M E M O R A N D U M

To: Vienna

From: _Crist_____ (Reviewer); Ohio EPA Legal Office.

Date: 5/21/2015

These files were reviewed to determine whether records contained herein are confidential or otherwise exempt from the disclosure obligations of Ohio Revised Code (ORC) 149.43.

x___ All files are public

No records were removed based on this review.

___ Some files are not public

Records were removed or redacted for the reasons given below:

___ **Attorney- Client Privilege**, State ex rel. Leslie v. Ohio Hous. Fin. Agency, 105 Ohio St.3d 261, 265 (2005).

___ **Attorney Work Product**, Squire, Sanders & Dempsey, L.L.P. v. Givaudan Flavors Corp., 127 Ohio St.3d 161 (2010).

___ **Confidential Law Enforcement Investigatory Records**, ORC 149.43(A)(1)(h).

___ **Social Security Numbers**, State ex rel. Office of Montgomery County Pub. Defender v. Siroki, 108 Ohio St.3d 207 (2006).

___ **Release Otherwise Prohibited by Law**, (i.e. trade secret, infrastructure and security records, etc.), ORC 149.43(A)(1)(v).

___ **Other Specified Reason**: _____

___ All files are confidential

Should you have any questions regarding this issue, please contact Ohio EPA's Office of Legal Services.

(This memorandum is to remain visibly attached to this file.)

HULL

Memorandum

via electronic communication

TO: Matt Kleese, KDA Disposal, Inc.

FROM: Hugh Crowell, Ecology & Wetlands Practice Leader
Dave Mustafaga, Environmental Division Leader

DATE: April 13, 2015

RE: Surface Water Determination and Impact Study for the KDA Inc. Kleese Facility Spill

Hull & Associates, Inc. (Hull) is pleased to present the results of a surface water determination and habitat study performed at and near the KDA Disposal Inc. Facility in Vienna, Trumbull County, OH (Site) to evaluate potential impacts to streams and other surface waters.

Background

The KDA Disposal Inc. site is located on the western side of State Route 45 in Vienna, Trumbull County, Ohio (Figure 1). A ravine located northeast of the facility contains an unnamed tributary to Little Yankee Run (Stream A; ~1.90 mile in length) that conveys surface water to Little Yankee Run. Under the Ohio Administrative Code (OAC) 3745-1, Stream A is undesignated, and Little Yankee Run has an aquatic life use designation of warmwater habitat (WWH). The spill occurred in USGS Hydrologic Unit Code 05030102-050.

On March 31, 2015 a release of unconventional oil and natural gas extraction wastewater occurred at the KDA Disposal Inc. Facility and an undetermined volume of wastewater entered Stream A. An appropriate on-site response was quickly implemented.

Methods

Prior to conducting the field investigation, Hull compiled and reviewed secondary source information that was used for screening and planning purposes. Secondary source information included, but was not limited to the following: U.S. Geological Survey (USGS) topographic maps, recent aerial photography and drainage areas of streams from Stream Stats website. Ecologists from Hull performed an on-site determination and assessment of surface waters and an impact study on April 9, 2015.

While on-site, ecologists from Hull investigated the stream impacted by the wastewater spill (Stream A). The upstream extent of federal jurisdiction for Stream A was determined in the field by experienced delineation staff. Wetland areas were identified in the field, photographed and GPS location data was taken, but no other wetland delineation data was obtained.

The Ohio EPA Headwaters Habitat Evaluation Index (HHEI), Headwaters Macroinvertebrate Field Evaluation Index (HMFEI) and salamander Visual Encounter Survey (VES), rapid ecological testing methods for small streams, were performed at four different stream locations. Three ecological assessment reaches were located within Stream A: 'Upstream Pond 1' located between State Route 45 and Pond 1; 'Downstream Pond 1' located between Pond 1 and Pond 2; and 'Downstream Pond 2'. A fourth ecological assessment reach called 'Reference' was conducted in Stream C, an unnamed tributary to

Stream A, to represent an unimpacted stream reach with habitat similarities to Stream A 'Upstream Pond 1'.

Results and Discussion

A site location map is presented in Figure 1, and the location of assessed surface waters is presented in Figure 2. Site photographs are included in Attachment A and stream data sheets are located in Attachment B.

Stream A was determined to be an intermittent, Ohio Class II headwater stream above Pond 1. Below Pond 1 Stream A was determined to be a perennial, Ohio Class II headwater stream which constitutes its existing aquatic life use under Ohio rules. Stream A had common ecological characteristics of a moderate quality headwater stream in northeastern Ohio.

A moderate diversity of benthic macroinvertebrates was found in the Stream A reach called 'Upstream Pond 1'. Most of the benthic macroinvertebrates taxa collected were dead, including oligochaete worms which were white in color and lying on top of sediments in the stream bed. Living benthic macroinvertebrates including insect larvae were moving very slowly and not displaying typical physiological responses. One dead fish (Centrarchidae) 2" in length was observed in this reach.

A moderate diversity of benthic macroinvertebrates was found in the Stream A reach called 'Downstream Pond 1', some of which were dead. Living damselfly and caddisfly larvae were moving very slowly but fewer dead taxa were observed in this reach. A living and active garter snake was found in this reach. All fish (Centrarchidae) observed in this reach were dead, and varied in length from approximately 3" to 8". Most dead fish observed were seen in Pond 1. The presence of dead fish in this reach may be due to dead fish being flushed through the pond spillway before absorbent booms were put into place around the top of the spillway.

Dead unidentified mussel shells were observed on the banks of Pond 2; however, these deaths were apparently due to predation as evidenced by teeth scratch marks on the outside of the shells and the shells having been dragged onto the dike and opened.

A low diversity of benthic macroinvertebrates was found in the reach called 'Downstream Pond 2', however all taxa were living and in good condition including oligochaete worms. Low ecological diversity in this reach may result from iron deposits apparently originating in Wetland 5 (Figure 2) which are causing adherence of sand and gravel to larger cobbles and consequent high embeddedness. Apparent algae treatment in Pond 2 may also be impacting benthic macroinvertebrates in this reach. No fish were observed.

An ephemeral tributary to Stream A, called Stream B, was documented. Stream B was observed to be unimpacted by sheen or odor, and was not further assessed.

Hull staff determined an unnamed tributary to Stream A (Stream C) to be an intermittent, Ohio Class II headwater stream, which constitutes its existing aquatic life use under Ohio rules. Stream C was evaluated as a reference stream ('Reference') unaffected by the spill, with comparable habitat, watershed size, maximum pool depth, bankfull width and flow regime to 'Upstream Pond 1'. When compared to 'Upstream Pond 1', the benthic macroinvertebrate community in 'Reference' had a similar HMFEI score; however, all taxa were living, and abundant Trichoptera larvae were observed.

The surface water determination survey included screening areas where secondary source information and general field conditions suggested the possible presence of wetlands. Hull preliminarily tested for the presence of field indicators of wetland hydrology and wetland plant communities, and identified 5 potential wetlands on-site (Figure 2), called Wetlands 1/2, 3, 4 and 5.

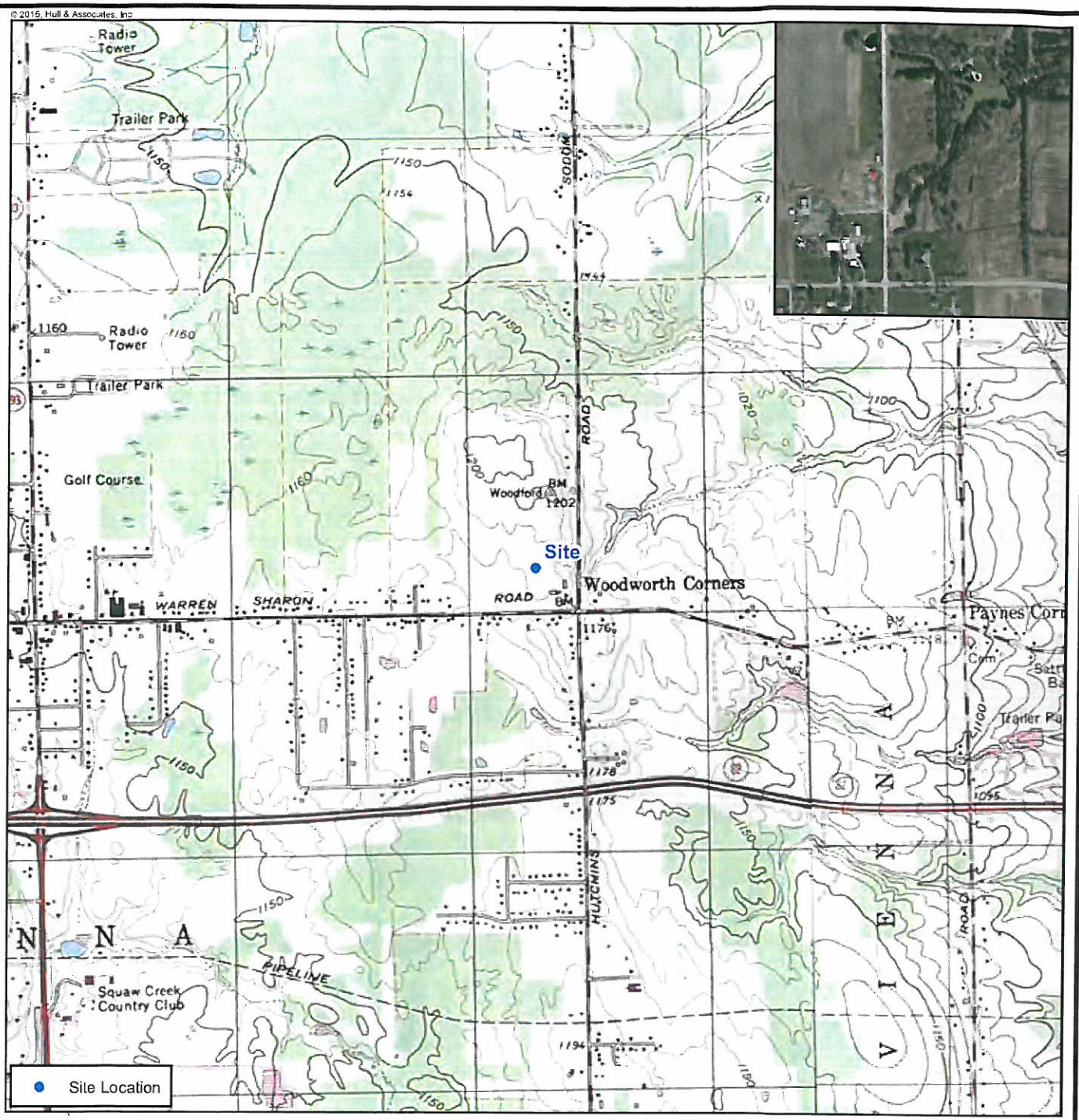
Ecological impacts from the wastewater spill were observed to be severe in the upper reach of Stream A (above Pond 1, closest to the spill), and these impacts were seen to decline downstream. There was no ecological impact of the spill observed downstream of Pond 2. Petroleum sheen and odor were observed throughout Wetlands 1/2 and 3 but were absent from Wetlands 4 and 5 and from Stream A downstream of Pond 2.

ATTACHMENT A

Site Photographs

ATTACHMENT B

Stream Data Sheets



DISCLAIMER
Hull & Associates, Inc (Hull) has furnished this map to the company identified in the title block (Client) for its sole and exclusive use as a preliminary planning and screening tool and field verification is necessary to confirm these data. This map is reproduced from geospatial information compiled from third-party sources which may change over time. Areas depicted by the map are approximate and may not be accurate to mapping, surveying or engineering standards. Hull makes no representation or guarantee as to the content, accuracy, timeliness or completeness of any information or spatial location depicted on this map. This map is provided without warranty of any kind, including but not limited to, the implied warranties of merchantability or fitness for a particular purpose. In no event will Hull, its owners, officers, employees or agents, be liable for damages of any kind arising out of the use of this map by Client or any other party

0 500 1,000 2,000 Feet

1:24,000

Quad: Girard

Source: The topographic map was acquired through the USGS Topographic Map web service.

The aerial photo in the inset was acquired through the ESRI Imagery web service. Aerial photography dated 2012

HULL

6397 Emerald Pkwy
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
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Site Location Map

Vienna, Trumbull County, Ohio

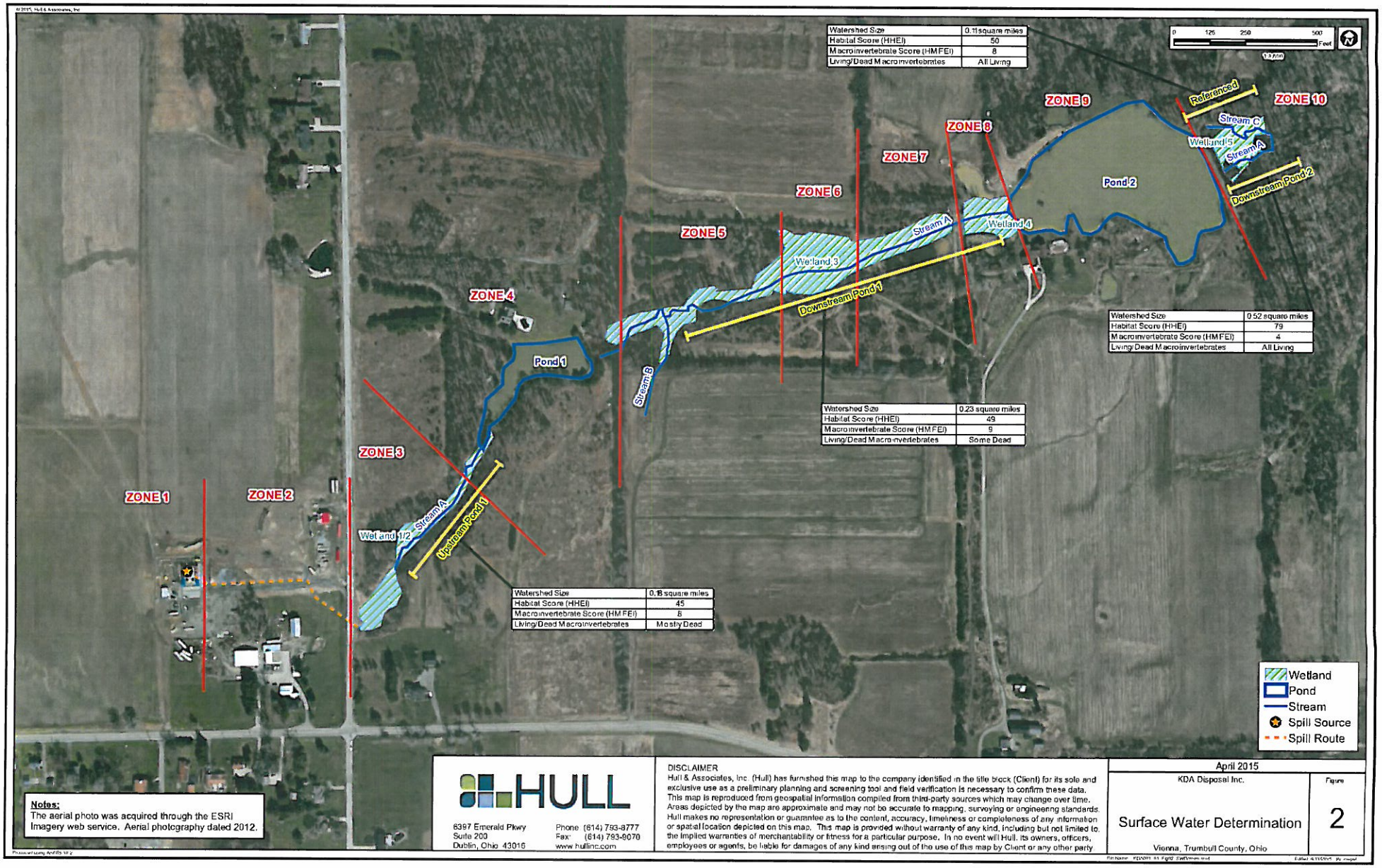
Date:
April 2015

File Name:
KDA001_01_Fig01_SLM.mxd

Edited: 4/13/2015 By: mopel

Figure
1

Produced using ArcGIS 10.2



Notes:
The aerial photo was acquired through the ESRI Imagery web service. Aerial photography dated 2012.

