0120-FM-PY0004 Rev. 3/2003

COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL QUALITY BOARD

PETITION FORM

RECEIVED

JUN 11 2008

ENVIRONMENTAL QUALITY BOARD

I. PETITIONER INFORMATION

Name: Foundation Mining, LP

Mailing Address: 158 Portal Road

P.O. Box 1020

Waynesburg, PA 15370; Attn: Mr. Terry L. Dayton

Telephone Number: (724) 627-2219

Date: June 9, 2008

II. PETITION INFORMATION

A. The petitioner requests the Environmental Quality Board to (check one of the following):

☐ Adopt a regulation

☒ Amend a regulation (Citation Citation 25 Pa. Code Section 93.9v Tributaries to South Fork of Tenmile)

☐ Repeal a regulation (Citation)

Please attach suggested regulatory language if request is to adopt or amend a regulation.

B. Why is the petitioner requesting this action from the Board? (Describe problems encountered under current regulations and the changes being recommended to address the problems. State factual and legal contentions and include supporting documentation that establishes a clear justification for the requested action.)

The "HQ-WWF" designation for the Petition Area (House Run, Hoge Run, and McCourtney Run) was promulgated in 1979 using criteria that are outdated by today's standards. According to the relevant Comment and Response document, the basis for listing was to "[p]rotect the Waynesburg water supply and the excellent smallmouth bass fishery." See, Exhibit C. The designation took effect immediately downstream of the Waynesburg water supply intake and continued up to the headwaters which include House Run, McCourtney Run, and Hoge Run. The entire section downstream of the intake was designated "WWF." See, Exhibit B. The Waynesburg water supply intake was removed from this stream in 1990 and replaced with a pipeline to the Monongahela River, such that there is no longer a public water supply intake to protect. See Exhibit D. Moreover, biological and chemical data collected by the Petitioner demonstrate that the streams in the petition area do not satisfy the requirements for a "High Quality" stream as set forth at 25 Pa. Code Section 93.4b and as such does not merit HQ protection. A WWF designation is perfectly appropriate to protect the smallmouth bass fishery, as is the case in the downstream segment of the waterway. See, Exhibit A. The existing "HQ-WWF" designation currently poses a barrier to activities and the associated NPDES discharges in the watershed by companies affiliated with the Petitioner and it is anticipated that these barriers will increase over time. Additionally, the Petitioner has filed applications for new activities in the watershed and the existing designation would be problematic for those activities, and could result in significantly increased costs and barriers with no attendant benefits. The existing designation of "HQ-WWF" is no longer appropriate for the Petition Area. The Petition Area should be redesignated as "WWF" where appropriate.

C. Describe the types of persons, businesses and organizations likely to be impacted by this proposal.

The Petition Area is situated in a rural area in Southwest Pennsylvania. Agriculture (including cattle grazing), oil and gas operations, and coal mining are the major industries in the area. Petitioner believes that the municipalities in the petition area are Center Township and Jackson Township.

D. Does the action requested in the petition concern a matter currently in litigation? If yes, please explain.

No, the requested action does not concern a matter currently in litigation.

E. For stream redesignation petitions, the following information must be included for the petition to be considered complete. Attach supporting material as necessary.

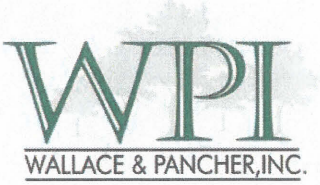
1. A clear delineation of the watershed or stream segment to be redesignated, both in narrative form and on a map. **(Exhibit A Section 2.0, Exhibit B Figure 1)**
2. The current designated use(s) of the watershed or segment. **(Exhibit A Section 2.0, Exhibit B Figure 2, Exhibit C)**
3. The requested designated use(s) of the watershed or segment. **(Exhibit A Section 2.0)**
4. Available technical data on instream conditions for the following: water chemistry, the aquatic community (benthic macroinvertebrates and/or fishes), or instream habitat. If such data are not included, provide a description of the data sources investigated. **(Exhibit A Sections 3.0, 4.0 and Appendices B and C, Exhibit B Figure 5)**
5. A description of existing and proposed point and nonpoint source discharges and their impact on water quality and/or the aquatic community. The names, locations, and permit numbers of point source discharges and a description of the types and locations of nonpoint source discharges should be listed. **(Exhibit E)**
6. Information regarding any of the qualifiers for designation as high quality waters (HQ) or exceptional value waters (EV) in §93.4b (relating to qualifying as High Quality or Exceptional Value waters) used as a basis for the requested designation. **(Exhibit A Section 4.0 and Appendix B, Exhibit D)**
7. A general description of land use and development patterns in the watershed. Examples include the amount or percentage of public lands (including ownership) and the amount or percentage of various land use types (such as residential, commercial, industrial, agricultural and the like). **(Exhibit A Section 2.1, Exhibit B Figure 4)**
8. The names of all municipalities through which the watershed or segment flows, including an official contact name and address. **(Exhibit B Figure 3, Exhibit F)**
9. Location information relevant to items 4-8 (except for contact names and addresses) displayed on a map or maps, if possible. **(Exhibit B Figures 3, 4, and 5)**

All petitions should be submitted to the
Secretary of the Department of Environmental Protection
P.O. Box 2063
Harrisburg, PA 17105-2063

Exhibit A
Proposed Petition Redesignation
High Quality Designation
Sampling Analysis

Proposed Petition Redesignation
High Quality Designation
Sampling Analysis

Prepared For:
Foundation Mining, LP
158 Portal Road
P.O. Box 1020
Waynesburg, PA 15370



Prepared By:
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1085 S. Hermitage Rd.
Hermitage, PA 16148
724-981-0155

June 2008

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1.0 INTRODUCTION AND BACKGROUND

The petition area (2,462 acres and 10.60 stream miles consisting of portions of the House Run, Hoge Run, and McCourtney Run watersheds located in Center and Jackson Townships, Greene County, Pennsylvania) was studied and compared against an unnamed tributary (UNT) to Sugarcamp Run located in Washington County, Independence Township PA. The petition area is currently designated as having High Quality Warm Water Fishes (HQ-WWF) by the Pennsylvania Department of Environmental Protection (Title 25 Pa. Code 93.9v, 2006a).

Wallace & Pancher Inc. has completed an assessment of the biological and chemical parameters, based on a one time sampling event, to support a possible change of the designated use for the petition area.

2.0 STUDY AREA

The high quality designation petition area is located in Center and Jackson Townships, Greene County, Pennsylvania. More specifically the petition area is located northwest of Golden Oaks Road (SR 18), between Bristoria Road and Tower Road. It covers an area of 2,462 acres and consists of eight streams with PaDEP five digit stream codes (10.60 stream miles). The watersheds located within the study area include; Hoge Run (Total - 951.6 Ac., Inside Petition Area - 951.6 Ac.), McCourtney Run (Total - 1,303.86 Ac., Inside Petition Area – 542.6 Ac.), and House Run (Total - 3,016 Ac., Inside Petition Area – 965 Ac.). (Figure 1, Exhibit B)

Currently the streams are designated as HQ-WWF (High Quality Warm Water Fishes). The requested designated use(s) of the watershed and segments is WWF (Warm Water Fishes). Both designations are defined in Title 25 Pa. Code Section 93.4. The current designation for South Fork Tenmile Creek and its named and unnamed tributaries is listed in Title 25 Pa. Code Section 93.9v. (Figure 2, Exhibit B)

The land use of the petition area is divided between five general land use categories:

Forest, Farmland, Low Density Urban/Commercial, Transportation, and Barren or Unclassified Land. The petition area is dominated by forests, which cover approximately 1951.68 acres, or 77% of the total petition area. Farmland occupies approximately 535.21 acres, or 21% of the petition area. All other land uses contribute less than 1% each to the total petition area. Areas associated with transportation (21.58 acres) cover a small portion of the lowlands near streams. The main portions of Low Density Urban/Commercial uses are located along Golden Oaks Road in the south east corner of the petition area along McCourtney Run and along Macedonia Road. This land use covers 17.02 acres. Barren and Unclassified Lands round out the remaining 4.37 acres. (Figure 4, Exhibit B)

Land use was determined using PA MAP Land Cover for Pennsylvania created by The Pennsylvania State University – PASDA.

2.1 Watershed Descriptions

The following section provides a detailed description of the HQ sample stations and their respective watersheds (Figure 5, Exhibit B).

HOGE RUN

Hoge Run (40632) flows east along Hoges Run Road in Center Township (Figure 1, Exhibit B). Elevations range from approximately 1,040 feet along the stream bottom to 1,470 feet at the adjacent hilltop. The entire Hoge Run watershed is located within the petition area. Shortly after Hoge Run crosses under SR 18, it flows into McCourtney Run. Sample stations HQ 6, HQ 7, and HQ 8 are located within the Hoge Run watershed.

Hoge Run consists of active pasture lowlands, residential areas, and forested upland habitat. The active pastures occur over a large portion of the watershed. Cattle and horses often have unlimited access to the stream channel resulting in sediment and nutrient loading. Stream bank fencing was observed on a few small farms. Residential areas cover a small percentage of the watershed. This land use consists of single family dwellings and several buildings associated with agricultural practices. The forested

upland habitat covers a majority of the watershed. Species observed included black willow (*Salix nigra*), oaks (Quercus spp.), ironwood (*Carpinus caroliniana*), multi-flora rose (*Rosa multiflora*), and poison ivy (*Toxicodendron radicans*).

HQ 6

HQ 6 is located along the main stem of Hoge Run in its most downstream portion. The northern bank of the site is open horse pasture. The streambank has been fenced in order to prevent horse access to the stream. The southern bank is forested. Dominant species included ironwood, red maple (*Acer rubrum*), American chestnut (*Castanea dentata*), and multi-flora rose. The stream substrate is dominated by bedrock, cobble, and gravel.

HQ 7

HQ 7 is located along tributary 40633 to Hoge Run. The floodplain of the tributary is covered by multi-flora rose and other early stage successional species. The dense overstory surrounding the floodplain allows sunlight to reach a narrow strip surrounding the stream. Typical floodplain species included multi-flora rose, wingstem (Asteraceae spp.), and poison ivy. The upland forested habitat surrounding the floodplain consisted of a mixture of red maple, sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), white oak (*Quercus alba*), hickory (Carya spp.), and American beech (*Fagus grandifolia*). A utility corridor and single family dwelling exist downstream.

HQ 8

HQ 8 is located along tributary 40634 to Hoge Run. A partially reclaimed access road runs along the streams eastern bank. A narrow riparian corridor lies between this road and the stream. Typical riparian species including multi-flora rose, black willow, sensitive fern (*Onoclea sensibilis*), and poison ivy were observed along the banks of tributary 40634 during sampling. Forested habitat covers the streams western bank. Dominant species include red and white oaks, and American elm (*Ulmus americana*).

HOUSE RUN

House Run (40635) flows east along Hampton, Macedonia, and Bristoria Roads in Center and Jackson Townships (Figure 1, Exhibit B). Elevations range from approximately

1,045 feet along the stream bottom to 1,439 feet at the adjacent hilltop. Approximately 40% of the House Run watershed is located within the petition area. Shortly after House Run crosses under SR 18, it joins with Garner Run to form McCourtney Run. Sample stations HQ 1, HQ 2, HQ 3, HQ 4, and HQ 5 are located within the House Run watershed.

The House Run watershed is dominated by forested habitat with smaller portions of pastures and residential areas. The forested habitat that covers a majority of the watershed is located on upland topography. Species observed included red maple, oaks, and black cherry (*Prunus serotina*). Residential areas cover a small percentage of the watershed. This land use consists of single family dwellings and several buildings associated with agricultural practices. A very small portion of the House Run watershed is used for agricultural practices. Active as well as inactive pastures are spread out along the length of the watershed. In some inactive pastures a narrow riparian corridor exists. Typical species include black willow, ironwood, and multi-flora rose.

