Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 22

SITE NAME/LOCATION AEP Gavin Site
SITE NUMBER 58 RIVER BASIN ____ DRAINAGE AREA (MI^2)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE 16 July 2016 SCORER TRW COMMENTS

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

STREAM CHANNEL – [X] NONE/NATURAL CHANNEL – [ ] RECOVERED – [ ] RECOVERING – [ ] RECENT OR NO RECOVERY
MODIFICATIONS

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
[ ]	[ ]	BLDR SLABS [16 pts]	
[ ]	[ ]	BOULDER (256 mm) [16 pts]	
[ ]	[ ]	BEDROCK [16 pts]	3
[ ]	[ ]	COBBLE (65-256mm) [12 pts]	5
[ ]	[ ]	GRAVEL (2-64 mm) [9 pts]	5
[X]	[X]	SAND (2 mm) [6 pts]	82

Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock (A)

TYPE			PERCENT
[ ]	[ ]	SILT [3 pt]	
[ ]	[ ]	LEAF PACK/WOODY DEBRIS [3 pts]	5
[ ]	[ ]	FINE DETRITUS [3 pts]	
[ ]	[ ]	CLAY or HARDPAN [0 pt]	
[ ]	[ ]	MUCK [0 pts]	
[ ]	[ ]	ARTIFICIAL [3 pts]	

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 12 TOTAL NUMBER OF SUBSTRATE TYPES: 5

HHEI Metric Points

Substrate Max = 40: 17 (A + B)

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

- [ ] >80 centimeters [20 pts]
- [ ] >22.5 – 80 cm [30 pts]
- [ ] >10 – 22.5 cm [25 pts]
- [ ] >5 cm – 10 cm [15 pts]
- [ ] <5 cm [2 pts]
- [X] NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): Dry

Pool Depth Max = 30: 0

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

- [ ] >4.0 meters [30 pts]
- [ ] >3.0 – 4.0 m [25 pts]
- [ ] >1.5 m – 3.0 m [20 pts]
- [ ] >1.0 m – 1.5 m [15 pts]
- [X] 1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 0.2-0.5

Bankfull Width Max = 30: 5

This information must also be completed

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

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

COMMENTS

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

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

COMMENTS

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

- [ ] None
- [ ] 0.5
- [ ] 1.0
- [ ] 1.5
- [X] 2.0
- [ ] 2.5
- [ ] 3.0
- [ ] > 3

STREAM GRADIENT ESTIMATE

- [ ] Flat (0.5 ft/100 ft)
- [ ] Flat to Moderate
- [X] Moderate (2 ft/100 ft)
- [ ] 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: Gallia Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____pH (S.U.)_____ Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____Voucher? (Y/N)_____Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW ➡

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 33

SITE NAME/LOCATION AEP Gavin Site
SITE NUMBER S9 RIVER BASIN ____ DRAINAGE AREA (MI²)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE July 2010 SCORER TZW COMMENTS pH = 2.6

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

STREAM CHANNEL – [ ] NONNATURAL CHANNEL – [ ] RECOVERED – [ ] RECOVERING – [ ] RECENT OR NO RECOVERY – MODIFICATIONS

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
[ ]	[ ]	BLDR SLABS [16 pts]	
[ ]	[ ]	BOULDER (>256 mm) [16 pts]	
[ ]	[ ]	BEDROCK [16 pts]	
[ ]	[ ]	COBBLE (65-256 mm) [12 pts]	
[ ]	[ ]	GRAVEL (2-64 mm) [9 pts]	10
[ ]	[X]	SAND (<2 mm) [6 pts]	30

Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock (A)

TYPE			PERCENT
[ ]	[X]	SILT [3 pts]	10
[ ]	[X]	LEAF PACK/WOODY DEBRIS [3 pts]	50
[ ]	[ ]	FINE DETRITUS [3 pts]	
[ ]	[ ]	CLAY or HARDPAN [0 pts]	
[ ]	[ ]	MUCK [0 pts]	
[ ]	[ ]	ARTIFICIAL [3 pts]	

(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 9 TOTAL NUMBER OF SUBSTRATE TYPES: 4

HHEI Metric Points — Substrate 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 reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

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

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): 8

Pool Depth Max = 30: 15

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

[ ] >4.0 meters [30 pts]
[ ] >3.0 – 4.0 m [25 pts]
[ ] >1.5 m – 3.0 m [20 pts]
[ ] >1.0 m – 1.5 m [15 pts]
[X] <1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 0.75-1

Bankfull Width Max = 30: 5

This information must also be completed

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

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

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):
[X] Stream Flowing
[ ] Subsurface flow with isolated pools (Interstitial)
[ ] Moist Channel, isolated pools, no flow (Intermittent)
[ ] Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61m (200 ft) of channel (Check *ONLY* one box):
[X] None [ ] 1.0 [ ] 2.0 [ ] 3.0
[ ] 0.5 [ ] 1.5 [ ] 2.5 [ ] > 3

STREAM GRADIENT ESTIMATE
[ ] Flat (0.5 ft/100 ft) [ ] Flat to Moderate [X] Moderate (2 ft/100 ft) [ ] 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:_____ Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____ pH (S.U.) 2.6 Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)

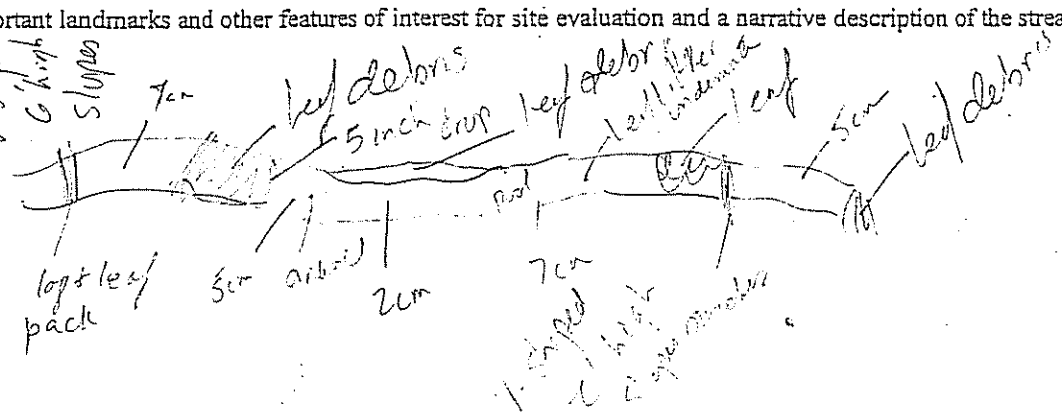
Fish Observed? (Y/N)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____ Voucher? (Y/N)_____ Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/N)___

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 streams location

FLOW



Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 42

SITE NAME/LOCATION AEP Gavin Site.
____ SITE NUMBER 510 RIVER BASIN ____ DRAINAGE AREA (MI²)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE 16 Jul 2010 SCORER TZW COMMENTS

