

Title Page
Kentucky Total Maximum Daily Load Planning
Standard Operating Procedures

Commonwealth of Kentucky
 Energy and Environment Cabinet
 Department for Environmental Protection
 Division of Water

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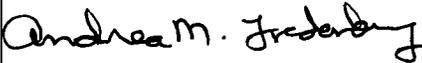
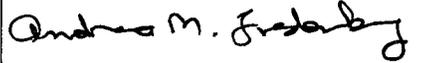
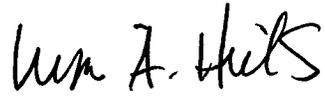
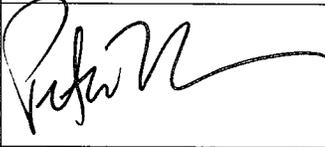
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Table of Contents

Title Page	1
Document Revision History.....	2
Table of Contents.....	3
List of Tables	3
Purpose.....	4
Applicability/Scope.....	5
Summary of Procedure	5
Definitions.....	5
Personnel Qualifications/Responsibilities	5
Procedures.....	6
Select Waters for TMDL Development.....	6
Obtain Priority Stream List.....	6
Review Priority List for Accuracy	6
Compile Draft List	6
Review Historical Data.....	6
Coordination with Third Party Data Collection.....	7
Determine Whether Additional Data Collection are Warranted.....	7
Review Draft List of Waters	7
Plan Public Participation.....	7
Map Project using GIS 9.2.....	8
Verify Aquatic Life Use Impairments	9
Develop Draft Monitoring Plan	9
Introduction.....	9
Sampling Strategy.....	9
Tables and Maps	10
Perform Site Reconnaissance.....	11
List of Equipment and Supplies for Reconnaissance.....	12
Develop Final Monitoring Plan	12
Generate EDAS Station ID Numbers	12
Approve Final Monitoring Plan.....	14
Changes to Final Approved Monitoring Plan	14
Develop/Update Quality Assurance Project Plan	14
Update TMDL Tracking Excel Sheet	14
Criteria	14
Records Management.....	15
Quality Control and Quality Assurance Section.....	15
Reference Section	16

List of Tables

Table 1. EDAS Watershed IDs	13
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Purpose

KRS 224.10-100 requires the Department for Environmental Protection to develop and conduct a comprehensive program for the management of water resources and to provide for the prevention, abatement, and control of water pollution. This administrative regulation and 401 KAR 10:002, 10:026, 10:029 and 10:030 establish procedures to protect the surface waters of the commonwealth, and thus protect water resources. These administrative regulations establish water quality standards consisting of designated legitimate uses of the surface waters of the commonwealth and the associated water quality criteria necessary to protect those uses. These water quality standards are minimum requirements that apply to all surface waters in the commonwealth of Kentucky in order to maintain and protect them for designated uses. These water quality standards are subject to periodic review and revision in accordance with federal and state laws.

The Water Quality Branch collects biological, bacteriological, physiochemical, chemical, habitat and other data to determine the use support status of Kentucky's waters. As expected, this monitoring has detected numerous impaired segments. 40CFR130 requires that states identify and set priorities for impaired stream segments and lakes requiring Total Maximum Daily Loads (TMDLs) and to develop TMDLs for these waters (CFR Title 40, Volume 21, revised July 1, 2005). Waters impaired by pollutants have been placed on Kentucky's 303(d) list since 1990. There are approximately 2100 waterbody/ pollutant combinations requiring TMDL development on the 2008 303(d) list. Kentucky, like other states, is required to complete TMDLs for 303(d)-listed waters within 13-15 years. To accomplish this significant task, careful yearly planning is required to select waters for TMDL development, to review existing data and current activities in the associated watersheds, to include other branches, agencies, and the public in the beginning phases of TMDL development, and to coordinate data collection efforts amongst different entities who may be working in the associated watersheds.