HQ 1

HQ 1 is located along tributary 40639 to House Run. The site is located in an active cattle pasture. The southern bank is forested with a mixture of maples and oaks. The northern bank is an active cattle pasture. The streambank is bare, allowing unlimited access to the stream channel resulting in sediment and nutrient loading. A large head cut exists in the middle of the site. Below this head cut, the stream substrate is comprised of a mixture of sand and gravel; above the head cut, the substrate is primarily clay.

HQ 2

HQ 2 is also located along tributary 40639 to House Run near the downstream terminus of the tributary, in an inactive pasture. Tall grasses surround the stream channel and a small portion of forested habitat exists upstream of the site. A narrow riparian corridor intermittently follows the stream channel. Typical species observed included multi-flora rose, rush (Juncus spp.), sweetflag (Acorus spp.), and black willow. Portions of the stream channel within HQ 2 are braided.

HQ 3

HQ 3 is located along tributary 40638 to House Run. A majority of the valley surrounding tributary 40638 is forested. The site is located in a small residential area near the confluence with House Run. The eastern bank is residential with closely mown grasses and a single family dwelling. The western bank is old field transitioning into forested habitat. Typical species include black willow, multi-flora rose, and wingstem.

HQ 4

HQ 4 is located along tributary 40636 to House Run. A majority of the valley surrounding tributary 40636 is forested. The site is located along a reclaimed access road in a less densely forested portion of the valley. Many early successional species are observed in the floodplain including multi-flora rose, black willow, and poison ivy. The lowland floodplain habitat quickly transitions into forested upland habitat containing black cherry, oaks, and hawthorn (Crataegus spp.).

HQ 5

HQ 5 is located along House Run in the lower portion of the stream. The habitat surrounding this site is predominately new field consisting of tall grasses and a few sporadic trees. Small residential and commercial portions exist within the site. The residential habitat consists of several single family dwellings and the commercial portion consists of structures associated with natural gas collection and transport.

MCCOURTNEY RUN

McCourtney Run begins as House Run enters Garner Run near the intersection of Bristoria Road and Golden Oaks Road. McCourtney Run then flows northeast along Golden Oaks Road and into South Fork Tenmile Creek. Elevations range from approximately 960 feet along the stream bottom to 1,460 feet at the adjacent hilltop. Only the upstream terminus of McCourtney Run is within the petition area. Sample stations HQ 9 and HQ 10 are located within the McCourtney Run watershed.

The portion of McCourtney Run within the petition area consists of residential areas, new

field habitat, and forested upland habitat. The small residential areas are found within the floodplain near McCourtney Run. These areas consist of single family dwellings and barns associated with these dwellings. New field habitat consisting of tall ungrazed grasses also lies within the floodplain of McCourtney Run surrounding the residential areas. The forested habitat begins as the topography transitions from floodplain to upland habitat.

HQ 9

HQ 9 is located along McCourtney Run downstream of its confluence with Hoge Run. The site is positioned in new field habitat between two residential areas. Golden Oaks Road runs along the western bank of McCourtney Run. This segment of McCourtney Run has a sinuous channel, poor bank stability, and few riffles.

HQ 10

HQ 10 is located along tributary 40630 to McCourtney Run. The site is positioned upstream of a small residential area in forested habitat. Tower Road runs along the northern bank of HQ 10. Typical species observed included several conifers in small stands, shagbark hickory (*Carya ovata*), oaks, and maples.

3.0 AQUATIC SAMPLING METHODOLOGY

3.1 Physiochemical Measurements

Wallace & Pancher Inc. field personnel collected surface water samples at each sample station in accordance with Pennsylvania Fish and Boat Commission standards. The parameters that were assessed in the lab included hardness, pH, dissolved oxygen, aluminum, iron, arsenic, cadmium, copper, lead, zinc, and ammonia nitrogen. These parameters mirror the parameters in the Pennsylvania Department of Environmental Protection Title 25 Pa. Code 93.4b, 2006a for a High Quality Warm Water Fishery.

In situ measurements of temperature, dissolved oxygen, and pH were also collected at each sampling station, in conjunction with the benthic macroinvertebrate sampling. All measurements of the candidate stream were made using a Sentry III Dissolved Oxygen

Meter and an Oakton pH/Conductivity/Temperature meter.

3.2 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate samples were collected, identified to genus level (except for Chironomidae and Oligochaetae) and analyzed according to methods prescribed in the U.S. Environmental Protection Agency's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (USEPA, 1999) and Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters (USEPA, 1990a).

A D-frame dip net equipped with a 600 micron mesh net was used to collect six (6) kicks at each location. At each station, a total area of 6 m^2 was sampled. The best riffle habitats were selected from throughout the reach. Riffles that contained various depths and typical substrate types for the reach were selected. The contents of the sample were placed in labeled field sample collection jars and preserved with 91% isopropyl alcohol.

In the laboratory, all portions of the sample were carefully examined and organisms removed from the debris. The contents of the vials were examined under a stereoscopic microscope (90x) for identification and enumeration to the genus taxonomic level. Identification was assisted by the following references: Peckarsky et al (1990), Merrit and Cummins (1996), Stewart and Stark (2002), and Edmunds et al (1976).

4.0 RESULTS

The physiochemical and macroinvertebrate data presented in the following sections are based on a one-time sampling event that occurred on April 29th and April 30th 2008. The camera used during sampling malfunctioned, as a result the time stamps displayed on the photographs in Appendix A of this document are incorrect by a margin of one day.

4.1 Physiochemical Characteristics

The ten (10) sample locations had temperatures ranging from 9.1 to 11.5 °C. Dissolved

oxygen concentrations varied from 9.6 to 11.2 parts per million (ppm). Field specific conductance ranged from 169 to 198 micro mhos/cm and pH from 7.1 to 7.6 across all sampling locations. An accredited laboratory, Severn Trent Laboratories of Pittsburgh, PA (PA certificate #02-00416), was contracted to analyze the following water quality parameters: dissolved oxygen, pH, hardness, arsenic, cadmium, copper, nickel, lead, zinc, iron, ammonia nitrogen, and aluminum. When the data is scrutinized using the acute and chronic criteria calculations, as directed by the PaDEP Guidance, ammonia nitrogen, aluminum, and zinc failed to meet the acute criteria. Ammonia nitrogen and iron failed to meet the chronic criteria (Appendix C, Table 1).

4.2 Macroinvertebrate Data

The benthic macroinvertebrate community collected at each station was analyzed by generating an integrated benthic macroinvertebrate score using the Biological Condition Score protocols as prescribed by the PaDEP Guidance. The Biological Condition Score protocols require the comparison of the following biological metrics: taxa richness, modified EPT index, modified Hilsenhoff index, percent dominant taxa, and percent modified mayfly index. A Biological Condition Score is generated by comparing the difference between the study streams (HQ 1-10) and the reference stream (UNT to Sugarcamp Run). Each metric uses a different scoring scale therefore the Biological Condition Scoring Criteria chart (PaDEP Guidance) is used to normalize the metrics for comparison. A percent value is generated for each sample station by adding the biological condition scores of each of the five metrics and dividing by the highest possible score. Table 2 is a summary of the benthic macroinvertebrate data obtained during one sampling event that occurred on April 29th and April 30th 2008.

Table 2. Petition Area Integrated Benthic Macroinvertebrate Score *Based on the PaDEP Water Quality Antidegradation Implementation Guidance Protocols		
Sample Name	Sum of Biological Scores (Max.=40)	Percent of Maximum
HQ 1	17	43%
HQ 2	29	73%
HQ 3	17	43%
HQ 4	24	60%
HQ 5	12	30%
HQ 6	14	35%
HQ 7	30	75%
HQ 8	20	50%
HQ 9	7	18%
HQ 10	19	48%

PaDEP Criteria for Stream Classification Using the Integrated Benthic
>92%= Exceptional Value
83-92%= High Quality
<83%= Existing or Designated Use

The Pennsylvania Department of Environmental Protection (Title 25 Pa. Code 93.4b, 2006a) defines specific water quality criteria that must be met for a surface water to be classified as a High Quality (HQ) Warm Water Fishes (WWF). One or more of the following conditions must be met for classification:

1. Water Chemistry- Based on at least *one (1) year* of data, the surface water must be better than the water quality criteria defined in PA Code 93.7, Table 3 and PA Code 16.102, Table 1 at least 99% of the time. ***(Conclusion – Not Met)***

2. Biology- The surface water (i.e. candidate stream) is compared to a reference stream or watershed using the protocols outlined in the PaDEP Water Quality Antidegradation Implementation Guidance (#391-0300-002). The integrated benthic macroinvertebrate score of the reference stream must be at least 83%. ***(Conclusion – Not Met)***

In summary, physical and biological data were collected on April 29th and April 30th 2008 for the petition area and analyzed per PaDEP guidance. The available data indicate that the petition area does not satisfy the regulatory standards for a High Quality fishery. Specifically, the physiochemical data do not meet the acute criteria for ammonia nitrogen, aluminum or zinc. Ammonia nitrogen and iron failed to meet the chronic

criteria of the PaDEP Guidance and biological data indicate a difference between the HQ-WWF (petition area) and the HQ-WWF reference stream (UNT to Sugarcamp Run). In addition, none of the sample sites reflected biological scores required to attain high quality status.

5.0 REFERENCES

Civil and Environmental Consultants Inc. 2006. Grinnage Run Redesignation Petition. Pittsburgh, PA.

Commonwealth of Pennsylvania Department of Environmental Protection. 2003. Water Quality Antidegradation Implementation Guidance. Harrisburg, PA.

Commonwealth of Pennsylvania Department of Environmental Protection. 2005. Chapter 16. Water Quality Toxics Management Strategy-Statement of Policy. Harrisburg, PA.

Commonwealth of Pennsylvania Department of Environmental Protection. 2005. Chapter 93. Water Quality Standards. Harrisburg, PA.

Edmunds, G. F., Jr., Jensen, S.L., and L. Berner. 1976. Mayflies of North and Central America. University of Minnesota Press, Minneapolis.

Merrit, R.W. and K.W. Cummins. 1996. An Introduction to the Aquatic Insects of North America, Second Edition. Kendall/Hunt Publishing Co., Dubuque, Iowa.

Peckarsky, B.L., Frassinet, P.R., Penton, M.A. and D.A Conklin, Jr. 1990. Freshwater Macroinvertebrates of Northeastern North America. Cornell University Press. Ithaca, New York.

Stewart, K.W. and B.P. Stark. 1993. Nymphs of North American Stonefly Genera (Plecoptera). University of North Texas, Denton, Texas.

U.S. Environmental Protection Agency. 1990b. Freshwater Macroinvertebrate Species List Including Tolerance Values and Functional Feeding Group Designations for Use in Rapid Bioassessment Protocols. Assessment and Watershed Protection Division, Washington, D.C.

United States Environmental Protection Agency. 2006. National Recommended Water Quality Criteria. Office of Water, Washington, DC.

U.S. Environmental Protection Agency. 1999. Rapid Bioassessment Protocols for Use in Wadable Streams and Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. Office of Water, Washington, D.C.