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

STREAM CHANNEL MODIFICATIONS: [1] NONE/NATURAL CHANNEL [2] RECOVERED [3] RECOVERING [4] 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
☐ ☐ BLDR SLABS [16 pts]	___	☐ ☐ SILT [3 pts]	5
☐ ☐ BOULDER (256 mm) [16 pts]	___	☐ ☐ LEAF PACK/WOODY DEBRIS [3 pts]	
☐ ☐ BEDROCK [16 pts]	___	☐ ☐ FINE DETRITUS [3 pts]	
☐ ☐ COBBLE (65-256 mm) [12 pts]	10	☐ ☐ CLAY or HARDPAN [0 pts]	
☐ ☐ GRAVEL (2-64 mm) [9 pts]	5	☐ ☐ MUCK [0 pts]	
☐ ☐ SAND (2 mm) [6 pts]	80	☐ ☐ ARTIFICIAL [3 pts]	
Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock	(A)		(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 18 TOTAL NUMBER OF SUBSTRATE TYPES: 4

HHEI Metric Points — Substrate Max = 40: 22 (A + B)

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

☐ >30 centimeters [20 pts]
☐ >22.5 – 30 cm [30 pts]
☐ 10 – 22.5 cm [25 pts]
☐ 5 cm – 10 cm [15 pts]
☐ <5 cm [2 pts]
☐ NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): 5

Pool Depth Max = 30: 15

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

☐ >4.0 meters [30 pts]
☐ 3.0 – 4.0 m [25 pts]
☐ 1.5 m – 3.0 m [20 pts]
☐ >1.0 m – 1.5 m [15 pts]
☒ <1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 0.75 – 1.0 m

Bankfull Width Max = 30: 5

This information must also be completed

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

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

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):
☐ Stream Flowing
☒ Subsurface flow with isolated pools (Interstitial)
☐ Moist Channel, isolated pools, no flow (Intermittent)
☐ Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61m (200 ft) of channel (Check *ONLY* one box):
☐ None ☐ 1.0 ☐ 2.0 ☐ 3.0
☐ 0.5 ☒ 1.5 ☐ 2.5 ☐ > 3

STREAM GRADIENT ESTIMATE
☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☒ Moderate (2 ft/100 ft) ☒ 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: GALLIA Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____ pH (S.U.) 4.6 Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____ Voucher? (Y/N)_____ Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 43

SITE NAME/LOCATION AEP GAVIN Site
____ SITE NUMBER 511 RIVER BASIN ____ DRAINAGE AREA (MI^2)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE 16 Jul 2010 SCORER TZW 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
☐	☐	BLDR SLABS [16 pts]	____	☐	☐	SILT [3 pt]	5
☐	☐	BOULDER (>256 mm) [16 pts]	____	☐	☐	LEAF PACK/WOODY DEBRIS [3 pts]	5
☐	☐	BEDROCK [16 pts]	____	☐	☐	FINE DETRITUS [3 pts]	
☐	☒	COBBLE (65-256 mm) [12 pts]	10	☐	☐	CLAY or HARDPAN [0 pt]	
☐	☐	GRAVEL (2-64 mm) [9 pts]	5	☐	☐	MUCK [0 pts]	
☐	☒	SAND (2 mm) [6 pts]	75	☐	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock (A) (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 18 TOTAL NUMBER OF SUBSTRATE TYPES: 5

HHEI Metric Points — Substrate Max = 40: 23 (A + B)

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

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

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): 10

Pool Depth Max = 30: 15

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

☐ >4.0 meters [30 pts]
☐ >3.0 – 4.0 m [25 pts]
☐ >1.5 m – 3.0 m [20 pts]
☐ >1.0 m – 1.5 m [15 pts]
☒ 1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 0.5-1.0m

Bankfull Width Max = 30: 5

This information must also be completed

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

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

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):
☐ Stream Flowing
☐ Subsurface flow with isolated pools (Interstitial)
☐ Moist Channel, isolated pools, no flow (Intermittent)
☐ Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61m (200 ft) of channel (Check *ONLY* one box):
☐ None ☐ 1.0 ☐ 2.0 ☐ 3.0
☐ 0.5 ☒ 1.5 ☐ 2.5 ☐ > 3

STREAM GRADIENT ESTIMATE
☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☒ Moderate (2 ft/100 ft) ☐ 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: GALLIA Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____ pH (S.U.) 3.5 Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____ Voucher? (Y/N)_____ Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 64

SITE NAME/LOCATION AEP Gavin Site
SITE NUMBER 512 RIVER BASIN ____ DRAINAGE AREA (MI²)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE 16 Jul 2010 SCORER TRW 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
☐ ☐	BLDR SLABS [16 pts]	2	☐ ☐	SILT [3 pts]	10
☐ ☐	BOULDER (256 mm) [16 pts]		☐ ☐	LEAF PACK/WOODY DEBRIS [5 pts]	5
☐ ☐	BEDROCK [16 pts]		☐ ☐	FINE DETRITUS [5 pts]	
☐ ☒	COBBLE (65–256 mm) [12 pts]	30	☐ ☐	CLAY or HARDPAN [0 pts]	
☐ ☐	GRAVEL (2–64 mm) [9 pts]	10	☐ ☐	MUCK [0 pts]	
☐ ☒	SAND (2 mm) [6 pts]	43	☐ ☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock (A) (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 18 TOTAL NUMBER OF SUBSTRATE TYPES: 6

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

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

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

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): 15cm

Pool Depth Max = 30: 25

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

☐ > 4.0 meters [30 pts]
☐ 3.0 – 4.0 m [25 pts]
☐ 1.5 m – 3.0 m [20 pts]
☒ 1.0 m – 1.5 m [15 pts]
☐ < 1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 1.5m

Bankfull Width Max = 30: 15

This information must also be completed

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

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

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):
☒ Stream Flowing
☐ Subsurface flow with isolated pools (Interstitial)
☐ Moist Channel, isolated pools, no flow (Intermittent)
☐ Dry channel, no water (Ephemeral)
COMMENTS

SINUOSITY (Number of bends per 61m (200 ft) of channel (Check *ONLY* one box):
☐ None ☐ 1.0 ☐ 2.0 ☐ 3.0
☐ 0.5 ☐ 1.5 ☒ 2.5 ☐ > 3

STREAM GRADIENT ESTIMATE
☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☒ Moderate (2 ft/100 ft) ☐ 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: Gallia Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____ pH (S.U.) 3.0 Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____ Voucher? (Y/N)_____ Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW ➡