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6397 Emerald Pkwy
Suite 200
Dublin, Ohio 43016
Phone (614) 793-8777
Fax (614) 793-8070
www.hullinc.com

April 2015

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Surface Water Determination

Vienna, Trumbull County, Ohio

Figure 2

ATTACHMENT A

Site Photographs

PHOTO 1: Wetland 1/2 looking North

PHOTO 2: Culvert draining into southern end of Wetland 1/2

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

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Site Photographs

Vienna, Trumbull County, Ohio

Date:
APRIL 2015

Project Number: KDA001

File Name:
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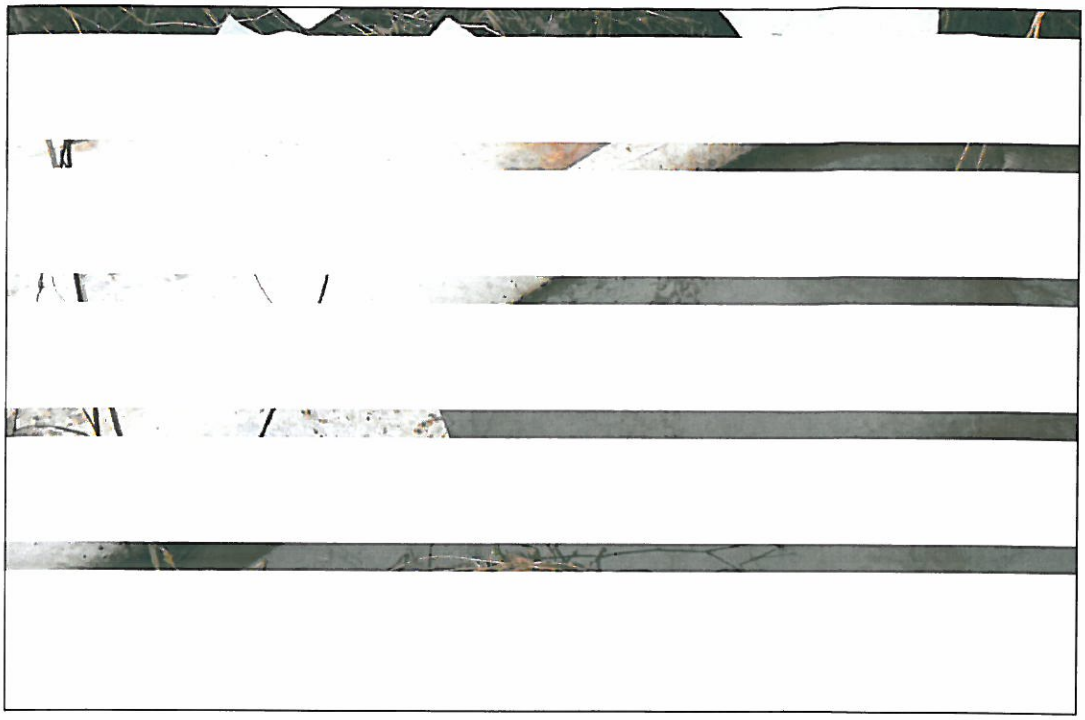

PHOTO 3: Sheen on Stream A and on Wetland 1/2

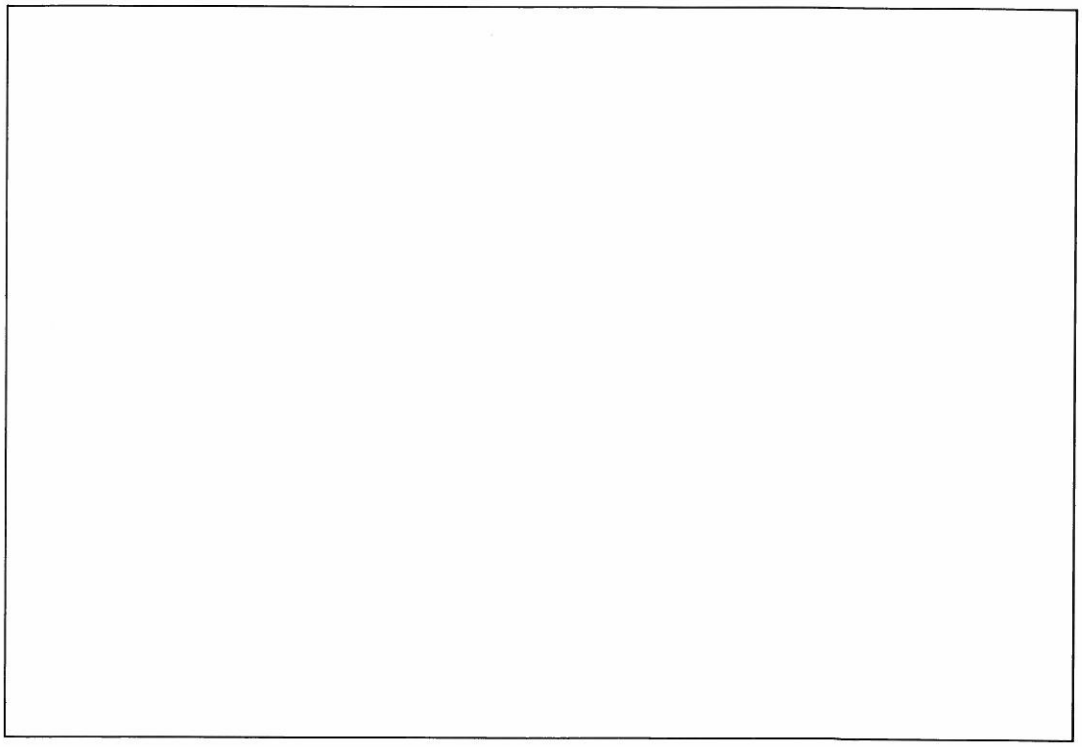

PHOTO 4: Wetland 1/2 looking south

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016

Phone (614) 793-8777
Fax (614) 793-9070
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PHOTO 5: Visible sheen on Stream A and Wetland 1/2

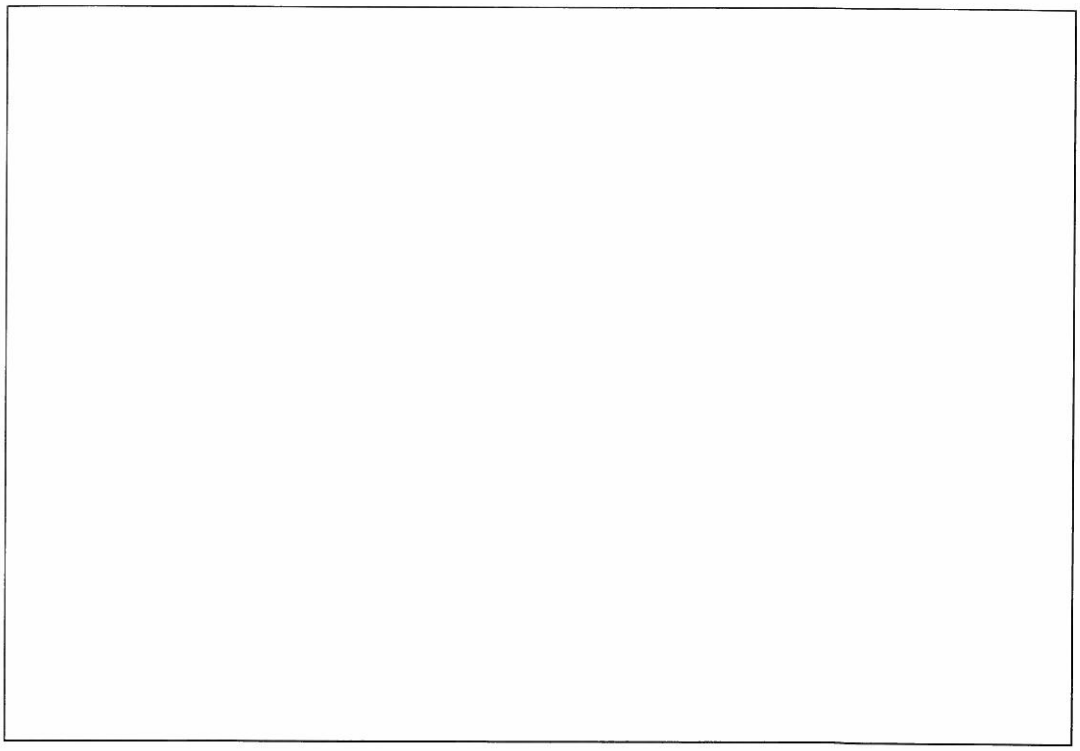

PHOTO 6: Stream A looking upstream approximately 40 feet upstream of Pond 1

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
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PHOTO 7: Stream A looking downstream about 40 feet upstream of Pond 1

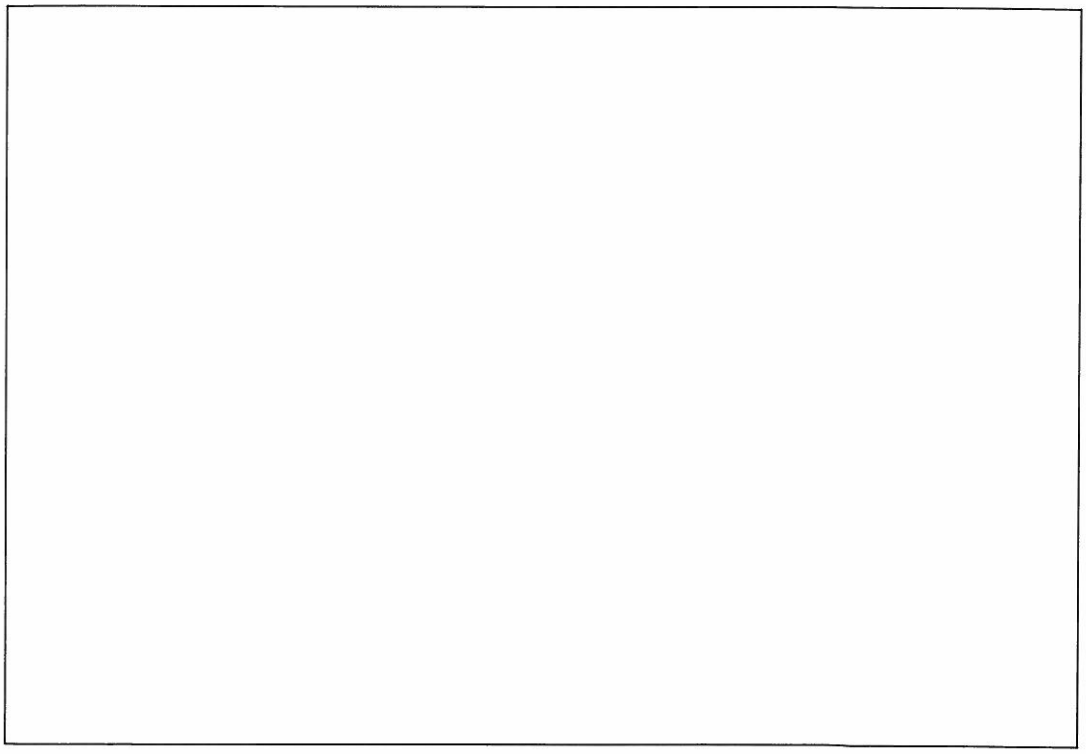

PHOTO 8: Wetland complex 1/2 approximately 40 feet upstream of Pond 1 on either side of Stream A

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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PHOTO 9: Stream A outletting into Pond 1