APPENDIX A

PHOTOGRAPHS

Photographic Log

HQ 1 Upstream Reach (upstream)

HQ 1 Upstream Reach (downstream)

HQ 1 Downstream Reach (upstream)

HQ 1 Downstream Reach (downstream)

HQ 1 Headcut

HQ 2 Upstream Reach (upstream)

HQ 2 Upstream (downstream)

HQ 2 Downstream Reach (upstream)

HQ 2 Downstream Reach (downstream)

HQ 3 Upstream Reach (upstream)

HQ 3 Upstream Reach (downstream)

HQ 3 Downstream Reach (upstream)

HQ 3 Downstream Reach (downstream)

HQ 3 Sample Kick

HQ 3 Riffle Habitat

HQ 4 Upstream Reach (upstream)

HQ 4 Upstream Reach (downstream)

HQ 4 Downstream Reach (upstream)

HQ 4 Downstream Reach (downstream)

HQ 5 Upstream Reach (upstream)

HQ 5 Upstream Reach (downstream)

HQ 5 Downstream Reach (upstream)

HQ 5 Downstream Reach (downstream)

HQ 5 Bridge

HQ 5 Left bank to right bank at bridge with gas line

HQ 5 right bank to left bank at bridge with gas line

HQ 5 Kick #3 downstream from bridge

HQ 5 Upstream from bridge

HQ 6 Upstream Reach (upstream)

HQ 6 Upstream Reach (downstream)

HQ 6 Downstream Reach (upstream)

HQ 6 Downstream Reach (downstream)

HQ 6 Tributary flowing into sample reach

HQ 7 Upstream Reach (upstream)

HQ 7 Upstream Reach (downstream)

HQ 7 Downstream Reach (upstream)

HQ 7 Downstream Reach (downstream)

HQ 7 Marking Kick #1 with GPS unit

HQ 8 Upstream Reach (upstream)

HQ 8 Upstream Reach (downstream)

HQ 8 Downstream Reach (upstream)

HQ 8 Downstream Reach (downstream)

HQ 8 Sample Kick

HQ 9 Upstream Reach (upstream)

HQ 9 Upstream Reach (downstream)

HQ 9 Downstream Reach (upstream)

HQ 9 Downstream Reach (downstream)

HQ 9 Sample Kick

HQ 10 Upstream Reach (upstream)

HQ 10 Upstream (downstream)

HQ 10 Downstream Reach (upstream)

HQ 10 Downstream Reach (downstream)

HQ water sample on ice

APPENDIX B

SUMMARY OF FIELD DATA

Table 1. Comparison of Petition Area Water Quality to the PaDEP Acute and Chronic Criteria for Fish and Aquatic Life

Water Quality Parameter	HQ 1	HQ 2	HQ 3	HQ 4	HQ 5	HQ 6	HQ 7	HQ 8	HQ 9	HQ 10	Standard Deviation	Mean	Coefficient of Variation	99th Percentile	Acute Criterion	99th Percentile	Chronic Criterion
pH (standard units)	7.1	7.3	7.6	7.3	7.6	7.6	7.5	7.5	7.7	7.6	0.187	7.48	0.03	8.02	9.00[d]	7.74	N/A
Temperature (°C)[e]	9.3	9.1	9.1	10	10.9	11.2	11.3	10.4	10.4	11.5	0.919	10.32	0.1	12.95	<14.4[d]	11.58	N/A
Dissolved Oxygen (ppm)	11	10.9	10.3	10.6	10.4	11.2	9.6	10.6	10.2	10.7	0.458	10.55	0.04	11.57	>5.0[d]	11.05	>5.0[d]
Ammonia Nitrogen (ug/L)	110	85	750	140	75	80	92	150	330	100	210.222	191.20	1.1		128[cd]		31[cd]
Total Iron (ug/L)	733	731	3020	262	2240	387	1340	300	1760	904	918.528	1167.70	0.8	4689	N/A		1500[d]
Total Aluminum (ug/L)	724	471	2430	231	1560	251	1060	298	1180	617	699.492	882.20	0.8		750[a]	2005	N/A
Dissolved Arsenic (ug/L)	0.57	0.51	0.85	0.72	0.41	N/A	0.2	N/A	N/A	0.44	0.213	0.53	0.4	1.20	340[a]	0.82	150[b]
Dissolved Cadmium (ug/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.59[b]	N/A	0.21[b]
Dissolved Copper (ug/L)	1.3	1.4	2.2	1	1.5	1.2	1.1	0.99	1.4	1.2	0.351	1.33	0.3	2.52	10.7[b]	1.86	7.29[b]
Dissolved Nickel (ug/L)	0.53	0.46	0.4	0.21	0.29	0.28	0.23	0.24	0.28	0.29	0.106	0.32	0.3	0.61	381[b]	0.45	42.4[b]
Dissolved Lead (ug/L)	0.18	0.22	0.1	0.078	0.07	0.081	0.071	0.068	0.068	0.12	0.053	0.11	0.5	0.29	49.6[b]	0.19	1.93[b]
Dissolved Zinc (ug/L)	4.3	2.6	3.2	2.2	3.2	1.8	1.7	1.8	1.7	87	26.735	10.95	2.4		95.6[b]	63	96.3[b]

[a] PaDEP Chapter 16 Fish and Aquatic Life Water Quality Criteria Maximum and Chronic Values
[b] Criteria Maximum Concentration at Hardness= 76.8mg/L
[c] Calculated at pH=7.48 and Temperature= 10.32°C
[d] PaDEP Chapter 93 Water Quality Criteria
[e] Measurements taken in field

Failed Parameter

Identification and Enumeration of Benthic Macroinvertebrates Collected from House Run, Hoge Run, and McCourtney Run and Associated UNTs on April 29th and 30th 2008.

Taxa Order	Pollution Tolerance Value	Functional Feeding Group	[redacted]	HQ 1	HQ 2	HQ 3	HQ 4	HQ 5	HQ 6	HQ 7	HQ 8	HQ 9	HQ 10
Ephemeroptera (mayflies)													
Ameletidae													
Ameletus	0	GC		2			8			30	1		
Heptageniidae													
Maccaffertium	3	SC			12	1	1						3
Stenacron	4	SC											1
Epeorus	0	SC					30			16	1		1
Ephemerellidae													
Ephemerella	1	GC		12	3	8	27			5	11		1
Eurylophella	4	GC		1			1			1	1		2
Caenidae													
Caenis	7	GC										4	1
Ephemeridae													
Ephemera	2	GC			1								
Plecoptera (stoneflies)													
Perlodidae													
Isoperla	2	PR		24	16	7	32		13	24	17		5
Peltoperlidae													
Peltoperla	2	SH			1								
Chloroperlidae													
Sweltsa	0	PR			1	2	3			1	1		
Haploperla					2	2							8
Alloperla	0	PR											1
Nemouridae													
Amphinemura	3	SH		31	48	13	69			24	54		
Ostrocerca					2								
Leuctridae													
Leuctra	0	SH			1					8			
Trichoptera (caddisflies)													
Limnephilidae													
Pycnopsyche	4	SH								2			
Ironoquia	3	SH					1			2			
Hydropsychidae													
Hydropsyche	5	FC			2								3
Cheumatopsyche	6	FC			16				1		1	4	3
Diplectrona	0	FC		3	1		3			3	1		
Rhyacophilidae													
Rhyacophila	1	PR		5	4	1	2			4	1		
Uenoidae													
Neophylax	3	SC		1	2	1	2			5	1		
Diptera (true flies)													
Chironomidae	6	GC		108	72	102	25	177	187	46	69	106	121
Ceratopogonidae													
Bezzia	6	GC		1	4	1		1		4	1	3	
Simuliidae													
Simulium	6	FC							1			1	
Tipulidae													
Limnophila	3	PR								1	1		
Tipula	4	SH			1		1						1
Hexatoma	2	PR				1	1		5				1
Pseudolimnophilia	2	PR		6	5	6	1	1	2		5		2
Molophilus	4	SH					1	6				1	
Coleoptera (beetles)													
Elmidae													
Stenelmis	5	SC						5	5				3
Optioservus	4	SC				4							1
Psephenidae	4	SC											
Psephenus	4	SC						2					3
Megaloptera													
Corydalidae													
Nigronia	2	PR			2								
Sialidae													
Sialis	6	PR			1								
Veneroida (Clams)													
Sphaeriidae	8	FC		17								1	
Pulmonata (Snails)													
Lymnaeidae	7	SC		1									
Amphipoda (Scuds)													
Crangonyctidae													
Crangonyx	4	GC								5	1		
Decapoda (Crayfish)													
Cambaridae	6	GC			2				1		2		2
Phylum Annelida													
Oligochaeta	10	GC		1	2	13				3		8	2
Odonata													
Gomphidae													
Dromogomphus	4	PR										1	
Average Pollution Tolerance Value	3.59		**Total Individuals**	213	201	162	208	192	215	184	169	129	165
			Species Diversity	14	23	14	17	6	8	18	17	9	20
			Average Pollution Tolerance Value	3.79	3.04	3.07	2.24	4.50	4.38	2.78	2.76	6.33	3.75

House Run and Unnamed Tributaries to House Run Integrated Benthic Macroinvertebrate Scores and Biological Condition Score Results.

Sample Name	HQ 1	HQ 2	HQ 3	HQ 4	HQ 5	Reference
Stream Name	UNT to House Run	UNT to House Run	UNT to House Run	UNT to House Run	House Run	
METRIC:						
Taxa Richness	14	23	14	17	6	31
Modified EPT Index	8	13	8	12	0	15
Modified Hilsenhoff Index	3.79	3.13	3.07	2.24	4.5	3.6
Percent Dominant Taxon	50.7	35.8	63	33.2	92.19	12
	Chironomidae	Chironomidae	Chironomidae	Amphinemura	Chironomidae	Chironomidae
Percent Modified Mayflies	7	7.8	5.56	32.2	0	13

Sample Name	Metric				
HQ 1	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	14	8	3.79	50.7	7
Difference	45.2	53.3	0.19	39	6
Biological Condition Score	0	1	8	0	8
Sum of Biological Condition Scores[1]		17			
Percent of Maximum (40)		**43%**			

Sample Name	Metric				
HQ 2	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	23	13	3.13	35.8	7.8
Difference	74.2	86.7	-0.47	24	5.2
Biological Condition Score	5	8	8	0	8
Sum of Biological Condition Scores[1]		29			
Percent of Maximum (40)		**73%**			

Sample Name	Metric				
HQ 3	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	14	8	3.07	63	5.56
Difference	45.16	53.33	-0.53	51	7.44
Biological Condition Score	0	1	8	0	8
Sum of Biological Condition Scores[1]		17			
Percent of Maximum (40)		**43%**			

Sample Name	Metric				
HQ 4	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	17	12	2.24	33.2	32.2
Difference	54.84	80	-1.36	21.2	-19.2
Biological Condition Score	0	7	8	1	8
Sum of Biological Condition Scores[1]		24			
Percent of Maximum (40)		**60%**			

Sample Name	Metric				
HQ 5	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	6	0	4.5	92.19	0
Difference	19.4	0	0.9	80.19	13
Biological Condition Score	0	0	5	0	7
Sum of Biological Condition Scores[1]		12			
Percent of Maximum (40)		**30%**			

[1]Biological Condition Scores obtained from PADEP Water Quality Antidegradation Implementation Guidance

Hoge Run Integrated Benthic Macroinvertebrate Scores and Biological Condition Score Results.				
Sample Name	HQ 6	HQ 7	HQ 8	Reference
Stream Name	Hoge Run	Hoge Run	Hoge Run	
METRIC:				
Taxa Richness	8	18	17	31
Modified EPT Index	1	13	10	15
Modified Hilsenhoff Index	4.38	2.78	2.76	3.6
Percent Dominant Taxon	86.98	25	40.83	12
	Chironomidae	Chironomidae	Chironomidae	Chironomidae
Percent Modified Mayflies	0	28.26	8.28	13

Sample Name	Metric				
HQ 6	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	8	1	4.38	86.98	0
Difference	25.8	6.67	0.78	74.98	13
Biological Condition Score	0	0	7	0	7
Sum of Biological Condition Scores[1]		14			
Percent of Maximum (40)		**35%**			

Sample Name	Metric				
HQ 7	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	18	13	2.78	25	28.26
Difference	58.06	86.67	-0.82	13	-15
Biological Condition Score	0	8	8	6	8
Sum of Biological Condition Scores[1]		30			
Percent of Maximum (40)		**75%**			

Sample Name	Metric				
HQ 8	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	17	10	2.76	40.83	8.28
Difference	54.84	66.67	-0.84	28.83	4.72
Biological Condition Score	0	4	8	0	8
Sum of Biological Condition Scores[1]		20			
Percent of Maximum (40)		**50%**			

[1]Biological Condition Scores obtained from PADEP Water Quality Antidegradation Implementation Guidance

McCourtney Run and UNT to McCourtney Run Integrated Benthic Macroinvertebrate Scores and Biological Condition Score Results.