Primary Headwater Habitat Evaluation Form

OhioEPA

HHEI Score (sum of metrics 1, 2, 3) : 18

SITE NAME/LOCATION AEP Gavin Site
SITE NUMBER 513 RIVER BASIN ____ DRAINAGE AREA (MI²)
LENGTH OF STREAM REACH (ft) ____ LAT. ____ LONG. ____ RIVER CODE ____ RIVER MILE
DATE 16 Jul 2010 SCORER TZW COMMENTS

flows into W23

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

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

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
☐	☐	BLDR SLABS [16 pts]		☐	☐	SILT [3 pt]	
☐	☐	BOULDER (256 mm) [16 pts]		☐	☒	LEAF PACK/WOODY DEBRIS [3 pts]	20
☐	☐	BEDROCK [16 pts]	2	☐	☐	FINE DETRITUS [3 pts]	
☐	☐	COBBLE (65-256 mm) [12 pts]		☐	☐	CLAY or HARDPAN [0 pt]	
☐	☐	GRAVEL (2-64 mm) [9 pts]	10	☐	☐	MUCK [0 pts]	
☐	☒	SAND (2 mm) [6 pts]	68	☐	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock (A) (B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 9 TOTAL NUMBER OF SUBSTRATE TYPES: 4

HHEI Metric Points

Substrate 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 reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

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

COMMENTS ____ MAXIMUM POOL DEPTH (centimeters): 0

Pool Depth Max = 30: 0

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

☐ > 4.0 meters [30 pts]
☐ > 3.0 – 4.0 m [25 pts]
☐ > 1.5 m – 3.0 m [20 pts]
☐ > 1.0 m – 1.5 m [15 pts]
☐ < 1.0 m [5 pts]

COMMENTS ____ AVERAGE BANKFULL WIDTH (meters): 0.75-1m

Bankfull Width Max = 30: 5

This information must also be completed

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

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

COMMENTS

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

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

COMMENTS

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

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

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: Gallia Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____pH (S.U.)_____ Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____Voucher? (Y/N)_____Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW ➡

Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) : 53

SITE NAME/LOCATION AEP Gavin Site
SITE NUMBER 514 RIVER BASIN ____ DRAINAGE AREA (MI²)
LENGTH OF STREAM REACH (ft)____ LAT.____ LONG.____ RIVER CODE____ RIVER MILE
DATE 17 Jul 2010 SCORER TCW COMMENTS upstream of w24

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 [X] 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
[ ] [ ] BLDR SLABS [16 pts]		[ ] [ ] SILT [5 pts]	10
[ ] [ ] BOULDER (256 mm) [16 pts]		[ ] [ ] LEAF PACK/WOODY DEBRIS [3 pts]	15
[ ] [ ] BEDROCK [16 pts]		[ ] [ ] FINE DETRITUS [3 pts]	
[ ] [ ] COBBLE (65–256 mm) [12 pts]		[ ] [ ] CLAY or HARDPAN [0 pts]	
[ ] [ ] GRAVEL (2–64 mm) [9 pts]	10	[ ] [ ] MUCK [0 pts]	
[ ] [ ] SAND (2 mm) [6 pts]	65	[ ] [ ] ARTIFICIAL [3 pts]	
Total of Percentages of Bldr Slabs, Boulder, cobble, Bedrock	(A)		(B)

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 9 TOTAL NUMBER OF SUBSTRATE TYPES: 4

HHEI Metric Points — Substrate 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 reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

[ ] [ ] [ ] > 30 centimeters [20 pts]
[ ] [ ] [X] 22.5 – 30 cm [30 pts]
[ ] [ ] [ ] > 10 – 22.5 cm [25 pts]
[ ] [ ] [ ] > 5 cm – 10 cm [15 pts]
[ ] [ ] [ ] ≤ 5 cm [5 pts]
[ ] [ ] [ ] NO WATER OR MOIST CHANNEL [0 pts]

COMMENTS____ MAXIMUM POOL DEPTH (centimeters): 11cm

Pool Depth Max = 30: 25

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

[ ] [ ] [ ] > 4.0 meters [30 pts]
[ ] [ ] [ ] 3.0 – 4.0 m [25 pts]
[ ] [ ] [ ] 1.5 m – 3.0 m [20 pts]
[ ] [X] [ ] > 1.0 m – 1.5 m [15 pts]
[ ] [ ] [ ] < 1.0 m [5 pts]

COMMENTS____ AVERAGE BANKFULL WIDTH (meters): 1.5m

Bankfull Width Max = 30: 15

This information must also be completed

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

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

COMMENTS

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):
[X] Stream Flowing
[ ] Subsurface flow with isolated pools (Interstitial)
[ ] Moist Channel, isolated pools, no flow (Intermittent)
[ ] Dry channel, no water (Ephemeral)

COMMENTS

SINUOSITY (Number of bends per 61m (200 ft) of channel (Check *ONLY* one box):
[ ] None [ ] 1.0 [ ] 2.0 [ ] 3.0
[ ] 0.5 [ ] 1.5 [X] 2.5 [ ] > 3

STREAM GRADIENT ESTIMATE
[ ] Flat (0.5 ft/100 ft) [ ] Flat to Moderate [X] Moderate (2 ft/100 ft) [ ] 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: Addison NRCS Soil Map Page:_____ NRCS Soil Map Stream Order_____

County: GALLIA Township / City:_____

MISCELLANEOUS

Base Flow Conditions (Y/N):_____ Date of last precipitation:_____ Quantity:_____

Photograph Information:_____

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

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

Field Measures: Temp (°C)_____ Dissolved Oxygen (mg/l)_____ pH (S.U.) 2.9 Conductivity (umhos/cm)_____

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

Additional comments/description of pollution impacts:_____

BIOTIC EVALUATION

Performed? (Y/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)_____ Voucher? (Y/N)_____ Salamanders Observed? (Y/N)U_____ Voucher? (Y/N)_____
Frogs or Tadpoles Observed? (Y/N)_____ Voucher? (Y/N)_____ Aquatic Macroinvertebrates Observed? (Y/N)_____ Voucher? (Y/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 streams location

FLOW

American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373
casvoboda@aep.com

November 27, 2012

Ms. Susan Fields
Department of the Army
Huntington District Corps of Engineers
502 Eighth Street
Huntington, WV 25701-2070

Reference: Gavin FGD Landfill Expansion
404 Permit Application Revised Sections

Dear Susan:

Enclosed in this submittal are revisions to the Gavin Landfill 404 Permit Application resulting from delineation of the additional areas of disturbance along Stream 13 and Wetland Area 23. Since all the additional wetland areas were along Stream 13, I labeled all the additional areas as Wetland 23. The additional areas are shown on Figure 3 and the 8 letter size sheets of the plan were also updated. I updated the impact tables and the mitigation plan and the alternative analysis.

If you have any questions or need additional information in order to post the public notice, please contact me at (614) 716-1264.

