

Large Filing Separator Sheet

Case Number: 10-2865-EL-BGN

File Date: 3/10/11

Section: 4

Number of Pages: 200

Description of Document: Application

with 954 Kcmil ACSS wire (ISD 12/1/2011). Estimated cost is \$2,159,500.
 (Network Upgrade# n1575)
 Increase in Rating = 1792 MVA

TOTAL 2,332,600

Note: Reconstructor assumes that FE begins work 7/2010

Total cost for the APS and FE upgrades is **\$5,558,600**

Queue	MW contribution	Percentage of cost	\$ cost (K) = \$5,558.600 K
T32	59.61	5.3%	296.962
T33	80.85	7.2%	402.775
T34	80.85	7.2%	402.775
T35	80.85	7.2%	402.775
T92	77.94	7.0%	388.278
T93	77.94	7.0%	388.278
T94	65.97	5.9%	328.651
T105	18.49	1.7%	92.133
T120	13.47	1.2%	67.079
T124	10.34	0.9%	51.531
T125	10.31	0.9%	51.372
T126	10.52	0.9%	52.418
T127	10.52	0.9%	52.418
T130	20.75	1.9%	103.361
T139	162.18	14.5%	807.941
T142	18.74	1.7%	93.333
T143	31.27	2.8%	155.759
T183	10.52	0.9%	52.418
T184	10.52	0.9%	52.418
U1-37	13.42	1.2%	66.843
U1-49	5.39	0.5%	26.832
U1-60	15.92	1.4%	79.306
U1-87	7.78	0.7%	38.768
U1-88	5.19	0.5%	25.845
U2-41	22.24	2.0%	110.804
U2-42	15.92	1.4%	79.306
U2-58	25.24	2.3%	125.715

U2-72	22.24	2.0%	110.804
U3-26	80.85	7.2%	402.775
U3-29	14.29	1.3%	71.202
U3-30	12.80	1.1%	63.785
U4-01	22.87	2.0%	113.943

The U4-001 responsibility for these network upgrades is \$113,943.

Upgrade#2

APS Upgrade:

Reinforcement: Reconductor the AP portion (approximately 2.94 miles) of the existing Sammis-Wylie Ridge 345kV line with twin bundle 795 Drake ACSS-AW HT conductor for emergency ½ hour rating of 3760A and 4 hour rating of 3647A at 225C. Assume only minor steel reinforcement is required. At Wylie Ridge SS, replace the Sammis 345kV line trap with a 4000A rated line trap. (Network Upgrade #n1580). The estimated cost is \$1,901,682.

The estimated project duration for the line reconductor is 18 months after the receipt of an executed Interconnection Service Agreement and Construction Service Agreement. Increase in rating = 2179 MVA

FE Upgrade:

Sammis Sub: Replace backup line relaying and metering on the 345 kV Wylie Ridge line (ISD 12/1/2010). The estimated cost is \$68,200.

Wylie Ridge line: Replace GCX51 backup line relays with an SEL 421. Replace existing metering with digital multimeter. Replace 3000 A wave trap. (Network Upgrade# n1576). Increase in rating = 2166 MVA.

The total estimated cost for the APS and FE upgrades is \$1,969,882.

Queue	MW contribution	Percentage of cost	\$ cost (K) = \$1,969.882 K
T126	2.96	0.6%	10.968
T127	10.52	2.0%	38.990
T130	20.75	3.9%	76.883
T139	162.18	30.5%	600.965
T142	18.74	3.5%	69.423
T143	31.27	5.9%	115.858
T183	10.52	2.0%	38.990
T184	10.52	2.0%	38.990

U1-37	13.42	2.5%	49.719
U1-49	5.39	1.0%	19.958
U1-60	15.92	3.0%	58.989
U1-87	7.78	1.5%	28.837
U1-88	5.19	1.0%	19.224
U2-41	22.24	4.2%	82.419
U2-42	15.92	3.0%	58.989
U2-58	25.24	4.7%	93.509
U2-72	22.24	4.2%	82.419
U3-26	80.85	15.2%	299.593
U3-29	14.29	2.7%	52.961
U3-030	12.80	2.4%	47.445
U4-01	22.87	4.3%	84.753

The U4-001 responsibility for these network upgrades is \$84,753.

MISO Impacts

PJM will determine if there are any impacts on MISO facilities in the Facilities study.

Cost

The U4-001 project is responsible for 100% of the direct connection cost of \$1,574,000. The U4-001 project is also responsible for 2% of the cost of network upgrades #n1432, #n1574 and #n1575 (\$113,943) for the Sammis-Wylie Ridge 345kV circuit and the U4-001 project is also responsible for 4.3% of the cost of network upgrades #n1580 & #n1576 (\$84,753) for the Sammis-Wylie Ridge 345kV circuit.

The total cost responsibility for the U4-001 project, assuming no prior queued projects withdraw, is \$1,732,696.

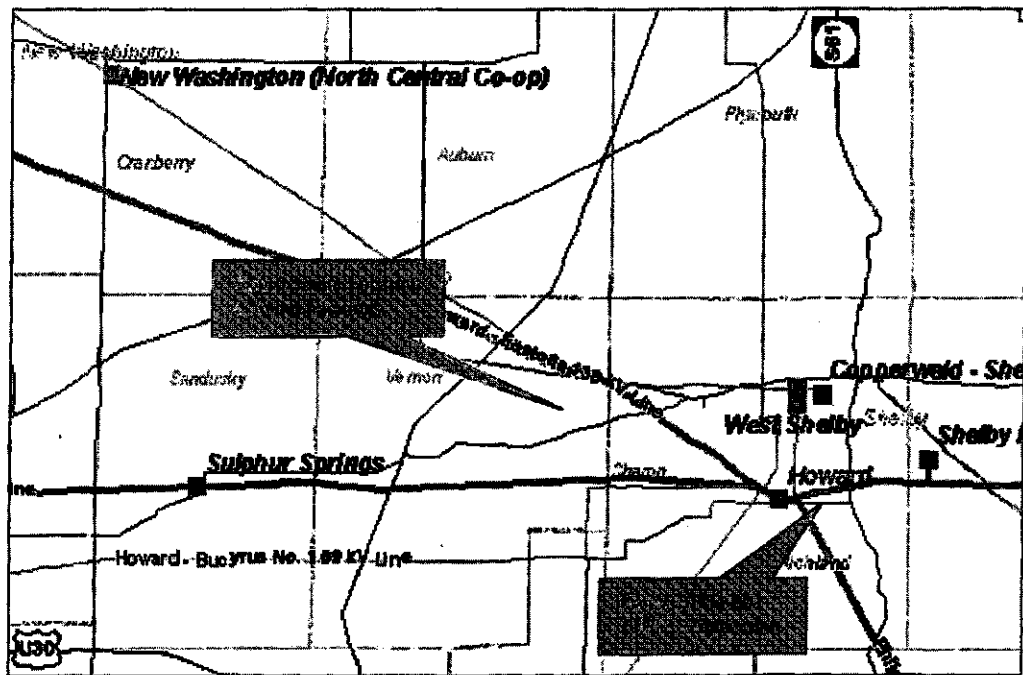


Exhibit 1: Approximate interconnection location of the proposed facilities

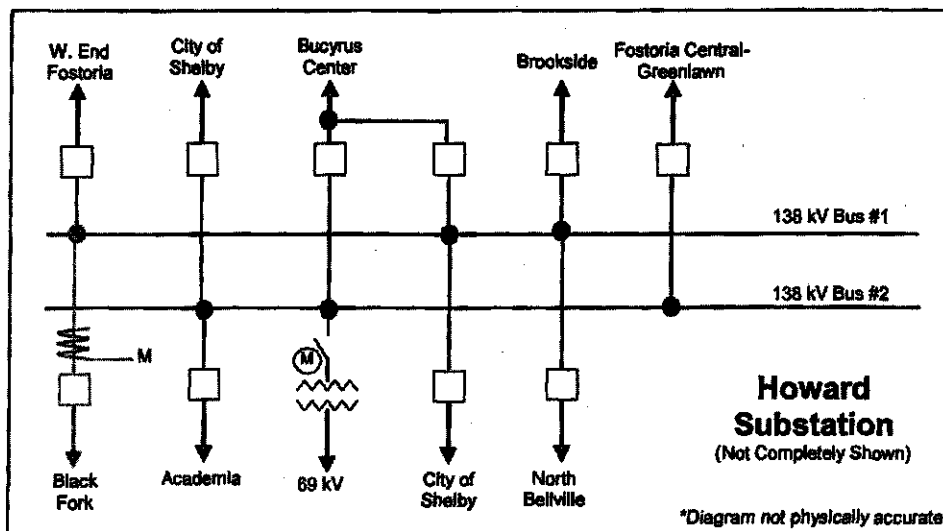


Exhibit 2: Simplified diagram of proposed 138 kV interconnection

Attachment #1
U4-001
2013 Peak Load Stability Faults

Table 1: BREAKER CLEARING TIMES (CYCLES)

Station	Primary (3ph/slg)	3-ph with unsuccessful Autoreclosure (total)	SLG Fault with Stuck Breaker (total)
138 kV	5	20	18

All cases stable

1a. Line tripping of Howard - Brookside 138 kV without fault
 1b. 3ph @ Howard - Brookside 138 kV with unsuccessful autoreclosure
 1c. SLG @ Howard - Brookside 138 kV with stuck breaker (D), fault cleared by opening Howard - N. Bellville and Howard - Chatfield - S. Tiffin - Airco - West End Fostoria 138 kV lines

2a. Line tripping of Howard - N. Lexington - Academia 138 kV without fault
 2b. 3ph @ Howard - N. Lexington - Academia 138 kV with unsuccessful autoreclosure
 2c. SLG @ Howard - Brookside 138 kV with stuck breaker (I), fault cleared by opening Howard - Bucyrus Center and Howard - Fostoria/Greelawn 138 kV lines

3a. Line tripping of Howard - N. Bellville 138 kV without fault
 3b. 3ph @ Howard - N. Bellville 138 kV with unsuccessful autoreclosure
 3c. SLG @ Howard - N. Bellville 138 kV with stuck breaker (H), fault cleared by opening Howard - Brookside and Howard - West End Fostoria 138 kV lines [same as contingency 1c]

4a. Line tripping of Howard - Chatfield - S. Tiffin - Airco - West End Fostoria 138 kV without fault
 4b. 3ph @ Howard - Chatfield - S. Tiffin - Airco - West End Fostoria 138 kV with unsuccessful autoreclosure
 4c. SLG @ Howard - Chatfield - S. Tiffin - Airco - West End Fostoria 138 kV with stuck breaker (B), fault cleared by opening Howard - Brookside and Howard - N. Bellville 138 kV lines [same as contingency 1c]

5a. Line tripping of Howard - Fostoria/Greenlawn 138 kV without fault
 5b. 3ph @ Howard - Fostoria/Greenlawn 138 kV with unsuccessful autoreclosure
 5c. SLG @ Howard - Fostoria/Greenlawn 138 kV with stuck breaker (A), fault cleared by opening Howard - Bucyrus Center and Howard - N. Lexington - Academia 138 kV lines [same as contingency 2c]

6a. Line tripping of West End Fostoria - Lemoyne 138 kV without fault

6b. 3ph @ West End Fostoria – Lemoyne 138 kV with unsuccessful autoreclosure
6c1. SLG @ West End Fostoria – Lemoyne 138 kV with stuck breaker (D), fault cleared by disconnecting West End Fostoria 138 kV bus

7a. Line tripping of West End Fostoria – Fostoria Central 138 kV without fault
7b. 3ph @ West End Fostoria – Fostoria Central 138 kV with unsuccessful autoreclosure
7c. SLG @ West End Fostoria – Fostoria Central 138 kV with stuck breaker (A), fault cleared by disconnecting West End Fostoria 138 kV bus [same as contingency 6c]

8a. Line tripping of Fostoria Central – New Liberty/Findlay Center 138 kV without fault
8b. 3ph @ Fostoria Central – New Liberty/Findlay Center 138 kV with unsuccessful autoreclosure
8c1. SLG @ Fostoria Central – New Liberty/Findlay Center 138 kV with stuck breaker (K2), fault cleared by opening Fostoria Central 138/345 kV transformer
8c2. SLG @ Fostoria Central – New Liberty/Findlay Center 138 kV with stuck breaker (J2), fault cleared by opening Fostoria Central – Greenlawn/Howard 138 kV lines

9a. Line tripping of Fostoria Central – N. Findlay without fault
9b. 3ph @ Fostoria Central – N. Findlay 138 kV with unsuccessful autoreclosure
9c1. SLG @ Fostoria Central – N. Findlay 138 kV with stuck breaker (K1), fault cleared by opening Fostoria Central – Buckley Rd 138 kV line
9c2. SLG @ Fostoria Central – N. Findlay 138 kV with stuck breaker (J1), fault cleared by opening Fostoria Central – West End Fostoria 138 kV line

10a. Tripping of Fostoria Central 138/345 kV transformer without fault
10c1. SLG @ Fostoria Central 138/345 kV transformer with stuck breaker (K2), fault cleared by opening Fostoria Central – Findlay/New Liberty 138 kV line [same as contingency 8c1]
10c2. SLG @ Fostoria Central 138/345 kV transformer with stuck breaker (K), fault cleared by opening Fostoria Central – Buckley Rd 138 kV line

11a. Line tripping of Brookside - Cloverdale 138 kV without fault
11b. 3ph @ Brookside - Cloverdale 138 kV with unsuccessful autoreclosure
11c. SLG @ Brookside - Cloverdale 138 kV with stuck breaker (30), fault cleared by opening Brookside – Longview, Brookside – Howard, and Brookside – Beaver 138 kV lines

12a. Line tripping of Brookside - Burger 138 kV without fault
12b. 3ph @ Brookside - Burger 138 kV with unsuccessful autoreclosure
12c. SLG @ Brookside - Burger 138 kV with stuck breaker (3), fault cleared by opening Brookside – Wellington, Brookside – Madison – Longview, and Brookside – Leaside 138 kV lines

13a. Line tripping of Brookside - Longview 138 kV without fault
13b. 3ph @ Brookside - Longview 138 kV with unsuccessful autoreclosure

13c. SLG @ Brookside - Longview with stuck breaker (28), fault cleared by opening Brookside - Cloverdale, Brookside - Howard, and Brookside - Beaver 138 kV lines [same as contingency 11c1]

14a. Line tripping of Brookside - Milliron - Leaside 138 kV without fault

14b. 3ph @ Brookside - Milliron - Leaside 138 kV with unsuccessful autoreclosure

14c. SLG @ Brookside - Milliron - Leaside 138 kV with stuck breaker (36), fault cleared by opening Brookside - Burger, Brookside - Wellington, and Brookside - Madison - Longview 138 kV lines [same as contingency 12c1]

15a. Line tripping of Brookside - Troy - Brighton - Beaver 138 kV without fault

15b. 3ph @ Brookside - Troy - Brighton - Beaver 138 kV with unsuccessful autoreclosure

15c. SLG @ Brookside - Troy - Brighton - Beaver 138 kV with stuck breaker (59), fault cleared by opening Brookside - Cloverdale, Brookside - Howard, Brookside - Longview 138 kV lines [same as contingency 11c1]

16a. Line tripping of Academia - W. Mt. Vernon 138 kV without fault

16b. 3ph @ Academia - W. Mt. Vernon 138 kV with unsuccessful autoreclosure

16c. SLG @ Academia - W. Mt. Vernon 138 kV with stuck breaker (R), fault cleared by disconnecting Academia 138 kV bus

17a. Line tripping of Academia - Ohio Central 138 kV without fault

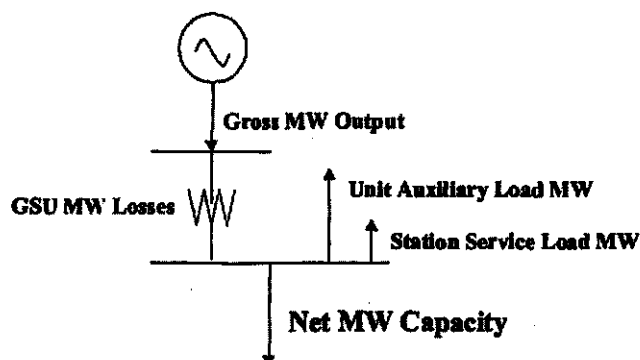
17b. 3ph @ Academia - Ohio Central 138 kV with unsuccessful autoreclosure

17c1. SLG @ Academia - Ohio Central 138 kV with stuck breaker (R), fault cleared by disconnecting Academia 138 kV bus [same as contingency 16c1]

17c2. SLG @ Academia - Ohio Central 138 kV with stuck breaker (S), fault cleared by disconnecting Academia 138 kV bus [same as contingency 16c1]

Attachment #2

U4-001 Unit Capability Data



Net MW Capacity = (Gross MW Output - GSU MW Losses* - Unit Auxiliary Load MW - Station Service Load MW)

Queue Letter/Position/Unit ID: _____ U4-001

Primary Fuel Type: _____ Vestas 100 1.8 MW (Wind)

Maximum Summer (92° F ambient air temp.) Net MW Output**: _____ 202

Maximum Summer (92° F ambient air temp.) Gross MW Output: _____ 202

Minimum Summer (92° F ambient air temp.) Gross MW Output: _____ 0

Maximum Winter (30° F ambient air temp.) Gross MW Output: _____ 202

Minimum Winter (30° F ambient air temp.) Gross MW Output: _____ 0

Gross Reactive Power Capability at Maximum Gross MW Output – Please include
Reactive Capability Curve (Leading and Lagging): _____ +/- 0 Mvar

Individual Unit Auxiliary Load at Maximum Summer MW Output (MW/MVAR): _ N/A

Individual Unit Auxiliary Load at Minimum Summer MW Output (MW/MVAR): _ N/A

Individual Unit Auxiliary Load at Maximum Winter MW Output (MW/MVAR): _ N/A

Individual Unit Auxiliary Load at Minimum Winter MW Output (MW/MVAR): _ N/A

Station Service Load: _____ N/A

* GSU losses are expected to be minimal.

** Your project's declared MW, as first submitted in Attachment N, and later confirmed or modified by the Impact Study Agreement, should be based on either the 92° F Ambient Air Temperature rating of the unit(s) or, if less, the declared Capacity rating of your project.

U4-001 Unit Generator Dynamics Data

Queue Letter/Position/Unit ID: _____ U4-001

MVA Base (upon which all reactances, resistance and inertia are calculated): _____ 1.8x112

Nominal Power Factor: _____ N/A

Terminal Voltage (kV): _____ 0.69

Unsaturated Reactances (on MVA Base)

Direct Axis Synchronous Reactance, $X_{d(i)}$: _____ N/A

Direct Axis Transient Reactance, $X'_d(i)$: _____ N/A

Direct Axis Sub-transient Reactance, $X''_d(i)$: _____ N/A

Quadrature Axis Synchronous Reactance, $X_{q(i)}$: _____ N/A

Quadrature Axis Transient Reactance, $X'_q(i)$: _____ N/A

Quadrature Axis Sub-transient Reactance, $X''_q(i)$: _____ N/A

Stator Leakage Reactance, X_l : _____ N/A

Negative Sequence Reactance, $X_2(i)$: _____ N/A

Zero Sequence Reactance, X_0 : _____ N/A

Saturated Sub-transient Reactance, $X''_d(v)$ (on MVA Base): _____ N/A

Armature Resistance, R_a (on MVA Base): _____ N/A

Time Constants (seconds)

Direct Axis Transient Open Circuit, T'_{do} : _____ N/A

Direct Axis Sub-transient Open Circuit, T''_{do} : _____ N/A

Quadrature Axis Transient Open Circuit, T'_{qo} : _____ N/A

Quadrature Axis Sub-transient Open Circuit, T''_{qo} : _____ N/A

Inertia, H (kW-sec/kVA, on KVA Base): _____ N/A

Speed Damping, D : _____ N/A

Saturation Values at Per-Unit Voltage [$S(1.0)$, $S(1.2)$]: _____ N/A

Units utilize a Generator model

U4-001 Unit GSU Data

Queue Letter/Position/Unit ID: _____ U4-001(112 GSU)
Generator Step-up Transformer MVA Base: _____ 2.1x112
Generator Step-up Transformer Impedance (R+jX, or %, on transformer MVA Base): _____ 7.8%
Generator Step-up Transformer Reactance-to-Resistance Ration (X/R): _____ 10
Generator Step-up Transformer Rating (MVA): _____ 2.1x112
Generator Step-up Transformer Low-side Voltage (kV): _____ 0.69
Generator Step-up Transformer High-side Voltage (kV): _____ 34.5
Generator Step-up Transformer Off-nominal Turns Ratio: _____ 1.0
Generator Step-up Transformer Number of Taps and Step Size: _____ 5, 2.5%

U4-001 Main Transformer Data

Queue Letter/Position/Unit ID: _____ U4-001(2 Main Transformers)
Generator Step-up Transformer MVA Base: _____ 100
Generator Step-up Transformer Impedance (R+jX, or %, on transformer MVA Base): _____ 9%
Generator Step-up Transformer Reactance-to-Resistance Ration (X/R): _____ N/A
Generator Step-up Transformer Rating (MVA): _____ 80/100/120
Generator Step-up Transformer H-side Voltage (kV): _____ 138
Generator Step-up Transformer X-side Voltage (kV): _____ 34.5
Generator Step-up Transformer Off-nominal Turns Ratio: _____ 1.0
Generator Step-up Transformer Number of Taps and Step Size: _____ 9, 1.25%

Attachment #3

All the control systems were updated according to the developer's specification; these updates are shown in Dynamic Data Format.

As specified by the developer, the Vestas V90 turbine user model was used.

/ Vestas V90

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/ Vestas V90

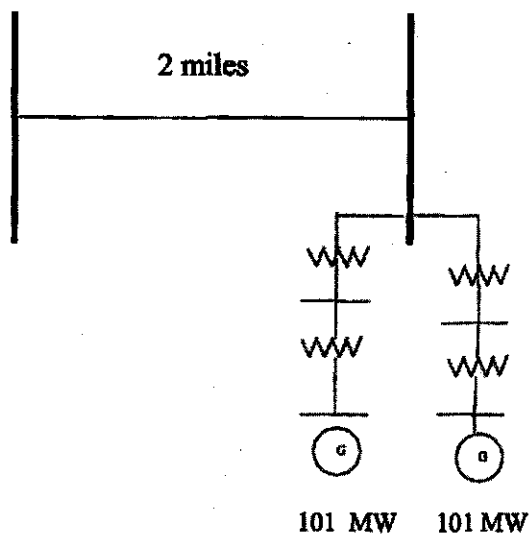
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Attachment #4

Howard 138 kV Bus

U4-001 138 kV



U4-001 Project

FACILITIES STUDY AGREEMENT

RECITALS

1. This Facilities Study Agreement ("Agreement"), dated as of February 18, 2010, is entered into by and between Black Fork Wind, L.L.C. ("New Service Customer") and PJM Interconnection, L.L.C. ("Transmission Provider"), pursuant to Part VI of the PJM Interconnection, L.L.C. Open Access Transmission Tariff ("PJM Tariff").
2. Pursuant to Section 36.2 or Section 205 of the PJM Tariff, Transmission Provider has completed a Generation or Transmission Interconnection Feasibility Study or an Initial Study (as applicable) and a System Impact Study and has provided the results of those studies to New Service Customer.
3. Transmission Provider has informed New Service Customer that the estimated date for completion of a Facilities Study pursuant to Section 206 of the PJM Tariff is August 15, 2010 and that New Service Customer's estimated cost responsibility for such Facilities Study, subject to revision as provided in this Agreement, is \$100,000.
4. New Service Customer desires that Transmission Provider commence a Facilities Study for the New Service Request with Queue Position U4-001 Howard 138kV.

PREVIOUS SUBMISSIONS

5. Except as otherwise specifically set forth in an attachment to this Agreement, New Service Customer represents and warrants that the information provided in section 3 of the Feasibility Study Agreement, dated November 3, 2008, by and between New Service Customer and Transmission Provider, and to the extent supplemented as set forth in section 4 of the System Impact Study Agreement, dated April 24, 2009, by and between New Service Customer and Transmission Provider, is accurate and complete as of the date of execution of this Facilities Study Agreement.

MILESTONES

6. Pursuant to Section 206.1 of the PJM Tariff, the parties agree that New Service Customer must meet the following milestone dates relating to the development of its generation or merchant transmission project(s) or New Service Request, as applicable, in order to retain the assigned Queue Position of its New Service Request(s) (as established pursuant to Section 201 of the PJM Tariff) while Transmission Provider is completing the Facilities Study:

6.1 On or before April 1, 2010, New Service Customer must provide evidence of an ownership interest in, or right to acquire or control the location which shall be on the high voltage side of the Customer Facility generator step-up transformer(s), or in the case of a Customer Facility with a single step-up transformer for multiple generators, the

high voltage side of the facility step-up transformer. The evidence of site control shall be a deed, option agreement, lease, or other similar document acceptable to the Transmission Provider.

6.2 To the extent any new or additional property is required to accommodate required Attachment Facilities, on or before April 1, 2010, New Service Customer must provide evidence of an ownership interest in, or right to acquire or control the location which shall be the location of the network substation which shall be built and subsequently transferred to the Interconnected Transmission Owner. The evidence of site control shall be a deed, option agreement, lease, or other similar document acceptable to the Transmission Provider.

Should New Service Customer fail to achieve any of the foregoing milestones, its New Service Request(s) shall be deemed to be withdrawn and terminated and it will have to resubmit its New Service Request(s) for reassignment of a Queue Position and re-initiation of the New Service Request study process.

PURPOSE AND SCOPE OF THE FACILITIES STUDY

7. Transmission Provider, in consultation with the affected Transmission Owner(s), shall commence a Facilities Study pursuant to Section 206 of the PJM Tariff to evaluate the Attachment Facilities, Local Upgrades and/or Network Upgrades necessary to accommodate New Service Customer's New Service Request assigned Queue Position U4-001 Howard 138kV.
 - A. **Scope of Facilities Study:** The purpose of the Facilities Study is to provide, commensurate with any mutually agreed parameters regarding the scope and degree of specificity described in Schedule A attached to this agreement, conceptual engineering and, as appropriate, detailed design, plus cost estimates and project schedules, to implement the conclusions of the System Impact Study regarding the Attachment Facilities, Local Upgrades and Network Upgrades necessary to accommodate the New Service Customer's New Service Request(s). Cost estimates shall be determined in a manner consistent with Section 217 of the PJM Tariff. The nature and scope of the materials that Transmission Provider shall deliver to the New Service Customer upon completion of the Facilities Study shall be described in the PJM Manuals.
 - B. **Facilities Study Cost and Time Estimate:** Transmission Provider's estimates of the date for completion of the Facilities Study and of New Service Customer's cost responsibility for the Facilities Study are stated in section 3 of this Agreement. In the event that Transmission Provider determines that it will be unable to complete the Facilities Study by the estimated completion date stated in section 3 of this Agreement, it shall notify New Service Customer and will explain the reasons for the delay. New Service Customer agrees that its estimated cost responsibility stated in section 3 is subject to revision as provided in sections 14, 15 and 16 of this Agreement.

8. The Facilities Study necessarily will employ various assumptions regarding New Service Customer's New Service Request(s), other pending New Service Requests, and PJM's Regional Transmission Expansion Plan at the time of the study. IN NO EVENT SHALL THIS AGREEMENT OR THE FACILITIES STUDY IN ANY WAY BE DEEMED TO OBLIGATE TRANSMISSION PROVIDER OR THE TRANSMISSION OWNERS TO CONSTRUCT ANY FACILITIES OR UPGRADES OR TO PROVIDE ANY TRANSMISSION OR INTERCONNECTION SERVICE TO OR ON BEHALF OF NEW SERVICE CUSTOMER EITHER AT THIS POINT IN TIME OR IN THE FUTURE.

CONFIDENTIALITY

9. New Service Customer agrees to provide all information requested by Transmission Provider necessary to complete the Facilities Study. Subject to section 10 of this Agreement and to the extent required by Section 222 of the PJM Tariff, information provided pursuant to this section 9 shall be and remain confidential.
10. Until completion of the Facilities Study, Transmission Provider shall keep confidential all information provided to it by the New Service Customer. Upon completion of the Facilities Study, Transmission Provider shall provide a copy of the study to New Service Customer, and to all other New Service Customers whose New Service Requests were evaluated in the Facilities Study, along with (to the extent consistent with Transmission Provider's confidentiality obligations in Section 18.17 of the Operating Agreement) all related work papers. Transmission Provider also shall post on its OASIS the existence of the Facilities Study. New Service Customer acknowledges and consents to such other, additional disclosures of information as may be required under the PJM Tariff or the FERC's rules and regulations.
11. New Service Customer acknowledges that, consistent with Part VI of the PJM Tariff, the affected Transmission Owner(s) will participate in the Facilities Study process and that Transmission Provider may disseminate information to the affected Transmission Owner(s) and may consult with them regarding part or all of the Facilities Study.

COST RESPONSIBILITY

12.
 - A. New Service Customer shall reimburse Transmission Provider for all, or for an allocated portion of, the actual cost of the Facilities Study in accordance with its cost responsibility as determined under Section 206 of the PJM Tariff.
 - B. Prior to initiating the Facilities Study, Transmission Provider shall bill New Service Customer for New Service Customer's share of the cost of work on the study that is scheduled to be completed during the first three months after work commences. Thereafter, on or before the 5th business day of every third month, Transmission Provider shall bill New Service Customer for New Service Customer's share of the cost of work expected to be completed on the Facilities Study during the ensuing three months. New Service Customer shall pay each bill within twenty (20) days after receipt thereof. In the event New Service Customer fails, other than as provided below regarding billing disputes, to make timely payment of any invoice for work on

the Facilities Study, its New Service Request shall be deemed to be terminated and withdrawn as of the date when payment was due. Notwithstanding the foregoing, in the event that the total estimated cost of the Facilities Study does not exceed the amount of the deposit required under Section 206 of the PJM Tariff, Transmission Provider shall apply the deposit in payment of the invoices for the cost of the Facilities Study. Upon written request by the New Service Customer pursuant to Section 206.4.1.1 of the PJM Tariff, Transmission Provider may provide a quarterly cost reconciliation. Subject to the following sentence regarding the final cost reconciliation upon completion of the Facility Study, such a quarterly cost reconciliation will have a one-quarter lag, e.g., reconciliation of costs for the first calendar quarter of work will be provided at the start of the third calendar quarter of work. Within 120 days after Transmission Provider completes the Facilities Study, Transmission Provider shall provide a final invoice presenting an accounting of, and the appropriate party shall make any payment to the other that is necessary to resolve, any difference between (a) New Service Customer's cost responsibility under this Agreement and the PJM Tariff for the actual cost of the Facilities Study and (b) New Service Customer's aggregate payments hereunder, including its deposits.

- C. In the event of a billing dispute, Transmission Provider shall continue to perform its obligations under this Agreement so long as (1) New Service Customer continues to make all payments not in dispute, and (2) New Service Customer's aggregate deposits held by Transmission Provider under this Agreement while the dispute is pending exceeds the amount in dispute, or (3) New Service Customer pays to Transmission Provider or into an independent escrow account the portion of the invoice in dispute, pending resolution of such dispute. If New Service Customer fails to meet any of these requirements, then its New Service Request shall be deemed to be terminated and withdrawn as of the date when payment was due.
13. Concurrent with execution of this Agreement, New Service Customer will pay Transmission Provider a cash deposit, as provided by Section 206 of the PJM Tariff, equal to the greater of \$100,000.00 or New Service Customer's estimated cost responsibility for the first three months of work on the Facilities Study. New Service Customer's quarterly estimated cost responsibility shall equal its estimated cost responsibility for the work on the Facilities Study that is scheduled to be completed during each three-month period after such work commences. If New Service Customer fails timely to provide the deposit required by this section, its New Service Request shall be deemed terminated and withdrawn and this Agreement shall be null and void. New Service Customer acknowledges that it may become obligated to pay one or more additional deposits pursuant to sections 14 and 15 below. Except as otherwise provided in section 12.B above, Transmission Provider shall continue to hold the amounts on deposit under this agreement until settlement of the final invoice.
14. If the Facilities Study, as described in section 7.A of this Agreement, is to include evaluation of more than one New Service Request and one or more of those requests is terminated and withdrawn, subject to the terms of section 15 of this Agreement, Transmission Provider will redetermine and reallocate the costs of the Facilities Study among the remaining participating New Service Customers in accord with Section 206 of the PJM Tariff. In that event, and subject to the terms of section 15, within 30 days after the date for execution and return of Facilities Study Agreements as determined under

Section 206 of the PJM Tariff, Transmission Provider will provide the New Service Customer with a written statement of the New Service Customer's revised responsibility for the estimated cost of the Facilities Study, determined in accordance with Section 206 of the PJM Tariff. In the event that New Service Customer's revised cost responsibility exceeds the sum of its previous deposits for the Facilities Study, it shall deliver to Transmission Provider, within 10 days after New Service Customer's receipt of its revised cost responsibility, an additional cash deposit equal to the amount of the excess. If New Service Customer fails timely to provide an additional deposit that is required under this section, its New Service Request shall be deemed terminated and withdrawn as of the date by which its additional deposit was due. In the event that New Service Customer's revised cost responsibility under the notice described in this section is less than the sum of its previous deposits for the Facilities Study, Transmission Provider shall return to New Service Customer, with its notice of the revised cost responsibility, the amount of the difference.

15. A. This section shall apply prior to commencement of the Facilities Study (1) if the Facilities Study is to include multiple New Service Requests; and (2) if, in Transmission Provider's reasonable judgment, the termination and withdrawal of one or more of those New Service Requests significantly changes the group of New Service Requests to be included in the Facilities Study from the group that was included in the System Impact Study. For the purposes of this section, a change to the group of New Service Requests to be included in the Facilities Study shall be significant if, in Transmission Provider's reasonable engineering judgment, the change is likely to cause the system constraints relating to, and/or the facilities and upgrades necessary to accommodate, the group of New Service Requests remaining to be included in the Facilities Study to differ materially from the system constraints relating to, and/or from the facilities and upgrades necessary to accommodate, the group of New Service Requests that the System Impact Study evaluated.
- B. In the event of a significant change to the group of New Service Requests that the System Impact Study evaluated, within 15 days after the date for execution and return of Facilities Study Agreements as determined under Section 206 of the PJM Tariff, Transmission Provider shall provide New Service Customer with an explanation of the nature and extent of the change in the affected group of New Service Requests and of the extent to which Transmission Provider has determined that it must re-assess the results of the System Impact Study. Within 30 days after it provides the explanation described in the preceding sentence, Transmission Provider shall provide New Service Customer with a revised estimate of the time needed, and of the likely cost, to complete the Facilities Study, and, if the study continues to include evaluation of more than one New Service Customer's New Service Request(s), New Service Customer's allocated share of the estimated cost of the revised Facilities Study, determined in accord with Section 206 of the PJM Tariff.
- C. In the event that New Service Customer's revised cost responsibility exceeds the sum of its previous deposits for the Facilities Study, it shall deliver to Transmission Provider, within 10 days after New Service Customer's receipt of its revised cost responsibility, an additional cash deposit equal to the amount of the excess. If New

Service Customer fails timely to provide an additional deposit that is required under this section, its New Service Request shall be deemed terminated and withdrawn as of the date by which its additional deposit was due. In the event that New Service Customer's revised cost responsibility under the notice described in this section is less than the sum of its previous deposits for the Facilities Study, Transmission Provider shall return to New Service Customer, with its notice of the revised cost responsibility, the amount of the difference.

16. A. If the Facilities Study includes New Service Customer's New Service Request(s) only, New Service Customer may terminate its participation in the study at any time by providing written notice of termination to Transmission Provider. New Service Customer's notice of termination (1) shall be effective as of the end of the business day following the day that Transmission Provider receives such notice and (2) concurrently shall have the effect of terminating and withdrawing New Service Customer's New Service Request(s). New Service Customer will be responsible for all costs of the Facilities Study that Transmission Provider incurred prior to the effective date of the notice of termination. Within thirty (30) days after the effective date of New Service Customer's notice of termination, Transmission Provider will deliver to New Service Customer a statement of New Service Customer's responsibility for the costs of the Facilities Study incurred up to the date of termination. In the event that New Service Customer's cost responsibility as of the date of termination exceeds the sum of its deposits then held by Transmission Provider for the Facilities Study, Transmission Provider's statement will include an invoice in the amount of such excess. New Service Customer will pay that invoice within ten (10) days after it receives it. In the event that New Service Customer does not pay the invoice within ten (10) days after receipt, New Service Customer shall owe the invoice amount plus interest at the applicable rate prescribed in 18 C.F.R. § 35.19a (a)(2)(iii), accrued from the day after the date payment was due until the date of payment. In the event that New Service Customer's cost responsibility as of the date of termination was less than the sum of its deposits for the Facilities Study, Transmission Provider's statement will include a payment to New Service Customer in the amount of the difference.
- B. If the Facilities Study includes any New Service Request(s) other than that (those) of New Service Customer, termination and withdrawal of New Service Customer's New Service Request(s) at any time after Transmission Provider has commenced the Facilities Study will not alter New Service Customer's responsibility for the costs of the Facilities Study under this Agreement and the PJM Tariff.

DISCLAIMER OF WARRANTY, LIMITATION OF LIABILITY

17. In analyzing and preparing the Facilities Study, Transmission Provider, the Transmission Owners, and any other subcontractors employed by Transmission Provider shall have to rely on information provided by New Service Customer and possibly by third parties and may not have control over the accuracy of such information. Accordingly, NEITHER THE TRANSMISSION PROVIDER, THE TRANSMISSION OWNERS, NOR ANY OTHER SUBCONTRACTORS EMPLOYED BY TRANSMISSION PROVIDER

MAKES ANY WARRANTIES, EXPRESS OR IMPLIED, WHETHER ARISING BY OPERATION OF LAW, COURSE OF PERFORMANCE OR DEALING, CUSTOM, USAGE IN THE TRADE OR PROFESSION, OR OTHERWISE, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO THE ACCURACY, CONTENT, OR CONCLUSIONS OF THE FACILITIES STUDY. New Service Customer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder.

18. In no event will Transmission Provider, the Transmission Owners or other subcontractors employed by Transmission Provider be liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with this Facilities Study Agreement or the Facilities Study, even if Transmission Provider, the Transmission Owners, or other subcontractors employed by Transmission Provider have been advised of the possibility of such a loss. Nor shall Transmission Provider, the Transmission Owners, or other subcontractors employed by Transmission Provider be liable for any delay in delivery, or for the non-performance or delay in performance, of Transmission Provider's obligations under this Agreement.

Without limitation of the foregoing, New Service Customer further agrees that the Transmission Owners and other subcontractors employed by Transmission Provider to prepare or assist in the preparation of any Facilities Study shall be deemed third party beneficiaries of this provision entitled "Disclaimer of Warranty/Limitation of Liability."

MISCELLANEOUS

19. Any notice or request made to or by either party regarding this Facilities Study Agreement shall be made to the representative of the other party as indicated below.

Transmission Provider

PJM Interconnection, L.L.C.
955 Jefferson Avenue
Valley Forge Corporate Center
Norristown, PA 19403-2497

New Service Customer

Black Fork Wind, L.L.C.
c/o Gary Energetics
1560 Broadway, Suite 2100
Denver, CO 80202
Attn: David Hettich

20. No waiver by either party of one or more defaults by the other in performance of any of the provisions of this Agreement shall operate or be construed as a waiver of any other or further default or defaults, whether of a like or different character.
21. This Agreement or any part thereof, may not be amended, modified, assigned or waived other than by a writing signed by all parties hereto.
22. This Agreement shall be binding upon the parties hereto, their heirs, executors, administrators, successors, and assigns.
23. Neither this Agreement nor the Facilities Study performed hereunder shall be construed as an application for service under Part II or Part III of the PJM Tariff.
24. The provisions of Part VI of the PJM Tariff are incorporated herein and made a part hereof.
25. Capitalized terms used but not otherwise defined herein shall have the meaning ascribed to them in the PJM Tariff.
26. This Facilities Study Agreement shall be effective as of the date of the New Service Customer's execution of it and shall remain in effect until the earlier of (a) the date on which the Transmission Provider tenders the completed Facilities Study and, as applicable, a proposed Interconnection Service Agreement or Upgrade Construction Service Agreement to New Service Customer pursuant to Section 212 or Section 213, respectively, of the PJM Tariff, or (b) termination and withdrawal of the New Service Request(s) to which the Facilities Study hereunder relates.

27. **No Third-Party Beneficiaries**

This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the parties, and the obligations herein assumed are solely for the use and benefit of the parties, their successors in interest and where permitted, their assigns.

28. **Multiple Counterparts**

This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

29. **No Partnership**

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the parties or to impose any partnership obligation or partnership liability upon either party. Neither party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other party.

30. **Severability**

If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other Governmental Authority, (1) such portion or provision shall be deemed separate and independent, (2) the parties shall negotiate in good faith to restore insofar as practicable the benefits to each party that were affected by such ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

31. **Governing Law, Regulatory Authority, and Rules**

For Interconnection Requests, the validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the state of Ohio (where the Point of Interconnection is located), without regard to its conflicts of law principles. This Agreement is subject to all Applicable Laws and Regulations. Each party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, or regulations of a Governmental Authority.

32. **Reservation of Rights**

The Transmission Provider shall have the right to make a unilateral filing with FERC to modify this Agreement with respect to any rates, terms and conditions, charges, classifications of service, rule or regulation under section 205 or any other applicable provision of the Federal Power Act and FERC's rules and regulations thereunder, and the Interconnection Customer shall have the right to make a unilateral filing with FERC to modify this Agreement under any applicable provision of the Federal Power Act and FERC's rules and regulations; provided that each party shall have the right to protest any such filing by the other party and to participate fully in any proceeding before FERC in which such modifications may be considered. Nothing in this Agreement shall limit the rights of the parties or of FERC under sections 205 or 206 of the Federal Power Act and FERC's rules and regulations, except to the extent that the parties otherwise agree as provided herein.

IN WITNESS WHEREOF, Transmission Provider and the New Service Customer have caused this Facilities Study Agreement to be executed by their respective authorized officials.

Transmission Provider: PJM Interconnection, L.L.C.

By: _____
Name Title Date

Printed Name

New Service Customer: Black Fork Wind, L.L.C.

By: _____
Name Title Date

Printed Name

Schedule A
Details of Design and Cost Estimates/Quality
For the Facilities Study

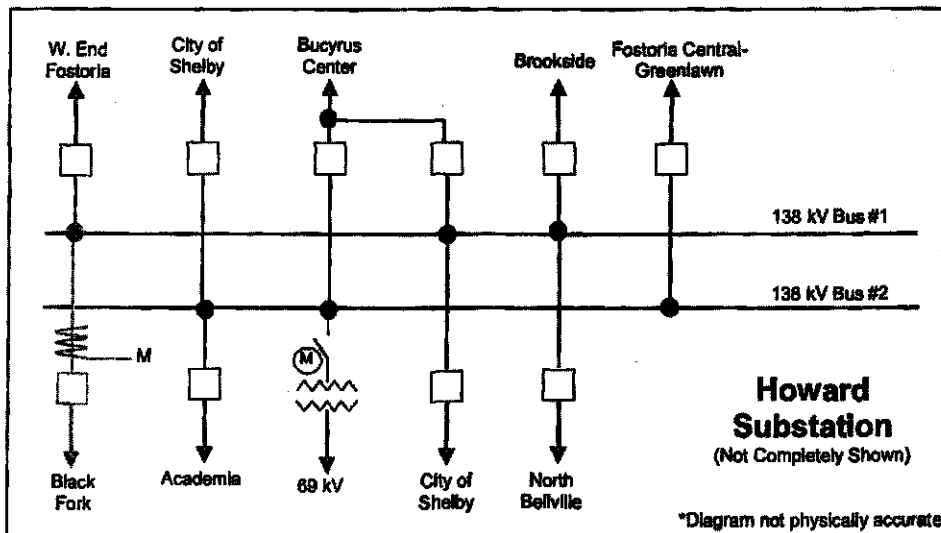
PJM will determine if there are any impacts on MISO facilities

The AEP engineering and design scope for the attachment facilities:

- Install a new 138 kV circuit breaker, disconnect switches, protective relaying, 138kV revenue metering and associated equipment, including 800 feet of underground 138 kV cable, at Howard Station.

Estimated cost for E&D and the evaluation of Impact on MISO facilities \$ 25,000

The minimum security required, per the Tariff, for the Facilities Study is \$100,000.



The APS engineering and design scope for the network upgrade facilities:

Network Upgrade #n1432

Reconductor the Sammis-Wylie Ridge No. 240 345kV line (6.9miles) with 1622 ACSS conductor to exceed 3000A capacity. Assume no structure replacement is required, only minor steel reinforcement. Upgrade the line trap on the Sammis terminal at Wylie Ridge with a 4000A rated trap and replace risers and connectors for 1622 ACSS.

Network Upgrade #n1580

Reconductor the AP portion (approximately 2.94 miles) of the existing Sammis-Wylie Ridge 345kV line with twin bundle 795 Drake ACSS-AW HT conductor for emergency ½ hour rating of 3760A and 4 hour rating of 3647A at 225C. Assume only minor steel reinforcement is required. At Wylie Ridge SS, replace the Sammis 345kV line trap with a 4000A rated line trap.

The FirstEnergy engineering and design scope for the network upgrade facilities:

Network Upgrade #n1574

Sammis Sub: Replace backup line relaying and metering on the 345 kV Wylie Ridge line.

Network Upgrade #n1575

Sammis -Wylie Ridge 345 kV, Reconductor 4.39 Miles: Re-conductor the Sammis-Wylie Ridge 345 kV line (4.39 mile) with 954 Kcmil ACSS wire.

Network Upgrade #n1576

Sammis Sub: Replace backup line relaying and metering on the 345 kV Wylie Ridge line. Replace GCX51 backup line relays with an SEL 421. Replace existing metering with digital multimeter. Replace 3000 Amp wave trap.

G

Wetlands Report

**Wetlands and Waterbodies Report
for the Black Fork Wind Project**

**Crawford and Richland Counties
Ohio**

February 2011

Prepared for:

Black Fork Wind Energy, LLC
400 Preston Ave, Suite 200
Charlottesville, VA 22901

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
368 Pleasant View Drive
Lancaster, New York 14086

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List of Abbreviations and Acronyms

AA	adjacent area
amsl	above mean sea level
CFR	Code of Federal Regulations
cm	centimeters
CWA	Clean Water Act
E & E	Ecology and Environment, Inc.
GPS	global positioning system
JD	Jurisdictional Determination
kV	kilovolt
MW	megawatt
NWI	National Wetland Inventory
NWP	Nationwide Wetland Permit
OAC	Ohio Administrative Code
Ohio EPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
PEM	palustrine emergent wetland
PFO	palustrine forested wetland
PSS	palustrine scrub-shrub wetland
ROW	right-of-way
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

List of Abbreviations and Acronyms (cont.)

USGS	United States Geological Survey
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1

Introduction

This report has been prepared for Black Fork Wind Energy, LLC to assist in the development of the Black Fork Wind Project (the Project) and to support an application to the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need. This delineation report will also be used to support a jurisdictional determination of the wetland and water bodies located near planned Project facilities by the United States Army Corps of Engineers (USACE).

Ecology and Environment, Inc. (E & E) delineated and evaluated wetlands and waterbodies within proximity to the proposed Project facilities that are, or have the potential to be, regulated by the USACE under Section 401 and 404 of the Clean Water Act (CWA) and have the potential to be regulated by the Ohio Environmental Protection Agency (OEPA) under Chapter 6111 of the Ohio Revised Code (ORC), Water Pollution Control (Isolated Wetland Permit). This document is intended to provide the results of those delineations along with related information necessary for the USACE and OEPA to verify wetland delineations and to make a jurisdictional determination of the wetlands within the area surveyed.

Section 1 of this report provides a general Project description; Section 2 outlines the regulatory framework that governs activities in wetlands and waterbodies; Section 3 provides a description of the ecological setting of the Project Area, including the results of a preliminary data review; Section 4 outlines the methodologies used to conduct field surveys; Section 5 provides the results of the wetland delineations field surveys; Section 6 provides the results of the waterbody evaluations; and Section 7 provides the references used in compiling this report. Appendix A provides 8.5- by 11-inch, black and white wetland and waterbody mapping for the Project. Appendices B and C provide datasheets and photo logs for the delineated wetlands and streams included in this report.

Project Description

Black Fork Wind Energy, LLC proposes to construct and operate the Black Fork Wind Energy project, a wind powered electric generation facility to be located in Richland and Crawford counties, Ohio. The Generation Facility will consist of up to 91 wind turbines and will have a maximum nameplate capacity of 200 megawatts (MW). In addition to the turbines, the Generation Facility will also include access roads, electrical collection lines, construction staging areas, a concrete



1. Introduction

batch plant, one substation and switchyard, and an operation and maintenance (O&M) facility. The substation will collect the wind energy generated by the Generation Facility and deliver the energy to the existing American Electric Power (AEP) transmission line that runs through the Project area, distributing energy to the PJM transmission grid. In total, over 24,000 acres of land have been leased in Auburn, Jackson, Jefferson, Sandusky, and Vernon Townships in Crawford County and Plymouth and Sharon Townships in Richland County (see Figure 1). Project facilities are shown in Figure 2. Wetland and waterbody surveys were not completed for the entire Project Area, only an area surrounding the proposed facilities.