Sample Name	HQ 9	HQ 10	Reference
Stream Name			
METRIC:			
Taxa Richness	9	20	31
Modified EPT Index	0	8	15
Modified Hilsenhoff Index	6.33	3.75	3.6
Percent Dominant Taxon	82.17	73.33	12
	Chironomidae	Chironomidae	Chironomidae
Percent Modified Mayflies	0	5.45	13

Sample Name	Metric				
HQ 9	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	9	0	6.33	82.17	0
Difference	29	0	2.73	70.17	13
Biological Condition Score	0	0	0	0	7
Sum of Biological Condition Scores[1]		7			
Percent of Maximum (40)		**18%**			

Sample Name	Metric				
HQ 10	Taxa Richness	Modified EPT Index	Modified Hilsenhoff Index	Percent Dominant Taxon	Percent Modified Mayflies
Reference Value	31	15	3.6	12	13
Candidate Value	20	8	3.75	73.33	5.45
Difference	64.52	53.33	0.15	61.33	7.55
Biological Condition Score	2	1	8	0	8
Sum of Biological Condition Scores[1]		19			
Percent of Maximum (40)		**48%**			

[1]Biological Condition Scores obtained from PADEP Water Quality Antidegradation Implementation Guidance

APPENDIX C

FIELD DATA SHEETS

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION		
STATION #	HQ 1	RIVERMILE	STREAM CLASS		
LAT		LONG	RIVER BASIN		
STORET #			AGENCY		
INVESTIGATORS	MW, GG				
FORM COMPLETED BY	GG		DATE	4/30/2008	REASON FOR SURVEY
			TIME	8:55am	Baseline

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers (intermittent)	showers (intermittent)
x	% cloud cover	60 % cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 4.4

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km
Stream Type		Cold Water	X	Warm Water	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

30	Forest	Commercial
70	Field/Pasture	Industrial
	Agricultural	Other
	Residential	

Local Watershed NPS Pollution

	No Evidence	
	Some Potential sources	
x	Obvious sources	cattle

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees	Shrubs	x	Grasses	Herbaceous

Dominant species present

INSTREAM FEATURES

Estimated Stream Width	3.5	ft
Estimated Stream Depth	3	in
Surface Velocity (at thalweg)	0.34	ft/sec
Esitmated Reach Length	300	ft

High Water Mark ft

Proportion of Reach Represented by Stream Morphology Types

60%	Riffle	20%	Run
20%	Pool		

Channelized YES / x NO

Dam Present YES / x NO

% Canopy Cover 40%

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

	Rooted Emergent		Rooted Submerged		Rooted Floating
	Floating Algae	x	Attached Aglae		Free Floating

Dominant species present

Portion of the reach with aquatic vegetation 40%

WATER QUALITY

Temperature	9.3	degrees C
Specific Conductance	169.7	us
Dissolved Oxygen	17.76	ppm
pH	7.93	

Water Odors

	None		Sewage
	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick		Globs
x	None		Flecks
	Sheen		Other

Turbidity

Turbidity (if not measured)

	Clear		Opaque
x	Slightly turbid		Stained
	Turbid		Other

WQ Instrument Used Visual

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Oils

x	Absent	Moderate
	Slight	Profuse

Looking at stone that are not deeply embedded, are the undersides black in color?

x	YES	NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	40%
Gravel	2-64 mm (0.1" -2.5")	20%
Sand	0.06-2 mm (gritty)	10%
Silt	0.004-0.06 mm	10%
Clay	<0.004 mm (slick)	20%

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION
STATION #	HQ 2	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG		DATE 4/30/2008 / TIME 9:40am
REASON FOR SURVEY	Baseline		

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers (intermittent)	showers (intermittent)
x		
100	% cloud cover	60 % cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 4.4

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type: Cold Water X Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

5	Forest		Commercial
	Field/Pasture		Industrial
95	Agricultural		Other
	Residential		

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees		Shrubs	x	Grasses		Herbaceous

Dominant species present

INSTREAM FEATURES

Estimated Stream Width	3	ft
Estimated Stream Depth	1	ft
Surface Velocity (at thalweg)	0.61	ft/sec
Esitmated Reach Length	300	ft
% Canopy Cover	10%	

High Water Mark	1.5	ft	
Proportion of Reach Represented by Stream Morphology Types			
20%	Riffle	30%	Run
50%	Pool		

Channelized	YES
x	NO
Dam Present	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

	Rooted Emergent		Rooted Submerged		Rooted Floating
	Floating Algae	x	Attached Aglae		Free Floating

Dominant species present

Portion of the reach with aquatic vegetation 100%

WATER QUALITY

Temperature	9.1	degrees C
Specific Conductance	178.4	us
Dissolved Oxygen	15.12	ppm
pH	7.68	

Water Odors

	x	None	Sewage
		Petroleum	Chemical
		Fishy	Other

Water Surface Oils

		Slick	Globs
	x	None	Flecks
		Sheen	Other

Turbidity

WQ Instrument Used Visual

Turbidity (if not measured)

		Clear	Opaque
		Slightly turbid	Stained
	x	Turbid	Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal		Anaerobic
	Chemical		Petroleum
	Sewage		None
			Other

Oils

x	Absent		Moderate
	Slight		Profuse

Deposits

	Sludge		Sand
	Sawdust		Paper Fiber
	Relict shells		Other NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	30%
Sand	0.06-2 mm (gritty)	20%
Silt	0.004-0.06 mm	20%
Clay	<0.004 mm (slick)	20%

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME	House Run		LOCATION		
STATION #	HQ 3	RIVERMILE	STREAM CLASS		
LAT		LONG	RIVER BASIN		
STORET #			AGENCY		
INVESTIGATORS	MW, GG				
FORM COMPLETED BY			DATE	4/29/2008	REASON FOR SURVEY
			TIME	11:35am	Baseline

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers	showers
x	(intermittent)	x (intermittent)
100	% cloud cover	% cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 4.4

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type	Cold Water	X	Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

40	Forest		Commercial
	Field/Pasture		Industrial
	Agricultural		Other
50	Residential		

10% old field riparian habitat

Local Watershed NPS Pollution

x	No Evidence	
	Some Potential sources	
	Obvious sources	

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees	x	Shrubs	x	Grasses	Herbaceous

Dominant species present black willow, multiflora rose, wing stem

INSTREAM FEATURES

Estimated Stream Width	4.5	ft
Estimated Stream Depth	3	in
Surface Velocity (at thalweg)	0.33	ft/sec
Esitmated Reach Length	300	ft

High Water Mark ft

Proportion of Reach Represented by Stream Morphology Types

40%	Riffle	45%	Run
15%	Pool		

Channelized		YES
	x	NO

% Canopy Cover 10%

Dam Present		YES
	x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	9.1	degrees C
Specific Conductance	172.7	us
Dissolved Oxygen	20.54	ppm
pH	7.93	

Turbidity

WQ Instrument Used visual

Water Odors

x	None		Sewage
	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick		Globs
x	None		Flecks
	Sheen		Other

Turbidity (if not measured)

	Clear		Opaque
	Slightly turbid		Stained
x	Turbid		Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal		Anaerobic
	Chemical		Petroleum
	Sewage		None
			Other

Oils

x	Absent		Moderate
	Slight		Profuse

Deposits

	Sludge	x	Sand
	Sawdust		Paper Fiber
	Relict shells		Other

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	30%
Gravel	2-64 mm (0.1" -2.5")	40%
Sand	0.06-2 mm (gritty)	15%
Silt	0.004-0.06 mm	10%
Clay	<0.004 mm (slick)	5%

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	5%
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION
STATION #	HQ 4	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	GG, MW		
FORM COMPLETED BY	GG		DATE 4/30/2008
			TIME 10:25am
			REASON FOR SURVEY: Baseline

WEATHER CONDITIONS	Now		Past 24 Hours	
		storm (heavy rain)		storm (heavy rain)
		rain (steady rain)		rain (steady rain)
		showers		showers
	x	(intermittent)		(intermittent)
	100	% cloud cover	60	% cloud cover
		clear/sunny		clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 7.2

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION	Stream Subsystem		Stream Origin			Catchment Area
	X	Perennial	Glacial	X	Spring Fed	sq km
		Intermittent	Non-Glacial montane		Mixture of Origins	
		Tidal	Swamp and bog		Other	
	Stream Type		Cold Water	X	Warm Water	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

100	Forest	Commercial
	Field/Pasture	Industrial
	Agricultural	Other
	Residential	

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees	Shrubs	x	Grasses	Herbaceous

Dominant species present

INSTREAM FEATURES

Estimated Stream Width	2	ft
Estimated Stream Depth	3	ft
Surface Velocity (at thalweg)	0.33	ft/sec
Esitmated Reach Length	300	ft

High Water Mark ft

Proportion of Reach Represented by Stream Morphology Types

60%	Riffle	20%	Run
20%	Pool		

% Canopy Cover 40%

Channelized

	YES
x	NO

Dam Present

	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	10	degrees C
Specific Conductance	191.9	us
Dissolved Oxygen	15.08	ppm
pH	7.66	

Water Odors

	None		Sewage
	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity

WQ Instrument Used Visual

Turbidity (if not measured)

x	Clear	Opaque
	Slightly turbid	Stained
	Turbid	Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	40%
Sand	0.06-2 mm (gritty)	30%
Silt	0.004-0.06 mm	20%
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME	House Run			LOCATION	
STATION #	HQ 5	RIVERMILE		STREAM CLASS	
LAT		LONG		RIVER BASIN	
STORET #				AGENCY	
INVESTIGATORS	MW, GG, BL				
FORM COMPLETED BY	MW			DATE	4/29/2008
				TIME	1:50pm
REASON FOR SURVEY	Baseline				

WEATHER CONDITIONS	Now		Past 24 Hours	
		storm (heavy rain)		storm (heavy rain)
		rain (steady rain)		rain (steady rain)
		showers (intermittent)	x	showers (intermittent)
	75	% cloud cover	100	% cloud cover
		clear/sunny		clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 8.3

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type: Cold Water | X | Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

30	Forest		Commercial
10	Field/Pasture	10	Industrial
	Agricultural		Other
50	Residential		

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

x	Trees	Shrubs	x	Grasses	Herbaceous

Dominant species present Maple, multiflora rose

INSTREAM FEATURES

Estimated Stream Width	14	ft 14ft wet
Estimated Stream Depth	5.5	in
Surface Velocity (at thalweg)	0.61	ft/sec
Esitmated Reach Length	300	ft
% Canopy Cover	30%	

High Water Mark >1.5 ft

Proportion of Reach Represented by Stream Morphology Types

40%	Riffle	60%	Run
	Pool		

Channelized	YES
x	NO

Dam Present	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	10.9	degrees C
Specific Conductance	178.1	us
Dissolved Oxygen	16.21	ppm
pH	7.83	

Water Odors

x	None		Sewage
	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity

Turbidity (if not measured)

	Clear	Opaque
	Slightly turbid	Stained
x	Turbid	Other

WQ Instrument Used Visual

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	x	Sand
	Sawdust		Paper Fiber
	Relict shells		Other