Sincerely,

Christina Svoboda
Environmental Specialist

Enclosures

August 12, 2013

Ms. Christina Svoboda
American Electric Power
1 Riverside Plaza
Columbus, Ohio 43215-2373

Re: Revised Preliminary Wetlands and Stream Determination at the Alternative Landfill Site for the Gavin Power Plant in Gallia County, Ohio

Dear Ms. Svoboda:

On July 17, 2010, Dr. Timothy Walters and John Kusnier, both of The Mannik & Smith Group, Inc. (MSG) conducted a preliminary wetlands and stream determination at the alternative landfill site for the Gavin Power Plant in Gallia County, Ohio. The purpose of this study was to determine the extent to which potential wetlands and regulated stream channels exist on the site. Prior to conducting the site visit, Dr. Walters and Mr. Kusnier reviewed an aerial photograph (Figure 1) and USGS 7.5 minute topographic map (Figure 2) of the alternative landfill area. The USGS topographic map revealed the presence of four mapped stream channels that joined the roadside ditches that run through the approximate center of the site. The four streams (Streams 1-4 on Figure 1) were checked in the field for potential Class 3 Headwater Habitat status. None of these streams had attributes that would classify them as high quality streams. Streams 2 (1,406 lineal feet) and 4 (476 lineal feet) were dry at the time of survey and are presumed to be ephemeral. Stream 1 (2,580 lineal feet) was inspected from the road up to the first beaver impounded wetland. This stream, which has been mapped with several additional impoundments further upstream, is affected by acid mine drainage, as exhibited by a pH of 4.6 below the lowest beaver dam and a pH of 3.9 above the dam. Stream 3 (2,905 lineal feet) had a pH of 6.0, but no macroinvertebrates or salamanders were found. This stream is 1 to 1.5 meters wide and up to 10 cm deep. Flow in Stream 3 also appears to be ephemeral. The only other mapped waterways within the area of interest are the deep roadside ditches cut along both sides of the road that runs through the area. If these are found to be jurisdictional, they are low quality drainages.

The aerial map of the site also revealed the presence of several areas on the site that may contain wetlands. Figure 1 shows areas that were previously mapped as wetlands or ponds, as well as other areas that, based on our review of the aerial photography and USGS topographic map, may contain wetlands. Six areas, totaling approximately 1.4 acres), were previously shown as wetlands on the mapping. Another seven areas, totaling approximately 2.4 acres, are also shown on the figure. Possible wetlands were areas observed on the aerial photo as darkened or depressions on the map. Based on our experience at the primary Gavin site, areas like these have a high probability of containing the necessary criteria to be considered wetlands. The potential wetlands presented in Figure 1 were not field verified and should not be considered a comprehensive listing of all wetlands that may be present on the property.

Also, based on field observations at this site and experience at the primary site, there is a very low probably of threatened or endangered plant species at the alternative site.

In summary, the preliminary wetland and stream determination conducted by MSG at the alternative landfill site contained a total of 7,367 lineal feet of potentially regulated stream channel and 13 potential wetland areas totaling 3.8 acres. If you have any questions or comments concerning this study, please do not hesitate to contact me at (419) 891-2222.

Sincerely,

Keith Carr

Ct: Dean M. Niese, P.E., The Mannik & Smith Group, Inc.

Attachments

FIGURES

24 February 2012

Christina Svoboda
American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373
(614)716-1264
casvoboda@aep.com

Re: *VIBI Report* – Gavin Generating Facility, Gallia County, Ohio

Dear Ms. Svoboda:

Two copies of the VIBI report for the above referenced site are enclosed: one bound and one unbound to facilitate copying, if necessary. Please review and notify me of any comments or corrections you may require. If there are no changes, please consider the report a final copy.

If you have any questions or would like more information, please contact me by phone at (419) 367-1422, or email me at twalters@enviroscienceinc.com. If I am unavailable, Michael Liptak at (330) 688-0111 can also assist you. Thank you for this opportunity to be of service.

Respectfully,

Timothy L. Walters Ph.D.
Senior Ecologist

enc: VIBI Report (2)

VIBI DETERMINATION OF SEVEN WETLANDS

GAVIN GENERATING FACILITY
CHESHIRE, GALLIA COUNTY, OHIO

Project # 342-4122

Presented to:

American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373

Prepared by:

EnviroScience, Inc., 3781 Darrow Road, Stow OH 44224
Toll-Free (800) 940-4025 Phone: (330) 688-0111 Fax: (330) 688-3858
www.enviroscienceinc.com

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24 February 2012

STATEMENT OF CERTIFICATION

The analyses, opinions and conclusions in this report are based entirely on EnviroScience's unbiased, professional judgment. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study. Neither EnviroScience nor any EnviroScience employee has any vested interest in the property examined in this study.

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EXECUTIVE SUMMARY

EnviroScience, Inc. performed a Vegetative Index of Biotic Integrity (VIBI) assessment in August 2011 for American Electric Power (AEP) on seven emergent wetlands at the Gavin Generating Facility, Cheshire, Gallia County, Ohio. The objective of this study was to use a second method to confirm the quality and category of these seven wetlands.

After the quantitative ORAM assessment of the wetlands (Wetlands 6, 7, 24, 25, 26, 27 and 28), each of the wetlands would have been either Category 1 or within the gray zone between Category 1 and 2. Because of the presence of a state threatened species (*Juncus diffusissimus*), and in accordance with the narrative portion of the ORAM, each of these wetlands were elevated to Category 3 status. VIBIs were conducted on each of these seven wetlands. These wetlands received VIBI scores that equated to low quality Category 1 and low Modified Category 2 wetlands. Therefore the VIBI scores had a strong correlation with the quantitative ORAM scores (inverse of the narrative portion of the ORAM).

The state threatened *Juncus diffusissimus* (diffuse rush) is an early successional, colonizing species of recently disturbed sandy to silty substrates. Typically it grows in lower quality wetlands that have a destructive disturbance regime. It is at the northern extent of the range in Ohio and has been documented to have recently extended its range northward into several states. Three of these states consider the rush non-native while one state considers this recent range extension as native. Many of the recent records of *Juncus diffusissimus* in Ohio are ruderal areas recently or artificially created by mechanical traffic (i.e. ATV, truck) and were found in wetland areas at the bottom of quarries or ATV tracks. In the case of Gallia County populations, the populations are in historic strip mine created wetlands next to an active landfill. Many of these wetlands are still influenced by large truck traffic. This has raised questions to the nativeness of this species as a whole in Ohio and also if any of these new populations in ruderal habitats should be given the same protection under ORAM.

1.0 INTRODUCTION AND SITE DESCRIPTION

EnviroScience, Inc. (ES) performed seven Vegetative Index of Biotic Integrity (VIBI) plots at the Gavin Generating Facility, Cheshire, Gallia County, Ohio for American Electric Power from August 29 through 31, 2011 according to the methods outlined in OEPA's *Integrated Wetland Assessment Program. Part 9: Field Manual for the Vegetation Index of Biotic Integrity for Wetlands v. 1.4.* The objective of this study was to use a second method to confirm the quality and category of these seven wetlands.

From July 12 through 16, 2010, a wetlands delineation and stream evaluation was performed on 406 acres on the above property. A total of 28 wetlands were identified using the 1987 *Corps of Engineers wetlands delineation manual* and evaluated using Ohio EPA's Ohio Rapid Assessment Method (ORAM), version 5.0.