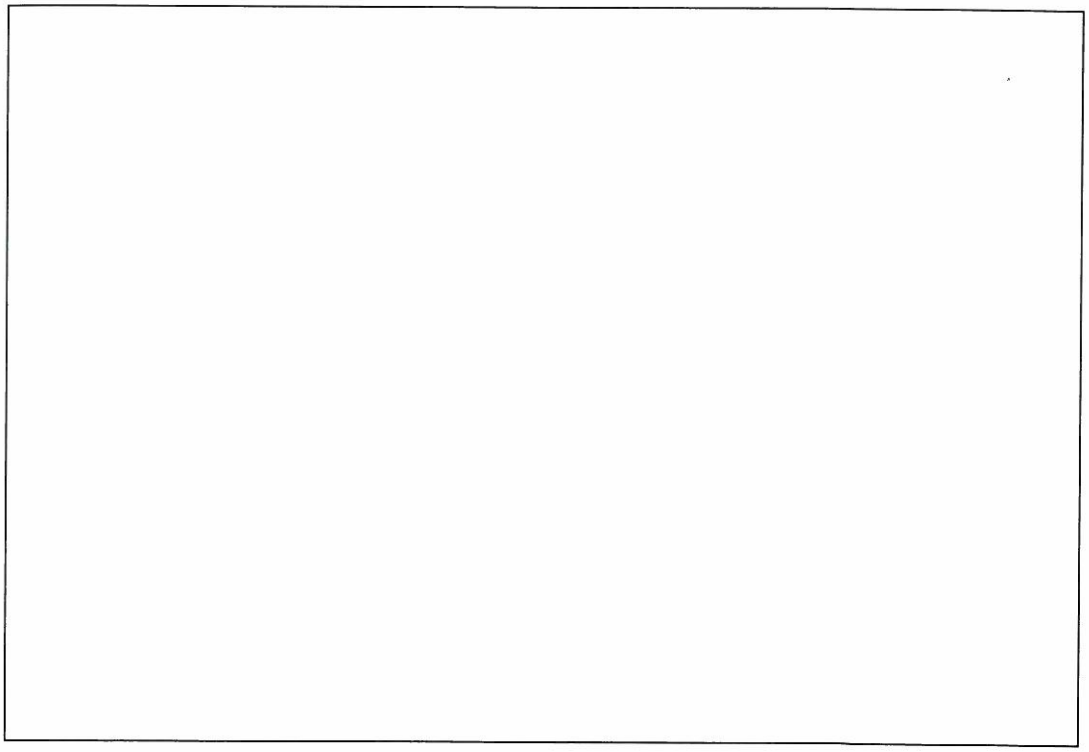

PHOTO 10: Substrate within Stream A about 50 feet upstream of Pond 1

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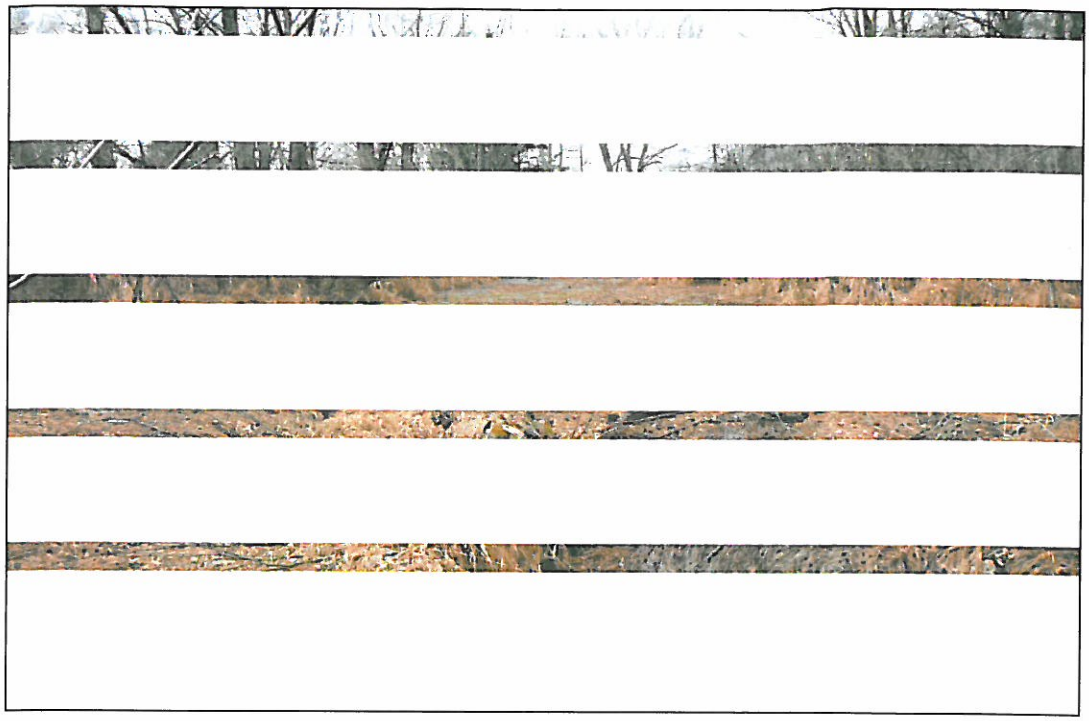

PHOTO 11: Sheet flow through northern portion of Wetland 1/2 looking south

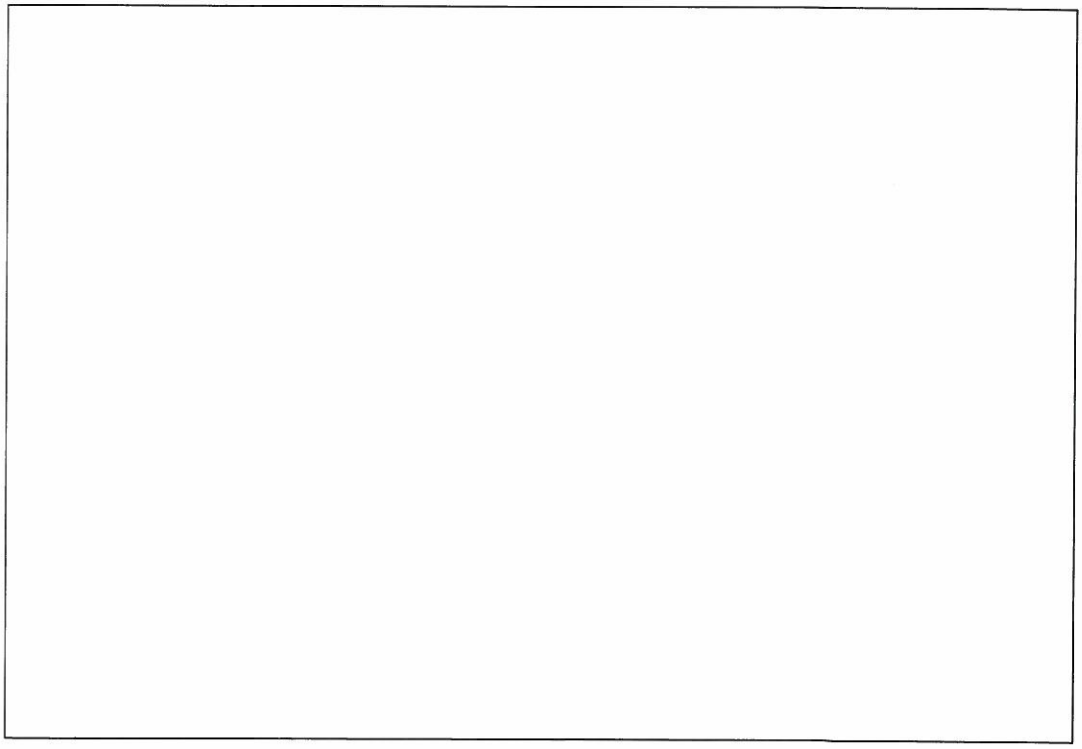

PHOTO 12: Stream A facing south, within Wetland 1/2

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PHOTO 13: Stream A looking North, southern extent of Stream A

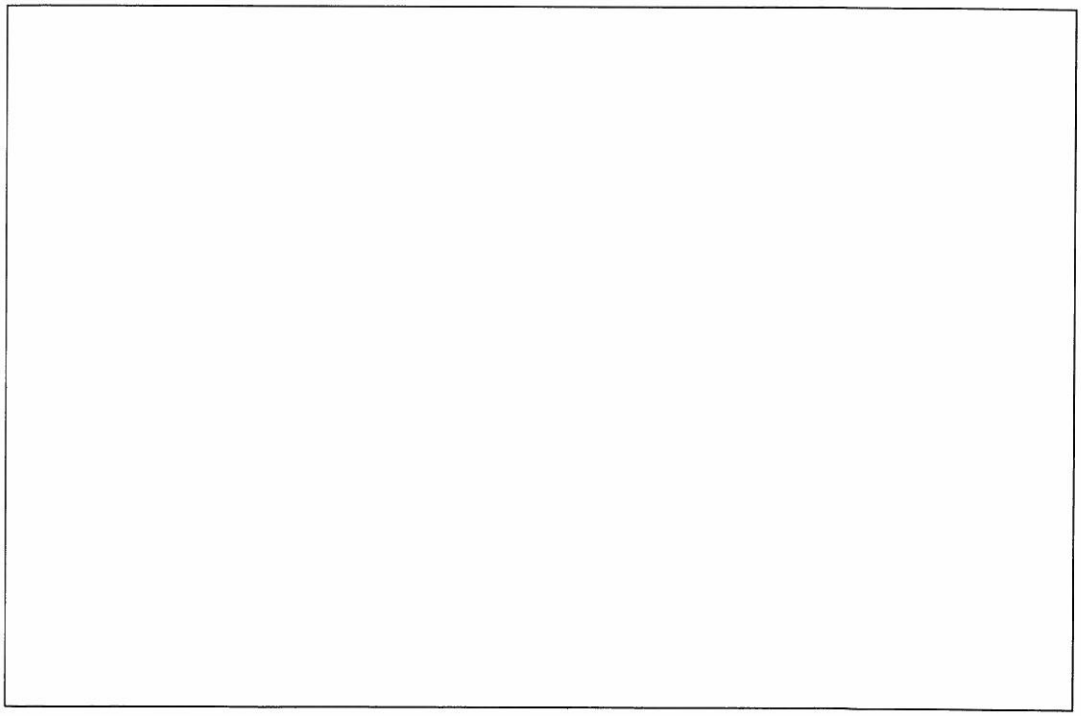

PHOTO 14: Photo of dead crappie or bass found in Stream A approximately 30 feet upstream of Pond 1

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PHOTO 15: Photo of dead bluegill in Pond 1

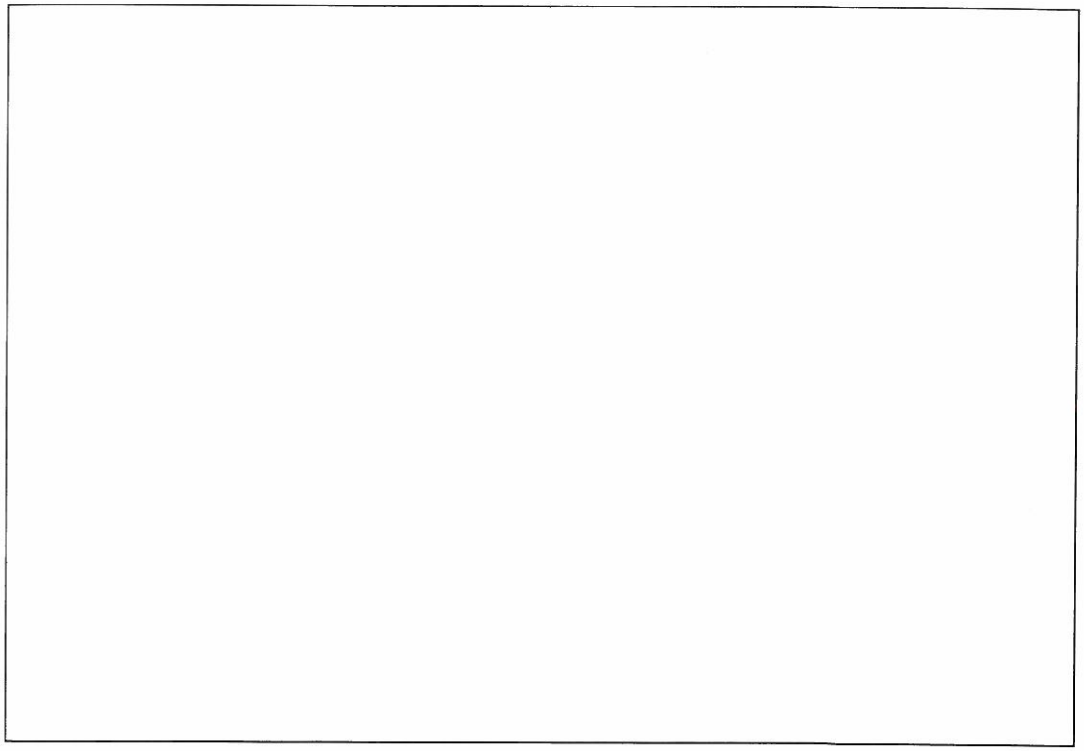

PHOTO 16: Pond 1 looking south

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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PHOTO 17: Photo of dead crappie, Pond 1

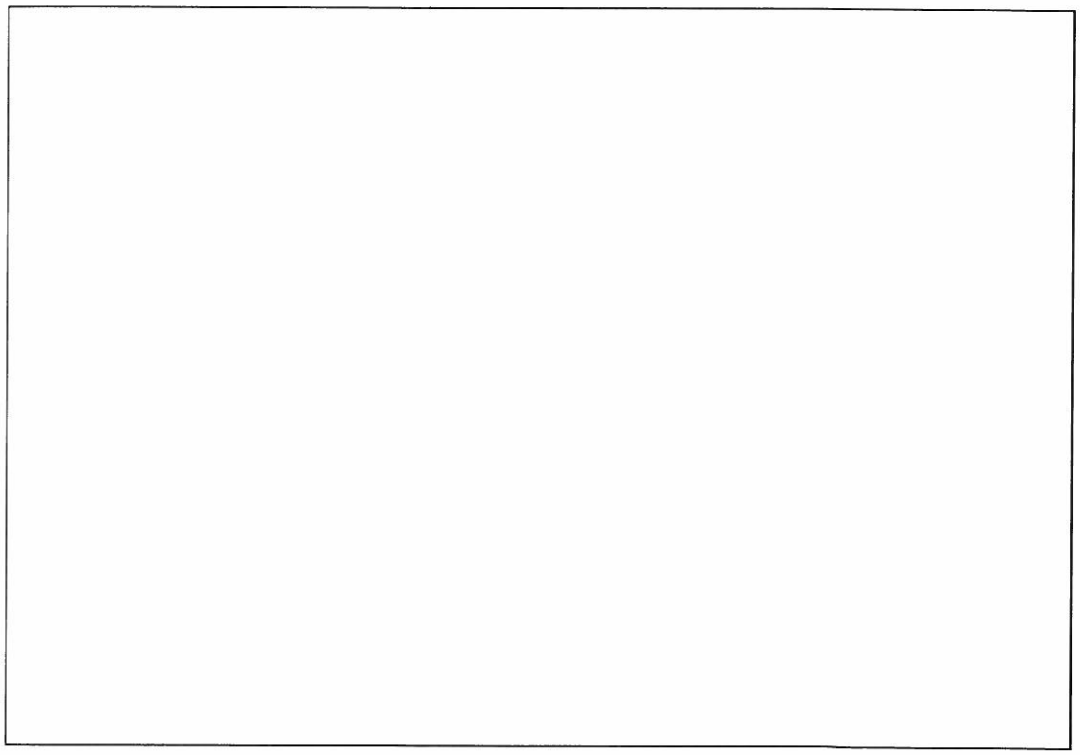

PHOTO 18: View of culvert draining Pond 1 into Stream A

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Fax (614) 793-9070
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PHOTO 19: Wetland 5 on the north bank of Stream A

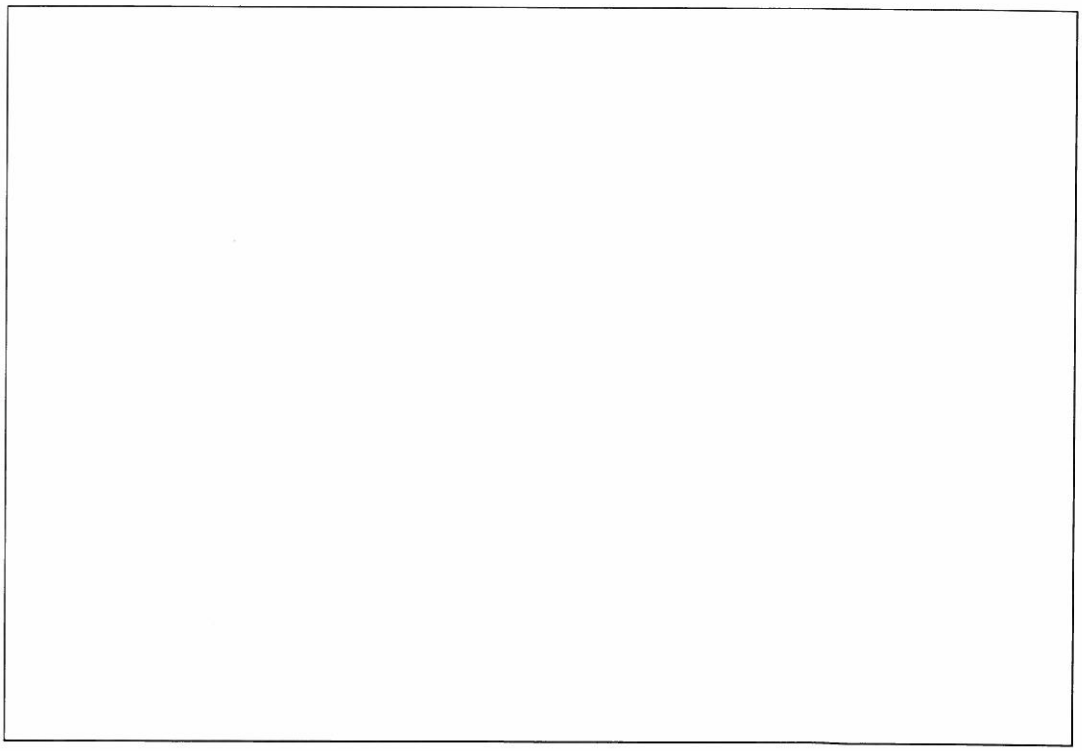

PHOTO 20: Garter snake in Stream A downstream of Pond 1.

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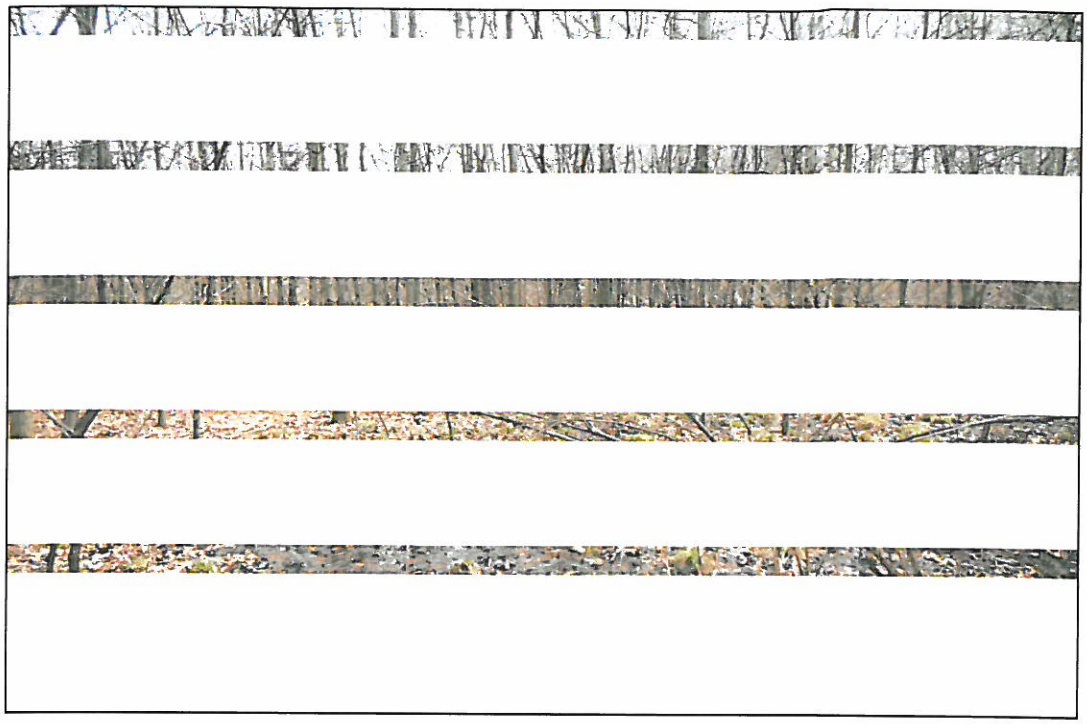

PHOTO 21: Forested section of Wetland 5

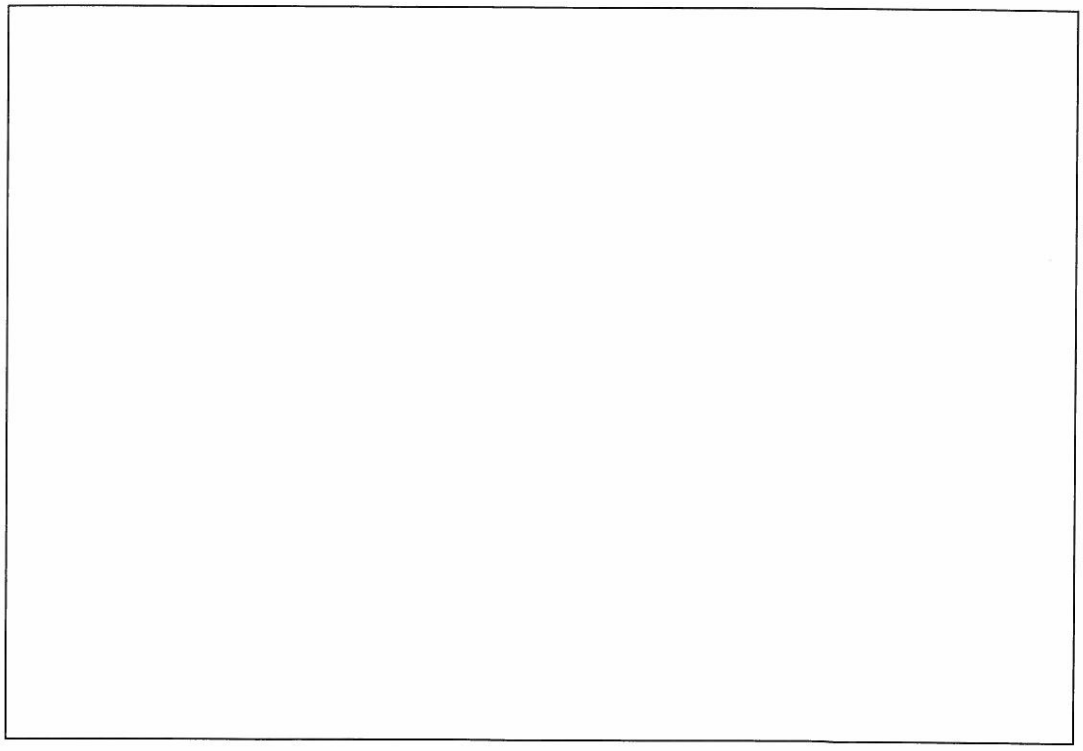

PHOTO 22: Wetland 3 near gravel crossing/road crossing looking south

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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Fax: (614) 793-9070
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PHOTO 23: Dead bass in Stream A downstream of Pond 1

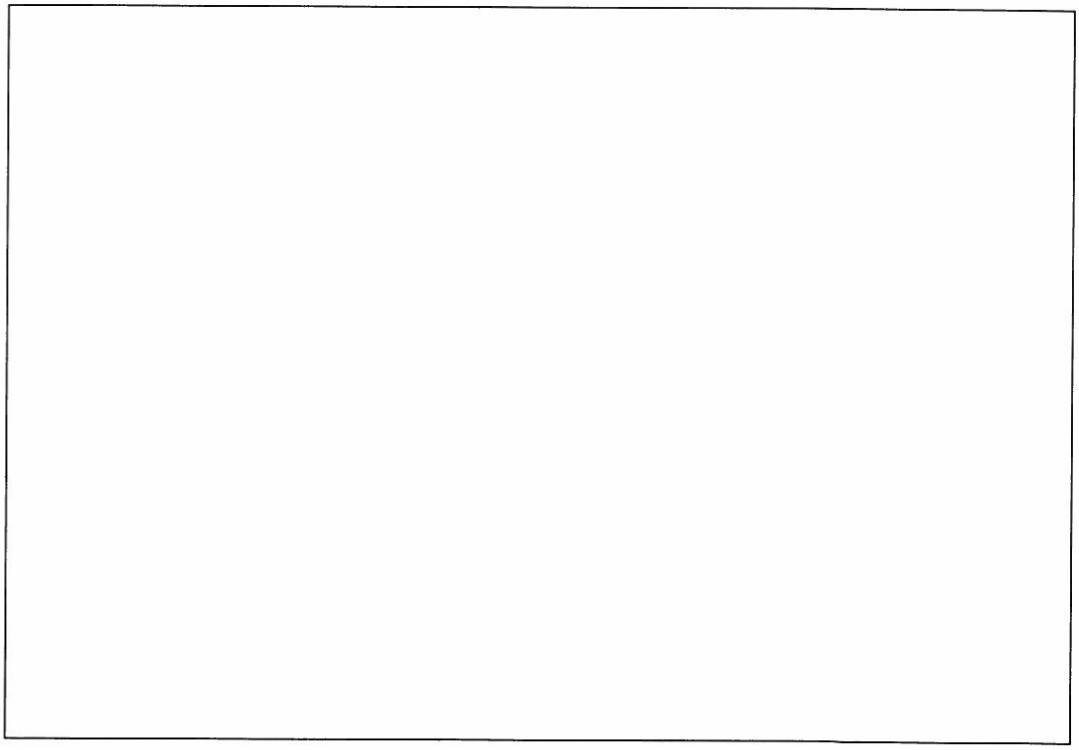

PHOTO 24: Stream A downstream of Pond 1, looking upstream facing West

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6397 Emerald Parkway
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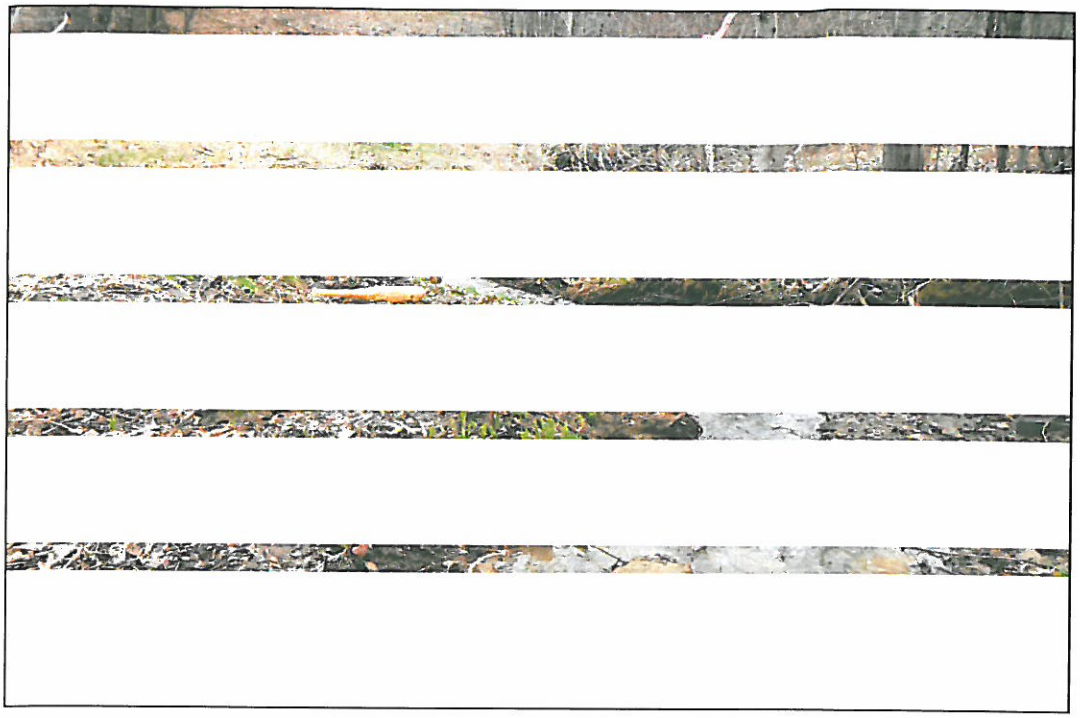

PHOTO 25: Stream A downstream of Pond 1, looking downstream facing east

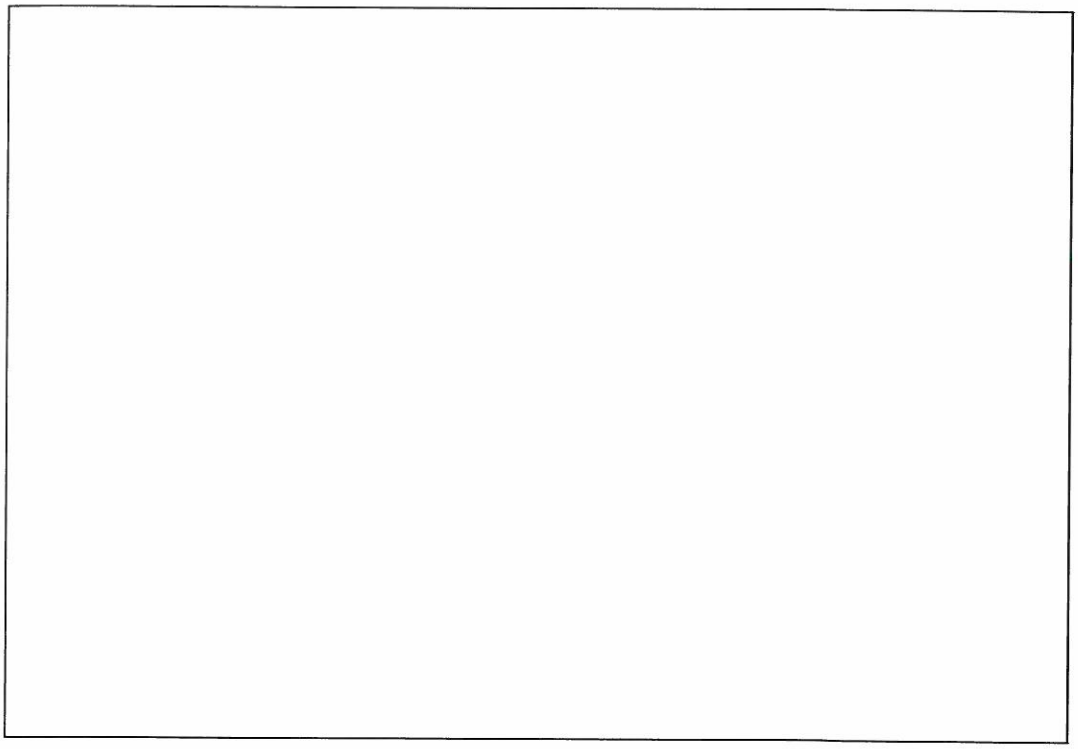

PHOTO 26: Stream B downstream facing north

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016

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Fax: (614) 793-9070
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PHOTO 27: Stream B upstream facing South