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	25%
Gravel	2-64 mm (0.1" -2.5")	45%
Sand	0.06-2 mm (gritty)	30%
Silt	0.004-0.06 mm	
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	5%
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION		
STATION #	HQ 6	RIVERMILE	STREAM CLASS		
LAT		LONG	RIVER BASIN		
STORET #			AGENCY		
INVESTIGATORS	MW, GG				
FORM COMPLETED BY	GG		DATE	4/30/2008	REASON FOR SURVEY
			TIME	11:45am	Baseline

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers (intermittent)	showers (intermittent)
	40 % cloud cover	60 % cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 7.2

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photo

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type	Cold Water	X	Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

50	Forest		Commercial
50	Field/Pasture		Industrial
	Agricultural		Other
	Residential		

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

x	Trees	Shrubs		Grasses	Herbaceous

Dominant species present Iron wood

INSTREAM FEATURES

Estimated Stream Width	7	ft
Estimated Stream Depth	1	ft
Surface Velocity (at thalweg)	0.36	ft/sec
Esitmated Reach Length	300	ft
% Canopy Cover	30%	

High Water Mark	2	ft	
Proportion of Reach Represented by Stream Morphology Types			
40%	Riffle	30%	Run
30%	Pool		

Channelized	YES
x	NO
Dam Present	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

	Rooted Emergent		Rooted Submerged	Rooted Floating
	Floating Algae	x	Attached Aglae	Free Floating

Dominant species present

Portion of the reach with aquatic vegetation 25%

WATER QUALITY

Temperature	11.2	degrees C
Specific Conductance	193	us
Dissolved Oxygen	15.21	ppm
pH	8.21	

Turbidity

WQ Instrument Used Visual

Water Odors	x	None	Sewage
		Petroleum	Chemical
		Fishy	Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity (if not measured)

x	Clear	Opaque
	Slightly turbid	Stained
	Turbid	Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		40%
Boulder	>256 mm (10")	10%
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	20%
Sand	0.06-2 mm (gritty)	10%
Silt	0.004-0.06 mm	10%
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	10%
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME	House Run	LOCATION	
STATION #	HQ 7	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	MW, GG, BL		
FORM COMPLETED BY		DATE	4/29/2008
		TIME	12:20pm
		REASON FOR SURVEY	Baseline

WEATHER CONDITIONS	Now		Past 24 Hours	
		storm (heavy rain)		storm (heavy rain)
		rain (steady rain)		rain (steady rain)
		showers (intermittent)	x	showers (intermittent)
	50	% cloud cover	100	% cloud cover
		clear/sunny		clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 6.1

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial		Glacial	X Spring Fed	
	Intermittent		Non-Glacial montane	Mixture of Origins	
	Tidal		Swamp and bog	Other	sq km

Stream Type: Cold Water x Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

60	Forest		Commercial
	Field/Pasture		Industrial
	Agricultural		Other
10	Residential		
	30% old field flood plain		

Local Watershed NPS Pollution

	No Evidence	
x	Some Potential sources	gas line
	Obvious sources	

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

x	Trees	x	Shrubs	x	Grasses	Herbaceous

Dominant species present multiflora rose

INSTREAM FEATURES

Estimated Stream Width	1.5	ft
Estimated Stream Depth	2	in
Surface Velocity (at thalweg)	0.91	ft/sec
Esitmated Reach Length	300	ft
% Canopy Cover	40%	

High Water Mark ft

Proportion of Reach Represented by Stream Morphology Types

30%	Riffle	60%	Run
10%	Pool		

Channelized

	YES
x	NO

Dam Present

	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	11.3	degrees C
Specific Conductance	176.6	us
Dissolved Oxygen	13.23	ppm
pH	7.45	

Water Odors

	None		Sewage
x	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick		Globs
x	None		Flecks
	Sheen		Other

Turbidity _____

WQ Instrument Used Visual

Turbidity (if not measured)

	Clear		Opaque
	Slightly turbid	x	Stained
	Turbid		Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal		Anaerobic
	Chemical		Petroleum
	Sewage		None
			Other

Oils

x	Absent		Moderate
	Slight		Profuse

Deposits

	Sludge	x	Sand
	Sawdust		Paper Fiber
	Relict shells		Other

Looking at stone that are not deeply embedded, are the undersides black in color?

	YES	x	NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	40%
Sand	0.06-2 mm (gritty)	40%
Silt	0.004-0.06 mm	
Clay	<0.004 mm (slick)	10%

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	10%
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION
STATION #	HQ 8	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG		DATE 4/30/2008 / TIME 11:10am
REASON FOR SURVEY	Baseline		

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers (intermittent)	showers (intermittent)
70	% cloud cover	60 % cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 7.2

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type: Cold Water — X — Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

50	Forest		Commercial
50	Field/Pasture		Industrial
	Agricultural		Other
	Residential		

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

x	Trees	Shrubs		Grasses	Herbaceous

Dominant species present Oak

INSTREAM FEATURES

Estimated Stream Width	5	ft
Estimated Stream Depth	2	in
Surface Velocity (at thalweg)	0.27	ft/sec
Esitmated Reach Length	300	ft

High Water Mark 5 in

Proportion of Reach Represented by Stream Morphology Types

40%	Riffle	30%	Run
30%	Pool		

% Canopy Cover 50%

Channelized		YES
	x	NO
Dam Present		YES
	x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	10.4	degrees C
Specific Conductance	188.1	us
Dissolved Oxygen	14.25	ppm
pH	7.64	

Water Odors

	x	None	Sewage
		Petroleum	Chemical
		Fishy	Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity

Turbidity (if not measured)

x	Clear	Opaque
	Slightly turbid	Stained
	Turbid	Other

WQ Instrument Used visual

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	50%
Sand	0.06-2 mm (gritty)	20%
Silt	0.004-0.06 mm	20%
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	10%
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION
STATION #	HQ 9	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	GG, MW, BL		
FORM COMPLETED BY	GG		DATE 4/29/2008 / TIME 2:40pm
REASON FOR SURVEY	Baseline		

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	x rain (steady rain)
	showers (intermittent)	showers (intermittent)
	60 % cloud cover	% cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 7.2

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type	Cold Water	X	Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

	Forest		Commercial
90	Field/Pasture		Industrial
	Agricultural		Other
10	Residential		
road			

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees	Shrubs	x	Grasses	Herbaceous

Dominant species present

INSTREAM FEATURES

Estimated Stream Width	15	ft
Estimated Stream Depth	3'8"	ft
Surface Velocity (at thalweg)	0.76	ft/sec
Esitmated Reach Length	300	ft

High Water Mark 5 ft

Proportion of Reach Represented by Stream Morphology Types

10%	Riffle	80%	Run
10%	Pool		

% Canopy Cover 0%

Channelized		YES
	x	NO
Dam Present		YES
	x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present *NONE*

Portion of the reach with aquatic vegetation 0%

WATER QUALITY

Temperature	10.4	degrees C
Specific Conductance	194.5	us
Dissolved Oxygen	15.85	ppm
pH	7.99	

Water Odors

	x	None	Sewage
		Petroleum	Chemical
		Fishy	Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity

WQ Instrument Used Visual

Turbidity (if not measured)

	Clear	Opaque
	Slightly turbid	Stained
x	Turbid	Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	10%
Gravel	2-64 mm (0.1" -2.5")	40%
Sand	0.06-2 mm (gritty)	30%
Silt	0.004-0.06 mm	20%
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

STREAM NAME			LOCATION
STATION #	HQ 10	RIVERMILE	STREAM CLASS
LAT		LONG	RIVER BASIN
STORET #			AGENCY
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG		DATE 4/30/2008 / TIME 12:35pm
			REASON FOR SURVEY: Baseline

WEATHER CONDITIONS	Now	Past 24 Hours
	storm (heavy rain)	storm (heavy rain)
	rain (steady rain)	rain (steady rain)
	showers (intermittent)	showers (intermittent)
	50 % cloud cover	60 % cloud cover
	clear/sunny	clear/sunny

Has there been a heavy rain in the last 7 days?

x YES

NO

Air Temperature (degrees C) 7.2

Other

SITE LOCATION MAP

DRAW A MAP OF THE SITE AND INDICATE THE AREAS SAMPLED (OR ATTACH A PHOTOGRAPH)

See photos

STREAM CHARACTERIZATION

Stream Subsystem		Stream Origin			Catchment Area
X	Perennial	Glacial	X	Spring Fed	
	Intermittent	Non-Glacial montane		Mixture of Origins	
	Tidal	Swamp and bog		Other	sq km

Stream Type	Cold Water	X	Warm Water

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES

Predominant Surrounding Landuse

	Forest		Commercial
	Field/Pasture		Industrial
	Agricultural		Other
100	Residential		
	Home and road		

Local Watershed NPS Pollution

	No Evidence
x	Some Potential sources
	Obvious sources

Local Watershed Erosion

	None	Heavy
x	Moderate	

RIPARIAN VEGETATION (18 meter buffer)

Indicate the dominant type and record the dominant species present

	Trees	Shrubs	x	Grasses	Herbaceous

Dominant species present

INSTREAM FEATURES

Estimated Stream Width	3.5	ft
Estimated Stream Depth	5	in
Surface Velocity (at thalweg)	0.46	ft/sec
Esitmated Reach Length	300	ft
% Canopy Cover	20%	

High Water Mark 6 in

Proportion of Reach Represented by Stream Morphology Types

70%	Riffle	10%	Run
20%	Pool		

Channelized	YES
x	NO
Dam Present	YES
x	NO

AQUATIC VEGETATION

Indicate the dominant type and record the dominant species present

Rooted Emergent	Rooted Submerged	Rooted Floating
Floating Algae	Attached Aglae	Free Floating

Dominant species present: *NONE*

Portion of the reach with aquatic vegetation: 0%

WATER QUALITY

Temperature	11.5	degrees C
Specific Conductance	198	us
Dissolved Oxygen	14.42	ppm
pH	8.07	

Turbidity

WQ Instrument Used: Visual

Water Odors

	x None		Sewage
	Petroleum		Chemical
	Fishy		Other

Water Surface Oils

	Slick	Globs
x	None	Flecks
	Sheen	Other

Turbidity (if not measured)

x	Clear	Opaque
	Slightly turbid	Stained
	Turbid	Other

SEDIMENT/ SUBSTRATE

Odors

x	Normal	Anaerobic
	Chemical	Petroleum
	Sewage	None
		Other

Oils

x	Absent	Moderate
	Slight	Profuse

Deposits

	Sludge	Sand	
	Sawdust	Paper Fiber	
	Relict shells	Other	NONE

Looking at stone that are not deeply embedded, are the undersides black in color?