This manual has been developed by the Total Maximum Daily Load (TMDL) Section of the Water Quality Branch to document the standard operating procedures (SOP) to be used for annual TMDL project planning. It provides standardization of the steps used to select waters for TMDL development, to plan public participation meetings, and to develop monitoring plans and quality assurance project plans (QAPPs) for the selected waters.

This manual will be reviewed annually and updated if necessary. If you have any questions or comments concerning this manual, please contact the Total Maximum Daily Load Section at the following address:

Kentucky Division of Water
Water Quality Branch
200 Fair Oaks Lane
4th Floor
Frankfort, KY 40601
(502) 564-3410

Applicability/Scope

The procedures in this manual are to be followed on a yearly basis to plan TMDL monitoring for the upcoming FFY. It is to be followed by TMDL staff planning to perform monitoring for TMDL development. If other staff in DOW plan to perform TMDL monitoring, this SOP is to be followed and TMDL field biologist duties are assigned to these other staff. This planning document does not apply to entities performing third party monitoring for TMDL development.

Summary of Procedure

This manual provides standardization of the steps used to select waters for TMDL monitoring, plan public participation meetings, and develop monitoring plans and quality assurance project plans (QAPPs) for the selected waters on a yearly basis.

Definitions

303(d) list- A list of impaired waters that require a TMDL to be developed.

Ecological Data Assessment System (EDAS) – A data base used to store biological information and to calculate biological indices.

Priority List – A list of pollutant/waterbody combinations recommended for TMDL monitoring.

Total Maximum Daily Load (TMDL) – The maximum amount of pollutant a waterbody can assimilate and not be impaired by a specific pollutant.

TMDL Tracking Excel Sheet – Excel sheet created by the TMDL Section to track progress on each pollutant/waterbody combination on the current 303(d) list.

Personnel Qualifications/Responsibilities

The main personnel responsible for performing activities contained within this SOP are the TMDL section supervisor, the Watershed Management Branch TMDL liaison, and TMDL field biologists. The Watershed Management Branch TMDL liaison is responsible for submitting a priority list of TMDL monitoring requests and indicating whether public participation meetings are desired. The TMDL section supervisor is responsible for verifying information on the TMDL priority list and approving yearly monitoring plans and quality assurance project plans. The TMDL field biologists are responsible for gathering existing data, determining feasibility of monitoring, and producing yearly monitoring plans and a QAPP. The TMDL field biologists must have training and be proficient in the use of GIS9.2 and EDAS.

Procedures

Select Waters for TMDL Development

Obtain Priority Stream List

The TMDL section supervisor will request a list of priority waterbody/pollutant combinations for TMDL monitoring from the WMB/TMDL liaison. This will occur during October/ November of every year for TMDL monitoring to begin the following year. The supervisor will inform the liaison about any limitations to be used in establishing the list (limits on travel distances, limits on pollutants that have policy or resource issues, etc.). The supervisor will relay the timeframe for submittal of the priority list. A minimum of two months notice will be provided to the liaison to complete this task. The WMB/TMDL liaison will submit the priority list to the TMDL Supervisor within the required timeframe.

Review Priority List for Accuracy

The TMDL Supervisor will verify whether TMDLs are currently under development or under contract for the waterbody/pollutant combinations on the priority list. The TMDL Supervisor will verify that the pollutants and river miles match the current 303(d)-listed segments.

Compile Draft List

The TMDL supervisor will submit the priority list to the TMDL field biologists. The TMDL field biologists will use a HUC14 to HUC12 watershed approach (depending upon HUC size and professional judgment) and add any additional waterbody/pollutant combinations to the priority list such that all waterbody/pollutant combinations within the HUC or within the vicinity of the priority stream are on the draft list. In order to maximize waterbody/pollutant combinations while minimizing staff resources during the stream monitoring season, the TMDL field biologists will add additional waterbody/pollutant combinations to the list at their discretion and TMDL Supervisor approval.