2.0 METHODS

The seven VIBI plots were performed in seven different previously delineated wetlands (Wetlands 6, 7, 24, 25, 26, 27 and 28) at the generating facility. When possible, the standard fixed plot sampling design was performed (Mack, 2007), consisting of 10 modules in a 20m X 50m layout. Due to the size and shape of some of the wetlands, this design was modified as per the manual to best fit each of the wetlands.

Since this secondary analysis was necessary due to the presence of the state threatened plant (*Juncus diffusissimus*) in these wetlands, the VIBI plots were placed to include this plant within the sampling grid. This allowed for a direct comparison between the previously conducted ORAM and the follow-up VIBI. Also, since only the VIBI score is required, soil and water analysis was not conducted. Datasheets that included plot information, field data collection and biomass calculations are included (Appendix A). The VIBI scores were calculated using the automated program provided by the Ohio EPA. All of the wetlands were calculated using index for emergent, non-coastal wetland community. The wetland community and type of VIBI configuration is summarized below. Digital images of each wetland were taken of each wetland and are included in Appendix B.

2.1 ORAM Categorization

ES characterized the quality of the wetland using the VIBI and compared it to the original Ohio Rapid Assessment Method (ORAM), version 5.0.

Ohio EPA has established three primary and three intermediate categories of wetland quality which are based on a wetland's size, its hydrologic function, the types of plant communities present, the physical structure of the wetland plant community and the wetland's level of disturbance (OAC 3745-1-54). The relationship between the various wetland categories and their respective ORAM scores is presented in Table 2. ES also evaluated the project area for the presence of state threatened and endangered species as part of the ORAM evaluation.

Table 1: Ohio Rapid Assessment Categories

Category Number	Range of ORAM Scores	VIBI Scores*
Category 1	0–29.9	0-29
Category 1 or 2 (Gray Zone)	30–34.9	
Modified Category 2	35–44.9	30-59
Category 2	45–59.9	60-75
Category 2 or 3	60–64.9	
Category 3	65–100	76-100

*for Depressions for all HGM wet meadows in all ecoregions

Category 3 wetlands have the highest quality, and are generally characterized by a high level of biological diversity and topographical variation, large numbers of native species, or a high level of functional importance to its surroundings. Category 2 wetlands have the capability to support a moderate wildlife community or maintain mid-level hydrological functions. Category 2 also includes wetlands that may be of lower quality or degraded but have reasonable potential to be restored (Modified Category 2). Category 1 wetlands are of the lowest quality, and are generally characterized by hydrological isolation, lack of plant species diversity, insufficient habitat availability, and limited potential to perform major wetland functions (OAC 3745-1-54).

2.2 VIBI Categorization

The Vegetation IBI is a multi-metric index comprised of 10 metrics that includes the weighted richness of species (FQAI) along with nine other metrics. Each of the 10 metrics can receive a score of 0. 3, 7 or 10 based on the value of the calculated metric. The maximum VIBI score is 100 and a minimum score of 0 (Table 1). For this survey, since all of the wetlands were emergent, the VIBI-EMERGENT was used.

For the VIBI-EMERGENT, the following metrics are calculated for the score.

- **Carex metric:** number of species (species richness) of the genus *Carex*
- **Dicot metric:** native, dicotyledon species richness
- **Shrub metric:** native, wetland (FACW or OBL), shrub richness.

  The wetland indicator status of each dominant species is listed as determined by Reed (1997) and adapted by Mack *et al.* (2004). The wetland indicator status reflects the likelihood of a species occurring in a wetland versus non-wetland habitat. The various indicator status designations are explained in greater detail in Table 2.

Table 2: Definitions of Wetland Indicator Status Designations

Indicator Status	Symbol	Definition
Obligate Wetland Species	OBL	Almost always (estimated probability > 99%) occurs in wetlands
Facultative Wetland Species	FACW	Usually (estimated probability 67% – 99%) occurs in wetlands
Facultative Species	FAC	Equally likely to occur in wetlands and non-wetlands (estimated probability 34% – 66%)
Facultative Upland Species	FACU	Usually occurs in non-wetlands (estimated probability 67% – 99%)
Obligate Upland Species	UPL	Almost always (estimated probability > 99%) occurs in non-wetlands

- **Hydrophyte metric:** number of native wetland (FACW or OBL) species
- **Annual/Perennial metric:** the ratio of annual (AN) species to perennial (PE) species (Annual/ Perennial) according to Mack, 2004

- **FQAI metric:** The FQAI (see above) for only the 50x20 sampling area.
- **% tolerant metric:** the sum of the relative cover values of all species, including adventive species with a Coefficient of Conservation (COC) value of 0, 1, or 2.
- **% sensitive metric:** the sum of the relative cover values of all species, with a COC value of 6, 7, 8, 9, or 10 (according to Andreas et al., 2004).
- **% invasive graminoid metric:** the sum of the relative cover of reed canary grass (*Phalaris arundinacea*), cattails (*Typha angustifolia, T. latifolia T x glauca*) and giant reed (*Phragmites australis*).
- **Biomass**: The biomass metric is calculated by averaging the grams per square meter of standing biomass samples collected within the VIBI plot. In a standard plot, two 0.1 square meter clip plots of standing biomass (vegetation) are collected in the corners of each intensive module.

3.0 RESULTS

Seven VIBI plots were established in each of seven wetlands that were initially given Category 3 ratings solely based on the presence of a state-threatened species. Each of these wetlands would have had a Category 1 rating if it were not for the rare species.

Table 3: Summary of VIBI Metrics

Site	6		7		24		25		26		27		28	
Date	29-Aug-2011		29-Aug-2011		30-Aug-2011		30-Aug-2011		29-Aug-2011		29-Aug-2011		31-Aug-2011	
	value	VIBI-E	value	VIBI-E	value	VIBI-E	value	VIBI-E	value	VIBI-E	value	VIBI-E	value	VIBI-E
Carex	2	3	3	3	2	3	0	0	0	0	0	0	2	3
Cyperaceae	7	n/a	7	n/a	7	n/a	1	n/a	3	n/a	1	n/a	6	n/a
dicot	23	7	14	3	26	10	6	0	14	3	10	0	8	0
shade	4	n/a	1	n/a	6	n/a	2	n/a	3	n/a	2	n/a	0	n/a
shrub	2	3	2	3	3	7	1	0	2	3	2	3	1	0
hydrophyte	26	7	20	3	26	7	7	0	11	3	12	3	15	3
SVP	1	n/a	1	n/a	1	n/a	1	n/a	2	n/a	0	n/a	0	n/a
A/P ratio	0.4583	3	0.0909	10	0.2500	7	0.4000	3	0.4118	3	0.3636	3	0.26667	7
FQAI	15.3	7	12.2	3	19.2	7	13.0	3	13.3	3	12.5	3	10.8186	3
%bryophyte	0.0091	n/a	0.0070	n/a	0.0492	n/a	0.2165	n/a	0.0193	n/a	0.0432	n/a	0	n/a
%hydrophyte	0.0013	n/a	0.0000	n/a	0.0035	n/a	0.0000	n/a	0.0000	n/a	0.0185	n/a	0	n/a
%sensitive	0.1098	7	0.0130	0	0.0837	3	0.1861	10	0.0376	3	0.0618	3	0.01645	0
%tolerant	0.7972	0	0.5214	3	0.5237	3	0.5152	3	0.7393	0	0.6789	0	0.78181	0
%invasive graminoids	0.5684	0	0.2667	3	0.0423	7	0.0000	10	0.0000	10	0.4629	0	0.56904	0
small tree	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0	n/a
subcanopy IV	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0	n/a
canopy IV	0.0000	n/a	0.1833	n/a	0.1121	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.09444	n/a
biomass	2403	0	818	0	483	3	1065	0	415	7	390	7	1768	0
stems/ha wetland trees	0	n/a	170	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a
stems/ha wetland shrubs	0	n/a	370	n/a	490	n/a	0	n/a	120	n/a	0	n/a	160	n/a