The Project Facilities will consist of the following:

- Installation and operation of up to 91 wind energy turbines to produce a nameplate generating capacity of up to 200 MW of renewable energy;
- Construction and use of approximately 30 miles of access roads that will connect each wind turbine to a town, state or county roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities as well as access by emergency services, if needed. The access roads will be gravel-based and will meet the load-bearing requirements of trucks transporting concrete, aggregate, and turbine components to the turbine sites;
- Construction and use of an electrical collection system that will allow delivery of electricity to a new switchyard and substation. The majority of the lines will be installed underground;
- Construction and use of a new switchyard and substation within the Project Area. The substation will enable the Project to deliver power to the existing American Electrical Power (AEP)-owned Howard-Fostoria Substation for distribution to the PJM Interconnection, LLC (PJM) grid;
- Construction of a temporary concrete batch plant, in order to provide the concrete necessary for the construction of the turbine and substation foundations. After construction is complete at the Facility, the temporary concrete batch plant area will be restored to pre-construction conditions; and
- Construction and use of an operations and maintenance (O&M) building that will include administrative offices, house monitoring stations, and storage for parts and other small equipment. The O&M building and an associated parking lot will occupy approximately 3 acres.

Black Fork Wind Energy, LLC - Project Area Location

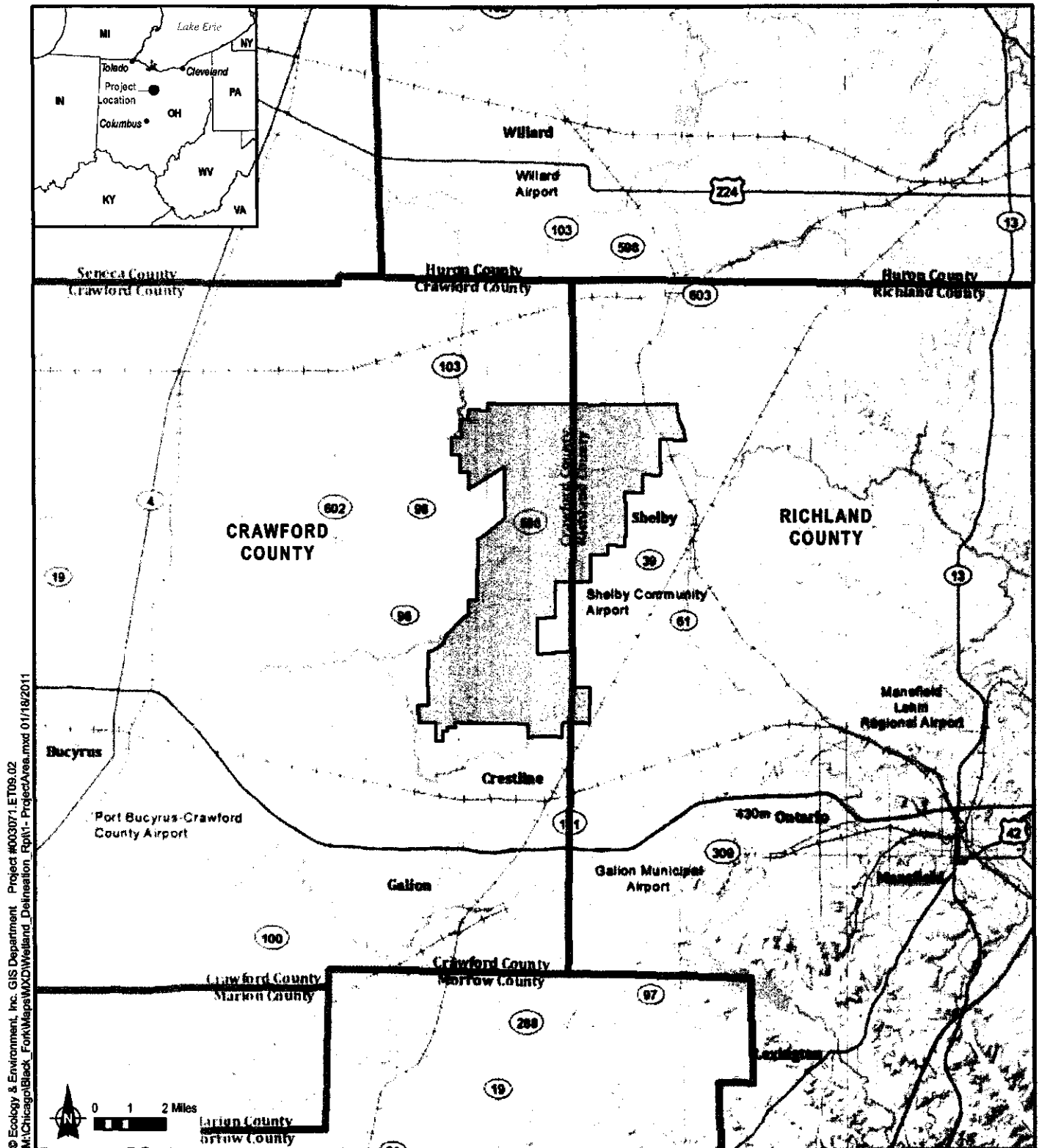
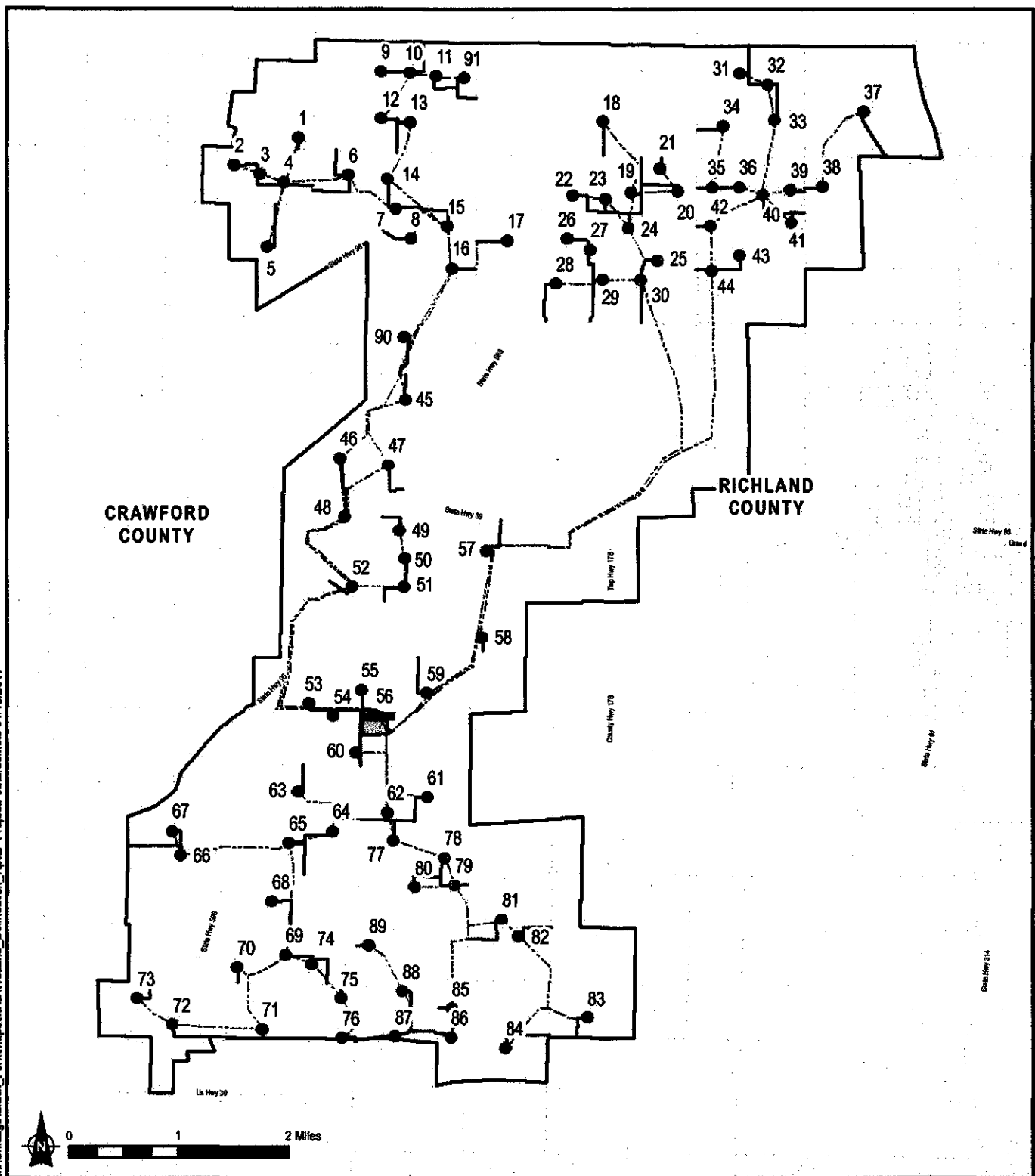


Figure 1
Black Fork Wind Energy, LLC Project Area Location
Crawford and Richland Counties, Ohio

Source: ESRI 2010;
EP, 2011

Black Fork Wind Energy, LLC - Project Facilities

© Ecology & Environment, Inc. GIS Department Project #003071.ET09.02
 M:\Chicago\Black_Fork\Map\WCD\Wetland_Delineation_Rpt2-ProjectFacilities.mxd 01/18/2011



- | | |
|--------------------------------------|---------------------------------------|
| Turbines (01-14-11) | O&M Building (01-13-11) |
| V100MDL | Switchyard (01-13-11) |
| ● V100 w/ 80 m Hub (130m tip height) | Substation (01-13-11) |
| ● V100 w/ 95 m Hub (145m tip height) | Laydown Yard & Batch Plant (01-13-11) |
| — Access Roads (01-14-11) | Project Area (01-03-11) |
| --- Collection Line (01-14-11) | |
| Public Road | |

Figure 2
 Black Fork Wind Energy, LLC Project Facilities
 Crawford and Richland Counties, Ohio

Source: ESRI 2010;
 EP, 2011



1. Introduction

This report documents the boundaries of, and provides a description of, the wetlands and waterbodies delineated within a survey corridor around the proposed facilities.

The following terms are used throughout this document to describe the proposed action.

- **Project.** "Project" refers to all activities involved in the construction and operation of the wind energy project described above and all components thereof.
- **Project Area.** The Project Area is denoted by the outer boundary of the geographic area that includes all turbine sites, access roads, and collection system components. The Project Area includes the locations of all Project facilities in Crawford and Richland Counties, Ohio.
- **Project Site.** The Project Site contains all portions of the Project Area that have the potential to be permanently or temporarily disturbed as a result of the construction or operation of Project facilities (including wind turbines, electrical collection, utility trenches, utility poles, access roads, staging areas, and other related structures).
- **Survey Corridor.** The limit of the corridor within which wetlands and waterbodies were delineated. It pertains solely to those wetlands and waterbodies identified in the Project and generally includes a 200- to 300-foot corridor centered on linear facilities and a circular area with a 250-foot radius surrounding each turbine. This report pertains only to wetlands and waterbodies delineated in the Survey Corridor.

2

Regulatory Review and Permit Requirements

This report was prepared to address the requirements of the CWA of 1977; Ohio Revised Code Chapter 6111. Each of these requirements is discussed below.

2.1 Clean Water Act

The CWA was implemented to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Under Sections 401 and 404 of the CWA, permits must be issued for certain activities that may impact wetlands and waterways. Section 401 of the CWA requires state approval for any federally permitted action impacting waters of the United States to ensure that the permitted action will not violate the state's water quality standards or impair designated uses. The Ohio State agency responsible for administering the Section 401 program is the Ohio Environmental Protection Agency (OEPA). Section 404 of the CWA requires that a permit be obtained for the discharge of dredged or fill material into waters of the United States, including wetlands and streams. Waters of the United States are defined under 33 Code of Federal Regulations (CFR), and wetlands are specifically defined under 33 CFR Part 328.3(b). The permitting agency responsible for Section 404 permits is the USACE. The Project falls within the jurisdiction of USACE Buffalo and Huntington Districts. Black Fork Wind Energy, LLC has consulted with both USACE Districts and the USACE has determined that the Buffalo District will take the lead on reviewing the Project. The Project is also in the jurisdiction of the Northwest District Office of the OEPA.

Depending on the final design and location of the project facilities, a CWA Section 404 permit may be required. If the permit is needed, the USACE will make a Jurisdictional Determination (JD) for delineated features following a field review of the Project. Based on guidance issued by the USACE in June 2008, the applicant may request either a Preliminary JD or an Approved JD (USACE 2008).

If Black Fork Wind Energy, LLC requests a Preliminary JD, all wetlands and waters delineated during field surveys will be considered federally jurisdictional regardless of surface water connections to waters of the United States or potential impacts on the physical and/or chemical nature of traditional navigable waters. Any permits sought or issued will be based on the assumption that all wetlands



2. Regulatory Review and Permit Requirements

and waters are federally jurisdictional. In the event that Black Fork Wind Energy, LLC later determines that an Approved JD is required, the request for a Preliminary JD may be revised to a request for an Approved JD.

In the case of an Approved JD, the USACE will make a determination for each wetland and waterbody, based on the surface connections and the potential importance of water quality, within traditional navigable waterways (USACE 2007).

2.2 Ohio Revised Code, Title 61, Chapter 6111

Chapter 6111 of the Ohio Revised Code (ORC) is titled Water Pollution Control. This law provides regulation for protection of all waters of the state, including wetlands. The law also provides permitting requirements for projects potentially impacting waterbodies, federal jurisdictional wetlands, and isolated wetlands (i.e., wetlands not subject to regulation under Section 404 of the CWA).

Isolated Wetlands

Ohio EPA takes jurisdiction of all wetlands within the state, even those wetlands without a clear hydrological connection to navigable waterways also referred to as isolated wetlands. By definition, "hydrologically isolated wetlands" are defined as those wetlands which:

- Have no surface water connection to a surface water of the state;
- Are outside of, and not contiguous to, any one hundred-year "floodplain" as that term is defined in this rule; and
- Have no contiguous hydric soil between the wetland and any surface water of the state (OAC 3745-50(T)).

In Ohio, there are two isolated wetland permits, the general isolated wetland permit and the individual isolated wetland permit. The general isolated wetland permit is required for any isolated wetlands that are less than ½ acre in size and classified as Category 1 or Category 2 wetlands. The general wetland permit requires a level one review, which includes:

- Submission of a pre-activity notice that includes an application;
- An acceptable wetland delineation;
- A wetland categorization;
- Description of the project;
- Acreage of the isolated wetland that will be subject to filling;
- Site photographs; and



2. Regulatory Review and Permit Requirements

- Mitigation proposal for the impact to the isolated wetland.

An individual isolated wetland permit with a level two review is required for any isolated wetlands that are classified as Category 1 and greater than ½ acre or Category 2 and between ½ and 3 acres. The level 2 review includes:

- All of the information required for the general permit (see above);
- Analysis of practicable on-site alternatives to the proposed filling of the isolated wetland that would have a less adverse impact on the isolated wetland ecosystem; and
- Information indicating whether high quality waters are to be avoided by the proposed filling of the isolated wetland.

An individual isolated wetland permit with a level three review is required for any isolated wetlands that are classified as Category 2 and greater than 3 acres, or all Category 3 wetlands. The level three review includes:

- The information required for the general permit (see above);
- Full antidegradation review; and
- Information indicating whether high quality waters are to be avoided by the proposed filling of the isolated wetland.

Section 401 Water Quality Certification

Disturbances to wetlands and streams have the potential to degrade water quality, therefore in addition to the federal CWA Section 404 permit for direct impacts to wetlands and streams, a Section 401 Water Quality Certification (Section 401 certification) is also required. The project must comply with Ohio's Water Quality Standards (OAC3745-1) and not potentially result in an adverse long-term or short-term impact on water quality in order for OEPA to issue a Section 401 certification. Ohio's Antidegradation Rule (OAC 3745-1-05), which is included in the Water Quality Standards, establishes the existing uses of surface waters, sets the conditions in which water quality may be lowered in surface waters, and includes additional application requirements for high quality waters and wetlands and the accompanying public participation procedures.

In addition to the routine wetland delineation required for USACE wetland delineation, the OEPA requires that all wetlands be classified within the state according to their size and functions using the Ohio Rapid Assessment Method (ORAM). This method classifies wetlands into three categories with Category 1 wetlands having the lowest ranking and Category 3 having the highest ranking and therefore the highest level of protection. Section 5 provides more details on the



2. Regulatory Review and Permit Requirements

categorization of wetlands using ORAM. OEPA also puts additional restrictions of the issuing of permits under the Section 404 Nationwide Permits Program based on which Category of wetland is impacted. Specifically, temporary or permanent impacts to Category 3 wetlands are prohibited [with the exception of NWP 27, which permits Stream and Wetland Restoration Activities] (OEPA 2007).

3

Project Area Description

3.1 General Project Area Description

The Project facilities are located in Auburn, Jackson, Jefferson, Sandusky, and Vernon Townships in Crawford County and Plymouth and Sharon Townships in Richland County. In total, over 24,000 acres of land have been leased. The Project Area is located in central Ohio, in an agriculturally dominated area approximately 60 miles north of Columbus, OH.

The Project Area is generally dominated by cultivated cropland with small pockets of deciduous forest and pasture (See Figure 3). The predominant crops are corn and soybean (USDA 2008). These crops would constitute the primary vegetative cover to be removed during construction of the Project.

The Project Area is located on the Lake Erie-Ohio River Basin Divide with 64% (approximately 15,495 acres) of the Project Area falling into the Lake Erie Watershed and 36% (approximately 11,203 acres) both major watersheds. No major rivers are present in the Project area; however there are several perennial and intermittent streams draining to three distinct watersheds: the Sandusky River and the Huron-Vermillion River Basins, both of which ultimately drain into Lake Erie and the Mohican River Basin that drains to the Ohio River (ODNR, Division of Water 2009a). These watersheds are identified by USGS eight-digit hydrologic unit codes (HUCs) as 04100011 (Sandusky River), 04100012 (Huron-Vermillion Rivers), and 05040002 (Mohican River) (USGS 2009). These major drainage basins are further divided into sub-watersheds (10-digit HUC): Broken Sword Creek (04100011 03), Sandusky River (04100011 04), Honey Creek (04100011 08), West Branch Huron River (04100012 01), and Black Fork Mohican River (05040002 01) (see Figure 5). The acreage of each watershed, within the Project Area is provided in Table 3-1.

3. Project Area Description

Table 3-1 Watersheds within the Black Fork Project Area

10-digit HUC	Watershed Name	Description	Acreage of Project Area Within Watershed
04100011 03	Broken Sword Creek	Headwaters to below Unnamed Tributary at New Haven Road	854 acres
04100011 04	Sandusky River	Headwaters to Upstream Broken Sword Creek	8,685 acres
04100011 08	Honey Creek	Between Waynesburg Tiro Road and Lydell Road	3,455 acres
04100012 01	West Branch Huron River	Headwaters to above Slate Run	2,502 acres
05040002 01	Black Fork Mohican River	Headwaters to Downstream Whetstone Creek	8,702 acres

General information about existing surface water quality in the vicinity of the Project Area was obtained from an OEPA document, *Integrated Water Quality Monitoring and Assessment Report* (OEPA, Division of Surface Water 2008), compiled under the Clean Water Act Sections 303(d) and 305(b). This report lists stream segments with impaired ambient water quality in the state of Ohio. All five 10-Digit HUC watersheds within the Project Area are listed as impaired in both the aquatic life use assessment and recreation use assessment. In addition, fish tissue assessments were listed as impaired for the Sandusky River watershed. High-magnitude causes of impairment include direct habitat alterations, siltation, nutrients, organic enrichment, and flow alterations. High magnitude sources of impairment include major municipal point sources, spills, channelization for agriculture and development, combined sewer overflows, non-irrigated crop production, on-site wastewater systems, flow regulation for agriculture, and urban runoff and storm sewers. Table 3-2 summarizes the causes and sources of impairment by watershed.

Table 3-2 Watershed Impairment Summary

Watershed HUC	Causes of Impairment	Sources of Impairment
04100011 03 Broken Sword Creek	Siltation Nutrients Flow Alteration Direct Habitat Alterations	Non-irrigated Crop Production Channelization- Agriculture Flow Regulation/Modification- Agriculture Spills
04100011 04 Sandusky River	Siltation Nutrients Organic Enrichment/DO Flow Alteration	Major Municipal Point Source Combine Sewer Overflows Non-irrigated Crop Production On-site Wastewater Systems (Septic Tanks) Flow Regulations/Modification- Agriculture

3. Project Area Description

Table 3-2 Watershed Impairment Summary

Watershed HUC	Causes of Impairment	Sources of Impairment
04100011 08 Honey Creek	Siltation Nutrients Flow Alteration	Minor Municipal Point Source Non-irrigated Crop Production Channelization- Agriculture Flow Regulation/Modification-Agriculture Removal of Riparian Vegetation
04100012 01 West Branch Huron River	Siltation Nutrients Flow Alteration Direct Habitat Alterations	Minor Municipal Point Source Non-irrigated Crop Production Upstream Impoundment Channelization- Development Waste/Storage Tank Leaks Irrigated Crop Production
05040002 01 Black Fork Mo- hican River	Unknown Toxicity Nutrients Siltation Direct Habitat Alterations	Major Industrial point Source Urban Runoff/Storm Sewers (NPS) Channelization- Agriculture Channelization- Development Removal of Riparian Vegetation- Development Contaminated Sediments

3.2 Preliminary Data Review

Prior to performing fieldwork, background information was reviewed to assist in the initial identification of wetlands and waterbodies.

3.2.1 Review of Existing Wetland Information

Information sources used to determine the possible presence of wetlands included current high-resolution aerial photographs of the Project Area (See Figure 3); USGS 7.5-Minute Series topographic maps (See Figure 4); United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and Ohio Wetland Inventory maps (See Figure 5); and Richland County and Crawford County Soil Surveys (See Figure 6).

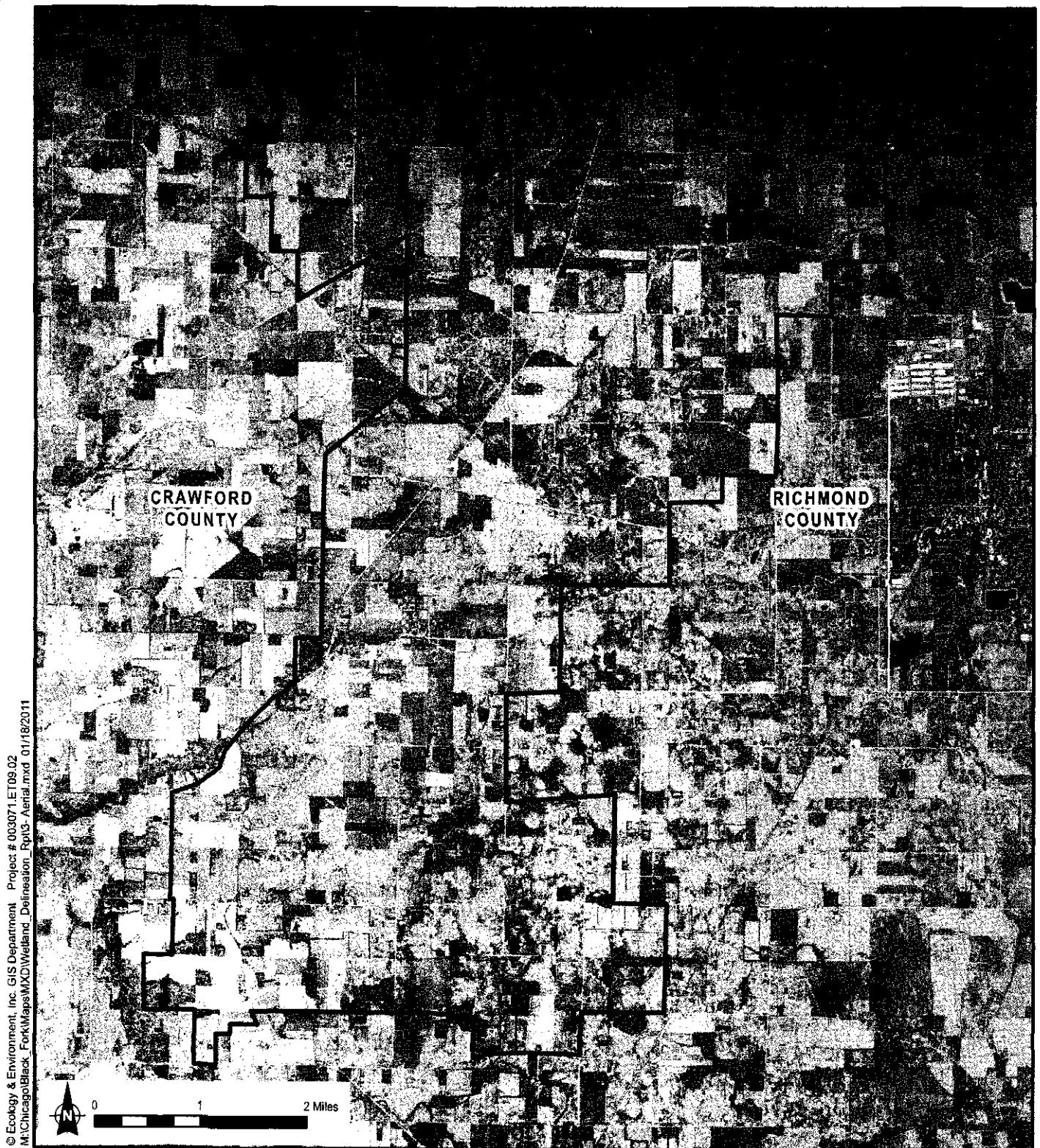
USGS topographic maps and aerial photos indicate the possible presence of wetlands in the Survey Corridor. The NWI maps are readily available for only half of the project area as such, only the areas covered by the NWI maps were reviewed. These maps depict wetlands occurring throughout the Survey Corridor. Ohio Wetland Inventory Maps are available for the entire Project Area and depict approximately 656 acres of wetlands within the proposed Project Area. Approximately 13.4 acres of wetlands fall within the proposed Project Site and therefore may be impacted. Ohio Wetland Inventory maps were created with the intent to be used for planning purposes only and not as a surrogate for field surveys. The Richland County and Crawford County Soil Surveys indicate the presence of hydric soils and soils with potential hydric inclusions in the Survey Corridor. Based



3. Project Area Description

on the results of the desktop review, it was determined that field verification would be required to determine the presence and extent of wetlands in the Survey Corridor.

Black Fork Wind Energy, LLC - Aerial Photo of Project Area



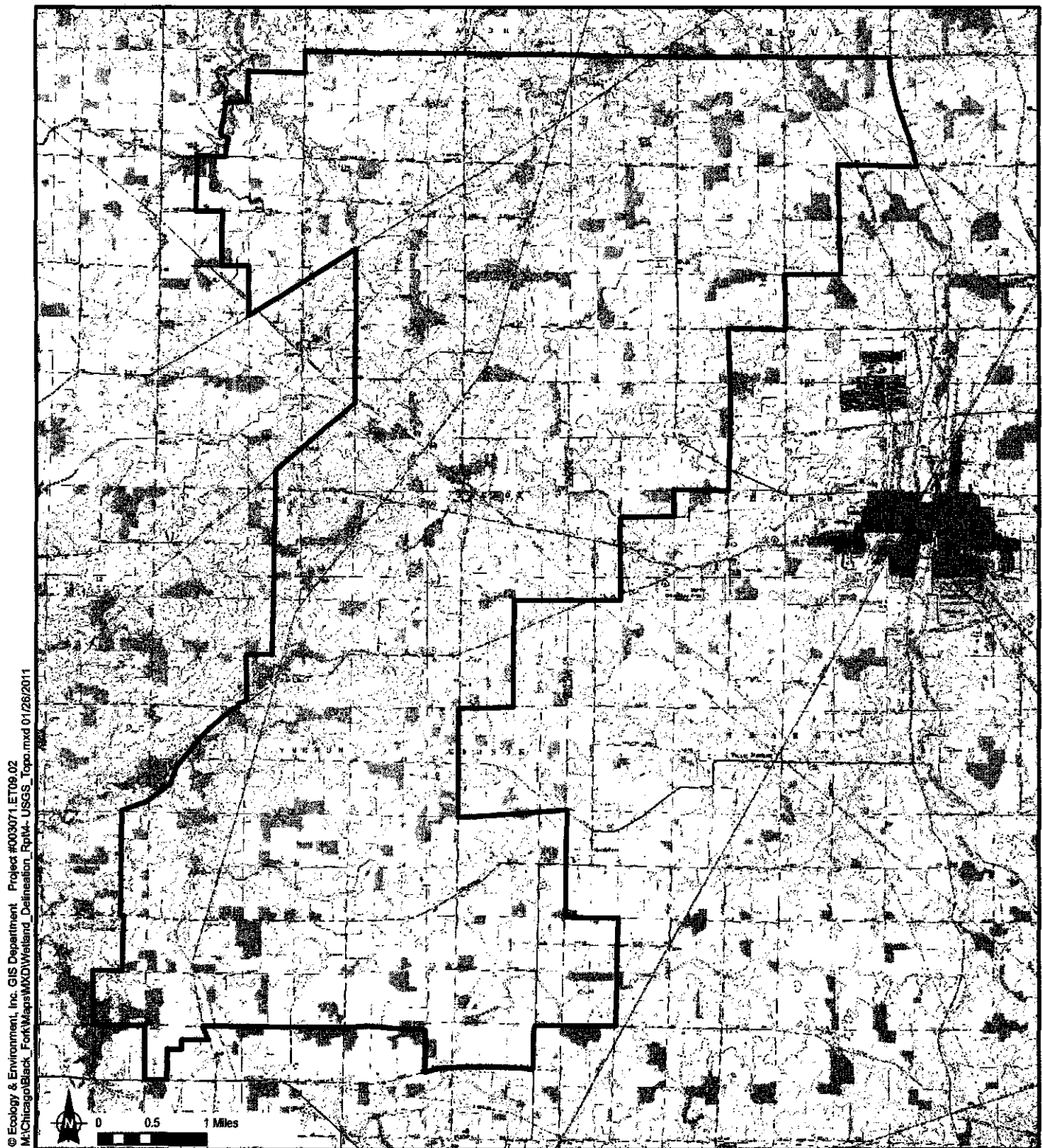
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Project Area (01-03-11)

Figure 3
Black Fork Wind Energy, LLC Aerial Photo of Project Area
Crawford and Richland Counties, Ohio

Source: ESRI 2010; EP 2011;
OSIP 2008;

Black Fork Wind Energy, LLC - Topographic Map

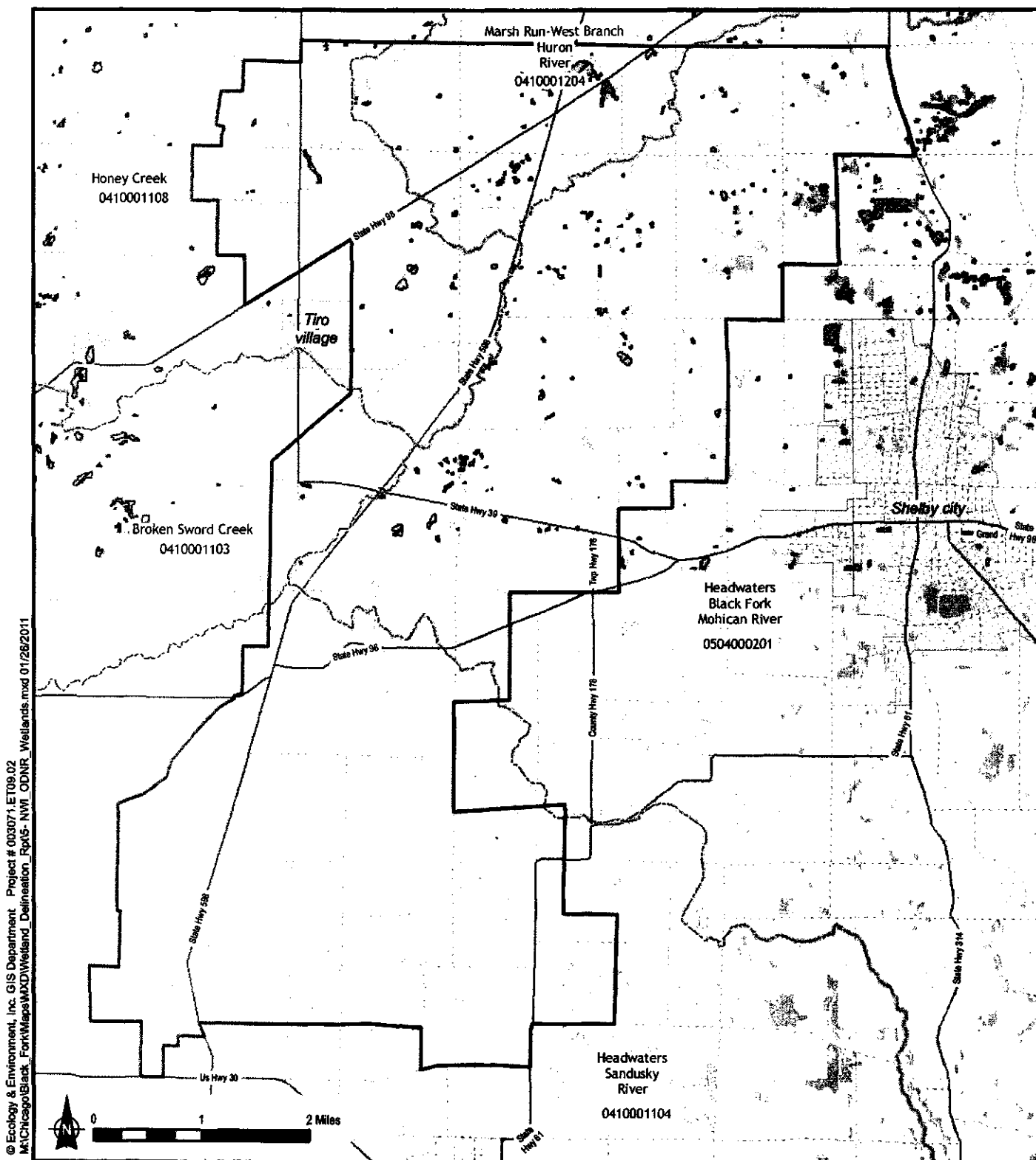


Project Area (01-03-11)

Figure 4
Black Fork Wind Energy, LLC
USGS 7.5" x 7.5"; 1:24,000 Topographic Map
Crawford and Richland Counties, Ohio

Source: ESRI 2010; USGS 2008;
EP 2011

Black Fork Wind Energy, LLC - Watersheds and Wetlands



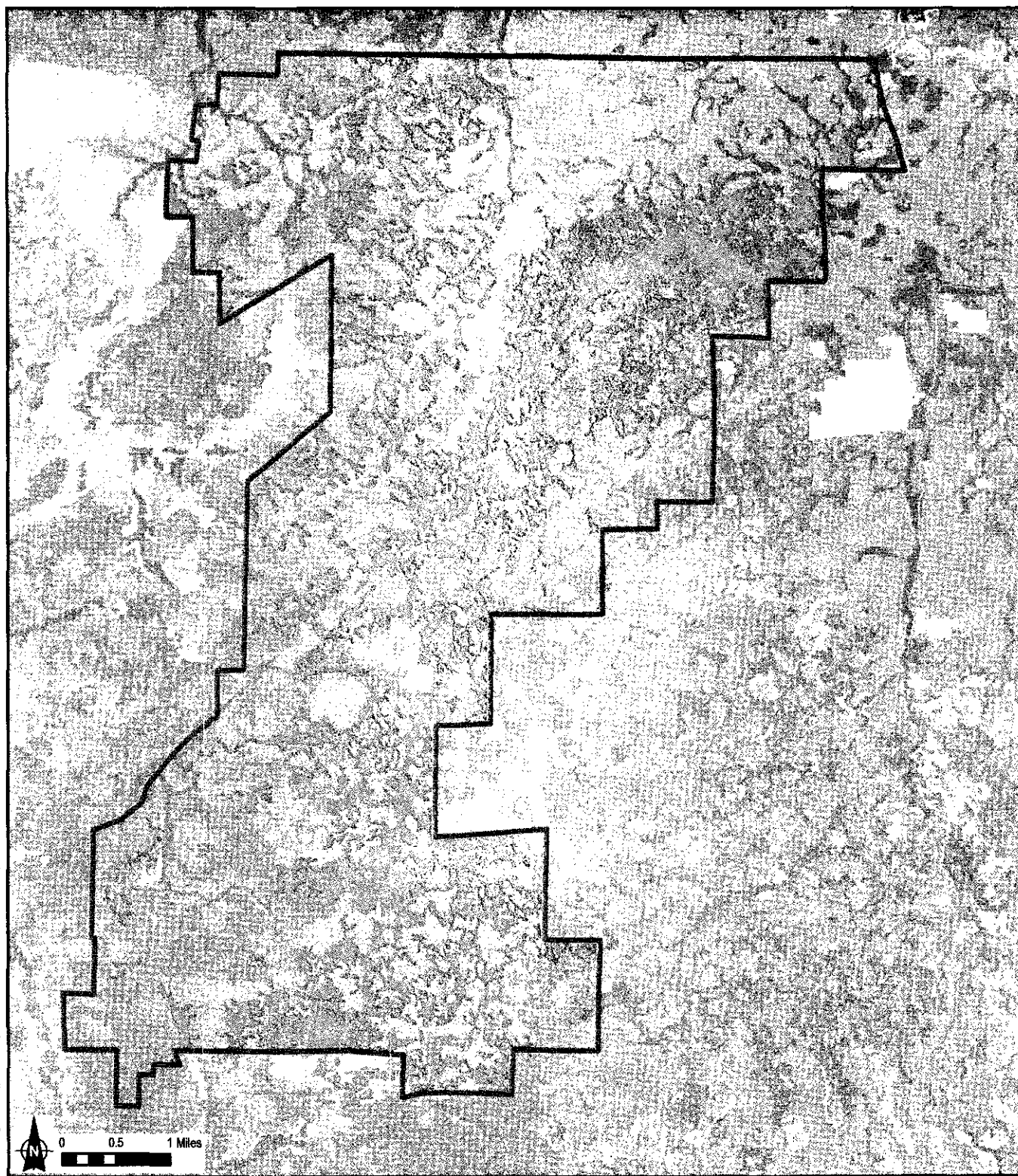
- Project Area (01-03-11)
- 10 Digit Hydrologic Unit Code (HUC)
- National Wetland Inventory Wetland
- Ohio Wetland Inventory Wetland

Figure 5
Black Fork Wind Energy, LLC Watersheds and Wetlands
Crawford and Richland Counties, Ohio

Source: ESRI 2010; USFWS 1993-2000;
ODNR 2008; EP 2011

Black Fork Wind Energy, LLC - Hydric Soils Map

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- Project Area (01-03-11)
- Hydric Soils
- All hydric

Figure 6
Black Fork Wind Energy, LLC Hydric Soils Map
Crawford and Richland Counties, Ohio

Source: ESRI 2010; USDA NRCS 2008;
EP 2011

4

Methodology

Surveys for wetland and waterbody resources were conducted using a 250-foot radius around the proposed location of turbines, a 300-foot-wide corridor centered on the access roads, and a 200-foot-wide corridor centered on the associated electric collection lines connecting the individual turbines, substation and switchyard. In some areas surveys were restricted because of property access or expanded to accommodate site-specific conditions.

Wetland mapping is included in Appendix A (8.5- by 11-inch, black and white mapping) and depicts the Survey Corridor in which the surveys were conducted. The 200- to 300-foot-wide survey area around access roads, collection lines, and 250-foot radius surrounding each turbine allowed for an assessment of adjacent ecological communities and provided flexibility for minor shifts in layout of these facilities.

Field surveys were conducted from September 22 through October 23, 2009 and October 13, 2010 through October 18, 2010 to:

- Delineate wetland boundaries and characterize wetland functions and values to obtain sufficient data about individual wetlands within the Survey Corridor to allow for a complete assessment of potential Project-related impacts;
- Characterize all waterbodies and watercourses that occur within the Survey Corridor.

The surveys conducted in 2009 were conducted using delineation procedures in the USACE *Wetland Delineation Manual* (Environmental Laboratory 1987). This manual is commonly referred to as the “87 Manual.” In March 2010, the USACE adopted the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (U.S. Army Engineer Research and Development Center 2009). As a result the surveys conducted in 2010 utilized the new regional supplement. The specific procedures used to evaluate the soils, vegetation, and hydrology at each potential wetland location is described below.



4.1 Soils

Soils were examined by using a tile spade shovel, or “sharpshooter,” to a depth of at 14 to 24 inches. Wherever disturbance of the soils, caused by past excavation or fill activity, was evident the soil characterization was performed in adjacent, undisturbed areas within the potential wetland. Soils were characterized in each soil horizon. Soil colors were identified using a Munsell Soil Color Chart (Munsell 2000), and other characteristics such as the presence of redoximorphic features and soil texture were recorded. Hydric soil characteristics, such as organic soil layers, gleying, concentrations, and oxidized rhizospheres were noted where they occurred.

During the 2010 field surveys, hydric soil indicators described in the *Field Indicators of Hydric Soils in the United States A Guide for Identifying and Delineating Hydric Soils Version 7.0* (USDA 2010) were used to identify and document hydric soils per the NC/NE Regional Supplement.

4.2 Hydrology

The *Wetlands Delineation Manual* (Environmental Laboratory 1987) provides guidelines for determining the presence of wetland hydrology. In general, the criteria for wetland hydrology are met if the area is inundated or saturated at the soil surface during the growing season for a time sufficient to develop hydric soils and support hydrophytic vegetation. In some instances, it is necessary to use other field characteristics to identify wetland hydrology. These characteristics may include water staining, sediment deposits, drainage patterns, or drift lines. Hydrologic characteristics, as well as the depth of surface water or depth to soil saturation, were recorded for each wetland area.

The Northcentral and Northeast (NC/NE) Regional Supplement allows a variety of hydrology indicators to be used. Examples of indicators that can be used include but not limited to: saturations; surface water; sediment, drift, and iron deposits; surface soil cracks; presence of reduced iron; and stunted or stressed plants. This expanded list of hydrology indicators was used during the 2010 field surveys to observe and document wetland hydrology.

4.3 Vegetation

To determine the presence of hydrophytic vegetation, the dominant species in each major vegetative stratum (e.g., tree, shrub/sapling, herbaceous, and woody vine) were identified and recorded. Each plant was then assigned a wetland indicator status (i.e., obligate wetland, facultative wetland, facultative, facultative upland, or upland) from *National List of Vascular Plant Species that Occur in Wetlands* (Reed 1988). The 2009 surveys followed the 87 Manual in which hydrophytic vegetation was present if the dominant species observed had an indicator status of facultative (FAC), facultative wetland (FACW), or obligate (OBL).

In 2010, the presence of hydrophytic vegetation was determined using the procedures described in the NC/NE Regional Supplement. Vegetation in each of the strata were sampled in the following plot sizes:

- Tree stratum- 30-ft radius
- Sapling/shrub stratum- 15-ft radius
- Herb stratum- 5-ft radius
- Vine stratum- 30-ft radius

Within each stratum, the abundance of each species within the plot was recorded and determined by using areal cover estimates. The Rapid Field Test was applied and if the majority of the species in each strata had an indicator of FACW or OBL, hydrophytic vegetation was present. If the sampled area did not contain all species with an indicator status of FACW or OBL, the Dominance Test was applied. Most plant communities occurring within areas with hydric soils and indicators of hydrology will meet the qualifications of the Rapid Field Test or the Dominance Test. If a site with hydric soils and indicators of hydrology failed the Rapid Field Test and the Dominance Test, the vegetation was evaluated using the Prevalence Index and if necessary, observing plant morphological adaptations and re-running the Prevalence Index.

4.4 Delineation

If the soils, hydrology, and vegetation at a survey point indicated that it was within a wetland, the boundary of the wetland was determined, and flagged with high visibility wetland delineation tape. The approximate boundary was recorded on site maps, and the boundary was surveyed using a global positioning system (GPS) unit with sub-meter accuracy. The electronic files generated from the GPS survey were then downloaded and integrated into a geographical database on the project that includes the alignment drawings to identify where the delineated wetlands and the proposed Project facilities overlapped or were nearby. Photographs were taken and datasheets completed at each delineated wetland, stream, and water body, and other points of interest within the Survey Corridor.

5

Wetland Delineation Results

Several field investigations were conducted to assist in the development of the layout of the Project. Initial field investigations were conducted from September 22 through October 23, 2009 and resulted in the delineation of 14 wetlands and several streams and ponds (See Section 6 of this report for more information regarding streams). Based on the results of the field investigations some of the Project facilities were re-located to avoid impacting some of these wetlands in early 2010. Further refinement of the layout continued through the summer of 2010 utilizing the results of the fall 2009 field investigations and new constraints information obtained from other environmental and engineering studies concurrently being conducted for the Project. Once these changes were integrated and a new layout was complete, field investigations were conducted within areas not previously surveyed October 13 through October 18, 2010. Four additional wetlands were delineated during these field investigations. Figure 7 depicts all the areas field investigations were conducted within the Project area. The information collected during the previous two surveys was used to evaluate the location of planned facilities once again. Minor shifts were made to project facilities to further avoid and minimize impacts.

The results presented in this report are only those wetlands that are within the survey corridor centered on the current locations of the proposed facilities. This includes the a 250-foot radius of currently proposed turbine locations, a 200-foot buffer area centered on electrical collection lines, a 300-foot buffer area centered on access roads, and within the areas encompassing the proposed substation, switchyards, O&M building, concrete batch plant and laydown yard as depicted on Figure 2. Only two wetlands occur within the survey corridor around the current layout. Facilities are no longer planned near the 12 other wetlands identified during the survey. As such, only information concerning these two wetlands are presented in this report as Black Fork Wind Energy, LLC is requesting a review by USACE and OEPA on wetlands that may potentially be impacted by the Project.

Maps depicting the location of the two delineated wetlands that occur within the survey corridor of the Project are located in Appendix A. Appendices B and C include the wetland datasheets, and the photographic exhibits for the wetlands



5. Wetland Delineation Results

identified in the survey corridor. The following sections describe the two wetlands

5.1 Delineated Wetlands Summary

Wetland community types were assigned to each of the delineated wetlands using the Classification of *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) in the field. In addition, the plant community found within each wetland was also classified according to *Plant Communities of the Mid-West Ohio Subset* (Faber-Langendoen 2001) to provide a regional approach to describing wetland habitat. The two wetlands occurring nearby planned Project facilities are classified as Palustrine Emergent (PEM) wetlands under the Cowardin et al (1979) system. PEM wetlands are dominated by herbaceous vegetation with little or no woody plant material present. These wetlands contain plant communities with some characteristics of Bulrush – Cattail – Burreed Shallow Marsh as described in Faber-Langendoen. Bulrush-Cattail-Burreed Shallow Marshes have a conservation status rank of G4G5 (Apparently secure or secure) and range broadly over the Midwestern U.S. and Canada, from Ohio and Ontario west to Manitoba, south to Oklahoma, and east to Indiana. The community is highly variable and can serve as an interface between wet meadows and deep marshes or be found alone in small depressional areas. They are dominated by low-lying species (<1 m) to tall emergent species (1-2 m).

Wetland W800

Wetland W800 is an emergent wetland located in an agricultural field and is approximately 0.04 acres in size. The landscape is slightly rolling and the wetland is a small tear-drop shaped depression. There is an approximate 2 ft rise around the wetland boundary and no apparent inlet or outlet indicating that the source of water for this wetland is overland sheet flow. The underlying soils had a silty clay texture in the A horizon and a clay loam texture in the B horizon and is a poorly drained soil. The wetland has sparse aerial coverage of vegetation due to its location in a field used for row crops. Only two species were observed, blue grass (*Poa compressa*) and a species of beggars' ticks (*Bidens sp.*).

Wetland W901

Wetland W901 is a small emergent wetland approximately 0.11 acres in size located in a bowl-shaped depression in an active agricultural field. The hydrology of this wetland was driven by run-off from the surrounding topography that is slightly rolling and the underlying poorly drained soil. The B horizon has a clay texture and a gleyed matrix starting at 12" below the soil surface. The wetland is actively farmed however the crops were stunted and sparse on the outer boundary of the wetland and were absent in the interior of the wetland. As result of the regular ground disturbance from tilling and use of herbicides, the plant community has low diversity and is composed of species adapted to disturbance or are considered agricultural weeds. The dominant hydrophytic plant species observed



5. Wetland Delineation Results

in this wetland include reed canary grass (*Phalaris arundinacea*), yellow nutsedge (*Cyperus esculentus*), and tearthumb (*Polygonum saggitatum*).

5.2 OEPA Jurisdictional Wetlands

OEPA takes jurisdiction over all wetlands within the state of Ohio, even isolated wetlands. OEPA requires that an evaluation of each impacted wetland be performed using the Ohio Rapid Assessment Method (ORAM). The results of the ORAM assessment are used to determine which ranking a wetland will receive. The ranking system is based on three categories: Category 1, Category 2, and Category 3. Category 1 wetlands have the lowest ranking in terms of quality, while Category 3 wetlands exhibit the highest quality. Category 1 wetlands receive the lowest level of protection whereas impacts to Category 3 wetlands are only permitted under specific circumstances. The delineated wetlands were evaluated using the ORAM assessment method in the field to determine a score for each wetland. The score is based on the wetland's functions and values. The ORAM score determines which Category the wetland will fall within. The ORAM scores and ranking will ultimately be determined by OEPA during the Section 401 or Isolated Wetland Permitting process.

Category 1 Wetlands

Category 1 wetlands are the lowest value wetland rating. They are defined by OEPA as supporting minimal wildlife habitat, and minimal hydrological and recreational functions. These wetlands do not provide critical habitat for threatened or endangered species, or contain rare, threatened or endangered species (OAC 3745-1-54 (C)(1)(a)).

Wetlands assigned to Category 1 may possess some or all of the following characteristics: hydrologic isolation, low species diversity, a predominance of non-native species (greater than 50% areal cover for vegetative species), no significant wildlife habitat or wildlife use, and limited potential to achieve beneficial wetland functions (OAC 3745-1-54 (C)(1)(b-c)).

