.6	30.6			0.00
01/15/11	38.1	38.1	38.1			0.00
01/16/11	38.1	38.1	38.1			0.00
01/17/11	38.1	38.1	38.1			0.05
01/18/11	30.9					0.29
01/19/11	35.9					0.12
01/20/11	46.4	46.4				0.08
01/21/11	32.5	32.5	32.5			0.02
01/22/11	40.9	40.9	40.9			0.00
01/23/11	40.9	40.9	40.9			0.00
01/24/11	40.9	40.9	40.9			0.02
01/25/11	29.6	29.6	29.6			0.00
01/26/11	46.1					0.50
01/27/11	69.6	69.6				0.00
01/28/11	45.3	45.3				0.06
01/29/11	48.8	48.8				0.00
01/30/11	48.8	48.8				0.00
01/31/11	48.8	48.8				0.01
02/01/11	39.5					0.34
02/02/11	69.0				69.0	0.47
02/03/11	48.5	48.5				0.00
02/04/11	49.4	49.4				0.00
02/05/11	51.3					0.19
02/06/11	51.3	51.3				0.00
02/07/11	51.3					0.10
02/08/11	33.7					0.17
02/09/11	48.1					0.40
02/10/11	40.3	40.3	40.3			0.02
02/11/11	25.4	25.4	25.4			0.00
02/12/11	41.0	41.0	41.0			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
02/13/11	41.0	41.0	41.0			0.00
02/14/11	41.0	41.0	41.0			0.00
02/15/11	36.8	36.8	36.8			0.00
02/16/11	36.1	36.1	36.1			0.00
02/17/11	38.3	38.3	38.3			0.00
02/18/11	34.1	34.1	34.1			0.01
02/19/11	31.5	31.5	31.5			0.00
02/20/11	31.5	31.5	31.5			0.03
02/21/11	31.5	31.5	31.5			0.00
02/22/11	39.1					0.29
02/23/11	35.6	35.6	35.6			0.00
02/24/11	38.9					1.17
02/25/11	110.5				110.5	1.40
02/26/11	110.5	110.5		110.5		0.00
02/27/11	110.5	110.5		110.5		0.05
02/28/11	110.5				110.5	1.80
03/01/11	190.7	190.7		190.7		0.00
03/02/11	73.8	73.8		73.8		0.00
03/03/11	61.3	61.3		61.3		0.00
03/04/11	52.6	52.6				0.00
03/05/11	84.2				84.2	0.68
03/06/11	84.2				84.2	0.45
03/07/11	84.2	84.2		84.2		0.00
03/08/11	61.3	61.3		61.3		0.00
03/09/11	60.2					0.78
03/10/11	153.3				153.3	0.88
03/11/11	76.2					0.11
03/12/11	76.2	76.2		76.2		0.00
03/13/11	76.2	76.2		76.2		0.00
03/14/11	76.2					0.31
03/15/11	57.5					0.21
03/16/11	61.6	61.6		61.6		0.00
03/17/11	65.3	65.3		65.3		0.00
03/18/11	46.3					0.17
03/19/11	93.7	93.7			93.7	0.06
03/20/11	14.0	14.0	14.0			0.00
03/21/11	14.0	14.0	14.0			0.00
03/22/11	14.0	14.0	14.0			0.00
03/23/11	29.9					0.16
03/24/11	31.1	31.1	31.1			0.04
03/25/11	30.1	30.1	30.1			0.00
03/26/11	3.5	3.5	3.5			0.09
03/27/11	3.5	3.5	3.5			0.06
03/28/11	3.5	3.5	3.5			0.00
03/29/11	30.5	30.5	30.5			0.00
03/30/11	31.6					0.11
03/31/11	27.1	27.1	27.1			0.00
04/01/11	30.9	30.9	30.9			0.00
04/02/11	33.0	33.0	33.0			0.07
04/03/11	33.0	33.0	33.0			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
04/04/11	33.0					1.34
04/05/11	122.2				122.2	0.49
04/06/11	87.8	87.8		87.8		0.00
04/07/11	64.2	64.2				0.00
04/08/11	49.4	49.4				0.00
04/09/11	144.6				144.6	0.35
04/10/11	34.3	34.3	34.3			0.00
04/11/11	34.3					0.24
04/12/11	34.3					1.57
04/13/11	112.3	112.3		112.3		0.00
04/14/11	71.7	71.7		71.7		0.00
04/15/11	52.3					0.54
04/16/11	102.5				102.5	0.84
04/17/11	102.5	102.5		102.5		0.02
04/18/11	102.5	102.5		102.5		0.00
04/19/11	58.3	58.3				0.00
04/20/11	53.4					0.73
04/21/11	68.1	68.1				0.00
04/22/11	84.6				84.6	0.33
04/23/11	84.6				84.6	0.57
04/24/11	84.6				84.6	0.53
04/25/11	84.6	84.6		84.6		0.00
04/26/11	70.7					0.49
04/27/11	73.7					1.01
04/28/11	110.1				110.1	0.84
04/29/11	101.4	101.4		101.4		0.07
04/30/11	65.9	65.9				0.00
05/01/11	65.9					0.50
05/02/11	65.9	65.9				0.05
05/03/11	49.6					1.24
05/04/11	156.4	156.4		156.4		0.00
05/05/11	74.9	74.9		74.9		0.00
05/06/11	67.2	67.2		67.2		0.00
05/07/11	52.2	52.2				0.06
05/08/11	52.2	52.2				0.08
05/09/11	52.2	52.2				0.00
05/10/11	45.6	45.6				0.00
05/11/11	39.5	39.5	39.5			0.00
05/12/11	43.6	43.6	43.6			0.00
05/13/11	29.2	29.2	29.2			0.01
05/14/11	40.6					0.52
05/15/11	40.6					0.34
05/16/11	40.6	40.6	40.6			0.05
05/17/11	40.9	40.9	40.9			0.07
05/18/11	42.0					0.15
05/19/11	39.5	39.5	39.5			0.00
05/20/11	38.9	38.9	38.9			0.00
05/21/11	39.4	39.4	39.4			0.00
05/22/11	39.4					0.43
05/23/11	39.4					0.87

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
05/24/11	50.1	50.1				0.08
05/25/11	47.9	47.9				0.00
05/26/11	41.9					0.45
05/27/11	44.9					0.19
05/28/11	38.3	38.3	38.3			0.00
05/29/11	38.3	38.3	38.3			0.00
05/30/11	38.3	38.3	38.3			0.00
05/31/11	43.6	43.6	43.6			0.00
06/01/11	37.8	37.8	37.8			0.00
06/02/11	39.0	39.0	39.0			0.00
06/03/11	23.7	23.7	23.7			0.00
06/04/11	34.9	34.9	34.9			0.00
06/05/11	34.9	34.9	34.9			0.01
06/06/11	34.9	34.9	34.9			0.00
06/07/11	34.9	34.9	34.9			0.00
06/08/11	29.7	29.7	29.7			0.00
06/09/11	28.8	28.8	28.8			0.00
06/10/11	34.7	34.7	34.7			0.09
06/11/11	32.7	32.7	32.7			0.00
06/12/11	32.7	32.7	32.7			0.00
06/13/11	32.7	32.7	32.7			0.00
06/14/11	34.6	34.6	34.6			0.00
06/15/11	33.6					0.37
06/16/11	33.4	33.4	33.4			0.00
06/17/11	32.9					0.17
06/18/11	46.3					0.57
06/19/11	46.3					0.62
06/20/11	46.3					2.01
06/21/11	79.6	79.6		79.6		0.00
06/22/11	43.6	43.6				0.04
06/23/11	49.2					0.13
06/24/11	25.0	25.0	25.0			0.00
06/25/11	39.2	39.2	39.2			0.00
06/26/11	39.2					0.21
06/27/11	39.2	39.2	39.2			0.08
06/28/11	23.8	23.8	23.8			0.00
06/29/11	33.9	33.9	33.9			0.00
06/30/11	35.8	35.8	35.8			0.00
07/01/11	31.2	31.2	31.2			0.00
07/02/11	31.2	31.2	31.2			0.00
07/03/11	31.2	31.2	31.2			0.00
07/04/11	31.2	31.2	31.2			0.01
07/05/11	41.9					1.51
07/06/11	25.4	25.4	25.4			0.05
07/07/11	38.1	38.1	38.1			0.00
07/08/11	34.6					0.42
07/09/11	34.6	34.6	34.6			0.00
07/10/11	34.6	34.6	34.6			0.00
07/11/11	34.6	34.6	34.6			0.00
07/12/11	28.6	28.6	28.6			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
07/13/11	30.7	30.7	30.7			0.03
07/14/11	38.8	38.8	38.8			0.00
07/15/11	34.6					0.76
07/16/11	35.1	35.1	35.1			0.00
07/17/11	35.1					0.28
07/18/11	35.1	35.1	35.1			0.00
07/19/11	30.9	30.9	30.9			0.00
07/20/11	31.3	31.3	31.3			0.00
07/21/11	15.2	15.2	15.2			0.00
07/22/11	56.2	56.2	56.2			0.00
07/23/11	34.0	34.0	34.0			0.00
07/24/11	34.0					0.41
07/25/11	34.0	34.0	34.0			0.07
07/26/11	30.7	30.7	30.7			0.00
07/27/11	34.2	34.2	34.2			0.00
07/28/11	39.6	39.6	39.6			0.00
07/29/11	30.0	30.0	30.0			0.01
07/30/11	32.7	32.7	32.7			0.09
07/31/11	32.7	32.7	32.7			0.00
08/01/11	32.7	32.7	32.7			0.00
08/02/11	33.3	33.3	33.3			0.00
08/03/11	28.1					0.48
08/04/11	35.4	35.4	35.4			0.00
08/05/11	33.9	33.9	33.9			0.00
08/06/11	30.4					0.13
08/07/11	30.4					0.40
08/08/11	30.4					0.16
08/09/11	35.9	35.9	35.9			0.01
08/10/11	31.8	31.8	31.8			0.00
08/11/11	35.6	35.6	35.6			0.00
08/12/11	26.7	26.7	26.7			0.00
08/13/11	33.0	33.0	33.0			0.00
08/14/11	33.0					0.27
08/15/11	33.0	33.0	33.0			0.00
08/16/11	28.4	28.4	28.4			0.00
08/17/11	36.7	36.7	36.7			0.00
08/18/11	30.8	30.8	30.8			0.01
08/19/11	30.8	30.8	30.8			0.00
08/20/11	33.2	33.2	33.2			0.00
08/21/11	33.2	33.2	33.2			0.01
08/22/11	33.2					0.19
08/23/11	32.2	32.2	32.2			0.00
08/24/11	33.6	33.6	33.6			0.00
08/25/11	32.9	32.9	32.9			0.00
08/26/11	26.5	26.5	26.5			0.00
08/27/11	34.9	34.9	34.9			0.00
08/28/11	34.9	34.9	34.9			0.00
08/29/11	34.9	34.9	34.9			0.00
08/30/11	32.2	32.2	32.2			0.00
08/31/11	37.1	37.1	37.1			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
09/01/11	25.7	25.7	25.7			0.00
09/02/11	29.7	29.7	29.7			0.06
09/03/11	29.7	29.7	29.7			0.00
09/04/11	29.7					0.37
09/05/11	29.7					1.52
09/06/11	44.2					0.71
09/07/11	34.3					0.36
09/08/11	38.5	38.5	38.5			0.02
09/09/11	34.5	34.5	34.5			0.00
09/10/11	28.8	28.8	28.8			0.00
09/11/11	28.8	28.8	28.8			0.00
09/12/11	28.8	28.8	28.8			0.01
09/13/11	32.3	32.3	32.3			0.00
09/14/11	32.7	32.7	32.7			0.00
09/15/11	35.2					0.24
09/16/11	29.5	29.5	29.5			0.00
09/17/11	33.5	33.5	33.5			0.00
09/18/11	33.5	33.5	33.5			0.00
09/19/11	33.5					0.46
09/20/11	33.3	33.3	33.3			0.07
09/21/11	28.8					1.22
09/22/11	39.6	39.6	39.6			0.00
09/23/11	70.4	70.4				0.05
09/24/11	19.1	19.1	19.1			0.00
09/25/11	19.1	19.1	19.1			0.00
09/26/11	19.1					0.47
09/27/11	34.9	34.9	34.9			0.00
09/28/11	28.3	28.3	28.3			0.00
09/29/11	30.8	30.8	30.8			0.00
09/30/11	32.9	32.9	32.9			0.00
10/01/11	32.1	32.1	32.1			0.00
10/02/11	32.1	32.1	32.1			0.00
10/03/11	32.1	32.1	32.1			0.00
10/04/11	32.2	32.2	32.2			0.00
10/05/11	26.7	26.7	26.7			0.00
10/06/11	31.0	31.0	31.0			0.00
10/07/11	27.5	27.5	27.5			0.00
10/08/11	34.6	34.6	34.6			0.00
10/09/11	34.6	34.6	34.6			0.00
10/10/11	34.6	34.6	34.6			0.00
10/11/11	29.8	29.8	29.8			0.01
10/12/11	37.0					0.20
10/13/11	38.4					0.78
10/14/11	25.4					0.13
10/15/11	34.3	34.3	34.3			0.00
10/16/11	34.3	34.3	34.3			0.00
10/17/11	34.3	34.3	34.3			0.00
10/18/11	32.5	32.5	32.5			0.00
10/19/11	49.6					1.78
10/20/11	50.6					0.18

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
10/21/11	44.3	44.3	44.3			0.00
10/22/11	36.7	36.7	36.7			0.00
10/23/11	36.7	36.7	36.7			0.00
10/24/11	36.7	36.7	36.7			0.01
10/25/11	37.6	37.6	37.6			0.00
10/26/11	32.8					0.47
10/27/11	37.5					0.42
10/28/11	46.3					0.29
10/29/11	42.7	42.7	42.7			0.03
10/30/11	42.7	42.7	42.7			0.00
10/31/11	42.7	42.7	42.7			0.00
11/01/11	38.3	38.3	38.3			0.00
11/02/11	34.7	34.7	34.7			0.00
11/03/11	38.6					0.54
11/04/11	37.8					0.12
11/05/11	48.2	48.2	48.2			0.00
11/06/11	48.2	48.2	48.2			0.00
11/07/11	48.2	48.2	48.2			0.00
11/08/11	27.8	27.8	27.8			0.00
11/09/11	37.5	37.5	37.5			0.00
11/10/11	56.1	56.1	56.1			0.00
11/11/11	13.0	13.0	13.0			0.00
11/12/11	36.4	36.4	36.4			0.00
11/13/11	36.4	36.4	36.4			0.00
11/14/11	36.4	36.4	36.4			0.00
11/15/11	35.5		35.5			1.22
11/16/11	101.2				101.2	1.43
11/17/11	131.9	131.9		131.9		0.00
11/18/11	74.9	74.9		74.9		0.00
11/19/11	59.8	59.8		59.8		0.00
11/20/11	59.8			59.8		0.46
11/21/11	59.8			59.8		0.36
11/22/11	107.7				107.7	0.61
11/23/11	79.4	79.4		79.4		0.04
11/24/11	76.8	76.8		76.8		0.00
11/25/11	60.6	60.6		60.6		0.00
11/26/11	72.6	72.6		72.6		0.00
11/27/11	72.6				72.6	0.57
11/28/11	72.6				72.6	1.43
11/29/11	108.6				108.6	0.58
11/30/11	32.6	32.6	32.6			0.04
12/01/11	7.7	7.7	7.7			0.00
12/02/11	16.5	16.5	16.5			0.00
12/03/11	46.4	46.4	46.4			0.00
12/04/11	46.4	46.4	46.4			0.01
12/05/11	46.4					0.39
12/06/11	71.0					0.50
12/07/11	48.2					0.22
12/08/11	45.1	45.1	45.1			0.00
12/09/11	49.6	49.6	49.6			0.00

Date	Flow (1,000 gpd)					
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	Rainfall (inches)
12/10/11	52.0	52.0	52.0			0.00
12/11/11	52.0	52.0	52.0			0.00
12/12/11	52.0	52.0	52.0			0.00
12/13/11	39.5	39.5	39.5			0.00
12/14/11	45.7	45.7	45.7			0.01
12/15/11	39.9	39.9	39.9			0.04
12/16/11	41.2	41.2	41.2			0.02
12/17/11	40.7	40.7	40.7			0.00
12/18/11	40.7	40.7	40.7			0.00
12/19/11	40.7	40.7	40.7			0.00
12/20/11	37.7	37.7	37.7			0.01
12/21/11	35.3	35.3	35.3			0.02
12/22/11	38.3					0.57
12/23/11	48.6	48.6	48.6			0.06
12/24/11	49.5	49.5	49.5			0.00
12/25/11	49.5	49.5	49.5			0.00
12/26/11	49.5	49.5	49.5			0.00
12/27/11	57.6					0.88
12/28/11	90.5	90.5		90.5		0.00
12/29/11	65.5	65.5	65.5	65.5		0.00
12/30/11	57.3	57.3	57.3			0.00
12/31/11	57.3	57.3	57.3			0.00
Average	45.5	42.7	34.6	86.2	100.1	
Maximum	190.7					

Avg Infiltration: avg non-rainfall day - avg base flow day = 8.1 gpd
 Avg Inflow: avg daily flow - avg non-rainfall day = 2.8 gpd
 Peak Infiltration: avg peak infiltration day - avg base flow day = 51.6 gpd
 Peak Inflow: avg peak I/I day - peak infiltration = 48.5 gpd

Notes:

1. Flow data provided by the University of Kentucky Agricultural Weather Center, World Wide Web URL: <http://www.wagwx.ca.uky.edu/climdata.html>. Berea weather station.
2. Non-Rainfall Day occurs if the total rainfall for the day is less than 0.1 inches.
3. Base Flow Day represents days during a dry spell when the groundwater table is low, and therefore, minimal infiltration occurs.
4. Peak Infiltration Day represents non-rainfall days during wet season conditions such that flow levels are high (indicative of high rate of infiltration.).
5. Peak I/I Day represents high-rainfall days with excessively high flow rates.

Exhibit 6-2

Northern Madison County Sanitation District
 Battlefield Wastewater Treatment Plant Flow History
 January 2011 through December 2011

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
01/01/11	91.3					0.41
01/02/11	94.5	94.5				0.00
01/03/11	66.5	66.5				0.00
01/04/11	77.7	77.7				0.00
01/05/11	84.6	84.6				0.00
01/06/11	69.9	69.9				0.00
01/07/11	63.8	63.8				0.03
01/08/11	69.3	69.3				0.08
01/09/11	105.1	105.1		105.1		0.00
01/10/11	45	45	45			0.00
01/11/11	72.4	72.4				0.05
01/12/11	77.2	77.2				0.01
01/13/11	75.2	75.2				0.00
01/14/11	68.8	68.8				0.00
01/15/11	53.6	53.6	53.6			0.00
01/16/11	89.3	89.3	89.3			0.00
01/17/11	55.1	55.1	55.1			0.05
01/18/11	68.8					0.29
01/19/11	70.3					0.12
01/20/11	68.6	68.6				0.08
01/21/11	61.3	61.3	61.3			0.02
01/22/11	71.7	71.7	71.7			0.00
01/23/11	66.4	66.4	66.4			0.00
01/24/11	60.4	60.4	60.4			0.02
01/25/11	67.4	67.4	67.4			0.00
01/26/11	67.7					0.50
01/27/11	99	99		99		0.00
01/28/11	89.6	89.6				0.06
01/29/11	95.9	95.9		95.9		0.00
01/30/11	82.8	82.8		82.8		0.00
01/31/11	72	72				0.01
02/01/11	72					0.34
02/02/11	103.2					0.47
02/03/11	153.1	153.1		153.1		0.00
02/04/11	113.4	113.4		113.4		0.00
02/05/11	85.7					0.19
02/06/11	97.7	97.7				0.00
02/07/11	67.9					0.10
02/08/11	76.4					0.17
02/09/11	90.8					0.40
02/10/11	88.7	88.7				0.02
02/11/11	83.3	83.3				0.00
02/12/11	70.2	70.2				0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
02/13/11	73.4	73.4				0.00
02/14/11	58.2	58.2	58.2			0.00
02/15/11	58.7	58.7	58.7			0.00
02/16/11	56.4	56.4	56.4			0.00
02/17/11	61.3	61.3	61.3			0.00
02/18/11	60.8	60.8	60.8			0.01
02/19/11	58.9	58.9	58.9			0.00
02/20/11	57.5	57.5	57.5			0.03
02/21/11	60.8	60.8	60.8			0.00
02/22/11	68					0.29
02/23/11	68.6	68.6	68.6			0.00
02/24/11	60.1					1.17
02/25/11	297.1				297.1	1.40
02/26/11	395.7	395.7		395.7		0.00
02/27/11	178.4	178.4			178.4	0.05
02/28/11	144.4				144.4	1.80
03/01/11	348	348		348		0.00
03/02/11	277.4	277.4		277.4		0.00
03/03/11	137.2	137.2		137.2		0.00
03/04/11	98.3	98.3		98.3		0.00
03/05/11	93.5					0.68
03/06/11	151.5			151.5		0.45
03/07/11	161.3	161.3		161.3		0.00
03/08/11	137	137		137		0.00
03/09/11	118.3					0.78
03/10/11	190.6				190.6	0.88
03/11/11	261.6				261.6	0.11
03/12/11	203.5	203.5		203.5		0.00
03/13/11	157.3	157.3		157.3		0.00
03/14/11	81.9					0.31
03/15/11	105.9					0.21
03/16/11	90.5	90.5				0.00
03/17/11	98.1	98.1				0.00
03/18/11	68.4					0.17
03/19/11	80	80				0.06
03/20/11	61.9	61.9	61.9			0.00
03/21/11	52.3	52.3	52.3			0.00
03/22/11	60.9	60.9	60.9			0.00
03/23/11	48.8					0.16
03/24/11	58.4	58.4	58.4			0.04
03/25/11	60.1	60.1	60.1			0.00
03/26/11	66.1	66.1	66.1			0.09
03/27/11	56.6	56.6	56.6			0.06
03/28/11	54.3	54.3	54.3			0.00
03/29/11	55.7	55.7	55.7			0.00
03/30/11	52.5					0.11
03/31/11	63.5	63.5	63.5			0.00
04/01/11	57.1	57.1	57.1			0.00
04/02/11	64.8	64.8	64.8			0.07
04/03/11	54	54	54			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
04/04/11	43.1					1.34
04/05/11	184.8				184.8	0.49
04/06/11	238.9	238.9		238.9		0.00
04/07/11	131	131		131		0.00
04/08/11	84.3	84.3				0.00
04/09/11	75.5					0.35
04/10/11	101.5	101.5				0.00
04/11/11	70.2					0.24
04/12/11	124.4					1.57
04/13/11	297.6	297.6		297.6		0.00
04/14/11	206.3	206.3		206.3		0.00
04/15/11	122					0.54
04/16/11	274.7				274.7	0.84
04/17/11	160.2	160.2			160.2	0.02
04/18/11	139.9	139.9		139.9		0.00
04/19/11	108	108				0.00
04/20/11	87.4					0.73
04/21/11	119.4	119.4				0.00
04/22/11	80.9					0.33
04/23/11	100.6					0.57
04/24/11	134.6					0.53
04/25/11	153.9	153.9		153.9		0.00
04/26/11	132.2					0.49
04/27/11	109.8					1.01
04/28/11	250.4					0.84
04/29/11	301.2	301.2			301.2	0.07
04/30/11	191	191		191		0.00
05/01/11	89.3					0.50
05/02/11	100	100				0.05
05/03/11	86					1.24
05/04/11	253.3	253.3		253.3		0.00
05/05/11	198.3	198.3		198.3		0.00
05/06/11	118.6	118.6		118.6		0.00
05/07/11	90.6	90.6				0.06
05/08/11	76.8	76.8				0.08
05/09/11	55.1	55.1	55.1			0.00
05/10/11	59.7	59.7	59.7			0.00
05/11/11	52.6	52.6	52.6			0.00
05/12/11	57.7	57.7	57.7			0.00
05/13/11	37.8	37.8	37.8			0.01
05/14/11	48.9					0.52
05/15/11	75.5					0.34
05/16/11	46	46	46			0.05
05/17/11	59.3	59.3	59.3			0.07
05/18/11	52.9					0.15
05/19/11	60.7	60.7	60.7			0.00
05/20/11	58.2	58.2	58.2			0.00
05/21/11	74.3	74.3	74.3			0.00
05/22/11	55.8					0.43
05/23/11	40.7					0.87

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
05/24/11	131.6	131.6		131.6		0.08
05/25/11	88.1	88.1				0.00
05/26/11	77.6					0.45
05/27/11	78.5					0.19
05/28/11	62.3	62.3	62.3			0.00
05/29/11	65.2	65.2	65.2			0.00
05/30/11	52.7	52.7	52.7			0.00
05/31/11	38.3	38.3	38.3			0.00
06/01/11	55.7	55.7	55.7			0.00
06/02/11	55.3	55.3	55.3			0.00
06/03/11	36.9	36.9	36.9			0.00
06/04/11	50	50	50			0.00
06/05/11	47.5	47.5	47.5			0.01
06/06/11	37.9	37.9	37.9			0.00
06/07/11	43.1	43.1	43.1			0.00
06/08/11	33.7	33.7	33.7			0.00
06/09/11	45	45	45			0.00
06/10/11	37.3	37.3	37.3			0.09
06/11/11	105.3	105.3				0.00
06/12/11	60.3	60.3	60.3			0.00
06/13/11	44.9	44.9	44.9			0.00
06/14/11	79.9	79.9	79.9			0.00
06/15/11	73.1					0.37
06/16/11	66.3	66.3	66.3			0.00
06/17/11	50.5					0.17
06/18/11	62					0.57
06/19/11	85.1					0.62
06/20/11	65.6					2.01
06/21/11	142.2	142.2		142.2		0.00
06/22/11	91.1	91.1				0.04
06/23/11	93.9					0.13
06/24/11	43.6	43.6	43.6			0.00
06/25/11	64.3	64.3	64.3			0.00
06/26/11	42.3					0.21
06/27/11	55.3	55.3	55.3			0.08
06/28/11	51.7	51.7	51.7			0.00
06/29/11	54.4	54.4	54.4			0.00
06/30/11	34.8	34.8	34.8			0.00
07/01/11	46.9	46.9	46.9			0.00
07/02/11	57.7	57.7	57.7			0.00
07/03/11	38.2	38.2	38.2			0.00
07/04/11	37.7	37.7	37.7			0.01
07/05/11	40.2					1.51
07/06/11	55.6	55.6	55.6			0.05
07/07/11	52.6	52.6	52.6			0.00
07/08/11	53.7					0.42
07/09/11	54.6	54.6	54.6			0.00
07/10/11	38.1	38.1	38.1			0.00
07/11/11	50.4	50.4	50.4			0.00
07/12/11	36.4	36.4	36.4			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
07/13/11	91.8	91.8				0.03
07/14/11	37	37	37			0.00
07/15/11	35.9					0.76
07/16/11	66.3	66.3	66.3			0.00
07/17/11	32.9					0.28
07/18/11	51.6	51.6	51.6			0.00
07/19/11	41.3	41.3	41.3			0.00
07/20/11	36.7	36.7	36.7			0.00
07/21/11	38.3	38.3	38.3			0.00
07/22/11	42.3	42.3	42.3			0.00
07/23/11	41.1	41.1	41.1			0.00
07/24/11	33.8					0.41
07/25/11	40.3	40.3	40.3			0.07
07/26/11	33.8	33.8	33.8			0.00
07/27/11	36.2	36.2	36.2			0.00
07/28/11	25.8	25.8	25.8			0.00
07/29/11	34.2	34.2	34.2			0.01
07/30/11	23.5	23.5	23.5			0.09
07/31/11	32.4	32.4	32.4			0.00
08/01/11	29.9	29.9	29.9			0.00
08/02/11	26.6	26.6	26.6			0.00
08/03/11	28.6					0.48
08/04/11	57	57	57			0.00
08/05/11	38.4	38.4	38.4			0.00
08/06/11	35.9					0.13
08/07/11	34.2					0.40
08/08/11	39.9					0.16
08/09/11	42.1	42.1	42.1			0.01
08/10/11	39	39	39			0.00
08/11/11	29	29	29			0.00
08/12/11	23.7	23.7	23.7			0.00
08/13/11	36	36	36			0.00
08/14/11	30					0.27
08/15/11	40.7	40.7	40.7			0.00
08/16/11	29.2	29.2	29.2			0.00
08/17/11	38	38	38			0.00
08/18/11	27.5	27.5	27.5			0.01
08/19/11	27.5	27.5	27.5			0.00
08/20/11	35.8	35.8	35.8			0.00
08/21/11	28.7	28.7	28.7			0.01
08/22/11	29.8					0.19
08/23/11	23.8	23.8	23.8			0.00
08/24/11	26.3	26.3	26.3			0.00
08/25/11	24.4	24.4	24.4			0.00
08/26/11	10.9	10.9	10.9			0.00
08/27/11	19.4	19.4	19.4			0.00
08/28/11	18.1	18.1	18.1			0.00
08/29/11	29.4	29.4	29.4			0.00
08/30/11	22.5	22.5	22.5			0.00
08/31/11	32	32	32			0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
09/01/11	27.5	27.5	27.5			0.00
09/02/11	24.1	24.1	24.1			0.06
09/03/11	29.4	29.4	29.4			0.00
09/04/11	29.9					0.37
09/05/11	34					1.52
09/06/11	83					0.71
09/07/11	71					0.36
09/08/11	54.9	54.9	54.9			0.02
09/09/11	55.7	55.7	55.7			0.00
09/10/11	39.8	39.8	39.8			0.00
09/11/11	36.8	36.8	36.8			0.00
09/12/11	31.1	31.1	31.1			0.01
09/13/11	36.7	36.7	36.7			0.00
09/14/11	29.4	29.4	29.4			0.00
09/15/11	32.8					0.24
09/16/11	31.8	31.8	31.8			0.00
09/17/11	41.9	41.9	41.9			0.00
09/18/11	23.2	23.2	23.2			0.00
09/19/11	32.6					0.46
09/20/11	53.8	53.8	53.8			0.07
09/21/11	41.4					1.22
09/22/11	73	73				0.00
09/23/11	50.4	50.4	50.4			0.05
09/24/11	44.9	44.9	44.9			0.00
09/25/11	41.6	41.6	41.6			0.00
09/26/11	30.6					0.47
09/27/11	52.4	52.4	52.4			0.00
09/28/11	31.9	31.9	31.9			0.00
09/29/11	37.5	37.5	37.5			0.00
09/30/11	28.9	28.9	28.9			0.00
10/01/11	62.8	62.8	62.8			0.00
10/02/11	33.2	33.2	33.2			0.00
10/03/11	33.4	33.4	33.4			0.00
10/04/11	28.4	28.4	28.4			0.00
10/05/11	35.9	35.9	35.9			0.00
10/06/11	27.1	27.1	27.1			0.00
10/07/11	31.5	31.5	31.5			0.00
10/08/11	31.3	31.3	31.3			0.00
10/09/11	33.8	33.8	33.8			0.00
10/10/11	38.5	38.5	38.5			0.00
10/11/11	25.8	25.8	25.8			0.01
10/12/11	39.3					0.20
10/13/11	37.4					0.78
10/14/11	55.6			55.6		0.13
10/15/11	36.4	36.4	36.4			0.00
10/16/11	37.6	37.6	37.6			0.00
10/17/11	38.88	38.88	38.88			0.00
10/18/11	28.3	28.3	28.3			0.00
10/19/11	48.6					1.78
10/20/11	123.5				123.5	0.18

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
10/21/11	93.5	93.5	93.5			0.00
10/22/11	54.5	54.5	54.5			0.00
10/23/11	49.3	49.3	49.3			0.00
10/24/11	49.7	49.7	49.7			0.01
10/25/11	37.4	37.4	37.4			0.00
10/26/11	39					0.47
10/27/11	55.5					0.42
10/28/11	73.6					0.29
10/29/11	84.6	84.6		84.6		0.03
10/30/11	61.9	61.9		61.9		0.00
10/31/11	68.5	68.5		68.5		0.00
11/01/11	44.7	44.7				0.00
11/02/11	52.2	52.2				0.00
11/03/11	48.3					0.54
11/04/11	55.6					0.12
11/05/11	31.3	31.3	31.3			0.00
11/06/11	33	33	33			0.00
11/07/11	123.2	123.2				0.00
11/08/11	42.5	42.5	42.5			0.00
11/09/11	53	53	53			0.00
11/10/11	41.6	41.6	41.6			0.00
11/11/11	48.6	48.6	48.6			0.00
11/12/11	42.3	42.3	42.3			0.00
11/13/11	46	46	46			0.00
11/14/11	50.8	50.8	50.8			0.00
11/15/11	53.4					1.22
11/16/11	108.3				108.3	1.43
11/17/11	294.8	294.8		294.8		0.00
11/18/11	214.1	214.1		214.1		0.00
11/19/11	144.5	144.5		144.5		0.00
11/20/11	64.7					0.46
11/21/11	118.6				118.6	0.36
11/22/11	73.7					0.61
11/23/11	172.5	172.5		172.5		0.04
11/24/11	155.5	155.5		155.5		0.00
11/25/11	81.2	81.2		81.2		0.00
11/26/11	107.2	107.2		107.2		0.00
11/27/11	107.7				107.7	0.57
11/28/11	132.3				132.3	1.43
11/29/11	288.4				288.4	0.58
11/30/11	362.5	362.5		362.5		0.04
12/01/11	221.4	221.4		221.4		0.00
12/02/11	151	151		151		0.00
12/03/11	107.1	107.1		107.1		0.00
12/04/11	90.8	90.8		90.8		0.01
12/05/11	86.5					0.39
12/06/11	94.3				94.3	0.50
12/07/11	131.8				131.8	0.22
12/08/11	137.2	137.2		137.2		0.00
12/09/11	120.4	120.4		120.4		0.00

Date	Flow (1,000 gpd)					Rainfall (inches)
	Flow	Non-Rainfall Day	Base Flow Day	Peak Infiltration Day	Peak I & I Day	
12/10/11	87.9	87.9		87.9		0.00
12/11/11	86.7	86.7		86.7		0.00
12/12/11	90.1	90.1		90.1		0.00
12/13/11	60.3	60.3		60.3		0.00
12/14/11	65.6	65.6		65.6		0.01
12/15/11	59.8	59.8		59.8		0.04
12/16/11	61.3	61.3		61.3		0.02
12/17/11	86.2	86.2		86.2		0.00
12/18/11	81.6	81.6		81.6		0.00
12/19/11	63.7	63.7		63.7		0.00
12/20/11	59.4	59.4		59.4		0.01
12/21/11	42	42	42			0.02
12/22/11	61.9					0.57
12/23/11	72.4	72.4		72.4		0.06
12/24/11	80.5	80.5		80.5		0.00
12/25/11	76.2	76.2		76.2		0.00
12/26/11	59.4	59.4		59.4		0.00
12/27/11	76.4					0.88
12/28/11	93.8	93.8		93.8		0.00
12/29/11	106.1	106.1		106.1		0.00
12/30/11	71.6	71.6		71.6		0.00
12/31/11	88.2	88.2				0.00
Average	77	74	45	139	182	
Maximum	396					

Avg Infiltration: avg non-rainfall day - avg base flow day = 29.2 gpd
 Avg Inflow: avg daily flow - avg non-rainfall day = 2.7 gpd
 Peak Infiltration: avg peak infiltration day - avg base flow day = 94.1 gpd
 Peak Inflow: avg peak I/I day - peak infiltration = 88.2 gpd

Notes:

1. Flow data provided by the University of Kentucky Agricultural Weather Center, World Wide Web URL: <http://www.agwx.ca.uky.edu/climdata.html>. Berea weather station.
2. Non-Rainfall Day occurs if the total rainfall for the day is less than 0.1 inches.
3. Base Flow Day represents days during a dry spell when the groundwater table is low, and therefore, minimal infiltration occurs.
4. Peak Infiltration Day represents non-rainfall days during wet season conditions such that flow levels are high (indicative of high rate of infiltration.).
5. Peak I/I Day represents high-rainfall days with excessively high flow rates.

Section 7 Forecasts of Flows and Waste Loads in the Planning Area

1. Current and Projected Flows

Flow per household was calculated for the three collection systems discussed in Chapter 6. Both long-term and maximum monthly average flows are shown in Table 7-1. Totalling the data for the three collection systems the average gpd per household is 161 gpd. The maximum monthly average flow per household is 281 gpd.

A second flow basis method was taken using the 2010 Census figure of 2.45 persons per household applied to the 10-States design standard of 100 gallons per day per capita (gpcd). The resulting average daily flow per household is 245 gpd.

From the values determined above, the more conservative maximum monthly average flow per household of 281 gpd was used as the basis for flow planning.

Table 7-1
Flow Basis

Flow Basis Using Historical Data

Description	No. Homes	Flow		Flow/Home	
		Avg (gpd)	Max Mo. Avg (gpd)	Avg (gpd/HH)	Max Mo. Avg (gpd/HH)
Greens Crossing Neighborhood	307	45,500	72,800	148	237
Battlefield STP	472	77,000	140,000	163	297
Executive Park STP	70	13,800	25,700	197	367
Total	849	136,300	238,500	161	281

Flow Basis Using 10-States Stds Applied to 2010 Census Data

2010 Census, persons per household in Madison Co.	2.45
Average daily flow per person, per 10-States Stds.	100 gpcd
Estimated flow per household	245 gpd/HH

Both project areas lie largely in property zoned for single family residential, rural community and agricultural zoning. Although property could conceivably be rezoned in the future resulting in significant commercial and/or industrial uses, there are no known plans for such. Given the predominantly rural nature of the region, for purposes of this analysis, the flows from the existing commercial contributors are converted to an

equivalent number of homes. These equivalent figures are added into the total number of current homes. Future projections are then based on a 1.5% annual population increase, (as discussed in Section 4), applied to that total. Thus it is assumed that the relative number of commercial to residential flow sources will remain the same in the future, and therefore, this analysis assumes a 1.5% annual increase in commercial growth.

House counts were performed in the Phase 1 and Phase 2 areas that are identified for future sewage collection. These homes are located in existing subdivisions (e.g. Moberly) or are along the main route of a proposed sewer (e.g. Waco). Table 7-2 itemizes and totals the number of homes for each source and multiplies them by 281 gpd/household. For each area, the totals are broken down into three time frames: Phase 1, 0–5 years, 10-year projection and 20-year projection; and Phase 2, 6 -10 years; 10-year projection; and 20-year projection. The primary focus of this Plan Update is the 0-5 year and 6-10 year periods, and the related construction projects. Future growth projections beyond these time frames are considered general indications of what might be expected. Thus, these figures impact the conceptual design of the initial phases and their future expandability.

Table 7-2
Planning Area Flow Projections

Phase 1 Area		
Description	No. Homes	Flow (gpd)
Waco Elementary (equivalent homes)	28	7,878
Bybee Grocery (equivalent homes)	2	696
BP Food Mart (equivalent homes)	4	1,000
Greens Crossing Neighborhood	307	86,267
Moberly	151	42,431
Waco	88	24,728
Southeast of Moberly	72	20,232
Total, Phase 1 Area (0–5 yrs)	652	183,232
10-Year Projection	750	210,750
20-Year Projection	848	238,288

Phase 2 Area

Description	No. Homes	Flow (gpd)
Battlefield STP	472	132,632
Executive Park STP	70	19,670
Twin Lakes Subdivision	51	14,331
Kingston	198	55,638
Total, Phase 2 Area (6–10 yrs)	791	222,271
10-Year Projection	910	255,710
20-Year Projection	1,028	288,868

Flow per Household	281
KY State Data center projected annual growth 2010 thru 2050	1.5%

Note: These projections are considered conservative, as they are based on the historical maximum monthly average flow per household (See Table 7-1).

2. Current and Proposed Wastewater Treatment Capacities

A. Phase 1 Area

The Phase 1 Area will consist of the following:

- Construct a new 0.20 MGD wastewater treatment plant (referred herein as the Muddy Creek WWTP), with future expansion up to 0.25 MGD as needed.
- Reroute flow from the existing Greens Crossing Pump station to the Muddy Creek WWTP. Construct gravity sewers and four pump stations to collect flow from the surround area.

B. Phase 2 Area

- Expand the existing Battlefield WWTP from 0.114 MGD to 0.228 MGD, with future expansion up to 0.29 MGD as needed.
- Decommission the Executive Park WWTP and reroute the flow to the Battlefield WWTP via a new pump station. Construct gravity sewers and four pump stations to collect flow from Kingston and the nearby community.

Table 7-3 provides a breakdown of populations served by each proposed pump station and their projected flows.

Table 7-3
Pump Station Flow Projections

Phase 1 Area

Description	No. Homes	Avg Daily Flow (gpd)	Peak Instantaneous Flow	
			(gpd)	(gpm)
Greens Crossing PS (reroute)	307	86,267	345,068	240
Moberly PS #1	458	128,698	514,792	357
Moberly PS #2	45	12,645	50,580	35
Waco PS	68	19,108	76,432	53
Caroline Drive PS	58	16,298	65,192	45

Phase 2 Area

Description	No. Homes	Avg Daily Flow (gpd)	Peak Instantaneous Flow	
			(gpd)	(gpm)
Kingston PS # 1	198	55,638	222,552	155
Kingston PS # 2	72	20,232	80,928	56
Kingston PS # 3	42	11,802	47,208	33
Kingston PS # 4	30	8,430	33,720	23
Executive Park PS	70	19,670	78,680	55

3. Waste Load Allocation

A copy of a Waste Load Allocation Letter, issued by the Division of Water on November 17, 2011 is provided in at the end of this Section as Exhibit 7-1. This applies to the proposed Muddy Creek WWTP. With respect to expansion of the existing Battlefield WWTP, current discharge limits are assumed. Since that phase is projected for the 6-10 year period, a wasteload allocation request seemed premature.

Waste load allocation limits for the proposed Muddy Creek WWTP are shown in Table 7-4. These limits can be met through a secondary treatment process.

Table 7-4
Waste Load Allocation Limits for the Proposed Muddy Creek WWTP

Parameter	5/1 - 10/31 (mg/l)	11/1 - 4/30 (mg/l)
CBOD5	20	20
Total Suspended Solids	30	30
Ammonia Nitrogen	4	10
Dissolved Oxygen	7	7
Total Phosphorus	monitor	monitor
Total Nitrogen	monitor	monitor
Total Residual Chlorine	0.011	0.011

Exhibit 7-1

Kentucky Division of Water

Waste Load Allocation

November 17, 2011

(4 pages)



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 17, 2011

Mark H. Feibes, PE
Nesbitt Engineering, Incorporated
227 North Upper Street
Lexington, Kentucky 40507-1016

Re: Waste Load Allocation Request
Northern Madison County Sanitation District
Madison County, Kentucky

Dear Mr. Feibes:

This is in response to your September 15, 2011 letter (attached), requesting a waste load allocation (WLA) for a proposed wastewater treatment plant (WWTP) in Madison County. The initial and future design capacities to be considered are 0.1 MGD and 0.2 MGD, respectively. Discharge is proposed to Longitude 84°09'23.422" and Latitude 37°44'28.694", approximately mile point (mp) 13.7 of Muddy Creek, segment 04023. Per your correspondence, the requested WLA information will be utilized in drafting a Regional Wastewater Facilities Plan update.

The division notes that Muddy Creek (mp 0.0 to 20.2) is included on the 2010 303(d) List of impaired waters. The impaired use listed is primary contact recreation (non-support). The pollutant of concern is fecal coliform. The suspected source is livestock (grazing or feeding operations). State and Federal regulations allow new or expanded discharges into impaired waters only if the discharge will improve, or at least not contribute, to existing impairments. Discharge from a new WWTP, in compliance with applicable Kentucky Pollutant Discharge Elimination System (KPDES) permit limitations and requirements, would not be considered a contributor to the existing impairment, and could thus be approved.

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

Design Capacity = 0.1 or 0.2 MGD / Discharge to mp 13.7 of Muddy Creek

Parameter	May 1 - October 31	November 1 - April 30
CBOD ₅	20 mg/l	20 mg/l
Total Suspended Solids	30 mg/l	30 mg/l
Ammonia Nitrogen	4 mg/l	10 mg/l
Dissolved Oxygen	7 mg/l	7 mg/l
Total Phosphorus	Monitor, mg/l	Monitor, mg/l
Total Nitrogen	Monitor, mg/l	Monitor, mg/l
Total Residual Chlorine	0.011 mg/l	0.011 mg/l

Reliability Classification = Grade C

Mr. Mark H. Feibes
Waste Load Allocation Request
Page Two

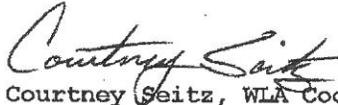
In addition to the above requirements, the monthly average and weekly maximum values of E. coli shall be at or below 130 colonies per 100 milliliters or 240 colonies per 100 milliliters, respectively, the year around. If a form of chlorine is proposed to disinfect the wastewater, then de-chlorination will likely be needed to achieve the chlorine residual effluent limitation. Additional effluent limitations and water quality standards are contained in 401 KAR Chapter 5 and 401 KAR Chapter 10.

A site survey has been completed at the proposed WWTP site. The inspector noted that easements will be required to facilitate discharge to the receiving stream. Appropriate easements documentation will need to be included with any submitted permit application.

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) 564-8158, 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

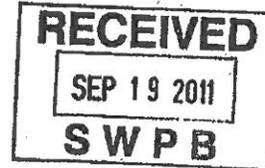
CS

c: Anshu Singh, Water Infrastructure Branch
Compliance and Technical Assistance
Branch, Frankfort Section
Division of Water Files



September 15, 2011

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



Subject: Northern Madison County Sanitation District
Request for Wasteload Allocation

Dear Mr. Seitz:

On behalf of the Northern Madison County Sanitation District (NMCS D), we are requesting preliminary stream discharge limits for a proposed wastewater treatment plant discharge. These limits will be used for planning purposes to prepare an amendment to their Regional Facilities Plan.

The amendment will involve construction of a wastewater treatment plant off of KY 52, east of Richmond, KY. As noted below we anticipate an initial treatment capacity and a future capacity. We would appreciate discharge limits for both cases so that we may plan accordingly.

Attached is a USGS map showing the approximate location of the proposed discharge, and below is a summary of pertinent information.

Proposed initial capacity	0.10 MGD
Future capacity	0.20 MGD
Receiving stream	Muddy Creek
Latitude	37° 44' 28.694"
Longitude	84° 09' 23.422"

Thank you in advance for your assistance with this request. Please feel free to call me at (859) 685-4517, or e-mail me at mfeibes@nel-ky.com.

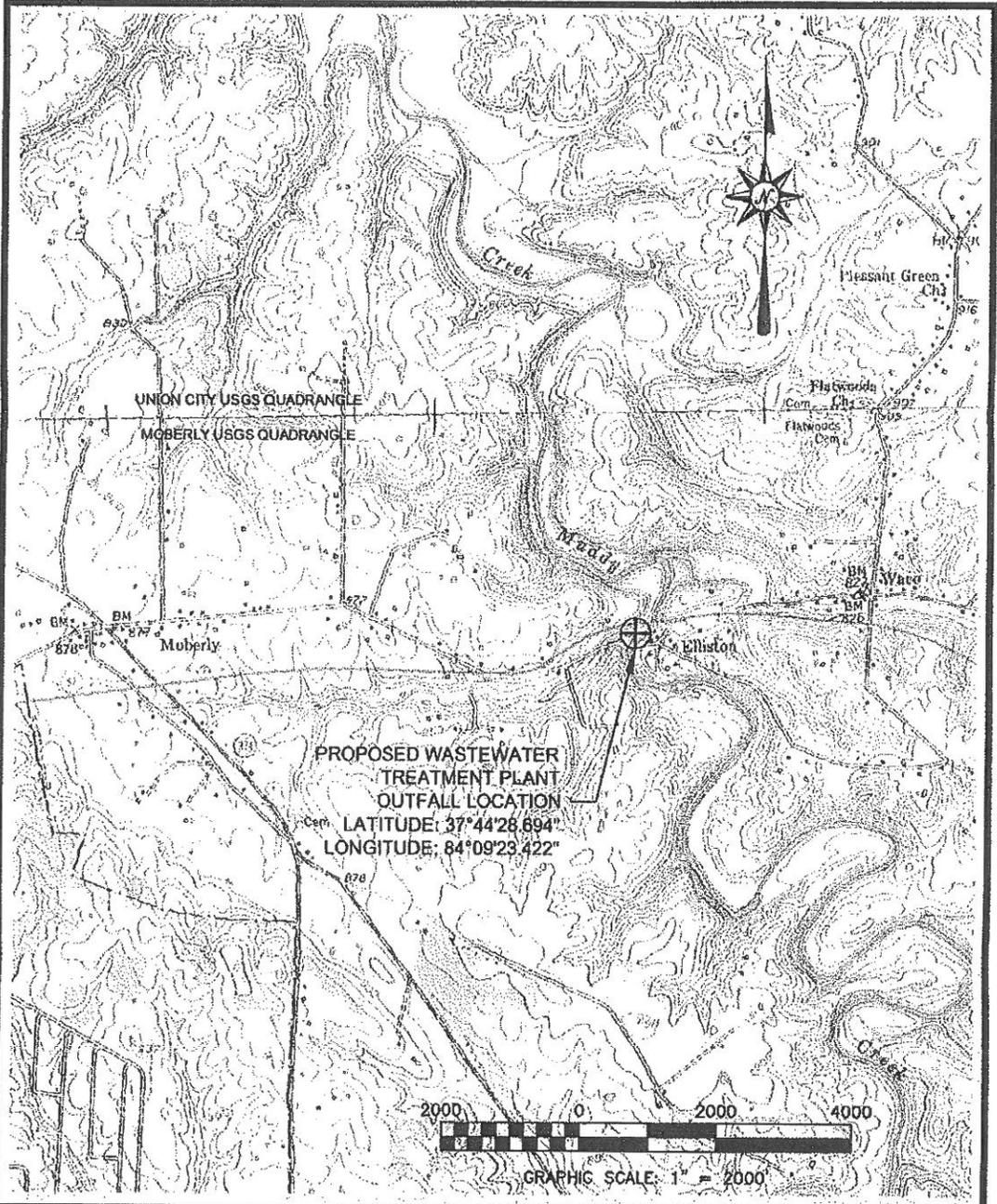
Sincerely,

Mark H. Feibes, PE

cc: Elliott Turner, NMCS D

attachments: 8½ x 11 map of proposed site for WLA Request

P:\NorthMad\TEMP\09 15 11 WLA request.doc



	nesbitt engineering, inc. <small>providing proven solutions since 1976</small>		PLANT OUTFALL LOCATION PROPOSED MUDDY CREEK WWTP NORTHERN MADISON COUNTY SANITATION DISTRICT	
	W.L.A. REQUEST		<small>drawn by:</small> JCW	<small>disk/file name:</small> \TEMP\DWGS\OUTFALL USGS.DWG
		<small>date:</small> 9-14-11	<small>last plot date:</small>	<small>scale:</small> 1" = 2000'

Section 8 Evaluation of Alternatives

1. Alternatives

A. No Action

There are several consequences to no action:

- The Greens Crossing area is currently served by a collection system owned by the NMCSO, with a metered interconnection to the Richmond Utilities (RU) sewer. Per RU Ordinance No. 07-12 (See Appendix 1), sewer rates for the existing Greens Crossing residents will increase to an average of \$70.74 per month by 2015. If Phase 1A is implemented, the anticipated sewer rates in 2015 will be \$60.26 per month. Furthermore, without this project, annual rate increases proportioned to the CPI are projected for each year with no foreseeable end to the increases. With this project, rates are much more likely to stabilize.
- The 3/8/2005 Sewer Use Agreement between RU and the NMCSO (See Appendix 2) limits the NMCSO to a total of 400 sewer connections. Currently there are 307 connections. Thus no action will limit the growth in the area, and the possibility of regionalization.
- The region will continue to experience failing septic systems, leading to public health and environmental concerns.

B. Optimization of Existing Facilities

1) Phase 1 Area - WWTP

The NMCSO does not own a wastewater treatment plant within the Phase 1 Area. Two of existing treatment plants in the area are privately owned, and the third is owned by the school district. Their treatment capacities are one to two orders of magnitude less than what is proposed for the Phase 1 Area (Muddy Creek) WWTP. Thus optimization of an existing WWTP is not feasible to achieve the desired treatment capacity.

2) Phase 1 Area – Collection System

The existing collection system is less than ten years old, with relatively minimal infiltration and inflow. With an average daily flow per household of 148 gpd, it appears the residents of this area generally conserve water, and thus there is not much opportunity for a reduction in wastewater flow through conservation methods. Optimization of the existing septic systems is generally not feasible due to the poor soil conditions and history of failing septic systems discussed in Sections 5 and 6 of this Plan respectively.

3) Phase 2 Area – WWTP's

The NMCSD owns two WWTP's in the Phase 2 Area. The treatment capacities of the Executive Park WWTP and Battlefield WWTP's are 0.03 and 0.114 MGD respectively. The initial construction in this phase will involve doubling the capacity of the Battlefield WWTP to 0.228 MGD. Therefore, optimizing the existing Battlefield WWTP is not feasible to achieve the desired treatment capacity.

4) Phase 2 Area – Collection System

The existing collection system in the Phase 2 Area ranges from about 4 to 40 years old. The system has relatively minimal infiltration and inflow. With an average daily flow per household of 168 gpd, it appears the residents in this area generally conserve water, and thus is not much opportunity for a reduction in wastewater flow through conservation methods. Optimization of the existing septic systems is generally not feasible due to the poor soil conditions and history of failing septic systems discussed in Sections 5 and 6 of this Plan respectively.

C. Regionalization

The Phase 1 Area is currently served by three small WWTP's (owned by others), private septic systems and an interconnection with the Richmond Utilities. Regionalization will redirect flow from these varied entities and from any future sources, to a single point a treatment. Additionally, regionalization will result in much shorter sewage travel distances (reducing from up to nine miles without regionalization to about four with regionalization), thus reducing pumping costs and the potential for odors. Furthermore, regionalization will place the control and responsibility for sewage treatment, in the hands of a public sanitation district as opposed to portions being privately owned and operated.

Similarly, the Phase 2 Area is currently served by two WWTP's (owned by the NMCSD), and private septic systems. Regionalization will redirect flow from these entities and from any future sources, to a single point a treatment. Furthermore, regionalization will place the control and responsibility for sewage treatment, in the hands of a public sanitation district as opposed to portions (in this case septic systems) being privately owned and operated.

Consideration was given to a third phase of regionalization in which the Muddy Creek WWTP is decommissioned, the Battlefield WWTP is further expanded and a force main and series of pump stations are built to transfer wastewater from the Muddy Creek WWTP to the Battlefield WWTP. Although this may be a possibility, it is so far in the distant future that no further examination of this option is considered at this time.

2. Alternatives Analysis

A. Phase 1 (0-5 Years) Wastewater Treatment

Several approaches to treatment were considered.

1) Decentralized Treatment Facilities

For reasons discussed in Part 1 of this Section, for this situation, centralized treatment is recommended over decentralized treatment.

2) No Discharge Treatment Technologies

Land application of treated wastewater works best with deep well drained soil, which is atypical in this area. Furthermore, it requires large areas of land, thereby substantially increasing the cost of disposal. Finally, public perception of land application could be a substantial obstacle to overcome. Thus, given these factors, and the availability of a receiving stream with secondary treatment level discharge limits (based on the Waste Load Allocation), land application technologies were not considered favorable for this project.

3) Conventional Treatment Technologies

Numerous treatment approaches were considered prior to a cost analysis. As per the flows estimated in Section 7, the initial design phase will require a minimum treatment capacity of 0.183 MGD. Three treatment alternatives were considered in detail:

- Extended Aeration Package Plant - The NMCSO owns and operates several steel package plants. Generally, with sufficient flow equalization, they operate well. Currently, the NMCSO owns a 0.1 MGD package plant, located in the Boones Trace subdivision, which was decommissioned after its flow was redirected to the north regional WWTP. To reuse this WWTP, it would have to be dismantled, transported, and refurbished at the new location. Combined with a new 0.1 MGD steel package plant, a dual train 0.20 MGD steel package plant option was evaluated.
- Extended Aeration Poured in Place Concrete – This option is effectively the same as the package plant, with the exception that the tanks are poured-in-place concrete, thus longer lasting and not requiring periodic sandblasting and coating. Given the NMCSO's comfort with this process, a 0.20 MGD concrete extended aeration WWTP was evaluated.
- Sequencing Batch Reactor (SBR) – The NMCSO owns and operates a 1.0 MGAL SBR in the northern end of the county with great success. Given their experience and comfort with this process, a 0.20 MGD SBR was evaluated.
- Complete Mix Conventional Aeration treatment process and Contact Stabilization treatment process – These well-proven technologies utilize

smaller reactors than the extended aeration process, and are best suited to large WWTP's. In smaller systems, they can be very sensitive to variations in flow and loading. Furthermore, the extended aeration process provides a greater degree of nitrification (ammonia reduction) than do these processes. Therefore, these technologies were not given any further consideration.

- Lagoon – Based on preliminary design calculations, using 10-States Standards a three-cell lagoon totaling 5.8 Mgal would be required to meet the treatment requirements under winter temperatures. Accounting for side slopes, approximately three acres of flat land would be necessary for construction of these cells. The property that the NMCS D has identified for the regional WWTP is not large enough nor is the topography suitable for a lagoon system, therefore it was not given any further consideration.
- Oxidation Ditch – From a treatment standpoint, the oxidation ditch is a viable alternative. However, because of its inherent design (shallow depths), it requires significantly more property than the other processes that are considered. Therefore the oxidation ditch was not given any further consideration.

4) Cost

Exhibits 8-1 through 8-3, at the end of this Section provide a detailed breakdown of costs for the three options considered. Table 8-1 below summarizes these costs. The present value, which factors in initial project costs, periodic replacement costs and operations and maintenance costs assumes a 6.625% interest rate and a 3% inflation rate. Costs of all three options track fairly closely. The package plant option has the highest 20-year present value, in part due to the limited life of the system.

Table 8-1
Opinion of Probable Costs

0 to 5 Year Planning Area Opinion of Probable Cost Muddy Creek Wastewater Treatment Plant

Alternate	Construction	Development & Contingency	Project	20-Yr Present Value
A Steel Extended Aeration Package Plant	\$ 660,000	\$ 224,000	\$ 884,000	\$ 1,280,000
B Concrete Extended Aeration WWTP	\$ 580,000	\$ 205,000	\$ 785,000	\$ 1,150,000
C Sequencing Batch Reactor WWTP	\$ 680,000	\$ 229,000	\$ 909,000	\$ 1,270,000

5) Non-Monetary Effectiveness Criteria

Evaluation of alternatives by present worth comparison is limited because the only items considered are construction costs, OM&R costs and salvage values. There are other factors not directly tied to these costs that should be considered in the selection of an alternative. These seven other factors which were used to evaluate the treatment alternative are identified and described below:

- Constructability – ease with which the alternative can be constructed and phased into operation.
- Energy Use – energy conservation.
- Environmental Impact – short-and long term impacts on the environment.
- Flexibility – ability to adapt to changing conditions.
- Operability – ease of operation
- Public Acceptance – a measure of the public acceptance of the project.
- Reliability – a measure of performance dependability.

A matrix was used to evaluate each alternative based on these factors. Each factor was given a subjective weight. A total of 100 points were distributed among the seven factors based on relative importance. Each alternative was then assigned a ranking for each factor. A ranking of one represented the least favorable ranking, whereas a five represented the most favorable. Each alternative was then scored as the sum of weight factor times the assigned ranking. Totaling all of the scores for each factor produced a final score for each alternative. Table 8–2 presents the matrix indicating non-economic effectiveness factors for the treatment alternatives.

Table 8-2
Non-Economic Effectiveness Alternative Analysis

0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Treatment Plant

Evaluation Criteria	Weight Factor	Rank Score					
		Alternative A		Alternative B		Alternative C	
		Steel EA		Concrete EA		SBR	
Environmental Impact	15	4	60	4	60	4	60
Public Acceptance	15	3	45	4	60	4	60
Flexibility	15	3	45	3	45	5	75
Reliability	15	4	60	4	60	4	60
Operability	15	4	60	4	60	4	75
Energy Use	10	3	30	3	30	3	30
Constructability	15	5	75	3	45	3	45
Total Score	100		375		360		390

The alternative with the greatest total score is the preferred alternative based on the non-economic factors. Combining this non-economic analyses with the present worth (economic analysis) should identify the "best" or the selected alternative. Table 8-3 combines these two analyses into a present worth/non-economic (PW/NE) ratio. The selected alternative is the one with the lowest PW/NE ratio.

Table 8-3
Non-Economic Effectiveness Alternative Analysis

0 to 5 Year Planning Area
Muddy Creek Wastewater Treatment Plant

Alternate	Present Worth (PW)	Non-Economic Effectiveness (NE)	Comparison Ratio (PW/NE) ¹
A Steel Extended Aeration Package Plant	\$ 1,280,000	375	3,413
B Concrete Extended Aeration WWTP	\$ 1,150,000	360	3,194
C Sequencing Batch Reactor WWTP	\$ 1,270,000	390	3,256

¹The lowest comparison ratio is bolded and represents the highest ranked/selected alternative.

6) Recommended Alternative

Based on the above analysis, the recommended alternative for the Phase 1 Muddy Creek Wastewater Treatment is a concrete poured-in-place extended aeration wastewater treatment plant.

B. Phase 1 (0-5 Years) Sewage Collection

1) Alternatives Considered

Several approaches to sewage collection were considered.

- Gravity Sewers - Gravity sewers are well suited for gently sloped densely packed neighborhoods that are generally laid along the natural drainage channels. Gravity sewers often drain to central pump stations where the sewage is lifted to a higher elevation from which it again travels by gravity. Much of the residential neighborhoods in Phase 1 meet this condition. Thus, this option was considered a feasible alternative.
- Low Pressure Sewers - Low pressure sewers are often found in neighborhoods and rural areas with multiple slopes that would be difficult to serve with gravity sewers. Each home is equipped with a simplex grinder pump station that feeds into a common force main. Although it appears much

of the Phase 1 area can be served by gravity, low pressure sewers are also considered a feasible alternative.

- Septic Tank Effluent Pump (STEP) System – STEP systems are typically selected to handle the same conditions as those for a low pressure sewer. They are in fact very similar in design with the exception that instead of pumping raw sewage, the simplex pump stations are placed downstream of a septic tank. This substantially reduces both the solids concentration and organic strength of the sewage, making it easier to pump and treat. However, it requires routine maintenance and pumping of the septic systems to prevent overloading the force mains and WWTP with septic solids. Given the NMCSD's lack of experience with STEP systems and the requirement for septic tank maintenance, this alternative was not given any further consideration.

2) Cost

Exhibits 8-3 and 8-4, at the end of this Section provide a detailed breakdown of costs for the two options considered. Table 8-4 below summarizes these costs. Not surprisingly, construction costs for the gravity sewer are greater than that for the low pressure sewer. However, the pressure sewer system incorporates 311 grinder pump stations, which over a 20-year period incurs significant maintenance costs, thus impacting the 20-year present value.

Table 8-4
Opinion of Probable Costs

0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Collection System

Alternate	Construction	Development & Contingency	Project	20-Yr Present Value
A Gravity Sewer System	\$ 3,700,000	\$ 687,000	\$ 4,387,000	\$ 4,760,000
B Low Pressure Sewer System	\$ 3,620,000	\$ 656,000	\$ 4,276,000	\$ 5,560,000

3) Non-Monetary Effectiveness Criteria

Table 8-5 presents the matrix indicating non-economic effectiveness factors for the sewage collection alternatives. Each system has its particular advantages. Overall, based on this weighting system, the low pressure sewer fares slightly better.

Table 8-5
Non-Economic Effectiveness Alternative Analysis

0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Treatment Plant Collection System

Evaluation Criteria	Weight Factor	Rank Score			
		Alternative A		Alternative B	
		Gravity Sewer		Low Pressure Sewer	
Environmental Impact	15	3	45	4	60
Public Acceptance	15	5	75	2	30
Flexibility	15	3	45	5	75
Reliability	15	4	60	3	45
Operability	15	4	60	3	45
Energy Use	10	3	30	4	40
Constructability	15	3	45	5	75
Total Score	100		360		370

Table 8-6 combines these results of the present worth analysis and the non-economic analysis into a present worth/non-economic (PW/NE) ratio. The selected alternative is the one with the lowest PW/NE ratio.

Table 8-6
Non-Economic Effectiveness Alternative Analysis

0 to 5 Year Planning Area
Muddy Creek Wastewater Collection System

Alternate	Present Worth (PW)	Non-Economic Effectiveness (NE)	Comparison Ratio (PW/NE) ¹
A Gravity Sewer System	\$ 4,760,000	360	13,222
B Low Pressure Sewer System	\$ 5,560,000	370	15,027

4) Recommended Alternative

Based on the above analysis, the recommended alternative for the Phase 1 Muddy Creek Wastewater Collection system is a gravity sewer system.

C. Phase 2 (6-10 Years) Wastewater Treatment

1) Alternatives Considered

The same alternatives and treatment approaches that were considered for the 0-5 Year Planning Area were considered for the 6-10 year Planning Area. As per the flows estimated in Section 7, the initial design phase will require a minimum treatment capacity of 0.223 MGD. Three treatment alternatives were evaluated in detail:

- Extended Aeration Package Plant - In this scenario, the existing 0.114 MGD steel package plant would remain in operation. Currently, the NMCSO owns several used steel package plants that have been decommissioned and are now in storage. Two of these would be refurbished and reused, with a combined treatment capacity of 0.129 MGD. The expanded WWTP capacity would therefore, be 0.243 MGD.
- Extended Aeration Poured in Place Concrete – This option is effectively the same as the package plant, with the exception that the tanks are poured-in-place concrete, thus longer lasting and do not require periodic sandblasting and coating. The design capacity of this WWTP would be 0.23 MGD.
- Sequencing Batch Reactor (SBR) – Using a portion of the existing polishing pond, an lined earthen basin is constructed for installation of floating SBR equipment. The existing WWTP tanks are converted to flow equalization and sludge holding tanks. The remaining portion of polishing pond is still retained as such. Given the economy of scale for earthen lined structures, the SBR basin is built for the ultimate flow of 0.29 MGD, but the equipment will be sized for 0.23 MGD, and be easily expandable to 0.29 MGD.

2) Cost

Tables 8-6 through 8-8, at the end of this Section provide a detailed breakdown of costs for the three options considered. Table 8-7 below summarizes these costs. Not surprisingly, the expansion of the existing steel package WWTP with refurbished units that the NMCSO already owns is substantially less initial construction cost than the other options.

Table 8-7
Opinion of Probable Costs

6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Treatment Plant

Alternate	Construction	Development & Contingency	Project	20-Yr Present Value
A Steel Extended Aeration Package Plant	\$ 440,000	\$ 167,000	\$ 607,000	\$ 1,070,000
B Concrete Extended Aeration WWTP	\$ 890,000	\$ 269,000	\$ 1,159,000	\$ 1,620,000
C Sequencing Batch Reactor WWTP	\$ 620,000	\$ 210,000	\$ 830,000	\$ 1,240,000

3) Non-Monetary Effectiveness Criteria

Table 8–8 presents the matrix indicating non-economic effectiveness factors for the treatment alternatives. Each system has its particular advantages. Overall, based on this weighting system, the SBR is the more desirable than the other options.

Table 8-8
Non-Economic Effectiveness Alternative Analysis

Evaluation Criteria	Weight Factor	Rank Score					
		Alternative A		Alternative B		Alternative C	
		Steel EA		Concrete EA		SBR	
Environmental Impact	15	4	60	4	60	4	60
Public Acceptance	15	3	45	4	60	4	60
Flexibility	15	3	45	3	45	5	75
Reliability	15	4	60	4	60	4	60
Operability	15	4	60	4	60	4	60
Energy Use	10	3	30	3	30	3	30
Constructability	15	5	75	3	45	4	60
Total Score	100		375		360		405

Table 8-9 combines these two analyses into a present worth/non-economic (PW/NE) ratio. The selected alternative is the one with the lowest PW/NE ratio.

Table 8-9
Non-Economic Effectiveness Alternative Analysis

6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Treatment Plant

Alternate	Present Worth (PW)	Non-Economic Effectiveness (NE)	Comparison Ratio (PW/NE) ¹
A Steel Extended Aeration Package Plant	\$ 1,070,000	375	2,853
B Concrete Extended Aeration WWTP	\$ 1,620,000	360	4,500
C Sequencing Batch Reactor WWTP	\$ 1,240,000	405	3,062

¹The lowest comparison ratio is bolded and represents the highest ranked/selected alternative.

4) Recommended Alternative

Based on the above analysis, the recommended alternative for the Phase 2 Battlefield Wastewater Treatment is a steel extended aeration package wastewater treatment plant.

D. Phase 2 (6-10 Years) Sewage Collection

Tables 8-9 and 8-10, at the end of this Section provide a detailed breakdown of costs for the two options considered. Table 8-10 below summarizes these costs. Again, as with the Phase 1 sewer, construction costs for the gravity sewer are greater than that for the low pressure sewer. However, the pressure sewer system incorporates 262 grinder pump stations, which over a 20-year period incurs significant maintenance costs, thus impacting the 20-year present value.

Table 8-10
Opinion of Probable Costs

6 to 10 Year Planning Area Opinion of Probable Cost
Greater Battlefield Wastewater Collection System

Alternate	Construction	Development & Contingency	Project	20-Yr Present Value
A Gravity Sewer System	\$ 4,090,000	\$ 711,000	\$ 4,801,000	\$ 5,250,000
B Low Pressure Sewer System	\$ 3,570,000	\$ 694,000	\$ 4,219,000	\$ 5,450,000

2) Non-Monetary Effectiveness Criteria

Table 8–11 presents the matrix indicating non-economic effectiveness factors for the sewerage collection alternatives. Each system has its particular advantages. Overall, based on this weighting system, the low pressure sewer fares slightly better.

Table 8-11
Non-Economic Effectiveness Alternative Analysis

6 to 10 Year Planning Area Opinion of Probable Cost
Greater Battlefield Wastewater Collection System

Evaluation Criteria	Weight Factor	Rank Score			
		Alternative A		Alternative B	
		Gravity Sewer		Low Pressure Sewer	
Environmental Impact	15	3	45	4	60
Public Acceptance	15	5	75	2	30
Flexibility	15	3	45	5	75
Reliability	15	4	60	3	45
Operability	15	4	60	3	45
Energy Use	10	3	30	4	40
Constructability	15	3	45	5	75
Total Score	100		360		370

Table 8-12 combines these results of the present worth analysis and the non-economic analysis into a present worth/non-economic (PW/NE) ratio. The selected alternative is the one with the lowest PW/NE ratio.

Table 8-12
Non-Economic Effectiveness Alternative Analysis

6 to 10 Year Planning Area
Greater Battlefield Wastewater Collection System

Alternate	Present Worth (PW)	Non-Economic Effectiveness (NE)	Comparison Ratio (PW/NE) ¹
A Gravity Sewer System	\$ 5,250,000	360	14,583
B Low Pressure Sewer System	\$ 5,450,000	370	14,730

3) Recommended Alternative

Based on the above analysis, the recommended alternative for the Phase 2 Greater Battlefield Wastewater Collection system is a gravity sewer system.

Exhibit 8-1

**0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Treatment Plant - 0.20 MGAL Treatment Capacity
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost
Alternate A - Steel Package WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	0.1 MGD Package WWTP - Refurbished and installed ²	ls	1	\$ 80,000	\$ 80,000	20	\$ -	\$ -	\$ 80,000
2	0.1 MGD Package WWTP - New ²	ls	1	317,000	317,000	20	-	-	317,000
3	UV Disinfection equipment (channel in package plant)	ls	1	60,000	60,000	20	-	-	60,000
4	Yard Piping and Valves	ls	1	20,000	20,000	20	-	-	20,000
5	Control/ Mechanical Building	sq ft	400	200	80,000	40	11,000	-	69,000
6	Electrical/ Service/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
7	Fence	lf	500	12.00	6,000	20	-	-	6,000
8	Access Driveway & Gravel Yard	cu yds	407	45.00	18,333	20	-	-	18,333
9	Earthwork	cu yds	1,778	19.50	34,667	20	-	-	34,667
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 660,000		\$ 11,000	\$ -	\$ 645,000
	Project Development rounded to nearest \$1,000 ⁶				191,000				171,600
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				33,000				33,000
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 884,000				849,600
	Operations and Maintenance, First Year Annual Cost			\$ 39,321					
	Operations and Maintenance, Present Value ⁷								428,992
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,280,000

Notes:

- Costs are for year 2012.
- For purposes of this analysis, items with no salvage value are given a 20-year service life.
- Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-2

**0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Treatment Plant - 0.20 MGAL Treatment Capacity
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost

Alternate B - Concrete Extended Aeration Treatment Process WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	WWTP Concrete Tanks, Poured-in-place	cy	432	\$ 400	\$ 172,919	50	\$ 29,000	\$ -	\$ 143,919
2	WWTP - Clarifier weirs and launder, installed	lf	30	160	4,800	40	1,000	-	3,800
3	WWTP Mechanical, Installed	ls	1	90,000	90,000	20	-	-	90,000
4	UV Disinfection channel and equipment	ls	1	80,000	80,000	20	-	-	80,000
5	WWTP Walkway	sq ft	450	30.00	13,500	20	-	-	13,500
6	Yard Piping and Valves	ls	1	40,000	40,000	20	-	-	40,000
7	Control/ Mechanical Building	sq ft	400	200	80,000	40	11,000	-	69,000
8	Electrical/ Service/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
9	Fence	lf	500	12.00	6,000	20	-	-	6,000
10	Access Driveway & Gravel Yard	cu yds	407	45.00	18,333	20	-	-	18,333
11	Earthwork	cu yds	1,778	19.50	34,667	20	-	-	34,667
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 580,000		\$ 41,000	\$ -	\$ 539,219
	Project Development rounded to nearest \$1,000 ⁶				176,000				150,800
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				29,000				29,000
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 785,000				719,019
	Operations and Maintenance, First Year Annual Cost			\$ 39,121					
	Operations and Maintenance, Present Value ⁷								426,810
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,150,000

Notes:

- Costs are for year 2012.
- For purposes of this analysis, items with no salvage value are given a 20-year service life.
- Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-3

**0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Wastewater Treatment Plant - 0.20 MGAL Treatment Capacity
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost

Alternate C - Sequencing Batch Reactor Treatment Process WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	WWTP Concrete Tanks, Poured-in-place	cy	375	\$ 400	\$ 150,104	50	\$ 25,000	\$ -	\$ 125,104
2	SBR Mechanical and Controls	ls	1	242,000	242,000	20	-	-	242,000
3	UV Disinfection channel and equipment	ls	1	80,000	80,000	20	-	-	80,000
4	WWTP Walkway	sq ft	390	30.00	11,700	20	-	-	11,700
5	Yard Piping and Valves	ls	1	20,000	20,000	20	-	-	20,000
6	Control/ Mechanical Building	sq ft	400	200	80,000	40	11,000	-	69,000
7	Electrical/ Service/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
8	Fence	lf	500	12.00	6,000	20	-	-	6,000
9	Access Driveway & Gravel Yard	cu yds	407	45.00	18,333	20	-	-	18,333
10	Earthwork	cu yds	1,778	19.50	34,667	20	-	-	34,667
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 680,000		\$ 36,000	\$ -	\$ 646,804
	Project Development rounded to nearest \$1,000 ⁶				195,000				176,800
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				34,000				34,000
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 909,000				857,604
	Operations and Maintenance, First Year Annual Cost			\$ 37,556					
	Operations and Maintenance, Present Value ⁷								409,734
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,270,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-4

**0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Collection System
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost
Alternate A - Gravity Sewer System

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs.) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	4" PVC SDR21 Force Main	LF	2,000	\$ 14.00	\$ 28,000	50	\$ 5,000	\$ -	23,000
2	6" PVC SDR21 Force Main	LF	22,000	19.00	418,000	50	70,000	-	348,000
3	8" SDR 35 PVC Gravity Sewer	LF	49,000	38.00	1,862,000	50	310,000	-	1,552,000
4	4" SDR 35 PVC Sewer Lateral w/ tees, wyes, C.O., etc.	LF	31,100	22.00	684,200	50	114,000	-	570,200
5	Greens Crossing Pump Station Upgrade	EA	1	30,000.00	30,000	15	8,638	17,856	39,219
6	Moberly Pump Station No.1	EA	1	100,000.00	100,000	15	28,793	59,521	130,728
7	Moberly Pump Station No.2	EA	1	40,000.00	40,000	15	11,517	23,809	52,291
8	Waco Pump Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
9	Caroline Drive Pump Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
10	Gravity Sewer Manhole	EA	163	2,200.00	359,333	30	33,000	-	326,333
11	Combination Air Release Valve & Manhole	EA	24	2,300.00	55,200	15	15,894	32,856	72,162
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 3,700,000		\$ 631,393	\$ 205,468	\$ 3,270,808
	Project Development rounded to nearest \$1,000 ⁶				502,000				962,000
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				185,000				185,000
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 4,387,000				4,417,808
	Operations and Maintenance, First Year Annual Cost			\$ 31,779					
	Operations and Maintenance, Present Value ⁷								346,710
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 4,760,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-5

**0 to 5 Year Planning Area Opinion of Probable Cost
Muddy Creek Collection System
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost
Alternate B - Low Pressure Sewer System

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	1-1/2" PVC SDR21 Force Main	LF	31,100	9.50	295,450	50	49,000	-	246,450
2	2" PVC SDR21 Force Main	LF	25,500	11.00	280,500	50	47,000	-	233,500
3	4" PVC SDR21 Force Main	LF	16,500	\$ 14.00	\$ 231,000	50	\$ 38,000	\$ -	\$ 193,000
4	6" PVC SDR21 Force Main	LF	31,000	19.00	589,000	50	98,000	-	491,000
5	Greens Crossing Pump Station Upgrade	EA	1	30,000.00	30,000	15	8,638	17,856	39,219
6	Moberly Pump Station No.1	EA	1	100,000.00	100,000	15	28,793	59,521	130,728
7	Grinder Pump Station	EA	311	6,500.00	2,021,500	15	582,050	1,203,224	2,642,674
8	Combination Air Release Valve & Manhole	EA	31	2,300.00	71,305	15	20,531	42,441	93,215
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 3,620,000		\$ 872,011	\$ 1,323,043	\$ 4,069,787
	Project Development rounded to nearest \$1,000 ⁶				475,000				941,200
	Contingency (~5% of Initial Construction Costs)				181,000				181,000
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 4,276,000				5,191,987
	Operations and Maintenance, First Year Annual Cost			\$ 33,394					
	Operations and Maintenance, Present Value ⁷								364,329
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 5,560,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-6

**6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Treatment Plant - Expansion from 0.114 to 0.243 MGD
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost

Alternate A - Steel Package WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	0.1 MGD Package WWTP - Refurbished and installed ²	ls	1	\$ 80,000	\$ 80,000	20	\$ -	\$ -	\$ 80,000
1	0.029 MGD Package WWTP - Refurbished and installed ²	ls	1	\$ 30,000	\$ 30,000	20	\$ -	\$ -	\$ 30,000
2	UV Disinfection equipment new channel and equipment	ls	1	110,000	110,000	20	-	-	110,000
3	Yard Piping and Valves	ls	1	40,000	40,000	20	-	-	40,000
4	New Control/ Mechanical Building	sq ft	600	200	120,000	40	17,000	-	103,000
5	Electrical/ Service Upgrade/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
6	Earthwork	cu yds	889	19.50	17,333	20	-	-	17,333
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 440,000		\$ 17,000	\$ -	\$ 420,333
	Project Development rounded to nearest \$1,000 ⁶				145,000				114,400
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				22,000				22,000
	Subtotal B. (Construction, Replacement, Project Dev. &Contingency)				\$ 607,000				556,733
	Operations and Maintenance, First Year Annual Cost			\$ 47,241					
	Operations and Maintenance, Present Value ⁷								515,392
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,070,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternates, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-7

**6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Treatment Plant - New 0.23 MGD WWTP
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost

Alternate B - Concrete Extended Aeration Treatment Process WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	WWTP Concrete Tanks, Poured-in-place	cy	722	\$ 400	\$ 288,774	50	\$ 48,000	\$ -	\$ 240,774
2	WWTP - Clarifier weirs and launder, installed	lf	67	160	10,656	40	1,000	-	9,656
3	WWTP Mechanical, Installed	ls	1	150,300	150,300	20	-	-	150,300
4	UV Disinfection channel and equipment	ls	1	110,000	110,000	20	-	-	110,000
5	WWTP Walkway	sq ft	1,000	30.00	30,000	20	-	-	30,000
6	Yard Piping and Valves	ls	1	60,000	60,000	20	-	-	60,000
7	Control/ Mechanical Building	sq ft	600	200	120,000	40	17,000	-	103,000
8	Electrical/ Service Upgrade/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
#REF!	Earthwork	cu yds	3,947	19.50	76,960	20	-	-	76,960
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 890,000		\$ 66,000	\$ -	\$ 820,690
	Project Development rounded to nearest \$1,000 ⁶				224,000				231,400
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				45,000				44,500
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 1,159,000				1,096,590
	Operations and Maintenance, First Year Annual Cost			\$ 48,366					
	Operations and Maintenance, Present Value ⁷								527,665
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,620,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-8

**6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Treatment Plant - New 0.23 MGD WWTP
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost

Alternate C - Sequencing Batch Reactor Treatment Process WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	Lagoon Earthwork	cu yds	6,124	\$ 8.50	\$ 52,055	50	\$ 9,000	\$ -	\$ 43,055
2	Lagoon Liner and Geofabric Underlayment	sq yds	1,423	9.70	13,798	50	2,000	-	11,798
2	SBR Mechanical and Controls	ea	1	278,300	278,300	20	-	-	278,300
3	UV Disinfection channel and equipment	ls	1	90,000	90,000	20	-	-	90,000
4	Yard Piping and Valves	ls	1	30,000	30,000	20	-	-	30,000
5	Control/ Mechanical Building	sq ft	600	200	120,000	40	17,000	-	103,000
6	Electrical/ Service Upgrade/Controls/Instrumentation	ls	1	40,000	40,000	20	-	-	40,000
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 620,000		\$ 28,000	\$ -	\$ 596,153
	Project Development rounded to nearest \$1,000 ⁶				179,000				161,200
	Contingency rounded to nearest \$1,000 (-5% of Initial Construction Costs)				31,000				31,000
	Subtotal B. (Construction, Replacement, Project Dev. &Contingency)				\$ 830,000				788,353
	Operations and Maintenance, First Year Annual Cost			\$ 41,349					
	Operations and Maintenance, Present Value ⁷								451,110
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 1,240,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternates, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable), surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-9

**6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Wastewater Collection System
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost
Alternate A - Gravity Sewer System

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	4" PVC SDR21 Force Main	LF	18,000	\$ 14.00	\$ 252,000	50	\$ 42,000	\$ -	\$ 210,000
2	6" PVC SDR21 Force Main	LF	12,000	18.00	216,000	50	36,000	-	180,000
3	8" SDR 35 PVC Gravity Sewer	LF	88,000	38.00	2,204,000	50	367,000	-	1,837,000
4	4" SDR 35 PVC Sewer Lateral w/ tees, wyes, C.O., etc.	LF	26,200	22.00	576,400	50	96,000	-	480,400
5	Kingston Pump Station No.1	EA	1	90,000.00	90,000	15	25,914	53,569	117,656
5	Kingston Pump Station No.2	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
5	Kingston Pump Station No.3	EA	1	40,000.00	40,000	15	11,517	23,809	52,291
6	Kingston Pump Station No.4	EA	1	40,000.00	40,000	15	11,517	23,809	52,291
7	Executive Park Lift Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
8	Indian Lane Pump Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
9	Gravity Sewer Manhole	EA	193	2,200.00	425,333	30	39,000	-	386,333
10	Combination Air Release Valve & Manhole	EA	30	2,300.00	69,000	15	19,867	41,070	90,203
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 4,090,000		\$ 700,642	\$ 249,394	\$ 3,641,485
	Project Development rounded to nearest \$1,000 ⁶				506,000				1,063,400
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				205,000				204,500
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 4,801,000				4,909,385
	Operations and Maintenance, First Year Annual Cost			\$ 30,828					
	Operations and Maintenance, Present Value ⁷								336,334
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 5,250,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Exhibit 8-10

**6 to 10 Year Planning Area Opinion of Probable Cost
Battlefield Collection System
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Opinion of Probable Construction and Project Cost
Alternate B - Low Pressure Sewer System

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed) ¹	Service Life (Yrs) ²	Salvage Value, Adjusted to Present Value ³	Present Value of All Future Purchases (if S.L. < 20 yrs) ⁴	Total Present Value
1	1-1/2" PVC SDR21 Force Main	LF	24,900	\$ 9.50	\$ 236,550	50	\$ 39,000	\$ -	\$ 197,550
2	2" PVC SDR21 Force Main	LF	43,500	11.00	478,500	50	80,000	-	398,500
3	4" PVC SDR21 Force Main	LF	32,500	14.00	455,000	50	76,000	-	379,000
4	6" PVC SDR21 Force Main	LF	12,000	19.00	228,000	50	38,000	-	190,000
5	Kingston Pump Station No.1	EA	1	90,000.00	90,000	15	25,914	53,569	117,656
6	Kingston Pump Station No.2	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
7	Executive Park Pump Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
8	Indian Lane Pump Station	EA	1	60,000.00	60,000	15	17,276	35,713	78,437
9	Grinder Pump Station	EA	262	6,500.00	1,703,000	15	490,344	1,013,648	2,226,304
10	Combination Air Release Valve & Manhole	EA	88	2,300.00	202,400	15	58,277	120,471	264,594
	Subtotal A. rounded to nearest \$10,000 (Construction Costs)⁵				\$ 3,570,000		\$ 859,362	\$ 1,294,827	\$ 4,008,915
	Project Development rounded to nearest \$1,000 ⁶				470,000				928,200
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				179,000				178,500
	Subtotal B. (Construction, Replacement, Project Dev. & Contingency)				\$ 4,219,000				5,115,615
	Operations and Maintenance, First Year Annual Cost			\$ 31,105					
	Operations and Maintenance, Present Value ⁷								339,355
	TOTAL OPINION OF PRESENT WORTH, (Rounded to nearest \$10,000)								\$ 5,450,000

Notes:

- 1) Costs are for year 2012.
- 2) For purposes of this analysis, items with no salvage value are given a 20-year service life.
- 3) Salvage value is for the most recent purchase of the given item, if replaced in less than 20 years. Future cost is based on an assumed 3% inflation rate, adjusted to a present worth, using a 6.625% interest rate.
- 4) If an item is purchased more than once over the 20-year planning cycle, the present value of each purchase is calculated and totaled in this column. Present value is based on a 6.625% interest rate. Future purchases are calculated on an assumed 3% inflation.
- 5) This estimate is preliminary without final design being completed. It is intended for purposes of comparison between alternatives, and not for budgeting.
- 6) Project development includes: engineering design and project management, resident project representative, administrative and legal, land and RPW, interim financing, environmental assessment (if applicable) surveying, etc.
- 7) Operations and Maintenance present value is based on a 20-year, 6.625% equal-payment series present worth factor of 10.9099.

Section 9

Cross-Cutter Correspondence and Mitigation

Letters were sent to the agencies listed below to determine if the proposed project would create adverse impacts to social, historical, or environmental resources. Copies of the letters sent to these agencies and the responses from the agencies are attached in the following Exhibits.

- Exhibit 9-1 U.S. Fish and Wildlife Service Correspondence
- Exhibit 9-2 Kentucky Department of Fish and Wildlife Resources Correspondence
- Exhibit 9-3 Kentucky Heritage Council Correspondence
- Exhibit 9-4 U.S. Army Corps of Engineers Correspondence
- Exhibit 9-5 Natural Resources and Conservation Service Correspondence

Exhibit 9-1

U.S. Fish and Wildlife Correspondence



March 5, 2012

Mr. Lee Andrews
Field Supervisor
U.S. Fish and Wildlife Service
330 W. Broadway, Rm. 265
Frankfort, Kentucky 40601

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Andrews:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCSD) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

The Area 2 project will involve upgrade of the existing Battlefield Park WWTP, adjacent to the southeast corner of the Bluegrass Army Depot on US 421. It will include the installation of approximately 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals, and 180 manholes. The project will also include the construction of five new pump stations. The sewer system to the WWTP and the WWTP expansion will all be constructed within previously disturbed road right-of-ways, or on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant.

As part of the Facilities Plan Update, we are requesting that the U.S. Fish and Wildlife Service provide us with information concerning the possibility of federally protected wetlands, ecologically sensitive areas, or federally listed endangered or threatened species within the impact area of the proposed project. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of the NMCSD, thank you for your kind and prompt attention to this matter.

Sincerely,

Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\US Fish&Wild Lett.doc

NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.



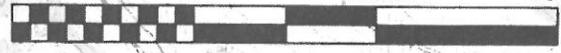
UNION CITY USGS QUADRANGLE
MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER
TREATMENT PLANT
LOCATION

KY 52 TO
RICHMOND

KY 52
TO IRVINE

2000 0 2000 4000



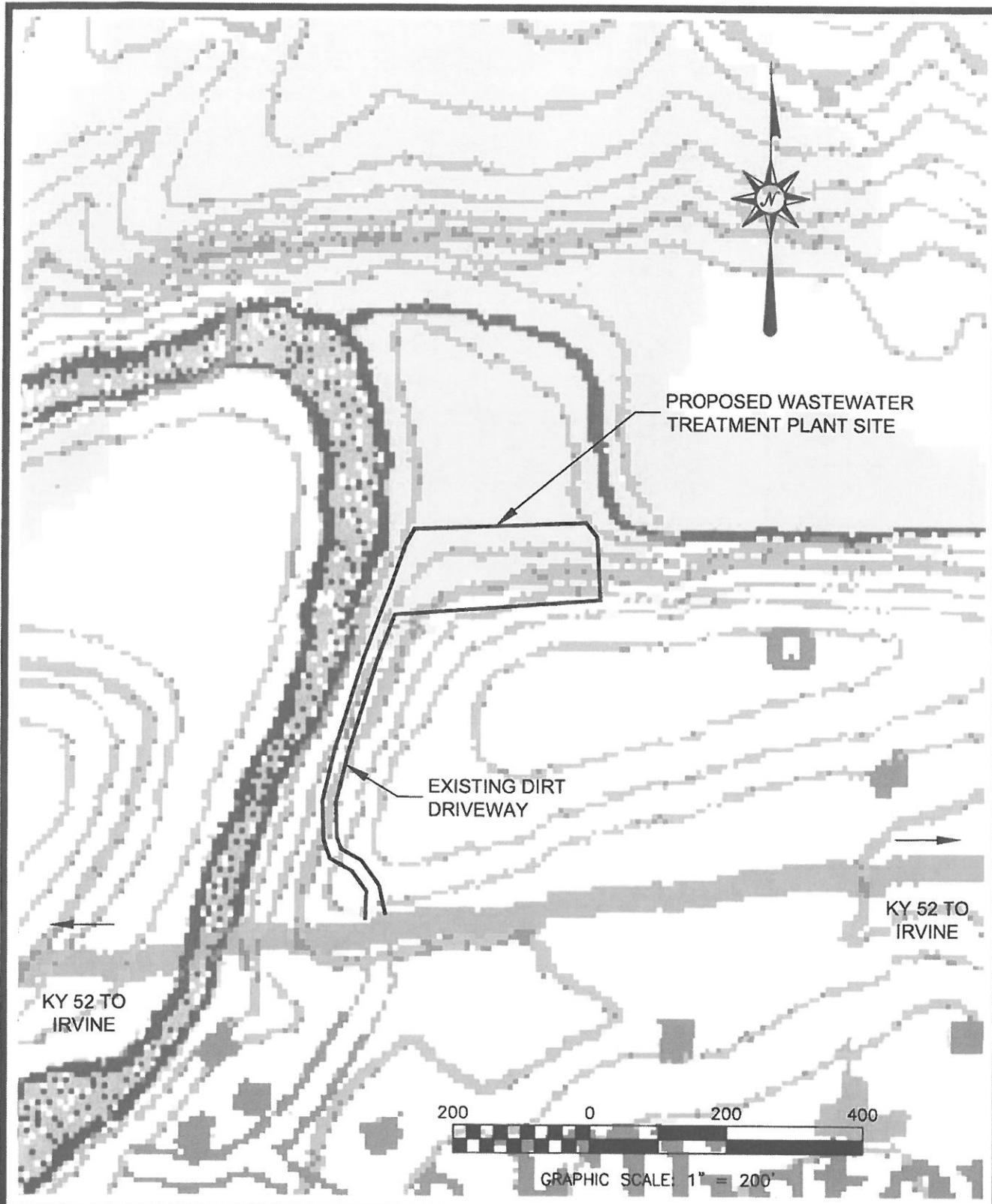
GRAPHIC SCALE: 1" = 2000'



nesbitt engineering, inc.
providing proven solutions since 1976

**SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 2000'



	nesbitt engineering, inc. <i>providing proven solutions since 1976</i>		SITE PLAN PROPOSED MUDDY CREEK WWTP NORTHERN MADISON COUNTY SANITATION DISTRICT	
	drawn by: JCW	disk/file name: \DWGS\LOCATION USGS.DWG	job no.: 934.41	
	date: 3-01-12	last plot date:	scale: 1" = 200'	



1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

March 16, 2012

Ms. Kari Wallover, PG
Professional Geologist
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, Kentucky 40507 - 1016

Re: FWS 2012-B-0378; Nesbitt Engineering, Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System Project, located in Madison County, Kentucky

Dear Ms. Wallover:

The U.S. Fish and Wildlife Service (Service) has reviewed your correspondence dated March 5, 2012 regarding the above-referenced project. The Service offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). This is not a concurrence letter. Please read carefully, as further consultation with the Service may be required.

In accordance with 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 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 two federally listed species have the potential to occur within the project vicinity. The listed species are:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Federal Status</u>
Indiana bat	<i>Myotis sodalis</i>	endangered
running buffalo clover	<i>Trifolium stoloniferum</i>	endangered

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

Summer roost and/or winter habitat for the endangered Indiana bat may exist within the proposed project site. Based on this information, we believe that: (1) forested areas in the vicinity of and on the project area may provide potentially suitable summer roosting and foraging habitat for the Indiana bat; and (2) caves, rockshelters, and abandoned underground mines in the vicinity of and on the project area may provide potentially suitable wintering habitat for the Indiana bat. Our belief that potentially suitable habitat may be present is based on the information provided in your correspondence, the fact that much of the project site and/or surrounding areas contain forested habitats that are within the natural range of this species, and our knowledge of the life history characteristics of the species.

The Indiana bat utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (i.e., dead trees or dead portions of live trees). Trees in excess of 16 inches diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9 inches DBH appear to provide suitable maternity roosting habitat. Male Indiana bats have been observed roosting in trees as small as 5 inches DBH.

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 "swarming" period is dependent upon weather conditions and may last from about September 15 to about November 15. This is a critical time for Indiana bats, since they are acquiring additional fat reserves and mating prior to hibernation. Research has shown that bats exhibiting this "swarming" behavior will range up to five miles from chosen hibernacula during this time. For hibernation, the Indiana bat prefers limestone caves, sandstone rockshelters, and abandoned underground mines with stable temperatures of 39 to 46 degrees F and humidity above 74 percent but below saturation.

Because we have concerns relating to the Indiana bat on this project and due to the lack of occurrence information available on this species relative to the proposed project area, we would have the following recommendations relative to Indiana bats.

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 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.
2. We would also recommend that the project proponent only remove trees within the project area between October 15 and March 31 in order to avoid impacting summer roosting Indiana bats.

However, if any Indiana bat hibernacula are identified on the project area, we recommend the project proponent only remove trees between November 15 and March 31 in order to avoid impacting Indiana bat “swarming” behavior.

However, if these recommendations cannot be incorporated as project conditions, then the project area may be surveyed to determine the presence or absence of this species within the project area in an effort to determine if potential impacts to the Indiana bat are likely. A qualified biologist who holds the appropriate collection permits for the Indiana bat must undertake such surveys, and we would appreciate the opportunity to approve the biologist’s survey plan prior to the survey being undertaken and to review all survey results, both positive and negative. If any Indiana bats are identified, we would request written notification of such occurrence(s) and further coordination and consultation.

If your project schedule requires the clearing of potential Indiana bat habitat (i.e., trees) during the period of April 1 to October 14, you have two primary options for addressing impacts to Indiana bats. First, you can survey the project site as described previously, or you can enter into a Conservation Memorandum of Agreement (MOA) with the Service. 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 as set forth in the Indiana Bat Mitigation Guidance for the Commonwealth of Kentucky. For additional information about this option, please notify our office.

running buffalo clover

Running buffalo clover may occur within the proposed project site. This species requires periodic, moderate disturbances to reduce competition and maintain open or semi-open habitat conditions. Disturbed areas such as old pastures, moderately grazed fields, road rights-of-way, and power line rights-of-way that are mechanically maintained are known to provide suitable habitat for these species. Additionally, running buffalo clover is known to occur in habitats ranging from stream banks and low mesic (moderately moist) forests to lawns and cemeteries. If the proposed project(s) require alteration of habitat that coincides with the habitat required for this species, an on-site inspection or survey of the area must be conducted to determine if the listed species is present or occurs seasonally. Prior to construction activities including tree clearing, a survey should be done by qualified personnel and be conducted during the appropriate time of day and/or year to ensure confidence in survey results. Please notify this office with the results of any surveys and an analysis of the “effects of the action,” as defined by 50 CFR 402.02 on any listed species including consideration of direct, indirect, and cumulative effects.

Surveys for the aforementioned species would not be necessary if sufficient site-specific information was available that showed that: (1) there is no potentially suitable habitat within the project area or its vicinity or (2) the species would not be present within the project area or its vicinity due to site-specific factors. A survey for Indiana bats would also not be necessary if trees were removed from the site between October 15 and March 31, or if the project proponent chooses to enter into a Conservation MOA with the Service.

Exhibit 9-2

**Kentucky Department of Fish and Wildlife
Resources Correspondence**



March 5, 2012

Mr. Daniel Stoelb
Biologist, Environmental Section
Kentucky Department of Fish and Wildlife Resources
#1 Sportsman's Lane
Frankfort, Kentucky 40601

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Stoelb:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCS D) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

The Area 2 project will involve upgrade of the existing Battlefield Park WWTP, adjacent to the southeast corner of the Bluegrass Army Depot on US 421. It will include the installation of approximately 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals, and 180 manholes. The project will also include the construction of five new pump stations. The sewer system to the WWTP and the WWTP expansion will all be constructed within previously disturbed road right-of-ways, or on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant.

As part of the Facilities Plan Update, we are requesting that the Kentucky Department of Fish and Wildlife Resources provide us with information concerning the possibility of state listed or federally threatened or endangered species within the impact area of the proposed project. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of the NMCS D, thank you for your kind and prompt attention to this matter.

Sincerely,

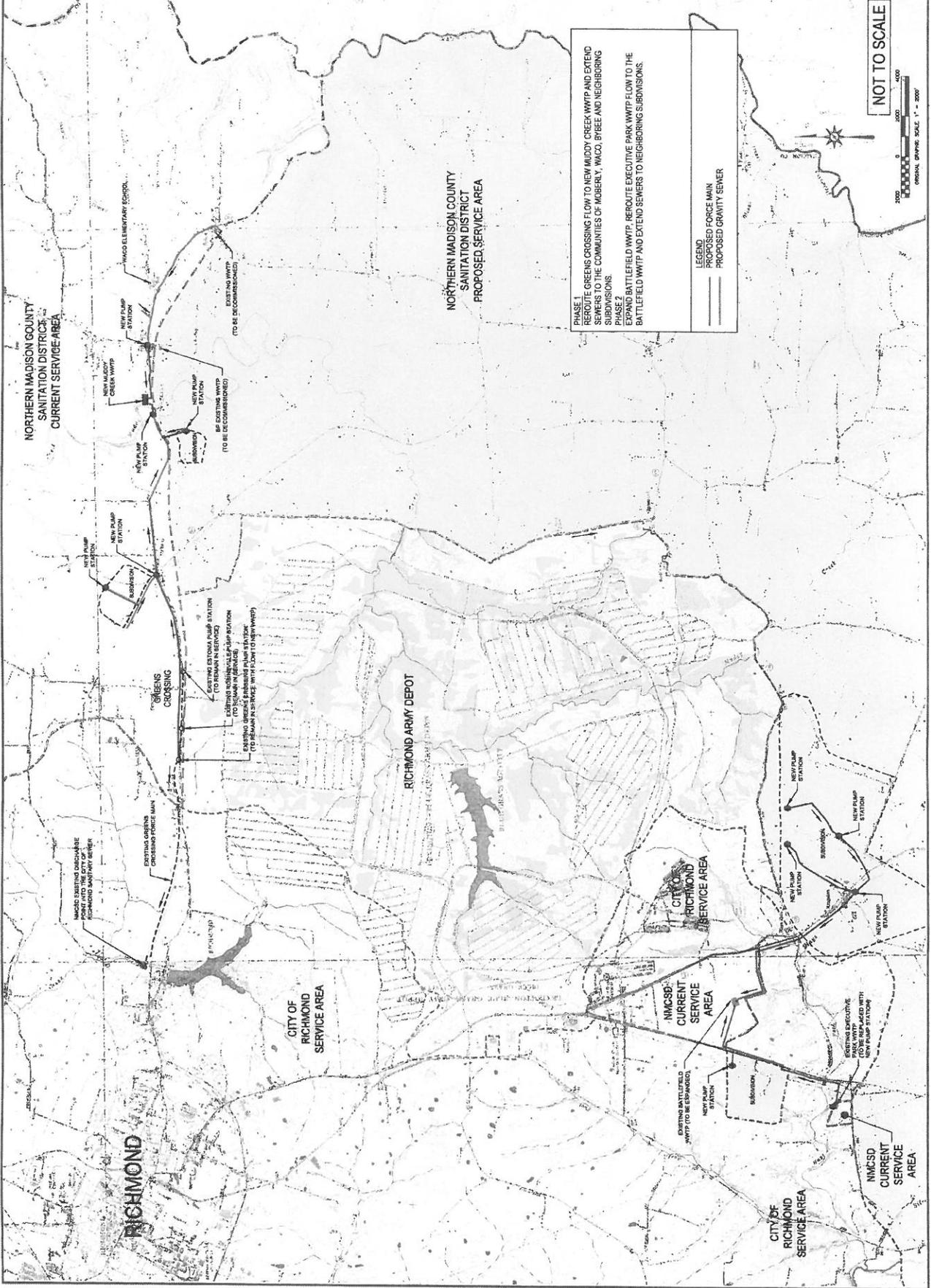
Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\KDFWR Lett.doc



NOT TO SCALE



NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.

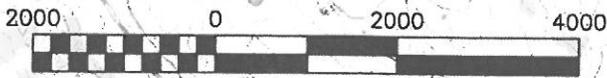


UNION CITY USGS QUADRANGLE
MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER
TREATMENT PLANT
LOCATION

KY 52 TO
RICHMOND

KY 52
TO IRVINE



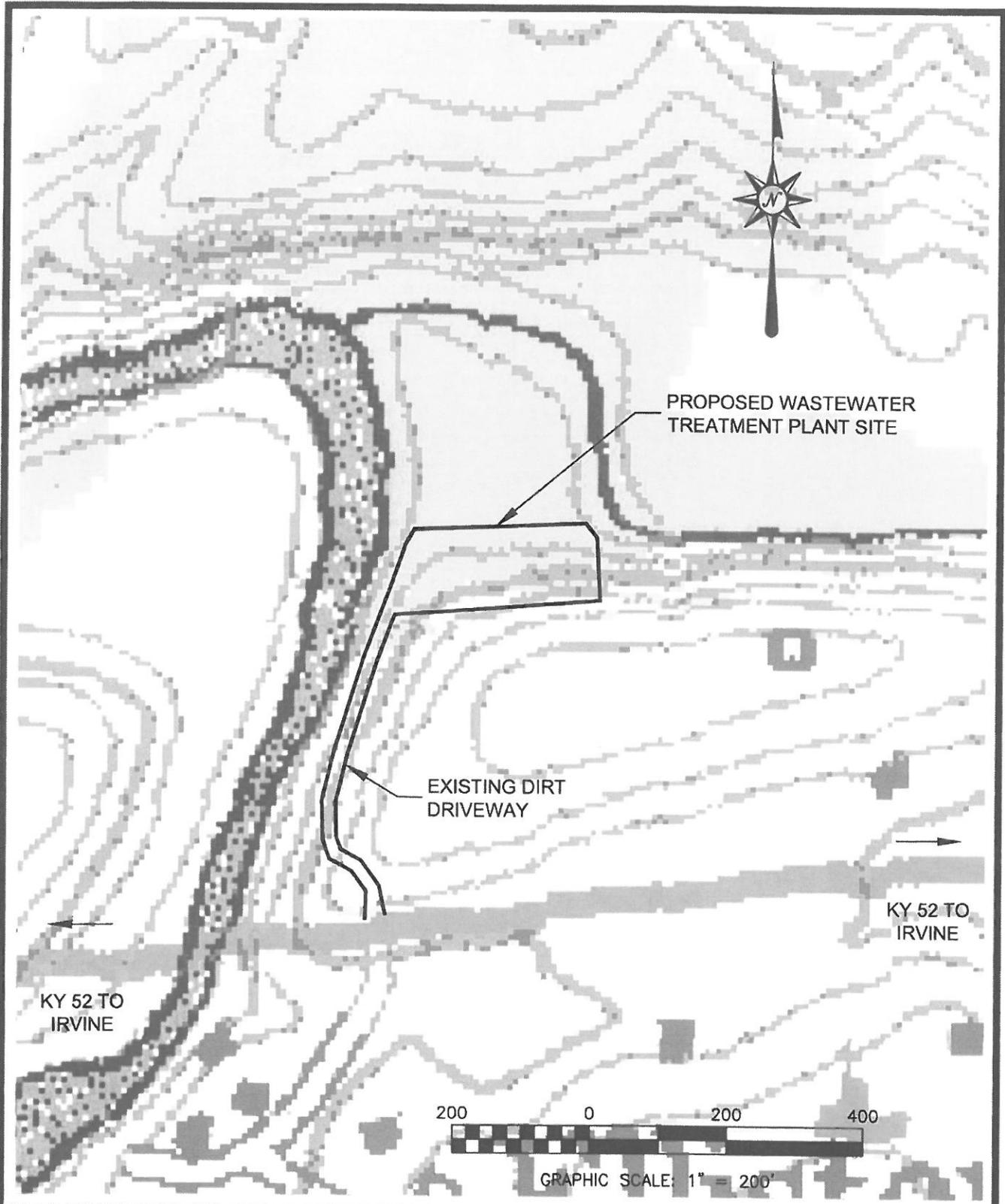
GRAPHIC SCALE: 1" = 2000'



nesbitt engineering, inc.
providing proven solutions since 1976

**SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 2000'



	nesbitt engineering, inc. <i>providing proven solutions since 1976</i>		SITE PLAN PROPOSED MUDDY CREEK WWTP NORTHERN MADISON COUNTY SANITATION DISTRICT		
	drawn by:	disk/file name:	job no.:		
	JCW	\\DWGS\LOCATION USGS.DWG	934.41		
date:	last plot date:	scale:			
3-01-12		1" = 200'			



1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.



**KENTUCKY DEPARTMENT OF FISH & WILDLIFE RESOURCES
TOURISM, ARTS, AND HERITAGE CABINET**

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

Marcheta Sparrow
Secretary

Dr. Jonathan W. Gasset
Commissioner

12 March 2012

Kari A. Wallover, PG
Professional Geologist
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, KY 40507-1016

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System
Madison County, Kentucky

Dear Ms. Wallover:

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has received your request for information regarding the subject project. The Kentucky Fish and Wildlife Information System indicates that the federally-endangered Gray bat (*Myotis grisescens*) is known to occur within 10 miles of the proposed project. The state-listed Northern Leopard Frog (*Rana pipiens*) and Henslow's Sparrow (*Ammodramus henslowii*) are known to occur within close proximity to the project sites. Due to the nature of the project, the KDFWR does not anticipate impacts to listed species or any critical habitat, wetlands, special aquatic sites, or refuge areas. Please be aware that our database system is a dynamic one that only represents our current knowledge of various species distributions.