Table 3: Summary of VIBI Metrics

%unvegetated	0.1731	n/a	0.2885	n/a	0.1415	n/a	0.4656	n/a	0.1577	n/a	0.1584	n/a	0.23662	n/a
%buttonbush	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0.0000	n/a	0	n/a
%perennial native hydrophytes	0.2956	n/a	0.2848	n/a	0.4133	n/a	0.5974	n/a	0.2200	n/a	0.3087	n/a	0.3125	n/a
%adventives	0.6507	n/a	0.2966	n/a	0.2666	n/a	0.0130	n/a	0.5966	n/a	0.5555	n/a	0.61731	n/a
%open water	0.035	n/a	0.000	n/a	0.000	n/a	0.055	n/a	0.000	n/a	0.000	n/a	0.055	n/a
%unvegetated open water	0.000	n/a	0.000	n/a	0.000	n/a	0.055	n/a	0.000	n/a	0.000	n/a	0.075	n/a
%bare ground	0.075	n/a	1.150	n/a	0.100	n/a	0.700	n/a	0.000	n/a	0.035	n/a	0.225	n/a
SCORE	**37**		**31**		**57**		**29**		**35**		**22**		**16**	

4.1 WETLANDS

Seven wetlands initially delineated and characterized using ORAM in July 2010 were evaluated using VIBI in August 2011. These wetlands were all emergent wetlands found on historically strip mined areas (Table 4). Each of these wetlands are discussed below in detail.

Table 4: Summary of Wetlands

Wetland Number	Delineated acreage	Wetland Type	ORAM* Including Metric 5 of ORAM	Category without counting Metric 5 of ORAM*	VIBI Score	Wetland Category (VIBI)
6	0.92	PEM	35.5 (Mod 2)	1 (25.5)	37	Mod 2
7	0.83	PEM/PSS	37 (Mod 2)	1 (27)	31	Mod 2
24	1.06	PEM/PSS	40 (Mod 2)	1/2 (30)	57	Mod 2
25	0.21	PEM	40 (Mod 2)	1/2 (30)	29	1
26	0.18	PEM	37.5 (Mod 2)	1 (27.5)	35	Mod 2
27	0.02	PEM	32 (Mod 2)	1 (22)	22	1
28	0.52	PEM	37 (Mod 2)	1 (27)	16	1
Total	3.74					

*Each wetland would be elevated to Category 3 status based on the presence of a state-threatened plant.

Wetland 6

Wetland 6 is a 0.92-acre cat-tail dominated emergent wetland. This wetland (Photo page 1) is an excavated detention type wetland with a distinct outflow. Culverts connect this wetland to Wetlands 7 and 28. Two test pits excavated in the wetland and revealed hydric soils. The soil profile had a six to seven-inch layer of dark grayish brown (10YR 4/2) clay with brown (7.5YR), dark yellowish brown (10YR 4/4) and yellowish red (5YR 4/6) mottles underlain by at least ten inches of dark gray (10YR 4/1) clay with brown (7.5YR 4/4), dark yellowish brown (10YR 4/4) and yellowish red (5YR 4/6) mottles.

Positive indicators of wetland hydrology for one or both of the sample plots included surface inundation, soil saturation, drainage patterns, water-stained leaves, oxidized roots channels and a positive FAC-neutral test. Dominant vegetation consisted of narrow-leaved cattail (*Typha angustifolia:* OBL), sedge (*Carex lurida:* OBL), Spanish needles, rushes (*Juncus effusus:* FACW+ and *J. articulatus:* OBL) and redtop grass (*Agrostis gigantea*: FACW). While a shrubby (SP17) portion of the Wetland 6 was dominated by netted chain fern (*Woodwardia aereolata:*

FACW+), wool-grass (FACW+), sweet gum (*Liquidamber stryciflua:* FAC), red maple (FAC), common blackberry (*Rubus alleghaniensis:* FACU) and steeplebush (FACW).

Due their relative vicinity, size (all under an acre) and similar hydrological connection, Wetlands 6, 7 and 28 were calculated independently and together using ORAM. Even through the wetlands look to be constructed independently and no road split an existing wetland, these detention wetlands are connected through culverts under the existing road. These wetlands do not exhibit the typical "patchwork on the landscape" that these would qualify for combining. Regardless, these wetlands are similar in score if they are combined or separated. Due the presence of highly disturbed substrate due to excavation, low quality emergent dominant community with the presence of the invasive *Typha angustifolia* and the presence of the state threatened *Juncus diffusissimus,* all of the wetlands/wetland complex fall into the same category. Wetlands 6 (ORAM=35.5), 7 (ORAM=37) and 28 (ORAM=37) and the combined complex (ORAM=39.5) all fall into the modified Category 2 category and all would have been elevated to Category 3 due to the rare species.

A typical 5x2 VIBI plot was placed into Wetland 6. The VIBI sampling grid was placed through the patch of *Juncus diffusissimus* that was found within the wetland. The score was a 37 (Tables 3 and 4). This correlates to a Modified Category 2 wetland. This is a similar evaluation score to the ORAM prior to the automatic elevation due to the presence of the state threatened species that would have automatically raised these wetlands to a Category 3 status. If the *Juncus* had no status in Ohio, and thus would not bring the ten extra points in Metric 5 and the automatic categorization, all of these wetlands (6, 7 and 28) would be Category 1 wetlands. These same wetlands would be either a modified Category 2 (Wetlands 6 and 7) or a Category 1 Wetland (Wetland 28) using VIBI.