Wetlands with ORAM scores between 0 and 29.9 are assigned a Category 1 status. Wetlands with scores between 30.0 and 34.9 fall in a "gray zone" and additional testing is required to determine if they belong in Category 1 or the next higher category (Mack, 2000).

Wetlands W800 and W901 had ORAM scores that defined them as Category 1 wetlands. These wetlands were small, isolated wetlands occurring within active agricultural fields. They showed signs of recent or regular disturbance such as mowing, tilling, and herbicide applications. Both wetlands were also dominated by reed canary grass and contained non-native species. Finally, these wetlands offered virtually no wildlife habitat and no recreational opportunities.

6

Waterbodies

The waterbodies found within the survey corridor were assessed by their flow characteristics to determine if they met USACE's definition of a stream. Streams were defined as having a scoured channel, defined bed and banks, and having an ordinary high water mark. The centerline of the stream occurring within the survey corridor was mapped and an assessment was conducted on the stream reach that occurred within the survey corridor. Each stream reach was given an alphanumeric name. Many streams were crossed multiple times therefore some streams were assessed multiple times and have several alphanumeric names. USGS topographic maps and recent aerial photography were used to determine the hydrologic connection to traditional navigable waterways. Fifty (50) stream reaches were mapped and assessed during the field survey efforts conducted in 2009 and 2010. As previously discussed, the location of streams mapped in the field was used to further refine the layout to minimize and avoid impacts. There are 21 stream reaches that occur within the survey corridor of the current location of proposed Project facilities. Only these 21 stream reaches are discussed. Other waterbodies were also noted if encountered. Ponds were the only other waterbodies found. The ponds were observed in yards of residences and were man-made and maintained impoundments. They are mainly used for aesthetics and recreation.

The stream reaches were evaluated using the Ohio Qualitative Habitat Evaluation Index (QHEI) scoring method or the Headwater Habitat Evaluation Index (HHEI) as applicable. The scope of the surveys was limited to the length of stream that fell within the survey corridor therefore the stream reach assessed was defined by the length of stream delineated. Generally, the QHEI evaluation applies to streams whose drainage area is greater than 1 square mile but less than 20 square miles, and whose maximum pool depth is greater than 40 centimeters. These streams are classified as Headwater Habitat (HHW) streams by Ohio EPA. The HHEI evaluation applies to streams whose drainage area is less than 1 square mile and whose maximum pool depth is less than 40 centimeters. These streams are classified as Primary Headwater Habitat (PHWH) streams. Metrics for each method were evaluated and scored to assist in determining an aquatic life use potential for that stream section.

OEPA also assigns beneficial use designations to water bodies in the state. These designations describe existing or potential uses of water bodies. They take into



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consideration the use and value of water for public water supplies, protection and propagation of aquatic life, recreation in and on the water, agricultural, industrial and other purposes. There may be more than one use designation assigned to a water body. Examples of beneficial use designations include: public water supply, primary contact recreation, and numerous sub-categories of aquatic life uses (*Ohio 2008 Integrated Report*). The QHEI and HHEI methods assist in assigning the beneficial use designations.

OEPA also classifies waterbodies into four categories of high quality waters pursuant to division (A)(2) of section 6111.12 of the Revised Code: limited quality waters, general high quality waters, superior high quality waters, outstanding state waters, and outstanding national water resources. High quality waters are protected from loss of water quality by OAC 3745-1-05. All surface waters are classified as general high quality waters unless found in the superior high quality water, outstanding state water due to exceptional values, or outstanding state water due to exceptional ecological values tables in OAC 3745-1-05. This classification system assigns levels of protection to the waterbodies with outstanding national water resources receiving the highest level of protection. There are no waters classified by OEPA as limited quality waters, superior high quality waters, outstanding state waters, or outstanding national water resources within the Project area, therefore by default all the delineated streams are classified as general high quality waters.

6.1 Stream Reach Summary

Table 6-1 provides a description of each perennial, intermittent, or ephemeral stream reach that was identified within the survey corridor. Ten of the 21 stream reaches evaluated are perennial streams. The remaining 11 have either intermittent or ephemeral flow. The vast majority of the stream reaches evaluated are located in agricultural fields. They are well-defined streams that have been channelized and dredged to accommodate flow from drainage tiles and runoff from adjacent agricultural fields. The locations of these streams are depicted in relation to Project facilities on the mapping included in Appendix A. Photographs of the streams and QHEI and HHEI data sheets are included in Appendices B and C.

A total of 10 streams were identified within the Lake Erie watershed and 11 streams were identified within the Ohio River watershed. The streams identified that are located within the Lake Erie watershed are tributaries to Honey Creek, Loss Creek, and Paramour Creek. In turn, these streams are tributary to the Sandusky River. Stream reach S705 is a reach of Loss Creek and stream reaches S801 and S802 are portions of Paramour Creek. The streams identified that are located within the Ohio River watershed are tributaries to Marsh Run. Delineated stream reaches S002 and S1562 are reaches of Marsh Run.

Twenty of the stream reaches evaluated occur in agricultural fields and have been channelized through the fields. These channels appear to be routinely dredged. In some locations during the surveys, field surveyors observed back hoes and exca-

6. Waterbodies

vators actually dredging the streams. It is likely that these streams are a part of County Ditch Programs or used to ensure compliance with Ohio Drainage Law. Under the programs, landowners are provided financial assistance to maintain adequate drainage within agricultural land and developed areas. These channels were historically straightened to prevent flooding and are still maintained to ensure adequate drainage for the extensive tile drain systems located within the Project area. Sediment is periodically removed from the channel as a result the bottom of the channel is typically 6 to 10-feet below the ground surface.

As a result of the channelization and maintenance, these streams have trapezoidal shaped channel cross sections, lack sinuosity, and are incised by an average of 7-10 feet. The streams lack defined pool-riffle-pool regimes and in-stream habitat is lacking. Often the channel has reed canary grass growing out of the bottom. On many of the smaller streams, the scoured channel is visible only if the surveyor pulled back the vegetation. If pool habitat is present, they are often short in length and are less than two feet in depth. Outlets for subsurface drain tile are common within the stream banks. Riparian areas were often lacking as crops were observed up to the top of the banks on most streams. If a riparian area was present it consisted of a narrow strip of mowed cool season grasses used as an access road for farm equipment. The stream banks within the trapezoidal channels are frequently mowed to remove any woody vegetation. The unnatural conditions of the streams limit stream functions and are reflected in the QHEI/HHEI scores. Table 6.1-1 provides a description of the streams as well as their QHEI/HHEI score.

Two of these streams (S803 and S711) exist in their natural state and have not been recently manipulated for agricultural purposes. Stream reach S803 flows through agricultural land and does not contain a high quality riparian area. The stream exhibits past disturbance such as incision however the stream is recovering. Sinuosity in S803 is higher than most of the other stream reaches observed. The riparian area is composed of goldenrods, cool season grasses and other weed species and lacks trees and shrubs. Stream reach S711 is a natural channel that flows through a mature forested area. It too exhibits past disturbance with incision and moderately stable banks. There is an abandoned bridge located within the evaluated reach. Hammond Road historically continued to the east of its present location and has since been abandoned. The bridge abutments are still located on the stream banks however the bridge decking has been removed. Sinuosity of this stream is high. Pool-riffle-pool regimes are present in both of these stream reaches.

Surface Water Use

Surface water features mapped within the Survey Corridor are headwater streams with no specific designated use category. It is presumed that they are utilized by wildlife and for agricultural uses and may be used for secondary contact recreation. No perennial streams designated for fishing were found within the Survey Corridor. Public fishing access is not available to any waterbodies within the Project Area. None of the major waterbodies will be traversed by the Project, and



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these waterbodies lie primarily outside of the Project Area. Honey Creek is considered a superior high quality water (SHQW) by OEPA. Three stream reaches evaluated (S500, S501 and S711) are tributary to Honey Creek. Stream reach S500 is the beginning of a stream created by a culvert in State Route 98. Road ditched running parallel to State Route 98 outlet into the culvert thus creating enough concentrated flow to create a scoured channel. As a result this stream contains a large amount of sediment. Stream reach S501 is in the typical condition for streams flowing through agricultural fields in the Project area and is maintained. Stream reach S711 is one of the natural stream channels evaluated. Precipitated ferrous iron was observed in the channel indicating groundwater discharge into the channel. This stream is only tributary observed to Honey Creek that would contribute to the maintenance of Honey Creek as a SHQW. Further details on these streams are described in Table 6.1.

All of the streams within the Survey Corridor may be used to some extent by wildlife as a source of drinking water. However, many of the streams are intermittent or ephemeral therefore water availability is intermittent and may be present only during periods of continuous or heavy precipitation or during the snow-melt period in the spring. Furthermore, the conditions in these streams are typically unsuitable for fish most of the year and unsuitable for bi-valves. Amphibians and macro-invertebrates are likely to inhabit intermittent streams when water is present.

Man-made ponds are scattered throughout the Project area. Ponds vary in size, but are typically less than 1 acre with depths ranging from 2 to 10 feet. Man-made ponds are used primarily for recreational purposes are located in open or forested residential areas adjacent to farm fields. Wildlife may also utilize these resources.



6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S002	0.52	11.6	1.58	Silt/Clay	Perennial	P-RPW	Marsh Run		QHEI - 21	Stream S002 is a small perennial stream that has been manipulated (dredged and deepened) for agricultural purposes. The stream channel is narrow and is choked with reed canary grass (See Photos P007 and P008 in Appendix B). The stream flows northwest beyond the survey corridor as an unnamed tributary to Marsh Run.
S013	0.2	7.9	1.42	Gravel, Silt/Clay	Intermittent	S-RPW	Unnamed Tributary to Marsh Run		HHEI - 32 (Modified Class II)	Stream S013 is a narrow, intermittent stream that has been straightened and dredged to accommodate adjacent agricultural activities (See Photo P158 in Appendix B). The delineated segment has low canopy coverage and low sinuosity. The stream flows west through a culvert at Baker Road as an unnamed tributary to Marsh Run.
S021	0.21	6.7	1.02	Silt/Clay	Intermittent	S-RPW	Unnamed Tributary to Loss Creek		QHEI - 14 HHEI - 40 (Modified Class II)	Stream S021 is a small unnamed tributary to Loss Creek. The channel has been channelized through agricultural fields. It receives water from tile drain outlets along the banks as well as roadside ditches. This reach of the stream flows west through a 6 foot concrete culvert under Nazor Road (See Photo P209 in Appendix B).



6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type ¹	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S1550	Not Measured	12.7	2.20	Gravel, silt	Perennial	P-RPW	Unnamed Tributary to Paramour Creek	QHEI - 49	Stream 1550 is a perennial stream flowing north to Paramour Creek. Within the survey corridor the stream flows under a bridge at Hook Rd. The surrounding landscape is dominated by agricultural land. The banks are steep and the channel is incised by approximately 7 feet indicative of recent and intense disturbance. Sinuosity is low and riffle/run quality is poor. The banks are vegetated with reed canary grass. In-stream cover is sparse. Shrub growth has been suppressed by recent mowing (See Photo P899 in Appendix A).
S1553	0.18	Not Measured	Not Measured	Silt	Perennial	P-RPW	Unnamed Tributary to Marsh Run	QHEI - 18	Stream 1503 flows perennially through agricultural fields (See Photo P903 and P904 in Appendix B). The stream channel was recently heavily disturbed and bankful measurements could not be taken due to recent dredging activity (occurring within one week of delineation). The scoured channel is located within a 10ft deep trapezoidal trench. There is no sinuosity to the stream, and channelization is severe. Riffle/run quality is low. Substrate is exclusively silt. A small wooded parcel buffers the stream immediately to the northeast. Vegetative cover is very low due to recent disturbance, and the channel is exposed nearly 100%. Fish are present.



6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type ¹	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S1560	1.67	6.93	1.67	Silt, muck	Perennial	P-RPW	Unnamed Tributary to Marsh Run	QHEI - 24 HHEI - 28 (Modified Class I)	Stream 1560 is a primary headwater stream flowing N through a large agricultural field (See Photo P916 in Appendix B). The channel has been dredged and is incised by approximately 6 ft (See Photo P917 in Appendix B). The channel lacks sinuosity, is poorly developed, and shows little recovery from recent disturbances. Flow is slow and somewhat turbid. There is poor development of a pool-riffle-pool regime. The banks are dominated by reed canary grass (See Photo P918 in Appendix B).
S1562	0.69	20.24	1.90	Silt, muck	Perennial	P-RPW	Marsh Run	QHEI - 28	Stream 1562 is a delineated reach of Marsh Run. The stream is sharply channelized through an agricultural field. Sinuosity is low, and has poorly defined pool-riffle-pool regime. The channel has a trapezoidal cross section and is incised. Reed canary grass chokes the scoured channel. Aquatic macrophytes are present.
S500	0.094	10.3	1.17	Silt/Clay	Intermittent	S-RPW	Unnamed Tributary to Honey Creek	QHEI - 19 HHEI - 32 (Modified Class II)	This stream begins at a culvert on Route 98. The culvert outlets on the north side of Route 98 creating a scoured channel (See Photo P1009 in Appendix B). Flow is intermittent as water was observed in the pools during base flow conditions.



6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S501	0.55	9.1	1.35	Gravel, Silt/Clay, large Cobbles in sandy clay substrate	Intermittent	S-RPW	Unnamed Tributary to Honey Creek	QHEI - 22 HHEI - 50 (Modified Class II)	Stream S501 is a small perennial stream located between 2 agriculture fields. This stream has been straightened and contains tile drain outlets along the banks. The stream is contained within a steep sided channel approximately 4 feet deep (See Photos P1026-P1027 in Appendix A). The north bank of the stream in the survey corridor is buffered from the agriculture field by ~60 feet of forested land. The south bank abuts an active agricultural field. The stream flows into a mature block of forest on the western edge of the survey corridor and becomes a natural channel hereafter.
S505	0.75	8.6	2.16	Silt/Clay	Intermittent	S-RPW	Unnamed Tributary to Marsh Run	QHEI - 20 HHEI - 27 (Modified Class I)	Stream S505 is a narrow ephemeral stream that has been deepened and straightened for agricultural purposes (See Photo P1044 in Appendix B). The channel has heavy siltation, low sinuosity, and poor pool/riffle development. The channel is choked with reed canary grass. It flows southeast beyond the survey corridor as an unmapped tributary to Marsh Run and is mapped as Stream S506 where it re-enters the survey corridor north of Hazelbrush Road.
S506	1.27	12	2.5	Sand, Silt/Clay	Perennial	P-RPW	Unnamed Tributary to Marsh Run	QHEI - 17.5 HHEI - 51 (Modified Class II)	Stream S506 is a different reach of the same stream as S505. This stream is a headwater stream to Marsh Run and has been straightened and deepened to accommodate drain tile inflow from adjacent agriculture fields. Water was present in this reach suggesting this portion of the stream receives enough groundwater inflow from tile drain outlets to make this section intermittent or perennial (See Photos P1049 and P1050 in Appendix B).

6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ³	Comments ³
S508	0.28	16.4	2	Silt/Clay	Perennial	P-RPW	Unnamed Tributary to Marsh Run	QHEI - 16 HHEI - 46 (Modified Class II)	The channel has been manipulated for agriculture purposes; however, banks along this section have not been maintained and shrub growth provides some canopy cover (See Photo P1072 in Appendix B). There velocity of flow is slow in this section, the water appears stagnant and the substrate is silty muck.
S700		10.5	2	Silt	Intermittent	S-RPW	Unnamed Tributary to Marsh Run	HHEI - 32 (Modified Class II)	Stream S700 is an intermittent stream flowing through an active agricultural field. The stream is clearly used for drainage to support the drain tile system installed in the field. The habitat is of low quality and lacking structure. This incised channel does not have access to the floodplain. The banks are very steep and the channel was likely dug out in last 5 years.
S705		11.5	2	Silt/Leaf pack	Perennial	P-RPW	Loss Creek	HHEI - 37 (Modified Class II)	Stream S705 is a perennial stream that has been modified for agricultural purposes. It has poor pool development, but some point bar development is present. Reed canary grass heavily choking channel. Some algae present in channel and flow is very slow. No fish were observed. The riparian area is mowed.
S706	0	8.33	1.75	Silt/Leaf pack	Ephemeral	Non-RPW	Unnamed tributary to Marsh Run	HHEI - 27 (Modified Class I)	Stream S706 is an ephemeral stream, with a narrow mowed riparian area, than runs through an agricultural field. There is no water in the channel at the time of survey. The substrate is dominated by silt however there were pockets of leaf packs to support invertebrates. There are cattails and sedges in the bottom of the channel that also form some of the riffles in the assessed reach.

**6. Waterbodies****Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project**

Field ID	Baseflow (feet)	Bankfull Width (feet)	Bankfull Depth (feet)	Substrate	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S707	0	8	1.5	Silt/Leaf pack	Ephemeral	Non-RPW	Marsh Run	HHEI - 27 (Modified Class I)	Stream S707 is an ephemeral stream that runs through an agricultural field and has a narrow mowed riparian area. The scoured channel is small and has a silt substrate with some scattered leaf packs. Reed canary grass, sedges, asters and goldenrods are present along the banks and adjacent to the channel. Channel development is poor and lacks pool-riffle sequences. Similar to other streams in the Project that occur in agricultural fields, the stream is incised and can not reach its floodplain.
S709		30	1.5	Cobble, Gravel, Silt	Perennial	P-RPW	Unnamed Tributary to Loss Creek	QHEI - 51	Stream S709 is recovering from historic maintenance as an agricultural ditch. Stream dwelling fish and low water quality tolerant invertebrates were observed. There is a large amount of brown algae covering the substrate. Some bank failures were observed. The banks are mostly vegetated with reed canary grass, however, other species are colonizing and diversity appears to be increasing.
S711		10	2	Cobble, Silt	Perennial	P-RPW	Unnamed Tributary to Honey Creek	QHEI - 53	Stream S711 is a perennial stream located in a forested area. Iron and scum were observed on the surface of the water. There is a historic road present and the stream was channelized to accommodate the bridge structure and road crossing. The stream is recovered now and the bridge is no longer present. This stream has poor pool-riffle development and it is incised by 3.5-4 feet and can not reach the floodplain.

6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankful Width (feet)	Bankful Depth (feet)	Substrate	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
S801		10.1	0.3	Cobble, Gravel	Perennial	P-RPW	Paramour Creek	HHEI - 65 (Modified Class II)	Stream S801 is a perennial stream located in a forested riparian area adjacent to two agricultural fields. The stream appears to have been straightened in the past for agricultural purposes and is now recovering, with some pool-riffle and sidebar development. The stream has access to an approximately 2-3 feet wide floodplain on either bank.
S802		12.8	0.4	Gravel, Silt	Perennial	S-RPW	Paramour Creek	HHEI - 65 (Modified Class II)	Stream S802 is a different, downstream, reach of S801. This reach flows under a bridge over State Route 61. The stream is clearly used to support tile drainage in agricultural fields on either side of the road. The stream has low quality habitat and lacks structure. As with other streams in agricultural areas, the channel has no access to the floodplain and the channel appears to have been dug out to maintain adequate drainage capacity.
S803		9	0.3	Gravel, Silt	Intermittent	S-RPW	Unnamed Tributary to Honey Creek	HHEI - 51 (Modified Class II)	Stream S803 is an intermittent stream flowing along the western edge of an active agricultural field. The stream flows under Hammond Road to the south of the survey reach. The stream is recovering from straightening from the agricultural usage, with some access to an herbaceous and scrub dominated floodplain along the left bank. Habitat along the right bank, however, is of low quality and lacks structure. Reed canary grass is growing within the banks and dominates the riparian zone, though other herbaceous species have begun to colonize the left bank. The channel shows little to no pool-riffle development.

6. Waterbodies

Table 6-1 Summary of Delineated Stream Characteristics, Black Fork Wind Energy Project

Field ID	Baseflow (feet)	Bankfull Width (feet)	Bankfull Depth (feet)	Substrate	Flow Type	Flow Type	Flow Type	Hydrologic Connection	QHEI or HHEI Rating ²	Comments ³
Total Number of Streams Delineated In Survey Corridor	21									

Notes:

- Stream flow classifications are based on the following definitions:
 Perennial Flow (P-RPW) - The stream flow is evident throughout the year, in most years.
 Intermittent Flow (S-RPW) - The stream channel contains flowing water for at least three months but does not flow throughout the year, in most years.
 Ephemeral Flow (Non-RPW) - The stream channel contains flowing water for less than three months of the year, in most years.
- QHEI - Qualitative Habitat Evaluation Index, Ohio Environmental Protection Agency (OEPA) requires this evaluation for a stream reach whose watershed is greater than 1 square mile.
 OEPA classifies streams with watersheds less than 20 square miles and greater than 1 square mile as Headwater Habitat (HHW) Streams.
 HHEI - Headwater Habitat Evaluation Index, OEPA requires this evaluation for a stream reach whose drainage area is < 1 square mile and whose pool depth is less than 40cm.
 OEPA classifies these streams as Primary Headwater Habitat (PHWH) Streams. Scores for both evaluation methods are provided where post-field watershed area calculations warranted a HHEI rating.
 Modified Class I - Manipulated or otherwise unnatural stream channel whose HHEI index rating is <30, these are considered ephemeral PHWH streams
 Modified Class II - Manipulated or otherwise unnatural stream channel whose HHEI index rating is >30 and <70, these are considered intermittent or perennial PHWH streams.
- P## = Photo Numbers Used by Field Teams, See Appendix A.
- Index mapping showing mapped wetlands, waterbodies, and Project facilities are provided in Appendix D.

7

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6. References

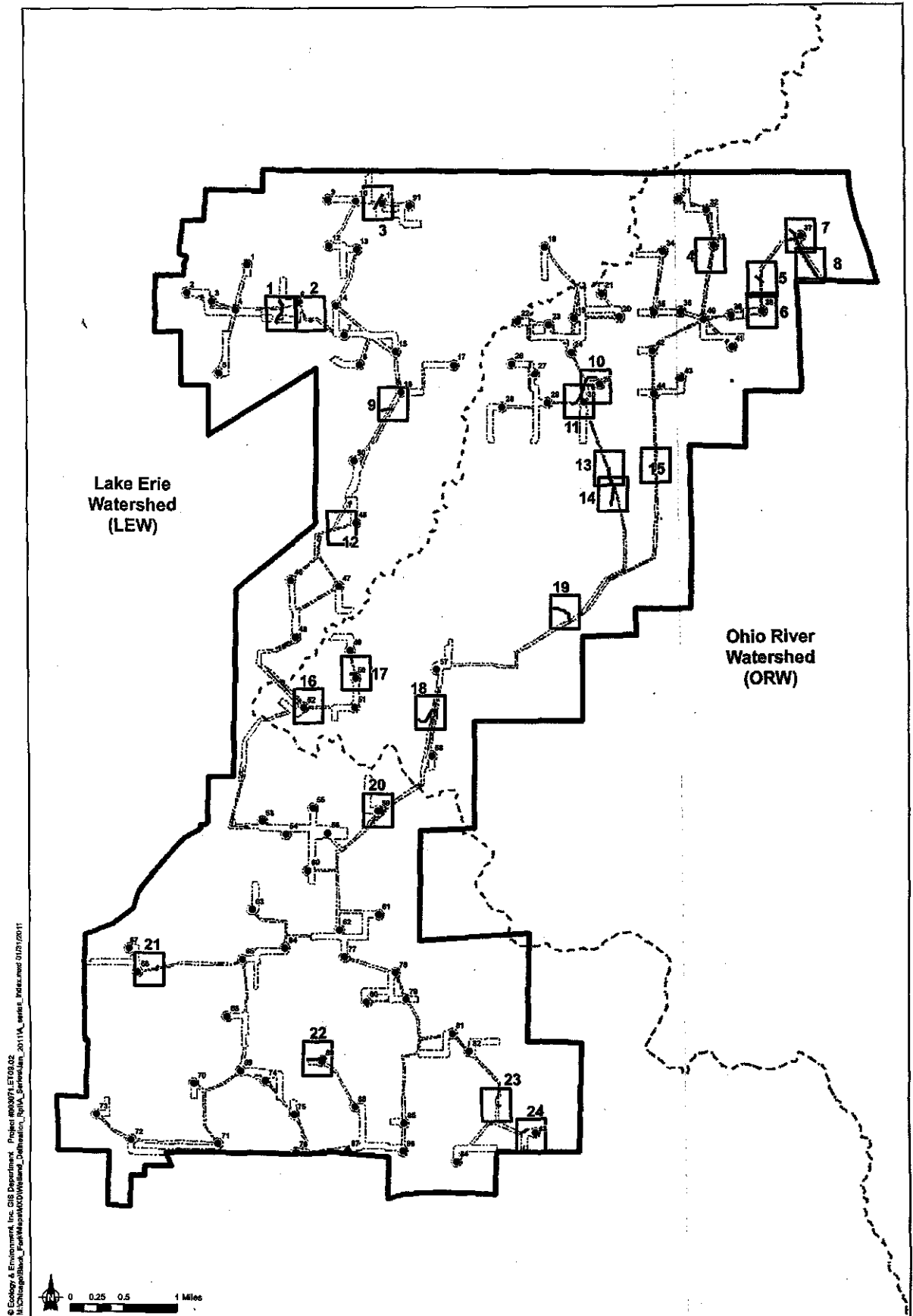
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A

Maps

Black Fork Wind Energy, LLC - Field Delineated Features

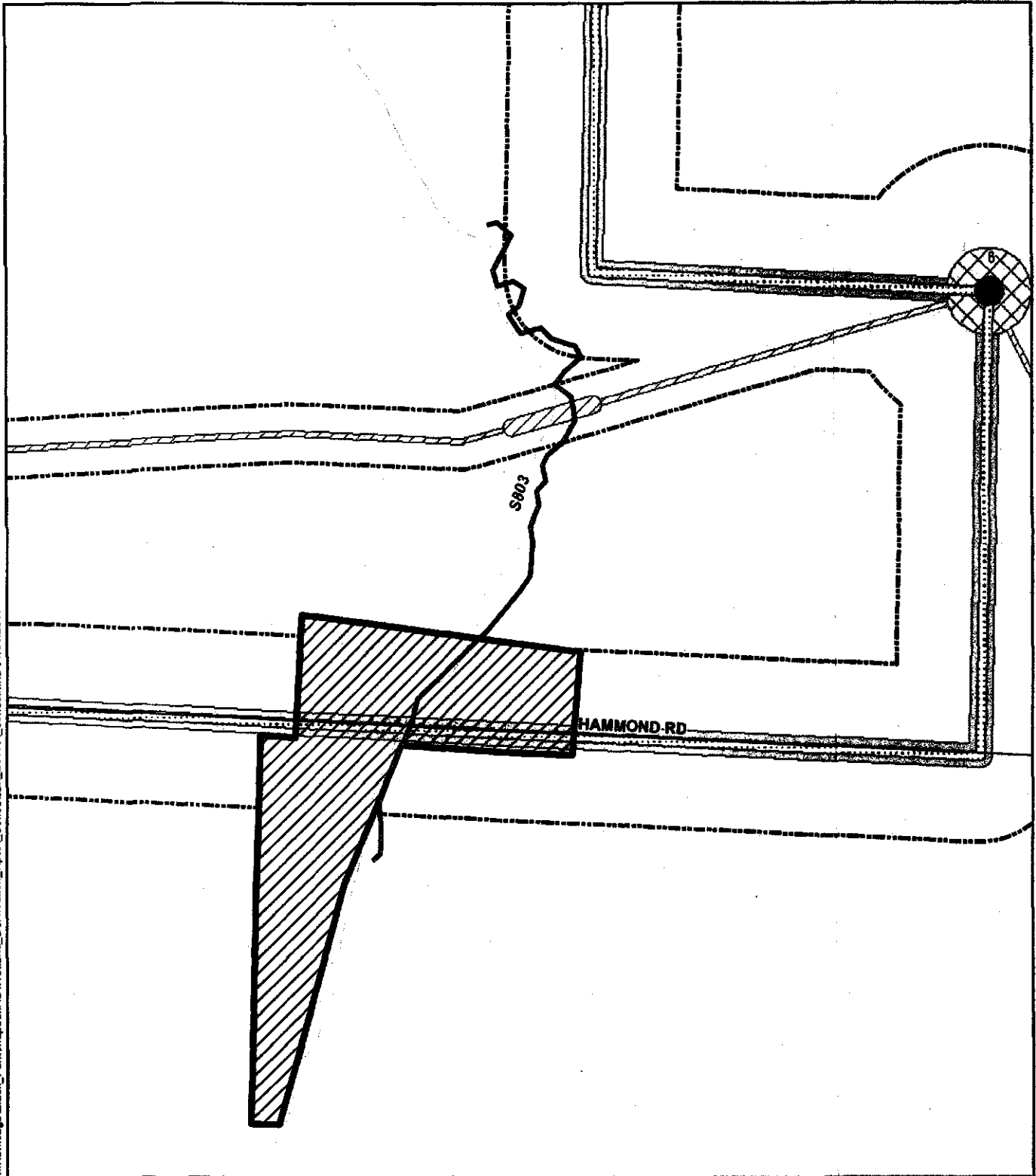


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- Turbines (01-14-11)
- Stream
- Wetland
- Survey Corridor (01-18-11)
- Project Boundary (01-03-11)
- Watershed

Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

⊙ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

— Field Delineated Stream

▨ Field Delineated Wetland

▨ Access Road Permanent ROW (01-14-11)

▨ Access Road Temporary ROW (01-14-11)

▨ Collection ROW (01-14-11)

▨ Turbine Permanent Impact (01-14-11)

▨ Turbine Temporary Impact (01-14-11)

NHD Stream

▨ Survey Corridor (01-18-11)

▨ No Access

— Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

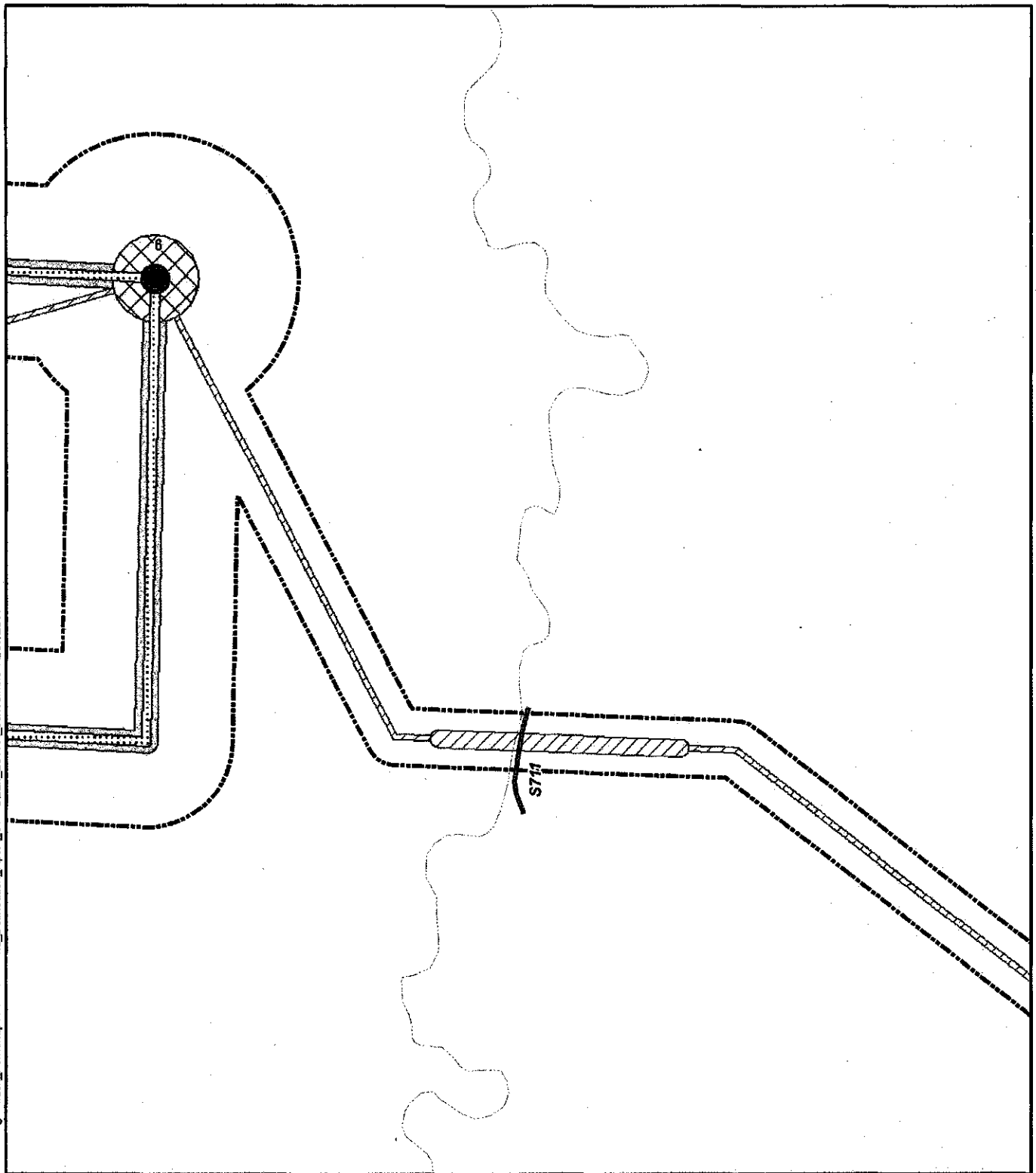
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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

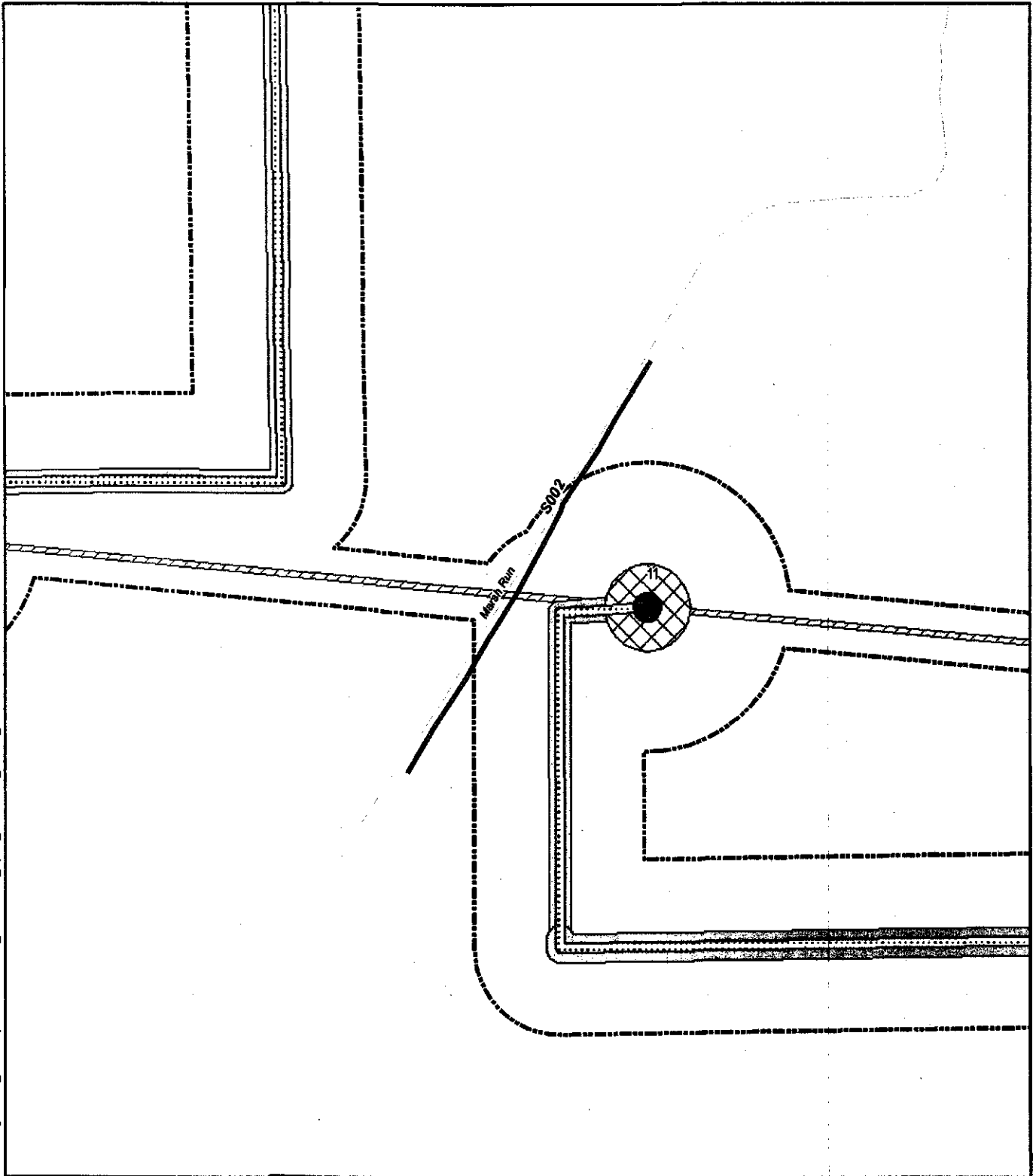
Appendix A
Black Fork Wind Energy, LLC
Field Delineated Features
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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

○ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream

Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

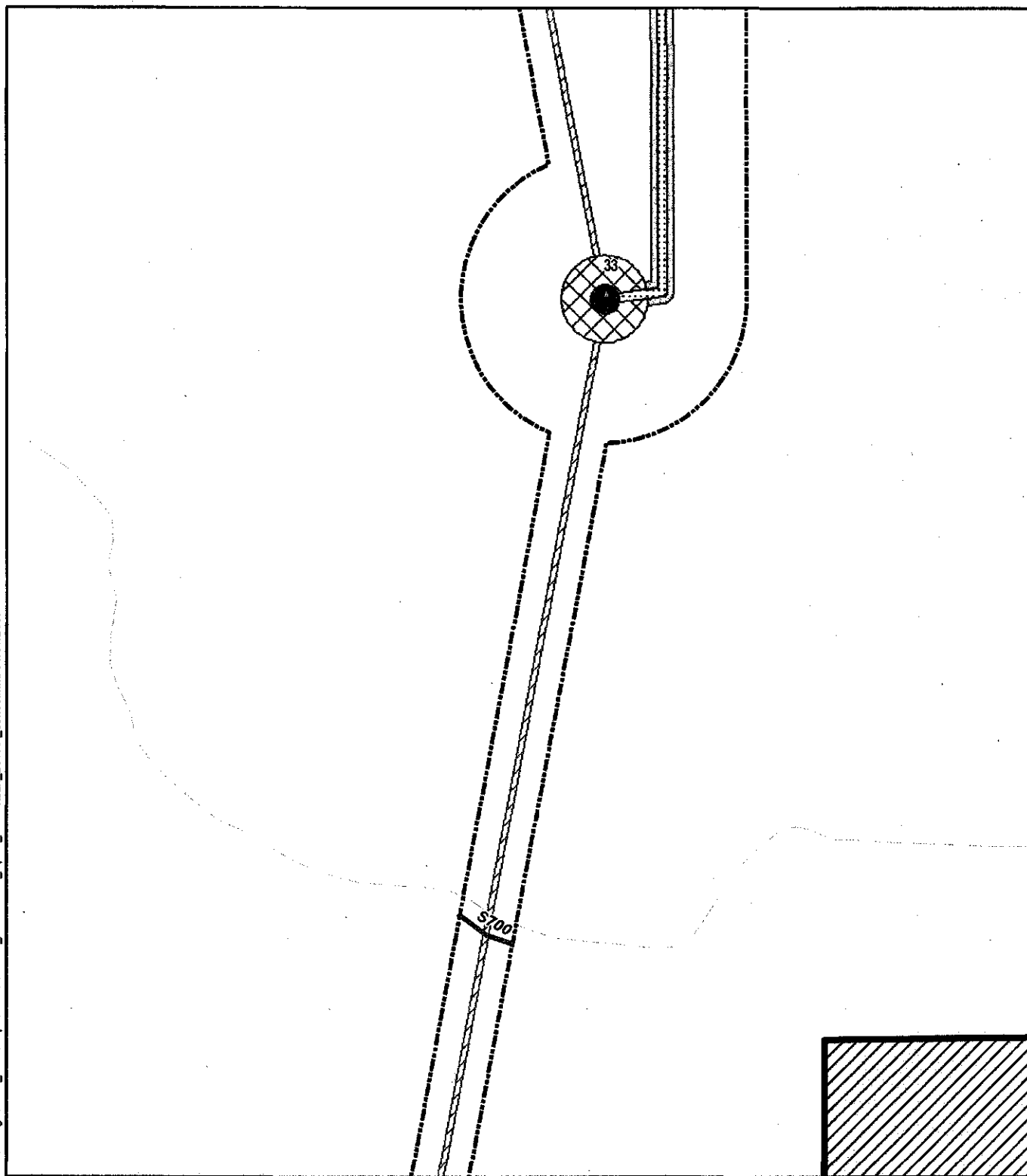
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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

Access Road Permanent ROW (01-14-11)
Access Road Temporary ROW (01-14-11)
Collection ROW (01-14-11)
Turbine Permanent Impact (01-14-11)
Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC
Field Delineated Features

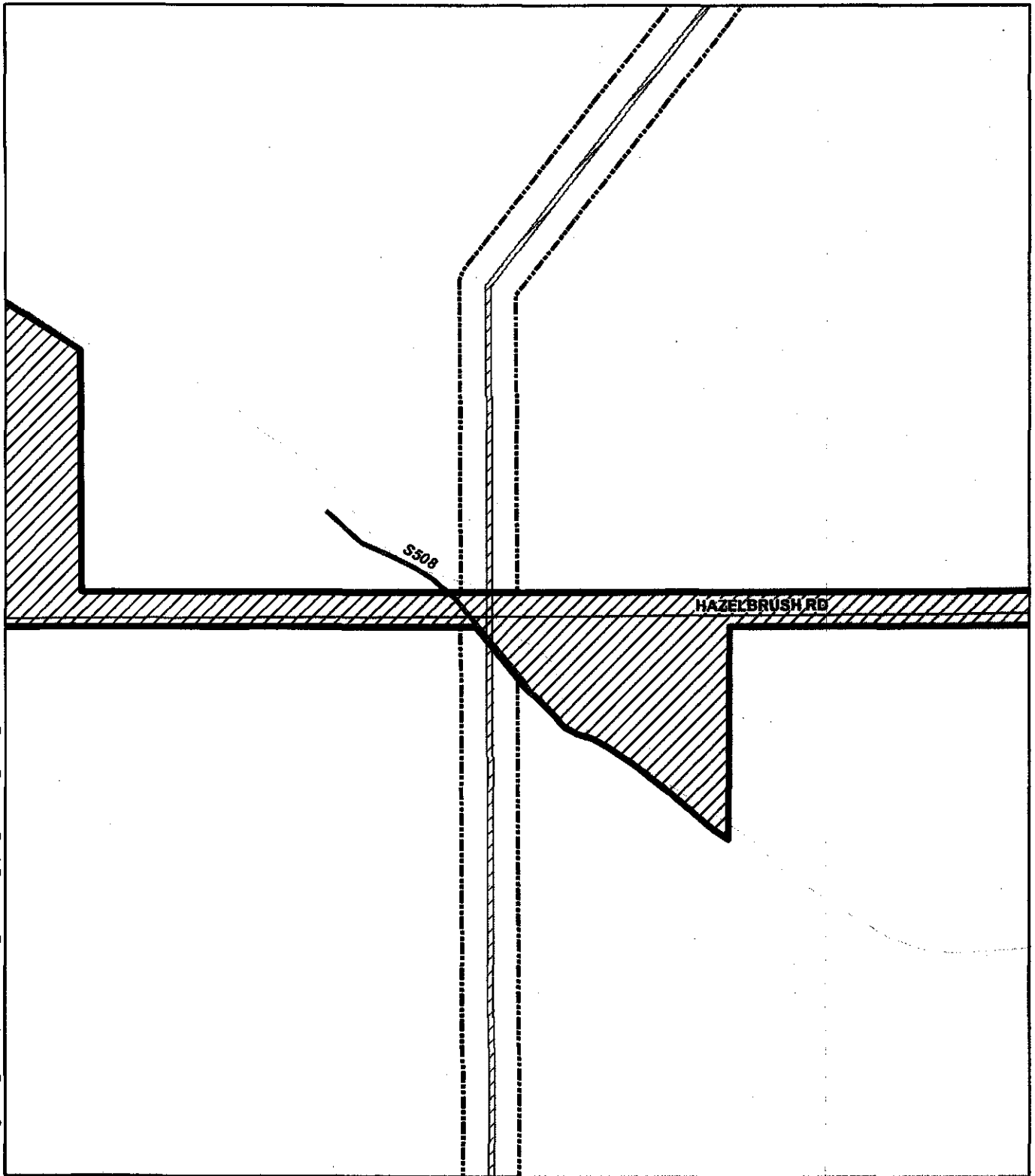
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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

③ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream

Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

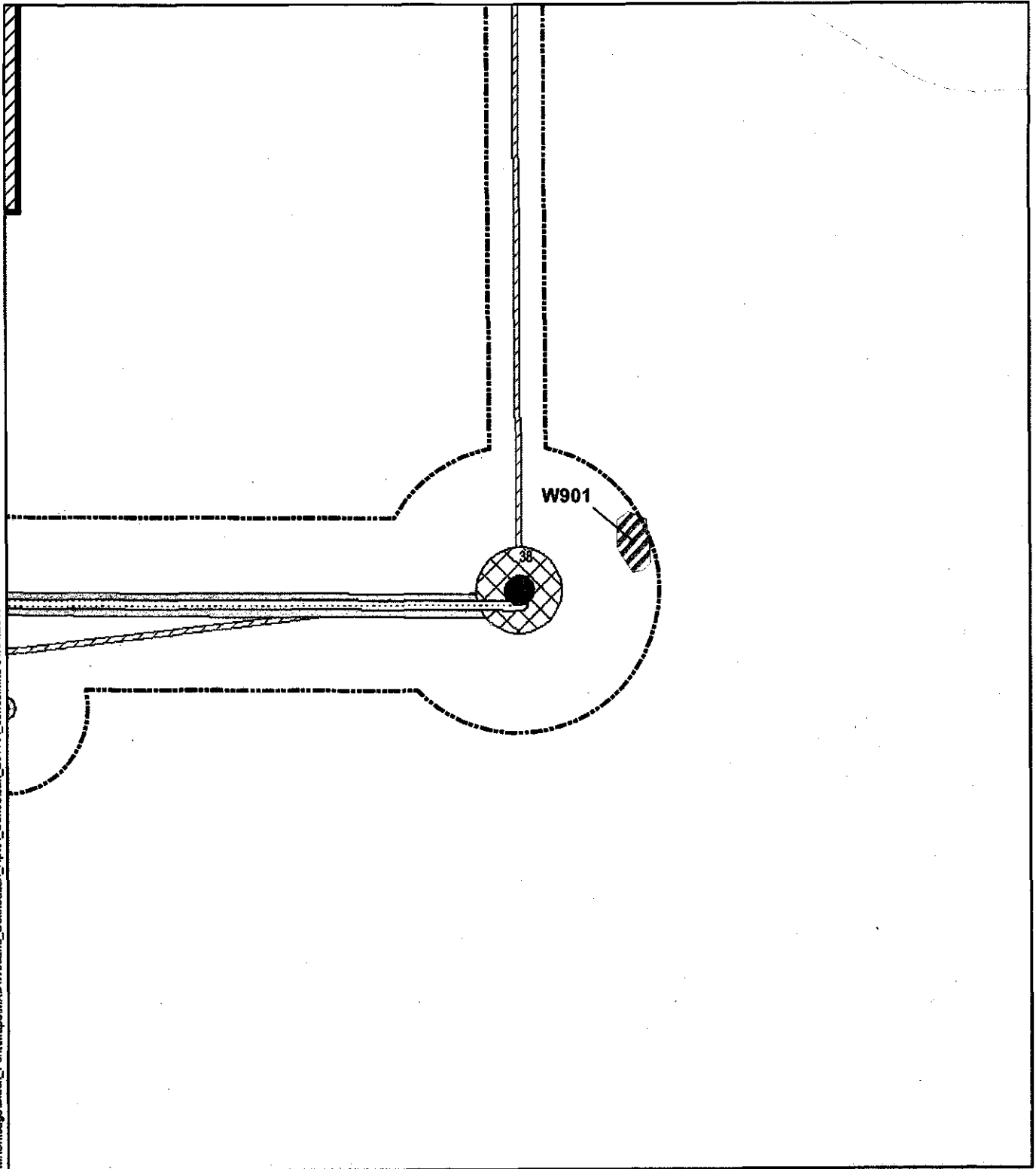
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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
 Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
 Source: USGS in cooperation with USEPA