YES x NO

INORGANIC SUBSTRATE COMPONENTS (Should add up to 100%)

Substrate Type	Diameter	% Composition
Bedrock		
Boulder	>256 mm (10")	
Cobble	64-256 mm (2.5"-10")	20%
Gravel	2-64 mm (0.1" -2.5")	50%
Sand	0.06-2 mm (gritty)	20%
Silt	0.004-0.06 mm	10%
Clay	<0.004 mm (slick)	

ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)

Substrate Type	Characteristic	% Composition
Detritis	sticks, wood, coarse plant materials (CPOM)	
Muck-Mud	black, very fine organics (FPOM)	
Marl	grey, shell fragments	

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 1 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	GG, MW		
FORM COMPLETED BY	GG	DATE 4/30/08 TIME 8:55am	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 **3** 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 2	10 9	8 7 6	5 4 3	**2** 1 0
(RB) 7	10 9	8 **7** 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 1	10 9	8 7 6	5 4 3	2 **1** 0
(RB) 10	**10** 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 0	10 9	8 7 6	5 4 3	2 1 **0**
(RB) 10	**10** 9	8 7 6	5 4 3	2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 2 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG	DATE 4/30/08 TIME 9:40am	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 5	10 9	8 7 6	5 4 3	2 1 0
(RB) 5	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 4	10 9	8 7 6	5 4 3	2 1 0
(RB) 4	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 0	10 9	8 7 6	5 4 3	2 1 0
(RB) 0	10 9	8 7 6	5 4 3	2 1 0

Total Score: 118 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 3 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	MW	DATE 4/29/08 TIME 11:35am	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 11	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 8	20 19 18 17 16	15 14 13 12 11	10 9 **8** 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 5	10 9	8 7 6	**5** 4 3	2 1 0
(RB) 1	10 9	8 7 6	5 4 3	2 **1** 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 8	10 9	**8** 7 6	5 4 3	2 1 0
(RB) 1	10 9	8 7 6	5 4 3	2 **1** 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 9	10 **9**	8 7 6	5 4 3	2 1 0
(RB) 1	10 9	8 7 6	5 4 3	2 **1** 0

Total Score: 119 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 4 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	GG, MW		
FORM COMPLETED BY	GG	DATE 4/30/08 TIME 10:25am	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 5	10 9	8 7 6	5 4 3	2 1 0
(RB) 5	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 5	10 9	8 7 6	5 4 3	2 1 0
(RB) 5	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 8	10 9	8 7 6	5 4 3	2 1 0
(RB) 8	10 9	8 7 6	5 4 3	2 1 0

Total Score: 122 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 5 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG, BL		
FORM COMPLETED BY	MW	DATE 4/29/08 TIME 1:50pm	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**5** 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 2	10 9	8 7 6	5 4 3	**2** 1 0
(RB) 1	10 9	8 7 6	5 4 3	2 **1** 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 4	10 9	8 7 6	5 **4** 3	2 1 0
(RB) 5	10 9	8 7 6	**5** 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 4	10 9	8 7 6	5 **4** 3	2 1 0
(RB) 8	10 9	**8** 7 6	5 4 3	2 1 0

Total Score: 107 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 6 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG	DATE 4/30/08 TIME 11:45am	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 4	10 9	8 7 6	5 4 3	2 1 0
(RB) 6	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 1	10 9	8 7 6	5 4 3	2 1 0
(RB) 10	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 0	10 9	8 7 6	5 4 3	2 1 0
(RB) 10	10 9	8 7 6	5 4 3	2 1 0

Total Score: 124 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 7 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG, BL		
FORM COMPLETED BY	MW	DATE 4/29/08 TIME 12:20pm	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 12	20 19 18 17 16	15 14 13 **12** 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 7	20 19 18 17 16	15 14 13 12 11	10 9 8 **7** 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	**20** 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 5	10 9	8 7 6	**5** 4 3	2 1 0
(RB) 5	10 9	8 7 6	**5** 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 5	10 9	8 7 6	**5** 4 3	2 1 0
(RB) 8	10 9	**8** 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 7	10 9	8 **7** 6	5 4 3	2 1 0
(RB) 10	**10** 9	8 7 6	5 4 3	2 1 0

Total Score: 125 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 8 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG	DATE 4/30/08 TIME 11:10am	REASON FOR SURVEY Baseline

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 9	20 19 18 17 16	15 14 13 12 11	10 **9** 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 17	20 19 18 **17** 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Pa

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 6	10 9	8 7 6	5 4 3	2 1 0
(RB) 6	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 10	10 9	8 7 6	5 4 3	2 1 0
(RB) 10	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 1	10 9	8 7 6	5 4 3	2 1 0
(RB) 10	10 9	8 7 6	5 4 3	2 1 0

Total Score: 142 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 9 RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	GG, MW, BL		
FORM COMPLETED BY	GG, MW, BL	DATE 4/29/08 TIME 2:40pm	REASON FOR SURVEY Baseline

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 19	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 8	10 9	8 7 6	5 4 3	2 1 0
(RB) 8	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 5	10 9	8 7 6	5 4 3	2 1 0
(RB) 5	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 0	10 9	8 7 6	5 4 3	2 1 0
(RB) 0	10 9	8 7 6	5 4 3	2 1 0

Total Score: 130 /200

HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION #	HQ 1(RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS	MW, GG		
FORM COMPLETED BY	GG	DATE 4/30/08	REASON FOR SURVEY Baseline
		TIME 12:25pm	

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and no	30%-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance or populations; presence of additional substrate in the form of newfall, but now yet prepared for colonization (may rate at high end of scale).	10%- 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10 % stable habitat; lack of habitat is obvious substrate unstable or lacking.
SCORE: 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 10	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small deep pools present.	Majority of pools large-deep; very few shallows.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE: 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE: 15	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE: 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0

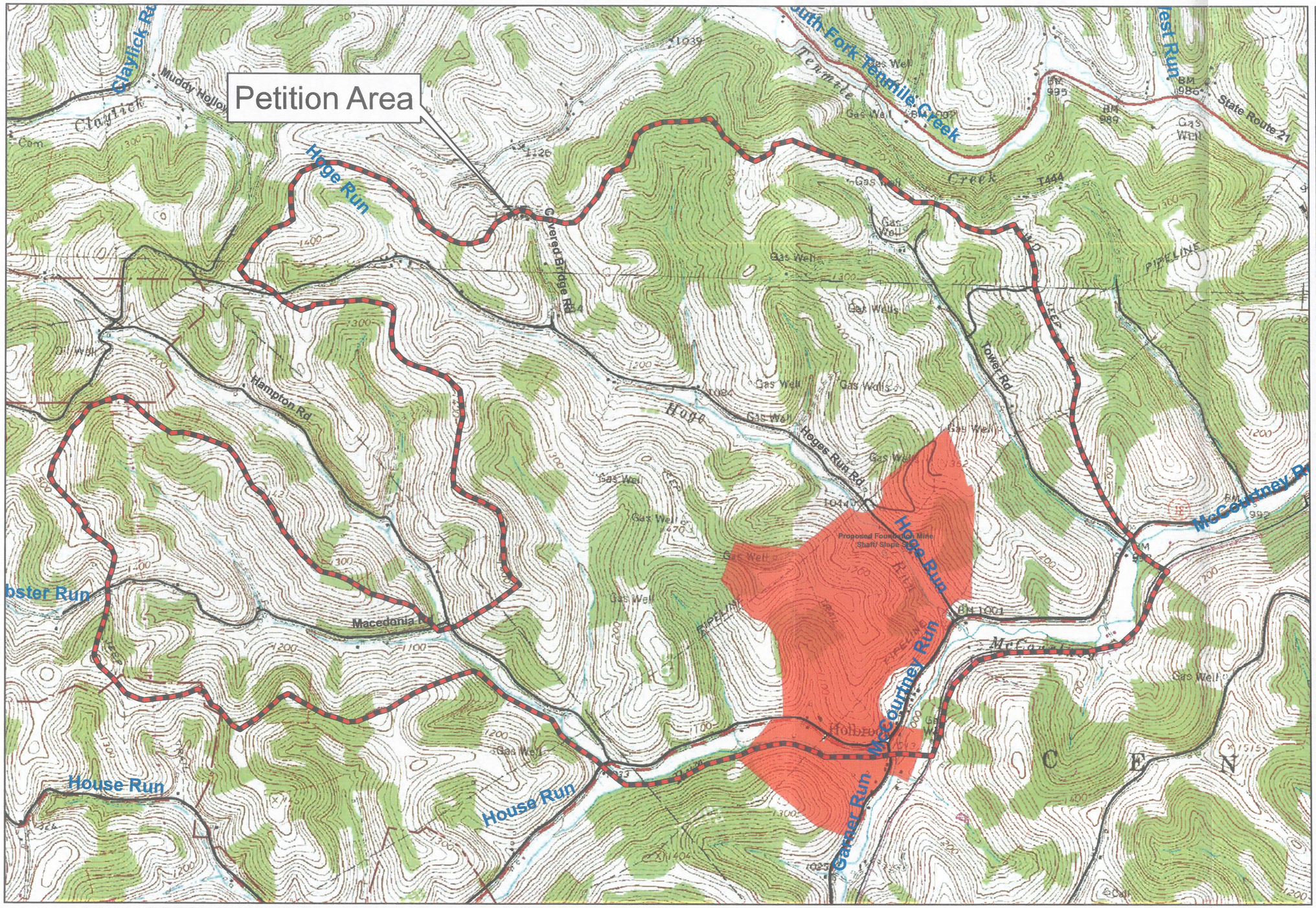
HABITAT ASSESSMENT FIELD DATA SHEET - LOW GRADIENT STREAMS (BACK)

Pa

Habitat Parameter	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach is channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it were in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE: 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious band sloughing; 60-100% of bank has erosional scars.
SCORE: (LB) 8	10 9	8 7 6	5 4 3	2 1 0
(RB) 5	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allow	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE: (LB) 1	10 9	8 7 6	5 4 3	2 1 0
(RB) 1	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE: (LB) 0	10 9	8 7 6	5 4 3	2 1 0
(RB) 3	10 9	8 7 6	5 4 3	2 1 0

Total Score: 115 /200

Exhibit B
Figures



Proposed Petition Redesignation

High Quality Sampling Analysis

Petition Area: 2,462 Acres

Stream Miles within Petition Area: 10.60 Miles

FIGURE 1. PROJECT LOCATION MAP
PROPOSED PETITION AREA

FOUNDATION COAL CORPORATION

WPI WALLACE & PANCHER, INC.

Foundation Mining, LP
PO Box 1020
Waynesburg, PA 15370

Proposed Petition Redesignation

High Quality Sampling Analysis

Petition Area: 2,462 Acres

Stream Miles within Petition Area: 10.60 Miles

Legend

- Proposed Petition Area
- Underground Permit Bounary
- Emerald Permit Boundary
- Cumberland Permit Boundary
- Boundary CNG
- Cumberland West Current Boundary
- Sewickley Boundary

Chapter 93 Designated Use

- CWF(COLD WATER FISHES)
- EV(EXCEPTIONAL VALUE)
- HQ(HIGH QUALITY)
- HQ-CWF(HIGH QUALITY-COLD WATER FISHES)
- HQ-TSF(HIGH QUALITY-TROUT STOCKING)
- HQ-WWF(HIGH QUALITY-WARM WATER FISHES)
- Missing from Chapter 93
- TSF(TROUT STOCKING)
- WWF(WARM WATER FISHES)

Source:
PA MAP Land Cover for Pennsylvania, 2005
The Pennsylvania State University - PASDA

Date: May 29, 2008

Projection:
State Plane NAD1983
Pennsylvania South Feet

FIGURE 2. CURRENT USE DESIGNATIONS
PROPOSED PETITION AREA

FOUNDATION COAL CORPORATION

WPI WALLACE & PANCHER, INC.