Wetland 7

Wetland 7 is a 0.83 acre emergent/shrub scrub wetland with areas of exposed mudflat (Photo page 1). The wetland flows out through a culvert to Wetland 6. A test pit that was excavated in the wetland revealed a six-inch layer of very dark gray (10YR 3/2) clay with yellowish red (10YR 5/6) mottles, underlain by at least six inches of very dark gray (10YR 3/2) clay with strong brown (7.5YR 4/6), dark brown (10YR 3/3) and black (10YR 2/1) mottles.

Positive indicators of wetland hydrology included soil saturation, water-stained leaves, oxidized roots channels and a positive FAC-neutral test. Dominant herbaceous vegetation consisted of common rush (*Juncus effusus:* FACW+), diffuse rush and round-leaved thoroughwort (*Eupatorium rotundifolium*: FAC-). Dominant shrubs and trees included steeplebush (FACW), pussy willow (*Salix discolor*: OBL), black willow (*Salix nigra:* OBL) and sycamore (*Platanus occidentalis:* FACW-).

The ORAM for this wetland was discussed in Wetland 6 (Tables 3 and 4). A typical 2x5 VIBI plot was used to evaluate Wetland 7. The VIBI sampling grid was placed through the patch of *Juncus diffusissimus* that was found within the wetland. Wetland 7 scored a 31 using the VIBI evaluation. Similar to Wetland 6, this scores a Modified Category 2.

Wetland 24

Wetland 24 is a 1.06-acre emergent wetland. The wetland (Photo page 2) is comprised of a shallow, wide ditch full on perennial vegetation and sandy clay flat with more sparse, short-statured species. A soil test pit excavated in the wetland and revealed a three-inch layer of dark grayish brown (10YR 4/2) sandy clay loam with yellowish red (5YR 4/6) and yellowish brown (10YR 5/4) mottles. This was underlain by at least nine inches of dark gray (10YR 4/1) sandy clay loam with dark yellowish brown (10YR 4/4 and 10YR 4/6) and black (10YR 2/1) mottles.

Positive indicators of wetland hydrology that occurred at one or both of the plots included surface inundation, soil saturation, drainage patterns, oxidized root channels, water-stained leaves and a positive FAC-neutral test. Dominant vegetation of the inundated ditch/marsh (SP61) consisted of broad-leaved cat-tail (OBL), common rush (FACW+), sedge (*Carex lurida:* OBL), and wool-grass (FACW+). SP62 was much more diverse and was dominated by diffuse rush, hybrid cat-tail (*Typha* x *glauca:* OBL), common rush (FACW+), wool-grass (FACW+), sandbar willow (*Salix exigua:* OBL), steeplebush and sedge (*Carex lurida:* OBL).

The ORAM score for this wetland was calculated to be a 40, which correlates to a modified Category 2 wetland. Due to the presence of the state threatened species, *Juncus diffusissimus*, this would automatically raise this wetland to Category 3 status. If the *Juncus* had no status in Ohio, and thus would not bring the ten extra points of Metric 5 and the automatic categorization the wetland would have an ORAM score of 30 and fall into the gray zone between a Category 1 and 2 wetland. Gray-

zone wetland would be considered Category 2 wetlands unless another index shows a different category. The early successional nature of the wetland with its saturated conditions provides prime conditions for the growth of rushes. This wetland is larger than most of the other wetlands and thus bump this into the next higher category.

Due to the linear nature of the wetland; a 1x7 VIBI plot configuration was needed. Due to patches of cottonwoods trees that were present along the edge of the wetland, the plot could not be expanded without leaving the emergent nature of the plot and adhering the rules for the use of the VIBI sampling grid. The VIBI score for this wetland was a 57. This correlates to a Modified Category 2 wetland. Thus both the ORAM (without considering the *Juncus*) and the VIBI would both give this wetland a Modified Category 2 rating.

Wetland 25

Wetland 25 is a 0.21-acre emergent seep. The wetland (Photo page 3) flows out of the hillside and onto a shallow bedrock shelf with a thin layer of soil. This is another acidified wetland with a measure pH of 2.9. A test pit (SP63) that was excavated in the wetland revealed a six-inch layer of dark grayish brown (10YR 4/2) sand with yellowish brown (10YR 5/6) and black (10YR 2/1) mottles underlain by bedrock

Positive indicators of wetland hydrology included surface inundation, soil saturation, oxidized root channels, water-stained leaves and a positive FAC-neutral test. Dominant vegetation consisted of common rush (FACW+), wool-grass (FACW+), steeplebush (FACW) and white snakeroot (*Eupatorium rugosum*: UPL). The ORAM score for this wetland was calculated to be a 37.5, which correlates to a modified Category 2 wetland. Due to the presence of the state threatened species, *Juncus diffusissimus*, this would automatically raise this wetland to Category 3 status. As stated before in other wetland cases, Wetland 25 would be a Category 1 wetland if it were not for the presence of the rare rush.

Due to the small size of the wetland, the entire wetland was sampled using a 1x2 sampling grid. Both of these modules were intense modules. The VIBI score for this wetland was a 29 which correlates to a Category 1 wetland. This categorization is the same category given to the wetland when using the ORAM.

Wetland 26

Wetland 26 is a 0.18-acre emergent wetland. The wetland (Photo page 4) A test pit (SP67) that was excavated in the wetland revealed a four-inch layer of dark grayish brown (10YR 4/2) sand with dark yellowish brown (10YR 4/6) mottles underlain by eight inches of yellowish brown (10YR 5/4) sand with very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 4/6) mottles.

Positive indicators of wetland hydrology included oxidized root channels and a positive FAC-neutral test. Dominant vegetation consisted of sand bar willow (OBL), smooth scouring-rush (*Equisetum laevigatum:* FACW), common rush (FACW), bulrush (*Scirpus lineatus:* OBL), steeplebush (FACW) and Korean bush-clover (*Lespedeza stipulacea*: FACU). The ORAM score for this wetland was calculated to be a 37.5, which correlates to a modified Category 2 wetland. This wetland would be a Category 1 wetland if it were not for the presence of the *Juncus*.

Due to the shape and size of the wetland, a 4x1 sampling grid was used. All of the modules sampled were intensive modules. The modules were placed across the area that had contained the *Juncus diffusissimus.* No *Juncus diffusissimus* was found at the time of survey anywhere within the wetland. The area that previously contained the rush had a much denser vegetative cover than the year before. This lack of bare soil and increase in vegetative cover likely eliminated the *Juncus* from the wetland. The VIBI score was a 35 which correlates to a low modified Category 2 wetland. This is slightly higher than the quantitative ORAM categorization.

Wetland 27

Wetland 27 is a 0.02 acre, partially vegetated, emergent depression wetland located on an elevated terrace. The wetland (Photo page 4) has no inflow or outflows. A test pit (SP69) that was excavated in the wetland revealed at least twelve inches of grayish brown (10YR 5/2) silty loam with dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) mottles.

Positive indicators of wetland hydrology included drainage patterns, water-stained leaves and a positive FAC-neutral test. Dominant vegetation consisted of narrow-leaved cat-tail (OBL), wool-grass (FACW+), Spanish needles (FACU), black willow (*Salix nigra:* OBL), sweet gum (*Liquidamber stryraciflua:* FAC), red maple (FAC) and arrow-leaved tearthumb (*Polygonum sagittatum*: OBL). The ORAM score for this wetland was

calculated to be a 37.5, which correlates to a modified Category 2 wetland, but would be elevated to Category 3 status due to the state threatened species. This wetland would be a Category 1 wetland if it were not for the presence of the *Juncus*.

Due to the very small size of this wetland, only a 1x1 sampling grid could be used. This allowed the entire wetland to be intensively measured as 1 module. The VIBI score for this wetland was a 22, which correlates to a Category 1 wetland. This correlates well with the quantitative ORAM score.

Wetland 28

Wetland 28 is a 0.52-acre cat-tail marsh, detention area. This highly disturbed wetland (Photo page 5) is a result of partial excavation that created a depression and allows for a seasonal flow through a culvert to Wetland 7. A test pit was excavated in the wetland revealed a two-inch layer of black (10YR 2/1) saturated organic layer underlain by a layer of gravel. This layer of gravel was thick enough that the sampling was stopped. The black organic layer along was enough evidence to establish the site has hydric conditions.

Positive indicators of wetland hydrology included soil saturation, water marks, sediment deposits, water-stained leaves and a positive FAC-neutral test. Dominant vegetation consisted of jointed rush (*Juncus articulatus:* OBL), wool-grass (FACW+), narrow-leaved cat-tail (OBL), common rush (FACW+) and Frank's sedge (*Carex frankii*: OBL). The ORAM for this wetland was discussed in Wetland 6. The score of this wetland would be Category 1 if there was no presence of a state threatened species.

Due to the shape and size of the wetland a 2x4 sampling grid was used for the VIBI with 4 intensive modules. Due to the small upland peninsula that entered into the sampling grid, one module was eliminated from consideration. Thus four intensive and 3 non-intensive modules were used. The sampling grid did include the population of *Juncus diffusissimus* that still remained within the wetland.

5.0 DISCUSSION

The six of the seven wetlands were found to still have populations of the state threatened diffuse rush (*Juncus diffusissimus*). The rush was not relocated in

Wetland 26. This *Juncus* is typical to other rush species in that it is an early successional, colonizing species of recently disturbed sandy to silty substrates. Typically it grows in lower quality wetlands that have a destructive disturbance regime. Within this study site, it has been found in several very low quality wetlands that have similar characteristics such as: occasional (yearly) soil disturbance, sandy to occasionally sandy silt substrate, areas of unvegetated saturated soil and a prevalence of early successional species. All of the wetlands where this species was found were influenced by acid mine drainage (lower pH). This species has not been shown to have a pH preference in other populations within its range. Therefore this is most likely a convergent attribute that the rush can tolerate a lower pH and this acidic condition will maintain a lower vegetated density and the open areas of saturated soil that the rush requires.

The VIBI results support the initial results provided by the ORAM quantitative rating categorization of the wetland. Both of these IBI's score the wetlands as either Category 1 or low quality (Modified) Category 2 wetlands. Only the presence of this early successional rush would elevate these wetlands to Category 3 status.

Ohio is at the northern extent of the historic range of the rush. Lamont and Young (2005) have documented the recent northern spread of *Juncus diffusissimus*. In some of these states at the northern edge of its range, Natureserve indicates that the species is considered a non-native waif (Maryland, Pennsylvania and Delaware) while New York has considered it a native rare species. This has been a recent introduction to New York where it was first discovered in 2004.

Many of the recent records of *Juncus diffusissimus* in Ohio are ruderal areas recently or artificially created by mechanical traffic (i.e. ATV, truck) and were found in wetland areas at the bottom of quarries or ATV tracks. In the case of Gallia County populations, the populations are in historic strip mine created wetlands next to an active landfill. Many of these wetlands are still disturbed by large truck traffic. This has raised questions to the nativeness of this species as a whole in Ohio and also if any of these new populations in ruderal habitats should be considered natural populations and counted as state threatened.

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Appendix A: VIBI Datasheets

OhioEPA

Site	date	species	voucher #	notes/comments	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #	mod #	corner #
					10	2	10	4	9	2	9	4	8	2	8	4	7	2	7	4	R	R
					depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode	depth	covcode
Wetland 6	29-Aug-11	%open water			1	4			1				1				1					
		%unvegetated open water			1	0			1				1				1					
		%bare ground			1	5			1				1				1					
		%litter cover			1	4			1				1				1					
		Typha angustifolia			4		4	9	4		3	8	4		2	5	4		4	8	R	
		Spiraea tomentosa			3			4							4	3			4	4	R	
		Juncus effusus			3		3	5	3		4	5					3		3	5	R	
		Juncus diffusissimus			4		4	5			4	5			3	6			3	5	R	
		Liquidambar styraciflua			2			1					2			1					R	
		Acer saccharinum			2			1													R	
		Erechtites hieracifolia			2		4	2	3			3									R	
		Bidens aristosa			2		3	2			2	4									R	
		Microstegium vimineum			2		3	3	3			5			2	5			1	4	R	
		Polygonum hydropiperoides			2			3													R	
		Parthenocissus quinquefolia					1	1													R	
		Setaria glauca					2	2					2			2					R	
		Eleocharis acicularis					1	4													R	
		Eleocharis obtusa					1	1													R	
		Lespedeza stipulacea					1	4			1	3									R	
		Eupatorium perfoliatum					1	3			2	2									R	
		Hypericum mutilum					3	1			3	3	2			2					R	
		Carex lurida					2	4					2			3					R	
		Eupatorium maculatum					2	1													R	
		Solidago rugosa					2	1													R	
		Juncus articulatus					2	2			1	1									R	
		Conyza canadensis					2	1													R	
		Ambrosia artemisiifolia					1	3													R	
		Cyperus strigosus					1	2			1	2									R	
		Onoclea sensibilis					1	3													R	
		Agrostis gigantea					1	1													R	
		Agrostis stolonifera					1	2			2	3									R	
		Strophostyles helvula					1	4			1	2	2		2	3					R	
		Euthamia graminifolia					1	2													R	
		moss sp.					1	4													R	
		Eupatorium serotinum									1	2									R	
		Leersia oryzoides							4		2	4									R	
		Bidens frondosa							3		3	3									R	
		Scirpus cyperinus									2	2	4				4		3	6	R	
		Cyperus odoratus									2	1									R	
		Salix exigua									2	3									R	
		Carex vulpinoidea									1	2							3	3	R	
		Platanus occidentalis									1	2									R	
		Asclepias incarnata									1	1			1	2					R	
		Ludwigia alternifolia													1	1			1	1	R	
		Boehmeria cylindrica													1	2					R	
		Lonicera japonica													2	4					R	
		Epilobium coloratum													1	1					R	
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