Appendix A

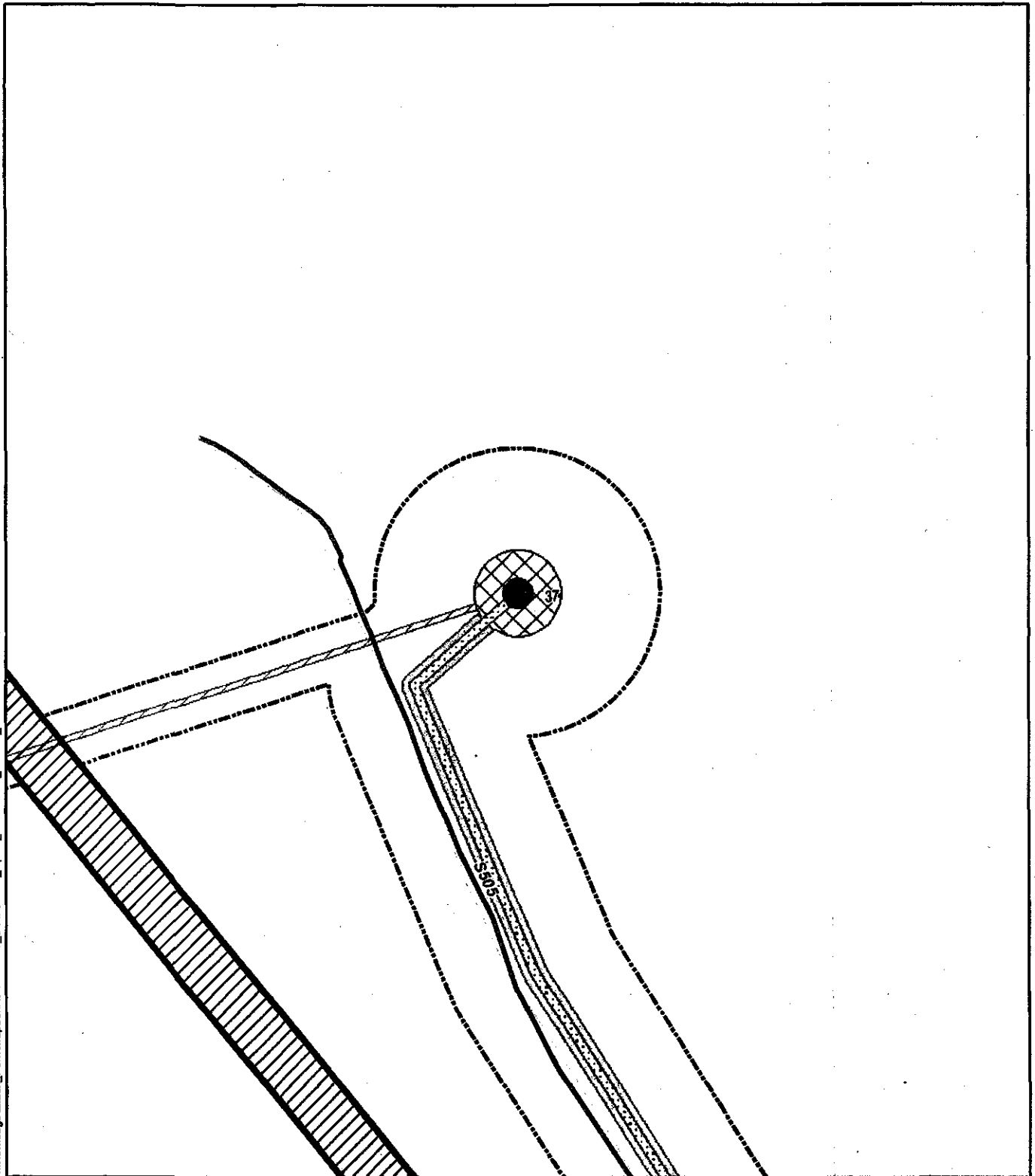
Black Fork Wind Energy, LLC
 Field Delineated Features
 Frame 6 of 24

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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)
Vestas V100

- ⊙ V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

- Access Road Permanent ROW (01-14-11)
- Access Road Temporary ROW (01-14-11)
- Collection ROW (01-14-11)
- Turbine Permanent Impact (01-14-11)
- Turbine Temporary Impact (01-14-11)
- NHD Stream

- Survey Corridor (01-18-11)
- No Access
- Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

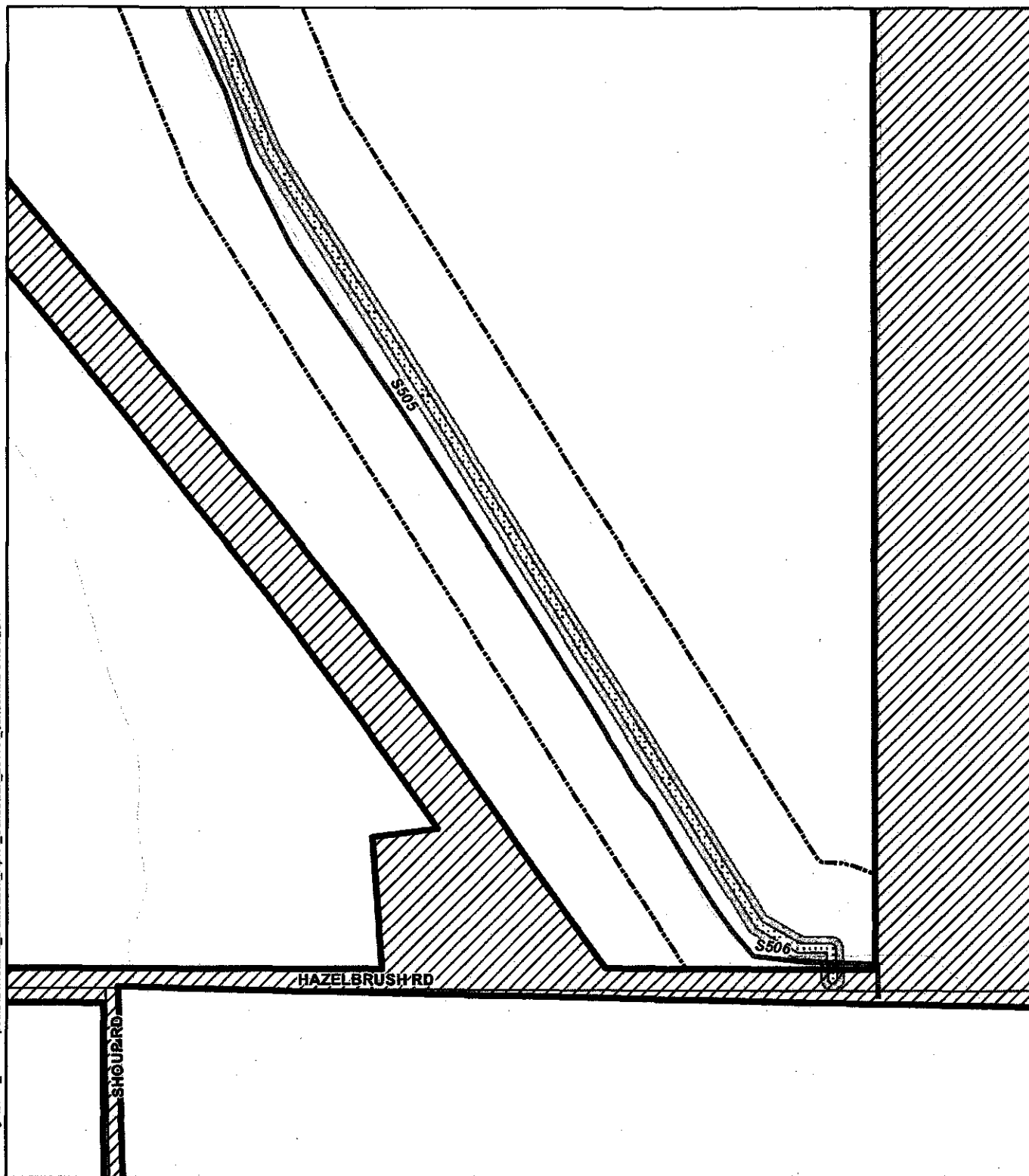
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Black Fork Wind Energy, LLC
Field Delineated Features
Frame 7 of 24

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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

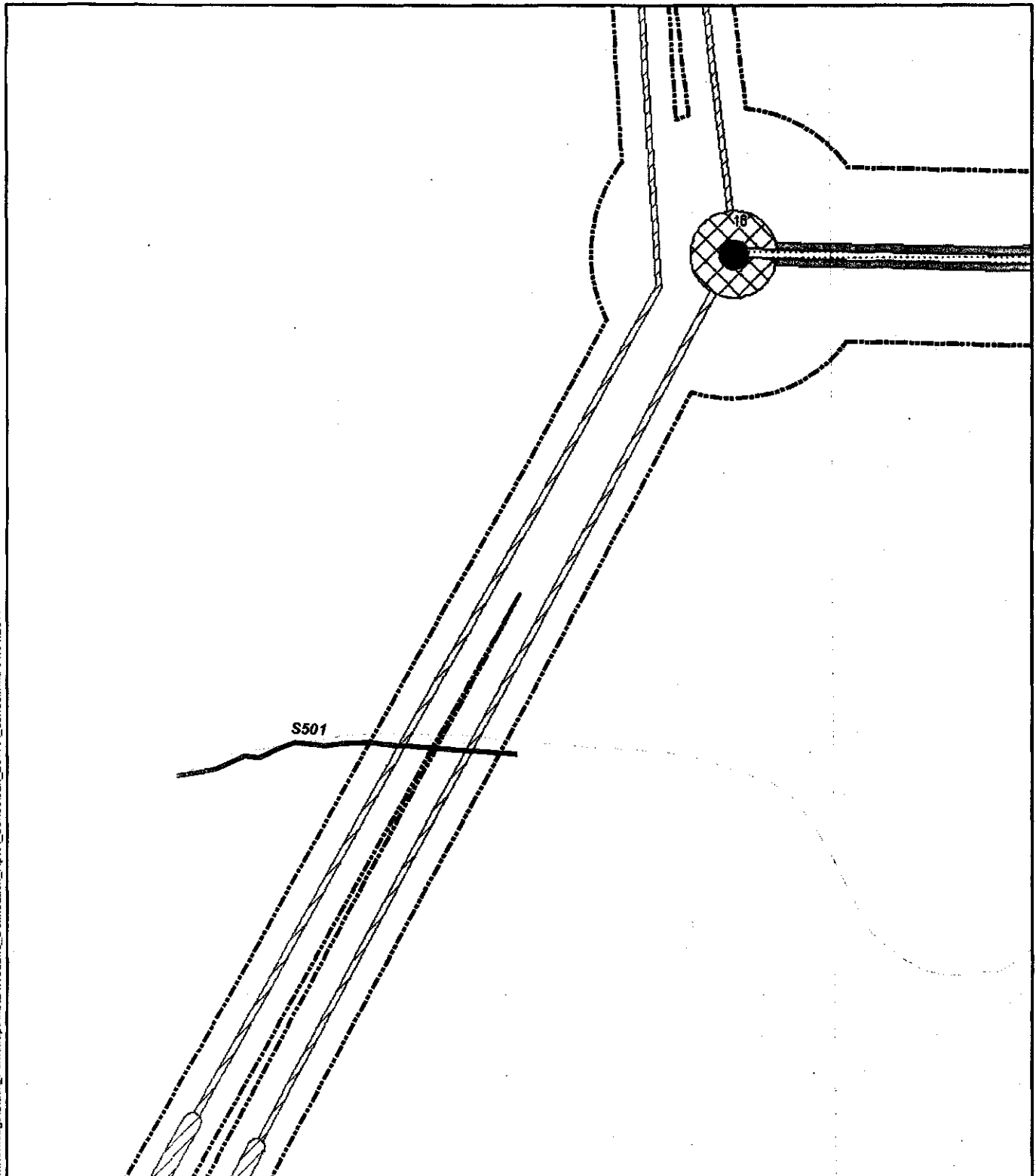
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 8 of 24

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Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

⊙ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

— Field Delineated Stream

▨ Field Delineated Wetland

▨ Access Road Permanent ROW (01-14-11)

▨ Access Road Temporary ROW (01-14-11)

▨ Collection ROW (01-14-11)

▨ Turbine Permanent Impact (01-14-11)

▨ Turbine Temporary Impact (01-14-11)

NHD Stream

▨ Survey Corridor (01-18-11)

▨ No Access

— Public Roads

Note: NHD = National Hydrographic Dataset
 Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

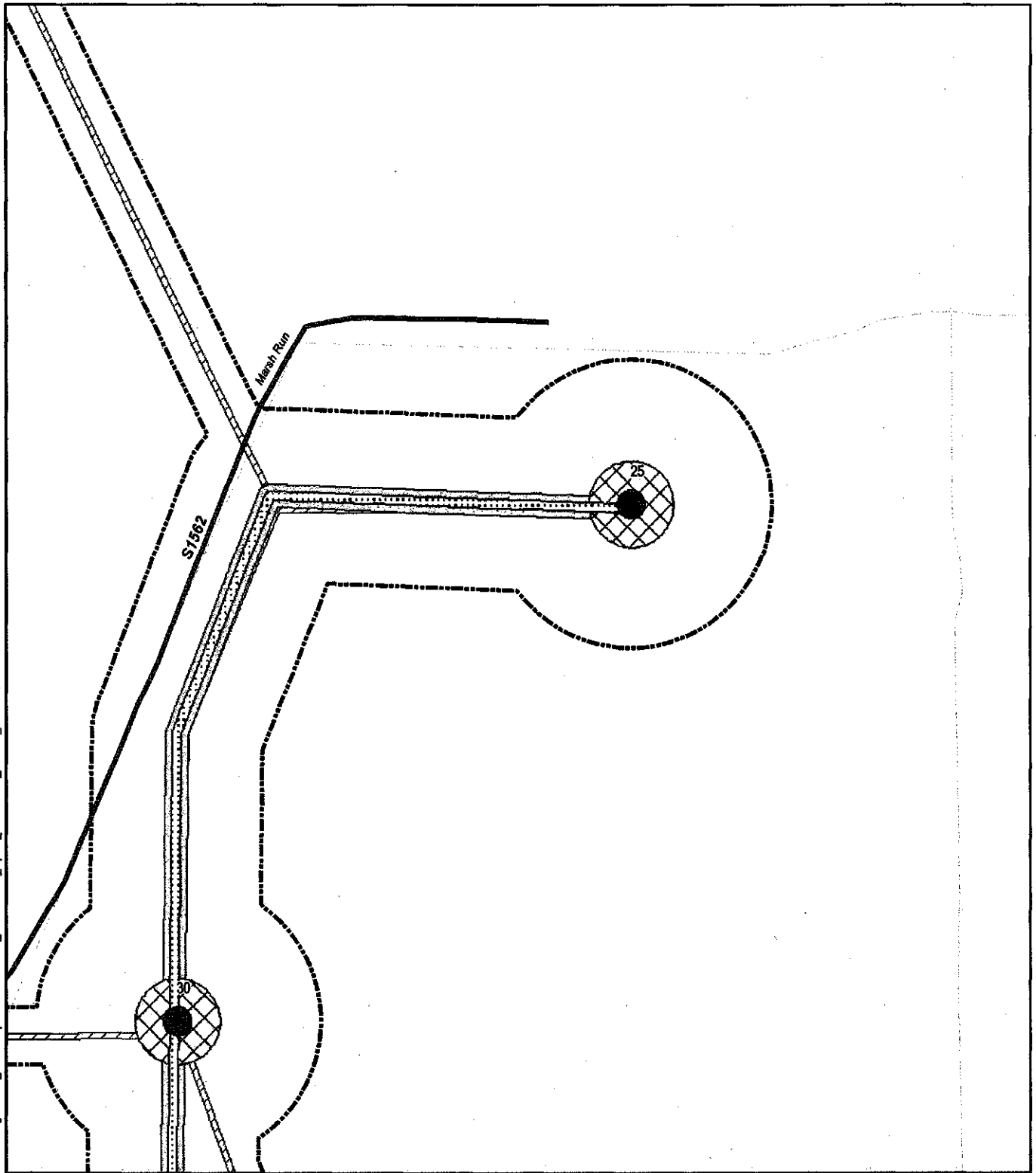
Frame 9 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- ▨ Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC
Field Delineated Features

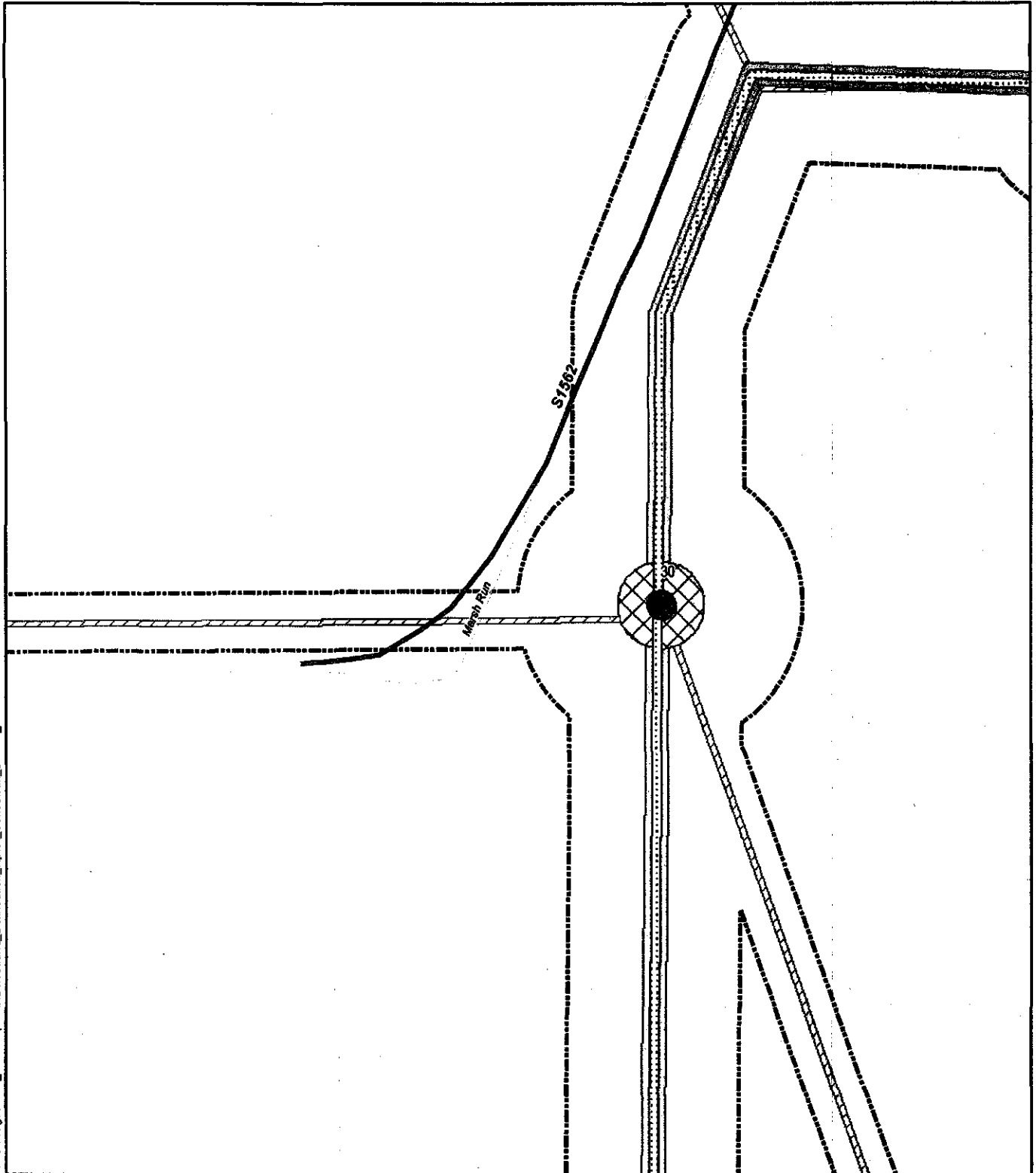
Frame 10 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

⊙ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

— Field Delineated Stream

/// Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

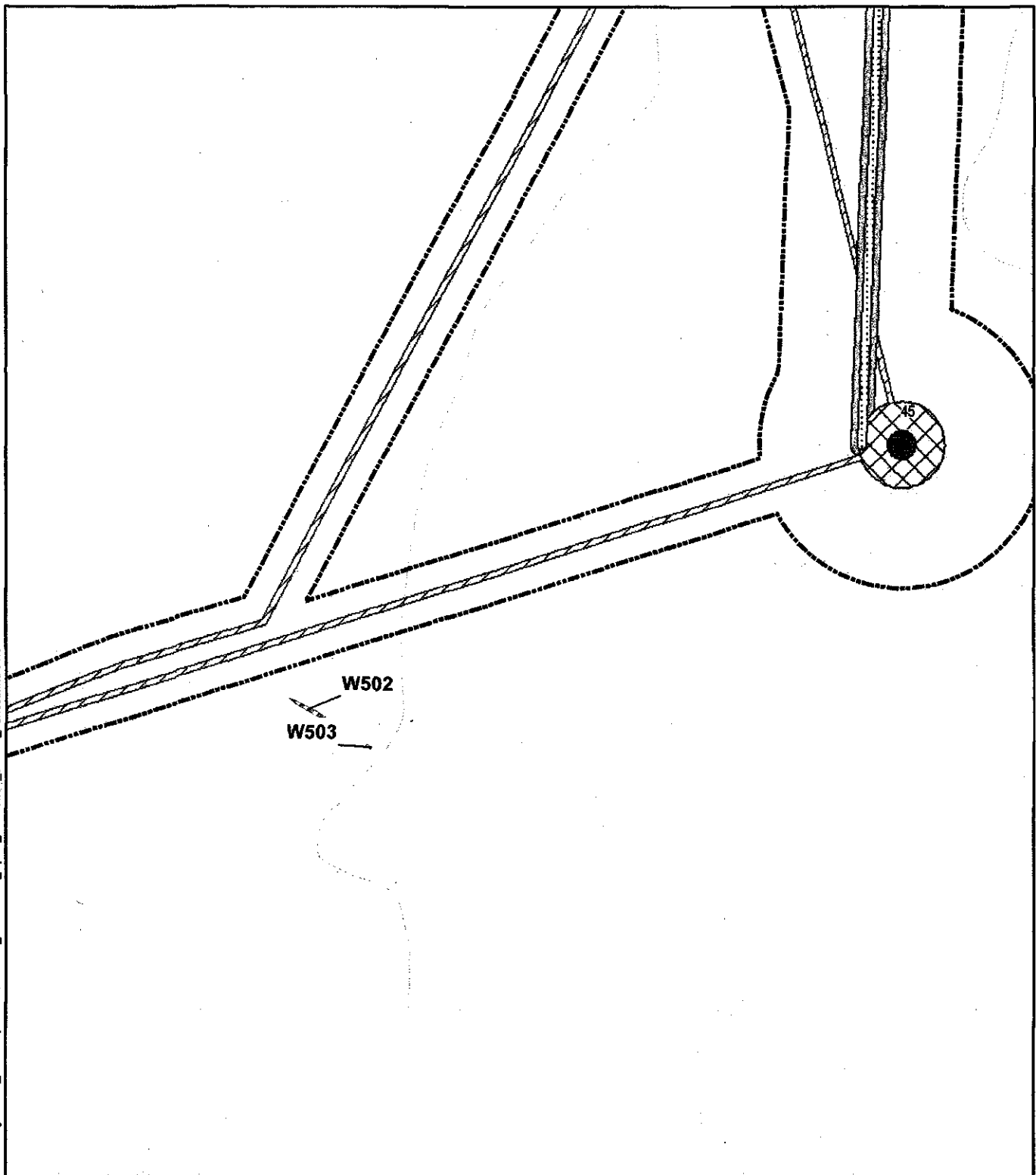
Frame 11 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
 Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
 Sources: USGS in cooperation with USEPA

Appendix A

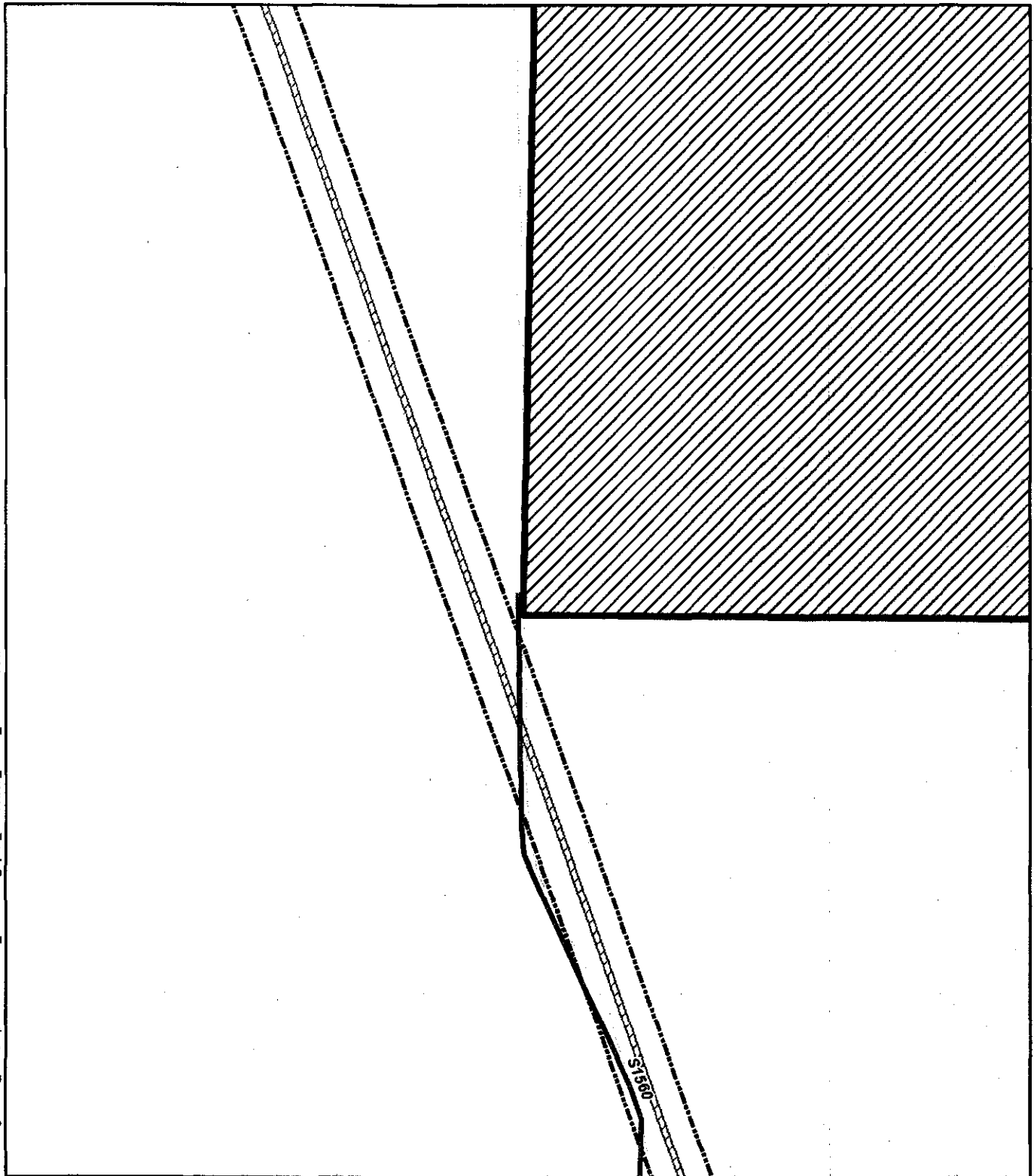
Black Fork Wind Energy, LLC
 Field Delineated Features
 Frame 12 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)
Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

Access Road Permanent ROW (01-14-11)
Access Road Temporary ROW (01-14-11)
Collection ROW (01-14-11)
Turbine Permanent Impact (01-14-11)
Turbine Temporary Impact (01-14-11)
NHD Stream

Survey Corridor (01-18-11)
No Access
Public Roads

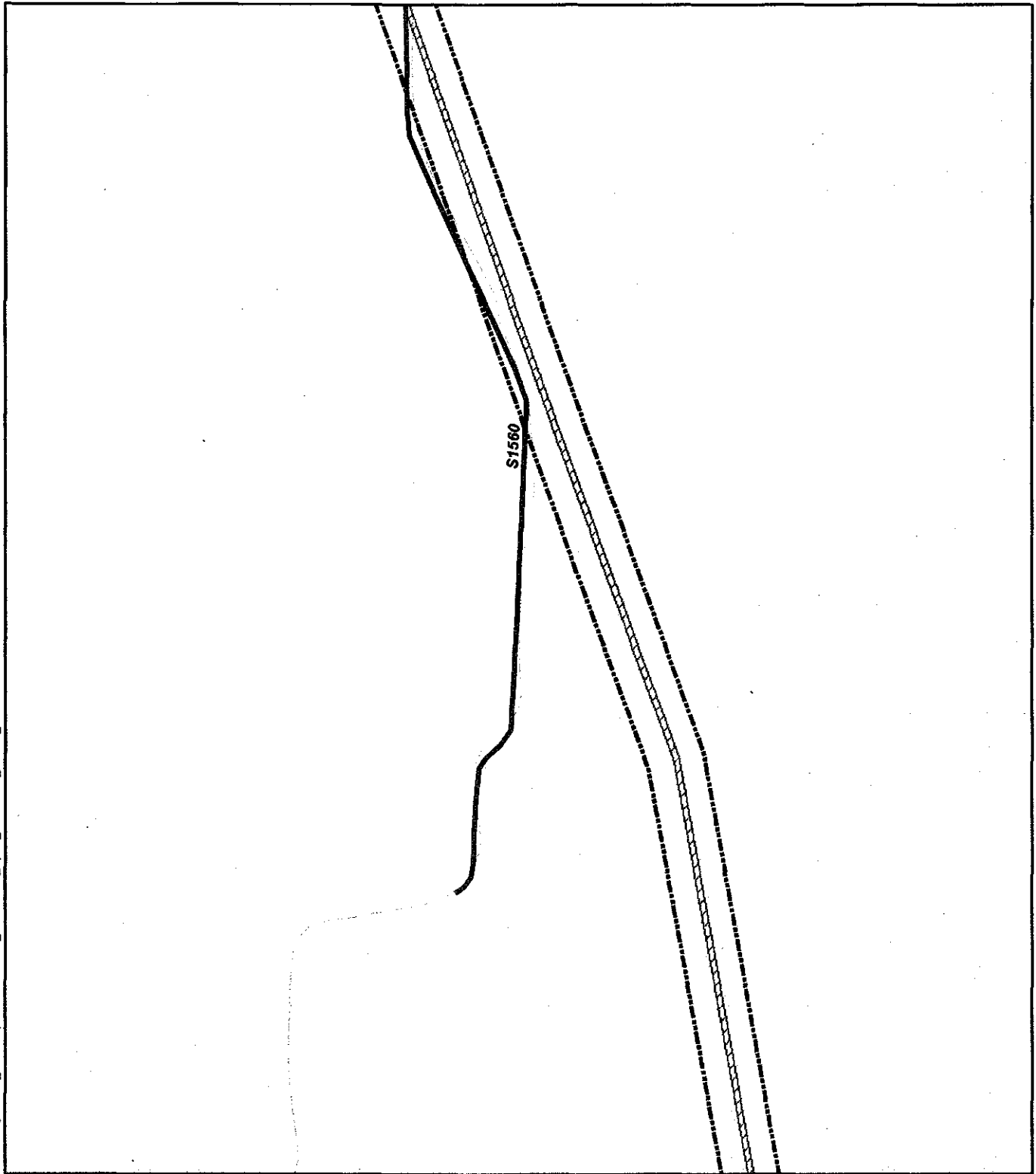
Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 13 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features



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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- ▨ Field Delineated Wetland

- ▨ Access Road Permanent ROW (01-14-11)
- ▨ Access Road Temporary ROW (01-14-11)
- ▨ Collection ROW (01-14-11)
- ▨ Turbine Permanent Impact (01-14-11)
- ▨ Turbine Temporary Impact (01-14-11)
- NHD Stream

- ▨ Survey Corridor (01-18-11)
- ▨ No Access
- Public Roads

Note: NHD = National Hydrographic Dataset
 Source: USGS in cooperation with USEPA

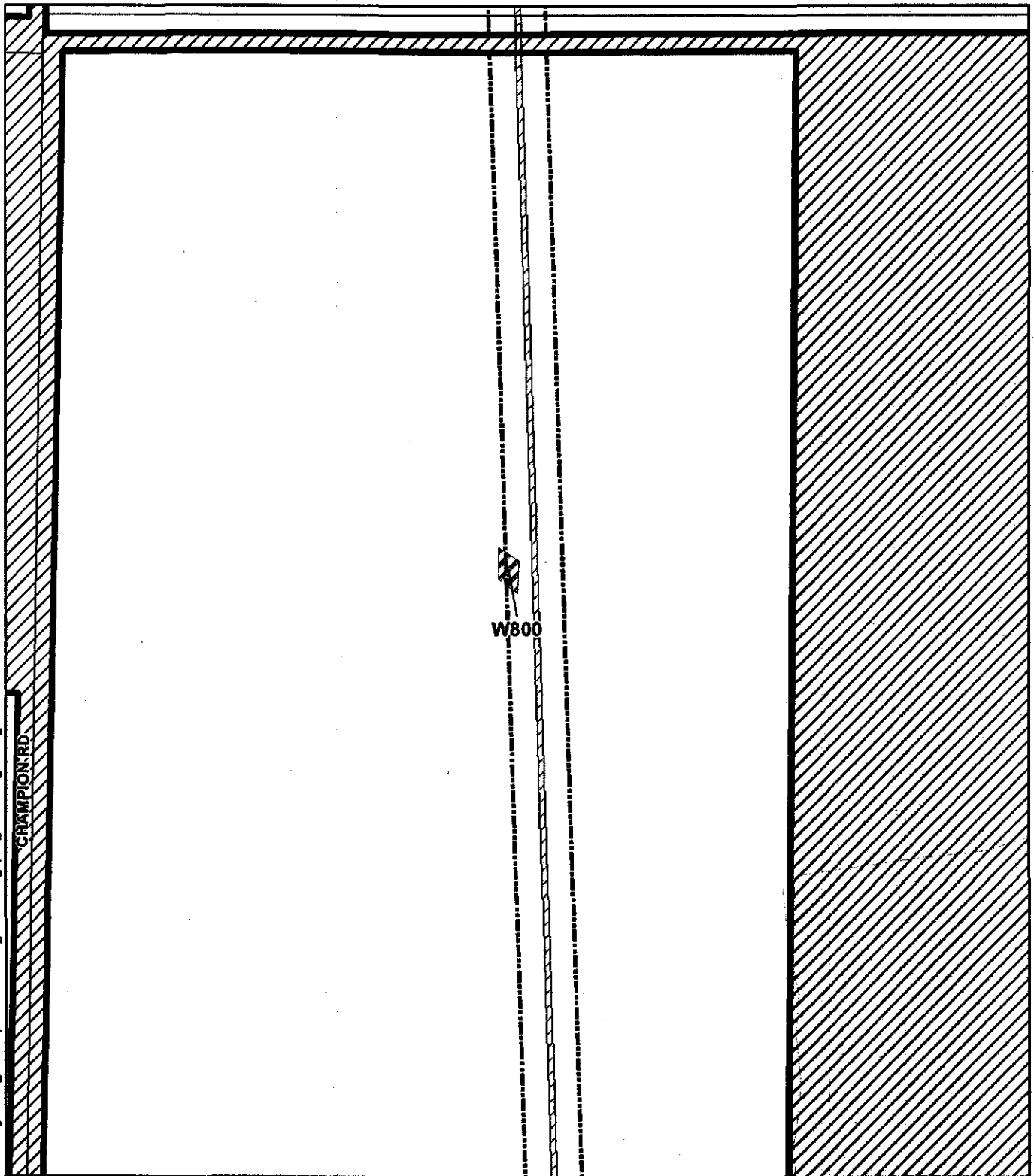
Appendix A
 Black Fork Wind Energy, LLC
 Field Delineated Features
 Frame 14 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

① V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream

Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
 Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

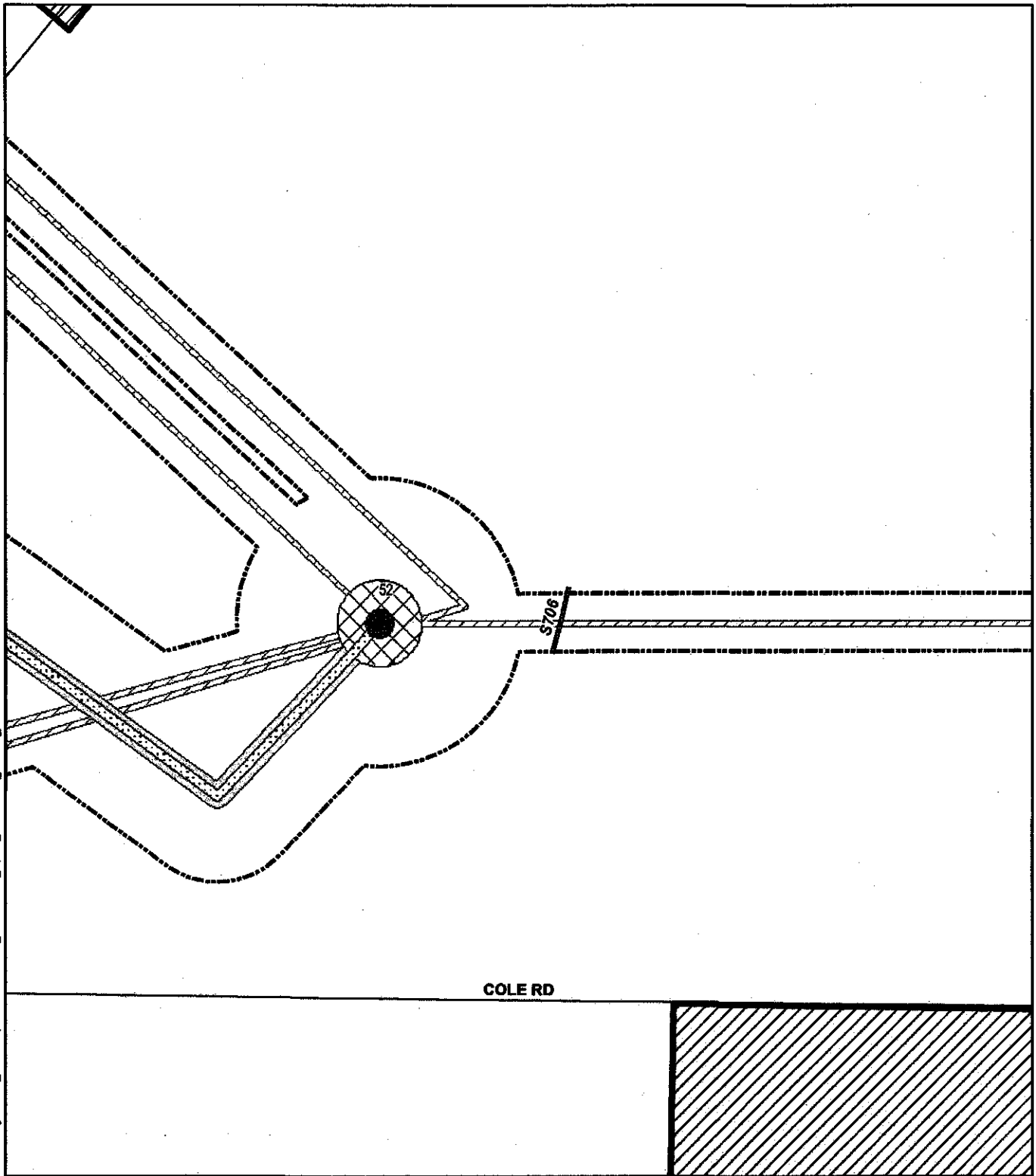
Frame 15 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- ▨ Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC
Field Delineated Features

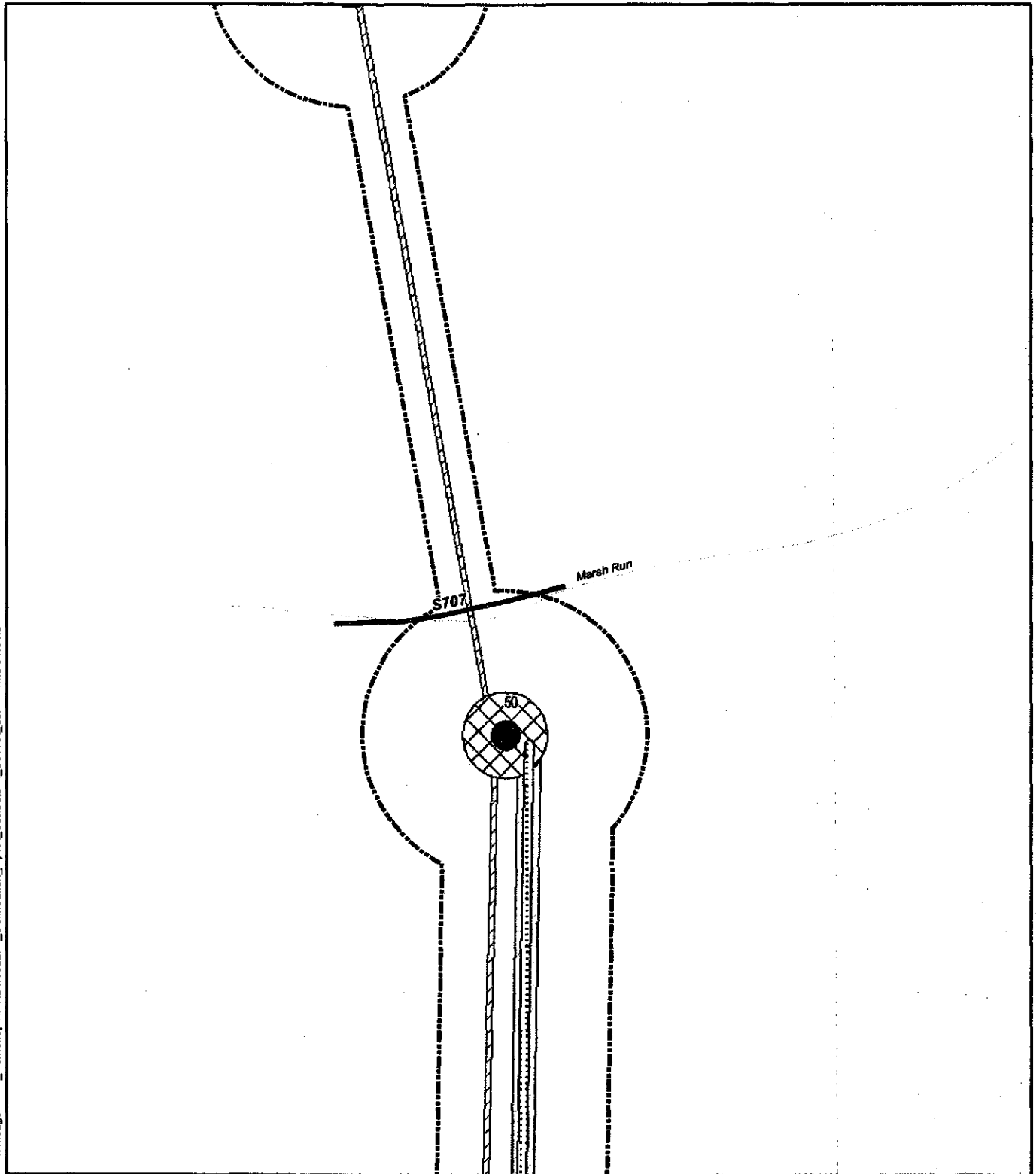
Frame 16 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

☉ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream

Field Delineated Wetland

Access Road Permanent ROW (01-14-11)

Access Road Temporary ROW (01-14-11)

Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)

Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset

Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

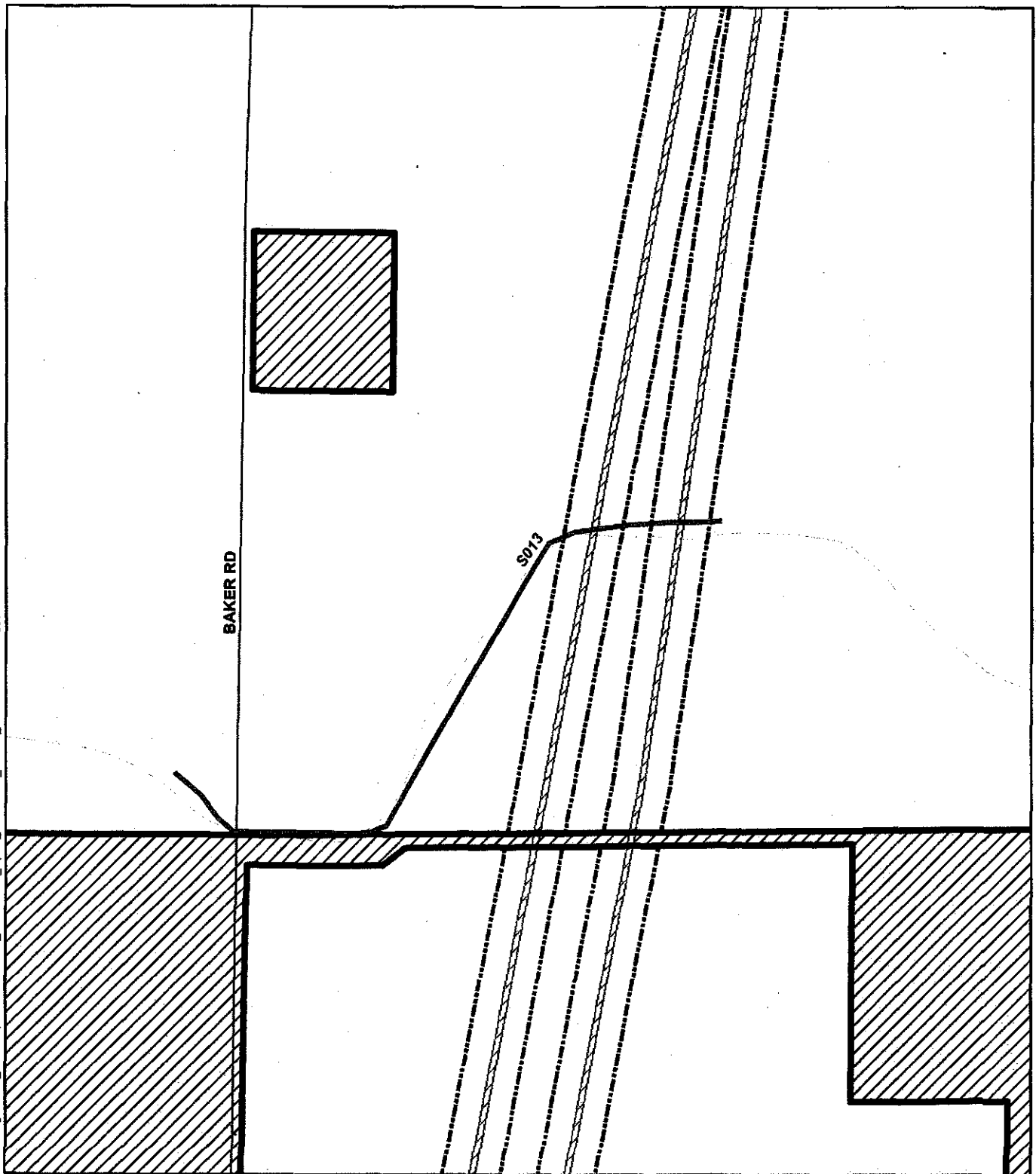
Frame 17 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
 Field Delineated Wetland

Access Road Permanent ROW (01-14-11)
 Access Road Temporary ROW (01-14-11)
 Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)
 Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
 Source: USGS in cooperation with USEPA

Appendix A

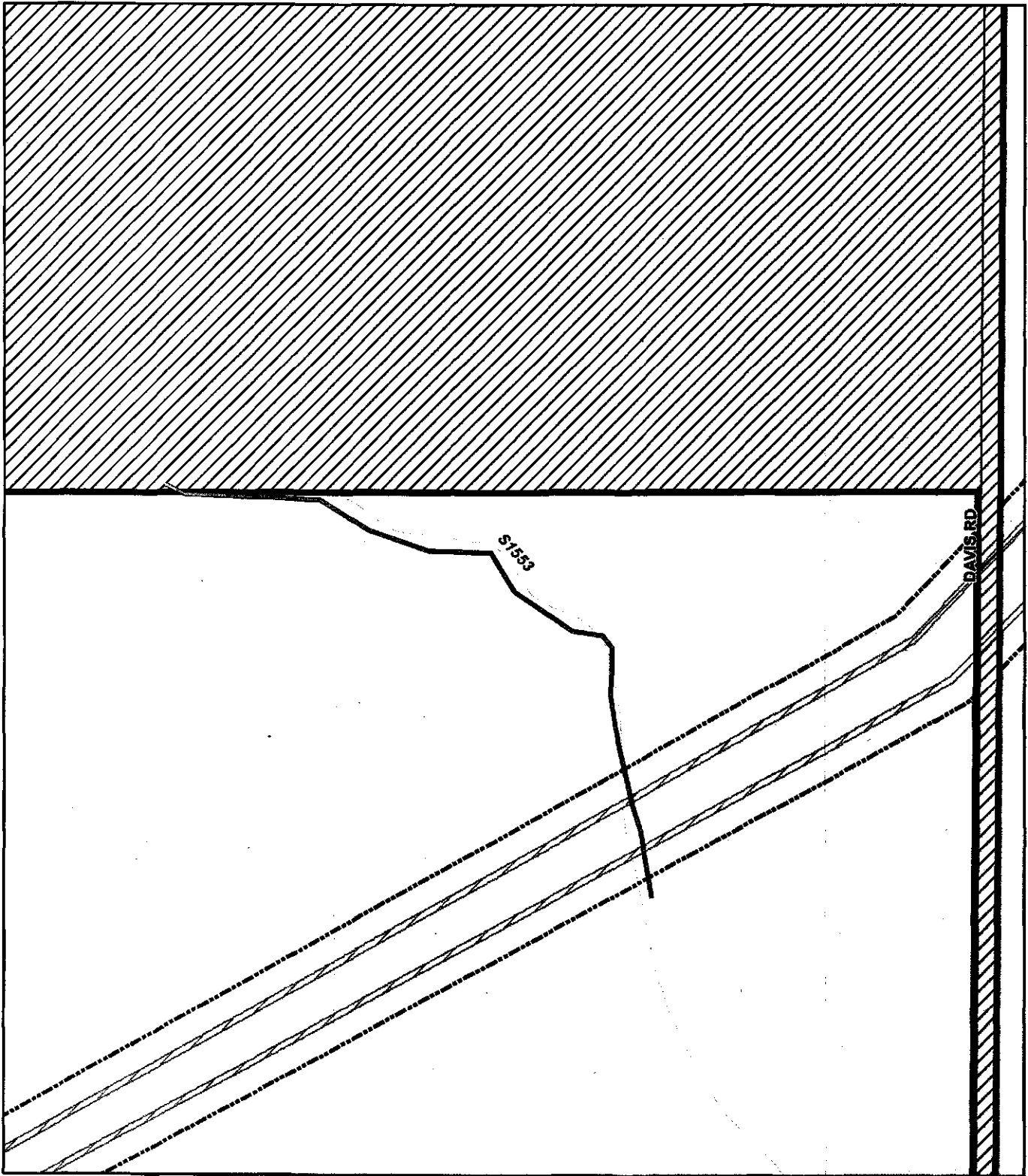
Black Fork Wind Energy, LLC
 Field Delineated Features
 Frame 18 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)
Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