Review Historical Data

The TMDL field biologists will document the initial 303(d) listing and any changes to the listing over the years for each pollutant/waterbody combination. The field biologists will request and/or compile existing and historical information (biological, chemical, and habitat) including monitoring locations (latitude and longitude in decimal degrees) and quality assurance project plan (QAPP) or equivalent documentation for the combinations on the draft list. The field biologists will document the dates and times the segment was monitored, the location of the monitoring (latitude and longitude in decimal degrees), who (program, university, consulting company) performed the monitoring, and the results of the monitoring. Sources of this type of information include the original 305(b) assessment sheet located on the W drive at W:\Programmatic_data\Clean_water_act\305b, 303(d) reports, and EDAS.

Coordination with Third Party Data Collection

If outside entities are collecting or plan to collect some data in the watersheds of interest, TMDL field biologists will document these planned activities in as much detail as possible. Information to be documented or compiled includes, but is not limited to, who is performing the monitoring, the proposed monitoring locations (latitude and longitude in decimal degrees), a copy of the QAPP and SOP or equivalent documentation, and the sample design including timing and frequency of sampling events and parameters to be analyzed.

Determine Whether Additional Data Collection are Warranted

The TMDL field biologists, TMDL analytical staff and the TMDL supervisor will review the historical data and any current third party activities or proposed activities to determine if sufficient data exists (or will exist) to warrant TMDL development without additional data collection by the TMDL Section. If additional data collection is warranted, the TMDL staff will determine what pollutant(s) require additional data and what monitoring protocol(s) should be followed. Specific information regarding monitoring protocols will be contained in a QAPP and associated monitoring plans developed for the sampling year. If it is determined that sufficient data exists or will exist after third party data collection, the affected pollutant/waterbody combinations will be removed from the draft list and will be identified as TMDL under development in the TMDL tracking Excel sheet.

Review Draft List of Waters

After the TMDL field biologists have made the necessary additions and deletions to the draft list, they will submit it to the TMDL supervisor. The TMDL supervisor will meet with the WMB/TMDL liaison to discuss the list and make final selections of combinations for TMDL monitoring. The TMDL supervisor will then submit the final list to the TMDL field biologists for monitoring plan development.

Plan Public Participation

The TMDL Supervisor will request that the WMB/TMDL liaison send the priority list to the WMB basin coordinators and solicit feedback on whether the coordinators believe a public meeting is necessary. The TMDL supervisor, the WMB/TMDL liaison and others on an as needed basis, will meet to discuss whether any public meetings are needed or should be scheduled for the segments/watersheds on the priority list and will determine when in the TMDL process the public meetings should occur (prior to monitoring, after data collection and preliminary analysis, prior to public participation, etc.). Lack of advanced planning of meetings will not exclude future meetings from being held, if needed. The scheduling and notification for public meetings will follow the WMB protocol.

Map Project using GIS 9.2

The TMDL field biologists staff will create a GIS project and will save it in the TMDL administrative records. The TMDL Basemap layer will be used to populate the map. The project will be clipped to the area of interest (HUC or several small HUCs within close proximity).

Draft Chemistry monitoring sites will be selected based upon the following criteria for location:

1. Along the impaired segment. The actual number of sites depends upon the segment length, but at least one site must be within the impaired segment, preferably as far downstream as possible such that no tributaries or springs enter between the end of the impaired segment and the monitoring site.
2. Above the impaired segment, if the entire stream is not listed and there are headwater areas contributing to the impaired segment
3. At the mouth of any major tributary entering the impaired stream. The tributary may enter into or above the impaired segment.
4. Below different land use categories or different potential pollutant sources (i.e. agricultural, urban, mining) for the impaired segment and tributaries.
5. Below (and sometimes above) major point sources (WWTP, package plant, etc.). The site should be at least 0.25 miles below the outfall of a WWTP.
6. If necessary for the pollutant, a reference site will be located on a stream that has properties similar to the impaired segment, but is not impaired by the pollutant of interest.
7. At the outfall from major springs, especially when the spring is not located within the stream channel itself.
8. In a defined flowing channel (if not in headwaters and not a major lake) above and/or below a small swamp/wetland/pond/lake/reservoir.