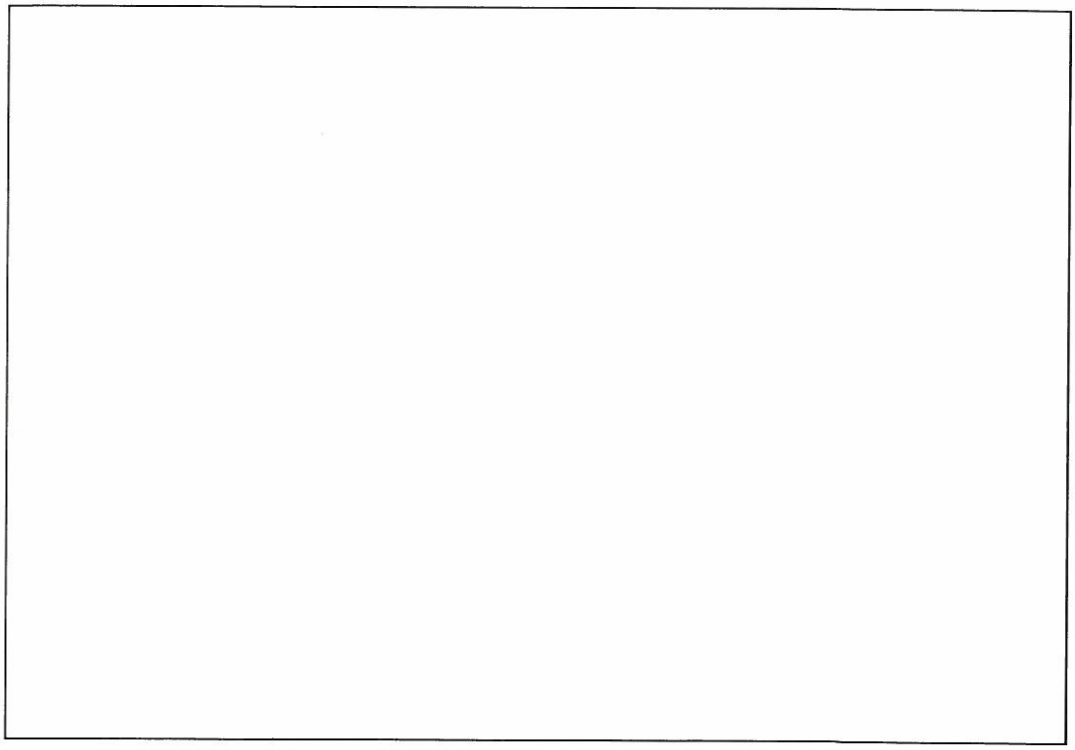

PHOTO 28: Swale north of impacted stream

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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Fax: (614) 793-9070
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PHOTO 29: Iron deposit from Wetland 5

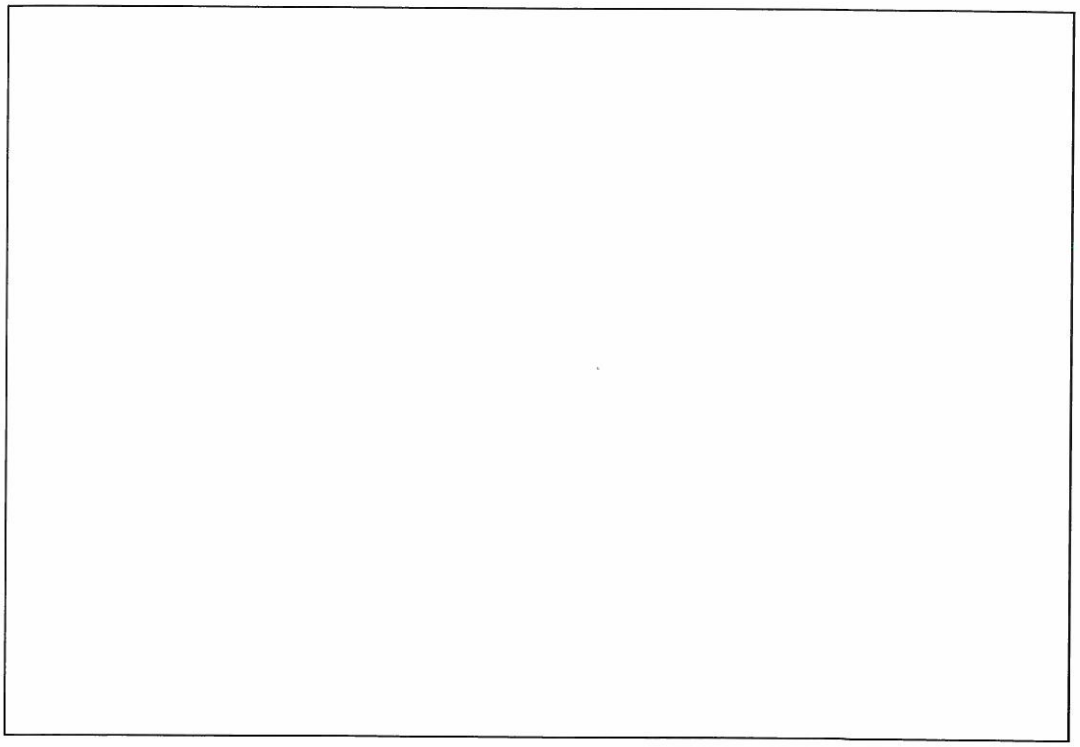

PHOTO 30: Stream A below Pond 2, looking downstream facing North

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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Fax: (614) 793-9070
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PHOTO 31: Stream A below Pond 2, looking upstream facing south

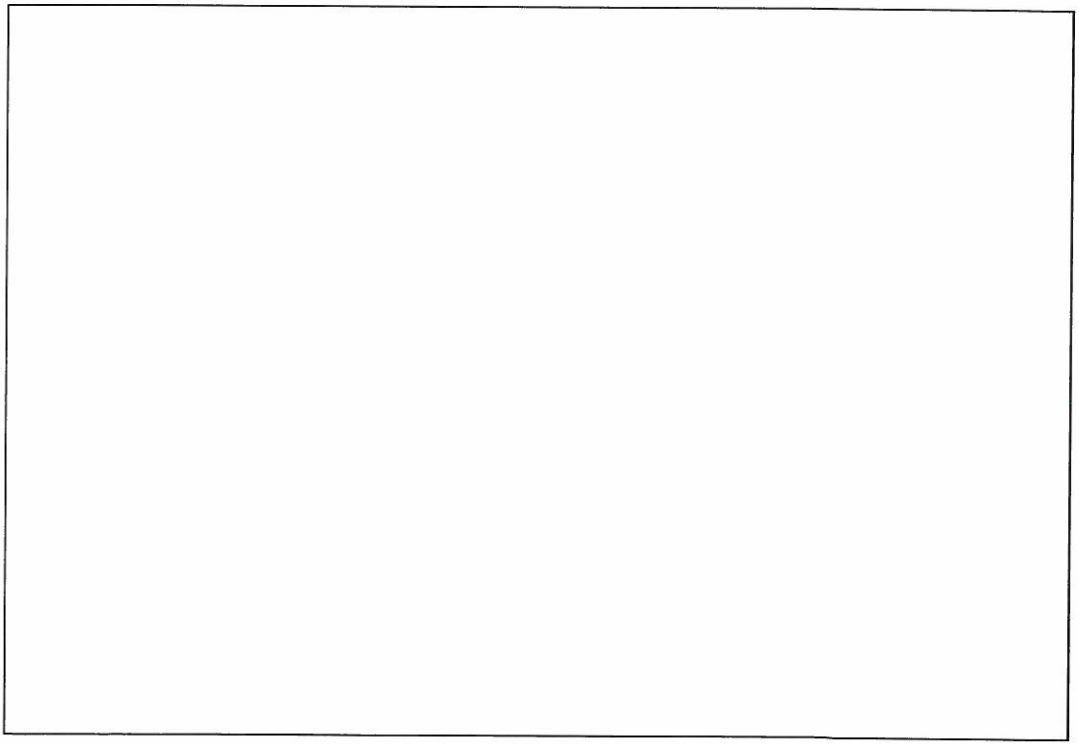

PHOTO 32: Stream C looking downstream, facing East

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6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016
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Fax: (614) 793-9070
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PHOTO 33: Stream C looking upstream facing West

PHOTO 34:

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Fax (614) 793-9070
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ATTACHMENT B

Stream Data Sheets

STREAM: A upstream Pond 1

Ohio EPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 45

SITE NAME/LOCATION _____

_____ SITE NUMBER _____ RIVER BASIN _____ DRAINAGE AREA (mi²) 0.18 mi²

LENGTH OF STREAM REACH (ft) 200 LAT. 41.23990 LONG. -80.63531 RIVER CODE _____ RIVER MILE _____

DATE 4/9/15 SCORER K. Hershey COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	35
☐	BOULDER (>256 mm) [16 pts]		☐	LEAF PACK/WOODY DEBRIS [3 pts]	
☐	BEDROCK [16 pt]		☐	FINE DETRITUS [3 pts]	
☐	COBBLE (65-256 mm) [12 pts]		☐	CLAY or HARDPAN [0 pt]	
☒	GRAVEL (2-64 mm) [9 pts]	40	☐	MUCK [0 pts]	
☐	SAND (<2 mm) [6 pts]	25	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 12

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

(B) 3

TOTAL NUMBER OF SUBSTRATE TYPES:

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☒ > 10 - 22.5 cm [25 pts] 2.5 cm = 1"
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 10" (10 inches)

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☒ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS 2' AVERAGE BANKFULL WIDTH (meters): 2' (feet)

HHEI Metric Points

	Max	Score
Substrate	40	15
A + B		
Pool Depth	30	25
Bankfull Width	30	5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH L	R	(Per Bank)	FLOODPLAIN QUALITY L	R	(Most Predominant per Bank)	L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☒	☒	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☒	☒	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☒ 1.5	☐ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

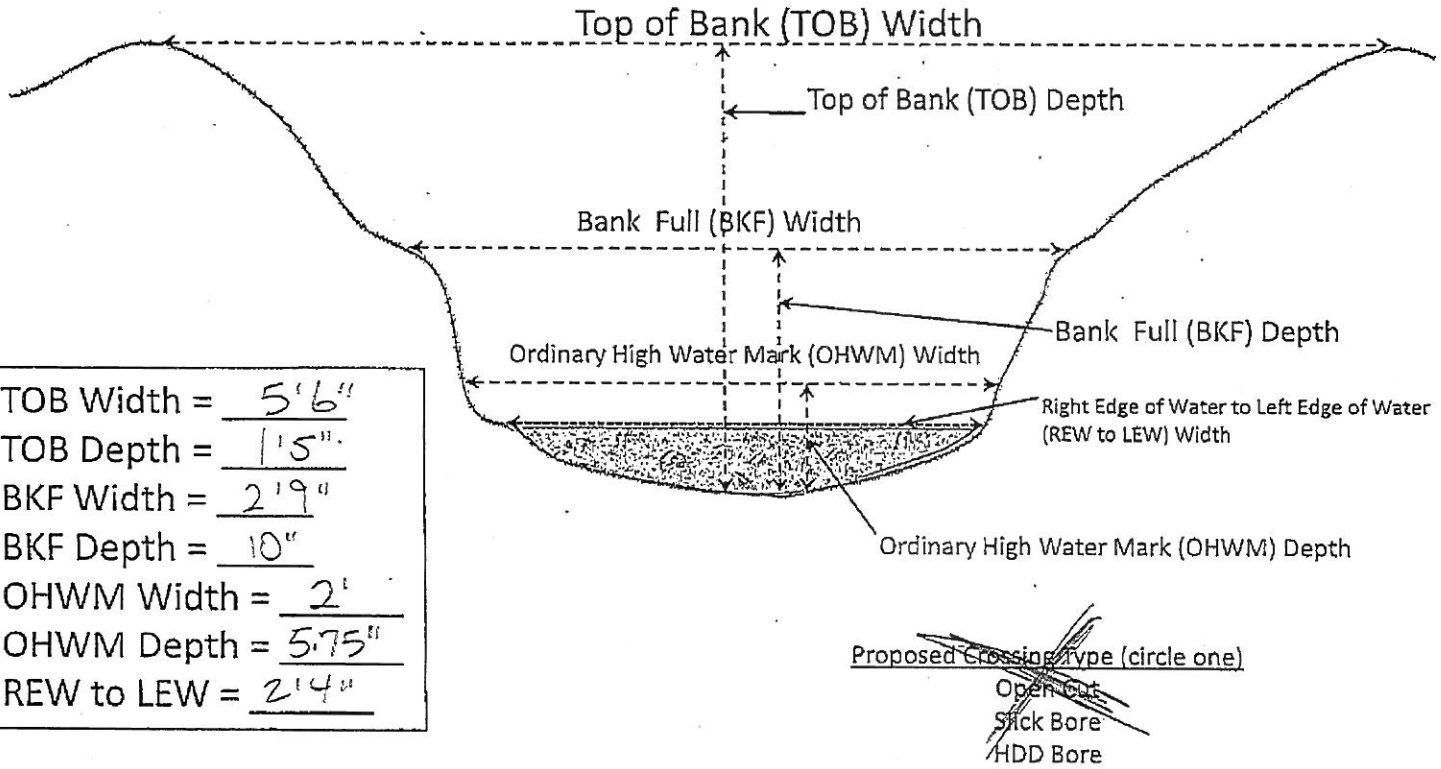
4/9/15

UPSTREAM POND 1

Stream A Cross Section Dimensions

Stream Name: UT to Little Yankee Run

Hull Investigator(s): J. Kinney Project: KDA001



TOB Width = 5'6"
TOB Depth = 1'5"
BKF Width = 2'9"
BKF Depth = 10"
OHWM Width = 2'
OHWM Depth = 5.75"
REW to LEW = 2'4"

STREAM A Upstream Pond 1

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); A = Abundant (10 -50); C = Common (3 -9); R = Rare (< 3)