- Access Road Permanent ROW (01-14-11)
- Access Road Temporary ROW (01-14-11)
- Collection ROW (01-14-11)
- Turbine Permanent Impact (01-14-11)
- Turbine Temporary Impact (01-14-11)
- NHD Stream

- Survey Corridor (01-18-11)
- No Access
- Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

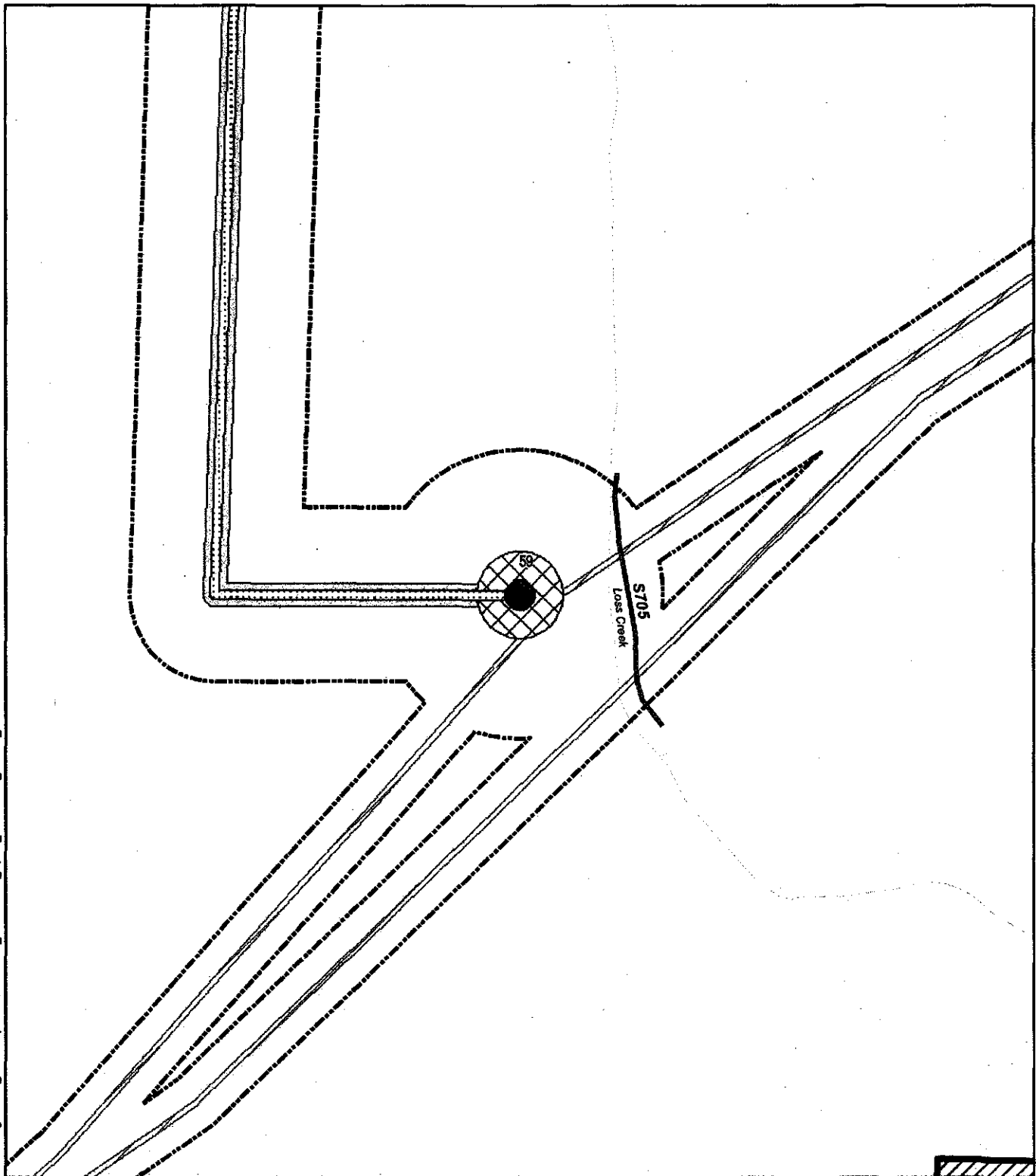
Appendix A
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 19 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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- | | | |
|---|--|--|
| <p>Turbines (01-14-11)</p> <p>Vestas V100</p> <ul style="list-style-type: none"> ● V100 w/ 80 m Hub (130m tip height) ● V100 w/ 95 m Hub (145m tip height) <p>— Field Delineated Stream</p> <p>▨ Field Delineated Wetland</p> | <p>▨ Access Road Permanent ROW (01-14-11)</p> <p>▨ Access Road Temporary ROW (01-14-11)</p> <p>▨ Collection ROW (01-14-11)</p> <p>▨ Turbine Permanent Impact (01-14-11)</p> <p>▨ Turbine Temporary Impact (01-14-11)</p> <p>— NHD Stream</p> | <p>▨ Survey Corridor (01-18-11)</p> <p>▨ No Access</p> <p>— Public Roads</p> <p>Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA</p> |
|---|--|--|

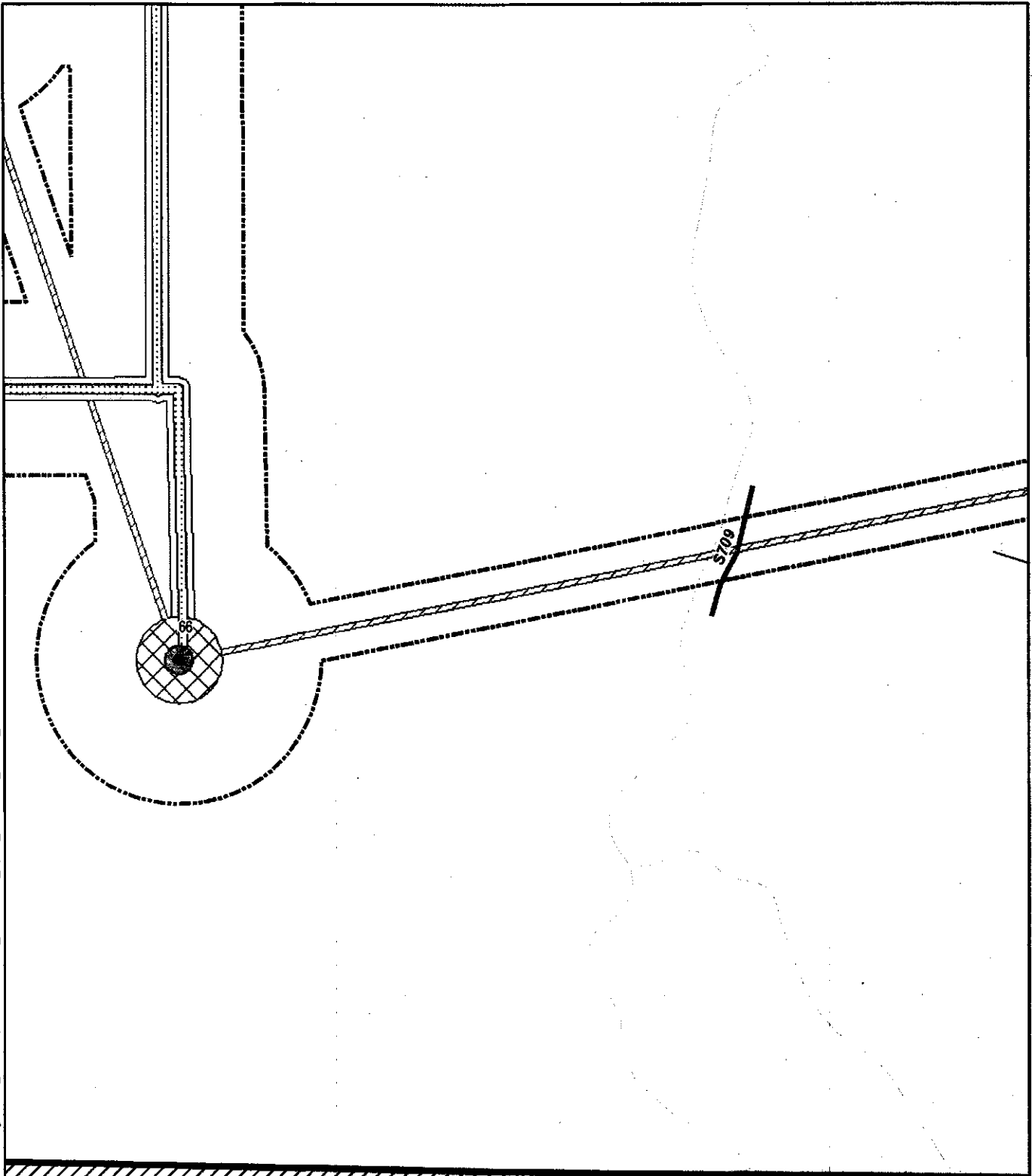
Appendix A
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 20 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

⊙ V100 w/ 80 m Hub (130m tip height)

● V100 w/ 95 m Hub (145m tip height)

— Field Delineated Stream

▨ Field Delineated Wetland

▨ Access Road Permanent ROW (01-14-11)

▨ Access Road Temporary ROW (01-14-11)

▨ Collection ROW (01-14-11)

▨ Turbine Permanent Impact (01-14-11)

▨ Turbine Temporary Impact (01-14-11)

NHD Stream

▨ Survey Corridor (01-18-11)

▨ No Access

— Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

Black Fork Wind Energy, LLC

Field Delineated Features

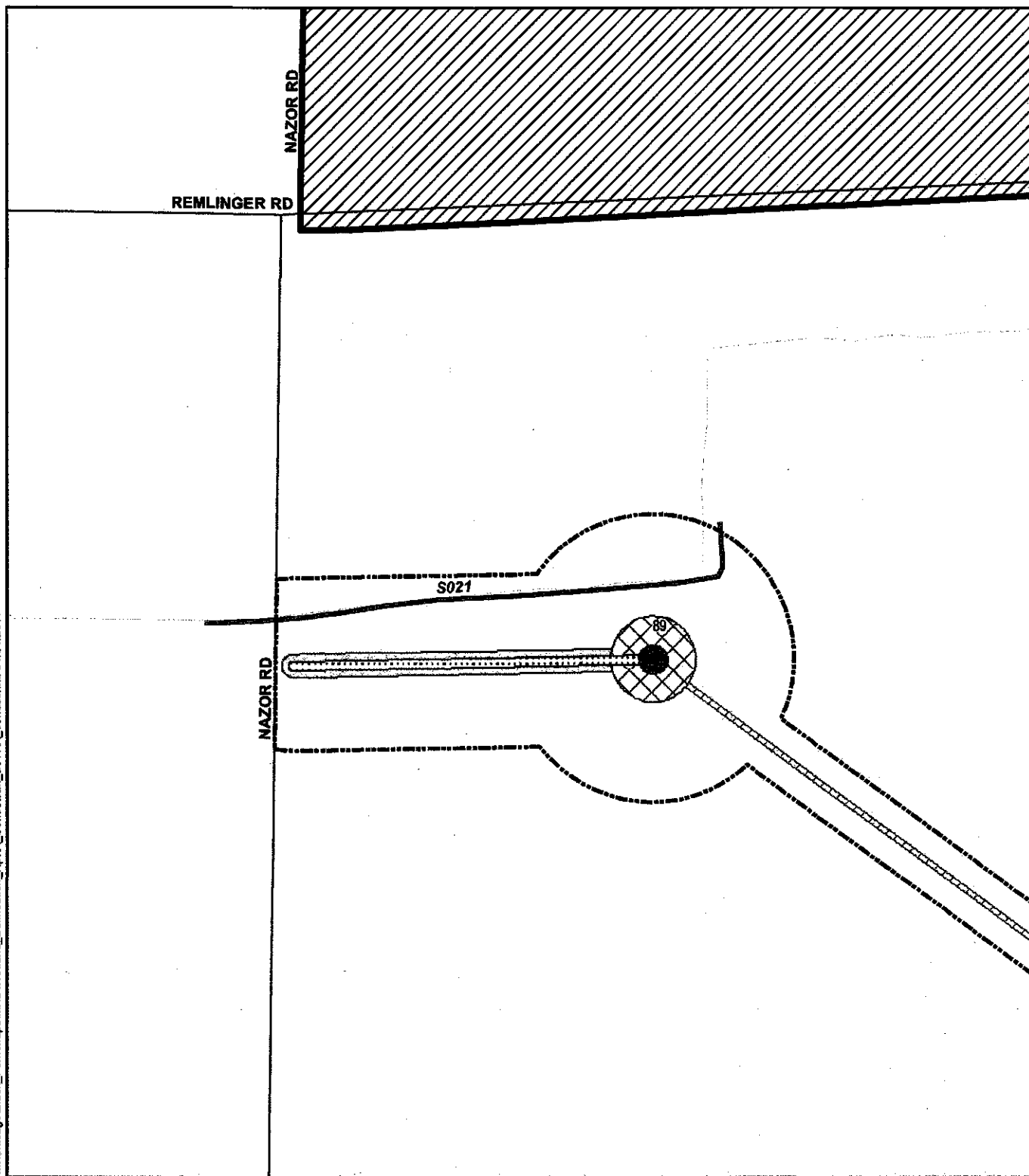
Frame 21 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- ▨ Field Delineated Wetland

- ▨ Access Road Permanent ROW (01-14-11)
- ▨ Access Road Temporary ROW (01-14-11)
- ▨ Collection ROW (01-14-11)
- ▨ Turbine Permanent Impact (01-14-11)
- ▨ Turbine Temporary Impact (01-14-11)
- NHD Stream

▨ Survey Corridor (01-18-11)

▨ No Access

— Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

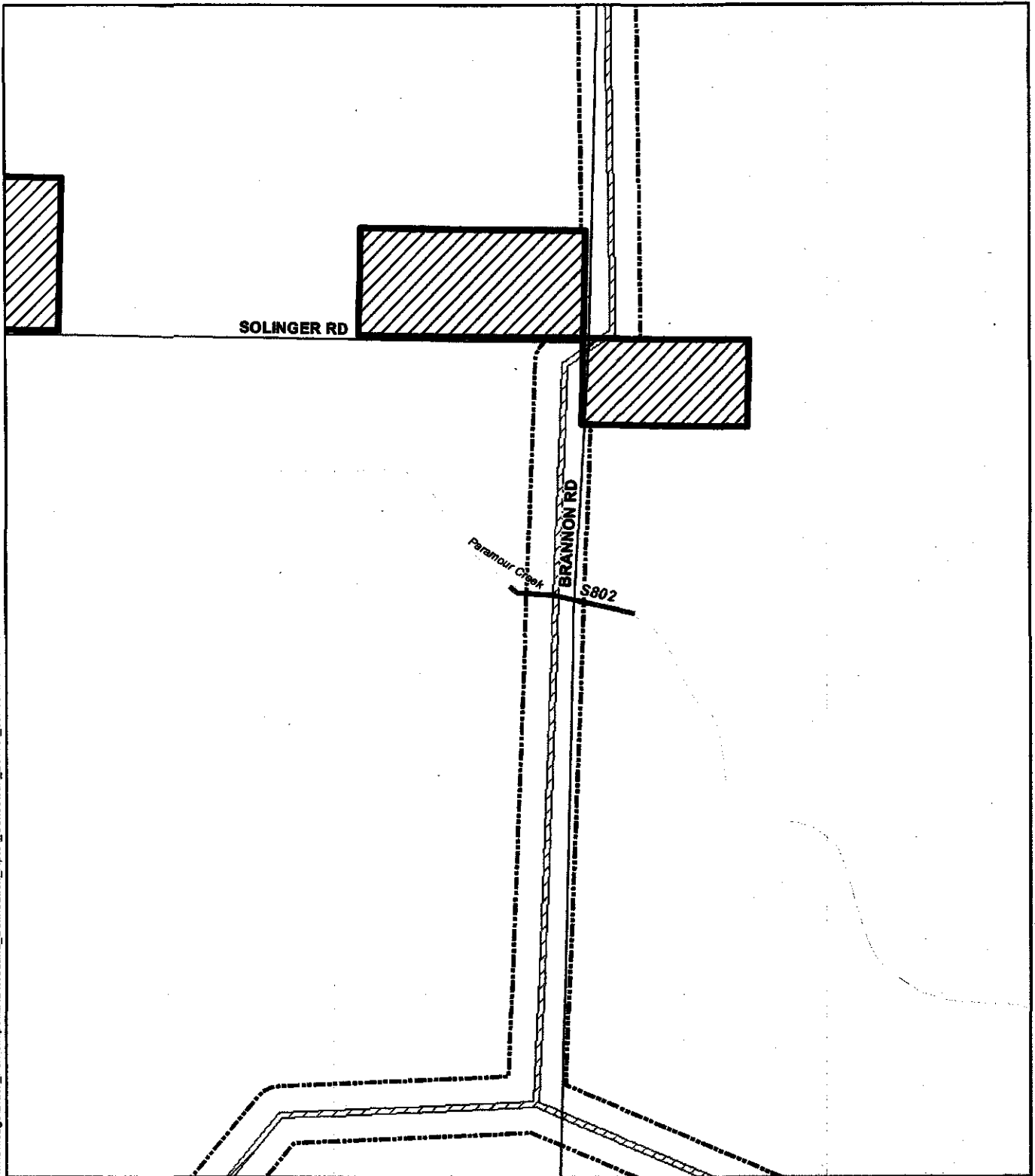
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 22 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)
Vestas V100

- ⊙ V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

Field Delineated Stream
Field Delineated Wetland

Access Road Permanent ROW (01-14-11)
Access Road Temporary ROW (01-14-11)
Collection ROW (01-14-11)

Turbine Permanent Impact (01-14-11)
Turbine Temporary Impact (01-14-11)

NHD Stream

Survey Corridor (01-18-11)

No Access

Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A

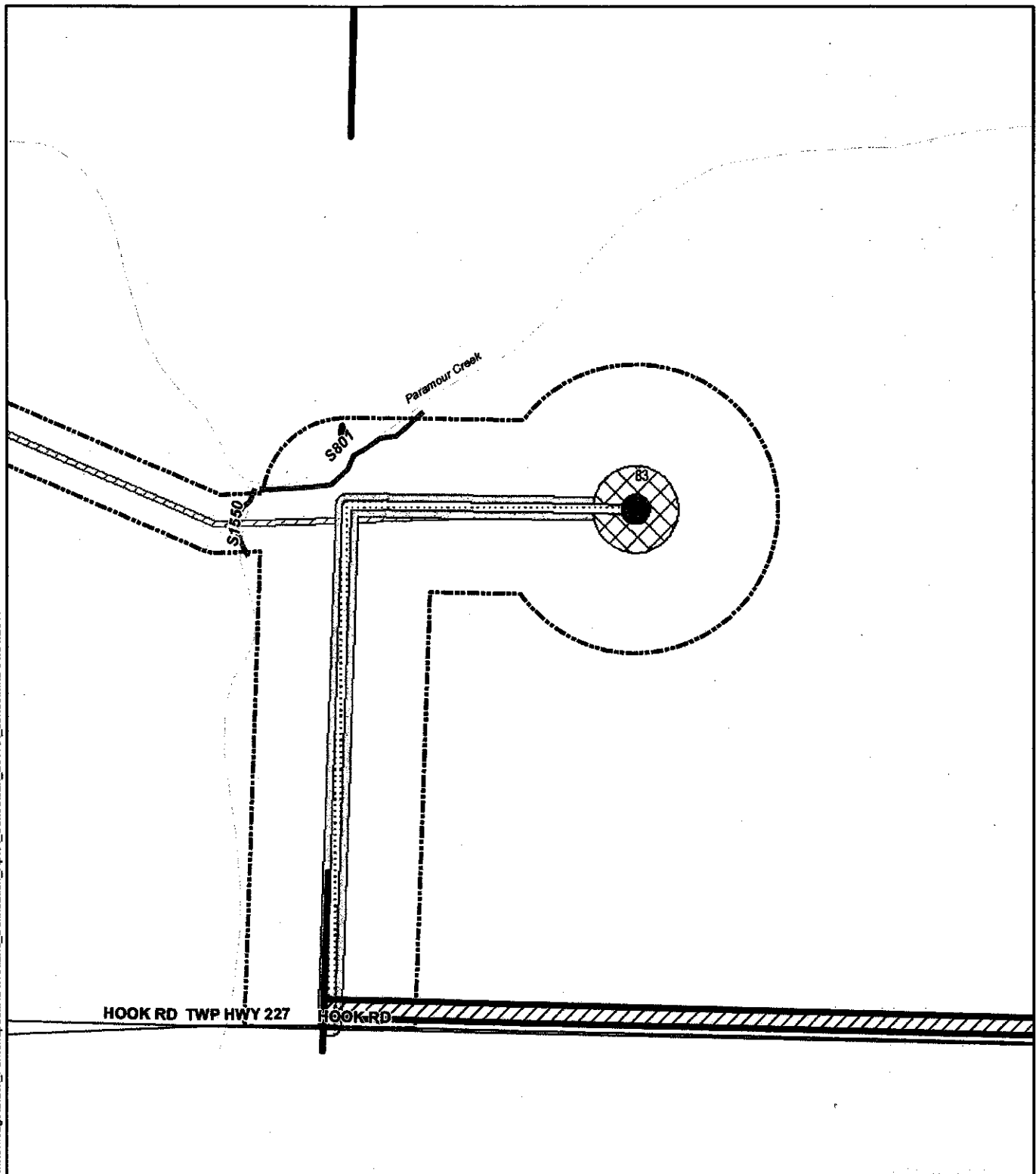
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 23 of 24

0 50 100 200 Feet



Black Fork Wind Energy, LLC - Field Delineated Features

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Turbines (01-14-11)

Vestas V100

- V100 w/ 80 m Hub (130m tip height)
- V100 w/ 95 m Hub (145m tip height)

- Field Delineated Stream
- ▨ Field Delineated Wetland

- ▨ Access Road Permanent ROW (01-14-11)
- ▨ Access Road Temporary ROW (01-14-11)
- ▨ Collection ROW (01-14-11)
- ▨ Turbine Permanent Impact (01-14-11)
- ▨ Turbine Temporary Impact (01-14-11)
- NHD Stream

▨ Survey Corridor (01-18-11)

▨ No Access

— Public Roads

Note: NHD = National Hydrographic Dataset
Source: USGS in cooperation with USEPA

Appendix A
Black Fork Wind Energy, LLC
Field Delineated Features
Frame 24 of 24

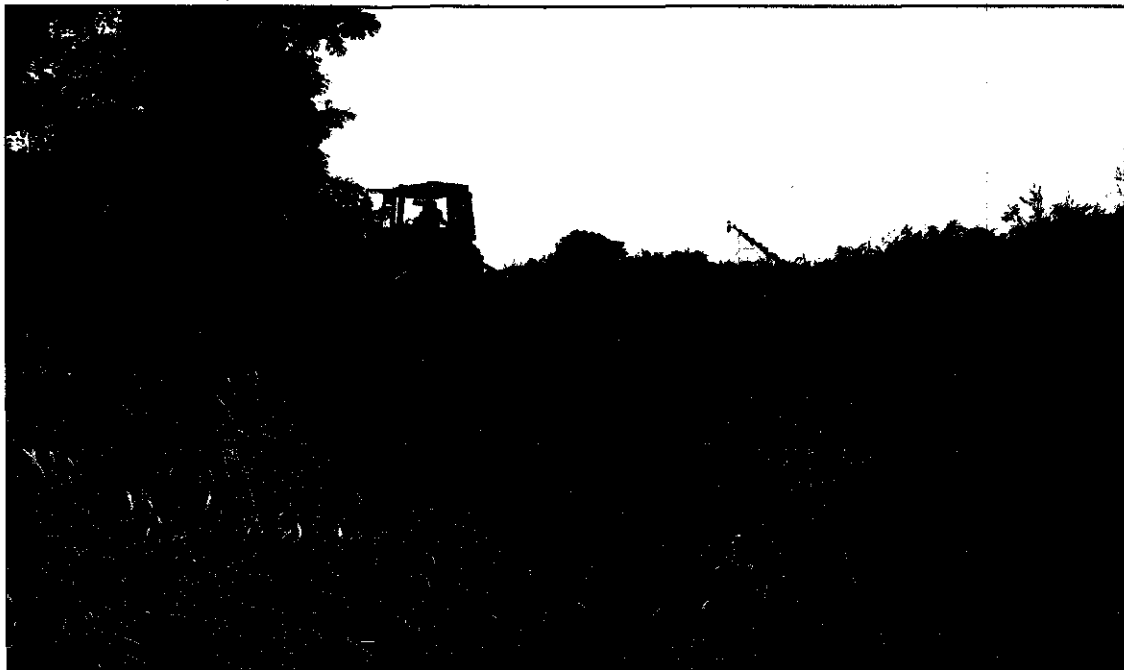
0 50 100 200 Feet



B

Photos

**Black Fork Wind
Field Survey Photographs**



Date: September 22, 2009
Location P007: Looking upstream at S002
Direction of View: Southwest



Date: September 22, 2009
Location P008: Downstream at S002
Direction of View: Northeast



Date: October 18, 2010
Location P49- Stream S013 looking upstream
Direction of View: East



Date: October 18, 2010
Location P50: Stream S013, looking downstream
Direction of View: West



Date: October 2, 2009
Location P209: S021 taken from Nazor Road
Direction of View: South



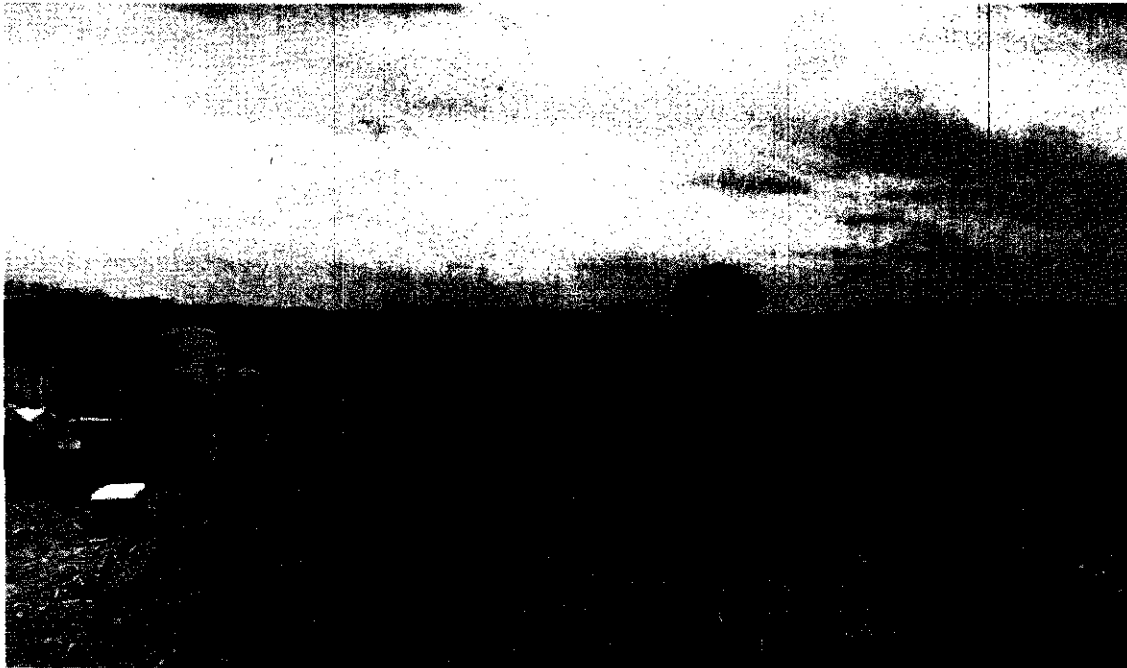
Date: September 22, 2009
Location P1009: Stream S500 from Route 98
Direction of View: West



Date: September 22, 2009
Location P1027: Downgradient at Stream S501
Direction of View: West



Date: September 22, 2009
Location P1026: Upstream at Stream S501
Direction of View: East



Date: September 24, 2009
 Location P1044: Stream S505
 Direction of View: South



Date: September 24, 2009
 Location P1049: Stream S506, taken from road culvert.
 Direction of View: East



Date: September 24, 2009
Location P1050: Stream S506
Direction of View: North



Date: October 14, 2010
Location P5: Looking across channel of stream S508
Direction of View: Northeast



Date: October 14, 2010
Location P6: Stream 508 looking downstream
Direction of View: South



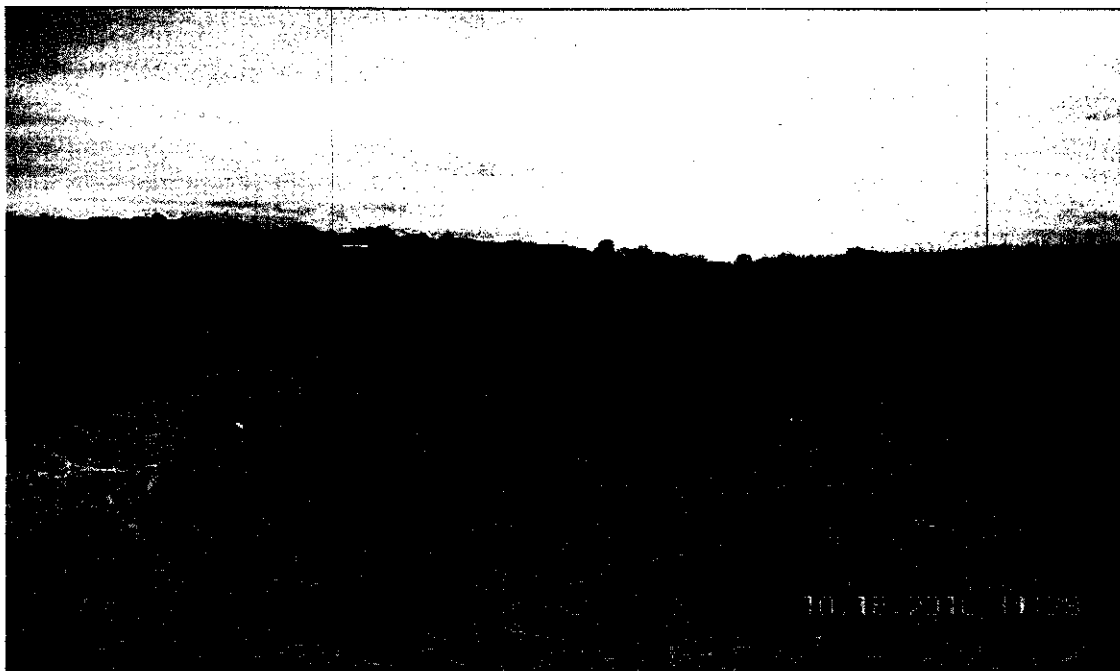
Date: October 14, 2010
Location P7: Stream S700, looking upstream
Direction of View: West



Date: October 18, 2010
Location P47: Stream S705, looking upstream
Direction of View: North



Date: October 18, 2010
Location P48: Stream S705, looking downstream
Direction of View: South



Date: October 18, 2010
Location P51: Stream S706, looking upstream
Direction of View: North



Date: October 18, 2010
Location P52: Stream S706, looking downstream
Direction of View: South



Date: October 18, 2010

Location P53- Stream S707, looking upstream at tractor crossing

Direction of View: East



Date: October 18, 2010

Location P54: Stream S707, looking downstream

Direction of View: West



Date: October 18, 2010
Location P59: Stream S709, looking upstream
Direction of View: South



Date: October 18, 2010
Location P60: Stream S709, looking downstream
Direction of View: North



Date: October 19, 2010

Location P66: Stream 711, looking downstream at remains of an old bridge

Direction of View: North



Date: October 22, 2009

Location P900: W800, a small isolated wetland within a crop field, notice surrounding rise in topography.

Direction of View: South



Date: January 17, 2011
Location P573: Upstream at S801
Direction of View: Northeast



Date: January 17, 2011
Location P574: Downstream at S801
Direction of View: Southwest



Date: January 17, 2011
Location P575: Downstream at S802
Direction of View: East



Date: January 17, 2011
Location P576: Upstream at S802
Direction of View: West



Date: January 17, 2011
Location P578: Upstream at Stream S803
Direction of View: South



Date: January 17, 2011
Location P579: Downstream at Stream S803
Direction of View: North



Date: October 15, 2010

Location P18: Looking north at wetland W901 in an active agricultural field

Direction of View: North



Date: October 22, 2009
Location P899: Looking at stream S1550.
Direction of View: North



Date: October 15, 2010
 Location P32: Looking downstream at stream S1553
 Direction of View: Northwest



Date: October 15, 2010
 Location P33: Stream S1553 bank erosion near collection line crossing
 Direction of View: North



Date: October 23, 2009
Location P916: View of stream S1560.
Direction of View: North



Date: October 23, 2009
Location P917: Typical view of stream S1560 from inside the banks.
Direction of View: North



Date: October 23, 2009

Location P918: Close up view of *Phalaris arundinacea* choked stream S1560 channel.

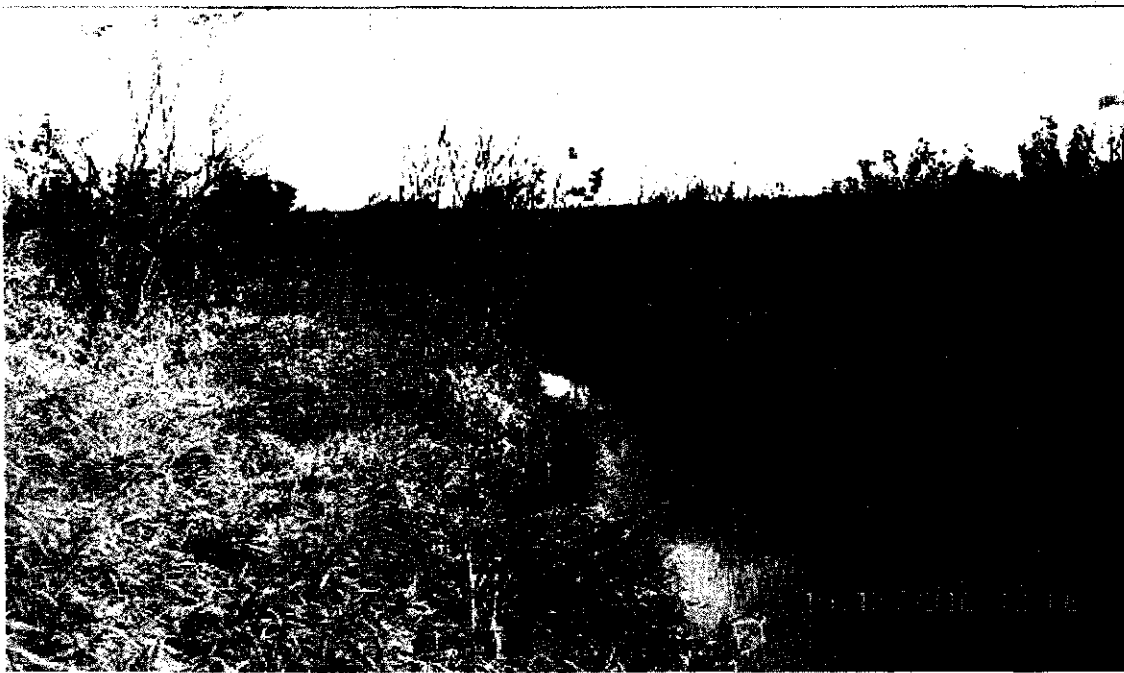
Direction of View: Southwest



Date: October 15, 2010

Location P13: Looking downstream at stream S1562

Direction of View: East



Date: October 15, 2010

Location P14: Looking downstream at stream S1562

Direction of View: Northeast

C

Datasheets

Routine Wetland Determination

DATA FORM

1987 Corps Wetland Delineation Manual

Project/Site: Black Fork Wind Project				Date: 10/21/09			
Applicant/owner: Black Fork Wind, LLC				County: Richland			
Investigator(s): A. Gardner & R. Noyes				State: OH			
Do normal circumstances exist on the site? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Community ID: PEM			
Is the site significantly disturbed (atypical situation)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Sector:			
Is the area a potential problem area? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				Transect ID: W800			
Explanation of atypical or problem area: Active agricultural field, vegetation cut.				Status: Isolated			
VEGETATION (For *strata, indicate T = tree; S = shrub; H = herb; V = vine)							
Dominant Plant Species	*Stratum	Indicator	% Cover	Dominant Plant Species	*Stratum	Indicator	% Cover
<i>Galeopsis tetrahit</i>	H	NI					
<i>Poa compressa</i>	H	FACU					
<i>Echinochloa crus-galli</i>	H	FACU					
HYDROPHYTIC VEGETATION INDICATORS:							
% of dominants OBL, FACW, & FAC: 66%							
Remarks: Sparse vegetation.							
Vegetation in about half of wetland has been cut by combine.							
Hydrophytic vegetation present? <input type="checkbox"/> Yes <input type="checkbox"/> No							
Rationale for decision/Remarks:							
HYDROLOGY							
Inundated: <input type="checkbox"/>				Water Marks: <input type="checkbox"/>		Sediment Deposits: <input type="checkbox"/>	
Saturated in upper 12 in: <input type="checkbox"/>				Drift Lines: <input type="checkbox"/>		Drainage Patterns: <input checked="" type="checkbox"/>	
WQ if sat/inundated:							
<input type="checkbox"/> Water is clear <input type="checkbox"/> Presence of litter							
<input type="checkbox"/> Water is turbid <input type="checkbox"/> Other: _____							
<input type="checkbox"/> Oil Sheen present							
Depth of inundation: _____ inches				Oxidized Root (live roots)		Local Soil Survey: <input type="checkbox"/>	
				Channels <12in: <input type="checkbox"/>			
Depth to free water in pit: _____ inches				FAC Neutral: <input type="checkbox"/>		Water-stained Leaves: <input type="checkbox"/>	
Depth to saturated soil: _____ inches							
Check all that apply & explain below:				Other (explain): Small depression in slightly rolling agricultural field.			
<input type="checkbox"/> Stream, lake or gage data							
<input type="checkbox"/> Aerial photographs							
<input type="checkbox"/> Other							
Wetland hydrology present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No							
Rationale for decision/remarks:							

SOILS

Map Unit Name (Series and Phase): Fitchville-Bennington silt loam

Drainage Class Somewhat poorly drained

Field observations confirm mapped type? ☒ Yes ☐ No

Taxonomy (subgroup)

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size and contrast	Texture, concretions, structure, etc.	Ap is nice dark loam with high organic matter content.
0 - 10	Ap	10YR 2/1	-	-	Loam	
10 - 14	B	2.5Y 4/1	7.5YR 6/8	5%, large, distinct	Clay loam	

Hydric Soil Indicators: (check all that apply)

- | | |
|--|---|
| <input type="checkbox"/> Histosol | <input checked="" type="checkbox"/> Matrix chroma ≤ 2 with mottles |
| <input type="checkbox"/> Histic Epipedon | <input checked="" type="checkbox"/> Mg or Fe Concretions |
| <input type="checkbox"/> Sulfidic Odor | <input type="checkbox"/> High Organic Content in Surface Layer of Sandy Soils |
| <input type="checkbox"/> Aquic Moisture Regime | <input type="checkbox"/> Organic Streaking in Sandy Soils |
| <input type="checkbox"/> Reducing Conditions | <input type="checkbox"/> Listed on National/Local Hydric Soils List |
| <input type="checkbox"/> Gleyed or Low-Chroma | <input type="checkbox"/> Other (explain in remarks) |

Hydric soils present?☒ Yes ☐ No

Rationale for decision/Remarks:

Wetland Determination

- | | |
|---|---|
| Hydrophytic vegetation present? | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Hydric soils present? | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Wetland hydrology present? | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Is the sampling point within a wetland? | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |

What is this based on?

Field review

Stream name (if known):

Approximate distance to stream:

Watershed Relationship

What watershed is the delineated wetland within?

- Wetland is
- ☐ Abutting
- ☐ Adjacent with surface connection
- ☐ Adjacent without surface connection

Comments: See below.

Flow relationship to associated stream:

- | | |
|---|---|
| <input type="checkbox"/> intermittent surface | <input type="checkbox"/> ephemeral surface |
| <input type="checkbox"/> perennial surface | <input checked="" type="checkbox"/> no surface flow |

Is the associated stream reach delineated? ☐ Yes ☐ No

Flow is:

- Is the associated stream reach: ☐ TNW ☐ P-RPW
- ☐ S-RPW ☐ Non-RPW

- | | |
|-----------------------------------|--|
| <input type="checkbox"/> discrete | <input type="checkbox"/> discrete and confined |
| <input type="checkbox"/> confined | <input type="checkbox"/> overland sheet flow |
| <input type="checkbox"/> other | |

Explain:

Rationale/Remarks:

Wetland is clearly isolated. The surrounding topography rises about 2 feet all around the wetland.

Site: W800

Rater(s): A. Gardner & R. Noyes

Date: 10/21/09

0

0

max 6 pts.

subtotal

Metric 1. Wetland Area (size).

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☐ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☒ <0.1 acres (0.04ha) (0 pts)

1

1

max 14 pts.

subtotal

Metric 2. Upland buffers and surrounding land use.

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

13

14

max 30 pts.

subtotal

Metric 3. Hydrology.

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☒ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☐ None or none apparent (12)
- ☒ Recovered (7)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☐ Seasonally inundated (2)
- ☒ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- ☐ ditch
- ☒ tile
- ☐ dike
- ☐ weir
- ☐ stormwater input

- ☐ point source (nonstormwater)
- ☐ filling/grading
- ☐ road bed/RR track
- ☐ dredging
- ☒ other row cropping

3

17

max 20 pts.

subtotal

Metric 4. Habitat Alteration and Development.

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- ☒ mowing
- ☐ grazing
- ☐ clearcutting
- ☐ selective cutting
- ☐ woody debris removal
- ☐ toxic pollutants

- ☐ shrub/sapling removal
- ☐ herbaceous/aquatic bed removal
- ☐ sedimentation
- ☐ dredging
- ☒ farming
- ☐ nutrient enrichment

17

subtotal this page

Site: W800

Rater(s): A. Gardner & R. Noyes

Date: 10/21/09

1

subtotal this page

0

17

max 10 pts.

subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

1

18

max 20 pts.

subtotal

Metric 6. Plant communities, interspersions, microtopography.

6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ 0 Aquatic bed
- ☐ 0 Emergent
- ☐ 0 Shrub
- ☐ 0 Forest
- ☐ 0 Mudflats
- ☐ 0 Open water
- ☐ Other

6b. horizontal (plan view) Interspersion.

Select only one.

- ☐ High (5)
- ☐ Moderately high(4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☐ Low (1)
- ☒ None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☐ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☒ Absent (1)

6d. Microtopography.

Score all present using 0 to 3 scale.

- ☐ 0 Vegetated hummocks/tussocks
- ☐ 0 Coarse woody debris >15cm (6in)
- ☐ 0 Standing dead >25cm (10in) dbh
- ☐ 0 Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

18

GRAND TOTAL(max 100 pts)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Black Fork City/County: Richland Sampling Date: 10/15/2010
 Applicant/Owner: Element Power State: OH Sampling Point: WD901
 Investigator(s): A. Gardner, K. Guadagno Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): convex
 Slope (%): 1% Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: Bennington-Fitchville silt loams NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No _____ (If no, explain in Remarks.)
 Are Vegetation ☒, Soil ☒, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ☒
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	If yes, optional Wetland Site ID: <u>W901</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Explain alternative procedures here or in a separate report.) Area is problematic because this is a farmed wetland.	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Water Table Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? Yes _____ No <input checked="" type="checkbox"/>	Depth (inches): _____	
(includes capillary fringe)		Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Bowl shaped depression within active agricultural field. Adjacent forested area is wetland.		

VEGETATION – Use scientific names of plants.

 Sampling Point: **WD901**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
				_____ = Total Cover
Sapling/Shrub Stratum (Plot size: _____)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
				_____ = Total Cover
Herb Stratum (Plot size: 5' radius _____)				
1. <i>Phalaris arundinacea</i>	50%	Yes	FACW	
2. <i>Cyperus esculentus</i>	50%	Yes	FACW	
3. <i>Polygonum sagittatum</i>	5%		OBL	
4. <i>Glycin max</i> (soybean)	5%		NI	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
12. _____				
				_____ = Total Cover
Woody Vine Stratum (Plot size: _____)				
1. _____				
2. _____				
3. _____				
4. _____				
				_____ = Total Cover

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
☒ Rapid Test for Hydrophytic Vegetation
☐ Dominance Test is >50%
☐ Prevalence Index is $\leq 3.0^1$
☐ Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: (Include photo numbers here or on a separate sheet.)
 Farmed wetland, however soybean is unable to successfully grow and wetland plants are out competing and thriving.

SOIL

Sampling Point: WD901

[illegible]

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Black Fork City/County: Richland Sampling Date: 10/15/2010
 Applicant/Owner: Element Power State: OH Sampling Point: WD901
 Investigator(s): A. Gardner, K. Guadagno Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): convex
 Slope (%): 1% Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: Bennington-Fitchville silt loams NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No _____ (If no, explain in Remarks.)
 Are Vegetation ☒, Soil ☒, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ☒
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	If yes, optional Wetland Site ID: <u>W901</u>
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Explain alternative procedures here or in a separate report.) Area is problematic because this is a farmed wetland.	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Marl Deposits (B15)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		<input type="checkbox"/> Microtopographic Relief (D4)
		<input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations:		
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____		
Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____		
Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Bowl shaped depression within active agricultural field. Adjacent forested area is wetland.		

VEGETATION – Use scientific names of plants.

 Sampling Point: WD901

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status															
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)														
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
_____ = Total Cover				Prevalence Index worksheet: <table style="width: 100%;"> <tr> <td style="width: 50%;">Total % Cover of:</td> <td style="width: 50%;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x 1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x 2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x 3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x 4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x 5 = _____</td> </tr> <tr> <td>Column Totals: _____</td> <td>(A) _____ (B) _____</td> </tr> </table> Prevalence Index = B/A = _____	Total % Cover of:	Multiply by:	OBL species _____	x 1 = _____	FACW species _____	x 2 = _____	FAC species _____	x 3 = _____	FACU species _____	x 4 = _____	UPL species _____	x 5 = _____	Column Totals: _____	(A) _____ (B) _____
Total % Cover of:	Multiply by:																	
OBL species _____	x 1 = _____																	
FACW species _____	x 2 = _____																	
FAC species _____	x 3 = _____																	
FACU species _____	x 4 = _____																	
UPL species _____	x 5 = _____																	
Column Totals: _____	(A) _____ (B) _____																	
Sapling/Shrub Stratum (Plot size: _____)																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> Rapid Test for Hydrophytic Vegetation _____ Dominance Test is >50% _____ Prevalence Index is ≤3.0 ¹ _____ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation ¹ (Explain)														
Herb Stratum (Plot size: 5' radius)																		
1. <i>Phalaris arundinacea</i>	50%		FACW															
2. <i>Cyperus esculentus</i>	50%		FACW															
3. <i>Polygonum sagittatum</i>	5%		OBL															
4. <i>Glycin max</i> (soybean)	5%		NI															
5. _____	_____	_____	_____															
6. _____	_____	_____	_____															
7. _____	_____	_____	_____															
8. _____	_____	_____	_____															
9. _____	_____	_____	_____															
10. _____	_____	_____	_____															
11. _____	_____	_____	_____															
12. _____	_____	_____	_____															
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.														
Woody Vine Stratum (Plot size: _____)																		
1. _____	_____	_____	_____															
2. _____	_____	_____	_____															
3. _____	_____	_____	_____															
4. _____	_____	_____	_____															
_____ = Total Cover																		
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____																		
Remarks: (Include photo numbers here or on a separate sheet.) Farmed wetland, however soybean is unable to successfully grow and wetland plants are out competing and thriving.																		

Sampling Point: WD901

[illegible]

Indicators for Problematic Hydric Soils³:

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

Restrictive Layer (if observed):

Depth (inches): 12

Hydric Soil Present? Yes ☒ No ☐

From 4-6 inches, distinct prominent Fe concentrations = F8, remainder upper 12 was low chroma.

Site: Black Fork Wind W901 Rater(s): AG Date: 10-14-10

1	1
---	---

Metric 1. Wetland Area (size).

max 6 pts.

subtotal

Select one size class and assign score.

- ☐ >50 acres (>20.2ha) (6 pts)
- ☐ 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- ☐ 10 to <25 acres (4 to <10.1ha) (4 pts)
- ☐ 3 to <10 acres (1.2 to <4ha) (3 pts)
- ☐ 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- ☒ 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- ☐ <0.1 acres (0.04ha) (0 pts)

1	2
---	---

Metric 2. Upland buffers and surrounding land use.

max 14 pts.

subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- ☐ WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- ☐ MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- ☐ NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- ☒ VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

2b. Intensity of surrounding land use. Select one or double check and average.

- ☐ VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- ☐ LOW. Old field (>10 years), shrubland, young second growth forest. (5)
- ☐ MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- ☒ HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

19	28
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Metric 3. Hydrology.

max 30 pts.

subtotal

3a. Sources of Water. Score all that apply.