Foundation Mining, LP
PO Box 1020
Waynesburg, PA 15370

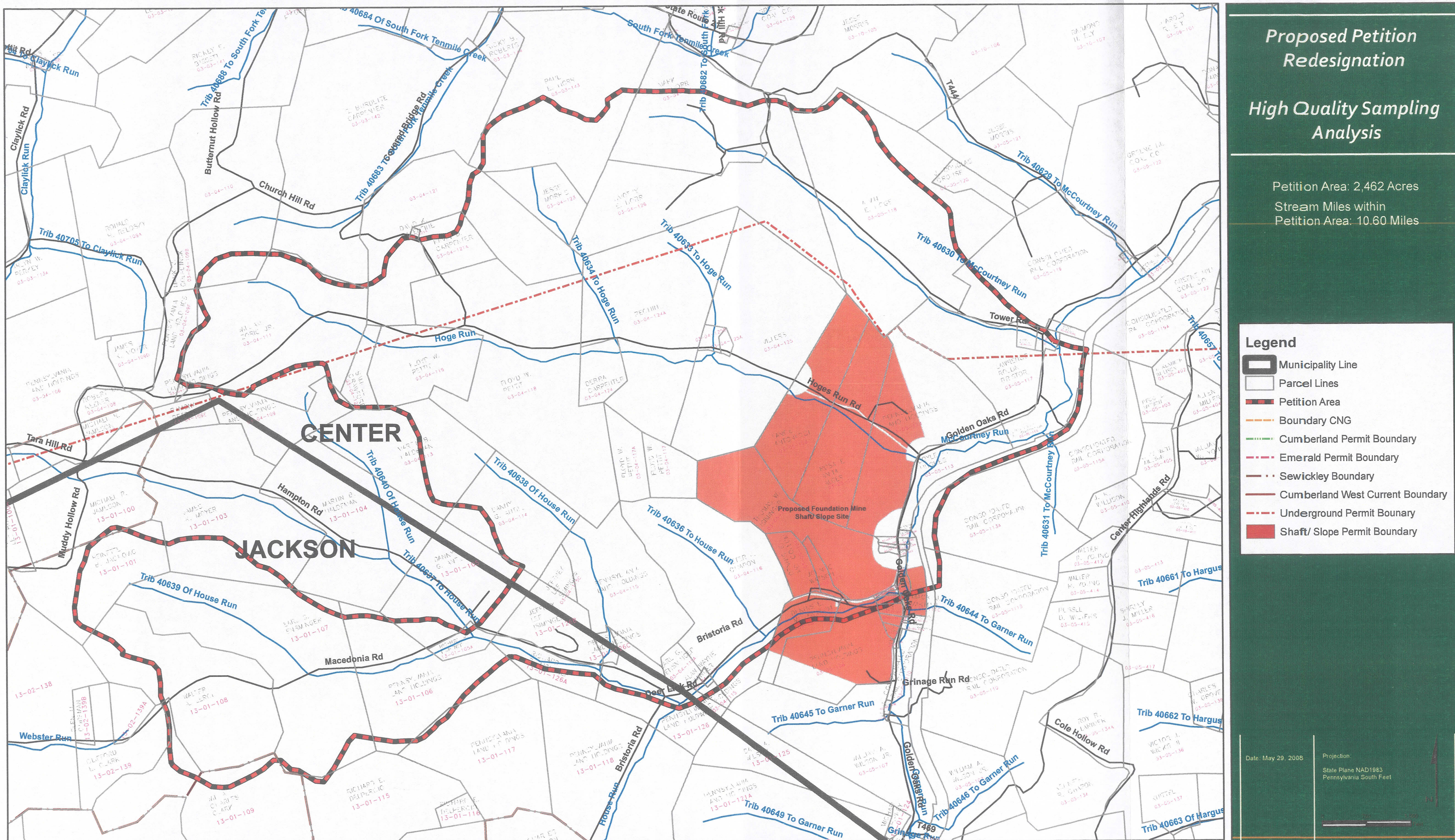
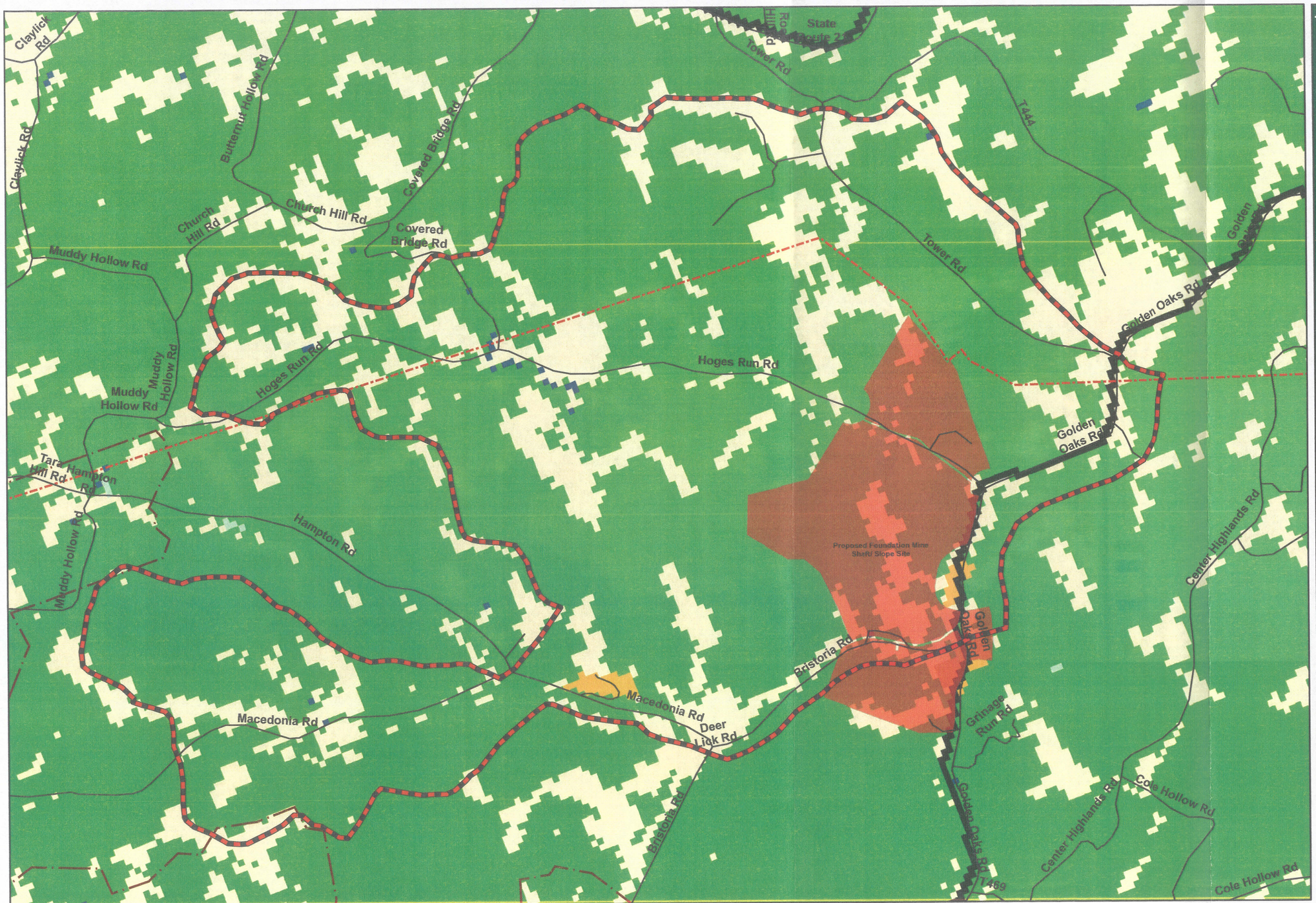

Proposed Petition Redesignation
High Quality Sampling Analysis
Petition Area: 2,462 Acres
Stream Miles within Petition Area: 10.60 Miles
Legend
Municipality Line
Parcel Lines
Petition Area
Boundary CNG
Cumberland Permit Boundary
Emerald Permit Boundary
Sewickley Boundary
Cumberland West Current Boundary
Underground Permit Bounary
Shaft/ Slope Permit Boundary
CENTER
JACKSON
Proposed Foundation Mine Shaft/ Slope Site
Hoge Run
Hoges Run Rd
Golden Oaks Rd
Tower Rd
Church Hill Rd
Butternut Hollow Rd
Claylick Rd
Claylick Run
Tara Hill Rd
Muddy Hollow Rd
Hampton Rd
Macedonia Rd
Bristoria Rd
Deer Lick Rd
Grinage Run Rd
Cole Hollow Rd
Center Highlands Rd
Webster Run
House Run
T469
Trib 40639 Of House Run
Trib 40638 Of House Run
Trib 40636 To House Run
Trib 40637 To House Run
Trib 40640 Of House Run
Trib 40634 To Hoge Run
Trib 40633 To Hoge Run
Trib 40705 To Claylick Run
Trib 40629 To McCourtney Run
Trib 40630 To McCourtney Run
Trib 40631 To McCourtney Run
Trib 40644 To Garner Run
Trib 40645 To Garner Run
Trib 40646 To Garner Run
Trib 40649 To Garner Run
Trib 40661 To Hargus
Trib 40662 To Hargus
Trib 40663 Of Hargus
South Fork Tenmile Creek
Trib 40684 Of South Fork Tenmile Creek
Trib 40683 To South Fork Tenmile Creek
Date: May 29, 2008
Projection:
State Plane NAD1983
Pennsylvania South Feet

Figure 3. Municipalities & Property Owners
Proposed Petition Area

FOUNDATION COAL CORPORATION

WPI WALLACE & PANCHER, INC.

Foundation Mining, LP
PO Box 1020
Waynesburg, PA 15370



Proposed Petition Redesignation

High Quality Sampling Analysis

Petition Area: 2,462 Acres

Stream Miles within Petition Area: 10.60 Miles

Legend

- Petition Area
- Boundary CNG
- Cumberland Permit Boundary
- Emerald Permit Boundary
- Sewickley Boundary
- Cumberland West Current Boundary
- Underground Permit Bounary
- Shaft/ Slope Permit Boundary
- Transportation
- Low Density Urban/Commercial
- High Density Urban/Commercial
- Farmland
- Forest
- Water
- Wetlands
- Barren Land/Unclassified
- Mining Related Use
- Golf Courses

Source:
PA MAP Land Cover for Pennsylvania, 2005
The Pennsylvania State University - PASDA

Date: May 29, 2008

Projection:
State Plane NAD1983
Pennsylvania South Feet

FIGURE 4. LAND USE/ LAND COVER CLASSIFICATIONS
PROPOSED PETITION AREA

FOUNDATION COAL CORPORATION

WPI WALLACE & PANCHER, INC.

Foundation Mining, LP
PO Box 1020
Waynesburg, PA 15370

Proposed Petition Redesignation

High Quality Sampling Analysis

Petition Area: 2,462 Acres

Stream Miles within Petition Area: 10.60 Miles

Legend

- 300' Sampling Area
- Petition Area
- Shaft/ Slope Permit Boundary
- Boundary CNG
- Cumberland Permit Boundary
- Emerald Permit Boundary
- Sewickley Boundary
- Cumberland West Current Boundary
- Underground Permit Bounary
- Green Manor Reserve

Foundation Mine Preferred Refuse Areas

- Alternate 1-R1
- Alternate 2-R3 & R5
- Alternate 3-R4
- Alternate 4-R6
- Alternate 5-R21
- Alternate 6-R11

- CWF(COLD WATER FISHES)
- EV(EXCEPTIONAL VALUE)
- HQ(HIGH QUALITY)
- HQ-CWF(HIGH QUALITY-COLD WATER FISHES)
- HQ-TSF(HIGH QUALITY-TROUT STOCKING)
- HQ-WWF(HIGH QUALITY-WARM WATER FISHES)
- Missing from Chapter 93
- TSF(TROUT STOCKING)
- WWF(WARM WATER FISHES)

Source:
Pennsylvania Department of Environmental Protection (EMap)
Oct 25, 2007
Existing Use Streams
Chapter 93 Reference: Commonwealth of Pennsylvania. 2003. Pennsylvania Code. Title 25 Environmental Protection. Department of Environmental Protection. Chapter 93. Water Quality Standards. Harrisburg, PA

Date: May 29, 2008

Projection:
State Plane NAD1983
Pennsylvania South Feet

FIGURE 5. STREAM SAMPLING MAP
PROPOSED PETITION AREA

FOUNDATION COAL CORPORATION

WPI WALLACE & PANCHER, INC.

Foundation Mining, LP
PO Box 1020
Waynesburg, PA 15370

Exhibit C
Chapter 93 Designation

COMMENTS & RESPONSES

DEPARTMENT OF ENVIRONMENTAL RESOURCES'
REPORT TO THE ENVIRONMENTAL QUALITY BOARD
CONCERNING PROPOSED REVISIONS TO
WATER QUALITY CRITERIA (CHAPTER 93),
WASTEWATER TREATMENT REQUIREMENTS (CHAPTER 95),
AND INDUSTRIAL WASTES (CHAPTER 97)

July 1979

Table B

County	Stream	Revisions to Stream Use	Proposed Revisions to Criteria	Remarks
Allegheny	Bull Creek basin between McDowell Run and Allegheny River	From WWF to TSF	From WWF to TSF	This reflects an existing use.
Allegheny	Pucketa Creek basin	No changes from TSF	Use the current TSF list; this changes DO and temperature	Updates criteria.
Allegheny	Plum Creek basin	From TSF to WSF	From TSF to WWF	Based on recommendation of the Pa. Fish Commission.
Allegheny	Squaw Run basin	From WWF less PWS to HQ-WWF less PWS	WWF, but change TDS and delete Mn criteria	Protects the existing uses in the boy scout reservation area.
Allegheny	Guyasuta Run basin above Route 28	From WWF less PWS to HQ-WWF less PWS	WWF, but change TDS and delete Mn criteria	Protects the existing uses in the boy scout reservation area.
Allegheny	Pine Creek basin below North Pork Lake	No change from TSF less PWS	Use the current TSF list; this changes DO and temperature. In addition, the TDS is changed and Mn is deleted.	Updates criteria.
Allegheny	Girtys Run basin	From TSF less PWS to WWF less PWS	Change to WWF, and change the TDS and delete Mn	TSF is eliminated because urbanization of the watershed, particularly the stream channel project in the lower end, makes trout stocking very unlikely.

Drainage List V - Monongahela River Basin in Pennsylvania

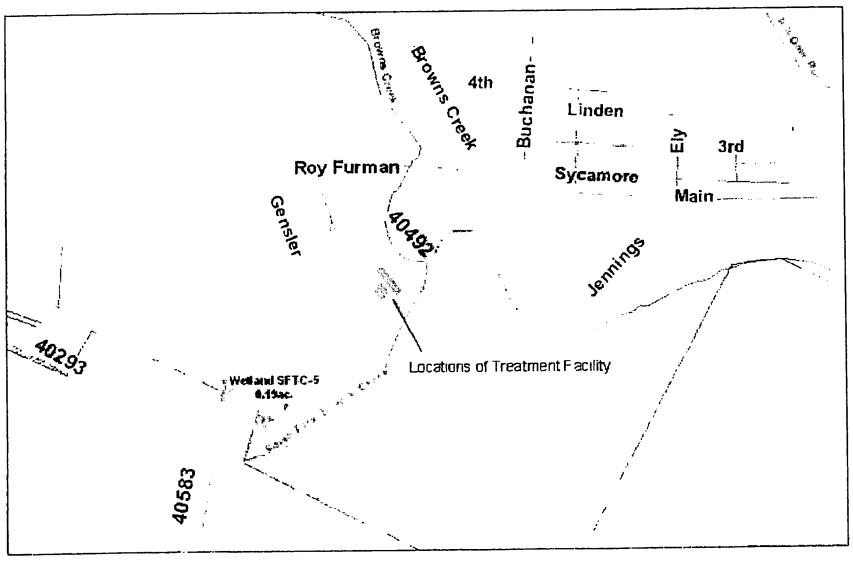
Allegheny Westmoreland Washington Fayette Greene	Monongahela River, main stem	Add N, navigation	Use WWF	Addition of N reflects current use.
Fayette	Big Sandy Creek, main stem	From CWF to HQ-CWF	From CWF to HQ-CWF	The stream has excellent water quality; the rest of the basin is already a "Conservation Area" and this action updates the use and criteria, which did not exist when Big Sandy standards were first adopted.
Fayette	Quebec Run basin upstream of Mill Run	From HQ-CWF to EV	From HQ-CWF to preservation of existing quality	This is a wilderness trout stream.
Fayette	Little Sandy Creek, main stem	From CWF to HQ-CWF	From CWF to HQ-CWF	Same reasons as given for Big Sandy Creek.
Greene	Rudolf Run, Main Stem	From No Uses to WWF	From general criteria only to WWF	Makes the standards consistent with those of the rest of the Rudolf Run basin.
Greene	Little Shannon Run basin	From WWF to CWF	From WWF to CWF	The CWF classification is currently achieved.
Greene	South Fork Tenmile Creek basin from source to and including Browns Run	From WWF to HQ-WWF	No change from WWF	Protect the Waynesburg water supply and the excellent smallmouth bass fishery.
Washington	Pigeon Creek basin	From TSF to WWF	From TSF to WWF	Change is recommended by the Pa. Fish Commission.
Washington	Mingo Creek basin, upstream of Froman Run	From TSF to HQ-TSF	No change from TSF	Stream has very good to excellent water quality.
Fayette	Youghiogheny River, Main Stem from dam to Indian Creek	From CWF to HQ-CWF	From CWF to HQ-CWF	Help to protect the wild and scenic attributes of this section.
Fayette	Youghiogheny River, Main Stem from Indian Creek to Connell Run	From WWF to HQ-CWF	From WWF to HQ-CWF	Updates to the existing CWF character of the stream and helps to protect the wild and scenic attributes of the section.
Fayette Somerset	Unnamed tributaries of the Youghiogheny River between the state line and Ramcat Run	From WWF to CWF	From WWF to CWF	The CWF classification is currently achievec.

Exhibit D
Gensler Road
Treatment Facility

Gensler Road Treatment Facility

Information obtained from Joe Sematic (724.883.2305) with the Southwestern PA Water Authority. Information from a Webber, Fick & Wilson Inventory and appraisal report (1956)

- Built and established with a dam on 10 mile creek and facilities in 1904. The elongated facility was used for flitration and the smaller square structure was used to store chemicals.
- Facilities only ran part time from 1967-1990, one shift daily with an approximate output of 0.5 million gallons/day.
- Facility Serviced Western Waynesburg.
- Reservoir on Wisecarver Run that serviced the facilities built in 1931 to supplement the water supply from browns creek and 10 mile. Held Approximately 80 million gallons when built, but siltation has decreased the capacity to approximately 50 million.
- Sold to the South West Pennsylvania Water Authority in 1967. The main reason for the sale was drought. The facility actually went dry in 1967, as the result of a 1966 flood.
- Source from facility was said to be unreliable. Not enough water.
- Facilities completely destroyed in 1985 (Nov.) flood. Rebuilt and run part time until 1990 because it could not augment the water supply for Western Waynesburg.
- Facility completely shut down in 1990, replaced by a pipeline running from a larger facility on the Monongalia River.
- Building destroyed in the mid 1990's.



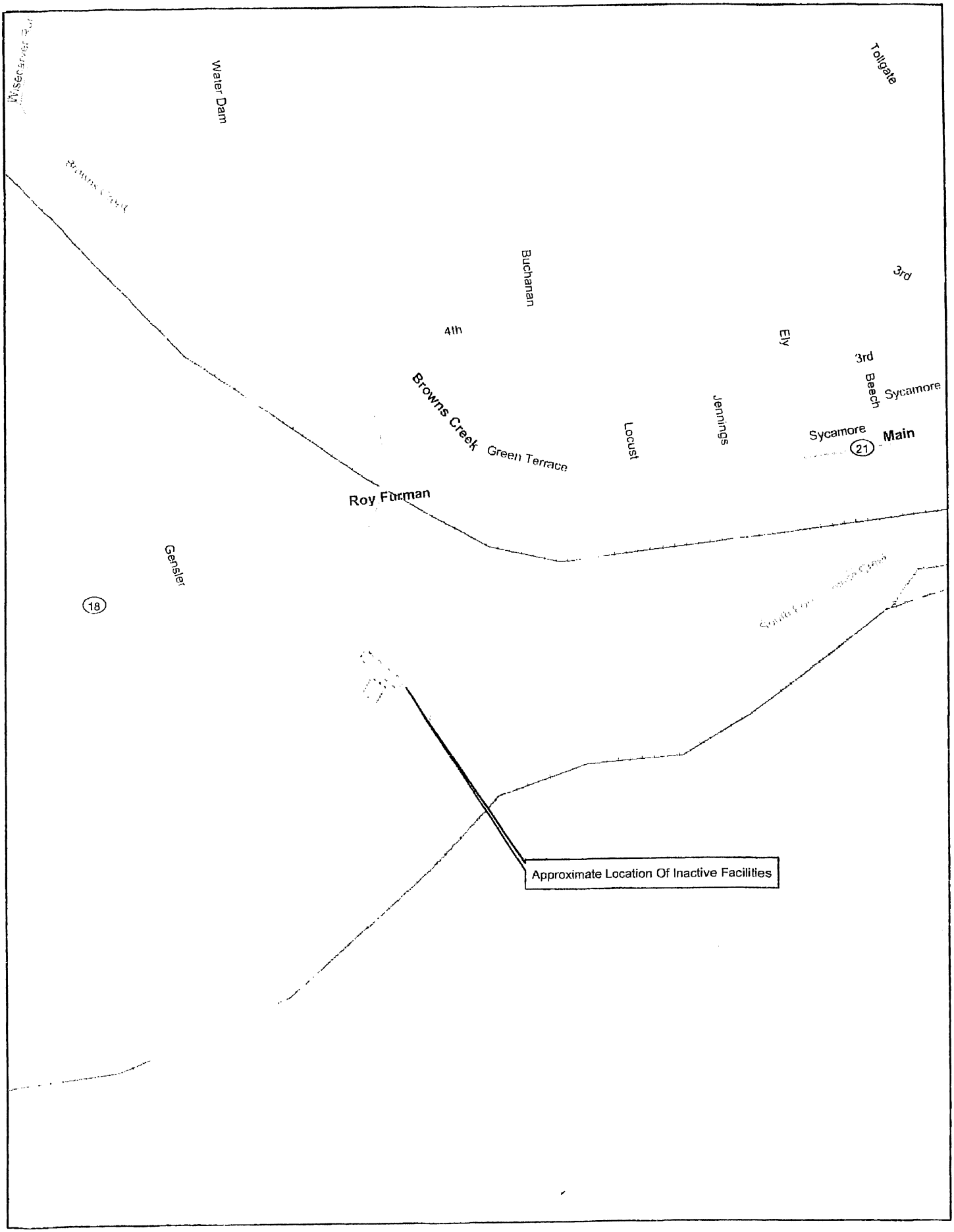

Water Dam
Tollgate
Buchanan
4th
Ely
3rd
3rd
Beech
Sycamore
Browns Creek
Green Terrace
Locust
Jennings
Sycamore
21
Main
Roy Furman
Gensler
18
Approximate Location Of Inactive Facilities

Exhibit E
Point and NonPoint Discharges

Point and NonPoint Source Discharges

The Greene County Conservation District confirmed that no NPDES point or nonpoint source discharge permits exist within the South Fork Tenmile Creek study area. At this time no known point or nonpoint source discharges have been proposed for this area.

During field investigations, unpermitted nonpoint source discharges were observed within the petition area. Agricultural runoff was observed in active pastures along Hoge Run indicating sediment and nutrient loading. Poor bank stability along McCourtney Run also indicates sediment loading and excessive sediment transport during high water events.

Exhibit F
Municipality Contact Information

Municipality Contact Information

Center Township

Paul Cook
Chairman of Township Supervisors
P.O. Box 435
Rogersville, Pennsylvania 15359
Phone: (724) 499-5487

Jackson Township

Raymond S. Kiger
Chairman of Township Supervisors
104 Tunnel Road
Holbrook, Pennsylvania 15341
Phone: (724) 499-5713
Fax: (724) 499-5883