Other considerations for site locations:

1. The number of sites should be limited based upon the staff resources available.
2. Access is required for all sites.
3. Sampling two subwatersheds with the same source/landuse breakdown may not be necessary. It's probably better to spend the resources elsewhere.
4. Avoid placing sites where there may not be measurable flow (immediately upstream/downstream of bridges, deep pools, lowhead dams, beaver dams, backwater areas, etc.).
5. It is strongly recommended that several TMDL staff (field biologists, data analysts, and supervisor) be involved in site selection/review. One person may "see" something everyone else has missed.

If the use-impairment includes aquatic life, draft Biology monitoring sites will be selected based upon the following criteria for location:

1. On major un-assessed tributaries and
2. Upstream areas draining to the impaired segment

Once draft chemistry and biology sites are chosen, the TMDL field biologists will add them into the GIS project as coverages. The TMDL field biologists will develop layouts as required for the monitoring plan maps, below.

Verify Aquatic Life Use Impairments

If aquatic-life use impairments exist within the watershed of interest and no biological monitoring of the affected segments have been performed within the last three years, the impairment will be verified by collecting macroinvertebrates and algae and scoring habitat at the original site(s) that resulted in the 303(d) listing. This biological monitoring will be performed during the spring and summer index period prior to the beginning of chemistry monitoring in November. If the segment is found to no longer be impaired for the aquatic-life use, the segment will not be monitored for aquatic life impairing pollutants and a delisting will be pursued via the Integrated Report process.

Develop Draft Monitoring Plan

Draft monitoring plans will be developed by TMDL field biologists and will include the information below:

Introduction

Describe the history of the listing: who collected the data, what data was collected, where it was collected, when it was collected, what is/are the use impairment(s) and support status, what is/are the pollutant(s), when the segment was first listed, whether there have been changes in the listing (change in river miles, segments split/combined, change in the pollutant from OE to nutrients, etc.). Provide references for information [305(b) assessment sheets, 303(d) lists, EPA approval documents, ADB, EDAS, STORET, etc.). Describe any sources found in the watershed and indicate any KPDES permit compliance issues or violations. Indicate if there are any karst influences in the watershed and detail what is known about the karst flows (check with Groundwater Branch). In addition, detail any current or planned third party monitoring, including who is performing the monitoring, the proposed monitoring locations (latitude and longitude in decimal degrees, the sample design including timing and frequency of sampling events and parameters to be analyzed, and a reference for the third party QAPP and SOP. The results of any biological samples used to verify the aquatic life use impairment will be noted including date of sampling, MBI and habitat scores and current impairment status.

Sampling Strategy

Specify the number of draft chemistry sites and indicate whether a reference site is necessary and what information was used to select the reference site. Specify the timeframe for the study, the frequency of sampling events, and the desired number of sampling events. Specify the parameters to be collected at each site (in the narrative or in a table). Indicate what additional monitoring will be performed (biological, habitat, dissolved DO study, sediment), when these data will be collected and at what locations the data will be collected. Specify whether timing of events needs to be coordinated with any third parties and list the third party contact information (name and e-mail address or phone number).