- ☐ High pH groundwater (5)
- ☐ Other groundwater (3)
- ☒ Precipitation (1)
- ☒ Seasonal/intermittent surface water (3)
- ☐ Perennial surface water (lake or stream) (5)

3c. Maximum water depth. Select only one and assign score.

- ☐ >0.7 (27.6in) (3)
- ☐ 0.4 to 0.7m (15.7 to 27.6in) (2)
- ☒ <0.4m (<15.7in) (1)

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- ☒ None or none apparent (12)
- ☐ Recovered (7)
- ☐ Recovering (3)
- ☐ Recent or no recovery (1)

3b. Connectivity. Score all that apply.

- ☐ 100 year floodplain (1)
- ☐ Between stream/lake and other human use (1)
- ☐ Part of wetland/upland (e.g. forest), complex (1)
- ☐ Part of riparian or upland corridor (1)

3d. Duration inundation/saturation. Score one or dbl check.

- ☐ Semi- to permanently inundated/saturated (4)
- ☐ Regularly inundated/saturated (3)
- ☒ Seasonally inundated (2)
- ☐ Seasonally saturated in upper 30cm (12in) (1)

Check all disturbances observed

- | | |
|---|---|
| <input type="checkbox"/> ditch | <input type="checkbox"/> point source (nonstormwater) |
| <input type="checkbox"/> tile | <input type="checkbox"/> filling/grading |
| <input type="checkbox"/> dike | <input type="checkbox"/> road bed/RR track |
| <input type="checkbox"/> weir | <input type="checkbox"/> dredging |
| <input type="checkbox"/> stormwater input | <input type="checkbox"/> other _____ |

3	31
---	----

Metric 4. Habitat Alteration and Development.

max 20 pts.

subtotal

4a. Substrate disturbance. Score one or double check and average.

- ☐ None or none apparent (4)
- ☐ Recovered (3)
- ☐ Recovering (2)
- ☒ Recent or no recovery (1)

4b. Habitat development. Select only one and assign score.

- ☐ Excellent (7)
- ☐ Very good (6)
- ☐ Good (5)
- ☐ Moderately good (4)
- ☐ Fair (3)
- ☐ Poor to fair (2)
- ☒ Poor (1)

4c. Habitat alteration. Score one or double check and average.

- ☐ None or none apparent (9)
- ☐ Recovered (6)
- ☐ Recovering (3)
- ☒ Recent or no recovery (1)

Check all disturbances observed

- | | |
|---|---|
| <input type="checkbox"/> mowing | <input type="checkbox"/> shrub/sapling removal |
| <input type="checkbox"/> grazing | <input type="checkbox"/> herbaceous/aquatic bed removal |
| <input type="checkbox"/> clearcutting | <input type="checkbox"/> sedimentation |
| <input type="checkbox"/> selective cutting | <input type="checkbox"/> dredging |
| <input type="checkbox"/> woody debris removal | <input checked="" type="checkbox"/> farming |
| <input type="checkbox"/> toxic pollutants | <input checked="" type="checkbox"/> nutrient enrichment |

31

subtotal this page

Site: W901 Rater(s): _____ Date: _____

-3

subtotal this page

0 31

max 10 pts.

subtotal

Metric 5. Special Wetlands.

Check all that apply and score as indicated.

- ☐ Bog (10)
- ☐ Fen (10)
- ☐ Old growth forest (10)
- ☐ Mature forested wetland (5)
- ☐ Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- ☐ Lake Erie coastal/tributary wetland-restricted hydrology (5)
- ☐ Lake Plain Sand Prairies (Oak Openings) (10)
- ☐ Relict Wet Prairies (10)
- ☐ Known occurrence state/federal threatened or endangered species (10)
- ☐ Significant migratory songbird/water fowl habitat or usage (10)
- ☐ Category 1 Wetland. See Question 1 Qualitative Rating (-10)

-3 28

max 20 pts.

subtotal

Metric 6. Plant communities, interspersions, microtopography.

6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- ☐ Aquatic bed
- ☐ Emergent
- ☐ Shrub
- ☐ Forest
- ☐ Mudflats
- ☐ Open water
- ☐ Other

6b. horizontal (plan view) interspersions.

Select only one.

- ☐ High (5)
- ☐ Moderately high (4)
- ☐ Moderate (3)
- ☐ Moderately low (2)
- ☒ Low (1)
- ☐ None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- ☒ Extensive >75% cover (-5)
- ☐ Moderate 25-75% cover (-3)
- ☐ Sparse 5-25% cover (-1)
- ☐ Nearly absent <5% cover (0)
- ☐ Absent (1)

6d. Microtopography.

Score all present using 0 to 3 scale.

- ☒ Vegetated hummocks/mounds
- ☒ Coarse woody debris >15cm (6in)
- ☒ Standing dead >25cm (10in) dbh
- ☐ Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

38 **GRAND TOTAL(max 100 pts)**

Stream & Location: S002, Unnamed Tributary to Honey Creek

RM: 1 0.9 Date: 09/22/09

A. Francisco and R. McGinnis

Scorers Full Name & Affiliation: Ecology and Environment Inc.

River Code: - - -

STORET #: - - -

Lat./ Long.: 40.9416 / 82.7100

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDR / SLABS [10]	_____	<input type="checkbox"/> HARDPAN [4]	_____
<input type="checkbox"/> BOULDER [9]	_____	<input type="checkbox"/> DETRITUS [3]	_____
<input type="checkbox"/> COBBLE [8]	_____	<input type="checkbox"/> MUCK [2]	_____
<input type="checkbox"/> GRAVEL [7]	_____	<input checked="" type="checkbox"/> SILT [2]	100 100
<input type="checkbox"/> SAND [6]	_____	<input type="checkbox"/> ARTIFICIAL [0]	_____
<input type="checkbox"/> BEDROCK [5]	_____	(Score natural substrates; ignore sludge from point-sources)	

ORIGIN

☐ LIMESTONE [1]☐ TILLS [1]☐ WETLANDS [0]☐ HARDPAN [0]☐ SANDSTONE [0]☐ RIP/RAP [0]☐ LACUSTURINE [0]☐ SHALE [-1]☐ COAL FINES [-2]

QUALITY

☒ HEAVY [-2]☐ MODERATE [-1]☐ NORMAL [0]☐ FREE [1]☐ EXTENSIVE [-2]☐ MODERATE [-1]☐ NORMAL [0]☐ NONE [1]

SILT

EMBEDDEDNESS

Substrate
3
Maximum
20NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

0 UNDERCUT BANKS [1]

0 POOLS > 70cm [2]

0 OXBOWS, BACKWATERS [1]

☐ EXTENSIVE >75% [11]☐ MODERATE 25-75% [7]

2 OVERHANGING VEGETATION [1]

0 ROOTWADS [1]

0 AQUATIC MACROPHYTES [1]

☒ SPARSE 5-<25% [3]☐ NEARLY ABSENT <5% [1]

0 SHALLOWS (IN SLOW WATER) [1]

0 BOULDERS [1]

0 LOGS OR WOODY DEBRIS [1]

0 ROOTMATS [1]

Comments

Cover
Maximum
20

5

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY

☐ HIGH [4]☐ MODERATE [3]☐ LOW [2]☒ NONE [1]

DEVELOPMENT

☐ EXCELLENT [7]☐ GOOD [5]☐ FAIR [3]☒ POOR [1]

CHANNELIZATION

☐ NONE [6]☐ RECOVERED [4]☐ RECOVERING [3]☒ RECENT OR NO RECOVERY [1]

STABILITY

☒ HIGH [3]☐ MODERATE [2]☐ LOW [1]

Comments

Channel
Maximum
20

6

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

☒ NONE / LITTLE [3]☐ MODERATE [2]☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH

☐ WIDE > 50m [4]☐ MODERATE 10-50m [3]☐ NARROW 5-10m [2]☐ VERY NARROW < 5m [1]☒ NONE [0]

FLOOD PLAIN QUALITY

☐ FOREST, SWAMP [3]☐ SHRUB OR OLD FIELD [2]☐ RESIDENTIAL, PARK, NEW FIELD [1]☐ FENCED PASTURE [1]☒ OPEN PASTURE, ROWCROP [0]☐ CONSERVATION TILLAGE [1]☐ URBAN OR INDUSTRIAL [0]☐ MINING / CONSTRUCTION [0]Indicate predominant land use(s)
past 100m riparian.

Comments

Riparian
Maximum
10

3

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

☐ > 1m [6]☐ 0.7-<1m [4]☐ 0.4-<0.7m [2]☐ 0.2-<0.4m [1]☒ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

☐ POOL WIDTH > RIFFLE WIDTH [2]☐ POOL WIDTH = RIFFLE WIDTH [1]☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]☐ SLOW [1]☐ VERY FAST [1]☐ INTERSTITIAL [-1]☐ FAST [1]☐ INTERMITTENT [-2]☐ MODERATE [1]☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

Pool /
Current
Maximum
12

0

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

☐ BEST AREAS > 10cm [2]☐ BEST AREAS 5-10cm [1]☒ BEST AREAS < 5cm [metric=0]

RUN DEPTH

☐ MAXIMUM > 50cm [2]☐ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE

☐ STABLE (e.g., Cobble, Boulder) [2]☐ MOD. STABLE (e.g., Large Gravel) [1]☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

☐ NONE [2]☐ LOW [1]☐ MODERATE [0]☐ EXTENSIVE [-1]Riffle /
Run
Maximum
8

0

Comments

6) GRADIENT (

ft/ml)

☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL: 50

%GLIDE: 50

%RUN: 50

%RIFFLE: 50

Gradient
Maximum
10

4

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☒ WADE
- ☐ LINE
- ☐ OTHER

STAGE

- 1st sample pass-- 2nd
- ☐ HIGH
- ☐ UP
- ☒ NORMAL
- ☐ LOW
- ☐ DRY

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☒ OTHER

253

meters

CANOPY

- ☒ > 85% - OPEN
- ☐ 55% - < 85%
- ☐ 30% - < 55%
- ☐ 10% - < 30%
- ☐ < 10% - CLOSED

CLARITY

- 1st sample pass-- 2nd
- ☒ < 20 cm
- ☐ 20 - < 40 cm
- ☐ 40 - 70 cm
- ☐ > 70 cm / CTB
- ☐ SECCHI DEPTH

1st _____ cm

2nd _____ cm

CJ RECREATION

POOL: ☐ > 100m? ☐ > 3ft

BJAESTHETICS

- ☐ NUISANCE ALGAE
- ☒ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☐ OIL SHEEN
- ☐ TRASH / LITTER
- ☐ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC (PRIVATE) BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / CLIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

Stream S002 is 10.9 miles up an unnamed tributary to Honey Creek that enters Honey Creek at Rivermile 35.84.

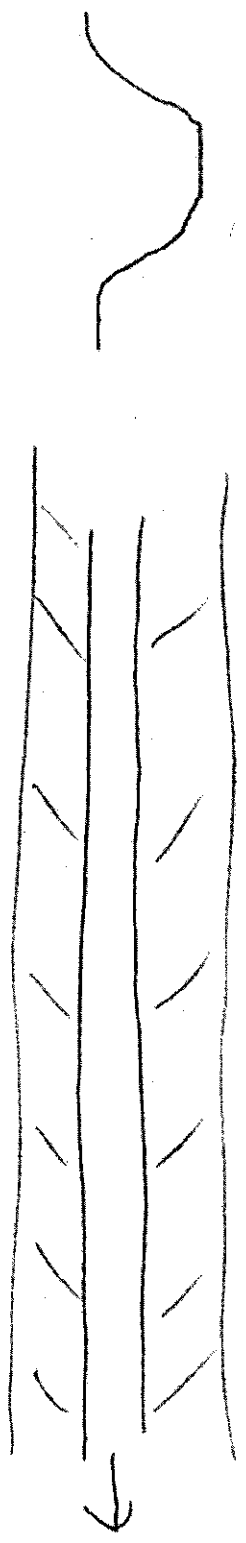
Measurements in feet. F

FJ MEASUREMENTS

\bar{x} width	6.8
\bar{x} depth	0.5
max. depth	
\bar{x} bankfull width	11.6
bankfull \bar{x} depth	1.6
W/D ratio	7.3
bankfull max. depth	
floodprone \bar{x} width	
entrench. ratio	0.27

Legacy Tree:

Stream Drawing:





Primary Headwater Habitat Evaluation Form

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

13

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**

SCORER

A. Garder, Jr.

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**HHEI
Metric
PointsSubstrate
Max = 40

13

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

Pool Depth
Max = 30

0

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☐ Y Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☐ N Canopy (% open): 100%
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:

BIOTIC EVALUATION

Performed? (Y/N): ☐ N (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): ☐ N Voucher? (Y/N): ☐ N Aquatic Macroinvertebrates Observed? (Y/N): ☐ N Voucher? (Y/N): ☐ N
Comments Regarding Biology:
 No aquatic wildlife observed.

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

FLOW 

Stream & Location: S21, Unnamed tributary to Loss Creek

RM: 0.8 Date: 10/01/09

J. Zoladz & A. Francisco

Scorers Full Name & Affiliation: Ecology & Environment

River Code: - - -

STORET #: - - -

Lat./Long.: 40.8266 / 82.7639

Office verified location ☐

1) SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES POOL RIFFLE

☐ BLDR / SLABS [10] ☐ POOL RIFFLE

☐ BOULDER [9] ☐ POOL RIFFLE

☐ COBBLE [8] ☐ POOL RIFFLE

☐ GRAVEL [7] ☐ POOL RIFFLE

☐ SAND [6] ☐ POOL RIFFLE

☐ BEDROCK [5] ☐ POOL RIFFLE

OTHER TYPES POOL RIFFLE

☐ HARDPAN [4] ☐ POOL RIFFLE

☐ DETRITUS [3] ☐ POOL RIFFLE

☒ MUCK [2] ☐ POOL RIFFLE 50

☒ SILT [2] ☐ POOL RIFFLE 50

☐ ARTIFICIAL [0] ☐ POOL RIFFLE

(Score natural substrates; ignore

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources

Comments

☒ 3 or less [0]

ORIGIN

☐ LIMESTONE [1]

☐ TILLS [1]

☒ WETLANDS [0]

☐ HARDPAN [0]

☐ SANDSTONE [0]

☐ RIP/RAP [0]

☐ LACUSTURINE [0]

☐ SHALE [-1]

☐ COAL FINES [-2]

SILT

EMBEDDEDNESS

QUALITY

☒ HEAVY [-2]

☐ MODERATE [-1]

☐ NORMAL [0]

☐ FREE [1]

☐ EXTENSIVE [-2]

☐ MODERATE [-1]

☒ NORMAL [0]

☐ NONE [1]

Substrate

2

Maximum 20

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

0 UNDERCUT BANKS [1]

0 POOLS > 70cm [2]

0 OXBOWS, BACKWATERS [1]

☐ EXTENSIVE >75% [11]

1 OVERHANGING VEGETATION [1]

0 ROOTWADS [1]

0 AQUATIC MACROPHYTES [1]

☐ MODERATE 25-75% [7]

0 SHALLOWS (IN SLOW WATER) [1]

0 BOULDERS [1]

0 LOGS OR WOODY DEBRIS [1]

☐ SPARSE 5-<25% [3]

0 ROOTMATS [1]

☒ NEARLY ABSENT <5% [1]

Comments

Cover

Maximum 20

2

Some overhanging herbaceous vegetation

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY

DEVELOPMENT

CHANNELIZATION

STABILITY

☐ HIGH [4]

☐ MODERATE [3]

☐ LOW [2]

☒ NONE [1]

☐ EXCELLENT [7]

☐ GOOD [5]

☐ FAIR [3]

☒ POOR [1]

☐ NONE [6]

☐ RECOVERED [4]

☐ RECOVERING [3]

☒ RECENT OR NO RECOVERY [1]

☐ HIGH [3]

☐ MODERATE [2]

☒ LOW [1]

Comments

Channel

Maximum 20

4

Maintained drainage ditch

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

RIPARIAN WIDTH

FLOOD PLAIN QUALITY

☒ EROSION

☒ NONE / LITTLE [3]

☐ MODERATE [2]

☐ HEAVY / SEVERE [1]

☐ WIDE > 50m [4]

☐ MODERATE 10-50m [3]

☐ NARROW 5-10m [2]

☒ VERY NARROW < 5m [1]

☐ NONE [0]

☐ FOREST, SWAMP [3]

☐ SHRUB OR OLD FIELD [2]

☐ RESIDENTIAL, PARK, NEW FIELD [1]

☐ FENCED PASTURE [1]

☒ OPEN PASTURE, ROWCROP [0]

☐ CONSERVATION TILLAGE [1]

☐ URBAN OR INDUSTRIAL [0]

☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian

Maximum 10

4

Row crops on either side, low flow, no erosion

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY!)

Check ONE (Or 2 & average)

Check ALL that apply

☐ > 1m [6]

☐ 0.7-<1m [4]

☐ 0.4-<0.7m [2]

☐ 0.2-<0.4m [1]

☒ < 0.2m [0]

☐ POOL WIDTH > RIFFLE WIDTH [2]

☐ POOL WIDTH = RIFFLE WIDTH [1]

☒ POOL WIDTH < RIFFLE WIDTH [0]

☐ TORRENTIAL [-1]

☐ VERY FAST [1]

☐ FAST [1]

☐ MODERATE [1]

☒ SLOW [1]

☐ INTERSTITIAL [-1]

☐ INTERMITTENT [-2]

☐ EDDIES [1]

Indicate for reach - pools and riffles.

Comments

< 0.2m automatic value of 0

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

☐ BEST AREAS > 10cm [2]

☐ BEST AREAS 5-10cm [1]

☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH

☐ MAXIMUM > 50cm [2]

☐ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE

☐ STABLE (e.g., Cobble, Boulder) [2]

☐ MOD. STABLE (e.g., Large Gravel) [1]

☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

☐ NONE [2]

☐ LOW [1]

☐ MODERATE [0]

☐ EXTENSIVE [-1]

Riffle / Run

Maximum 8

0

Comments

Almost no flow, very flat.

6) GRADIENT

DRAINAGE AREA

ft/mi

mi²☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL: 0

%GLIDE: 100

%RUN: 0

%RIFFLE: 0

Gradient

Maximum 10

2

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.
Unnamed tributary to Loss Creek. Very narrow, small incised channel. Typical Ohio channelized trip, no recreation.

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ LINE
☒ OTHER
- STAGE**
1st sample pass-- 2nd
☐ HIGH
☒ UP
☐ NORMAL
☐ LOW
☐ DRY

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☒ OTHER
- 56 meters
- CLARITY**
1st sample pass-- 2nd
☒ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm/CTB
☐ SECHI DEPTH

CANOPY

- ☒ > 85% - OPEN
☐ 55% - 85%
☐ 30% - 55%
☐ 10% - 30%
☐ < 10% - CLOSED

CJ RECREATION

AREA DEPTH
POOL: ☐ > 100R2 ☐ > 3R

Stream S020 is 0.8 miles up an secondary unnamed tributary to Loss Creek that enters the primary unnamed tributary to Loss Creek at Rivermile 2.4, which in turn enters Loss Creek at Rivermile 2.98.

BJ AESTHETICS

- ☐ NUISANCE ALGAE
☒ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE (BOTH) NA
ACTIVE / HISTORIC (BOTH) NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OLD / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURRED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL (DRAINAGE)

EJ ISSUES

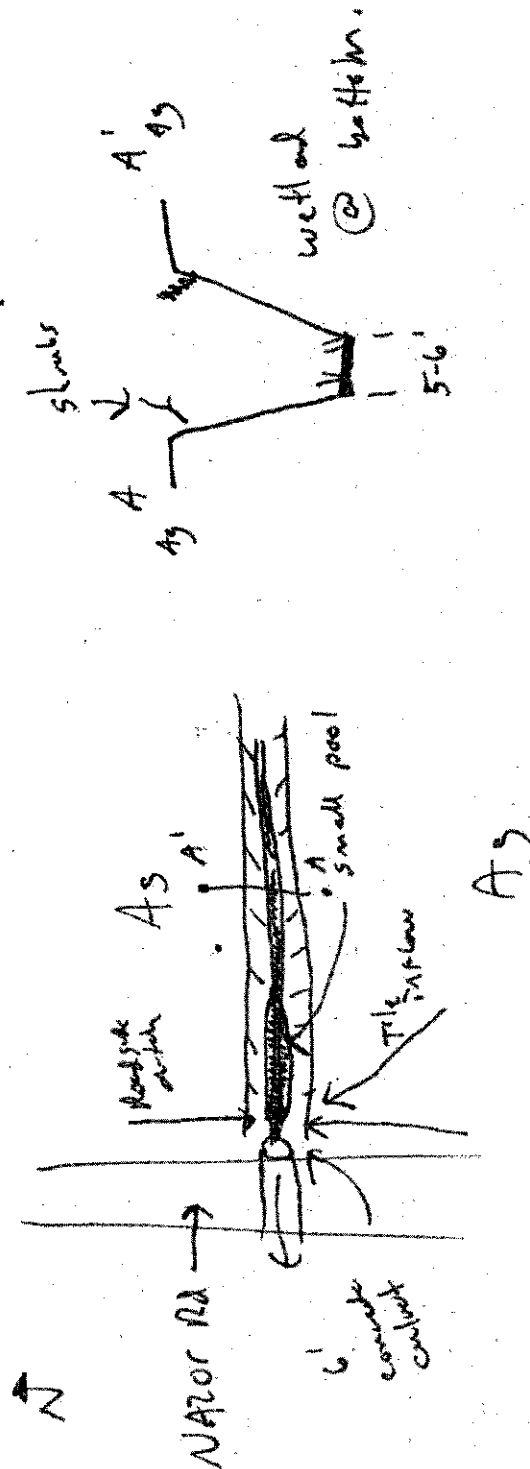
- WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT & GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H₂O / TILE / H₂O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

width	4.6
depth	0.21
max depth	
bankfull width	6.7
bankfull depth	1.0
W/D ratio	6.6
bankfull max. depth	
floodprone x ² width	
entrench. ratio	0.31

Legacy Tree:

Stream Drawing:





Primary Headwater Habitat Evaluation Form

40

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

SITE NAME/LOCATION **Unnamed Tributary to Loss Creek**SITE NUMBER **S021**RIVER BASIN **Sandusky**DRAINAGE AREA (mi²) **0.39**LENGTH OF STREAM REACH (ft) **185**LAT. **40.82660**LONG. **-82.76390**

RIVER CODE

RIVER MILE **0.8**DATE **10/01/09**SCORER **A.F. & J.Z.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 50%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input checked="" type="checkbox"/> MUCK [0 pts]	<input checked="" type="checkbox"/> 50%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

Substrate Percentage Check **100%**

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **3**TOTAL NUMBER OF SUBSTRATE TYPES: **2**

HHEI Metric Points

Substrate Max = 40

5

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

Pool Depth Max = 30

15

COMMENTS

MAXIMUM POOL DEPTH (centimeters): **6**

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

Bankfull Width Max=30

20

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.04**

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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Narrow <5m
<input type="checkbox"/>	<input type="checkbox"/>	None

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS

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

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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

QHEI PERFORMED? - ☒ Yes ☐ No QHEI Score 14.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: North Robinson NRCS Soil Map Page: NRCS Soil Map Stream Order
County: Crawford Township / City: Vernon

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: 10/01/09 Quantity: 0.82
Photograph Information: Photo P209 East on 10/01/09
Elevated Turbidity? (Y/N): Y Canopy (% open): 100%
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:

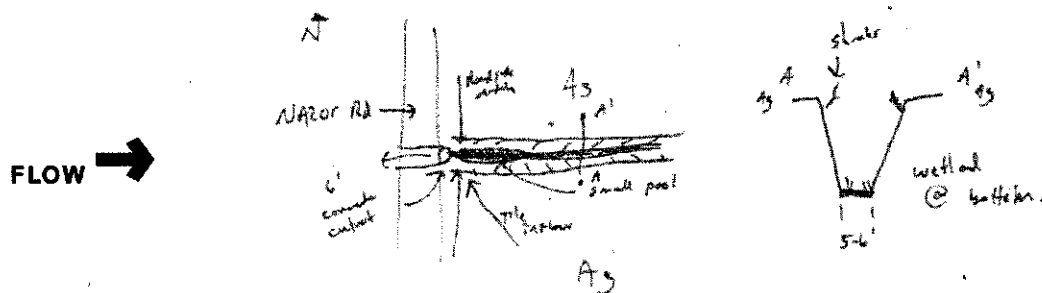
Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): N (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): N Voucher? (Y/N): N Aquatic Macroinvertebrates Observed? (Y/N): N Voucher? (Y/N): N
Comments Regarding Biology:

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 & Location: S1550 - Unnamed tributary to Paramour Creek

RM: 0.2 Date: 10/20/09

A. Gardner & R. Noyes

Scorers Full Name & Affiliation: Ecology & Environment, Inc.

River Code: - - -

STORET #: - - -

Lat./ Long.: 40.8147 / 82.7262

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLD/SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>
<input checked="" type="checkbox"/> GRAVEL [7]	50 90	<input checked="" type="checkbox"/> SILT [2]	50 10
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>	(Score natural substrates; ignore sludge from point-sources)	

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

ORIGIN	QUALITY
<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/> HEAVY [-2]
<input checked="" type="checkbox"/> SILT	<input checked="" type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> FREE [1]
<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> LACUSTURINE [0]	<input type="checkbox"/> NONE [1]
<input type="checkbox"/> SHALE [-1]	
<input type="checkbox"/> COAL FINES [-2]	

Substrate
9
Maximum
20

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

0 UNDERCUT BANKS [1]	1 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
2 SHALLOWS (IN SLOW WATER) [1]	0 BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
0 ROOTMATS [1]		

Comments

AMOUNT
<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> MODERATE 25-75% [7]
<input checked="" type="checkbox"/> SPARSE 5-25% [3]
<input type="checkbox"/> NEARLY ABSENT <5% [1]

Cover
Maximum
20
10

Sparse overhanging shrubs, mostly overhanging Phalaris arundinacea.

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input checked="" type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input checked="" type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Channel
Maximum
20
11

Few vegetated point bars, low sinuosity in plan form.

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY
<input checked="" type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Comments

Indicate predominant land use(s)
past 100m riparian.
Riparian
Maximum
10
4

Stream is incised by about 7 feet.

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> SLOW [1]
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	<input type="checkbox"/> VERY FAST [1]
<input checked="" type="checkbox"/> 0.2-0.4m [1]		<input type="checkbox"/> FAST [1]
<input type="checkbox"/> < 0.2m [0]		<input checked="" type="checkbox"/> MODERATE [1]
		<input type="checkbox"/> INTERSTITIAL [-1]
		<input type="checkbox"/> INTERMITTENT [-2]
		<input type="checkbox"/> EDDIES [1]

Comments

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)Pool /
Current
Maximum
12
4

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input checked="" type="checkbox"/> BEST AREAS > 10cm [2]	<input checked="" type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input checked="" type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

Riffle /
Run
Maximum
8
5

6) GRADIENT (ft/mi)	<input type="checkbox"/> VERY LOW - LOW [2-4]
DRAINAGE AREA (4.468 mi ²)	<input checked="" type="checkbox"/> MODERATE [6-10]
	<input type="checkbox"/> HIGH - VERY HIGH [10-6]

%POOL: 40	%GLIDE: 10
%RUN: 20	%RIFFLE: 10

Gradient
Maximum
10
6

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT ☐ WADE ☐ L LINE ☐ OTHER

STAGE

- 1st sample pass-- 2nd
☐ HIGH ☐ UP ☐ NORMAL ☐ LOW ☐ DRY

DISTANCE

- ☐ 0.5 Km ☐ 0.2 Km ☐ 0.15 Km ☐ 0.12 Km ☐ OTHER

CLARITY

- 1st sample pass-- 2nd
☐ < 20 cm ☐ 20-40 cm ☐ 40-70 cm ☐ > 70 cm/CTB ☐ SECCHI DEPTH

93 meters

- CANOPY**
☐ > 85% - OPEN ☐ 55% - 85% ☐ 30% - 55% ☐ 10% - 30% ☐ < 10% - CLOSED

CJ RECREATION

POOL: ☐ > 100m? ☐ > 3ft

BJ AESTHETICS

- ☐ NUISANCE ALGAE ☐ INVASIVE MACROPHYTES ☐ EXCESS TURBIDITY ☐ DISCOLORATION ☐ FOAM / SCUM ☐ OIL SHEEN ☐ TRASH / LITTER ☐ NUISANCE ODOR ☐ SLUDGE DEPOSITS ☐ CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA ☐ ACTIVE / HISTORIC / BOTH / NA ☐ YOUNG-SUCCESSION-OLD ☐ SPRAY / SNAG / REMOVED ☐ MODIFIED / DIPPED OUT / NA ☐ LEVEED / ONE SIDED ☐ RELOCATED / CUTOFFS ☐ MOVING-BEDLOAD-STABLE ☐ ARMoured / SLUMPS ☐ ISLANDS / SCoured ☐ IMPOUNDED / DESICCATED ☐ FLOOD CONTROL / DRAINAGE

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
 HARDENED / URBAN / DIRT&GRIME
 CONTAMINATED / LANDFILL
 BMPs-CONSTRUCTION-SEDIMENT
 LOGGING / IRRIGATION / COOLING
 BANK / EROSION / SURFACE
 FALSE BANK / MANURE / LAGOON
 WASH H₂O / TILE / H₂O TABLE
 ACID / MINE / QUARRY / FLOW
 NATURAL / WETLAND / STAGNANT
 PARK / GOLF / LAWN / HOME
 ATMOSPHERE / DATA PAUCITY

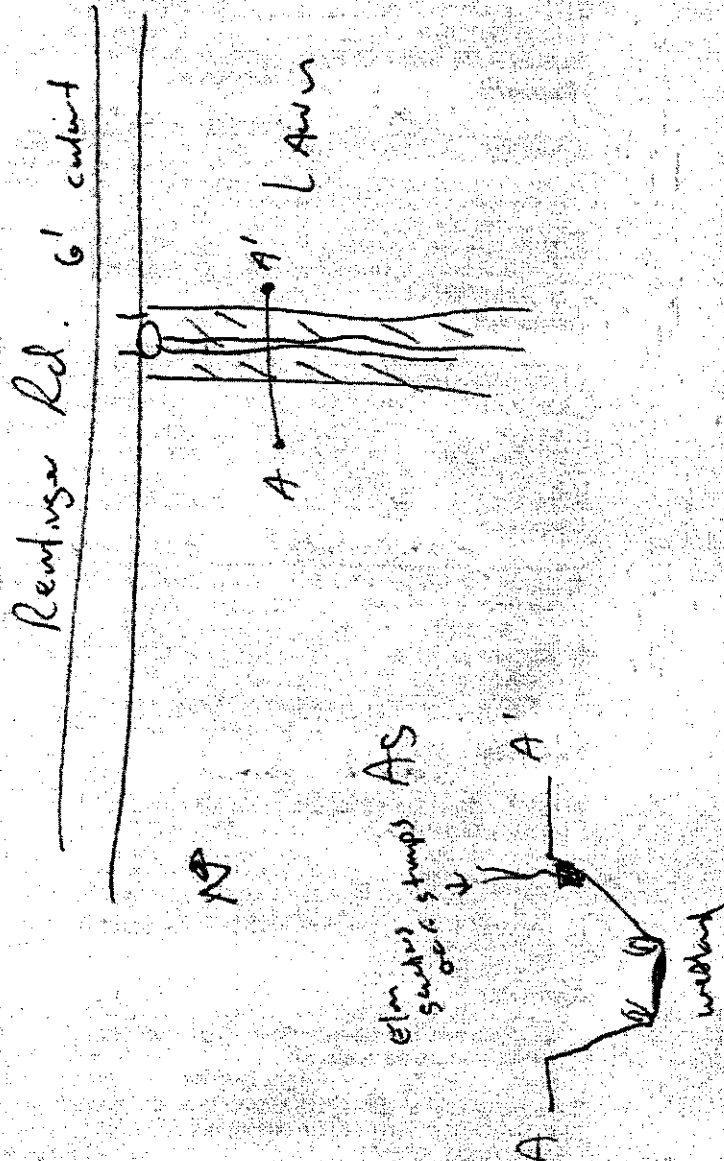
FJ MEASUREMENTS

- ☐ width ☐ depth ☐ max. depth ☐ bankfull width ☐ bankfull depth ☐ W/D ratio ☐ bankfull max. depth ☐ floodprone x² width ☐ entrench. ratio

Legacy Tree:

Stream S1550 is 0.16 miles up an unnamed tributary to Paramour Creek that enters Paramour Creek at Rivermile 5.15.

Stream Drawing:



Stream & Location: S1553, Unnamed tributary to Marsh Run

RM: 1.5 Date: 10/22/09

A. Gardner & R. Noyes

Scorers Full Name & Affiliation: Ecology & Environment, Inc.

River Code: - - -

STORET #: - - -

Lat./Long.: 40.8861 / 82.7178

Office verified location ☐1] SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLD/SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/>	<input checked="" type="checkbox"/> SILT [2]	<input type="checkbox"/>
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Stream was recently dredged, all run.

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

	0	1	2	3
UNDERCUT BANKS [1]	0	0	0	0
OVERHANGING VEGETATION [1]	0	0	0	0
SHALLOWS (IN SLOW WATER) [1]	0	0	0	0
ROOTMATS [1]	0	0	0	0
POOLS > 70cm [2]	0	0	0	0
ROOTWADS [1]	0	0	0	0
BOULDERS [1]	0	0	0	0
OXBOWS, BACKWATERS [1]	0	0	0	0
AQUATIC MACROPHYTES [1]	0	0	0	0
LOGS OR WOODY DEBRIS [1]	0	0	0	0

Comments

AMOUNT

Check ONE (Or 2 & average)

<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SPARSE 5-25% [3]
<input checked="" type="checkbox"/> NEARLY ABSENT <5% [1]

Cover
Maximum
20

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Channel
Maximum
20

Recently (last week) dredged.

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION		RIPARIAN WIDTH		FLOOD PLAIN QUALITY		CONSERVATION TILLAGE	
<input checked="" type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/>	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/>	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/>	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/>	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/>	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/>	<input type="checkbox"/> MINING / CONSTRUCTION [0]	<input type="checkbox"/>
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/>	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/>	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/>		
		<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/>	<input type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/>		
		<input checked="" type="checkbox"/> NONE [0]	<input type="checkbox"/>	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input type="checkbox"/>		

Comments

Indicate predominant land use(s)
past 100m riparian.Riparian
Maximum
10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

<input checked="" type="checkbox"/> > 1m [6]
<input type="checkbox"/> 0.7-1m [4]
<input type="checkbox"/> 0.4-0.7m [2]
<input type="checkbox"/> 0.2-0.4m [1]
<input type="checkbox"/> < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]
<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]
<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

<input type="checkbox"/> TORRENTIAL [-1]	<input checked="" type="checkbox"/> SLOW [1]
<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]
<input type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Comments

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)Pool /
Current
Maximum
12

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

All run.

6] GRADIENT (DRAINAGE AREA)

ft/mi

mi²

<input checked="" type="checkbox"/> VERY LOW - LOW [2-4]
<input type="checkbox"/> MODERATE [6-10]
<input type="checkbox"/> HIGH - VERY HIGH [10-6]

%POOL:

%GLIDE:

%RUN:

%RIFFLE:

Gradient
Maximum
10

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

AJ SAMPLED REACH

Check ALL that apply

METHOD

1st - sample pass- 2nd

BOAT ☐ WADE ☐ LINE ☐ OTHER ☐

STAGE

HIGH ☐ UP ☐ NORMAL ☐ LOW ☐ DRY ☐

DISTANCE

0.5 Km ☐ 0.2 Km ☐ 0.15 Km ☐ 0.12 Km ☐ OTHER ☐

244 meters

CLARITY

1st - sample pass- 2nd

< 20 cm ☐ 20-40 cm ☐ 40-70 cm ☐ > 70 cm/CTB ☐ SECCHI DEPTH ☐

1st ☐ 2nd ☐

88 88 88

CANOPY

> 85% - OPEN ☐ 55% - < 85% ☐ 30% - < 55% ☐ 10% - < 30% ☐ < 10% - CLOSED ☐

CJ RECREATION

AREA DEPTH

POOL: ☐ > 100R2 ☐ > 3R

Stream S155307 is 1.5 miles up an unnamed tributary to Marsh Run that enters Marsh Run at Rivermile 4.87.

Measurement in feet.

FJ MEASUREMENTS

width

depth

max. depth

bankfull width

bankfull depth

W/D ratio

bankfull max. depth

floodprone x² width

entrench. ratio

Legacy Tree:

DJ MAINTENANCE

PUBLIC / PRIVATE / BOTH / NA

ACTIVE / HISTORIC / BOTH / NA

YOUNG-SUCCESSION-OLD

SPRAY / SNAG / REMOVED

MODIFIED / DIPPED OUT / NA

LEVEED / ONE SIDED

RELOCATED / CUTOFFS

MOVING-BEDLOAD-STABLE

ARMOURD / SLUMPS

ISLANDS / SCoured

IMPOUNDED / DESICCATED

FLOOD CONTROL / DRAINAGE

EJ ISSUES

WWTP / CSO / NPDES / INDUSTRY

HARDENED / URBAN / DIRT & GRIME

CONTAMINATED / LANDFILL

BMPs-CONSTRUCTION-SEDIMENT

LOGGING / IRRIGATION / COOLING

BANK / EROSION / SURFACE

FALSE BANK / MANURE / LAGOON

WASH H₂O / TILE / H₂O TABLE

ACID / MINE / QUARRY / FLOW

NATURAL / WETLAND / STAGNANT

PARK / GOLF / LAWN / HOME

ATMOSPHERE / DATA PAUCITY

Stream Drawing:

Channel width - 8.8'
current water depth - 0.18'

bankful could not be measured due to recent
dredging activities. Channel is inside ~ 6' deep
trapezoidal trench



Stream & Location: S 1560, Unnamed tributary to Marsh Run

RM: 0.9 Date: 10/23/09

A. Gardner, R. Noyes

Scorers Full Name & Affiliation: Ecology and Environment

River Code: - - -

STORET #: - - -

Lat./Long.: 40.9010 / 82.7097

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDR / SLABS [10]		<input type="checkbox"/> HARDPAN [4]	
<input type="checkbox"/> BOULDER [9]		<input type="checkbox"/> DETRITUS [3]	
<input type="checkbox"/> COBBLE [8]		<input checked="" type="checkbox"/> MUCK [2]	20 20
<input type="checkbox"/> GRAVEL [7]		<input checked="" type="checkbox"/> SILT [2]	80 80
<input type="checkbox"/> SAND [6]		<input type="checkbox"/> ARTIFICIAL [0]	
<input type="checkbox"/> BEDROCK [5]			

ORIGIN

☐ LIMESTONE [1]☐ TILLS [1]☐ WETLANDS [0]☐ HARDPAN [0]☐ SANDSTONE [0]☐ RIP/RAP [0]☐ LACUSTURINE [0]☐ SHALE [-1]☐ COAL FINES [-2]

QUALITY

☐ HEAVY [-2]☐ MODERATE [-1]☐ NORMAL [0]☐ FREE [1]☐ EXTENSIVE [-2]☐ MODERATE [-1]☐ NORMAL [0]☒ NONE [1]

SILT

EMBEDDEDNESS

Substrate

6

Maximum 20

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources

Comments

☐ 3 or less [0]

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

0 UNDERCUT BANKS [1]

0 POOLS > 70cm [2]

0 OXBOWS, BACKWATERS [1]

☐ EXTENSIVE >75% [11]

1 OVERHANGING VEGETATION [1]

0 ROOTWADS [1]

1 AQUATIC MACROPHYTES [1]

☐ MODERATE 25-75% [7]

1 SHALLOWS (IN SLOW WATER) [1]

0 BOULDERS [1]

0 LOGS OR WOODY DEBRIS [1]

☐ SPARSE 5-<25% [3]

0 ROOTMATS [1]

☒ NEARLY ABSENT <5% [1]

Comments

Cover

Maximum 20

4

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY

☐ HIGH [4]☐ MODERATE [3]☐ LOW [2]☒ NONE [1]

DEVELOPMENT

☐ EXCELLENT [7]☐ GOOD [5]☐ FAIR [3]☒ POOR [1]

CHANNELIZATION

☐ NONE [6]☐ RECOVERED [4]☐ RECOVERING [3]☒ RECENT OR NO RECOVERY [1]

STABILITY

☒ HIGH [3]☐ MODERATE [2]☐ LOW [1]

Comments

Channel

Maximum 20

6

Lacks defined pool-riffle-pool regime

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

☒ NONE / LITTLE [3]☐ MODERATE [2]☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH

☐ WIDE > 50m [4]☐ MODERATE 10-50m [3]☐ NARROW 5-10m [2]☐ VERY NARROW < 5m [1]☒ NONE [0]

FLOOD PLAIN QUALITY

☐ FOREST, SWAMP [3]☐ SHRUB OR OLD FIELD [2]☐ RESIDENTIAL, PARK, NEW FIELD [1]☐ FENCED PASTURE [1]☒ OPEN PASTURE, ROWCROP [0]☐ CONSERVATION TILLAGE [1]☐ URBAN OR INDUSTRIAL [0]☐ MINING / CONSTRUCTION [0]☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian

Maximum 10

3

Vegetation mowed on banks

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

☐ > 1m [6]☐ 0.7-<1m [4]☐ 0.4-<0.7m [2]☐ 0.2-<0.4m [1]☒ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

☐ POOL WIDTH > RIFFLE WIDTH [2]☐ POOL WIDTH = RIFFLE WIDTH [1]☐ POOL WIDTH > RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]☐ VERY FAST [1]☐ FAST [1]☐ MODERATE [1]☒ SLOW [1]☐ INTERSTITIAL [-1]☐ INTERMITTENT [-2]☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

Pool /

Current Maximum 12

1

Lacks defined pool-riffle regime

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH

☐ BEST AREAS > 10cm [2]☐ BEST AREAS 5-10cm [1]☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH

☐ MAXIMUM > 50cm [2]☐ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE

☐ STABLE (e.g., Cobble, Boulder) [2]☐ MOD. STABLE (e.g., Large Gravel) [1]☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

☒ NONE [2]☐ LOW [1]☐ MODERATE [0]☐ EXTENSIVE [-1]

Riffle /

Run Maximum 8

0

Comments

6) GRADIENT

ft/ml

☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL:

%GLIDE:

Gradient

Maximum 10

4

DRAINAGE AREA

(0.4755 ml²)

%RUN:

100

%RIFFLE:

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ LINE
- ☐ OTHER

STAGE

- ☐ HIGH
- ☐ UP
- ☐ NORMAL
- ☐ LOW
- ☐ DRY

CLARITY

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

DISTANCE

- ☐ 121 meters
- ☐ CANOPY
- ☐ 85% - OPEN
- ☐ 55% - 85%
- ☐ 30% - 55%
- ☐ 10% - 30%
- ☐ <10% - CLOSED

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

Stream S1560 is 0.9 miles up an unnamed tributary to Marsh Run that enters Marsh Run at Rivermile 3.44.

Measurements in feet.

DJ MAINTENANCE		EJ ISSUES	FJ MEASUREMENTS
<input type="checkbox"/> PUBLIC / PRIVATE / BOTH / NA		<input type="checkbox"/> WWTP / CSO / NPDES / INDUSTRY	<input type="checkbox"/> \bar{x} width
<input type="checkbox"/> ACTIVE / HISTORIC / BOTH / NA		<input type="checkbox"/> HARDENED / URBAN / DIRT & GRIME	<input type="checkbox"/> \bar{x} depth
<input type="checkbox"/> YOUNG-SUCCESSION-OLD		<input type="checkbox"/> CONTAMINATED / LANDFILL	<input type="checkbox"/> max. depth
<input type="checkbox"/> SPRAY / SNAG / REMOVED		<input type="checkbox"/> BMPs-CONSTRUCTION-SEDIMENT	<input type="checkbox"/> \bar{x} bankfull width
<input type="checkbox"/> MODIFIED / DIPPED OUT / NA		<input type="checkbox"/> LOGGING / IRRIGATION / COOLING	<input type="checkbox"/> bankfull \bar{x} depth
<input type="checkbox"/> LEVEED / ONE SIDED		<input type="checkbox"/> BANK / EROSION / SURFACE	<input type="checkbox"/> W/D ratio
<input type="checkbox"/> RELOCATED / CUTOFFS		<input type="checkbox"/> FALSE BANK / MANURE / LAGOON	<input type="checkbox"/> bankfull max. depth
<input type="checkbox"/> MOVING-BEDLOAD-STABLE		<input type="checkbox"/> WASH H ₂ O / TILE / H ₂ O TABLE	<input type="checkbox"/> bankfull \bar{x} width
<input type="checkbox"/> ARMORED / SLUMPS		<input type="checkbox"/> ACID / MINE / QUARRY / FLOW	<input type="checkbox"/> floodprone \bar{x} width
<input type="checkbox"/> ISLANDS / SCoured		<input type="checkbox"/> NATURAL / WETLAND / STAGNANT	<input type="checkbox"/> entrench. ratio
<input type="checkbox"/> IMPOUNDED / DESICCATED		<input type="checkbox"/> PARK / GOLF / LAWN / HOME	
<input type="checkbox"/> FLOOD CONTROL / DRAINAGE		<input type="checkbox"/> ATMOSPHERE / DATA PAUCITY	

CJ RECREATION
POOL: ☐ >100R? ☐ >3R

Stream Drawing:



Channel depth - 20"
Channel width - 6.93'
bankfull width - 6.93'
bankfull depth - 20"

Top of bank depth - 6'

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

SITE NAME/LOCATION **Unnamed Tributary to Marsh Run**SITE NUMBER **S1560**RIVER BASIN **Mohican**DRAINAGE AREA (mi²) **0.48**LENGTH OF STREAM REACH (ft) **397** LAT. **40.90100** LONG. **-82.70970** RIVER CODE **.** RIVER MILE **0.9**DATE **10/23/09** SCORER **A.G.** 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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input checked="" type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 80%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input checked="" type="checkbox"/> 20%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock **0.00%** (A)Substrate Percentage Check **100%** (B)SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **6**TOTAL NUMBER OF SUBSTRATE TYPES: **2**HHEI
Metric
PointsSubstrate
Max = 40**8**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input checked="" type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters):

Pool Depth
Max = 30**0**

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): **2.10**Bankfull
Width
Max=30**20**

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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS _____

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

<input type="checkbox"/> Stream Flowing	<input checked="" type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS _____

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

<input type="checkbox"/> None	<input checked="" type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

ADDITIONAL STREAM INFORMATION (This information must also be completed):

QHEI PERFORMED? ☒ Yes ☐ No QHEI Score 24.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: Shelby NRCS Soil Map Page: NRCS Soil Map Stream Order:
County: Richland Township / City: Plymouth & Sharon

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☐ N Date of last precipitation: 10/23/09 Quantity: 0.42
Photograph Information: Photos P916 & P917 both North on 10/22/09
Elevated Turbidity? (Y/N): ☐ N Canopy (% open): 100%
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:

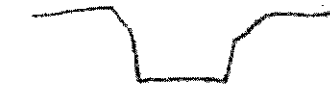
BIOTIC EVALUATION

Performed? (Y/N): ☐ N (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) ☐ N Voucher? (Y/N) ☐ N Aquatic Macroinvertebrates Observed? (Y/N) ☐ N Voucher? (Y/N) ☐ N
Comments Regarding Biology:

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

FLOW →



Channel depth - 20"
Channel width - 6.93'
bankfull width - 6.93'
bankfull depth - 20"

Top of bank depth - ~6'

Stream & Location: S1562, Marsh Run

RM: 3.8 Date: 10/23/09

A. Gardner, R. Noyes

Scorers Full Name & Affiliation: Ecology and Environment

River Code: - - -

STORET #: - - -

Lat./Long.: 40.9153 / 82.7152

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES		POOL RIFFLE	OTHER TYPES		POOL RIFFLE	ORIGIN		QUALITY		
<input type="checkbox"/> BLD / SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/> HEAVY [-2]	<input type="checkbox"/>	<div>Substrate</div> <div>6</div> <div>Maximum 20</div>	
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/>		
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	1	1	<input type="checkbox"/> WETLANDS [0]	<input checked="" type="checkbox"/> NORMAL [0]	<input type="checkbox"/>		
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> SILT [2]	99	99	<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> FREE [1]	<input type="checkbox"/>		
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> EXTENSIVE [-2]	<input type="checkbox"/>		
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>	<input type="checkbox"/>	(Score natural substrates; ignore sludge from point-sources)			<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/>		
NUMBER OF BEST TYPES: <input type="checkbox"/> 4 or more [2] <input type="checkbox"/> 3 or less [0]						SILT		<div>EMBEDDEDNESS</div>		
Comments						<input type="checkbox"/> LACUSTURINE [0]		<input type="checkbox"/> NORMAL [0]		
						<input type="checkbox"/> SHALE [-1]		<input type="checkbox"/> NONE [1]		
						<input type="checkbox"/> COAL FINES [-2]				

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input checked="" type="checkbox"/> SPARSE 5-<25% [3]
<input type="checkbox"/> ROOTMATS [1]			<input type="checkbox"/> NEARLY ABSENT <5% [1]

Comments

Cover

Maximum 20

6

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input checked="" type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Channel

Maximum 20

6

Channelized through ag. fields.

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION		RIPARIAN WIDTH		FLOOD PLAIN QUALITY	
<input checked="" type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> CONSERVATION TILLAGE [1]		
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]		
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/> MINING / CONSTRUCTION [0]		
	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]			
	<input type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]			

Comments

Mowed grass strip ~25' on both sides

Indicate predominant land use(s)
past 100m riparian.

Riparian

Maximum 10

4

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY!)