Sessile Animals (Porifera, Cnidaria, Bryozoa) (HMFEI pts = 1)	Crayfish (Decapoda) (HMFEI pts = 2)	Fishfly Larvae (Corydalidae) (HMFEI pts = 3)
Aquatic Worms (Turbellaria, Oligochaeta, Hirudinea) (HMFEI pts = 1) C 1 (all dead)	Dragonfly Nymphs (Anisoptera) (HMFEI pts = 2)	Water Penny Beetles (Psephenidae) (HMFEI pts = 3)
Sow Bugs (Isopoda) (HMFEI pts = 1)	Riffle Beetles (Dryopidae, Elmidae, Pilodactylidae) (HMFEI pts = 2)	Cranefly Larvae (Tipulidae) (HMFEI pts = 3)
Scuds (Amphipoda) (HMFEI pts = 1)	Larvae of other Flies (Diptera) Name: (HMFEI pts = 1)	EPT TAXA* Total No. EPT Taxa = 1
Water Mites (Hydracarina) (HMFEI pts = 1)	Midges (Chironomidae) (HMFEI pts = 1) 1 dead R 1	Mayfly Nymphs (Ephemeroptera) Taxa Present: HMFEI pts = No. Taxa (x) 3]
Damselfly Nymphs (Zygoptera) (HMFEI pts = 1) 1 R 1	Snails (Gastropoda) (HMFEI pts = 1) 1 dead R 1	
Alderfly Larvae (Sialidae) (HMFEI pts = 1)	Clams (Bivalvia) (HMFEI pts = 1) 1 R 1	Stonefly Nymphs (Plecoptera) Taxa Present: HMFEI pts = No. Taxa (x) 3]
Other Beetles (Coleoptera) (HMFEI pts = 1)	Other Taxa :	
Other Taxa: water striders	Other Taxa:	Caddisfly Larvae (Trichoptera) Taxa Present: 1 (dead) HMFEI pts = No. Taxa (x) 3] 3
Other Taxa:	Other Taxa	

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID:_____ Time Spent (minutes): 30mins x 2 = 60mins

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

Final HMFEI Calculated Score (Sum of All White Box Scores) = 8

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM

PHWH STREAM BIOLOGICAL CHARACTERISTICS FIELD SHEET:

1. Fish: Voucher Specimens Retained? (circle) Y / N Time Spent (minutes): 30 x 2 = 60 minutes
Sample Method dip net Stream Length Assessed (~~meters~~) 100 ft

Species	Number Caught	Notes
Centrarchidae	1	dead

2. Salamanders: Voucher Specimens Retained? (circle) Y / N Time Spent (minutes): 30 x 2 = 60 minutes
Sample Method dip net Stream Length Assessed (~~meters~~) 100'

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky (*Desmognathus ochrophaeus*)			
Northern Dusky (*Desmognathus fuscus*)			
Two-lined (*Eurycea bislineata*)		None observed	
Long-tailed (*Eurycea longicauda*)			
Cave (*Eurycea lucifuga*)			
Red (*Pseudotriton ruber*)			
Mud (*Pseudotriton montanus*)			
Spring (*Gyrinophilus porphyriticus*)			
Mole spp. (*Ambystoma spp.*)			
Four-toed (*Hemidactylium scutatum*)			
Other (name)			
Total			

Notes on Vertebrates: _____

STREAM A downstream Pond 1

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3): 49

SITE NAME/LOCATION

SITE NUMBER STR RIVER BASIN DRAINAGE AREA (mi²) 0.23

LENGTH OF STREAM REACH (ft) 200 LAT. 41.241169 LONG. 80.63258 RIVER CODE RIVER MILE

DATE 4/9/15 SCORER K Hershey COMMENTS

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☐	SILT [3 pts]	20
☐	BOULDER (> 256 mm) [16 pts]		☐	LEAF PACK/WOODY DEBRIS [3 pts]	
☐	BEDROCK [16 pts]		☐	FINE DETRITUS [3 pts]	
☐	COBBLE (65-256 mm) [12 pts]	15	☐	CLAY or HARDPAN [0 pts]	
☒	GRAVEL (2-64 mm) [8 pts]	40	☐	MUCK [0 pts]	
☐	SAND (< 2 mm) [6 pts]	25	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 15 (A) 15

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

(B) 4 TOTAL NUMBER OF SUBSTRATE TYPES

HHEI Metric Points — Substrate Max = 40: 19

A + B

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes*) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts] > 12"
- ☐ > 22.5 - 30 cm [30 pts] ≥ 9" - 12"
- ☒ ≥ 10 - 22.5 cm [25 pts] ≥ 4" - 9"
- ☐ ≥ 5 cm - 10 cm [15 pts] ≥ 2" - 4"
- ☐ < 5 cm [5 pts] < 2"
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS MAXIMUM POOL DEPTH (centimeters): 11 INCHES

Pool Depth Max = 30: 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☒ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS AVERAGE BANKFULL WIDTH (meters): 3' feet

Bankfull Width Max=30: 5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY (NOTE: River Left (L) and Right (R) as looking downstream)

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☐	☐	Wide >10m	☒	☒	Mature Forest, Wetland	☐	☐	Conservation Tillage
☒	☒	Moderate 5-10m	☒	☒	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☒	☒	Mining or Construction

PL corridor

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with Isolated pools (Interstitial)
- ☐ Moist Channel, Isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None	☐ 1.0	☐ 2.0	☒ 3.0
☐ 0.5	☐ 1.5	☐ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

- ☒ Flat (0.5 ft/100 ft)
- ☐ Flat to Moderate >0.5-2<
- ☐ Moderate (2 ft/100 ft)
- ☐ Moderate to Severe >2+<10'
- ☐ Severe (10 ft/100 ft)

STREAM A downstream Pond A

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☒ WWH Name: Little Yankee Run Distance from Evaluated Stream ~1 mile

☐ CWH Name: _____ Distance from Evaluated Stream _____

☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Mahoning Township / City: Vienna

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 4/9/15 (total) Quantity: ~1/4" in last 2 days

Photograph Information: Yes, upstream & downstream

Elevated Turbidity? (Y/N): N Canopy (% open): 40%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or Id, and attach results) Lab Number: —

Field Measures: Temp (°C) — Dissolved Oxygen (mg/l) — pH (S.U.) — Conductivity (µmhos/cm) —

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: _____

Additional comments/description of pollution impacts: Spill upstream, increase siltation from upstream activities

BIOTIC EVALUATION

Performed? (Y/N): Y (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) Y Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

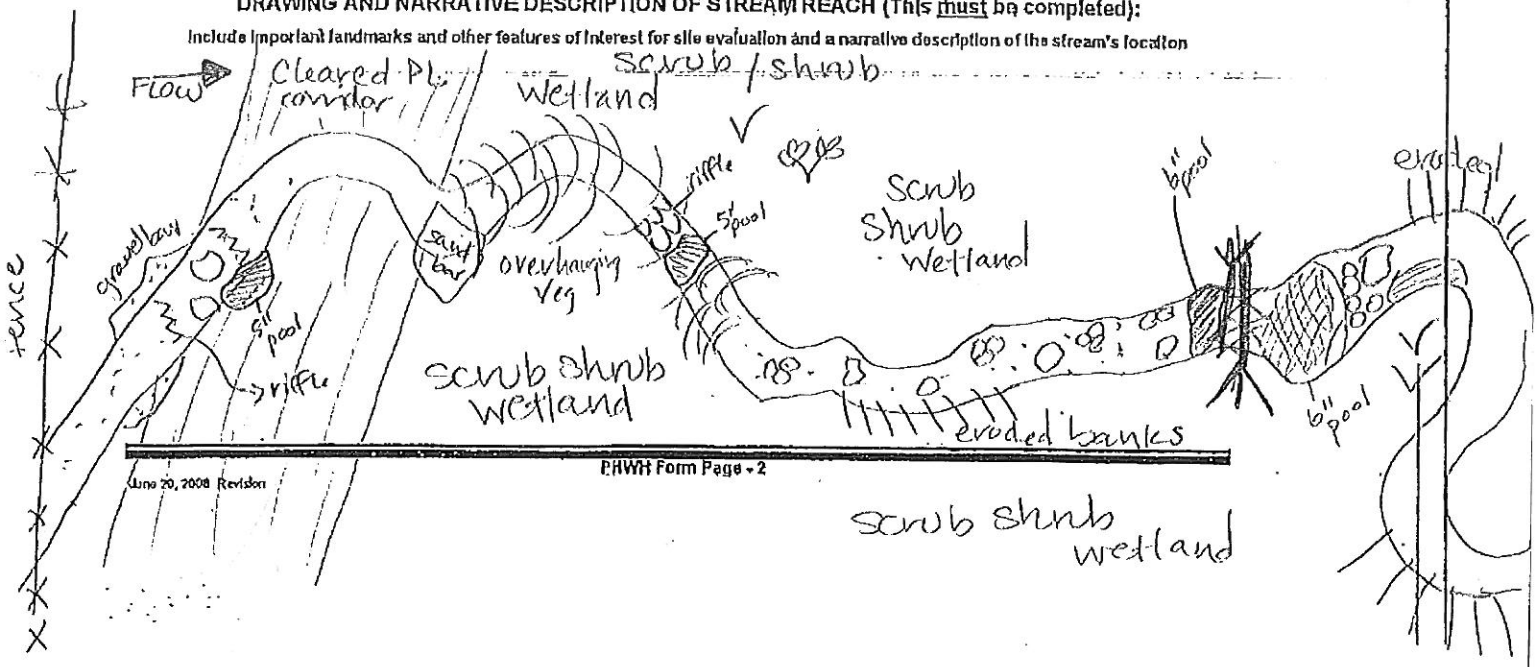
Frogs or Tadpoles Observed? (Y/N) N Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) Y Voucher? (Y/N) N

Comments Regarding Biology: Garter snake also observed alive. All fish found were dead

Please refer to HWFEI

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



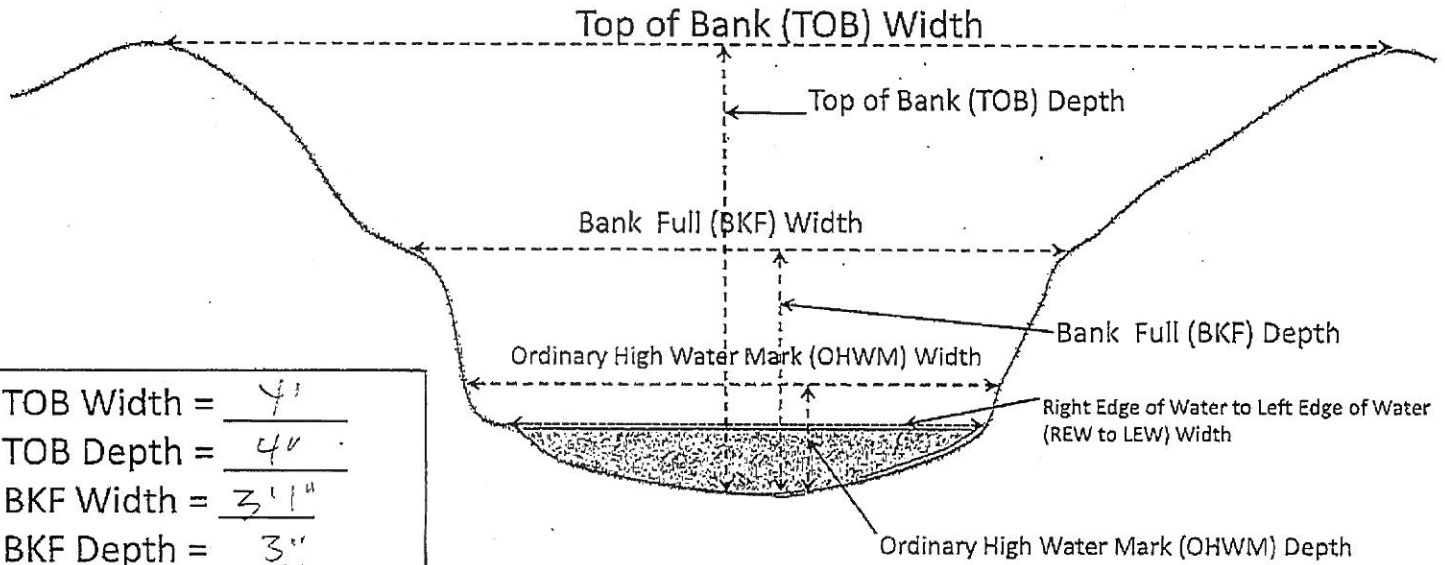
4-9-15

downstream pond 7

Stream A Cross Section Dimensions

Stream Name: UT to Little Yankee Run

Hull Investigator(s): J. Kinney Project: KDA001



TOB Width = 4'
TOB Depth = 4"
BKF Width = 3'1"
BKF Depth = 3"
OHWM Width = 3'
OHWM Depth = 2"
REW to LEW = 3'

Proposed Crossing Type (circle one)

~~Open Cut~~
~~Slick Bore~~
~~HDD Bore~~

Stream A downstream Pond 1

4-9-15

KMH, JMK - Hull & Associates, Inc

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); A = Abundant (10 -50); C = Common (3 -9); R = Rare (< 3)

Sessile Animals (Porifera, Cnidaria, Bryozoa) (HMFEI pts = 1)	Crayfish (Decapoda) 1 (HMFEI pts = 2) R 2	Fishfly Larvae (Corydalidae) (HMFEI pts = 3)
Aquatic Worms (Turbellaria, Oligochaeta, Hirudinea) (HMFEI pts = 1)	Dragonfly Nymphs (Anisoptera) (HMFEI pts = 2)	Water Penny Beetles (Psephenidae) (HMFEI pts = 3)
Sow Bugs (Isopoda) (HMFEI pts = 1)	Riffle Beetles (Dryopidae, Elimidae, Pillodactylidae) (HMFEI pts = 2)	Cranefly Larvae (Tipulidae) 1 (HMFEI pts = 3) R 3 dead
Scuds (Amphipoda) (HMFEI pts = 1)	Larvae of other Flies (Diptera) Name: (HMFEI pts = 1)	EPT TAXA* Total No. EPT Taxa = 1
Water Mites (Hydracarina) (HMFEI pts = 1)	Midges (Chironomidae) (HMFEI pts = 1)	Mayfly Nymphs (Ephemeroptera) Taxa Present: [HMFEI pts = No. Taxa (x) 3]
Damselfly Nymphs (Zygoptera) 1 (HMFEI pts = 1) C 1	Snails (Gastropoda) (HMFEI pts = 1)	
Alderfly Larvae (Sialidae) (HMFEI pts = 1)	Clams (Bivalvia) (HMFEI pts = 1)	Stonefly Nymphs (Plecoptera) Taxa Present: [HMFEI pts = No. Taxa (x) 3]
Other Beetles (Coleoptera) (HMFEI pts = 1)	Other Taxa :	
Other Taxa:	Other Taxa:	Caddisfly Larvae (Trichoptera) Taxa Present: [HMFEI pts = 1 No. Taxa (x) 3] R 3
Other Taxa:	Other Taxa	

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID_____ Time Spent (minutes): 30 x 2 = 60

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

Final HMFEI Calculated Score (Sum of All White Box Scores) = 9

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM

STREAM A downstream Pond 1
4-9-15
JMK, KMH
Hull & Associates, Inc.

PHWH STREAM BIOLOGICAL CHARACTERISTICS FIELD SHEET:

1. Fish: Voucher Specimens Retained? (circle) Y / N Time Spent (minutes): 30 x 2 = 60
Sample Method dip net Stream Length Assessed (~~meters~~) 200'

Species	Number Caught	Notes
Centrarchidae	10	All decapod

2. Salamanders: Voucher Specimens Retained? (circle) Y / N Time Spent (minutes): 30 x 2 = 60
Sample Method dip net Stream Length Assessed (meters) 200'

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky *(Desmognathus ochrophaeus)*			
Northern Dusky *(Desmognathus fuscus)*		None observed	
Two-lined *(Eurycea bislineata)*			
Long-tailed *(Eurycea longicauda)*			
Cave *(Eurycea lucifuga)*			
Red *(Pseudotriton ruber)*			
Mud *(Pseudotriton montanus)*			
Spring *(Gyrinophilus porphyriticus)*			
Mole spp. *(Ambystoma spp.)*			
Four-toed *(Hemidactylium scutatum)*			
Other (name)			
Total			

Notes on Vertebrates: _____

STREAM A Downstream of large Pond

Ohio EPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 79

SITE NAME/LOCATION _____

SITE NUMBER STR- RIVER BASIN _____ DRAINAGE AREA (mi²) 0.52

LENGTH OF STREAM REACH (ft) 200 LAT. 41.2431 LONG. 80.0500 RIVER CODE _____ RIVER MILE _____

DATE 4/9/15 SCORER _____ COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☑ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☐	SILT [3 pt]	15
☐	BOULDER (>256 mm) [16 pts]	5	☐	LEAF PACK/WOODY DEBRIS [3 pts]	10
☐	BEDROCK [15 pt]		☐	FINE DETRITUS [3 pts]	
☒	COBBLE (65-256 mm) [12 pts]	40	☐	CLAY or HARDPAN [0 pt]	
☐	GRAVEL (2-64 mm) [8 pts]	10	☐	MUCK [0 pts]	
☐	SAND (<2 mm) [6 pts]	20	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 40 (A) 18 (B) 6

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points — Substrate Max = 40: 24 — A + B

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts] > 12"
- ☑ > 22.5 - 30 cm [30 pts] ≈ 9" - 12"
- ☐ > 10 - 22.5 cm [25 pts] ≈ 4" - 9"
- ☐ > 5 cm - 10 cm [15 pts] ≈ 2 - 4"
- ☐ ≤ 5 cm [5 pts] < 2"
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): INCHES IF 12"

Pool Depth Max = 30: 30

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☑ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters) Feet 8'

Bankfull Width Max=30: 25

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH L	R	(Per Bank)	FLOODPLAIN QUALITY L	R	(Most Predominant per Bank)	L	R	
☒	☒	Wide >10m	☒	☒	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☐	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, Isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

☐ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☐ 2.5	☒ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate >0.5 - 2 < ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe >2 < 10' ☐ Severe (10 ft/100 ft)

STREAM A Downstream of Large Pond

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Mahoning Township / City: Vienna

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: Currently Raining Quantity: >1/4" in last 2 days

Photograph Information: Yes, upstream & downstream

Elevated Turbidity? (Y/N): Y Canopy (% open): 10

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: —

Field Measures: Temp (°C) — Dissolved Oxygen (mg/l) — pH (S.U.) — Conductivity (µmhos/cm) —

Is the sampling reach representative of the stream (Y/N) N/A If not, please explain: _____

Additional comments/description of pollution impacts: Pond + Dike Upstream Could discharge Algae treatment

BIOTIC EVALUATION

Performed? (Y/N): Y (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

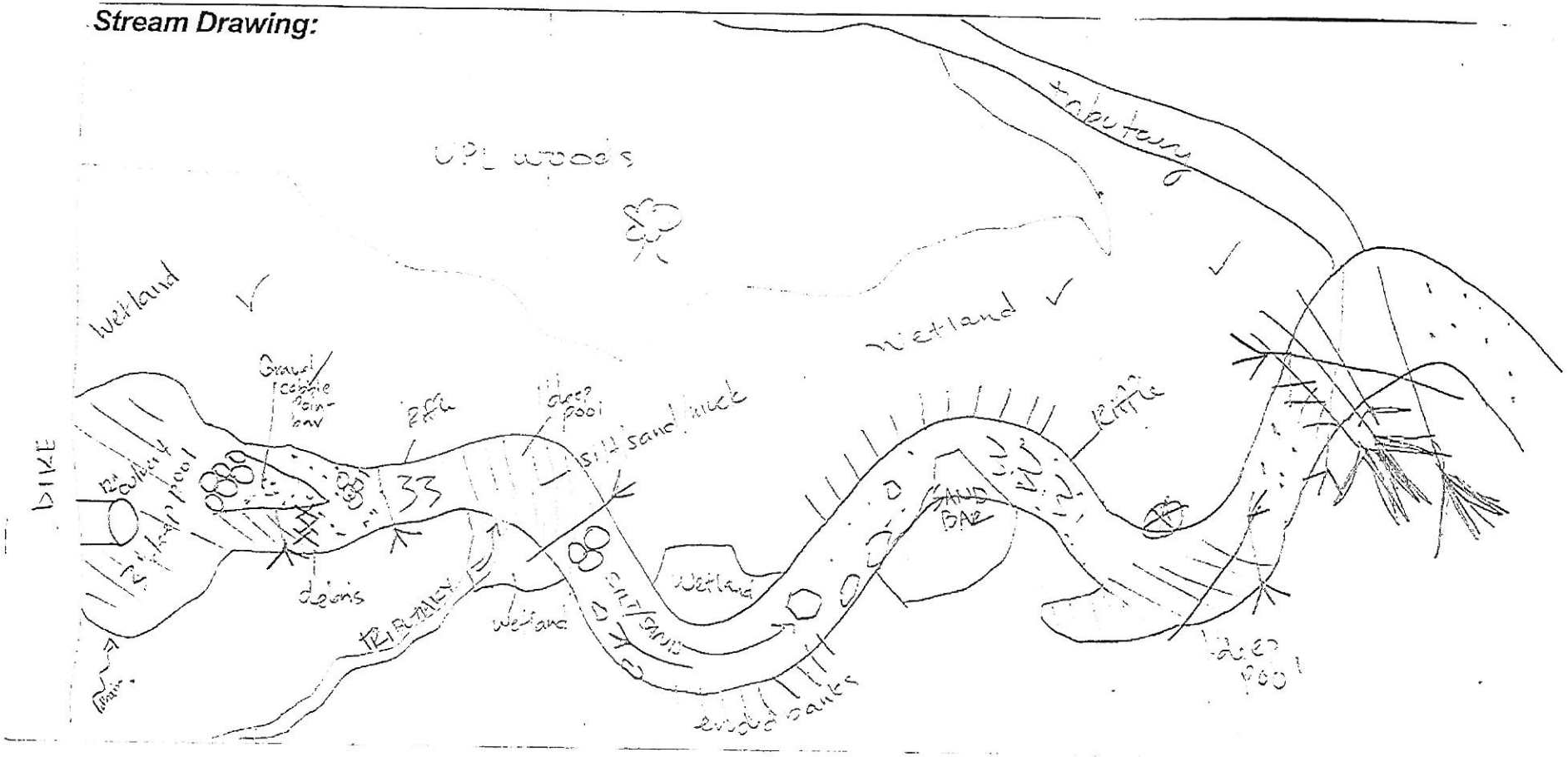
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N
Frogs or Tadpoles Observed? (Y/N) Y Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) Y Voucher? (Y/N) —

Comments Regarding Biology: Please reference HMFEI

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

Stream Drawing:

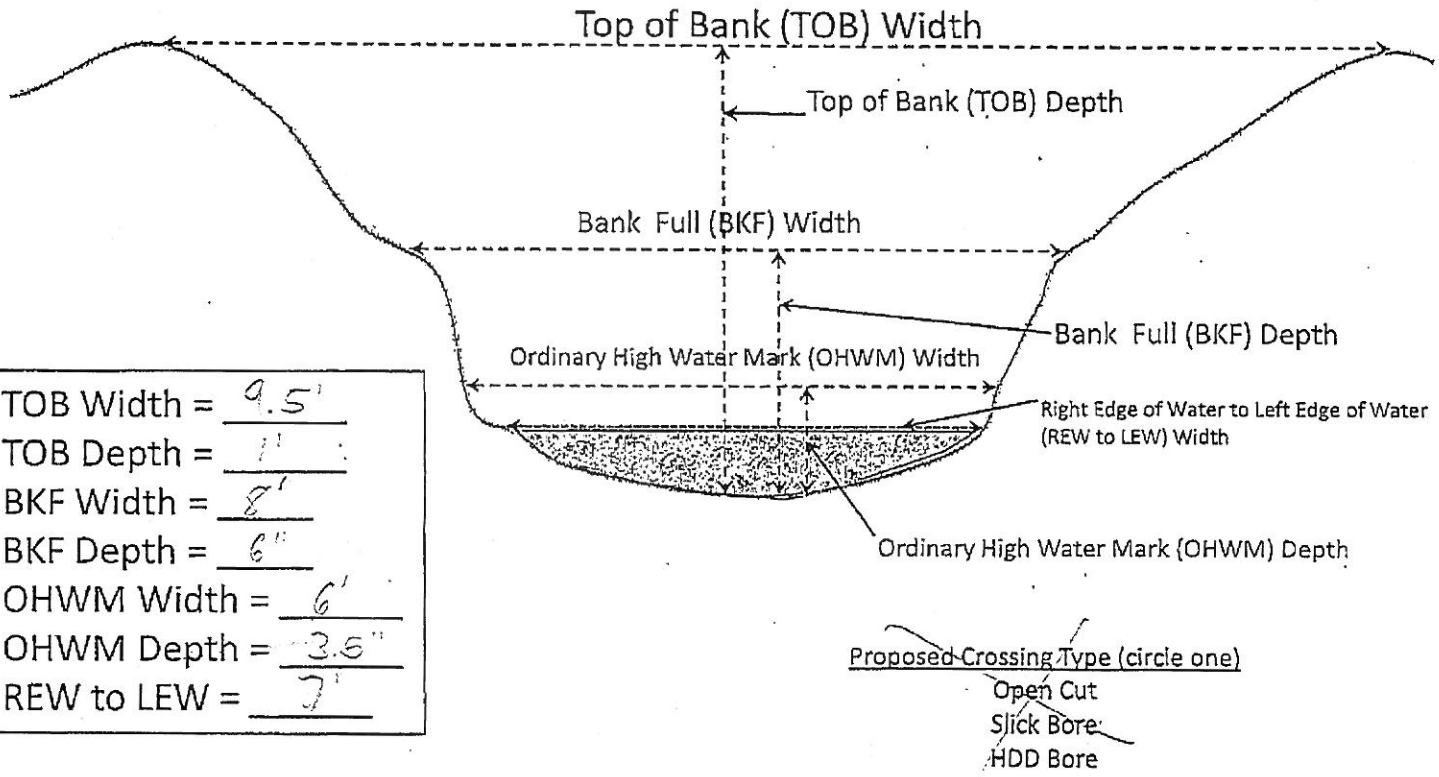


Downstream of large pond

Stream A Cross Section Dimensions

Stream Name: UT to Little Yankee Run

Hull Investigator(s): KMH, JMK Project: KDA001



TOB Width = 9.5'
TOB Depth = 1'
BKF Width = 8'
BKF Depth = 6"
OHWM Width = 6'
OHWM Depth = 3.5"
REW to LEW = 7'

Proposed Crossing Type (circle one)
Open Cut
Slick Bore
HDD Bore

STREAM A
downstream of large Pond

4/9/15

JMK, PWH
Hull & Associates

PHWH STREAM BIOLOGICAL CHARACTERISTICS FIELD SHEET:

1. Fish: Voucher Specimens Retained? (circle) Y / (N) Time Spent (minutes): 20 x 2 = 60
Sample Method Wade Stream Length Assessed (meters) 200'

Species	Number Caught	Notes

2. Salamanders: Voucher Specimens Retained? (circle) Y / N Time Spent (minutes): 30 x 2 = 60 mins
Sample Method Flip rocks Stream Length Assessed (meters) 200'

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky (*Desmognathus ochrophaeus)*			
Northern Dusky (*Desmognathus fuscus)*			
Two-lined *(Eurycea bislineata)*			
Long-tailed *(Eurycea longicauda)*			
Cave (*Eurycea lucifuga)*			
Red *(Pseudotriton ruber)*			
Mud *(Pseudotriton montanus)*			
Spring *(Gyrinophilus porphyriticus)*			
Mole spp. *(Ambystoma spp.)*			
Four-toed *(Hemidactylium scutatum)*			
Other (name)			
Total			

Notes on Vertebrates: _____

STREAM A downstream of Large Pond

4/9/15

KMH, JMK
Hall & Associates Inc

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); A = Abundant (10 -50); C = Common (3 -9); R = Rare (< 3)

Sessile Animals (Porifera, Cnidaria, Bryozoa) (HMFEI pts = 1)	Crayfish (Decapoda) (HMFEI pts = 2)	Fishfly Larvae (Corydalidae) (HMFEI pts = 3)
Aquatic Worms (Turbellaria, Oligochaeta, Hirudinea) (HMFEI pts = 1) C 1	Dragonfly Nymphs (Anisoptera) (HMFEI pts = 2)	Water Penny Beetles (Psephenidae) (HMFEI pts = 3)
Sow Bugs (Isopoda) (HMFEI pts = 1)	Riffle Beetles (Dryopidae, Elmidae, Ptilodactylidae) (HMFEI pts = 2)	Cranefly Larvae (Tipulidae) (HMFEI pts = 3)
Scuds (Amphipoda) (HMFEI pts = 1) R 1	Larvae of other Flies (Diptera) Name: (HMFEI pts = 1)	EPT TAXA* Total No. EPT Taxa =
Water Mites (Hydracarina) (HMFEI pts = 1)	Midges (Chironomidae) (HMFEI pts = 1) 1 A 1	Mayfly Nymphs (Ephemeroptera) Taxa Present: HMFEI pts = No. Taxa (x) 3]
Damselfly Nymphs (Zygoptera) (HMFEI pts = 1)	Snails (Gastropoda) (HMFEI pts = 1) 1 R 1	
Alderfly Larvae (Sialidae) (HMFEI pts = 1)	Clams (Bivalvia) (HMFEI pts = 1)	Stonefly Nymphs (Plecoptera) Taxa Present: HMFEI pts = No. Taxa (x) 3]
Other Beetles (Coleoptera) 1 (HMFEI pts = 1)	Other Taxa :	
Other Taxa: Water Striders	Other Taxa:	Caddisfly Larvae (Trichoptera) Taxa Present: HMFEI pts = No. Taxa (x) 3]
Other Taxa:	Other Taxa	

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID_____ Time Spent (minutes): 20 x 2 = 60

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

Abundance & diversity very low

Final HMFEI Calculated Score (Sum of All White Box Scores) = 4

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM

STREAM: C

Ohio EPA Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 50

SITE NAME/LOCATION KDA001

SITE NUMBER _____ RIVER BASIN _____ DRAINAGE AREA (mi²) 0.11

LENGTH OF STREAM REACH (ft) 200 LAT. 41.24349 LONG. 80.62425 RIVER CODE _____ RIVER MILE _____

DATE 4/9/15 SCORER K. Hershey COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

Upstream of assessed reach is Dike

1. SUBSTRATE (Estimate percent of every type of substrate present. Check *ONLY* two predominant substrate *TYPE* boxes (Max of 40). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☐	SILT [3 pt]	30
☐	BOULDER (>256 mm) [16 pts]		☐	LEAF PACK/WOODY DEBRIS [3 pts]	5
☐	BEDROCK [16 pt]		☐	FINE DETRITUS [3 pts]	
☐	COBBLE (65-256 mm) [12 pts]		☐	CLAY or HARDPAN [0 pt]	10
☐	GRAVEL (2-64 mm) [9 pts]	25	☐	MUCK [0 pts]	
☒	SAND (<2 mm) [6 pts]	40	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 15

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES: (B) 5

HHEI Metric Points

Substrate Max = 40: 20

A + B

2. Maximum Pool Depth *(Measure the maximum pool depth within the 61 meter (200 ft)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☐ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☒ > 10 - 22.5 cm [25 pts]
- ☐ > 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5 pts]
- ☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 5" inches

Pool Depth Max = 30: 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☒ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters) .83 Feet

Bankfull Width Max=30: 5

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH (Per Bank) L	R	FLOODPLAIN QUALITY (Most Predominant per Bank) L	R	L	R	
☒	☒	Wide >10m	☒	☒ Mature Forest, Wetland	☐	☐ Conservation Tillage
☐	☐	Moderate 5-10m	☒	☒ Immature Forest, Shrub or Old Field	☐	☐ Urban or Industrial
☐	☐	Narrow <5m	☐	☐ Residential, Park, New Field	☐	☐ Open Pasture, Row Crop
☐	☐	None	☐	☐ Fenced Pasture	☐	☐ Mining or Construction

COMMENTS _____

FLOW REGIME *(At Time of Evaluation)* (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (Interstitial)
- ☐ Moist Channel, isolated pools, no flow (Intermittent)
- ☐ Dry channel, no water (Ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check *ONLY* one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☒ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

June 29, 2009 Revision

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? - ☐ Yes ☒ No QHEI Score _____ (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

☑ WWH Name: Little Yankee Run Distance from Evaluated Stream ~0.75 mi

☐ CWH Name: _____ Distance from Evaluated Stream _____

☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order _____

County: Mahoning Township / City: Vienna

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: Currently raining Quantity: ~1/4" in last 2 days

Photograph Information: _____

Elevated Turbidity? (Y/N): Y Canopy (% open): 30

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: N/A

Field Measures: Temp (°C) NA Dissolved Oxygen (mg/l) NA pH (S.U.) NA Conductivity (µmhos/cm) NA

Is the sampling reach representative of the stream (Y/N) NA If not, please explain: _____

Additional comments/description of pollution impacts: Pond + Dike upstream could discharge algae treatment

BIOTIC EVALUATION

Performed? (Y/N): Y (If Yes, Record all observations, Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

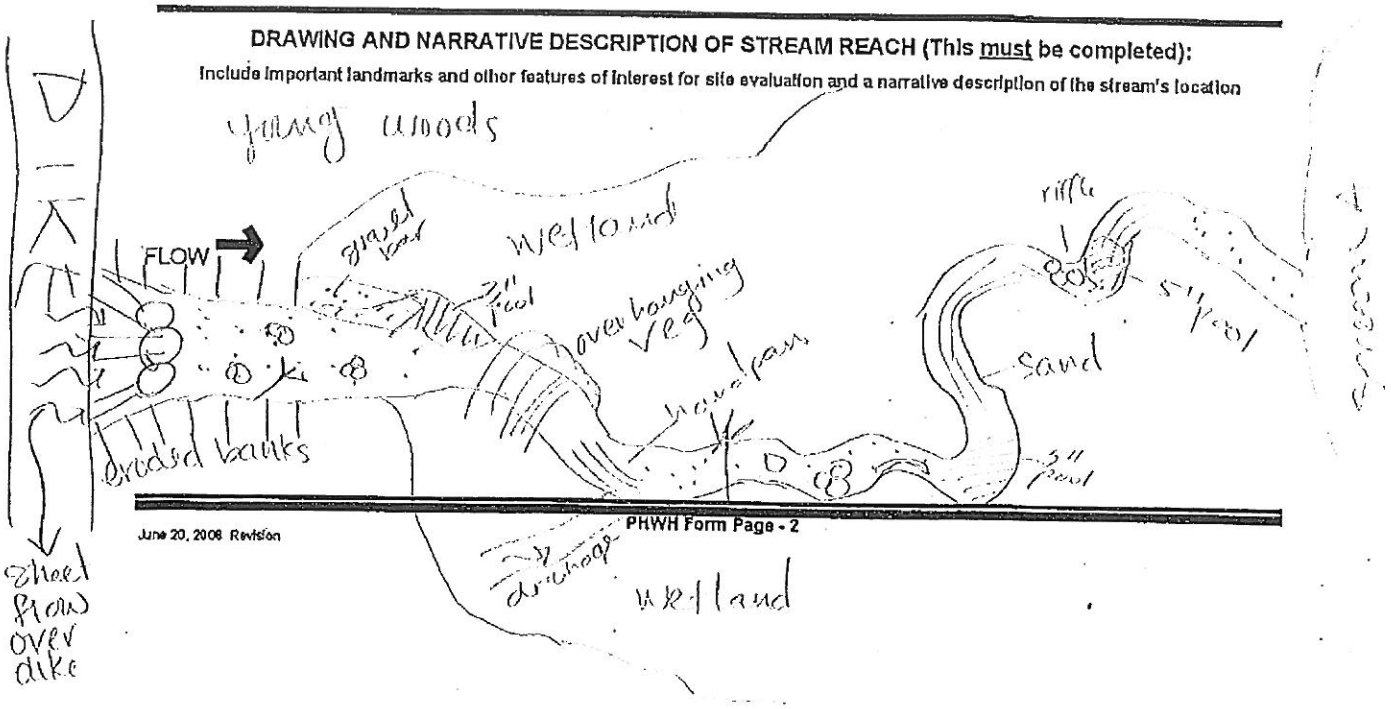
Fish Observed? (Y/N) N Voucher? (Y/N) N Salamanders Observed? (Y/N) N Voucher? (Y/N) N

Frogs or Tadpoles Observed? (Y/N) Y Voucher? (Y/N) N Aquatic Macroinvertebrates Observed? (Y/N) Y Voucher? (Y/N) N

Comments Regarding Biology: Please reference limited

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):

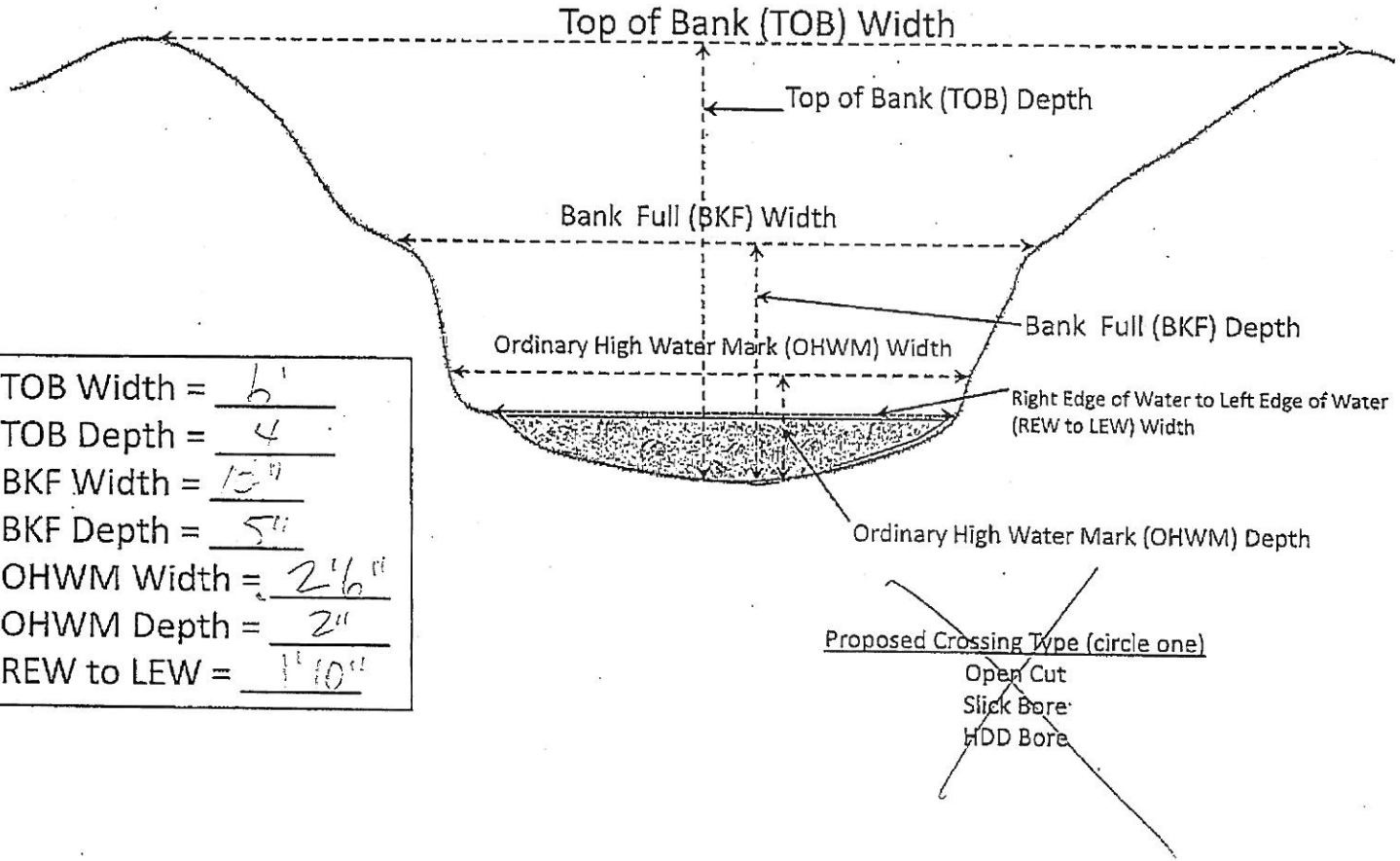
Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Stream C Cross Section Dimensions

Stream Name: UT to UT to Little Yankee Run

Hull Investigator(s): J. Kinney Project: KOA 97



TOB Width = 6'
TOB Depth = 4
BKF Width = 15'
BKF Depth = 5'
OHWM Width = 2'6"
OHWM Depth = 2"
REW to LEW = 1'10"

Proposed Crossing Type (circle one)
Open Cut
Slick Bore
HDD Bore

STREAM C

4.9.15
KMH, JMK
Hull & Associates Inc.

PHWH STREAM BIOLOGICAL CHARACTERISTICS FIELD SHEET:

1. Fish: Voucher Specimens Retained? (circle) Y / (N) Time Spent (minutes): 30 x 2 = 60
Sample Method Wade Stream Length Assessed (meters) 200'

Species	Number Caught	Notes
	None	observed

2. Salamanders: Voucher Specimens Retained? (circle) Y (N) Time Spent (minutes): 30 x 2 = 60
Sample Method flipracks Stream Length Assessed (meters) 200'

Species *(Genus)*	# Larvae	# Juveniles/Adults	Total Number
Mountain Dusky (*Desmognathus ochrophaeus*)			
Northern Dusky (*Desmognathus fuscus*)			
Two-lined (*Eurycea bislineata*)		None	
Long-tailed (*Eurycea longicauda*)		observed	
Cave (*Eurycea lucifuga*)			
Red (*Pseudotriton ruber*)			
Mud (*Pseudotriton montanus*)			
Spring (*Gyrinophilus porphyriticus*)			
Mole spp. (*Ambystoma spp.*)			
Four-toed (*Hemidactylium scutatum*)			
Other (name)			
Total			

Notes on Vertebrates: _____

STREAM C

4-9-15
KMH, JMK
Hull & Associates, Inc.

3. Macroinvertebrate Scoring Sheet:

THE HEADWATER MACROINVERTEBRATE FIELD EVALUATION INDEX (HMFEI) SCORING SHEET

Indicate Abundance of Each Taxa Above each White Box.

Record HMFEI Scoring Value Points Within each Box.

For EPT taxa, also indicate the different taxa present.

Key: V = Very Abundant (> 50); A = Abundant (10 -50); C = Common (3 -9); R = Rare (< 3)

Sessile Animals (Porifera, Cnidaria, Bryozoa) (HMFEI pts = 1)	Crayfish (Decapoda) (HMFEI pts = 2)	Fishfly Larvae (Corydalidae) (HMFEI pts = 3)
Aquatic Worms (Turbellaria, Oligochaeta, Hirudinea) (HMFEI pts = 1) R 1	Dragonfly Nymphs (Anisoptera) (HMFEI pts = 2)	Water Penny Beetles (Psephenidae) (HMFEI pts = 3)
Sow Bugs (Isopoda) (HMFEI pts = 1)	Riffle Beetles (Dryopidae, Elmidae, Ptilodactylidae) (HMFEI pts = 2)	Cranefly Larvae (Tipulidae) (HMFEI pts = 3)
Scuds (Amphipoda) (HMFEI pts = 1)	Larvae of other Flies (Diptera) Name: 1 R 1 (HMFEI pts = 1)	EPT TAXA* Total No. EPT Taxa = 2
Water Mites (Hydracarina) (HMFEI pts = 1)	Midges (Chironomidae) (HMFEI pts = 1)	Mayfly Nymphs (Ephemeroptera) Taxa Present: (HMFEI pts = No. Taxa (x) 3]
Damselfly Nymphs (Zygoptera) (HMFEI pts = 1).	Snails (Gastropoda) (HMFEI pts = 1)	
Alderfly Larvae (Sialidae) (HMFEI pts = 1)	Clams (Bivalvia) (HMFEI pts = 1)	Stonefly Nymphs (Plecoptera) Taxa Present: (HMFEI pts = No. Taxa (x) 3]
Other Beetles (Coleoptera) (HMFEI pts = 1)	Other Taxa :	
Other Taxa:	Other Taxa:	Caddisfly Larvae (Trichoptera) Taxa Present: 1 A (HMFEI pts = No. Taxa (x) 3] 6
Other Taxa:	Other Taxa	

*Note: EPT identification based upon Family or Genus level of taxonomy

Voucher Sample ID N/A

Time Spent (minutes): 30 x 2 = 60 min

Notes on Macroinvertebrates: (Predominant Organisms; Other Common Organisms; Diversity Estimate)

Final HMFEI Calculated Score (Sum of All White Box Scores) = 8

IF Final HMFEI Score is > 19, Then CLASS III PHWH STREAM
IF Final HMFEI Score is 7 to 19, Then CLASS II PHWH STREAM
IF Final HMFEI Score is < 7, Then CLASS I PHWH STREAM