Tables and Maps

Include the following tables and maps in the draft plan:

1. A table of the pollutant/waterbody listings as per the most recent 303(d) list, including stream name, the receiving waterbody, the river miles of the segment, the county, the use impairment (indicate PS or NS), the pollutant, and the suspected source(s). List each pollutant/waterbody combination separately.
2. A table of KPDES permitted sources, including permit number, outfall location (latitude and longitude), type of source, site name, site address, receiving stream (if any), permitted flow (if any), pollutant permit limits for pollutant(s) of concern to the TMDL, if any, etc. If sources are too numerous to list, detail the major sources as above and map minor sources (these may include numerous oil and gas wells, etc.).
3. A table of chemistry monitoring sites, including stream on which the site is located, nearest road or crossing, the river mile at which the site is located and, if on a tributary, the river mile at which the tributary enters the stream, the catchment area, the latitude and longitude, and the parameters to be collected at the site.
4. A table of any third party monitoring sites and the information detailed in number 3 above.
5. A table of proposed biological monitoring sites including stream, road location or crossing, river mile, tributary river mile, catchment area, latitude and longitude, and index period.
6. A color map of the landuses within the watershed. Change the major landuse to "clear" on the map. Include stream lines in blue and the impaired segment in red. If more than one impaired segment is in the HUC, use red, yellow, and orange colors and hashing marks to identify different segments. Additional colors may be used as needed, but green and blue should be avoided, if possible. Include any major potential sources. Clip the map to the watershed/HUC of interest.
7. A color map of the watershed with streams in blue, proposed chemical sites with black circles, proposed biology sites with black squares, the impaired segment(s) as in item 6 above, and the HUC outline in black. Clip the map to the watershed of interest. If third parties are collecting or plan to collect data, map their proposed sample sites with black triangles.

All maps should follow standard cartography, should include a north arrow, legend, and scale bar, and should indicate data source, date map created, and name of person who created the map.

Perform Site Reconnaissance

The TMDL field biologists and others, as needed, will perform site reconnaissance prior to the start of monitoring. As the watershed is driven, the landuse surrounding the stream (row crops, fallow field, cow pasture with animal access to stream, residential, etc.) will be noted on a photocopied topomap where the stream and landuse can be seen from the road or stream (windshield survey).

Upon arrival at the site, if there is a house nearby and a resident is home, the field biologists will explain the purpose of the sampling to the resident and request permission to be on the land during the duration of the TMDL project. The homeowner will be given a signed copy of the TMDL stream monitoring information letter which will be printed on department letterhead (example letter contained in Attachment 1). If a house is present, but no resident is home, staff will place the signed TMDL stream monitoring information letter in a noticeable spot (not in mailboxes; they are federal property and it is illegal to place items in the mailbox). If there is potential access to a site, but it is secured by the landowner, attempts to locate and contact the landowner to obtain access will be made. This may require contacting the property value administration office to find landowner contact information.

At each site, field biologists will walk the stream to find a spot that is accessible, that will be wadeable during most of the year and that is a straight section with as uniform a bottom as possible. This will be the location to measure flow (and to collect chemistry samples and multi-probe readings). The latitude and longitude of this site will be determined using GPS and will be recorded. The location of riffles will be noted if biology will also be collected at the site.

If the proposed site is not accessible, either due to hazardous site conditions or landowner denial of entry, field biologists will scout other potential site locations that are accessible. If possible, these potential sites should be on the same stream, either slightly up- or down stream, such that no major tributaries or springs enter between the planned site and the new site. If tributaries or springs do enter between the desired location and a newly scouted location, a sampling site may also be necessary on the spring or tributary.

field biologists will photograph the following features at each site: stream facing upstream and downstream, stream banks (left and right), stream bed composition, riparian area (left and right), and everything else of note (beaver dams, large headcuts, etc).

field biologists will document the following, if known: name of landowner (if contacted directly), and, if necessary, their phone number, driving/walking directions to the site, parking location, riffle location (for biology sites), stream and bank conditions, surrounding landuse conditions, farm animals with access to the stream, any construction activities, any bank failures, any sand bars or islands, etc.

List of Equipment and Supplies for Reconnaissance

Staff will bring the following items to conduct site reconnaissance:

Project folder with draft monitoring plan and directions to proposed sites

Photocopied topo-map of the watershed

Pencils/pens

Paper or field notebook

Signed information letters for landowners

Boots and waders or hiking boots

GPS unit

Camera

Walkie-talkies—optional equipment

Disposable gloves

Safety glasses or goggles

Develop Final Monitoring Plan

Based upon field reconnaissance, field biologists will determine any site additions or deletions for the watershed. Once sites are finalized, the field biologists will enter the field measured latitudes and longitudes for the sites into the GIS project; deleting sites or adding new sites, as necessary. All monitoring plan tables and maps will be updated with this information. The monitoring plan will also be updated with any new information gleaned from site reconnaissance, including additional identified sources of pollutant, information on karst features, and identification of sites with farm animal access to the stream, etc. All final sites will be assigned a unique identification number based upon the naming convention for the Ecological Data Assessment System (EDAS). This unique station identification (ID) number will be used in all tables in the final monitoring plan. The information on the EDAS ID and the procedure to generate the ID are contained in the next section below.

Generate EDAS Station ID Numbers

EDAS Station IDs consist of 8 numbers. These 8 numbers are a combination of a watershed ID, a subwatershed ID, and a location ID. The following explains how to generate these numbers. When assigning EDAS Station IDs it is very important to use the station table in EDAS to make sure there no existing stations in EDAS for the location to which an ID is being assigned. All new Station IDs should begin with DOW, signifying that the stations were created by the Division of Water.

In EDAS, each major watershed has been assigned a unique ID. The 13 watershed IDs can be found in Table 1. The first two numbers found in an EDAS Station ID consists of the unique watershed ID. For example, all EDAS stations that are located in the Licking River start with the numbers DOW05.

Table 1. EDAS Watershed IDs

Watershed	EDAS ID
Big Sandy River	01
Upper Cumberland River	02
Green River	03
Kentucky River	04
Licking River	05
Little Sandy River	06
Mississippi River	07
Ohio River	08
Tennessee River	09
Tradewater River	10
Tygarts River	11
Salt River	12
Lower Cumberland River	20

The next three numbers in an EDAS Station ID represent the subwatershed in which the sampling location is located. The Water Quality Branch uses a map that shows the delineations for all the subwatersheds in the state. An important thing to note is that these subwatersheds do not necessarily follow HUC boundaries. This map is available by GIS 9.2 as an overlay called ‘DOW_SubBasins_of_Kentucky_KY1Z.tif’. It is contained within the Division of Water Folder in the Imagery Folder. For a subwatershed example, Houston Creek in Bourbon County is in the Licking River watershed (05) and, based upon the map, its subwatershed number is 17. A zero is placed in front of the subwatershed number. Therefore, the first 5 numbers of the station ID for this stream is **DOW05017**.

The final three numbers in the EDAS Station ID represent the location ID. Each location of a sampling site within a subwatershed must have its own unique value. To determine what this number is, staff should look in the Stations Table in EDAS. Click in the Station ID heading and hit the sort ascending button (the button with the A Z and up arrow) in order to put all IDs in numerical order. Using Houston Creek as an example, scroll down until Station IDs that begin with DOW05017 are located. Highlight the DOW05017 in one of the cells and hit the filter button (the funnel with the lightning bolt). This will filter only the DOW05017 stations that already exist in EDAS. The results show that DOW has stations that already exist for Houston Creek. A new sampling location in Houston Creek would get the next highest location ID. To get the final EDAS Station ID put a zero in front of the location ID and tack these three numbers on the end. The final Station ID would be DOW050170xx, where xx represents the next highest number.

Several agencies besides DOW also utilize EDAS; therefore there may already be an ID for a station in EDAS under a different agency code. If stations already exist for the stream of

interest, check the location information to see if your location already has an EDAS ID. If it does, use that ID even if it is from a different agency (CFD, EKU, DBF, etc.).

Approve Final Monitoring Plan

Once finalized, the monitoring plan will be submitted to the TMDL section supervisor for approval. Final monitoring plans are to be submitted prior to or during October, before November chemistry sampling begins. The TMDL supervisor will then inform staff that the monitoring plan has been approved and that it can be added as an appendix to the QAPP for that monitoring year.

Changes to Final Approved Monitoring Plan

Any changes to an approved monitoring plan, including but not limited to changes in site locations (moving sites and adding or deleting sites), must be approved by the TMDL section supervisor. TMDL field biologists will submit a written word document identifying the name of the TMDL field biologists requesting the change and the date of the request, specifying the change to be made and the rationale for the change, and containing signature and date lines for Supervisor approval of the requested change. Once a change is approved, the TMDL field biologists will convert the word document to pdf format and will add the pdf as an addendum to the approved monitoring plan.

Develop/Update Quality Assurance Project Plan

A yearly Monitoring Quality Assurance Project Plan (QAPP) will be developed or updated by the TMDL field biologists. The QAPP will follow EPA development guidelines including EPA Guidance for Quality Assurance Project Plans (EPA, 2002) and EPA Requirements for Quality Assurance Project Plans (EPA, 2001). The yearly QAPP will outline the quality assurance/quality control procedures to be followed from the planning phase of TMDL development through sample collection and analysis. Monitoring plans, specific to each watershed, will be attached as an appendix to the yearly QAPP.

Update TMDL Tracking Excel Sheet

Once the monitoring plans and QAPP are developed, the TMDL tracking sheet needs to be updated to indicate "Yes" under the TMDL under development column. Additional columns should be completed as QAPPs are approved and monitoring progresses.

Criteria

Not Applicable

Records Management

All documents will be retained according to the yearly QAPP.

Quality Control and Quality Assurance Section

The monitoring plans will be spell checked with prior to submittal to the TMDL section supervisor.

Reference Section

EPA, 2001. EPA Requirements for Quality Assurance Project Plans: EPA QA/R-5. Office of Environmental Information, Washington, D.C. www.epa.gov/quality

EPA, 2002. Guidance for Quality Assurance Project Plans: EPA QA/G-5. Office of Environmental Information, Washington, D.C. www.epa.gov/quality.

Attachment 1: Example Landowner Letter

To Whom It May Concern:

The Kentucky Division of Water (DOW) is required under Section 303(d) of the Clean Water Act to develop a list of waterbodies not supporting designated uses. As required by 40 CFR 130.7(b) (4), these waters have been prioritized for total maximum daily load (TMDL) development. TMDL is defined as the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. TMDLs also include an allocation of that amount to the pollutant's sources. The Goose/Little Goose and Pond Creek Watersheds have been selected as a priority watershed for TMDL development.

The Water Quality Branch (WQB) of the Kentucky DOW will be conducting a study of the Little Goose/Goose and Pond Creek Watersheds starting in November of 2007. The study will include assessments to determine the water quality of these watersheds. Assessments will evaluate the stream habitat and the aquatic insect and algal community structure. Water quality samples and flow profiles will be collected from various locations within the watershed.

The WQB would greatly appreciate cooperation by landowners through access to Little Goose/Goose and Pond Creeks and their tributaries. An attempt will be made to contact landowners during the sampling activities to answer any questions pertaining to the sampling in these watersheds. If you have further questions you may contact me at 502-564-3410, Ext. 4853.

It is the mission of the Kentucky Division of Water to manage, protect and enhance the water resources of the Commonwealth for present and future generations through voluntary, regulatory and educational programs. We would like to thank you in advance for your assistance in accomplishing our mission and preserving one of our state's most valuable natural resources - water.

Sincerely,

Andrea M. Fredenburg, TMDL Section Supervisor
Kentucky Division of Water
Water Quality Branch
200 Fair Oaks Lane
4th Floor
Frankfort, KY 40601