Check ONE (Or 2 & average)

Check ALL that apply

- ☐ > 1m [6]
☐ 0.7-1m [4]
☐ 0.4-0.7m [2]
☒ 0.2-0.4m [1]
☐ < 0.2m [0]

- ☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

- ☐ TORRENTIAL [-1] ☒ SLOW [1]
☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☐ FAST [1] ☐ INTERMITTENT [-2]
☐ MODERATE [1] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

Lacks pool-riffle regime

Pool / Current

Maximum 12

2

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

Lacks pool-riffle regime

Riffle / Run

Maximum 8

0

6) GRADIENT

ft/mi

☒ VERY LOW - LOW [2-4]

%POOL:

%GLIDE:

Gradient

DRAINAGE AREA

☐ MODERATE [6-10]

%RUN:

%RIFFLE:

Maximum

(7.926 mi²)☐ HIGH - VERY HIGH [10-6]

100

4

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

A) SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ L. LINE
☒ OTHER
- STAGE**
1st - sample pass-- 2nd
☐ HIGH
☐ UP
☒ NORMAL
☐ LOW
☐ DRY

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☒ OTHER
- 115 meters
- CLARITY**
1st - sample pass-- 2nd
☐ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm/CTB
☐ SECCHI DEPTH

CANOPY 1st ☐ 85% - OPEN 2nd ☐ 85% - OPEN

- ☐ 55% - 45%
☐ 30% - 55%
☐ 10% - 30%
☐ < 10% - CLOSED

CJ RECREATION

POOL: ☐ > 100m² ☐ > 3ft

Stream Drawing:

Measurements in feet.

FJ MEASUREMENTS

\bar{x} width	6.3
\bar{x} depth	0.69
max. depth	
\bar{x} bankfull width	20.4
bankfull \bar{x} depth	1.9
W/D ratio	10.8
bankfull max. depth	
floodprone \bar{x} width	
entrench. ratio	0.19

Legacy Tree:

EJ ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT & GRIME
CONTAMINATED / LANDFILL
BMPs - CONSTRUCTION - SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H₂O / TILE / H₂O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

DJ MAINTENANCE

PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

BJ AESTHETICS

☐ NUISANCE ALGAE
☐ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs/SSOs/OUTFALLS

(51562)

Top of Bank - 10'

Channel width - 6.31'

Channel depth - 1.20'

baseflow depth - 0.69' = (0.21m)

bankfull width - 20.44'

bankfull depth - 22.74"

Stream & Location: S500, Unnamed tributary to Honey Creek

RM: 0.3 Date: 09/22/09

J. Zoladz & J.T. Layne

Scorers Full Name & Affiliation: Ecology & Environment

River Code: -

STORET #: -

Lat./Long.: 40.9206 / 82.7598

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLD/SLABS [10]		<input type="checkbox"/> HARDPAN [4]	
<input type="checkbox"/> BOULDER [9]		<input type="checkbox"/> DETRITUS [3]	
<input type="checkbox"/> COBBLE [8]		<input type="checkbox"/> MUCK [2]	
<input type="checkbox"/> GRAVEL [7]		<input checked="" type="checkbox"/> SILT [2]	100
<input type="checkbox"/> SAND [6]		<input type="checkbox"/> ARTIFICIAL [0]	
<input type="checkbox"/> BEDROCK [5]			

ORIGIN
<input type="checkbox"/> LIMESTONE [1]
<input type="checkbox"/> TILLS [1]
<input type="checkbox"/> WETLANDS [0]
<input type="checkbox"/> HARDPAN [0]
<input type="checkbox"/> SANDSTONE [0]
<input type="checkbox"/> RIP/RAP [0]
<input type="checkbox"/> LACUSTURINE [0]
<input type="checkbox"/> SHALE [-1]
<input type="checkbox"/> COAL FINES [-2]

QUALITY
<input checked="" type="checkbox"/> HEAVY [-2]
<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> FREE [1]
<input type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> NONE [1]

Substrate
2
Maximum
20NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

Silt/clay bottom. No gravel.

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

0 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
0 SHALLOWS (IN SLOW WATER) [1]	0 BOULDERS [1]	0 LOGS OR WOODY DEBRIS [1]
0 ROOTMATS [1]		

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☒ SPARSE 5-25% [3]
☐ NEARLY ABSENT <5% [1]Cover
Maximum
20

Comments

Only some small Salix brush. Other vegetation is all herbaceous.

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]
<input checked="" type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Channel
Maximum
20

Comments

Only small curves within incised channel, typical deepened and straightened channel.

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Indicate predominant land use(s)
past 100m riparian.
Riparian
Maximum
10

Comments

Only a few willows within banks. Almost no riparian zone.

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY!)

Check ONE (Or 2 & average)

Check ALL that apply

☐ > 1m [6]
☐ 0.7-1m [4]
☐ 0.4-0.7m [2]
☐ 0.2-0.4m [1]
☒ < 0.2m [0]☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☐ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)Pool /
Current
Maximum
12

Comments

Intermittent stream. All glide < 20 cm.

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Riffle /
Run
Maximum
8

Comments

No water present. Low slope, appears as all glide.

6) GRADIENT (ft/mi) ☒ VERY LOW - LOW [24]
DRAINAGE AREA (0.2744 mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]%POOL: %GLIDE: 100
%RUN: %RIFFLE: Gradient
Maximum
10

A) SAMPLED REACH

Check ALL that apply

METHOD

- BOAT ☐ WADE ☐ L. LINE ☐ OTHER ☐
- DISTANCE
- 0.5 Km ☐ 0.2 Km ☐ 0.15 Km ☐ 0.12 Km ☐ OTHER ☐
- 110 meters

STAGE

- 1st sample pass-- 2nd
- HIGH ☐ UP ☐ NORMAL ☐ LOW ☐ DRY ☐

CLARITY

- 1st sample pass-- 2nd
- < 20 cm ☐ 20-40 cm ☐ 40-70 cm ☐ > 70 cm/CTB ☐
- SECCHI DEPTH ☐

CANOPY

- > 85%- OPEN ☐ 55%-85% ☐ 30%-55% ☐ 10%-30% ☐ <10%- CLOSED ☐

CJ RECREATION

AREA DEPTH

POOL: ☐ >100R2 ☐ >3ft

Comment RE: Reach consistency/ Is reach typical of stream? - Inferred, Other/ Sampling observations, Concerns, Access directions, etc. Small seasoned tributary to Honey Creek. Stream begins at Rt 98 where overland flow of Ag fields and a broad swale are culverted under the road.

On the north side of the road additional tile and roadside ditches add to the volume of water and a defined bed and bank are present.

Stream S500 is 0.3 miles up an secondary unnamed tributary to Honey Creek that enters the primary unnamed tributary to Honey Creek at Rivermile 2.4, which in turn enters Honey Creek at Rivermile 41.75.

Measurements in feet.

FJ MEASUREMENTS

\bar{x} width	0.57
\bar{x} depth	0.09
max. depth	
\bar{x} bankfull width	10.3
bankfull \bar{x} depth	1.2
W/D ratio	8.8
bankfull max. depth	
floodprone \bar{x}^2 width	0.23
entrench. ratio	

Legacy Tree:

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT & GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H₂O TILE / H₂O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

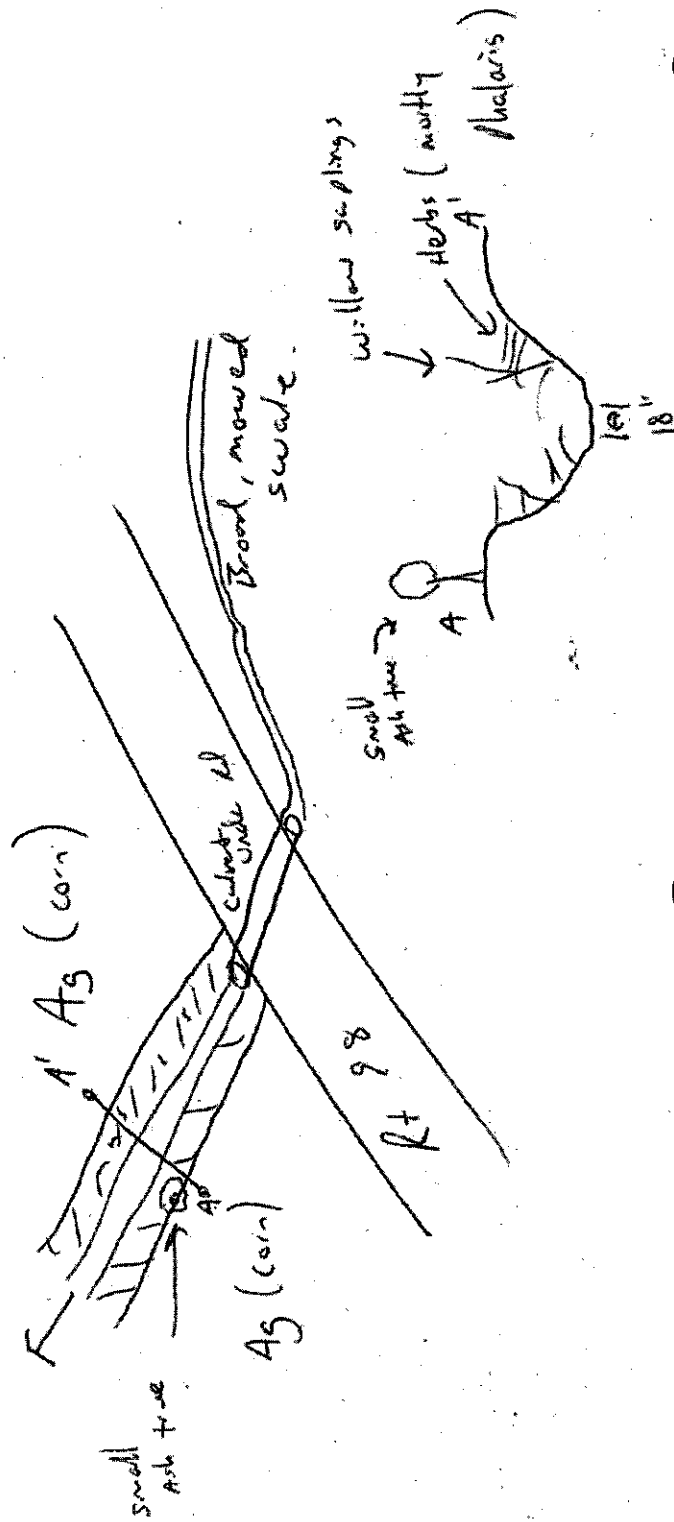
DJ MAINTENANCE

- PUBLIC / PRIVATE (BOTH) NA
ACTIVE / HISTORIC (BOTH) NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURD / SLUMPS
ISLANDS / SCOURD
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

BJ AESTHETICS

- NUISANCE ALGAE ☐ INVASIVE MACROPHYTES ☐ EXCESS TURBIDITY ☐ DISCOLORATION ☐ FOAM / SCUM ☐ OIL SHEEN ☐ TRASH / LITTER ☐ NUISANCE ODOR ☐ SLUDGE DEPOSITS ☐ CSOs/SSOs/OUTFALLS ☐

Stream Drawing:





Primary Headwater Habitat Evaluation Form

32

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

SITE NAME/LOCATION **Unnamed tributary to Honey Creek**

SITE NUMBER **S500** RIVER BASIN **Sandusky** DRAINAGE AREA (mi²) **0.27**

LENGTH OF STREAM REACH (ft) **361** LAT. **40.92060** LONG. **-82.75980** RIVER CODE RIVER MILE **0.3**

DATE **09/22/09** SCORER **J.Z. & J.T.L.** 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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input checked="" type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 100%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock **0.00%** (A)Substrate Percentage Check **100%** (B)SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **6**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

HHEI Metric Points

Substrate Max = 40

7

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input checked="" type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS MAXIMUM POOL DEPTH (centimeters): **3**

Pool Depth Max = 30

0

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

<input checked="" type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS AVERAGE BANKFULL WIDTH (meters): **3.14**

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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Narrow <5m
<input type="checkbox"/>	<input type="checkbox"/>	None

COMMENTS

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

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

<input type="checkbox"/> Stream Flowing	<input checked="" type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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

QHEI PERFORMED? ☒ Yes ☐ No QHEI Score 17.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: New Washington NRCS Soil Map Page: NRCS Soil Map Stream Order
County: Crawford Township / City: Auburn

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Y Date of last precipitation: 09/21/09 Quantity: 0.08

Photograph Information: Photo number P1009 west, looking at stream channel, taken October 22, 2009

Elevated Turbidity? (Y/N): ☐ N Canopy (% open): 100%

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:

BIOTIC EVALUATION

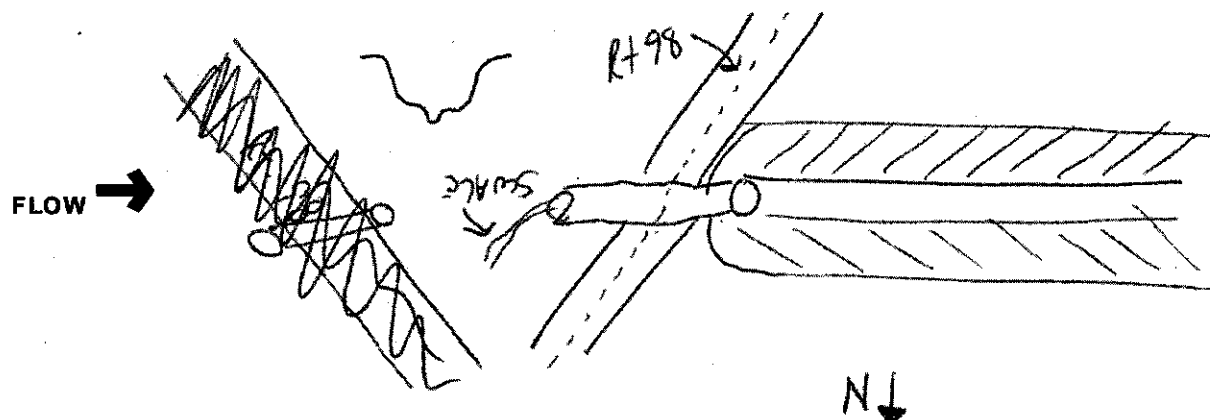
Performed? (Y/N): ☐ N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

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

Comments Regarding Biology:

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 & Location: S501, Unnamed tributary to Honey Creek

RM: 0.5 Date: 09/22/09

J. Zoladz, J. Layne

Scorers Full Name & Affiliation: Ecology & Environment

River Code: - - - -

STORET #: - - - -

Lat./ Long.: 40.9133 / 82.7504

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDG / SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>
<input checked="" type="checkbox"/> GRAVEL [7]	50	<input type="checkbox"/> SILT [2]	50
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>		

ORIGIN
<input type="checkbox"/> LIMESTONE [1]
<input type="checkbox"/> TILLS [1]
<input type="checkbox"/> WETLANDS [0]
<input type="checkbox"/> HARDPAN [0]
<input type="checkbox"/> SANDSTONE [0]
<input type="checkbox"/> RIP/RAP [0]
<input type="checkbox"/> LACUSTURINE [0]
<input type="checkbox"/> SHALE [-1]
<input type="checkbox"/> COAL FINES [-2]

QUALITY
<input type="checkbox"/> HEAVY [-2]
<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> FREE [1]
<input checked="" type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> NONE [1]

Substrate
7
Maximum
20NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources
☒ 3 or less [0]

Comments

Small intermittent stream (UNT to Honey Creek) with some gravel over silt/clay bottom.

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

0 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
0 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
0 SHALLOWS (IN SLOW WATER) [1]	0 BOULDERS [1]	0 LOGS OR WOODY DEBRIS [1]
0 ROOTMATS [1]		

AMOUNT
Check ONE (Or 2 & average)

<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SPARSE 5-<25% [3]
<input checked="" type="checkbox"/> NEARLY ABSENT <5% [1]

Comments

Cover
Maximum
20

1

Only overhanging vegetation is herbaceous. No other cover.

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]
<input checked="" type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Channel
Maximum
20

7

Typical straightened and deepened channel. Two small pools present some sinuosity within ditch.

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input checked="" type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Indicate predominant land use(s)
past 100m riparian.

Comments

Riparian
Maximum
10

3

Some scour, some trees on either bank

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY!)

Check ONE (Or 2 & average)

Check ALL that apply

<input type="checkbox"/> > 1m [6]
<input type="checkbox"/> 0.7-1m [4]
<input type="checkbox"/> 0.4-0.7m [2]
<input checked="" type="checkbox"/> 0.2-0.4m [1]
<input type="checkbox"/> < 0.2m [0]

<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]
<input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]
<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]

<input type="checkbox"/> TORRENTIAL [-1]	<input type="checkbox"/> SLOW [1]
<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> FAST [1]	<input checked="" type="checkbox"/> INTERMITTENT [-2]
<input type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Only small pools with water. Intermittent stream.

Pool /
Current
Maximum
12

0

Indicate for functional riffles; Best areas must be large enough to support a population
of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input checked="" type="checkbox"/> EXTENSIVE [-1]

Riffle /
Run
Maximum
8

0

Comments

Very low gradient.

6) GRADIENT

DRAINAGE AREA

ft²/mimi²

<input checked="" type="checkbox"/> VERY LOW - LOW [2-4]
<input type="checkbox"/> MODERATE [6-10]
<input type="checkbox"/> HIGH - VERY HIGH [10-6]

%POOL: 30

%GLIDE: 70

%RUN:

%RIFFLE:

Gradient
Maximum
10

4

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ L LINE
☒ OTHER
- STAGE**
 1st-sample pass--2nd
☐ HIGH
☐ UP
☒ NORMAL
☐ LOW
☐ DRY

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☒ OTHER
- 92 meters
- CLARITY**
 1st-sample pass--2nd
☐ <20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ >70 cm/CTB
☐ SECCHI DEPTH

CANOPY

- ☐ >85% OPEN
☐ 55%-85%
☐ 30%-55%
☒ 10%-30%
☐ <10%-CLOSED

CJ RECREATION

AREA DEPTH
 POOL: ☐ >100m² ☐ >3ft

BJ AESTHETICS

- ☐ NUISANCE ALGAE
☐ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC (PRIVATE) BOTH / NA
 ACTIVE (HISTORIC) BOTH / NA
 YOUNG-SUCCESSION-OLD
 SPRAY / SNAG / REMOVED
 (MODIFIED) DIPPED OUT / NA
 LEVEED / ONE SIDED
 RELOCATED / CUTOFFS
 MOVING-BEDLOAD-STABLE
 ARMORED / SLUMPS
 ISLANDS / SCOURED
 IMPOUNDED / DESICCATED
 FLOOD CONTROL (DRAINAGE)

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
 HARDENED / URBAN / DIRT&GRIME
 CONTAMINATED / LANDFILL
 BMPs-CONSTRUCTION-SEDIMENT
 LOGGING / IRRIGATION / COOLING
 BANK / EROSION / SURFACE
 FALSE BANK / MANURE / LAGOON
 WASH H₂O (TILE) H₂O TABLE
 ACID / MINE / QUARRY / FLOW
 NATURAL WETLAND / STAGNANT
 PARK / GOLF / LAWN / HOME
 ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

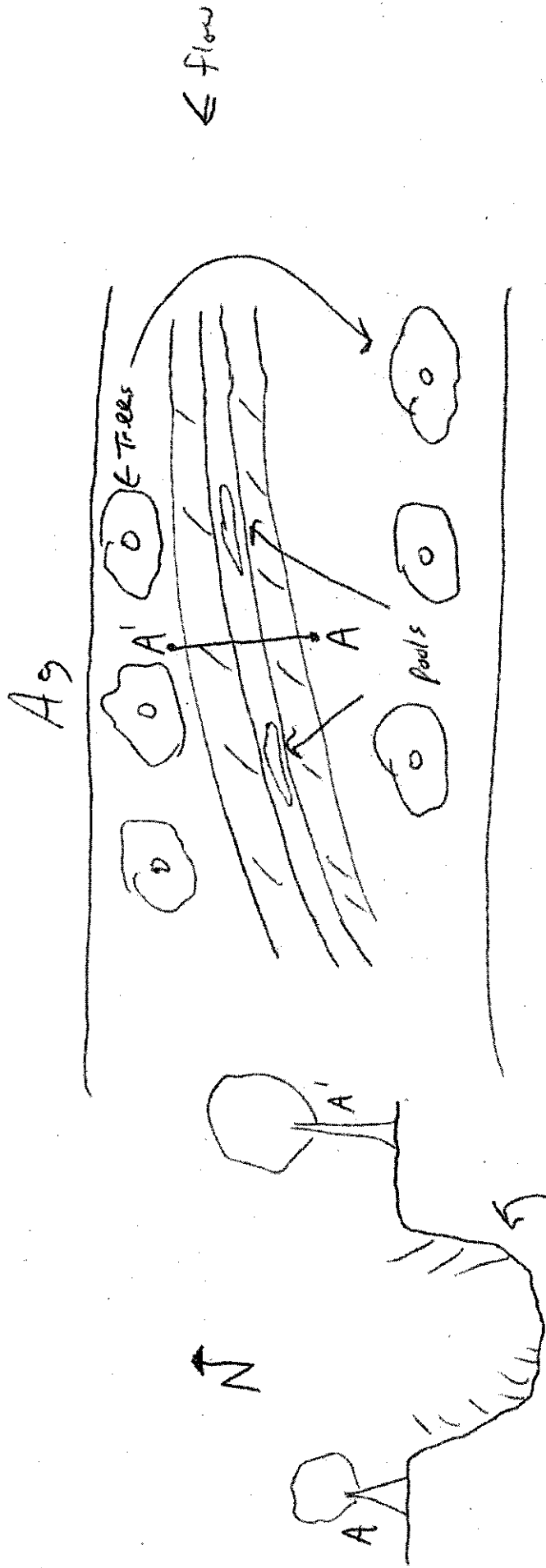
\bar{x} width	7.3
\bar{x} depth	0.55
max. depth	
\bar{x} bankfull width	9.1
bankfull \bar{x} depth	1.2
W/D ratio	8.8
bankfull max. depth	
floodprone \bar{x}^2 width	
entrench. ratio	0.23

Legacy Tree:

Stream S501 is 0.5 miles up an secondary unnamed tributary to Honey Creek that enters the primary unnamed tributary to Honey Creek at Rivermile 3.2, which in turn enters Honey Creek at Rivermile 41.75.

Measurements in feet.

Stream Drawing:



Comment RE: Reach consistency/ Is reach typical of stream? - Inferred. Other/ Sampling observations, Concerns, Access directions, etc. Small, seasoned UNT to Honey Creek. No recreation potential. Some trees on either bank. Typical deepened and straightened headwater. Some evidence of recovery with trees and shrubs.



Primary Headwater Habitat Evaluation Form

50

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

SITE NAME/LOCATION **Unnamed tributary to Honey Creek**SITE NUMBER **S501**RIVER BASIN **Sandusky**DRAINAGE AREA (mi²) **0.48**LENGTH OF STREAM REACH (ft) **302**LAT **40.91332**LONG. **-82.75043**

RIVER CODE

RIVER MILE **0.45**DATE **09/22/09**SCORER **J.Z. & J.T.L.**

COMMENTS

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH 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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 45%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 10%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input checked="" type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input checked="" type="checkbox"/> 45%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **10.00%** (A)Substrate Percentage
Check **100%** (B)SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **3**HHEI
Metric
PointsSubstrate
Max = 40**15**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

Pool Depth
Max = 30**15**

COMMENTS

MAXIMUM POOL DEPTH (centimeters): **17**

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

Bankfull
Width
Max=30**20**

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.77**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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Narrow <5m
<input type="checkbox"/>	<input type="checkbox"/>	None

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS

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

<input type="checkbox"/> Stream Flowing	<input checked="" type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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

QHEI PERFORMED? ☒ Yes ☐ No QHEI Score 22.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: New Washington NRCS Soil Map Page: NRCS Soil Map Stream Order:
County: Crawford Township / City: Auburn

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 09/21/09 Quantity: 0.08

Photograph Information: Photo numbers P1026 looking east and P1027 looking west at stream channel, taken September 22, 2009

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

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:

BIOTIC EVALUATION

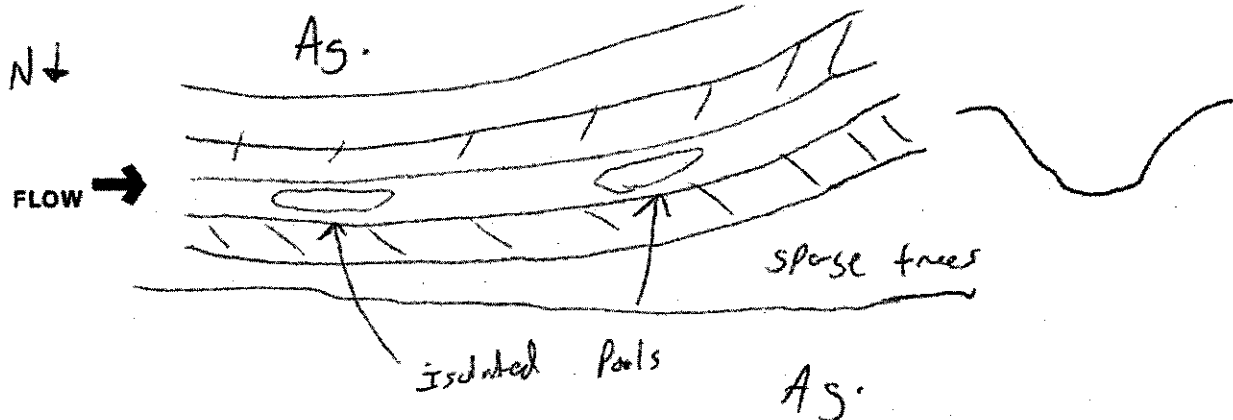
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

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

Comments Regarding Biology:

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 & Location: S505, Unnamed tributary to Marsh Run

RM: 0.7 Date: 09/24/09

J. Zoladz & J. T. Layne

Scorers Full Name & Affiliation: Ecology & Environment

River Code: - - -

STORET #: - - -

Lat./ Long.: 40.9364 / 82.6767

Office verified location ☐1) **SUBSTRATE** Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES

- ☐
- BLD/SLABS [10]
-
- ☐
- BOULDER [9]
-
- ☐
- COBBLE [8]
-
- ☐
- GRAVEL [7]
-
- ☐
- SAND [6]
-
- ☐
- BEDROCK [5]

POOL RIFFLE

- ☐
- POOL
-
- ☐
- RIFFLE

OTHER TYPES

- ☐
- HARDPAN [4]
-
- ☐
- DETRITUS [3]
-
- ☐
- MUCK [2]
-
- ☒
- SILT [2] 100
-
- ☐
- ARTIFICIAL [0]

(Score natural substrates; ignore sludge from point-sources)

POOL RIFFLE

- ☐
- POOL
-
- ☐
- RIFFLE

ORIGIN

- ☐
- LIMESTONE [1]
-
- ☐
- TILLS [1]
-
- ☒
- WETLANDS [0]
-
- ☐
- HARDPAN [0]
-
- ☐
- SANDSTONE [0]
-
- ☐
- RIP/RAP [0]
-
- ☐
- LACUSTURINE [0]
-
- ☐
- SHALE [-1]
-
- ☐
- COAL FINES [-2]

QUALITY

- ☒
- HEAVY [-2]
-
- ☐
- MODERATE [-1]
-
- ☐
- NORMAL [0]
-
- ☐
- FREE [1]
-
- ☐
- EXTENSIVE [-2]
-
- ☐
- MODERATE [-1]
-
- ☒
- NORMAL [0]
-
- ☐
- NONE [1]

SILT

EMBEDDEDNESS

Substrate
2
Maximum
20NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

100% silt/clay bottom.

2) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

0 UNDERCUT BANKS [1]

0 POOLS > 70cm [2]

0 OXBOWS, BACKWATERS [1]

☐ EXTENSIVE >75% [11]

2 OVERHANGING VEGETATION [1]

0 ROOTWADS [1]

1 AQUATIC MACROPHYTES [1]

☐ MODERATE 25-75% [7]

0 SHALLOWS (IN SLOW WATER) [1]

0 BOULDERS [1]

0 LOGS OR WOODY DEBRIS [1]

☒ SPARSE 5-25% [3]

0 ROOTMATS [1]

☐ NEARLY ABSENT <5% [1]

Comments

Cover
Maximum
20

6

Some typha within stream channel, willows present.

3) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

SINUOSITY

- ☐
- HIGH [4]
-
- ☐
- MODERATE [3]
-
- ☐
- LOW [2]
-
- ☒
- NONE [1]

DEVELOPMENT

- ☐
- EXCELLENT [7]
-
- ☐
- GOOD [5]
-
- ☐
- FAIR [3]
-
- ☒
- POOR [1]

CHANNELIZATION

- ☐
- NONE [6]
-
- ☐
- RECOVERED [4]
-
- ☐
- RECOVERING [3]
-
- ☒
- RECENT OR NO RECOVERY [1]

STABILITY

- ☐
- HIGH [3]
-
- ☒
- MODERATE [2]
-
- ☐
- LOW [1]

Comments

Channel
Maximum
20

5

Typical deepened, straightened channel. Some scour in subsoil banks.

4) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

- ☐
- NONE / LITTLE [3]
-
- ☒
- MODERATE [2]
-
- ☐
- HEAVY / SEVERE [1]

RIPARIAN WIDTH

- ☐
- WIDE > 50m [4]
-
- ☐
- MODERATE 10-50m [3]
-
- ☐
- NARROW 5-10m [2]
-
- ☒
- VERY NARROW < 5m [1]
-
- ☐
- NONE [0]

FLOOD PLAIN QUALITY

- ☐
- FOREST, SWAMP [3]
-
- ☐
- SHRUB OR OLD FIELD [2]
-
- ☐
- RESIDENTIAL, PARK, NEW FIELD [1]
-
- ☐
- FENCED PASTURE [1]
-
- ☒
- OPEN PASTURE, ROWCROP [0]

- ☐
- CONSERVATION TILLAGE [1]
-
- ☐
- URBAN OR INDUSTRIAL [0]
-
- ☐
- MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian
Maximum
10

3

Some erosion on steep banks. Some willows and shrubs on banks.

5) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

MAXIMUM DEPTH

Check ONE (ONLY!)

- ☐
- > 1m [6]
-
- ☐
- 0.7-1m [4]
-
- ☐
- 0.4-0.7m [2]
-
- ☐
- 0.2-0.4m [1]
-
- ☒
- < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

- ☐
- POOL WIDTH > RIFFLE WIDTH [2]
-
- ☐
- POOL WIDTH = RIFFLE WIDTH [1]
-
- ☐
- POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

- ☐
- TORRENTIAL [-1]
-
- ☐
- VERY FAST [1]
-
- ☐
- FAST [1]
-
- ☐
- MODERATE [1]
-
- ☐
- SLOW [1]
-
- ☐
- INTERSTITIAL [-1]
-
- ☐
- INTERMITTENT [-2]
-
- ☐
- EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

Pool /
Current
Maximum
12

0

Seasonal tributary to Marsh Run.

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH

- ☐
- BEST AREAS > 10cm [2]
-
- ☐
- BEST AREAS 5-10cm [1]
-
- ☐
- BEST AREAS < 5cm [metric=0]

RUN DEPTH

- ☐
- MAXIMUM > 50cm [2]
-
- ☐
- MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE

- ☐
- STABLE (e.g., Cobble, Boulder) [2]
-
- ☐
- MOD. STABLE (e.g., Large Gravel) [1]
-
- ☐
- UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

- ☐
- NONE [2]
-
- ☐
- LOW [1]
-
- ☐
- MODERATE [0]
-
- ☐
- EXTENSIVE [-1]

Riffle /
Run
Maximum
8

0

Comments

100% glide. Currently dry.

6) **GRADIENT** (ft/mi)

DRAINAGE AREA

(0.5338 mi²)

- ☒
- VERY LOW - LOW [2-4]
-
- ☐
- MODERATE [6-10]
-
- ☐
- HIGH - VERY HIGH [10-6]

%POOL:

%GLIDE:

100

%RUN:

%RIFFLE:

Gradient
Maximum
10

4

AJ SAMPLED REACH

Check ALL that apply

METHOD

- STAGE**
☐ BOAT
☐ WADE
☐ L LINE
☒ OTHER
DISTANCE
☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☒ OTHER
 268 meters

CLARITY

- 1st sample pass-- 2nd
☐ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm/CTB
☐ SECCHI DEPTH
 1st _____ cm
 2nd _____ cm

CANOPY

- ☐ > 85% - OPEN
☐ 55%-85%
☐ 30%-55%
☐ 10%-30%
☐ < 10% - CLOSED

CJ RECREATION

AREA DEPTH
 POOL: ☐ > 100R2 ☐ > 3R

BJ AESTHETICS

- ☐ NUISANCE ALGAE
☒ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- ☐ PUBLIC / PRIVATE / BOTH / NA
☒ ACTIVE / HISTORIC / BOTH / NA
☐ YOUNG-SUCCESSION-OLD
☒ SPRAY / SNAG / REMOVED
☒ MODIFIED / DIPPED OUT / NA
☐ LEVEED / ONE SIDED
☐ RELOCATED / CUTOFFS
☐ MOVING-BEDLOAD-STABLE
☐ ARMOURRED / SLUMPS
☐ ISLANDS / SCOURED
☐ IMPOUNDED / DESICCATED
☒ FLOOD CONTROL / DRAINAGE

EJ ISSUES

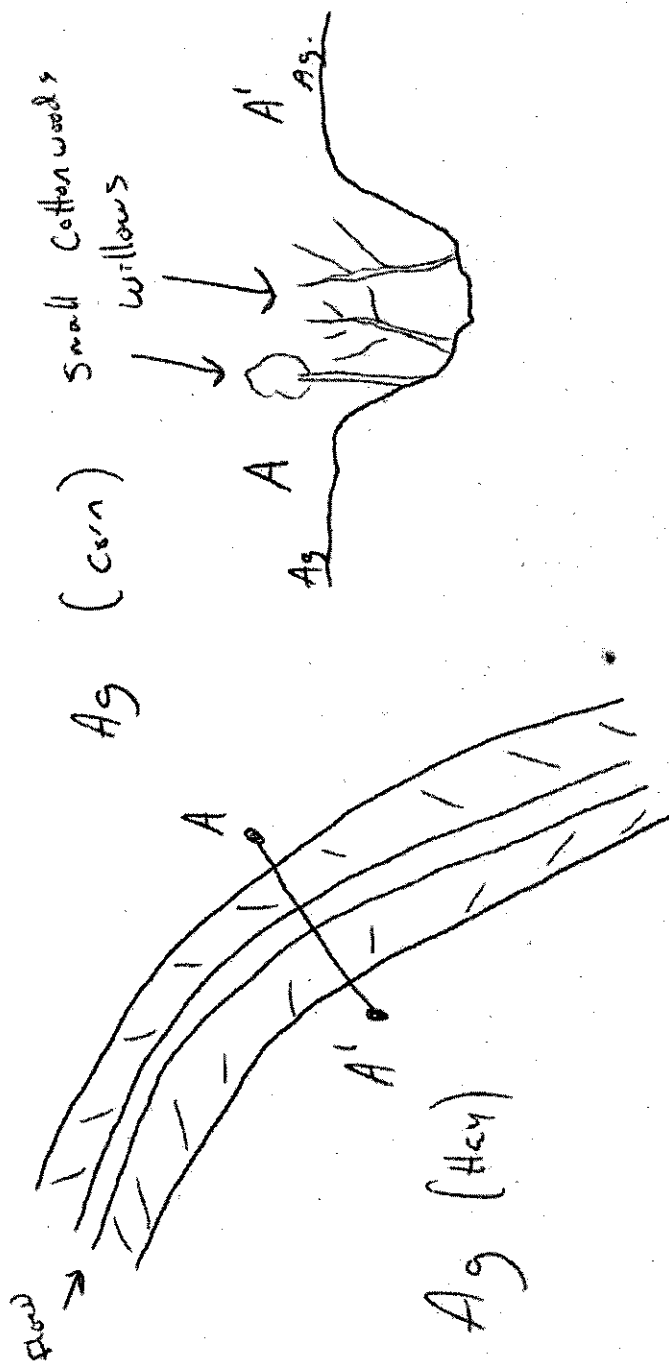
- WWTP / CSO / NPDES / INDUSTRY
 HARDENED / URBAN / DIRT & GRIME
 CONTAMINATED / LANDFILL
 BMPs-CONSTRUCTION-SEDIMENT
 LOGGING / IRRIGATION / COOLING
 BANK EROSION / SURFACE
 FALSE BANK / MANURE / LAGOON
 WASH H₂O / TILE / H₂O TABLE
 ACID / MINE / QUARRY / FLOW
 NATURAL WETLAND / STAGNANT
 PARK / GOLF / LAWN / HOME
 ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width 2.4
 \bar{x} depth 0.75
 max. depth
 \bar{x} bankfull width 8.6
 bankfull \bar{x} depth 2.2
 W/D ratio 4.0
 bankfull max. depth
 floodprone \bar{x} width
 entrench. ratio 0.50

Legacy Tree:

Stream Drawing:



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

SITE NAME/LOCATION **Unnamed tributary to Marsh Run**SITE NUMBER **S505**RIVER BASIN **Mohican**DRAINAGE AREA (mi²) **0.53**LENGTH OF STREAM REACH (ft) **884**LAT. **40.93639**LONG. **-82.67672**

RIVER CODE

RIVER MILE **0.7**DATE **09/24/09**SCORER **J.Z. & J.T.L.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input checked="" type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 100%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%** (A)Substrate Percentage
Check **100%** (B)SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **6**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

- 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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input checked="" type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS

MAXIMUM POOL DEPTH (centimeters): **23**

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (<= 3' 3") [5 pts]
<input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.62**HHEI
Metric
PointsSubstrate
Max = 40

7

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS

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

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input checked="" type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

ADDITIONAL STREAM INFORMATION (This information must also be completed):

QHEI PERFORMED? - ☒ Yes ☐ No QHEI Score 18.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: Shelby NRCS Soil Map Page: NRCS Soil Map Stream Order
County: Richland Township / City: Plymouth

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Y Date of last precipitation: 09/21/09 Quantity: 0.08

Photograph Information: Photo numbers P1043 west and P1044 south looking at stream channel

Elevated Turbidity? (Y/N): ☐ N Canopy (% open): 100%

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:

BIOTIC EVALUATION

Performed? (Y/N): ☐ N (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) ☐ N Voucher? (Y/N) ☐ N Aquatic Macroinvertebrates Observed? (Y/N) ☐ N Voucher? (Y/N) ☐ N

Comments Regarding Biology:

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 & Location: S506, UNT to Marsh Run

RM: 0.4 Date: 09/24/09

J. Zoladz, J. Layne

Scorers Full Name & Affiliation: Ecology & Environment

River Code: - - -

STORET #: - - -

Lat./ Long.: 40.9308 / 82.6726

Office verified location ☐1] SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDR / SLABS [10]	_____	<input type="checkbox"/> HARDPAN [4]	_____
<input type="checkbox"/> BOULDER [9]	_____	<input type="checkbox"/> DETRITUS [3]	_____
<input type="checkbox"/> COBBLE [8]	_____	<input type="checkbox"/> MUCK [2]	_____
<input type="checkbox"/> GRAVEL [7]	_____	<input checked="" type="checkbox"/> SILT [2]	50
<input checked="" type="checkbox"/> SAND [6]	50	<input type="checkbox"/> ARTIFICIAL [0]	_____
<input type="checkbox"/> BEDROCK [5]	_____	(Score natural substrates; ignore sludge from point-sources)	

ORIGIN

☐ LIMESTONE [1]☐ TILLS [1]☐ WETLANDS [0]☐ HARDPAN [0]☐ SANDSTONE [0]☐ RIP/RAP [0]☐ LACUSTURINE [0]☐ SHALE [-1]☐ COAL FINES [-2]

QUALITY

☒ HEAVY [-2]☐ MODERATE [-1]☐ NORMAL [0]☐ FREE [1]☐ EXTENSIVE [-2]☐ MODERATE [-1]☐ NORMAL [0]☐ NONE [1]

SILT

EMBEDDEDNESS

Substrate

6.5

Maximum

20

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments

Silty sand bottom fully embedded. Quicksand like.

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

<input type="0"/> UNDERCUT BANKS [1]	<input type="0"/> POOLS > 70cm [2]	<input type="0"/> OXBOWS, BACKWATERS [1]
<input type="0"/> OVERHANGING VEGETATION [1]	<input type="0"/> ROOTWADS [1]	<input type="0"/> AQUATIC MACROPHYTES [1]
<input type="0"/> SHALLOWS (IN SLOW WATER) [1]	<input type="0"/> BOULDERS [1]	<input type="0"/> LOGS OR WOODY DEBRIS [1]
<input type="0"/> ROOTMATS [1]		

☐ EXTENSIVE >75% [11]☐ MODERATE 25-75% [7]☐ SPARSE 5-25% [3]☒ NEARLY ABSENT <5% [1]

Cover

Maximum

20

1

Comments

Straight glide, overhanging Bidens caryina and Iersia oryzoides.

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Channel

Maximum

20

4

Comments

Straightened and deepened channel for Ag. Banks topsoil/subsoil.

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE
<input type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/> MINING / CONSTRUCTION [0]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	
	<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]	
	<input checked="" type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s)
past 100m riparian.

Riparian

Maximum

10

2

Comments

Some scour on banks. Riparian only herbs. Row cap either side.

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
<input type="checkbox"/> > 1m [6]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> SLOW [1]
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [0]	<input type="checkbox"/> VERY FAST [1]
<input type="checkbox"/> 0.2-0.4m [1]		<input type="checkbox"/> FAST [1]
<input checked="" type="checkbox"/> < 0.2m [0]		<input type="checkbox"/> MODERATE [1]
		<input type="checkbox"/> INTERSTITIAL [-1]
		<input type="checkbox"/> INTERMITTENT [-2]
		<input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Pool /

Current

Maximum

12

0

Comments

alid <20 cm = 0

Indicate for functional riffles; Best areas must be large enough to support a population
of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Riffle /

Run

Maximum

8

0

Comments

100% glide

6] GRADIENT (

ft/mi)

☒ VERY LOW - LOW [2-4]☐ MODERATE [6-10]☐ HIGH - VERY HIGH [10-6]

%POOL:

%GLIDE:

100%

%RUN:

%RIFFLE:

Gradient

Maximum

10

4

SITE NAME/LOCATION **Unnamed tributary to Marsh Run**

SITE NUMBER **S506** RIVER BASIN **Mohican** DRAINAGE AREA (mi²) **0.59**

LENGTH OF STREAM REACH (ft) **716** LAT. **40.93078** LONG. **-82.67263** RIVER CODE RIVER MILE **0.4**

DATE **09/24/09** SCORER **J.Z. & J.T.L.** 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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input checked="" type="checkbox"/> 50%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input checked="" type="checkbox"/> SAND (<2 mm) [6 pts]	<input checked="" type="checkbox"/> 5%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

Substrate Percentage Check **55%**

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **9**

TOTAL NUMBER OF SUBSTRATE TYPES: **2**

HHEI Metric Points

Substrate Max = 40

11

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS

MAXIMUM POOL DEPTH (centimeters): **39**

Pool Depth Max = 30

15

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

<input checked="" type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **3.66**

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

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS

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

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input checked="" type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name: <input type="text"/>	Distance from Evaluated Stream <input type="text"/>
<input type="checkbox"/> CWH Name: <input type="text"/>	Distance from Evaluated Stream <input type="text"/>
<input type="checkbox"/> EWH Name: <input type="text"/>	Distance from Evaluated Stream <input type="text"/>

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: Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Y Date of last precipitation: Quantity:

Photograph Information: Photo P1049 facing East, and P1050 North

Elevated Turbidity? (Y/N): ☐ N Canopy (% open): 0%

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:

BIOTIC EVALUATION

Performed? (Y/N): ☐ N (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)

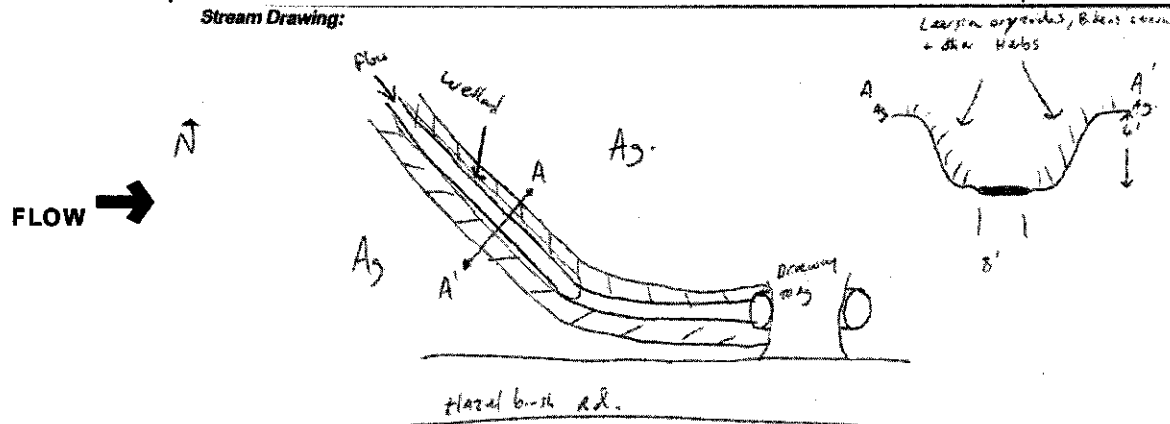
Fish Observed? (Y/N): <input type="checkbox"/> N	Voucher? (Y/N): <input type="checkbox"/> N	Salamanders Observed? (Y/N): <input type="checkbox"/> N	Voucher? (Y/N): <input type="checkbox"/> N
Frogs or Tadpoles Observed? (Y/N): <input type="checkbox"/> N	Voucher? (Y/N): <input type="checkbox"/> N	Aquatic Macroinvertebrates Observed? (Y/N): <input type="checkbox"/> N	Voucher? (Y/N): <input type="checkbox"/> N

Comments Regarding Biology:

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:



Stream & Location: S508, UNT to Marsh Run

RM: 0.7 Date: 09/25/09

J. Zoladz, J.T. Layne

Scorers Full Name & Affiliation: Ecology & Environment

River Code: - - -

STORET #: - - -

Lat./Long.: 40.9305 / 82.6831
(NAD 83 - decimal)Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

BEST TYPES	POOL RIFFLE	OTHER TYPES	POOL RIFFLE
<input type="checkbox"/> BLDR/SLABS [10]		<input type="checkbox"/> HARDPAN [4]	
<input type="checkbox"/> BOULDER [9]		<input type="checkbox"/> DETRITUS [3]	
<input type="checkbox"/> COBBLE [8]		<input checked="" type="checkbox"/> MUCK [2]	100%
<input type="checkbox"/> GRAVEL [7]		<input type="checkbox"/> SILT [2]	
<input type="checkbox"/> SAND [6]		<input type="checkbox"/> ARTIFICIAL [0]	
<input type="checkbox"/> BEDROCK [5]			

Check ONE (Or 2 & average)

ORIGIN	QUALITY
<input type="checkbox"/> LIMESTONE [1]	<input checked="" type="checkbox"/> HEAVY [-2]
<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> MODERATE [-1]
<input checked="" type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> FREE [1]
<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> LACUSTURINE [0]	<input checked="" type="checkbox"/> NORMAL [0]
<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/> NONE [1]
<input type="checkbox"/> COAL FINES [-2]	

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources
☐ 3 or less [0]

Comments

100% muck

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

	AMOUNT
0 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]
2 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]
0 SHALLOWS (IN SLOW WATER) [1]	0 BOULDERS [1]
0 ROOTMATS [1]	

Check ONE (Or 2 & average)

<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SPARSE 5-25% [3]
<input checked="" type="checkbox"/> NEARLY ABSENT <5% [1]

Comments

Some shrubs coming in along banks.

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Deepened and straightened for Agricultural purposes..

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY
<input checked="" type="checkbox"/> NONE / LITTLE [3]	<input type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/> FOREST, SWAMP [3]
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
	<input type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input checked="" type="checkbox"/> NONE [0]	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Comments

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

CHANNEL WIDTH

CURRENT VELOCITY

Check ONE (ONLY!)

Check ONE (Or 2 & average)

Check ALL that apply

<input type="checkbox"/> > 1m [6]
<input type="checkbox"/> 0.7-1m [4]
<input type="checkbox"/> 0.4-0.7m [2]
<input type="checkbox"/> 0.2-0.4m [1]
<input checked="" type="checkbox"/> < 0.2m [0]

<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]
<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]
<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]

<input type="checkbox"/> TORRENTIAL [-1]	<input type="checkbox"/> SLOW [1]
<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]
<input type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

100% slide with depths < 20cm

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☒ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

All slide.