To minimize indirect impacts to aquatic resources, strict erosion control measures should be developed and implemented prior to construction to minimize siltation into streams and storm water drainage systems 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. Additionally, the KDFWR recommends the following measures for any work that may occur within a stream to help reduce impacts to stream habitat and quality:

- When crossing a stream, the pipe should be laid perpendicular to the stream bank to minimize the direct impacts to the streambed.
- Avoidance of impacts to intermittent and perennial streams if it is feasible.
- Development/excavation during low flow period to minimize disturbances.
- Proper placement of erosion control structures below highly disturbed areas to minimize entry of silt to the stream.
- Replanting of disturbed areas after construction, including reforestation of stream banks, with native vegetation for soil stabilization and enhancement of fish and wildlife populations.



- Avoid impacts to forested areas if possible. If impacts cannot be avoided we recommend reforestation of common areas with native trees to promote use by various species of wildlife.
- Return all disturbed instream habitat to stable condition upon completion of construction in the area.
- Preservation of any tree canopy overhanging the stream.

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,



Dan Stoelb
Wildlife Biologist

Cc: Environmental Section File

Exhibit 9-3

Kentucky Heritage Council Correspondence



March 5, 2012

Mr. Lindy Casebier
Acting Director/State Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Casebier:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCS D) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

The Area 2 project will involve upgrade of the existing Battlefield Park WWTP, adjacent to the southeast corner of the Bluegrass Army Depot on US 421. It will include the installation of approximately 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals, and 180 manholes. The project will also include the construction of five new pump stations. The sewer system to the WWTP and the WWTP expansion will all be constructed within previously disturbed road right-of-ways, or on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant.

As part of the Facilities Plan Update, we are requesting that the State Historic Preservation Office provide us with information concerning any historic and/or archaeological resources on and adjacent to the proposed project site. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of the NMCS D, thank you for your kind and prompt attention to this matter.

Sincerely,

Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\SHPO Lett.doc

NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.



UNION CITY USGS QUADRANGLE
MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER TREATMENT PLANT LOCATION

KY 52 TO RICHMOND

KY 52 TO IRVINE



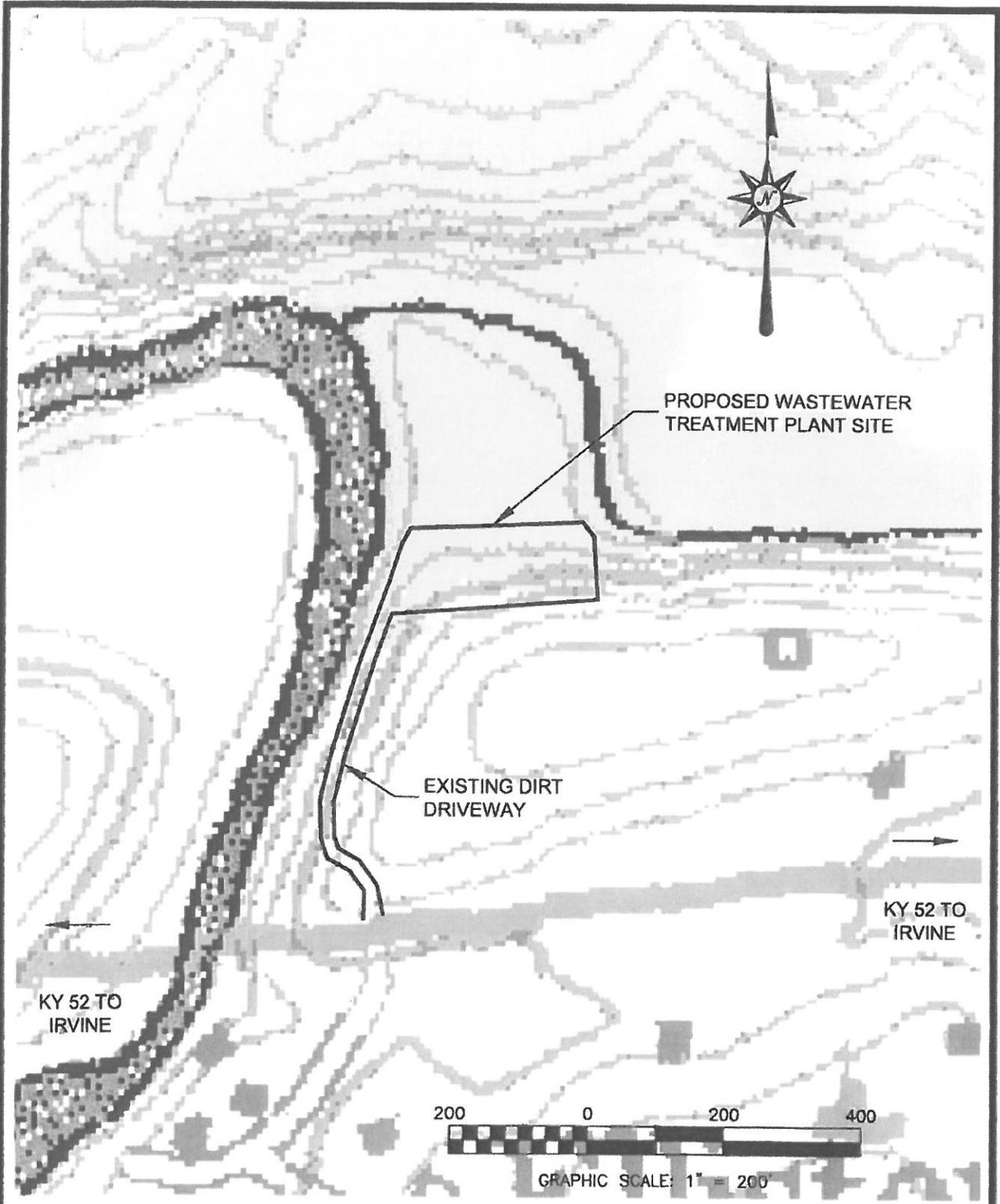
GRAPHIC SCALE: 1" = 2000'



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**SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 2000'



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SITE PLAN
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 200'



1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.



STEVEN L. BESHEAR
GOVERNOR

**TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL**

MARCHETA SPARROW
SECRETARY

THE STATE HISTORIC PRESERVATION OFFICE
300 WASHINGTON STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

LINDY CASEBIER
ACTING EXECUTIVE DIRECTOR AND
STATE HISTORIC PRESERVATION OFFICER

March 29, 2012

Kari A. Wallover
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, KY 40507-1016

**RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System,
Madison County, Kentucky**

Ms. Wallover,

Thank you for your correspondence regarding the above referenced project. Our review indicated that the proposed project has the potential to impact sites eligible for listing or currently listed on the National Register of Historic Places. Therefore, we recommend that a cultural historic survey and an archaeological survey be completed by qualified professionals prior to project implementation. Separate reports documenting the results of the cultural historic and archaeological investigations must be submitted to the State Historic Preservation Office for review, comment and approval. Upon completion of our review of the aforementioned cultural historic and archaeological reports, the State Historic Preservation Officer will advise the applicant if further consultation is required.

Should you have any questions, feel free to contact Phillip Johnson of my staff at 502- 564-7005 ext 122.

Sincerely,

Lindy Casebier, Acting Executive Director
Kentucky Heritage Council and
State Historic Preservation Officer

LC:prj

Exhibit 9-4

U.S. Army Corps of Engineers Correspondence



March 5, 2012

Mr. Mike Turner
CELRL-PM-P-E
Room 708
United States Army Corps of Engineers, Louisville
P.O. Box 59
Louisville, Kentucky 40201-0059

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Turner:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCS D) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

The Area 2 project will involve upgrade of the existing Battlefield Park WWTP, adjacent to the southeast corner of the Bluegrass Army Depot on US 421. It will include the installation of approximately 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals, and 180 manholes. The project will also include the construction of five new pump stations. The sewer system to the WWTP and the WWTP expansion will all be constructed within previously disturbed road right-of-ways, or on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant.

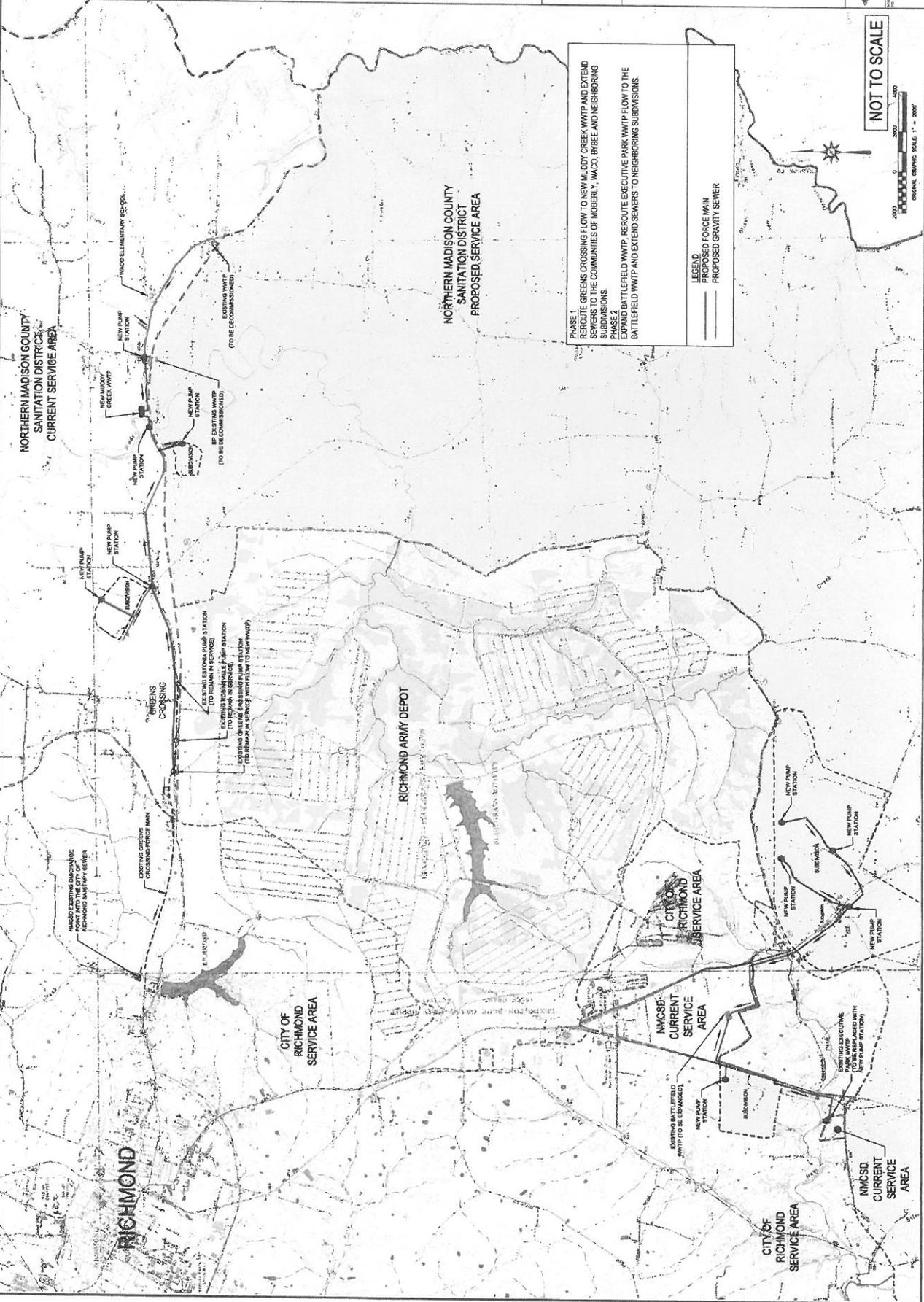
As part of the Facilities Plan Update, we are requesting that the Army Corps of Engineers provide us with information concerning the possibility of wetlands within the impact area of the proposed project. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of NMCS D, thank you for your kind and prompt attention to this matter.

Sincerely,

Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\USACE Lett.doc



PHASE 1
 RELOCATE GREENS CROSSINGS FLOW TO NEW MUDDY CREEK WWTP AND EXTEND SEWERS TO THE COMMUNITIES OF MOBERLY, WACO, BYBEE AND NEIGHBORING SUBDIVISIONS
PHASE 2
 EXPAND BATTLEFIELD WWTP, REROUTE EXECUTIVE PARK WWTP FLOW TO THE BATTLEFIELD WWTP AND EXTEND SEWERS TO NEIGHBORING SUBDIVISIONS

LEGEND
 — PROPOSED FORCE MAIN
 — PROPOSED GRAVITY SEWER

NOT TO SCALE



NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.



UNION CITY USGS QUADRANGLE
MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER
TREATMENT PLANT
LOCATION

KY 52 TO
RICHMOND

KY 52
TO IRVINE



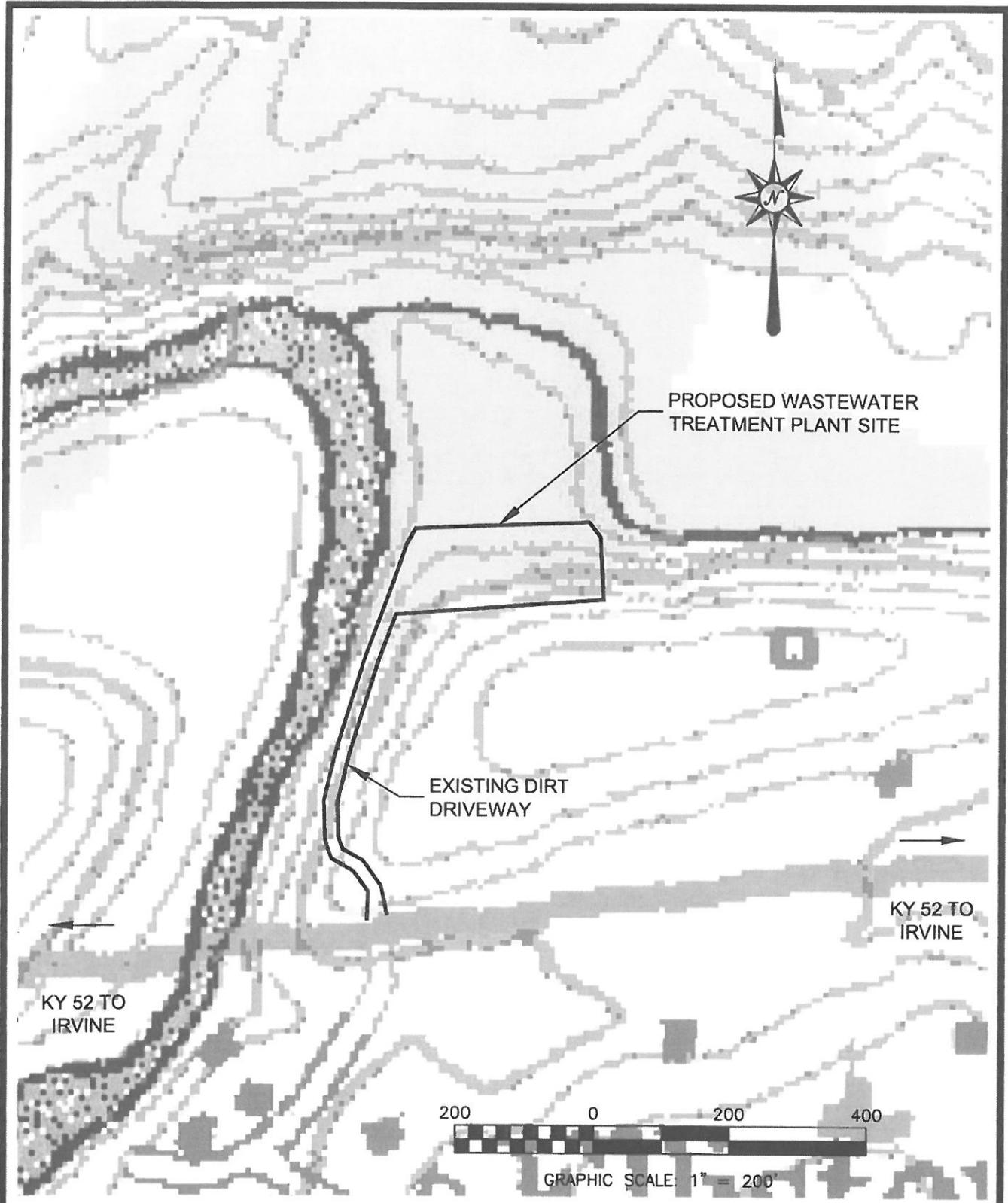
GRAPHIC SCALE: 1" = 2000'



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**SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 2000'



	nesbitt engineering, inc. <i>providing proven solutions since 1976</i>		SITE PLAN PROPOSED MUDDY CREEK WWTP NORTHERN MADISON COUNTY SANITATION DISTRICT	
	drawn by: JCW	disk/file name: \DWGS\LOCATION USGS.DWG	job no.: 934.41	
	date: 3-01-12	last plot date:	scale: 1" = 200'	



1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE KY 40201-0059
FAX: (502) 315-6677
<http://www.lrl.usace.army.mil/>

March 30, 2012

Operations Division
Regulatory Branch (South)
ID No. LRL-2012-00248-jea

Ms. Kari A. Wallover
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, Kentucky 40507-1016

Dear Ms. Wallover:

This is in regard to your request dated March 5, 2012, for information concerning the possibility of wetlands within the impact area of a new wastewater treatment plant near Waco, Kentucky, and the installation of 50,000 linear feet (LF) of gravity sewer, 15,000 LF of force main, 15,000 LF of lateral and 180 manholes. In addition, the proposed project consists of upgrading the existing Battlefield Park wastewater treatment plant adjacent to the southeast corner of the Bluegrass Army Depot on US 421 in Madison County, Kentucky. This proposed work includes the installation of 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals and 180 manholes.

To our knowledge, no wetland mapping of your proposed project site has been done. It was noted that the soil survey map indicates hydric soils are present within the proposed project which is good indication of wetlands. However, this does not mean wetlands exist within the project area. A jurisdictional determination must be completed if a proposed project would impact "waters of the United States (U.S.)" including wetlands.

Also, your proposed project was reviewed pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA). Section 10 of the Rivers Act of 1899 requires that a Department of the Army (DA) permit be obtained for certain structures or work in or affecting navigable waters of the U.S., prior to conducting the work (33 U.S.C. 403) Section 404 of the Clean Water Act requires that a DA permit be obtained for placement or discharge of dredged and/or fill material into waters of the U.S., including wetlands prior to conducting the work (33 U.S.C. 1344).

Your letter did not indicate if any streams or wetlands would be impacted by the installation and/or construction of the sewer collection system and a proposed waste water treatment plant. Please note that streams and adjacent wetlands are considered "waters of the U.S." pursuant to Section 404 of the CWA.

Exhibit 9-5

**Natural Resources and Conservation
Service Correspondence**



March 5, 2012

Mr. Sam Miller
District Conservationist
Natural Resources Conservation Service
1024 Ival James Blvd.
Richmond, KY 40475

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Miller:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCS D) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

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As part of the Facilities Plan Update, we are requesting that the Natural Resource Conservation Service provide us with information concerning the possibility of hydric soils, prime farmland, or farmland of statewide importance within the impact area of the proposed project. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of the NMCS D, thank you for your kind and prompt attention to this matter.

Sincerely,

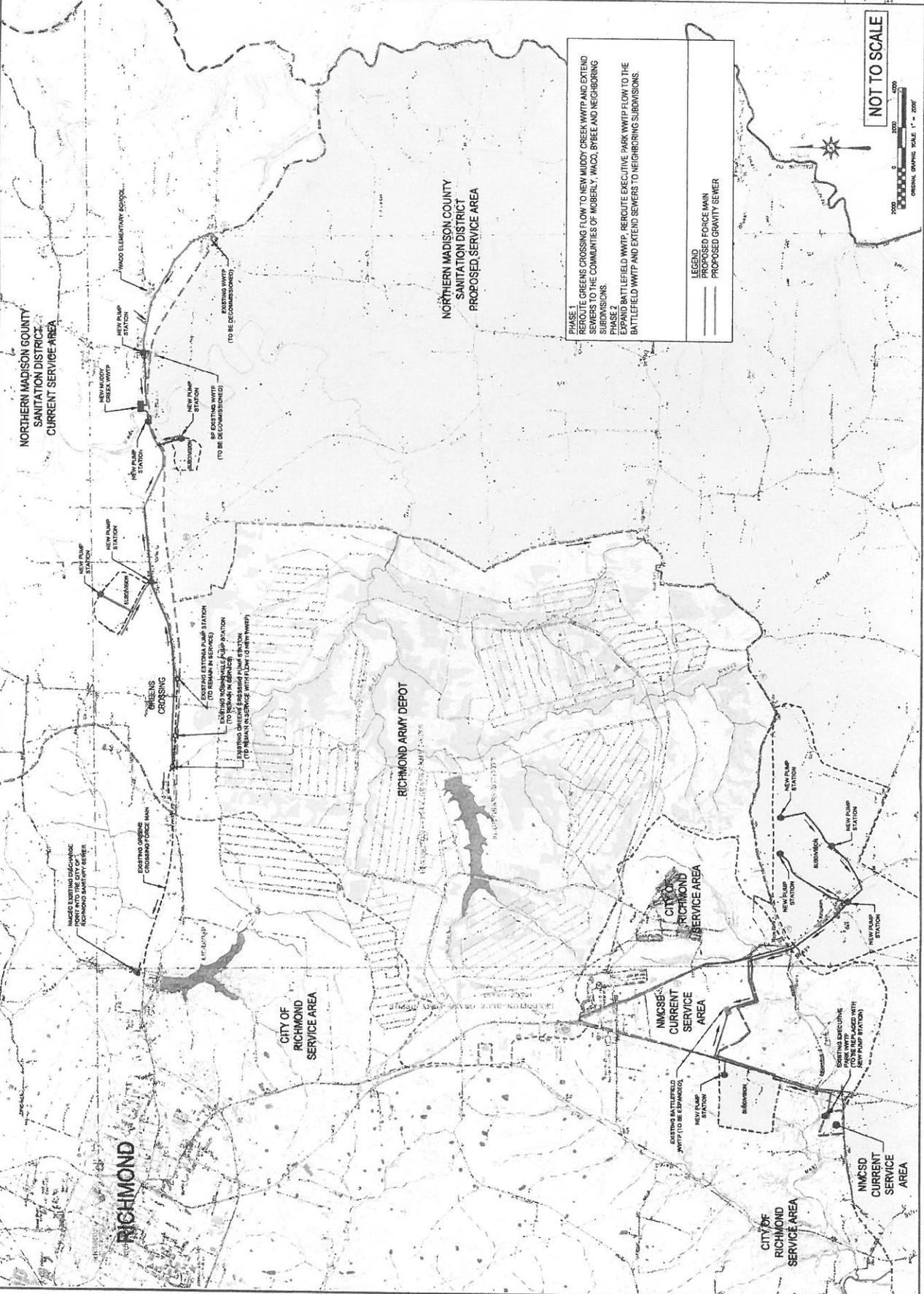
Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\NRCS Lett.doc



NOT TO SCALE



PHASE 1
 RELOCATE GREENS CROSSING FLOW TO NEW MUDDY CREEK WWTTP AND EXTEND SEWERS TO THE COMMUNITIES OF MOBBELY, WACCO, BREE, AND NEIGHBORING SUBDIVISIONS.
PHASE 2
 EXPAND BATTLEFIELD WWTTP, RELOCATE EXECUTIVE PARK WWTTP FLOW TO THE BATTLEFIELD WWTTP AND EXTEND SEWERS TO NEIGHBORING SUBDIVISIONS.

- LEGEND
- PROPOSED FORCE MAIN
 - - - PROPOSED GRAVITY SEWER

NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.



UNION CITY USGS QUADRANGLE

MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER TREATMENT PLANT LOCATION

KY 52 TO RICHMOND

KY 52 TO IRVINE

2000 0 2000 4000



GRAPHIC SCALE: 1" = 2000'



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SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT

drawn by:
JCW

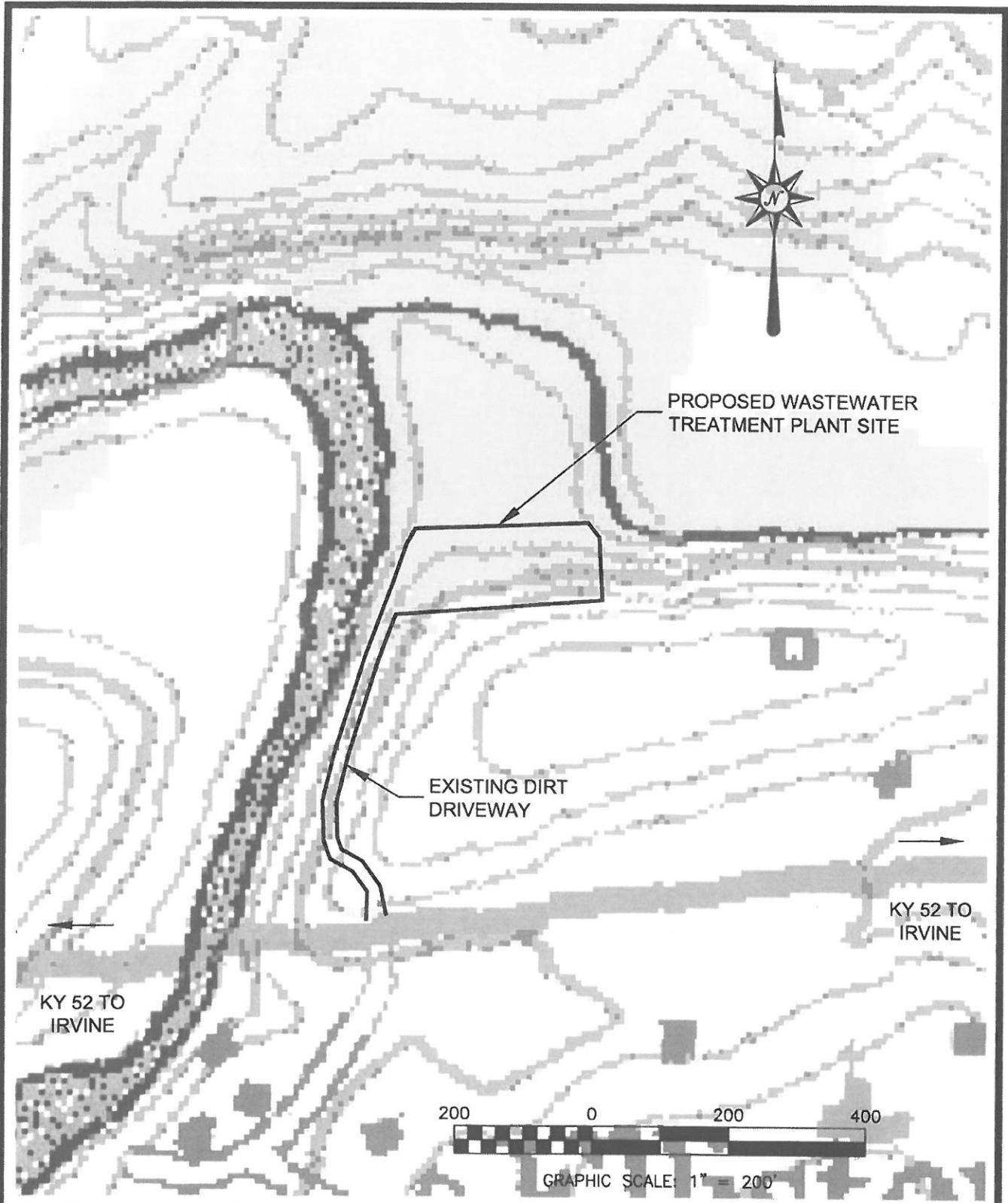
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job no.:
934.41

date:
3-01-12

last plot date:

scale:
1" = 2000'



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**SITE PLAN
 PROPOSED MUDDY CREEK WWTP
 NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by:
 JCW

disk/file name:
 \DWGS\LOCATION USGS.DWG

job no.:
 934.41

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1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.

United States Department of Agriculture



NRCS Natural
Resources
Conservation
Service

1925 Old Main Street
Suite 2
Maysville, KY. 41056
Ph: 606-759-5570

To: Kari A. Wallover, PG
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, KY 40507-1016
Ph: 859-233-3111

Mar. 20, 2012

Re: Northern Madison co. Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Ms. Wallover,

Attached is an NRCS map using 2010 aerial photography showing the Waco WWTP project area, as identified by maps provided with your request. In addition, I have included a prime farmland legend and brief soil map unit descriptions for this site. Additional information including, information on hydric soils in Madison County, is available on-line through USDA's Web Soil Survey.

According to the information in your request all other areas of construction, pump station, force mains, and new lines will be placed on existing right-a-ways or previously disturbed areas that are already considered as prior converted land. "This part of the determination does not apply to any lands beyond the boundary of the right-of-ways or previously disturbed areas not already designated as *Prior Converted*."

If this office may be of additional assistance, please do not hesitate to contact my office in Maysville Ky. or contact the NRCS District Conservationist at 859-624-1981.

Steve Jacobs
Resource Soil Scientist, NRCS, Maysville, KY.

cc: Sam Miller, NRCS District Conservationist, Richmond, KY

**Waco WWTP site Madison Co. KY.
Northern Madison County Sanitation District**

Ld - Lindside silt loam, primefarmland

CyE - Cynthiana-Rock Outcrop complex, 12 to 30 percent slopes, not important farmland



NRCS 2010 Aerial Photography

Scale 1" = 100'

Map Unit Description (Brief)

Madison County, Kentucky

[Only those map units that have entries for the selected non-technical description categories are included in this report]

Map Unit: CyE - Cynthiana-Rock outcrop complex, 12 to 30 percent slopes

Description Category: PHG

PHG-9 Rocky and stony soils

Shallow and moderately deep, well drained rocky or stony, silty clay to loam soils of the uplands with slopes of more than 6 percent and low productivity potential

Map Unit: Ld - Linside silt loam

Description Category: PHG

PHG-1 Well drained bottomland soils

Deep, well drained silt loam, loam and fine sandy loam soils of the flood plains with very high productivity potential

Prime and other Important Farmlands

Madison County, Kentucky

Map symbol	Map unit name	Farmland classification
Ld	Lindsay silt loam	All areas are prime farmland

Section 10 Evaluation of Recommended Plan

1. Environmental Impacts

A. Water Quality

As a consequence of eliminating failing septic systems, the net effect of these projects will be a regional quality improvement in both the surface water and groundwater.

B. Wetlands and Floodplains

No wetland disturbance is anticipated by these projects.

A portion of the proposed Muddy Creek WWTP site appears to be in floodplain. A preliminary HEC RAS study was performed using available topographic data to estimate the 100-year flood elevation in an effort to assess site feasibility. Based on these findings, a portion of the WWTP will be in the flood plain. It is anticipated that fill material will be placed along the edge of the floodplain up to a depth of seven feet. During preliminary design of the WWTP, the site will be surveyed to generate a detailed topographic site plan from which a more accurate determination of the 100-year floodplain and its impact can be determined. Subsequent permitting through the Division of Water Surface Water Permits Branch and the Water Quality Branch will be filed as required.

C. Air Quality

No impact on air quality, neither positive nor negative, is anticipated by these projects.

D. Endangered Species

The United State Fish and Wildlife Service (USFWS) and the Kentucky Department of Fish and Wildlife Resources (KDFWR) were contacted to determine if there were any federally or state listed threatened or endangered species in the vicinity of the project site. KDFWR personnel indicated that due to the nature of the project, impacts to listed species or any critical habitat, wetlands, special aquatic sites, or refuge areas are not anticipated. USFWS personnel indicated that two federally listed species have the potential to occur within the project vicinity, which are the Indiana bat and running buffalo clover. To avoid impacts to the Indiana bat, the USFWS recommended that trees only be removed from the project area between October 15 and March 31 to avoid impacting summer roosting Indiana bats or between November 15 and March 31 if Indiana bat hibernacula are identified on the project site to avoid impacting "swarming" behavior. In addition, a survey for running buffalo clover was required to be done at the site. A survey was conducted at the site by Ecosource, Inc. (Georgetown, KY) on May 1-2, 2012, which determined that running buffalo clover is not present at the site. Therefore, no impact on endangered species is anticipated by this project. A copy of the running buffalo clover survey report is provided as Appendix 4.

E. Historical and Archaeological Resources

The Kentucky Heritage Council was contacted regarding the possibility of historic and archaeological resources on or adjacent to the proposed project site. A letter was received from Mr. Lindy Casebier, the State Historic Preservation Officer (SHPO). Mr. Casebier recommended that an archaeological survey be completed at the site. An archaeological survey was completed on the property in May 2012, by Dr. Jack Shock (Bowling Green, KY). No archeological sites were located during the survey. Therefore, no impact on historical or archaeological resources is anticipated by this project. A copy of the archaeological survey report is provided as Appendix 5.

F. Other Environmentally Sensitive Areas

No impacts on prime farmland or other environmentally sensitive areas are anticipated by this project.

2. Institutional Structure

A. The Northern Madison County Sanitation District will construct, own and operate the proposed facilities, all within their existing Planning Area, or within newly established Planning Area that is currently undesignated. Therefore, no inter-municipal agreements will be required. Furthermore, the improvements addressed in this Plan Update will not require any special site-specific rules or Sewer Use Ordinance changes.

3. Funding Plan

The Funding Plan discussed herein addresses the initial projects proposed for the 0-5 Year Planning Area only. A funding plan for work beyond that timeframe would involve so many unknown variables (such as future rates, future construction costs, future customer base, interest rates, grant availability, etc.) that a funding analysis would not yield useful results at this time.

A. Proposed Project Phasing

Phase 1, which is anticipated to be completed within five years will be constructed in several phases. The first phase will entail construction of the Muddy Creek WWTP and rerouting flow from the existing Greens Crossing collection system to the new WWTP, herein referred to as Phase 1A Sewer Project. Future sewer projects will be constructed each year to extend sewers into the outlying region as funds become available. Figures 10-1 and 10-2 depict the initial and future phases of construction respectively. Figures 10-3, 10-4 and 10-5 are respectively, an overall site plan of the proposed Muddy Creek WWTP, a general conceptual plan, and a more detailed plan depicting the process flow. Although a funding plan was not prepared for Phase 2, Figure 10-6 is a conceptual plan of the Phase 2 area improvements.

B. Project Cost - Phase 1A

Phase 1A capital costs are summarized in Table 10-1 below.

Table 10-1
Phase 1A Capital Costs

Phase 1A - Muddy Creek Wastewater Treatment Plant

Construction Cost	\$ 580,000
Legal, Land and Right of Way	8,000
Administrative	29,000
Engineering (Design and Resident Observation)	139,000
Project Contingencies	29,000
Total Project Cost (rounded to nearest \$10,000)	\$ 790,000

Phase 1A - Sewers

Construction Cost	\$ 670,000
Legal, Land and Right of Way	8,000
Administrative	33,000
Engineering (Design and Resident Observation)	129,000
Project Contingencies	34,000
Total Project Cost (rounded to nearest \$10,000)	\$ 870,000

Total Phase 1A Project Cost	\$ 1,660,000
------------------------------------	---------------------

C. Operational Cost – Phase 1A

Phase 1A operational costs are summarized in Table 10-2 below. Costs are for operations and maintenance only. There is no outstanding debt service on the existing Greens Crossing collection system.

Table 10-2
Phase 1A Operational Costs

Muddy Creek WWTP

	Quantity	Units	Unit Cost	Annual Total
Payroll	568	hours	\$ 30 per hour	\$ 17,040
Fuel	173	Gallons	4.00 per gal	693
Laboratory Analyses	1	lump sum	3,328 per year	3,328
Electrical	194,801	kw-hrs/yr	0.075 per kw-hr	14,610
PM: belts, filters, oil,grease	1	lump sum	2,000 per year	2,000
Major Maintenance	1	lump sum	1,450 per year	1,450
Total Operating Expenses				\$ 39,121

Phase 1A Sewers

	Quantity	Units	Unit Cost	Annual Total
Payroll	272	hours	\$ 30 per hour	\$ 8,160
Fuel	35	gallons	4.00 per gal	139
Electrical	54,182	kw-hr/yr	0.075 per kw-hr	4,064
Major Maintenance	1	lump sum	1,675 per year	1,675
Total Operating Expenses				\$ 14,037

Notes

1. Annual maintenance is assumed to be 0.25% of the capital cost.
2. Lab analysis is based on weekly sampling of BOD5, TSS, NH3-N, PO4-P and pH.
3. Electrical cost is based on typical energy demands of pumps and blowers required to meet the design flows and treatment levels at the design flow.
4. Annual major maintenance cost is assumed 0.25% of construction cost.

D. Replacement Costs

Phase 1A replacement costs are shown for short lived assets in Table 10-3 below. These figures are based on a 20-year project life and a 2% earnings rate on escrow, combined with a 2.49% average 10-year CPI (2002 thru 2011)

Table 10-3
Short Lived Assets Replacement Costs

Description	Unit	No.	Unit Cost	Total Cost	Service Life	Future Cost	Annual Deposit
walkway grating	ls	1	\$3,500	\$3,500	20	\$5,724	\$ 236
aeration diffusers	ls	1	2,400	2,400	10	3,069	280
blowers - aeration tanks	ea	2	5,200	10,400	10	13,300	1,215
blowers - digesters and eq tanks	ea	2	3,400	6,800	10	8,696	794
pumps - eq tanks	ea	2	3,600	7,200	10	9,208	841
pumps - sludge transfer and sump	ea	4	2,400	9,600	10	12,277	1,121
ultraviolet disinfection mechanical	ea	2	16,000	32,000	20	52,334	2,154
flowmeters and instrumentation	ls	1	4,000	4,000	20	6,542	269
pumps - Greens Crossing PS	ea	2	5,800	11,600	10	14,835	1,355
Total Annual Reserve							\$8,265

Future Cost and Annual Deposit values are based on the following rates:

Interest rate from escrow (assumed)	0.02
Inflation rate (10-yr avg CPI)	0.02

E. Income – Phase 1A

The Northern Madison County Sanitation District tracks the income from each of its four collection and treatment areas separately. Their goal is for each to be self sustaining. Table 10-4 summarizes the service fees from each of these areas. Late fees, sales tax and application fees are not included in these as those values tend to be variable or as in the case of tax, not applicable to the net income.

Table 10-4
NMCSO 2011 Income From Service Fees

Month	Greens Crossing	Executive Park	Battlefield Estates	North WWTP	Total
Jan	\$ 11,956	\$ 2,853	\$ 16,230	\$ 31,607	\$ 62,647
Feb	11,112	2,479	14,464	30,010	58,065
Mar	14,360	3,203	19,063	34,253	70,878
Apr	12,162	3,080	18,630	35,206	69,078
May	14,372	2,964	19,819	37,040	74,196
Jun	13,305	3,159	16,542	40,648	73,653
Jul	14,009	3,420	22,525	34,272	74,226
Aug	15,916	3,050	20,338	45,904	85,209
Sep	15,258	3,223	19,096	39,722	77,300
Oct	15,528	3,150	20,526	39,512	78,715
Nov	14,607	3,686	19,938	36,779	75,009
Dec	14,079	2,969	20,806	39,554	77,407
Avg	\$ 13,889	\$ 3,103	\$ 18,998	\$ 37,042	\$ 73,032
Total	\$ 166,665	\$ 37,234	\$ 227,976	\$ 444,507	\$ 876,382

For purposes of confirming a flow basis to project future income, an analysis was performed comparing the actual existing income per customer against estimated income based on historical flows. Table 10-5 steps through this analysis. Using the base flow derived from the I/I analysis as representative of water usage, and therefore the basis for billing, the estimated annual income was calculated using the 2011 sewer rates. The result tracks closely to the actual income for 2011. An adjusted average flow per household is then backed out from the actual income figure. This flow is then applied to the future 2012 rate, established in Resolution No. 11-10 (Appendix 3).

Table 10-5
Income for Greens Crossing / Future Muddy Creek WWTP

base daily flow (from I/I evaluation)	34,600	gpd
number of households (2011)	293	
average flow per household	118	gpd
	480	cf/mo.
2011 Rates Imposed by NMCS D		
first 280 cu ft	\$ 34.50	
rate > 280 cu ft per 100 cu ft	\$ 5.75	
average monthly bill per hh	\$ 46.01	
est. annual income from existing customers	\$ 161,776	
actual annual income from existing customers	\$ 166,665	
actual average monthly bill per hh	\$ 47.40	
average flow per household, adjusted	504	cf/mo.
2012 Rates Imposed by NMCS D		
first 280 cu ft	\$ 37.95	
rate > 280 cu ft per 100 cu ft	\$ 6.33	
average monthly bill per hh	\$ 52.15	
projected 2012 income from existing customers	\$ 183,371	

F. Funding Scenario

Applying the figures from above, the following analysis demonstrates one possible funding alternative utilizing a 20-year State Revolving Fund loan at the current standard rate of 3%. It is anticipated that an income survey of the region would validate a non-standard lower interest rate and possibly a percentage of loan forgiveness, but for purposes of this analysis, the higher more conservative rate is used. As shown in Table 10-6, based on the current rate structure and number of customers, this project can be self-funded through a 100% loan.

Table 10-6
 Loan Analysis for Greens Crossing / Future Muddy Creek WWTP

Collection System	\$	870,000
WWTP	\$	790,000
Total loan amount	\$	1,660,000
Interest rate (Standard SRF rate)		3.00%
Number of years		20
Capital Recovery Factor		0.0672
Annual loan repayment	\$	111,578
KIA - Reserve Account - SLA	\$	8,265
Annual O&M, WWTP	\$	39,121
Annual O&M, sewers	\$	14,037
Total Annual Revenue Requirement	\$	173,001
Annual Income (2012)	\$	183,371
Annual Balance	\$	10,369

Other funding sources will be pursued that can provide for a portion of the project to be funded through grants, such as Rural Development, Community Development Block Grant, and state line item funding. Furthermore, the approach to funding future Phase 1 projects will be similar.

4. Residential User Charge Rates

Applying the rate structure established in the NMCSO Resolution No. 11-10 to the historical flow of 3,773 gal.mo and to a nominal flow of 4,000 gal/mo, Table 10-7 shows the current and future projected monthly sewer rates. These rates will be effective regardless of whether or not the projects discussed in this Plan Update are implemented. However, as discussed in Section 2, without Phase 1A, the cost per household will be substantially greater without this project.

Table 10-7
Current and Projected Residential User Charge Rate per Month

Average Flow per Household		
Historical Flow	Nominal Usage	
124	132	gpd
3,773	4,000	gal/mo
504	535	cu ft /mo

Average Monthly Sewer Bill					
	2011	2012	2013	2014*	2015*
first 280 cu ft	\$ 34.50	\$ 37.95	\$ 41.75	\$ 42.79	\$ 43.86
rate > 280 cu ft per 100 cu ft	\$ 5.75	\$ 6.33	\$ 6.96	\$ 7.13	\$ 7.31
average monthly bill per hh based on historical flow	\$ 47.40	\$ 52.15	\$ 57.37	\$ 58.80	\$ 60.26
average monthly bill per hh based on 4,000 gal/mo	\$ 49.15	\$ 54.08	\$ 59.48	\$ 60.96	\$ 62.48

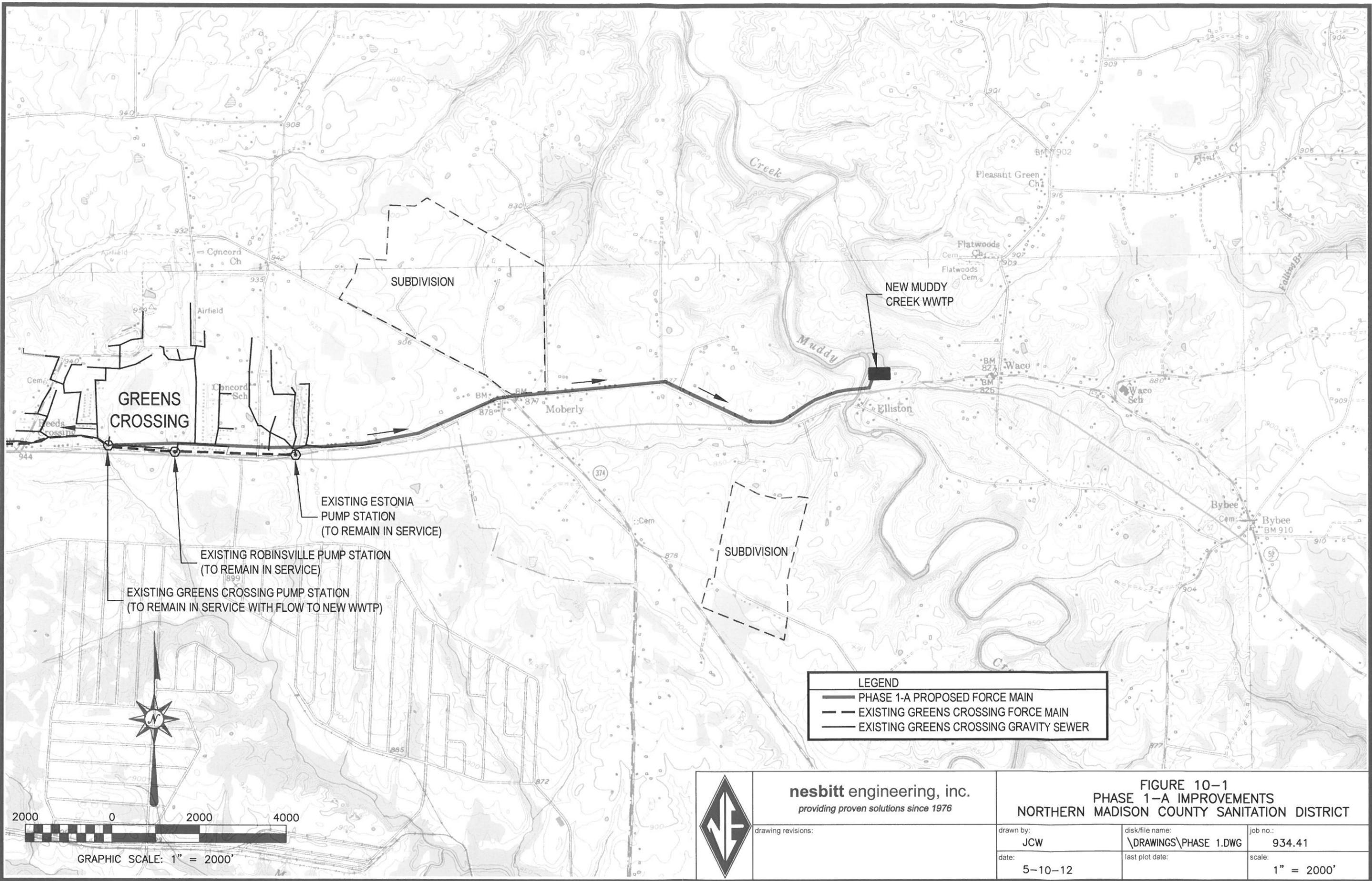
* Beginning in 2014 the NMCSD Sewer Use Ordinance calls for an automatic annual rate increase scaled to the CPI.

5. Implementation Schedule

Table 10-8 is a proposed implementation schedule for the projects outlined in this report. Given the financial urgency to complete Phase 1A, and the ability to self-fund the project, Phase 1A will be implemented shortly after approval of this Plan Update. The ensuing phases of work are generally separated into moderately sized projects that can be quickly implemented due to their size.

Table 10-8
Proposed Implementation Schedule

Phase	Description	Completion Date	
		Design	Construction
1A	Reroute Greens X-ing and Construct Muddy Creek WWTP	July, 2012	July, 2013
1B	Sewer Extension to Waco School	Jan, 2013	Dec 2013
1C	Moberly Subdivision Sewers	Jan, 2014	Dec 2014
1D	South Subdivision (Caroline Drive) Sewers	Jan, 2015	Dec 2015
1E	East Sewer Extension to ByBee	Jan, 2016	Dec 2016
2A	Battlefield WWTP Expansion	Jan, 2018	Dec 2018
2B	Executive Park Sewer Extension	Jan, 2019	Dec 2019
2C	Kingston Subdivision Sewers Phase 1	Jan, 2020	Dec 2020
2D	Kingston Subdivision Sewers Phase 2	Jan, 2021	Dec 2021
2E	Kingston Subdivision Sewers Phase 3	Jan, 2022	Dec 2022



GREENS CROSSING

SUBDIVISION

NEW MUDDY CREEK WWTP

EXISTING ESTONIA PUMP STATION
(TO REMAIN IN SERVICE)

EXISTING ROBINSVILLE PUMP STATION
(TO REMAIN IN SERVICE)

EXISTING GREENS CROSSING PUMP STATION
(TO REMAIN IN SERVICE WITH FLOW TO NEW WWTP)

SUBDIVISION

LEGEND

- PHASE 1-A PROPOSED FORCE MAIN
- EXISTING GREENS CROSSING FORCE MAIN
- EXISTING GREENS CROSSING GRAVITY SEWER

2000 0 2000 4000

GRAPHIC SCALE: 1" = 2000'

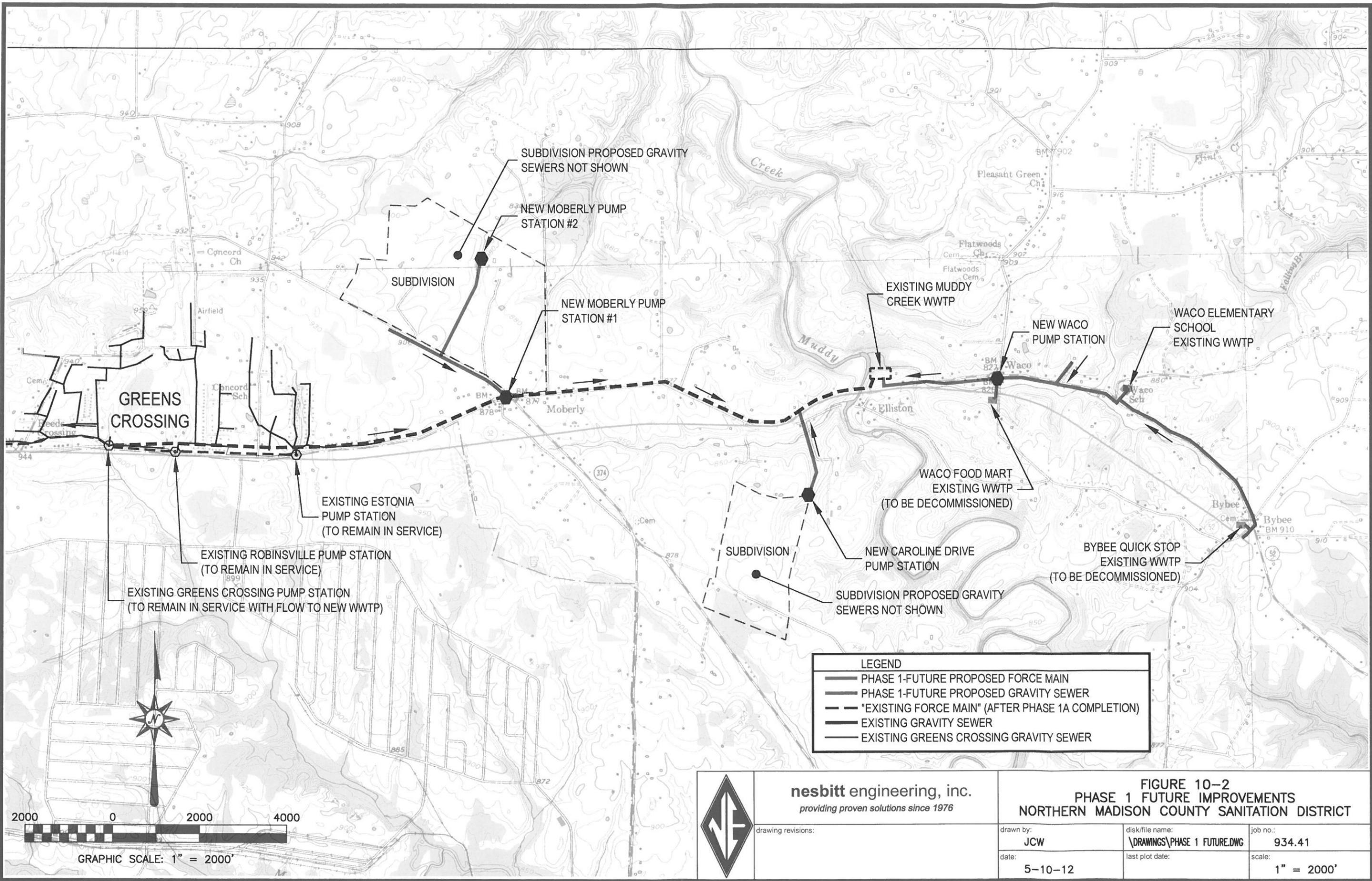


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FIGURE 10-1
PHASE 1-A IMPROVEMENTS
NORTHERN MADISON COUNTY SANITATION DISTRICT

drawn by: JCW	disk/file name: \\DRAWINGS\PHASE 1.DWG	job no.: 934.41
date: 5-10-12	last plot date:	scale: 1" = 2000'



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FIGURE 10-2
PHASE 1 FUTURE IMPROVEMENTS
NORTHERN MADISON COUNTY SANITATION DISTRICT

drawn by:
JCW

date:
5-10-12

disk/file name:
 \DRAWINGS\PHASE 1 FUTURE.DWG

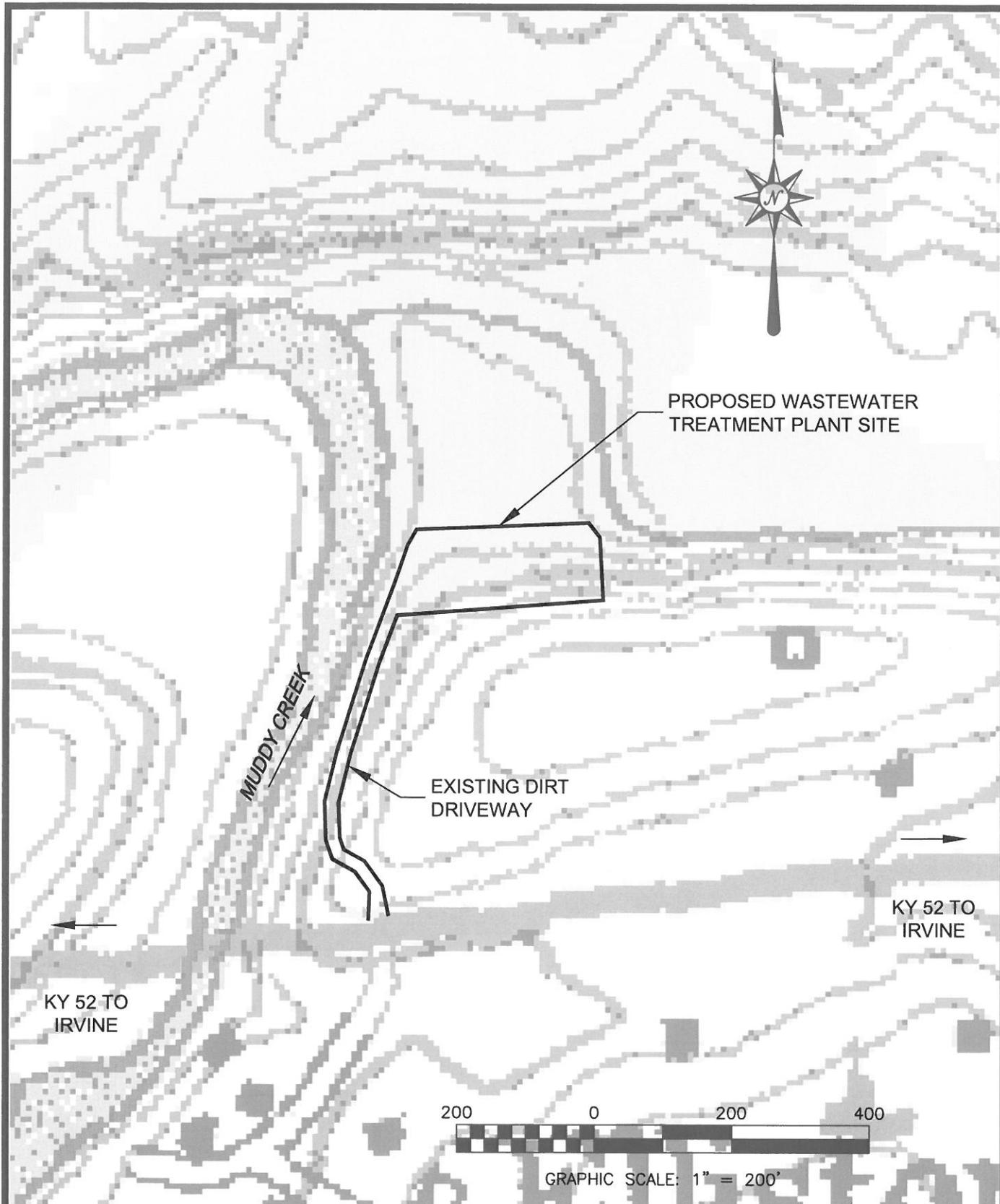
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job no.:
934.41

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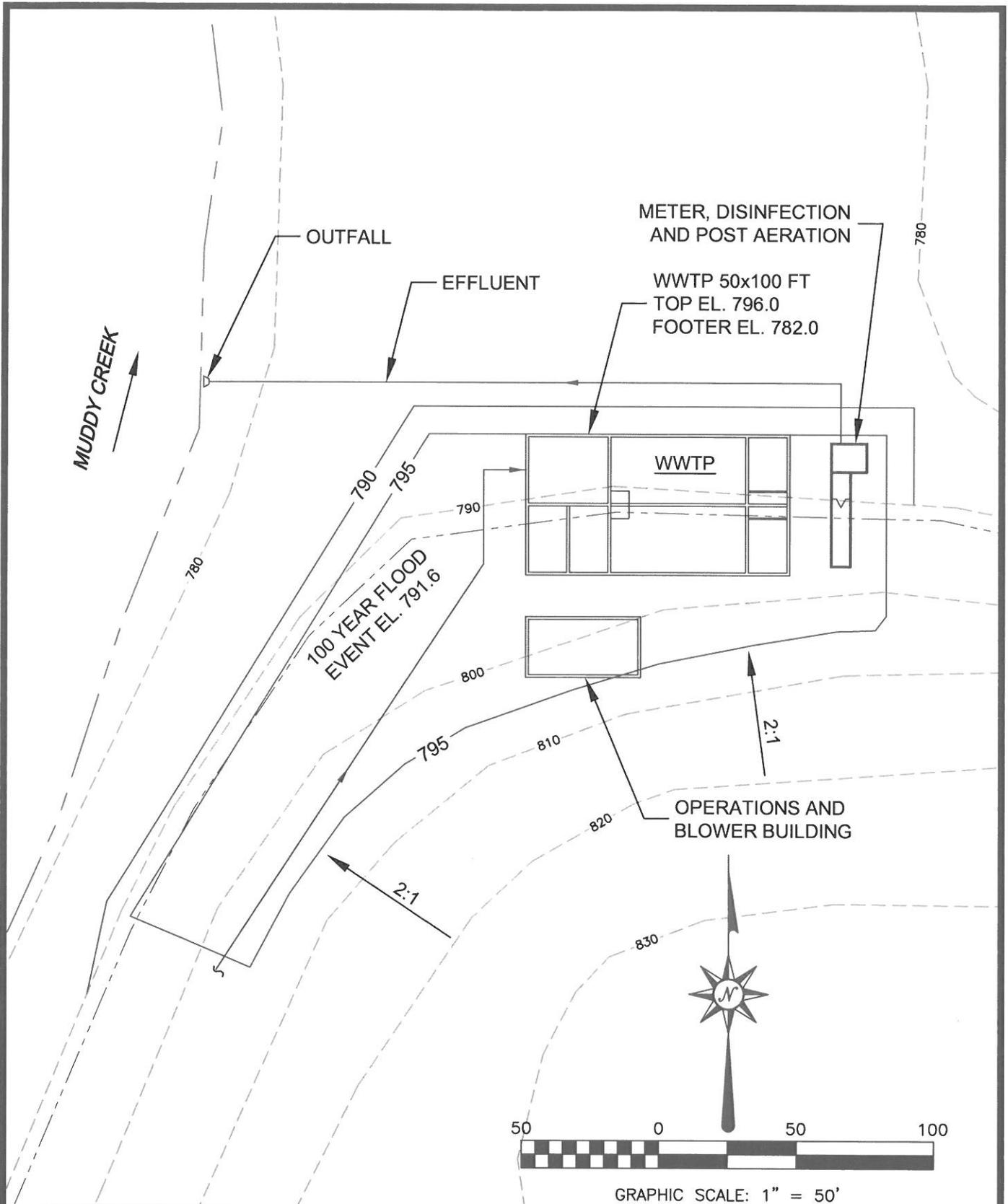
GRAPHIC SCALE: 1" = 2000'



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**FIG 10-3 SITE PLAN
 PROPOSED MUDDY CREEK WWTP
 NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 4-03-12	last plot date:	scale: 1" = 200'



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drawn by:

JCW

date:

4-03-12

disk/file name:

\\DRAWINGS\WWTP CONCEPT.DWG

last plot date:

job no.:

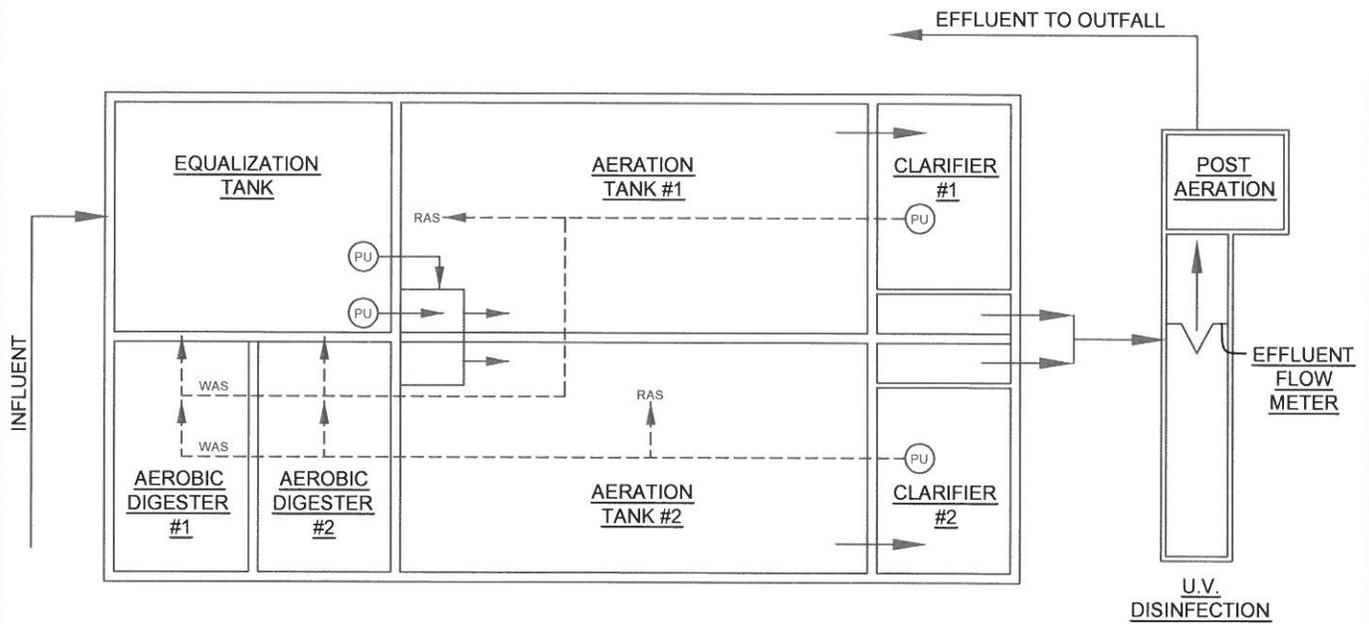
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scale:

1" = 50'

**FIG 10-4 CONCEPT DESIGN
 PROPOSED MUDDY CREEK WWTP
 NORTHERN MADISON COUNTY SANITATION**

GRAPHIC SCALE: 1" = 50'



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drawing revisions:

drawn by:

JCW

date:

4-03-12

disk/file name:

\\DRAWINGS\WWTP CONCEPT.DWG

last plot date:

job no.:

934.41

scale:

NOT TO SCALE

**FIG 10-5 CONCEPT PLAN
 PROPOSED MUDDY CREEK WWTP
 NORTHERN MADISON COUNTY SANITATION**

Exhibit 10-1

**0 to 5 Year Planning Area Opinion of Probable Cost
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Selected Alternative - Concrete Extended Aeration Treatment Process : Muddy Creek WWTP

No.	Description	Unit	Quantity	Unit Cost	Total Capital Cost (Installed)
1	WWTP Concrete Tanks, Poured-in-place	cy	432	\$ 400	\$ 172,919
2	WWTP - Clarifier weirs and launder, installed	lf	30	160	4,800
3	WWTP Mechanical, Installed	ls	1	90,000	90,000
4	UV Disinfection channel and equipment	ls	1	80,000	80,000
5	WWTP Walkway	sq ft	450	30.00	13,500
6	Yard Piping and Valves	ls	1	40,000	40,000
7	Control/ Mechanical Building	sq ft	400	200	80,000
8	Electrical/ Service/Controls/Instrumentation	ls	1	40,000	40,000
9	Fence	lf	500	12.00	6,000
10	Access Driveway & Gravel Yard	cu yds	407	45.00	18,333
11	Earthwork	cu yds	1,778	19.50	34,667
	Construction Cost (rounded to nearest \$10,000)				\$ 580,000
	Project Development rounded to nearest \$1,000				176,000
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)				29,000
	Total Project Cost (rounded to nearest \$10,000)				\$ 790,000

Exhibit 10-2

**0 to 5 Year Planning Area Opinion of Probable Cost
Regional Wastewater Facilities Plan Update/ Northern Madison County Sanitation District**

Selected Alternate - Gravity Sewer System

No.	Description	Unit	Quantity		Unit Cost	Total Capital Cost (Installed)	
			Phase 1A	Future Phases		Phase 1A	Future Phases
1	4" PVC SDR21 Force Main	LF		2,000	\$ 14.00	\$ -	\$ 28,000
2	6" PVC SDR21 Force Main	LF	19,000	3,000	19.00	361,000	57,000
3	8" SDR 35 PVC Gravity Sewer	LF	5,000	44,000	38.00	190,000	1,672,000
4	4" SDR 35 PVC Sewer Lateral, etc.	LF		31,100	22.00	-	684,200
5	Greens Crossing Pump Station Upgrade	EA	1		30,000	30,000	-
6	Moberly Pump Station No.1	EA		1	100,000	-	100,000
7	Moberly Pump Station No.2	EA		1	40,000	-	40,000
9	Waco Pump Station	EA		1	60,000	-	60,000
10	Caroline Drive Pump Station	EA		1	60,000	-	60,000
11	Gravity Sewer Manhole	EA	17	146	2,200	36,667	320,467
12	Combination Air Release Valve & Manhole	EA	21	3	2,300	48,556	7,667
	Construction Cost (rounded to nearest \$10,000)					\$ 670,000	\$ 3,030,000
	Project Development rounded to nearest \$1,000					169,000	411,000
	Contingency rounded to nearest \$1,000 (~5% of Initial Construction Costs)					34,000	152,000
	Total Project Cost (rounded to nearest \$10,000)					\$ 870,000	\$ 3,590,000

Notes:

1. Phase 1 sewers will be constructed concurrent with the Muddy Creek WWTP. Future phases will be performed in subsequent years as funding becomes available.
2. Because this work is phased, the sum of the project development costs will be greater than the value calculated in Exhibit 8-4.

Section 11
Documentation of Public Participation

1. Newspaper Advertisement
 - Richmond Register, 05/23/12
 - Madison Advertiser, 05/30/12
2. Measures Taken to Solicit Public Participation
 - Flyer posted at local convenience stores
3. Summary Report Presented to the Public
 - Powerpoint presentation
4. Public Meeting Attendance Sheet
 - 05/31/12
5. Public Comments
 - No public comments.

The Richmond Register

Madison County Advertiser

AFFIDAVIT

I, Kathy Smith (name), Classifier Sales Rep (title)

of Richmond Register and The Madison County Advertiser hereby state that the advertisement concerning RFP- ^{Hearing 5/31/12} ~~Re:~~ Greens Crossing + Battlefield did run in the Richmond Register on the requested date(s). 5-23-12 (dates)

Kathy Smith
Signature

5-23-12
Date

[Signature]
Notary Public Signature

May 3, 2014
Expiration Date



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Wanted: Local Tri-Axle dump truck drivers and OTR Tractor Trailer Drivers. Competitive Wages, benefits & bonus program. 1-800-514-2384 859-254-2385. Apply online at haynestruckingllc.com

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Attention to the Businesses of Madison County. The Adopt A Pet Page Runs the Last Thursday of each Month and the 1st Wednesday in the Madison County Advertiser. The page is full color and Features the Animals Up for Adoption at The Madison County Animal Shelter and New to the Page is the Humane Society Animal League For Life.

Currently there is 2 spots open on that page. **We are looking for more sponsor to support this page each month.** The Cost is on \$35.00 for both runs.

Think you might be interested in running Just Give me a Call! at 859-624-6691.

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610 Homes

Berea: Nice 3bd, 2ba, gar. \$675. Lg 2bd Townhouse, appl, A/C \$495. No pets. 986-4757, 986-2525.

NOTICE OF PUBLIC HEARING

(PURSUANT TO 401KAR5:006 SECTION 4 & 5; KRS - 424, and 40CFR 25.5 & 6)

The Northern Madison County Sanitation District, 201 Aqueduct Dr., B-9 Richmond, KY, 40476 has drafted a Regional Facilities Plan (RFP) Update containing waste water requirements for collection and treatment and its cost, focusing on the greater Greens Crossing region and the greater Battlefield region of its planning area. Interested citizens may obtain further information and view a copy of the draft RFP by contacting Elliott Turner at the above given address or by calling (859) 626-0431 between the hours of 8 a.m. and 4 p.m. on Monday to Friday.

A public hearing will be held on May 31, 2012, at 7:00 p.m. at the Madison County Emergency Management Service Center, 558 South Keenland Drive, Richmond, KY. The purpose of the hearing is to discuss the draft plan and its contents, specifically the alternatives, project cost, financing sources, user charges and hook up/tap on fee. The public is encouraged to attend this meeting and shall have a right to comment on the plan for a period of 30 days from the date of publication of this notice by writing to the above address or before the termination of the hearing whichever is later. A longer comment period may be requested in writing. All persons who believe any condition of the draft plan is inappropriate, inaccurate, incomplete, or otherwise not in the best interest of the public and environment must raise all reasonable issues and submit all reasonable arguments, facts, and comments with supporting documents to the above given contact person.

155 Lost and Found

Spaying & Neutering your pets saves lives & unwanted pets often abandoned when grown.

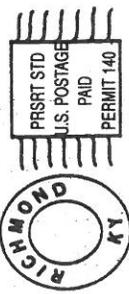
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Home • Auto • Life • Health • Long Term Care



Postal Patron
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MADISON COUNTY

ADVERTISER

Wednesday, May 30, 2012

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Volume 24 Number 11

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NOTICE OF PUBLIC HEARING

(PURSUANT TO 401KAR5:006 SECTION 4 & 5; KRS - 424, and
40CFR 25.5 & 6)

The Northern Madison County Sanitation District, 201 Aqueduct Dr., B-9
Richmond, KY, 40476 has drafted a Regional Facilities Plan (RFP) Update
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field region of its planning area. Interested citizens may obtain further in-
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the above given address or by calling (859) 626-0431 between the hours of
8 a.m. and 4 p.m. on Monday to Friday.

A public hearing will be held on May 31, 2012, at 7:00 p.m. at the Madison
County Emergency Management Service Center, 558 South Keenland
Drive, Richmond, KY. The purpose of the hearing is to discuss the draft
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above address or before the termination of the hearing whichever is later. A
longer comment period may be requested in writing. All persons who be-
lieve any condition of the draft plan is inappropriate, inaccurate, incomplete,
or otherwise not in the best interest of the public and environment must raise
all reasonable issues and submit all reasonable arguments, facts, and com-
ments with supporting documents to the above given contact person.

Home Accents

Categories Listed
DOES NOT INCLUDE SEASONAL

- Mirrors
WALL & TABLE
- Lamps,
Nite Lights
& Lamp Shades
- Candles, Flameless
LED Candles,
Fragrance Warmers
& Diffusers

ITEMS \$4.99 & UP

Public Hearing

Northern Madison County Sanitation District

Date: May 31, 2012, at 7:00 p.m.

Location: Madison County Emergency Management Service Center, 558 South Keenland Drive, Richmond, KY

Purpose: The Northern Madison County Sanitation District, 201 Aqueduct Dr., B-9 Richmond, KY, 40476 has drafted a Regional Facilities Plan (RFP) Update containing waste water requirements for collection and treatment and its cost, focusing on the greater Greens Crossing region and the greater Battlefield region of its planning area.

A public hearing will be held to discuss the draft plan and its contents, specifically the alternatives, project cost, financing sources, user charges and hook up/tap on fee.

Interested citizens may obtain further information and view a copy of the draft RFP by contacting Elliott Turner at the above given address or by calling (859) 626-0431 between the hours of 8 a.m. and 4 p.m. on Monday to Friday.

Northern Madison County Sanitation District
Regional Facility Plan Update

Public Meeting

Thursday, May 31, 7:00 PM

Madison County Emergency Management Service
Center



Northern Madison County Sanitation District
Regional Facility Plan Update

James Rowe: Chairman, NMCS D

Marcella Hayden: Board Member, NMCS D

Johnny Webb, Board Member, NMCS D

Elliott Turner: Manager, NMCS D

Mark Feibes, P.E. : Engineer, NEI



History

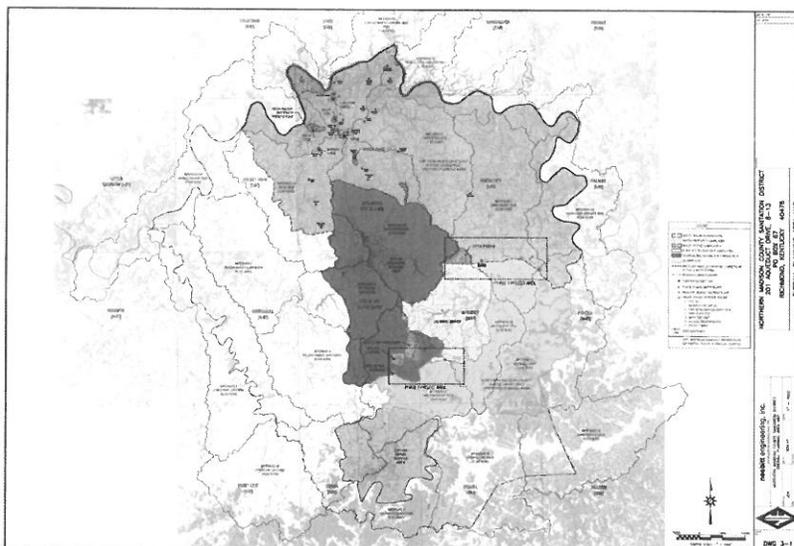
NMCSD Established in 1996

Currently Serves Three Regions:

- Northern end of the county – “Jacks Creek” WWTP
- Greens Crossing area – feeds to the Otter Creek WWTP (Owned by Richmond Utilities)
- Battlefield & Executive Park WWTP’s



Madison County Sewer Districts



Sewer Agreement with Richmond Utilities

City of Richmond Sewer Use Agreements of 05/26/99,
09/25/03 and 03/08/05.

- 03/08/05 Agreement set a maximum allowable number of connections at 400 customers.
- Currently there are 390 connections (342 currently active).

City of Richmond Ordinance No. 07-12, 04/24/07

- Eight discreet rate increases every July, from 2007 through 2014. After that rate automatically increases annually based on the CPI (2.5% avg over the last 10 years).
- These rate increases must be passed off directly onto the customers.



Sewer Agreement with Richmond Utilities

Current average 2012 sewer bill	\$52.12
Amount due to RU, per customer	\$46.16
Average sewer bill in 2015 without the proposed Phase 1 project	\$70.74
Amount due to RU, per customer	\$64.72
Worst case average sewer bill in 2015 with the proposed Phase 1 project	\$60.26



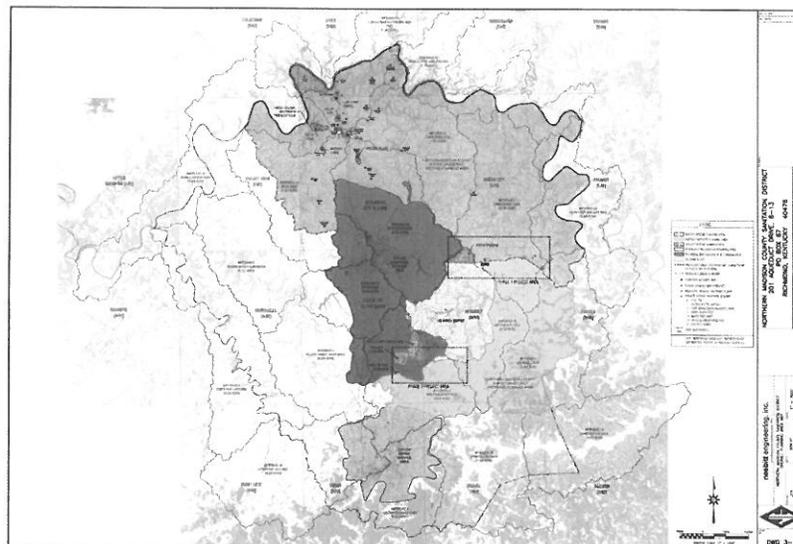
Sewer Agreement with Richmond Utilities

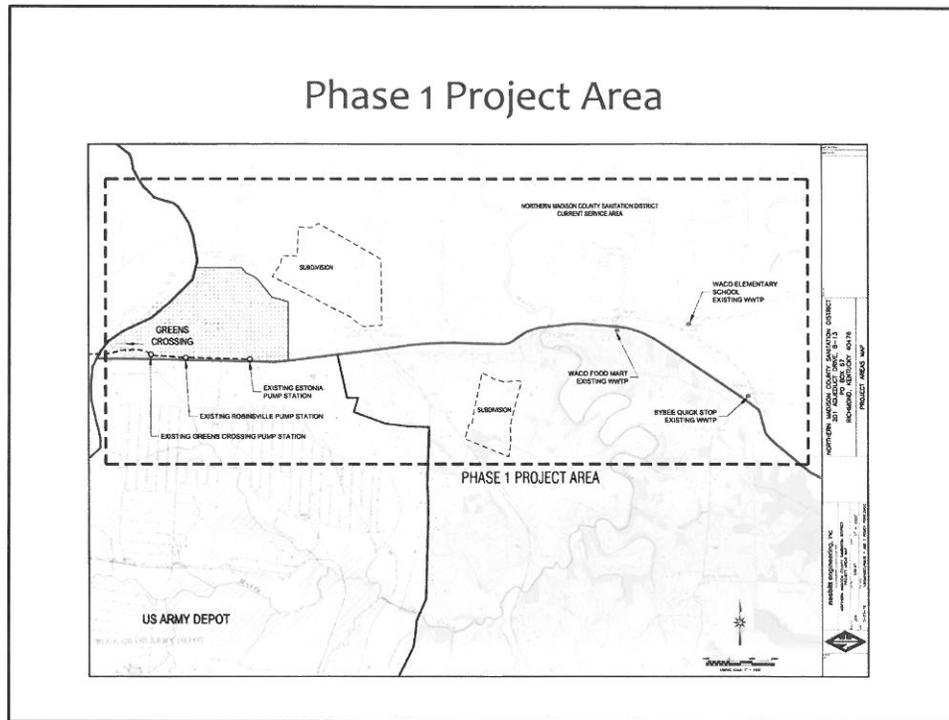
Goals of the NMCSD

- Add sewer connections as needed to serve the region, without external limits, such as those imposed by Richmond Utilities.
- Control costs as much as possible to minimize sewer bills.



Madison County Sewer Districts





Phase 1 Project Area

Description	No. Homes	Flow (gpd)
Waco Elementary (equivalent homes)	28	7,878
Bybee Grocery (equivalent homes)	2	696
BP Food Mart (equivalent homes)	4	1,000
Greens Crossing Neighborhood	307	86,267
Moberly	151	42,431
Waco	88	24,728
Southeast of Moberly	72	20,232
Total, Phase 1 Area	652	183,232
10-Year Projection	750	210,750
20-Year Projection	848	238,288




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Phase 1 - Proposed Improvements

Phase 1A

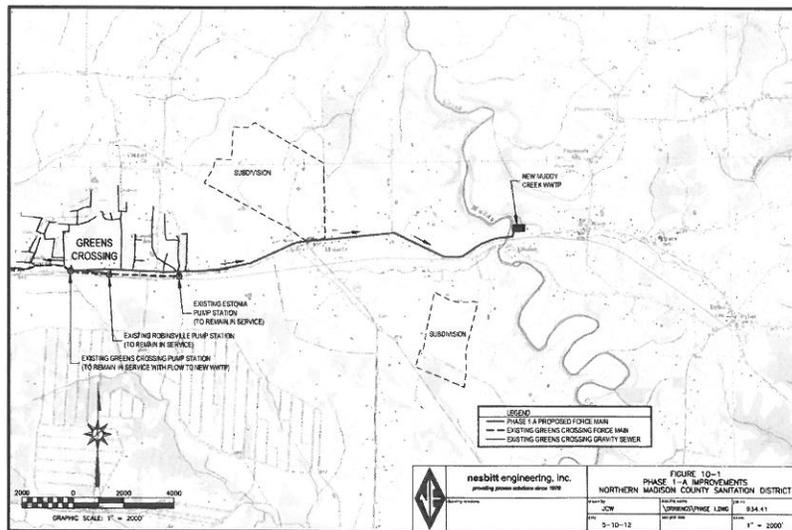
Construct a new 200,000 gpd (gallons per day) wastewater treatment plant (Muddy Creek WWTP), with future expansion up to 250,000 gpd as needed. Reroute flow from the existing Greens Crossing Pump station to the Muddy Creek WWTP.

Future Phase 1 Projects

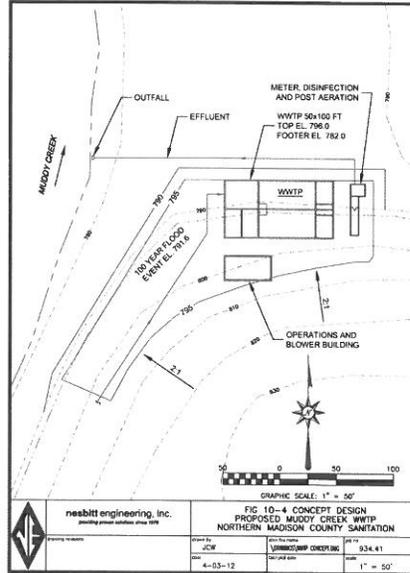
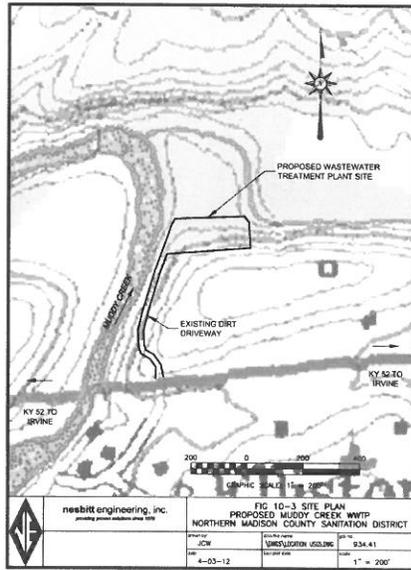
Construct gravity sewers and four pump stations to collect flow from the surrounding area.



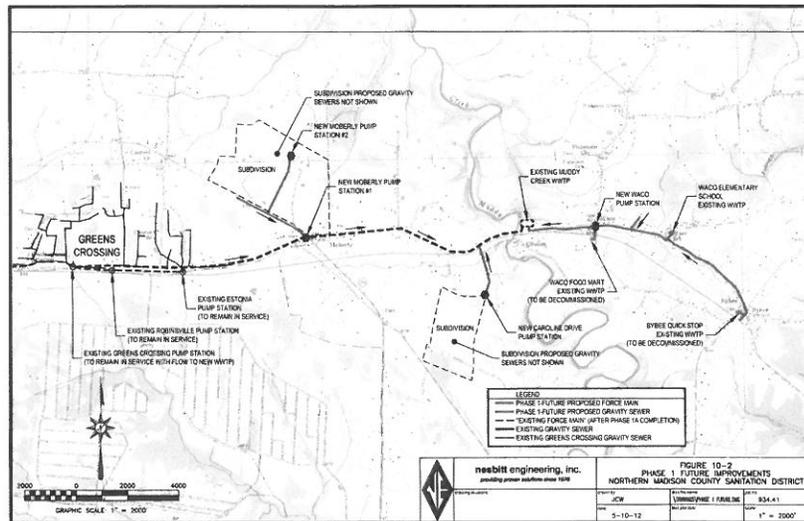
Phase 1A



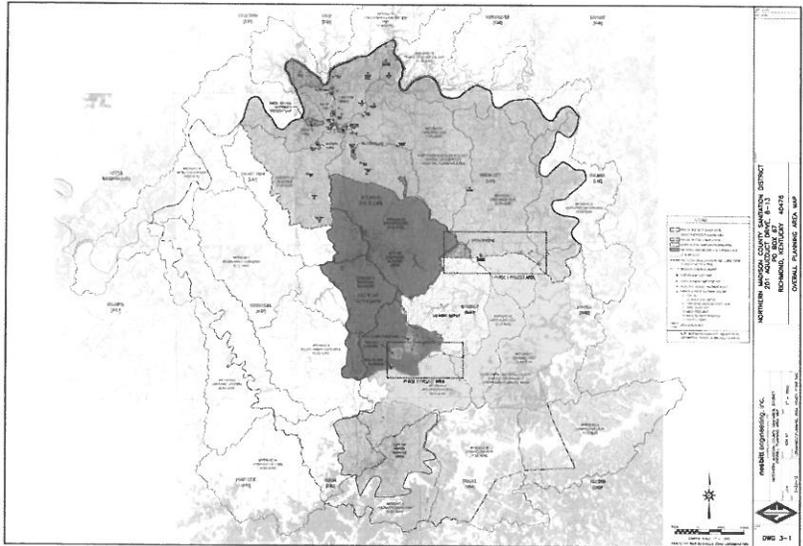
Phase 1A



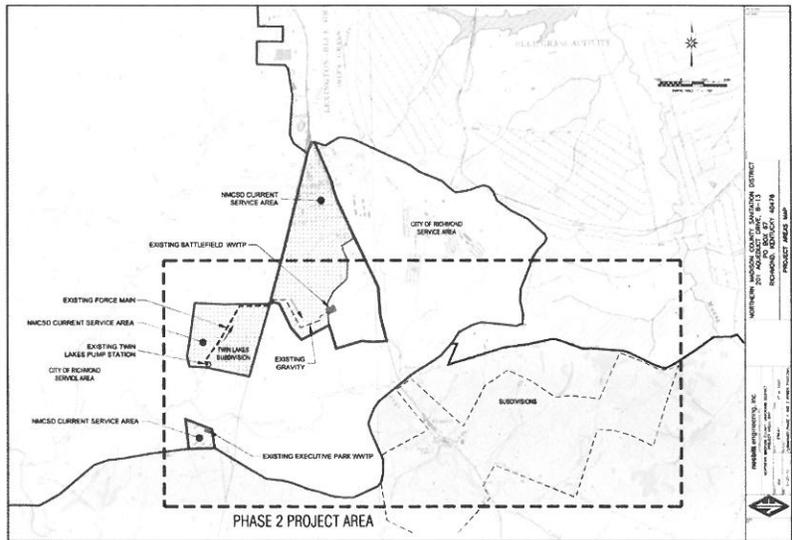
Future Phase 1 Projects



Madison County Sewer Districts



Phase 2 Project Area



Phase 2 Project Area

Description	No. Homes	Flow (gpd)
Battlefield STP	472	132,632
Executive Park STP	70	19,670
Twin Lakes Subdivision	51	14,331
Kingston	198	55,638
Total, Phase 2 Area	791	222,271
10-Year Projection	910	255,710
20-Year Projection	1,028	288,868



Phase 2 - Proposed Improvements

Phase 2 Area

Expand the existing Battlefield WWTP from 114,000 gpd to 228,000 gpd, with future expansion up to 290,000 gpd as needed.

Decommission the Executive Park WWTP and reroute the flow to the Battlefield WWTP via a new pump station. Construct gravity sewers and four pump stations to collect flow from Kingston and the nearby community.



NMCS D Rate Structure, 2012

NMCS D Resolution 11-10, 11/02/10

- Rate structure adjusted to compensate for increased billing by Richmond Utilities.

- 2012 Rates:

- Residential

First 280 CF (appx 2100 gal)	\$37.95
281+ CF	\$6.33 per 100 CF
Maximum Bill	\$63.25

- Commercial

First 280 CF (appx 2100 gal)	\$37.95
281+ CF	\$16.75 per 100 CF
Maximum Bill	No Limit



NMCS D Rate Structure, 2013 and Beyond

Per NMCS D Resolution 11-10, 11/02/10:

- 2013 Rates:

- Residential

First 280 CF (appx 2100 gal)	\$41.75
281+ CF	\$6.96 per 100 CF
Maximum Bill	\$69.58

- Commercial

First 280 CF (appx 2100 gal)	\$41.75
281+ CF	\$16.75 per 100 CF
Maximum Bill	No Limit

- Future years: CPI increases to cover operational cost increases.



Thank You for Coming!
Questions and Comments



Section 12: Regional Facility Plan Completeness Checklist and Forms

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

Regional Planning Agency Name: _____

Date: _____

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

4.	If available, a local planning and zoning land use map.	3-2
SECTION 4		
SOCIOECONOMIC CHARACTERISTICS OF THE PLANNING AREA- The following characteristics of the planning area shall be discussed:		
1.	Historical, current, and projected population in the planning area including wastewater contributions from industrial and commercial sources.	4-1
2.	Current and projected population in the existing service area and unsewered parts of the planning area	4-1
3.	Economic or social benefit to the affected community	4-3
SECTION 5		
EXISTING ENVIRONMENT IN THE PLANNING AREA- Describe existing physical, biological, cultural, and other resource features within the planning area with an emphasis on those that may be impacted by the proposed plan or projects, including the following:		
1.	Physical features such as surface and groundwater quality, water sources and supply, wetlands, lakes, streams, air pollution, floodplains, soils, geology, and topography	5-1
2.	Biological: Identify plant and animal communities in the planning area with an emphasis upon endangered and threatened species likely to be impacted	5-4
3.	Cultural: Describe archaeological and historical resources that may be affected by the proposed project	5-5
4.	Other Resource Features such as national and state parks, recreational areas, USDA Designated Important Farmland, and any other applicable environmentally sensitive areas	5-5
SECTION 6		
EXISTING WASTEWATER SYSTEM- This section shall be prepared by a Professional Engineer licensed in Kentucky. A description of the existing facilities within the planning area shall include the following:		
1.	On-site systems in the planning area	6-1
2.	Physical condition of the existing wastewater treatment plant(s) including the type, age, design capacity, process units, peak and average wastewater flows, current discharge permit limits, schematic layout of treatment plant. Include a narrative description of the capacity of the treatment plant to meet reliability and redundancy requirements as outlined in regulation 401 KAR 5:005, Section 13.	6-1
3.	Existing collection and conveyance system and its condition	6-16
4.	Existing biosolids disposal method	6-20
5.	Existing operation, maintenance and compliance issues	6-21
SECTION 7		
FORECASTS OF FLOWS AND WASTE LOADS IN THE PLANNING AREA- This section shall be prepared by a professional engineer licensed in Kentucky and shall include:		
1.	Current and projected commercial, industrial and residential growth for the proposed planning period	7-1
2.	A copy of the waste load allocation (WLA) issued by the DOW for new or expanded treatment plant projects	7-6

SECTION 8		
EVALUATION OF ALTERNATIVES- This section shall be prepared by a professional engineer licensed in Kentucky and include an assessment of alternatives to determine the appropriate facilities that will meet the wastewater needs of the planning area and provide benefits that are cost-effective and environmentally sound. The section shall include:		
1.	No-action alternative	8-1
2.	Optimization of existing facilities	8-1
3.	Regionalization	8-2
4.	Other alternatives	8-3, 6, 9 -
5.	Detailed cost analysis along with 20 year present worth analysis for each alternative	8-4, 7, 10, 11
6.	Recommended alternative	8-6, 9, 11, 13
SECTION 9		
CROSS-CUTTER CORRESPONDENCE AND MITIGATION- Each facility plan shall include cross-cutter correspondences to and from each agency related to the following four environmental and cultural concerns:		EXHIBITS
1.	Threatened and Endangered Species: The U.S. Fish and Wildlife Service- Kentucky Ecological Services Field Station and the Kentucky Department of Fish and Wildlife Resources	9-1 892
2.	Historical Resources: The Kentucky Heritage Council State Historic Preservation Office	9-3
3.	Aquatic Resources: The US. Army Corps of Engineers (Louisville, Nashville, or Huntington Districts).	9-4
4.	Agricultural Resources: The local office of the Natural Resources Conservation Service (NRCS) or USDA Service Center	9-5
SECTION 10		
EVALUATION OF RECOMMENDED REGIONAL FACILITY PLAN- This section of the facility plan shall summarize the critical components of the recommended plan.		
1.	Environmental impacts	10-1
2.	Institutional structure	10-2
3.	Funding plan	10-2
4.	Current and projected residential user charge rate based on 4,000 gallon usage per month	10-8
5.	Implementation schedule	10-9
SECTION 11		
DOCUMENTATION OF PUBLIC PARTICIPATION- The section shall include a copy of the newspaper advertisement/proof of publication, attendance sheet, and public comments.		11-1 AND EXHIBITS

Northern Madison County Sanitation District
Regional Facilities Plan Update
Checklist Spreadsheet - Unit Process Design Criteria

A. Muddy Creek WWTP - New

Design Capacity 0.20 MGD

Unit Process	Number of Units ¹	Design Flow per Unit (MGD)	Design Criteria ²
Screening - Manual	1	>>0.20	10-States, Sec. 61.1
Flow Equalization Pumping	2	0.4	10-States, Sec. 44 & 65
Extended Aeration Process	2	0.1	10-States, Sec. 92
Final Clarification	2	0.1	10-States, Sec. 70
UV Disinfection	2	>0.2	10-States, Sec. 104
Post Aeration	1	0.5	10-States, Sec. 92.332
RAS/WAS Pumping	2	0.3	10-States, Sec. 92.4
Aerobic Digester	2	0.1	10-States, Sec. 85

B. Battlefield Estates WWTP - Expansion

Design Capacity 0.243 MGD

Unit Process	Number of Units ¹	Design Flow per Unit (MGD)	Design Criteria ²
Screening - Manual	1	>>0.243	10-States, Sec. 61.1
Extended Aeration Process	1	0.114	10-States, Sec. 92
	1	0.129	
Final Clarification	1	0.114	10-States, Sec. 70
	1	0.129	
Polishing Pond	1	N/A	N/A
UV Disinfection	2	>0.243	10-States, Sec. 104
Post Aeration	1	0.5	10-States, Sec. 92.332
RAS/WAS Pumping	2	0.36	10-States, Sec. 92.4
Aerobic Diigester	1	0.114	10-States, Sec. 85
	1	0.129	

Footnotes

1. The number of units shall be in accordance with the reliability/redundancy checklist.
2. The design criteria shall be in accordance with 401 KAR 5:005 Including Ten States Standards.

**Northern Madison County Sanitation District
Regional Facilities Plan Update
Checklist Spreadsheet - Design Flows and Concentration**

A. Muddy Creek WWTP - New

	Flow		BOD ₅		TSS		NH ₃ -N		TKN		P	
	MGD	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	
Average Daily												
Domestic Portion	0.20	220	367	220	367	25	42	40	67	8	13	
Industrial Portion	0.00	0	0	0	0	0	0	0	0	0	0	
Total	0.20	220	367	220	367	25	42	40	67	8	13	
P.E.	1,597											
Peak Hourly												
Domestic Portion	0.73	60	367	60	367	7	42	11	67	2	13	
Industrial Portion	0.00	0	0	0	0	0	0	0	0	0	0	
Total	0.73	60	367	60	367	7	42	11	67	2	13	
Peak Daily	0.44	100	367	100	367	11	42	18	67	4	13	
Peak Instantaneous	0.73	60	367	60	367	7	42	11	67	2	13	

B. Battlefield Estates WWTP - Expansion

	Flow		BOD ₅		TSS		NH ₃ -N		TKN		P	
	MGD	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	mg/l	lb/day	
Average Daily												
Domestic Portion	0.243	220	446	220	446	25	51	40	81	8	16	
Industrial Portion	0	0	0	0	0	0	0	0	0	0	0	
Total	0.24	220	446	220	446	25	51	40	81	8	16	
P.E.	1,938											
Peak Hourly												
Domestic Portion	0.87	61	446	61	446	7	51	11	81	2	16	
Industrial Portion	0.00	0	0	0	0	0	0	0	0	0	0	
Total	0.87	61	446	61	446	7	51	11	81	2	16	
Peak Daily	0.57	93	446	93	446	11	51	17	81	3	16	
Peak Instantaneous	0.87	61	446	61	446	7	51	11	81	2	16	

Appendix 1

City of Richmond, Ordinance No. 07-12

ORDINANCE NO. 07-12

AN ORDINANCE OF THE CITY OF RICHMOND, KENTUCKY, REVISING THE RATES TO BE CHARGED BY THE SEWER SYSTEM OF RICHMOND

WHEREAS, rates now charged for sewer usage to customers of the Richmond Water, Gas and Sewerage Works were established by Article VII of Ordinance No. 95-08 and were revised by Ordinance No. 96-16, revised by Ordinance No. 00-17, revised by Ordinance No. 02-14, and revised by Ordinance No. 05-17 (later amended by Ordinance No. 05-29) ; and

WHEREAS, rates now charged for sewer rates for master meters outside of the city limits of Richmond for wholesale sewer sanitation districts were established in 05-17 (later amended by Ordinance No. 05-29); and

WHEREAS, the Richmond Utility Board has reviewed the rates charged to customers as required by Ordinance 95-08; and

WHEREAS, the Richmond Utility Board has reviewed the excessive strength surcharge at the time of the rate review; and

WHEREAS, the Richmond Utilities Board has recommended that rates for sewer usage be increased to cover the costs of operation and to maintain the financial security of the sewer system;

NOW THEREFORE, BE IT ORDAINED by the Board of Commissioners of the City of Richmond, Kentucky, that:

(A) **Phase I.** The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2007 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$10.46 (Min.)
Next 400 (Cu.Ft./Mo.)	3.15 per 100 Cu. Ft
Next 5,000 (Cu.Ft./Mo.)	2.84 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	2.54 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	2.26 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$20.94 (Min)
Next 400 (Cu. Ft./Mo.)	6.30 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	5.71 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	5.08 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	4.51 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$3.45 per 100/cubic feet of measured wastewater flow

(B) Phase II. The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2008 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$12.03 (Min.)
Next 400 (Cu.Ft./Mo.)	3.62 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	3.27 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	2.93 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	2.59 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$24.08 (Min)
Next 400 (Cu. Ft./Mo.)	7.25 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	6.56 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	5.84 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	5.19 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$3.97 per 100/cubic feet of measured wastewater flow

(C) Phase III. The schedule of rates to be charged for each class of sewer user, based on water

consumption, on bills mailed after July 1, 2009 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$13.84 (Min.)
Next 400 (Cu.Ft./Mo.)	4.17 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	3.76 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	3.36 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	2.98 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$27.69 (Min)
Next 400 (Cu. Ft./Mo.)	8.34 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	7.55 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	6.72 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	5.97 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$4.56 per 100/cubic feet of measured wastewater flow

(D) Phase IV. The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2010 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$16.19 (Min.)
Next 400 (Cu.Ft./Mo.)	4.88 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	4.40 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	3.94 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	3.49 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$32.40 (Min)
Next 400 (Cu. Ft./Mo.)	9.75 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	8.83 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	7.86 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	6.98 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$5.34 per 100/cubic feet of measured wastewater flow

(E) Phase V. The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2011 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$18.95 (Min.)
Next 400 (Cu.Ft./Mo.)	5.71 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	5.15 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	4.61 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	4.08 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$37.91 (Min)
Next 400 (Cu. Ft./Mo.)	11.41 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	10.33 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	9.19 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	8.17 per 100 Cu. Ft.

Wholesale Sanitation District Customers

→ Flat Rate: \$6.25 per 100/cubic feet of measured wastewater flow

(F) Phase VI. The schedule of rates to be charged for each class of sewer user, based on water

consumption, on bills mailed after July 1, 2012 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$22.17 (Min.)
Next 400 (Cu.Ft./Mo.)	6.68 per 100 Cu. Ft
Next 5,000 (Cu.Ft./Mo.)	6.02 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	5.39 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	4.78 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$44.35 (Min)
Next 400 (Cu. Ft./Mo.)	13.35 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	12.09 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	10.76 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	9.56 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$7.31 per 100/cubic feet of measured wastewater flow

(G) Phase VII The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2013 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$25.93 (Min.)
Next 400 (Cu.Ft./Mo.)	7.81 per 100 Cu. Ft
Next 5,000 (Cu.Ft./Mo.)	7.05 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	6.30 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	5.59 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$51.89 (Min)
Next 400 (Cu. Ft./Mo.)	15.62 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	14.14 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	12.58 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	11.18 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$8.55 per 100/cubic feet of measured wastewater flow.

(H) Phase VIII. The schedule of rates to be charged for each class of sewer user, based on water consumption, on bills mailed after July 1, 2014 shall be as follows:

Class I - Inside the City Limits:

Water Consumption – Inside City - Rates Per Month

First 300 (Cu.Ft./Mo.)	\$30.34 (Min.)
Next 400 (Cu.Ft./Mo.)	9.14 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	8.24 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	7.38 per 100 Cu. Ft.
Over 10,700 (Cu.Ft./Mo.)	6.54 per 100 Cu. Ft.

Class II - Outside the City Limits:

Water Consumption – Outside City – Rates Per Month

First 300 (Cu. Ft./Mo.)	\$60.72 (Min)
Next 400 (Cu. Ft./Mo.)	18.28 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	16.55 per 100 Cu. Ft.
Next 5,000 (Cu.Ft./Mo.)	14.72 per 100 Cu. Ft.
Over 10,700 (Cu. Ft./Mo.)	13.08 per 100 Cu. Ft.

Wholesale Sanitation District Customers

Flat Rate: \$10.00 per 100/cubic feet of measured wastewater flow.

(I) Phase IX. Beginning on July 1, 2015, all rates shall be adjusted annually on bills mailed

after July 1 of each year to reflect Richmond Water, Gas & Sewerage Works increase in costs for operations. The annual adjustment shall be equal to average percentage change in the Consumer Price Index for all Urban Consumers (U.S. City Average) published by the U.S. Department of Labor, Bureau of Labor Statistics, however the annual adjustment shall never be less than zero.

(J) Ordinances 95-08, 96-16, 00-17, 00-46, 02-14, 05-17, and 05-29, other than those parts of these ordinances directly affected by the above rate change and surcharge rate change, shall remain in full force and effect.

(K) This Ordinance shall be in full force and effect upon second reading and adoption by the City of Richmond Board of Commissioners.

Date of First Reading: April 10, 2007
Motion By: Commissioner Blythe
Seconded By: Commissioner Brewer

Date of Second Reading: April 24, 2007
Motion By: Commissioner Blythe
Seconded By: Commissioner Jones

Vote:	Yes	No
Commissioner Blythe	x	
Commissioner Brewer	x	
Commissioner Jones	x	
Commissioner Strong	x	
Mayor Lawson	x	

Connie Lawson
Mayor

Attest:
Kerleen K. Wortham
City Clerk

Appendix 2

Agreements Between the City of Richmond and the Madison County Fiscal Court

- **March 8, 2005**
- **September 25, 2003**
- **May 26, 1999**

AGREEMENT

THIS AGREEMENT is made and entered into this 27th day of March, 2005, by and between the CITY OF RICHMOND, P.O. Box 250, Richmond, KY 40476 (hereinafter referred to as the "City") and the MADISON COUNTY FISCAL COURT (hereinafter referred to as "the County").

WITNESSETH

WHEREAS, the City entered into *Conditions of Sewer Service for Residential County Customers* with the County on May 26, 1999 (hereinafter referred to as the "1999 Sewer Agreement"); and

WHEREAS, as part of the 1999 Sewer Agreement, the City agreed to accept waste flows for transportation and treatment from specific designated Madison County areas, and in exchange the County agreed, among other things, to pay sewer development fees and sewer assessment fees (hereinafter "connection fees"); and

WHEREAS, the Richmond Water, Gas & Sewerage Works (hereinafter referred to as "Richmond Utilities") and the Madison County Utility District (hereinafter referred to as the "Utility District") entered into a *Settlement Agreement and Contract for Service and Sale of Water* on September 26, 1997 (hereinafter referred to as the "1997 Water Agreement"); and

WHEREAS, the City and the Utility District agreed in the 1997 Water Agreement, in part, that the City would pay to the County a set amount for the release of any Utility District water customers within the City of Richmond boundaries; and

WHEREAS, the City and the County entered into an agreement in 2003 in which the City reduced the amount to be paid by the County for the connection fees for the waste flows and the County release to the City certain water customers so designated in that agreement (hereinafter referred to as the 2003 Sewer Connection Fee Reduction Agreement; and

WHEREAS, the City and County wish to amend the above agreements so that an additional 29 residential or light commercial sewer connections for a total 400 sewer connections in exchange for payment by the County of normal and customary sewer assessment fees and sewer development fees; and

NOW THEREFORE, the parties that the 1999 Sewer Agreement and the 2003 Agreement regarding the reduction of payment by the County in exchange of release of specific water customers is amended as follows:

1. The City agrees to allow for an additional 29 residential or light commercial sewer connections, and the County agrees to pay the normal and customary sewer assessment fees and sewer development fees as required for all sewer connection

under City of Richmond Ordinance No. 98-17. All light commercial businesses connecting on are subject to the City of Richmond's approval.

2. The County agrees to provide the City with a comprehensive listing of all sewer connections made onto its sewer system.

3. The 1999 Sewer Agreement, the 1997 Water Agreement, and the 2003 Sewer Connection Fee Reduction Agreement shall remain in full force and effect except to the extent modified herein.

4. The full and entire agreement between the parties hereto is contained in this writing.

CITY OF RICHMOND

BY: Constance Lawson
CONSTANCE LAWSON, Mayor

ATTEST:

BY: Karleen K. Wortham
Name: Karleen K. Wortham
City Clerk

MADISON COUNTY FISCAL COURT

BY: Kent Clark
JUDGE KENT CLARK
Madison County Judge Executive

ATTEST:

BY: James A. Lowe
Name: JAMES A. LOWE

AGREEMENT

THIS AGREEMENT is made and entered into this 25th day of September, 2003, by and between the CITY OF RICHMOND, P.O. Box 250, Richmond, KY 40476 (hereinafter referred to as the "City") and the MADISON COUNTY FISCAL COURT (hereinafter referred to as "the County").

WITNESSETH

WHEREAS, the City entered into *Conditions of Sewer Service for Residential County Customers* with the County on May 26, 1999 (hereinafter referred to as the "1999 Sewer Agreement"); and

WHEREAS, as part of the 1999 Sewer Agreement, the City agreed to accept waste flows for transportation and treatment from specific designated Madison County areas, and in exchange the County agreed, among other things, to pay sewer development fees and sewer assessment fees (hereinafter "connection fees"); and

WHEREAS, the Richmond Water, Gas & Sewerage Works (hereinafter referred to as "Richmond Utilities") and the Madison County Utility District (hereinafter referred to as the "Utility District") entered into a *Settlement Agreement and Contract for Service and Sale of Water* on September 26, 1997 (hereinafter referred to as the "1997 Water Agreement"); and

WHEREAS, the City and the Utility District agreed in the 1997 Water Agreement, in part, that the City would pay to the County a set amount for the release of any Utility District water customers within the City of Richmond boundaries; and

WHEREAS, the parties have determined that it is feasible to enter into a new agreement which reduces the connection fees to be paid to the City by the County for connection of County sewer customers who are in the areas designated in the 1999 Sewer Agreement to the City sewer and which eliminates payment to the County by the City for the release of certain Utility District water customers to the City;

NOW THEREFORE, the parties agree as follows:

1. The County agrees to pay to the City the reduced sum of \$315,959.15 in connection fees for connection of the County sewer customers who are in the areas designated in the 1999 Sewer Agreement to the City sewer. The County agrees to pay this amount before connecting such County sewer customers on to the City sewer.

2. In consideration of the reduction in sewer connection fees, the County agrees to surrender to Richmond Utilities any and all rights it may have to serve water customers located in areas specified on attached Exhibit A. The County further agrees to transfer all improvements listed on Exhibit B to Richmond Utilities. As to these areas, the payment to the County required by the 1997 Water Agreement is hereby eliminated. The

County will alter the boundaries of the Utility District so as to delete the areas specified in Exhibit A from the boundaries of the Utility District within sixty days of the execution of this agreement.

3. The 1999 Sewer Agreement and the 1997 Water Agreement shall remain in full force and effect, except to the extent modified herein.

4. The full and entire agreement between the parties hereto is contained in this writing.

CITY OF RICHMOND

BY: Constance Lawson
CONSTANCE LAWSON, Mayor

ATTEST:

BY: Karleen K. Wortham
Name: Karleen K. Wortham
City Clerk

MADISON COUNTY FISCAL COURT

BY: [Signature]
JUDGE KENT CLARK
Madison County Judge Executive

ATTEST:

BY: William E. Gabbard, Clerk
Name: William E. Gabbard

EXHIBIT A

The service area begins at the intersection of Duncannon Road and U.S. Highway 25 and runs in a westerly direction along the south side of Duncannon Road for approximately 1400 feet; thence in a southerly direction alongside and parallel to the City of Richmond city limits for approximately 6000 feet; thence in a southerly direction for approximately 14,900 feet along and parallel to the CSX Railroad to a point in Menelaus Pike; thence with Menelaus Pike 2100 feet to Silver Creek; thence in a westerly direction along the centerline of Silver Creek to the east right-of-way of I-75; thence in a northerly direction along I-75 to the existing north bound rest area, and includes both north and south bound rest areas; thence continuing in a northerly direction along I-75 to a point 3000 feet east of KY Highway 52, said point being also the east boundary line of the City of Richmond water service territory (Milford Water District); thence in a northeasterly direction along said boundary line approximately 6900 feet to the city limits; thence in a southerly direction along and parallel to the city limits for approximately 3900 feet; thence in an easterly direction approximately 5100 feet to the west boundary of the City of Richmond water service territory (Industrial Park); thence in an easterly direction approximately 1250 feet to the CSX Railroad; thence in a northerly direction approximately 3900 feet with said railroad; thence in an easterly direction approximately 400 feet to the west right-of-way of U.S. Highway 25; thence south along U.S. Highway 25 approximately 5000 feet to the intersection of Duncannon Road, the point of beginning. The area described is shown as the area shaded on the attached map.

EXHIBIT B

1. Newer – 6" CI Water Line
13,870 LF @ \$11.40/LF
From Master Meter
To Just Past Parrish Lane
2. 6" PVC Water Line
1,621 LF @ \$5.55/LF
Along Service Roads
(North & South Duncannon)
3. 4" CI Water Line
3,225 LF + 30 LF @ \$11.10/LF
Cross – Country Line
4. 6" MJ Gate Valve
4 EA @ \$455/EA
5. 4" MJ Gate Valve
2 EA @ \$388/EA
6. Underground Blow-off
1 EA @ \$1,300/EA
7. 6" MJ Cap
2EA @ \$125/EA
8. 4" Compound Meter and Vault
1 EA @ \$9,345/EA
9. 2" Meter Setting
1 EA @ \$1,380/EA
10. 1" Meter Setting
3 EA @ \$750/EA
11. 3/4" x 5/8" Meter Setting
29 EA @ \$625/EA
12. 8" Horizontal Bore and Casing – 35' x \$50.00/ft.
(Intersection of Service Roads and Duncannon)
13. 8" Diagonal Bore and Casing – 50' x \$50.00/ft.

CONDITIONS OF SEWER SERVICE FOR RESIDENTIAL COUNTY CUSTOMERS

THIS AGREEMENT is made and entered into this 26 day of May, 1999 between the CITY OF RICHMOND, P.O. Box 250, Richmond, KY 40476 hereinafter referred to as the "CITY" and the MADISON COUNTY FISCAL COURT, hereinafter referred to as the "COUNTY".

W I T N E S S E T H:

WHEREAS, the City of Richmond (the "City") desires to cooperate with the Madison County (the "County") in the elimination of unsanitary conditions which result from inadequate sewage disposal for County residential customers designated on the attached Map # 1; and

WHEREAS, the Division of Water has requested that an agreement between the two governmental agencies be executed; and

WHEREAS, the Madison County Health Department has identified specific areas of concern, which areas are identified on the attached Map # 1; and

WHEREAS, these specific identified areas utilize septic systems that are non-repairable due to small lot sizes and poor soil factors; and

WHEREAS, the Executive Park package treatment plant has operation and maintenance problems which are beyond the resources of private ownership;

NOW THEREFORE, the parties agree as follows:

1. The City of Richmond ("City") will accept residential waste flows for transportation and treatment from the existing specific Madison County ("County") areas. Residential areas shall be defined as those which existed on January 1, 1998. Residential areas within the County which fall under this agreement are delineated on the attached map no. 1.
2. In return for City provision of sewer service to the identified residential County areas, the County agrees to accept and honor the City ordinance requiring annexation into the City as a condition of receiving sewer service in all other cases of sewer service.
3. The conditions of service shall be essentially the same as for City customers and include, but not be limited to, the following:
 - a. County customers shall execute a statement acknowledging the City sewer use ordinance and

- other standard rules of service as are or may ever be placed into effect by the City for governing all its customers.
- b. Sewer Development fees and sewer assessment fees shall be the same for County as for City customers.
 - c. User charges for the computation of monthly sewer bills shall be higher than those for City annexed customers. The actual rate will be calculated, taking into consideration cost of service, cost of treatment and transportation facilities allocable to the customer group and other appropriate considerations.
 - d. Waste streams from consolidated or grouped (as in a sewer district) County customers shall comply with monitoring and other requirements for volume and quality issues. Flow monitoring (metering) equipment shall be calibrated quarterly or as needed. The cost of calibration and maintenance of monitoring equipment shall be the responsibility of the sewer customer or the County.
 - e. In the event waste flows are found to be inconsistent with the provisions of City ordinances and rules, the customer shall either correct flow deficiencies or, if allowed by the City, pay a surcharge for the privilege of discharging a non-compliant waste. As in the case of all City customers, continued non-compliance shall result in cessation of service.
 - f. County customers shall install their own waste collection system, including odor control and transportation features to deliver collected waste to the City at the closest practical point of the city system possessing the capacity to receive same. This requirement is the same as required of City customers.
 - g. Non-compliance with these and other conditions of service shall give the City the power to cease services immediately until conditions are met.
4. The County shall apply for sewer service and shall be responsible for payment to the City as are all other customers.
 5. The City shall have the right of approval of design and inspection of the construction site of all County sewer systems.

- 6. Any ordinances or rules enacted by the County shall meet or exceed the requirements of the City ordinances.
- 7. The County will certify that only customers identified on the attached map no. 1 are connected to the sewer system.
- 8. The County agrees to dismiss with prejudice its challenge to the City's Facilities Management Plan that has been filed with the Natural Resources and Environmental Protection Cabinet in File No. DOW-23644-042 and styled as Kingston Terrill Water District (now known as the Madison County Utilities District) vs. Natural Resources and Environmental Protection Cabinet and City of Richmond, Kentucky.
- 9. The Parties agree that any business or industry existing as of January 1, 1999 which is annexed into the City will pay to the City its occupational tax, and the City will remit to the County its one percent share of the tax. This provision only applies to businesses and industries which were paying to the County an occupational tax as of January 1, 1999 (which includes the Bluegrass Army Depot, Ajax Magnethermic Corporation, and Okonite Company).

CITY OF RICHMOND:

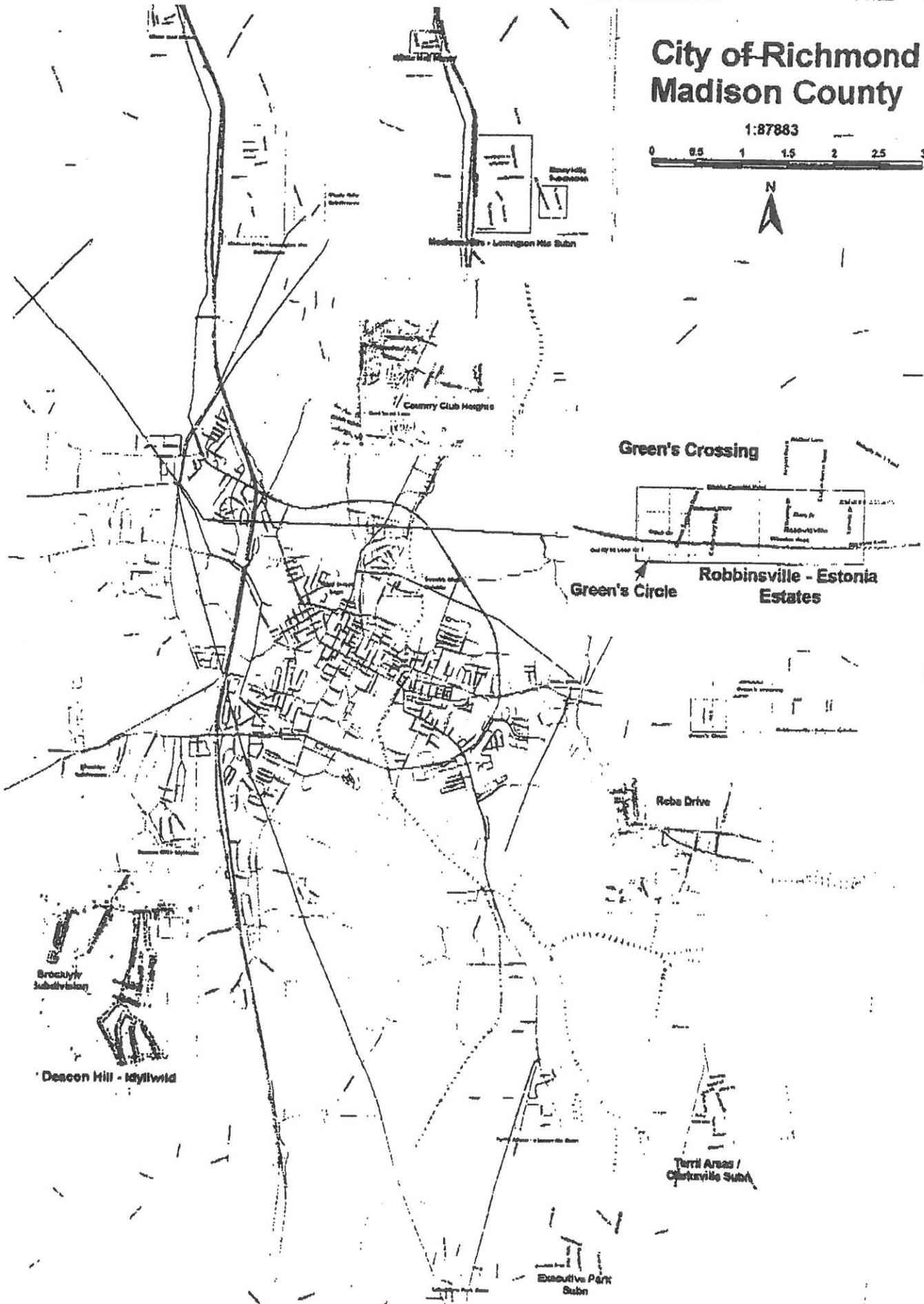
BY: *Ann L. Durham*
 MAYOR ANN L. DURHAM
 CITY OF RICHMOND

MADISON COUNTY FISCAL COURT:

BY: *James Kent Clark*
 JAMES KENT CLARK
 MADISON COUNTY JUDGE EXECUTIVE

City of Richmond Madison County

1:87883



ORDER NO. 99-91

AN ORDER OF THE CITY OF RICHMOND, KENTUCKY AUTHORIZING THE MAYOR TO EXECUTE AN AGREEMENT WITH THE COUNTY TO RESOLVE ENVIRONMENTAL PROBLEMS IN SPECIFIC COUNTY RESIDENTIAL AREAS

WHEREAS, the City strives to enhance the quality of life in Richmond and Madison County; and

WHEREAS, the City and County have worked together to resolve environmental problems in residential areas identified by the Madison County Health Department as areas of concern; and

WHEREAS, the City and County have reached an agreement addressing these environmental problems.

NOW, THEREFORE BE IT ORDERED BY the Richmond City Board of Commissioners that:

SECTION I

1. Mayor Ann L. Durham is authorized to execute the attached Agreement addressing environmental problems in specific areas of the County.
2. The Agreement referred to herein shall be attached and made a permanent part of this Order.

SECTION II

This Order is to become effective immediately upon passage by the Richmond City Board of Commissioners.

DATE ADOPTED: May 18, 1999
MOTION BY: Commissioner Tobler
SECONDED BY: Commissioner Brewer

VOTE:	YES	NO
Commissioner Brewer	x	
Commissioner Hacker	x	
Commissioner Jones	x	
Commissioner Tobler	x	
Mayor Durham		Absent


 Mayor

RESOLUTION # 99-123

WHEREAS, sanitary sewer service is not presently available to residents of the unincorporated areas of Madison County; and

WHEREAS, the City of Richmond and Madison County have reached an agreement to provide said services to certain distressed areas of the county as identified by the Madison County Health Department based upon certain terms and conditions;

WHEREAS, the Madison County Fiscal Court has considered the agreement and has authorized the Madison County Judge Executive to execute the agreement.

NOW, THEREFORE, BE IT RESOLVED that the Madison County Judge Executive is hereby authorized and directed to enter into the afore-mentioned agreement with the City of Richmond.

Be it so resolved on this 26 day of May, 1999

ATTEST:

Mary Jane Hunter

[Signature]
COUNTY JUDGE EXECUTIVE

RESOLUTION NO . 11-10

**RESOLUTION BY THE BOARD OF COMMISSIONERS OF THE
NORTHERN MADISON COUNTY SANITATION DISTRICT
REVISING THE SEWER SERVICE RATES**

WHEREAS, the Northern Madison County Sanitation District is mandated by different funding agencies to establish a sewer rate that is adequate to meet the cost of operations, maintenance and loan re- payment of the system; and

WHEREAS, the Northern Madison County Sanitation District has determined, with assistance from the Bluegrass ADD and the Nesbitt Engineering, Inc, the needed revenue to meet the funding requirements; and

WHEREAS, the sewage rate needed will be fair and equal to all residential customers and commercial customers within the Northern Madison County Sanitation District; and

WHEREAS, the Board of Commissioners of the Northern Madison County Sanitation District have reviewed current rates and have by passage of this resolution agreed to establish this needed rate structure:

NOW, THEREFORE, be it duly **RESOLVED** as follow:

To recommend to the Madison County Fiscal Court that all customers served by Northern Madison County Sanitation District have the following rate structure:

Rate beginning January 1, 2011:

Residential Customers:

First 280 Cubic Feet	\$34.50
All over 281 Cubic Feet	\$5.75 per 100 Cubic Feet
Maximum Bill	\$57.50

Commercial Customers

First 280 Cubic Feet	\$34.50
All over 281 Cubic Feet	\$16.75 per 100 Cubic Feet

Rate beginning January 2012

Residential Customers

First 280 Cubic Feet	\$37.95
All over 281 Cubic Feet	\$6.33 per 100 Cubic Feet
Maximum Bill	\$63.25

Commercial Customers

First 280 Cubic Feet \$37.95
All over 281 Cubic Feet \$16.75 per 100 Cubic Feet

Rate beginning January 2013

Residential Customers

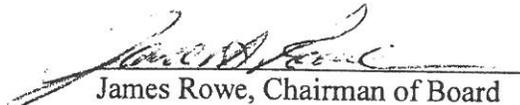
First 280 Cubic Feet \$41.75
All over 281 Cubic Feet \$6.96 per 100 Cubic Feet
Maximum Bill \$69.58

Commercial Customers

First 280 Cubic Feet \$41.75
All over 281 Cubic Feet \$16.75 per 100 Cubic Feet

Beginning in January 2014 all rates shall be adjusted annually to reflect Northern Madison County Sanitation District's increase in cost for operations. This annual adjustment shall be equal to average percentage change in the Consumer Price Index for all Urban Consumers (U.S. City Average) published by the U.S. Department of Labor, Bureau of Labor Statistics, however the annual adjustment shall never be less than zero.

SO, RESOLVED by the Board of Commissioners of the Northern Madison County Sanitation District on this the 24th day of November, 2010.


James Rowe, Chairman of Board

Vote

Yes

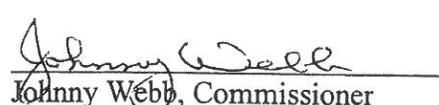
No


Marcella Hayden, Commissioner

Vote

Yes

No


Johnny Webb, Commissioner

Vote

Yes

No

Appendix 3

**Northern Madison County Sanitation District
Resolution No. 11-10**

Appendix 4

**Northern Madison County Sanitation District
Running Buffalo Clover Site Investigation Report
EcoSource Inc., May 2012**

**North Madison County Sanitation District
Wastewater Treatment Plant
and Collection System
Near Waco, Madison County, Kentucky**

May 2012

EcoSource, Inc.

104 Boston Square
Georgetown, Kentucky 40324

Telephone (502) 868-5200
Fax (502) 868-5282

May 23, 2012

Mr. Jim Gruhala
U.S. Fish and Wildlife Service
330 West Broadway, Suite 265
Frankfort, Kentucky 40601

RE: North Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Near Waco, Madison County, Kentucky

Jim:

Per your letter dated March 16, 2012, you requested that the potential for Indiana bat and running buffalo clover be investigated on the above referenced project area. The enclosed report provides survey information for the running buffalo clover. However, the project owner has proposed to delay the Indiana bat surveys until the project construction dates are determined. Based on information gathered during the site investigations, no running buffalo clover were found within the proposed project route.

If you have any questions concerning the content of the report, please feel free to contact me at your convenience.

Sincerely,


Debbie Collinsworth
Principal Scientist

Enc.

**North Madison County Sanitation District
Wastewater Treatment Plant
and Collection System
Near Waco, Madison County, Kentucky**

May 2012

Submitted to:

**U.S. Fish and Wildlife Service,
Kentucky Ecological Services Field Station
Frankfort, Kentucky**

Prepared for:

**Nesbitt Engineering, Inc.
Lexington, Kentucky**

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 2. Reconnaissance

 3. Results

 B. Indiana Bat (*Myotis sodalis*)2

IV. CONCLUSION3

APPENDICES

Correspondences

Exhibits

I. PROJECT DESCRIPTION

The Northern Madison County Sanitation District is updating a Regional Facilities Plan that includes the construction of a new wastewater treatment plant, 15,000 linear feet (LF) of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include upgrading an existing pump station and the construction of four new pump stations. This updated area of the plan is to be built in the Moberly-Waco area of central Madison County, Kentucky.

Coordination with the U.S. Fish and Wildlife Service (USFWS) was requested by Nesbitt Engineering per letter dated March 5, 2012. Mr. Jim Gruhala of the USFWS provided a response by letter dated March 16, 2012 in compliance with Section 7 of the Endangered Species Act. The USFWS indicated that the proposed project has the potential to impact federally listed running buffalo clover (RBC) (*Trifolium stoloniferum*) and Indiana bat (*Myotis sodalis*). Copies of these correspondences are contained in the appendix.

The initial correspondence from Nesbitt Engineering listed project areas 1 and 2. However, due to extended project completion timelines, the survey was limited to project area 1. In order to further minimize the area of survey for the RBC, an additional step was taken to conduct a preliminary habitat survey using recent aerial photography. Mr. Gruhala was contacted by EcoSource Inc. via email dated April 26, 2012. With this email, photographs delineating potential RBC habitat were provided for review. Mr. Gruhala subsequently approved the minimized survey area via email dated April 27, 2012. Copies of these correspondences are contained in the appendix.

II. ENVIRONMENTAL SETTING

The project is located in central Madison County in the Outer Bluegrass Ecoregion¹. All of the known RBC sites in Kentucky are found on limestone based soils in the Inner or Outer Bluegrass. The project area is located within the Lawrence-Mercer-Roberstville soil association². This is a group of somewhat poorly-drained soils on broad flats to moderately well-drained, level to gently-sloping soils on wide ridgetops, and moderately well-drained soils along drainageways.

Almost the entire proposed sewer-line route is adjacent to existing roadways (US 52, old US 52, and Moberly Road), or in relatively new subdivisions. A majority of the route passes through residential lawns or open pasture.

The project area is adjacent to the Bluegrass Army Depot for a portion of its length. There are known populations of RBC on the Depot property, and the possibility of the species occurring on the project area was highly possible.

¹ Woods, A.J., Omernik, J.M., Martin, W.H., Pond, G.J., Andrews, W.M., Call, S.M., Comstock, J.A., and Taylor, D.D., 2002, Ecoregions of Kentucky (color poster with map, descriptive text, summary tables, and photographs): Reston, VA., U.S. Geological Survey (map scale 1:1,000,000).

² U.S. Department of Agriculture, Soil Conservation Service. 1973. Soil Survey of Madison County, Kentucky,

III. SPECIES OF CONCERN

A. Running Buffalo Clover (*Trifolium stoloniferum*)

1. Species Status

RBC attained endangered species status on July 6, 1987, and a revised final recovery plan was approved on June 27, 2007³. The species occurs in central Kentucky and was historically associated with buffalo traces and relatively open savannah woodlands. RBC is typically associated with limestone-based soils and is dependent on partial shade (filtered sunlight) and periodic disturbance.

2. Reconnaissance

The areas of wooded habitat that were identified in the preliminary habitat survey were subsequently examined on-the-ground. The survey was conducted on May 1 and 2, 2012, in order to search for the species during the blooming period from early May to mid-June. Flowering phenology during the spring of 2012 has occurred approximately one month early compared to the average, and as noted at a reference RBC population in central Kentucky containing blooming plants in late April.

The entire project route was driven to validate the preliminary habitat evaluation. Each potential field-verified RBC site was searched on foot for the species and for evidence of its habitat. Potential habitat consisted of any wooded area that provided partial or filtered sunlight within the project's disturbance limits.

3. Results

The preliminary survey of wooded habitats as shown on aerial photos highlighted 55 potential areas. Most of these sites were eliminated during the initial driving survey. The majority of the sites were maintained lawns with shade trees and mowed grass, or pasture fencerows that did not provide suitable habitat. Eight sites were searched on foot for RBC. The habitat and dominant plants present are described on field data forms, which are attached. Areas of potential habitat that were searched are shown on Exhibits 1 through 4 and illustrated in photographs. These exhibits and photographs are contained in the appendix.

B. Indiana Bat (*Myotis sodalis*)

Although the Indiana bat was referenced as a species of concern in the USFWS correspondence, the project owner has opted to allow the contractor that undertakes the project construction to be responsible for further investigations for the species. However, during field investigations for the RBC, several potential summer roosting trees were noted along the proposed project route. Any further investigations will be undertaken by the project contractor prior to any construction activity. Any Indiana bat investigations will be coordinated through the USFWS.

³ U.S. Fish and Wildlife Service. 2007. Running buffalo clover (*Trifolium stoloniferum*) Recovery Plan: First Revision

IV. CONCLUSION

Intensive surveys of eight potential habitat sites for RBC resulted in no plants of the species found within the project corridor. The proposed construction activities are “not likely to adversely affect” running buffalo clover (*Trifolium stoloniferum*).

Further investigations for the Indiana bat are delayed and become the responsibility of the construction contractor. Any investigations for the Indiana bat will be coordinated through the USFWS.

CORRESPONDENCES

- Nesbitt Engineering Inc. – March 5, 2012
- US Fish and Wildlife Service – March 16, 2012
- Emails between: EcoSource, Inc. and USFWS – April 26&27, 2012



March 5, 2012

Mr. Lee Andrews
Field Supervisor
U.S. Fish and Wildlife Service
330 W. Broadway, Rm. 265
Frankfort, Kentucky 40601

RE: Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System, Madison County, Kentucky

Dear Mr. Andrews:

Nesbitt Engineering, Inc. has been retained by Northern Madison County Sanitation District (NMCS D) to prepare a Regional Facilities Plan Update for a proposed wastewater treatment plant (WWTP) and associated collection system in Madison County, Kentucky. The Facilities Plan Update will address two project areas (Area 1, Area 2) which are shown in the attached map.

The Area 1 project will involve the construction of a new WWTP near Waco, Kentucky. It will include the installation of approximately 15,000 LF of force main, 50,000 LF of gravity sewer, 15,000 LF of laterals, and 167 manholes. The project will also include the upgrade of an existing pump station and the construction of four new pump stations. The sewer system to the WWTP will be constructed within previously disturbed road right-of-ways, on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant. The proposed WWTP site appears to have been previously farmed, but may have undisturbed land. Please find attached maps and photographs showing the proposed WWTP location.

The Area 2 project will involve upgrade of the existing Battlefield Park WWTP, adjacent to the southeast corner of the Bluegrass Army Depot on US 421. It will include the installation of approximately 12,000 LF of force main, 54,000 LF of gravity sewer, 13,000 LF of laterals, and 180 manholes. The project will also include the construction of five new pump stations. The sewer system to the WWTP and the WWTP expansion will all be constructed within previously disturbed road right-of-ways, or on previously disturbed private property immediately adjacent to a road right-of-way, or on property currently containing a package wastewater treatment plant.

As part of the Facilities Plan Update, we are requesting that the U.S. Fish and Wildlife Service provide us with information concerning the possibility of federally protected wetlands, ecologically sensitive areas, or federally listed endangered or threatened species within the impact area of the proposed project. Please submit comments in a letter addressed to the undersigned when you have completed your review. If you require additional information, please call me at (859) 233-3111. On behalf of the NMCS D, thank you for your kind and prompt attention to this matter.

Sincerely,

Kari A. Wallover, PG
Professional Geologist

attachments

P:\NorthMad\934-41 RFP\Corresp Cross Cutter\US Fish&Wild Lett.doc

NOTE: ALL SEWERS TO THE WWTP WILL BE CONSTRUCTED WITHIN PREVIOUSLY DISTURBED ROAD RIGHT OF WAYS. THE PROPOSED WWTP SITE IS THE ONLY AREA THAT MAY HAVE UNDISTURBED LAND.



UNION CITY USGS QUADRANGLE
MOBERLY USGS QUADRANGLE

PROPOSED WASTEWATER TREATMENT PLANT LOCATION

KY 52 TO RICHMOND

KY 52 TO IRVINE

2000 0 2000 4000



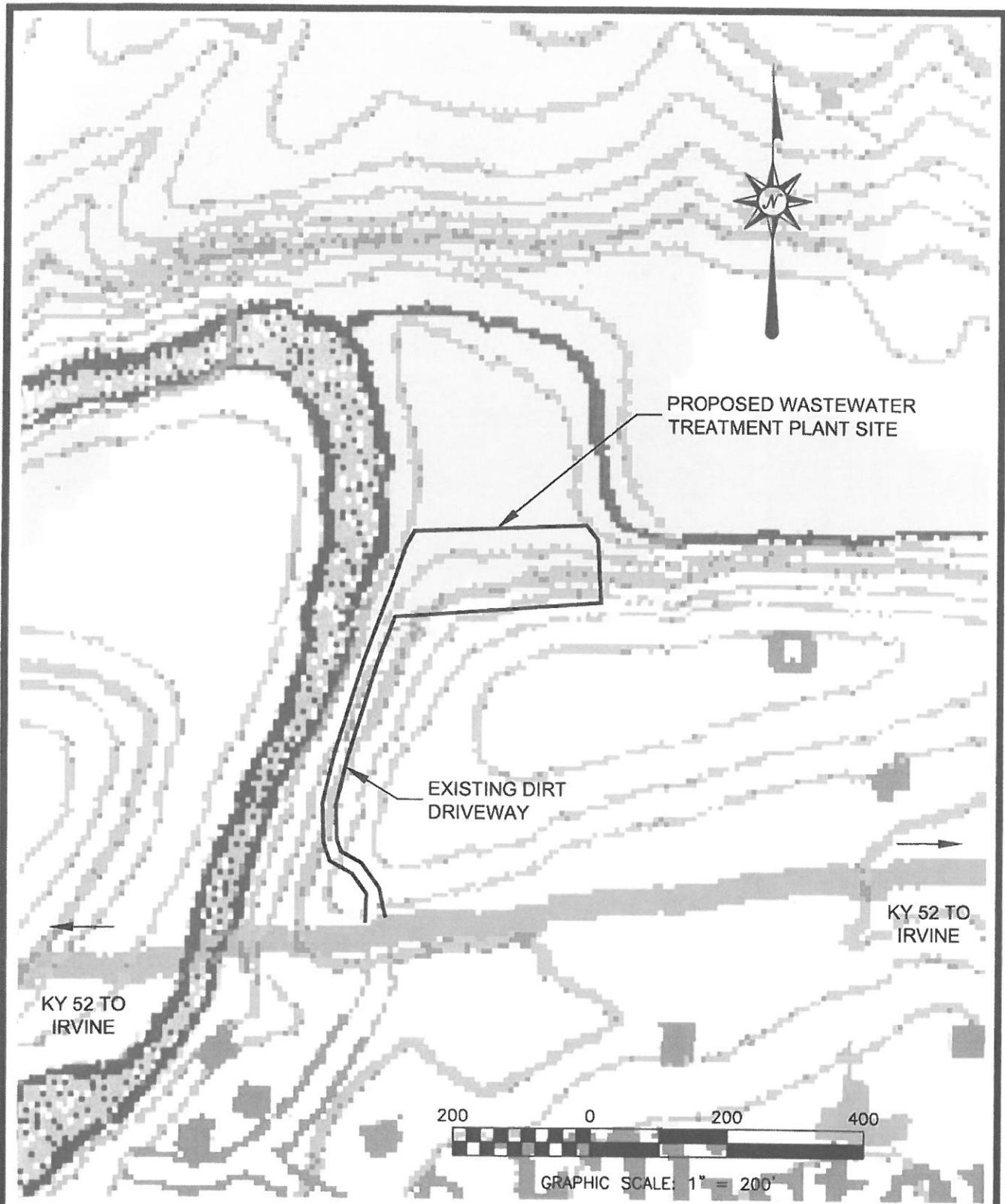
GRAPHIC SCALE: 1" = 2000'



nesbitt engineering, inc.
providing proven solutions since 1976

**SITE LOCATION
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT**

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 2000'



	nesbitt engineering, inc. <i>providing proven solutions since 1976</i>		SITE PLAN PROPOSED MUDDY CREEK WWTP NORTHERN MADISON COUNTY SANITATION DISTRICT	
	drawn by: JCW	disk/file name: \DWGS\LOCATION USGS.DWG	job no: 934.41	
	date: 3-01-12	last plot date:	scale: 1" = 200'	



1: Photo looking north at existing dirt road into proposed WWTP site.



2: View showing the northeastern portion of the proposed WWTP site.



3: View of the southern vegetated portion of the project site.



4: Photo looking east at the south end of the proposed project parcel.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

March 16, 2012

Ms. Kari Wallover, PG
Professional Geologist
Nesbitt Engineering, Inc.
227 North Upper Street
Lexington, Kentucky 40507 - 1016

Re: FWS 2012-B-0378; Nesbitt Engineering, Northern Madison County Sanitation District, Wastewater Treatment Plant and Collection System Project, located in Madison County, Kentucky

Dear Ms. Wallover:

The U.S. Fish and Wildlife Service (Service) has reviewed your correspondence dated March 5, 2012 regarding the above-referenced project. The Service offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). This is not a concurrence letter. Please read carefully, as further consultation with the Service may be required.

In accordance with 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 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 two federally listed species have the potential to occur within the project vicinity. The listed species are:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Federal Status</u>
Indiana bat	<i>Myotis sodalis</i>	endangered
running buffalo clover	<i>Trifolium stoloniferum</i>	endangered

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

Summer roost and/or winter habitat for the endangered Indiana bat may exist within the proposed project site. Based on this information, we believe that: (1) forested areas in the vicinity of and on the project area may provide potentially suitable summer roosting and foraging habitat for the Indiana bat; and (2) caves, rockshelters, and abandoned underground mines in the vicinity of and on the project area may provide potentially suitable wintering habitat for the Indiana bat. Our belief that potentially suitable habitat may be present is based on the information provided in your correspondence, the fact that much of the project site and/or surrounding areas contain forested habitats that are within the natural range of this species, and our knowledge of the life history characteristics of the species.

The Indiana bat utilizes a wide array of forested habitats, including riparian forests, bottomlands, and uplands for both summer foraging and roosting habitat. Indiana bats typically roost under exfoliating bark, in cavities of dead and live trees, and in snags (i.e., dead trees or dead portions of live trees). Trees in excess of 16 inches diameter at breast height (DBH) are considered optimal for maternity colony roosts, but trees in excess of 9 inches DBH appear to provide suitable maternity roosting habitat. Male Indiana bats have been observed roosting in trees as small as 5 inches DBH.

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 "swarming" period is dependent upon weather conditions and may last from about September 15 to about November 15. This is a critical time for Indiana bats, since they are acquiring additional fat reserves and mating prior to hibernation. Research has shown that bats exhibiting this "swarming" behavior will range up to five miles from chosen hibernacula during this time. For hibernation, the Indiana bat prefers limestone caves, sandstone rockshelters, and abandoned underground mines with stable temperatures of 39 to 46 degrees F and humidity above 74 percent but below saturation.

Because we have concerns relating to the Indiana bat on this project and due to the lack of occurrence information available on this species relative to the proposed project area, we would have the following recommendations relative to Indiana bats.

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 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.
2. We would also recommend that the project proponent only remove trees within the project area between October 15 and March 31 in order to avoid impacting summer roosting Indiana bats.

However, if any Indiana bat hibernacula are identified on the project area, we recommend the project proponent only remove trees between November 15 and March 31 in order to avoid impacting Indiana bat “swarming” behavior.

However, if these recommendations cannot be incorporated as project conditions, then the project area may be surveyed to determine the presence or absence of this species within the project area in an effort to determine if potential impacts to the Indiana bat are likely. A qualified biologist who holds the appropriate collection permits for the Indiana bat must undertake such surveys, and we would appreciate the opportunity to approve the biologist’s survey plan prior to the survey being undertaken and to review all survey results, both positive and negative. If any Indiana bats are identified, we would request written notification of such occurrence(s) and further coordination and consultation.

If your project schedule requires the clearing of potential Indiana bat habitat (i.e., trees) during the period of April 1 to October 14, you have two primary options for addressing impacts to Indiana bats. First, you can survey the project site as described previously, or you can enter into a Conservation Memorandum of Agreement (MOA) with the Service. 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 as set forth in the Indiana Bat Mitigation Guidance for the Commonwealth of Kentucky. For additional information about this option, please notify our office.

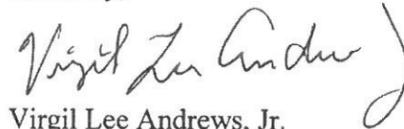
running buffalo clover

Running buffalo clover may occur within the proposed project site. This species requires periodic, moderate disturbances to reduce competition and maintain open or semi-open habitat conditions. Disturbed areas such as old pastures, moderately grazed fields, road rights-of-way, and power line rights-of-way that are mechanically maintained are known to provide suitable habitat for these species. Additionally, running buffalo clover is known to occur in habitats ranging from stream banks and low mesic (moderately moist) forests to lawns and cemeteries. If the proposed project(s) require alteration of habitat that coincides with the habitat required for this species, an on-site inspection or survey of the area must be conducted to determine if the listed species is present or occurs seasonally. Prior to construction activities including tree clearing, a survey should be done by qualified personnel and be conducted during the appropriate time of day and/or year to ensure confidence in survey results. Please notify this office with the results of any surveys and an analysis of the “effects of the action,” as defined by 50 CFR 402.02 on any listed species including consideration of direct, indirect, and cumulative effects.

Surveys for the aforementioned species would not be necessary if sufficient site-specific information was available that showed that: (1) there is no potentially suitable habitat within the project area or its vicinity or (2) the species would not be present within the project area or its vicinity due to site-specific factors. A survey for Indiana bats would also not be necessary if trees were removed from the site between October 15 and March 31, or if the project proponent chooses to enter into a Conservation MOA with the Service.

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 James Gruhala at (502) 695-0468 extension 116.

Sincerely,

A handwritten signature in cursive script that reads "Virgil Lee Andrews, Jr." The signature is written in dark ink and is positioned above the printed name.

Virgil Lee Andrews, Jr.
Field Supervisor

Debbie Collinsworth

EcoSource, Inc.
502-868-5200



Exhibit 1 of 4
Tree Canopy Areas
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky



Exhibit 2 of 4
Tree Canopy Areas
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky



Exhibit 3 of 4
Tree Canopy Areas
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky



Exhibit 4 of 4
Tree Canopy Areas
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky

EXHIBITS

- **Observed Sites for RBC**
 - **Photographs**
- **Plant Survey Data Sheets**

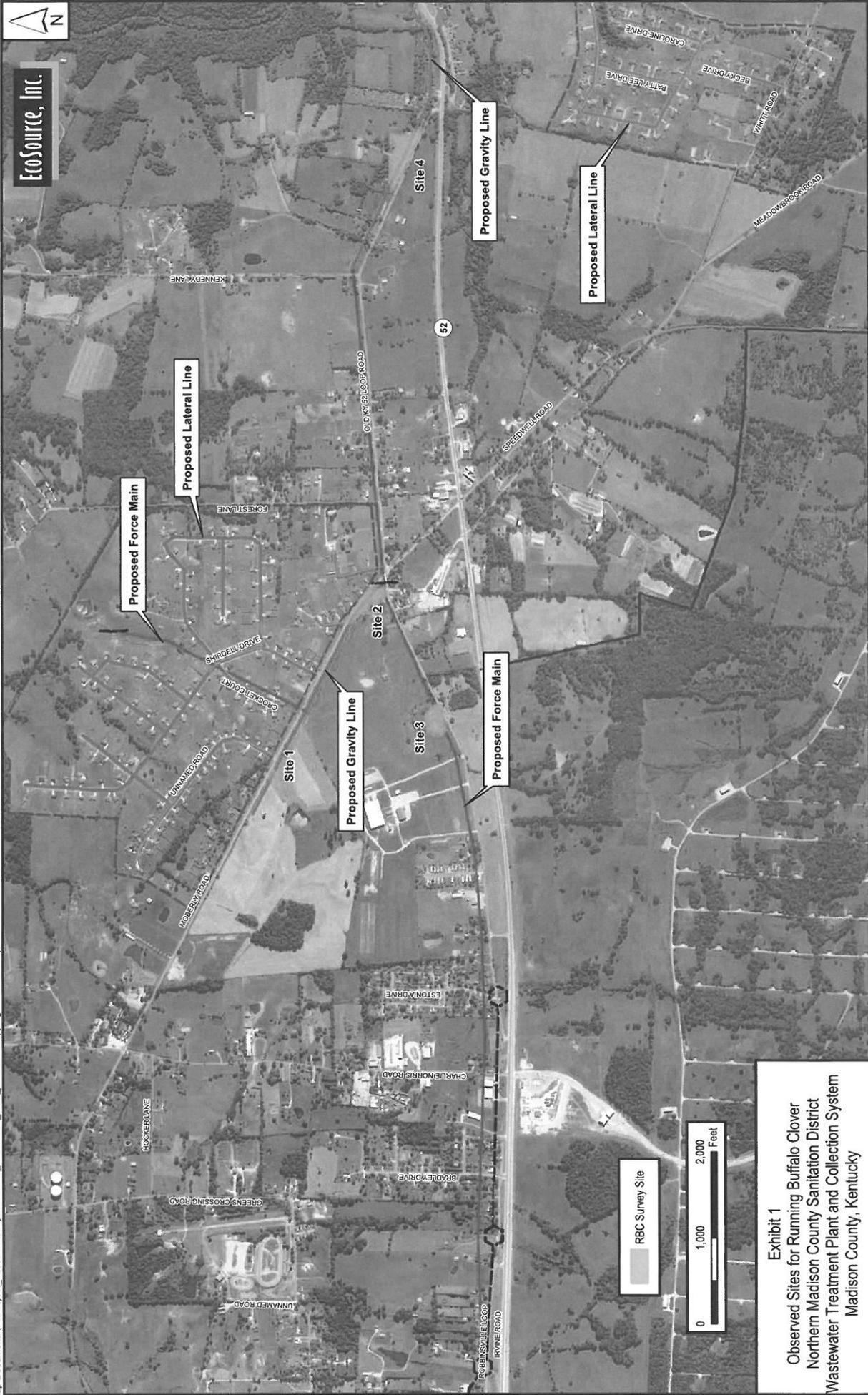


Exhibit 1
Observed Sites for Running Buffalo Clover
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky



EcoSource, Inc.



RBC Survey Site

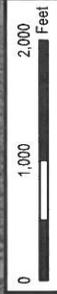


Exhibit 2
Observed Sites for Running Buffalo Clover
Northern Madison County Sanitation District
Wastewater Treatment Plant and Collection System
Madison County, Kentucky



Site 1



Site 1



Site 2



Site 2



Site 3



Site 3



Site 4



Site 4



Site 5



Site 5



Site 6



Site 6



Site 7



Site 7



Site 8



Site 8

Plant Survey Data Sheet – Site 1

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 44.2" Longitude: W -84° 11' 28.9"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Wooded fenceline surrounded by pasture. Gently rolling to flat.

Slope: 2% Aspect: N/A % shade: 90% % ground cover: 65%

Current land use:

Pasture

Disturbance present and what kind:

Cattle, but not recently

Dominant plants:

Burdock, cheat (*Bromus* sp.)

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 2

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 34.4" Longitude: W -84° 11' 06.2"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Wooded fenceline with ephemeral channel. Bordered by residential land use. Thick shade on inside. Too much ground cover outside.

Slope: 2% Aspect: N/A % shade: 95% % ground cover: 100% (outer); 10% (inner)

Current land use:

Residential / agricultural

Disturbance present and what kind:

None. Mowed on edge, stream does not flow very often

Dominant plants:

Bromus sp., poison hemlock, wild cherry, rough dogwood, daisy fleabane

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (circle): Single Plant < 20 20-99 100-999 >1,000

Colony Size (Approx. Area): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (circle): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 3

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 24.3" Longitude: W -84° 11' 21.7"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Old homestead, gently rolling to flat. Home is gone but chimney remains. Large shade trees (pin oak, large red maple), currently grazed by cattle.

Slope: 2% Aspect: N/A % shade: 50% % ground cover: 85%

Current land use:

Abandoned homestead, currently grazed

Disturbance present and what kind:

Grazed currently by cattle

Dominant plants:

Burdock, bluegrass, white clover, bed straw, Johnson grass

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 4

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 26.8" Longitude: W -84° 09' 59.9"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Old pasture, part residential, mostly flat. Not enough disturbance; thick ground cover.

Slope: 2% Aspect: N/A % shade: 25% % ground cover: 100%

Current land use:

Abandoned pasture/residential

Disturbance present and what kind:

Some mowing or grazing, not often

Dominant plants:

Bed straw, black walnut, American plum, bluegrass, blackberry

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 5

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 32.9" Longitude: W -84° 09' 03.2"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Unnamed tributary to Muddy Creek. Riparian area is approximately 50 feet wide, both banks. Stream appears to be perennial. Sycamore, boxelder, and green ash present. Not enough disturbance present; too much ground cover.

Slope: 2% Aspect: N/A % shade: 75% % ground cover: 90%

Current land use:

Riparian area

Disturbance present and what kind:

Stream flooding

Dominant plants:

Sinnicula, wild rye, privet, bush honeysuckle, green ash, sycamore, boxelder

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 6

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 35.5" Longitude: W -84° 09' 16.2"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

Forested hillslope, fairly steep. Not much disturbance, dominated by sugar maple and white ash

Slope: 30° Aspect: North % shade: 90% % ground cover: 90%

Current land use:

Forest

Disturbance present and what kind:

Few deer paths, along unnamed tributary to Muddy Creek

Dominant plants:

Sugar maple, white ash, wild ginger, sinnicula, bed straw

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 7

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 33.1" Longitude: W -84° 09' 18.7"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

East riparian floodplain adjacent to Muddy Creek. Dominated by sycamore, boxelder, sugar maple. Approximately 100 feet wide.

Slope: 30° on hillside Aspect: West % shade: 85% % ground cover: 95%
(floodplain flat)

Current land use:

Forested riparian zone of Muddy Creek

Disturbance present and what kind:

Flooding, deer paths

Dominant plants:

Sycamore, boxelder, sugar maple, sinnicula, wild ginger, spice bush, bed straw

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (*circle*): Single Plant < 20 20-99 100-999 >1,000

Colony Size (*Approx. Area*): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (*circle*): Infrequent Even Localized Frequent Dense

Phenology: _____

Plant Survey Data Sheet – Site 8

Project # and County: KY12-004; Madison County Date: 5/1/12

Biologist: E. Hartowicz and B. Remley Latitude : N 37° 44' 31.4" Longitude: W -84° 09' 20.9"

Species searched for: Running Buffalo Clover

(NOTE: If species is present fill out plant occurrence section at bottom of form)

Brief overall site description, including topography:

West floodplain riparian forest of Muddy Creek generally flat. Few gravel bars, no running buffalo clover. Approximately 30 feet wide then pasture.

Slope: 2% Aspect: East facing % shade: 60% % ground cover: 90%

Current land use:

Riparian forest

Disturbance present and what kind:

Flooding, deer paths

Dominant plants:

Sycamore, boxelder, buckeye, sinnicula, wild rye

No running buffalo clover observed.

NOTE: If target species is observed, complete this section.

No. of Individual Plants (circle): Single Plant < 20 20-99 100-999 >1,000

Colony Size (Approx. Area): Width: _____ Depth: _____

GPS Coordinates Recorded Occurrence Photographed Sketch location of occurrence boundary on back of form

Distance to Pavement: _____

Distribution (circle): Infrequent Even Localized Frequent Dense

Phenology: _____

Appendix 5

**Northern Madison County Sanitation District
Archaeological Survey of Proposed Wastewater Treatment Plant Site
May 2012**

AN ARCHAEOLOGICAL SURVEY OF APPROXIMATELY TWO (2) ACRES
FOR A FUTURE WASTEWATER TREATMENT PLANT
IN MADISON COUNTY, KENTUCKY

Lead Agency - None at this time

SAI # None at this time

Kentucky Project # FY12-7273

by

Dr. Jack M. Schock

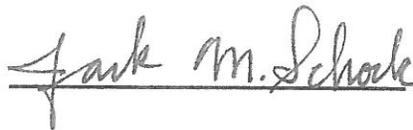
Arrow Enterprises

3020 Hunt Master Court

Bowling Green, Kentucky 42104

Telephone - (C.) (270) - 784 - 1271
(H.) (270) - 904 - 0899

May 2012

A handwritten signature in cursive script that reads "Jack M. Schock". The signature is written in dark ink and is positioned above a horizontal line.

Report requested by:
Mr. Mark Feibes
Nesbitt Engineering, Inc.
227 N. Upper Street
Lexington, Kentucky 40507

Telephone (859) 233-3111

ABSTRACT

Dr. Jack M. Schock of Arrow Enterprises conducted an archaeological reconnaissance of two acres for a future waste water treatment plant in Madison County on May 6th, 2012. There is no Lead Agency nor SAI# at this time. The Kentucky Registration Number is FY12-7273.

This archaeological survey was conducted at the request of Mr. Mark Feibes of Nesbitt Engineering at Lexington, Kentucky.

Five (5) man-hours were spent in the field conducting this archaeological survey.

No archaeological sites were located. Thus; no further archaeological work is recommended for this project.

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Previous Archaeological Investigations	4
Archaeological Procedures	4
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2. Photograph of proposed project area	5
3. Map showing shovel test locations	6

INTRODUCTION

Dr. Jack M. Schock of Arrow Enterprises conducted an archaeological survey of two acres for a proposed waste water treatment plant (Figure 1) in Madison County, Kentucky. The archaeological investigation was conducted on May 6th, 2012 at the request of Mr. Mark Feibes of Nesbitt Engineering at Lexington, Kentucky.

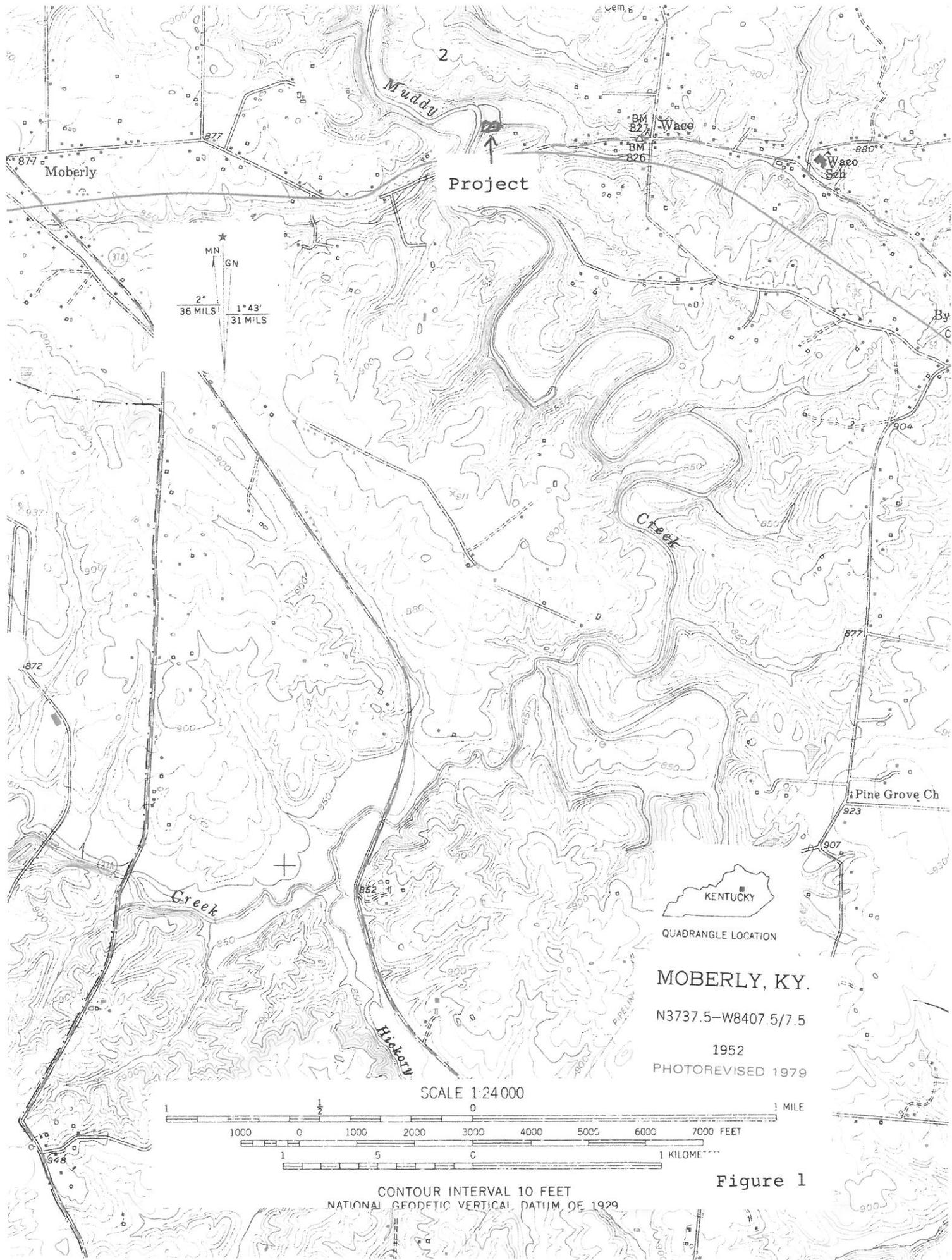
No archaeological sites were located; thus, no further archaeological work is recommended for this project.

This report is the result of an archaeological survey conducted to determine whether prehistoric or early historic archaeological sites will be affected by this project. The term historic is being used here to refer to pre-1950 sites. Such surveys are required on various funded or regulated projects to determine whether (1) any archaeological sites are present which will be affected by the project and (2) whether such sites meet the National Register of Historic Places criteria as expressed by 36 CFR 60.8.

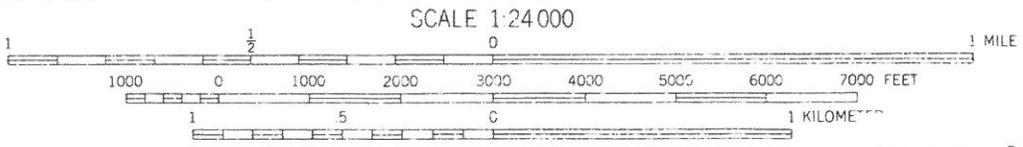
The following information is quoted from 36 CFR Part 66 in (Federal Register, Vol. 42, No. 19 - Friday, January 28, 1977).

APPENDIX B - Guidelines for the Location and Identification of Historic Properties Containing scientific, Prehistoric, Historical or Archaeological data.

In order to notify the Secretary of the potential loss or destruction of significant, prehistoric, historical or archaeological data pursuant to sections 2, 3 and 4 of the Act in a manner that will permit the Secretary to act effectively in response to this notification, it is necessary that the agency provide appropriate documentation concerning the nature and significance of all historic properties,



KENTUCKY
 QUADRANGLE LOCATION
MOBERLY, KY.
 N3737.5-W8407 5/7.5
 1952
 PHOTOREVISED 1979



CONTOUR INTERVAL 10 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

Figure 1

subject to impact that many contain such data. It is recommended that such documentation be generated by agencies in the course of their planning activities carried out under the authorities of the National environmental Policy Act of 1969 (Pub. L. 91-190) (NEPA), the National Historic Preservation Act of 1966 (Pub. L. 89-665) as amended (NHPA), Executive Order 11593, and related authorities.

It is important that agencies understand the relationship among NEPA, such as general historic preservation authorities as the NHPA and the Archaeological and Historic Preservation Act. NEPA mandates the evaluation of project impacts of cultural resources. One kind of cultural resource is the historic property which is the concern of the NHPA and Executive Order 11595. Some historic properties contain scientific, prehistoric, historical and archaeological data.

If archaeological sites are located which will be affected by a project, their significance must be determined before further work can be recommended. The results of this determination are qualified on the basis of whether or not the site is worthy of nomination to the National Register of Historic Places.

The term "archaeological site" is used here where there is evidence of former human activity. Site numbering nomenclature is based on the Smithsonian system. No prehistoric or historic sites which warranted archaeological site numbers were found as a result of this survey; thus, the short form format is being used in this report.

THE ENVIRONMENTAL SETTING

Physiographically, Madison County is located in the Central Bluegrass. The management area is the Inner Bluegrass (Pollack 1990:22-23).

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Madison County

Archaeological procedures included checking at the Office of State Archaeology regarding any known sites within two kilometers of this project. Project maps were provided by the client (Figure 1). The site check was performed on May 6th, 2012. Those sites which are within two kilometers of this project are discussed in the section Previous Archaeological Investigations.

There are no previously recorded archaeological sites in this proposed project area. The only previous archaeological survey was for a housing project (Fiegel 2004) which is merely two kilometers northeast of this proposed project.

Archaeological Procedures

The south portion of this proposed project is located on a steep slope lined with trees. This area has no archaeological potential. The northern portion is in a former cultivated field which is now in grass. Nine shovel tests were placed at approximately 20 meter intervals across this area (Figure 2). A tenth shovel test was added next to Muddy Creek.

The soil from the shovel tests was screened through a ¼ inch wire mesh. The topsoil yielded a brown plow zone (10YR 3/3) averaging 18 cm. in depth. No cultural material was found. If a archaeological site had been present, it would have been at shovel tests 1-2 and 10 were placed.

IMPACT ON ARCHAEOLOGICAL RESOURCES

No archaeological sites were located.



Figure 2 - Photograph of project area (looking south)

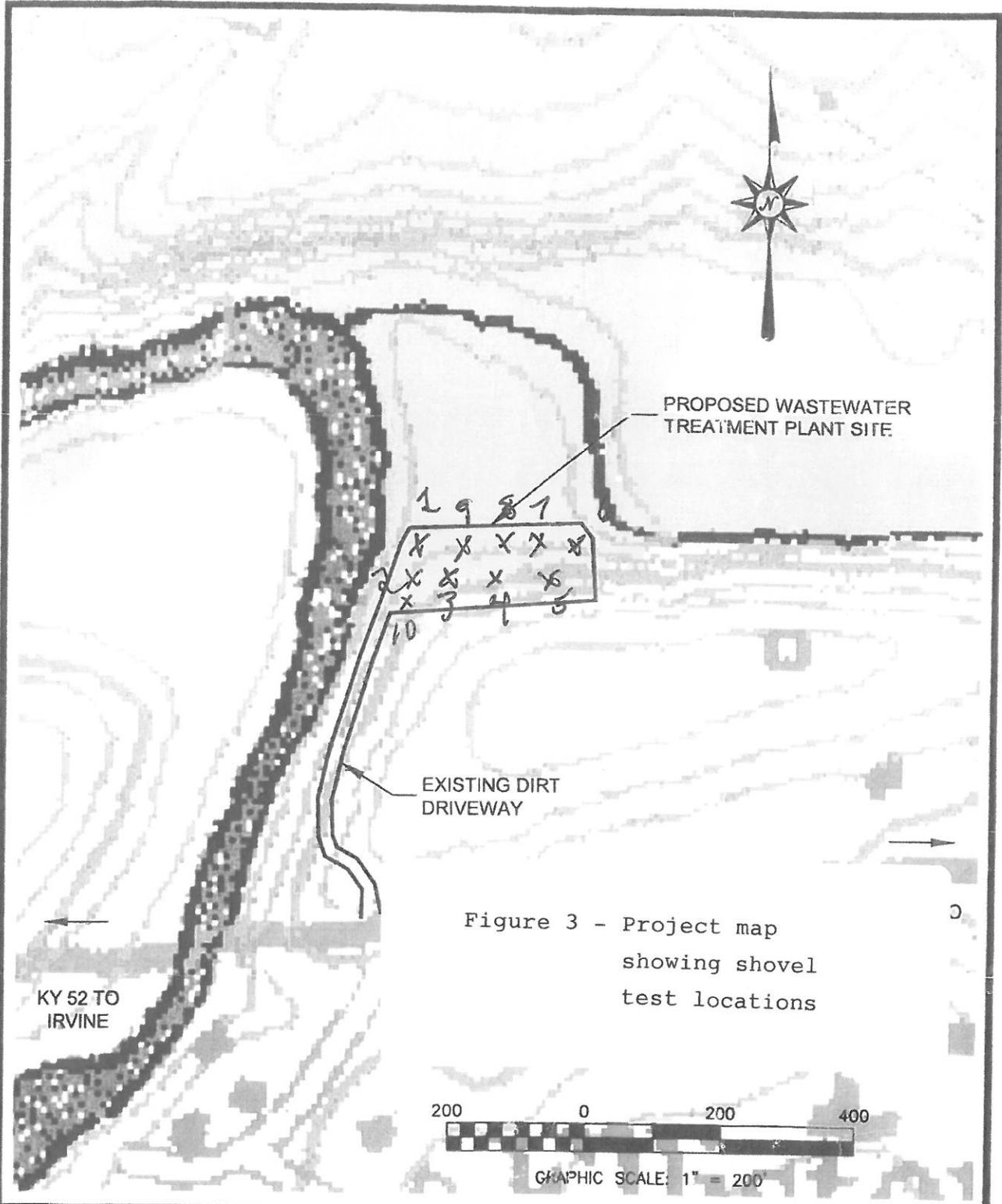


Figure 3 - Project map showing shovel test locations



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SITE PLAN
PROPOSED MUDDY CREEK WWTP
NORTHERN MADISON COUNTY SANITATION DISTRICT

drawn by: JCW	disk/file name: \\DWGS\LOCATION USGS.DWG	job no.: 934.41
date: 3-01-12	last plot date:	scale: 1" = 200'

PROJECT SUMMARY AND RECOMMENDATIONS

Dr. Jack M. Schock of Arrow Enterprises conducted an archaeological reconnaissance of two acres for a future waste water treatment plant in Madison County on May 6th, 2012. There is no Lead Agency nor SAI# at this time. The Kentucky Registration Number is FY12-7273.

This archaeological survey was conducted at the request of Mr. Mark Feibes of Nesbitt Engineering at Lexington, Kentucky.

Five (5) hours were spent in the field conducting this archaeological survey.

No archaeological sites were located. Thus; no further archaeological work is recommended for this project.

REFERENCES

Fiegel, Kurt

- 2004 An Archaeological Assessment of the Habitat for Humanity of Madison County Housing Project Near Waco, Madison County, Kentucky

Pollack, David (ed).

- 1990 Archaeology of Kentucky. Past Accomplishments and Future Directions.
Volume One. Kentucky Heritage State Historic
Preservation Plan. Report No. 1.

VITA

The investigator's vita is on file at both the Kentucky Heritage Council and the Office of the State Archaeology.

SCHOCK, JACK M.

PhD - Anthropology, State University of New York at Buffalo, 1974

M.S. - Anthropology, University of Kansas, 1964

Retired Professor of Anthropology

Taught at the Department of Sociology and Anthropology for 28 years
Western Kentucky University
Bowling Green, Kentucky

Home Telephone: (270) 904-0899

Facsimile - (270) 904-1057

Member: Register of Professional Archaeologists

Lifetime Member: Society of Professional Archaeologists

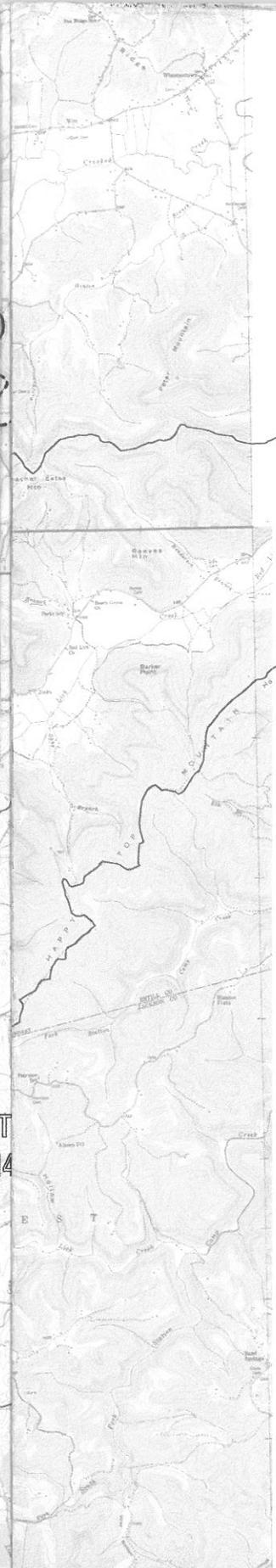
Forty years of professional archaeological work in Kentucky and have written and submitted 1500+ archaeological reports.

PANOLA
(M45)

10. EKU RIFLE RANGE

USGS QUADRANGLE

NOTE: WATERSHED BOUNDARIES AND WATERSHED
INFORMATION PROVIDED BY MADISON COUNTY GIS



GRAPHIC SCALE: 1" = 7000'

KENTUCKY NAD 83 SINGLE ZONE COORDINATES



Mark H. Feibes
07/12

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NORTHERN MADISON COUNTY SANITATION DISTRICT
OVERALL PLANNING AREA MAP

drawn by: JCW

job no.:

934.41

scale:

1" = 7000'

date:

4-03-12

file name:

\\DRAWINGS\PLANNING AREA.DWG

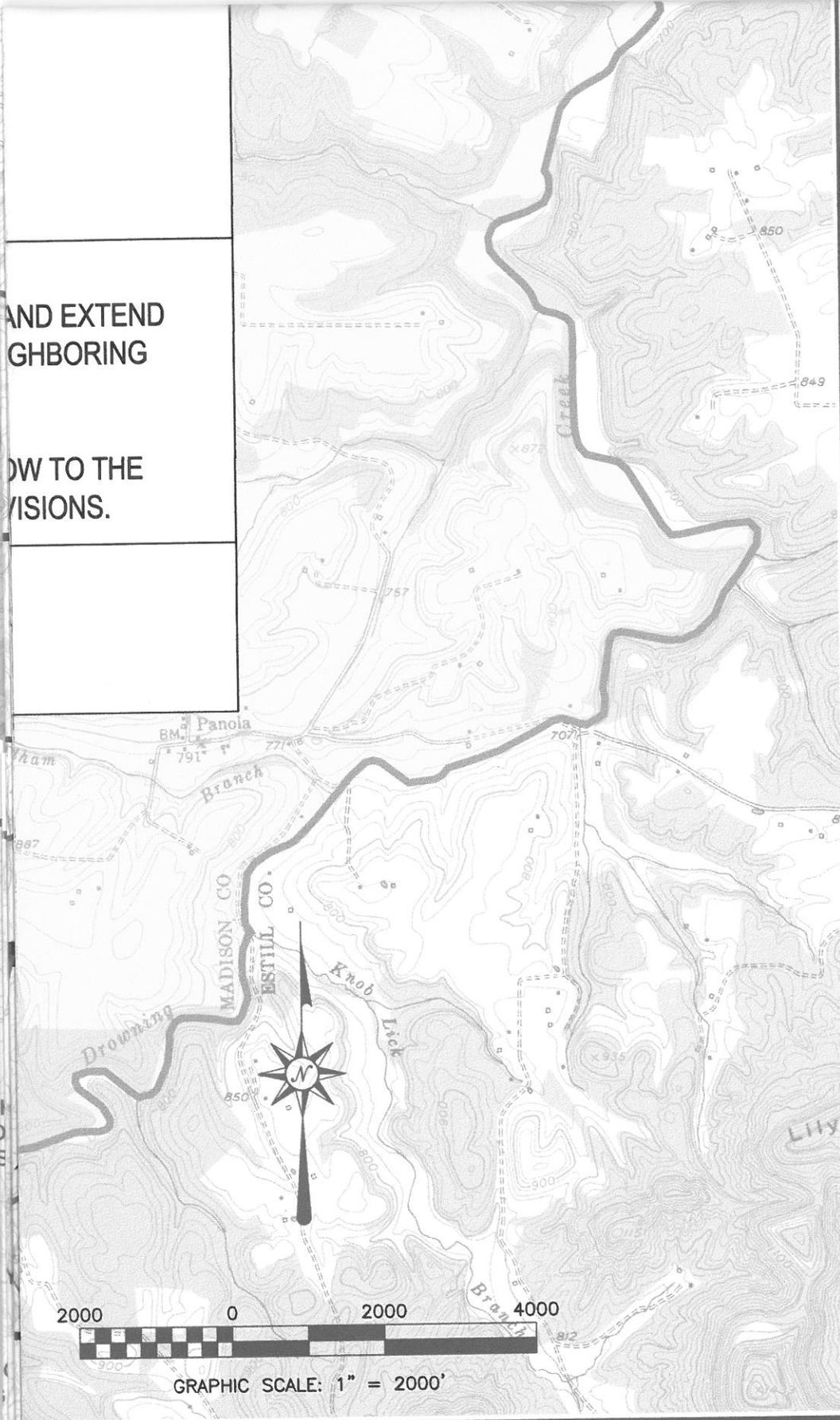


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no.

DWG 3-1

AND EXTEND
GHBORING

DOW TO THE
VISIONS.



Mark H. Feibes
65112

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**NORTHERN MADISON COUNTY SANITATION DISTRICT
PROJECT AREAS MAP**

drawn by: JCW	job no.: 934.41	scale: 1" = 2000'
date: 4-03-12	file name: \DRAWINGS\MUDDY CREEK WWTP.DWG	



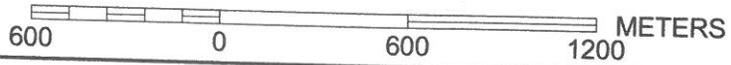
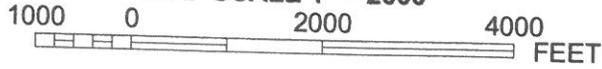
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DWG 3-2

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 2000'



NFIP

PANEL 0300C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MADISON COUNTY, KENTUCKY AND INCORPORATED AREAS

PANEL 300 OF 425

(SEE LOCATOR DIAGRAM OR MAP INDEX
FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
MADISON COUNTY	210342	0300	C

DWG 3-3

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

PRELIMINARY DATE MAP NUMBER
SEPTEMBER 30, 2009 21151C0300C



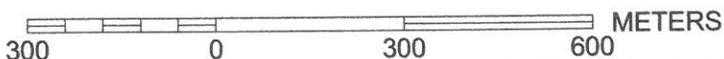
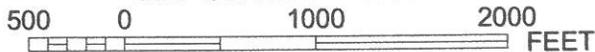
State of Kentucky
Federal Emergency Management Agency

History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 1000'



NFIP

PANEL 0270C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MADISON COUNTY, KENTUCKY AND INCORPORATED AREAS

PANEL 270 OF 425
(SEE LOCATOR DIAGRAM OR MAP INDEX
FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
BEREA, CITY OF	210156	0270	C
MADISON COUNTY	210342	0270	C
RICHMOND, CITY OF	210157	0270	C

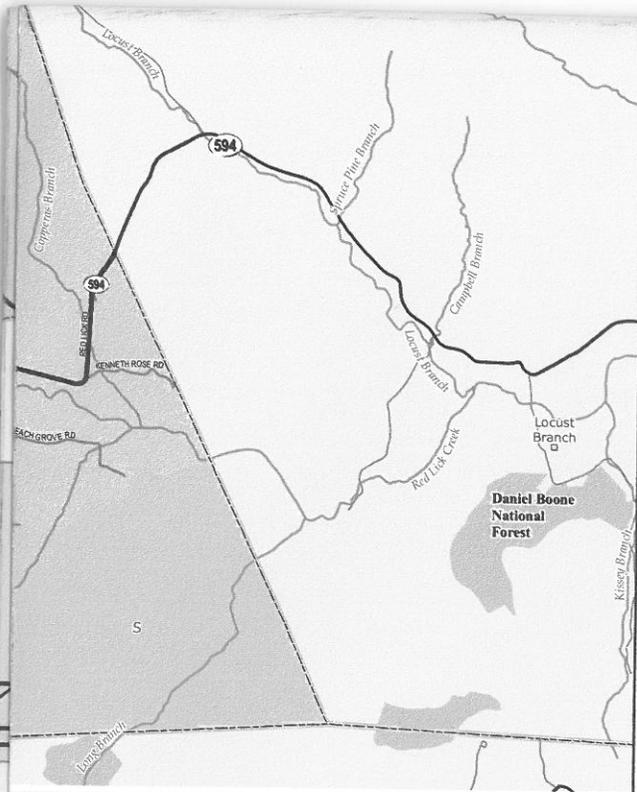
DWG 3-4

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

PRELIMINARY DATE MAP NUMBER
SEPTEMBER 30, 2009 21151C0270C



State of Kentucky
Federal Emergency Management Agency



Land Use & Zoning Codes

Legend	Code & Use
URBAN DEVELOPMENT	UC-1 Single Family Residential UC-2 Multi Family Residential UC-3 Neighborhood Commercial UC-4 General Commercial UC-4IC Interstate Commercial UC-5 Light Industrial UC-6 Public & Semi Public UC-7 Urban Agricultural UC-8 Resource Extraction UC-9 Mobile Home Park UC-10 Hazardous Industry
RURAL DEVELOPMENT	RC-1 Single Family Dwelling RC-2 Multi Family Residential RC-3 Neighborhood Commercial RC-4 General Commercial RC-5 Light Industrial RC-6 Public & Semi Public RC-7 Urban Agricultural RC-8 Resource Extraction RC-9 Mobile Home Park RC-10 Hazardous Industry
RURAL COMMUNITY	C-1 Single Family Dwelling C-2 Multi Family Residential C-3 Neighborhood Commercial C-4 General Commercial C-5 Light Industrial C-6 Public & Semi Public C-7 Urban Agricultural C-8 Resource Extraction C-9 Mobile Home Park
RURAL AREAS	R-1 Single Family Dwelling R-2 Multi Family Residential R-3 Neighborhood Commercial R-4 General Commercial R-5 Light Industrial R-6 Public & Semi Public R-7 Urban Agricultural R-8 Resource Extraction R-9 Mobile Home Park

nesbitt engineering, inc.

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**NORTHERN MADISON COUNTY SANITATION DISTRICT
MADISON COUNTY PLANNING & ZONING**

job no.: **934.41** scale: **1" = 5000'**

drawn by: **JCW** file name: **\DRAWINGS\PLANNING AND ZONING.DWG**

date: **4-03-12**



sheet no.

DWG 3-5



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