6) GRADIENT

ft/mi)

☒ VERY LOW - LOW [2-4]

%POOL:

%GLIDE:

100

DRAINAGE AREA

☐ MODERATE [6-10]

%RUN:

%RIFFLE:

Gradient
Maximum
10

AJ SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ LINE
☒ OTHER

STAGE

- 1st - sample pass 2nd
☐ HIGH
☐ UP
☒ NORMAL
☐ LOW
☐ DRY

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☒ OTHER
 101
 meters

CLARITY

- 1st - sample pass 2nd
☐ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm / CTB
☐ SECCHI DEPTH
 1st _____ cm
 2nd _____ cm

CANOPY

- ☒ > 85% - OPEN
☐ 55% - 85%
☐ 30% - 55%
☐ 10% - 30%
☐ < 10% - CLOSED

CJ RECREATION

AREA DEPTH
POOL: ☐ > 100R? ☐ > 3R

BJ AESTHETICS

- ☐ NUISANCE ALGAE
☐ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs / SSOs / OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE (BOTH) NA
 ACTIVE / HISTORIC (BOTH) NA
 YOUNG-SUCCESSION-OLD
 SPRAY / SNAG / REMOVED
 MODIFIED / DIPPED OUT / NA
 LEVEED / ONE SIDED
 RELOCATED / CUTOFFS
 MOVING-BEDLOAD-STABLE
 ARMOURRED / SLUMPS
 ISLANDS / SCOURED
 IMPOUNDED / DESICCATED
 FLOOD CONTROL / DRAINAGE

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
 HARDENED / URBAN / DIRT & GRIME
 CONTAMINATED / LANDFILL
 BMPs-CONSTRUCTION-SEDIMENT
 LOGGING / IRRIGATION / COOLING
 BANK / EROSION / SURFACE
 FALSE BANK / MANURE / LAGOON
 WASH H₂O (TILE) H₂O TABLE
 ACID / MINE / QUARRY / FLOW
 NATURAL WETLAND STAGNANT
 PARK / GOLF / LAWN / HOME
 ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- x width 3.3
 x depth 0.28
 max. depth
 x bankfull width 16.4
 bankfull x depth 2.0
 WD ratio 8.2
 bankfull max. depth
 floodprone x² width 0.24
 entrench. ratio

Legacy Tree:

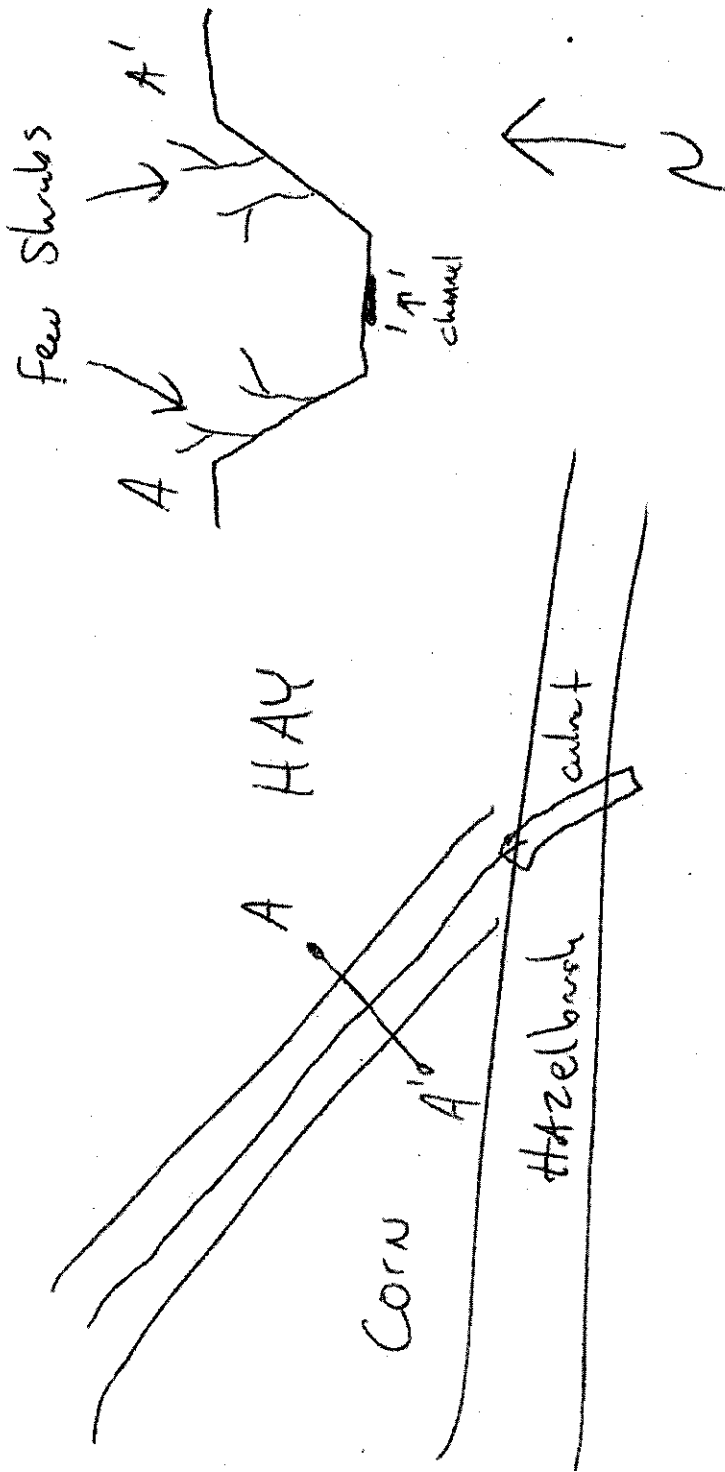
Measurements in feet.

Stream S508 is 0.7 miles up an secondary unnamed tributary to Marsh Run that enters the primary unnamed tributary to Marsh Run at Rivermile 0.2, which in turn enters Marsh Run at Rivermile 0.85.

via culvert, wetland present within incised channel.

Comment RE: Reach consistency/ Is reach typical of stream? - Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc. Small tributary to Marsh Run. Not as recently modified as S507 stretch, still deeply incised and modified. All glide and weeds. Flows SE under Hazelbrush Rd.

Stream Drawing:



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

SITE NAME/LOCATION **Unnamed tributary to Marsh Run**SITE NUMBER **S508**RIVER BASIN **Mohican**DRAINAGE AREA (mi²) **0.87**LENGTH OF STREAM REACH (ft) **331**LAT **40.93050**LONG. **-82.68310**

RIVER CODE

RIVER MILE **0.7**DATE **09/25/09**SCORER **J.Z. & J.T.L.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input checked="" type="checkbox"/> MUCK [0 pts]	<input checked="" type="checkbox"/> 100%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%** (A)Substrate Percentage
Check **100%** (B)SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **0**TOTAL NUMBER OF SUBSTRATE TYPES: **1**HHEI
Metric
PointsSubstrate
Max = 40**1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS

MAXIMUM POOL DEPTH (centimeters): **9**Pool Depth
Max = 30**15**

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

<input checked="" type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **5.00**Bankfull
Width
Max=30**30**

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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	None

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS

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

<input checked="" type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS

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

<input checked="" type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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

QHEI PERFORMED? ☒ Yes ☐ No QHEI Score 16.0 (If Yes, Attach Completed QHEI Form)

DOWNSTREAM DESIGNATED USE(S)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

USGS Quadrangle Name: Shelby NRCS Soil Map Page: NRCS Soil Map Stream Order
County: Richland Township / City: Plymouth

MISCELLANEOUS

Base Flow Conditions? (Y/N): Y Date of last precipitation: 09/21/09 Quantity: 0.08

Photograph Information: Photo P1072, Northwest, 09/25/09

Elevated Turbidity? (Y/N): N Canopy (% open): 100%

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:

BIOTIC EVALUATION

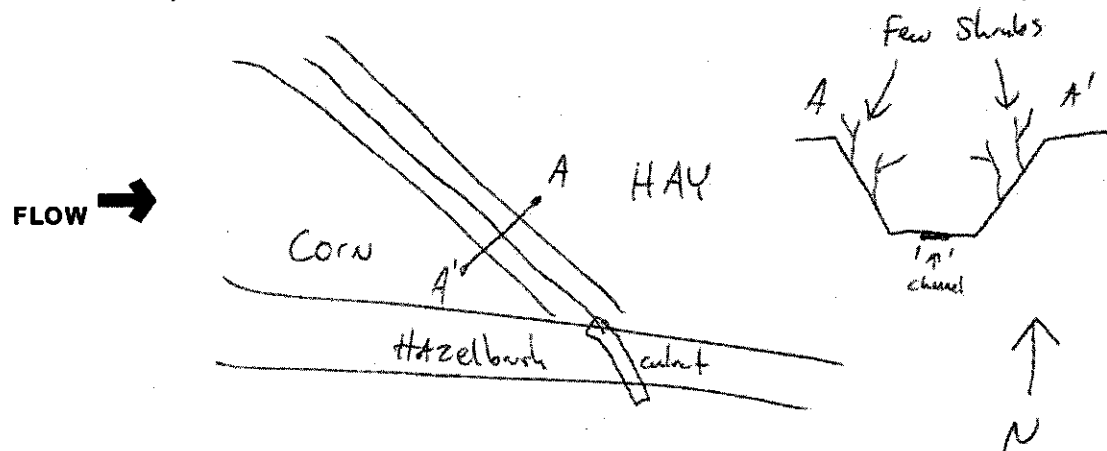
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

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

Comments Regarding Biology:

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





Primary Headwater Habitat Evaluation Form

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

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	0%	<input type="checkbox"/> SILT [3 pt]	75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	0%	<input checked="" type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	25%
<input type="checkbox"/> BEDROCK [16 pt]	0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	0%	<input type="checkbox"/> MUCK [0 pts]	0%
<input checked="" type="checkbox"/> SAND (<2 mm) [6 pts]	0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (<= 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**HHEI
Metric
PointsSubstrate
Max = 40

13

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**

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

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**

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

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☐ Yes ☒ No Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☐ No ☒ Yes Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): ☐ No ☒ Yes (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): ☐ Yes ☒ No If not, please explain:

Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☐ No ☒ Yes (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): ☐ No ☒ Yes Voucher? (Y/N): ☐ No ☒ Yes Salamanders Observed? (Y/N): ☐ No ☒ Yes Voucher? (Y/N): ☐ No ☒ Yes
Frogs or Tadpoles Observed? (Y/N): ☐ No ☒ Yes Voucher? (Y/N): ☐ No ☒ Yes Aquatic Macroinvertebrates Observed? (Y/N): ☐ No ☒ Yes Voucher? (Y/N): ☐ No ☒ Yes
Comments Regarding Biology: No aquatic wildlife observed.

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

FLOW





Primary Headwater Habitat Evaluation Form

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

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%** (A)

100% (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**HHEI
Metric
PointsSubstrate
Max = 40

13

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

Pool Depth
Max = 30

0

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**

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

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**

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

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Yes Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): No Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): No (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) ☒ Yes If not, please explain:

Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): No (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) No Voucher? (Y/N) No Salamanders Observed? (Y/N) No Voucher? (Y/N) No
Frogs or Tadpoles Observed? (Y/N) No Voucher? (Y/N) No Aquatic Macroinvertebrates Observed? (Y/N) No Voucher? (Y/N) No
Comments Regarding Biology: No aquatic wildlife observed.

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

FLOW →



Primary Headwater Habitat Evaluation Form

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

13

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**HHEI
Metric
PointsSubstrate
Max = 40

13

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☐ Yes ☐ No Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☐ No ☐ Yes Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): ☐ No ☐ Yes (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): ☐ Yes ☐ No If not, please explain:

Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☐ No ☐ Yes (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): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes Salamanders Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes
Frogs or Tadpoles Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes Aquatic Macroinvertebrates Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes
Comments Regarding Biology: No aquatic wildlife observed.

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

FLOW 



Primary Headwater Habitat Evaluation Form

13

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

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**

HHEI Metric Points

Substrate Max = 40

13

A + B

Pool Depth Max = 30

0

Bankfull Width Max=30

0

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)
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m
<input type="checkbox"/>	<input type="checkbox"/>	None

FLOODPLAIN QUALITY

L	R	(Most Predominant per Bank)
<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland
<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field
<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field
<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture

L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Yes Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☐ No Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): ☐ No (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): ☒ Yes If not, please explain:

Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☐ No (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): ☐ No Voucher? (Y/N): ☐ No Salamanders Observed? (Y/N): ☐ No Voucher? (Y/N): ☐ No
Frogs or Tadpoles Observed? (Y/N): ☐ No Voucher? (Y/N): ☐ No Aquatic Macroinvertebrates Observed? (Y/N): ☐ No Voucher? (Y/N): ☐ No
Comments Regarding Biology: No aquatic wildlife observed.

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

FLOW 

Stream & Location: Black Fork Wind Project - Stream S709

RM: Date: 10/18/19

Scorers Full Name & Affiliation: A. Gardner, K. Guadagno

River Code: STORET #: Lat./ Long.: 18 Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES		OTHER TYPES		ORIGIN		QUALITY	
POOL	RIFFLE	POOL	RIFFLE				
<input type="checkbox"/> BLD/SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>	<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/>	<input type="checkbox"/> HEAVY [-2]	<div>Substrate</div> <div>16</div> <div>Maximum 20</div>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>	<input checked="" type="checkbox"/> TILLS [1]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> MODERATE [-1]	
<input checked="" type="checkbox"/> COBBLE [8]	<input checked="" type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>	<input checked="" type="checkbox"/> WETLANDS [0]	<input checked="" type="checkbox"/>	<input type="checkbox"/> NORMAL [0]	
<input checked="" type="checkbox"/> GRAVEL [7]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> SILT [2]	<input checked="" type="checkbox"/>	<input type="checkbox"/> HARDPAN [0]	<input checked="" type="checkbox"/>	<input type="checkbox"/> FREE [1]	
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>	<input type="checkbox"/> SANDSTONE [0]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> EXTENSIVE [-2]	
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>			<input type="checkbox"/> RIP/RAP [0]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> MODERATE [-1]	
(Score natural substrates; ignore sludge from point-sources)				<input type="checkbox"/> LACUSTURINE [0]	<input checked="" type="checkbox"/>	<input type="checkbox"/> NORMAL [0]	
NUMBER OF BEST TYPES: <input type="checkbox"/> 4 or more [2] <input type="checkbox"/> 3 or less [0]				<input type="checkbox"/> SHALE [-1]	<input checked="" type="checkbox"/>	<input type="checkbox"/> NONE [1]	
Comments				<input type="checkbox"/> COAL FINES [-2]			

Maintained, but is recovering, has not been altered in some time. Habitat is absent and not diverse, but is developing.

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> EXTENSIVE >75% [11]
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input type="checkbox"/> MODERATE 25-75% [7]
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input checked="" type="checkbox"/> SPARSE 5-25% [3]
<input type="checkbox"/> ROOTMATS [1]			<input type="checkbox"/> NEARLY ABSENT <5% [1]

Comments

Cover

Maximum 20

8

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [0]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input checked="" type="checkbox"/> MODERATE [2]
<input checked="" type="checkbox"/> LOW [2]	<input checked="" type="checkbox"/> FAIR [3]	<input checked="" type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

Channel

Maximum 20

10

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

EROSION		RIPARIAN WIDTH		FLOOD PLAIN QUALITY		CONSERVATION TILLAGE	
<input type="checkbox"/> NONE / LITTLE [3]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> WIDE > 50m [4]	<input type="checkbox"/>	<input type="checkbox"/> FOREST, SWAMP [3]	<input type="checkbox"/>	<input type="checkbox"/> CONSERVATION TILLAGE [1]	<input type="checkbox"/>
<input checked="" type="checkbox"/> MODERATE [2]	<input type="checkbox"/>	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/>	<input type="checkbox"/> SHRUB OR OLD FIELD [2]	<input type="checkbox"/>	<input type="checkbox"/> URBAN OR INDUSTRIAL [0]	<input type="checkbox"/>
<input type="checkbox"/> HEAVY / SEVERE [1]	<input type="checkbox"/>	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/>	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/>	<input type="checkbox"/> MINING / CONSTRUCTION [0]	<input type="checkbox"/>
	<input type="checkbox"/>	<input checked="" type="checkbox"/> VERY NARROW < 5m [1]	<input type="checkbox"/>	<input checked="" type="checkbox"/> FENCED PASTURE [1]	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/> NONE [0]	<input type="checkbox"/>	<input checked="" type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input type="checkbox"/>		

Comments

Stream incised by ~4 feet and can not reach floodplain.

Indicate predominant land use(s) past 100m riparian.

Riparian

Maximum 10

9

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH		CHANNEL WIDTH		CURRENT VELOCITY	
Check ONE (ONLY!)		Check ONE (Or 2 & average)		Check ALL that apply	
<input type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/>	<input type="checkbox"/> TORRENTIAL [-1]	<input type="checkbox"/> SLOW [1]
<input type="checkbox"/> 0.7-1m [4]	<input type="checkbox"/>	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/>	<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]
<input type="checkbox"/> 0.4-0.7m [2]	<input type="checkbox"/>	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	<input type="checkbox"/>	<input type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]
<input checked="" type="checkbox"/> 0.2-0.4m [1]	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]
<input type="checkbox"/> < 0.2m [0]	<input type="checkbox"/>		<input type="checkbox"/>	Indicate for reach - pools and riffles.	

Comments

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Pool / Current

Maximum 12

4

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> BEST AREAS < 5cm [metric=0]		<input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input checked="" type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

Riffles are few and far between. Runs present but pool riffle run regime is not in sync.

Riffle / Run

Maximum 8

2

6) GRADIENT (ft/mi)	<input checked="" type="checkbox"/> VERY LOW - LOW [2-4]	%POOL: 10	%GLIDE: 10	<div>Gradient</div> <div>Maximum 10</div> <div>2</div>
DRAINAGE AREA (mi ²)	<input type="checkbox"/> MODERATE [6-10]	%RUN: 70	%RIFFLE: 10	
	<input type="checkbox"/> HIGH - VERY HIGH [10-5]			

A) SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ L- LINE
☐ OTHER

STAGE

- 1st - sample pass - 2nd
☐ HIGH
☐ UP
☐ NORMAL
☐ LOW
☐ DRY

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☐ OTHER

CLARITY

- 1st - sample pass - 2nd
☐ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm / CTB
☐ SECCHI DEPTH

meters

CANOPY

- ☐ > 85% - OPEN
☐ 55% - 85%
☐ 30% - 55%
☐ 10% - 30%
☐ < 10% - CLOSED

C) RECREATION

POOL: ☐ > 100ft ☐ > 3ft

Stream Drawing:

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

50%

B) AESTHETICS

- ☒ NUISANCE ALGAE
☐ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ CSOs/SSOs/OUTFALLS

D) MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMoured / SLUMPS
ISLANDS / SCoured
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E) ISSUES

- WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT & GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H₂O / TILE / H₂O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F) MEASUREMENTS

- x width
x depth
max. depth
x bankfull width
bankfull x depth
W/D ratio
bankfull max. depth
floodprone x² width
entrench. ratio

Legacy Tree:

Stream & Location: Black Fork Wind Project - Stream S709

RM: Date: 10/18/19

Scorers Full Name & Affiliation: A. Gardner, K. Guadagno

River Code: -

STORET #: -

Lat./ Long.:

/8

Office verified location ☐1) SUBSTRATE Check ONLY Two substrate TYPE BOXES;
estimate % or note every type present

Check ONE (Or 2 & average)

BEST TYPES

☐ BLD R / SLABS [10] ☐ POOL RIFFLE 7

☐ BOULDER [9] ☐ COBBLE [8] ☒ GRAVEL [7] ☐ SAND [6] ☐ BEDROCK [5]

30

OTHER TYPES

☐ HARDPAN [4] ☐ DETRITUS [3] ☐ MUCK [2] ☒ SILT [2] ☐ ARTIFICIAL [0]

ORIGIN

☐ LIMESTONE [1] ☒ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

SILT

EMBEDDEDNESS

QUALITY

☐ HEAVY [-2] ☒ MODERATE [-1] ☐ NORMAL [0] ☐ FREE [1] ☐ EXTENSIVE [-2] ☒ MODERATE [-1] ☐ NORMAL [0] ☐ NONE [1]

Substrate
16
Maximum
20NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Poor pool-riffle development, all substrate is in runs.

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT

Check ONE (Or 2 & average)

0 UNDERCUT BANKS [1]

0 OVERHANGING VEGETATION [1]

0 SHALLOWS (IN SLOW WATER) [1]

0 ROOTMATS [1]

0 POOLS > 70cm [2]

0 ROOTWADS [1]

0 BOULDERS [1]

1 OXBOWS, BACKWATERS [1]

2 AQUATIC MACROPHYTES [1]

0 LOGS OR WOODY DEBRIS [1]

☐ EXTENSIVE >75% [1]

☐ MODERATE 25-75% [7]

☒ SPARSE 5-25% [3]

☐ NEARLY ABSENT <5% [1]

Comments

Cover
Maximum
20
8

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY

☐ HIGH [4] ☐ MODERATE [3] ☒ LOW [2] ☐ NONE [1]

DEVELOPMENT

☐ EXCELLENT [7] ☐ GOOD [5] ☒ FAIR [3] ☐ POOR [1]

CHANNELIZATION

☐ NONE [6] ☐ RECOVERED [4] ☒ RECOVERING [3] ☐ RECENT OR NO RECOVERY [1]

STABILITY

☐ HIGH [3] ☒ MODERATE [2] ☐ LOW [1]

Comments

Channel
Maximum
20
10

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

☐ NONE / LITTLE [3] ☒ MODERATE [2] ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH

☒ WIDE > 50m [4] ☐ MODERATE 10-50m [3] ☐ NARROW 5-10m [2] ☒ VERY NARROW < 5m [1] ☐ NONE [0]

FLOOD PLAIN QUALITY

☐ FOREST, SWAMP [3] ☐ SHRUB OR OLD FIELD [2] ☐ RESIDENTIAL, PARK, NEW FIELD [1] ☒ FENCED PASTURE [1] ☒ OPEN PASTURE, ROWCROP [0]

☐ CONSERVATION TILLAGE [1] ☐ URBAN OR INDUSTRIAL [0] ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s)
past 100m riparian.

Comments

Stream is incised by 3.5-4 feet and can not reach the floodplain.

Riparian
Maximum
10
9

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

☐ > 1m [6] ☐ 0.7-1m [4] ☐ 0.4-0.7m [2] ☒ 0.2-0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

☒ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1] ☐ SLOW [1] ☐ VERY FAST [1] ☐ INTERSTITIAL [-1] ☐ FAST [1] ☐ INTERMITTENT [-2] ☒ MODERATE [1] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments Pool riffle development is lacking.

Pool /
Current
Maximum
12
4Indicate for functional riffles; Best areas must be large enough to support a population
of riffle-obligate species:

Check ONE (Or 2 & average).

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH

☐ BEST AREAS > 10cm [2] ☐ BEST AREAS 5-10cm [1] ☒ BEST AREAS < 5cm [metric=0]

RUN DEPTH

☐ MAXIMUM > 50cm [2] ☒ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE

☐ STABLE (e.g., Cobble, Boulder) [2] ☒ MOD. STABLE (e.g., Large Gravel) [1] ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

☐ NONE [2] ☐ LOW [1] ☒ MODERATE [0] ☐ EXTENSIVE [-1]

Riffle /
Run
Maximum
8
2

Comments Riffle and run development is poor.

6) GRADIENT

DRAINAGE AREA

ft²/mimi²

☒ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: 10

%GLIDE: 10

%RUN: 70

%RIFFLE: 10

Gradient
Maximum
10
2

A) SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
☐ WADE
☐ L LINE
☐ OTHER

DISTANCE

- ☐ 0.5 Km
☐ 0.2 Km
☐ 0.15 Km
☐ 0.12 Km
☐ OTHER

STAGE

- 1st - sample pass-- 2nd
☐ HIGH
☐ UP
☐ NORMAL
☐ LOW
☐ DRY

CLARITY

- 1st - sample pass-- 2nd
☐ < 20 cm
☐ 20-40 cm
☐ 40-70 cm
☐ > 70 cm / CTB
☐ SECCI DEPTH

meters

CANOPY

- ☐ > 85% - OPEN
☐ 55% - 85%
☐ 30% - 55%
☐ 10% - 30%
☐ < 10% - CLOSED

CJ RECREATION

POOL: ☐ > 100ft² ☐ > 3ft

Stream Drawing:

Comment RE: Reach consistency/ is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.
Iron and silt in water. There is a historic road present and the stream was channelized to accommodate the bridge structure and road crossing. The stream is recovered now and the bridge is no longer present.

BJ AESTHETICS

- ☒ NUISANCE ALGAE
☐ INVASIVE MACROPHYTES
☐ EXCESS TURBIDITY
☐ DISCOLORATION
☐ FOAM / SCUM
☐ OIL SHEEN
☐ TRASH / LITTER
☐ NUISANCE ODOR
☐ SLUDGE DEPOSITS
☐ GSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMoured / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

EJ ISSUES

- WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H₂O / TILE / H₂O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- ☐ width
☐ depth
max. depth
☐ bankfull width
bankfull ☐ depth
W/D ratio
bankfull max. depth
floodprone ☐ width
entranch. ratio

Legacy Tree:



Primary Headwater Habitat Evaluation Form

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

13

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
<input type="checkbox"/> > 22.5 - 30 cm [30 pts]	<input type="checkbox"/> < 5 cm [5 pts]
<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (<= 3' 3") [5 pts]
<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**HHEI
Metric
PointsSubstrate
Max = 40

13

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

<input type="checkbox"/> Stream Flowing	<input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent)
<input type="checkbox"/> Subsurface flow with isolated pools (Interstitial)	<input type="checkbox"/> Dry channel, no water (Ephemeral)

COMMENTS **Likely intermittent, water present due to time of year.**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☐ Yes ☐ No Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☐ No ☐ Yes Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): ☐ No ☐ Yes (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): ☐ Yes ☐ No If not, please explain:

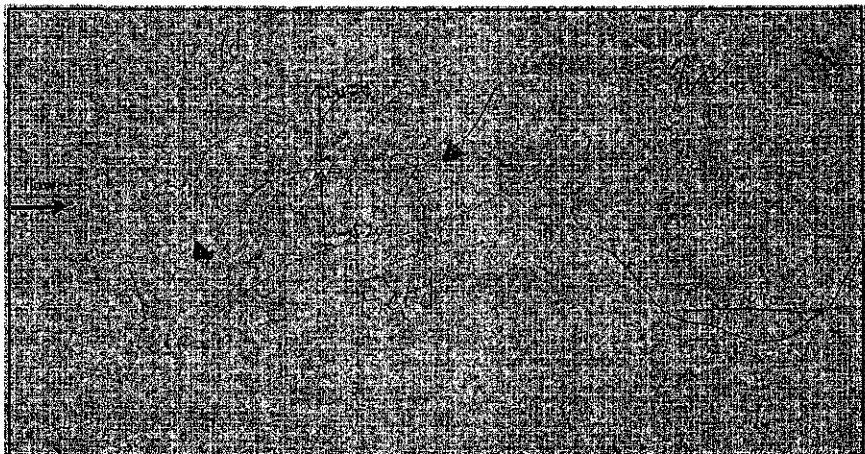
Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☐ No ☐ Yes (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): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes Salamanders Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes
Frogs or Tadpoles Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes Aquatic Macroinvertebrates Observed? (Y/N): ☐ No ☐ Yes Voucher? (Y/N): ☐ No ☐ Yes
Comments Regarding Biology: No aquatic wildlife observed.

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



SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (mi²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**SCORER **A. Garder, Jr.**

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 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

TYPE	PERCENT	TYPE	PERCENT
<input type="checkbox"/> BLDR SLABS [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> SILT [3 pt]	<input type="checkbox"/> 75%
<input type="checkbox"/> BOULDER (>256 mm) [16 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]	<input type="checkbox"/> 25%
<input type="checkbox"/> BEDROCK [16 pt]	<input type="checkbox"/> 0%	<input type="checkbox"/> FINE DETRITUS [3 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> COBBLE (65-256 mm) [12 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> CLAY or HARDPAN [0 pt]	<input type="checkbox"/> 0%
<input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> MUCK [0 pts]	<input type="checkbox"/> 0%
<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Bldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

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COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

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<input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]	<input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]
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COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**HHEI
Metric
PointsSubstrate
Max = 40

13

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
<input type="checkbox"/>	<input type="checkbox"/>	Wide >10m	<input type="checkbox"/>	<input type="checkbox"/>	Mature Forest, Wetland	<input type="checkbox"/>	<input type="checkbox"/>	Conservation Tillage
<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
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COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

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COMMENTS **Likely intermittent, water present due to time of year.**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

<input type="checkbox"/> None	<input type="checkbox"/> 1.0	<input type="checkbox"/> 2.0	<input type="checkbox"/> 3.0
<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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)

<input type="checkbox"/> WWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> CWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>
<input type="checkbox"/> EWH Name:	<input type="text"/>	Distance from Evaluated Stream	<input type="text"/>

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

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County: Crawford Township / City:

MISCELLANEOUS

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Were samples collected for water chemistry? (Y/N): ☐ No ☒ Yes (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) ☒ Yes If not, please explain:

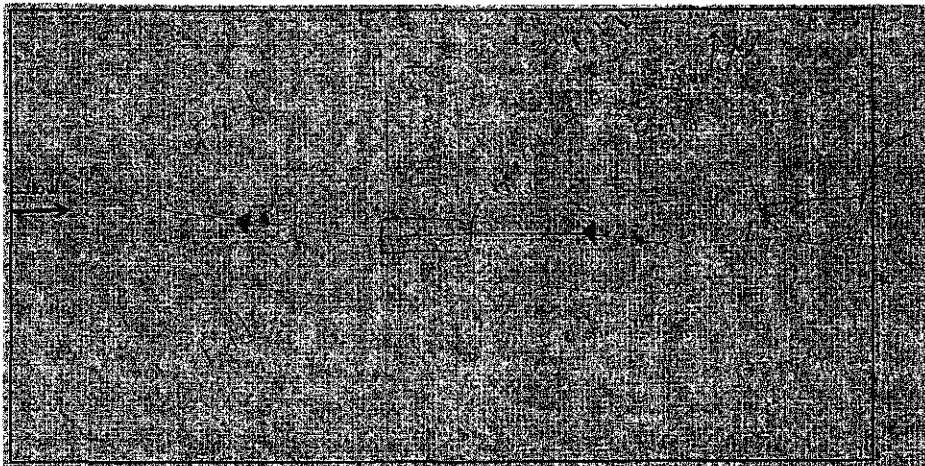
Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☐ No ☒ Yes (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) ☐ No ☒ Yes Voucher? (Y/N) ☐ No ☒ Yes Salamanders Observed? (Y/N) ☐ No ☒ Yes Voucher? (Y/N) ☐ No ☒ Yes
Frogs or Tadpoles Observed? (Y/N) ☐ No ☒ Yes Voucher? (Y/N) ☐ No ☒ Yes Aquatic Macroinvertebrates Observed? (Y/N) ☐ No ☒ Yes Voucher? (Y/N) ☐ No ☒ Yes
Comments Regarding Biology:
 No aquatic wildlife observed.

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





Primary Headwater Habitat Evaluation Form

13

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

SITE NAME/LOCATION **Black Fork Wind Project**SITE NUMBER **S013**RIVER BASIN **Ohio River**DRAINAGE AREA (m²)LENGTH OF STREAM REACH (ft) **163**

LAT.

LONG.

RIVER CODE

RIVER MILE

DATE **10/18/10**

SCORER

A. Garder, Jr.

COMMENTS

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

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<input type="checkbox"/> SAND (<2 mm) [6 pts]	<input type="checkbox"/> 0%	<input type="checkbox"/> ARTIFICIAL [3 pts]	<input type="checkbox"/> 0%

Total of Percentages of
Blldr Slabs, Boulder, Cobble, Bedrock **0.00%**

(A)

100%

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: **12**TOTAL NUMBER OF SUBSTRATE TYPES: **1**

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):

<input type="checkbox"/> > 30 centimeters [20 pts]	<input type="checkbox"/> > 5 cm - 10 cm [15 pts]
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<input type="checkbox"/> > 10 - 22.5 cm [25 pts]	<input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS **Poor pool development**

MAXIMUM POOL DEPTH (centimeters):

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

<input type="checkbox"/> > 4.0 meters (> 13') [30 pts]	<input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
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<input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]	

COMMENTS

AVERAGE BANKFULL WIDTH (meters): **2.08**HHEI
Metric
PointsSubstrate
Max = 40

13

A + B

Pool Depth
Max = 30

0

Bankfull
Width
Max=30

0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

RIPARIAN WIDTH

FLOODPLAIN QUALITY

L	R	(Per Bank)	L	R	(Most Predominant per Bank)	L	R	
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<input type="checkbox"/>	<input type="checkbox"/>	Moderate 5-10m	<input type="checkbox"/>	<input type="checkbox"/>	Immature Forest, Shrub or Old Field	<input type="checkbox"/>	<input type="checkbox"/>	Urban or Industrial
<input type="checkbox"/>	<input type="checkbox"/>	Narrow <5m	<input type="checkbox"/>	<input type="checkbox"/>	Residential, Park, New Field	<input type="checkbox"/>	<input type="checkbox"/>	Open Pasture, Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	None	<input type="checkbox"/>	<input type="checkbox"/>	Fenced Pasture	<input type="checkbox"/>	<input type="checkbox"/>	Mining or Construction

COMMENTS **Incised by 6-8 feet, no access to floodplain.**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

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<input type="checkbox"/> 0.5	<input type="checkbox"/> 1.5	<input type="checkbox"/> 2.5	<input type="checkbox"/> >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)

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: Crawford Township / City:

MISCELLANEOUS

Base Flow Conditions? (Y/N): ☒ Yes Date of last precipitation: 10/14/10 Quantity: 0.06
Photograph Information: P49 - Facing east from collection line crossing, looking upstream. P50 - Facing west from collection line
Elevated Turbidity? (Y/N): ☒ No Canopy (% open): 100%
Were samples collected for water chemistry? (Y/N): ☒ No (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) ☒ Yes If not, please explain:

Additional comments/description of pollution impacts:

BIOTIC EVALUATION

Performed? (Y/N): ☒ No (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) ☒ No Voucher? (Y/N) ☒ No Salamanders Observed? (Y/N) ☒ No Voucher? (Y/N) ☒ No
Frogs or Tadpoles Observed? (Y/N) ☒ No Voucher? (Y/N) ☒ No Aquatic Macroinvertebrates Observed? (Y/N) ☒ No Voucher? (Y/N) ☒ No
Comments Regarding Biology: No aquatic wildlife observed.

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

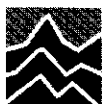
Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location





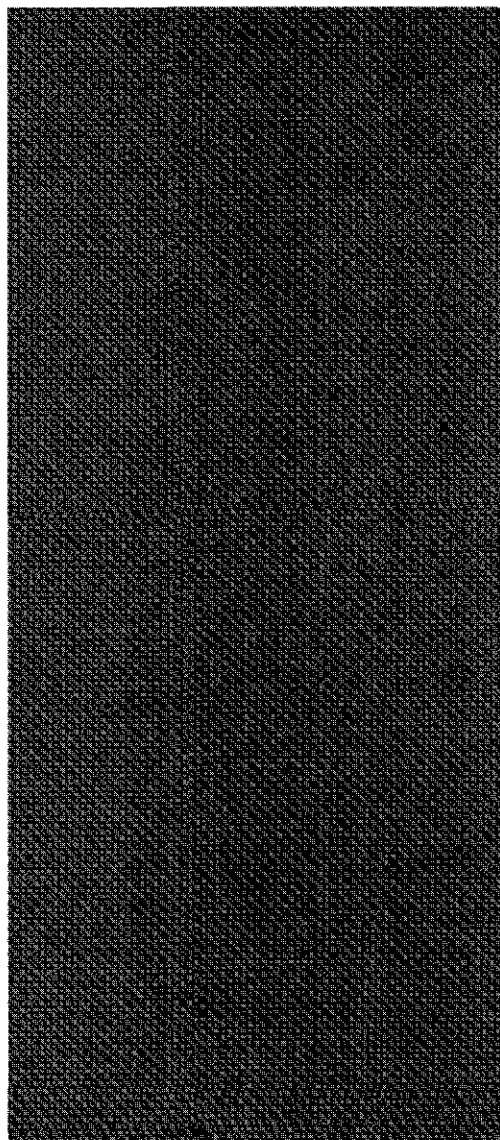
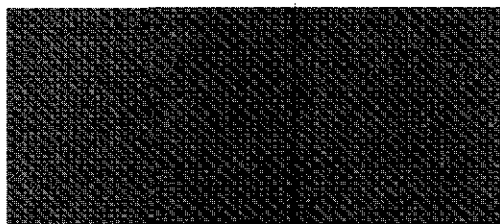
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RSG Sound Study



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ENVIRONMENT, ENERGY, & ACOUSTICS



Sound Modeling for Black Fork Wind Farm

Richland & Crawford County,
Ohio

March 2011

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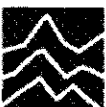


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1.0 INTRODUCTION

Black Fork Wind, LLC proposes to construct and operate up to 91 wind turbines in an area west of Shelby, Ohio. The project is currently considering three possible turbine models: Vestas V100, Siemens SWT 2.3, and GE 1.6 XLE. The total capacity of the system would be up to 209.3 MW, with turbines generating between 1.6 and 2.3 MW each. This study assessed the sound levels from wind turbines and substations in the surrounding area. This report includes:

- 1) A description of the site
- 2) A noise primer
- 3) A discussion of noise issues specific to wind turbines
- 4) A discussion of applicable noise limits
- 5) The results of background sound level monitoring
- 6) The results of computer propagation modeling
- 7) A discussion of construction noise impacts
- 8) Summary and conclusions

2.0 SITE DESCRIPTION

The proposed turbines are located to the west of Shelby, Ohio within Auburn, Plymouth, Sandusky, Vernon, Sharon, and Jackson Townships. The area is primarily flat and used for agriculture. There are approximately 1,400 homes in and around the project area.

A map of the project area is provided in Figure 1.

3.0 A NOISE PRIMER

3.1 What is Noise?

Noise is defined as "a sound of any kind, especially when loud, confused, indistinct, or disagreeable." Passing vehicles, a noisy refrigerator, or an air conditioning system are sources of noise which may be bothersome or cause annoyance. These sounds are a part of generally accepted everyday life, and can be measured, modeled, and, if necessary, controlled.

3.2 How is Sound Described?

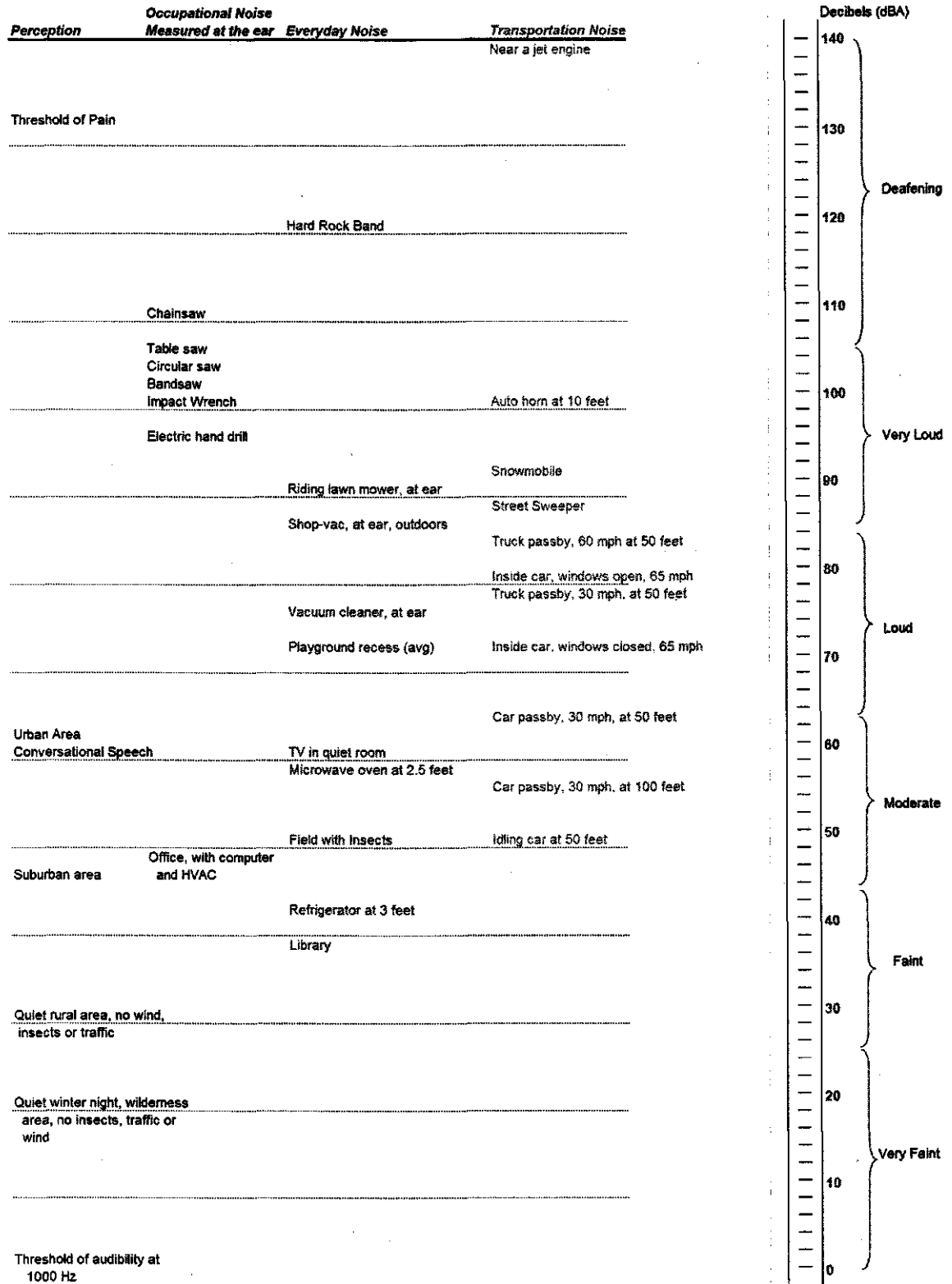
Sound is caused by variations in air pressure at a range of frequencies. Sound levels that are detectable by human hearing are defined in the decibel (dB) scale, with 0 dB being the threshold of human hearing at mid frequencies, and 120 dB to 150 dB causing pain and permanent damage to the ear. Figure 2 shows the sound levels of typical activities that generate noise.



Figure 1: Project Area Map



Figure 2: Basic Theory: Common Sounds in Decibels



The decibel scale can be weighted to mimic the human perception of certain frequencies. The most common of these weighting scales is the "A" weighting, and this scale is used most frequently in environmental noise analysis. Sound levels that are weighted by the "A" scale have units of dBA or dB(A).

3.3 Sound Pressure vs Sound Power Levels

Both sound power and sound pressure levels are described in terms of decibels, but they are not the same thing. Sound power is a measure of the acoustic power emitted or radiated by a source. The sound power level of a source does not change with its surrounding conditions.

Sound pressure level is observed at a specific location and is related to the difference in air pressure above or below atmospheric pressure. This fluctuation in air pressure is a result of the sound power of a source, the distance at which the sound pressure level is being observed, and the characteristics of the path and environment around the source and receiver. When one refers to sound level, they are generally speaking of the perceived level, or sound pressure level.

For example, a coffee grinder will have the same sound power whether or not it is grinding indoors or outdoors. The amount of sound the coffee grinder generates is always the same. However, if you are standing six feet away from the coffee grinder indoors, you would experience a higher sound pressure level than you would if you were six feet away from the coffee grinder outdoors in an open field. The reason for this is that the sound being emitted from the coffee grinder would bounce off walls and other surfaces indoors which would cause sound to build up and raise the sound pressure level.

Sound power cannot be directly measured. However, since sound pressure and sound power are related, sound power can be calculated by measurements of sound pressure and/or sound intensity. It can be helpful to note that over soft ground outside, the sound pressure level of a small source observed 50 feet away is roughly 33 dB lower than its sound power level.

3.4 How is Sound Modeled?

The decibel sound level is on a logarithmic scale. One manifestation of this is that sound power increases by a factor of 10 for every 10 dB increase. However, for every 10 dB increase in sound pressure level at mid frequencies, we perceive an approximate doubling of loudness. Small changes in sound pressure level, below 3 dB, are generally not perceptible¹.

For a point source, sound level diminishes or attenuates by 6 dB for every doubling of distance due to geometrical divergence. For example, if an idling truck is measured at 50 feet as 66 dBA, at 100 feet the level will decline to 60 dBA, and at 200 feet, 54 dBA, assuming no other influences. From a line source, sound attenuates at approximately 3 dB per doubling distance. Line sources transition to an attenuation of 6 dB per doubling at a distance of roughly a third of the length of the line source.

Other factors, such as intervening vegetation, terrain, walls, berms, buildings, and atmospheric absorption will also further reduce the sound level reaching the listener. In each of these, higher frequencies will attenuate faster than lower frequencies. Finally, the ground can also have an impact on sound levels. Harder ground generally increases and softer ground generally decreases the sound level at a receiver. Reflections off of buildings and walls can increase broadband sound levels by as much as 3 dB.

¹ There is a range of perception thresholds depending on the character of the sound and the way it is presented to the listener



If we add two equal sources together, the resulting sound level will be 3 dB higher. For example, if one machine registers 76 dBA at 50 feet, two co-located machines would register 3 dB more, or 79 dBA at that distance. In a similar manner, at a distance of 50 feet, four machines, all operating at the same place and time, would register 82 dBA and eight machines would register 85 dBA. If the two sources differ in sound level then 0 to 3 dB will be added to the higher level as shown in Table 1.

Table 1: Decibel Addition

If Two Sources Differ By	Add
0-1 dB	3 dB
2-4 dB	2 dB
5-9 dB	1 dB
>9 dB	0 dB

3.5 Description of Terms

Sound can be measured in many different ways. Perhaps the simplest way is to take an instantaneous measurement, which gives the sound pressure level at an exact moment in time. The level reading could be 62 dB, but a second later it could 57 dB. Sound pressure levels are constantly changing. It is for this reason that it makes sense to describe noise and sound in terms of time.

The most common ways of describing noise over time is in terms of various statistics. Take, as an example, the sound levels measured shown in Figure 3. Instantaneous measurements are shown as a ragged grey line. The sound levels that occur over this time can be described verbally, but it is much easier to describe the recorded levels statistically. This is done using a variety of "levels" which are described below.

3.5.1 Equivalent Average Sound Level - Leq

One of the most common ways of describing noise levels is in terms of the continuous equivalent sound level (Leq). The Leq is the average of the sound pressure over an entire monitoring period and expressed as a decibel. The monitoring period could be for any amount of time. It could be one second (Leq 1-sec), one hour (Leq(1)), or 24 hours (Leq(24)). Because Leq describes the average pressure, loud and infrequent noises have a greater effect on the resulting level than quieter and more frequent noises. For example, in Figure 3, the median sound level is about 47 dBA, but the equivalent average sound level (Leq) is 53 dBA. Because it tends to weight the higher sound levels and is representative of sound that takes place over time, the Leq is the most commonly used descriptor in noise standards and regulations.

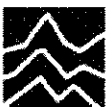
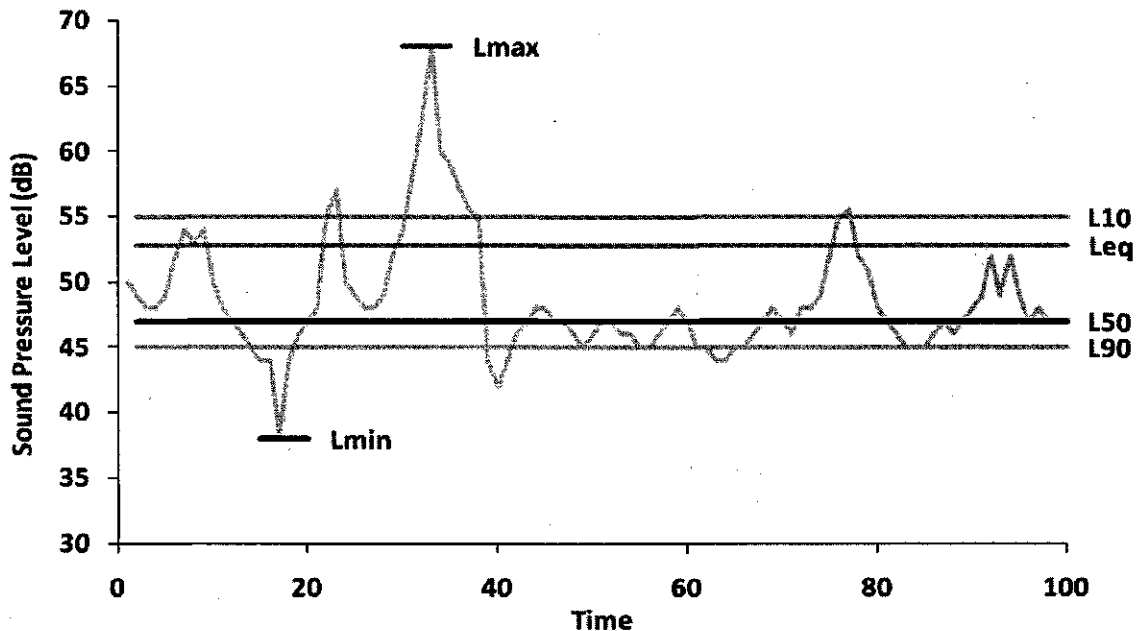


Figure 3: Example of Sound Measurement over Time and Descriptive Statistics



3.5.2 Percentile Sound Level - L_n

L_n is the sound level exceeded n percent of the time. This type of statistical sound level, also shown in Figure 3, gives us information about the distribution of sound levels over time. For example, the L_{10} is the sound level that is exceeded 10 percent of the time, while the L_{90} is the sound level exceeded 90% of the time. The L_{50} is exceeded half the time. The L_{90} is a residual base level which most of the sound exceeds, while the L_{10} is representative of the peaks and higher, but less frequent levels. When one is trying to measure a continuous sound, like a wind turbine, the L_{90} is often used to filter out other short-term environmental sounds that increase the level, such as dogs barking, vehicle passbys, wind gusts, and talking. That residual sound, or L_{90} , is then the sound that is occurring in the absence of these noises.

3.5.3 L_{min} and L_{max}

L_{min} and L_{max} are simply the minimum and maximum sound level, respectively, monitored over a period of time. These are shown in Figure 3.

4.0 OHIO SITING REQUIREMENTS AND STANDARDS

4.1 Application Requirements

The Ohio Power Siting Board has defined the materials required of an applicant during the permitting process in Ohio Administrative Code 4906-17-08. This reads:

“(2) Noise. The applicant shall:

